Idaho

State Wildlife Action Plan

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US Fish and Wildlife Service, Region 1, Office of Migratory Birds & State Programs, Wildlife & Sport Fish Restoration, 911 NE 11th Ave, Portland, OR 97232-4181

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Idaho Department of Fish and Game
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About this Document

This report is the result of a 10-year comprehensive review and revision of the entire Idaho State Wildlife Action Plan in accordance with the 2007 joint US Fish and Wildlife Service–Association of Fish & Wildlife Agencies' guidance for State Wildlife Action Plan review and revisions; distribution is unlimited.

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Executive Summary

In 2000, Congress created the Wildlife Conservation and Restoration Program and State and Tribal Wildlife Grants Program (SWG), which for the first time, provided funding to state fish and wildlife agencies primarily for the conservation and management of nongame species. The funding was distributed to the states with the condition that each state develop a State Wildlife Action Plan—the strategic direction to implementing proactive, nonregulatory, action-based solutions to conserve fish and wildlife. Congress also required that all states commit to reviewing and, if necessary, revising their Wildlife Action Plans within 10 years.

Comprehensive in scope, this 10-year revision of the Idaho State Wildlife Action Plan (SWAP) is a statewide plan for conserving and managing Idaho's diverse fish and wildlife and the habitats they depend on. The plan was developed using input from working groups that consisted of a wide array of Idahoans including sportsmen, conservationists, landowners, and community leaders as well as state and federal agency representatives. Their input helped to outline conservation actions that will ensure a vibrant wildlife resource for future generations.

As per title 36, Idaho Code, we define wildlife as ". . . any form of animal life, native or exotic, generally living in a state of nature . . . ." For the purpose of the SWAP, we only consider native species that regularly occur in Idaho as conservation targets.

Approximately 98% of Idaho's native fish and wildlife species held in public trust by the State of Idaho are not hunted, fished, or trapped and have limited sources of funding. State and Tribal Wildlife Grants funding is critical to sustaining the Idaho Department of Fish and Game's (IDFG) overall Wildlife Diversity Program budget and programs. Idaho currently receives approximately $550,000 annually through this program, and in the last decade since developing the original SWAP in 2005, has received more than $6.5 million dollars of SWG funding. The Idaho SWAP provides strategic guidance on how to invest these funds with an emphasis on preventing future listings under the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; ESA) thus maintaining state-led management authority for wildlife.

In the plan, we provide a summary of what's new in the 2015 revision, a summary of significant changes, a "road map" to help the user find information with respect to each of the 8 required elements, an overview of the methodology used, including the approach and criteria used for selecting species of greatest conservation need (SGCN), checklists of all known vertebrates and invertebrates, a list of SGCN, a species assessment for each SGCN, and 14 ecological section (hereafter section) plans. Each section plan includes an introductory narrative that describes the section; maps of surface management and vegetation; an at-a-glance table of conservation targets; a table of the section's SGCN crosswalked to their associated conservation targets (e.g., habitat, species assemblage); and for each conservation target, a narrative description, its viability, and prioritized threats and strategies. In addition to prioritized threats, we include a section on species designation, planning, and monitoring.

To address the full array of wildlife, we first compiled an updated checklist of all known vertebrate and invertebrate species that have been documented in Idaho using multiple sources, further described in the approach and criteria for selecting SGCN. This resulted in documented occurrence data for >670 vertebrates and 4,198 invertebrates (including nonnatives and transients).

We then assessed the conservation status of species—specifically their extirpation risk in Idaho—using NatureServe's methodology for assigning ranks. Finally, we considered other relevant information in assigning the final rank. The result is a relative rank from 1 to 5 (most to least imperiled) that provides a relative status for the species in Idaho. We used this rank as 1 criterion in a suite of criteria used to derive the revised SGCN list.

In selecting Idaho SGCN, we adhered to the original congressional intent for SWG and SWAPs by focusing on the "most critical needs," by placing priority on those species with the "greatest" conservation need, and by addressing the life needs and habitat requirements of such species to preclude the need to list them as threatened or endangered under the ESA. We interpret this to include species that are experiencing known threats that without intervention are likely to continue to decline or to become increasingly vulnerable. We also include species that lack the information needed to adequately assess their status.

We further prioritized SGCN by subdividing the list into 3 tiers, based on relative conservation priority in Idaho. We consider Tier 1 SGCN to be our highest priority for the SWAP and to represent species with the most critical conservation needs, i.e., an early-warning list of taxa that may be heading toward extirpation. Forty-three species met tier 1 criteria as follows:

- Pacific Lamprey (*Entosphenus tridentatus*)
- White Sturgeon (Kootenai River DPS) (*Acipenser transmontanus*)
- Steelhead (Snake River Basin DPS) (*Oncorhynchus mykiss*)
- Sockeye Salmon (Snake River ESU) (*Oncorhynchus nerka*)
- Chinook Salmon (Snake River fall-run ESU) (*Oncorhynchus tshawytscha*)
- Chinook Salmon (Snake River spring/summer-run ESU) (*Oncorhynchus tshawytscha*)
- Burbot (*Lota lota*)
- Columbia Spotted Frog (Great Basin DPS) (*Rana luteiventris*)
- Greater Sage-Grouse (*Centrocercus urophasianus*)
- Yellow-billed Cuckoo (*Coccyzus americanus*)
- Wolverine (*Gulo gulo*)
- Grizzly Bear (*Ursus arctos*)
- Caribou (*Rangifer tarandus*)
- Northern Idaho Ground Squirrel (*Urocitellus brunneus*)
- Southern Idaho Ground Squirrel (*Urocitellus endemicus*)
- Banbury Springs Limpet (*Lanx* sp. 1)
- Snake River Physa (*Physa natricina*)
- Pixie Pebblesnail (*Fluminicola minutissimus*)
- Bruneau Hot Springsnail (*Pyrgulopsis bruneauensis*)
- Bear Lake Springsnail (*Pyrgulopsis pilsbryana*)
- Bliss Rapids Snail (*Taylorconcha serpenticola*)
- Marbled Jumping-slug (*Hemphillia danielsi*)
- Magnum Mantleslug (*Magnipelta mycophaga*)
- Blue-gray Taildropper (*Prophysaon coeruleum*)
- Papillose Taildropper (*Prophysaon dubium*)

- Rocky Mountain Axetail (*Securicauda hermani*)
- Marbled Disc (*Discus marmorensis*)
- Seven Devils Mountainsnail (*Oreohelix hammeri*)
- Thin-ribbed Mountainsnail (*Oreohelix tenuistriata*)
- Whorled Mountainsnail (*Oreohelix vortex*)
- Lava Rock Mountainsnail (*Oreohelix waltoni*)
- Selway Forestsnail (*Allogona lombardii*)
- Salmon Oregonian (*Cryptomastix harfordiana*)
- Mission Creek Oregonian (*Cryptomastix magnidentata*)
- Cottonwood Oregonian (*Cryptomastix populi*)
- Kingston Oregonian (*Cryptomastix sanburni*)
- Bruneau Dune Tiger Beetle (*Cicindela waynei*)
- A Click Beetle (*Beckerus barri*)
- A Skiff Beetle (*Hydroscapha redfordi*)
- Blind Cave Leiodid Beetle (*Glacicavicola bathyscioides*)
- Morrison's Bumble Bee (*Bombus morrisoni*)
- Western Bumble Bee (*Bombus occidentalis*)
- Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)

We used the US National Vegetation Classification (NVC), Northwest Regional Gap Analysis Land Cover, and Natural Resources Conservation Service Wetland Classification System as the underlying framework for classifying vegetation. To predict ecological condition (i.e., viability), we used a statewide GIS-based landscape integrity model that incorporated stressors known to directly and indirectly affect ecosystem condition and function.

To classify threats and conservation actions, we used the International Union for Conservation of Nature (IUCN)–Conservation Measures Partnership (CMP) Threats and Actions Classifications framework. The SWAP considers threats regardless of their origins (e.g., local, state, regional, national, and international) where relevant to Idaho's species and habitats. Similarly, where relevant, the plan describes conservation actions for Idaho species and habitats that could be addressed by federal resource management agencies or regional, national, or international partners and shared with other states (e.g., out-of-basin fish passage, threats on wintering grounds).

We used the *Open Standards for the Practice of Conservation*, as implemented in Miradi Adaptive Management Software for Conservation Projects, as the core methodology for revisions to this plan. This methodology is designed to allow key agencies and stakeholders in each of Idaho's 14 sections to discuss and hopefully come to agreement on focal conservation targets (both species and habitats), key threats affecting these targets, the actions needed to mitigate these threats and/or restore the targets, and the monitoring indicators that can be used to track progress over time. Our ultimate aim was to create a living action plan for each section that can become the basis for ongoing adaptive management of these important resources.

For the 2015 SWAP revision, we took a "coarse filter–fine filter" approach to both address the "full array of wildlife" and "wildlife-related issues" in Idaho, but also to focus on actions that benefit multiple species and the habitats they depend on.

We identified key partners and stakeholders for each of the 14 sections that compose ongoing Adaptive Management (and implementation) teams for each section. Our long-term goal is to convene these groups at least 1 to 2 times per year to discuss successes, challenges, and opportunities for implementing SWAP; thus maintaining an adaptive and community-based approach to conservation and management.

In developing materials for the SWAP, we considered how identified threats and associated actions relate to other agency plans (both internal IDFG management plans as well as partner plans, e.g., US Forest Service (FS) forest plans, Idaho Forest Action Plan, Bureau of Land Management (US) (BLM) Resource Management Plans, etc.). We also considered the implications of our work to affected stakeholders, e.g., the agriculture and livestock industry, forest industry, mining industry, etc. Critical to the success of the SWAP—and the conservation of Idaho's wildlife—is that we find ways to resolve potential conflicts. To this end, our planning process explicitly recognizes not only ecological targets in each section, but also the human values that these resources provide. In addition, by making our assumptions and strategies for conservation clear, this enables us to have specific and meaningful conversations with our resource management partners to find appropriate solutions for managing these resources.

We identified 205 SGCN (43 Tier 1, 66 Tier 2, 96 Tier 3): 73 vertebrates (12 fish, 4 amphibians, 37 birds, 19 mammals, 1 reptile) and 132 invertebrates. Of these, 20 are classified as game species and 13 are listed under ESA (9 vertebrates, 4 invertebrates). Invertebrate SGCN represent 18 orders and 57 families. For each SGCN, we give the scientific and English common name, NatureServe global conservation status rank, Idaho subnational (i.e., state) rank, status under ESA, FS Northern Region's (R1) Sensitive Species list, FS Intermountain Region's (R4) Threatened, Endangered, Proposed, and Sensitive Species list, BLM Idaho Special Status Species list, and IDAPA Classification and Protection of Wildlife. We also include a species assessment for each of the 205 SGCN, which provides information on distribution and abundance, habitat and ecology, trend, threats, and a summary of conservation actions.

Each of the section plans contains a high-level summary of the adaptive management plans for all 14 of Idaho's ecological sections. These plans represent a substantial advancement of the original section plans developed as part of the 2005 Idaho SWAP. The original plans had static descriptions of each section as well as lists of SGCN, including priority habitats in each section. These updated plans now contain the beginnings of a true strategic plan that outlines the ecological conditions in each section as well as prioritized strategies that can be used to achieve and maintain the health and vigor of Idaho's wildlife.

In each section, we summarize general habitat associations and requirements and indicate habitat management priorities and opportunities. We tier these priorities and management direction to existing species management plans when possible. In addition, we indicate priorities for inventory and monitoring, applied conservation research, disease management, and other species-specific conservation priorities.

In conclusion, the Idaho SWAP provides voluntary guidance on conservation actions intended to benefit the highest priority "species of greatest conservation need" and is intended to guide the state's approach to wildlife conservation over the next decade. We consider the segregation of species management priorities and habitat management priorities to be important. State species management is the responsibility of IDFG. The listed actions will be important for the development and monitoring of work plans and for maintaining programmatic focus and coordination. Habitat management is the responsibility of land managers and other regulatory agencies. Nevertheless, management priorities for wildlife are important to communicate, and this document provides an opportunity to articulate those priorities for important habitats and to provide opportunities for partnerships.

Introduction

The Idaho Department of Fish and Game (Department) has completed a comprehensive review and revision of the Idaho State Wildlife Action Plan (SWAP; formerly known as the Comprehensive Wildlife Conservation Strategy), first completed in 2005 pursuant to the creation of the Wildlife Conservation and Restoration Account under the Federal Aid in Wildlife Conservation Act, Pub. L. No. 106–553, appendix B–H.R. 5548, title IX (Wildlife, Ocean and Coastal Conservation), §§ 901–902, 114 Stat. 2762A– 118–124 (Dec. 21, 2000).

Approximately 98% of Idaho's native fish and wildlife species held in public trust by the State of Idaho are not hunted, fished, or trapped and have limited sources of funding. These species are often referred to as "nongame."

In 2000, Congress created the Wildlife Conservation and Restoration Program and State and Tribal Wildlife Grants Program (SWG), which for the first time, provided funding to state fish and wildlife agencies primarily for the conservation and management of nongame species. The funding was distributed to the states with the condition that each state develop a SWAP—the strategic direction to implementing proactive, nonregulatory, action-based solutions to conserve fish and wildlife. Congress also required that all states commit to reviewing and, if necessary, revising their Wildlife Action Plans within 10 years.

Approximately 98% of Idaho's native fish and wildlife species held in public trust by the State of Idaho are not hunted, fished, or trapped and have limited sources of funding. State and Tribal Wildlife Grants funding is critical to sustaining the Idaho Department of Fish and Game's (IDFG) overall Wildlife Diversity Program budget and programs. Idaho currently receives approximately \$550,000 annually through this program, and in the last decade since developing the original SWAP in 2005, has received more than \$6.5 million dollars of SWG funding. The Idaho SWAP provides strategic guidance on how to invest these funds with an emphasis on preventing future listings under the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; ESA) thus maintaining state-led management authority for wildlife.

The "Eight Required Elements"

Congress identified eight required elements to be addressed in these wildlife conservation plans (see below). Further, the plan must identify and be focused on the "species in greatest need of conservation," yet address the "full array of wildlife" and wildlife-related issues. They must provide and make use of:

1. The distribution and abundance of species of wildlife, including low and declining populations as each state fish and wildlife agency deems appropriate, that are indicative of the diversity and health of wildlife of the state (these species are now referred to as species of greatest conservation need or SGCN);

2. The location and relative condition of key habitats and community types essential to the conservation of each state's SGCN;

3. The problems [that] may adversely affect SGCN or their habitats, and priority research and surveys needed to identify factors [that] may assist in restoration and improved conservation of SGCN and their habitats;

4. The actions necessary to conserve SGCN and their habitats and priorities for implementing such conservation actions;

5. The provisions for periodic monitoring of SGCN and their habitats, for monitoring the effectiveness of conservation actions, and for adapting conservation actions as appropriate to respond to new information or changing conditions;

6. Each state's provisions to review its plan at intervals not to exceed 10 years;

7. Each state's provisions for coordination during the development, implementation, review, and revision of its plan with federal, state, and local agencies and Indian tribes that manage significant areas of land or water within the state, or administer programs that significantly affect the conservation of species or their habitats; and

8. Each state's provisions to provide the necessary public participation in the development, revision, and implementation of its plan.

Although the Department is the state's lead wildlife manager, it is not a major land management agency and does not administer significant regulatory programs other than regulating the take of wildlife. By necessity, the Department's ability to conserve wildlife will depend on its effectiveness in working cooperatively with others.

The 2005 plan (formerly known as Idaho Comprehensive Wildlife Conservation Strategy http://fishandgame.idaho.gov/public/wildlife/cwcs/) largely focused on species, and included a species account for each of the 229 species of greatest conservation need (SGCN). Although the plan included ecological section summaries, it did not specifically develop section-level plans by considering the uniqueness of each section or the local conditions. For the 2015 revision, we aimed to be more dynamic and to create plans for each of Idaho's 14 ecological sections that acknowledges both what we will do and what we will not do. The process we used for the revision—the Open Standards for the Practice of Conservation (http://cmp-openstandards.org/) as implemented in Miradi Software (https://www.miradi.org/)—gives us a tool for assessing status/condition (species or habitats), identifying and prioritizing critical threats, and prioritizing conservation actions—all essential components of the State Wildlife Action Plan.

Planning efforts at the scale of a state the size of Idaho have something of a "Goldilocks problem." On one hand, conditions are varied enough across the state that it is difficult to plan or implement conservation actions for a habitat or species across all of Idaho—the planning unit is "too big." On the other hand, it's also challenging to develop plans for thousands of individual conservation areas or sites—the planning unit is "too small." We thus needed a planning unit that was small enough to capture variation, but large enough to be efficient. It is also helpful to have a planning unit that represents an area managed by a defined group of agencies/organizations/stakeholder groups and the individuals within them—the people who will allocate time and resources to conservation work in the area over the coming decade. Although we considered doing planning by watershed or by IDFG Region, in the end we decided to use the same 14 ecological sections from the 2005 plan because (1) they met the Goldilocks just right criterion, (2) are the product of an established external framework (Bailey's ecoregions http://www.fs.fed.us/land/ecosysmgmt/), (3) represent a neutral framework that all agencies can use, (4) link to work done in neighboring states, and (5) make use of existing work in the 2005 plan.

For the 2015 State Wildlife Action Plan revision, we took a "coarse filter–fine filter" approach to both address the "full array of wildlife" and "wildlife-related issues" in Idaho, but also to focus on actions that benefit multiple species and the habitats they depend on. Many threats to species are habitat-based so we started by identifying the threats to these habitats and considered the system as a whole by including nested targets (e.g., sagebrush-obligate birds nested under the Sagebrush Steppe system). Where species had threats that weren't habitat-based, or they had special conservation needs, we identified the species as a target in its own right. For example, some species, such as Bighorn Sheep or bats, are impacted by disease threats and focusing on the habitat isn't going to solve the problem. In those cases, the species became the target so that we could appropriately address the threat(s). We also started with more generic habitat types but then looked at specific manifestations of that habitat in each section. In some cases, mosaics of multiple habitats become the target.

As stated above, we looked at species in an ecological systems context and did not distinguish between game and nongame. That said the plan focused on species of greatest conservation need—regardless of how they're classified.

We identified key partners and stakeholders for each of the 14 ecological sections that compose ongoing Adaptive Management (and implementation) teams for each section. Our long-term goal is to convene these groups at least 1 to 2 times per year for a 3 to 4 hour meeting to be held in a central location for that section. Although we initially grouped approximately 4 sections into a single workshop for training and teaching efficiencies, moving forward, each section's group will meet individually. We've also created dynamic information systems for each section recognizing that the initial knowledge captured for each section can be improved over time.

In developing materials for the State Wildlife Action Plan, we considered how identified threats and associated actions relate to other agency plans (both internal IDFG management plans as well as partner plans, e.g., US Forest Service forest plans, Idaho Forest Action Plan, BLM Resource Management Plans, etc.). We also considered the implications of our work to affected stakeholders, e.g., the livestock industry, timber industry, mining industry, etc. It's critical to the success of the State Wildlife Action Plan—and the conservation of Idaho's wildlife—that we find ways to resolve potential conflicts. To this end, our planning process explicitly recognizes not only ecological targets in each section, but also the human values that these resources provide. In addition, by making our assumptions and strategies for conservation clear, this enables us to have specific and meaningful conversations with our resource management partners to find appropriate solutions for managing these resources.

Concurrent to the ecological section planning in Miradi described above, we updated the conservation status of all Idaho species (vertebrate and invertebrate). The updated status (S-rank) was used as a criterion in a suite of criteria used to derive the revised species of greatest conservation need list for the State Wildlife Action Plan. We provide individual assessments for 205 species of greatest conservation need.

The first of the eight elements required of the plan addresses designation of priority species, stating "The distribution and abundance of species of wildlife, including low and declining populations as each state fish and wildlife agency deems appropriate, that are indicative of the diversity and health of wildlife of the state (referred to as SGCN)." Additionally, the plan must identify and be focused on the "species in greatest need of conservation." Although the criteria do not stipulate eligible species necessarily be characterized by low and declining populations, the implication, and Idaho's approach, is that abundant or increasing populations would be of a lower priority. Idaho designated SGCN using a suite of criteria, including distribution, abundance, trends, and viability threats as reflected by the updated status (S-rank).

We also placed considerable emphasis on the element of need, relative to the SWG program. Idaho's approach to SWAP is based on the premise that the product will primarily serve as a basis for prioritizing SWG funding for important work on rare or declining species where few to no other funding mechanisms exist. In describing the focus for these plans, Congress emphasized that priority should be placed on the most critical needs, on those species with the greatest conservation need, and that funds should be used to address the life needs and habitat requirements of those species to preclude the need to list them as threatened or endangered under ESA. To that end, we focused on currently unmet conservation needs. Whether or not a species relies solely or primarily on the SWG program for conservation funding was a key consideration. Under this approach, the limited funding available in the SWG program will be most effectively directed to the greatest need.

In some cases, the criteria used for development of this plan resulted in changes in SGCN status (either tier or exclusion) from the 2005 plan. Importantly, omission of a previously designated SGCN is not reflective of a diminished concern for the species, lesser importance, or the lack of a conservation commitment. Changes are the result of new information about (or change in) distribution and abundance, implementation of species-specific conservation plans, access to a wider range of funding mechanisms for conservation actions, or a combination of factors.

This plan represents the Department's efforts to complete a comprehensive review and revision of the 2005 plan. Voluntary in nature, the SWAP provides a framework for collaborative conservation in Idaho and helps the Department to fulfill its mission to *preserve, protect, and perpetuate* all wildlife to provide for the citizens of this state. Wildlife management has broad implications to the state of Idaho and therefore the SWAP must be based on the best available science and appropriately balanced taking into consideration the multiple natural resource goals important to Idaho. The Department plans to continue to engage its partners to ensure that viable conservation actions for species outlined in the SWAP are implemented.

Key Messages

- The Idaho SWAP provides voluntary guidance on conservation actions intended to benefit the highest priority "species of greatest conservation need" (SGCN);
- The SWAP revision is a Department-led effort with broad stakeholder involvement, including a public review;
- Implementation of conservation actions in the revised SWAP goes beyond Department staff capacity and resources—it is a truly comprehensive State Plan, not just a Department Plan, that also engages key partners and other interested stakeholders;
- Submission of a revised SWAP to the US Fish and Wildlife Service in February 2016 ensures that the Department remains eligible to receive Congressionally-appropriated State Wildlife Grants funding; and
- Revision and implementation of the SWAP by the Department is paid for using State Wildlife Grants matched with Nongame Trust Fund revenue—no license dollars are used for these efforts.

Conservation Status Assessment

To assess the conservation status of species—specifically their extirpation risk in Idaho—we used standard methods developed by NatureServe. Both NatureServe and Natural Heritage program staff across North America collect and evaluate data for species and ecosystems of concern using these methods and tools to ensure that assigned status ranks are accurate, consistent, and based on current field and remote-sensing information.

Eight core factors are used to assess status: range extent, area of occupancy, population size, number of occurrences, number of occurrences or percent area with good viability/ecological integrity, overall threat impact, long-term trend, and short-term trend (see Master et al. 2012). In addition, 2 other factors, environmental specificity and intrinsic vulnerability, are used when information on the number of occurrences and area of occupancy are unknown or information on threats is unknown, respectively.

Factors are organized into 3 categories (rarity, threats, and trends). Conditional rules for use of factors are applied to ensure that adequate information is used for assessing status. Factors are scaled and weighted according to their impact on risk. Consistent factor scaling and weighting allows the use of points to effectively score the contribution of each factor to risk. Scores are weighted and combined by category resulting in an overall calculated rank, which is reviewed, and a final conservation status rank assigned (see Faber–Langendoen et al. 2012).

A rank calculator automates the process of assigning conservation status ranks (NatureServe 2012). In 2015, NatureServe released an updated version of the rank calculator (NatureServe 2015c), but we were already well underway with our status assessment and so used Version 3.1 from July 2012 (with default weighting). However, we plan to use the updated version for future status assessments.

In assigning the final rank, we also considered other relevant information. The result is a relative rank from 1 to 5 (most to least imperiled) that provides a relative status for the species in Idaho. We used this rank as 1 of several criteria to derive the revised Idaho species of greatest conservation need (SGCN) list.

The results of this assessment (and relevant factors) for each SGCN are presented in individual accounts in Appendix F. A guide to interpreting these assessments, as well as species checklists in Appendix A and Appendix C follows.

Scientific and Common Names

Taxonomy for fishes follows the American Fisheries Society's (AFS) *Common and Scientific Names of Fishes from the United States, Canada, and Mexico* (Page et al. 2013). English common names for fish orders follow ITIS (ITIS 2015). Trout and salmon subspecies names follow *Trout and Salmon of North America* (Behnke and illustrated by JR Tomelleri 2002).

Taxonomy for birds follows the American Ornithologists' Union (AOU) Checklist and supplements (American Ornithologists' Union 1998; 2000; 2015; Banks et al. 2007; Banks et al. 2008; Banks et al. 2002; 2003; 2004; 2005; 2006; Chesser et al. 2009; 2010; 2011; 2012; 2013; Chesser et al. 2014). The

"AOU Checklist" is the official source on the taxonomy of birds found in North and Middle America, including adjacent islands. The checklist we used incorporates changes through the 55th supplement (American Ornithologists' Union 2015). Recent work from Benkman et al. (2009) indicates that the crossbill population in the South Hills and Albion Mountains of south-central Idaho warrants species status. However, because the AOU Checklist Committee does not yet recognize Benkman's proposed taxon South Hills Crossbill (*Loxia sinesciurus*) as a distinct species from Red Crossbill (*L. curvirostra*), we refer to this population as "Red Crossbill (*L. curvirostra*; South Hills population)" in the State Wildlife Action Plan.

Taxonomy of amphibians and reptiles follows the Society for the Study of Amphibians and Reptiles' (SSAR) *Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in Our Understanding* (Crother 2012). With few exceptions, common names are adapted from Stebbins (2003) for amphibians and reptiles.

Taxonomy for mammals generally follows the *Revised Checklist of North American Mammals North of Mexico, 2014* (Bradley et al. 2014) with some exceptions. Departures from Bradley et al. (2014) include the Northern Idaho Ground Squirrel (*Urocitellus brunneus*) and Southern Idaho Ground Squirrel (*Urocitellus endemicus*), which we recognize as distinct species based on work by Hoisington–Lopez et al. (2012).

Because of the complexity of invertebrate taxonomy, we used multiple sources for both scientific and English common names, including peer-reviewed literature.

Standard English common names of animal species are capitalized following conventions adopted by the American Fisheries Society (Page et al. 2013), American Ornithologists' Union (American Ornithologists' Union 2015), and the Society for the Study of Amphibians and Reptiles (SSAR 2015). Exceptions to this include hybrids (e.g., splake) and common names for taxa above the species level (e.g., trout-perches, colubrids), which are not capitalized.

Conservation Status and Classification

This section of the assessment reports the status of the species under the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; ESA); US Forest Service (FS) Northern Region (R1) and Intermountain Region (R4) Sensitive Species status; Bureau of Land Management (US) (BLM) Idaho Special Status Species designation; classification and protection of wildlife under Idaho Administrative Code (IDAPA); NatureServe global conservation status rank (G-rank); subnational (i.e., Idaho) conservation status rank (S-rank); SGCN tier; and a brief description of the rationale for why the species was selected as a SGCN. Species that have no official designation under any of these categories are denoted by "No status."

Endangered Species Act (ESA) Status Definitions

In the field labeled "ESA," we report the status of a species under the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; ESA). Designations in this checklist reflect the 2015 October 1 edition of 50 CFR § 17.11 (Endangered . . . Endangered and threatened wildlife 2015), the 2014 April 14 edition of 50 CFR Parts 223 and 224 (species under the jurisdiction of the

National Marine Fisheries Service that are currently listed as threatened or endangered) (NOAA 2014), and the 2015 December 24 Candidate Notice of Review (CNOR) (FWS 2015).

In the "ESA" field the following symbols are used:

E—Endangered: an endangered species is any species that is in danger of extinction throughout all or a significant portion of its range

T—Threatened: a threatened species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range

US Forest Service (FS) Northern Region (R1) Sensitive Species

In the field labeled "FS Region 1," we report the status of species based on the most current (February 2011) version of the FS Northern Region's (R1) Sensitive Species List ([FS] US Forest Service 2011). The FS Northern Region (R1) manages ESA-listed species separately than "Sensitive Species" and therefore does not include these species on its Sensitive Species list. Accordingly, a "No status" under FS R1 for federally listed species simply reflects this management distinction.

In the "FS Region 1" field the following symbol is used:

S—Sensitive

US Forest Service (FS) Intermountain Region (R4) Sensitive Species

In the field labeled "USFS Region 4," we report the status of species based on the most current (February 2013) version of the FS Intermountain Region's (R4) Threatened, Endangered, Proposed, and Sensitive Species list ([FS] US Forest Service 2013). FS R4 does include ESA-listed species on its Sensitive Species list.

In the "FS Region 4" field the following symbols are used:

E—Endangered

T—Threatened

P—Proposed

S—Sensitive

Bureau of Land Management (US) (BLM) Idaho Special Status Species List

In accordance with national policy (BLM Manual 6840), BLM Idaho updated its Special Status Species List 2015 January 13 to address conservation management needs and to establish priorities (BLM 2015). In this list, BLM consolidated and simplified its former categories into 2 types.

In the "BLM" column the following symbols are used:

Type 1—Species with one of the following status designations under ESA: endangered, threatened, essential experimental population, or critical habitat

Type 2—BLM Idaho Sensitive Species, including US Fish and Wildlife Service proposed and candidate species, ESA-listed species delisted during the past 5 y, and ESA nonessential experimental population; also includes species designated by BLM Idaho State Director

IDAPA Classification and Protection of Wildlife

The Idaho Fish and Game Commission is authorized under Sections 36-104(b) and 36-201, Idaho Code, to adopt rules concerning the taking of wildlife species and the classification of all wildlife in the state of Idaho (IDAPA 13.01.06.000 2015).

In the "IDAPA" field the following symbols are used:

BG—Big Game Animals

UGA—Upland Game Animals

UGB—Upland Game Birds

MGB—Migratory Game Birds

GF—Game Fish

F—Furbearing Animals

E—Endangered Species: any native species in danger of extinction throughout all or a significant portion of its Idaho range.

T—Threatened Species: any native species likely to be classified as Endangered within the foreseeable future throughout all or a significant portion of its Idaho range.

PNS—Protected Nongame Species

PW—Predatory Wildlife

UW—Unprotected Wildlife

Global Conservation Status Definitions (G-rank)

Listed below are definitions for interpreting NatureServe global conservation status ranks (G-ranks) (NatureServe 2015a). These ranks reflect an assessment of the condition of the species or ecological community across its entire range and are assigned by NatureServe. Where indicated, definitions differ for species and ecological communities.

In the “G-rank” column, the following symbols are used:

NatureServe Global Conservation Status Ranks

Basic Ranks

Rank	Definition
GX	Presumed Extinct (species)—Not located despite intensive searches and virtually no likelihood of rediscovery. Eliminated (ecological communities)—Eliminated throughout its range, with no restoration potential due to extinction of dominant or characteristic species.
GH	Possibly Extinct (species)—Missing; known from only historical occurrences but still some hope of rediscovery. Presumed Eliminated (Historic, ecological communities)—Presumed eliminated throughout its range, with no or virtually no likelihood that it will be rediscovered, but with the potential for restoration, for example, American chestnut (forest).
G1	Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2	Imperiled—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3	Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4	Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5	Secure—Common; widespread and abundant.

Variant Ranks

Rank	Definition
G#G#	Range Rank—A numeric range rank (e.g., G2G3) is used to indicate the range of uncertainty in the status of a species or community. Ranges cannot skip more than one rank (e.g., GU should be used rather than G1G4).

GU	Unrankable—-Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. Whenever possible, the most likely rank is assigned and the question mark qualifier is added (e.g., G2?) to express uncertainty, or a range rank (e.g., G2G3) is used to delineate the limits (range) of uncertainty.
GNR	Unranked—Global rank not yet assessed.
GNA	Not Applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

Rank Qualifiers

Rank	Definition
?	Inexact Numeric Rank—Denotes inexact numeric rank (e.g., G2?)
Q	Questionable taxonomy—Taxonomic distinctiveness of this entity at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower-priority conservation priority.
C	Captive or Cultivated Only—At present extant only in captivity or cultivation, or as a reintroduced population not yet established.

Infraspecific Taxon Conservation Status Ranks

Infraspecific taxa refer to subspecies, varieties, and other designations below the level of the species. Infraspecific taxon status ranks (T-ranks) apply to plants and animal species only; these T-ranks do not apply to ecological communities.

Rank	Definition
T#	Infraspecific Taxon (trinomial)—The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above for global conservation status ranks. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T-rank cannot imply the subspecies or variety is more abundant than the species as a whole—for

	example, a G1T2 cannot occur. A vertebrate animal population, such as those listed as distinct population segments under the US Endangered Species Act, may be considered an infraspecific taxon and assigned a T-rank; in such cases a Q is used after the T-rank to denote the taxon's informal taxonomic status.

Subnational Conservation Status Definitions (S-rank)

Listed below are definitions for interpreting conservation status ranks at the subnational (S-rank) level (NatureServe 2015b). The term "subnational" refers to state or province-level jurisdictions (e.g., Idaho, British Columbia). Assigning subnational conservation status ranks for species and ecological communities follows the same general principles used in assigning global status ranks. A subnational rank, however, cannot imply that the species or community is more secure at the state/province level than it is nationally or globally (i.e., a rank of G1S3 cannot occur). Similarly, a national rank cannot exceed the global rank. Subnational ranks are assigned and maintained by state or provincial natural heritage programs and conservation data centers. In Idaho, subnational ranks are assessed and assigned by the Idaho Department of Fish and Game.

In the "S-rank" field, the following symbols are used:

Subnational (S) Conservation Status Ranks

Status	Definition
SX	Presumed Extirpated—Species or community is believed to be extirpated from the state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
SH	Possibly Extirpated (Historical)—Species or community occurred historically in the state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20–40 y. A species or community could become SH without such a 20–40 y delay if the only known occurrences in a state/province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
S1	Critically Imperiled—Critically imperiled in the state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
S2	Imperiled—Imperiled in the state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or

	other factors making it very vulnerable to extirpation from the state/province.
S3	Vulnerable—Vulnerable in the state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4	Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5	Secure—Common, widespread, and abundant in the state/province.
SNR	Unranked—State/province conservation status not yet assessed.
SU	Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA	Not Applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S#	Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

Breeding Status Qualifiers

Qualifier	Definition
B	Breeding—Conservation status refers to the breeding population of the species in the state/province.
N	Nonbreeding—Conservation status refers to the nonbreeding population of the species in the state/province.
M	Migrant—Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the state/province.

Note: A breeding status is only used for species that have distinct breeding and/or nonbreeding populations in the state/province. A breeding-status S-rank can be coupled with its complementary nonbreeding-status S-rank if the species also winters in the state/province, and/or a migrant-status S-rank if the species occurs regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. The 2 (or rarely, 3) status ranks are separated by a comma (e.g., "S2B,S3N" or "SHN,S4B,S1M").

Other Qualifiers

Rank	Definition
?	Inexact or Uncertain—Denotes inexact or uncertain numeric rank. (The ? qualifies the character immediately preceding it in the S-rank.)

Idaho Species of Greatest Conservation Need (SGCN)

The "SGCN TIER" field gives the species of greatest conservation need (SGCN) tier (see "Approach and Criteria for Selecting Idaho Species of Greatest Conservation Need" for additional descriptions of the 3 tiers) using the following symbols:

1—Tier 1 SGCN are our highest priority for the State Wildlife Action Plan and represent species with the most critical conservation needs, i.e., an early-warning list of taxa that may be heading toward the need for ESA listing.

2—Tier 2 SGCN are secondary in priority and represent species with high conservation needs—that is, species with longer-term vulnerabilities or patterns suggesting management intervention is needed but not necessarily facing imminent extinction or having the highest management profile.

3—Tier 3 SGCN include a suite of species that do not meet the above tier criteria, yet still have conservation needs. In general, these species are relatively more common, but commonness is not the sole criterion and often these species have either declining trends rangewide or are lacking in information.

Distribution and Abundance

This section reports the range extent, key ecological sections for the species, population size, and a brief description of the species. Range extent is generally defined as the area contained within the shortest continuous imaginary boundary that can be drawn to encompass all the known, inferred, or projected sites of present occurrence of a taxon or ecosystem, excluding cases of vagrancy (IUCN 2001). The range extent criterion measures the spatial spread of areas currently occupied by a species or ecosystem and is not intended to be an estimate of the amount of occupied or potential habitat (IUCN 2001; Master et al. 2012). Range extent for most species was calculated using ArcGIS. Population size is the estimated current total population of the species within Idaho, based on naturally occurring and wild individuals of reproductive age or stage (at an appropriate time of the year), including mature but currently nonreproducing individuals (Master et al. 2012). Population size is not applicable for invertebrates.

Habitat and Ecology

This section gives both the environmental specificity (the degree to which a species or ecosystem depends on a relatively scarce set of habitats, substrates, food types, or other abiotic and/or biotic factors within the overall range) of a species as well as a general description of the species' habitat and overall ecology.

Population Trend

This section includes both short-term and long-term trend for species as well as an overall description of what we know about the species' trend. Trend describes the observed, estimated, inferred, or suspected degree of change in population size, range extent, area of occupancy, number of occurrences, and/or number of occurrences or percent area with good viability or ecological integrity over the long term (ca. 200 years) or short term (10 years or 3 generations [for long-lived taxa], whichever is longer [up to a maximum of 100 years]), whichever most significantly affects the conservation status assessment in Idaho (see Master et al. 2012).

Threats

This section reports the overall threat impact from the assessment, as well as intrinsic vulnerability. The overall threat impact incorporates the scope (extent of species range) and severity (the level of damage to the species than can reasonably be expected with continuation of circumstances and trends within a 10 y/3 generation timeframe) of several threats. Intrinsic vulnerability is defined as the observed, inferred, or suspected degree to which characteristics of the species or ecosystem (such as life history or behavior characteristics of species, or likelihood of regeneration or recolonization for ecosystems) make it vulnerable or resilient to natural or anthropogenic stresses or catastrophes (Master et al. 2012). The section also provides a brief narrative description of primary threats to the species in Idaho.

Conservation Actions

Although not part of the status assessment, we report a statewide overview of key conservation actions and/or strategies for species. More detailed objectives, strategies, and actions can be found in each of the 14 section plans.

Additional Comments

This includes additional information that doesn't fit within existing formal categories. Typically, this includes details on the current ESA listing status for the species and/or any taxonomic uncertainties.

Information Sources

This is a compilation of key sources we used for the assessments.

Map Sources

This provides the sources of spatial data used in generating the map.

How to Read the Map

Observations

For vertebrates, the map displays point locations for the species (observations) in 2 time intervals: observations reported since 2005 October 1 and observations reported prior to 2005 October 1. We chose to separate these to better depict the species' current distribution and to reflect data acquired since we completed the 2005 State Wildlife Action Plan. The point data represent observations housed in the Idaho Department of Fish and Game, Idaho Fish and Wildlife Information System, Species Diversity Database. These data include observations from professionals and in some cases the public. In both cases the points are filtered to display only observations where the observer is confident that he/she identified the species correctly. The data include a mix of observations from targeted survey efforts as well as incidental observations. Each point displays locational precision to 10,000 m (i.e., the observation is mapped within 0 to 10,000 m from its actual location). In some cases, the point observations can appear clustered; this is typically the result of targeted surveys within a localized area. Conversely, the lack of observational data does not provide evidence of absence but simply reflects a lack of survey effort or detection. Finally, the point locations do not reflect abundance. For example, multiple observers could report the same observation or the same individual of the species could have been seen on multiple occasions.

Species Distribution Model or Range Map

In addition to observations, the vertebrate maps also depict the species' predicted distribution. Whereas a range map represents the geographic region where the species may occur, a species distribution model represents potential habitat within that range based on a variety of factors (e.g., vegetation type, elevation, slope, etc.). Although both range maps and distribution models reflect the most current information biologists have on a species, including known locations and habitat requirements, they both estimate potential occurrence, not actual. For most terrestrial vertebrates, we used the Northwest ReGAP Species Distribution Model (Beauvais et al. 2013). For some species, however, other data sets were more appropriate. In such cases, alternative sources for species are identified in the Map Source section.

Instead of distribution models, the maps for fish and invertebrates display species ranges. For fish, the maps display IDFG-derived predicted fish ranges developed from the IDFG Fish Distribution Database. The invertebrate range maps were developed by IDFG using available occurrence data and hydrologic boundaries (HUC5) following the Northwest ReGAP species range methodology as well as expert review.

Bailey's Ecological Section

The map also depicts the boundaries of the 14 ecological sections in Idaho.

Approach and Criteria for Selecting Idaho Species of Greatest Conservation Need

Congressional Guidance

In the Congressional language that describes State Wildlife Grants and State Wildlife Action Plans, Congress explicitly stated that this program provides funds for the States to develop and implement wildlife management and habitat restoration for the "most critical wildlife needs" (H.R. Doc. No. 108–542 . . . 2004). Congress intended the priority for these funds to be placed on those species with the greatest conservation need and to address the life needs and habitat requirements of such species to preclude the need to list them as threatened or endangered under the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; ESA). For the purpose of selecting Idaho species of greatest conservation need (SGCN), we interpret this to include species (or habitats) that are experiencing known threats that without intervention are likely to continue to decline or to become increasingly vulnerable. Accordingly, we present an updated list of animal species native to Idaho that we regard as SGCN—those species most in need of conservation action. In some cases, the criteria used for development of the updated SGCN resulted in changes in SGCN status (either tier or exclusion) from the 2005 plan. Importantly, omission of a previously designated SGCN such as cutthroat trout is ***not*** reflective of lack of conservation commitment. Changes reflect the result of new information about (or change in) distribution and abundance, existing implementation of species-specific conservation management plans with access to a wider range of funding mechanisms for conservation actions, or a combination of factors.

Species Selection Process

To address the full array of wildlife, we first compiled an updated checklist of all known vertebrate and invertebrate species that have been documented in Idaho using multiple sources. In addition to using the IDFG's Idaho Fish and Wildlife Information System database, occurrence data were gathered from several sources including online databases (e.g., Global Biodiversity Information Facility, Integrated Digitized Biocollections), museums (e.g., Essig Museum of Entomology, University of Idaho William F Barr Entomological Museum, The College of Idaho Orma J Smith Museum of Natural History), state and private databases (e.g., Idaho Department of Environmental Quality BURP Data Viewer, Pacific Northwest Moths, The Lepidopterists' Society, OdonataCentral, Xerces Society), and numerous research efforts (published manuscripts as well as theses and dissertations). This resulted in documented occurrence data for >670 vertebrates and 4198 invertebrates (including nonnatives and transients) (see Appendix A for an annotated checklist of Idaho vertebrates and Appendix B for a summary checklist of Idaho invertebrates).

Next, we developed a suite of criteria for selecting a subset of these species that warranted inclusion in the State Wildlife Action Plan. We derived these criteria from multiple sources (e.g., Joseph et al. 2009; Marsh et al. 2007; Rosenberg et al. 2014). We then followed a series of steps to derive our species of greatest conservation need list.

First, we filtered the overall list of taxa to include only those species that were native, confirmed, regularly occurring, and currently present in Idaho. To conserve the full diversity of wildlife, we also considered subspecies, distinct population segments, and ESUs of high conservation concern. Next, we selected those species ranked SH, S1, S2, or S3 in Idaho; G1, G2, or G3 globally; or with status under ESA in Idaho (e.g., proposed or petitioned for listing, under status review, threatened, endangered, candidate). We then evaluated species through a fine-scale, local analysis (e.g., is species genetically unique [i.e., species comprises an evolutionarily significant unit within Idaho] or globally taxonomically distinct). Finally, to assess Idaho's conservation responsibility for the species, we considered whether a species was endemic to Idaho or regionally endemic, range restricted (i.e., >5% of species' known range in the contiguous US is within Idaho), or geographically disjunct (i.e., Idaho population disjunct from other populations). We applied additional criteria to invertebrates in restricting SGCN to those species endemic to Idaho or the region (where "region" is defined as Idaho and adjacent states), or where substantial rangewide declines had been documented or other compelling reasons existed to justify the species' inclusion. Species that met these criteria were selected as SGCN.

Some species that met these criteria were not included in the list. For example, species currently listed under ESA but secure in Idaho and no longer ranked G1, G2, or G3 globally, were excluded (e.g., Bull Trout). In addition, we excluded species with no evidence of historical or potential continued presence and/or regular occurrence in Idaho at a given location, e.g., Canada Lynx, American Bison. In the case of Canada Lynx, the extreme northeast corner of Idaho (Canada–Idaho–Montana border) contains approximately 117 km^2 (45 mi^2) of federally-designated critical habitat for the ESA-listed Canada Lynx distinct population segment, and individual animals are occasionally present in Idaho. However, based on various surveys and trapping records, Idaho does not have a persistent Canada Lynx population.

For species that didn't meet the above criteria, we further evaluated the species through fine-scale, local analysis (e.g., is species threatened rangewide, does species have critical conservation needs, is species found only in particular concentration areas within Idaho where the species might warrant conservation attention [e.g., migratory species that regularly occur at particular staging areas or concentration spots, bats that congregate in hibernacula during the winter]).

SGCN Tiers

We further prioritized SGCN by subdividing the list into 3 tiers, based on relative conservation priority in Idaho as follows:

Tier 1

We consider Tier 1 SGCN to be our highest priority for the SWAP and to represent species with the most critical conservation needs, i.e., an early-warning list of taxa that may be heading toward extirpation. These include species that meet one or more of the following criteria:

- high profile and/or exceptionally vulnerable to extinction
- species listed as endangered (E), threatened (T), or candidate (C) under ESA
- species proposed for listing as endangered or threatened under ESA (on a case-by-case basis)
- former ESA-listed or candidate species that remain management priorities
- non-ESA species that need urgent conservation attention to keep them from becoming threatened or endangered
- species with IUCN Red List Categories (Version 3.1) of Endangered (EN), Critically Endangered (CR), or Vulnerable (VU)
- species with NatureServe global conservation status rank (G-rank) of G1 or G2 and for which reasonable survey efforts, distribution data, or conservation threats are known from Idaho
- species with extremely high vulnerability to extinction due to small population, small range, high threats, and rangewide declines
- distinct populations of high conservation concern (including but not restricted to distinct population segments of vertebrate species [DPS] under ESA)
- Idaho endemics with high vulnerability
- species with distribution or viability restricted from past or ongoing declines
- Bird species listed on *The State of the Birds 2014 Red Watch List* (Rosenberg et al. 2014)

Tier 2

Tier 2 SGCN are secondary in priority and represent species with high conservation needs—that is, species with longer-term vulnerabilities or patterns suggesting management intervention is needed but not necessarily facing imminent extinction or having the highest management profile. This tier includes species that meet one or more of the following criteria:

- species under evaluation of its status on FWS initiative
- species that are either range restricted (small range and population), or are more widespread but with troubling declines and high threats (e.g., certain shorebirds because of their small global populations and tendency to concentrate in small, threatened habitats during their long-distance migrations)
- species with NatureServe G-rank of G3 (Vulnerable)
- species with biogeographically restricted distributions or thresholds (e.g., habitat specialist, limited vagility, etc.) w/ declining trend and/or recognized threats
- habitat specialists with important range in Idaho

- species meeting SGCN criteria but historically extirpated from any of the 14 ecological sections in Idaho are also included and may possibly be considered for reintroduction; some species may not be considered for restoration within the planning window (i.e., 2015–2025), but initiation of habitat work may be important now
- Bird species listed on *The State of the Birds 2014 Yellow Watch List* (Rosenberg et al. 2014)
- endemics
- species with severe declines

Tier 3

Tier 3 SGCN include a suite of species that do not meet the above tier criteria, yet still have conservation needs. In general, these species are relatively more common, but commonness is not the sole criterion and often these species have either declining trends rangewide or are lacking in information. This tier includes species that meet one or more of the following criteria:

- Relatively common, yet long-term monitoring surveys indicate they are rapidly declining throughout the species' range
- Species with emerging threats
- Regionally endemic that are associated with at-risk habitats
- Species for which current status is not fully understood (i.e., species that meet the IUCN Red List criteria for Data Deficient [DD])
- Bird species listed as *Common Birds in Steep Decline* in *The State of the Birds 2014* (Rosenberg et al. 2014)

The resulting list can be found in Appendix C. Idaho Species of Greatest Conservation Need, 2015.

Location and Condition of Key Habitats

To address Element 2, location and relative condition of key habitats and community types essential to the conservation of species of greatest conservation need (SGCN), we first mapped habitats at both the state (Fig. 1) and section level (see section maps of vegetation conservation targets) using the NW ReGap land cover map for the 5-state region (Oregon, Washington, Idaho, Montana, and Wyoming). We used the US National Vegetation Classification (NVC), Northwest Regional Gap Analysis Land Cover, and Natural Resources Conservation Service Wetland Classification System as the underlying framework for classifying vegetation. To predict ecological condition (i.e., viability), we used a statewide GIS-based landscape integrity model that incorporated stressors known to directly and indirectly affect ecosystem condition and function. We provide narrative descriptions of key habitats (i.e., vegetation conservation targets) in Appendix E. SWAP Vegetation Conservation Target Abstracts. Throughout the SWAP, we used the PLANTS Database (NRCS 2016) for standardized information about the vascular plants, mosses, liverworts, hornworts, and lichens of the US and its territories.

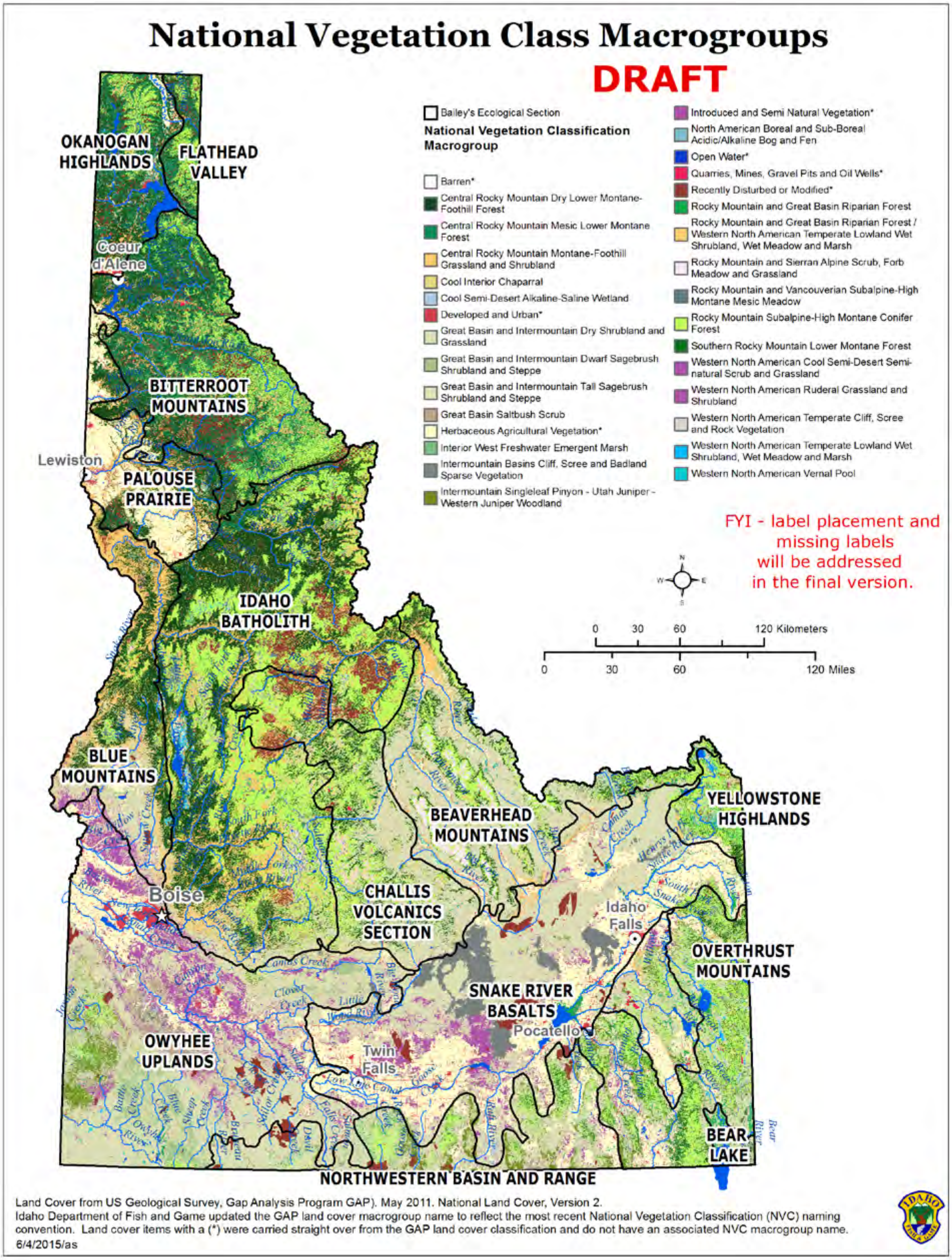


Fig. 1. Map of Idaho vegetation conservation targets

Landscape Integrity Model

Landscape-scale assessment of ecological condition has been widely applied at the national level (Comer and Hak 2012; Faber–Langendoen et al. 2006) and in various states. Landscape-scale condition assessments operate on the premise that human land uses such as agriculture, industrial, residential, commercial, transportation, utilities, mining, timber harvest, water management, and others are predictive of finer-scale condition. Most landscape-scale GIS analyses use a similar list of spatial layer inputs to calculate metrics for condition analyses.

For Idaho, a raster-based landscape integrity model analogous to those for Montana (Vance 2009), Colorado (Lemly et al. 2011), and the US (Comer and Hak 2012; Faber–Langendoen et al. 2006) was built. Complete methods are found in Murphy et al. (2012). Spatial layers used in the landscape integrity model had statewide coverage and were downloaded from the statewide geospatial data clearinghouse, the Interactive Numeric and Spatial Information Data Engine for Idaho (INSIDE) (http://inside.uidaho.edu/index.html), or obtained from various state or federal agencies. A complete list of spatial layers used in the landscape integrity model and sources of the GIS data are listed in Murphy et al. (2012). NW ReGAP landcover (2009) was the most current Idaho land use map and thus chosen for the model. Each input was snapped to a 30-m² raster layer. High-resolution layers were incomplete for some important potential condition indicators of ecological condition, including herbicide or pesticide use, livestock grazing, noxious weed abundance, nutrient and sediment loading, off-highway vehicle use, and recent energy development (e.g., wind turbines). The NW ReGAP (2009) pasture/hay cover type was the only representation of areas grazed by livestock. NW ReGAP (2009) was also used to represent areas of nonnative plant species invasion.

Spatial analysis in ArcGIS was used to calculate the presence of human land use and disturbance (i.e., stressor) metrics for each 30-m² pixel across Idaho. The disturbance value for each pixel incorporated an inverse distance weighted model based on the assumption that ecological condition will be poorer in areas with the most cumulative human activities and disturbances (Comer and Hak 2012; Faber–Langendoen et al. 2006; Lemly et al. 2011; Vance 2009). Condition improves as one moves toward least-developed areas, typically in a predictable pattern (distance-decay function). For simplicity, the model assumed that land uses or stressors within 50 m had twice the impact than disturbances 50–100 m away (e.g., Vance 2009). Land uses and stressors >100 m away were assumed to have negligible impact. Because not all land uses or stressors affect condition the same way, a weighting scheme for each land use or stressor was determined based on published literature (e.g., Comer and Hak 2012; Rocchio and Crawford 2009; Vance 2009). Weighting coefficients from Landscape Development Intensity indices (Brown and Vivas 2005; Durkalec et al. 2009; Fennessy et al. 2007) and hydrogeomorphic assessment of riverine floodplain functions in the Northern Rocky Mountains (Hauer et al. 2002) were adapted (Murphy et al. 2012).

The condition value for each pixel was then calculated based on all input rasters. For example, the value for a pixel with a 2-lane highway and railroad within 50 m, and a home and urban park between 50 and 100 m, is calculated as follows:

Stressor	Weighting coefficient ×	Distance factor =	Impact
2-lane highway =	7.81	2	15.62
railroad =	7.81	2	15.62
single family home—low density =	6.91	1	6.91
recreation / open space – medium intensity =	4.38	1	4.38
		Total Disturbance Value =	42.53

The total disturbance value was multiplied by 100 for converting to integer values for the final raster layer, resulting in landscape integrity model values that ranged from 0 to 14,055.

Condition Ranking

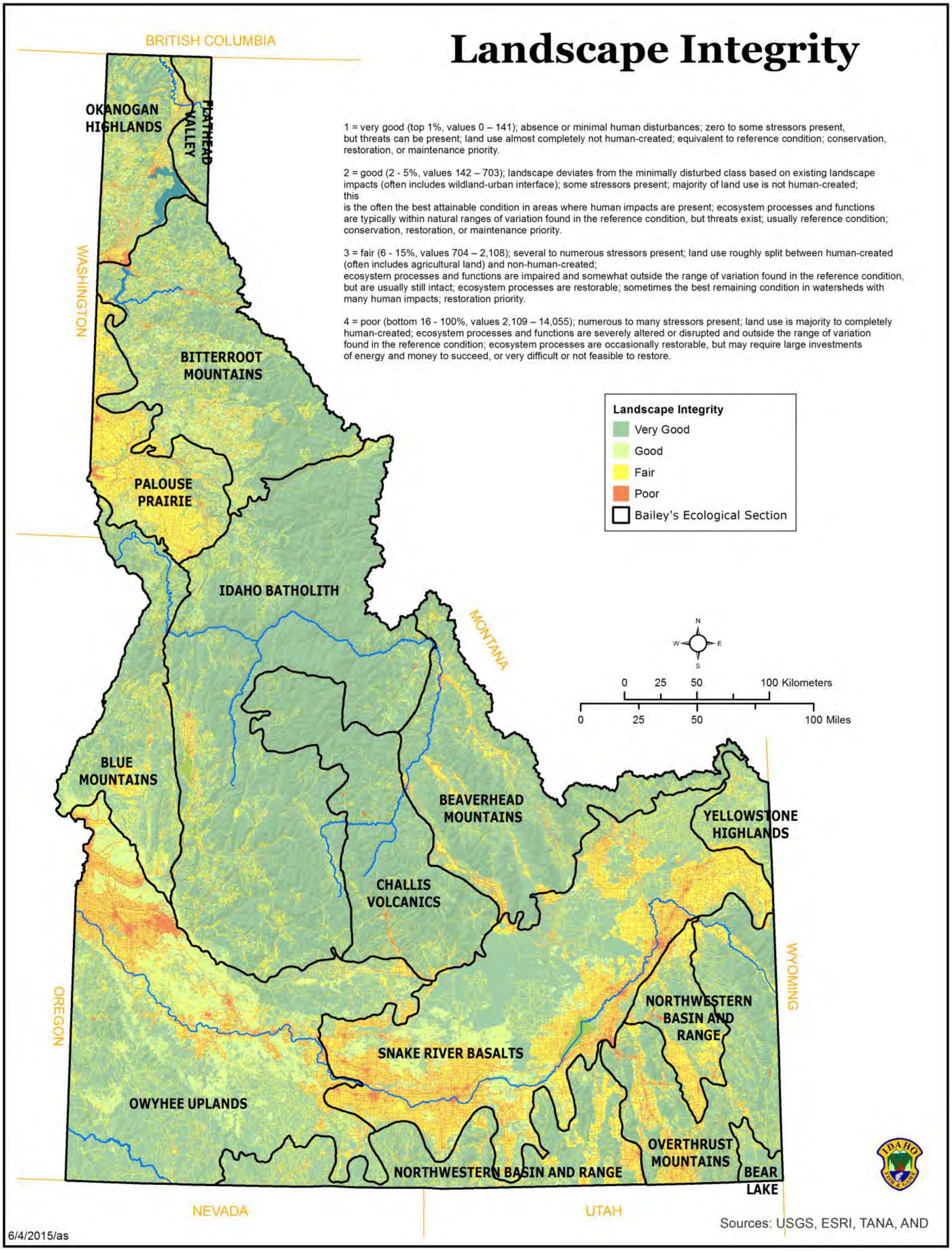
Each pixel's disturbance value was ranked relative to all others in Idaho using methods analogous to Stoddard et al. (2005), Fennessy et al. (2007), Mita et al. (2007), Troelstrup and Stueven (2007), and Lemly et al. (2011). We used an arbitrary ranking scale based on expert judgment and nonquantitative examination of the disturbance value distribution. Any scale can be applied based on assessment needs. For the Idaho SWAP, we used 4 condition categories based on the value range in the landscape integrity model:

1 = *very good* (top 1%, values 0–141): absence of, or minimal, human disturbance; zero to some stressors and threats present; on-the-ground condition can be negatively impacted by localized, but controllable, invasive species or site-specific land uses (e.g., livestock grazing); overall land use almost completely not human-created; ecosystem processes and functions are typically within natural ranges of variation; conservation, restoration, or maintenance priority.

2 = *good* (2–5%, values 142–703): landscape deviates from the minimally-disturbed class due to existing impacts (common in the wildland-urban interface); some stressors and threats present; most land use is not human-created but localized impacts can be present; often the best attainable condition where human impacts are present; ecosystem processes and functions are usually within natural range of variation; conservation, restoration, or maintenance priority.

3 = *fair* (6–15%, values 704–2,108): several to many stressors present; land use roughly split between human-altered (often includes agricultural land) and minimally disturbed; ecosystem processes and functions are impaired and somewhat outside the range of variation found in the reference condition, but are usually still intact; ecosystem processes are restorable; sometimes the best remaining condition in watersheds with many human impacts; restoration priority.

4 = *poor* (bottom 16–100%, values 2,109–14,055): many stressors present; land use is majority to completely human-created; ecosystem processes and functions are severely altered or disrupted and outside the range of variation found in the reference condition; ecosystem processes are occasionally restorable, but may require large investments of energy and money to succeed, or are difficult or not feasible to restore.


Landscape Integrity
1 = very good (top 1%, values 0 – 141); absence or minimal human disturbances; zero to some stressors present, but threats can be present; land use almost completely not human-created; equivalent to reference condition; conservation, restoration, or maintenance priority.
2 = good (2 - 5%, values 142 – 703); landscape deviates from the minimally disturbed class based on existing landscape impacts (often includes wildland-urban interface); some stressors present; majority of land use is not human-created; this
is the often the best attainable condition in areas where human impacts are present; ecosystem processes and functions are typically within natural ranges of variation found in the reference condition, but threats exist; usually reference condition; conservation, restoration, or maintenance priority.
3 = fair (6 - 15%, values 704 – 2,108); several to numerous stressors present; land use roughly split between human-created (often includes agricultural land) and non-human-created;
ecosystem processes and functions are impaired and somewhat outside the range of variation found in the reference condition, but are usually still intact; ecosystem processes are restorable; sometimes the best remaining condition in watersheds with many human impacts; restoration priority.
4 = poor (bottom 16 - 100%, values 2,109 – 14,055); numerous to many stressors present; land use is majority to completely human-created; ecosystem processes and functions are severely altered or disrupted and outside the range of variation found in the reference condition; ecosystem processes are occasionally restorable, but may require large investments of energy and money to succeed, or very difficult or not feasible to restore.
Landscape Integrity
Very Good
Good
Fair
Poor
Bailey's Ecological Section
BRITISH COLUMBIA
WASHINGTON
OREGON
MONTANA
WYOMING
NEVADA
UTAH
OKANOGAN HIGHLANDS
FLATHEAD VALLEY
BITTERROOT MOUNTAINS
PALOUSE PRAIRIE
IDAHO BATHOLITH
BLUE MOUNTAINS
BEAVERHEAD MOUNTAINS
YELLOWSTONE HIGHLANDS
CHALLIS VOLCANICS
NORTHWESTERN BASIN AND RANGE
SNAKE RIVER BASALTS
OWYHEE UPLANDS
OVERTHRUST MOUNTAINS
BEAR LAKE
NORTHWESTERN BASIN AND RANGE
N
W
E
S
0 25 50 100 Kilometers
0 25 50 100 Miles
Sources: USGS, ESRI, TANA, AND
6/4/2015/as

Threats and Actions

To classify threats and conservation actions, we used the International Union for Conservation of Nature (IUCN)–Conservation Measures Partnership (CMP) Threats and Actions Classifications framework. The SWAP considers threats regardless of their origins (e.g., local, state, regional, national, and international) where relevant to Idaho's species and habitats. Similarly, where relevant, the plan describes conservation actions for Idaho species and habitats that could be addressed by federal resource management agencies or regional, national, or international partners and shared with other states (e.g., out-of-basin fish passage, threats on wintering grounds). Threats and conservation actions for species are described in the species assessments (Appendix F) as well as each of the 14 ecological section plans.

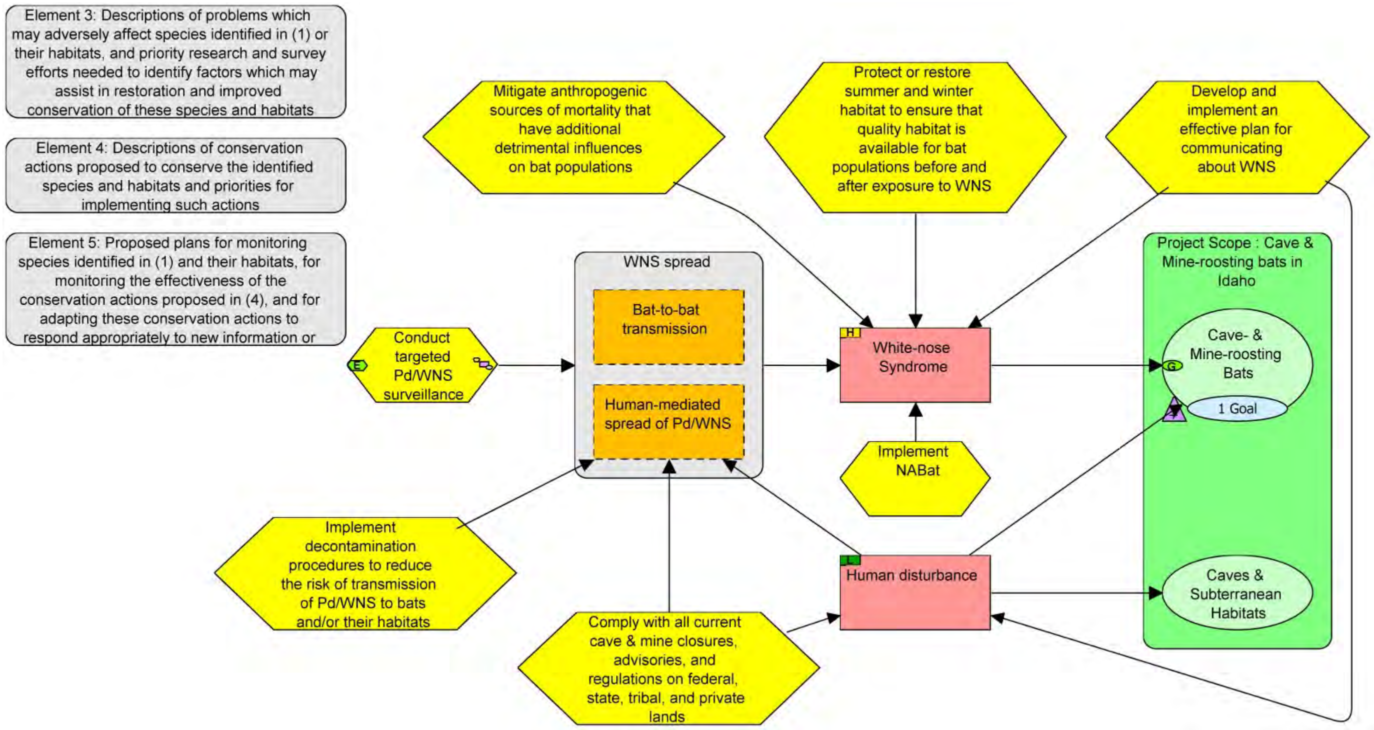
Monitoring

As described in *Conceptualizing and Planning Conservation Projects and Programs: A Training Manual* (FOS 2009), we define monitoring as the periodic process of gathering data related to the project goals and objectives. Based on methods outlined in the Training Manual, the Open Standards (CMP 2013), and *Measuring the Effectiveness of State Wildlife Grants* (AFWA 2011), we plan to develop a formal monitoring plan that we can use to evaluate the assumptions in our results chains and to track progress in achieving our stated objectives. In doing so, the plan will enable us to identify the resources needed for implementation, a timeline for data collection and analysis, and a reflection of potential risks that we should consider. The target audience for our monitoring is the Idaho Department of Fish and Game and its partners and stakeholders, specifically, the 14 ecological section teams, which we consider adaptive management teams for SWAP.

We plan to develop specific indicators that we will use to collect and analyze the data required to meet our information needs. These indicators must meet the criteria of being measurable, precise, consistent, and sensitive and tied explicitly to the objectives identified in the SWAP for each of the 14 sections and that address both species and habitats. We had already begun work on this in the initial 14 section plans in Miradi and some species and habitats already have indicators for monitoring.

Conceptual models

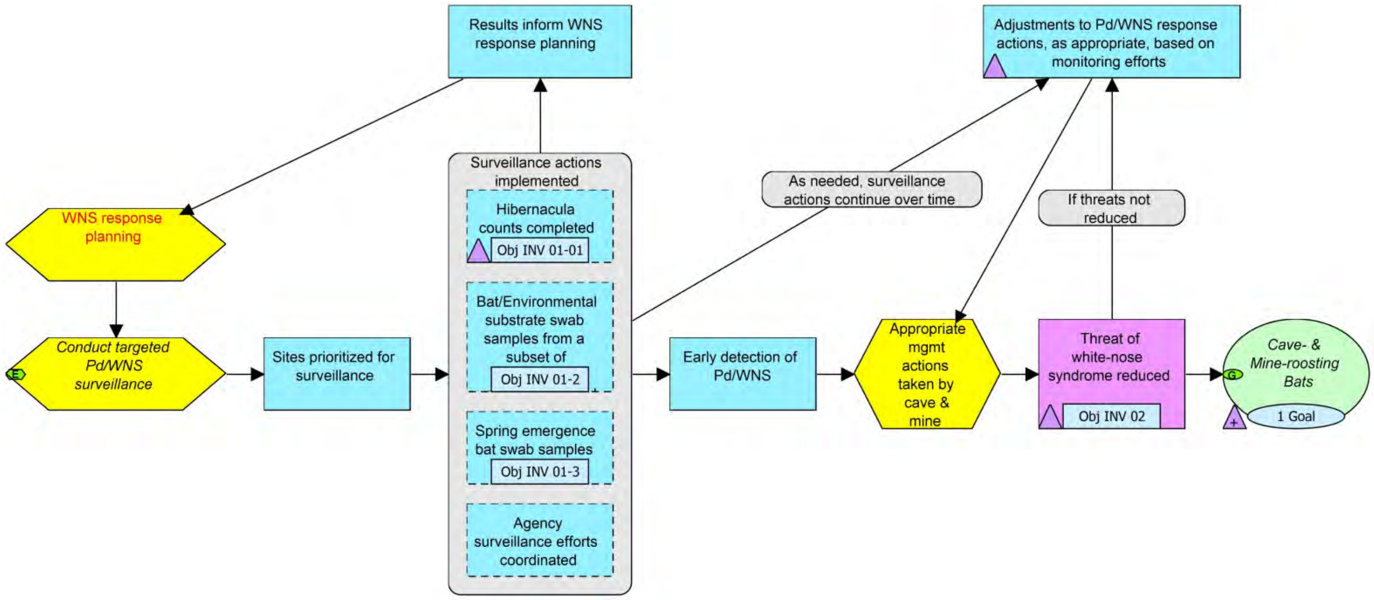
A conceptual model is a diagram of a set of relationships between certain factors that are believed to impact or lead to a conservation target. The example conceptual model in Fig. 2 depicts 2 threats to bats, white-nose syndrome and human disturbance. Initial work for the 14 section plans in SWAP began by developing such conceptual models. These provided the framework for the materials in this plan.



Legend Table
Target
Direct Threat
Contributing Factor
Strategy
Goal

Fig. 2. Conceptual model showing bats and threats of white-nose syndrome and human disturbance

In Fig. 3, a results chain shows the desired results (e.g., threat of white-nose syndrome reduced), the causal links (i.e., if . . . then statements; e.g., if we detect *Pd*/WNS, then appropriate management actions are taken), demonstrates change (e.g., improve, increase, or decrease), reasonably complete (i.e., sufficient boxes to construct logical connections but not so many that the chain becomes overly complex), and simple (one result per box). We plan to construct results chains to monitor species and habitats identified as priorities in each of the 14 ecological section plans of SWAP. Example results chains for different kinds of actions are provided in (AFWA 2011). We will use those as templates to guide our efforts.



Legend Table
Target
Intermediate Result
Threat Reduction Result
Strategy
Goal
Objective
Indicator

Fig. 3. White-nose syndrome results chain with potential indicators

Review and Revision

In accordance with the 2007 FWS–AFWA Guidance for Wildlife Action Plan Review and Revisions (2007 Guidance), the Idaho Department of Fish and Game will review and revise the entire action plan by 2025 October 1. Prior to the intent-to-revise notification, we will create a project management chart that identifies milestones, timelines, resources needed, deliverables, and staff roles. Upon submitting the plan, the Department will also include a summary of significant changes, where in the plan those changes can be found, and documentation that describes how the revised version of the action plan adequately addresses the eight required elements, including an up-to-date public review process specified in elements 7 and 8; we will also include a "road map" to assist the reviewer in locating revisions in the action plan.

In the meantime, and within the constructs of the 2007 Guidance, the Department intends to incorporate new information and changing circumstances (including responding to emerging issues) into the action plan to ensure that it becomes a dynamic and adaptive document.

The 2012 SWAP Best Practices Voluntary Guidance explicitly recommended the use of the *Open Standards for the Practice of Conservation* http://cmp-openstandards.org/ as a best practice. The *Open Standards* represents a cyclical process of review and revision that transforms ordinary management into true adaptive management, which is called for in element 5 of the eight required elements, i.e., ". . . and for adapting these conservations actions to respond appropriately to new information and changing conditions." To accomplish this, we will maintain a dedicated dialogue with federal, state, and tribal agencies, nongovernmental organizations, private consultants, and the public—thus maintaining an adaptive community-based approach to conservation and management; and we will reconvene at least annually each ecological section adaptive management team to discuss successes, challenges, and opportunities for implementing SWAP.

We also intend to update the underlying data that informs the plan. For example, the Idaho Fish and Wildlife Information System (IFWIS), housed within the Department, is a comprehensive information system for standardizing data on fish, wildlife, and plants in Idaho. The Idaho Species Diversity Database—the most comprehensive repository for site-specific data on Idaho's fish, wildlife, and plant diversity—is maintained by IFWIS under the stewardship of the Wildlife Diversity Program at the Idaho Department of Fish and Game. Data acquired through SWAP implementation (in particular SWG-funded projects) and monitoring will likewise be entered into the database. IFWIS is readily accessible via the Web and these observational data will continue to inform ongoing SWAP development, particularly with respect to distributional data on SGCN, which will be used to inform the range and area of occupancy factors in the conservation status assessments. With respect to status under other agency authorities (e.g., ESA, US Forest Service Northern Region and Intermountain Region, Bureau of Land Management, IDAPA classification, NatureServe global ranks), we will likewise report the most current status in the revised SWAP and endeavor to keep these updated in our SWAP as they change.

Scientific and English common names of vertebrates and invertebrates, including species of greatest conservation need, will be updated to reflect the most current taxonomy of the respective taxonomic groups, e.g., American Fisheries Society, American Ornithologists' Union (soon to be American Ornithological Society effective late October 2016), Society for the Study of Amphibians and Reptiles, Checklist of North American Mammals North of Mexico, etc.

We will continue to use the World Conservation Union (IUCN)–Conservation Measures Partnership (CMP) Threats and Actions Classification and update SWAP to reflect any changes in the classification. The use of such a common nomenclature not only facilitates cross-project learning but also allows us to create general summaries for broader organizational purposes. As new information becomes available on threats and conservation actions, we will update relevant sections of SWAP to reflect these changes.

We will evaluate annually the conservation status of species as new information becomes available on the 8 core factors (range extent, area of occupancy, population size, number of occurrences, number of occurrences or percent area with good viability/ecological integrity, overall threat impact, long-term trend, and short-term trend). In 2015, NatureServe released an updated version of the Conservation Status Rank Calculator (the Calculator) (NatureServe 2015c), used to assess conservation status of species and ecosystems. However, we were already well underway with our status assessment and so used Version 3.1 from July 2012 (with default weighting) in the current plan. We plan to use the new version for future status assessments.

The methodology and literature on prioritizing species for conservation action (i.e., that can be used to inform the selection of species of greatest conservation need), continues to evolve. We intend to stay abreast of current methodology for consideration in revising our criteria and process for identifying SGCN.

We expect that in the next 10 years, land cover data will continue to improve. For example, in early 2015, the National Gap Analysis (GAP) and Landscape Fire and Resource Management Planning Tools (LANDFIRE) programs announced they are teaming up to deliver detailed land cover maps that support wildland fire and species conservation planning for the nation. The 2016 National Terrestrial Ecosystems Dataset for the United States will be a comprehensive mapping effort that uses new satellite imagery (Landsat 8), point and field data to create a new base map data suite that represents contemporary conditions. This effort will leverage changes and advancements in data and science to support the development and production of the next generation vegetation layer.

In September 2016, the 2 programs collaborated to form a Remap Strategy Team (RST). The RST is researching improvements in land cover mapping methodology and has selected 7 prototype areas representing the major ecosystems across the country to test a variety of modeling methods to determine the best strategy for implementing Remap. The complete remap of the US vegetation to 2016 conditions is projected to be completed by 2019. Once available, we will use this new GAP–Landfire National Terrestrial Ecosystems land cover data to update SWAP.

In addition, currently underway in Idaho is a project to use existing spatial data and remote-sensed data layers combined with ground surveys to develop a prototype fine-scale vegetation map that can ultimately be used to predict nutritional conditions for a variety of wildlife. We also plan to use this fine-scale vegetation map to inform SWAP revisions.

Finally, to ensure that the general public has ample opportunity to review and comment on the revised plan, and in the spirit of continual improvement, we plan to post the newly approved plan on the Department's Web site and include an online comment form where anyone can post comments on the plan. This will give us an interactive and ongoing platform for incorporating new information into the plan. The Department also has a subscription service on its Web site that notifies subscribers when changes have been made to content. Currently underway is a project to increase the usability and accessibility of the Idaho SWAP by creating a Web-based, interactive, and database-driven application that allows the user to access information in SWAP based on the user's particular interest, e.g., a given section, species, threat, conservation action, etc. Prior to submitting a comprehensive review and revision in 2025, we will provide a formal public review process over a 30–60 day period.

Coordination

Extent of coordination

The Idaho Department of Fish and Game engaged a broad array of federal, state and local agencies, Indian tribes, nongovernmental organizations, and others in the SWAP revision. Members of the entire SWAP team are listed at the beginning of the document under the heading "Idaho State Wildlife Action Plan Core Team." In addition, individuals and organizations who directly contributed to the SWAP are acknowledged under the heading titled "Other Contributors." For a list of section team members, see each section plan under the heading titled "Section Team." In addition to engaging external partners and stakeholders, we integrated the revision effort throughout the Department including multiple bureaus, programs, and regions. A list of agencies, organizations, and entities that we coordinated with during the SWAP revision follows:

- Boise State University, Intermountain Bird Observatory
- Bureau of Land Management (US)
- Bureau of Reclamation (US)
- Defenders of Wildlife
- Ducks Unlimited
- Eastern Idaho Aspen Working Group
- Essig Museum of Entomology
- Foundations of Success
- Gonzales–Stoller Surveillance, LLC
- Greater Yellowstone Coalition
- Hancock Forest Management
- Idaho Army National Guard
- Idaho Bat Working Group
- Idaho Bird Conservation Partnership
- Idaho Cattle Association
- Idaho Department of Environmental Quality

- Idaho Department of Fish and Game
- Idaho Department of Lands
- Idaho Department of Parks and Recreation
- Idaho Fish and Game Commission
- Idaho Governor's Office of Energy Resources
- Idaho Governor's Office of Species Conservation
- Idaho Lands Resource Coordinating Council
- Idaho Mining Association
- Idaho Partners in Amphibian and Reptile Conservation
- Idaho Power Company
- Idaho Soil and Water Conservation Commission
- Idaho State Department of Agriculture
- Idaho State University
- Idaho Sustainable Forestry Initiative Implementation Committee
- Idaho Transportation Department
- Kootenai Tribe of Idaho
- Latah Soil and Water Conservation District
- Montana State University
- National Park Service
- Natural Resources Conservation Service (US)
- Nez Perce Soil and Water Conservation District
- Nez Perce Tribe
- Northwest Nazarene University
- OdonataCentral
- Oregon Department of Fish and Wildlife
- Owyhee County
- Pacific Northwest Moths
- Potlatch Forest Holdings, Inc.
- POWER Engineers, Inc.
- Shoshone–Bannock Tribes
- Shoshone–Paiute Tribes
- Sitka Technology Group
- Stimson Lumber Company
- Teton Regional Land Trust
- The College of Idaho
- The College of Idaho Orma J Smith Museum of Natural History
- The Field Museum
- The Lepidopterists' Society
- The Nature Conservancy in Idaho
- Trout Unlimited
- Trumpeter Swan Society
- University of Idaho
- University of Idaho William F Barr Entomological Museum
- US Army Corps of Engineers
- US Department of Defense
- US Department of Energy

- US Department of the Interior, Northwest Climate Science Center
- US Fish and Wildlife Service
- US Fish and Wildlife Service, Great Basin Landscape Conservation Cooperative
- US Fish and Wildlife Service, Great Northern Landscape Conservation Cooperative
- US Forest Service Intermountain Region (R4)
- US Forest Service Intermountain Region (R4), Boise National Forest
- US Forest Service Intermountain Region (R4), Caribou–Targhee National Forest
- US Forest Service Intermountain Region (R4), Payette National Forest
- US Forest Service Intermountain Region (R4), Sawtooth National Forest
- US Forest Service, Moscow Forestry Sciences Laboratory
- US Forest Service Northern Region (R1), Idaho Panhandle National Forests
- US Forest Service Northern Region (R1), Nez Perce–Clearwater National Forests
- US Forest Service, Rocky Mountain Research Station
- US Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory
- USGS Forest and Rangeland Ecosystem Science Center
- US Navy Acoustic Research Detachment
- Washington Department of Fish and Wildlife
- Western Washington University
- Xerces Society

As we began the SWAP revision effort, we pilot-tested an approach to revising the plan using two of the state's 14 ecological sections: Owyhee Uplands and Bear Lake. The Department hosted an expert/stakeholder review meeting for these initial pilot sections on 2014 August 25–27 at the Idaho Department of Fish and Game Headquarters office in Boise (23 attendees). This meeting provided a chance for key experts and stakeholders from each of these sections to provide review, feedback, and input into these draft plans as well as our overall process. The target audience for the workshop was key experts and stakeholders who could provide input into the plans for at least one of the pilot ecological sections and who would be important for us to work with in implementing the final plan. The meeting objectives were to:

1. Provide an overview of the proposed process for 2015 revision of Idaho State Wildlife Action Plan

2. Begin to get feedback/input from key experts and stakeholders on draft plans for 2 pilot sections

3. Get input on proposed plans for completing the 2015 Idaho State Wildlife Action Plan revision and ongoing adaptive management of this work (ideally participant commitment to work with us)

Subsequent to this initial workshop, we held other in-person workshops as well as Webinars and face-to-face meetings with key partners and stakeholders. We held a half-day Owyhee Uplands Adaptive Management Team Meeting on 2014 December 16 (11 attendees). We held another expert/stakeholder review meeting for the southern sections (Snake River Basalts, Yellowstone Highlands, Overthrust Mountains, Northwestern Basin & Range, Owyhee Uplands) on 2015 January 26–27 in Pocatello (49 attendees). The Department hosted an expert/stakeholder review meeting for the central sections (Blue Mountains, Idaho Batholith, Challis Volcanics, Beaverhead Mountains) on 2015 Jan 28–29 (28 attendees). Finally, we hosted an expert/stakeholder review meeting for the northern sections (Okanogan Highlands, Flathead Valley, Bitterroot Mountains, Palouse Prairie) on 2015 February 2–3, in Coeur d'Alene (20 attendees).

Because not all of our key partners and stakeholders were able to attend the initial workshops, we held additional meetings and workshops for some. For example, because the Caribou–Targhee National Forest is the major landowner in the Yellowstone Highlands, and therefore has the greatest capacity for implementing conservation within that section, we held a 1-day Workshop on 2015 February 13 to get their input on the Yellowstone Highlands Section Plan (9 attendees).

We met with the Idaho Department of Fish and Game Operations Team during its 2015 April 17 meeting to discuss the status of the SWAP revision and to ensure that SWAP would be aligned with existing Department management plans.

We held a working session with the Nez Perce Soil and Water Conservation District (NPSWCD) during its Board Meeting on 2015 May 21 in Lewiston to get the Board's input on the draft Palouse Prairie Section (10 attendees). Conservation districts are legal subdivisions of state government that direct and administer local conservation programs to conserve natural resources. There are 51 conservation districts in the state of Idaho and approximately 3,000 districts in the US. The mission of the NPSWCD is to coordinate technical and financial resources for the implementation of conservation practices and projects that enhance and conserve Idaho's natural resources.

To get input from the forest industry, we held a 1-day expert/stakeholder review meeting in Lewiston on 2015 May 22 (6 attendees). We followed that with a 1-day SWAP coordination workshop 2016 June 1 with Idaho Department of Lands, Forest Action Plan staff, to work in Miradi to identify and rate threats to forest systems, primarily focused on the northern Idaho sections, as well as identify appropriate strategies and actions to address them.

In June 2015, we conducted a 1-month internal Department review of the initial draft SGCN list, species assessments, and Miradi section plans. This led to the Department's Operations Team creating an Executive SWAP Oversight Committee comprised of Deputy Director Kiefer, 3 regional supervisors (Panhandle, Magic Valley, and Upper Snake regions), Wildlife Bureau Chief, Wildlife Diversity Program Manager, and State Wildlife Action Plan Coordinator. The Committee's vision for SWAP was that it serve as a work plan of prioritized species, threats, and strategies, focused on very high, high, and medium threats. The Committee also wanted to see a focus on precluding species from becoming listed as threatened or endangered under ESA.

To ensure the support of the Idaho Fish and Game Commission (Commission), and to keep the Commission apprised of the SWAP revision process, we provided briefing materials and regular updates at the Commission's quarterly and special meetings. On 2015 May 20, we provided an information-only SWAP update to the Commission recommending that we proceed with the SWAP revision for submission later that year. We followed up by providing an update on SWAP development and an outline for further review during the 2015 November 19 Commission meeting. On 2015 November 30, we provided draft SWAP materials to the Commission for review and over the next 2 weeks, held one-on-one meetings with each of the Department's 7 commissioners and regional staff to address any questions or concerns they might have with respect to SWAP. To obtain consensus from the Commission for the Department to proceed with the public review of the draft SWAP, we held a special meeting with the Commission on 2015 December 14. Finally, during the 2016 Jan 28 meeting, we provided an update summarizing the results of the public comment period as well as other significant updates to the SWAP since the Commission's review of draft materials in early December. We also described the next steps for submitting the final draft SWAP to the US Fish and Wildlife Service for Regional Review Team review.

Although not required to address coordination with neighboring states in the revision process, throughout the SWAP planning process, we participated in periodic coordination conference calls among adjacent northwest states (Oregon and Washington) and the US Fish and Wildlife Service (R1) Regional Office including an in-person meeting hosted by FWS in Portland, OR. In addition, we coordinated with Utah with respect to our Miradi section planning efforts.

Continued coordination

Some of the public comments we received on the draft SWAP will require additional coordination with key partners and stakeholders to ensure that we appropriately address their concerns with respect to how information is characterized in SWAP. This level of coordination will also build capacity for implementing SWAP. For example, as participants in the Sustainable Forestry Initiative, Potlatch Forest Holdings, Inc., is obligated to support the wildlife conservation efforts identified in the SWAP. Potlatch is a major forest landowner in the state and committed to supporting wildlife management on its 791,000 acres in north and central Idaho. In reviewing the draft SWAP, Potlatch expressed concern that the actions identified reflected a general lack of understanding of forest management in Idaho and emphasized the importance of accurately stating the role and effects of forest management in wildlife management. Potlatch noted that all Idaho stakeholders are faced with limited resources for research and management action, and therefore emphasized the importance of effectively allocating these resources. From Potlatch's perspective, inaccurate statements on the role of forest management on species in SWAP invites lawsuits and regulation that further reduces the resources available for sound wildlife management. Consequently, Potlatch encouraged IDFG to partner with its sister agencies the Idaho Department of Lands (IDL) and Idaho Department of Environmental Quality, the University of Idaho, and external partners such as Potlatch to start a continuing education effort toward better understanding of forest management in the state of Idaho. We plan to work with Potlatch and others in this regard.

Likewise, similar issues were expressed by the Idaho State Department of Agriculture (ISDA) with respect to agriculture and livestock. ISDA recognizes that wildlife management has broad implications to the state of Idaho and suggested that references to agriculture and livestock should be based on the best available science and appropriately balanced taking into consideration the multiple natural resource goals important to Idaho. ISDA recommended that the Department continue to engage partners to ensure that viable conservation actions for species are implemented in the SWAP. Accordingly, we plan to continue to coordinate with agencies/entities such as the ISDA, Idaho Soil and Water Conservation Commission, Soil and Water Conservation Districts, Owyhee County, and Idaho Cattle Association—all have proven invaluable to the SWAP revision process.

The Idaho Governor's Office of Species Conservation (OSC) encouraged the Department's continued engagement of all stakeholders in collaborative efforts such as SWAP and its importance in ensuring that appropriate strategies to conserve fish and wildlife species are balanced with predictable levels of land-use activities. OSC acknowledged that the revised SWAP will be a valuable reference document for OSC as it begins to refocus and complete a Rare and Declining Species Policy for the State of Idaho. With these planning tools, the State of Idaho will be better equipped to further the conservation of fish and wildlife in Idaho balanced with the economic vitality of the state. We share OSC's desire for continued collaboration on these important species conservation planning efforts.

Another recommendation from key stakeholders was that we consider adding additional criteria to our process for selecting SGCN. We plan to follow up with these stakeholders to discuss ways to improve the existing process. We had initially considered other approaches and criteria for selecting SGCN, including more quantitative approaches. In moving forward, we will continue to explore better ways to prioritize and work with our partners to find a system that works for Idaho. Central to this will be coordination with the US Fish and Wildlife Service (Idaho Fish and Wildlife Office) in prioritizing species for its Strategic Habitat Conservation Initiative. In addition, coordination with the Bureau of Land Management Idaho, and US Forest Service regions 1 and 4, on their sensitive species designations will contribute to more consistency among our respective species lists. The more aligned we are in Idaho in terms of setting conservation priorities, the more effective we can be at achieving mutual conservation goals.

Another important need is to continue to coordinate with the IDL on revisions to the Idaho Forest Action Plan (FAP) and to find ways to align both the FAP and SWAP. IDL was instrumental in assisting with the revision of SWAP in identifying threats to forests and in developing appropriate objectives, strategies, and actions.

Finally, through the SWAP revision effort, we have gained support from a broad array of partners and stakeholders including federal, state, and local agencies, tribes, applied partnerships, industry, and conservation groups. We will continue to ensure that we address the concerns of partners and stakeholders as we continue to refine SWAP and look forward to working together to implement the plan.

Public Participation

On December 30, 2015, we issued a news release announcing the availability of draft SWAP materials for review on IDFG's Web site and held a 21-day public comment period. Upon the news release, the Great Basin Landscape Conservation Cooperative shared the SWAP news release notice on GBLCC's Facebook site and reached 397 people; the post was subsequently picked up and shared by the Society for Range Management. Likewise, the news release was shared among the membership lists of both the Idaho Bat Working Group and the Idaho Bird Conservation Partnership. We also shared the news release with partners and stakeholders who had been involved in SWAP, which included 285 individuals. To facilitate review by the public, we created a Web form on the IDFG Web site for submitting comments and provided several questions to guide the review.

During the public comment period, IDFG hosted 3 2-hour Webinars for partners and stakeholders who had been involved in the process; each Webinar was recorded and made available to everyone on the SWAP distribution list (285 individuals). The first Webinar focused on the southern Idaho sections, the second on the central sections, and the final Webinar on the northern sections. The Webinars gave stakeholders an opportunity for interactive discussion about SWAP and particular issues that had been raised. For example, one of the primary topics was the predicted distribution maps, some of which had overpredicted the distribution for certain species, e.g., Fisher, American White Pelican, and American Bittern. Consequently, we were able to obtain better models to incorporate into our final draft for these species. The other main issue raised was about certain species that particular individuals felt should have been identified as SGCN. For example, some participants questioned the omission of the ESA-listed Bull Trout, 3 cutthroat trout species, Canada Lynx, and Caribou, American Bison, among others. Following the Webinars, we held follow-up coordination phone calls with some of our partners to discuss these species. In the end, based on the best available information on the status of these species in Idaho, we only added two of the recommended species to the SGCN list: Northern Leatherside Chub and Caribou.

We received 45 public comments submitted via the Web form; additional reviewers submitted comments via email directly to Idaho's SWAP Coordinator. Over 61 organizations/agencies (including in some cases comments by multiple individuals within the organization/agency), and private individuals submitted comments on the SWAP. Of these, 60% of respondents who commented via the Web form strongly agreed/somewhat agreed that they supported the Idaho State Wildlife Action Plan as written (if we removed the cutthroat trout respondents, this percentage would have increased significantly). In response to the second question we posed, 80% of respondents who commented via the Web form strongly agreed/somewhat agreed that the State Wildlife Action Plan will be a useful document for the State of Idaho. The most consistent response among reviewers was with respect to the third question; 96% of respondents who commented via the Web form strongly agreed/somewhat agreed that it is important to have a prioritized list of species of greatest conservation need. Finally, 53% of respondents strongly agreed/somewhat agreed that in general, the plan addresses the primary conservation challenges to species and their habitats. Again, if we removed the cutthroat trout respondents, this percentage would have increased significantly.

The most unexpected result of the public review was the controversy generated over Yellowstone Cutthroat Trout not having been identified as a SGCN in the 2015 SWAP revision. This species was a SGCN in the 2005 plan and many respondents requested to include it as a SGCN in the 2015 plan. Of those who provided public comments on Yellowstone Cutthroat Trout, most were concerned that not including it as a SGCN in SWAP would compromise their ability to get funding and impact local economies of eastern Idaho. One NGO issued an "action alert" through an email blast urging its membership to provide comments asking that Yellowstone Cutthroat Trout be included as a SGCN. Unfortunately, the action alert misrepresented our process and criteria for selecting SGCN and many of those who responded to the alert simply asked us to add the Cutthroat but without information to substantiate their request. Follow-up meetings with the IDFG Fisheries Bureau staff resulted in the decision that Yellowstone Cutthroat Trout did not meet the criteria for SGCN.

The Idaho Fish and Game Commission met January 27–28, 2016 with a public hearing in Boise January 27. The SWAP was on the Commission agenda and the SWAP Coordinator presented a summary of public comments to the Commission on January 28, 2016, where we sought and obtained the Commission's approval to submit the draft SWAP to the US Fish and Wildlife Service Regional Review Team for review. During the public hearing, one individual provided testimony to the Commission on SWAP requesting that we consider adding Moose to the SGCN list. We had originally considered Moose as a SGCN because in some parts of the state the species is experiencing declines. However, in other parts of the state the populations are thriving. From a statewide perspective, Moose does not meet the criteria for SGCN and so we did not add it to the list. However, we will monitor the status of Moose and if other populations begin to show declines, we will reconsider it as a SGCN.

Some individuals and groups asked for a formal response explaining why certain species did not make the 2015 SGCN list. We plan to follow up with these groups post-submission.

One way we plan to continue to involve the public in ongoing SWAP development and implementation is to further develop the SWAP Web page hosted by the Department. In addition, we had created a Web page on Miradi Share as part of our revision and will launch the site to the public once we're ready for public viewing.

Ecological Sections

This chapter contains high-level summaries of the adaptive voluntary conservation management plans for all 14 of Idaho's ecological sections (hereafter sections; Fig. 1). These plans represent a substantial advancement of the original section plans developed as part of the 2005 Idaho State Wildlife Action Plan (formerly Idaho Comprehensive Wildlife Conservation Strategy; IDFG 2005). The original plans had static descriptions of each section as well as lists of species of greatest conservation need, including priority habitats in each section. These updated plans now contain the beginnings of a true strategic plan that outlines the ecological conditions in each section as well as prioritized conservation strategies.

In each section, we summarize general species habitat associations and/or requirements and indicate habitat management priorities and opportunities. We tier these priorities and management direction to existing species management plans when possible. In addition, we indicate priorities for inventory and monitoring, applied conservation research, disease management, and other species-specific conservation priorities.

We consider the segregation of species management priorities and habitat management priorities to be important. State species management is the responsibility of the Idaho Department of Fish and Game (IDFG). The listed actions will be important for the development and monitoring of work plans and for maintaining programmatic focus and coordination. Habitat management is the responsibility of land managers and other regulatory agencies. Nevertheless, management priorities for wildlife are important to communicate, and this document provides an opportunity to articulate those priorities for important habitats and to provide opportunities for partnerships.

Overview of Methodology for Section Plans

A key premise behind the section plans presented in this report is that we view each section as a long-term "project" in which cross-organizational working groups seek to coordinate their ongoing work to achieve mutually agreed upon conservation goals and objectives. Our goal is to produce an effective plan that can frame the basis for ongoing adaptive management of conservation needs in each section.

These section plans were developed in partnership with the nonprofit Foundations of Success following the Conservation Measures Partnership's *Open Standards for the Practice of Conservation* (CMP 2013) (Fig. 2). The Open Standards provide an adaptive management framework for designing, managing, monitoring, and learning from conservation projects. Key advantages of using the Open Standards include the following:

- **A Framework for Making and Documenting Strategic Choices**—True strategic planning involves specifying and communicating not just what a project team WILL focus on, but also what the team WILL NOT do—it is about making systematic choices about how best to allocate time and funding. The Open Standards help project teams make judicious choices by helping them to strategically select focal conservation targets, assess the current viability of each target, consider and prioritize threats to these targets, identify key leverage points in each system, and then identify and rate potential strategies to restore degraded targets and/or mitigate key threats.

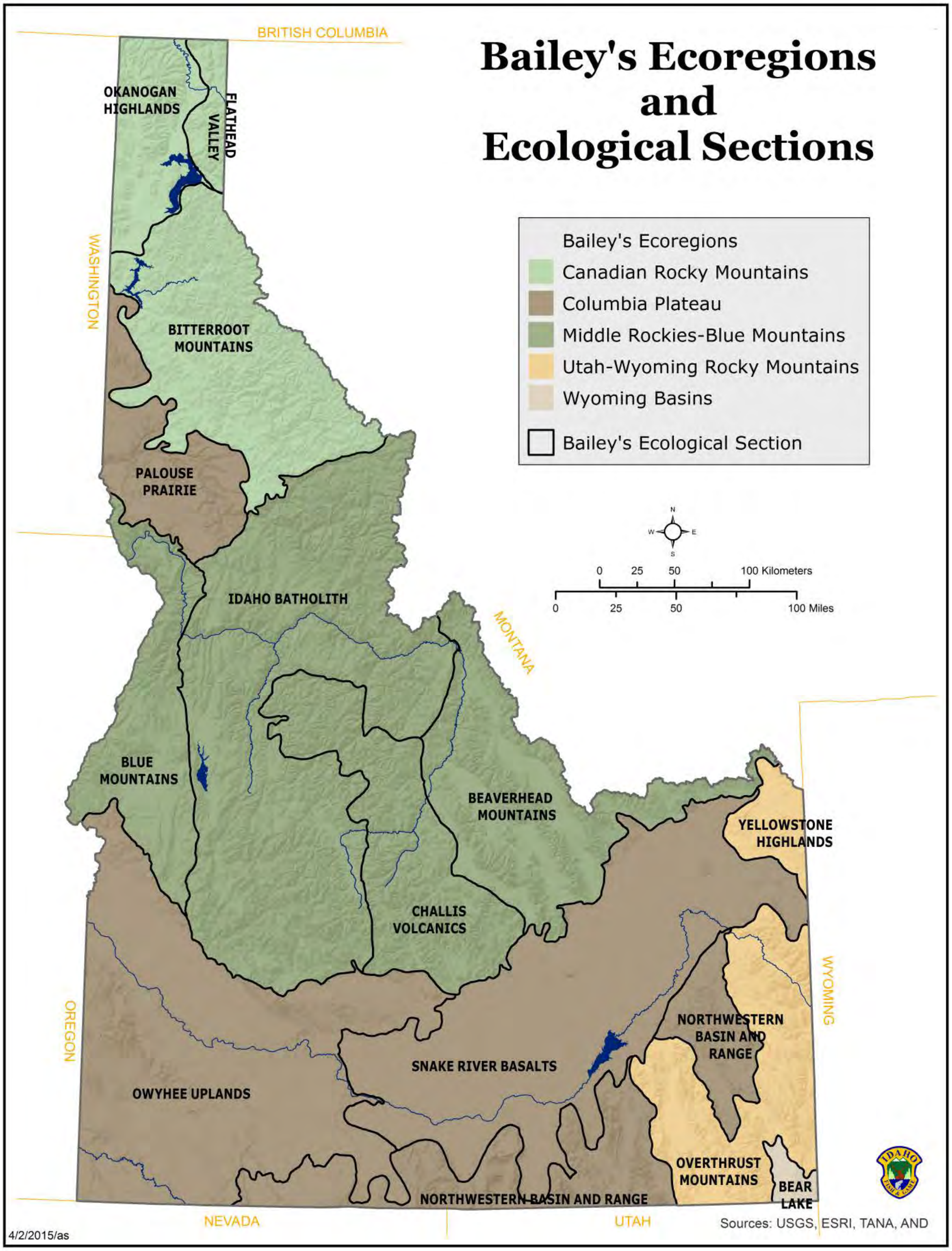


Fig. 1 Map of Idaho's 14 ecological sections

- **A Common Neutral Language**—An increasing number of conservation implementing organizations, agencies, and funders use the Open Standards and thus this growing uniformity provides a common language for sharing and coordinating conservation work across organizations and cultures. The Open Standards can also be cross-walked to other similar planning systems such as the Strategic Habitat Conservation framework used by the US Fish and Wildlife Service.
- **Collaborative Tools**—Key Open Standards tools like Miradi Software (CMP and Sitka Technology Group 2013–2016) and Miradi Share (FOS 2016) can be used to capture results in a common format and to share them electronically over the wires across the project team and with stakeholders.
- **The Ability to Harness the Wisdom of Crowds**—The Open Standards provides a common framework through which diverse groups of stakeholders can share their perspectives and mental models, discuss options, and arrive at a shared consensus of both problems and solutions. This ability to pool the collective knowledge of many different stakeholders results in a solution that is generally both robust and accurate.
- **A Platform for Iterative Adaptive Management**—Key outputs of this process are the section plans provided in the remainder of this chapter. Perhaps more importantly, however, are the groups of stakeholders who came together to create these initial plans and who will hopefully form the basis of cross-organization/interagency working groups that can practice ongoing adaptive management of these sections in the coming years.

Each section plan was developed through a multistep, metacognitive process:

1. A small working group of IDFG staff and key experts developed an initial draft of a plan for each section using the Open Standards framework.
2. This draft plan was then vetted and refined at an in-person workshop attended by a wide variety of stakeholders from key state and federal agencies, tribes, NGOs, and other partners.
3. Feedback from each workshop was then incorporated into a revised version of each plan, which was sent out within the Department for additional internal review and comment.
4. The current version of each plan represents continued work by Department staff to improve each section plan. Existing content is the sole responsibility of the Department.
5. We will continue to update and refine these plans as we receive additional comments.
6. Each plan will ultimately provide the basis for ongoing adaptive management work by the project teams established in each section.

Fig. 2 The CMP Open Standards for the Practice of Conservation. Source: http://cmp-openstandards.org/

A User's Guide to Section Plans

The following shows a guide to the materials presented in each section. These materials represent only a high-level summary of more detailed information developed by each section's working group. Guidance to steps in the Open Standards is available in the FOS training guide (FOS 2009).

Information in this chapter summarizes an ongoing adaptive management plan for the section

The section description provides a basic overview of the section

Ecological sections were selected as the "unit of analysis" for this work as they represent ecologically functional units and come from an external standard framework

12. Owyhee Uplands Section

Summary Plan: v. 2015-12-27

Section Description

The Owyhee Uplands Section is part of the Columbia Plateau Ecoregion. The Idaho portion, the subject of this review, comprises southwestern Idaho from the lower Payette River valley in the northwest and the Camas Prairie in the northeast, south through the Hagerman Valley and Salmon Falls Creek Drainage (Fig. 12.1, Fig. 12.2). The Owyhee Uplands spans a 1,200 to 2,561 m (4,000 to 8,402 ft) elevation range. This arid region generally receives 18 to 25 cm (7 to 10 in) of precipitation annually at lower elevations. At higher elevations, precipitation falls predominantly during the winter and often as snow.

The Owyhee Uplands has the largest human population of any region in Idaho, concentrated in a portion of the section north of the Snake River—the lower Boise and lower Payette River valleys, generally referred to as the Treasure Valley. This area is characterized by urban and suburban development as well as extensive areas devoted to agriculture. Among the conservation issues in the Owyhee Uplands include the ongoing conversion of agricultural lands to urban and suburban development, which further limits wildlife habitat values. The aridity of this region requires water management programs, including water storage, delivery, and regulation for agriculture, commercial, and residential uses. Agricultural fields are irrigated with either flood irrigation, mostly supplied by diversion from the Snake, Boise, and Payette rivers, or sprinkler irrigation supplied by groundwater pumping. Major hydroelectric and water storage reservoirs include CJ Strike and Swan Falls reservoirs on the Snake River. Reaches of the Boise and Payette rivers within the Owyhee Uplands are controlled by upstream dams.

Lower Deep Creek, Owyhee Uplands, Idaho © 2011 Will Whelan

In stark contrast, the portion of the Owyhee Uplands to the south of the Snake River is a topographically rugged, sparsely populated, and remote area. This area is high-desert sagebrush steppe. The Owyhee Mountain Range (oriented north-south in western Owyhee County) is the dominant landform with stands of quaking aspen (*Populus tremuloides* Michx.).

Focal conservation targets are selected to represent the overall wildlife values of the section; we start with "coarse-filter" ***habitat targets*** that contain "nested targets" within them

Habitat target names follow standard nomenclature

Some targets are mosaics of different habitat types while others represent human-created habitats that are important for wildlife

We add "fine filter" ***species targets*** that face specific threats and/or require separate conservation strategies beyond habitat conservation

This page contains high-level descriptions of priority threats in the section

Priority threats include those threats that have a "very high," "high," or "medium" impact on at least one target

Conservation Targets in the Owyhee Uplands

We selected 7 habitat targets (3 upland, 4 aquatic) that represent the highest priorities for wildlife conservation in the Owyhee Uplands as shown in Table 12.1. Species of greatest conservation need (SGCN) are associated with each habitat, i.e., "nested targets" (Table 12.2). The intent of the recommended "Objectives, Strategies, and Actions" is to direct resources toward improving the quality of these habitats for wildlife. Management of the habitat targets listed below will contribute to improving population viability for the species nested within them. Research and monitoring topics, such as species designation, ecological research, or planning, are summarized at the end of each target habitat if additional information is needed to support management programs. Such projects are often species-specific and include disease investigation and management.

Table 12.1 At-a-glance table of conservation targets in the Owyhee Uplands

Target	Target description	Target viability	Nested targets (SGCN)	
Semi-Desert Shrubland & Steppe–Saltbush Scrub	Combines "Semi-Desert Shrubland & Steppe" and "Saltbush Scrub." Xeric landscape dominated by salt desert scrub. In this section, often on ancient alkaline lacustrine deposits.	Fair to Good. In many areas, invasive weeds have affected plant diversity and created dense stands of annual grasses and forbs.	*Tier 2* *Tier 3*	Ferruginous Hawk Golden Eagle Burrowing Owl Short-eared Owl Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Great Basin Collared Lizard
Sparsely Vegetated Dune Scrub & Grassland	Bruneau Dunes, Weiser Dunes, Windmill Dunes, and other unnamed scattered dune complexes.	Fair. Large areas dominated by cheatgrass and other invasive annuals.	*Tier 1* *Tier 2*	Bruneau Dune Tiger Beetle Ant-like Flower Beetle Lined June Beetle
Sagebrush Steppe	Sagebrush steppe systems at all elevations across the Owyhee Uplands. This target comprises a variety of sagebrush types, habitat structure, and seral stages.	Poor to Very Good. Habitat is intact in good ecological condition in some areas, but in others, dominated by invasive annual grasslands with an altered fire regime.	*Tier 1* *Tier 2*	Greater Sage-Grouse Southern Idaho Ground Squirrel Morrison Bumble Bee Ferruginous Hawk Golden Eagle Burrowing Owl Sage Thrasher Sagebrush Sparrow

Target	Target description	Target viability	Nested targets (SGCN)	
Bat Assemblage	The Owyhee Uplands contains the full complement of bat species found in the state (14 spp.)	Good. Main concerns include fatality associated with wind energy, AML closures, and potential incidence of white-nose syndrome (WNS).	*Tier 2* *Tier 3*	Silver-haired Bat Hoary Bat Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis

Prioritized Threats and Strategies for Sagebrush Steppe

Very High rated threats to Sagebrush Steppe in the Owyhee Uplands

Increased frequency & severity of wildfire

The increased frequency and severity of wildfire is considered a primary threat to the sagebrush-steppe ecosystem and to the many sagebrush-steppe species that depend on it, including Sage-Grouse (Otter 2012, US Fish and Wildlife Service 2014). In the Desert and West Owyhee Greater Sage-Grouse Conservation Areas in particular (see Fig. 2-14; BLM 2015), wildfire is a more serious issue relative to other areas of the state (Otter 2012). The accelerated invasion of nonnative annual grasses—in particular cheatgrass and medusahead—and the spread of juniper into the sagebrush-steppe ecosystem (coupled with the effects of intensified drought and climate change), create conditions that lead to larger, more intense rangeland fires across the Great Basin (DOI 2015). This contributes to the ongoing fragmentation and loss of shrub-steppe habitats. Almost the entire extent of the Owyhee Uplands is rated as "very high" with respect to burn probability (DOI 2015).

Certain remote areas of the Owyhee Uplands, e.g., the intact Wyoming big sagebrush basin between the Bruneau Escarpment and the Bruneau River and the area south and west of the Owyhee River, are especially vulnerable to lightning-caused wildfire. Protection of intact sagebrush-steppe areas and restoration management of degraded areas is a priority for this key system. In terms of fire suppression, habitat management within the Greater Sage-Grouse Priority Habitat Management Area (PHMA) (BLM 2015) should be aggressive and is intended to maintain large tracts, habitat resiliency, and sustainability.

Viability analysis is used to systematically determine the status of each target; this draft has high-level viability estimates but subsequent drafts will have more empirically determined assessments using a common framework and set of indicators for each type of target

A key feature of this adaptive management approach is that additional information can always be added over time so it is okay to show uncertainty

For a more detailed description of the threat rating methodology, see (FOS 2009)

This part contains a high level summary of the strategies and conservation actions either being implemented or under consideration

Strategies roll up to objectives

This column identifies key SGCN that will benefit from a given objective, strategy, or action

Objective	Strategy	Action(s)	Target SGCNs
Manage wildfires to minimize loss of sagebrush habitat.	Improve fire suppression protocols and resource allocations to limit habitat losses to wildfire.	Support development and implementation of Rangeland Fire Protection Associations (RFPAs) (e.g., Idaho Code § 38-104B and Governor's Executive Order 2015-04) (Otter 2015). During high fire danger conditions, stage initial attack and secure additional resources closer to priority areas, with particular consideration of the West Owyhee, Southern, and Desert Conservation Areas to ensure quicker response times in or near Sage-Grouse habitat (BLM 2015). Create and maintain effective fuel breaks to modify fire behavior and increase fire suppression effectiveness based on criteria outlined in the Governor's Alternative (Otter 2012).	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Dark Kangaroo Mouse
Increase post-fire restoration success (DOI 2015)	Expand the use of native seeds and seedlings to accelerate efforts to improve and restore post-fire rangeland health (DOI 2015).	Reallocate use of native seed from ESR projects outside of PHMA or IHMA (or ESA-listed species habitat) to those inside it in years when preferred native seed is in short supply (BLM 2015). Collect native seed from across the distribution of the species for use in developing commercial	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Dark Kangaroo Mouse

Describes the project team that was involved in creating the initial section plan; a key feature of this approach is that it integrates perspectives of many different stakeholders involved in managing each section.

Owyhee Uplands Section Team

An initial version of the Owyhee Uplands Section project plan was completed for the 2005 Idaho State Wildlife Action Plan (formerly Comprehensive Wildlife Conservation Strategy). The Owyhee Uplands was selected as one of 2 initial pilot sections for the 2015 Idaho State Wildlife Action Plan revision. A small working group developed an initial draft of the section plan (Miradi v. 0.12), which was then reviewed by a wider group of partners and stakeholders during a 2-day workshop held at the Idaho Department of Fish and Game Headquarters office, Boise, Idaho, in August 2014 (this input was captured in Miradi v. 0.14). That draft was then subsequently distributed for additional stakeholder input including a half-day meeting in December 2014. Since then, we have continued to work with key internal and external stakeholders and subject matter experts to improve upon the plan. Materials in this document are based on Miradi v. 0.##. Individuals, agencies, and organizations involved in this plan are listed in Table 12.1.

Table 12.1 Individuals, agencies, and organizations involved in developing this plan

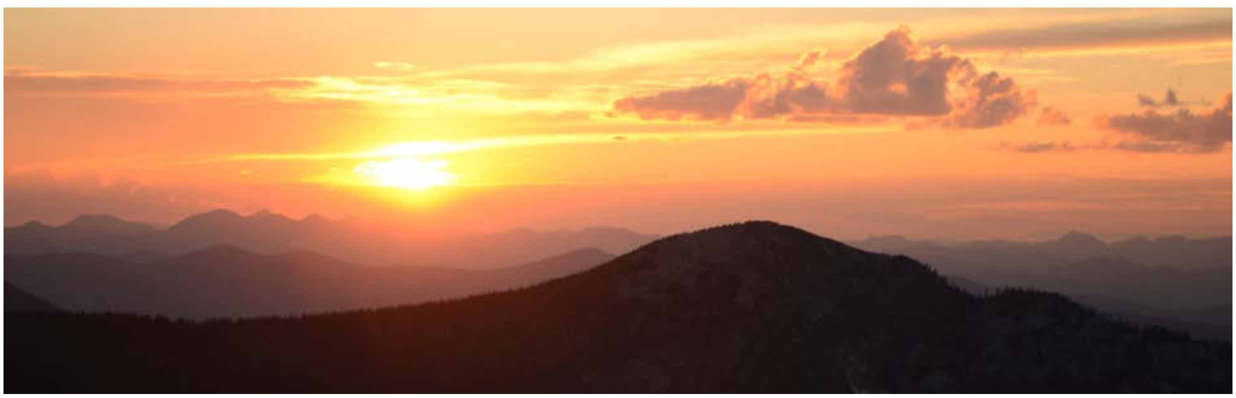
First name	Last name	Affiliation
Rita	Dixon*	Idaho Department of Fish and Game
Bob	Unnasch*	The Nature Conservancy in Idaho
Jon	Beals	Idaho Governor's Office of Species Conservation
Regan	Berkley	Idaho Department of Fish and Game
William R	Bosworth	Idaho Department of Fish and Game
Jay	Carlisle	Intermountain Bird Observatory
Michelle	Commons-Kemner	Idaho Department of Fish and Game
Nicole	DeCrappeo	DOI Northwest Climate Science Center
Jim	Desmond	Owyhee County

Contact these individuals to join the team for this section going forward

1. Okanogan Highlands Section

Section Description

The Okanogan Highlands Section is part of the Canadian Rocky Mountains Ecoregion. The Idaho portion of the Okanogan Highlands includes the northwest portion of the Idaho Panhandle from the Selkirk Mountains along the Idaho–Washington border to the west and the Purcell Trench to the northeast, south through Rathdrum Prairie with the Spokane River serving as the southern boundary (Fig. 1.1, Fig. 1.2). The Okanogan Highlands spans from 529 to 2,351 m (1,736 to 7,709 ft.) in elevation. This region is influenced by a maritime climate with annual precipitation amounts of 51 to 197 cm (20 to 77 in; PRISM 30-year annual precipitation) and generally cool temperatures (average annual temperature = 1.7–8.7 °C [35.1–47.6 °F]; PRISM 30-year annual temperature) (PRISM Climate Group 2012). Precipitation occurs mostly as snow from November to March, although rain on snow is common at lower elevations. Rain on snow events are expected to increase in the future due to predicted warmer air temperatures.



Parker Ridge, Selkirk Mountains © 2012 Scott Rulander

Communities within Okanogan Highlands are generally small and rural. Although there has been moderate population growth within towns such as Sandpoint and in areas surrounding Lake Pend Oreille, Pend Oreille River, and Priest Lake as tourism increases and more families are purchasing second homes. Other communities include Bonner's Ferry, Hayden, Rathdrum, Priest River, and Post Falls. The Okanogan Highlands provides recreational opportunities such as angling, hunting, boating, hiking, camping, horseback riding, wildlife watching and winter activities such as skiing and snowmobiling. Participation in recreational activities has been increasing in the region as larger population centers such as Coeur d'Alene and nearby Spokane, Washington are increasing in size. The Okanogan Highlands has a historical and continuing relationship with logging and the wood products industry with several lumber mills in the area. Local agriculture and the production of hops for the beer industry are prevalent in the valleys. Cattle ranching for beef and limited mining also occur.

The Okanogan Highlands is a mountainous region carved by relatively recent glaciation and is climatically dominated by the maritime westerlies that carry moisture-laden air currents from the northern Pacific Ocean. The Selkirk Mountains comprise the principal mountain range within this section, extending from the northwest border to Mica Peak, which is southwest of Coeur d'Alene. The northern portion of the Idaho Selkirks is characterized by glacially–carved peaks with steep, narrow watersheds. In the Priest Lake area, the Selkirks surround the lake on 3 sides with a narrow valley near the Pend Oreille River that forms a topographical bowl. At lower elevations, this bowl traps cold air in the winter and cool moist air in the summer, leading to environmental conditions favorable for dense forests and understories dominated by grand fir (*Abies grandis* [Douglas ex D. Don] Lindl.), western hemlock (*Tsuga heterophylla* [Raf.] Sarg.), and western redcedar (*Thuja plicata* Donn ex D. Don)). On the Priest Lake side of the Selkirks, large continuous tracts of old-growth grand fir, western hemlock and western redcedar remain with a high concentration of ancient cedar groves. On the east side of the Selkirks, in addition to the continental glacier, mountain glaciers carved steep, prominent drainages that channel water and cool moist air into the valley below. The combination of recent glaciation, cool temperatures, and abundant precipitation have led to the northern portion of the Selkirks supporting diverse assemblages of plant and animal species including those found commonly in coastal and boreal habitats. For example, the area hosts the highest concentration of fen wetlands (peatlands) in north Idaho. Overall, the forest habitat is diverse with Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco), western larch (*Larix occidentalis* Nutt.), grand fir, and lodgepole pine (*Pinus contorta* Douglas ex Loudon) at mid-elevations and mountain hemlock (*Tsuga mertensiana* [Bong.] Carrière), subalpine fir (*Abies lasiocarpa* [Hook.] Nutt.), and whitebark pine (*Pinus albicaulis* Engelm.) at high elevations. These dense and diverse forests support a diversity of wildlife, including Grizzly Bear (*Ursus arctos*), Northern Bog Lemming (*Synaptomys borealis*), and Hoary Marmot (*Marmota caligata*).

Numerous glacial lakes, rivers, and streams populate the Okanogan Highlands. Alpine lakes and ponds are abundant along the Selkirk Crest and provide breeding habitat for amphibians such as Western Toad (*Anaxyrus boreas*). *Sphagnum* rich peatlands, willow (*Salix* L.), rose spirea (*Spiraea douglasii* Hook.) shrublands, and western redcedar–Engelmann spruce swamps occur around the numerous valley lakes, ponds, and wetlands filling glacial carved depressions. Steep drainages, lined by alder (*Alnus* Mill.) and other riparian shrubs, deliver water into the Kootenai, Upper Pack, Upper Priest, and Priest rivers. Although most of the land in the Kootenai River Valley has been converted to agriculture or rangelands, remnant sedge (*Carex* L.) wet meadows, cattail-bulrush (*Typha latifolia* L. – *Schoenoplectus* [Rchb.] Palla) marshes, riparian habitats, and dry-conifer forests provide important wildlife corridors between the Selkirk, Purcell, and Cabinet mountain ranges. River and stream valleys provide important breeding habitat for fish, amphibians, neotropical migratory birds, and several bat species.

The most prominent waterbody in the Okanogan Highlands is Lake Pend Oreille—the largest lake in Idaho and the 5th deepest lake in the US. Part of the Pend Oreille drainage, which includes the Pend Oreille River and this lake, encompasses a 383 km^2 (94,720 acres) area and is fed by the Clark Fork, Flathead, Bitterroot, Blackfoot, and St. Regis rivers in Montana and Lightning Creek, Pack River, and Priest River in Idaho. Historical overharvest, logging, farming, residential development, roads, the construction of hydroelectric dams, and introduced nonnative plant and animal species have all taken a toll on the native fish populations and habitat.

Outwash from the Clark Fork and Pack rivers into Lake Pend Oreille produce large deltas that support extensive and diverse riparian habitat, as well as waterfowl, fish, amphibians, bats, and upland wildlife. The Clark Fork delta supports extensive black cottonwood (*Populus balsamifera* L. ssp. *trichocarpa* [Torr. & A. Gray ex Hook.] Brayshaw) riparian forests with a wide variety of riparian shrubs intermixed. The deltas also provide nutrients and sediments to the lake and purify the water. However, the Pack River Delta and the Clark Fork Delta have both undergone severe losses and degradation through the construction of several hydroelectric dams within the Pend Oreille drainage. Although producing power for the Inland Northwest, dams such as the Albeni Falls dam on the Pend Oreille River cause shoreline and island erosion by raising and lowering water levels within the lake. Dams upstream of the Clark Fork River (Cabinet Gorge dams) reduce the amount of sediment and large wood necessary in the formation of the delta. However, restoration efforts on both deltas (Pack River, 2008–2009 and Clark Fork River 2014–2015) have improved the deltas' functionality by stabilizing shorelines and reconstructing delta islands while removing nonnative species such as purple loosestrife (*Lythrum salicaria*) and planting native riparian species.

Conservation efforts in this section should strive to maximize the collaborative opportunities in Washington, British Columbia, and Montana, given their close proximity and ecological connections.

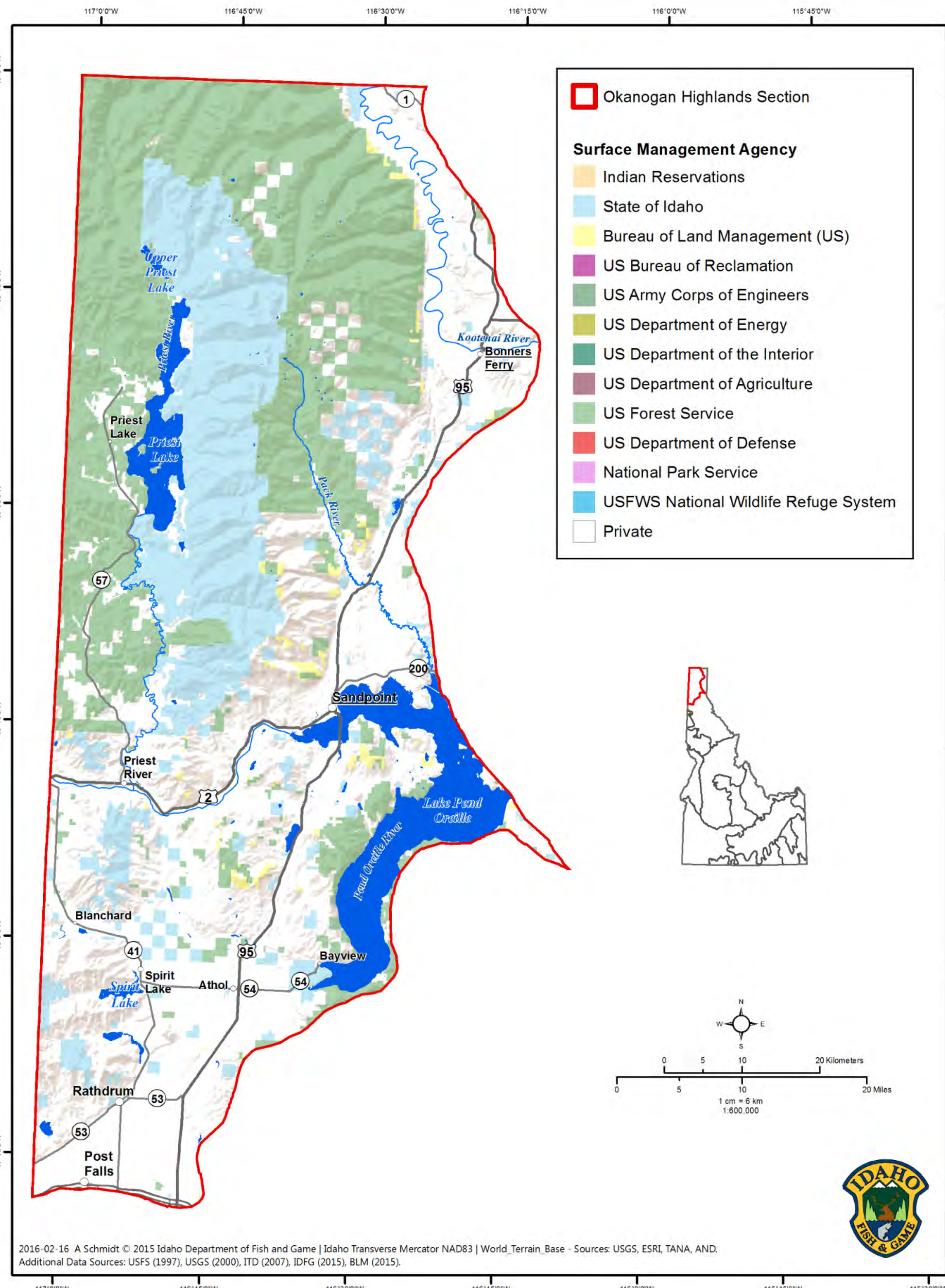


Fig. 1.1 Map of Okanogan Highlands surface management

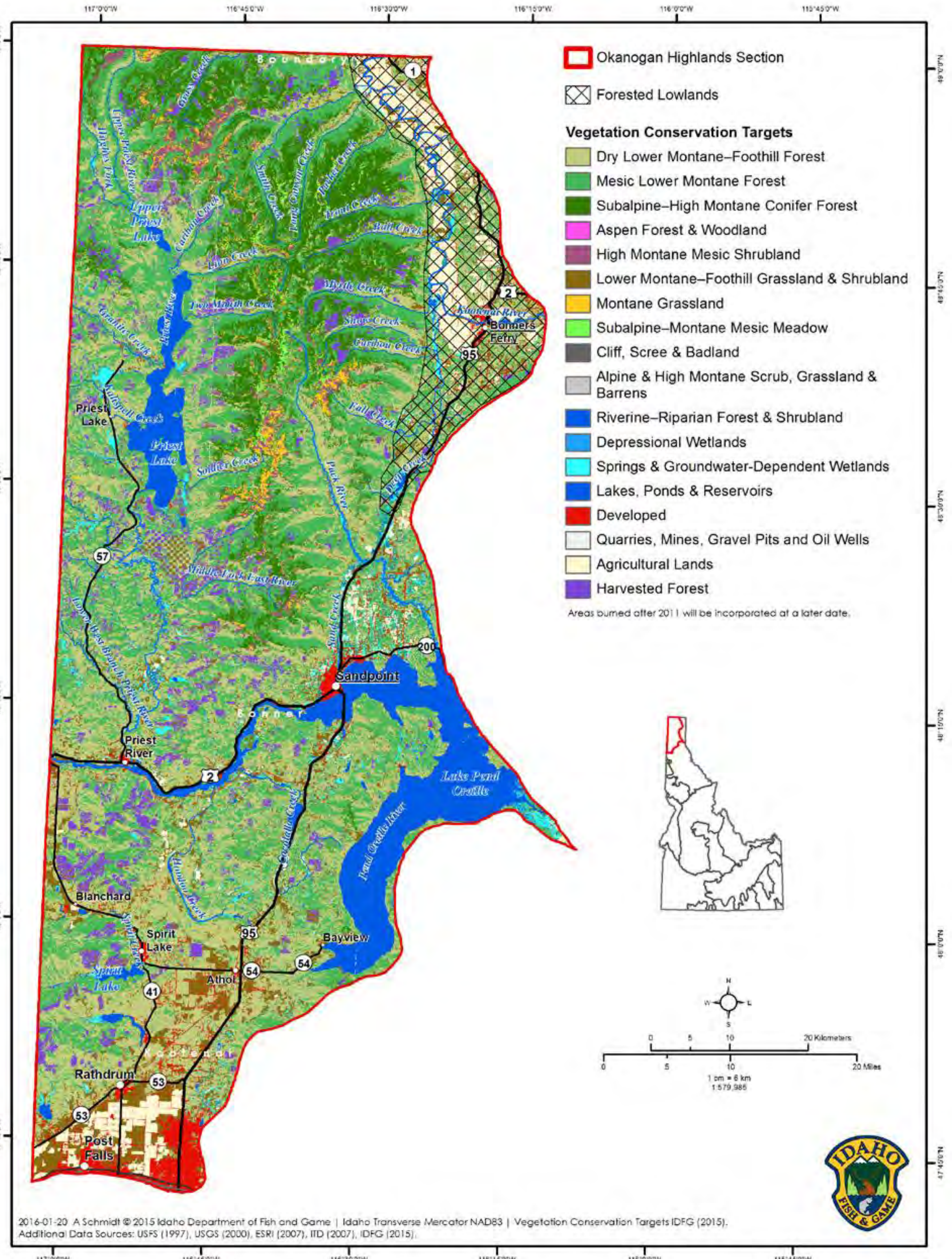


Fig. 1.2 Map of Okanogan Highlands vegetation conservation targets

Conservation Targets in the Okanogan Highlands

We selected 8 habitat targets (5 upland, 3 aquatic) that represent the major ecosystems in the Okanogan Highlands as shown in Table 1.1. Each of these systems provides habitat for key species of greatest conservation need (SGCN), i.e., "nested targets" (Table 1.2). All SGCN management programs in the Okanogan Highlands have a nexus with habitat management programs. Conservation of the habitat targets listed below should conserve most of the nested species within them. However, we determined that 7 taxonomic groups/species (Pond-Breeding Amphibians, Lake-Nesting Birds, Low-Density Forest Carnivores, Grizzly Bear, Caribou, Ground-Dwelling Invertebrates, and Pollinators) have special conservation needs and thus are presented as explicit species targets as shown in Table 1.1.

Table 1.1 At-a-glance table of conservation targets in the Okanogan Highlands

Target	Target description	Target viability	Nested targets (SGCN)	
Forested Lowlands	Forested habitats of Kootenai River basin below 3,000 ft (914 m), which historically experienced frequent flood disturbance cycles.	*Fair* to *Poor.* Most converted to agriculture and natural flood cycles eliminated.	*Tier 1*	Wolverine Grizzly Bear
			Tier 2	Northern Leopard Frog Fisher
Dry Lower Montane–Foothill Forest	Northern Rocky Mts. Douglas-fir and ponderosa pine woodland and savannah systems at lower elevation forests in the Selkirk Mountains.	*Fair.* Substantial encroachment by other habitat types due to lack of natural fire cycle.	*Tier 3*	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis
Mesic Lower Montane Forest	Commonly referred to as a "cedar–hemlock" forest but also includes lodgepole pine and aspen-mixed conifer forest at lower elevations in the Selkirk Mountains.	*Fair.* Substantial encroachment by other habitat types due to lack of natural fire cycle and loss of western white pine.	*Tier 2*	Silver-haired Bat
			Tier 3	Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis
Subalpine–High Montane Conifer Forest	Dry–mesic Engelmann spruce– subalpine fir forest and whitebark pine woodlands at higher elevations in the Selkirk Mountains.	*Fair* to *Poor.* Subject to altered fire regimes, forest insects, disease, and climate change; reduction in whitebark pine woodlands.	*Tier 1*	Wolverine Grizzly Bear
			Tier 3	Clark's Nutcracker Mountain Goat Hoary Marmot
Cool Air Refugia	Microsites with lower air temperature regimes compared to adjacent habitat.	*Fair.* Climate change expected to reduce habitat.	*Tier 1*	Magnum Mantleslug
			Tier 2	A Roundback Slug (*Hemphillia* sp. 1)
			Tier 3	Northern Bog Lemming Hoary Marmot Pale Jumping-slug Shiny Tightcoil

Target	Target description	Target viability	Nested targets (SGCN)
Riverine–Riparian Forest & Shrubland	Rivers and streams, including aquatic habitats and their associated terrestrial riparian habitats. Includes Kootenai, Upper Pack, Priest and Pend Oreille rivers and their tributaries.	*Fair.* Riverine systems in the lower valleys impacted by hydroelectric operations and invasive species. Higher elevation headwaters threatened by climate change.	*Tier 1* White Sturgeon (Kootenai River DPS) Burbot *Tier 2* Harlequin Duck Black Swift A Mayfly (*Ephemerella alleni*) *Tier 3* Western Ridged Mussel
Depressional Wetlands	Surface-water-fed systems ranging from infrequent to semipermanently or permanently flooded. Typically pond sized or smaller. Includes vernal pools and most marshes.	*Fair.* Lower elevations experiencing altered hydrologic regimes and invasive species/disease. Higher elevations threatened by climate change.	*Tier 2* Western Toad Northern Leopard Frog American Bittern Black Tern Silver-haired Bat *Tier 3* Townsend's Big-eared Bat Little Brown Myotis
Springs & Groundwater-Dependent Wetlands	Groundwater-dependent wetlands including fens, most wet meadows, and headwater springs.	*Good.* Threatened by climate change.	*Tier 2* Western Toad *Tier 3* Northern Bog Lemming
Pond-Breeding Amphibians	Amphibians that primarily breed in lentic wetlands.	*Poor.* Northern Leopard Frogs extirpated from section. Extant species face invasive species and disease threats.	*Tier 2* Western Toad Northern Leopard Frog
Lake-Nesting Birds	Common Loon and Western Grebe are listed as Intermountain West Waterbird Conservation Plan priority species due to habitat concerns and impacts from recreational boating.	*Poor.* No successfully nesting Common Loons detected in region. One Western Grebe colony in the Okanogan Highlands with no reproduction.	*Tier 2* Common Loon Western Grebe
Low-Density Forest Carnivores	Wide-ranging mammalian mesocarnivores.	*Poor.* Only a few individuals known to occur in section.	*Tier 1* Wolverine *Tier 2* Fisher
Grizzly Bear	Grizzly Bear is listed as Federally threatened. Population within the Selkirks is thought to be 50–60 bears.	*Fair.* Population appears to be expanding in both size and distribution.	*Tier 1* Grizzly Bear
Caribou			*Tier 1* Caribou
Ground-Dwelling Invertebrates	Assemblage of terrestrial invertebrates found on forest and other habitat floors.	*Unknown.* Habitat and threat data deficient. Many species taxonomically and	*Tier 1* Magnum Mantleslug *Tier 2* A Roundback Slug (*Hemphillia* sp. 1)

Target	Target description	Target viability	Nested targets (SGCN)	
		distributionally data deficient.	*Tier 3*	Pale Jumping-slug Salmon Coil Coeur d'Alene Oregonian Western Flat-whorl Shiny Tightcoil Spur-throated Grasshopper (*Melanoplus*) Species Group
Pollinators	Species delivering pollination ecosystem service.	*Fair.* Many pollinators declining rangewide.	*Tier 1*	Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 3	Monarch

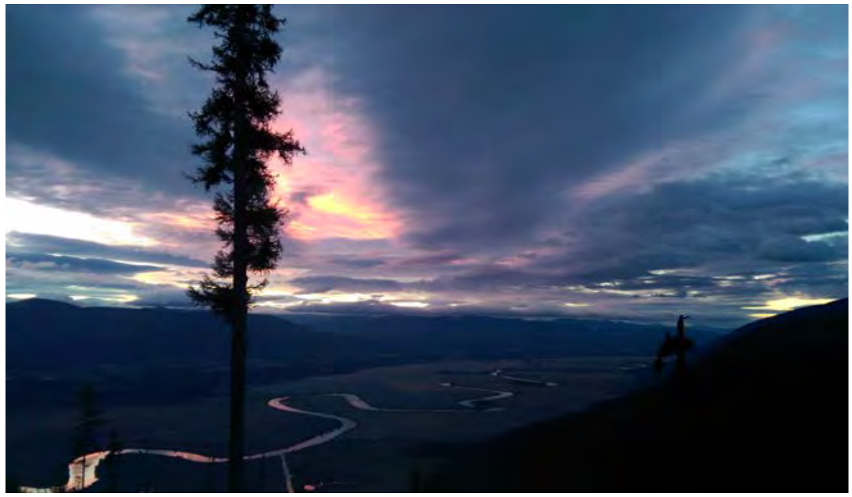
Table 1.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Okanogan Highlands

Taxon	Conservation targets: Forested Lowlands	Dry Lower Montane–Foothill Forest	Mesic Lower Montane Forest	Subalpine–High Montane Conifer Forest	Cool Air Refugia	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Pond-Breeding Amphibians	Lake-Nesting Birds	Low-Density Forest Carnivores	Grizzly Bear	Caribou	Ground-Dwelling Invertebrates	Pollinators
RAY-FINNED FISHES															
White Sturgeon (Kootenai River DPS) (*Acipenser transmontanus*)[1]						X									
Burbot (*Lota lota*)[1]						X									
AMPHIBIANS															
Western Toad (*Anaxyrus boreas*)[2]	X						X	X	X						
Northern Leopard Frog (*Lithobates pipiens*)[2]	X						X		X						
BIRDS															
Harlequin Duck (*Histrionicus histrionicus*)[2]						X									
Common Loon (*Gavia immer*)[2]										X					
Western Grebe (*Aechmophorus occidentalis*)[2]										X					
American Bittern (*Botaurus lentiginosus*)[2]							X								
Black Tern (*Chlidonias niger*)[2]							X								
Common Nighthawk (*Chordeiles minor*)[3]		X													
Black Swift (*Cypseloides niger*)[2]						X									
Olive-sided Flycatcher (*Contopus cooperi*)[3]		X	X												
Clark's Nutcracker (*Nucifraga columbiana*)[3]				X											
MAMMALS															
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]		X	X				X								
Silver-haired Bat (*Lasionycteris noctivagans*)[2]			X				X								
Little Brown Myotis (*Myotis lucifugus*)[3]		X	X				X								
Wolverine (*Gulo gulo*)[1]	X			X							X				
Fisher (*Pekania pennanti*)[2]	X										X				
Grizzly Bear (*Ursus arctos*)[1]	X			X								X			
Mountain Goat (*Oreamnos americanus*)[3]				X											
Caribou (*Rangifer tarandus*)[1]													X		
Northern Bog Lemming (*Synaptomys*					X			X							

Taxon	Forested Lowlands	Dry Lower Montane–Foothill Forest	Mesic Lower Montane Forest	Subalpine–High Montane Conifer Forest	Cool Air Refugia	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Pond-Breeding Amphibians	Lake-Nesting Birds	Low-Density Forest Carnivores	Grizzly Bear	Caribou	Ground-Dwelling Invertebrates	Pollinators
	Conservation targets														
borealis)[3]															
Hoary Marmot (*Marmota caligata*)[3]				X	X										
BIVALVES															
Western Ridged Mussel (*Gonidea angulata*)[3]						X									
TERRESTRIAL GASTROPODS															
Pale Jumping-slug (*Hemphillia camelus*)[3]					X									X	
A Roundback Slug (*Hemphillia* sp. 1)[2]					X									X	
Magnum Mantleslug (*Magnipelta mycophaga*)[1]					X									X	
Salmon Coil (*Helicodiscus salmonaceus*)[3]														X	
Coeur d'Alene Oregonian (*Cryptomastix mullani*)[3]														X	
Western Flat-whorl (*Planogyra clappi*)[3]														X	
Shiny Tightcoil (*Pristiloma wascoense*)[3]					X									X	
INSECTS															
A Mayfly (*Ephemerella alleni*)[2]						X									
Western Bumble Bee (*Bombus occidentalis*)[1]															X
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]															X
Monarch (*Danaus plexippus*)[3]															X
Spur-throated Grasshopper (*Melanoplus*) Species Group[3]														X	

Target: Forested Lowlands

Forested lowlands are the habitats found below 3,000 ft (914 m) that serve as important wildlife corridors between and within the Selkirk, Purcell, and Cabinet mountain ranges (i.e., Kootenai River Valley). The valley between the mountain ranges was a mosaic of forested lowlands, large emergent marshes, black cottonwood riparian forest, oxbow lakes, and numerous ponds prior to European settlement (KTOI 2009). It was considered the largest and richest riparian and wetland complexes in the Pacific Northwest (KTOI 2009). This habitat not only provided movement corridors for more mobile species but also important year-round habitat for many species with more limited movements. However, much of the forested and wetland landscape within the Kootenai River sub-basin was converted to agriculture and pastureland with nearly 22,000 acres of wetlands and 50,000 acres of floodplain altered since the late 1800s (KTOI 2009). With grassland and farmland as the predominant habitat types, wildlife movements are likely now more relegated to narrow corridors where forests still provide cover and link the three mountain ranges. Wildlife corridors are increasing in importance as habitat fragmentation disrupts species movements and thus gene flow in wildlife populations (Beier and Gregory 2012). The movement of individuals across the species' range is essential for population persistence and for a species' ability to shift their range in response to climate change (Cushman et al. 2013*a*). In the Idaho Panhandle, genetic assignment tests and radiotelemetry have determined that species such as Grizzly Bear (Proctor et al. 2012) move between the three mountain ranges. Additionally, the three mountain ranges and the associated valleys have been included in continent-wide dispersal routes for Wolverine (*Gulo gulo*, Schwartz et al. 2009) and Grizzly Bear (Proctor et al. 2012). In an increasingly fragmented landscape, especially within the valley bottoms, identifying, restoring, and maintaining forested lowlands will be critical in establishing corridors for the movement of numerous wildlife species.


Kootenai River Valley © 2015 Michael Lucid

Target Viability

Fair to Poor. Historically, the valley between the Selkirk, Purcell, and Cabinet mountain ranges was a large and diverse riparian and wetland complex. Since the late 1800s, most of the land has been converted to agriculture with little forest and wetland remaining. The installation of Libby Dam and levee systems have changed the natural flooding cycles in the Kootenai River Valley. Rail, highway, and local road systems, utility corridors, forest practices, and housing development have further fragmented forested lowlands.

Prioritized Threats and Strategies for Forested Lowlands

Very High rated threats in the Forested Lowlands in the Okanogan Highlands

Loss of genetic connectivity

The forested lowlands of this section are well recognized as being of major importance to gene flow between the Selkirk, Cabinet, and Purcell Mountains (Schwartz et al. 2009, Cushman et al.

2014). Habitat fragmentation has likely disrupted gene flow in some species. Research is necessary to assess historic and current levels of gene flow across the Kootenai Valley within the context of the Flathead, Bitterroot, and Okanogan Highlands sections to identify priority land parcels for conservation or habitat restoration actions that are most appropriate for conservation or restoration of multiple species genetic connectivity.

Objective	Strategy	Action(s)	Target SGCNs
Assess genetic connectivity between mountain ranges.	Assess genetic connectivity for SGCN with varying vagility levels to assess current and historic areas of gene flow in order to prioritize land parcels for habitat conservation, acquisition and/or restoration.	Assemble genetic samples from current collections. When necessary, conduct field work to collect necessary genetic samples. Conduct genetic studies to determine valley locations that have been or are currently important for multiple species gene flow.	Western Toad Common Nighthawk Clark's Nutcracker Silver-haired Bat Wolverine Fisher Grizzly Bear Pale Jumping-slug A Roundback Slug (*Hemphillia* sp. 1) Magnum Mantleslug Coeur d'Alene Oregonian Shiny Tightcoil Western Bumble Bee Suckley's Cuckoo Bumble Bee Spur-throated Grasshopper (Melanoplus) Species Group
Restore genetic connectivity.	Work toward long-term restoration and conservation of parcels identified as important for genetic connectivity.	Conserve, acquire, and/or restore land parcels identified as important for genetic connectivity.	
Monitor genetic connectivity between mountain ranges.	Monitor genetic connectivity over time.	Develop and implement long-term multitaxa monitoring program.	

Climate change

Global climate change is expected to have widespread effects on temperature and precipitation regimes worldwide and mean annual global air temperatures are predicted to rise within the 2 to 4.5 °C range by the end of the century (Meehl et al. 2007). Conditions in the Pacific Northwest are expected to trend toward hotter drier summers and warmer wetter winters (Karl et al. 2009). Snowpack depth and duration are predicted to decrease, reducing summer soil moisture, impacting species dependent on mesic conditions. Climate change is expected to further alter fire extent and severity while allowing for larger scale and more persistent mountain pine beetle infestations. As a result, whitebark pine is expected to decrease in extent.

Delineating temperature refugia for cool water or air temperature dependent species is a relatively new idea (e.g., Isaak et al. 2015). Recent microclimate monitoring work in the Idaho Panhandle identified a portion of the Okanogan Highlands as the largest area of annually cool air relative to other portions of the Idaho Panhandle (Lucid et al. 2016). Continued monitoring of microclimate along with co-occurrence of cool air dependent organisms will provide bedrock information for research determining best management practices for cool air associated species.

Objective	Strategy	Action(s)	Target SGCNs
Improve landscape	Manage for diverse, healthy,	Create or reengineer wetlands to hold water ephemerally and maintain relatively cool air	Western Toad Northern Leopard

Objective	Strategy	Action(s)	Target SGCNs
climate resiliency for SGCN.	habitats that favor SGCN ecological needs.	and water temperatures (M-A. Beaucher, Creston Valley Wildlife Management Area, pers. comm). Implement American Bullfrog control program. Treat nonnative vegetation and revegetate with locally collected pollinator food sources. (Mader et al. 2011, KTOI 2009). Provide areas and structures for pollinator nesting and overwintering. Identify deforested land parcels and reforest to provide cover for animal movement and relatively cool air temperatures. Implement public education and/or participatory science programs that include climate change, habitat restoration, pesticides, and invasive species elements. Develop incentive programs for private and nonprivate landowners to conduct habitat work in rural and urban areas.	Frog Wolverine Fisher Grizzly Bear Western Ridged Mussel Pale Jumping-slug A Roundback Slug (*Hemphillia* sp. 1) Magnum Mantleslug Coeur d'Alene Oregonian Western Flat-whorl Shiny Tightcoil A Mayfly (*Ephemerella alleni*) Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

High rated threats in the Forested Lowlands in the Okanogan Highlands

Transportation corridors

Highway 95 and the railroad that runs parallel to the highway are prominent transportation corridors within the forested lowlands target. Mortality records for the section of Highway 95 that runs through the Kootenai River Valley regularly document hundreds of animals colliding with high-speed vehicles each year (IDFG Roadkill and Salvage database, accessed on Nov 8, 2015). However, mortality due to vehicle collision is not thought to profoundly affect wildlife populations, except in the case of some threatened or endangered species (Forman and Alexander 1998). Rather the avoidance of transportation corridors prevents the dispersal of individuals across the landscape (Forman and Alexander 1998) and possibly prevents gene flow within a population (Cushman et al. 2013*b*).

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk along roadways.	Highway signage at areas of high wildlife use. Construction of over- and underpasses.	Determine high risk areas for wildlife crossings. Construct over- and underpasses. Construct noise buffers at crossing areas. Work with legislators, ITD, and other relevant organizations to include wildlife considerations in road construction/maintenance project or road related legislation.	Western Toad Northern Leopard Frog Wolverine Fisher Grizzly Bear Coeur d'Alene Oregonian

Invasive & noxious weeds

One of the limiting factors impacting the restoration of riparian areas in the Kootenai River Valley is the prevalence of invasive and noxious weeds in disturbed or developed areas (KTOI 2009). Invasive species often prevent the establishment of native species by forming dense monocultures and in some instances even change the soil chemistry or hydrology of the invaded area (Ricciardi et al. 2013). In plant surveys conducted in Boundary Creek WMA, 52 of the 56 study sites detected noxious weeds at varying densities (Cousins and Antonelli 2008*a*). Additionally, reed canarygrass (*Phalaris arundinacea* L.) was the dominant species found in 5 of the 17 marsh communities and it had doubled in coverage from previous surveys conducted in meadow communities (Cousins and Antonelli 2008*a*). Reed canarygrass is a native species in the lower 48 but is considered a noxious weed in Washington and is thought to have hybridized with a nonnative invasive reed canarygrass (Lavergne and Molofsky 2007). Reed canarygrass forms dense monocultures that decreases plant diversity and degrades wildlife habitat.

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use Global Positioning Systems (GPS), remote sensing, and Geographic Information Systems (GIS) technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Northern Leopard Frog Wolverine Fisher Grizzly Bear Suckley's Cuckoo Bumble Bee Monarch
Contain and reduce widespread weeds in areas that are already infested (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Identify and treat dispersal vectors to prevent further spread of invasive and noxious weeds. Restore treated areas with native species.	Treat weeds in high impact areas and along roads (USFS 2013). Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USFS 2013, IDL 2015). Revegetate treatment areas with native species and monitor restoration (KTOI 2009). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Northern Leopard Frog Wolverine Fisher Grizzly Bear Suckley's Cuckoo Bumble Bee Monarch

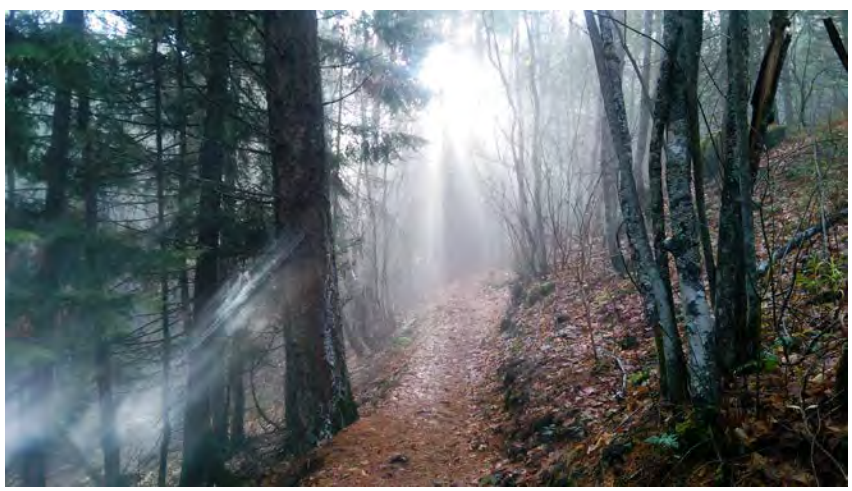
Loss of farm field diversity

Agricultural monocultures are prevalent in the Kootenai River Valley. The primary crops of wheat, alfalfa, and canola are generally rotated on the hundreds of acres scale in the most northern portion of the valley. This confounds connectivity issues, reduces ephemeral wetland availability, and results in a dearth of pollinator habitat. Wheat does not provide pollen and although pollinators do receive some benefit from canola and alfalfa, the benefit does not extend across the breeding season because the crops bloom in synchrony. Fortunately, simple steps could be taken to add habitat mosaic patches to cropland, which would benefit multiple SGCN (Mader et al. 2011).

Objective	Strategy	Action(s)	Target SGCNs
Increase farm field diversity.	Work with farmers to improve farm field diversity.	Work with NRCS and other organizations to assess current incentive programs and, if necessary, create new incentive programs. Communicate with farmers to determine their level of interest in participating in a habitat diversity program. Work with interested farmers to develop and implement farm field diversity management plans.	Western Toad Northern Leopard Frog Common Nighthawk Silver-haired Bat Little Brown Myotis Grizzly Bear Coeur d'Alene Oregonian Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Target: Dry Lower Montane–Foothill Forest

In the Okanogan Highlands, nearly 28% of the land cover is classified as Dry Lower Montane–Foothill Forest. Although this habitat group can be located at all aspects and slopes, it is predominantly found on warm–dry, south–southwest, moderately steep slopes within the Selkirk Mountains (Cooper et al. 1991). However, it also extends into the valleys and floodplains that surround the mountain range, including the floodplain of the Kootenai, Priest, and Pend Oreille rivers and is the predominant habitat type that surrounds Rathdrum Prairie. Elevation ranges from 529 to 1,920 m in the Okanogan Highlands but there are numerous occurrences above 1,920 m. In the Dry Lower Montane–Foothill Forest, Douglas-fir is a codominant climax species with ponderosa pine (*Pinus ponderosa* Lawson & C. Lawson) in mixed or single species stands (Rocchio 2011). Species such as lodgepole pine, western larch, and grand fir only occasionally occur and are found in the wetter microsites within the habitat group (Cooper et al. 1991). Ponderosa pine woodlands are dominant on the driest sites and where fires are frequent and of low severity (Cooper et al. 1991). Historically, fires were thought to be frequent and moderate to low severity, which maintained open stands of fire-resistant



Coeur d'Alene Mountains © 2015 Michael Lucid

species. Low fire frequency has resulted in a dominance of shrub and tree species such as grand fir and Douglas-fir in the understory. Currently, the habitat group contains a variable understory physiognomy ranging from shrub-dominated and dense with mallow ninebark (*Physocarpus malvaceus* [Greene] Kuntze) and ocean spray (*Holodiscus discolor* [Pursh] Maxim.), to bunchgrass-dominated and open with Idaho fescue (*Festuca idahoensis* Elmer) and bluebunch wheatgrass (*Pseudoroegneria spicata* [Pursh] Á. Löve).

Target Viability

Fair. There has been substantial encroachment in the habitat type by more shade-tolerant overstory species due to the lack of normal fire intervals. Forest management and development (e.g., housing, roads) have also altered stands.

Prioritized Threats and Strategies for Dry Lower Montane–Foothill Forest

Very High Threats for Dry Lower Montane–Foothill Forest in the Okanogan Highlands

Altered fire regimes (fire suppression & stand-replacing wildfires)

Historically, moderate- to low-severity fires that burned on average every 10 to 30 years maintained the open understory and predominance of shade-intolerant species such as ponderosa pine in the overstory (Smith and Fischer 1997). However, decades of fire suppression activities aided by a cool period in the Pacific decadal oscillation were effective in preventing most moderate fires in the ecosystem while also preventing stand-replacing fires that often enable shade-intolerant species to establish (USFS 2013). This resulted in the encroachment of shade-tolerant species into the habitat group as well as a decrease in fire-tolerant species, increased vertical stand structure, increased canopy closure, increased vertical fuel ladders, greater biomass, greater fire intensities and severities, and increased insect and disease epidemics (Keane et al. 2002). Fire management over the past 15 years has attempted to simulate and reestablish the vegetative composition of regular fire patterns, but is hampered by policy that does not allow natural fires to burn. In addition, human population increases have increased the Wildland–Urban Interface (WUI) that often prevents the use of fire as a management tool.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USFS 2013 [monitoring and evaluation program]).	Use prescribed and natural fires to maintain desired conditions (USFS 2015).	Reduce fuels through mechanical removal or controlled burns on lands within the WUI (USFS 2015). Leave fire-killed trees standing as wildlife habitat if they pose no safety hazard (USFS 2015). Remove perceived barriers to allow more prescribed natural fire on state and private forest lands. Promote/facilitate the use of	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
		prescribed fire as a habitat restoration tool, on both public and private lands where appropriate. Increase membership and participation in Idaho Forest Stewardship Programs, American Tree Farm System, and NRCS.	
Simulate natural fire regimes.	Design and implement silvicultural prescriptions that simulate natural disturbance regimes.	Actively remove shade-tolerant species. Increase markets to pay for ecological forest management activities, e.g., explore markets to thin trees so that they can ward off fire and insect threats.	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis

High Threats for Dry Lower Montane–Foothill Forest in the Okanogan Highlands

Invasive & noxious weeds

In the drier habitat types such as the Dry Lower Montane–Foothill Forest, invasive/noxious weeds have migrated from disturbed areas such as roads, railroads, and utility right-of-ways to undisturbed habitats. Across the Idaho Panhandle National Forest (IPNF), nearly 82% of the warm/dry habitat type is at high risk for invasion by nonnative weeds (USFS 2013). Additionally, surveys done in the Okanogan Highlands found 14% of sites in the Dry Lower Montane–Foothill Forest type (n=115) had spotted knapweed or tansy present (Lucid et al. 2016). Species such as spotted knapweed, diffuse knapweed, yellow star-thistle, leafy spurge, and dyer's woad are particularly invasive within the IPNF and have dispersed into undisturbed areas and displaced native species over large areas (USFS 2013).

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use GPS, remote sensing, and GIS technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis
Contain and reduce widespread weeds in areas that are already infested (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies.	Treat weeds in high impact areas and along roads (USFS 2013). Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USFS 2013, IDL 2015).	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
	Identify and treat dispersal vectors to prevent further spread of invasive and noxious weeds. Restore treated areas with native species.	Revegetate treatment areas with native species and monitor restoration (KTOI 2009). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012). Incorporate noxious weeds into a multitaxa monitoring program.	

Species designation, planning & monitoring

Two species identified as SGCN found in the Dry Lower Montane–Foothill Forest are declining as a result of unknown causes. The priority for many of these species in the coming years is to identify the root causes and to develop strategies to address them.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of decline for nightjar species in Idaho.	Work with WWG PIF and the Pacific Flyway Nongame Technical Committee (PFNTC) to assess causes(s) of decline.	Assist WWG PIF with adjusting current Nightjar Survey Network protocols to collect data that will inform potential cause(s) of decline, including assessments of insect prey populations and their habitats. Work with WWG PIF and PFNTC to identify opportunities for research on contaminant impacts.	Common Nighthawk
Determine causes of decline in Olive-sided Flycatcher.	Determine relative importance of known and suspected threats to Olive-sided Flycatcher, its prey, and its habitats (see Canada's recovery plan, Appendix B; Environment Canada 2015*b*). Investigate factors that affect reproductive output, survival, and fidelity to breeding sites.	Promote cooperation and collaboration with Western Working Group Partners in Flight (WWG PIF) to fill knowledge gaps and to mitigate threats.	Olive-sided Flycatcher
Assess future changes to species status.	Monitor population status.	Incorporate species into multitaxa monitoring program.	Common Nighthawk Olive-sided Flycatcher

Target: Mesic Lower Montane Forest

Selkirk Mountains © 2013 Michael Lucid

In the Okanogan Highlands, 30% of the land cover is classified as Mesic Lower Montane Forest. Within the Selkirk Mountains, this habitat group is located on the slopes and benches, and in valley bottoms, ravines, and canyons with high soil moisture and cool summer temperatures. Elevations typically range from 532–1,800 m. Commonly referred to as a cedar/hemlock forest, western hemlock and western redcedar are common in the overstory, with grand fir, Douglas-fir, Engelmann spruce, western white pine (*Pinus monticola* Douglas ex D. Don), and western larch as frequently present within the canopy (Cooper et al. 1991) and lodgepole pine on drier and cooler microsites (Crawford 2011). The understory is composed of short and tall shrubs, perennial graminoids, forbs, ferns and mosses, often at levels of in-stand diversity approaching or equal to the diversity found in some eastern deciduous forests (Reid 2013). Forests within this habitat group are often centuries old with fire only passing through every 500 years. The fire interval is long with stand-replacing fires occurring 150–500 years and moderate fires 50–100 years (Crawford 2011). Suppression of what would be moderate-intensity fires on drier sites has created mixed aged stands that form fuel ladders which make the forest more susceptible to high intensity and stand-replacing fires. Disturbance in the form of insect, disease, windfall and ice generally produce canopy openings for the regeneration of forest types. Western white pine was once a predominant canopy species within this habitat group; however logging, fire and the introduction of the white pine blister rust (*Cronartium ribicola*) has decimated this species to below 90% of its historical prevalence (Cooper et al. 1991).

Target Viability

Fair. Substantial encroachment by other habitat types due to lack of natural fires cycle and loss of western white pine. Forest practices and roads have also altered stands.

Prioritized Threats and Strategies for Mesic Lower Montane Forest

Very High Threats for Mesic Lower Montane Forest in the Okanogan Highlands

Altered fire regimes (fire suppression and stand-replacing wildfires)

Historically, fires were as variable as the tree species in the forest stand, with an average mean interval of 200–250 years but some drier stands burning with a mean of 18 years (Smith and Fischer 1997). Stands with fire intervals shorter than 140 years were often dominated by western white pine, western larch, Douglas-fir and grand fir (Smith and Fischer 1997). However, decades of fire suppression activities aided by a cool period in the Pacific decadal oscillation were effective in preventing most moderate fires in the ecosystem while also preventing stand-replacing fires that often enable shade and fire-intolerant species to establish and heavy fuel loads to build (USFS 2013). This resulted in the encroachment of shade-tolerant species into the habitat group as well as a decrease in fire-tolerant species, increased vertical stand structure, increased canopy closure, increased vertical fuel ladders, greater biomass, greater fire intensities and severities, and increased insect and disease epidemics (Keane et al. 2002). Fire management over the past 15 years has attempted to simulate and reestablish the vegetative composition of regular fire patterns but is hampered by policy that does not allow natural fires to burn. Additionally, population increases in neighboring towns has increased the WUI that often prevents the use of fire as a management tool.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USFS 2013 [monitoring and evaluation program]).	Use prescribed and natural fires to maintain desired conditions (USFS 2015).	Reduce fuels through mechanical removal or controlled burns on lands within the WUI (USFS 2015). Leave fire-killed trees standing as wildlife habitat if they pose no safety hazard (USFS 2015). Remove perceived barriers to allow more prescribed natural fire on state and private forest lands. Promote/facilitate the use of prescribed fire as a habitat restoration tool, on both public and private lands where appropriate. Increase membership and participation in Idaho Forest Stewardship Programs, American Tree Farm System, and NRCS.	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis
Simulate natural fire regimes.	Design and implement silvicultural prescriptions that simulate natural disturbance regimes.	Actively remove shade-tolerant species. Increase markets to pay for ecological forest management activities, e.g., explore markets to thin trees so that they can ward off fire and insect threats.	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis
Assess species response to	Monitor species occurrence prior	Incorporate species into multitaxa monitoring program.	Common Nighthawk Olive-sided Flycatcher

Objective	Strategy	Action(s)	Target SGCNs
changes in fire regimes.	to and after fire events.		Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis

High Threats for Mesic Lower Montane Forest in the Okanogan Highlands

Forest insect pests & disease epidemics

When at endemic population levels, native forest insects and disease play a critical role in maintaining the health of the forest ecosystem by removing individuals or small groups weakened by drought, injury, or fire (USFS 2010). However, when large stands of trees are stressed by prolonged drought and/or dense stocking, outbreaks of forest insects and disease can impact tree growth, forest composition, and cause extensive tree mortality (USFS 2010). Severe outbreaks of forest insects and pathogens can even cause the conversion of forest to shrublands or grasslands. The impact on forest composition from large scale outbreaks is predicted to increase as climate change decreases summer precipitation and increases temperatures (USFS 2010). Currently, 15–20% of lodgepole pine stands in the IPNF are at high risk for attack by the Mountain Pine Beetle, whereas 25–30% of Douglas-fir stands are at high risk for attack by the Douglas-fir Beetle, with each beetle predicted to kill 80% and 60%, respectively of the basal area in high-risk stands (USFS 2010). The introduction of the nonnative white pine blister rust has reduced western white pine to 5% of its original distribution across the interior Pacific Northwest. This caused changes in forest composition from a relatively stable, fire- and disease-tolerant western white pine forests to early seral forests dominated by the fire and disease-intolerant species such as Douglas-fir, grand fir, and subalpine fir (USFS 2013).

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk of stand-replacing pine beetle or root fungus infestations	Use integrated pest management strategies. Increase diversity of stand ages, size classes and tree species (KPNZ Climate, 2010). Promote responsible firewood harvest/transport.	Use pheromones to protect stands (beetle whispering) (Kegley and Gibson 2004). Target removal of diseased and appropriate size class trees. Remove debris that attracts pine beetles.	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis
Increase number of rust-resistant western white pine in the ecosystem (USFS 2013)	Continue to develop genetics of disease resistant trees. Plant rust-resistant western white pine during restoration efforts.	Conserve and protect any old-growth western white pine on the landscape. Determine if trees are rust-resistant (Neuenschwander et al. 1999). Plant rust-resistant trees in openings that are also *Ribes* free (Neuenschwander et al. 1999). Monitor and remove any signs of the rust on planted trees (USFS 2013).	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
Assess changes in insect numbers over time.	Monitor insect populations and disease.	Incorporate insect and disease threats into a multitaxa monitoring program.	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis

Species designation, planning and monitoring

Two species identified as SGCN found in the Mesic Lower Montane Forest are declining as a result of unknown causes. The priority for many of these species in the coming years is to identify the root causes and to develop strategies to address them.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of decline for nightjar species in Idaho.	Work with WWG PIF and the PFNTC to assess causes of decline.	Assist WWG PIF with adjusting current Nightjar Survey Network protocols to collect data that will inform potential cause(s) of decline, including assessments of insect prey populations and their habitats. Work with WWG PIF and PFNTC to identify opportunities for research on contaminant impacts.	Common Nighthawk
Determine causes of decline in Olive-sided Flycatcher.	Determine relative importance of known and suspected threats to Olive-sided Flycatcher, its prey, and its habitats (see Canada's recovery plan, Appendix B; Environment Canada 2015*b*). Investigate factors that affect reproductive output, survival, and fidelity to breeding sites.	Promote cooperation and collaboration with WWG PIF to fill knowledge gaps and to mitigate threats.	Olive-sided Flycatcher
Assess future changes to species status.	Monitor population status.	Incorporate species into multitaxa monitoring program.	Common Nighthawk Olive-sided Flycatcher

Target: Subalpine–High Montane Conifer Forest

At the higher elevations within the Selkirk Mountains, the Subalpine–High Montane Conifer Forest is the prevalent habitat group. It is predominantly found at elevations between 900–2,338 m in the Selkirk Mountains. Engelmann spruce, lodgepole pine, and subalpine fir are the most frequent overstory trees. At lower elevations or on warmer sites, Douglas-fir, western larch, and western white pine also occur. Lodgepole pine forms woodlands within this habitat group on drier and cooler sites, sometimes at lower elevations (Crawford 2011). Thinleaf huckleberry (*Vaccinium membranaceum* Douglas ex Torr.) and grouse whortleberry (*Vaccinium scoparium*

Leiberg ex Coville) are common species in the understory and provide important wildlife forage (Smith and Fischer 1997). Mountain hemlock is often a co-climax species in this habitat group; however, like subalpine larch (*Larix lyallii* Parl.), it has a limited distribution in the Selkirk Mountains (Smith and Fischer 1997). Whitebark pine replaces lodgepole pine at higher elevations and becomes dominant as the elevation and climate severity increases. At timberline, the transition zone between continuous forest and the limited alpine, only Engelmann spruce, subalpine fir, subalpine larch and whitebark pine persist. The timberline zone is impacted by drying winds, heavy snow accumulation and subsurface rockiness that lead to stunted growth and a clustered distribution (Cooper et al. 1991, Smith and Fischer 1997). At timberline, whitebark pine is commonly the species that colonizes sites and provides habitat for less hardy species. Whitebark pine also provides high calorie food resources for numerous wildlife species such as Grizzly Bear, Clark's Nutcracker (*Nucifraga columbiana*), and other small mammals and birds in the form of large seeds (Fryer 2002). Whitebark pine is a long-lived and slow-growing species that is often overtopped by faster-growing, shade-tolerant species such as subalpine fir and Engelmann spruce. Fire and other disturbances such as ice, windthrow, rockslides, and landslides help to maintain whitebark pine as the climax species within the upper elevations of the subalpine forest. However, fire suppression, invasion of white pine blister rust, and Mountain Pine Beetle have all contributed to the recent precipitous declines of whitebark pine across its range (Smith and Fischer 1997, Fryer 2002).

Selkirk Mountains-Whitebark Pine © 2015 Michael Lucid

Target Viability

Poor to Fair. Altered fire regimes, insects and disease, and climate change have all caused a reduction in whitebark pine woodlands.

Prioritized Threats and Strategies for Subalpine–High Montane Conifer Forest

Very High Threats for Subalpine–High Montane Conifer Forest in the Okanogan Highlands

Altered fire regimes (fire suppression & stand-replacing wildfires)

Historically, mixed severity fires burned between 60–300 years with nonlethal burns in the understory of whitebark pine stands at an average interval of 56 years (Smith and Fischer 1997). However, tree regeneration in the upper elevation is dependent on soil moisture, temperature, and whitebark pine seed cache and may be slow in some areas. For example, the lack of whitebark pine regeneration after the Sundance Fire (a 56,000-acre wildfire that started in Sundance Mountain in Bonner County in 1967) is thought to be due to a lack of seed cache after mature trees were killed by Mountain Pine Beetle or infected with blister rust (Smith and Fischer 1997). As with the other habitat types, decades of fire suppression activities aided by a cool period in the Pacific decadal oscillation were effective in preventing most moderate fires in the ecosystem while also preventing stand-replacing fires that often enable shade-intolerant species to establish (USFS 2013). This resulted in the encroachment of shade-tolerant species into the habitat group as well as a decrease in fire-tolerant species, increased vertical stand structure, increased canopy closure, increased vertical fuel ladders, greater biomass, greater fire intensities and severities, and increased insect and disease epidemics (Keane et al. 2002). Fire management over the past 15 years has attempted to simulate and reestablish the vegetative composition of regular fire patterns, but is hampered by policy that does not allow natural fires to burn.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USFS 2013 [monitoring and evaluation program]).	Use prescribed and natural fires to maintain desired conditions (USFS, 2015).	Reduce fuels through mechanical removal or controlled burns on lands within the WUI (USFS 2015). Leave fire-killed trees standing as wildlife habitat if they pose no safety hazard (USFS 2015). Remove perceived barriers to allow more prescribed natural fire on state and private forest lands. Promote/facilitate the use of prescribed fire as a habitat restoration tool, on both public and private lands where appropriate.	Clark's Nutcracker Wolverine Grizzly Bear Mountain Goat Hoary Marmot
Simulate natural fire regimes.	Design and implement silvicultural prescriptions that simulate natural disturbance regimes.	Actively remove shade-tolerant species where impacts to fragile subalpine soils can be minimized.	Clark's Nutcracker Wolverine Grizzly Bear Mountain Goat Hoary Marmot
Assess species response to changes in fire	Monitor species occurrence prior to and after fire events.	Incorporate species into multitaxa monitoring program.	Clark's Nutcracker Wolverine Grizzly Bear

Objective	Strategy	Action(s)	Target SGCNs
regimes.			Mountain Goat Hoary Marmot Magnum Mantleslug Spur-throated Grasshopper (*Melanoplus*) Species Group

High Threats for Subalpine–High Montane Conifer Forest in the Okanogan Highlands

Climate change

Global climate change is expected to have widespread effects on temperature and precipitation regimes worldwide and mean annual global air temperatures are predicted to rise within the 2 to 4.5 °C range by the end of the century (Meehl et al. 2007). Conditions in the Pacific Northwest are expected to trend toward hotter drier summers and warmer wetter winters (Karl et al. 2009). Snowpack depth and duration are predicted to decrease, reducing summer soil moisture, impacting species dependent on mesic conditions. Climate change is expected to further alter fire extent and severity while allowing for larger-scale and more persistent Mountain Pine Beetle infestations. As a result, whitebark pine is expected to decrease in extent.

Delineating temperature refugia for cool water or air temperature dependent species is a relatively new idea (e.g., Isaak et al. 2015). Recent microclimate monitoring work in the Idaho Panhandle identified a portion of the Okanogan Highlands as the largest area of annually cool air relative to other portions of the Idaho Panhandle (Lucid et al. 2016). Continued monitoring of microclimate along with co-occurrence of cool air dependent organisms will provide bedrock information for research determining best management practices for cool air associated species.

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring.	Monitor climate variables and species co-occurrence over time.	Develop climate monitoring program using a variety of microclimate variables along with co-occurrence of associated SGCN.	Clark's Nutcracker Wolverine Grizzly Bear Mountain Goat Hoary Marmot Magnum Mantleslug Spur-throated Grasshopper (*Melanoplus*) Species Group
Implement other state management plans.	Implement *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014).	Implement specific actions outlined in climate section of *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014).	Wolverine

Forest insect pests & disease

When at endemic population levels, native forest insects and disease play a critical role in maintaining the health of the forest ecosystem by removing individuals or small groups weakened by drought, injury or fire (USFS 2010). However, when large stands of trees are stressed by prolonged drought and/or dense stocking, outbreaks of forest insects and disease can impact tree growth, forest composition and cause extensive tree mortality (USFS 2010). Severe outbreaks of forest insects and pathogens can even cause the conversion of forest to shrublands or grasslands. The impact on forest composition from large scale outbreaks is predicted to increase as climate change decreases precipitation and increases temperatures (USFS 2010). The introduction of the nonnative white pine blister rust has reduced whitebark pine by nearly a quarter to a half in subalpine ecosystems in Northern Idaho and Montana (USFS 2010) by reducing the ability of the species to produce cones. In the Selkirk Mountains, an average of 70% of live whitebark pine is already infected by blister rust (Kegley and Gibson 2004). Additionally, Mountain Pine Beetle often kills whitebark pines that are rust resistant (Schwandt 2006). As a keystone species within subalpine ecosystems, the loss of whitebark pine is predicted to negatively impact forest composition, wildlife communities, soil structure, and alpine hydrology (Schwandt 2006).

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk of stand-replacing pine beetle infestations.	Use integrative pest management strategies. Increase diversity of stand ages, size classes and tree species (KPNZ Climate 2010). Promote responsible firewood harvest/transport.	Use pheromones to protect stands (beetle whispering) (Kegley and Gibson 2004). Target removal of diseased and appropriate size class trees. Remove debris that attracts pine beetles.	Clark's Nutcracker Grizzly Bear
Increase number of rust-resistant whitebark pine in the ecosystem (USFS 2013).	Continue to develop genetics of disease resistant trees for restoration efforts.	Monitor rust and beetle levels in live whitebark pine. Collect rust-resistant seed for testing and restoration (Schwandt 2006). Plant rust-resistant whitebark pine. Monitor and remove any signs of the rust on planted trees (USFS 2013).	Clark's Nutcracker Grizzly Bear
Assess changes in insect numbers over time.	Monitor insect populations and disease.	Incorporate insect and disease threats into a multitaxa monitoring program.	Clark's Nutcracker Grizzly Bear

Target: Cool Air Refugia

Cool Air Refugia are micro- or macrosites where cool and moist-adapted, low dispersal organisms can retreat to and persist under a warming and drying climate regime. These habitats occur where cold air pools at the bottom of slopes in valleys and canyons in combination with topographic shading (e.g., on north-facing slopes). These factors reduce the rate of spring snowmelt and maintain cooler and moister microclimates in summer. They are preferably spatially linked and of sufficient size to meet life history requirements and maintain genetic diversity of organisms. They have not yet been mapped in Idaho.

Delineating temperature refugia for cool water or air temperature dependent species is a relatively new idea (Isaak et al. 2015). Recent microclimate monitoring work in the Idaho Panhandle identified a portion of the Okanogan Highlands as the largest area of annually cool air in the Idaho Panhandle (Lucid et al. 2016). Continued monitoring of microclimate along with co-occurrence of cool air dependent organisms will provide bedrock information for research determining best management practices for cool air associated species.

Fortunately, the Okanogan Highlands has a substantial database on species co-occurrence with different microclimate regimes (Lucid et al. 2016). This database provides information necessary to begin learning how to help cool air dependent species adapt to climate change. A clear understanding of local climatic landscapes and climatic requirements of wildlife species is the first step toward managing landscapes in such a way to reduce potential climatic stressors on wildlife species.

Target Viability

Fair. Although partially mitigated by topography, climate change (hotter, drier summers, warmer and wetter winters, less snowpack) is expected to reduce the extent and possibly the quality of Cool Air Refugia habitat in northern Idaho. Landscapes fragmented by human development or climate-influenced, large-scale environmental change (e.g., severe wildfire) may decrease the ability of dispersal-limited species to use refugia.

Prioritized Threats and Strategies for Cool Air Refugia

High Threats for Cool Air Refugia in the Okanogan Highlands

Climate change

Global climate change is expected to have widespread effects on temperature and precipitation regimes worldwide and mean annual global air temperatures are predicted to rise within the 2 to 4.5 °C range by the end of the century (Meehl et al. 2007). Conditions in the Pacific Northwest are expected to trend toward hotter drier summers and warmer wetter winters (Karl et al. 2009). These changes will likely increase the temperature and evaporative rates in otherwise inherently protected refugia, thereby reducing the extent and quality of cool-air microsites. How wildlife populations will respond to these changes in localized areas is uncertain. Although sometimes available, empirical data to evaluate even the basic climatic requirements for many species is generally lacking (Mawdsley 2009).

Objective	Strategy	Action(s)	Target SGCNs
Maintain Cool Air Refugia for SGCN.	Improve knowledge of the distribution and status of Cool Air Refugia and associated SGCN.	Monitor microclimate variables and species co-occurrence over time. Determine species habitat requirements. Evaluate and enhance	Western Toad Wolverine Northern Bog Lemming Hoary Marmot Pale Jumping-slug A Roundback Slug (*Hemphillia* sp. 1)

Objective	Strategy	Action(s)	Target SGCNs
		opportunities for SGCN to access Cool Air Refugia. Determine best management practices to maintain cool microsites and benefit cool air associated species.	Magnum Mantleslug Shiny Tightcoil Western Bumble Bee

Target: Riverine–Riparian Forest & Shrubland

In the Okanogan Highlands, the riverine ecosystem includes all rivers, streams, and smaller order waterways (1–3 order; Strahler stream order) and their associated floodplain and riparian vegetation. Riparian habitat of smaller streams is highly diverse, typically dominated by Drummond's willow (*Salix drummondiana* Barratt ex Hook.), alder (*Alnus* Mill.), or redosier dogwood (*Cornus sericea* L.) shrublands. Geyer's willow (*Salix geyeriana* Andersson), Bebb's willow (*Salix bebbiana* Sarg.), thinleaf alder (*Alnus incana* L.) and rose spirea (*Spiraea douglasii* Hook.) shrublands line lower gradient streams. Understory vegetation is a lush mix of mesic forbs and graminoids.

Upper Priest Falls © 2013 Michael Lucid

Major rivers (those designated as 4+ order in Strahler stream order) in the Okanogan Highlands includes the Kootenai, Pend Oreille, and Priest rivers. Prior to agricultural development, flood control, and alteration of the hydrologic regime, the Kootenai River supported black cottonwood-dominated riparian forests. Western redcedar and red alder (*Alnus rubra* Bong.) are other important riparian trees at lower elevations. Engelmann spruce and subalpine fir dominate riparian habitats at higher elevations and in cold-air drainages.

The Kootenai River is the only drainage in Idaho with a native Burbot (ling) population and is home to a genetically distinct population of White Sturgeon. Fisheries for both of these species were closed for conservation purposes in 1984 in response to major declines in these populations. Alteration of the natural flow regime, substrate, temperature, and nutrients are believed to be the primary reasons for the lack of successful reproduction of White Sturgeon and Burbot (IDFG, 2008). Other rivers and streams in the region support numerous fisheries and provide host habitat for several mussel species. High-velocity mountain streams provide important nesting habitat for Harlequin Ducks (*Histrionicus histrionicus*). In the Okanogan Highlands there are numerous waterfalls documented for the region. Waterfalls support aquatic organisms uniquely adapted to extremely high water velocities and plants and animals that require cool, constantly moist rocky habitats. Waterfalls also provide important nesting habitat for Black Swift (*Cypseloides niger*). Although swifts are commonly detected within the Okanogan Highlands region, a nesting colony has not yet been discovered (Miller et al. 2013).

Target Viability

Fair. Kootenai River is subjected to sometimes very high to more often very low levels of nutrients that influence aquatic invertebrate load and thus fish. An altered seasonal flooding regime and development of riparian zones (e.g., levees, roads, etc.) negatively impacts important habitat for fish and aquatic invertebrates, as well as the health and reproduction of riparian vegetation. Terrestrial and aquatic habitats of other rivers are influenced by changed hydrographic regime. Invasive species are another major stressor.

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

Very High Threats for Riverine–Riparian Forest & Shrubland in the Okanogan Highlands

Dams & water management

Historically, the natural flood regime of the Kootenai River was dependent on winter snowmelt; with the most severe floods occurring in May or June and water flow remaining steady or low September–March (Hoffman et al. 2002, Burke et al. 2006). Currently, flows are dependent on power production, flood control, recreation, and special operations for the recovery of ESA–listed White Sturgeon and Bull Trout, with consideration for Burbot (SGCN) other focal species (KTOI and Montana Dept. of Fish and Wildlife 2004). Since the construction of Libby Dam, the hydrologic regime of the Kootenai River has shifted dramatically, with the highest flows occurring in the fall and early winter and low flows in the spring (Hoffman et al. 2002). In addition, dam operations also disrupt the delivery of fine sediments and nutrients into aquatic and riparian habitats within the floodplain (Burke et al. 2006). Severe floods have been eliminated entirely with the construction of levees and dikes that effectively disconnected the river from the surrounding floodplain (KTOI 2009).

Objective	Strategy	Action(s)	Target SGCNs
Develop habitat modifications that are compatible within the current hydrologic regime (KTOI 2009). Determine feasibility of restoring historic hydrologic regime. Restore populations of flood-associated	Increase floodplain areas with suitable substrate and elevation relative to the water table that can support riparian vegetation recruitment and establishment (KTOI 2009). Determine if all or a portion of historic hydrologic regime could be restored. Determine which organisms historically altered flood regimes	Implement strategies outlined in the Kootenai Tribe's Kootenai River Habitat Restoration Project Master Plan (KTOI 2009). Conduct review study to determine obstacles and solution to hydrologic regime recovery. Conduct review study to determine best mechanisms to restore natural flood-associated species and implement actions developed in plan.	White Sturgeon (Kootenai River DPS) Burbot Western Toad Northern Leopard Frog Fisher Grizzly Bear Western Ridged Mussel A Mayfly (*Ephemerella alleni*)

Objective	Strategy	Action(s)	Target SGCNs
organisms.	and implement population restoration programs.	Conduct reintroduction programs for organisms that directly influence natural flooding cycles.	

Aquatic invasive invertebrate & plant species

Aquatic invasive species are often the hardest to detect and eradicate. Across the nation, Zebra (*Dreissena polymorpha*) and Quagga Mussels (*Dreissena bugensis*) have disrupted food chains, competed with native species and cost millions of dollars of damage to municipalities by choking water intake pipes and other facilities (Pimentel et al. 2005). Although Zebra and Quagga mussels have not yet been detected in the waterbodies of the Okanogan Highlands, several boat check stations in the region have found the mussels on boats traveling through the area (ISDA 2015 Road Side Inspection Stations, accessed on Nov 2, 2015). It is a goal of the state that neither mussel is ever established in any of the Idaho water ways. Other aquatic invasive species such as Eurasian watermilfoil (*Myriophyllum spicatum* L.), flowering rush (*Butomus umbellatus* L.), and curly pondweed (*Potamogeton crispus* L.) have been detected and established in the Kootenai and Pend Oreille rivers (T. Woolf, pers. comm.). These species easily spread through the movement of boats between the recreational lakes, rivers, and streams in the region. For most of the aquatic plant species, only a fragment of the vegetated matter is necessary to establish the species in a new area. Aquatic invasive plant species, particularly watermilfoil, often form dense mats that prevent the establishment of native aquatic plant species and degrade wildlife and fish habitat (Idaho Invasive Species Counsel and ISDA 2007).

Objective	Strategy	Action(s)	Target SGCNs
Prevent the establishment of aquatic invasive species in noninvaded riverine systems.	Increase monitoring of riverine systems. Increase monitoring and treatment of dispersal vectors for invasive species.	Determine which riverine systems are not impacted by aquatic invasive species. Establish a monitoring schedule to visit un-invaded but high-risk riverine systems. Educate the public about the dangers of associated with spreading an aquatic invasive species. (ID Invasive Species Counsel and ISDA 2007). Maintain boat-check stations for the regular inspection for aquatic invasive species. Incorporate monitoring efforts into a multitaxa monitoring program that includes both invasive species and target SGCNs and their associates.	White Sturgeon (Kootenai River DPS) Burbot Western Ridged Mussel A Mayfly (*Ephemerella alleni*)
Contain and eradicate populations of Eurasian watermilfoil, flowering rush, and curlyleaf pondweed.	Implement actions indicated in the ISDA's 2008 Statewide Strategic Plan For Eurasian Watermilfoil	Survey invaded waters to determine extent of nonnative aquatic species distribution. Develop treatment priorities based on waterbody use. Develop strategies for eradication based	White Sturgeon (Kootenai River DPS) Burbot Western Ridged Mussel A Mayfly (*Ephemerella alleni*)

Objective	Strategy	Action(s)	Target SGCNs
	In Idaho.	on waterbody hydrology and use. Regularly monitor and re-treat areas after initial treatment. (ID Invasive Species Counsel and ISDA 2007).	

Invasive & noxious riparian weeds

Invasive species often prevent the establishment of native species by forming dense monocultures and in some instances even change the soil chemistry or hydrology of the invaded area (Ricciardi et al. 2013). In plant surveys conducted at several of the creeks within the Pend Oreille WMA, found an overall increase in noxious weed coverage at several of the properties, with a range of 0.46–28.25% coverage (Cousins and Antonelli 2008). Reed canarygrass was also predominant at many of the survey sites with 16.32% coverage of interior riparian areas (Cousins and Antonelli 2008). Reed canarygrass is a native species in the lower 48 but is considered a noxious weed in Washington and is thought to have hybridized with a nonnative invasive reed canarygrass (Lavergne and Molofsky 2007). Reed canarygrass forms dense monocultures that decrease plant diversity and degrade wildlife habitat.

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use GPS, remote sensing, and GIS technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Harlequin Duck Common Nighthawk Olive-sided Flycatcher
Contain and reduce widespread weeds in areas that are already infested (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Identify and treat of dispersal vectors to prevent further spread of invasive and noxious weeds. Restore treated areas with native species.	Treat weeds in high impact areas and along roads (USFS 2013). Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USFS 2013, IDL 2015). Revegetate treatment areas with native species and monitor restoration (KTOI 2009). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012). Incorporate noxious weeds into a multitaxa monitoring program.	Harlequin Duck Common Nighthawk Olive-sided Flycatcher

Species designation, planning & monitoring

Multiple species identified as SGCN found in Riverine–Riparian Forest & Shrubland are declining as a result of unknown causes. The priority for many of these species in the coming years is to identify the root causes and develop a strategy to address them.

Harlequin Duck

In Idaho, Harlequin Ducks are uncommon and occupy high-quality streams from the Canadian border south to the Selway River and in the Greater Yellowstone Ecosystem. Breeding streams are relatively undisturbed with high elevation gradients, cold, clear, and swift water, rocky substrates, and forested bank vegetation. Harlequin Ducks use different stream reaches over the course of the breeding season depending on environmental conditions (e.g., timing and magnitude of stream runoff, food abundance) and reproductive chronology (i.e., pre-nesting, nesting, early and late brood-rearing), but remain closely tied to rivers and streams for food, security, and escape cover from predators. There are an estimated 50 pairs of Harlequin Ducks that breed in Idaho (IDFG unpublished data). From 1996 to 2007 there was no statistically significant change in the statewide population. However, there were possible declines on several rivers including the Moyie River, Granite Creek (Lake Pend Oreille drainage) and the St. Joe River. Distribution and abundance of Harlequin Duck has not been assessed since 2007.

Objective	Strategy	Action(s)	Target SGCNs
Improve understanding of Harlequin Duck distribution, abundance, and population status.	Design studies that improve understanding of the factors that influence Harlequin Duck stream occupancy, survival, and reproduction.	Mark and track individuals on the breeding grounds to better understand habitat use, survival rates, causes and timing of mortality, patterns and timing of movements, linkages between breeding, molting, and wintering areas, and return rates. Seek partnerships with coastal states and provinces to study wintering ecology and habitat use. Investigate how human disturbance, changes in forest management, and stream flow characteristics (severity, timing, and frequency of peak and low stream flows) affect behavior, occupancy, reproductive success, and survival on breeding streams.	Harlequin Duck
Establish baseline population metrics for Harlequin Duck.	Implement a coordinated Harlequin Duck monitoring program.	Develop partnerships, funding, and capacity to conduct breeding surveys statewide on a regular basis following the protocol established in the Harlequin Duck Conservation Assessment and Strategy for the US Rocky Mountains (Cassirer et al. 1996) or other appropriate techniques. Where local declines are documented, expand surveys upstream of historically occupied stream reaches. Coordinate surveys with MT, WY, OR, BC, and AB to facilitate a northwest regional population assessment. Incorporate Harlequin Duck surveys into riverine multitaxa monitoring programs.	Harlequin Duck Western Ridged Mussel A Mayfly (*Ephemerella alleni*)

Black Swift

Little is known about breeding Black Swifts in Idaho. Black Swifts are not generally detected during breeding bird surveys. Additionally, their cryptic nesting sites and small colony sizes are obstacles when determining distribution or abundance in the state. In 2013, a survey of breeding locations for Black Swift found evidence of nesting at 5 of the 16 waterfalls visited and roosting swifts at two of the waterfalls (Miller et al. 2013).

Objective	Strategy	Action(s)	Target SGCNs
Determine current breeding locations of Black Swifts	Conduct a comprehensive survey of potential nesting locations	Work with partners, including Intermountain Bird Observatory and Washington, Montana, and British Columbia to develop and implement a systematic survey. Incorporate surveys into multitaxa monitoring programs.	Black Swift

Restoration tool: American Beaver

American Beaver populations currently exist at lower than historic levels across the western United States. This results in a host of ecological consequences such as stream downcutting, reduced riparian extent, and desiccation of riparian and wetland habitat. American Beaver restoration efforts have been shown to be an effective tool to restoring habitat and ecological function to riverine systems.

Objective	Strategy	Action(s)	Target SGCNs
Restore hydrologic function and restore riparian habitats.	Use American Beaver to accomplish hydrologic and habitat restoration.	Determine past and current status of American Beaver populations. Determine feasibility of using American Beaver in restoration efforts. Implement actions delineated by above analysis.	Western Toad Northern Leopard Frog Western Ridged Mussel A Mayfly (*Ephemerella alleni*)

Target: Depressional Wetlands

Depressional Wetlands are any wetlands found in a topographic depression. Depressional Wetlands include vernal pools, old oxbows, disconnected river meanders, and constructed wetlands. In the Okanogan Highlands, this includes many of the wetlands found within the Pend Oreille, McArthur Lake, and Boundary Creek WMAs, the Kootenai National Wildlife Refuge, and within the floodplains of the Kootenai, Upper Pack, and Pack rivers. Other Depressional Wetlands are found within the Selkirk Mountains wherever the elevational lines close and surface waters accumulate (e.g., glacial kettles). Small depressional ponds (less than 2 m deep) commonly occur within the Selkirk Mountains and provide breeding habitat for Western Toads. Depressional Wetlands often support emergent marsh or tree or shrub-dominated swamps. Marshes are composed of broad-leaf cattail (*Typha latifolia* L.), tall bulrush species (*Schoenoplectus* (Rchb.) Palla), panicled bulrush (*Scirpus microcarpus* J. Presl & C. Presl), and other emergent marsh species. Swamps are characterized by western redcedar, Engelmann spruce, rose spirea , and thinleaf alder. In swamps with a high water table, devilsclub (*Oplopanax horridus* [Sm.] Miq.) and American skunkcabbage (*Lysichiton americanus* Hultén & H. St. John) are regularly encountered. In the valley bottoms, reed canarygrass often forms impenetrable monocultures that limit species diversity within the wetlands (K. Cousins, pers. comm.). Amphibians, waterbirds, marshbirds, and waterfowl all use Depressional Wetlands for breeding and foraging habitats.

Target Viability

Fair. Lower elevation wetlands have experienced, or are currently threatened by, filling and draining, altered hydrologic regimes (e.g., disconnection from floodplain due to levees, water diversion), and invasive species or disease. Higher elevation Depressional Wetlands are threatened by climate change, which alters the timing and amount of water entering them.

Prioritized Threats and Strategies for Depressional Wetlands

Very High Threats for Depressional Wetlands in the Okanogan Highlands

Invasive & noxious weeds

Invasive species often prevent the establishment of native species by forming dense monocultures and in some instances even change the soil chemistry or hydrology of the invaded area (Ricciardi et al. 2013). In plant surveys conducted in Boundary Creek WMA and Pend Oreille WMA, 93% and 83% of the study sites, respectively detected noxious weeds at varying densities (Cousins and Antonelli 2008*a*,*b*). Additionally, in the Boundary Creek WMA, reed canarygrass was the dominant species found in 5 of the 17 marsh communities and it had doubled in coverage from previous surveys conducted in meadow communities (Cousins and Antonelli 2008*a*). Reed canarygrass is a native species in the lower 48 but is considered a noxious weed in Washington and highly invasive elsewhere; it is thought to have hybridized with a nonnative invasive reed canarygrass (Lavergne and Molofsky 2007). Reed canarygrass forms dense monocultures that decreases plant diversity and degrades wildlife habitat. Additionally, surveys done in the Okanogan Highlands, found 33 of the ponds, small lakes and emergent wetlands (n = 176) surveyed had spotted knapweed or tansy present (Lucid et al. 2016).

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use GPS, remote sensing, and GIS technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Western Toad Northern Leopard Frog American Bittern Black Tern Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis
Contain and reduce widespread weeds in areas that are already infested (USFS	Coordinate invasive and noxious weed monitoring and treatment across	Continue annual noxious weed control program and coordinate weed management activities with Bonner County and the Selkirk Cooperative Weed Management Area. (Cousins and Antonelli 2008*b*).	Western Toad Northern Leopard Frog American Bittern Black Tern Townsend's Big-eared Bat

Objective	Strategy	Action(s)	Target SGCNs
2013).	agencies. Identify and treat dispersal vectors to prevent further spread of invasive and noxious weeds. Restore treated areas with native species.	Treat weeds in high impact areas and along roads (USFS 2013). Revegetate treatment areas with native species and monitor restoration (KTOI 2009). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012). Incorporate noxious weeds into a multitaxa monitoring program.	Silver-haired Bat Little Brown Myotis

High Threats for Depressional Wetlands in the Okanogan Highlands

Climate change

In the Pacific Northwest, climate change is expected to trend toward hotter, drier summers and warmer, slightly wetter winters (Karl et al. 2009). This scenario may result in snowpacks that are shallower and earlier melting. Although Depressional Wetlands may fill with water, it may occur earlier in the year. Less snowpack may mean less surface and groundwater being available to sustain wetland hydrology later in summer, resulting in more Depressional Wetlands drying out earlier in summer. How this will affect SGCN dependent on Depressional Wetlands is not known. More information is needed to make appropriate wetland management decisions needed to sustain wetland functions with a changing climate.

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring.	Monitor climate variables and species co-occurrence over time.	Develop collaborative climate monitoring program using a variety of microclimate variables along with co-occurrence of SGCN and their associates. Collaborate with Washington, British Columbia, and Montana.	Western Toad Northern Leopard Frog American Bittern Black Tern Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis

Species designation, planning & monitoring

Multiple species identified as SGCN that are dependent on Depressional Wetlands are declining as a result of unknown causes. The priority for many of these species in the coming years is to identify the root causes and develop a strategy for addressing it. For Black Tern (*Chlidonias niger*), there may be many additional nesting sites in Idaho yet to be discovered. This should be a high priority in the next 10 years so that we have a better sense of our baseline breeding population.

Objective	Strategy	Action(s)	Target SGCNs
Determine current distribution and	Participate in coordinated monitoring.	Conduct repeat surveys of effort initiated in early 2000s to determine where species distribution and density	American Bittern

Objective	Strategy	Action(s)	Target SGCNs
abundance of American Bittern.	Identify hot spots for conservation.	has changed.	
Determine statewide breeding populations of Black Tern.	Identify habitat requirements of breeding Black Tern.	Conduct repeat surveys of targeted habitat for tern nesting.	Black Tern
Assess future changes to species status.	Monitor population status.	Incorporate species into multitaxa monitoring program.	Western Toad Northern Leopard Frog American Bittern Black Tern

Target: Springs & Groundwater-Dependent Wetlands

In the Okanogan Highlands, peatlands are one of the most conspicuous types of groundwater-dependent wetlands with over 31 sites identified (Lichthardt 2004) within the ecoregion. Peatlands are found on waterlogged spring-fed soils, in cold microsites, with at least 30 cm of peat accumulation that range from nutrient-poor (poor fens) to nutrient-rich (rich fens and swamps) (Bursik and Mosely 1992). They often host a diversity of boreal plant species that are disjunct from, or at the edge of their core range and species that are unique in their ability to persist in nutrient- and oxygen-poor soils (e.g., *Sphagnum* moss, mud sedge (*Carex limosa* L.), tall cottongrass (*Eriophorum angustifolium* Honck.), sundew (*Drosera* L. spp.), etc.) (Lichthardt 2004). Surveys for Northern Bog Lemming in Montana (Reichel and Corn, 1997) and Idaho (Groves 1994) have found the species most frequently in wetland habitats with a peat component. Cold-water springs and other groundwater-dependent wetlands are also widespread within the Selkirk Mountains, particularly within the glacial carved troughs and in stream headwaters. They often provide a cold-water refugium for invertebrate and vertebrate species (Issak et al. 2015). These include wet meadows dominated by sedges (*Carex* L. spp.), tufted hairgrass (*Deschampsia cespitosa* [L.] P. Beauv.), and bluejoint (*Calamagrostis canadensis* [Michx.] P. Beauv.).

Target Viability

Good. Many groundwater-dependent wetlands in the Okanogan Highlands are relatively secure, being located in minimally developed locations of the Selkirk Mountains. These habitats are primarily threatened by climate change which may increase temperatures (altering soil processes such as peat formation) and decrease the amount of groundwater available to sustain wetlands. However, some valley peatlands (Lichthardt 2004) and wet meadows are also stressed by nutrient pollution from adjacent agricultural and housing development, historic hydrologic alteration (e.g., dams, diversions, ditches, beaver removal), livestock grazing, invasive species, recreation, and forest management.

Prioritized Threats and Strategies for Springs & Groundwater-Dependent Wetlands

Very High Threats for Springs & Groundwater-Dependent Wetlands in the Okanogan Highlands

Smith Creek Peatland © 2014 Michael Lucid

Invasive & noxious weeds

Invasive species often prevent the establishment of native species by forming dense monocultures and in some instances even change the soil chemistry or hydrology of the invaded area (Ricciardi et al. 2013). In wetland surveys conducted in Boundary Creek WMA and Pend Oreille WMA, 52 and 54 of the 56 and 65 study sites, respectively, detected noxious weeds at varying densities (Cousins and Antonelli 2008*a*,*b*). Additionally, in the Boundary Creek WMA, reed canarygrass doubled in coverage from previous surveys conducted in meadow communities (Cousins and Antonelli 2008*a*). Reed canarygrass forms dense monocultures that decreases plant diversity and degrades wildlife habitat. Peatlands in the Okanogan Highlands have been degraded by various invasive plant species (Lichthardt 2004).

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use GPS, remote sensing, and GIS technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Western Toad Northern Bog Lemming
Contain and reduce widespread weeds in areas that are already infested (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Identify and treat dispersal vectors to prevent further spread of	Continue annual noxious weed control program and coordinate weed management activities with Bonner County and the Selkirk Cooperative Weed Management Area. (Cousins and Antonelli 2008*b*). Treat weeds in high impact areas and along roads (USFS 2013). Revegetate treatment area with native species and monitor restoration	Western Toad Northern Bog Lemming

Objective	Strategy	Action(s)	Target SGCNs
	invasive and noxious weeds. Restore treated areas with native species.	(KTOI 2009). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012). Incorporate noxious weeds into a multitaxa monitoring program.	

High Threats for Springs & Groundwater-Dependent Wetlands in the Okanogan Highlands

Climate change

In the Pacific Northwest, climate change is expected to trend toward hotter, drier summers and warmer, slightly wetter winters (Karl et al. 2009). This scenario may result in snowpacks that are shallower and earlier melting. Less snowpack may mean less groundwater being available to sustain hydrology later in summer, resulting in reduced wetland extent and conversion to drought tolerant meadow communities. These changes will likely increase the temperature and evaporative rates in peatlands (e.g., cool microsite refugia), potentially reducing the value of these wetlands for species sensitive to warmer temperatures. Management that promotes retention of water in wetlands (e.g., American Beaver reintroduction) may be needed to mitigate hydrologic changes. How climate change will affect SGCN found in groundwater-dependent wetlands is uncertain. Although sometimes available, empirical data to evaluate even the basic climatic requirements for many species is generally lacking (Mawdsley 2009).

Delineating temperature refugia (e.g., peatlands) for cool water or air temperature dependent species is a relatively new idea (Isaak et al. 2015). Recent microclimate monitoring work in the Idaho Panhandle identified a portion of the Okanogan Highlands as the largest area of annually cool air in the Idaho Panhandle (Lucid et al. 2016). Continued monitoring of microclimate along with co-occurrence of cool air dependent organisms will provide bedrock information for research determining best management practices for cool air associated species.

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring	Monitor climate variables and species co-occurrence over time	Develop collaborative climate monitoring program using a variety of microclimate variables along with co-occurrence of associated SGCN. Collaborate with Washington, Montana, and British Columbia.	Western Toad Northern Bog Lemming

Target: Pond-Breeding Amphibians

Amphibians are a highly vulnerable taxonomic group which, globally, hosts more species in decline than birds or mammals (Stuart et al. 2004). Amphibian populations have been declining worldwide for decades (Houlahan et al. 2000) and sometimes occur rapidly in seemingly pristine environments (Stuart et al. 2004). Amphibians are susceptible to pathogens, climate change, environmental pollution, exposure to ultraviolet-B (UV-B) radiation, and invasive species (Bridges and Semlitsch 2000, Kiesecker et al. 2001, Stuart et al. 2004, Cushman 2006). In addition, they tend to have relatively low vagilities (Bowne and Bowers 2004, Cushman 2006) and often have narrow habitat requirements (Cushman 2006).

One of the last verified Northern Leopard Frog detections in the Okanogan Highlands, 2014 IDFG

Western Toads have experienced rangewide declines in western North America. This species could be experiencing similar declines in the Okanogan Highlands, but recent surveys indicate this species is more abundant in the section than other sections in the Idaho Panhandle (Lucid et al. 2016). This indicates the importance of maintaining quality conditions for this species in the Okanogan Highlands. Northern Leopard Frogs (*Rana pipiens*) are abundant across their range, but have experienced severe declines in portions of their range. Northern Leopard Frogs appear to be extirpated from the Okanogan Highlands (Lucid et al. 2016).

Target Viability

Poor. Northern Leopard Frogs have been extirpated from this section. Extant species face invasive species and disease threats.

Prioritized Threats and Strategies for Pond-Breeding Amphibians

High rated threats to Pond-Breeding Amphibians in the Okanogan Highlands

Amphibian chytridiomycosis & other disease

Recent surveys for amphibian chytridiomycosis, a disease caused by a fungal pathogen, *Batrachochytrium dendrobatidis* (*Bd*), on Columbia Spotted Frogs (*Rana luteiventris*) across the Okanogan Highlands indicated the fungus is widespread, occurring at approximately two-thirds of surveyed sites. *Bd* was found more commonly at low and high-elevation sites than mid-elevation sites. *Bd* is a known threat to Western Toad and has been documented to cause near total egg hatching failure of a Western Toad population in the Pacific Northwest (Blaustein et al. 1994). Further research is needed to assess the threat of *Bd* to Western Toad and Northern Leopard Frog. Local die-offs of Western Toad and other amphibians have been recorded in recent years. These die-offs may be disease related and sites should be investigated and monitored.

Objective	Strategy	Action(s)	Target SGCNs
Determine level of threat to Western Toad.	Determine status of *Bd* in Western Toad.	Visit known Western Toad sites and swab toads for *Bd*.	Western Toad
Monitor amphibian disease.	Develop amphibian disease monitoring program.	Develop monitoring program that encompasses monitoring *Bd* presence, *Bd* levels, and other potential amphibian disease.	Western Toad Northern Leopard Frog

Extirpation of Northern Leopard Frog

Extensive surveys indicate this species has been extirpated from the Okanogan Highlands (Lucid et al. 2016). The closest known colony of this species occurs at the Creston Valley Wildlife Management Area in British Columbia. This population could potentially serve as a source population for human-assisted reintroduction or natural recolonization efforts. Nonnative American Bullfrog occurs on the US side of the border but has not been detected on the British Columbia side. It is critically important to initiate immediate control and extirpation efforts on the most northern American Bullfrog populations in Idaho to prevent their dispersal to the Creston Valley Wildlife Management Area.

Objective	Strategy	Action(s)	Target SGCNs
Address Northern Leopard Frog extirpation.	Work with transboundary partners in Idaho, Washington, and British Columbia	Conduct a literature review assessing potential recovery options including reintroduction and natural recolonization for this species.	Northern Leopard Frog
American Bullfrog control.	Prevent American Bullfrog expansion to Creston Valley Wildlife Management Area Northern Leopard Frog colony.	Work with partners to conduct American Bullfrog control and eradication actions near the Canadian border. Coordinate efforts with British Columbia and Washington.	Western Toad Northern Leopard Frog

Climate change

In the Pacific Northwest, climate change is expected to trend toward hotter, drier summers and warmer, slightly wetter winters (Karl et al. 2009). This scenario may result in snowpacks that are shallower and earlier melting. Although wetlands may fill with water, it may occur earlier in the year. Less snowpack may mean less surface and groundwater being available to sustain wetland hydrology later in summer, resulting in more wetlands drying out earlier in summer. How this will affect SGCN dependent on wetlands is not known. More information is needed to make appropriate wetland management decisions needed to sustain wetland functions with a changing climate.

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring.	Monitor climate variables and	Develop climate monitoring program using a variety of microclimate	Western Toad Northern Leopard Frog

Objective	Strategy	Action(s)	Target SGCNs
	species and disease co-occurrence over time.	variables along with co-occurrence of associated SGCN. Monitor *Bd* in relation to microclimate variables.	

Target: Lake-Nesting Birds

Western Grebe (*Aechmophorus occidentalis*) and Common Loon (*Gavia immer*) are 2 lake-nesting species that are found in the Okanogan Highlands. Western Grebes build floating nests that are often hidden among emergent vegetation but are sometimes in the open. They are often found in colonies that can number into the hundreds or thousands. In the Okanogan Highlands, a nesting colony of Western Grebes has been regularly documented on Lake Pend Oreille near Denton Slough although nest numbers have ranged only 2–10 nests per year. Reproductive success of these nests has not been documented. Common Loons build platform nests on lake edges or in shallow water. Nesting has only been documented in a few locations in Idaho but nonflying juvenile loons were observed on the north end of Priest Lake, Upper Priest Lake, and the Clark Fork Delta on Lake Pend Oreille in the 1990s (IDFG 2005); however, there have been no recent sightings.

Target Viability

Poor. The one Western Grebe colony had no reproductive success during the 2015 season. There has been no sign of reproduction in Common Loons in the Okanogan Highlands.

High Threats for Lake-Nesting Birds in the Okanogan Highlands

Water level fluctuations in lakes

Fluctuating water levels are a significant issue for several waterbirds species, including Western Grebe and Clark's Grebe. Most Western and Clark's Grebe colonies are located on lakes, reservoirs, or along rivers susceptible to water fluctuations resulting from dam operations. Rapid increase in water levels results in nest flooding, while rapid releases of water results in nests that are no longer accessible to grebes. Additionally, recreational boat traffic near nests can inadvertently flood nests and cause a disruption of incubation behavior.

Objective	Strategy	Action(s)	Target SGCNs
Reduce nest failure.	Work with US Army Corps of Engineers (USACE) and dam operators to reduce water level fluctuations and boat wake during grebe nesting period. Educate public regarding presence and sensitivity of colonial nesting birds. Increase secure nest site availability	Create boating no-wake zones around nesting colonies, and monitor their effectiveness. Develop Best Management Practices with USACE for water level management around grebe colonies. Create signage at boat launches informing the public of colony presence and recommendations for reducing recreational impacts Install loon and grebe nest platforms in appropriate lakes, and monitor their use	Common Loon Western Grebe

Species designation, planning & monitoring

Lake-nesting species identified as SGCN are declining as a result of unknown causes. The priority for these species in the coming years is to identify the root causes and develop a strategy to address them.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of low nesting success and recruitment of Common Loon and Western Grebe in Idaho.	Conduct research on existing colonies in Idaho.	Collaborate with FWS on proposed research project.	Common Loon Western Grebe

Target: Low-Density Forest Carnivores

Low-Density Forest Carnivores naturally occur at low densities and can be directly affected by human activities. This presents unique opportunities to directly affect positive conservation outcomes for these species. This group consists of mammals traditionally considered furbearers including American Marten, weasels, and American Mink. Wolverine and Fisher are the 2 forest carnivore SGCN that occur within the Okanogan Highlands. Extensive surveys of this section from 2010 to 2014 detected only one individual male of each species within this section (Lucid et al. 2016). Conservation efforts in this section should focus on maintaining or improving ecosystem integrity conducive to the establishment of resident and reproductive Wolverine and Fisher. Research to determine reasons for recent declines in Fisher numbers (Lucid et al. 2016) and developing and implementing conservation actions to address those issues should be a priority.

Target Viability

Poor. Only a few individuals of Low-Density Forest Carnivores known to occur in this section.

Prioritized Threats and Strategies for Low-Density Forest Carnivores

High rated threats to Low-Density Forest Carnivores in the Okanogan Highlands

Genetic isolation

Wolverine and Fisher were nearly or completely extirpated from the lower 48 states in the early 20th century. A variety of natural (Wolverine) and human-mitigated (Fisher) recolonization events have likely affected the genetic structure of populations of the species (Aubry et al. 2007, Vinkey et al. 2006). Populations of both species likely have low genetic diversity due to founder affects. Proper habitat management and gene flow mitigation may help to reduce genetic isolation and increase species occurrence on the landscape.

Objective	Strategy	Action(s)	Target SGCNs
Monitor genetic isolation.	Determine current levels of genetic isolation.	Conduct genetic analyses to determine current population sizes and levels of gene flow. Maintain transboundary collaborations to assess and monitor Wolverine gene flow with Canadian populations.	Wolverine Fisher
Assess and enhance gene flow.	Manage connectivity habitat and	Conduct analysis to assess the apparent lack of Fisher gene flow from Flathead Valley to the Okanogan Highlands.	Wolverine Fisher

Objective	Strategy	Action(s)	Target SGCNs
	assess potential to enhance gene flow.	Conduct analysis assessing reasons for recent declines in Fisher numbers (Lucid et al 2016). Manage forested lowland habitat to maintain forested connectivity. Improve additional lowland forest to increase connectivity. Conduct analysis and literature review to assess potential recovery options including reintroduction and natural recolonization.	

Winter recreation

The *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014) outlines specific actions to minimize potential disturbance of Wolverine by oversnow recreation and ski area infrastructure.

Objective	Strategy	Action(s)	Target SGCNs
Manage winter recreation to minimize disturbance.	Coordinate efforts between public and private entities.	Implement strategies outlined in the *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014). Work with winter recreation groups to develop educational materials and programs.	Wolverine

Inadequate understanding of population and distribution status to assess potential effects of incidental capture from trapping on populations of Wolverine and Fisher

Wolverine and Fisher are on occasion incidentally captured in the course of trapping other species with legal harvest seasons. Idaho has a mandatory reporting requirement for incidental capture and mortality of any nontarget species such as Wolverine and Fisher. Based on IDFG records, some individuals are found dead in the trap while others are released alive. Information gaps regarding ecology and population dynamics of these species limit ability to draw conclusions about whether incidental capture has any population effects (e.g., whether patterns in capture numbers reflect cyclic changes in populations, greater exposure to trapping, or population increase and expansion).

Objective	Strategy	Action(s)	Target SGCNs
Narrow information gaps about ecology and population dynamics to evaluate threats, including the potential effect of incidental	Gather the necessary information to understand conservation priority related to incidental capture.	Implement strategies and actions outlined in the *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014), particularly Objective 6 (and related strategies): Continue to minimize injury and mortality of Wolverines from incidental trapping and shooting. As part of educating trappers about techniques to minimize incidental capture, conduct interviews with trappers to obtain	Wolverine Fisher

capture to local populations of Wolverine and Fisher.		information about the condition and demographics of captured individuals, and the locations, habitats, and trap sets involved in incidental captures of Wolverine or Fisher.	

Target: Grizzly Bear

Grizzly Bears in this section occupy the Selkirk Mountains ecosystem, which is approximately 2,200 square miles in size distributed equally between the United States and Canada. The Idaho Selkirks currently contain at least 25–30 Grizzly Bears. Research has been conducted on the Grizzly Bear population since the early 1980s, primarily in the form of trapping and radiocollaring. More recently, researchers have added camera trap and DNA collection to the research effort. Grizzly Bears typically den at high elevations in the Selkirks but move to lower elevations or south-facing slopes following den emergence, taking advantage of early spring green-up. As the season progresses, bears move to higher elevations, relying on a variety of berries with huckleberry (*Vaccinium* sp.) as the most important forage. Domestic livestock grazing is limited in this section and is not an important consideration in Grizzly Bear management. The population appears to be expanding both in size and distribution. Although included in the original threatened Grizzly Bear listing, the Selkirk population was subsequently petitioned for reclassification from threatened to endangered. After 2014, the FWS determined that the Selkirk population had recovered to the point that it was no longer warranted but precluded from listing as endangered and the Grizzly Bear remains listed as threatened under ESA.

Target Viability

Fair. Population appears to be expanding in both size and distribution.

Prioritized Threats and Strategies for Grizzly Bear

High rated threats to Grizzly Bear in the Okanogan Highlands

Anthropogenic attractants, roads, and the resulting potential for excessive human-caused mortality pose high threats to the Grizzly Bear.

Anthropogenic attractants

Data collected during the 1980s indicated human-caused mortality to be the most important factor affecting population recovery (Knick and Kasworm 1989). Illegal mortality has been reduced through enforcement and education efforts and access restrictions in the form of road closures. The reduced human-caused mortality resulted in an expanding Grizzly Bear population, both in distribution and number. As a result, more human–bear interactions are now taking place in low-elevation areas where humans have established year-round or seasonal residences. Anthropogenic attractants such as garbage, compost piles, sunflower bird feeders, small domestic livestock such as pigs, and corn deer feeders attract Grizzly Bears and can result in food-conditioned or habituated bears. Such bears require management actions including trapping and relocating animals, management removal (killing), or are killed by landowners and can increase the likelihood of mistaken identity kills during the Black Bear hunting season.

Objective	Strategy	Action(s)	Target SGCNs
Reduce human-caused mortalities to allow for population growth.	Reduce anthropogenic attractants.	Work with FS on education and enforcement of food storage orders on FS land. Public education about consequences of feeding and habituating bears.	Grizzly Bear

Roads

Roads can allow relatively easy access to areas that contain Grizzly Bears, thereby allowing more opportunities for mistaken identity kills, intentional poaching, or displacement of bears. Road management on federal lands, primarily US Forest Service ownership, has significantly improved conditions for Grizzly Bears and contributed to the reduction of human-caused mortalities. Access restrictions must be continued and evaluated to address mortality concerns.

Objective	Strategy	Action(s)	Target SGCNs
Reduce human-caused mortalities to allow for population growth.	Maintain access restrictions within the Bear Management Units.	Continue actions described in the Grizzly Bear Access Amendments within the 2015 Forest Service Management Plan (USFS 2015).	Grizzly Bear

Genetic isolation

Genetic isolation of any small population is of long-term conservation concern. Recent radiotelemetry and DNA data suggest that some interchange with adjacent Grizzly Bear populations is either occurring or possible; however, human populations continue to increase. Long-term conservation of Grizzly Bears must accommodate movement between adjacent ecosystems to ensure genetic interchange.

Objective	Strategy	Action(s)	Target SGCNs
Monitor genetic isolation.	Determine current levels of genetic isolation.	Conduct genetic analyses to determine current population sizes and levels of gene flow. Maintain transboundary collaborations to assess and monitor Grizzly Bear gene flow with Canadian populations.	Grizzly Bear
Assess and enhance gene flow.	Manage connectivity habitat and assess potential to enhance gene flow.	Manage forested lowland habitat to maintain forested connectivity. Improve additional lowland forest to increase connectivity.	Grizzly Bear

Target: Caribou

We added Caribou (*Rangifer tarandus*) after our public review and will be developing this narrative as a revision.

Target: Ground-Dwelling Invertebrates

Ground-Dwelling Invertebrates provide essential ecosystem services including decomposition, nutrient cycling, food for vertebrates, plant pollination, seed dispersal, and disease vectoring. They can also serve as effective indicators of environmental health (Jordan and Black 2012). This group encompasses a wide array of taxa. However, Okanogan Highland SGCN in this group are limited to terrestrial gastropods and the Spur-throated Grasshopper (*Melanoplus*) Species Group.

Target Viability

Unknown. Many species lack information on taxonomy, distribution, habitat, and threats.

Species designation, planning & monitoring

Basic knowledge of ecological requirements, habitat needs, systematics, and distribution is lacking for most Ground-Dwelling Invertebrates. Spur-throated Grasshoppers are in need of basic taxonomic work. Although substantial knowledge of terrestrial gastropod distribution and microclimate requirements was obtained during work conducted from 2010 to 2014 (Lucid et al. 2016), much work remains to be done to gain an adequate understanding of basic conservation needs for these species. Four terrestrial gastropods are known to be associated with cooler than average mean annual air temperatures (Lucid et al. 2016). Managing microsites for these species for cool air temperatures and minimal disturbance is recommended until a better ecological understanding is developed through research and monitoring.

Objective	**Strategy**	**Action(s)**	**Target SGCNs**
Determine appropriate taxonomic status of species within the Harvestman Species Group.	Investigate and validate taxonomic status.	Conduct field surveys to collect specimens. Conduct morphological and genetics work to determine species status.	A Harvestman (*Acuclavella*) Species Group
Conduct research and habitat conservation activities for cool air temperature associated gastropods (Lucid et al. 2016).	Develop a better understanding of requirements for these species.	Conduct research to assess ecological requirements for these species. Manage forest structure near microsites to maintain cool air temperatures. Manage these sites for minimal disturbance. Implement long-term monitoring of species and associated microclimate and other habitat requirements. Coordinate with Washington, Montana, and British Columbia.	Pale Jumping-slug A Roundback Slug (*Hemphillia* sp. 1) Magnum Mantleslug Shiny Tightcoil
Confirmation and site protection.	Implement actions to sites where Salmon Coil and Western Flat-whorl are known to occur.	Conduct genetics work to confirm taxonomic identity of specimens currently in possession of IDFG. Work with public or private landowners to minimize disturbance to sites.	Salmon Coil Western Flat-whorl
Determine appropriate	Investigate and validate	Conduct field surveys to collect specimens.	Coeur d'Alene Oregonian

Objective	Strategy	Action(s)	Target SGCNs
taxonomic status of subspecies within the Coeur d'Alene Oregonian species complex.	taxonomic status.	Conduct morphological and genetics work to determine species status.	
Determine appropriate taxonomic status of species within the Spur-throated Grasshopper Species Group).	Investigate and validate taxonomic status.	Conduct field surveys to collect specimens. Conduct morphological and genetics work to determine species status.	Spur-throated Grasshopper (*Melanoplus*) Species Group
Determine if range of Bitterroot Mountain invertebrate SGCN extends to Okanogan Highlands.	Implement actions to assess range of Bitterroot Mountain invertebrates.	Conduct targeted field surveys to collect specimens. Encourage incidental collection of invertebrates by other field workers or recreationists by developing protocols, providing equipment/supplies, providing educational opportunities such as training sessions.	Western Pearlshell Straight Snowfly Idaho Snowfly Palouse Snowfly Cascades Needlefly Idaho Forestfly Clearwater Roachfly Umatilla Willowfly A Click Beetle (*Beckerus barri*) A Riffle Beetle (*Bryelmis idahoensis*) A Mayfly (*Ameletus tolae*) Lolo Mayfly A Mayfly (*Paraleptophlebia falcula*) A Mayfly (*Paraleptophlebia jenseni*) A Mayfly (*Paraleptophlebia traverae*) A Mayfly (*Parameletus columbiae*) A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita wyomingensis sculleni*) Hunt's Bumble Bee A Mason Bee (*Hoplitis orthognathus*) A Caddisfly (*Apatania barri*) A Caddisfly (*Manophylax annulatus*) A Caddisfly (*Eocosmoecus schmidi*)

Objective	Strategy	Action(s)	Target SGCNs
			A Caddisfly (*Homophylax acutus*) A Caddisfly (*Philocasca antennata*) A Caddisfly (*Philocasca banksi*) A Caddisfly (*Rhyacophila oreia*) A Caddisfly (*Rhyacophila robusta*) A Caddisfly (*Goereilla baumanni*) A Caddisfly (*Sericostriata surdickae*)

Target: Pollinators

Pollinators provide an essential ecosystem service that benefits agricultural producers, agricultural consumers, and gardeners (Mader et al. 2011) in the Okanogan Highlands. A wide range of taxa includes birds and an array of insects that provide pollination activities. Western Bumble Bee (*Bombus occidentalis*), Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*), and Monarch (*Danaus plexippus*) are SGCN pollinators known to occur within this section.

Many pollinators, but particularly bees, are known to be experiencing population declines throughout North America (Mader et al. 2011) and those declines may be occurring within the Okanogan Highlands as well. Population declines and local die-offs occur for a variety of reasons including habitat loss, pesticide exposure, and climate change (Mader et al. 2011). The Okanogan Highlands is ripe with opportunity to address these threats and increase the status of SGCN pollinators. Farmers, habitat managers, roadway authorities, municipalities, and homeowners can all contribute to pollinator conservation in clear and productive ways.

Target Viability

Fair. Many pollinators declining rangewide.

Prioritized Threats and Strategies for Pollinators

Very High rated threats to Pollinators in the Okanogan Highlands

Pesticides

Pollinators are negatively affected by pesticides by absorbing pesticides through the exoskeleton, drinking nectar containing pesticides, and carrying pollen laced with pesticides back to colonies (Mader et al. 2011). Neonicotinoids are particularly harmful to bee populations and can cause dramatic die-offs (Hopwood et al. 2012). Although the most effective strategy benefitting pollinators is to eliminate pesticide use, significant benefit for pollinators can still be achieved through reducing the use of and pollinator exposure to pesticides (Mader et al. 2011).

Objective	Strategy	Action(s)	Target SGCNs
Reduce native pollinator exposure to pesticides (Mader et al. 2011).	Educate habitat managers, farmers, municipalities, and small property owners in methods to eliminate pesticide use (Mader et al. 2011).	Conduct educational activities that encourage potential pesticide applicators to eliminate the use of pesticides where practical. Where pesticides must be used, encourage applicators to apply the minimum amount of chemical necessary and apply when pollinators are least active (i.e., nighttime and when flowers are not blooming) (Mader et al. 2011). Specifically target urban homeowners in educational efforts in the elimination of or proper application of pesticides (Mader et al. 2011). Conduct workshops that discuss pesticides in relation to other pollinator habitat management concerns (Mader et al. 2011).	Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
Reduce native pollinator exposure to pesticides on IDFG administered property (Mader et al. 2011).	Implement measures to reduce or eliminate pesticide use on IDFG WMAs and other properties (Mader et al. 2011).	Use the minimum recommended amount of pesticide (Mader et al. 2011). Apply pesticides at times when pollinators are least active such as nighttime, cool periods, low wind activity, and when flowers are not blooming (Mader et al. 2011). Mow or otherwise remove flowering weeds before applying pesticides (Mader et al. 2011).	Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
Eliminate use of neonicotinoid insecticides (Hopwood et al. 2012).	Education measures on the detrimental effects of neonicotinoids on bees (Hopwood et al. 2012).	Develop and distribute educational material. Distribute to municipalities, counties, agriculture producers, habitat managers, and other property owners (Hopwood et al. 2012). Do not employ the use of neonicotinoids on IDFG administered lands (Hopwood et al. 2012).	Western Bumble Bee Suckley's Cuckoo Bumble Bee

Habitat loss

Pollinators require foraging and nesting habitat. Providing both types of habitat within close proximity to each other is the best way to ensure pollinator success. Protecting, enhancing, and creating pollinator habitat can be a fun and rewarding way to engage with local communities. Educating land managers about techniques to reduce land management impacts to pollinators is an essential component to pollinator habitat management.

Objective	Strategy	Action(s)	Target SGCNs
Reduce impact of land management	Educate about and implement practices	Reduce grazing impacts by limiting grazing to one-third to one-fourth of management areas per season (Mader et al. 2011).	Western Bumble Bee Suckley's Cuckoo

Objective	Strategy	Action(s)	Target SGCNs
practices on pollinators (Mader et al. 2011).	that benefit pollinators. (Mader et al. 2011).	Implement pollinator beneficial mowing techniques including use of flushing bar, cutting at ≤8 mph, maintaining a high minimum cutting height of ≥12–16 inches, mowing only in daylight hours, mowing in a mosaic instead of an entire site (Mader et al. 2011). Where prescribed fire is used, implement pollinator-friendly burning protocols including rotational burning of ≤30% of each site every few years, leave small unburned patches intact, avoid burning too frequently (no more than every 5–10 years), avoid high-intensity fires unless the burn goal is tree removal. Work with Idaho Transportation Department to implement proper roadside pollinator habitat management (Mader et al. 2011).	Bumble Bee Monarch
Conserve existing pollinator habitat.		Map existing major known pollinator habitat. Identify and recognize landowners providing pollinator habitat and provide habitat management educational opportunity (Mader et al. 2011). Conduct surveys for native milkweed. Initiate seed saving program (Mader et al. 2011).	Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
Create new urban and rural pollinator habitat.	Develop programs to encourage urban landowners to create pollinator habitat.	Provide pollinator habitat workshops for homeowners and rural land owners. Provide other educational materials for homeowners. Provide an incentive program for homeowners to create pollinator habitat in urban yards. Convert most of lawn at IDFG Panhandle Regional Office to pollinator habitat. Work with municipalities and businesses to create urban pollinator habitat. Provide bee nest boxes for purchase at the IDFG Panhandle Regional Office.	Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Species designation, planning & monitoring

Actions to enhance pollinator habitat will be most effective with knowledge of the current status of SGCN populations. Initiation of long-term monitoring will allow a continuous data stream to assess conservation activities.

Objective	Strategy	Action(s)	Target SGCNs
Determine pollinator population status.	Conduct surveys and implement a long-term pollinator monitoring program.	Conduct surveys to identify colonies and breeding locations of bee SGCN. Protect known breeding sites. Develop monitoring program that includes consideration for climate change impacts.	Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Okanogan Highlands Section Team

An initial summary version of the Okanogan Highlands Section project plan was completed for the 2005 Idaho State Wildlife Action Plan. A small working group developed an initial draft of the Section Plan (Miradi v 0.13 which was then reviewed by a much wider group of stakeholders at a 2-day meeting held at the Idaho Department of Fish and Game in February 201; this input captured in Miradi v 0.14). This draft was then subsequently cleaned up and polished. Materials in this document are based on Miradi v. 0.19. Individuals and organizations/agencies involved in this plan are shown in Table 1.3.

Table 1.3 Individuals, agencies, and organizations involved in developing this plan [a]

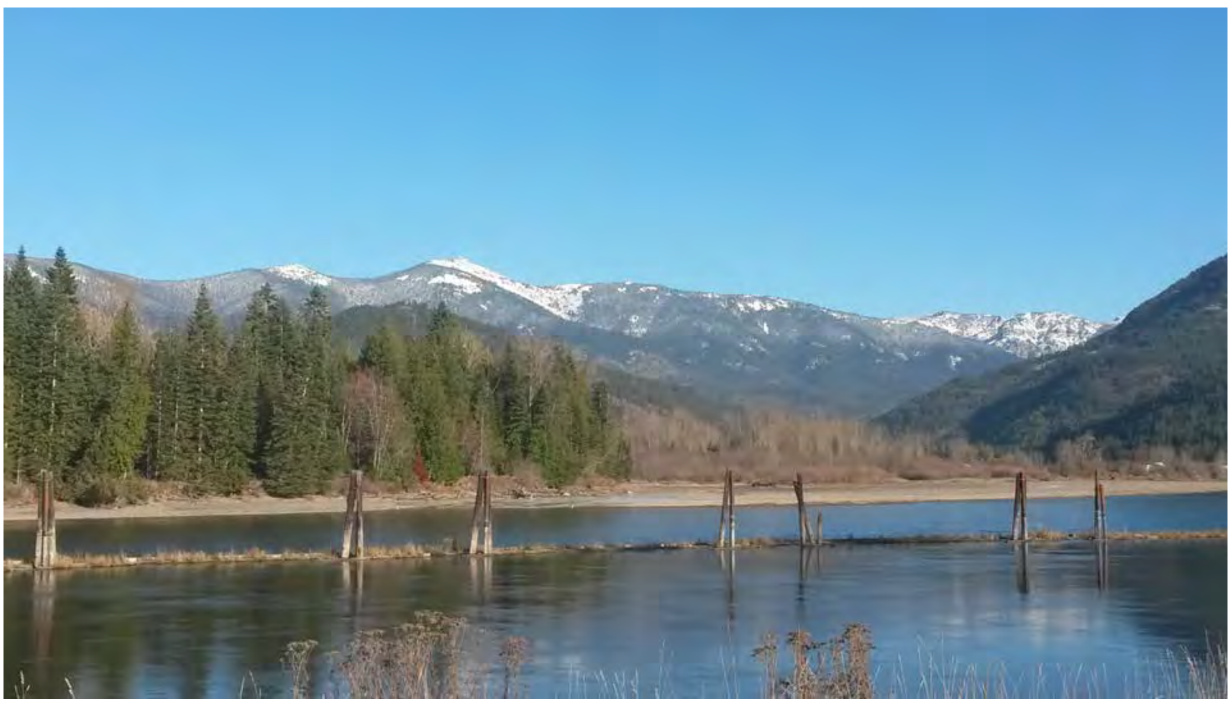
First name	Last name	Affiliation
Rita	Dixon	Idaho Department of Fish and Game, Headquarters
Michael	Lucid*	Idaho Department of Fish and Game, Panhandle Region
Cristy	Garris	Foundations of Success
Shannon	Ehlers*	Idaho Department of Fish and Game, Panhandle Region
Jim	Fredericks	Idaho Department of Fish and Game, Panhandle Region
Chris	Murphy	Idaho Department of Fish and Game, Headquarters
Wayne	Wakkinen	Idaho Department of Fish and Game, Panhandle Region
Laura	Wolf	Idaho Department of Fish and Game, Panhandle Region
Patrick	Seymour	Idaho Department of Lands
Charles R	Peterson	Idaho State University
Kathleen	Fulmer	US Fish and Wildlife Service, Northern Idaho Field Office
Lydia	Allen	US Forest Service Northern Region (R1), Idaho Panhandle National Forests

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

2. Flathead Valley Section

Section Description

The Flathead Valley, part of the Canadian Rocky Mountains Ecoregion, spans portions of Idaho, Montana, and British Columbia. The Idaho portion of the Flathead Valley comprises the northeast portion of the Idaho Panhandle from the Purcell Mountains in the north, south through the Cabinet Mountains to the Clark Fork River at its southern boundary (Fig. 2.1, 2.2). The Flathead Valley ranges from 541 to 2,141 m (1,775 to 7,024 ft) in elevation. This region is cool (average annual temperature ranges from 3.1 to 7.7 °C [37.6 to 45.9 °F]; PRISM 30-year annual temperature) and temperate and receives an annual precipitation of 61 to 234 cm (24 to 92 in; PRISM 30-year annual precipitation) (PRISM Climate Group 2012). Precipitation occurs mostly as snow from November to March, although rain on snow is common at lower elevations.



Cabinet Mountains © 2014 Britta Petersen

A sparsely-populated mountainous region, the Flathead Valley's largest communities are Moyie Springs, Hope, and Clark Fork, each having fewer than 1,000 full-time residents. Most activity in the region originates from larger neighboring towns such as Bonners Ferry or Sandpoint. Hunting, fishing, hiking, boating, wildlife watching, and snow activities are popular in the Flathead Valley; recreation in the area continues to grow. Timber harvest and limited agriculture (e.g., nonirrigated cropland and pasture) occur within the section.

The Cabinet and Purcell mountains are the prominent landforms within the Flathead Valley. The Idaho Purcell range, the southernmost extent of the Purcell Mountains, runs 300 mi north into southeastern British Columbia. The Cabinet Mountains straddle the Idaho and Montana border with the bulk of the range in Montana. Like the neighboring Selkirk Mountains, the Purcell and Cabinet ranges in Idaho have been carved by glaciation and have a maritime-influenced climate that produces warm wet winters and cool moist summers. However, the Purcell and Cabinet ranges also periodically receive blasts of cold arctic air that characterizes a continental climate pattern. Like the Selkirk range, the topography and climate produce environmental conditions favorable to dense, diverse forests.

Dominant forest cover types within the section include mountain hemlock (*Tsuga mertensiana* [Bong.] Carrière) and Engelmann spruce (*Picea engelmannii* Parry ex Engelm.)–subalpine fir (*Abies lasiocarpa* [Hook.] Nutt.) at higher elevations; Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco), western larch (*Larix occidentalis* Nutt.), grand fir (*Abies grandis* [Douglas ex D. Don] Lindl.), western white pine (*Pinus monticola* Douglas ex D. Don), and lodgepole pine (*Pinus contorta* Douglas ex Loudon) at middle elevations; western redcedar (*Thuja plicata* Donn ex D. Don)–western hemlock (*Tsuga heterophylla* [Raf.] Sarg.) in moister sites at lower elevations; and ponderosa pine (*Pinus ponderosa* Lawson & C. Lawson) on drier sites at lower elevations. A diverse assemblage of wildlife species inhabit these forests, including Fisher (*Pekania pennanti*), Grizzly Bear (*Ursus arctos*), Moose (*Alces americanus*), and Black Swift (*Cypseloides niger*).

The Flathead Valley is intersected by several major rivers. The Moyie River divides the Purcell range in the very northeast corner of the state before flowing into the Kootenai River at Moyie Springs. The Kootenai River separates the Purcell range from both the Cabinet Mountains to the south and the Selkirk range to the west. Patches of intact riparian habitat along the Kootenai River and its low elevation tributaries serve as important wildlife corridors between the 3 mountain ranges. Bounded to the south by the Clark Fork River and Lake Pend Oreille, the Cabinet Mountains sustain large streams such as Lightning Creek and Grouse Creek, which feed into the Clark Fork and Pack rivers, respectively, and ultimately into Lake Pend Oreille. Fen peatlands, wet meadows, and depressional wetlands, including western redcedar–Engelmann spruce swamps, occur in mountain valleys around the numerous lakes and ponds, and glacial carved basins. Steep drainages, lined by alder (*Alnus* Mill.) and other riparian shrubs deliver water into the Kootenai, Upper Pack, Upper Priest, and Priest rivers. Species such as Western Toad (*Anaxyrus boreas*), White Sturgeon (*Acipenser transmontanus*), Burbot (*Lota lota*), Harlequin Duck (*Histrionicus histrionicus*), and Black Swift depend upon the rivers, streams, wetlands, and ponds found within the Cabinet and Purcell mountain ranges.

Conservation efforts in this section should strive to maximize the collaborative opportunities in Washington, British Columbia, and Montana given their close proximity and ecological connections.

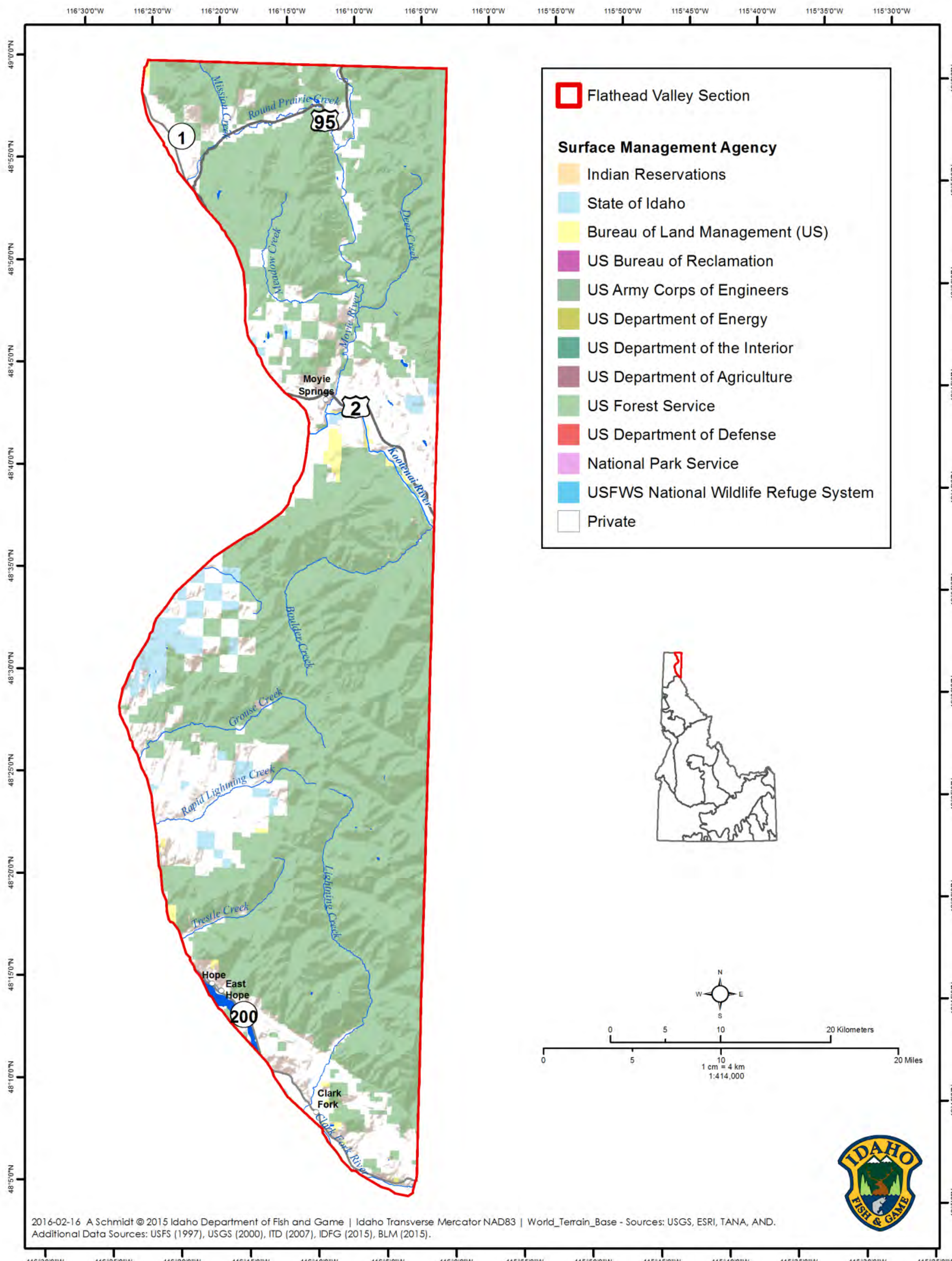


Fig. 2.1 Map of Flathead Valley surface management

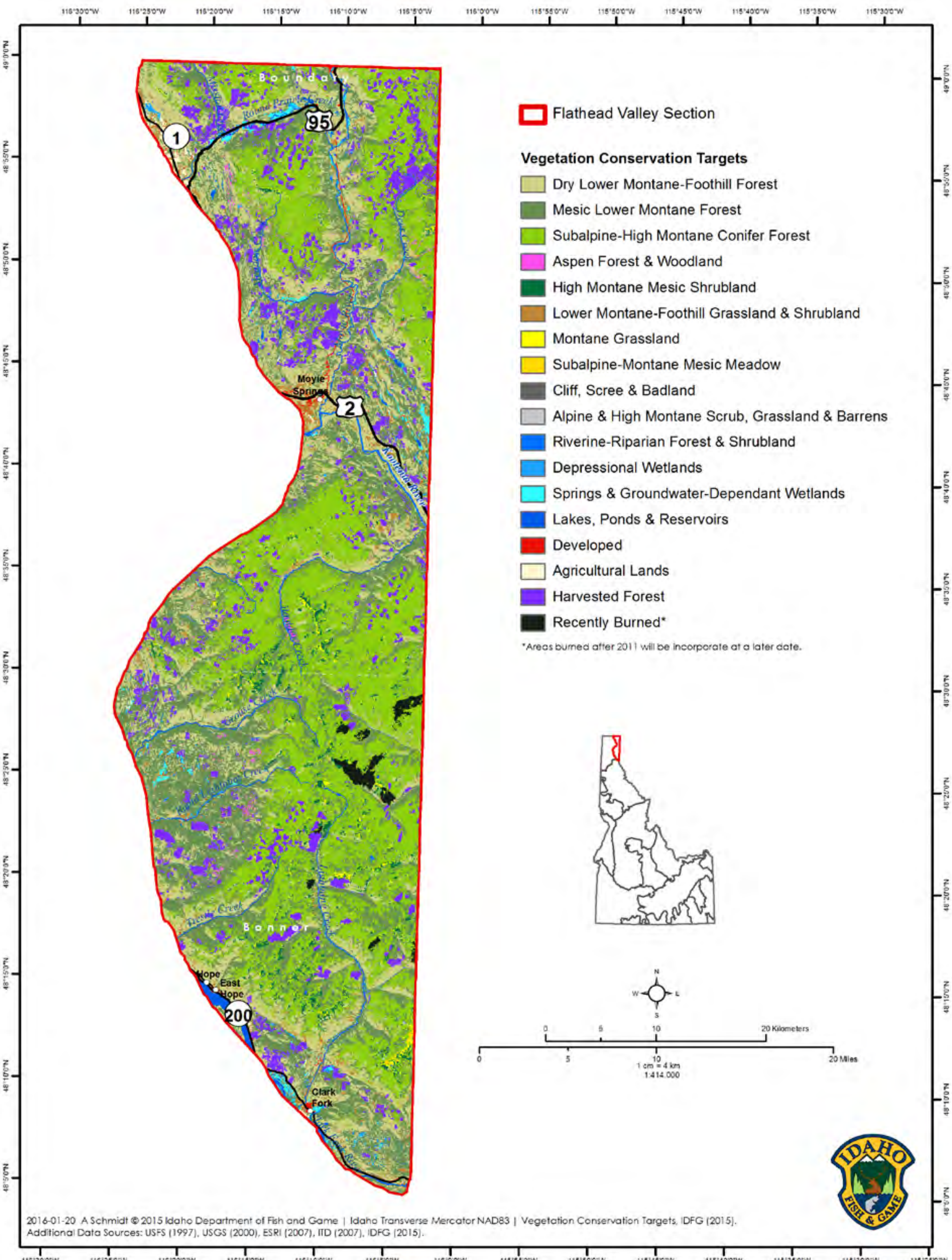


Fig. 2.2 Map of Flathead Valley vegetation conservation targets

Conservation Targets in the Flathead Valley

We selected 6 habitat targets (3 upland, 3 aquatic) that represent the major ecosystems in the Flathead Valley as shown in Table 2.1. Each of these systems provides habitat for key species of greatest conservation need (SGCN), i.e., "nested targets" (Table 2.2). All SGCN management programs in the Flathead Valley have a nexus with habitat management programs. Conservation of the habitat targets listed below should conserve most of the nested species within them. However, we determined that 6 taxonomic groups (Pond-Breeding Amphibians, Lake-Nesting Birds, Low-Density Forest Carnivores, Grizzly Bear, Ground-Dwelling Invertebrates, and Pollinators) have special conservation needs and thus are presented as explicit species targets as shown in Table 2.1.

Table 2.1 At-a-glance table of conservation targets in the Flathead Valley

Target	Target description	Target viability	Nested targets (SGCN)	
Dry Lower Montane–Foothill Forest	Northern Rocky Mts. Douglas-fir and ponderosa pine woodland and savannah systems at lower elevation forests in the Purcell and Cabinet mountains.	*Fair.* Substantial encroachment by other habitat types due to lack of natural fire cycle.	*Tier 3*	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis
Mesic Lower Montane Forest	Commonly referred to as a "cedar–hemlock" forest but also includes lodgepole pine and aspen–mixed conifer forest at lower elevations in the Purcell and Cabinet mountains.	*Fair.* Altered fire regimes, fragmented by forest practices, and loss of western white pine.	*Tier 2* *Tier 3*	Silver-haired Bat Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis
Subalpine–High Montane Conifer Forest	Engelmann spruce–subalpine fir forest and whitebark pine woodlands at higher elevations in the Cabinet and Purcell mountains.	*Poor* to *Fair*. Subject to altered fire regimes and forest insects and disease, and climate change; reduction in whitebark pine woodlands.	*Tier 1* *Tier 3*	Wolverine Grizzly Bear Clark's Nutcracker Mountain Goat Hoary Marmot
Riverine–Riparian Forest & Shrubland	Rivers and streams, including aquatic habitats and their associated terrestrial riparian habitats. Includes Moyie River, Kootenai River, Lightning Creek, Grouse Creek, and tributaries.	*Fair*. Riverine systems in the lower valleys impacted by hydroelectric operations and invasive species. Higher elevation headwaters threatened by climate change.	*Tier 1* *Tier 2* *Tier 3*	White Sturgeon (Kootenai River DPS) Burbot Harlequin Duck Black Swift A Mayfly (*Ephemerella alleni*) Western Ridged Mussel
Depressional Wetlands	Surface-water-fed systems ranging from infrequent to semipermanent or	*Fair*. Lower elevations experiencing altered hydrologic regimes	*Tier 2*	Western Toad Northern Leopard Frog Silver-haired Bat

Target	Target description	Target viability	Nested targets (SGCN)	
	permanently flooded. Typically pond sized or smaller. Includes vernal pools, and most marshes.	and invasive species and disease. Higher elevations threatened by climate change.	*Tier 3*	Townsend's Big-eared Bat Little Brown Myotis
Springs & Groundwater-Dependent Wetlands	Groundwater-dependent slope wetlands including peatland fens, wet meadows, and headwater springs.	*Good.* Primary threat is altered hydrology caused by climate change.	*Tier 2* *Tier 3*	Western Toad Northern Bog Lemming
Pond-Breeding Amphibians	Amphibians that primarily breed in lentic wetlands.	*Poor.* Northern Leopard Frogs extirpated from section and face invasive species and disease threats.	*Tier 2*	Western Toad Northern Leopard Frog
Lake-Nesting Birds	Common Loon is listed as an Intermountain West Waterbird Conservation Plan priority species due to habitat concerns and impacts from recreational boating.	*Poor.* Only 1 nest has been detected in the Flathead Valley and was abandoned before hatch.	*Tier 2*	Common Loon
Low-Density Forest Carnivores	Wide-ranging mammalian mesocarnivores.	*Poor* to *Good.* No resident Wolverine known to occur. Fisher population appears stable.	*Tier 1* *Tier 2*	Wolverine Fisher
Grizzly Bear	Grizzly Bear is listed as threatened under ESA. Population within the Cabinet–Yaak ecosystem in northeastern Idaho is thought to be <15 bears.	*Fair.* Population appears to be stable to increasing.	*Tier 1*	Grizzly Bear
Ground-Dwelling Invertebrates	Assemblage of terrestrial invertebrates found on forest and other habitat floors.	*Good.* Habitat and threat data deficient. Many species are data deficient with respect to taxonomy and distribution.	*Tier 1* *Tier 3*	Magnum Mantleslug Kingston Oregonian Pale Jumping-slug Coeur d'Alene Oregonian Western Flat-whorl Shiny Tightcoil Spur-throated Grasshopper (*Melanoplus*) Species Group
Pollinators	Species delivering pollination ecosystem service.	*Fair.* Many pollinators declining rangewide.	*Tier 1* *Tier 3*	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Table 2.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Flathead Valley

	Conservation Targets											
Taxon	Dry Lower Montane–Foothill Forest	Mesic Lower Montane Forest	Subalpine–High Montane Conifer Forest	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Pond-Breeding Amphibians	Lake-Nesting Birds	Low-Density Forest Carnivores	Grizzly Bear	Ground-Dwelling Invertebrates	Pollinators
RAY-FINNED FISHES												
White Sturgeon (*Acipenser transmontanus* ([Kootenai River DPS])[1]				X								
Burbot (*Lota lota*)[1]				X								
AMPHIBIANS												
Western Toad (*Anaxyrus boreas*)[2]					X	X	X					
Northern Leopard Frog (*Lithobates pipiens*)[2]					X		X					
BIRDS												
Harlequin Duck (*Histrionicus histrionicus*)[2]				X								
Common Loon (*Gavia immer*)[2]								X				
Common Nighthawk (*Chordeiles minor*)[3]	X											
Black Swift (*Cypseloides niger*)[2]				X								
Olive-sided Flycatcher (*Contopus cooperi*)[3]	X	X										
Clark's Nutcracker (*Nucifraga columbiana*)[3]			X									
MAMMALS												
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]	X											
Silver-haired Bat (*Lasionycteris noctivagans*)[2]	X	X										
Little Brown Myotis (*Myotis lucifugus*)[3]	X	X										
Wolverine (*Gulo gulo*)[1]			X						X			
Fisher (*Pekania pennanti*)[2]	X	X							X			
Grizzly Bear (*Ursus arctos*)[1]			X							X		
Mountain Goat (*Oreamnos americanus*)[3]			X									
Northern Bog Lemming (*Synaptomys borealis*)[3]												
Hoary Marmot (*Marmota caligata*)[3]			X									
TERRESTRIAL GASTROPODS												
Western Ridged Mussel (*Gonidea angulata*)[3]				X								
Pale Jumping-slug (*Hemphillia camelus*)[3]											X	
Magnum Mantleslug (*Magnipelta mycophaga*)[1]											X	
Coeur d'Alene Oregonian (*Cryptomastix mullani*)[3]											X	
Kingston Oregonian (*Cryptomastix sanburni*)[1]											X	

Taxon	Dry Lower Montane–Foothill Forest	Mesic Lower Montane Forest	Subalpine–High Montane Conifer Forest	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Pond-Breeding Amphibians	Lake-Nesting Birds	Low-Density Forest Carnivores	Grizzly Bear	Ground-Dwelling Invertebrates	Pollinators
	Conservation Targets											
Western Flat-whorl (*Planogyra clappi*)[3]											X	
Shiny Tightcoil (*Pristiloma wascoense*)[3]											X	
INSECTS												
A Mayfly (*Ephemerella alleni*)[2]				X								
Morrison's Bumble Bee (*Bombus morrisoni*)[1]												X
Western Bumble Bee (*Bombus occidentalis*)[1]												X
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]												X
Monarch (*Danaus plexippus*)[3]												X
Spur-throated Grasshopper (*Melanoplus*) Species Group[3]											X	

Target: Dry Lower Montane–Foothill Forest

In the Flathead Valley, nearly 20% of the land cover is classified as Dry Lower Montane–Foothill Forest. Although this habitat group can be located at all aspects and slopes, it is predominantly found on the warm–dry, south–southwest, and moderately steep slopes within the Cabinet and Purcell Mountains (Cooper et al. 1991). It also extends into the valleys that surround the mountain ranges. Elevations typically range from 538 to 1,920 m (1,765 to 6,300 ft) in the Flathead Valley, although there are some occurrences at higher elevations and also in valley bottoms. Douglas-fir is a codominant climax species with ponderosa pine (*Pinus ponderosa* Lawson & C. Lawson) in mixed or single species stands (Rocchio 2011). Species such as lodgepole pine, western larch, and grand fir only occasionally occur and are found in the wetter microsites (Cooper et al. 1991). Ponderosa pine woodlands are dominant on the driest sites where fires are frequent and of low severity (Cooper et al. 1991). Historically, fires were thought to be frequent and moderate to low severity, which maintained open stands of fire-resistant species. Low fire frequency has resulted in a dominance of shrubs and tree species such as grand fir and Douglas-fir in the understory. Currently, the habitat group contains a variable understory physiognomy ranging from shrub-dominated and dense with mallow ninebark (*Physocarpus malvaceus* [Greene] Kuntze) and oceanspray (*Holodiscus discolor* [Pursh] Maxim.), to bunchgrass-dominated and open, with Idaho fescue (*Festuca idahoensis* Elmer) and bluebunch wheatgrass (*Pseudoroegneria spicata* [Pursh] Á. Löve).

Target Viability

Fair. There has been substantial encroachment in the habitat type by more shade-tolerant overstory species due to the lack of normal fire intervals. This has resulted in increased risk of stand eliminating, severe wildfires.

Prioritized Threats and Strategies for Dry Lower Montane–Foothill Forest

Very High Threats for Dry Lower Montane–Foothill Forest in the Flathead Valley

Altered fire regimes (fire suppression & stand-replacing wildfires)

Historically, moderate- and low-severity fires burned, on average, every 10–30 years. Fires maintained the open understory and predominance of shade-intolerant species such as ponderosa pine in the overstory (Smith and Fischer 1997). However, decades of fire suppression activities, aided by a cool period in the Pacific decadal oscillation, prevented most moderate fires and stand-replacing fires and enabled shade-intolerant species to establish and heavy fuel loads to build (USFS 2013). This resulted in the encroachment of shade-tolerant species and a decrease in fire-tolerant species, alongside increased vertical stand structure, canopy closure, vertical fuel ladders, fire intensity and severity, and insect and disease epidemics (Keane et al. 2002). Fire management over the past 15 years has attempted to simulate and reestablish the vegetative composition of regular fire patterns, but is hampered by policy that does not allow natural fires to burn. Additionally, human development has increased the Wildland-Urban Interface (WUI) and often prevents the use of fire as a management tool.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USFS 2013).	Use prescribed and natural fires to maintain desired conditions (USFS 2015).	Reduce fuels through mechanical removal or controlled burns on lands within the WUI (USFS 2015). Leave fire-killed trees standing as wildlife habitat if they pose no safety hazard (USFS 2015). Remove perceived barriers to allow more prescribed natural fire on state and private forest lands. Promote/facilitate the use of prescribed fire as a habitat restoration tool, on both public and private lands where appropriate. Increase membership and participation in Idaho Forest Stewardship Programs, American Tree Farm System, and NRCS.	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis
Simulate natural	Design and	Actively remove shade-tolerant	Common Nighthawk

Objective	Strategy	Action(s)	Target SGCNs
fire regimes.	implement silvicultural prescriptions that simulate natural disturbance regimes.	species. Increase markets to pay for ecological forest management activities, e.g., explore markets to thin trees so that they can ward off fire and insect threats.	Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis

High Threats for Dry Lower Montane–Foothill Forest in the Flathead Valley

Invasive & noxious weeds

In the drier habitat types such as the Dry Lower Montane–Foothill Forest, invasive and noxious weeds have migrated from disturbed areas such as roads, railroads, and utility right-of-ways to undisturbed habitats. Across the Idaho Panhandle National Forest (IPNF), nearly 82% of the warm/dry habitat type is at high risk for invasion by nonnative weeds (USFS 2013). Additionally, surveys done in the Flathead Valley found 2 sites in the Dry Lower Montane–Foothill Forest type (n=39) had spotted knapweed (*Centaurea maculosa*) or tansy (*Tanacetum vulgare*) present (Lucid et al. 2016). Species such as spotted knapweed, diffuse knapweed (*Centaurea diffusa*), yellow star-thistle (*Centaurea solstitialis* L.), leafy spurge (*Euphorbia esula*), and Dyer's woad (*Isatis tinctoria*) are particularly invasive within the IPNF and have dispersed into undisturbed areas and displaced native species over large areas (USFS 2013).

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use Global Positioning Systems (GPS), remote sensing, and Geographic Information Systems (GIS) technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis
Contain and reduce widespread weeds in areas that are already infested (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Identify and treat dispersal vectors to prevent further spread of invasive and noxious weeds. Restore treated	Treat weeds in high impact areas and along roads (USFS 2013). Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USFS 2013, IDL 2015). Revegetate treatment areas with native species and monitor restoration (KTOI 2009). Implement actions described in the 2012–2016 Idaho Invasive Species	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
	areas with native species.	Strategic Plan (ISDA 2012). Incorporate noxious weeds into a multitaxa monitoring program.	

Species designation, planning & monitoring

Multiple species identified as SGCN are declining as a result of unknown causes. The priority for many of these species in the coming years is to identify the root causes and develop a strategy to address them.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of decline for nightjar species in Idaho.	Work with WWG PIF and the Pacific Flyway Nongame Technical Committee (PFNTC) to assess causes(s) of decline.	Assist WWG PIF with adjusting current Nightjar Survey Network protocols to collect data that will inform potential cause(s) of decline, including assessments of insect prey populations and their habitats. Work with WWG PIF and PFNTC to identify opportunities for research on contaminant impacts.	Common Nighthawk
Determine causes of decline in Olive-sided Flycatcher.	Determine relative importance of known and suspected threats to Olive-sided Flycatcher, its prey, and its habitats (see Canada's recovery plan, Appendix B; Environment Canada 2015*b*). Investigate factors affecting reproductive output, survival, and fidelity to breeding sites.	Promote cooperation and collaboration with Western Working Group Partners in Flight (WWG PIF) to fill knowledge gaps and to mitigate threats.	Olive-sided Flycatcher

Target: Mesic Lower Montane Forest

In the Flathead Valley, 42% of the land cover is classified as Mesic Lower Montane Forest. Within the Cabinet and Purcell mountains, this habitat group is located on the slopes, valley bottoms, ravines, canyons and benches with high soil moisture and cool summer temperatures. Elevation ranges from 538 to 1,900 m, Commonly referred to as a cedar–hemlock forest, western hemlock and western redcedar are common in the overstory with grand fir, Douglas-fir, Engelmann spruce, western white pine, and western larch as frequent associates within the canopy (Cooper et al. 1991). Lodgepole pine also forms woodlands within this habitat group in areas that are drier and cooler (Crawford 2011). The understory is composed of short and tall shrubs, perennial graminoids, forbs, ferns, and mosses, often at levels of in-stand diversity approaching or equal to the diversity found in some eastern deciduous forests (Reid 2013). In depressional areas with a high water table, devilsclub (*Oplopanax horridus* [Sm.] Miq.) is regularly encountered. Forests within this habitat group are often centuries old with fire only passing through every 500 years. The fire interval is long with stand-replacing fires occurring 150–500 years and moderate fires 50–100 years (Crawford 2011). Fire suppression has created mixed-aged stands that form fuel ladders, which make the forest more susceptible to high-intensity and stand-replacing fires. Disturbance in the form of insect, disease, windfall and ice generally produce canopy openings for the regeneration of forest types. Western white pine was once a predominant canopy species within this habitat group; however, logging, fire and the introduction of the white pine blister rust (*Cronartium ribicola*) has decimated this species to below 90% of its historical prevalence (Cooper et al. 1991).

Target Viability

Fair. Altered fire regime, fragmentation due to forest management, and loss of western white pine have negatively affected the viability of this habitat.

Prioritized Threats and Strategies for Mesic Lower Montane Forest

Very High Threats for Mesic Lower Montane Forest in the Flathead Valley

Altered fire regimes (fire suppression & stand-replacing wildfires)

Historically, fires were as variable as the tree species in the forest stand, with an average mean interval of 200-250 years but some stands burning with a mean of 18 years (Smith and Fischer 1997). Stands with fire intervals shorter than 140 years were often dominated by western white pine, western larch, Douglas-fir and grand fir (Smith and Fischer 1997). However, decades of fire suppression activities, aided by a cool period in the Pacific decadal oscillation, were effective in preventing most moderate-severity and enabled shade and fire-intolerant species to establish and heavy fuel loads to build (USFS 2013). This resulted in a decrease in fire-tolerant species, alongside increases in vertical stand structure, canopy closure, vertical fuel ladders, fire intensity and severity, and insect and disease epidemics (Keane et al. 2002). Fire management over the past 15 years has attempted to simulate and reestablish the vegetative composition of regular fire patterns but is hampered by policy that does not allow natural fires to burn. Additionally, human population increases have increased the WUI that often prevents the use of fire as a management tool.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USFS 2013 [monitoring and evaluation program]).	Use prescribed and natural fires to maintain desired conditions (USFS 2015).	Reduce fuels through mechanical removal or controlled burns on lands within the WUI (USFS 2015). Leave fire-killed trees standing as wildlife habitat if they pose no safety hazard (USFS 2015). Remove perceived barriers to allow more prescribed natural fire on state and private forest lands. Where appropriate, promote/facilitate the use of	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
		prescribed fire as a habitat restoration tool, on both public and private lands. Increase membership and participation in Idaho Forest Stewardship Programs, American Tree Farm System, and NRCS.	
Simulate natural fire regimes.	Design and implement silvicultural prescriptions that simulate natural disturbance regimes.	Actively remove shade-tolerant species. Increase markets to pay for ecological forest management activities, e.g., explore markets to thin trees so that they can ward off fire and insect threats.	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis

High Threats for Mesic Lower Montane Forest in the Flathead Valley

Forest insect pests & disease epidemics

When at endemic population levels, native forest insects and disease play a critical role in maintaining the health of the forest ecosystem by removing individuals or small groups weakened by drought, injury or fire (USFS 2010). However, when large stands of trees are stressed by prolonged drought and/or dense stocking, outbreaks of forest insects and disease can impact tree growth, forest composition and cause extensive tree mortality (USFS 2010). Severe outbreaks of forest insects and pathogens can even cause the conversion of forest to shrublands or grasslands. The impact on forest composition from large-scale outbreaks is predicted to increase as climate change decreases precipitation and increases temperatures (USFS 2010). Currently, 15–20% of lodgepole pine stands in the IPNF are at high risk for attack by the Mountain Pine Beetle (*Dendroctonus ponderosae*), whereas 25–30% of Douglas-fir stands are at high risk for attack by the Douglas-fir Beetle (*Dendroctonus pseudotsugae*), with each beetle predicted to kill 80% and 60%, respectively, of the basal area in high-risk stands (USFS 2010). The introduction of the nonnative white pine blister rust has reduced western white pine to 5% of its original distribution across the interior Pacific Northwest. This caused changes in forest composition from a relatively stable, fire- and disease-tolerant western white pine forests to early seral forests dominated by the fire and disease-intolerant species such as Douglas-fir, grand fir, and subalpine fir (USFS 2013).

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk of stand-replacing pine beetle or root fungus infestations.	Use integrated pest management strategies. Increase diversity of stand ages, size classes, and tree species (KPNZ Climate 2010). Promote	Use pheromones to protect stands (beetle whispering) (Kegley and Gibson 2004). Target removal of diseased and appropriate size class trees. Remove debris that attracts pine beetles. Cut out infected trees (mistletoe) (IDL	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
	responsible firewood harvest/transport.	2015).	
Increase number of rust-resistant western white pine in the ecosystem (USFS 2013).	Continue to develop genetics of disease-resistant trees. Plant rust-resistant western white pine during restoration efforts.	Conserve and protect any old-growth western white pine on the landscape. Determine if rust-resistant (Neuenschwander et al. 1999). Plant rust-resistant trees in openings that are also *Ribes* free (Neuenschwander et al. 1999). Monitor and remove any signs of the rust on planted trees (USFS 2013).	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis

Species designation, planning & monitoring

Multiple species identified as SGCN are declining as a result of unknown causes. The priority for these species in the coming years is to identify and address the root causes.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of decline for nightjar species in Idaho.	Work with Western Working Group Partners in Flight (WWG PIF) and the Pacific Flyway Nongame Technical Committee (PFNTC) to assess causes(s) of decline.	Assist WWG PIF with adjusting current Nightjar Survey Network protocols to collect data that will inform potential cause(s) of decline, including assessments of insect prey populations and their habitats. Work with WWG PIF and PFNTC to identify opportunities for research on contaminant impacts.	Common Nighthawk
Determine causes of decline in Olive-sided Flycatcher.	Determine relative importance of known and suspected threats to Olive-sided Flycatcher, its prey, and its habitats (see Canada's recovery plan, Appendix B; Environment Canada 2015*b*). Investigate factors affecting reproductive output, survival, and fidelity to breeding sites.	Promote cooperation and collaboration with Western Working Group Partners in Flight (WWG PIF) to fill knowledge gaps and to mitigate threats.	Olive-sided Flycatcher
Assess future changes to species status.	Monitor population status.	Incorporate species into multitaxa monitoring program.	Common Nighthawk Olive-sided Flycatcher

Target: Subalpine–High Montane Conifer Forest

At the higher elevations within the Cabinet and Purcell mountains, the Subalpine–High Montane Conifer Forest is the prevalent habitat. The Subalpine–High Montane Conifer Forest is predominantly found at elevations between 900 to 2,133 m in the Cabinet and Purcell mountains. Engelmann spruce, lodgepole pine, and subalpine fir characterize the overstory. Douglas-fir, western larch, and western white pine are intermixed at lower elevations on warmer sites. Thinleaf huckleberry (*Vaccinium membranaceum* Douglas ex Torr.) and grouse whortleberry (*Vaccinium scoparium* Leiberg ex Coville) are common species in the understory and provide important wildlife forage (Smith and Fischer 1997). Whitebark pine replaces lodgepole pine in higher elevations and becomes dominant as the elevation and climate severity increases. At timberline, the transition zone between continuous forest and the limited alpine, only Engelmann spruce, subalpine fir, subalpine larch (*Larix lyallii* Parl.) and whitebark pine persist. The timberline zone is impacted by drying winds, heavy snow accumulation and subsurface rockiness that lead to stunted growth and a clustered distribution (Cooper et al. 1991, Smith and Fischer 1997). At timberline, whitebark pine is commonly the species that colonizes sites and provides habitat for less hardy species. Whitebark pine also provides food resources for numerous wildlife species such as Grizzly Bear, Clark's Nutcracker (*Nucifraga columbiana*), and other small mammals and birds in the form of large high caloric-value seeds (Fryer 2002). It is a long-lived and slow-growing species that is often overtopped by faster-growing, shade-tolerant species such as subalpine fir and Engelmann spruce. Fire and other disturbances such as ice, windthrow, rockslides and landslides help to maintain whitebark pine as the climax species within the upper elevations of the subalpine. However, fire suppression, invasion of white pine blister rust, and Mountain Pine Beetle have all contributed to the recent precipitous declines of whitebark pine across its range (Smith and Fischer 1997, Fryer 2002).

Scotchman's Peak Mountain Goats © 2012 Britta Petersen

Target Viability

Poor to Fair. Subject to altered fire regimes, forest insects, disease, and climate change resulting in a reduction in whitebark pine woodlands.

Prioritized Threats and Strategies for Subalpine–High Montane Conifer Forest

Very High Threats for Subalpine–High Montane Conifer Forest in the Flathead Valley

Altered fire regimes (fire suppression & stand-replacing wildfires)

Historically, mixed severity fires burned between 60-300 years with nonlethal burns in the understory of whitebark pine stands at an average interval of 56 years (Smith and Fischer 1997). However, tree regeneration in the upper elevation is dependent on soil moisture, temperature, and whitebark pine seed cache and may be slow in some areas. For example, the lack of whitebark pine regeneration after the Sundance Fire (a 56,000-acre wildfire that started on Sundance Mountain in Bonner County in 1967) is thought to be due to a lack of seed cache after mature trees were killed by Mountain Pine Beetle or infected with blister rust (Smith and Fischer 1997). As with the other habitat types, decades of fire suppression activities, aided by a cool period in the Pacific decadal oscillation, were effective in preventing most moderate-severity and stand-replacing fires that enable shade-intolerant species to establish at the expense of fire-tolerant species (USFS 2013). This also resulted in increased vertical stand structure, canopy closure, vertical fuel ladders, biomass, fire intensity and severity, and insect and disease epidemics (Keane et al. 2002). Fire management over the past 15 years has attempted to simulate and reestablish the vegetative composition of regular fire patterns, but is hampered by policy that does not allow natural fires to burn.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USFS 2013 [monitoring and evaluation program]).	Use prescribed and natural fires to maintain desired conditions (USFS 2015).	Reduce fuels through mechanical removal (if minimal impact to subalpine soils is ensured) or controlled burns on lands (USFS 2015). Leave fire-killed trees standing as wildlife habitat if they pose no safety hazard (USFS 2015). Remove perceived barriers to allow more prescribed natural fire on state and private forest lands. Where appropriate, promote/facilitate the use of prescribed fire as a habitat restoration tool, on both public and private lands.	Clark's Nutcracker Wolverine Grizzly Bear Mountain Goat Hoary Marmot
Simulate natural fire regimes.	Design and implement silvicultural prescriptions that simulate natural disturbance regimes.	Actively remove shade-tolerant species where impacts to fragile subalpine soils can be minimized.	Clark's Nutcracker Wolverine Grizzly Bear Mountain Goat Hoary Marmot

High Threats for Subalpine–High Montane Conifer Forest in the Flathead Valley

Climate change

Global climate change is expected to have widespread effects on temperature and precipitation regimes worldwide and mean annual global air temperatures are predicted to rise within the 2 to 4.5 °C range by the end of the century (Meehl et al. 2007). Conditions in the Pacific Northwest are expected to trend toward hotter drier summers and warmer wetter winters (Karl et al. 2009). Snowpack depth and duration are predicted to decrease, reducing summer soil moisture, impacting species dependent on mesic conditions. Climate change is expected to further alter fire extent and severity while allowing for larger-scale and more persistent Mountain Pine Beetle infestations. As a result, whitebark pine is expected to decrease in extent.

Delineating temperature refugium for cool water or air temperature dependent species is a relatively new idea (Isaak et al. 2015). Recent microclimate monitoring work in the Idaho Panhandle identified within the Flathead Valley pockets of annually cool air (Lucid et al. 2016). Continued monitoring of microclimate along with co-occurrence of cool air dependent organisms will provide bedrock information for research determining best management practices for cool air associated species.

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring.	Monitor climate variables and species co-occurrence over time.	Develop climate monitoring program using a variety of microclimate variables along with co-occurrence of associated SGCN.	Clark's Nutcracker Wolverine Grizzly Bear Mountain Goat Hoary Marmot Magnum Mantleslug Spur-throated Grasshopper (*Melanoplus*) Species Group
Implement other state management plans.	Implement *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014).	Implement specific actions outlined in climate section of *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014).	Wolverine

Forest insect pests & disease

When at endemic population levels, native forest insects and disease play a critical role in maintaining the health of the forest ecosystem by removing individuals or small groups weakened by drought, injury or fire (USFS 2010). However, when large stands of trees are stressed by prolonged drought and/or dense stocking, outbreaks of forest insects and disease can impact tree growth, forest composition and cause extensive tree mortality (USFS 2010). Severe outbreaks of forest insects and pathogens can even cause the conversion of forest to shrublands or grasslands. The impact on forest composition from large-scale outbreaks is predicted to increase as climate change decreases precipitation and increases temperatures (USFS 2010). The introduction of the nonnative white pine blister rust has reduced whitebark pine by nearly a quarter to a half in subalpine ecosystems in Northern Idaho and Montana (USFS 2010) by reducing the ability of the species to produce cones. In the Selkirk Mountains, an average of 70% of live whitebark pine is already infected by blister rust (Kegley and Gibson 2004). Additionally, Mountain Pine Beetle often kills whitebark pine that is rust resistant (Schwandt 2006). As a keystone species within subalpine ecosystems, the loss of whitebark pine is predicted to negatively impact forest composition, wildlife communities, soil structure, and alpine hydrology (Schwandt 2006).

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk of stand-replacing pine beetle infestations.	Use integrative pest management strategies. Increase diversity of stand ages, size classes, and tree species (KPNZ Climate 2010). Promote responsible firewood harvest/transport.	Use pheromones to protect stands (beetle whispering) (Kegley and Gibson 2004). Target removal of diseased and appropriate size class trees. Remove debris that attracts pine beetles.	Clark's Nutcracker Grizzly Bear
Increase number of rust-resistant whitebark pine in the ecosystem (USFS 2013).	Continue developing genetics of disease resistant trees for restoration efforts.	Monitor rust and beetle levels in live whitebark pine. Collect rust-resistant seed for testing and restoration (Schwandt 2006). Plant rust-resistant whitebark pine. Monitor and remove any signs of the rust on planted trees (USFS 2013).	Clark's Nutcracker Grizzly Bear
Assess changes in insect numbers over time.	Monitor insect populations and disease.	Incorporate insect and disease threats into a multitaxa monitoring program.	Clark's Nutcracker Grizzly Bear

Target: Riverine–Riparian Forest & Shrubland

In the Flathead Valley, the riverine ecosystem includes all rivers, streams, and smaller order waterways (1–3 order; Strahler stream order) and their associated floodplain and riparian vegetation. Major rivers (those designated as 4+ order in Strahler stream order) in the Flathead Valley includes the Moyie, Kootenai, and Clark Fork rivers. Low elevation riparian habitat along rivers and higher-order streams is dominated by black cottonwood (*Populus balsamifera* L. subsp. *trichocarpa* [Torr. & A. Gray ex Hook.] Brayshaw), western redcedar, or shrubs such as thinleaf alder (*Alnus incana* [L.] Moench), redosier dogwood (*Cornus sericea* L.), and rose spirea (*Spiraea douglasii* Hook.). Higher elevation lower-order streams are lined by Engelmann spruce, subalpine fir, Sitka alder (*Alnus viridis* [Chaix] DC. subsp. *sinuata* [Regel] Á. Löve & D. Löve), and other shrubs.

Moyie River, 2013 IDFG

The Kootenai River is the only drainage in Idaho with a native Burbot (ling) population and is home to a genetically distinct population of White Sturgeon. Fisheries for both of these species were closed for conservation purposes in 1984 in response to major declines in these populations. Alteration of the natural flow regime, substrate, temperature, and nutrients are believed to be the primary reasons for the lack of successful reproduction of sturgeon and burbot (IDFG 2008). Other rivers and streams in the region support numerous fisheries and provide host habitat for several mussel species. High-velocity mountain streams provide important nesting habitat for Harlequin Ducks. In the Flathead Valley, there are numerous waterfalls documented for the region. Waterfalls support aquatic organisms uniquely adapted to extremely high water velocities and plants and animals that require cool, constantly moist rocky habitats. Waterfalls also provide important nesting habitat for Black Swift. There are at least 3 Black Swift nesting colonies detected in the Flathead Valley (Miller et al. 2013).

Target Viability

Fair. Kootenai River is subjected to sometimes very high, to more often very low, levels of nutrients that influence aquatic invertebrate populations and, thus, fish populations. Changes to seasonal flooding impacts important habitat for fish and aquatic invertebrates, as well as maintenance and reproduction of riparian vegetation. The Clark Fork is also influenced by changed hydrographic regime due to upstream dam operations.

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

Very High Threats for Riverine–Riparian Forest & Shrubland in the Flathead Valley

Aquatic invasive invertebrate & plant species

Aquatic invasive species are often the hardest to detect and eradicate. Across the nation, Zebra (*Dreissena polymorpha*)and Quagga Mussel (*Dreissena bugensis*) have disrupted food chains, competed with native species and cost millions of dollars of damage to municipalities by choking water intake pipes and other facilities (Pimentel et al. 2004). Although Zebra and Quagga Mussels have not yet been detected in the waterbodies of the Flathead Valley, several boat check stations in the region have found the mussels on boats traveling through the area (State of Idaho Agriculture, accessed on Nov 2, 2015). It is a goal of the state that neither mussel is ever established in any of the Idaho water ways. Other aquatic invasive species such as Eurasian watermilfoil (*Myriophyllum spicatum* L.), flowering rush (*Butomus umbellatus* L.), and curly pondweed (*Potamogeton crispus* L.) have been detected and established in the Kootenai and Clark Fork rivers (T. Woolf, pers. comm.). These species easily spread through the movement of boats between the recreational lakes, rivers, and streams in the region. For most of the aquatic plant species, only a fragment of the vegetated matter is necessary to establish the species in a new area. Aquatic invasive plant species, particularly Eurasian watermilfoil, often form dense mats that prevent the establishment of native aquatic plant species and degrade wildlife and fish habitat (ID Invasive Species Counsel and ID State Dept. of Agriculture 2007).

Objective	Strategy	Action(s)	Target SGCNs
Prevent the establishment of aquatic invasive species in noninvaded riverine systems.	Increase monitoring of riverine systems. Increase monitoring and treatment of dispersal vectors for invasive species.	Determine which riverine systems are not impacted by aquatic invasive species. Establish a monitoring schedule to visit noninvaded but high-risk riverine systems. Educate the public about the dangers associated with spreading an aquatic invasive species (ID Invasive Species Counsel and ISDA 2007). Maintain boat-check stations for the regular inspection for aquatic invasive species.	White Sturgeon (Kootenai River DPS) Burbot Western Ridged Mussel A Mayfly (*Ephemerella alleni*)
Contain and eradicate populations of Eurasian watermilfoil, flowering rush, and curlyleaf pondweed.	Implement actions indicated in the *2008 Statewide Strategic Plan for Eurasian Watermilfoil in Idaho* (Idaho Invasive Species Counsel and Idaho State Dept. of Agriculture 2007).	Survey invaded waters to determine extent of nonnative aquatic species distribution. Develop treatment priorities based on waterbody use. Develop strategies for eradication based on waterbody hydrology and use. Regularly monitor and re-treat areas after initial treatment (ID Invasive Species Counsel and ISDA 2007).	White Sturgeon (Kootenai River DPS) Burbot Western Ridged Mussel A Mayfly (*Ephemerella alleni*)

Invasive & noxious weeds

Invasive species often prevent the establishment of native species by forming dense monocultures and in some instances even change the soil chemistry or hydrology of the invaded area (Ricciardi et al. 2013). Riparian surveys conducted at several of the creeks within the Pend Oreille WMA found an overall increase in noxious weed coverage at several of the properties, up to 28% coverage (Cousins and Antonelli 2008). Rapid Lightning Creek was identified as having the highest cover of noxious weeds of all of the riparian areas (Cousins and Antonelli 2008). Reed canarygrass (*Phalaris arundinacea* L) was also dominant at many of the survey sites with 16% coverage of interior riparian areas (Cousins and Antonelli 2008). Reed canarygrass is a native species in the lower 48 states, but is considered a noxious weed in Washington and highly invasive elsewhere. It is thought to have hybridized with a nonnative invasive reed canarygrass (Lavergne and Molofsky 2007). Reed canarygrass forms dense monocultures that decreases plant diversity and degrades wildlife habitat.

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use GPS, remote sensing, and GIS technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in *The Idaho Invasive Species Strategic Plan* 2012–2016 (ISDA 2012).	White Sturgeon (Kootenai River DPS) Burbot
Contain and reduce widespread weeds in areas that are already infested (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Identify and treat dispersal vectors to prevent further spread of invasive and noxious weeds. Restore treated areas with native species.	Treat weeds in high impact areas and along roads (USFS 2013). Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USFS 2013, IDL 2015). Revegetate treatment areas with native species and monitor restoration (KTOI 2009). Implement actions described in *The Idaho Invasive Species Strategic Plan* 2012–2016 (ISDA 2012).	White Sturgeon (Kootenai River DPS) Burbot

Species designation, planning & monitoring

In addition to conservation actions to address specific threats, several SGCN associated with Riverine–Riparian Forest & Shrubland require inventory and monitoring to assess its current status and distribution in the Flathead Valley.

Harlequin Duck

In Idaho, Harlequin Ducks are uncommon and occupy high-quality streams from the Canadian border south to the Selway River and in the Greater Yellowstone Ecosystem. Breeding streams are relatively undisturbed with high-elevation gradients, cold, clear, and swift water, rocky substrates, and forested bank vegetation. Harlequin Ducks use different stream reaches over the course of the breeding season depending on environmental conditions (e.g., timing and magnitude of stream runoff, food abundance) and reproductive chronology (i.e., prenesting, nesting, early and late brood-rearing), but remain closely tied to rivers and streams for food, security, and escape cover from predators. There are an estimated 50 pairs of Harlequin Ducks that breed in Idaho (IDFG unpublished data). From 1996 to 2007, there was no statistically significant change in the statewide population. However, there were possible declines on several rivers including the Moyie River, Granite Creek (Lake Pend Oreille drainage), and the St. Joe River. However, distribution and abundance of Harlequin Duck has not been assessed since 2007.

Objective	Strategy	Action(s)	Target SGCNs
Improve understanding of Harlequin Duck distribution, abundance, and population status.	Design studies that improve understanding of the factors that influence Harlequin Duck stream occupancy, survival, and reproduction.	Mark and track individuals on the breeding grounds to better understand habitat use, survival rates, causes and timing of mortality, patterns and timing of movements, linkages between breeding, molting, and wintering areas, and return rates. Seek partnerships with coastal states and provinces to study wintering ecology and habitat use. Investigate how human disturbance, changes in forest management, and stream flow characteristics (severity, timing, and frequency of peak and low stream flows) affect behavior, occupancy, reproductive success, and survival on breeding streams.	Harlequin Duck
Establish baseline population metrics for Harlequin Duck.	Implement a coordinated Harlequin Duck monitoring program.	Develop partnerships, funding, and capacity to conduct breeding surveys statewide on a regular basis following the protocol established in the Harlequin Duck Conservation Assessment and Strategy for the US Rocky Mountains (Cassirer et al. 1996) or other appropriate techniques. Where local declines are documented, expand surveys upstream of historically-occupied stream reaches. Coordinate surveys with MT, WY, OR, BC, and AB to facilitate a northwest regional population assessment. Incorporate Harlequin Duck surveys into riverine multitaxa monitoring programs.	Harlequin Duck Western Ridged Mussel A Mayfly (*Ephemerella alleni*)

Black Swift

Little is known about breeding Black Swifts in Idaho. Black Swifts are not generally detected during breeding bird surveys. Additionally, their cryptic nesting sites and small colony sizes are obstacles when determining distribution or abundance in the state. In 2013, a survey of breeding locations for Black Swift found evidence of nesting at 5 of the 16 waterfalls visited and roosting swifts at two of the waterfalls (Miller et al. 2013).

Objective	Strategy	Action(s)	Target SGCNs
Determine current breeding locations of Black Swifts.	Conduct a comprehensive survey of potential nesting locations.	Work with partners, including Intermountain Bird Observatory, to develop and implement a systematic survey.	Black Swift

Restoration tool: American Beaver

American Beaver populations currently exist at lower than historic levels across the western US, including northern Idaho. This results in a host of ecological consequences such as stream incision, lowered water table, and reduced extent and wetness of riparian habitat. Beaver restoration efforts have been shown to be an effective tool to restoring habitat and ecological function to riverine systems.

Objective	Strategy	Action(s)	Target SGCNs
Restore hydrologic function and restore riparian habitats.	Use American Beaver to accomplish hydrologic and habitat restoration.	Determine past and current status of American Beaver populations. Determine feasibility of using American Beaver in restoration efforts. Implement actions delineated by above analysis.	Western Ridged Mussel A Mayfly (*Ephemerella alleni*)

Target: Depressional Wetlands

Cabinet Mountains © 2014 Shannon Ehlers

Depressional Wetlands are any wetlands found in a topographic basin. Depressional Wetlands include vernal pools, old oxbows, disconnected river meanders, and constructed wetlands. In the Flathead Valley, this includes many of the wetlands found within the Pend Oreille WMA and within the floodplains of the Moyie River, Round Prairie Creek, Kootenai River and Clark Fork River. Other Depressional Wetlands are found within the Purcell and Cabinet mountains wherever the elevational lines close and surface waters accumulate (e.g., glacial carved kettles). Small depressional ponds (less than 2 m deep) commonly occur within the Purcell and Cabinet mountains and provide breeding habitat for Western Toads. Depressional Wetlands often support emergent marsh that are composed of broad-leaf cattail (*Typha latifolia* L.), bulrush

(*Schoenoplectus* [Rchb.] Palla spp.), sedges (*Carex* spp. L.), or other emergent and aquatic species such as Rocky Mountain pond-lily (*Nuphar lutea* [L.] Sm. ssp. *polysepala* [Engelm.] E.O. Beal). Depressional Wetlands commonly support tree or shrub-dominated swamps dominated by western redcedar, Engelmann spruce, rose spirea (*Spiraea douglasii* Hook.), and thinleaf alder (*Alnus incana* [L.] Moench), with devilsclub and American skunkcabbage (*Lysichiton americanus* Hultén & H. St. John) in the understory. In the valley bottoms, reed canarygrass often forms impenetrable monocultures that limit species diversity within the wetlands (Cousins, personal comm.). Amphibians, waterbirds, marshbirds, and waterfowl all use Depressional Wetlands for breeding and foraging habitats.

Target Viability

Fair. Lower elevation wetlands have experienced, or are currently threatened by, filling and draining, altered hydrologic regimes (e.g., disconnection from floodplain due to levees, water diversion), and invasive species or disease. Higher elevation wetlands are threatened by climate change impacts to hydrology.

Prioritized Threats and Strategies for Depressional Wetlands

Very High Threats for Depressional Wetlands in the Flathead Valley

Invasive & noxious weeds

Invasive species often prevent the establishment of native species by forming dense monocultures and in some instances even change the soil chemistry or hydrology of the invaded area (Ricciardi et al. 2013). In plant surveys within the Pend Oreille WMA, noxious weeds such as oxeye daisy (*Leucanthemum vulgare*), spotted knapweed, and common tansy were documented to cover 0.45–28.45% of the overall sites (Cousins and Antonelli 2008). Additionally, all of the wetland sites were classified as reed canarygrass dominant (Cousins and Antonelli 2008). Reed canarygrass is a native species in the lower 48 states, but is considered a noxious weed in Washington and highly invasive elsewhere; it is thought to have hybridized with a nonnative invasive reed canarygrass (Lavergne and Molofsky 2007). Reed canarygrass forms dense monocultures that decreases plant diversity and degrades wildlife habitat. Additionally, surveys done in the Flathead Valley found 12 of the ponds, small lakes, and emergent wetlands (n = 44) surveyed had spotted knapweed or tansy present (Lucid et al. 2016).

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use GPS, remote sensing, and GIS technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species	Western Toad Northern Leopard Frog Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
		Strategic Plan (ISDA 2012).	
Contain and reduce widespread weeds in areas that are already infested (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Identify and treat dispersal vectors to prevent further spread of invasive and noxious weeds. Restore treated areas with native species.	Continue annual noxious weed control program and coordinate weed management activities with Bonner County and the Selkirk Cooperative Weed Management Area (Cousins and Antonelli 2008). Treat weeds in high impact areas and along roads (USFS 2013). Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USFS 2013, IDL 2015). Revegetate treatment areas with native species and monitor restoration (KTOI 2009). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Western Toad Northern Leopard Frog Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis

High Threats for Depressional Wetlands in the Flathead Valley

Climate change

In the Pacific Northwest, climate change is expected to trend toward hotter, drier summers and warmer, slightly wetter winters (Karl et al. 2009). This scenario may result in snowpacks that are shallower and earlier melting. Although Depressional Wetlands may fill with water, it may occur earlier in the year. Less snowpack may mean less surface and groundwater being available to sustain wetland hydrology later in summer, resulting in more Depressional Wetlands drying out earlier in summer. How this will affect SGCN dependent on Depressional Wetlands is not known. More information is needed to make appropriate wetland management decisions needed to sustain wetland functions with a changing climate.

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring.	Monitor climate variables and species co-occurrence over time.	Develop climate monitoring program using a variety of microclimate variables along with co-occurrence of associated SGCN.	Western Toad Northern Leopard Frog Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis

Target: Springs & Groundwater-Dependent Wetlands

In the Flathead Valley, peatlands are one of the most conspicuous types of groundwater-dependent wetlands with over 7 sites identified (Lichthardt 2004) within the section. Fens form in areas with cold temperatures and waterlogged soils with at least 30 cm peat accumulation. They range from nutrient poor (poor fens) to nutrient rich (rich sedge-dominated fens and swamps) (Bursik and Mosely 1992). They often host a diversity of boreal plant species that are disjunct from, or at the edge of, their core range and species that are unique in their ability to persist in nutrient- and oxygen-poor soils (e.g., *Sphagnum* moss, sundew (*Drosera* L. spp.), bladderwort (*Utricularia* L. spp.), buckbean (*Menyanthes trifoliata* L.) (Lichthardt 2004). In the Flathead Valley, fens most often occur as floating mats around ponds and lakes. Surveys for Northern Bog Lemming (*Synaptomys borealis*) in Montana (Reichel and Corn 1997) and Idaho (Groves 1994) have found the species frequently in wetland habitats with a peat component. Other groundwater-dependent wetlands such as cold-water springs and wet meadows dominated by sedges and bluejoint (*Calamagrostis canadensis* [Michx.] P. Beauv.), are also widespread within the Purcell and Cabinet mountains, particularly within the glacial-carved troughs and headwater stream valleys. They often provide a cold air and cold-water refugia for invertebrate and vertebrate species (Issak et al. 2015).

Cabinet Mountains-Round-leaf Sundew © 2014 Andrew Gygili

Target Viability

Good. Many groundwater-dependent wetlands in mountainous locations are in relatively good ecological condition and only minimally impacted by surrounding land uses (e.g., forest management, roads). However, valley fens and meadows in the Flathead Valley are sometimes negatively impacted by livestock grazing, invasive plant species, and other human land uses (Lichthardt 2004). Climate change is likely to alter the hydrologic regime, potentially decreasing the amount and timing of groundwater supply to these wetlands.

Prioritized Threats and Strategies for Springs & Groundwater-Dependent Wetlands

Very High Threats for Springs & Groundwater-Dependent Wetlands in the Flathead Valley

Invasive & noxious weeds

Invasive species often prevent the establishment of native species by forming dense monocultures and, in some instances, even changing the soil chemistry or hydrology of the invaded area (Ricciardi et al. 2013). In plant surveys within the Pend Oreille WMA, noxious weeds such as oxeye daisy, spotted knapweed and common tansy were documented to cover 1–28% of the overall sites (Cousins and Antonelli 2008). Additionally, all of the wetland sites were classified as reed canarygrass-dominated (Cousins and Antonelli 2008). Reed canarygrass forms dense monocultures that decreases plant diversity and degrades wildlife habitat. In the Flathead Valley, the source of nonnative plant species in wetlands is sometimes from adjacent pasture and grazing land.

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013).	Increase monitoring for invasive and noxious weeds. Coordinate invasive and noxious weed monitoring and treatment across agencies.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use GPS, remote sensing, and GIS technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in *The Idaho Invasive Species Strategic Plan 2012–2016* (ISDA 2012).	Western Toad Northern Bog Lemming
Contain and reduce widespread weeds in areas that are already infested (USFS 2013).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Identify and treat dispersal vectors to prevent further spread of invasive and noxious weeds. Restore treated areas with native species.	Continue annual noxious weed control program and coordinate weed management activities with Bonner County and the Selkirk Cooperative Weed Management Area (Cousins and Antonelli 2008). Treat weeds in high impact areas and along roads (USFS 2013). Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USFS 2013, IDL 2015). Revegetate treatment areas with native species and monitor restoration (KTOI 2009). Implement actions described in *The Idaho Invasive Species Strategic Plan 2012–2016* (ISDA 2012).	Western Toad Northern Bog Lemming

High Threats for Springs & Groundwater-Dependent Wetlands in the Flathead Valley

Climate change

Climate change in northern Idaho may result in increased summer temperatures and drought, and warmer, slightly wetter winters. This will lead to more precipitation falling as rain, and shallower, earlier melting snowpacks. As a result, there may be less groundwater to support wetlands, decreasing their extent and late-season wetness. Beavers have historically been important in slowing and storing surface water runoff, raising groundwater tables, expanding wetland habitat, and improving soil moisture for wetland vegetation. Restoration of American Beaver populations may play an important role in mitigating the effects of climate change in watersheds. In addition, delineating refugia such as fens for cool water or air temperature dependent species is a relatively new idea (Isaak et al. 2015). Recent microclimate monitoring work in the Idaho Panhandle identified within the Flathead Valley pockets of annually cool air (Lucid et al. 2016). Continued monitoring of microclimate along with co-occurrence of cool air dependent organisms will provide bedrock information for research determining best management practices for cool air associated species.

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring.	Monitor climate variables and species co-occurrence over time.	Develop climate monitoring program using a variety of microclimate variables along with co-occurrence of associated SGCN.	Western Toad Northern Bog Lemming
Determine current status of American Beaver populations.	Determine past and current status of American Beaver populations	Determine feasibility of using American Beaver in restoration efforts. Implement actions delineated by above analysis.	Western Toad Northern Bog Lemming

Target: Pond-Breeding Amphibians

Amphibians are a highly vulnerable taxonomic group which, globally, hosts more species in decline than birds or mammals (Stuart et al. 2004). Amphibian populations have been declining worldwide for decades (Houlahan et al. 2000) and sometimes occur rapidly in seemingly pristine environments (Stuart et al. 2004). Amphibians are susceptible to pathogens, climate change, environmental pollution, ultraviolet-b exposure, and invasive species (Bridges and Semlitsch 2000, Cushman 2006, Kiesecker et al. 2001, Stuart et al. 2004). In addition, they tend to have relatively low vagilities (Bowne and Bowers 2004, Cushman 2006) and often have narrow habitat requirements (Cushman 2006).

Western Toads have experienced rangewide declines in western North America. This species could be experiencing similar declines in the Flathead Valley as it is not detected as frequently in this section as the neighboring Okanogan Highlands (Lucid et al. 2016). Northern Leopard Frogs (*Rana pipiens*) are abundant across their range, but have experienced severe declines in portions of their range, including northern Idaho. Northern Leopard Frogs appear to be extirpated from the Flathead Valley (Lucid et al. 2016).

Target Viability

Poor. Northern Leopard Frogs extirpated from section and extant species face invasive species/disease threats.

Prioritized Threats and Strategies for Pond-Breeding Amphibians

High rated threats to Pond-Breeding Amphibians in the Flathead Valley

Amphibian chytridiomycosis & other disease

Recent surveys for amphibian chytridiomycosis, a disease caused by a fungal pathogen, *Batrachochytrium dendrobatidis* (*Bd*), on Columbia Spotted Frogs (*Rana luteiventris*) across the Flathead Valley indicated the fungus is widespread, occurring at approximately 83% of surveyed sites. *Bd* was found more commonly at low- and high-elevation sites than mid-elevation sites. *Bd* is a known threat to Western Toads and has been documented to cause near total egg hatching failure of a Western Toad population in the Pacific Northwest (Blaustein et al. 1994). Further research is needed to assess the threat of *Bd* to Western Toads and Northern Leopard Frogs in Idaho. Local die-offs of Western Toads and other amphibians have been recorded in recent years. These die-offs may be disease related and those sites should be investigated and monitored.

Objective	Strategy	Action(s)	Target SGCNs
Determine level of disease threat.	Determine status of *Bd* in at occupied sites. Examine relationship of species occurrence, microclimate, and disease.	Visit known sites and swab amphibians for *Bd*. Collect microclimate variables at occupied sites and examine presence of *Bd* and other potential diseases.	Western Toad Northern Leopard Frog
Monitor amphibian disease.	Develop amphibian disease monitoring program.	Develop monitoring program that encompasses monitoring *Bd* presence, *Bd* levels, and other potential amphibian disease.	Western Toad Northern Leopard Frog

Species designation, planning & monitoring

Northern Leopard Frog

Extensive surveys indicate this species has been extirpated from the Flathead Valley (Lucid et al. 2016). The closest known colony of this species occurs at the Creston Valley Wildlife Management Area in British Columbia. This population could potentially serve as a source population for human-assisted reintroduction or natural recolonization efforts. Nonnative American Bullfrogs occur on the US side of the border but have not been detected on the British Columbia side. It is critically important to initiate immediate control and extirpation efforts on the most northern bullfrogs in Idaho to prevent their dispersal to the Creston Valley Wildlife Management Area.

Objective	Strategy	Action(s)	Target SGCNs
Address Northern Leopard Frog extirpation.	Work with transboundary partners in Idaho, Washington, and British Columbia.	Conduct a literature review to assess potential recovery options, including reintroduction and natural recolonization.	Northern Leopard Frog
Limit American Bullfrog distribution.	Prevent American Bullfrog expansion to the Creston Valley Wildlife Management Area Northern Leopard Frog colony.	Work with partners to conduct American Bullfrog control and extirpation actions near the Canadian border.	Western Toad Northern Leopard Frog

Target: Lake-Nesting Birds

The only lake-nesting bird detected in the Flathead Valley is Common Loon (*Gavia immer*). Common Loons build platform nests on lake edges or in shallow water. Nesting has only been documented in a few locations in Idaho but nonflying juvenile loons were observed on the north end of Priest Lake, Upper Priest Lake, and the Clark Fork Delta on Lake Pend Oreille in the 1990s (IDFG 2005); however, there have been no recent sightings.

Target Viability

Poor. One nest was abandoned in 2014, no other documentation of nesting loons in the region.

Target: Low-Density Forest Carnivores

Forest carnivores naturally occur at low densities and can be directly affected by human activities. This presents unique opportunities to directly affect positive conservation outcomes for these species. This group consists of mammals traditionally considered "furbearers," including Marten, Weasels, and Mink. Wolverine (*Gulo gulo*) and Fisher are the 2 native forest carnivore SGCN which occur within the Flathead Valley. Extensive surveys from 2010–2014 failed to detect a single resident Wolverine. However, several verified detections of the species did occur during that time frame (Lucid et al. 2016). There was a verified track and a verified photo. An individual animal was not identified despite extensive genetic surveys. This suggests the detections were of an animal moving across the landscape, not residing in it. The 2010–2014 surveys detected 33 individual Fisher in the Cabinet Mountains. This population may be the result

Cabinet Mountains Fisher, 2012 IDFG

of a reintroduction effort which occurred in the late 1980s and early 1990s (Vinkey et al. 2006). Wolverine conservation efforts in this section should focus on maintaining or improving ecosystem integrity conducive to the establishment of resident and reproductive individuals. Fisher conservation efforts should focus on population monitoring.

Target Viability

Poor. Only a few individuals known to occur in section.

Prioritized Threats and Strategies for Low-Density Forest Carnivores

High rated threats to Low-Density Forest Carnivores in the Flathead Valley

Genetic isolation

Wolverine and Fisher were nearly or completely extirpated from the lower 48 states in the early 20th century. A variety of natural (Wolverine) and human-mitigated (Fisher) recolonization events have likely affected the genetic structure of populations of the species (Aubry et al. 2007, Vinkey et al. 2006). Populations of both species likely have low genetic diversity due to founder affects. Proper habitat management and gene flow mitigation may help improve genetic isolation and increase species occurrence on the landscape.

Objective	Strategy	Action(s)	Target SGCNs
Monitor genetic isolation.	Determine current levels of genetic isolation.	Conduct genetic analyses to determine current population sizes and levels of gene flow. Maintain transboundary collaborations to assess and monitor Wolverine gene flow with Canadian populations.	Wolverine Fisher
Assess and enhance gene flow.	Manage connectivity habitat and assess potential to enhance gene flow.	Manage forested lowland habitat to maintain forested connectivity. Improve additional lowland forest to increase connectivity. Conduct analysis and literature review assessing potential recovery options including reintroduction and natural recolonization.	Wolverine Fisher

Winter recreation

The *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014) outlines specific actions to minimize potential disturbance of Wolverine by oversnow recreation and ski area infrastructure.

Objective	Strategy	Action(s)	Target SGCNs
Manage winter recreation minimize disturbance.	Coordinate efforts between public and private entities.	Implement strategies outlined in the *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014).	Wolverine

Inadequate understanding of population and distribution status to assess potential effects of incidental capture from trapping on populations of Wolverine and Fisher

Wolverine and Fisher are on occasion incidentally captured in the course of trapping other species with legal harvest seasons. Idaho has a mandatory reporting requirement for incidental capture and mortality of any nontarget species such as Wolverine and Fisher. Based on IDFG records, some individuals are found dead in the trap, while others are released alive. Information gaps regarding ecology and population dynamics of these species limit ability to draw conclusions about whether incidental capture has any population effects (e.g., whether patterns in capture numbers reflect cyclic changes in populations, greater exposure to trapping, or population increase and expansion).

Objective	**Strategy**	**Action(s)**	**Target SGCNs**
Narrow information gaps about ecology and population dynamics to evaluate threats, including the potential effect of incidental capture to local populations of Wolverine and Fisher.	Gather the necessary information to understand conservation priority related to incidental capture.	Implement strategies and actions outlined in the *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014) particularly Objective 6 (and related strategies): Continue to minimize injury and mortality of Wolverines from incidental trapping and shooting. As part of educating trappers about techniques to minimize incidental capture, conduct interviews with trappers to obtain information about the condition and demographics of captured individuals, and the locations, habitats, and trap sets involved in incidental captures of Wolverine or Fisher.	Wolverine Fisher

Target: Grizzly Bear

Grizzly Bears in this section occupy the Cabinet–Yaak ecosystem which borders Canada and encompasses the Cabinet and Purcell mountain ranges in northeastern Idaho and northwestern Montana. A recent study by Kendall et. al (2016) estimates the Cabinet–Yaak population is currently 48–50 Grizzly Bears; less than 15 are estimated to occupy northeastern Idaho. Research has been conducted on the Grizzly Bear population since the early 1980s, primarily in the form of trapping and radiocollaring. More recently, researchers have included camera trap and DNA collection to the research effort. Grizzly Bears typically den at high elevations in the Cabinet–Yaak ecosystem but move to lower elevations or south-facing slopes following den emergence, taking advantage of early spring green-up. As the season progresses bears move to higher elevations, relying on a variety of berries with the huckleberry (*Vaccinium* sp.) as the most important forage. Domestic livestock grazing is limited in this section and is not an important consideration in Grizzly Bear management. The Cabinet–Yaak population appears to be stable to increasing at this time. Grizzly Bear is currently listed as threatened under the ESA.

Target Viability

Fair. Population appears to be expanding in both size and distribution.

Prioritized Threats and Strategies for Grizzly Bear

High rated threats to Grizzly Bear in the Flathead Valley

Anthropogenic attractants and roads and the resulting potential for excessive human-caused mortality pose high threats to the Grizzly Bear.

Anthropogenic attractants

Data collected during the 1980s indicated human-caused mortality to be the most important factor affecting population recovery (Knick and Kasworm 1989). Illegal mortality has been reduced through enforcement and education efforts and access restrictions in the form of road closures. The reduced human-caused mortality resulted in an expanding Grizzly Bear population, both in distribution and number. As a result, more human/bear interactions are now taking place in low elevation areas where humans have established year-round or seasonal residences. Anthropogenic attractants such as garbage, compost piles, sunflower bird feeders, small domestic livestock such as pigs, and corn deer feeders attract Grizzly Bears and can result in food-conditioned or habituated bears. Such bears require management actions including trapping and relocating animals, management removal (killing), or are killed by landowners and can increase the likelihood of mistaken identity kills during the American Black Bear hunting season.

Objective	Strategy	Actions	Target SGCNs
Reduce human-caused mortalities to allow for population growth.	Reduce anthropogenic attractants.	Work with FS on education and enforcement of food storage orders on USFS land. Public education about consequences of feeding and habituating bears.	Grizzly Bear

Roads

Roads can allow relatively easy access to areas that contain Grizzly Bears, thereby allowing more opportunities for mistaken identity kills, intentional poaching, or displacement of bears. Road management on federal lands, primarily US Forest Service ownership, has significantly improved conditions for Grizzly Bears and contributed to the reduction of human-caused mortalities. Access restrictions must be continued and evaluated to address mortality concerns.

Objective	Strategy	Actions	Target SGCNs
Reduce human-caused mortalities to allow for population growth.	Maintain access restrictions within the Bear Management Units.	Continue actions described in the Grizzly Bear Access Amendments within the 2015 Forest Service Management Plan (USFS 2015).	Grizzly Bear

Genetic isolation

Genetic isolation of any small population is of long-term conservation concern. Recent radiotelemetry and DNA data suggests that some interchange with adjacent Grizzly Bear populations is either occurring or possible; however, the human population continues to increase. Long-term conservation of Grizzly Bear must accommodate movement between adjacent ecosystems to ensure genetic interchange.

Objective	Strategy	Action(s)	Target SGCNs
Monitor genetic isolation.	Determine current levels of genetic isolation.	Conduct genetic analyses to determine current population sizes and levels of gene flow. Maintain transboundary collaborations to assess and monitor Grizzly Bear gene flow with Canadian populations.	Grizzly Bear
Assess and enhance gene flow.	Manage connectivity habitat and assess potential to enhance gene flow.	Manage forested lowland habitat to maintain forested connectivity. Improve additional lowland forest to increase connectivity.	Grizzly Bear

Target: Ground-Dwelling Invertebrates

Ground-Dwelling Invertebrates provide essential ecosystem services including decomposition, nutrient cycling, food for vertebrates, plant pollination, seed dispersal, and disease vectoring. They can also serve as effective indicators of environmental health (Jordan and Black 2012). This group encompasses a wide array of taxa. However, Flathead Valley SGCN in this group are limited to terrestrial gastropods and Spur-throated Grasshoppers.

Cabinet Mountains, Magnum Mantleslug © Shannon Ehlers 2013

Target Viability

Good. Habitat and threat data deficient. Many species taxonomically and distributionally data deficient.

Species designation, planning & monitoring

Basic knowledge of ecological requirements, habitat needs, systematics, and distribution is lacking for most Ground-Dwelling Invertebrates. Spur-throated Grasshoppers are in need of basic taxonomic work. Although substantial knowledge of terrestrial gastropod distribution and microclimate requirements was obtained during work conducted from 2010-2014 (Lucid et al. 2016), much work remains to be done to gain an adequate understanding of basic conservation needs for these species. Four terrestrial gastropods are known to be associated with cooler than average mean annual air temperatures (Lucid et al. 2016). Managing microsites for these species for cool air temperatures and minimal disturbance is recommended until a better ecological understanding is developed through research and monitoring.

Objective	Strategy	Action(s)	Target SGCNs
Determine appropriate taxonomic status of subspecies within the Coeur d'Alene Oregonian species complex.	Investigate and validate taxonomic status.	Conduct field surveys to collect specimens. Conduct morphological and genetics work to determine species status.	Coeur d'Alene Oregonian
Conduct research and habitat conservation activities for cool air temperature associated gastropods (Lucid et al. 2016).	Develop a better understanding of requirements for these species.	Conduct research to assess ecological requirements for these species. Manage forest structure near microsites to maintain cool air temperatures. Manage these sites for minimal disturbance. Implement long-term monitoring of species and associated microclimate and other habitat requirements.	Pale Jumping-slug Magnum Mantleslug Western Flat-whorl Shiny Tightcoil
Determine appropriate taxonomic status of species within the Spur-throated Grasshopper (*Melanoplus*) Species Group.	Investigate and validate taxonomic status.	Conduct field surveys to collect specimens. Conduct morphological and genetics work to determine species status.	Spur-throated Grasshopper (*Melanoplus*) Species Group
Determine if range of Bitterroot Mountain invertebrate SGCN extends to Flathead Valley.	Implement actions to assess range of Bitterroot Mountain invertebrates.	Conduct targeted field surveys to collect specimens. Encourage incidental collection of invertebrates by other field workers or recreationists by developing protocols, providing equipment/supplies, providing educational opportunities such as training sessions.	Western Pearlshell Straight Snowfly Idaho Snowfly Palouse Snowfly Cascades Needlefly Idaho Forestfly Clearwater Roachfly Umatilla Willowfly A Click Beetle (*Beckerus barri*) A Riffle Beetle (*Bryelmis idahoensis*) A Mayfly (*Ameletus tolae*) Lolo Mayfly A Mayfly (*Paraleptophlebia falcula*) A Mayfly (*Paraleptophlebia jenseni*) A Mayfly (*Paraleptophlebia traverae*) A Mayfly (*Parameletus columbiae*) A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita*

Objective	Strategy	Action(s)	Target SGCNs
			wyomingensis sculleni) Hunt's Bumble Bee A Mason Bee (*Hoplitis orthognathus*) A Caddisfly (*Apatania barri*) A Caddisfly (*Eocosmoecus schmidi*) A Caddisfly (*Homophylax acutus*) A Caddisfly (*Philocasca antennata*) A Caddisfly (*Rhyacophila oreia*) A Caddisfly (*Rhyacophila robusta*) A Caddisfly (*Goereilla baumanni*) A Caddisfly (*Sericostriata surdickae*)

Target: Pollinators

Pollinators provide an essential ecosystem service that benefits agricultural producers, agricultural consumers, and gardeners (Mader et al. 2011) in the Flathead Valley. A wide range of taxa including birds, bats, and a wide array of insects provide pollination activities. The Monarch (*Danaus plexippus*) Western Bumble Bee (*Bombus occidentalis*), and Suckley's Cuckoo Bumble Bee (*Bombus Suckleyi*) are 3 SGCN pollinators known to occur in the Flathead Valley.

Many pollinators, but particularly bees, are known to be experiencing population declines throughout North America (Mader et al. 2011) and those declines may be occurring within the Flathead Valley as well. Population declines and local die-offs occur for a variety of reasons including habitat loss, pesticide exposure, and climate change (Mader et al. 2011). The Flathead Valley is ripe with opportunity to address these threats and increase the status of SGCN pollinators. Farmers, habitat managers, roadway authorities, municipalities, and homeowners can all contribute to pollinator conservation in clear and productive ways.

Target Viability

Fair. Many pollinators declining rangewide.

Prioritized Threats and Strategies for Pollinators

High rated threats to Pollinators in the Flathead Valley

Pesticides

Pollinators are negatively affected by pesticides by absorbing pesticides through the exoskeleton, drinking nectar containing pesticides, and carrying pollen laced with pesticides back to colonies (Mader et al. 2011). Neonicotinoids are particularly harmful to bee populations and can cause dramatic die-offs (Hopwood et al. 2012). Although the most effective pollinator conservation strategy is to eliminate pesticide use, significant benefits can still be achieved by reducing use of and pollinator exposure to pesticides (Mader et al. 2011).

Objective	Strategy	Action(s)	Target SGCNs
Reduce native pollinator exposure to pesticides (Mader et al. 2011).	Educate habitat managers, farmers, municipalities, and small property owners in methods to eliminate pesticide use (Mader et al. 2011).	Conduct educational activities that encourage potential pesticide applicators to eliminate use of pesticides where practical. Where pesticides must be used, encourage applicators to apply the minimum amount of chemical necessary and apply when pollinators are least active (i.e., nighttime and when flowers are not blooming) (Mader et al. 2011). Specifically target urban homeowners in educational efforts in the elimination of or proper application of pesticides (Mader et al. 2011). Conduct workshops to discuss pesticides in relation to other pollinator habitat management concerns (Mader et al. 2011).	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
Reduce native pollinator exposure to pesticides on IDFG administered property (Mader et al. 2011).	Implement measures to reduce or eliminate pesticide use on IDFG WMAs and other properties (Mader et al. 2011).	Use the minimum recommended amount of pesticide (Mader et al. 2011). Apply pesticides at times when pollinators are least active such as nighttime, cool periods, low wind activity, and when flowers are not blooming (Mader et al. 2011). Mow or otherwise remove flowering weeds before applying pesticides (Mader et al. 2011).	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
Eliminate use of neonicotinoid insecticides (Hopwood et al. 2012).	Education measures on the detrimental effects of neonicotinoids on bees (Hopwood et al. 2012).	Develop and distribute educational material. Distribute to municipalities, counties, agriculture producers, habitat managers, and other property owners (Hopwood et al. 2012). Do not employ the use of neonicotinoids on IDFG administered lands (Hopwood et al. 2012).	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee

Habitat loss

Pollinators require foraging and nesting habitat. Providing both types of habitat within close proximity to each other is the best way to ensure pollinator success. Protecting, enhancing, and creating pollinator habitat can be a fun and rewarding way to engage with local communities. Educating land managers about techniques to reduce land management impacts to pollinators is an essential component to pollinator habitat management.

Objective	Strategy	Action(s)	Target SGCNs
Reduce impact of land management practices on pollinators (Mader et al. 2011).	Educate about and implement practices that benefit pollinators. (Mader et al. 2011).	Reduce grazing impacts by limiting grazing to one-third to one-fourth of management areas per season (Mader et al. 2011). Implement pollinator beneficial mowing techniques including use of flushing bar, cutting at ≤8 mph, maintaining a high minimum cutting height of ≥12–16 inches, mowing only in daylight hours, mow in a mosaic instead of an entire site (Mader et al. 2011). Where prescribed fire is used, implement pollinator-friendly burning protocols including rotational burning of ≤30% of each site every few years, leave small unburned patches intact, avoid burning too frequently (no more than every 5–10 years), avoid high-intensity fires unless the burn goal is tree removal. Work with Idaho Transportation Department to implement proper roadside pollinator habitat management (Mader et al. 2011).	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
Conserve existing pollinator habitat.		Map existing major known pollinator habitat. Identify and recognize landowners providing pollinator habitat and provide habitat management educational opportunity (Mader et al. 2011). Conduct surveys for native milkweed. Initiate seed saving program (Mader et al. 2011).	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
Create new urban and rural pollinator habitat.	Develop programs to encourage urban landowners to create pollinator habitat.	Provide pollinator habitat workshops for homeowners and rural land owners. Provide other educational materials for homeowners. Provide an incentive program for homeowners to create pollinator habitat in urban yards. Convert most of lawn at IDFG Panhandle Regional office to pollinator habitat.	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Objective	Strategy	Action(s)	Target SGCNs
		Work with municipalities and businesses to create urban pollinator habitat. Provide bee nest boxes for purchase at the IDFG IDFG Panhandle Regional office.	

Species designation, planning & monitoring

Actions to enhance pollinator habitat will be most effective with knowledge of the current status of SGCN populations. Initiation of long-term monitoring will allow a continuous data stream to assess conservation activities.

Objective	Strategy	Action(s)	Target SGCNs
Determine pollinator population status.	Conduct surveys and implement long-term pollinator monitoring program.	Conduct surveys to identify colonies and breeding locations of bee SGCN. Protect known breeding sites. Incorporate pollinators into regional multitaxa monitoring efforts that includes consideration for climate change impacts.	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Flathead Valley Section Team

An initial summary version of the Flathead Valley Section project plan was completed for the 2005 Idaho State Wildlife Action Plan. A small working group developed an initial draft of the Section Plan (Miradi v 0.7 which was then reviewed by a much wider group of stakeholders at a 2-day meeting held at the Idaho Department of Fish and Game in February 2015 (this input captured in Miradi v 0.9). This draft was then subsequently revised. Materials in this document are based on Miradi v. 0.16. Individuals and organizations/agencies involved in this plan are shown in Table 2.3.

Table 2.3 Individuals, agencies, and organizations involved in developing this plan [a]

First name	Last name	Affiliation
Michael	Lucid*	Idaho Department of Fish and Game, Panhandle Region
Shannon	Ehlers*	Idaho Department of Fish and Game, Panhandle Region
Rita	Dixon	Idaho Department of Fish and Game, Headquarters
Carrie	Hugo	Bureau of Land Management (US)
Cristy	Garris	Foundations of Success
Wayne	Wakkinen	Idaho Department of Fish and Game, Panhandle Region
Jim	Fredericks	Idaho Department of Fish and Game, Panhandle Region
Laura	Wolf	Idaho Department of Fish and Game, Panhandle Region
Ryan	Hardy	Idaho Department of Fish and Game, Panhandle Region
T J	Ross	Idaho Department of Fish and Game, Panhandle Region
Colleen	Trese	Idaho Department of Fish and Game, Panhandle Region

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

3. Bitterroot Mountains Section

Section Description

The Bitterroot Mountains Section is part of the Canadian Rocky Mountain Ecoregion. The section includes habitats in Idaho and Montana. The Idaho portion of the Bitterroot Mountains includes the Coeur d'Alene, St. Joe, North Clearwater, and North Bitterroot ranges and is bounded by the Clark Fork River in the north, Lake Pend Oreille and the Palouse Prairie in the west, the Idaho–Montana border in the east, and the ridge above the Lochsa River to the south (Fig. 3.1, Fig. 3.2). The Bitterroot Mountains span from 300 to 2,414 m (984 to 7,920 ft) in elevation with the highest peaks occurring along the Idaho–Montana border within the North Bitterroot Range. Like most of the sections in north Idaho, this section is cool and temperate with an annual precipitation of 54 to 208 cm (20 to 82 in; PRISM 30-year annual precipitation) and average annual temperature that ranges from 2.6 to 9.7 °C (36.7 to 49.5 °F, PRISM 30-year annual temperature) (PRISM Climate Group 2012). Precipitation occurs mostly as snow from November to March, while summers are dry.

The mountain ranges that compose the Bitterroot Mountains Section vary from the lower rolling peaks of the Coeur d'Alene Range to the higher, steeply dissected peaks of the North Bitterroot and North Clearwater Mountain ranges. The topology of the different ranges reflect the different underlying mechanisms responsible in their formation with the lower Coeur d'Alene and St. Joe mountains remaining unglaciated and the higher North Bitterroot and North Clearwater carved by alpine glaciers. The section has a maritime-influenced climate that delivers moisture-laden air currents in the fall, winter, and spring in the form of heavy snowfall and warmer winter temperatures. On the other hand, summers are hot and dry, with some areas reaching temperatures of around 38 °C (100 °F).

Coeur d'Alene Mountains © Michael Lucid

The section is predominantly forested with dense and diverse stands of subalpine fir (*Abies lasiocarpa* [Hook.] Nutt.), Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco), grand fir (*Abies grandis* [Douglas ex D. Don] Lindl.) and western redcedar (*Thuja plicata* Donn ex D. Don). Western white pine (*Pinus monticola* Douglas ex D. Don) was a prominent tree within these forests but the advent of the white pine blister rust (*Cronartium ribicola*), of which the pine has limited resistance, has nearly eliminated this species' presence on the landscape. Whitebark pine (*Pinus albicaulis* Engelm.) was another key component of the subalpine habitats but Mountain Pine Beetle (*Dendroctonus ponderosae*) and white pine blister rust have impacted this species as well. Wildlife species in this section are characteristic of the Northern Rockies and include Clark's Nutcracker (*Nucifraga columbiana*), Wolverine (*Gulo gulo*), and Mountain Goat (*Oreamnos americanus*) in subalpine habitats and Olive-sided Flycatcher (*Contopus cooperi*) and Fisher (*Pekania pennanti*) in mesic montane habitats.

Although the higher elevations of the North Bitterroot and North Clearwater ranges were carved by mountain glaciers, the lower portions of the ranges were unaffected by glaciation. This preserved the steep v-shaped canyons at lower elevations and provided a refugium for coastal species and an environment for the evolution of endemic plants. The maritime climate of this section continues to provide the mild temperatures and heavy precipitation necessary for nearly 40 species of disjunct populations of coastal plants identified in the lower canyons of the North Fork Clearwater, Selway, and Lochsa rivers. Examples of plants characteristic of the canyon habitats include red alder (*Alnus rubra* Bong.), deer fern (*Blechnum spicant* [L.] Sm.), Sierra marsh fern (*Thelypteris nevadensis* [Baker] Clute ex Morton), North Idaho monkeyflower (*Mimulus clivicola* Greenm.), and Constance's bittercress (*Cardamine constancei* Detling), which is a regional endemic. In addition, the canyon habitat harbors several species of beetles and earthworms that are endemic to Idaho. However, the filling of the Dworshak Reservoir inundated much of this habitat and it has been further impacted by the construction of roads, campgrounds, and administrative sites.

The Coeur d'Alene, St. Joe, St. Maries, and North Fork Clearwater rivers compose the major waterways of the Bitterroot Mountains Section. Three of these (Coeur d'Alene, St. Joe, and St. Maries) are major tributaries of the Spokane River drainage and feed into Lake Coeur d'Alene, the largest natural lake in the section. The floodplains of these rivers and their tributaries support diverse riparian forests and shrublands, as well as extensive marshes found in oxbows, meanders, and other low lying depressions. Although nearly 106 km (66 mi) of the upper St. Joe River is nationally designated as wild and scenic, most of the Spokane River drainage, including the St. Maries and Coeur d'Alene rivers and their associated wetlands, has been impacted by a long history of heavy metal pollution, sedimentation, and stream channelization. Numerous lowland lakes, waterfalls, wetlands, and mountain lakes in these drainages provide important nesting and migration stopover habitats for waterfowl, Neotropical migrants, colonial and semicolonial waterbirds such as Black Tern (*Chlidonias niger*).

The stunning beauty of Lake Coeur d'Alene and its proximity to the cities of Coeur d'Alene, the largest population center in the section, and Spokane, Washington, make it a popular tourist destination. Boating, angling, wildlife watching, and specifically winter eagle watching are common activities. Local economies benefit through fees paid on recreational activities such as hunting, fishing, boating, and snowmobiling and taxes paid on associated gear. Camping, hiking, wildlife watching, and biking are also popular outdoor activities in the region. Outside of Coeur d'Alene, most of the section's population is dispersed and rural. Towns are generally located along rivers. Wetlands of the lower Coeur d'Alene River valley are among the most important and valued in the state. This section is noted for its long and storied mining heritage (primarily for gold, silver, lead, and zinc), particularly the Coeur d'Alene Mountains and Silver Valley east of Coeur d'Alene where metal extraction continues today. Forestry and localized grazing are also important land uses within the section.

Black Tern, IDFG

Spotlight Species of Greatest Conservation Need: Clearwater Roachfly (*Soliperla salish*)

Although this small mayfly has an unattractive name, it is found in a beautiful habitat—the splash zones of high-elevation headwater stream waterfalls. It is believed to be endemic to the Clearwater Basin and is only known from a few sites. Considering how difficult it is to access its unique habitat sites, this species is likely undersampled and likely occurs at more sites than we are currently aware of (D. Gustafson pers. comm.). This species is representative of the high levels of endemism found in the Bitterroot Mountains Section and emblematic of a cold-adapted and understudied species that we strive to understand more completely in our rapidly changing world.

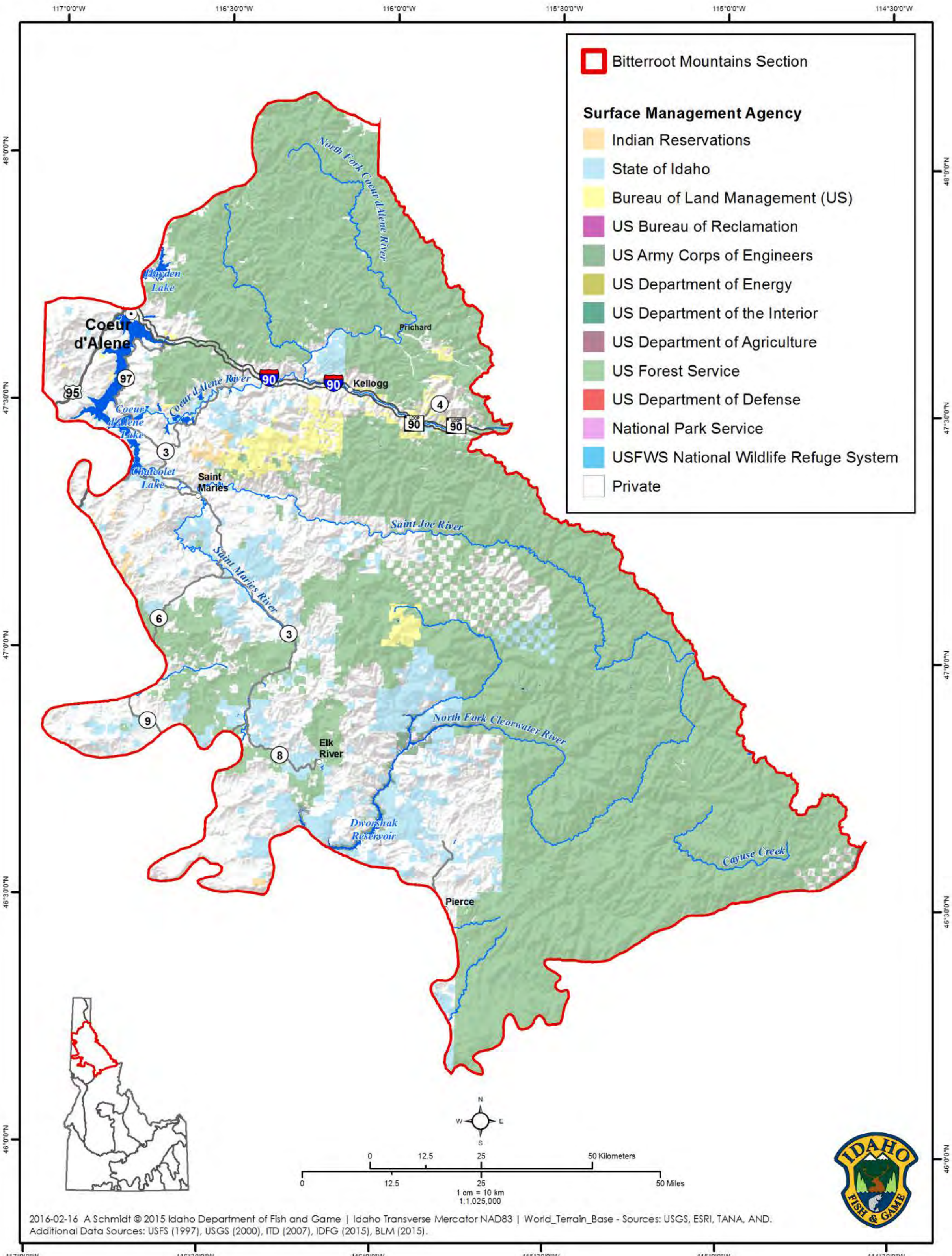


Fig. 3.1 Map of Bitterroot Mountains surface management

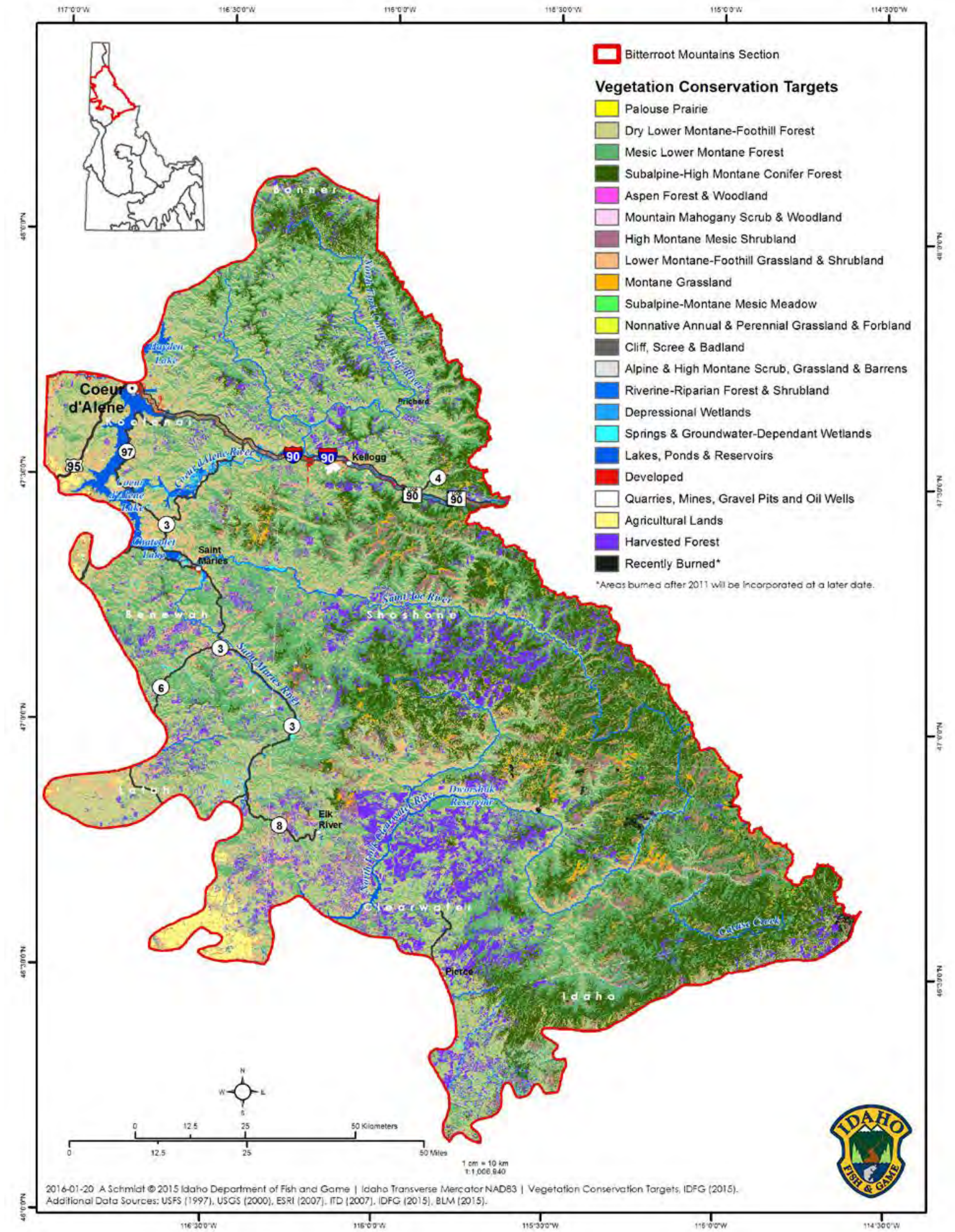


Fig. 3.2 Map of Bitterroot Mountains vegetation conservation targets

Conservation Targets in the Bitterroot Mountains

We selected 6 habitat targets (3 upland, 3 aquatic) that represent the major ecosystems in the Bitterroot Mountains as shown in Table 3.1. Each of these systems provides habitat for key species of greatest conservation need (SGCN), i.e., "nested targets" (Table 3.2). All SGCN management programs in the Bitterroot Mountains have a nexus with habitat management programs. Conservation of the habitat targets listed below should conserve most of the nested species within them. However, we determined that 6 taxonomic groups (Lake-Nesting Birds, Ground-Dwelling Invertebrates, Pond-Breeding Amphibians, Low-Density Forest Carnivores, Pollinators, and Bat Assemblage) have special conservation needs and thus are presented as explicit species targets as shown in Table 3.1.

Table 3.1 At-a-glance table of conservation targets in the Bitterroot Mountains

Target	Target description	Target viability	Nested targets (SGCN)	
Dry Lower Montane–Foothill Forest	Northern Rocky Mts. Douglas-fir and ponderosa pine woodland and savannah systems at lower elevation forests in the Coeur d'Alene, St. Joe, North Bitterroot, and North Clearwater mountains.	*Fair.* Substantial encroachment by other habitat types due to lack of natural fire cycle; improper off-highway vehicle use, invasive species, and insects/disease are other stressors.	*Tier 2* *Tier 3*	Lewis's Woodpecker Silver-haired Bat Hoary Bat Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis
Mesic Lower Montane Forest	Commonly referred to as "cedar-hemlock" but also includes grand fir and aspen–mixed conifer forest at lower elevations in the Coeur d'Alene, St. Joe, North Bitterroot, and North Clearwater mountains.	*Fair.* Altered stand composition and structure due to lack of natural fire cycle and loss of western white pine; fragmented by forest management.	*Tier 2* *Tier 3*	Silver-haired Bat Hoary Bat Fisher Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis
Subalpine–High Montane Conifer Forest	Engelmann spruce–subalpine fir–mountain hemlock forest and whitebark pine woodlands at higher elevations in the Coeur d'Alene, St. Joe, North Bitterroot, and North Clearwater mountains.	*Poor* to *Fair*. Subject to altered fire regimes, forest insects, disease, and climate change; reduction in whitebark pine woodlands.	*Tier 1* *Tier 2* *Tier 3*	Wolverine Magnum Mantleslug Western Toad Clark's Nutcracker Mountain Goat Hoary Marmot Pale Jumping-slug
Riverine–Riparian Forest & Shrubland	Rivers and streams, including aquatic habitats and their associated terrestrial riparian habitats. Includes Coeur d'Alene, St. Joe, St. Maries, and Clearwater rivers and tributaries.	*Fair*. Riverine systems in the lower valleys impacted by hydroelectric operations, pollution from mining, and invasive species. Higher elevation headwaters threatened by climate change.	*Tier 1* *Tier 2*	Pacific Lamprey A Click Beetle (*Beckerus barri*) Harlequin Duck Black Swift Western Pearlshell Rocky Mountain Duskysnail A Riffle Beetle (*Bryelmis idahoensis*) Lolo Mayfly A Mayfly (*Ephemerella*

Target	Target description	Target viability	Nested targets (SGCN)	
				alleni)
			Tier 3	Rotund Physa A Mayfly (*Ameletus tolae*) A Mayfly (*Paraleptophlebia falcula*) A Mayfly (*Parameletus columbiae*) Straight Snowfly Idaho Snowfly Palouse Snowfly Clearwater Roachfly Umatilla Willowfly A Caddisfly (*Manophylax annulatus*) A Caddisfly (*Eocosmoecus schmidi*) A Caddisfly (*Homophylax acutus*) A Caddisfly (*Philocasca antennata*) A Caddisfly (*Philocasca banksi*) A Caddisfly (*Rhyacophila oreia*) A Caddisfly (*Rhyacophila robusta*) A Caddisfly (*Goereilla baumanni*) A Caddisfly (*Sericostriata surdickae*)
Depressional Wetlands	Surface water-fed systems ranging from infrequent to semipermanent or permanently flooded. Typically pond sized or smaller. Includes vernal pools and most marshes.	*Fair*. Lower elevations experiencing altered hydrologic regimes, pollution from mining, and invasive species/disease. Higher elevations threatened by climate change.	*Tier 2* *Tier 3*	Western Toad American Bittern Black Tern Silver-haired Bat Townsend's Big-eared Bat Little Brown Myotis
Springs & Groundwater-Dependent Wetlands	Includes a subset of groundwater-dependent ecosystems such as springs, seeps, fens, and wet and mesic meadows.	*Fair*. Lower elevations experiencing altered hydrologic regimes, mining pollution, and invasive species/disease. Higher elevations threatened by climate change.	*Tier 1* *Tier 2* *Tier 3*	A Click Beetle (*Beckerus barri*) Western Toad Rocky Mountain Duskysnail Pristine Pyrg Cascades Needlefly Idaho Forestfly Clearwater Roachfly

Target	Target description	Target viability	Nested targets (SGCN)	
Pond-Breeding Amphibians	Amphibians and reptiles that primarily breed in lentic wetlands.	*Poor.* Many amphibians face invasive species/disease threats. Possible severe population declines.	*Tier 2*	Western Toad Northern Leopard Frog
Lake-Nesting Birds	Western Grebe is listed as an Intermountain West Waterbird Conservation Plan priority species due to habitat concerns and impacts from recreational boating.	*Good*. Colony has consistently numbered between 20 and 80 nests. Occasionally contains nesting Clark's Grebe.	*Tier 2*	Western Grebe
Bat Assemblage	Several bat species occur across habitats within the section.	*Fair*. Roost locations are impacted by human disturbance and AML closures. Threat of white-nose syndrome imminent.	*Tier 2* *Tier 3*	Silver-haired Bat Hoary Bat Townsend's Big-eared Bat Little Brown Myotis
Low-Density Forest Carnivores	Wide-ranging mammalian mesocarnivores.	*Poor* to *Fair*. Only a few Wolverines known to occur in section. Bitterroot Mountains is core habitat for Fisher.	*Tier 1* *Tier 2*	Wolverine Fisher
Ground-Dwelling Invertebrates	Assemblage of terrestrial invertebrates found on forest and other habitat floors.	*Good*. Habitat and threat data deficient. Many species taxonomically and distributionally data deficient.	*Tier 1* *Tier 3*	Marbled Jumping-slug Magnum Mantleslug Blue-gray Taildropper Papillose Taildropper Rocky Mountain Axetail Selway Forestsnail Mission Creek Oregonian Kingston Oregonian Harvestman (*Acuclavella*) Species Group Pale Jumping-slug Nimapuna Disc Salmon Coil Coeur d'Alene Oregonian Shiny Tightcoil Spur-throated Grasshopper (*Melanoplus*) Species Group
Pollinators	Species delivering pollination ecosystem services.	*Fair.* Many pollinators declining rangewide.	*Tier 1* *Tier 3*	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Hunt's Bumble Bee

Target	Target description	Target viability	Nested targets (SGCN)
			A Mason Bee (*Hoplitis orthognathus*) Monarch Gillette's Checkerspot

Table 3.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Bitterroot Mountains

Taxon	Conservation targets: Dry Lower Montane–Foothill Forest	Mesic Lower Montane Forest	Subalpine–High Montane Conifer Forest	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Pond-Breeding Amphibians	Lake-Nesting Birds	Bat Assemblage	Low-Density Forest Carnivores	Ground-Dwelling Invertebrates	Pollinators
LAMPREYS												
Pacific Lamprey (*Entosphenus tridentatus*)[1]				X								
AMPHIBIANS												
Western Toad (*Anaxyrus boreas*)[2]			X		X	X	X					
Northern Leopard Frog (*Lithobates pipiens*)[2]							X					
BIRDS												
Harlequin Duck (*Histrionicus histrionicus*)[2]				X								
Western Grebe (*Aechmophorus occidentalis*)[2]								X				
American Bittern (*Botaurus lentiginosus*)[2]					X							
Black Tern (*Chlidonias niger*)[2]					X							
Common Nighthawk (*Chordeiles minor*)[3]	X											
Black Swift (*Cypseloides niger*)[2]				X								
Lewis's Woodpecker (*Melanerpes lewis*)[2]	X											
Olive-sided Flycatcher (*Contopus cooperi*)[3]	X	X										
Clark's Nutcracker (*Nucifraga columbiana*)[3]			X									
MAMMALS												
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]	X	X			X				X			
Silver-haired Bat (*Lasionycteris noctivagans*)[2]	X	X			X				X			
Hoary Bat (*Lasiurus cinereus*)[2]	X	X							X			
Little Brown Myotis (*Myotis lucifugus*)[3]	X	X			X				X			
Wolverine (*Gulo gulo*)[1]			X							X		
Fisher (*Pekania pennanti*)[2]		X								X		
Mountain Goat (*Oreamnos americanus*)[3]			X									
Hoary Marmot (*Marmota caligata*)[3]			X									
ARACHNIDS												
Harvestman (*Acuclavella*) Species Group[3]											X	
BIVALVES												
Western Pearlshell (*Margaritifera falcata*)[2]				X								
AQUATIC GASTROPODS												
Rotund Physa (*Physella columbiana*)[3]				X								

Taxon	Conservation targets											
	Dry Lower Montane–Foothill Forest	Mesic Lower Montane Forest	Subalpine–High Montane Conifer Forest	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Pond-Breeding Amphibians	Lake-Nesting Birds	Bat Assemblage	Low-Density Forest Carnivores	Ground-Dwelling Invertebrates	Pollinators
Rocky Mountain Duskysnail (*Colligyrus greggi*)[2]				X		X						
Pristine Pyrg (*Pristinicola hemphilli*)[2]						X						
TERRESTRIAL GASTROPODS												
Pale Jumping-slug (*Hemphillia camelus*)[3]			X								X	
Marbled Jumping-slug (*Hemphillia danielsi*)[1]											X	
Magnum Mantleslug (*Magnipelta mycophaga*)[1]			X								X	
Blue-gray Taildropper (*Prophysaon coeruleum*)[1]											X	
Papillose Taildropper (*Prophysaon dubium*)[1]											X	
Rocky Mountain Axetail (*Securicauda hermani*)[1]											X	
Nimapuna Disc (*Anguispira nimapuna*)[3]											X	
Salmon Coil (*Helicodiscus salmonaceus*)[3]											X	
Selway Forestsnail (*Allogona lombardii*)[1]											X	
Mission Creek Oregonian (*Cryptomastix magnidentata*)[1]											X	
Coeur d'Alene Oregonian (*Cryptomastix mullani*)[3]											X	
Kingston Oregonian (*Cryptomastix sanburni*)[1]											X	
Shiny Tightcoil (*Pristiloma wascoense*)[3]											X	
INSECTS												
A Click Beetle (*Beckerus barri*)[1]				X		X						
A Riffle Beetle (*Bryelmis idahoensis*)[2]				X								
A Mayfly (*Ameletus tolae*)[3]				X								
Lolo Mayfly (*Caurinella idahoensis*)[2]				X								
A Mayfly (*Ephemerella alleni*)[2]				X								
A Mayfly (*Paraleptophlebia falcula*)[3]				X								
A Mayfly (*Parameletus columbiae*)[3]				X								
A Miner Bee(*Andrena aculeata*)[3]												X
A Miner Bee (*Perdita salicis euxantha*)[3]												X
Hunt's Bumble Bee (*Bombus huntii*)[3]												X
Morrison's Bumble Bee (*Bombus morrisoni*)[1]												X
Western Bumble Bee (*Bombus occidentalis*)[1]												X
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]												X

Taxon	Dry Lower Montane–Foothill Forest	Mesic Lower Montane Forest	Subalpine–High Montane Conifer Forest	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Pond-Breeding Amphibians	Lake-Nesting Birds	Bat Assemblage	Low-Density Forest Carnivores	Ground-Dwelling Invertebrates	Pollinators
	Conservation targets											
A Mason Bee (*Hoplitis orthognathus*)[3]												X
Monarch (*Danaus plexippus*)[3]												X
Gillette's Checkerspot (*Euphydryas gillettii*)[3]												X
Spur-throated Grasshopper (*Melanoplus*) Species Group[3]											X	
Straight Snowfly (*Capnia lineata*)[3]				X								
Idaho Snowfly (*Capnia zukeli*)[3]				X								
Palouse Snowfly (*Isocapnia palousa*)[3]				X								
Cascades Needlefly (*Megaleuctra kincaidi*)[3]						X						
Idaho Forestfly (*Soyedina potteri*)[3]						X						
Clearwater Roachfly (*Soliperla salish*)[3]				X		X						
Umatilla Willowfly (*Taenionema umatilla*)[3]				X								
A Caddisfly (*Manophylax annulatus*)[3]				X								
A Caddisfly (*Eocosmoecus schmidi*)[3]				X								
A Caddisfly (*Philocasca antennata*)[3]				X								
A Caddisfly (*Philocasca banksi*)[3]				X								
A Caddisfly (*Homophylax acutus*)[3]				X								
A Caddisfly (*Rhyacophila oreia*)[3]				X								
A Caddisfly (*Rhyacophila robusta*)[3]				X								
A Caddisfly (*Goereilla baumanni*)[3]				X								
A Caddisfly (*Sericostriata surdickae*)[3]				X								

Target: Dry Lower Montane–Foothill Forest

In the Bitterroot Mountains, nearly 27% of the land cover is classified as Dry Lower Montane–Foothill Forest. Although this habitat group can be located at all aspects and slopes, it is predominantly found on warm-dry, south-southwest, and moderately steep slopes within the Coeur d'Alene, St. Joe, North Bitterroot and North Clearwater mountains (Cooper et al. 1991). It also extends into the valleys and floodplains that surround the mountain ranges. Elevations typically range from 300 to 1,920 m (984 to 6,300 ft) in the Bitterroot Mountains, although there are numerous occurrences at higher elevations. Douglas-fir is a codominant climax species with ponderosa pine (*Pinus ponderosa* Lawson & C. Lawson) in mixed or single species stands (Rocchio 2011). Species such as lodgepole pine (*Pinus contorta* Douglas ex Loudon), western larch (*Larix occidentalis* Nutt.), and grand fir only occasionally occur and are found in the wetter microsites (Cooper et al. 1991). Ponderosa pine woodlands are dominant on the driest sites where fires are frequent and of low severity (Cooper et al. 1991). Historically, fires were thought to be frequent and moderate- to low-severity, which maintained open stands of fire-resistant species. Low fire frequency has resulted in a dominance of shrubs and tree species such as grand fir and Douglas-fir in the understory. Currently, the habitat group contains a variable understory physiognomy ranging from shrub-dominated and dense, with mallow ninebark (*Physocarpus malvaceus* [Greene] Kuntze) and oceanspray (*Holodiscus discolor* [Pursh] Maxim.), to bunchgrass-dominated and open, with Idaho Idaho fescue (*Festuca idahoensis* Elmer) and bluebunch wheatgrass bluebunch wheatgrass (*Pseudoroegneria spicata* [Pursh] Á. Löve).

Dry Lower Montane–Foothill Forest © Amanda DeLima

Target Viability

Fair. There has been substantial encroachment in the habitat type by more shade-tolerant overstory species due to the lack of normal fire intervals. Forest management and development (e.g., housing, roads) have also altered stands.

Prioritized Threats and Strategies for Dry Lower Montane–Foothill Forest

Very High rated threats to Dry Lower Montane–Foothill Forest in the Bitterroot Mountains

Altered fire regimes (fire suppression & stand-replacing wildfires)

Historically, moderate- to low-severity fires burned, on average, every 10 to 30 years. Fires maintained the open understory and predominance of shade-intolerant species such as ponderosa pine in the overstory (Smith and Fischer 1997). However, decades of aggressive fire suppression, aided by a cool period in the Pacific decadal oscillation, were effective in preventing most moderate-severity and stand-replacing fires and enabled shade-intolerant species to establish and heavy fuel loads to build (USFS 2013*a*). This resulted in the encroachment of shade-tolerant species into the habitat group and a decrease in fire-tolerant species, alongside increased vertical stand structure, canopy closure, vertical fuel ladders, fire intensity and severity, and insect and disease epidemics (Keane et al. 2002). Fire management activities over the past 15 years have attempted to simulate and reestablish the vegetative composition of regular fire patterns, but are hampered by policy that does not allow natural fires to burn. Additionally, population increases in neighboring towns has increased the Wildland–Urban Interface (WUI) that often prevents the use of fire as a management tool.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USFS 2013b [monitoring and evaluation program]).	Use prescribed and natural fires to maintain desired conditions (USFS 2015).	Reduce fuels through mechanical removal or controlled burns on lands within the WUI (USFS 2015). Leave fire-killed trees standing as wildlife habitat if they pose no safety hazard (USFS 2015). Remove perceived barriers to allow more prescribed natural fire on state and private forest lands. Promote/facilitate the use of prescribed fire as a habitat restoration tool, on both public and private lands where appropriate. Increase membership and participation in Idaho Forest Stewardship Programs, American Tree Farm System, and NRCS.	Common Nighthawk Lewis's Woodpecker Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis
Simulate natural fire regimes.	Design and implement silvicultural prescriptions that simulate natural disturbance regimes.	Actively remove shade-tolerant species. Increase markets to pay for ecological forest management activities, e.g., explore markets to thin trees so that they can ward off fire and insect threats.	Common Nighthawk Lewis's Woodpecker Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis

OHV use in undesignated areas

Considered a critical issue on state, industrial, and private lands as well as one of the US Forest Service's (FS) "four threats" (http://www.fs.fed.us/projects/four-threats/), pressure from Off Highway Vehicle (OHV) use can lead to the degradation of forested areas. Such use can increase erosion, user conflicts, spread of invasive species, damage to cultural sites, disturbance to wildlife, destruction of wildlife habitat, and risks to public safety. In the Idaho Panhandle National Forest (IPNF), there are over 6,920 km (4,300 mi) of roads and trails available for OHV use. Visitors to the IPNF often cite the ability to use OHVs on forest roads and trails as the primary reason for their visit (Cook and O'Laughlin 2008). It is a desired condition within the 2015 Forest Management Plan that motorized recreational opportunities at the levels designated in the plan continues within the forest (USFS 2015). However, in the IPNF and the adjacent Clearwater National Forest, there is evidence of unauthorized motorized used through the damage done to natural resources. Additionally, violations associated with OHV use are continuously in the triple digits (USFS 2013*b*). Unauthorized motorized use impacts soil and vegetation resources through the disruption or compaction of soil and the damage or removal of vegetation (Cook and O'Laughlin 2008). Wildlife may also be impacted through noise and disturbance. The severity of the impacts is dependent on the habitat and the associated wildlife (Cook and O'Laughlin 2008). Whether damage is intentional or unintentional, restoration efforts in areas damaged by OHV use often costs in the millions of dollars statewide (Cook and O'Laughlin 2008). However, during a survey of OHV users in Idaho, more than half of OHV users saw little to no impact on natural resources via off-trail/off-road vehicle use (Cook and O'Laughlin 2008).

Objective	Strategy	Action(s)	Target SGCNs
Minimize wildlife, soil, vegetation, and hydrologic disturbances from unauthorized off-trail/off-road motorized use.	Create and maintain OHV use areas.	Update Travel Management Plans on public lands. Create and maintain designated OHV use areas. Make sensitive sites more difficult to access while providing facilities and trails in other areas (Cook and O'Laughlin 2008).	
	Educate OHV users about potential resource impacts.	Provide education materials at vehicle registration sites and through other media outlets. Increase signage at closed roads/trails to prevent unintentional travel. Increase signage at vulnerable locations on OHV impacts.	
	Increase enforcement of unintentional travel.	Increase the severity penalties for OHV violations. Incentivize reporting violations. For example, Backcountry Hunters & Anglers provide monetary rewards for reporting OHVs behind closed gates.	

High rated threats to Dry Lower Montane–Foothill Forest in the Bitterroot Mountains

Noxious weeds

In the drier habitat types such as the Dry Lower Montane–Foothill Forest, invasive and noxious weeds have migrated from disturbed areas such as roads, railroads, and utility right-of-ways to undisturbed habitats. Across the IPNF, nearly 82% of the warm/dry habitat type is at high risk for invasion by nonnative weeds (USFS et al. 2013). In addition, surveys done in the Bitterroot Mountains found 5% of sites in the Dry Lower Montane–Foothill Forest type (*n* = 123) had spotted knapweed (*Centaurea stoebe* L.) or common tansy (*Tanacetum vulgare* L.) present (Lucid et al. 2016). Species such as spotted knapweed, diffuse knapweed (*Centaurea diffusa* Lam.), yellow star-thistle (*Centaurea solstitialis* L.), leafy spurge (*Euphorbia esula* L.), and Dyer's woad (*Isatis tinctoria* L.) are particularly invasive within the IPNF and have dispersed into undisturbed areas and displaced native species over large areas (USFS et al. 2013).

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013*a*).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use existing Global Positioning Systems (GPS), remote sensing, and Geographic Information Systems (GIS) technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis
Contain and reduce widespread weeds in areas that are already infested (USFS 2013*a*).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Identify and treat dispersal vectors to prevent further spread of invasive and noxious weeds. Restore treated areas with native species.	Treat weeds in high impact areas and along roads (USFS 2013*a*). Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USFS 2013*a*, IDL 2015). Revegetate treatment areas with native species and monitor restoration (KTOI 2009). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012). Incorporate noxious weeds into a multitaxa monitoring program.	Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis

Medium rated threats to Dry Lower Montane–Foothill Forest in the Bitterroot Mountains

Forest insect pests & diseases

The Idaho Forest Action Plan (Idaho Department of Lands 2010, rev. May 2012) scores this threat as "High" and considers Mountain Pine Beetle the most serious forest pest problem in Idaho, considered equal in importance to the combination of all other forest health sub-issues. However, when taking scope and severity of threat into consideration, the scope of this threat in the Bitterroot Mountains is not as pervasive as in other sections of the state, and therefore we consider the overall threat impact as medium in this section. Beetle infestations are a natural part of the system so in this plan, we focus on stand-replacing outbreaks as the problem. In addition, forest diseases such as root rot (e.g., *Armillaria*), mistletoe, and stem rot also result in tree mortality.

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk of stand-replacing pine beetle or root fungus infestations.	Use integrative pest management strategies. Increase diversity of stand ages, size classes and tree species (KPNZ Climate et al. 2010). Promote responsible firewood harvest/transport.	Use pheromones to protect stands (beetle whispering) (Kegley and Gibson 2004). Target removal of diseased and appropriate size class trees. Remove debris that attracts pine beetles. Cut out or girdle mistletoe-infected trees (IDL 2015).	

Species designation, planning & monitoring

Multiple species identified as SGCN found in the Dry Lower Montane–Foothill Forest are declining as a result of unknown causes. The priority for these species in the coming years is to identify the root causes and to develop strategies to address them.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of decline for nightjar species in Idaho.	Work with Western Working Group Partners in Flight (WWG PIF) and the Pacific Flyway Nongame Technical Committee (PFNTC) to assess causes(s) of decline.	Assist WWG PIF with adjusting current Nightjar Survey Network protocols to collect data that will inform potential cause(s) of decline, including assessments of insect prey populations and their habitats. Work with WWG PIF and PFNTC to identify opportunities for research on contaminant impacts.	Common Nighthawk
Determine causes of decline in Olive-sided Flycatcher.	Determine relative importance of known and suspected threats to Olive-sided	Promote cooperation and collaboration with WWG PIF to fill knowledge gaps and to mitigate threats.	Olive-sided Flycatcher

Objective	Strategy	Action(s)	Target SGCNs
	Flycatcher, its prey, and its habitats (see Canada's recovery plan, Appendix B; Environment Canada 2015*b*). Investigate factors affecting reproductive output, survival, and fidelity to breeding sites.		
Assess future changes to species status.	Monitor population status.	Incorporate species into multitaxa monitoring program.	Common Nighthawk Olive-sided Flycatcher

Target: Mesic Lower Montane Forest

In the Bitterroot Mountains, 32% of the land cover is classified as Mesic Lower Montane Forest. Within the Coeur d'Alene, St. Joe, North Bitterroot, and North Clearwater mountains, this habitat group is located on the slopes, valley bottoms, ravines, canyons, and benches with high soil moisture and cool summer temperatures. Elevation ranges from 487 to 805 m (1,598 to 2,641 ft). Commonly referred to as a cedar–hemlock forest, western redcedar and western hemlock (*Tsuga heterophylla* [Raf.] Sarg.) are common in the overstory with grand fir, Douglas-fir, Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), western white pine (*Pinus monticola* Douglas ex D. Don), and western larch as frequent associates within the canopy (Cooper et al. 1991). The understory is composed of short and tall shrubs, perennial graminoids, forbs, ferns, and mosses, often at levels of in-stand diversity approaching or equal to the diversity found in some eastern deciduous forests (Reid 2013). In depressional areas with a high water table, devilsclub (*Oplopanax horridus* [Sm.] Miq.) is regularly encountered. Forests within this habitat group are often centuries old with fire only passing through every 500 years. The fire interval is long with stand-replacing fires occurring every 150 to 500 years and moderate fires every 50 to100 years (Crawford 2011). Suppression of moderate fires in some locations has created mixed-aged stands that form fuel ladders, making the forest more susceptible to high-intensity and stand-replacing fires. Disturbance in the form of insect, disease, windfall, and ice generally produce canopy openings for the regeneration of forest types. Western white pine was once a predominant canopy species within this habitat group; however logging, fire, and the introduction of the white pine blister rust has reduced this species to below 90% of its historical prevalence (Cooper et al. 1991).

Target Viability

Fair. The structure and composition of some stands have been altered due to lack of natural fire cycle and loss of western white pine. Forest practices (e.g., even-aged management) has fragmented many stands.

Prioritized Threats and Strategies for Mesic Lower Montane Forest

Very High rated threats to Mesic Lower Montane Forest in the Bitterroot Mountains

Altered fire regimes (fire suppression & stand-replacing wildfires)

Historically, fires were as variable as the tree species in the forest stand, with an average mean interval of 200 to 250 years, but some stands burning with a mean of 18 years (Smith and Fischer 1997). Stands with fire intervals shorter than 140 years were often dominated by western white pine, western larch, and Douglas-fir (Smith and Fischer 1997). However, decades of fire suppression activities, aided by a cool period in the Pacific decadal oscillation, were effective in preventing most moderate-severity (and some stand-replacing) fires that enabled shade and fire-intolerant species to establish and heavy fuel loads to build (USFS 2013*a*). This resulted in the expansion of shade-tolerant species and a decrease in fire-tolerant species, alongside increases in vertical stand structure, canopy closure, vertical fuel ladders, fire intensity and severity, and insect and disease epidemics (Keane et al. 2002). Fire management activities over the past 15 years have attempted to simulate and reestablish the vegetative composition of regular fire patterns, but are hampered by policy that does not allow natural fires to burn. Additionally, population increases in neighboring towns has increased the WUI that often prevents the use of fire as a management tool.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USFS 2013*b* [monitoring and evaluation program]).	Use prescribed and natural fires to maintain desired conditions (USFS 2015).	Reduce fuels on lands within the WUI through mechanical removal or controlled burns (USFS 2015). Leave fire-killed trees standing (important wildlife habitat) if they pose no safety hazard (USFS 2015). Remove perceived barriers to allow more prescribed natural fire on state and private forest lands. Promote/facilitate the use of prescribed fire as a habitat restoration tool on both public and private lands where appropriate. Increase membership and participation in Idaho Forest Stewardship Programs, American Tree Farm System, and NRCS.	Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis
Simulate natural fire regimes.	Design and implement silvicultural prescriptions that simulate natural disturbance regimes.	Actively remove shade-tolerant species. Increase markets to pay for ecological forest management activities, e.g., explore markets to thin trees so that they can ward off fire and insect threats.	Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis

High rated threats to Mesic Lower Montane Forest in the Bitterroot Mountains

Forest insect pests & diseases

When at endemic population levels, native forest insects and disease play a critical role in maintaining the health of the forest ecosystem by removing individuals or small groups weakened by drought, injury, or fire (USFS 2010). However, when large stands of trees are stressed by prolonged drought and/or dense stocking, outbreaks of forest insects and disease can impact tree growth, forest composition, and cause extensive tree mortality (USFS 2010). Severe outbreaks of forest insects and pathogens can even cause the conversion of forest to shrublands or grasslands. The impact on forest composition from large-scale outbreaks is predicted to increase as climate change decreases precipitation and increases temperatures (USFS 2010). Currently, 15–20% of lodgepole pine stands in the IPNF are at high risk for attack by the Mountain Pine Beetle (*Dendroctonus ponderosae*), whereas 25–30% of Douglas-fir stands are at high risk for attack by the Douglas-fir Beetle (*Dendroctonus pseudotsugae*), with each beetle predicted to kill 80% and 60%, respectively, of the basal area in high risk stands (USFS 2010). The introduction of the nonnative white pine blister rust has reduced western white pine to 5% of its original distribution across the interior Pacific Northwest. This caused changes in forest composition from a relatively stable, fire- and disease-tolerant western white pine forest to early-seral forests dominated by the fire- and disease-intolerant species such as Douglas-fir, grand fir, and subalpine fir (USFS 2013*a*).

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk of stand-replacing pine beetle or root fungus infestations.	Use integrative pest management strategies. Increase diversity of stand ages, size classes, and tree species (KPNZ Climate et al. 2010). Promote responsible firewood harvest/transport.	Use pheromones to protect stands (beetle whispering) (Kegley and Gibson 2004). Target removal of diseased and appropriate size class trees. Remove debris that attracts pine beetles. Cut out or girdle mistletoe-infected trees (IDL 2015).	
Increase number of rust-resistant western white pine in the ecosystem (USFS 2013*a*).	Continue to develop genetics of disease resistant trees. Plant rust-resistant western white pine during restoration efforts.	Conserve and protect any old-growth western white pine on the landscape. Determine if rust-resistant (Neuenschwander et al. 1999). Plant rust-resistant trees in openings that are *Ribes* free (Neuenschwander et al. 1999). Monitor and remove any signs of the rust on planted trees (USFS 2013*a*).	Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis

Species designation, planning & monitoring

Olive-sided Flycatcher is a SGCN found in the Mesic Lower Montane Forest that is declining as a result of unknown causes. The priorities for this species in the coming years are to identify and address the root causes.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of decline in Olive-sided Flycatcher.	Determine relative importance of known and suspected threats to Olive-sided Flycatcher, its prey, and its habitats (see Canada's recovery plan, Appendix B; Environment Canada 2015*b*). Investigate factors affecting reproductive output, survival, and fidelity to breeding sites.	Promote cooperation and collaboration with WWG PIF to fill knowledge gaps and to mitigate threats. Develop monitoring program to assess changes in species distribution and population size for SGCN and associated species.	Olive-sided Flycatcher

Target: Subalpine–High Montane Conifer Forest

At the higher elevations within the Coeur d'Alene, St. Joe, North Bitterroot, and North Clearwater mountains, the Subalpine–High Montane Conifer Forest is the prevalent habitat group and can be found at elevations between 900 and 2,373 m (2,953 to 7,785 ft). Engelmann spruce, lodgepole pine, and subalpine fir typically dominate the overstory. Mountain hemlock (*Tsuga mertensiana* [Bong.] Carrière) is often a coclimax species in this habitat group; however, like subalpine larch (*Larix lyallii* Parl.), it has a limited distribution in the St. Joe, North Bitterroot, and North Clearwater mountains (Smith and Fischer 1997). Douglas-fir, western larch, and western white pine (*Pinus monticola* Douglas ex D. Don) are found at the lower elevations on warmer sites. Thinleaf huckleberry (*Vaccinium membranaceum* Douglas ex Torr.) and grouse whortleberry (*Vaccinium scoparium* Leiberg ex Coville) are common species in the understory and provide important wildlife forage (Smith and Fischer 1997). Whitebark pine replaces lodgepole pine in higher elevations and becomes dominant as the elevation and climate severity increases. At timberline, the transition zone between continuous forest and the limited alpine, only Engelmann spruce, subalpine fir, subalpine larch, and whitebark pine persist. The timberline zone is impacted by drying winds, heavy snow accumulation, and subsurface rockiness that lead to stunted growth and a clustered distribution (Cooper et al. 1991, Smith and Fischer 1997). At timberline, whitebark pine is commonly the species that colonizes sites and provides habitat for less hardy species. Whitebark pine also provides food resources for numerous wildlife species such as Clark's Nutcracker and other small mammals and birds in the form of large high caloric-value seeds (Fryer 2002). It is a long-lived and slow-growing species that is often overtopped by faster-growing, shade-tolerant species such as subalpine fir and Engelmann spruce. Fire and other disturbances such as ice, windthrow, rockslides, and landslides help to maintain whitebark pine as the climax species within the upper elevations of the subalpine. However, fire suppression, invasion of white pine blister rust, and Mountain Pine Beetle have all contributed to the recent precipitous declines of whitebark pine across its range (Smith and Fischer 1997, Fryer 2002).

Target Viability

Poor to Fair. Stands are subject to altered fire regimes, forest insects, disease, and climate change. There has been a reduction in whitebark pine woodlands.

Prioritized Threats and Strategies for Subalpine–High Montane Conifer Forest

Very High rated threats to Subalpine–High Montane Conifer Forest

Altered fire regimes (fire suppression & stand-replacing wildfires)

Historically, mixed-severity fires burned at intervals between 60 and 300 years and nonlethal burns in the understory of whitebark pine stands at an average interval of 56 years (Smith and Fischer 1997). However, tree regeneration in the upper elevation is dependent on soil moisture, temperature, and whitebark pine seed cache and may be slow in some areas. The lack of whitebark pine regeneration after fire is thought to be due to a lack of seed cache after mature trees were killed by Mountain Pine Beetle or infected with blister rust (Smith and Fischer 1997). As with the other habitat types, decades of fire suppression activities, aided by a cool period in the Pacific decadal oscillation, were effective in preventing most moderate-severity fires that enabled shade-intolerant species and heavy fuel loads to build (USFS 2013*a*). This also resulted in the encroachment of shade-tolerant species and a decrease in fire-tolerant species, alongside increases in vertical stand structure, canopy closure, vertical fuel ladders, fire intensity and severity, and insect and disease epidemics (Keane et al. 2002). Fire management activities over the past 15 years have attempted to simulate and reestablish the vegetative composition of regular fire patterns, but have been hampered by policy that does not allow natural fires to burn.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USFS 2013*b* [monitoring and evaluation program]).	Use prescribed and natural fires to maintain desired conditions (USFS et al. 2015).	Reduce fuels through mechanical removal or controlled burns while minimizing impacts to subalpine soils. Leave fire-killed trees standing as wildlife habitat if they pose no safety hazard (USFS 2015). Remove perceived barriers to allow more prescribed natural fire on state and private forest lands. Promote/facilitate the use of prescribed fire as a habitat restoration tool, on both public and private lands where appropriate.	Clark's Nutcracker Wolverine Mountain Goat Hoary Marmot
Simulate natural fire regimes.	Design and implement silvicultural prescriptions that simulate natural disturbance regimes.	Actively remove shade-tolerant species where impacts to fragile subalpine soils can be minimized.	Clark's Nutcracker Wolverine Mountain Goat Hoary Marmot

Objective	Strategy	Action(s)	Target SGCNs
Assess species response to changes in fire regimes.	Monitor species occurrence prior to and after fire events.	Incorporate species into multitaxa monitoring program.	Clark's Nutcracker Wolverine Mountain Goat Hoary Marmot

High rated threats to Subalpine–High Montane Conifer Forest in the Bitterroot Mountains

Climate change

Global climate change is expected to have widespread effects on temperature and precipitation regimes worldwide and mean annual global air temperatures are predicted to rise within the 2 to 4.5 °C range by the end of the century (Meehl et al. 2007). Conditions in the Pacific Northwest are expected to trend toward hotter drier summers and warmer wetter winters (Karl et al. 2009). Snowpack depth and duration are predicted to decrease, reducing summer soil moisture, impacting species dependent on mesic conditions. Climate change is expected to further alter fire extent and severity while allowing for larger-scale and more persistent Mountain Pine Beetle infestations. As a result, whitebark pine is expected to decrease in extent.

Delineating temperature refugia for cool water or air temperature dependent species is a relatively new idea (Isaak et al. 2015). Recent microclimate monitoring work in the Idaho Panhandle identified a portion of the St. Joe Mountains to have a cooler than average mean annual air temperature. In addition, the Coeur d'Alene Mountains tend to have warmer mean annual air temperatures than other mountain ranges in the Panhandle. Monitoring both the organisms that inhabit these mountains along with abiotic climate measurements will be an important component of adaptively managing wildlife in a changing climate (Lucid et al. 2016).

Objective	Strategy	Action(s)	Target SGCNs
Improve knowledge of species distribution.	Monitor climate variables and species co-occurrence over time.	Develop climate monitoring program using a variety of microclimate variables along with co-occurrence of associated SGCN.	Western Toad Clark's Nutcracker Wolverine Mountain Goat Hoary Marmot Pale Jumping-slug Magnum Mantleslug
Implement other state management plans.	Implement Management Plan for the Conservation of Wolverines in Idaho 2014–2019 (IDFG 2014).	Implement specific actions outlined in climate section of Management Plan for the Conservation of Wolverines in Idaho 2014–2019 (IDFG 2014).	Wolverine

Forest insect pests & disease

When at endemic population levels, native forest insects and disease play a critical role in maintaining the health of the forest ecosystem by removing individuals or small groups weakened by drought, injury, or fire (USFS 2010). However, when large stands of trees are stressed by prolonged drought and/or dense stocking, outbreaks of forest insects and disease can impact tree growth, forest composition and cause extensive tree mortality (USFS 2010).

Severe outbreaks of forest insects and pathogens can even cause the conversion of forest to shrublands or grasslands. The impact on forest composition from large-scale outbreaks is predicted to increase as climate change decreases precipitation and increases temperatures (USFS 2010). The introduction of the nonnative white pine blister rust has reduced whitebark pine by nearly a quarter to a half in subalpine ecosystems in northern Idaho and Montana (USFS 2010) by reducing the ability of the species to produce cones. In the Selkirk Mountains, an average of 70% of live whitebark pine is already infected by blister rust (Kegley and Gibson 2004). In addition, Mountain Pine Beetle often kills whitebark pines that are rust resistant (Schwandt 2006). As a keystone species within subalpine ecosystems, the loss of whitebark pine is predicted to negatively impact forest composition, wildlife communities, soil structure, and alpine hydrology (Schwandt 2006).

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk of stand-replacing pine beetle infestations.	Use integrative pest management strategies. Increase diversity of stand ages, size classes, and tree species (KPNZ Climate et al. 2010). Promote responsible firewood harvest/transport.	Use pheromones to protect stands (beetle whispering) (Kegley and Gibson 2004). Remove debris that attracts pine beetles.	Clark's Nutcracker
Increase number of rust-resistant whitebark pine in the ecosystem (USFS 2013*a*).	Continue to develop genetics of disease-resistant trees for restoration efforts.	Monitor rust and beetle levels in live whitebark pine. Collect rust-resistant seed for testing and restoration (Schwandt 2006). Plant rust-resistant whitebark pine. Monitor and remove any signs of the rust on planted trees (USFS 2013*a*).	Clark's Nutcracker

Target: Riverine–Riparian Forest & Shrubland

In the Bitterroot Mountains, the riverine ecosystem includes all rivers, streams, and smaller order waterways (1st through 3rd-order; Strahler stream order) and their associated floodplain and riparian vegetation. Major rivers (those designated as 4th+ order in Strahler stream order) in the Bitterroot Mountains include the Coeur d'Alene, Spokane, St. Joe, St. Maries, and North Fork Clearwater rivers. These low elevation riverine floodplains support riparian forests dominated by red alder, black cottonwood (*Populus balsamifera* L. subsp. *trichocarpa* [Torr. & A. Gray ex Hook.] Brayshaw), and western redcedar, as well as diverse shrublands characterized by thinleaf alder (*Alnus incana* [L.] Moench subsp. tenuifolia [Nutt.] Breitung), mallow ninebark (*Physocarpus malvaceus* [Greene] Kuntze), rose spirea (*Spiraea douglasii* Hook.), redosier dogwood (*Cornus sericea* L.), willow (*Salix* L.), and other shrubs. Other rivers and streams in the region support numerous fisheries and provide host habitat for several mussel species. High-velocity mountain streams provide important nesting habitat for Harlequin Duck (*Histrionicus histrionicus*) and a diversity of aquatic invertebrates. Montane streams are typically lined by alder (*Alnus* Mill.), willow, or an array of other shrubs such as alderleaf buckthorn (*Rhamnus alnifolia* L'Hér.) with a diverse and lush herbaceous understory. The cold to very cold waters found in subalpine headwater systems support a diversity of stenographic invertebrates, particularly within the Northern Rocky Mountain Refugium. Engelmann spruce and subalpine fir commonly shade and provide large woody debris to these streams. In the Bitterroot Mountains, numerous waterfalls have been documented for the region. Waterfalls support aquatic organisms uniquely adapted to extremely high water velocities and plants and animals that require cool, constantly moist rocky habitats. Waterfalls also provide important nesting habitat for Black Swift (*Cypseloides niger*). At least 2 nesting colonies are known from the Coeur d'Alene Mountains (Miller et al. 2013).

St. Joe River © John Neider

Target Viability

Fair. A long history of mining, timber harvest, livestock grazing, and flood control has impacted many floodplains of major rivers and their low elevation tributaries. Higher-elevation streams are likely to be impacted by changes to the hydrologic regime resulting from climatic warming.

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

High rated threats to Riverine–Riparian Forest & Shrubland in the Bitterroot Mountains

Pollution from mining

Heavy metal pollution, stream channelization, flood control, sedimentation, and migration barriers related to the extensive mining history have had severe impacts on fish, waterfowl, landbirds, amphibians, and aquatic invertebrates (Blus et al. 1995, Lybarger 2014, Maret and MacCoy 2002, Maret et al. 2003). In 1986, the US Environmental Protection Agency (EPA) listed the Bunker Hill Mining and Metallurgical Site in the Coeur d'Alene Basin on the National Priorities List. Remediation work began in 1989 to clean up contaminated sites particularly within inhabited locations. In 2002, a Record of Decision expanded remediation activities to areas outside of the Bunker Hill site. As sites are cleaned of contamination, restoration efforts have begun to restore the natural functioning ecosystem. Although restoration work has been completed in several areas since 2007, the final planning framework for the restoration of the Coeur d'Alene Basin is still in the approval process.

Objective	Strategy	Action(s)	Target SGCNs
Maintain (or provide) soil, sediment, and water quality capable of supporting a functional ecosystem for the aquatic and terrestrial plant and animal populations in the Coeur d'Alene Basin.	Restore river systems.	Implement the objectives, strategies, and actions outlined in the EPA's Bunker Hill and Metallurgical Site Record of Decision. Implement the objectives, strategies, and actions outlined in the Final Restoration Plan when approved.	Western Pearlshell

Aquatic invasive invertebrate & plant species

Aquatic invasive species are often the most difficult to detect and eradicate. Across the nation, Zebra Mussel (*Dreissena polymorpha*) and Quagga Mussel (*Dreissena bugensis*) have disrupted food chains, competed with native species, and cost millions of dollars of damage to municipalities by choking water intake pipes and other facilities (Pimental et al. 2004). Although neither Zebra nor Quagga Mussel have been detected in the waterbodies of the Bitterroot Mountains, several Watercraft Inspection Stations in the region have found the mussels on boats traveling through the area (State of Idaho Agriculture, accessed on Nov 2, 2015). It is a goal of the state that neither mussel is ever established in any of the Idaho waterways. Eurasian watermilfoil (*Myriophyllum spicatum* L.) has been detected and established in the Coeur d'Alene and St. Joe rivers (T. Woolf, pers. comm.). This species easily spreads through the movement of boats between the recreational lakes, rivers, and streams in the region. For most of the aquatic invasive species, only a fragment of the vegetated matter is necessary to establish the species in a new area. Aquatic invasive plant species, particularly Eurasian watermilfoil, often form dense mats that prevent the establishment of native aquatic plant species and degrade wildlife and fish habitat (ID Invasive Species Counsel and ID State Dept. of Agriculture 2007).

Objective	Strategy	Action(s)	Target SGCNs
Prevent the establishment of aquatic invasive species in riverine systems.	Increase monitoring of riverine systems. Identify and treat dispersal vectors.	Determine which riverine systems are not impacted by aquatic invasive species. Establish a monitoring schedule to visit noninvaded but high-risk riverine systems. Educate the public about the dangers associated with spreading an aquatic invasive species (ID Invasive Species Counsel and ISDA 2007). Maintain Watercraft Inspection Stations to regularly inspect for aquatic invasive species and treat when detected.	
Contain and eradicate populations of Eurasian watermilfoil.	Implement actions indicated in the ISDA's 2008 Statewide Strategic Plan for Eurasian watermilfoil in Idaho.	Survey invaded waters to determine extent of nonnative aquatic species distribution. Develop treatment priorities based on waterbody use. Develop strategies for eradication based on waterbody hydrology and use. Regularly monitor and retreat areas after initial treatment (ID Invasive Species Counsel and ISDA 2007).	Western Pearlshell
Monitor threat.	Monitor changes in range and distribution of noxious weeds.	Incorporate noxious weeds into a multitaxa monitoring program.	Western Pearlshell

Species designation, planning & monitoring

In addition to conservation actions to address specific threats, several SGCN associated with Riverine–Riparian Forest & Shrubland require inventory and monitoring to assess their current status and distribution in the Bitterroot Mountains.

Harlequin Duck

In Idaho, the Harlequin Duck is uncommon and occupies high-quality streams from the Canadian border south to the Selway River and in the Greater Yellowstone Ecosystem. Breeding streams are relatively undisturbed with high-elevation gradients; cold, clear, and swift water; rocky substrates; and forested bank vegetation. Harlequin Duck uses different stream reaches over the course of the breeding season, depending on environmental conditions (e.g., timing and magnitude of stream runoff, food abundance) and reproductive chronology (i.e., prenesting, nesting, early and late brood-rearing), but remains closely tied to rivers and streams for food, security, and escape cover from predators. An estimated 50 pairs of Harlequin Duck breed in Idaho (IDFG unpublished data). From 1996 to 2007, no statistically significant change in the statewide population could be detected. However, possible declines exist on several rivers including the Moyie River, Granite Creek (Lake Pend Oreille drainage), and St. Joe River. The distribution and abundance of Harlequin Duck has not been assessed since 2007.

Objective	Strategy	Action(s)	Target SGCNs
Improve understanding of Harlequin Duck distribution, abundance, and population status.	Design studies that improve understanding of the factors that influence Harlequin Duck stream occupancy, survival, and reproduction.	Mark and track individuals on the breeding grounds to better understand habitat use, survival rates, causes and timing of mortality, patterns and timing of movements, linkages between breeding, molting, and wintering areas, and return rates. Seek partnerships with coastal states and provinces to study wintering ecology and habitat use. Investigate how human disturbance, changes in forest management, and stream flow characteristics (severity, timing, and frequency of peak and low stream flows) affect behavior, occupancy, reproductive success, and survival on breeding streams.	Harlequin Duck
Establish baseline population metrics for Harlequin Duck.	Implement a coordinated Harlequin Duck monitoring program.	Develop partnerships, funding, and capacity to conduct breeding surveys statewide on a regular basis following the protocol established in the Harlequin Duck Conservation Assessment and Strategy for the US Rocky Mountains (Cassirer et al. 1996) or other appropriate techniques. Where local declines are documented, expand surveys upstream of historically occupied stream reaches. Coordinate surveys with MT, WY, OR, BC, and AB to facilitate a northwest regional population assessment. Incorporate Harlequin Duck surveys into riverine multitaxa monitoring programs.	Harlequin Duck

Black Swift

Little is known about breeding Black Swift in Idaho. Black Swifts are not generally detected during breeding bird surveys. In addition, their cryptic nesting sites and small colony sizes present obstacles to determining distribution or abundance in the state. In 2013, a survey of breeding locations for Black Swift found evidence of nesting at 5 of 16 waterfalls visited and roosting swifts at 2 of the waterfalls (Miller et al. 2013).

Objective	Strategy	Action(s)	Target SGCNs
Determine current breeding locations of Black Swift.	Conduct a comprehensive survey of potential nesting locations.	Work with partners, including Intermountain Bird Observatory, to develop and implement a systematic survey. Incorporate surveys into multitaxa monitoring programs.	Black Swift

Aquatic Invertebrates

Basic knowledge of ecological requirements, habitat needs, systematics, and distribution is lacking for most aquatic invertebrates. Understanding distribution and habitat requirements for these species is critical for management and conservation, since most aquatic invertebrates have specific habitat requirements that generally do not overlap with aquatic vertebrates (Stagliano and Maxell 2010). Surveys in the Bitterroot Mountains, specifically within the Northern Rocky Mountain Refugium, identified a hot spot of invertebrate endemism, particularly within the cold headwaters (Stagliano and Maxell 2010). However, regardless of location, little is known about most aquatic invertebrates within this section.

Objective	Strategy	Action(s)	Target SGCNs
Determine distribution and habitat requirements of aquatic invertebrates.	Conduct surveys to determine distribution and trends. Investigate associations between species and abiotic factors.	Conduct surveys to determine distribution and trends. Collect voucher specimens to confirm identification and taxonomic status. Develop monitoring program to determine future changes in population size and species distribution. Design studies to determine microclimate requirements. Implement programs to monitor stream temperature and species occurrence.	Western Pearlshell Rotund Physa Rocky Mountain Duskysnail A Click Beetle (*Beckerus barri*) A Riffle Beetle (*Bryelmis idahoensis*) A Mayfly (*Ameletus tolae*) Lolo Mayfly A Mayfly (*Ephemerella alleni*) A Mayfly (*Paraleptophlebia falcula*) A Mayfly (*Parameletus columbiae*) Straight Snowfly Idaho Snowfly Palouse Snowfly Clearwater Roachfly Umatilla Willowfly A Caddisfly (*Manophylax annulatus*) A Caddisfly (*Eocosmoecus schmidi*) A Caddisfly (*Philocasca antennata*) A Caddisfly (*Philocasca banksi*) A Caddisfly (*Homophylax acutus*) A Caddisfly (*Rhyacophila oreia*) A Caddisfly (*Rhyacophila robusta*) A Caddisfly (*Goereilla baumanni*) A Caddisfly (*Sericostriata surdickae*)
Determine SGCN species status.	Conduct surveys and implement long-term aquatic invertebrate species monitoring program.	Develop program to monitor trends in species distribution and population size.	Western Pearlshell

Restoration tool: American Beaver

American Beaver populations currently exist at lower than historic levels across the western United States. This results in a host of ecological consequences, primarily located in lower-order stream systems such as stream downcutting, reduced riparian extent, and desiccation of riparian and wetland habitat. American Beaver restoration efforts have been shown to be an effective tool to restoring habitat and ecological function to riverine systems.

Objective	Strategy	Action(s)	Target SGCNs
Restore hydrologic function and restore riparian habitats.	Use American Beaver to accomplish hydrologic and habitat restoration.	Determine past and current status of American Beaver populations. Determine feasibility of using American Beaver in restoration efforts. Implement actions delineated by above analysis.	Western Pearlshell A Mayfly (*Ephemerella alleni*)

Target: Depressional Wetlands

Depressional Wetlands are any wetlands found in a topographic depression. Depressional Wetlands include vernal pools, old oxbows, disconnected river meanders, and constructed wetlands. In the Bitterroot Mountains, this includes many of the wetlands found within the Coeur d'Alene Wildlife Management Area (WMA) and within the floodplains of the Coeur d'Alene, St. Joe, St. Maries, and North Fork Clearwater rivers. Other Depressional Wetlands are found within the mountain ranges wherever the topography closes and surface waters accumulate (e.g., glacial carved kettles). Small depressional ponds (<2 m deep) commonly occur within the mountain ranges and provide breeding habitat for Western Toad (*Anaxyrus boreas*). Low-elevation Depressional Wetlands in the Bitterroot Mountains often support productive and diverse emergent marshes characterized by broadleaf cattail (*Typha latifolia* L.), hardstem bulrush (*Schoenoplectus acutus* [Muhl. ex Bigelow] Á. Löve & D. Löve var. *acutus*), woolgrass (*Scirpus cyperinus* [L.] Kunth), water plantain (*Alisma* L.), arrowhead (*Sagittaria* L.), bur-reed (*Sparganium* L.), water horsetail (*Equisetum fluviatile* L.), blister sedge (*Carex vesicaria* L.), and other species. Shrub swamps are also common, dominated by rose spirea, thinleaf alder, and other shrubs. In the valley bottoms, common reed (*Phragmites australis* [Cav.] Trin. ex Steud.) and reed canarygrass (*Phalaris arundinacea* L.) often form impenetrable monocultures that limit species diversity within the wetlands (K. Cousins, IDFG, pers. comm.). Amphibians, waterbirds, marshbirds, and waterfowl all use Depressional Wetlands for breeding and foraging habitats.

Depressional Wetlands

Target Viability

Fair. Lower elevations experiencing altered hydrologic regimes and invasive species/disease. Mining-related pollution also has a negative impact on wetland ecosystem health. Higher elevations threatened by climate change.

Prioritized Threats and Strategies for Depressional Wetlands

Very High rated threats to Depressional Wetlands in the Bitterroot Mountains

Invasive & noxious weeds

Invasive species often prevent the establishment of native species by forming dense monocultures and in some instances even change the soil chemistry or hydrology of the invaded area (Ricciardi et al. 2013). Common reed and reed canarygrass are native species in the lower 48 states, but aggressive nonnative strains introduced into Bitterroot Mountain wetlands are considered highly invasive. Reed canarygrass forms dense monocultures that decrease plant diversity and degrade wildlife habitat. Surveys done in the Bitterroot Mountains found 25 of the ponds, small lakes, and emergent wetlands (*n* = 183) surveyed had spotted knapweed or common tansy present (Lucid et al. 2016).

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013*a*).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use GPS, remote sensing, and GIS technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Western Toad American Bittern Black Tern
Contain and reduce widespread weeds in areas that are already infested (USFS 2013*a*).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Identify and treat dispersal vectors to prevent further spread of invasive and noxious weeds. Restore treated areas with native species.	Continue annual noxious weed control program and coordinate weed management activities with Kootenai County and the Inland Empire Cooperative Weed Management Area. Treat weeds in high impact areas and along roads (USFS 2013*a*). Treat equipment used during timber harvest or fire suppression activities to be “weed-free” (USFS 2013a, IDL 2015). Revegetate treatment areas with native species and monitor restoration (KTOI 2009). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Western Toad American Bittern Black Tern

High rated threats to Depressional Wetlands in the Bitterroot Mountains

Climate change

In the Pacific Northwest, climate change is expected to trend toward hotter, drier summers and warmer, slightly wetter winters (Karl et al. 2009). This scenario may result in snowpacks that are shallower and earlier melting. Although Depressional Wetlands may fill with water, it may occur earlier in the year. Less snowpack may mean less surface and groundwater being available to sustain wetland hydrology later in summer, resulting in more Depressional Wetlands drying out earlier in summer. How this will affect SGCN dependent on Depressional Wetlands is not known. More information is needed to make appropriate wetland management decisions needed to sustain wetland functions with a changing climate.

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring.	Monitor climate variables and species co-occurrence over time.	Develop climate monitoring program using a variety of microclimate variables along with co-occurrence of associated SGCN.	Western Toad American Bittern Black Tern

Species designation, planning & monitoring

Multiple species identified as SGCN that are dependent on Depressional Wetlands are declining as a result of unknown causes. The priority for many of these species in the coming years is to identify the root causes and develop a strategy for addressing them. For Black Tern, there may be many additional nesting sites in Idaho yet to be discovered. This should be a high priority in the next 10 years so that we have a better sense of our baseline breeding population.

Objective	Strategy	Action(s)	Target SGCNs
Determine reasons for decline in Western Toad population.	Conduct studies.	Conduct literature and discuss issue with experts. Implement measures to restore viable Western Toad populations.	Western Toad
Determine current distribution and abundance of American Bittern.	Participate in coordinated monitoring. Identify hot spots for conservation.	Conduct repeat surveys of effort initiated in early 2000s to determine where species distribution and density have changed.	American Bittern
Determine statewide breeding population of Black Tern.	Identify habitat requirements of breeding Black Tern.	Conduct repeat surveys of targeted habitat for Black Tern nesting.	Black Tern

Target: Springs & Groundwater-Dependent Wetlands

In the Bitterroot Mountains, Springs & Groundwater-Dependent Wetlands are numerous and often occur on sloping land with gradients ranging from steep hillsides to nearly imperceptible. Slope wetlands differ from Depressional Wetlands by the lack of closed contours. The mountainous region contains numerous wet–mesic meadows, fens, and seep-fed shrub or tree dominated wetlands. Wet meadows occur in alluvial valleys with high water tables and are typically dominated by sedge (*Carex* L.), tufted hairgrass (*Deschampsia cespitosa* [L.] P. Beauv.), and a variety of wildflowers. Fens are wetlands that have over 30 cm of peat accumulation, forming in cold and saturated sites. They also form as floating mats around ponds and lakes. Various sedges and sphagnum (*Sphagnum* L.) typify the vegetation in the Bitterroot Mountains. Coldwater springs are prevalent in the Bitterroot Mountains section, particularly in the subalpine headwaters of the North Fork Clearwater River, St. Joe River, and Coeur d'Alene River basins. As with fens, they often provide a coldwater refugium for invertebrate and vertebrate species (Issak et al. 2015).

Target Viability

Fair. Altered hydrologic regimes and invasive species/disease are problems at lower elevation springs and meadow wetlands. Higher elevation wetlands (especially fens) are threatened by climate change.

Prioritized Threats and Strategies for Springs & Groundwater-Dependent Wetlands

Very High rated threats to Springs & Groundwater-Dependent Wetlands in the Bitterroot Mountains

Invasive & noxious weeds

Invasive species often prevent the establishment of native species by forming dense monocultures and in some instances even change the soil chemistry or hydrology of the invaded area (Ricciardi et al. 2013). Reed canarygrass or other grass species introduced into meadows as forage for livestock can form dense monocultures that decrease plant diversity and degrade wildlife habitat.

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USFS 2013*a*).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use GPS, remote sensing, and GIS technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Western Toad

Objective	Strategy	Action(s)	Target SGCNs
Contain and reduce widespread weeds in areas that are already infested (USFS 2013*a*).	Coordinate invasive and noxious weed monitoring and treatment across agencies. Identify and treat dispersal vectors to prevent further spread of invasive and noxious weeds. Restore treated areas with native species.	Continue annual noxious weed control program and coordinate weed management activities with Kootenai County and the Inland Empire Cooperative Weed Management Area. Treat weeds in high impact areas and along roads (USFS 2013*a*). Revegetate treatment areas with native species and monitor restoration (KTOI 2009). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012). Incorporate noxious weeds into a multitaxa monitoring program.	Western Toad

High rated threats to Springs & Groundwater-Dependent Wetlands in the Bitterroot Mountains

Climate change

In the Pacific Northwest, climate change is expected to trend toward hotter, drier summers and warmer, slightly wetter winters (Karl et al. 2009). This scenario may result in snowpacks that are shallower and earlier melting. Less snowpack may mean less groundwater being available to sustain hydrology later in summer, resulting in reduced wetland extent and conversion to drought-tolerant meadow communities. These changes will likely increase the temperature and evaporative rates in peatlands (e.g., cool microsite refugia), potentially reducing the value of these wetlands for species sensitive to warmer temperatures. Management that promotes retention of water in wetlands (e.g., American Beaver reintroduction) may be needed to mitigate hydrologic changes. How climate change will affect SGCN found in groundwater-dependent wetlands is uncertain. Although sometimes available, empirical data to evaluate even the basic climatic requirements for many species is generally lacking (Mawdsley 2009).

Delineating temperature refugia for cool water or air temperature dependent species is a relatively new idea (Isaak et al. 2015). Recent microclimate monitoring work in the Idaho Panhandle identified a portion of the St. Joe Mountains to have a cooler than average mean annual air temperature. In addition, the Coeur d'Alene Mountains tend to have warmer mean annual air temperatures than other mountain ranges in the Panhandle. Monitoring both the organisms that inhabit these mountains along with abiotic climate measurements will provide bedrock information for research to determine best management practices for cool air associated species.

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring.	Monitor climate variables and species co-occurrence over time.	Develop climate monitoring program using a variety of microclimate variables along with co-occurrence of associated SGCN.	Western Toad

Species designation, planning & monitoring

Basic knowledge of ecological requirements, habitat needs, systematics, and distribution is lacking for most aquatic and semiaquatic invertebrates within the Springs & Groundwater-Dependent Wetlands target. For example, the semiaquatic endemic click beetle (*Beckerus barri*) is known from only 2 locations and thought to be associated with groundwater-associated marshes. Understanding distribution and habitat requirements is critical for management and conservation since most aquatic invertebrates have specific habitat requirements that generally do not overlap with aquatic vertebrates (Stagliano and Maxell 2010).

Objective	Strategy	Action(s)	Target SGCNs
Determine distribution and habitat requirements.	Conduct surveys to determine distribution and trends.	Conduct surveys to determine distribution and trends. Collect voucher specimens to confirm identification and taxonomic status. Develop monitoring program to determine future changes in population size and species distribution.	Rocky Mountain Duskysnail Pristine Pyrg A Click Beetle (*Beckerus barri*) Cascades Needlefly Idaho Forestfly Clearwater Roachfly

Target: Pond-Breeding Amphibians

Amphibians represent a highly vulnerable taxonomic group that globally hosts more species in decline than birds or mammals (Stuart et al. 2004). Amphibian populations have been declining worldwide for decades (Houlahan 2000) and sometimes decline rapidly in seemingly pristine environments (Stuart et al. 2004). Amphibians are susceptible to pathogens, climate change, environmental pollution, ultraviolet-B exposure, and invasive species (Bridges and Semlitsch 2000, Cushman 2006, Kiesecker et al. 2001, Stuart et al. 2004); they also tend to have relatively low vagilities (Bowne and Bowers 2004, Cushman 2006) and often have narrow habitat requirements (Cushman 2006). Western Toad has experienced rangewide declines in western North America. A recent baseline survey effort in the Bitterroot Mountains Section detected this species at only 1 of 183 survey sites (Lucid et al. 2016); although trend cannot be inferred from this survey, the results nevertheless emphasize the need to conduct work to address this apparent population decline.

Target Viability

Poor. Amphibians represent a highly vulnerable taxonomic group. Western Toad is already facing rangewide declines and few were detected in the section. Western Toad faces invasive species/disease threats.

Prioritized Threats and Strategies for Pond-Breeding Amphibians

High rated threats to Pond-Breeding Amphibians in the Bitterroot Mountains

Amphibian chytridiomycosis & other disease

Recent surveys for amphibian chytridiomycosis, a disease caused by a fungal pathogen *Batrachochytrium dendrobatidis* [*Bd*], on Columbia Spotted Frog (*Rana luteiventris*) across the Bitterroot Mountains indicated the fungus is widespread, occurring at approximately 82% of surveyed sites. *Bd* was found more commonly at low and high elevation sites than mid-elevation sites. *Bd* is a known threat to Western Toad and has been documented to cause near total egg hatching failure of a Western Toad population in the Pacific Northwest (Blaustein et al. 1994). Further research is needed to assess the threat of *Bd* to Western Toad. Local die-offs of Western Toad and other herptiles have been recorded in recent years. These die-offs may be disease related and those sites should be investigated and monitored.

Objective	Strategy	Action(s)	Target SGCNs
Determine level of disease threat to Western Toad.	Determine status of *Bd* in Western Toad.	Visit known Western Toad sites and swab toads for *Bd*.	Western Toad
	Examine relationship of species occurrence, microclimate, and disease.	Collect microclimate variables at Western Toad sites and examine presence of *Bd* and other potential diseases.	
	Monitor amphibian disease.	Develop a monitoring program that encompasses monitoring *Bd* presence, *Bd* levels, and other potential amphibian disease.	

Species designation, planning & monitoring

The Western Toad is declining as a result of unknown causes. Priorities in the coming years are to identify and address the root causes.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of decline in Western Toad.	Determine relative importance of known and suspected threats to Western Toad, its prey, and its habitats.	Promote cooperation and collaboration with established wildlife diversity working groups to fill knowledge gaps and to mitigate threats.	Western Toad Northern Leopard Frog
	Investigate factors affecting reproductive output, survival, and fidelity to breeding sites.	Develop monitoring plan for Western Toad and other amphibians to determine distribution and population trends.	

Target: Lake-Nesting Birds

Western Grebe (*Aechmophorus occidentalis*) is a lake-nesting species that is found primarily on the lakes in the Coeur d'Alene WMA. Western Grebes build floating nests that are often hidden among emergent vegetation but are sometimes in the open. They are often found in colonies that can number into the hundreds or thousands. In the Coeur d'Alene WMA, a nesting colony of Western Grebe has been regularly documented on Cave Lake with nest numbers ranging from 20 to 80 nests per year. Lake-Nesting Birds are often impacted by recreational boat traffic and invasive and noxious weeds.

Target Viability

Good. The Cave Lake colony has consistently numbered between 20 and 80 nests. Occasionally, contains nesting Clark's Grebe (*Aechmophorus clarkii*).

High rated threats to Lake-Nesting Birds in the Bitterroot Mountains

Water level fluctuations in lakes

Fluctuating water levels are a significant issue for several waterbird species, including Western Grebe and Clark's Grebe. Most grebe colonies are located on lakes, reservoirs, or along rivers susceptible to water fluctuations resulting from dam operations. Rapid increase in water levels results in nest flooding, while rapid releases of water results in nests that are no longer accessible to grebes. In addition, recreational boat traffic near nests can inadvertently flood nests and cause a disruption of incubation behavior.

Objective	Strategy	Action(s)	Target SGCNs
Reduce grebe nest failure.	Work with US Army Corps of Engineers (USACE) and dam operators to reduce water level fluctuations and boat wake during grebe nesting period. Educate public regarding presence and sensitivity of colonial nesting birds.	Create boating no-wake zones around nesting colonies, and monitor their effectiveness. Develop Best Management Practices with USACE for water level management around grebe colonies. Create signage at boat launches informing the public of colony presence and recommendations for reducing recreational impacts.	Western Grebe

Species designation, planning & monitoring

Western Grebe is declining as a result of unknown causes. The priority for this species in the coming years is to identify and address the root causes.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of low nesting success and recruitment of Western Grebe in Idaho.	Conduct research on existing colonies in Idaho.	Collaborate with FWS on proposed research project.	Western Grebe

Target: Bat Assemblage

In the Bitterroot Mountains, 11 bat species are regularly documented on the landscape, including Townsend's Big-eared Bat (*Corynorhinus townsendii*), Silver-haired Bat (*Lasionycteris noctivagans*), Hoary Bat (*Lasiurus cinereus*), and Little Brown Myotis (*Myotis lucifugus*). Bats provide important ecological services through the regulation of forest and agricultural pests and nutrient cycling (USFS 2013*a*). However, little is known about population status and trends, migration routes, and hibernacula. In the Bitterroot Mountains, most bats are found foraging and roosting in most habitat types ranging from early-seral forest or clearcuts to mature- to late-successional forests (Hendricks and Maxwell 2005). Bats commonly forage along forest margins, above forest canopy, over water, and near the ground, generally preferring open stands or meadows to dense forests (Christy and West 1993). Bats roost in a variety of structures based on daily and seasonal needs ranging from trees and tree hollows to caves, mines, and anthropogenic structures (Hayes and Wiles 2013). All species are impacted by habitat loss and human disturbance at roost sites. The confirmation of white-nose syndrome (WNS) in Washington state in March 2016 elevates concern for the potential implications to Idaho's bat populations from WNS. Conservation efforts should focus on WNS response and disease surveillance, mitigating existing threats, and developing a statewide WNS response plan.

Target Viability

Fair. Roost locations are impacted by human disturbance and Abandoned Mine Lands (AML) closures. Models suggest white-nose syndrome could spread to Idaho in the near future.

Prioritized Threats and Strategies for Bat Assemblage

High rated threats to Bat Assemblage in the Bitterroot Mountains

Abandoned Mine Lands (AML) closures

As traditional roosting locations such as large snags are lost or altered, abandoned mines have become important habitat for numerous bat species (Ducummon 2000). Townsend's Big-eared Bat and Little Brown Myotis in particular often rely on caves and mines for roost locations. In the Bitterroot Mountains, caves are infrequent on the landscape; however, the long history of mining has left numerous abandoned mines with greater than 500 shafts, adits, and trenches identified in the IPNF and surrounding areas. In the 1980s and 1990s, thousands of mines were closed because of concerns to human safety with little forethought on the impact to roosting bats (Pierson et al. 1999). Closure of abandoned mines typically includes fencing, gating, and internal blasting to preclude humans from entering. Use of bat-friendly gates would prevent human entry while also protecting bat roosts.

Objective	Strategy	Action(s)	Target SGCNs
Reduce human disturbance at mines, tunnels, and tubes.	Promote the use of bat-friendly mine closures.	Survey mines to determine bat use and install the appropriate closures.	Townsend's Big-eared Bat Little Brown Myotis

White-nose syndrome

White-nose syndrome (WNS) is a fungal epidemic that has impacted bat populations in eastern North America, with the disease confirmed in Washington state in March 2016 (White-nose Syndrome.org). Although the fungus responsible for the infection (*Pseudogymnoascus destructans*) has been confirmed as pathogenic, the pathway by which the fungus causes mortality in bats is not well understood (Knudsen et al. 2013). The fungal infection appears to affect hibernating bats by increasing mid-winter arousal, aberrant behavior, and loss of fat reserves (Knudsen et al. 2013). Mortality associated with WNS has led to the near regional extirpation of several bat species in the East (Knudsen et al 2013).

Objective	Strategy	Action(s)	Target SGCNs
Minimize the potential spread of white-nose syndrome to north Idaho.	Implement WNS protection measures proactively.	Require mandatory compliance to WNS decontamination standard operation procedures at mines, caves, or any other visited caverns. Work with USFS abandoned mine training program to ensure continued focus on education regarding WNS education and management. Participate in regional WNS monitoring efforts. Implement agency and public efforts to educate key individual in proper protocol when dead bats are detected.	Townsend's Big-eared Bat Silver-haired Bat Little Brown Myotis

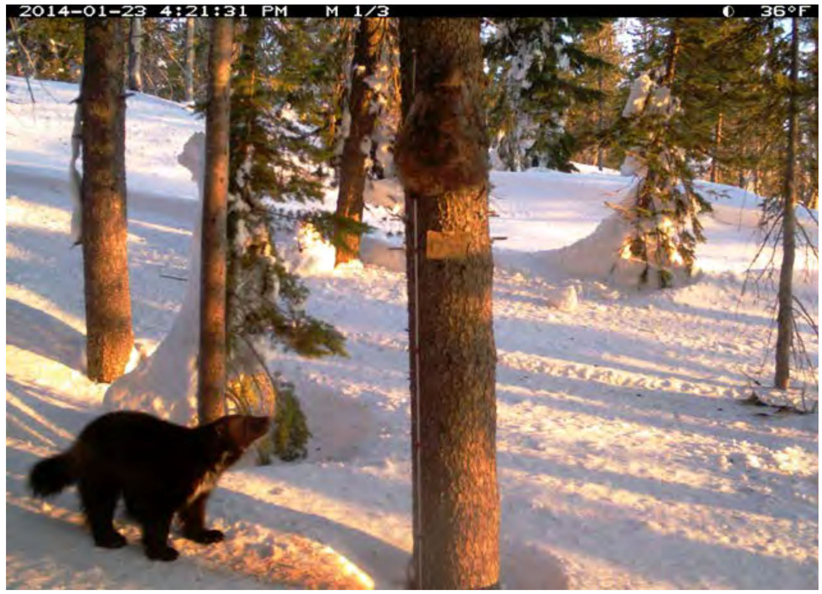
Species designation, planning & monitoring

Central to evaluating effectiveness of conservation actions will be programs to monitor changes in species distribution and abundance.

Objective	Strategy	Action(s)	Target SGCNs
Determine bat population status.	Conduct surveys and implement long-term bat monitoring program.	Implement the North American Bat Monitoring Program (NABat) (Loeb et al. 2015). Implement and incorporate bats into long-term multitaxa monitoring programs to monitor trends in species distribution and population size.	Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis

Target: Low-Density Forest Carnivores

Forest carnivores naturally occur at low densities and can be directly affected by human activities. This presents unique opportunities to directly affect positive conservation outcomes for these species. This group consists of mammals traditionally considered "furbearers" including American Marten (*Martes americana*), weasels (*Mustela* spp.), and American Mink (*Vison vison*). Wolverine and Fisher are the 2 forest carnivore SGCN that occur within the Bitterroot Mountains Section. Recent surveys detected 2 individual male Wolverines within this section (Lucid et al. 2016).



Wolverine, 2014 IDFG

Fisher has been documented to occur across a large swath of northern Idaho including the Bitterroot Mountains. Fisher is naturally found at low densities, with males and females maintaining intrasexually exclusive home ranges that average approximately 104 km² and 52 km² (40 mi² and 20 mi²), respectively. Throughout its range, Fisher is associated with forested habitats with high canopy closure, complex vertical and horizontal structure, plentiful snags, and an abundant prey base (Proulx et al. 2005). Conservation efforts in this section should focus on maintaining or improving ecosystem integrity conducive to increasing the number and distribution of individual Wolverine and Fisher.

Target Viability

Poor to *Fair.* Only a few individual Wolverines are known to occur in the Bitterroot Mountains Section. Currently, Fisher is known to be distributed from the Idaho–Canada border south at least 300 mi to the area around Cascade, ID. No formal estimate exists for the number of Fishers in Idaho. As Fisher is associated with mature forest characteristics, timber management and harvest activities may impact its abundance and distribution. Lastly, Fishers are incidentally captured and killed during recreational trapping for other species. Between 2000 and 2005, 3 Fishers were incidentally captured and submitted to the Department for a reward (trappers are required to report all nontarget captures such as Fisher; a $10 "reward" is offered for each report to encourage compliance with this regulation). Between 2010 and 2014, the most current data available, 54 were submitted for a reward (IDFG 2013, 2014). The causes and ramifications of this trend are poorly understood.

Prioritized Threats and Strategies for Low-Density Forest Carnivores

High rated threats to Low-Density Forest Carnivores in the Bitterroot Mountains

Timber management practices that remove overstory canopy from areas larger and more extensive than natural windthrow and fire

Even-aged timber management practices on moist productive sites (e.g., western redcedar, western hemlock, western white pine) on nonfederal industry and state-endowed lands that remove overstory canopy from areas larger and more extensive than natural windthrow and fire, and that result in inadequate amounts of late-seral forest retention results in degraded habitat quality for Fisher. For-profit timber companies do not manage for late-seral conditions except for Class 1 riparian areas, which represent about 5% of any forest type.

Objective	Strategy	Action(s)	Target SGCNs
Increase the amount of late-seral forested habitat with high canopy closure, complex vertical and horizontal structure, plentiful snags, and an abundant prey base.	Identify optimal Fisher habitat needs and travel connectivity corridors. Promote timber management practices that create small patch cuts interspersed with large, connected, uncut areas. Use conservation easements to improve habitats.	Provide travel corridors where too steep to harvest, i.e., Stream Protection Zones. Continue fine-scale habitat studies that will facilitate integration of Fisher habitat requirements into timber harvest plans. Promote participation by timber company landowners in certification programs that demonstrate 95% compliance. Regularly review minutes from Idaho Forest Practices Act Advisory Committee (FPAAC). Promote participation in landowner incentive programs, e.g., IDFG, NRCS, American Tree Farm program, Idaho Forest Group, and Idaho Forest Stewardship Program.	Fisher

Genetic isolation

Wolverine and Fisher were nearly or completely extirpated from the lower 48 states in the early 20th century. A variety of natural (Wolverine) and human-mitigated (Fisher) recolonization events have likely affected the genetic structure of the species' populations (Aubry et al. 2007, Vinkey et al. 2006). Populations of both species likely have low genetic diversity due to founder affects. Proper habitat management and gene flow mitigation may help to improve genetic isolation and increase species occurrence on the landscape.

Objective	Strategy	Action(s)	Target SGCNs
Assess and enhance gene flow.	Determine current levels of genetic isolation.	Conduct genetic analyses to determine currently population sizes and levels of gene flow. Maintain transboundary collaborations to assess and monitor Wolverine gene flow with Canadian populations.	Wolverine Fisher

Objective	Strategy	Action(s)	Target SGCNs
	Manage connectivity habitat and assess potential to enhance gene flow.	Implement actions outlined in the *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014).	

Winter recreation

The *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014) outlines specific actions to minimize potential disturbance of Wolverine by oversnow recreation and ski area infrastructure.

Objective	Strategy	Action(s)	Target SGCNs
Manage winter recreation to minimize disturbance.	Coordinate efforts between public and private entities.	Implement strategies outlined in the *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014). Work with winter recreation groups to develop educational materials and programs.	Wolverine

Inadequate understanding of population and distribution status to assess potential effects of incidental capture from trapping on populations of Wolverine and Fisher

Wolverine and Fisher are on occasion incidentally captured in the course of trapping other species with legal harvest seasons. Idaho has a mandatory reporting requirement for incidental capture and mortality of any nontarget species such as Wolverine and Fisher. Based on IDFG records, some individuals are found dead in the trap, while others are released alive. Information gaps regarding ecology and population dynamics of these species limit ability to draw conclusions about whether incidental capture has any population effects (e.g., whether patterns in capture numbers reflect cyclic changes in populations, greater exposure to trapping, or population increase and expansion).

Objective	Strategy	Action(s)	Target SGCNs
Narrow information gaps about ecology and population dynamics to evaluate threats, including the potential effect of incidental capture to local populations of Wolverine and Fisher.	Gather the necessary information to understand conservation priority related to incidental capture.	Implement strategies and actions outlined in the *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014) particularly Objective 6 (and related strategies): Continue to minimize injury and mortality of wolverines from incidental trapping and shooting. As part of educating trappers about techniques to minimize incidental capture, conduct interviews with trappers to obtain information about the condition and demographics of captured individuals, and the locations, habitats, and trap sets involved in incidental captures of Wolverine or Fisher.	Wolverine Fisher

Climate change

Delineating temperature refugia for cool water or air temperature dependent species is a relatively new idea (Isaak et al. 2015). Recent microclimate monitoring work in the Idaho Panhandle identified a portion of the St. Joe Mountains to have a cooler than average mean annual air temperature in the Panhandle. In addition, the Coeur d'Alene Mountains tend to have warmer mean annual air temperatures than other mountain ranges in the Panhandle. Monitoring both the organisms that inhabit these mountains along with abiotic climate measurements will be an important component to adaptively managing wildlife in a changing climate (Lucid et al. 2016).

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring.	Monitor climate variables and species co-occurrence over time.	Develop climate monitoring program using a variety of microclimate variables along with co-occurrence of associated SGCN.	Wolverine Fisher
Implement other state management plans.	Implement the *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014).	Implement specific actions outlined in the climate section of the *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014).	Wolverine

Species designation, planning & monitoring

Basic knowledge of current distribution for these species is well documented relative to other species. However, managing these species' needs in an adaptive capacity will require continued monitoring to determine changes in population levels, distribution, and gene flow. It is essential to build on current inventory programs and implement programs that allow continued monitoring work for these species.

Objective	Strategy	Action(s)	Target SGCNs
Monitor species population and distribution trends.	Expand knowledge of the distribution, abundance, and habitat requirements of Wolverine and Fisher.	Develop and participate in a multistate–provincial effort to monitor multiple carnivore species the US Northern Rockies. Develop a population estimate for Fisher. Conduct studies to determine why prey base for Fisher in the Coeur d'Alene Mountain Range is relatively less abundant than adjacent areas.	Wolverine Fisher

Target: Ground-Dwelling Invertebrates

Ground-Dwelling Invertebrates provide essential ecosystem services including decomposition, nutrient cycling, food for vertebrates, plant pollination, seed dispersal, and disease vectoring. They can also serve as effective indicators of environmental health (Jordan and Black 2012). This group encompasses a wide array of taxa. However, Bitterroot Mountains SGCN in this group are limited to terrestrial gastropods, Spur-throated Grasshoppers, and Harvestman species (commonly known as Daddy longlegs).

Cryptomastix **sp. © Michael Lucid**

Target Viability

Good. Habitat and threat data deficient. Many species taxonomically and distributionally data deficient.

Species designation, planning & monitoring

Basic knowledge of ecological requirements, habitat needs, systematics, and distribution is lacking for most Ground-Dwelling Invertebrates. Spur-throated Grasshoppers and Harvestman species are in need of basic taxonomic work. Although substantial knowledge of terrestrial gastropod distribution and microclimate requirements was obtained during work conducted from 2010 to 2014 (Lucid et al. 2016), much work remains to be done to gain an adequate understanding of basic conservation needs for these species. Four terrestrial gastropods are known to be associated with cooler than average mean annual air temperatures (Lucid et al. 2016). Managing microsites for these species for cool air temperatures and minimal disturbance is recommended until a better ecological understanding is developed through research and monitoring.

Objective	Strategy	Action(s)	Target SGCNs
Determine distribution and appropriate taxonomic status of several SGCN.	Investigate and validate taxonomic status.	Conduct field surveys to collect specimens. Conduct morphological and genetics work to determine species status.	Harvestman (*Acuclavella*) Species Group Pale Jumping-slug Marbled Jumping-slug Mission Creek Oregonian Coeur d'Alene Oregonian Kingston Oregonian

Objective	Strategy	Action(s)	Target SGCNs
			Spur-throated Grasshopper (*Melanoplus*) Species Group
Confirm site occupancy and protection for taildropper and axetail SGCN.	Conduct field investigation where species are known to occur.	Conduct genetics work to confirm taxonomic identity of specimens currently in possession of IDFG. Work with land management agencies or private landowners to minimize disturbance to sites.	Blue-gray Taildropper Papillose Taildropper Rocky Mountain Axetail
Develop a better understanding of distribution and habitat requirements for cool air temperature associated gastropods (Lucid et al. 2016).	Conduct research and monitoring.	Conduct surveys for gastropods and associated microclimate variables to assess environmental correlations. Manage forest structure near microsites to maintain cool air temperatures. Manage these sites for minimal disturbance. Implement long-term monitoring of species and habitat conditions.	Pale Jumping-slug Magnum Mantleslug Shiny Tightcoil
Determine population status of Ground-Dwelling Invertebrate SGCN.	Monitor populations.	Develop and implement multitaxa monitoring strategy for Ground-Dwelling Invertebrates.	Harvestman (*Acuclavella*) Species Group Pale Jumping-slug Marbled Jumping-slug Magnum Mantleslug Blue-gray Taildropper Papillose Taildropper Rocky Mountain Axetail Nimapuna Disc Salmon Coil Selway Forestsnail Mission Creek Oregonian Coeur d'Alene Oregonian Kingston Oregonian Shiny Tightcoil Spur-throated Grasshopper (*Melanoplus*) Species Group

Target: Pollinators

Pollinators provide an essential ecosystem service that benefits agricultural producers, agricultural consumers, and gardeners (Mader et al. 2011) in the Bitterroot Mountains. A wide range of taxa that includes birds and insects provide pollination activities. Two butterflies (Gillette's Checkerspot [*Euphydryas gillettii*] and Monarch [*Danaus plexippus*]) and 8 bee species compose the group of 10 SGCN pollinators known to occur within this section.

Western Bumble Bee

Many pollinators, especially bees, are known to be experiencing population declines throughout North America (Mader et al. 2011) and those declines may be occurring within the Bitterroot Mountains as well. Population declines and local die-offs occur for a variety of reasons including habitat loss, pesticide exposure, and climate change (Mader et al. 2011). The Bitterroot Mountains Section is ripe with opportunity to address these threats and increase the status of SGCN pollinators. Farmers, habitat managers, roadway authorities, municipalities, and homeowners can all contribute to pollinator conservation in clear and productive ways.

Target Viability

Fair. Many pollinators declining rangewide.

Prioritized Threats and Strategies for Pollinators

High rated threats to Pollinators in the Bitterroot Mountains

Pesticides

Pollinators are negatively affected by pesticides that are absorbed through the exoskeleton, ingested while drinking nectar containing pesticides, and carried back to colonies in pollen laced with pesticides (Mader et al. 2011). Neonicotinoids are particularly harmful to bee populations and can cause dramatic die-offs (Hopwood et al. 2012). Although the most effective pollinator benefitting strategy is to eliminate pesticide use, significant benefit for pollinators can still be achieved by reducing use and exposure (Mader et al. 2011).

Objective	Strategy	Action(s)	Target SGCNs
Reduce native pollinator	Educate habitat managers,	Conduct educational activities that encourage potential pesticide	A Miner Bee (*Andrena aculeata*)

Objective	Strategy	Action(s)	Target SGCNs
exposure to pesticides (Mader et al. 2011).	farmers, municipalities, and small property owners in methods to reduce pesticide use (Mader et al. 2011).	applicators to eliminate use where practical. Where pesticides must be used, encourage applicators to apply the minimum amount of chemical necessary and apply when pollinators are least active (e.g., nighttime and when flowers are not blooming) (Mader et al. 2011). Specifically target urban homeowners in educational efforts to reduce use and properly apply pesticides (Mader et al. 2011). Conduct workshops that discuss pesticides in relation to other pollinator habitat management concerns (Mader et al. 2011).	A Miner Bee (*Perdita salicis euxantha*) Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) Monarch Gillette's Checkerspot
Reduce native pollinator exposure to pesticides on IDFG administered property (Mader et al. 2011).	Implement measures to reduce or eliminate pesticide use on IDFG WMAs and other properties (Mader et al. 2011).	Use the minimum recommended amount of pesticide (Mader et al. 2011). Apply pesticides at times when pollinators are least active such as nighttime, cool periods, low wind activity, and when flowers are not blooming (Mader et al. 2011). Mow or otherwise remove flowering weeds before applying pesticides (Mader et al. 2011).	A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) Monarch Gillette's Checkerspot
Eliminate use of neonicotinoid insecticides (Hopwood et al. 2012).	Education measures on the detrimental effects of neonicotinoids on bees (Hopwood et al. 2012).	Develop and distribute educational materials to municipalities, counties, agricultural producers, habitat managers, and other property owners (Hopwood et al. 2012). Avoid use of neonicotinoids on IDFG administered lands (Hopwood et al. 2012).	A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) Monarch Gillette's Checkerspot

Habitat loss

Pollinators require foraging and nesting habitat. Providing both types of habitat within close proximity to each other is the best way to ensure pollinator success. Protecting, enhancing, and creating pollinator habitat can be a fun and rewarding way to engage with local communities. Educating land managers about techniques to reduce land management impacts to pollinators is an essential component to pollinator habitat management.

Objective	Strategy	Action(s)	Target SGCNs
Reduce impact of land management practices on pollinators (Mader et al. 2011).	Educate about and implement practices that benefit pollinators. (Mader et al. 2011).	Reduce grazing impacts by limiting grazing to one-third to one-fourth of management areas per season (Mader et al. 2011). Implement pollinator beneficial mowing techniques including use of flushing bar, cutting at ≤8 mph, maintaining a high minimum cutting height of ≥12–16 in, mowing only in daylight hours, mow in a mosaic instead of an entire site (Mader et al. 2011). Where prescribed fire is used, implement pollinator-friendly burning protocols including rotational burning of ≤30% of each site every few years, leave small unburned patches intact, avoid burning too frequently (no more than every 5–10 years), avoid high-intensity fires unless the burn goal is tree removal. Work with Idaho Transportation Department to implement proper roadside pollinator habitat management (Mader et al. 2011).	A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) Monarch Gillette's Checkerspot
Conserve existing pollinator habitat.		Map existing major known pollinator habitat. Identify and recognize landowners providing pollinator habitat and provide habitat management educational opportunity (Mader et al. 2011). Conduct surveys for native milkweed. Initiate seed saving program (Mader et al. 2011).	A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) Monarch Gillette's Checkerspot
Create new urban and rural pollinator habitat.	Develop programs to encourage urban landowners to create pollinator habitat.	Provide pollinator habitat workshops for homeowners and rural land owners. Provide other educational materials for homeowners. Provide an incentive program for homeowners to create pollinator habitat in urban yards. Convert most lawns at IDFG office and housing locations to pollinator habitat. Work with municipalities and businesses to create urban pollinator habitat. Provide bee nest boxes for purchase at the Coeur d'Alene IDFG regional office.	A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) Monarch Gillette's Checkerspot

Species designation, planning & monitoring

Actions to enhance pollinator habitat will be most effective with knowledge of the current status of SGCN populations. Initiation of long term-monitoring will allow a continuous data stream to assess conservation activities. Gillette's Checkerspot occurs in locally abundant colonies (Williams et al. 1984). Specific surveys for this species are required to map distribution. Known occupied sites should be managed to minimize disturbance.

Objective	Strategy	Action(s)	Target SGCNs
Determine pollinator population status.	Conduct surveys and implement long-term pollinator monitoring program.	Conduct surveys to identify colonies and breeding locations of bee SGCN. Conduct specific surveys for Gillette's Checkerspot. Protect known breeding sites. Develop program to monitor trends in species distribution and population size.	A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) Monarch Gillette's Checkerspot

Bitterroot Mountains Section Team

An initial summary version of the Bitterroot Mountains Section project plan was completed for the 2005 Idaho State Wildlife Action Plan. A small working group developed an initial draft of the Section Plan (Miradi v 0.14), which was then reviewed by a much wider group of stakeholders at a 2-day meeting held at the Idaho Department of Fish and Game in February 2015 (this input captured in Miradi v 0.16). This draft was then subsequently revised and has undergone additional internal view within the Idaho Department of Fish and Game. Materials in this document are based on Miradi v. 0.20. Individuals and organizations/agencies involved in this plan are shown in Table 3.3.

Table 3.3 Individuals, agencies, and organizations involved in developing this plan [a]

First name	Last name	Affiliation
Rita	Dixon*	Idaho Department of Fish and Game, Headquarters
Cristy	Garris	Foundations of Success
Shannon	Ehlers*	Idaho Department of Fish and Game, Panhandle Region
Michael	Lucid*	Idaho Department of Fish and Game, Panhandle Region
Matthew	Corsi	Idaho Department of Fish and Game, Clearwater Region
Joe	Dupont	Idaho Department of Fish and Game, Clearwater Region
Joel	Sauder	Idaho Department of Fish and Game, Clearwater Region
Wayne	Wakkinen	Idaho Department of Fish and Game, Panhandle Region
Tim	Weekley	Idaho Department of Fish and Game, Headquarters
Laura	Wolf	Idaho Department of Fish and Game, Panhandle Region
Gina	Davis	Idaho Department of Lands
Archie	Gray	Idaho Department of Lands
Robert "Bob"	Helmer	Idaho Department of Lands
Patrick E "Pat"	Seymour	Idaho Department of Lands
Dave	Stephenson	Idaho Department of Lands
Pete S	Van Sickle	Idaho Department of Lands
Charles R. "Chuck"	Peterson	Idaho State University
Kerry	Barnowe–Meyer	Nez Perce Tribe
Terrance W. "Terry"	Cundy	Potlatch Forest Holdings, Inc.
Russell L "Russ"	Davis	US Army Corps of Engineers
Lydia	Allen	US Forest Service Northern Region (R1), Idaho Panhandle National Forests

First name	Last name	Affiliation
Guy D	Wagner	US Forest Service Northern Region (R1), Nez Perce–Clearwater National Forests

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

4. Idaho Batholith Section

Section Description

The Idaho Batholith is the largest ecological section in Idaho, encompassing the remote central part of the state. It extends from the Lochsa River and Montana border in the north to the Snake River Plain in the south (Fig. 4.1, Fig. 4.2). The Batholith is characterized by granitic soils and extensive mountainous terrain with extreme topographic relief, spanning 425 to 3,400 m (1,400 to 11,000 ft). Plate tectonics formed the origin of this region, which was subsequently shaped by glaciers, as evidenced by its alpine ridges, cirques, and large U-shaped valleys with broad bottoms. Average annual temperature ranges from 2 to 7 °C (35 to 46 °F) but may be as low as −4 °C (24 °F) in the high mountains. Annual precipitation ranges from 51 to 203 cm (20 to 80 in), much of which falls as snow during the fall, winter, and spring. Climate is maritime-influenced with cool temperate weather and dry summers.

Idaho Batholith, Snowyside Peak, Idaho © 2013 Betsy Wagner

National Forest lands dominate the Idaho Batholith, representing approximately 88% of the total area. Much of this occurs in four wilderness areas: the Selway–Bitterroot, Gospel–Hump, Sawtooth, and Frank Church River of No Return. This vast mountainous landscape is comprised primarily of 2 forest ecosystems: Dry Lower Montane–Foothill Forest at lower elevations and along river corridors, and Subalpine–High Montane Conifer Forest at higher elevations. Together these two habitat types account for >60% of the land cover, but they provide a diversity of habitats at a fine scale due to the range of seral stages and past disturbance. Several species of greatest conservation need (SGCN) have the greatest extent of their statewide range in these mid- and high-elevation habitats of the Batholith, including Fisher (*Pekania pennanti*), Wolverine (*Gulo gulo*), Mountain Goat (*Oreamnos americanus*), Bighorn Sheep (*Ovis canadensis*), Harlequin Duck (*Histrionicus histrionicus*), Olive-sided Flycatcher (*Contopus cooperi*), and Clark's Nutcracker (*Nucifraga columbiana*).

Also integral to this landscape are the major river systems that originate in or bisect the Idaho Batholith, including the Salmon, Selway, Lochsa, Payette, Deadwood, and Boise rivers. These rivers and their tributaries provide a substantial portion of the state's habitat for ESA-listed anadromous salmonid fishes. These iconic rivers also support economically important recreation, from angling and hunting to water sports. The Selway, Lochsa, and Salmon rivers are premier destinations for whitewater rafting and kayaking.

The more than 2,000 high mountain lakes contained with the Idaho Batholith Section adorn the mountains like aquatic jewels. High mountain lakes are a stronghold of amphibian populations, such as Western Toad (*Anaxyrus boreas*) and provide popular recreational fishing opportunities in remote settings. Lakes, ponds, reservoirs, and other aquatic habitats support important wildlife populations including the state's largest nesting colony of Western Grebe (*Aechmophorus occidentalis*) on Lake Cascade.

Given the vast expanse of remote and roadless country, human population centers are relatively small and scattered. The largest towns are Riggins, McCall, Stanley, and Cascade. Historically, timber harvest was a main commercial industry, with livestock production locally important. In more recent times, commerce has broadened to tourism and recreation. The Idaho Batholith provides accessible and popular front country and back country opportunities for hunting, angling, trail riding, hiking, wildlife viewing, and snow and water sports. The Frank Church River of No Return Wilderness offers the largest roadless area in the continental US for backcountry pursuits. Gold mining has a long and colorful legacy in the Idaho Batholith, home to historic mining communities such as Warren, Leesburg, and Idaho City. Currently, there is renewed interest in exploration and extraction of gold and other minerals on a limited scale.

Important conservation issues in the Idaho Batholith include changes in ecological condition and function of conifer forest habitats; water quality of lakes, ponds, and reservoirs; barriers to anadromous salmonid spawning and rearing habitat and migration issues downstream and outside of the Batholith; and changing temperature and precipitation patterns.

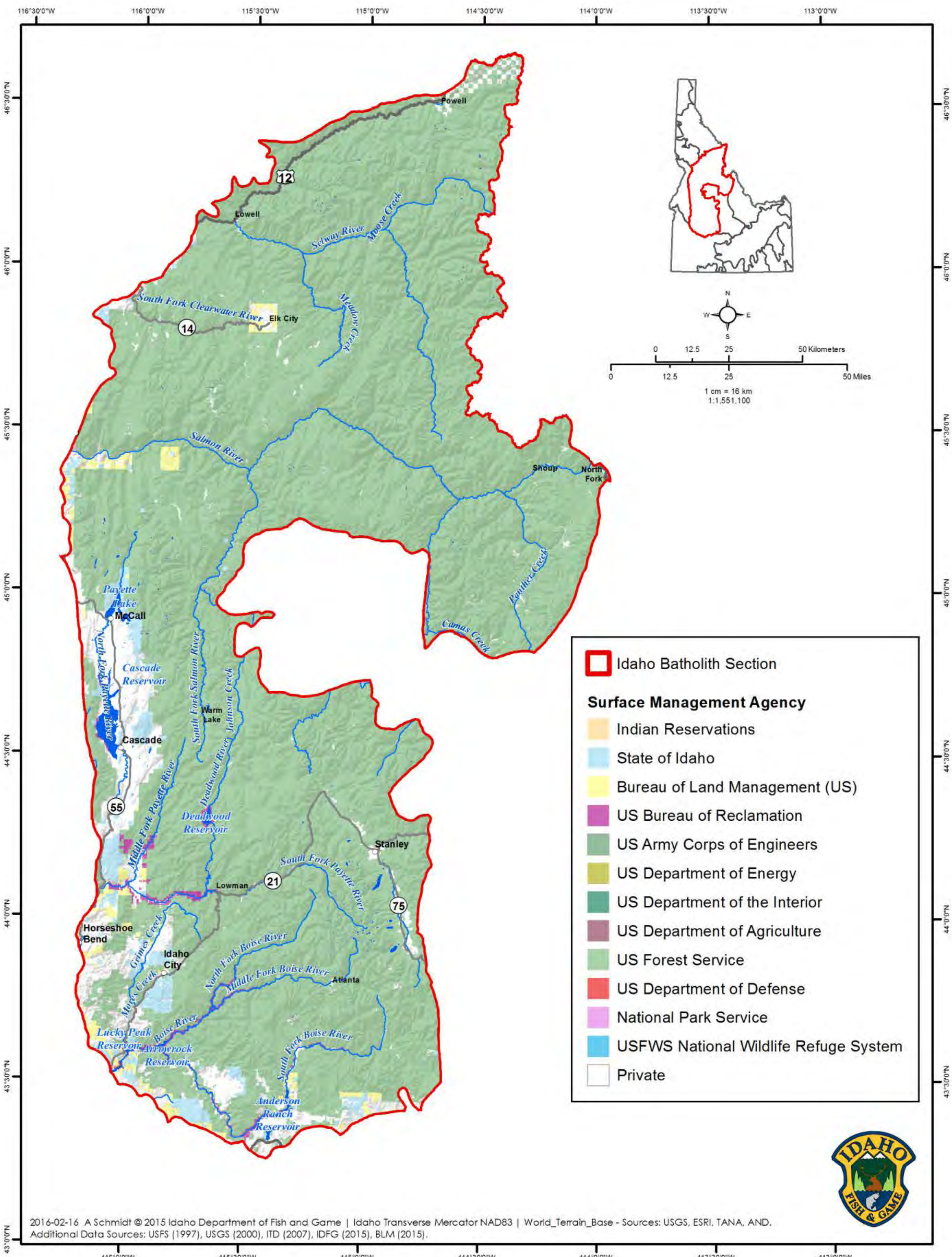


Fig. 4.1 Map of Idaho Batholith surface management

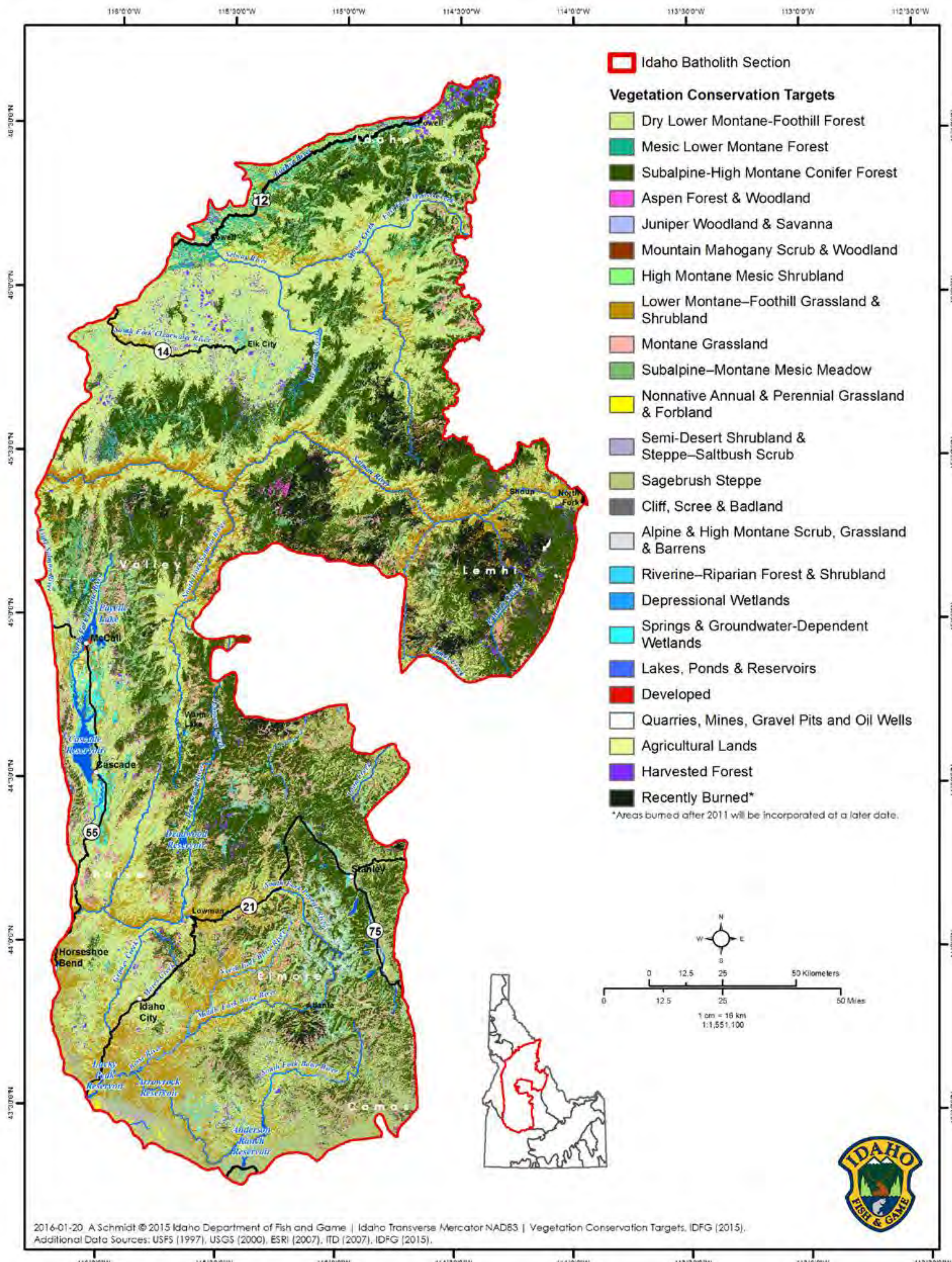


Fig. 4.2 Map of Idaho Batholith vegetation conservation targets

Conservation Targets in the Idaho Batholith

We selected 7 habitat targets (4 upland, 3 aquatic) that represent the major ecosystems in the Idaho Batholith as shown in Table 4.1. Each of these systems provides habitat for key SGCN, i.e., "nested targets" (Table 4.2) associated with each target. All SGCN management programs in the Idaho Batholith have a nexus with habitat management programs. We provide a high-level summary of current viability status for each target. Conservation of the habitat targets listed below should conserve most of the nested species within them. However, we determined that 2 taxa, Wolverine and Bighorn Sheep, face special conservation needs and thus are presented as explicit species targets as shown in Table 4.1. Wolverine is addressed in a separate management plan (http://fishandgame.idaho.gov/ public/ wildlife/planWolverine.pdf), as is Bighorn Sheep (http://fishandgame.idaho.gov/public /wildlife/planBighorn.pdf).

Table 4.1 At-a-glance table of conservation targets in the Idaho Batholith

Target	Target description	Target viability	Nested targets (SGCN)	
Dry Lower Montane–Foothill Forest	Previously referred to as "Northern Rocky Mountains Dry-Mesic Montane Mixed Conifer Forest." Includes the drier range of grand fir habitat with other seral species and includes meadow habitat important to the Northern Idaho Ground Squirrel.	*Fair*. The amount of habitat is still relatively high within its historic distribution, but forest conditions are poor due to altered fire regimes.	*Tier 1*	Northern Idaho Ground Squirrel Marbled Jumping-slug Marbled Disc Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Mountain Quail Lewis's Woodpecker Silver-haired Bat Hoary Bat Fisher Lyrate Mountainsnail Deep Slide Mountainsnail Striate Mountainsnail
			Tier 3	Common Nighthawk White-headed Woodpecker Olive-sided Flycatcher Townsend's Big-eared Bat Little Brown Myotis Nimapuna Disc Salmon Coil Boulder Pile Mountainsnail Coeur d'Alene Oregonian Western Flat-whorl Shiny Tightcoil A Mason Bee (*Hoplitis orthognathus*)
Subalpine–High Montane Conifer Forest	This habitat includes the wetter end of the grand fir mixed-conifer habitat as well as higher-elevation forest.	*Fair*. Amount and distribution remains extensive within the Idaho Batholith. Habitat condition has declined due to altered fire regimes and a keystone tree species, whitebark pine,	*Tier 1*	Wolverine Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Silver-haired Bat Hoary Bat Fisher
			Tier 3	Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Harvestman (*Acuclavella*)

Target	Target description	Target viability		Nested targets (SGCN)
		has declined dramatically.		Species Group Pale Jumping-slug Shiny Tightcoil Johnson's Hairstreak Gillette's Checkerspot
Lower Montane–Foothill Grassland & Shrubland	This habitat occurs primarily along the Salmon River corridor and in the southwestern portion of the section.	*Good.* Much of this habitat occurs in wilderness. Encroachment of invasive species is evident but not as pervasive as where altered fire regimes and human disturbance affect habitat quality.	*Tier 1*	Lava Rock Mountainsnail Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Mountain Quail Golden Eagle Silver-haired Bat Hoary Bat Bighorn Sheep Deep Slide Mountainsnail
			Tier 3	Common Nighthawk Townsend's Big-eared Bat Little Brown Myotis Salmon Coil Coeur d'Alene Oregonian Western Flat-whorl Monarch
Alpine & High Montane Scrub, Grassland & Barrens	Open grass, forb, and rock habitat above treeline.	*Good*. Much of this habitat occurs in designated wilderness where human-associated resource damage is minimal.	*Tier 1*	Wolverine
			Tier 3	Clark's Nutcracker Black Rosy-Finch Mountain Goat Hoary Marmot A Grasshopper (*Argiacris keithi*) A Grasshopper (*Argiacris militaris*) A Grasshopper (*Barracris petraea*) Spur-throated Grasshopper (*Melanoplus*) Species Group
Riverine–Riparian Forest & Shrubland	Rivers and streams, including aquatic habitats and their associated upland riparian habitats. Includes 6 major river systems (Lochsa, Selway, Salmon, Payette, Deadwood, and Boise) and their tributaries.	*Fair*. Approximately half of the total subbasin area of the major drainages within the Batholith supported their designated beneficial uses based on Idaho DEQ subbasin assessments. Rivers and streams representing the remaining subbasin area have assigned maximum daily load limits to	*Tier 1*	Pacific Lamprey Steelhead (Snake River Basin DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring/summer-run ESU) Marbled Jumping-slug Marbled Disc Selway Forestsnail Salmon Oregonian
			Tier 2	Harlequin Duck Mountain Quail Lewis's Woodpecker Silver-haired Bat Hoary Bat Western Pearlshell Striate Mountainsnail

Target	Target description	Target viability	Nested targets (SGCN)
		improve conditions.	A Riffle Beetle (*Bryelmis idahoensis*) Lolo Mayfly *Tier 3* Sandhill Crane Common Nighthawk Townsend's Big-eared Bat Little Brown Myotis Western Ridged Mussel Rotund Physa Boulder Pile Mountainsnail Coeur d'Alene Oregonian Lolo Sawfly Idaho Forestfly A Mayfly (*Parameletus columbiae*) Monarch Caddisflies (10 spp.; see Table 4.2)
Springs & Groundwater-Dependent Wetlands	Groundwater-dependent springs, seeps, alkaline wetlands, and wet and mesic meadows.	*Good*. Overall condition is good, although habitat extent is reduced from historic levels, particularly in lower elevation intermountain valleys where seeps and springs have been diverted and wet meadows have been seeded for haying and livestock pasture, housing, and road development.	*Tier 1* A Click Beetle (*Beckerus barri*) A Skiff Beetle (*Hydroscapha redfordi*) *Tier 2* Western Toad Mountain Quail Silver-haired Bat Hoary Bat Pristine Pyrg Lolo Mayfly Tier 3 Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis A Mayfly (*Parameletus columbiae*) Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (10 spp.; see Table 4.2) Idaho Amphipod
Lakes, Ponds & Reservoirs	Includes all natural lakes, high mountain lakes, deep ponds, dam-altered naturally formed lakes, and created waterbodies that fit the lacustrine definition.	*Fair*. Deep lakes such as Redfish and Payette in good condition. Lake Cascade has longstanding water quality issues. Alpine lakes exhibit good water quality but lowered amphibian production potential.	*Tier 2* Western Toad Western Grebe Clark's Grebe Silver-haired Bat Hoary Bat *Tier 3* Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis A Miner Bee (*Perdita salicis euxantha*) A Miner Bee (*Perdita wyomingensis sculleni*)

Target	Target description	Target viability	Nested targets (SGCN)	
Wolverine	The Idaho Batholith supports the largest proportion of modeled Wolverine habitat in the state and a core breeding subpopulation.	*Fair*. Genetic diversity is low across Idaho, perhaps the lowest in the Rocky Mountains, and the number of occupied female territories in the Batholith is lower than suitable habitat could support.	*Tier 1* *Tier 3*	Wolverine Black Rosy-Finch Hoary Marmot
Bighorn Sheep	3 Bighorn Sheep Population Management Units (PMUs) occur primarily in the Idaho Batholith (IDFG 2014).	*Fair*. Disease is established in all Bighorn Sheep PMUs within the Idaho Batholith, resulting in low lamb survival and recruitment for many years. However, some herds remain relatively unaffected by disease.	*Tier 2*	Bighorn Sheep

Table 4.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Idaho Batholith

Taxon	Conservation targets								
	Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Lower Montane–Foothill Grassland & Shrubland	Alpine & High Montane Scrub, Grassland & Barrens	Riverine–Riparian Forest & Shrubland	Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Wolverine	Bighorn Sheep
LAMPREYS									
Pacific Lamprey (*Entosphenus tridentatus*)[1]					X				
RAY-FINNED FISHES									
Steelhead (Snake River Basin DPS) (*Oncorhynchus mykiss*)[1]					X				
Sockeye Salmon (Snake River ESU) (*Oncorhynchus nerka*)[1]					X				
Chinook Salmon (Snake River fall-run ESU) (*Oncorhynchus tshawytscha*)[1]					X				
Chinook Salmon (Snake River spring/summer-run ESU) (*Oncorhynchus tshawytscha*)[1]					X				
AMPHIBIANS									
Western Toad (*Anaxyrus boreas*)[2]						X	X		
BIRDS									
Harlequin Duck (*Histrionicus histrionicus*)[2]					X				
Mountain Quail (*Oreortyx pictus*)[2]	X		X		X	X			
Western Grebe (*Aechmophorus occidentalis*)[2]							X		
Clark's Grebe (*Aechmophorus clarkii*)[2]							X		
Golden Eagle (*Aquila chrysaetos*)[2]			X						
Sandhill Crane (*Grus canadensis*)[3]					X	X	X		
Great Gray Owl (*Strix nebulosa*)[3]		X							
Common Nighthawk (*Chordeiles minor*)[3]	X		X		X				
Lewis's Woodpecker (*Melanerpes lewis*)[2]	X				X				
White-headed Woodpecker (*Picoides albolarvatus*)[3]	X								
Olive-sided Flycatcher (*Contopus cooperi*)[3]	X	X							
Clark's Nutcracker (*Nucifraga columbiana*)[3]		X		X					
Black Rosy-Finch (*Leucosticte atrata*)[3]				X				X	
MAMMALS									
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]	X		X		X	X	X		
Silver-haired Bat (*Lasionycteris noctivagans*)[2]	X	X	X		X	X	X		
Hoary Bat (*Lasiurus cinereus*)[2]	X	X	X		X	X	X		
Little Brown Myotis (*Myotis lucifugus*)[3]	X		X		X	X	X		

Taxon	Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Lower Montane–Foothill Grassland & Shrubland	Alpine & High Montane Scrub, Grassland & Barrens	Riverine–Riparian Forest & Shrubland	Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Wolverine	Bighorn Sheep
	Conservation targets								
Wolverine (*Gulo gulo*)[1]		X		X				X	
Fisher (*Pekania pennanti*)[2]	X	X							
Mountain Goat (*Oreamnos americanus*)[3]				X					
Bighorn Sheep (*Ovis canadensis*)[2]			X						X
Hoary Marmot (*Marmota caligata*)[3]				X				X	
Northern Idaho Ground Squirrel (*Urocitellus brunneus*)[1]	X								
ARACHNIDS									
Harvestman (*Acuclavella*) Species Group[3]		X							
BIVALVES									
Western Pearlshell (*Margaritifera falcata*)[2]					X				
Western Ridged Mussel (*Gonidea angulata*)[3]					X				
AQUATIC GASTROPODS									
Rotund Physa (*Physella columbiana*)[3]					X				
Pristine Pyrg (*Pristinicola hemphilli*)[2]						X			
TERRESTRIAL GASTROPODS									
Pale Jumping-slug (*Hemphillia camelus*)[3]		X							
Marbled Jumping-slug (*Hemphillia danielsi*)[1]	X				X				
Nimapuna Disc (*Anguispira nimapuna*)[3]	X								
Marbled Disc (*Discus marmorensis*)[1]	X				X				
Salmon Coil (*Helicodiscus salmonaceus*)[3]	X		X						
Lyrate Mountainsnail (*Oreohelix haydeni*)[2]	X								
Deep Slide Mountainsnail (*Oreohelix intersum*)[2]	X		X						
Boulder Pile Mountainsnail (*Oreohelix jugalis*)[3]	X				X				
Striate Mountainsnail (*Oreohelix strigosa goniogyra*)[2]	X				X				
Lava Rock Mountainsnail (*Oreohelix waltoni*)[1]			X						
Selway Forestsnail (*Allogona lombardii*)[1]					X				
Salmon Oregonian (*Cryptomastix harfordiana*)[1]					X				
Coeur d'Alene Oregonian (*Cryptomastix mullani*)[3]	X		X		X				
Western Flat-whorl (*Planogyra clappi*)[3]	X		X						
Shiny Tightcoil (*Pristiloma wascoense*)[3]	X	X							
INSECTS									

Taxon	Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Lower Montane–Foothill Grassland & Shrubland	Alpine & High Montane Scrub, Grassland & Barrens	Riverine–Riparian Forest & Shrubland	Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Wolverine	Bighorn Sheep
	Conservation targets								
A Click Beetle (*Beckerus barri*)[1]						X			
A Riffle Beetle (*Bryelmis idahoensis*)[2]					X				
A Skiff Beetle (*Hydroscapha redfordi*)[1]						X			
Lolo Mayfly (*Caurinella idahoensis*)[2]					X	X			
A Mayfly (*Parameletus columbiae*)[3]					X	X			
A Miner Bee (*Perdita salicis euxantha*)[3]							X		
A Miner Bee (*Perdita wyomingensis sculleni*)[3]							X		
Western Bumble Bee (*Bombus occidentalis*)[1]	X	X	X						
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]	X	X	X						
A Mason Bee (*Hoplitis orthognathus*)[3]	X								
Johnson's Hairstreak (*Callophrys johnsoni*)[3]		X							
Monarch (*Danaus plexippus*)[3]			X		X	X			
Gillette's Checkerspot (*Euphydryas gillettii*)[3]		X				X			
A Grasshopper (*Argiacris keithi*)[3]				X					
A Grasshopper (*Argiacris militaris*)[3]				X					
A Grasshopper (*Barracris petraea*)[3]				X					
Spur-throated Grasshopper (*Melanoplus*) Species Group[3]				X					
Lolo Sawfly (*Sweltsa durfeei*)[3]					X				
Cascades Needlefly (*Megaleuctra kincaidi*)[3]						X			
Idaho Forestfly (*Soyedina potteri*)[3]					X	X			
A Caddisfly (*Apatania barri*)[3]					X	X			
A Caddisfly (*Manophylax annulatus*)[3]					X	X			
A Caddisfly (*Cheumatopsyche logani*)[3]					X	X			
A Caddisfly (*Arctopora salmon*)[3]					X	X			
A Caddisfly (*Eocosmoecus schmidi*)[3]					X	X			
A Caddisfly (*Limnephilus challisa*)[3]					X	X			
A Caddisfly (*Psychoglypha smithi*)[3]					X	X			
A Caddisfly (*Rhyacophila oreia*)[3]					X	X			
A Caddisfly (*Rhyacophila robusta*)[3]					X	X			
A Caddisfly (*Rhyacophila velora*)[3]					X	X			
Idaho Amphipod (*Stygobromus idahoensis*)[3]						X			

Target: Dry Lower Montane–Foothill Forest

Dry Lower Montane–Foothill Forest is a significant habitat in the Idaho Batholith. It accounts for more land area than any other vegetation type in this section and restoration is a high priority on federal land. This conifer forest habitat occurs at lower elevations and along major river corridors. It is typically the first forest zone above grassland or shrubland and transitions to subalpine forest at the higher-elevation end of its range. Ponderosa pine (*Pinus ponderosa* Lawson & C. Lawson) and Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) are dominant tree species, occurring in open stands with a variety of grasses and/or shrubs in the understory such as pinegrass (*Calamagrostis rubescens* Buckley), Idaho fescue (*Festuca idahoensis* Elmer), mallow ninebark (*Physocarpus malvaceus* [Greene] Kuntze), white spirea (*Spiraea betulifolia* Pall.), and snowberry (*Symphoricarpos* Duham.). Frequent, low-intensity wildfire historically maintained open-stand conditions with widely spaced large trees. These forests have been important for timber harvest and recreation due to their accessibility.

Dry Lower Montane–Foothill Forest, Grass Mountain, Idaho © 2006 Pam Bond

Most of the Dry Lower Montane–Foothill Forest in the Idaho Batholith occurs on federally managed land. Management is shared among 6 National Forests (Nez Perce–Clearwater, Bitterroot, Payette, Salmon–Challis, Boise, and Sawtooth). Over the last decade, US Forest Service (FS) management direction has focused on restoring dry conifer forests toward historical range of variability for structure (e.g., tree species, size class, canopy cover) and ecological function (e.g., fire regime) because they have departed substantially from historic conditions and patterns (FS 2003, 2010).

Target Viability

Fair. The condition of Dry Lower Montane–Foothill Forest varies across the section from fair to good. The amount of habitat is still relatively high within its historic distribution, but nearly a century of fire suppression and timber harvest have changed conditions in many stands, particularly those outside wilderness areas. Forests have grown in with dense thickets of smaller-diameter trees; canopy cover is higher; large-diameter trees and snags are less abundant; and tree species composition has changed from predominantly early-seral species such as ponderosa pine and western larch (*Larix occidentalis* Nutt.) to a greater abundance of less fire-resistant species such as grand fir (*Abies grandis* [Douglas ex D. Don] Lindl.). As a result, the potential for more lethal fires has increased. These changes have affected habitat conditions for SGCN that occur in Dry Lower Montane–Foothill Forest such as Lewis's Woodpecker (*Melanerpes lewis*) and White-headed Woodpecker (*Leuconotopicus albolarvatus*).

Prioritized Threats and Strategies for Dry Lower Montane–Foothill Forest

High rated threats to Dry Lower Montane–Foothill Forest in the Idaho Batholith

Decreased frequency & increased intensity & severity of wildfire

The role of fire in shaping dry montane forests is well documented. The fire regime has changed from frequent, low-intensity fires to less frequent fires that burn with greater intensity and severity. Longer fire intervals caused structural changes to forests and a buildup of fuels that have increased the risk of crown fires, stand-replacement fires, and increased insect and disease epidemics (Keane et al. 2002). Landscape patterns have changed with a decline in early-seral forest communities. This altered fire regime compromises the resiliency of the forest to recover from disturbance and adapt to climate change and alters habitat conditions for wildlife species that prefer habitat conditions maintained in fire-dependent ecosystems. Collaborative Forest Landscape Restoration Programs (CFLRPs) offer the most direct way for IDFG to engage in forest management to benefit wildlife in meaningful ways. Two of the 23 national CFLRPs encompass portions of the Idaho Batholith—Selway–Middle Fork Clearwater and Weiser–Little Salmon Headwaters.

Objective	Strategy	Action(s)	Target SGCNs
Recreate open ponderosa pine stands and more open forests.	Implement silvicultural treatments followed by prescribed fire to reduce fuel loads and rejuvenate forest stands. Increase the occurrence of frequent, low-intensity fire on the landscape.	Actively participate in CFLRPs (Selway–Middle Fork Clearwater and Weiser–Little Salmon Headwaters CFLRPs) and other forest restoration collaboratives to help craft forest restoration prescriptions suitable for dry montane forests. Emphasize maintenance Rx burns at appropriate intervals (5–10 years).	Common Nighthawk Lewis's Woodpecker White-headed Woodpecker Olive-sided Flycatcher Northern Idaho Ground Squirrel
Increase forest resiliency to disturbance and a changing climate.	Create a mosaic of insect- and fire- resistant stands at the landscape scale.	Calculate departure from desired condition, based on historic range of variability, for tree size classes and canopy cover at meaningful scales (watershed, project area) to identify deficiencies in desired vegetation structure. Promote retention and maintenance of large tree size classes and open canopy stands of early-seral species.	Common Nighthawk Lewis's Woodpecker White-headed Woodpecker Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Fisher

Objective	Strategy	Action(s)	Target SGCNs
			Northern Idaho Ground Squirrel
Maintain suitable nesting habitat for cavity-nesting SGCN.	Promote and maintain large-diameter snags within forested landscapes.	Work with state, private, and federal forest management partners to incorporate snag retention guidelines and legacy tree guidelines into timber projects. Distribute Managing for Cavity-Nesting Birds in Ponderosa Pine Forests and Cavity-Nesting Bird Habitat and Populations in Ponderosa Pine Forests of the Pacific Northwest, produced by American Bird Conservancy, to appropriate land managers and private landowners.	Lewis's Woodpecker White-headed Woodpecker

Species designation, planning & monitoring

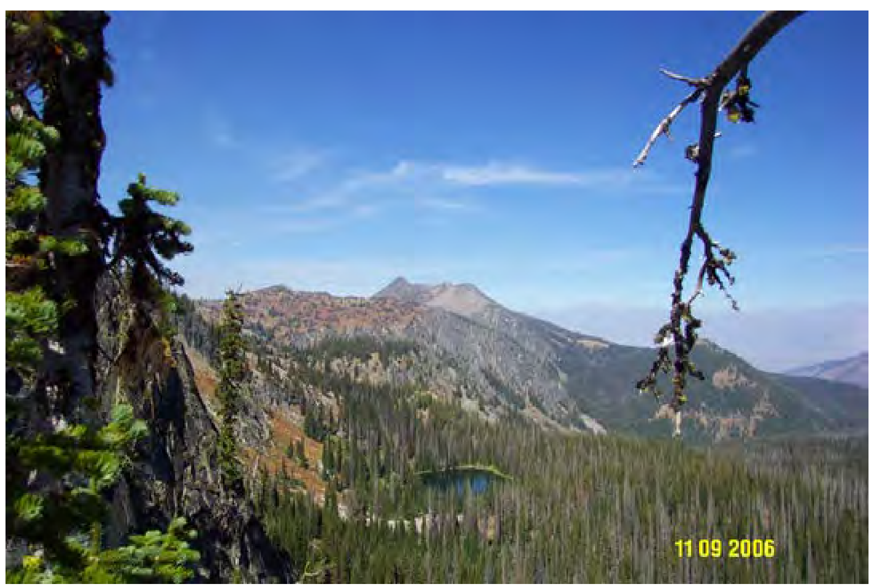
In addition to conservation actions to address specific threats, some species require inventory and monitoring to assess their current status and distribution in the Idaho Batholith. This includes Western Bumble Bee (*Bombus occidentalis*), Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*), and virtually all of the SGCN terrestrial gastropods associated with Dry Lower Montane–Foothill Forest listed in Table 4.2. In addition, some SGCN are declining from unknown causes. The priority for these species is to identify reasons for apparent declines and strategies for addressing them. We identify needs and appropriate actions in the section below.

Objective	Strategy	Action(s)	Target SGCNs
Determine distribution of little-known insects and terrestrial gastropod species.	Establish methods for assessing and monitoring status.	Conduct surveys to determine the occurrence, abundance, and habitat associations in the Idaho Batholith.	Terrestrial gastropods (see Table 4.2) Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (Hoplitis orthognathus
Determine the taxonomic status of little known species.	Clarify species status.	Work with researchers to determine the genetic status of the species or subspecies.	Striate Mountainsnail Coeur d'Alene Oregonian
Identify habitats crucial to Mountain Quail and occupancy of those habitats.	Conduct a targeted survey within known and potential Mountain Quail habitat.	Repeat 2003–2004 Mountain Quail survey routes; add new routes in modeled potential habitat as needed.	Mountain Quail
Investigate causes of decline in Olive-sided Flycatcher populations.	Determine relative importance of known and suspected threats to Olive-sided Flycatcher, its prey, and its	Promote cooperation and collaboration with Western Working Group Partners in Flight (WWG PIF) to fill knowledge gaps and to mitigate threats (see Canada's recovery plan, Appendix B; Environment Canada 2015*b*).	Olive-sided Flycatcher

Objective	Strategy	Action(s)	Target SGCNs
	habitats.	Investigate factors affecting reproductive output, survival, and fidelity to breeding sites.	
Identify cause(s) of decline for nightjar species in Idaho.	Work with WWG PIF and the Pacific Flyway Nongame Technical Committee (PFNTC) to assess causes(s) of decline.	Assist WWG PIF with adjusting current Nightjar Survey Network protocols to collect data that will inform potential cause(s) of decline, including assessments of insect prey populations and their habitats. Work with WWG PIF and PFNTC to identify opportunities for research on contaminant impacts.	Common Nighthawk
Maintain sustainable habitat for a secure Fisher population.	Expand knowledge of the distribution, abundance, and habitat requirements of Fisher.	Conduct a targeted survey within known and potential habitat. Develop and participate in a multistate–provincial effort to monitor multiple carnivore species in the US Northern Rockies. Identify optimal fisher habitat needs and travel connectivity corridors.	Fisher

Target: Subalpine–High Montane Conifer Forest

Subalpine–High Montane Conifer Forest is the second most abundant habitat in the Idaho Batholith. Its distribution covers most of this section except the South Fork Clearwater River region in the north, and south of the South Fork Payette River. Subalpine–High Montane Conifer Forest is the highest forested zone, transitioning to above treeline and alpine habitat at its upper end. Characteristic trees are subalpine fir (*Abies lasiocarpa* [Hook.] Nutt.), Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), lodgepole pine (*Pinus contorta* Douglas ex Loudon), and pockets of quaking aspen (*Populus tremuloides* Michx.). Whitebark pine (*Pinus albicaulis* Engelm.) replaces most other tree species at the highest elevations of this forest type and is a keystone species because of its role in stabilizing soil, trapping soil moisture, early



Subalpine–High Montane Conifer Forest, Patrick Butte, Idaho, 2006 IDFG

recolonization after wildfire, and highly nutritious seeds used by numerous birds and mammals. The understory of Subalpine–High Montane Conifer Forest is a mix of grasses and shrubs adapted to dry, cool summers and cold, snowy winters, including the photogenic common beargrass (*Xerophyllum tenax* [Pursh] Nutt.).

Subalpine zones are influenced by wind, snow, severe cold, and avalanches. Wildfire typically occurs infrequently and with mixed severity, often resulting in stand replacement when it does occur. A substantial portion of the Subalpine–High Montane Conifer Forest in the Idaho Batholith has burned in the last 30 years, mostly in the Salmon River drainage and North Fork Payette River.

Target Viability

Fair. The amount and distribution of Subalpine–High Montane Conifer Forest remains extensive within the Idaho Batholith. Habitat condition and pattern has declined due to altered fire regimes and a keystone tree species, whitebark pine, has declined dramatically. In 2011, whitebark pine, a critical habitat element for Clark's Nutcracker, was placed on the list of candidate species for listing under the Endangered Species Act of 1973, as amended (ESA) (US Fish and Wildlife Service 2011). Encroachment of subalpine fir into seral whitebark pine stands has created multilayered canopies, increasing the chance of stand-replacement fires (Keane et al. 2002). The interactions of fire exclusion, insects and disease, and projected changes in the distribution of forest ecosystems in the context of changing climate suggest that Subalpine–High Montane Conifer Forest could decrease substantially in extent over the next century in central Idaho (Hansen and Phillips 2015, Keane et al. 2002).

Spotlight Species of Greatest Conservation Need: Clark's Nutcracker

Clark's Nutcracker, a bird described from the Lewis and Clark expedition, is a year-round resident of western conifer forests, where it forages primarily on seeds of cone-producing trees. This species is a member of the select group of birds that cache seeds. Clark's Nutcrackers rely on keen spatial memory to recover seeds critical for overwinter survival and to feed the following year's young (Tomback 1998). In years of poor seed crops, Clark's Nutcrackers "irrupt" to lower elevations or beyond breeding locations in search of food. They also defer breeding in some years. A study in the Greater Yellowstone Ecosystem found population-wide failure to breed in 2 of the 5 years from 2009 to 2013, correlated with low whitebark pine cone crops the previous fall (Schaming 2015). Based on Breeding Bird Survey data for the most recent decade (Sauer et al. 2014), Idaho is experiencing a more substantial declining trend (-5% per year) than neighboring states and provinces.

Clark's Nutcracker is considered a keystone species in western North America because of its important role in forest regeneration and seed dispersal for a variety of conifer tree species. This bird rapidly and effectively moves seeds longer distances than wind, rodents, and all other North American seed-hoarding birds (Schaming 2015). This dispersal-regeneration association is exceptionally tight with whitebark pine, a high-elevation tree species that regenerates almost exclusively from Clark's Nutcracker seed caches. The decline of whitebark pine has the potential to create a negative feedback loop of less Clark's Nutcracker visitation to whitebark stands, fewer whitebark pine seeds dispersed and cached, reduced regeneration, leading to further decline in visitation to stands.

Prioritized Threats and Strategies for Subalpine–High Montane Conifer Forest

High rated threats to Subalpine–High Montane Conifer Forest in the Idaho Batholith

Changes in precipitation & broad-scale hydrologic regimes

Intensified drought due to increasing temperatures and changing precipitation patterns is increasing the vulnerability of the Subalpine–High Montane Conifer Forest by compounding the synergistic effects of changing hydrologic regimes, insect and disease outbreaks, and wildfire scope and severity. Snowpack levels are decreasing and winter temperatures are increasingly milder, creating conditions favorable for pathogen insect survival. More moisture is falling as rain during winter months, changing snowpack and moisture retention within this habitat and in lower elevation habitats whose headwaters lie here. An assessment of tree species vulnerability to changing temperatures and precipitation projected a net loss of whitebark pine, Engelmann spruce, subalpine fir, and lodgepole pine in the area defined by the Great Northern Landscape Conservation Cooperative (Hansen and Philips 2015), a landscape which encompasses the Idaho Batholith section.

Objective	Strategy	Action(s)	Target SGCNs
Improve landscape resilience.	Manage for diverse, healthy plant communities able to resist stresses including drought and drought-mediated impacts such as invasion by nonnative plants and wildfire.	Work with other agencies, organizations and user groups across the Idaho Batholith to refine planning options and alternatives to manage Subalpine–High Montane Conifer Forest habitat under forecasted climate models. Engage in microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate-induced stressors. Support efforts to increase public and political awareness of climate change impacts to local landscapes and wildlife dependent on them.	Olive-sided Flycatcher Clark's Nutcracker Silver-haired Bat Hoary Bat Wolverine Fisher

Altered fire regimes

Unlike lower dry montane forests, the long-term effects of changing fire regimes in subalpine forests are not yet fully evident because fire intervals typically were longer than the ~70-year period of effective fire suppression (Keane et al. 2002). Nevertheless, localized effects of fire exclusion are evident, particularly in whitebark pine ecosystems, and young age classes of subalpine forest are less represented on the landscape since fire suppression. Ecosystems with intact fire regimes have lower levels of plant stress, which reduces insect and disease infestations. The long-term consequence of fire exclusion in whitebark pine ecosystems is the conversion of a mixed-severity fire regime to a stand-replacement fire regime, trending toward larger and more intense fires (Keane et al. 2002).

Objective	Strategy	Action(s)	Target SGCNs
Return to a natural (within historic range) fire regime in Subalpine–High Montane Conifer Forest.	Implement silvicultural treatments and/or prescribed fire to achieve appropriate species composition, reduce fuel loads, and rejuvenate forest stands.	Actively participate in CFLRPs (Selway–Middle Fork Clearwater and Weiser–Little Salmon Headwaters CFLRPs) and other forest restoration collaboratives to help craft forest restoration prescriptions suitable for higher-elevation conifer forests. Work with FS partners to implement experimental mechanical and prescribed fire treatments in whitebark pine stands encroached upon by subalpine fir.	Olive-sided Flycatcher Clark's Nutcracker Silver-haired Bat Hoary Bat
Increase forest resiliency to disturbance and a changing climate.	Create a mosaic of insect- and fire- resistant stands at the landscape scale.	Calculate departure from desired condition, based on historic range of variability and fire regimes, for tree size classes and canopy cover at meaningful scales (watershed, project area) to identify deficiencies in desired vegetation structure and pattern. Implement prescriptions to achieve desired composition of stand ages on the landscape.	Olive-sided Flycatcher Clark's Nutcracker Silver-haired Bat Hoary Bat Wolverine Fisher

Insects & disease

High montane forests, specifically lodgepole and whitebark pine ecosystems, are experiencing unprecedented outbreaks of Mountain Pine Beetle (*Dendroctonus ponderosae*), exacerbated by drought and warmer temperatures extending longer into the fall and winter. The current outbreak across the West is >10 times larger than any other known (Six 2015). Whitebark pine, once relatively unsusceptible to Mountain Pine Beetle because it occurred beyond the climatic conditions the beetle favored, is encountering epidemic levels. At the same time, whitebark pine is succumbing to the nonnative fungal disease white pine blister rust (*Cronartium ribicola* J. C. Fisch.). Subalpine fir forests are experiencing the rapid eastward expansion of the nonnative balsam woolly adelgid (*Adelges piceae*; BWA), discovered in Idaho forests in the early 1980s and in central Idaho in 2002. BWA impacts and kills all size classes of subalpine fir, including the regeneration class. As with Mountain Pine Beetle, disease spread and tree mortality are facilitated by warmer winters and drought stress. Mortality caused by these pathogens could transition some forested sites to treeless areas, affecting slope stability, snow retention, and watershed hydrology and result in more homogeneous forests, changes in fire regimes, and reduced wildlife diversity (Schoettle 2004, Lowrey and Davis 2015). Loss of whitebark pine seed crops could reduce Clark's Nutcracker distribution and abundance.

Objective	Strategy	Action(s)	Target SGCNs
Reduce disease-related loss of SGCN habitat in the Subalpine–High Montane Conifer Forest in the Idaho	Respond to the spread of Mountain Pine Beetle, white pine blister rust, and balsam woolly adelgid.	Support federal, state, and private forest management agencies in their efforts for early detection and monitoring. Work with partner forest management agencies to incorporate wildlife considerations in their response to disease.	Olive-sided Flycatcher Clark's Nutcracker Silver-haired Bat Hoary Bat Wolverine

Objective	Strategy	Action(s)	Target SGCNs
Batholith.		Evaluate the effectiveness of potential response measures, including: planting blister rust resistant seedlings, applying pheromone patches (Verbenone) to adult disease-resistant trees to protect them from beetle infestation, exploring biological control agents, and promoting healthy forests in areas that have not yet been affected.	
Maintain or increase Clark's Nutcracker populations.	Identify potential effects of declining whitebark pine on Clark's Nutcracker reproductive potential.	Working with partners, assess the strength of the association between whitebark pine seed crops and reproductive success of Clark's Nutcracker. Develop appropriate response measures to improve habitat.	Clark's Nutcracker

Species designation, planning & monitoring

In addition to conservation actions to address specific threats, some species require inventory and monitoring to assess their current status and distribution in Idaho. This includes 5 SGCN insects—Western Bumble Bee, Suckley's Cuckoo Bumble Bee, Johnson's Hairstreak (*Callophrys johnsoni*), Gillette's Checkerspot (*Euphydryas gillettii)*, and the Harvestman species group—associated with Subalpine–High Montane Conifer Forest. In addition, some SGCN are declining from unknown causes or have specific conservation actions unrelated to the threats described above. We identify needs and appropriate actions in the section below.

Objective	Strategy	Action(s)	Target SGCNs
Provide suitable nesting and foraging habitat for Great Gray Owl.	Incorporate recommended buffer zones and protected activity centers (PACs) in timber management projects.	Work with federal forest land managers to establish a 300-m buffer around meadows adjacent to nest stands to maintain nesting, roosting, and fledgling habitat adjacent to foraging habitat. On federal lands, apply a limited operating period (LOP), prohibiting vegetation treatments and road construction within ¼ mi of an active Great Gray Owl nest stand, during the nesting period (typically Mar 1 to Aug 15). Work with state and private land managers to identify Great Gray Owl nest locations and develop site-specific conservation measures to address the habitat needs described above.	Great Gray Owl
Understand causes of decline in Olive-sided Flycatcher populations.	Determine relative importance of known and suspected threats to Olive-	Promote cooperation and collaboration with WWG PIF to fill knowledge gaps and to mitigate threats (see Canada's recovery plan, Appendix B; Environment Canada 2015*b*).	Olive-sided Flycatcher

Objective	Strategy	Action(s)	Target SGCNs
	sided Flycatcher, its prey, and its habitats.	Investigate factors that affect reproductive output, survival, and fidelity to breeding sites.	
Maintain sustainable habitat for a secure Fisher population.	Expand knowledge of the distribution, abundance, and habitat requirements of Fisher.	Conduct a targeted survey within known and potential habitat. Develop and participate in a multistate–provincial effort to monitor multiple carnivore species in the US Northern Rockies. Identify optimal fisher habitat needs and travel connectivity corridors.	Fisher
Determine the distribution of little-known insects and terrestrial gastropods in Subalpine–High Montane Conifer Forest.	Establish methods for assessing and monitoring status.	Conduct surveys to determine occurrence, abundance, and habitat associations in the Idaho Batholith.	Harvestman (*Acuclavella*) Species Group Pale Jumping-slug Shiny Tightcoil Western Bumble Bee Suckley's Cuckoo Bumble Bee Johnson's Hairstreak Gillette's Checkerspot

Target: Lower Montane–Foothill Grassland & Shrubland

Lower Montane–Foothill Grassland & Shrubland, South Fork Salmon River, Idaho © 2011 Nathan Borg

Lower Montane–Foothill Grassland & Shrubland accounts for a relatively small proportion of land area in the Idaho Batholith, but provides primary habitat for several SGCNs for whom the Batholith section encompasses a substantial portion of their range statewide (e.g., Bighorn Sheep). This grassland–shrubland complex is tightly associated with the major river corridors in the Idaho Batholith, where it covers steep canyon slopes up to where the plant community transitions to montane–foothill forest. In the southwestern portion of the Batholith section, this habitat is also prevalent on the open slopes around Lucky Peak and Arrowrock reservoirs and around Horseshoe Bend. This grassland and shrubland habitat occurs on state, federal (FS and Bureau of Land Management [BLM]), and privately-managed lands in the Batholith.

Lower Montane–Foothill Grassland & Shrubland is a fire-maintained ecosystem with warm, dry summers and cool, moist winters. Fire-maintained grasslands are comprised of perennial bunchgrasses (e.g., bluebunch wheatgrass

[*Pseudoroegneria spicata* (Pursh) Á. Löve], fescue [*Festuca* L.]), Sandberg bluegrass [*Poa secunda* J. Presl]) and a variety of forbs. Curl-leaf mountain mahogany (*Cercocarpus ledifolius* Nutt.) is an important shrub species used by Bighorn Sheep and other wild ungulates on winter range. Other representative shrub species include common snowberry (*Symphoricarpos albus* [L.] S.F. Blake), Rocky Mountain maple (*Acer glabrum* Torr.), mallow ninebark (*Physocarpus malvaceus* [Greene] Kuntze), black hawthorn (*Crataegus douglasii* Lindl.), blue elderberry (*Sambucus nigra* L. subsp. *cerulea* [Raf.] R. Bolli), chokecherry (*Prunus virginiana* L.), rose (*Rosa* L.), netleaf hackberry (*Celtis laevigata* Willd. var. *reticulata* [Torr.] L.D. Benson), and smooth sumac (*Rhus glabra* L.).

Target Viability

Good. The condition of Lower Montane–Foothill Grassland & Shrubland varies across the section but overall is good, with a desirable complement of native grasses, forbs, and shrubs. Where habitat occurs within roadless or wilderness boundaries, encroachment of noxious weeds tends to be localized. At the lower reaches of drainages and in the front country, noxious weeds and invasive annual grasses are more pervasive due to human use of the landscape. The suppression of wildfire in this fire-dependent ecosystem has resulted in conifer encroachment into grass- and scrublands and increased the potential for higher severity fire, paving the way for colonization by invasive plants.

Prioritized Threats and Strategies for Lower Montane–Foothill Grassland & Shrubland

High rated threats to Lower Montane–Foothill Grassland & Shrubland in the Idaho Batholith

Altered fire regimes

Fires historically burned at frequent intervals (Havlina 1995), resulting in a patchy mosaic of grasses and shrubs. Fire suppression compounded by changing temperature and precipitation patterns are trending this habitat toward larger and more intense fires. Altered fire cycles favor invasive plants and habitat conversion to less desirable species. Longer fire-return intervals allow conifer invasion into grass- and shrublands, which can prevent successful shrub regeneration (Havlina 1995).

Objective	Strategy	Action(s)	Target SGCNs
Move toward a natural (within historic range) fire regime.	Use prescribed fire to achieve appropriate species composition, reduce fuel loads, and rejuvenate grasslands.	Work with federal agencies to develop and implement programs that move fire management from reactive to proactive. Increase number of low-intensity controlled burns to create a better seral mosaic across the landscape. Strategically develop projects to minimize the potential for noxious weed invasion.	Mountain Quail Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Bighorn Sheep Terrestrial gastropods (see Table 4.2)
Conserve habitat for	Promote pollinator-friendly	Develop and incorporate measures to safeguard native pollinators during	Western Bumble Bee Suckley's Cuckoo

Objective	Strategy	Action(s)	Target SGCNs
native pollinators during fuels management activities.	prescribed fire techniques.	prescribed fire such as seasonal and daily timing to avoid blooming periods in pollinator foraging habitat.	Bumble Bee Monarch

Noxious weeds

Despite the remote nature and limited agricultural use of much of the Idaho Batholith, noxious weeds have become established in the northeastern and southeastern portions of this section (Northwest Power and Conservation Council 2003, 2004a, 2004b), particularly in nonwilderness and nonroadless areas where roads provide pathways for the spread of weeds. Road densities are on the high end in the Salmon–Cobalt and North Fork Ranger Districts of the Salmon–Challis National Forest from past timber management and road pioneering, facilitating the expansion of spotted knapweed (*Centaurea stoebe* L.) into lower-elevation grassland and shrubland habitat. Spotted knapweed also occurs along the Main Salmon River Corridor. Spotted knapweed, Canada thistle (*Cirsium arvense* [L.] Scop.), and Scotch cottonthistle (*Onopordum acanthium* L.) are prevalent in the South Fork Boise River watershed.

Objective	Strategy	Action(s)	Target SGCNs
Control or eradicate noxious weeds.	Work with FS, BLM, and other partners to control or reduce noxious weed occurrence.	Participate in County Cooperative Weed Management Area (CWMA) collaboratives. Map and identify noxious weed patches and share data with the appropriate land manager. Support the use of biological controls (insects) on infestations of spotted knapweed. Conduct aggressive weed management as part of post-fire habitat restoration. Provide native grass and shrub seed recommendations to land managers.	Mountain Quail Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Bighorn Sheep Terrestrial gastropods (see Table 4.2) Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Species designation, planning & monitoring

In addition to conservation actions to address specific threats, some species require inventory and monitoring to assess their current status and distribution in Idaho. This includes Western Bumble Bee, Suckley's Cuckoo Bumble Bee, Monarch (*Danaus plexippus*), and virtually all of the SGCN terrestrial gastropods associated with Lower Montane–Foothill Grassland & Shrubland listed in Table 4.2. In addition, some SGCN are declining from unknown causes or have specific conservation actions unrelated to the threats described above. We identify needs and appropriate actions in the section below.

Objective	Strategy	Action(s)	Target SGCNs
Determine current distribution and abundance of	Conduct a targeted survey within known and potential	Repeat 2003–2004 Mountain Quail survey routes; add new routes in modeled potential habitat as needed.	Mountain Quail

Objective	Strategy	Action(s)	Target SGCNs
Mountain Quail.	Mountain Quail habitat.		
Determine cause(s) of decline for nightjar species in Idaho.	Work with WWG PIF and the PFNTC to assess causes(s) of decline.	Assist WWG PIF with adjusting current Nightjar Survey Network protocols to collect data that will inform potential cause(s) of decline, including assessments of insect prey populations and their habitats. Work with WWG PIF and PFNTC to identify opportunities for research on contaminant impacts.	Common Nighthawk
Determine distribution of little-known insects and terrestrial gastropod species.	Establish methods for assessing and monitoring status.	Conduct surveys to determine the occurrence, abundance, and habitat associations in the Idaho Batholith.	Terrestrial gastropods (see Table 4.2) Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
Determine taxonomic status of little known species.	Clarify species status.	Work with researchers to determine the genetic status of Coeur d'Alene Oregonian.	Coeur d'Alene Oregonian
Reduce native pollinator exposure to contaminants (pesticides and neonicotinoid insecticides).	Promote Best Management Practices (BMP) across all ownerships to reduce the application of contaminants.	Engage landowners and managers to incorporate pollinator-friendly BMPs in existing control programs, including spot applications, timing of applications (seasonal and time of day).	Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
Increase public awareness of pollinators.	Develop public education and outreach materials for pollinators.	Design and distribute promotional materials describing the importance of pollinators. Develop a create habitat brochure for private landowners to establish and maintain pollinator habitat. Develop materials to share information about milkweeds, and to address concerns about weediness and toxicity held by some portions of the general public.	Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Target: Alpine & High Montane Scrub, Grassland & Barrens

Alpine & High Montane Scrub, Grassland & Barrens accounts for a relatively small proportion of land area in the Idaho Batholith, but provides primary habitat for two SGCNs for whom the Batholith section encompasses a substantial portion of their range statewide—Wolverine and Mountain Goat. This habitat includes grass and sedge communities, heath and willow dwarf shrubland, wet meadow, and sparsely vegetated rock and scree. It is found in and above treeline in cirque basins, adjacent to subalpine lakes, along spring-fed streams, and in avalanche runout zones. The hydrology is tightly associated with snowmelt and springs. In the Idaho Batholith, this habitat occurs at the tops of peaks in the Sawtooth and Salmon River mountains.

Alpine habitat, Sawtooth Mountains, Idaho © 2015 Robin Garwood, Sawtooth National Recreation Area

Target Viability

Good. Condition of Alpine & High Montane Scrub, Grassland & Barrens is good in the Idaho Batholith. Much of this habitat occurs in designated wilderness where human-associated resource damage is minimal. Because of the remoteness and inaccessibiliy of this habitat in the Batholith, the occurrence and distribution of many SGCN species, including Black Rosy-Finch (*Leucosticte atrata*), insects, and other invertebrates is not well known. It has been suggested that any grasshopper encountered above 8,000 ft could be a new species (R. Winton, IDFG, pers. comm.; D. Otte, Academy of Natural Sciences of Drexel University, pers. comm.).

Spotlight Species of Greatest Conservation Need: Mountain Goat

Mountain Goats (*Oreamnos americanus*) are endemic to alpine and subalpine habitats of western North America. Idaho represents the southern extent of the native range of the species and the Idaho Batholith supports the greatest (37%) modeled distribution in the state. Native populations occur in the Salmon River Mountains and Stanley Basin. Mountain Goats occupy precipitous, inaccessible terrain. In Idaho, some populations migrate from alpine habitats to lower-elevation south-facing slopes dominated by curl-leaf mountain mahogany. Other populations winter in alpine habitats where wind and steep southern exposures create areas of reduced snow pack. Mountain Goats naturally occur at relatively low densities, in part due to sparse forage resources, interspecific competition, and patchy habitat. Most populations exhibit low productivity because females do not reproduce until age 3–4, females typically give birth to 1 kid (rarely twins), and juveniles and yearlings have low survival, with falls being one cause.


Mountain Goat © 2010 Nick Myatt

Central Idaho has experienced a decline in abundance post-1960, characterized by localized fluctuations. For example, counts from aerial surveys in the Upper South Fork Salmon River drainage went from a high of 95 in 1954 to 9 in 2003. Mountain Goats are sensitive to human disturbance such as resource extraction developments, overharvest, and, particularly, helicopter overflights (Cote 1996). Snow-machining, helicopter-based recreation, and developed ski areas potentially reduce habitat suitability for the species (Hurley 2004, Richards and Cote 2015). Because habitat in Idaho is already limited to the highest elevation mountain ranges, changing temperature and precipitation patterns could affect the amount and quality habitat for this iconic species.

Prioritized Threats and Strategies for Alpine & High Montane Scrub, Grassland & Barrens

High rated threats to Alpine & High Montane Scrub, Grassland & Barrens in the Idaho Batholith

Changes in precipitation & broad-scale hydrologic regimes

Increasingly milder winter temperatures and changing precipitation patterns, compounded by drought, is increasing the vulnerability of Alpine & High Montane Scrub, Grassland & Barrens. Alpine habitat is limited in Idaho, and could become scarcer in the face of changing temperature and precipitation patterns. The most significant issue in this habitat is the uncertainty of changes in depth and persistence of snowpack. This system is dependent on snowfields and gradual snowmelt to maintain moisture for vegetation. Much work is needed to determine what impacts these changes will have on alpine birds, particularly Black Rosy-Finch, and what may be done to mitigate for these changes. The need also exists to determine whether additional stressors may exacerbate the effects of changing temperature and precipitation patterns on SGCN.

Objective	Strategy	Action(s)	Target SGCNs
Obtain reliable projections of future climate change impacts	Produce finer-scale projections of temperature and precipitation	Work with researchers to update regionally downscaled Global Climate Models (using the most current models and emission scenarios) and associated	Black Rosy-Finch Wolverine Mountain Goat Hoary Marmot

Objective	Strategy	Action(s)	Target SGCNs
on alpine habitats in central Idaho.	patterns for central Idaho and assess potential effects on SGCN habitat. Assess potential changes in tundra habitat phenology and its relationship to migratory SGCN.	climate indicators (e.g., snow data). Use results of downscaled models to produce maps of predicted seasonal temperatures and snow cover. Partner with researchers to investigate the relationship of Black Rosy-Finch seasonal occurrence with alpine habitat phenology.	Grasshoppers (3 species; Table 4.2) Spur-throated Grasshopper (*Melanoplus*) Species Group
Increase understanding of species-specific relationships with temperature.	Investigate relationship of SGCN occurrence with temperature regimes.	Work with partners, including universities, US Fish and Wildlife Service (FWS) and WWG PIF to develop methods and identify funding opportunities to implement research on temperature associations of Black Rosy-Finch and Wolverine.	Black Rosy-Finch Wolverine

Species designation, planning & monitoring

In addition to conservation actions to address specific threats, some species require inventory and monitoring to assess their current status and distribution in the Idaho Batholith. This includes SGCN of several taxa associated with Alpine & High Montane Scrub, Grassland & Barrens. We identify needs and appropriate actions in the section below.

Objective	Strategy	Action(s)	Target SGCNs
Determine occurrence and distribution of little-known SGCN.	Establish methods for assessing and monitoring status.	Work with partners, including FWS and WWG PIF, to develop protocols and identify funding opportunities for surveys. Conduct surveys to determine the occurrence, abundance, and habitat associations in the Idaho Batholith.	Black Rosy-Finch Mountain Goat Hoary Marmot Grasshoppers (3 species; Table 4.2) Spur-throated Grasshopper (*Melanoplus*) Species Group
Determine taxonomic status of little known species.	Clarify species status.	Work with researchers to determine the taxonomic uniqueness of these species.	Spur-throated Grasshopper (*Melanoplus*) Species Group
Improve understanding of Black Rosy-Finch prey base in alpine systems, including high mountain lakes and snow fields.	Design and implement a study on foraging habitat and prey.	Work with partners, including FWS and WWG PIF to identify funding opportunities and implement foraging studies.	Black Rosy-Finch

Target: Riverine–Riparian Forest & Shrubland

This diverse habitat includes small, narrow headwater and montane streams with high gradients and water velocities, lower-gradient larger streams and rivers, and the riparian habitats associated with these watercourses. Headwater stream habitat typically supports fewer pools and more rapids, and is dominated by boulders, cobbles, gravel, and less mobile large woody debris. They export much of the fine material in the watershed. Aquatic communities are usually dominated by shredder and collector macroinvertebrates and small fish (e.g., juvenile salmonids, sculpin [*Cottus* spp.], etc.). Larger streams and rivers are characterized by pools, riffles, and glides which allow for deposition of cobble, gravel, sand, and woody debris on alluvial bars and the formation of floodplains in wider valleys. Aquatic communities tend to be dominated by collector and grazer macroinvertebrates and larger fish. Riparian shrub and forest communities enhance aquatic habitat by stabilizing banks and moderating stream conditions, and support a high diversity of SGCN species.

Lochsa River, Idaho © 2009 Justin Barrett

Six major river systems define the Idaho Batholith. The Lochsa and Selway in the north drain to the Clearwater River. The Salmon drains the vast central part of the Batholith before merging with the Snake River to the west. The Payette, Deadwood, and Boise rivers drain south to the Snake River. The Lochsa River supports the highest number of breeding Harlequin Duck pairs in the state. The Salmon Subbasin, which extends into the Beaverhead and Challis Volcanics sections, provides more anadromous fish spawning area than any other subbasin in the Columbia River Basin (Northwest Power and Conservation Council 2014). Isolated patches of milkweed, a critical forage plant for Monarch, have been observed within the Main Salmon riparian corridor.

Target Viability

Fair. The condition of Riverine–Riparian Forest & Shrubland habitat across the Idaho Batholith is fair. Based on Idaho DEQ subbasin assessment, approximately half of the total subbasin area of the major drainages within the Batholith supported their designated beneficial uses (e.g., cold-water fish habitat, salmonid spawning, or recreation). Rivers and streams representing the remaining subbasin area, mostly in the Payette and Boise River drainages, have assigned maximum daily load limits to improve conditions (e.g., temperature, sediment, flow). The Salmon River and its tributaries provide some of the most pristine aquatic habitat in the entire Columbia River Basin (Northwest Power and Conservation Council 2014). However, anadromous fish populations struggle to persist upstream of the major hydropower dams on the lower Snake River outside of the Idaho Batholith. Idaho's anadromous fish populations are at low adult abundance compared to historic levels and most are federally listed under the ESA.

Spotlight Species: Anadromous Salmonid Fishes

Three species of endemic Pacific salmon and steelhead (*Oncorhynchus* spp.) spawn and rear in riverine habitats of the Idaho Batholith, and historically contributed major proportions of the production in the Columbia Basin. Current distributions, limited by human alteration in many watersheds and greatly diminished from historical abundances, are limited to 2 major free-flowing subbasins of the Snake River: the Clearwater and Salmon. All three of these important game species are under ESA protection and are the focus of considerable effort and funding for conservation, mitigation, and supplementation (Northwest Power and Conservation Council 2014).

Chinook, Beaver Creek, Idaho © 2011 Debi Jensen

Unique for anadromous salmonids around the world, Snake River salmon and steelhead make incredibly long freshwater migrations to and from the ocean, migrating 500 to 900 mi from rearing areas and then returning to those same river reaches to spawn. Populations returning to the Idaho Batholith convey ecologically important ocean-derived nutrients to this inherently nutrient poor region. Most every accessible stream and river reach provides spawning/rearing habitat for one or more of these species. This includes larger rivers that support fall-run Chinook Salmon (*Oncorhynchus tshawytscha*) through progressively smaller streams to 7,500-ft-elevation lakes in the headwaters of the Salmon River, which are home to Sockeye Salmon (*O. nerka*). Spring/summer-run Chinook Salmon and Steelhead (*O. mykiss*) are widespread throughout the Batholith.

Prioritized threats and strategies for Pacific Lamprey and Idaho's anadromous salmonids are addressed in several documents that detail approaches for conservation and recovery. The overarching documents include the IDFG Fisheries Management Plan 2013–2018 (IDFG 2013), Northwest Power and Conservation Council's Columbia River Basin Fish and Wildlife Program 2014, and the Pacific Lamprey Assessment and Template for Conservation Measures (US Fish and Wildlife Service 2011). This State Wildlife Action Plan defers to those documents.

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

High rated threats to Riverine–Riparian Forest & Shrubland in the Idaho Batholith

Changes in precipitation & broad-scale hydrologic regimes

Increasingly milder winter temperatures and more moisture falling as rain than snow, particularly in lower-elevation watersheds, point toward changes in the timing and distribution of water flow. Peak river flows will likely shift to earlier in the spring, less water will remain in rivers and streams later in the summer, reservoirs will release flows earlier, and water temperatures will continue to rise. These changes could be exacerbated by growing human demands on limited water resources. A shift to high-flow events during late-winter/early spring would coincide with Harlequin Duck nesting and brood-rearing and potentially affect nest success and cause brood mortality. Reduced summer flows and increases in stream temperatures could alter hatching times of aquatic invertebrates, affecting prey composition and forage quality for Harlequins, or render feeding and brood-rearing areas unavailable if streams run dry. Impacts to fisheries due to warmer water temperatures include physiological effects such as lower growth rates that can result in higher predation, increased susceptibility to invasive and nonnative species, and reduced cold-water refuges.

Objective	Strategy	Action(s)	Target SGCNs
Maintain and protect high quality riverine aquatic and riparian habitat in the uncertainty of changing environmental conditions.	Reduce anthropogenic impacts to riverine habitat to ameliorate potential effects from changing hydrologic regimes and temperature patterns.	Assess implications of changing hydrologic regimes under forecasted climate models. Introduce buffer zones along montane riparian habitats to maintain stream bank stability riparian structure and function, including snags and woody debris. Work with state, federal, and willing private partners to reduce or avoid siting projects (diversions, hydropower developments, and other activities) that alter runoff or impede natural hydrologic flow. Work with partners, including private landowners, to assess and implement ways to increase capacity and water storage, such as American Beaver restoration and irrigation management.	Pacific Lamprey Steelhead (Snake River Basin DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring/summer-run ESU) Harlequin Duck Mountain Quail Sandhill Crane Common Nighthawk Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Western Ridged Mussel Salmon Oregonian A Riffle Beetle (*Bryelmis idahoensis*) Lolo Mayfly A Mayfly (*Parameletus columbiae*) Monarch Lolo Sawfly Idaho Forestfly Caddisflies (10 species; Table 4.2)

Species designation, planning & monitoring

In addition to conservation actions to address specific threats, some species require inventory and monitoring to assess their current status and distribution in the Idaho Batholith. This includes virtually all of the SGCN insects, aquatic invertebrates, and terrestrial gastropods associated with Riverine–Riparian Forest & Shrubland listed in Table 4.2. We identify needs and appropriate actions in the section below.

Objective	Strategy	Action(s)	Target SGCNs
Improve understanding of Harlequin Duck distribution, abundance, and population status.	Design studies that improve understanding of the factors that influence Harlequin Duck stream occupancy, survival, and reproduction.	Mark and track individuals on the breeding grounds to better understand habitat use, survival rates, causes and timing of mortality, patterns and timing of movements, linkages between breeding, molting, and wintering areas, and return rates. Seek partnerships with coastal states and provinces to study wintering ecology and habitat use. Investigate how human disturbance, changes in forest management, and stream flow characteristics (severity, timing, and frequency of peak and low stream flows) affect behavior, occupancy, reproductive success, and survival on breeding streams.	Harlequin Duck
Establish baseline population metrics for Harlequin Duck.	Implement a coordinated Harlequin Duck monitoring program.	Develop partnerships, funding, and capacity to conduct breeding surveys statewide on a regular basis following the protocol established in the Harlequin Duck Conservation Assessment and Strategy for the US Rocky Mountains (Cassirer et al. 1996). Where local declines are documented, expand surveys upstream of historically occupied stream reaches. Coordinate surveys with MT, WY, OR, BC, and AB to facilitate a northwest regional population assessment. Incorporate Harlequin Duck surveys into riverine multitaxa monitoring programs.	Harlequin Duck
Determine distribution of little-known insects and terrestrial gastropods in Riverine–Riparian Forest & Shrubland.	Establish methods for assessing and monitoring status.	Conduct surveys to determine occurrence, abundance, and habitat associations in the Idaho Batholith.	Western Pearlshell Western Ridged Mussel Rotund Physa Marbled Jumping-slug Marbled Disc Boulder Pile Mountainsnail Striate Mountainsnail Selway Forestsnail Coeur d'Alene Oregonian Salmon Oregonian A Riffle Beetle (*Bryelmis idahoensis*) Lolo Mayfly

Objective	Strategy	Action(s)	Target SGCNs
			A Mayfly (*Parameletus columbiae*) Monarch Lolo Sawfly Idaho Forestfly Caddisflies (10 species; Table 4.2)
Establish baseline information on Monarch occurrence,	Assess distribution of milkweed patches and their occupancy by Monarch.	Design and conduct surveys for milkweed habitat and presence of Monarch within the Salmon River corridor.	Monarch

Target: Springs & Groundwater-Dependent Wetlands

Springs & Groundwater-Dependent Wetlands are both common and diverse in the Idaho Batholith, where they support stream and river base flows and provide important habitat for wildlife and plants. This habitat target contains a subset of Springs & Groundwater-Dependent Wetlands ecosystems, including springs, fens, wet meadows, and seep-fed tree- or shrub-dominated wetlands. Groundwater-dependent wetlands often occur on sloping land with gradients that range from steep hillsides to nearly imperceptible slopes. Groundwater sources can originate from a regional aquifer or from localized infiltration of surface water (e.g., snowmelt, precipitation, seasonal flooding).

Elk Meadows, Little French Creek, Salmon River, Idaho © 2005 Lisa Harloe

Wet meadows are common across the Idaho Batholith, often occurring as large features in gently sloping glacial outwash basins and subalpine glacial trough valleys typically between 5,000 and 7,000 ft in elevation. Extensive meadow systems occur in the Elk and Bear Valley Creek areas north of Lowman, in Chamberlain Creek basin of the Frank Church–River of No Return Wilderness, at the base of the Sawtooth Mountains near Stanley, and in the mountains north of McCall. They are fed by low-velocity surface and subsurface flows. Meadows can also occur as strips or patches at headwater springs (common in the South Fork Clearwater River basin), along toeslope seeps, around ponds and lakes, and in Depressional Wetlands. Sites are seasonally shallowly flooded to saturated, often drying by late summer. Sites may have surface water for part of the year, but depths rarely exceed 15 cm. Wet meadows can be closely associated with snowmelt. Vegetation occurs as a mosaic of several plant associations (reflecting soil or hydrologic changes), or as large stands of one or 2 species such as sedges (Murphy et al. 2011). Nonnative grasses are common in meadows disturbed by livestock grazing or seeded for haying. These spring- and seep-fed hay and pasture meadows occur near human settlements such as Elk City, Long Valley (McCall, Donnelly, Cascade), and Stanley, but they are priorities for wetland conservation and restoration based on their wetland functions, including habitat for SGCN (Murphy et al. 2012a).

Toeslope seeps adjacent to meadows and montane springs are a groundwater-dependent system dominated by shrubs. Lower montane seeps and springs are often dominated by quaking aspen (*Populus tremuloides* Michx.) or a mix of shrubs with a diverse, lush understory.

Peatland fens occur at montane to subalpine elevations (5,000 to 7,500 ft) in the Idaho Batholith. Excellent examples of fens occur north and east of the Sawtooth Mountains (Sawtooth Valley, Banner Summit, Cape Horn), in Long Valley north of Cascade Reservoir, Tranquil Basin in the Deadwood Reservoir area, and elsewhere. They often form on spring-fed gentle slopes. They are confined to areas with groundwater discharge, specific soil chemistry, and peat accumulation exceeding 30–40 cm in thickness. They are self-supporting, old ecosystems, having been in place since the retreat of Pleistocene glaciers and are thus difficult or impossible to restore. Groundwater maintains a fairly constant water level year-round. They often form on aquifers perched atop less permeable volcanic ash layers in glacial till. Constant high water levels and cold winter temperatures slow decomposition and lead to accumulation of organic material (peat) and eventual colonization by plants and mosses adapted to typically nutrient-poor peat soils. As peat accumulates, ridges or mounds may form, which can be relatively dry compared to flatter or interspersed depressional areas. Conifer swamps, another type of groundwater-dependent wetland, occur In the Idaho Batholith as small patches on sloped seeps and springs with peaty or mucky soils that are saturated year-round.

Seep-fed shrublands in Idaho Batholith foothills, Boise River WMA, Boise River, Idaho © 2013 Chris Murphy

Target Viability

Good. Overall, Springs & Groundwater-Dependent Wetlands in the Idaho Batholith is in good condition, although habitat extent is reduced from historic levels. This is especially true in lower elevation intermountain valleys where seeps and springs have been diverted and wet meadows have been seeded for haying and livestock pasture, housing, and road development (e.g., Long Valley, Stanley Basin) (NPCC 2004). Using the model of landscape integrity, which incorporates mapped land uses and stressors to estimate condition, about 59% of groundwater-dependent wetlands are in "Very Good" condition compared to 10% in "Good" and 26% in "Fair" condition (Murphy et al. 2012b). This model likely overestimated on-the-ground condition because it didn't capture localized impacts. In comparison, rapid assessments conducted in the field at 18 groundwater-dependent wetlands in the Idaho Batholith found these wetlands to be in "Good" condition (Murphy et al. 2012b). The most important stressors affecting wetlands include hydrologic modifications (e.g., diversions, stream channelization) and soil disturbance (e.g., livestock, recreation), with invasive nonnative plant species being slightly less important. Seep and spring-fed wetlands located at higher elevations, including roadless and wilderness areas, are more likely to be in the "Very Good" condition class.

Prioritized Threats and Strategies for Springs & Groundwater-Dependent Wetlands

High rated threats to Springs & Groundwater-Dependent Wetlands in the Idaho Batholith

Improper livestock grazing management

The presence of easily accessible, consistent surface water and lush, productive wet meadow vegetation tends to concentrate livestock around seeps and springs. Soil disturbance, primarily due to livestock grazing, was a moderate to high level stressor observed during field assessments of these wetland habitats in the Idaho Batholith (Murphy et al. 2012b). Impacts include the loss or decrease of trees and shrubs (e.g., aspen and willows) and deeply-rooted native herbaceous vegetation, which results in reduced cover, shade for aquatic habitat, and soil stabilization (Sada et al. 2001, Abele 2011); increased runoff and soil erosion, which lowers the water table and dries out seep-fed meadows (Sada et al. 2001, Abele 2011); and elevated levels of fine sediment, which reduces aquatic habitat quality for resident mollusks.

Objective	Strategy	Action(s)	Target SGCNs
Maintain the ecological condition of springs, seeps, and other groundwater-dependent wetlands.	Coordinate with land managers to maintain proper livestock management around springs, seeps, and groundwater-dependent wetlands to improve ecological	Inventory, prioritize, and map springs, meadows, and fens in need of restoration and protection based on condition and use by SGCN. Support the use of BMPs to protect high-priority sites and monitor effectiveness. Consider the following BMPs (Abele 2011): exclusion of livestock by installing and maintaining temporary or permanent fencing; providing alternate water sources (e.g., alternate delivery points away	Western Toad Mountain Quail Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Pristine Pyrg A Click Beetle (*Beckerus barri*) A Skiff Beetle (*Hydroscapha redfordi*) Lolo Mayfly

Objective	Strategy	Action(s)	Target SGCNs
	condition.	from spring sources); protecting heavy use areas by providing hardened livestock access; developing management plans that change seasons of use or prescribe rest or deferment for meadows, fens, springs, and seeps. Actively restore riparian vegetation (e.g., plantings) and aquatic habitat in springs that have been degraded by improper livestock grazing.	A Mayfly (*Parameletus columbiae*) Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (10 species; Table 4.2) Idaho Amphipod

Changes in precipitation & broad-scale hydrologic regimes

Increasingly milder winter temperatures and more moisture falling as rain than snow, particularly in lower-elevation watersheds, point toward changes in the timing and distribution of water flow, including lower snow pack depth, earlier runoff, and lower summer groundwater discharge. The extent of wetlands and their hydrologic connectivity could potentially decrease, with some wetlands drying completely. Resulting decline in habitat for amphibians could be compounded by associated genetic isolation. Although milder winters, longer growing seasons, and wetter falls might mitigate some negative pressures on frog survival and dispersal, overall effects of changing precipitation and hydrologic regimes are likely to be negative (Pilliod et al. 2015). Similarly, increased frequency, intensity, and size of wildfire could have short-term benefits for amphibians and aquatic species by increasing ecosystem productivity (e.g., less canopy cover, more sunlight reaching wetlands, higher temperatures), but the long-term effects are not known. Restoring American Beaver (*Castor canadensis*) to its historic range is a strategy that could increase the resiliency of wetlands and promote hydrologic connectivity for Western Toad and other SGCN (McGee and Keinath 2004, NPCC 2004).

Objective	Strategy	Action(s)	Target SGCN
Improve resiliency of wetland habitats to changing hydrologic regimes and precipitation patterns.	Incorporate climate data and models in strategic planning, research, management, and conservation actions to improve resiliency of wetland habitat.	Work with partners to assess implications of changing hydrologic regimes under forecasted climate models and use results to identify the location, extent, and condition of the most vulnerable wetlands. Identify knowledge gaps that inhibit prioritization and action. Initiate research to address knowledge gaps. Assess the potential to use American Beaver translocations to maintain wetland habitat. Monitor and evaluate the effectiveness of reintroduction projects.	Western Toad Mountain Quail Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Pristine Pyrg A Click Beetle (*Beckerus barri*) A Skiff Beetle (*Hydroscapha redfordi*) Lolo Mayfly A Mayfly (*Parameletus columbiae*) Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (10 species; Table 4.2) Idaho Amphipod

Loss and degradation of wetland habitat due to human land uses

The cumulative effects of human land uses have resulted in loss or degradation of wetland habitat and the important functions they provide. Observed land uses within, or immediately adjacent to, wetlands in the Idaho Batholith include agriculture (pasturing and haying), housing development, road and utility construction and maintenance, and recreation and trail development. These activities often remove wetland vegetation, facilitate nonnative species invasion, increase water pollution (e.g., sediment, nutrients, bacteria, toxic chemicals), and degrade and fragment wildlife habitat. Spring-dependent cold-water SGCN invertebrates generally are negatively affected by land uses that alter hydrology, remove riparian vegetation, and increase sediment (Stagliano et al. 2007). Aquatic habitat degradation from road construction and maintenance, damming and water diversion, campgrounds, and livestock grazing are primary threats to the SGCN mollusk Pristine Pyrg (*Pristinicola hemphilli*). The potential negative effects of water pollutants on amphibians are well studied. Recreational activities such as angling, hiking, biking, OHVs, and camping can damage vegetation and soils, interrupt migration, disturb SGCN wildlife (e.g., Western Toad, Sandhill Crane [*Grus canadensis*]), and inadvertently spread amphibian diseases on waders, boats, and vehicles. In addition, amphibian predators may be attracted to human-built environments (McGee and Keinath 2004). Road construction and maintenance within or adjacent to wetlands potentially results in vehicle-related disturbance or mortality, sediment and chemical pollution from runoff, habitat fragmentation, and barriers. Hydrologic disturbance was an observed moderate-level stressor during field assessments of these wetland habitats in the Idaho Batholith (Murphy et al. 2012b). Water diversions directly threaten aquatic and terrestrial groundwater-dependent habitats by reducing water volume, creating species migration barriers, directly destroying physical habitat and vegetation, and decreasing soil moisture necessary for supporting riparian and meadow vegetation (Abele 2011).

Objective	Strategy	Action(s)	Target SGCN
Protect, maintain, and restore, where appropriate, aquatic and terrestrial habitat and hydrologic condition and function of springs, seeps, fens, and meadows.	Work with partners to implement projects that protect, maintain, and/or improve aquatic and terrestrial habitat and hydrologic function of springs, seeps, fens, and meadows.	Identify opportunities to minimize diversions, impoundments, and developments at spring sources and wetlands to provide naturally-flowing habitat for spring- and wetland-dependent species. Use conservation funding programs for private lands to preserve undeveloped and minimally-impacted natural springs that have high value for SGCN. Use tools (e.g., boulders, logs, American Beaver introductions) to stabilize headcuts and raise the water table of incised channels in fens and meadows. Plant locally adapted native trees, shrubs, and deeply-rooted native herbaceous species to	Western Toad Mountain Quail Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Pristine Pyrg A Click Beetle (*Beckerus barri*) A Skiff Beetle (*Hydroscapha redfordi*) Lolo Mayfly A Mayfly (*Parameletus columbiae*) Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (10 species; Table 4.2) Idaho Amphipod

Objective	Strategy	Action(s)	Target SGCN
		shade out undesirable, invasive vegetation and stabilize soil.	
Minimize human-related disturbance to wetlands, with a focus on Stanley Basin, Long Valley, and Elk City areas.	Work with landowners, managers, and conservation partners to identify opportunities to improve stewardship of wetlands on public and private lands using a variety of conservation programs and mechanisms that minimize human disturbance.	Identify wetlands vulnerable to development and prioritize sites in need of protection and restoration. Support/initiate programs/efforts (e.g., Farm Bill, NAWCA, Idaho Soil and Water Conservation Commission, land trusts, etc.) that facilitate partnerships with willing private landowners to restore and protect wetlands. Work with partners to identify opportunities to concentrate recreational use and access in one area compared to dispersed access points by creating boardwalks, bridges, designated use areas, and footpaths for access and restricting vehicles and equipment to existing roads (Abele 2011).	Western Toad Mountain Quail Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Pristine Pyrg A Click Beetle (*Beckerus barri*) A Skiff Beetle (*Hydroscapha redfordi*) Lolo Mayfly A Mayfly (*Parameletus columbiae*) Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (10 species; Table 4.2) Idaho Amphipod

Upland & aquatic invasive species

The occurrence of nonnative plant species was a stressor observed during field assessments of wetland habitats in the Idaho Batholith (Murphy et al. 2012). The most abundant invasive plants in groundwater-dependent meadows were introduced as livestock forage and include reed canarygrass (*Phalaris arundinacea* L.), bluegrass (*Poa pratensis* L., *P. bulbosa* L., *P. palustris* L.), bentgrass (*Agrostis capillaris* L., *A. stolonifera* L.), seeded haygrasses (*Alopecurus pratensis* L., *Lolium* L., *Phleum pratense* L., *Holcus lanatus* L., *Dactylis glomerata* L.), and nonnative clover (*Trifolium* L.). Native lodgepole pine (*Pinus contorta* Douglas ex Loudon) has colonized some meadows due to meadow desiccation and lack of wildfire. Springs in the Batholith are susceptible to invasion by noxious weeds and invasive nonnative forbs, including creeping buttercup (*Ranunculus repens* L.), dock (*Rumex* L.), lesser burdock (*Arctium minus* Bernh.), common tansy (*Tanacetum vulgare* L.), and Canada thistle (*Cirsium arvense* [L.] Scop.). Although some of these plants may provide benefits such as streambank stabilization or pollinator habitat they typically replace native plant communities with which SGCN evolved.

Objective	Strategy	Action(s)	Target SGCN
Decrease or eradicate occurrences of noxious weed and invasive nonnative species in wetland habitats.	Working with partners, use an integrated, Early Detection and Rapid Response System for Invasive Plants approach (biological, chemical, and/or	Work with CWMAs to detect, treat, and monitor noxious weeds. Maintain awareness of new noxious and invasive species. Work with land management agencies and private landowners to secure funds and create incentives for control of noxious weeds and invasive nonnative plants and animals.	Western Toad Mountain Quail Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Pristine Pyrg A Click Beetle

Objective	Strategy	Action(s)	Target SGCN
	mechanical methods) to control noxious weeds and undesirable, highly invasive nonnative plant and animal species.	Maintain a database of sites inventoried for invasive species and control actions undertaken. Prioritize wetlands for treatment and eradication of noxious weeds and invasive nonnative species based on their negative impacts to SGCN. Restore meadows with low diversity and production caused by invasive species (e.g., reed canarygrass) through appropriate use of fire, herbicides, seasonal flooding, seeding, and/or other treatments. Avoid chemical application within habitat occupied by sensitive species.	(*Beckerus barri*) A Skiff Beetle (*Hydroscapha redfordi*) Lolo Mayfly A Mayfly (*Parameletus columbiae*) Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (10 species; Table 4.2) Idaho Amphipod

Species designation, planning & monitoring

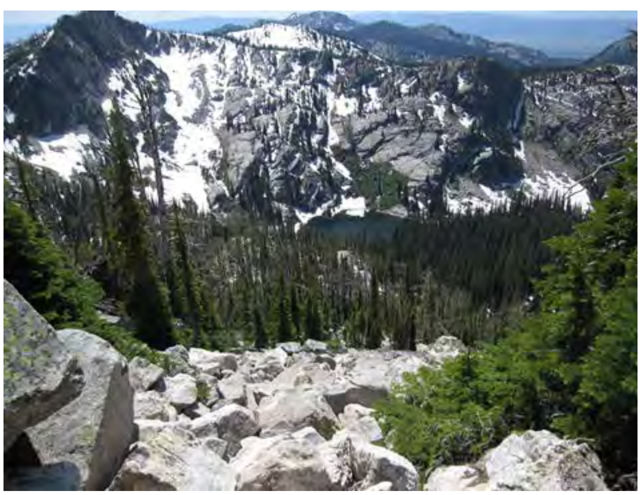
In addition to conservation actions to address specific threats, some species require inventory and monitoring to assess their current status and distribution in Idaho. We identify needs and identify appropriate actions in the section below.

Objective	Strategy	Action(s)	Target SGCNs
Determine distribution of little-known insects and terrestrial gastropods in Springs & Groundwater-Dependent Wetlands.	Establish methods for assessing and monitoring status.	Conduct surveys to determine occurrence, abundance, and habitat associations in the Idaho Batholith.	Pristine Pyrg A Click Beetle (Beckerus barri) A Skiff Beetle (*Hydroscapha redfordi*) Lolo Mayfly A Mayfly (*Parameletus columbiae*) Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (10 species; Table 4.2) Idaho Amphipod

Target: Lakes, Ponds & Reservoirs

Cascade Reservoir, Idaho © 2015 IDFG

These aquatic habitats include natural lakes, deep ponds, dam-altered naturally formed lakes, and reservoirs constructed for irrigation storage, flood control, and/or hydropower. These waterbodies also are used extensively for water-based recreation. They range from smaller gravel mine ponds and livestock water reservoirs to large lakes in glacial carved valleys. The largest open waterbodies in the Idaho Batholith are Lake Cascade, a reservoir on the North Fork Payette River, and Payette Lake in McCall, a dam-altered natural lake. Three extensive mainstem impoundments on the Boise River and South Fork Boise River—Anderson Ranch, Lucky Peak, and Arrowrock reservoirs—mark the southern boundary of the Idaho Batholith section. The Sawtooth Moraine Lakes are a chain of glacial lakes nestled against the east flank of the Sawtooth Mountains. These lakes (Alturas, Perkins, Pettit, Yellowbelly, Redfish, and Stanley lakes) provide strategic "stepping stone" refugia for waterbirds, waterfowl, and shorebirds migrating through the central Idaho mountains. Redfish, Pettit, and Alturas lakes support natural production of endangered Snake River Sockeye Salmon.



Buckhorn Lake, Idaho © 2012 Curt Mack

Alpine lakes, also called "high mountain lakes" are a distinct category of Lakes, Ponds & Reservoirs that occur at upper montane and subalpine elevations. High mountain lakes typically form in glacial ice-carved basins (e.g., cirques) where bedrock or moraine deposits create a depression. The surrounding cirque wall slopes are often steep and prone to rock and gravel deposits from eroding peaks and avalanche disturbance. High mountain lakes can occur in a series or in hanging valleys. High mountain lakes are more functionally defined as "those you can't drive to." Of the estimated >3,000 high mountain lakes in Idaho, over two-thirds lie within the Idaho Batholith section. These alpine lakes are managed under the IDFG Fisheries Management Plan 2013–2018 (IDFG 2013) guided through a Memorandum of Understanding with the FS.

Target Viability

Fair. Habitat conditions of Lakes, Ponds & Reservoirs collectively are fair. Deep-water lakes (e.g., Payette and Redfish lakes), support good conditions. Lake Cascade, a shallow reservoir, has long-standing water quality issues that suppress its ability to fully support all beneficial uses (IDEQ 2009), yet supports a mixed cold and warm water fishery that is extremely popular among anglers and provides an easily accessible food supply for large concentrations of Osprey (*Pandion haliaetus*), Bald Eagles (*Haliaeetus leucocephalus*), and the largest nesting colony of Western and Clark's Grebes (*Aechmophorus clarkii*) in the state. The 3 southernmost impoundments do not provide habitat for SGCN nesting birds because shorelines are barren and there is no emergent vegetation. High mountain lakes exhibit good water quality, but introductions of fish into some alpine lakes have lowered amphibian production potential.

Spotlight Species of Greatest Conservation Need: Western and Clark's Grebes

Western and Clark's Grebes are so similar in appearance, and perform the same rituals during courtship, that until 1985 they were considered different color phases of the same species. In Idaho they occur together at breeding sites, although Western Grebe far outnumbers Clark's Grebe. These 2 grebes nest in colonies, and Lake Cascade in the Idaho Batholith supports the largest nesting concentration in the state, upwards of 700 nests in some seasons. Lake Cascade was designated an Idaho Important Bird Area in part because of this nesting grebe concentration. Grebes on Lake Cascade likely benefited from IDFG's efforts to recover the Yellow Perch (*Perca flavescens*) fishery in these waters in recent years.

Western Grebe with chicks © 2012 Ron Dudley

Grebes build floating nests in emergent vegetation found in shallow back channels and coves. Once eggs are laid, these nests are extremely vulnerable to abrupt rises or falls in water levels, whether from natural high wind and wave events or water-level management. Unlike ducks or geese, grebes have difficulty walking on dry land, so rapidly receding water is as much a concern as flooding. Maintaining consistent water levels for the ~3 weeks of nest incubation is an important management strategy.

Prioritized Threats and Strategies for Lakes, Ponds & Reservoirs

High rated threats to Lakes, Ponds & Reservoirs in the Idaho Batholith

Changes in precipitation & broad-scale hydrologic regimes

Increasing temperatures and changing precipitation patterns, compounded by severe drought years, is increasing the vulnerability of Lakes, Ponds & Reservoirs. More moisture is falling as rain during winter months, particularly at low and mid elevations, reducing snowpack. Less snow equates to earlier runoff and reduced stream and river flows in the spring and summer, which affects recharge timing and volume for reservoirs and lakes. Earlier snowmelt would be particularly problematic for shallow high mountain lakes that do not have inlet streams, as they could begin to dry completely (D. Pilliod, USGS, pers. comm.).

Objective	Strategy	Action(s)	Target SGCNs
Promote long-term persistence of native amphibians and aquatic insects in alpine aquatic ecosystems.	Continue to manage for sufficient amounts of lentic habitats in alpine basins.	Assess the landscape-level distribution of amphibian habitat, including high mountain lakes, in the context of changing hydrologic patterns.	Western Toad
Assess potential impacts of drought on wetland-dependent species.	Participate in wetland connectivity assessment in the West.	Work with PFNTC to develop and implement a connectivity assessment.	Western Toad Western Grebe Clark's Grebe Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis

Invasive species

Lakes, Ponds & Reservoirs in the Idaho Batholith are relatively free of invasive aquatic species and diseases, but should invasives gain a foothold, the ecological and economic damage could be severe to the pristine waterbodies in the Batholith. No evidence of Zebra (*Dreissena polymorpha*) or Quagga Mussel (*D. bugensis*) has been detected in Idaho waters to date (T. Woolf, ISDA, pers. comm.), although 25 contaminated vessels were intercepted at Idaho check stations in 2015 (ISDA 2015). Aquatic invasive plants are potentially a higher threat than dreissenid mussels (small freshwater mussels) due to the sterile conditions and low calcium content of waterbodies in the Batholith. Eurasian watermilfoil (*Myriophyllum spicatum* L.) was detected in Payette Lake in 1999, with an active eradication program underway. This invasive aquatic plant also occurs in Lucky Peak Reservoir, and several other reservoirs are considered "susceptible." Systematic surveys for amphibian chytridiomycosis, a disease caused by a fungal pathogen, *Batrachochytrium dendrobatidis* (*Bd*), have not been conducted in the Idaho Batholith.

Objective	Strategy	Action(s)	Target SGCNs
Educate the public on potential vectors to prevent the establishment of *Bd*.	Implement surveillance for *Bd* in amphibian populations.	Develop a sampling scheme and implement systematic surveys for *Bd* at high mountain lakes.	Western Toad

Objective	Strategy	Action(s)	Target SGCNs
Keep waterbodies free from invasive Eurasian watermilfoil.	Facilitate the implementation of the 2008 Statewide Strategic Plan for Eurasian Watermilfoil in Idaho (ISDA 2007).	Eradicate watermilfoil where it occurs in the Idaho Batholith.	Western Grebe Clark's Grebe
Maintain invasive mussel-free waters.	Promote ongoing statewide surveillance efforts for dreissenid mussels.	Promote boat inspection stations, boat washing stations, and plankton tow surveys. Promote ongoing education/outreach efforts, including signs at boat launches and brochures.	Western Grebe Clark's Grebe

Unstable water levels at managed impoundments

Projected long-term fluctuations in climate patterns and associated shifts in peak water flows affect recharge timing and volume for reservoirs managed for irrigation, flood control, hydropower, and instream flow augmentation for salmon. This situation could be compounded in severe drought years. Lake Cascade is managed in an integrated system with Deadwood Reservoir and a third reservoir outside of the Batholith. Lake Cascade water levels begin to drop after full pool is reached in late June. The rate and volume of release is critical for nesting grebes, as nests could be flooded or left high and dry depending on management.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of low nesting success and recruitment of Western and Clark’s Grebes.	Conduct research on existing colonies.	Collaborate with FWS, Bureau of Reclamation (BOR), and other partners to investigate reasons for frequent colony-wide grebe nest failures, low nest success, and low recruitment on Lake Cascade.	Western Grebe Clark’s Grebe
Reduce nest loss due to inconsistent reservoir water levels for colony-nesting birds.	Maintain consistent water levels during nesting season to minimize nest flooding or stranding. Enhance nest success by minimizing human disturbance during nest initiation and incubation.	If appropriate, develop BMPs with BOR for water level management that reduces nest loss while also meeting irrigation needs. Educate the public though signage at boat launches about the sensitivity of colonial nesting birds to reduce recreational impacts.	Western Grebe Clark’s Grebe

Species designation, planning & monitoring

In addition to conservation actions to address specific threats, some species require inventory and monitoring to assess their current status and distribution in Idaho. This includes 2 insect species associated with Lakes, Ponds & Reservoirs. Other SGCN have knowledge gaps related to the threats described above. We identify needs and appropriate actions in the section below.

Objective	Strategy	Action(s)	Target SGCNs
Determine distribution of little-known insect	Establish methods for assessing and monitoring status.	Conduct surveys to determine the occurrence, abundance, and habitat associations in the	A Miner Bee (*Perdita salicis euxantha*) A Miner Bee (*Perdita*

Objective	Strategy	Action(s)	Target SGCNs
species.		Idaho Batholith.	*wyomingensis sculleni*)

Target: Wolverine

Although previously a candidate for listing as endangered or threatened under the ESA, the FWS issued a decision in 2014 that listing the Wolverine was not warranted (FWS 2014). However, the Wolverine and its habitat remain a management priority for IDFG. Conservation issues and management actions are described in the *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014). Wolverines inhabit remote, high-elevation montane habitats centered near alpine treeline where cold, snowy conditions exist for much of the year (Copeland 1996, Copeland et al. 2010, Inman et al. 2013). The Idaho Batholith supports the largest proportion of modeled wolverine habitat in Idaho, and it occurs as a relatively interconnected block due to the configuration of the Batholith. However, this region is near the southernmost extent of the Wolverine's current range in North America. During the last 30 years, wolverines have been documented at least once in most of the suitable habitat blocks in the Batholith (IDFG data). Important core populations occur in the Salmon River Mountains north and east of McCall and the Sawtooth Mountains near Stanley, based on research encompassing these areas (Copeland 1996, Heinemeyer and Squires 2014). Observations in the Gospel–Hump and Selway–Bitterroot Wilderness Areas suggest breeding populations in those areas as well, although recent studies have not been conducted. Essentially all occupied Wolverine habitat in the Idaho Batholith occurs on lands managed by the FS.

Wolverines captured on remote camera, Sawtooth Mountains, Idaho © 2015 Chris Klingler, Sawtooth National Recreation Area

Target Viability

Fair. After near extirpation by the early 1900s, Wolverine observations have increased throughout Idaho, with many of those observations from the mountains of central Idaho within the Batholith section. Although the current distribution statewide is believed to be similar to historical extent, we lack information to determine if density and productivity are similar to historical levels (IDFG 2014). For example, the apparent number of occupied female territories in the Idaho Batholith is lower than suitable habitat seemingly could support (Heinemeyer and Squires 2012). Despite the general remoteness of the Idaho Batholith overall, localized areas of high human activity coincide with occupied habitat and may influence habitat use. Like other rare species that occur at low densities, Wolverine is vulnerable to the consequences of low genetic diversity and isolation, potentially resulting in lower population resiliency to environmental changes.

Prioritized Threats and Strategies for Wolverine

Very High rated threats to Wolverine in the Idaho Batholith

Changing temperature & precipitation pattern uncertainty

Available scientific literature demonstrates that Idaho's climate is changing. Extreme cold days are projected to decrease in central Idaho and existing snow is expected to continue melting earlier throughout the Pacific Northwest (IDFG 2014 and citations therein). However, climatic projections and their potential impacts to Wolverine habitat contain a range of uncertainties. Issues of scale, differences in the magnitude of change between lower and higher elevations, and the complex topography of the Idaho Batholith all create impediments to accurate projections from climate models (IDFG 2014). Persistent, stable snow cover appears to be an important feature of denning habitat (97% of all known den sites across the Wolverine's global range as of 2010 coincided with a model of late, i.e., "persistent" spring snow; Copeland et al. 2010), yet this apparent ecological relationship is not fully understood. Given the association of Wolverine distribution with cold environments, this species may be vulnerable to changing climate.

Objective	Strategy	Action(s)	Target SGCNs
Reliable projections of future climate change impacts on alpine and subalpine habitats in central Idaho.	Produce finer-scale projections of temperature and precipitation patterns for central Idaho.	Work with researchers to update regionally downscaled Global Climate Models (using the most current models and emission scenarios) and associated climate indicators (e.g., snow data). Use results of downscaled models to produce maps of predicted seasonal temperatures and snow cover to identify potential refugia.	Wolverine
Increase our understanding of the ecological relationship between Wolverine and snow and cold temperatures.	Research Wolverine-snowpack relationships.	Work with researchers to design and implement field study on the Wolverine's degree of dependence on snow, and particularly persistent snow for denning.	Wolverine

High rated threats to Wolverine in the Idaho Batholith

Potential effects of winter snow sports recreation

Winter backcountry recreation (e.g., skiing, snowmobiling, snowshoeing) is one of the fastest growing recreational activities in Idaho (Cook and O'Laughlin 2008). Snowmobiling participants in Idaho doubled between 1995 and 2011 (IDPR 2012). McCall is a popular access point to hundreds of miles of groomed trails in the Idaho Batholith that support one of the highest user rates in the state. The Stanley Basin is another high-use snowmobiling destination. An expanding human footprint into previously inaccessible areas during winter coincides with the Wolverine's most energetically demanding period of the year. Recent science from central Idaho suggests high levels of winter recreation may result in increased movement rates and changes in habitat use of Wolverines (Heinemeyer and Squires 2014). Understanding this relationship more thoroughly is a priority for the IDFG, the FS, and winter sports groups.

Objective	Strategy	Action(s)	Target SGCNs
Increase our understanding of the level of threat winter snow sports recreation poses for Wolverine in the Idaho Batholith.	Use results of latest science to characterize Wolverine response to recreation.	Support the Central Idaho Wolverine–Winter Recreation Study data collection and analysis and disseminate results to internal and external partners.	Wolverine
Provide secure Wolverine denning habitat throughout the Idaho Batholith.	Predict areas of potential overlap of Wolverine with high levels of dispersed snow sports recreation.	Merge data on snowpack projections and Wolverine home ranges to map areas of overlap. Engage in travel planning and access issues to develop reasonable guidelines compatible with conservation of secure Wolverine denning areas if warranted by available science.	Wolverine

Target: Bighorn Sheep

The Idaho Batholith, along with Challis Volcanics, supports the only native Bighorn Sheep remaining in Idaho. These native Rocky Mountain Bighorn Sheep were never extirpated from the Salmon River drainage and represent the largest populations in the state (IDFG 2010). The Idaho Department of Fish and Game describes Rocky Mountain Bighorn Sheep as "a unique and irreplaceable resource" (IDFG 2010). Bighorn Sheep distribution in the Idaho Batholith is concentrated within the Salmon River and Selway River drainages in the north-central portion of this section, where they occupy dry, bunchgrass habitats and dry ponderosa pine-grasslands along river breaks and in rugged canyons. Higher-elevation alpine habitat is used to some extent in the summer. Most of the occupied habitat is managed by the FS and much of that is within designated wilderness. Habitat occurs to a lesser extent on BLM land and small private inholdings. Despite this remoteness, viewing Bighorn Sheep is a popular recreational pursuit, particularly for private and commercial river rafters.

Bighorn Sheep populations are managed in Idaho with a separate species management plan (IDFG 2010). Sheep occurrence in the Batholith is defined within 3 Population Management Units (PMUs), described in detail in the Bighorn Sheep Management Plan (IDFG 2010): Lower Salmon River, Selway, and Lower Panther–Main Salmon River. The Lower Salmon River population has persisted with no reintroductions or augmentations. The Selway PMU was augmented in 1989 with 29 sheep across 2 locations, but recent surveys suggest this effort was unsuccessful. The once healthy Panther Creek Bighorn Sheep population was the primary source for translocation to other sites in the 1970s and 1980s. Subsequent population decline prompted a reverse translocation of 16 sheep from Oregon to the Shoup area in 1984.

Target Viability

Fair. Bighorn Sheep numbers are much reduced from the 1980s in all three PMUs in the Idaho Batholith. Disease is established in the Lower Panther–Main Salmon River and Lower Salmon River PMUs, resulting in low lamb survival and recruitment for a number of years. However, some herds remain relatively unaffected by disease. The status of disease in the Selway PMU is uncertain and recent surveys suggest good lamb survival, creating uncertainty as to why this population continues to decline (IDFG 2010). Noxious weeds and encroachment of conifer forests due to fire suppression have affected habitat quality to some degree in the Batholith. Because of the remoteness and management designation of much of the occupied range in this section, issues associated with human development are relatively low. The northeastern corner of the Batholith is an exception, where high road densities, potential mining and geothermal energy development, and timber harvest could negatively affect populations and habitat.

Bighorn Sheep ewe and lamb, Salmon River, Idaho © 2011 Nez Perce Tribe

Prioritized Threats and Strategies for Bighorn Sheep

Very High rated threats to Bighorn Sheep in the Idaho Batholith

Disease

Disease was a significant factor in the historic decline of Bighorn Sheep and is a key factor limiting recovery throughout Idaho (IDFG 2010). Respiratory disease (pneumonia) is the most significant disease, resulting in negative effects on populations through increased adult and lamb mortality. Bighorn Sheep are vulnerable to organisms carried by healthy domestic sheep and goats, and once these organisms are transmitted, there is no effective treatment in Bighorn Sheep. Therefore, the most important management direction to reduce the impact of disease on Bighorn Sheep populations is to minimize or eliminate contact between Bighorn Sheep and domestic sheep and goats that could result in disease transmission (IDFG 2010).

Objective	Strategy	Action(s)	Target SGCNs
Work to reduce the effects of disease on Bighorn Sheep populations.	Advocate and work toward maintaining spatial and temporal separation between Bighorn Sheep and domestic sheep and goats.	Work with willing domestic sheep permittees, FS, and BLM to identify and implement BMPs (e.g., limit estrus ewes near wild sheep populations, develop effective grazing patterns, track and report missing livestock) to maintain separation between Bighorn Sheep and domestic sheep and goats. Work with the FS, BLM, and other land management agencies to identify appropriate alternative management options. Capture or euthanize wild sheep and stray domestic sheep or goats if found in an area (removal zone) where contact is likely (IDFG 2010). Work with ranchers to seasonally coordinate grazing patterns (WAFWA 2007; IDFG and ISDA 2008).	Bighorn Sheep
Improve education and outreach efforts regarding risks associated with contact between Bighorn Sheep and domestic sheep and goats.	Collaborate with ISDA and Idaho Wool Growers Association to develop education and outreach strategies.	Work with a key representative(s) from the livestock production sector to act as a mediator between agencies and producers to open the door to better communications between both groups on science and management issues. Seek out and speak to organized pack goat groups about risk of disease transmission. Develop signs for trailheads with information on avoiding contact with wild Bighorn Sheep.	Bighorn Sheep

Idaho Batholith Section Team

An initial version of the Idaho Batholith Section project plan was completed for the 2005 Idaho State Wildlife Action Plan. A small working group developed an initial draft of the Section Plan (Miradi v 0.19), which was then reviewed by a much wider group of partners and stakeholders at a 2-day meeting held at the Idaho Department of Fish and Game Headquarters Office, Boise, Idaho, in February 2015 (this input was captured in Miradi v 0.20). Since then, we have continued to work with key internal and external stakeholders to improve this section of the plan. Materials in this document are based on Miradi v. 0.28. Individuals, agencies, and organizations involved in this plan are listed in Table 4.3.

Table 4.3 Individuals, agencies, and organizations involved in developing this plan [a]

First Name	Last Name	Affiliation
Diane	Evans Mack* [b]	Idaho Department of Fish and Game, Southwest Region—McCall Office
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Dale	Allen	Idaho Department of Fish and Game, Southwest Region—McCall Office
Kim	Apperson	Idaho Department of Fish and Game, Southwest Region—McCall Office
Kerey K	Barnowe–Meyer	Nez Perce Tribe
Joanne	Bonn	US Forest Service Nez Perce–Clearwater National Forests
William R	Bosworth	Idaho Department of Fish and Game, Southwest Region—Nampa Office
Jay	Carlisle	Intermountain Bird Observatory
Trisha	Cracroft	Natural Resources Conservation Service
Rita	Dixon	Idaho Department of Fish and Game, Headquarters
Jon	Dudley	US Forest Service Rocky Mountain Research Station
Ana	Egnew	US Forest Service Payette National Forest
Robin	Garwood	US Forest Service Sawtooth National Forest
Clay	Hayes	Idaho Department of Fish and Game, Clearwater Region
Clay	Hickey	US Forest Service Nez Perce–Clearwater National Forests
Paul	Janssen	Idaho Department of Fish and Game, Southwest Region—McCall Office
Michael	Lucid	Idaho Department of Fish and Game, Panhandle Region
Chris	Murphy	Idaho Department of Fish and Game, Headquarters
Steve	Nadeau	Idaho Department of Fish and Game, Headquarters
Lisa	Nutt	US Forest Service Boise National Forest
David	Parrish	Idaho Department of Fish and Game, Headquarters
Nick	Salafsky	Foundations of Success
Joel	Sauder	Idaho Department of Fish and Game, Clearwater Region
John	Shivik	US Forest Service, Intermountain Region

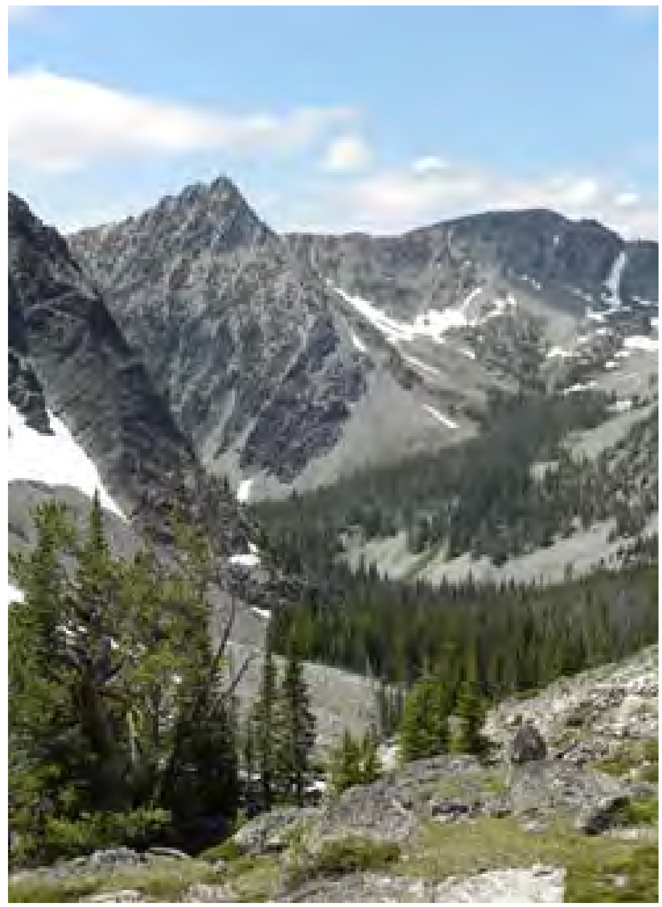
First Name	Last Name	Affiliation
Leona	Svancara	Idaho Department of Fish and Game, Headquarters
Allyson	Turner	US Fish and Wildlife Service
Dmitri	Vidigar	Bureau of Reclamation
Joe	Weldon	Bureau of Land Management
Ross	Winton	Idaho Department of Fish and Game, Magic Valley Region

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

5. Beaverhead Mountains Section

Section Description

The Beaverhead Mountains Section is part of the Middle Rockies–Blue Mountains Ecoregion, an expansive landscape of rugged mountains and intermontane valleys including major portions of Oregon, Idaho, Montana, and a small part of Washington. The Beaverhead Mountains Section within Idaho comprises 16,430 km^2 (6,345 mi^2), and together with a 28,330 km^2 (10,940 mi^2) expanse in southwestern Montana, constitutes the largest Section within the Middle Rockies–Blue Mountains Ecoregion. The Idaho portion of the Beaverhead Mountains Section encompasses east-central Idaho from the Continental Divide and state line along the Beaverhead, Centennial, and northern Henrys Lake Mountains, west to the Salmon River Valley and south through the Lemhi and Lost River mountain ranges (Fig. 5.1, Fig. 5.2).



Upper Freeman Creek, Beaverhead Mountains © 2011 Beth Waterbury

The Section is a complex physical environment including the highest mountain ranges in Idaho contrasting with intermontane basins and broad valleys, with elevations ranging from 1,100 to 3,860 m (3,600 to 12,662 ft). The diversity of its physical landscape is reflected in its partition into 13 ecological subsections, more than any other section in the state with the exception of the massive Idaho Batholith. The Beaverhead Mountains Section experiences a continental climate with cold, relatively dry winters influenced by the rainshadow effect of the central Idaho mountains. Average annual precipitation varies from over 127 cm (50 in) at the Beaverhead Mountains crest to 20–40 cm (8–16 in) across most of the Section. Most precipitation occurs as snow during winter and early spring, while summers are comparatively dry.

The Section is characterized by expansive publicly-owned lands and a sparse, largely rural human population. Public lands constitute 87% of the land area and are managed to produce forage for cattle grazing, mineral commodities, and wood products, and to provide recreation and terrestrial and aquatic habitats. Privately-owned lands comprise just 13% of the Section’s land base and are generally concentrated along watercourses where settlers typically chose to homestead. Beef cattle and hay/alfalfa forage production are the primary uses on private land, although residential development is increasing, driven by the area's exceptional scenic and recreational amenities.

Vast roadless landscapes of high ecological integrity are the hallmark of this section, providing refugia and movement corridors for wild ungulates, forest carnivores, and other species with large spatial requirements. The easternmost extent of the Centennial Mountains is occupied by Grizzly Bear (*Ursus arctos*) and is contiguous with the primary conservation area for Grizzly Bears centered on Yellowstone National Park (Merrill and Mattson 2003). The Continental Divide along the Centennial and Beaverhead mountains is considered an important linkage corridor for wildlife movement connecting the Greater Yellowstone Ecosystem with the rest of the northern Rocky Mountains (Schwartz et al. 2009, Inman et al. 2013). For purposes of geographic continuity and to best incorporate existing regional conservation and management activities, Shotgun Valley and Henrys Lake Flat in the eastern portion of the Beaverhead Mountains Section are discussed more fully in the Yellowstone Highlands Section.

Aquatic, riparian, and wetland habitats cover approximately 2% of the section, but comprise the most biologically diverse and productive systems of this region. These areas provide primary breeding and foraging habitat for native ungulates, amphibious mammals, birds, bats, amphibians, fish, and aquatic invertebrates, and function as migratory networks on the landscape. The Salmon, Pahsimeroi, Lemhi, and North Fork Salmon rivers in the north half of the Section are notable in supporting populations of one or more native species of salmonids, including anadromous stocks that complete the longest migration in the lower 48 states. At the south end of the Section lie the Sinks Drainages, a collection of closed surface drainage basins originating in the Pioneer, Lost River, Lemhi, and Centennial mountain ranges that flow generally east and south, eventually sinking into the fractured basalts of the Snake River Plain (Van Kirk et al. 2003). At the far eastern end of the Centennials are smaller headwater streams draining into Henrys Lake. Aquatic systems in the Centennial and Henrys Lake Mountains support American Beaver (*Castor canadensis*), Moose (*Alces americanus*), a diverse avian community, and important headwater populations of native Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*).

The Section's aquatic systems are intrinsically intertwined with its history, culture, and economy. In the Upper Salmon drainage, much of the currently occupied habitat of ESA-listed Salmon (*Oncorhynchus* spp.) and Steelhead (*O. mykiss*) occurs on private lands, which also represents lands most important for local economies. Over the last 2 decades, community-driven conservation programs have made significant progress in addressing limiting factors to listed salmonids while minimizing regulatory impacts and revenue losses to the agricultural community. Project work, including tributary reconnection, diversion screening, and instream flow enhancement, has not only benefited fish and wildlife, but has helped to sustain popular recreational fisheries that infuse significant revenue to local communities. The Salmon River is also a renowned multiuse recreation destination for whitewater rafters, other boaters, and outdoor enthusiasts that support a vital tourism industry.

Beaverhead Mountains vegetation reflects an overlap of floristic elements from the Rocky Mountain, Great Basin, and Great Plains regions influenced by the Section's diverse geology and vertical relief, as well as its continental climate (Cooper et al. 1999). The Section's extensive uplands are characterized by sagebrush steppe and mountain shrublands at low to mid-elevations and a relatively narrow forested zone grading up to patchy alpine meadows and barrens at highest elevations.

Sagebrush steppe is the most prevalent habitat in the Beaverhead Mountains Section, covering approximately 53% of the area. Most sagebrush lands are managed by the Bureau of Land Management (BLM), though extensive mountain big sagebrush (*Artemesia tridentata* spp. *vaseyana*) sites occur on US Forest Service (FS) lands. Sagebrush habitats exhibit high ecological integrity relative to other Idaho Sections based on their large spatial extent, contiguous distribution, and comparatively low human footprint. These attributes contribute to conditions that support viable populations of Greater Sage-Grouse (*Centrocercus urophasianus*), a "landscape-scale species" dependent on interconnected seasonal habitats (Wakkinen 1990). A large proportion of sagebrush steppe in this section comprises Greater Sage-Grouse Priority Habitat Management Areas (PHMAs). Diverse sagebrush communities also provide important habitat for sagebrush-obligate species such as Pygmy Rabbit (*Brachylagus idahoensis*), Pronghorn (*Antilocapra americana*), and Sage Thrasher (*Oreoscoptes montanus*), and steppe-associate species including Long-billed Curlew (*Numenius americanus*), Short-eared Owl (*Asio flammeus*), and Ferruginous Hawk (*Buteo regalis*).

Forests comprise the second most abundant land cover, occupying approximately 25% of the Section. Forest types range from Douglas-fir forests at lower timberline to mixed Douglas-fir and lodgepole pine at mid elevations to spruce-fir in the subalpine zone. The severe climate produces a relatively narrow forested zone. In some areas, soil moisture is not sufficient for tree growth on south and west aspects below timberline; thus, steppe communities often extend up through what would typically be the forested subalpine zone (Cooper et al. 1999). Drier forest types predominate in this section, limiting the probability of occurrence for SGCN species requiring more mesic forest types such as Fisher (*Pekania pennanti*). Although Fishers with native genetic lineage occur in this section (Waterbury 2012), their distribution appears localized in the northernmost, middle elevation forests of the North Fork Salmon River drainage and Beaverhead Mountains most proximal to core Fisher habitats in north-central Idaho.

Other less frequent but ecologically important forest types are ponderosa pine (*Pinus ponderosa*), whitebark pine (*Pinus albicaulis*), Utah juniper (*Juniperus osteosperma*), and quaking aspen (*Populus tremuloides*). Ponderosa pine is a major component of low elevation warm, dry forests at the far north end of the Section. Whitebark pine may occur as a climax species at treeline or as a seral species or codominant with subalpine fir. Utah juniper is found in patchy, open-canopied woodlands on the southernmost foothill toeslopes of the Lost River, Lemhi, Beaverhead, and Centennial mountain ranges. Aspen is a relatively rare component of the forest landscape, forming small, isolated stands in aggregate with conifers. Aspen habitats in the Centennial Mountains are a notable exception, where they can form extensive stands of seral and climax community types (Mueggler 1988).

The mountain ranges of this region all experienced Pleistocene alpine glaciation and today support extensive alpine communities ranging from high relief cirquelands to alpine meadows and barrens above 2,900 m (9,500 ft). Since alpine habitats make up less than 1% of the land area in Idaho (378,656 acres [153,300 ha]), this community is unique and has significant conservation value. Alpine habitats in this section support few vertebrate species, but those that do occur such as Black Rosy-Finch (*Leucosticte atrata*), Hoary Marmot (*Marmota caligata*), Mountain Goat (*Oreamnos americanus*), and Wolverine (*Gulo gulo*), are uniquely adapted to harsh climatic conditions. Snowpack from alpine catchments is critically important to maintaining favorable flow regimes in the Section's rivers and streams.

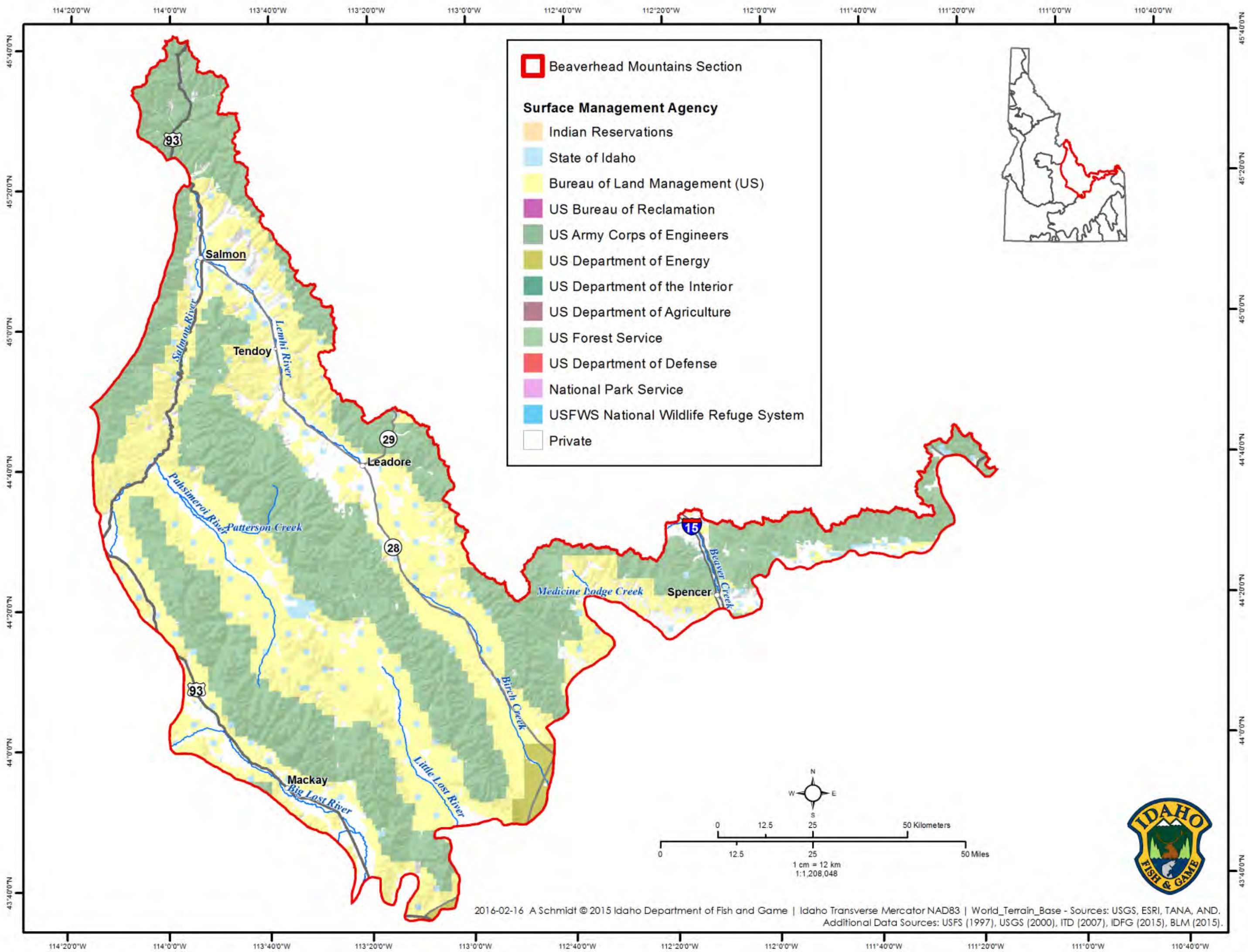


Fig. 5.1 Map of Beaverhead Mountains surface management

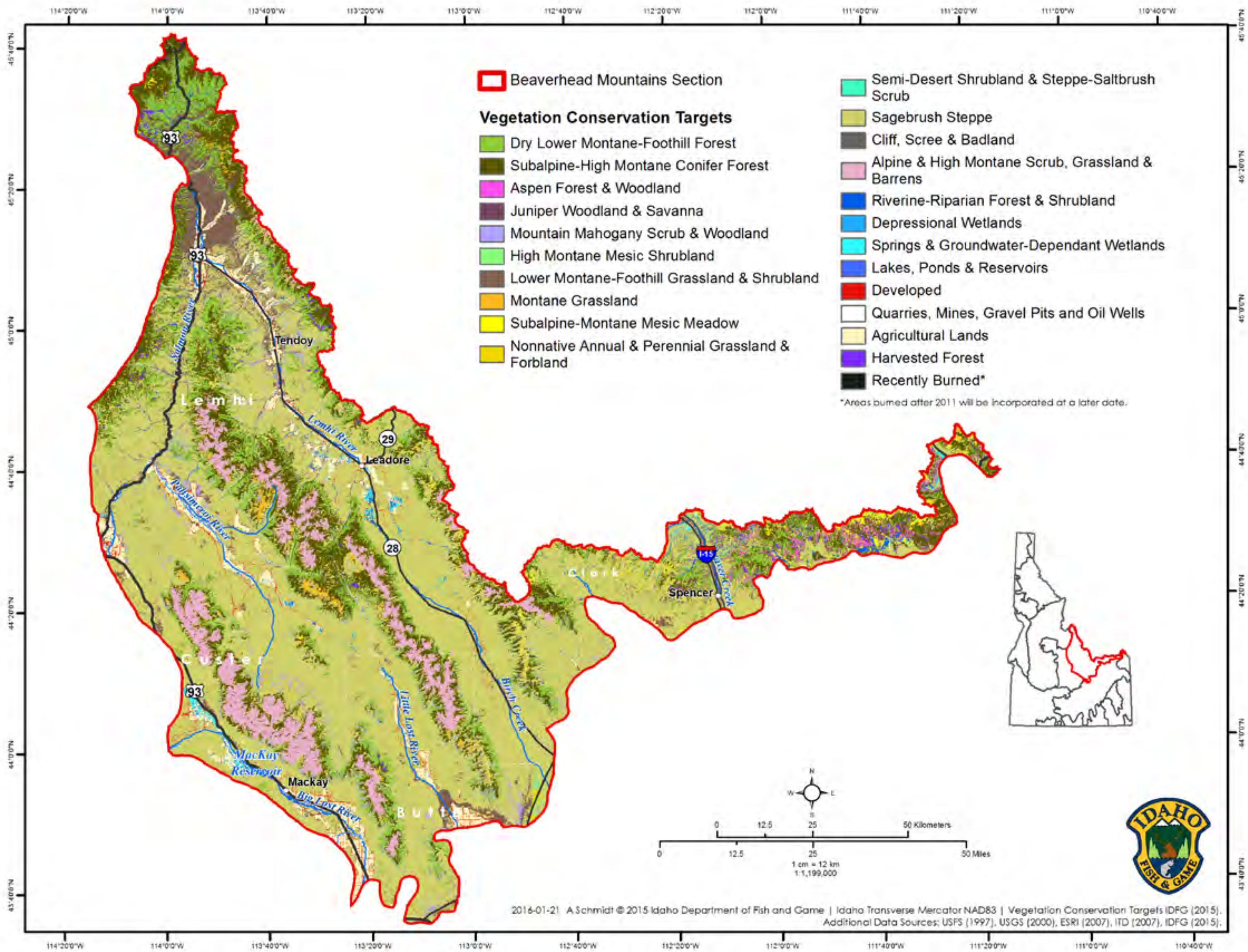


Fig. 5.2 Map of Beaverhead Mountains vegetation conservation targets

Conservation Targets in the Beaverhead Mountains

Eleven habitat targets (8 upland, 3 aquatic) were selected to represent the major ecosystems in the Beaverhead Mountains Section as shown in Table 5.1. Each of these systems provides habitat for key species of greatest conservation need (SGCN), i.e., "nested targets" (Table 5.2) associated with each target. All SGCN management programs in the Beaverhead Mountains have a nexus with habitat management programs. We provide a high-level summary of current viability status for each target. Conservation of the habitat targets listed below should conserve most of the nested species within them. However, we determined that at least 3 taxa—Wolverine, Bighorn Sheep (*Ovis canadensis*), and Pollinators—face special conservation needs and thus are presented as explicit species targets as shown in Table 5.1.

Table 5.1 At-a-glance table of conservation targets in the Beaverhead Mountains

Target	Target description	Target viability	Nested targets (SGCN)	
Dry Lower Montane–Foothill Forest	Forms 9% of section's land base at mid-elevations. Douglas-fir forests predominate with ponderosa pine codominant at the north end. Utah juniper woodlands occur on rocky foothills at the south end. Quaking aspen and mountain mahogany are often intermixed.	*Fair*. Fire suppression has created conditions highly susceptible to insect outbreaks and high severity stand-replacing fires. Lack of disturbance has also suppressed vigor of understory vegetation and allowed extensive areas of Douglas-fir to encroach on grassland and sagebrush-steppe habitats.	*Tier 1*	Wolverine Grizzly Bear
			Tier 2	Western Toad Ferruginous Hawk Golden Eagle Lewis's Woodpecker Silver-haired Bat Hoary Bat Fisher Bighorn Sheep Lyrate Mountainsnail
			Tier 3	Common Nighthawk Olive-sided Flycatcher Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Spur-throated Grasshopper (*Melanoplus*) Species Group
Subalpine–High Montane Conifer Forest	Comprises 15% of section's land base. Generally forms the highest-elevation forests including the upper treeline ecotone with alpine habitat. This section contains important populations of whitebark pine, a keystone and foundation species of this target.	*Fair*. Altered fire regimes are favoring succession of fire-intolerant trees more susceptible to high-severity fires. The threat posed by white pine blister rust, in synergy with Mountain Pine Beetle, altered fire regimes, and climate warming, threatens the viability of whitebark pine communities and the ecosystem	*Tier 1*	Wolverine Grizzly Bear
			Tier 2	Western Toad Golden Eagle Silver-haired Bat Hoary Bat Fisher
			Tier 3	Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Black Rosy-Finch Little Brown Myotis Mountain Goat Gillette's Checkerspot

Target	Target description	Target viability	Nested targets (SGCN)
		services they provide.	
Aspen Forest & Woodland	Aspen is an uncommon (<2% of land base) yet important habitat in this section. Although small in extent, aspen communities harbor high biodiversity, maintain water storage capacity for watersheds, and offer recreation and scenic value to humans.	*Poor*. Aspen decline across the western US is attributed to altered fire regimes and heavy ungulate grazing leading to poor regeneration. Recurring drought as a result of climate warming could exacerbate aspen decline.	*Tier 1* Grizzly Bear *Tier 2* Western Toad, Lewis's Woodpecker, Silver-haired Bat, Hoary Bat, Fisher *Tier 3* Great Gray Owl, Common Nighthawk, Olive-sided Flycatcher, Townsend's Big-eared Bat, Western Small-footed Myotis, Little Brown Myotis
Mountain Mahogany Scrub & Woodland	These unique shrublands and woodlands occur in small to large scattered stands in steep canyons, rocky outcrops, and steppe slopes of this section. Stands provide important winter cover for Mountain Goat, Bighorn Sheep, and other wild ungulates. Mountain mahogany is highly palatable to Bighorn Sheep, Moose, Elk, and Mule Deer.	*Fair*. Where dry conifer types are expanding due to altered fire regimes, mountain mahogany may be replaced as conifers dominate the canopy. Under this scenario and continued fire exclusion, this system is at risk from stand-replacing fire.	*Tier 2* Bighorn Sheep, Lyrate Mountainsnail *Tier 3* Mountain Goat
Lower Montane–Foothill Grassland & Shrubland	Comprising 5% of the section's land base, this target includes a subset of grasslands, shrub steppe, and deciduous shrubland types found below the lower treeline and extending up into high montane zones. This is a compositionally diverse habitat supporting numerous SGCN.	*Fair*. Altered fire regimes have resulted in dry conifer encroachment and dense shrublands outside the range of natural historic variation. Livestock grazing use has altered species composition. Invasive weeds have pioneered on many road and trail systems.	*Tier 1* Greater Sage-Grouse, Grizzly Bear, Morrison's Bumble Bee, Western Bumble Bee, Suckley's Cuckoo Bumble Bee *Tier 2* Ferruginous Hawk, Golden Eagle, Long-billed Curlew, Burrowing Owl, Bighorn Sheep, Lyrate Mountainsnail *Tier 3* Short-eared Owl, Common Nighthawk, Black Rosy-Finch, Townsend's Big-eared Bat, Western Small-footed Myotis

Target	Target description	Target viability	Nested targets (SGCN)	
				Hunt's Bumble Bee Monarch Gillette's Checkerspot A Grasshopper (*Argiacris militaris*) Spur-throated Grasshopper (*Melanoplus*) Species Group
Sagebrush Steppe	This system covers 53% of the section's land base and is characterized by an open shrub canopy and sparse to dense herbaceous layer dominated by perennial grasses. Microbiotic crusts are typically present. Sagebrush-steppe habitats are relatively intact compared to more fragmented landscapes in other sections.	*Good*. Target is extensive, strongly continuous, and exhibits a diversity of age classes and structure. Most is in public ownership, thus, less vulnerable to rangewide threats of habitat fragmentation and conversion to agriculture common in areas of mixed ownership. Target is relatively resilient to the fire–cheatgrass cycle in this section.	*Tier 1*	Greater Sage-Grouse Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Bighorn Sheep Lyrate Mountainsnail Idaho Point-headed Grasshopper
			Tier 3	Sandhill Crane Short-eared Owl Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Hunt's Bumble Bee A Grasshopper (*Argiacris amissuli*) A Grasshopper (*Argiacris militaris*) Spur-throated Grasshopper (*Melanoplus*) Species Group
Alpine & High Montane Scrub, Grassland & Barrens	Target comprises the greatest area and highest proportion of alpine land cover (5%) among Idaho sections. System occurs in notable extents in the Lemhi and Big Lost River mountain ranges. Target supports wildlife species specialized for cold, snowy environments.	*Good*. Large portions of this system are protected as Wilderness Study Area or Roadless Area. Other areas are "de facto" wilderness due to remoteness and inhospitable conditions for human habitation. Alpine wildlife is sensitive to climatic factors and may have low adaptive capacity to climate change.	*Tier 1*	Wolverine Grizzly Bear Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Golden Eagle Bighorn Sheep Alpine Tiger Beetle
			Tier 3	Clark's Nutcracker Black Rosy-Finch Mountain Goat Hoary Marmot Hunt's Bumble Bee Beartooth Copper A Grasshopper (*Argiacris militaris*) A Grasshopper (*Barracris petraea*) Spur-throated Grasshopper (*Melanoplus*) Species Group

Target	Target description	Target viability	Nested targets (SGCN)	
Riverine–Riparian Forest & Shrubland	This system includes rivers and streams, including aquatic habitats and their associated terrestrial riparian habitats. Major river systems are the Salmon, Pahsimeroi, Lemhi, North Fork Salmon, Sinks Drainages, and tributaries draining Henrys Lake Mountains.	*Fair* to *Good*. System accounts for 1% of land area, but supports diverse array of aquatic and terrestrial biota, including keystone species (American Beaver, salmon, cottonwood) and migration, juvenile rearing, spawning, or resident habitat for 5 species of ESA-listed fish. Water diversions have resulted in perturbation of fluvial processes and riparian conditions in this section.	*Tier 1*	Pacific Lamprey Steelhead (Snake River Basin DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Grizzly Bear Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Western Toad Harlequin Duck Lewis's Woodpecker Silver-haired Bat Hoary Bat Fisher Bighorn Sheep Western Pearlshell Lolo Mayfly
			Tier 3	Sandhill Crane Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Pondsnail (*Stagnicola*) Species Group A Mayfly (*Cinygma dimicki*) Hunt's Bumble Bee Monarch Lolo Sawfly Tiny Forestfly A Caddisfly (*Eocosmoecus schmidi*) A Caddisfly (*Rhyacophila oreia*) A Caddisfly (*Goereilla baumanni*) A Caddisfly (*Sericostriata surdickae*)
Springs & Groundwater-Dependent Wetlands	This target includes seeps, springs, and wet meadows occurring on gentle to steep slopes from floodplain to montane forest elevations. These are rare mesic features in a semiarid landscape, thus attract a diversity of wildlife and invertebrate species.	*Poor*. These systems are highly attractive to livestock and wildlife as sources of palatable green forage and water. Improper livestock grazing and OHV impacts can cause soil compaction and erosion, destroy vegetation, facilitate spread of invasive weeds, and alter	*Tier 1*	Greater Sage-Grouse Grizzly Bear Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Western Toad Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Silver-haired Bat Hoary Bat Bighorn Sheep
			Tier 3	Sandhill Crane Short-eared Owl

Target	Target description	Target viability	Nested targets (SGCN)	
		hydrologic processes.		Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Hunt's Bumble Bee Monarch Gillette's Checkerspot
Lakes, Ponds & Reservoirs	Target comprises all natural lakes and deep ponds, created waterbodies of all sizes, and dammed river channels. Includes Williams Lake, Summit Reservoir, and Mackay Reservoir, and hundreds of high mountain lakes in upper montane, subalpine, and alpine elevations.	*Good*. Large lakes/reservoirs established for irrigation water storage benefit fish and wildlife. High mountain lake fish-stocking programs should continue to balance recreational opportunity and maintenance of native amphibian populations. Climate warming may impair lake temperatures and productivity.	*Tier 2* *Tier 3*	Western Toad Long-billed Curlew Silver-haired Bat Hoary Bat Sandhill Crane Common Nighthawk Western Small-footed Myotis Little Brown Myotis
Agricultural Lands	This system comprises about 4% of the land base and includes irrigated forage crops and pasture tied to beef-cattle production. Agricultural lands are concentrated in the Salmon, Pahsimeroi, Lemhi, Little Lost, and Big Lost river valleys. Hayfields and pasturelands provide surrogate grassland habitat for avian SGCN.	*Fair*. Conversion of flood irrigation agriculture to center pivot systems reduces habitat suitability for grassland-nesting birds. Timing of hay harvest can overlap with peak nesting period for grassland birds.	*Tier 1* *Tier 2* *Tier 3*	Steelhead (Snake River Basin DPS) Chinook Salmon (Snake River spring/summer-run ESU) Greater Sage-Grouse Western Bumble Bee Suckley's Cuckoo Bumble Bee Western Toad Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Bobolink Sandhill Crane Short-eared Owl Common Nighthawk Black Rosy-Finch Hunt's Bumble Bee Monarch
Wolverine	An estimated population of ≤18 wolverine occurs within major blocks of primary habitat in the Beaverhead, Centennial, Lemhi and Lost River	*Fair*. Climate warming and shrinking snow cover may amplify the fragmented nature of wolverine habitat in this section resulting in	*Tier 1*	Wolverine

Target	Target description	Target viability	Nested targets (SGCN)	
	mountain ranges (IDFG 2014).	diminished connectivity and a subpopulation more vulnerable to extirpation.		
Bighorn Sheep	Bighorn Sheep are widely distributed in 7 Population Management Units (PMUs) across the Beaverhead Mountains Section (IDFG 2010).	*Good*. Some PMUs stable in terms of population size and structure.	*Tier 2*	Bighorn Sheep
Pollinators	With the exception of the Monarch, little is known about SGCN pollinator species in this section.	*Good*. Presumably based on extensive area and good condition of native plant communities in surrounding public lands and compatible agriculture.	*Tier 1*	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 3	Hunt's Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*) Beartooth Copper Monarch Gillette's Checkerspot

Table 5.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Beaverhead Mountains

	Conservation targets													
Taxon	Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Aspen Forest & Woodland	Mountain Mahogany Scrub & Woodland	Lower Montane–Foothill Grassland & Shrubland	Sagebrush Steppe	Alpine & High Montane Scrub, Grassland & Barrens	Riverine–Riparian Forest & Shrubland	S Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Agricultural Lands	Wolverine	Bighorn Sheep	Pollinators
LAMPREYS														
Pacific Lamprey (*Entosphenus tridentatus*)[1]								X						
RAY-FINNED FISHES														
Steelhead (Snake River Basin DPS) (*Oncorhynchus mykiss*)[1]								X			X			
Sockeye Salmon (Snake River ESU) (*Oncorhynchus nerka*)[1]								X			X			
Chinook Salmon (Snake River spring/summer-run ESU) (*Oncorhynchus tshawytscha*)[1]								X			X			
AMPHIBIANS														
Western Toad (*Anaxyrus boreas*)[2]	X	X	X					X	X	X	X			
BIRDS														
Harlequin Duck (*Histrionicus histrionicus*)[2]								X						
Greater Sage-Grouse (*Centrocercus urophasianus*)[1]					X	X			X		X			
Ferruginous Hawk (*Buteo regalis*)[2]	X				X	X			X		X			
Golden Eagle (*Aquila chrysaetos*)[2]	X	X			X	X	X		X		X			
Sandhill Crane (*Grus canadensis*)[3]						X		X	X	X	X			
Long-billed Curlew (*Numenius americanus*)[2]					X	X			X	X	X			
Burrowing Owl (*Athene cunicularia*)[2]					X	X			X		X			
Great Gray Owl (*Strix nebulosa*)[3]	X	X	X											
Short-eared Owl (*Asio flammeus*)[3]					X	X			X		X			
Common Nighthawk (*Chordeiles minor*)[3]	X		X		X	X		X	X	X	X			
Lewis's Woodpecker (*Melanerpes lewis*)[2]	X		X					X						
Olive-sided Flycatcher (*Contopus cooperi*)[3]	X	X	X											
Clark's Nutcracker (*Nucifraga columbiana*)[3]	X	X					X							
Sage Thrasher (*Oreoscoptes montanus*)[2]						X								
Sagebrush Sparrow (*Artemisiospiza nevadensis*)[2]						X								
Bobolink (*Dolichonyx oryzivorus*)[2]											X			
Black Rosy-Finch (*Leucosticte atrata*)[3]	X	X			X		X							
MAMMALS														
Pygmy Rabbit (*Brachylagus idahoensis*)[2]						X								
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]	X		X		X	X		X	X					

Taxon	Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Aspen Forest & Woodland	Mountain Mahogany Scrub & Woodland	Lower Montane–Foothill Grassland & Shrubland	Sagebrush Steppe	Alpine & High Montane Scrub, Grassland & Barrens	Riverine–Riparian Forest & Shrubland	S Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Agricultural Lands	Wolverine	Bighorn Sheep	Pollinators
	Conservation targets													
Silver-haired Bat (*Lasionycteris noctivagans*)[2]	X	X	X					X	X	X				
Hoary Bat (*Lasiurus cinereus*)[2]	X	X	X					X	X	X				
Western Small-footed Myotis (*Myotis ciliolabrum*)[3]	X		X		X	X		X	X	X				
Little Brown Myotis (*Myotis lucifugus*)[3]	X	X	X					X	X	X				
Wolverine (*Gulo gulo*)[1]	X	X					X					X		
Fisher (*Pekania pennanti*)[2]	X	X	X					X						
Grizzly Bear (*Ursus arctos*)[1]	X	X	X		X		X	X	X					
Mountain Goat (*Oreamnos americanus*)[3]		X		X			X							
Bighorn Sheep (*Ovis canadensis*)[2]	X			X	X	X	X	X	X				X	
Hoary Marmot (*Marmota caligata*)[3]							X							
BIVALVES														
Western Pearlshell (*Margaritifera falcata*)[2]								X						
GASTROPODS														
Pondsnail (*Stagnicola*) Species Group[3]								X						
Lyrate Mountainsnail (*Oreohelix haydeni*)[2]	X			X	X	X								
INSECTS														
Alpine Tiger Beetle (*Cicindela plutonica*)[2]							X							
Lolo Mayfly (*Caurinella idahoensis*)[2]								X						
A Mayfly (*Cinygma dimicki*)[3]								X						
Hunt's Bumble Bee (*Bombus huntii*)[3]					X	X	X	X	X		X			X
Morrison's Bumble Bee (*Bombus morrisoni*)[1]					X	X								X
Western Bumble Bee (*Bombus occidentalis*)[1]					X	X	X	X	X		X			X
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]					X	X	X	X	X		X			X
A Mason Bee (*Hoplitis producta subgracilis*)[3]	X	X			X									X
Beartooth Copper (*Lycaena phlaeas arctodon*)[3]							X							X
Monarch (*Danaus plexippus*)[3]					X			X	X		X			X
Gillette's Checkerspot (*Euphydryas gillettii*)[3]	X				X				X					X
Idaho Point-headed Grasshopper (*Acrolophitus pulchellus*)[2]						X								
A Grasshopper (*Argiacris amissuli*)[3]						X								
A Grasshopper (*Argiacris militaris*)[3]						X	X							
A Grasshopper (*Barracris petraea*)[3]							X							

	Conservation targets													
Taxon	Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Aspen Forest & Woodland	Mountain Mahogany Scrub & Woodland	Lower Montane–Foothill Grassland & Shrubland	Sagebrush Steppe	Alpine & High Montane Scrub, Grassland & Barrens	Riverine–Riparian Forest & Shrubland	S Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Agricultural Lands	Wolverine	Bighorn Sheep	Pollinators
Spur-throated Grasshopper (*Melanoplus*) Species Group[3]	X				X	X	X							
Lolo Sawfly (*Sweltsa durfeei*)[3]								X						
Tiny Forestfly (*Malenka tina*)[3]								X						
A Caddisfly (*Eocosmoecus schmidi*)[3]								X						
A Caddisfly (*Rhyacophila oreia*)[3]								X						
A Caddisfly (*Goereilla baumanni*)[3]								X						
A Caddisfly (*Sericostriata surdickae*)[3]								X						

Target: Dry Lower Montane–Foothill Forest

Dry Lower Montane–Foothill Forest communities comprise about 9% of this section. They typically occur at the lower treeline ecotone immediately above valley grasslands or sagebrush steppe and shrublands. Douglas-fir is the predominant forest type, but lodgepole pine and limber pine forests may intermix. Ponderosa pine is a codominant canopy tree at the northern end of the section, and Utah juniper woodlands are found on rocky foothills at the southern end of the section. Quaking aspen and mountain mahogany can also be intermixed. Fire suppression has interrupted the natural fire regime in this habitat type, resulting in unnaturally high tree densities with greater competition, less vigor and growth; susceptibility to insect outbreaks; and high risk of stand-replacing fires. Absence of fire has also suppressed vigor of understory vegetation and allowed extensive areas of Douglas-fir to encroach on grassland and sagebrush-steppe habitats. Most of this community type occurs on public lands managed by BLM and FS.

Upper Kenney Creek, Beaverhead Mountains © 2007 Beth Waterbury

This ecosystem supports several SGCN including Great Gray Owl (*Strix nebulosa*), Olive-sided Flycatcher (*Contopus cooperi*), and Clark's Nutcracker (*Nucifraga columbiana*). Lewis's Woodpecker (*Melanerpes lewis*) is present where ponderosa pine is a dominant component, and Western Toad (*Anaxyrus boreas*) occurs in kettle holes within lodgepole pine forests. This system provides abundant snag and live tree structure for bat roosting and insect prey for bat foraging. Dry montane forest types provide wintering habitat for mixed flocks of Black and Gray-crowned Rosy-Finch (*Leucosticte tephrocotis*), and are routinely patrolled by Wolverines scavenging for large mammal carrion. Fishers occupy mixed Douglas-fir and ponderosa pine ecotypes at the northernmost end of this section. This area represents the periphery of Fisher range in Idaho, as drier forest types (ponderosa pine , lodgepole pine) typically do not support sufficient structure and cover elements required for Fisher persistence (Schwartz et al. 2013).

Target Viability

Fair. Nearly a century of fire suppression in this forest type has created conditions highly susceptible to insect outbreaks and high severity stand-replacing fires. Absence of fire disturbance also results in Douglas-fir encroachment of ecotonal grasslands and sagebrush-steppe communities. Noxious weeds such as spotted knapweed have colonized many roads in this forest type, particularly at lower-elevation sites.

Prioritized Threats and Strategies for Dry Lower Montane–Foothill Forest

High Rated Threats to Dry Lower Montane–Foothill Forest in the Beaverhead Mountains

Altered fire regimes

These forest types evolved under the influence of frequent, low-severity fire that maintained relatively open stands of a mix of fire-resistant species. Nearly a century of fire suppression has dramatically shifted successional patterns, reduced spatial heterogeneity of forest types, increased the density of small shade-tolerant trees, and produced an unnatural accumulation of ground fuels. These conditions, further exacerbated by drought and warmer temperatures, have led to massive insect outbreaks and tree mortality. As a result, many low- and mid-elevation conifer forests in this section are susceptible to uncharacteristically large, high-severity, stand-replacing fires. The continuing absence of fire in the dry montane forest type has allowed extensive areas of Douglas-fir to encroach into montane and foothill grasslands and sagebrush-steppe habitats. Absence of fire has altered diversity, habitat structure, and productivity of understory shrubs, forbs, and grasses. Systems lacking early to mid-seral stages support fewer native ungulates such as Mule Deer and Elk, which comprise important year-round carrion prey for Wolverine (Copeland 1996).

Objective	Strategy	Action(s)	Target SGCNs
Restore characteristic fire regime and forest structure in Dry Lower Montane–Foothill Forest systems.	Coordinate actions with federal land management agencies and municipalities.	Engage and involve forest collaboratives in the development and implementation of forest restoration projects. Incorporate prescribed fire treatments in restoration projects. Use managed natural fire for forest restoration where/when appropriate. Incorporate mechanical thinning treatments to reduce stand densities where appropriate. Seek opportunities to conduct fuel load management (i.e., prescribed burns) in areas where wildland-urban interface concerns are not as pressing. Develop landscape-level models that evaluate commodity production, fire risk, forest health, and habitat needs of fish and wildlife in an integrated fashion. Implement forest activities that promote the growth of multistage forest stands with ample structure and variation in tree widths and ages.	Western Toad Ferruginous Hawk Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Grizzly Bear Bighorn Sheep

Objective	Strategy	Action(s)	Target SGCNs
		Retain trees that have decadence, disease, or defects that provide critical habitat structure at the stand and landscape scale.	
		Increase forest seral heterogeneity to improve reproductive performance of small mammal prey and overall herd health of wild ungulates.	Fisher Wolverine
		Retain stands and mosaics of mature late-seral trees in near proximity to meadows and montane grasslands.	Ferruginous Hawk Golden Eagle Great Gray Owl
Where appropriate, develop more aggressive strategies to reduce fuel load.	Improve targeting of fuels reduction opportunities and implementation.	Evaluate opportunities for harvesting and removal of biomass to meet treatment objectives and supply local biofuel facilities. Forest vegetation management includes evaluation opportunities for harvesting and removal of biomass to meet treatment objectives. Use stewardship contracts to achieve public land management goals in rural communities.	Western Toad Ferruginous Hawk Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Wolverine Grizzly Bear Bighorn Sheep
Change societal perceptions to accept fire as a beneficial tool for forest stewardship.	Develop effective stakeholder outreach on the role of wildland fire in forest health.	Engage forest collaboratives to promote benefits of forest restoration techniques, including use of fire. Develop and disseminate public outreach products on fire ecology in dry forest systems (news releases, presentations, brochures, articles).	Western Toad Ferruginous Hawk Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Wolverine Grizzly Bear Bighorn Sheep
Minimize conflicts between fire suppression and forest health policies.	Develop growth management policies in Wildland-Urban Interface areas.	Develop local land use ordinances to minimize rural/urban sprawl into wildlands. Incorporate climate change and fire behavior information into growth management and rural interface community planning initiatives.	Western Toad Ferruginous Hawk Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Silver-haired Bat

Objective	Strategy	Action(s)	Target SGCNs
			Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Wolverine Grizzly Bear Bighorn Sheep

Forest insect pests & disease

Dry forest types in the Beaverhead, Lemhi, and Lost River mountain ranges have experienced extensive tree mortality in the last decade associated with widespread outbreaks of Mountain Pine Beetle and Western Spruce Budworm Moth. Outbreaks often develop in dense stands of mature age-class lodgepole pine, mid-sized ponderosa pine, and homogeneous Douglas-fir forests. Warming climatic conditions and continued fire suppression have intensified insect outbreaks in this region. Extensive tree mortality associated with insect and disease outbreaks can significantly influence successional pathways and forest community composition. Other short- and long-term forest processes such as water yield and wildfire extent and severity can also be affected by tree mortality associated with insect outbreaks.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the potential for large-scale loss of Dry Lower Montane–Foothill Forest stands to insect outbreaks.	Implement restorative forest management at the landscape level.	Identify and strategically place forest restoration treatments in landscape locations and orientations for maximum benefit. Conduct risk assessments and appropriately prioritize areas for treatment. Restore appropriate stocking levels, species composition, and stand structure to levels more consistent with conditions under which host trees and insect/pathogen species coevolved. Retain a component of trees that have decadence, disease, or defects that provide critical habitat structure at the stand and landscape scale.	Western Toad Ferruginous Hawk Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Wolverine Grizzly Bear Bighorn Sheep

Noxious weeds & invasive annual grasses

The invasion of nonnative grasses and forbs is now a threat to Dry Lower Montane–Foothill Forest. These invasive weeds were historically considered a low-elevation problem; however, they are now spreading to higher elevations and spreading rapidly in some mid-elevation areas. Noxious weeds (e.g., spotted knapweed) and invasive annual grasses (e.g., cheatgrass) have colonized some habitat types of this section at lower and mid-elevations. Noxious weeds and invasive annual grasses replace native forbs and grasses, reduce forage quality for herbivorous wildlife, and increase the risk of intensified fire regimes. Frequent fire intervals may exacerbate alien plant invasions by removing needle litter accumulation and other surface fuels, which serve to inhibit cheatgrass establishment (Keeley and McGinnis 2007). The predicted climate warming scenario for this region may generate the biophysical conditions favored for further cheatgrass establishment.

Objective	Strategy	Action(s)	Target SGCNs
Control or eradicate noxious weeds.	Work with FS, BLM, and other partners to control or reduce noxious weed occurrence.	Participate in County Cooperative Weed Management Area collaboratives. Map and identify noxious weed patches and provide to the appropriate land manager. Use biological controls (insects) on infestations of spotted knapweed. Conduct aggressive weed management as part of post-fire habitat restoration. Monitor roads and trails leading into key wildlife habitats for presence of weeds and treat aggressively if detected. Provide native grass and shrub seed recommendations to land managers. Develop a noxious weed database for all lands across Idaho. Use GPS, remote sensing, and GIS technologies to efficiently collect, store, retrieve, analyze, and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012).	Western Toad Great Gray Owl Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Wolverine Grizzly Bear Bighorn Sheep

Changing temperature & precipitation regimes

Current climate models predict changing precipitation patterns and warming temperatures for the Beaverhead Mountains Section. Precipitation and temperature changes may be of great enough magnitude to exceed the environmental tolerances of existing plant species and their related fauna and ecosystem services from portions of the Beaverhead Mountains Section. Change in precipitation from snow to rain is much more likely to induce earlier summer plant dormancy, lengthen the fire season, and shorten the wetland saturation period (van Mantgem et al. 2009). Predicted temperature increases for central Idaho suggest at least a sixfold increase of area burned by wildfire with each 1 °C (1.8 °F) of temperature increase relative to the median annual area burned during 1950–2003 (Littell et al. 2009). The goal of dry-forest restoration should be to develop more open structure consistent with historical disturbance regimes (Arno et al. 1995, Stephens et al. 2012). This goal creates forests more resilient to and compatible with a warmer and drier future.

Objective	Strategy	Action(s)	Target SGCNs
Increase resiliency of Dry Lower Montane–Foothill Forest types to climate pattern uncertainty.	Actively implement restorative forest management at the landscape level.	Employ silvicultural and prescribed fire treatments to restore characteristic forest stand structure, fuel loading, and vegetative heterogeneity. Incorporate climate change mitigation strategies in forest and resource management plans.	Western Toad Ferruginous Hawk Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Wolverine Grizzly Bear Bighorn Sheep

Species designation, planning & monitoring

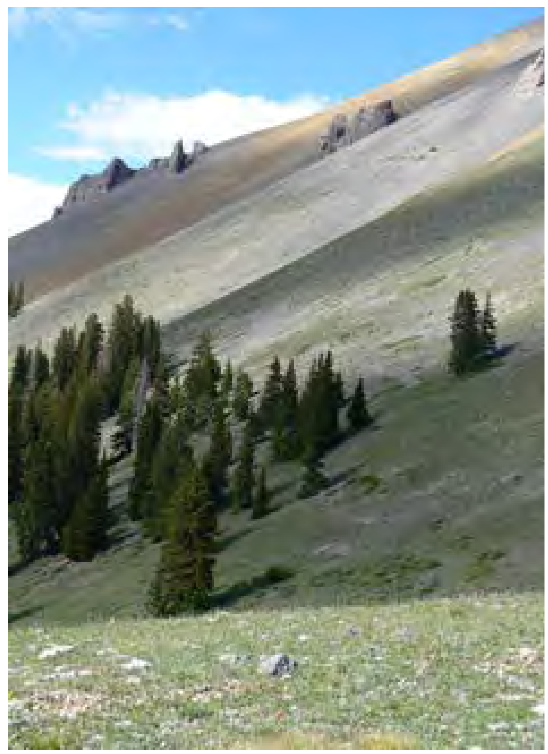
Information is lacking on the status of SGCN invertebrates in this habitat target, including the Lyrate Mountainsnail, A Mason Bee (*Hoplitis producta*), Gillette's Checkerspot, and numerous taxa comprising the Spur-throated Grasshopper (*Melanoplus*) Species Group. Many of these invertebrates are currently thought to be either Idaho or regional endemics. Investigations are needed to determine if species are extant the Beaverhead Mountains Section, if genetic work is needed to determine taxonomic uniqueness, and to assess species-specific threats.

Habitat suitability models show that Fishers avoid dry forest ecotypes, which in the intermountain west are frequently dominated by ponderosa pine and lodgepole pine and typically have sparse understory cover (Schwartz et al. 2013, Olson et al. 2014). The far north portion of the Beaverhead Mountain Section appears to support a persistent population of Fishers despite marginal habitat suitability (i.e., ponderosa pine-Douglas-fir dry forest type). Investigations are needed to better understand Fisher habitat selection and population dynamics in semiarid forest ecotypes at the periphery of Fisher range in the Northern Rocky Mountains. Such knowledge would enable adaptive forest management for a secure Fisher population in sections with dry conifer forest ecotypes.

Objective	Strategy	Action(s)	Target SGCNs
Improve knowledge of the distribution and abundance of SGCN invertebrates potentially occurring in Dry Lower Montane–Foothill Forest habitats of the Beaverhead Mountains Section.	Conduct surveys and implement long-term population monitoring programs.	Conduct surveys to determine occurrence, distribution, and habitat associations of Dry Lower Montane–Foothill Forest invertebrate taxa. Protect and conserve known breeding sites and larval host plants. Investigate the nature and extent of threats to SGCN invertebrate taxa in this section and habitat target.	Lyrate Mountainsnail A Mason Bee (*Hoplitis producta*) Gillette's Checkerspot Spur-throated Grasshopper (*Melanoplus*) Species Group

Objective	Strategy	Action(s)	Target SGCNs
Monitor Fisher population and distribution trends.	Expand knowledge of the distribution, abundance, and habitat requirements of Fisher in dry forest ecotypes of Idaho.	Develop and participate in a multistate–provincial effort to monitor Fisher in the US Northern Rockies; implement effort in a multiple carnivore species framework. Conduct fine-scale habitat studies that will facilitate integration of Fisher habitat requirements into timber harvest and forest restoration plans. Develop timber management and harvest strategies that are suitable for Fisher.	Fisher

Target: Subalpine–High Montane Conifer Forest



Meadow Canyon, Lemhi Mountain © 2006 Chris Murphy

Subalpine–High Montane Conifer Forest communities comprise about 14% of this section and generally form the elevationally uppermost forests, including the upper treeline ecotone with the alpine. Characteristic trees are subalpine fir, Engelmann spruce, whitebark pine, lodgepole pine, limber pine, and quaking aspen, which form variable canopies from nearly closed to open or patchy with intervening grasslands and shrublands. Subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*) form climax or long-lived seral forests in this section, with periodic disturbance from windthrow, avalanches, and more prominently, insect outbreaks and stand-replacing fire. Lodgepole pine forest types occur in cold-air drainages as seral even-aged stands. Whitebark pine and limber pine are prevalent forest types in upper subalpine environments where they are important foundation and keystone species. The threat posed by the introduced pathogen that causes white pine blister rust, in synergy with Mountain Pine Beetle, altered fire regimes, and warming climates, threatens the sustainability of these fragile 5-needled pine communities.

Subalpine forests and woodlands in this section are almost exclusively managed by the FS and form expansive, continuous, and largely unroaded habitat strongholds for a wide range of wildlife. Characteristic species include Wolverine, Great Gray Owl, Olive-sided Flycatcher, Clark’s Nutcracker, and Black Rosy-Finch. Boggy sites within subalpine forests also harbor Western Toad, and decay-prone spruce and fir trees provide roosting and natal sites for bats.

Target Viability

Fair. Successful fire suppression over the past century in this forest system has increased the proportion of area in late successional structural stages of stand development and led to increased homogeneity in forest cover. As subalpine forests become increasingly homogenous due to a cessation of small stand replacement fires, risk of larger fire occurrence may be heightened. A rapid decline in whitebark pine has occurred in the last decade as a result of 3 interrelated factors: (1) epidemics of Mountain Pine Beetle, (2) the introduced disease white pine blister rust, and (3) successional replacement by shade-tolerant conifers, specifically subalpine fir and Engelmann spruce, probably as a result of fire exclusion. The loss of this keystone and foundational tree species poses serious consequences for upper subalpine ecosystems, both in terms of the impacts on biodiversity and in losses of valuable ecosystem processes and services.

Prioritized Threats and Strategies for Subalpine–High Montane Conifer Forest

High Rated Threats to Subalpine–High Montane Conifer Forest in the Beaverhead Mountains

Changing temperature & precipitation regimes

Current climate models predict changing precipitation patterns and warming temperatures for the Beaverhead Mountains Section. Precipitation and temperature changes may be of great enough magnitude to exceed the environmental tolerances of existing plant species and their related fauna and ecosystem services from portions of the Beaverhead Mountains Section. Change in precipitation from snow to rain is much more likely to induce earlier summer plant dormancy, lengthen the fire season, and shorten the wetland saturation period (van Mantgem et al. 2009). Predicted temperature increases for central Idaho show at least a sixfold increase of area burned by wildfire with each 1 °C (1.8 °F) of temperature increase relative to the median annual area burned during 1950–2003 (Littell et al. 2009). This trajectory suggests that without active forest management, Subalpine–High Montane Conifer Forest systems will become less resilient and less compatible with a warmer and drier future.

Objective	Strategy	Action(s)	Target SGCNs
Increase resiliency of Subalpine–High Montane Conifer Forest types to climate pattern uncertainty.	Actively implement restorative forest management at the landscape level.	Develop landscape-level models that evaluate commodity production, fire risk, forest health, and habitat needs of fish and wildlife in an integrated fashion. Identify and prioritize areas for immediate restoration treatments. Incorporate prescribed fire treatments in restoration projects. Use managed natural fire for forest restoration where/when appropriate. Incorporate mechanical thinning treatments to reduce stand densities and crown cover where appropriate.	Western Toad Golden Eagle Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Black Rosy-Finch Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine Fisher Grizzly Bear Mountain Goat A Mason Bee (*Hoplitis producta*)

Objective	Strategy	Action(s)	Target SGCNs
		Favor retention of fire-tolerant tree species and restore fine-scale patchiness. Retain older age-class or large trees as part of a managed stand to create structural and age-class heterogeneity. Engage and involve forest collaboratives in the development and implementation of forest restoration projects.	

Forest insect pests & disease in 5-needled pines

Whitebark pine and limber pine are native 5-needled pines considered foundation species of high-elevation settings of this section. These woodland types serve a variety of key ecological roles, including providing food resources for Grizzly Bear, Clark's Nutcracker, squirrels, and other birds and improving snow retention. Populations of whitebark and limber pines in this section have been extensively and severely impacted by epidemics of Mountain Pine Beetle and white pine blister rust. Warming climate change forecasts suggest continued optimal conditions for pine beetle outbreaks for many decades (Hicke and Logan 2009). The introduced pathogen that causes white pine blister rust poses a more insidious threat given that it affects all aspects of the 5-needled pine forest regeneration process and will impair ecosystem recovery long after pine beetle epidemics phase out. Continued losses of whitebark and limber pines in this section could adversely modify hydrologic processes critical to listed anadromous fish and other aquatic-associated species.

Objective	Strategy	Action(s)	Target SGCNs
Ensure future persistence and viability of whitebark pine.	Support and implement long-term strategies to restore whitebark pine (i.e., A Range-Wide Restoration Strategy for Whitebark Pine (Pinus albicaulis) (Keane et al. 2012).	Collect whitebark pine seed for genetic testing, gene conservation, rust screening, and operational planting. Cultivate rust-resistant whitebark pine seedlings to out-plant to disturbed areas. Allow wildfire to treat potentially declining areas to reduce competing subalpine fir and create caching habitat for Clark's Nutcracker. Preserve putative rust-resistant cone-bearing trees as cultivated and natural seed sources. Plant burned areas with rust-resistant whitebark pine seedlings. Use stand-level treatments to restore high value or critical declining stands, especially those stands that are distant from seed sources, that contain putative rust-resistant cone-bearing trees, or that are too valuable to lose from uncontrolled wildfire (e.g., critical Grizzly Bear habitat). Inventory, monitor, evaluate, and adaptively manage treatment sites.	Clark's Nutcracker Black Rosy-Finch Wolverine Grizzly Bear Mountain Goat

Target: Aspen Forest & Woodland

Aspen is an important yet uncommon (<2% of land base) vegetation community in most of the Beaverhead Mountains Section. Aspen is somewhat more abundant and in larger stands in the Centennial Mountains. Although small in scale, healthy aspen communities harbor high biodiversity and are critically important to Mule Deer (*Odocoileus hemionus*), Elk (*Cervus elaphus*), birds, bats, amphibians, and pollinator insects. In addition, they maintain water storage capacity for watersheds and offer recreation and scenic value to humans. Aspen stands in this section are typically small (<10 acres) and interspersed with conifers or part of a riparian area. Although aspen is naturally seral in this section, it has declined about 60% since European settlement. This decline has been due primarily to changes in fire regimes and heavy ungulate browsing leading to poor regeneration. Within the Beaverhead Mountains section, it can be found in lower elevation dry forest, montane riparian areas, subalpine forest, subalpine meadows and shrublands, and mountain big sagebrush stands.

Salmon River Mountains © 2013 Beth Waterbury

Significant effort has been made over the last decade by land managers and their partners within the section to identify aspen stands and assess their overall condition and likelihood for successful treatment. In addition, some stands that ranked as high priority for treatment have been addressed. These areas include the Salmon River Mountains directly west of Salmon, the Lemhi Range, the upper Pahsimeroi Valley, the upper Little Lost drainage, and the Centennial Mountains.

Target Viability

Poor. Aspen condition is poor over most of the section, primarily from conifer encroachment and heavy ungulate browsing. Climate change resulting in less precipitation, higher temperatures, and recurring drought, could exacerbate aspen decline. The Centennial Mountains may have better-condition aspen because of the greater abundance there. Aspen stands in the Beaverhead Mountains have had little assessment work or on-the-ground management and are vulnerable to further decline from conifer encroachment and ungulate damage. Aspen stands in the Lemhi Range have had some assessment and manipulation, primarily in the McDevitt and Hayden Creek drainages. This has resulted in some improvement to these stands. Some stands in the South Fork of Williams Creek were the focus of some thinning and fencing in the last year and significant improvement is expected. BLM personnel conducted risk assessments on stands in the upper Pahsimeroi Valley and conifer removal work began in the fall of 2015. Improvement work consisting mostly of conifer removal has been ongoing in Sawmill Canyon in the upper Little Lost drainage.

Prioritized Threats and Strategies for Aspen Forest & Woodland

High rated threats to Aspen Forest & Woodland in the Beaverhead Mountains

Changing precipitation & temperature patterns

Long range climate models predict hotter and drier conditions for the Beaverhead Mountains section. A bioclimate model developed for aspen in the Central Rockies predicts a 40–75% decline in the extent of aspen range by the decade surrounding 2060 (Rehfeldt et al. 2009). In fact, the effects of drought and warmer temperatures have already become evident in the form of Sudden Aspen Decline (SAD) documented over the last decade in parts of the Central Rockies (Morelli and Carr 2011). Within this section, it is difficult to determine if this phenomenon has occurred as many of these stands are small and already on the decline from conifer encroachment and ungulate damage. However, this section has experienced similar drought and above normal temperatures, so one can assume that those conditions are placing stress on aspen stands.

Objective	Strategy	Action(s)	Target SGCNs
Enhance resiliency of aspen stands from long-term decline caused by altered precipitation and temperature patterns.	Implement actions aimed at increasing the health and vigor of existing stands.	Identify all stands with high levels of conifer encroachment and implement conifer removal. Use prescribed burning to stimulate suckering and stand expansion. Thin conifers upslope from aspen stands to increase water availability. Erect barriers such as fencing and stacking of felled conifers to protect treated stands from livestock and wild ungulate damage.	Western Toad Great Gray Owl Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Grizzly Bear

Improper livestock grazing management

Improper livestock grazing in aspen stands in the Beaverhead Mountains Section is occurring where regeneration and recruitment of aspen is severely hindered by livestock browsing or damage. Many of these stands are in mesic drainage bottoms that attract and hold livestock during the hottest part of the summer and are characteristic of aspen in the Lemhi and Pahsimeroi valleys. Long-term grazing, even when regulated, retards aspen recruitment at a level that can affect overall age structure of a stand and its long-term presence on the landscape (Beschta et al. 2014). Although detrimental browsing pressure by wild ungulates may occur, especially where winter densities are high (Smith et al. 2001), these animals are widespread over their range and impacts to aspen recruitment are often not measurable (DeByle 1985). Remote cameras have been deployed in several stands in the upper Pahsimeroi Valley to try and document wild ungulate compared to livestock use.

Objective	Strategy	Action(s)	Target SGCNs
Promote and enforce livestock grazing management strategies that support aspen regeneration and recruitment.	Work with and encourage land managers to improve grazing management where damage is occurring.	Identify aspen stands where recruitment is impaired by livestock browsing or physical damage. Work with district or field office range conservationists and allotment permittees to modify grazing practices to reduce impacts on aspen regeneration. Deploy remote cameras in heavily browsed aspen stands to determine level of wild ungulate use.	Western Toad Great Gray Owl Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Grizzly Bear

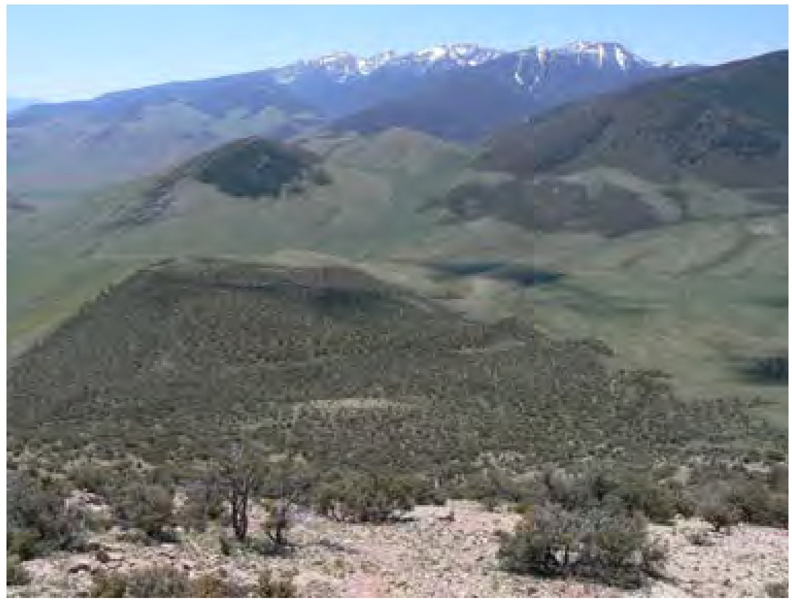
Altered fire regimes

Natural fire intervals have been altered throughout the Beaverhead Mountains Section. Little fire activity has taken place within the section in recent history with the exception of the Mustang Fire north and west of the town of North Fork in 2012 and the north end of the Lemhi range in 2005. Most natural starts have been suppressed, particularly near ranch and residential structures. Some natural starts in higher elevations have been allowed to burn within predefined perimeters. Fire suppression, which allows competing conifers to suppress aspen regeneration, has been identified as the primary driver behind the decline of aspen in the West (Kulakowski et al. 2103).

Objective	Strategy	Action(s)	Target SGCNs
Promote restoration of characteristic fire regimes in aspen forest and woodland systems.	Increase use of prescribed fire and mechanical treatments to mimic natural fire history.	Identify and map conifer encroachment within aspen stands where regeneration is compromised. Provide technical assistance and encouragement to land managers for aspen improvement projects. Assist with post-treatment monitoring. Stay engaged with Central Idaho Aspen Working Group to work cooperatively on aspen improvement.	Western Toad Great Gray Owl Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Grizzly Bear

Target: Mountain Mahogany Scrub & Woodland

Mountain Mahogany Scrub & Woodland communities occur in small to large scattered patches in steep canyons, rocky outcrops, and steppe slopes of this section. This land cover type includes both woodlands and shrublands dominated by curl-leaf mountain mahogany (*Cercocarpus ledifolius* Nutt.). Undergrowth is often sparse and dominated by bunchgrasses such as bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), basin wildrye (*Leymus cinereus*), or spike fescue (*Leucopoa kingii*). Curl-leaf mountain mahogany is a slow-growing, drought-tolerant, and exceptionally long-lived species. Historically, fire was infrequent and spotty in this community due to rocky substrates limiting development of a continuous vegetation canopy needed for fire to spread. Mountain mahogany habitats of this section provide important winter cover for Mountain Goat, Bighorn Sheep, and other wild ungulates. Curl-leaf mountain mahogany comprises about 9% of the summer diets of Bighorn Sheep in the Big Creek drainage (Elliott and Flinders 1984) and is highly palatable to Moose, Elk, and Mule Deer. In areas with high Elk densities, plants are often heavily browsed beyond the reach of smaller-stature wild ungulates.



Hawley Mountain, Lost River Range © 2008 Chris Murphy

Target Viability

Fair. Many mountain mahogany stands in this section occur in the transition zone between the steppe and montane life zones. Where conifers (i.e., Douglas-fir, Utah juniper) are successfully reproducing, curl-leaf mountain mahogany may be replaced as conifers dominate the canopy. Under this scenario and continued fire exclusion, the viability of mountain mahogany communities is at risk from stand replacement fire. Heavy curl-leaf mountain mahogany mortality is common following most fires. Post-fire establishment can take several decades following severe fires that destroy the seed bank and kill parent plants.

Prioritized Threats and Strategies for Mountain Mahogany Scrub & Woodland

High Rated Threats to Mountain Mahogany Scrub & Woodland in the Beaverhead Mountains

Altered fire regimes

Prior to 1900, fire was the chief disturbance process limiting the distribution of mountain mahogany to the most fire-protected rocky escarpments of this section. Increases in mountain mahogany abundance after 1900 are attributed to reductions in fine fuels due to livestock grazing and a decreased fire frequency in response to fire exclusion policies. Many of the areas where mountain mahogany established were historically grasslands. Mountain mahogany stands now comprise ecotonal inclusions between dry conifer forest and steppe communities. Fire exclusion has also facilitated the expansion of dry forest species such as Douglas-fir onto sites historically supporting woodland, shrubland, and grassland vegetation. Curl-leaf mountain mahogany's shade tolerance is low, so where sites can support conifer species, mountain mahogany is typically replaced as Douglas-fir dominates the canopy. Proximity of mountain mahogany stands to dry conifer forests susceptible to large, stand-replacing fires has the potential to cause major mortality to parent plants and seed banks. The necessary conditions for successful seed germination, emergence, and establishment of mountain mahogany do not co-occur regularly and contribute to overall poor regeneration.

Objective	Strategy	Action(s)	Target SGCNs
Reduce conifer encroachment in mountain mahogany stands.	Targeted removal of Douglas-fir or Utah juniper to remove young-age-class trees expanding into mountain mahogany communities.	Map mountain mahogany stands. Mechanical treatment of Douglas-fir/Utah juniper in key areas including lop and lay, mastication, and lop and scatter methods. Evaluate a range of treatment alternatives to test restoration success and effects on plant communities and soil resources in an adaptive management framework. Exclude old-growth Douglas-fir or Utah juniper stands from any vegetation treatments. Use categorical exclusions to conduct treatments on public lands.	Mountain Goat Bighorn Sheep Lyrate Mountainsnail
Restore characteristic fire regime and forest structure in Dry Lower Montane–Foothill Forest systems.	Coordinate actions with federal land management agencies and municipalities.	Incorporate prescribed fire treatments in restoration projects. Use managed natural fire for forest restoration where/when appropriate. Incorporate mechanical thinning treatments to reduce stand densities where appropriate. Develop landscape-level models that	Mountain Goat Bighorn Sheep Lyrate Mountainsnail

Objective	Strategy	Action(s)	Target SGCNs
		evaluate commodity production, fire risk, forest health, and habitat needs of fish and wildlife in an integrated fashion.	

Target: Lower Montane–Foothill Grassland & Shrubland

This target comprises approximately 5% of the section's land area and includes a subset of grasslands, shrub steppe, and deciduous shrubland types found below the lower treeline and extending up into high montane zones. Grasslands are prevalent on warmer, drier sites, especially at higher elevation. Idaho fescue and bluebunch wheatgrass are predominant grasses but a variety of cool-season graminoids may be present. Shrublands often occur on cooler, more mesic sites, including the steep slopes of canyons, north aspects, and toeslopes. Common shrubs include Saskatoon serviceberry (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*), rose (*Rosa* spp.), blue elderberry (*Sambucus nigra* ssp. *cerulea*), common snowberry (*Symphoricarpos albus*), and oceanspray (*Holodiscus discolor*). Forb diversity is typically high in both mesic and dry aspects of this community.

Smout Creek Drainage, Beaverhead Mountains © 2006 Beth Waterbury

Several SGCN are associated with this compositionally diverse habitat. Bighorn Sheep use the grasslands to graze on preferred grasses and forbs, but may seasonally shift to subsist on shrubs. Grassland and shrub steppe habitats provide nesting, brood-rearing, and foraging sites for Greater Sage-Grouse, Short-eared Owl, and Common Nighthawk (*Chordeiles minor*). Grassland and shrub steppe communities support abundant small mammal prey resources for Ferruginous Hawk and Golden Eagle (*Aquila chrysaetos*). Large, mixed flocks of Black Rosy-Finch and Gray-crowned Rosy-Finch (*Leucosticte tephrocotis*) migrate downward in elevation to winter in foothill grasslands and adjacent cultivated lands on the west slope of the Beaverhead Mountains. The wide variety of grasses, forbs, and shrubs in this habitat type provide abundant nectar and pollen resources for a diverse assemblage of pollinator species.

Target Viability

Fair. Lower Montane–Foothill Grassland & Shrubland communities generally occur at lower elevations at the interface of private lands. Consequently, they have a long history of human use, both for commodity purposes (e.g., livestock grazing), and as an area where effective fire exclusion was practiced early on and eventually altered the historic disturbance regime. Changes in fire frequency and severity have resulted in Douglas-fir invasion in many areas, or the development of dense shrublands outside the range of natural historic variation. In some areas, heavy livestock use has altered plant species composition, soil compaction, nutrient levels, and vegetative structure. Invasive weeds have pioneered many roads and trails in this system, affecting the structure and composition of this target.

Prioritized Threats and Strategies for Lower Montane–Foothill Grassland & Shrubland

High Rated Threats to Lower Montane–Foothill Grassland & Shrubland in the Beaverhead Mountains

Altered fire regimes

Fire is a naturally occurring but highly variable natural disturbance in this system. Although fire has historically played a part in its composition and distribution, the system is not always fire-driven. Although fire suppression has abetted the encroachment of Douglas-fir into some grasslands and shrublands, many sites in this section are too xeric to support tree growth, even in the absence of fire. Likewise, fire suppression has allowed the development of shrub communities dominated by old, dense, and decadent shrubs with substantial amounts of fuels. Consequently, fires that do occur are likely to be high severity, and system recovery slow.

Objective	Strategy	Action(s)	Target SGCNs
Restore characteristic fire regimes in Lower Montane–Foothill Grassland & Shrubland systems.	Coordinate actions with federal land management agencies, livestock permittees, municipalities, and other stakeholders.	Identify and map key areas in need of restoration treatments. Implement targeted restoration techniques including prescribed burning, seeding, mechanical treatment, and/or changes in livestock grazing regimes. Work with livestock grazing permittees and private landowners to implement fuels treatment actions on their lands and allotments as part of strategic, landscape efforts (DOI 2015). Implement aggressive and targeted application of both proven techniques and the rapid investigation and implementation of new practices to control cheatgrass and spotted knapweed, and mitigate habitat impacts from unwanted rangeland fire (DOI 2015).	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Black Rosy-Finch Townsend's Big-eared Bat Western Small-footed Myotis Grizzly Bear Bighorn Sheep
Reduce	Targeted	Mechanical treatment of Douglas-	Greater Sage-Grouse

Objective	Strategy	Action(s)	Target SGCNs
conifer encroachment in Lower Montane–Foothill Grassland & Shrubland systems.	removal of Douglas-fir or Utah juniper to remove young-age-class trees expanding into grassland and shrubland communities.	fir/Utah juniper in key areas including lop and lay, mastication, and lop and scatter methods. Exclude old-growth Douglas-fir or Utah juniper stands from any vegetation treatments. Use categorical exclusions to conduct treatments on public lands.	Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Grizzly Bear Bighorn Sheep

Improper livestock grazing management

Livestock grazing is probably the most widespread economic land use in this system and a legacy activity that has modified much of this vegetative community from its historical condition. Livestock grazing can have a keystone effect on these habitats where livestock occur at economically meaningful densities (Bock et al. 1993). For example, livestock grazing can change grassland habitat features that directly influence birds by reducing ground-nesting cover, substrate for an abundance and diversity of insect prey, and herbaceous cover and foliage height diversity for mammalian prey. Livestock grazing can harm pollinator habitat through direct trampling of potential and existing nest sites and removal of food resources. Increased intensity of livestock grazing can negatively affect bee species richness (Sugden 1985). Grazing during periods when floral resources are scarce (e.g., midsummer) may result in insufficient forage for bees and other pollinators (Cravell 2002). Grazing that reduces surface litter and perennial grass cover and height can reduce small mammal species richness and abundance (Rosenstock 1996).The trampling action of livestock can degrade biological soil crusts, which are essential features of arid steppe plant communities that reduce soil evaporation, aid in nitrogen fixation of plants, and inhibit the establishment of invasive nonnative species such as cheatgrass and spotted knapweed (Belnap et al. 2001). Nonnative weed species not only outcompete native bunchgrasses, but are also susceptible to larger and more frequent fires.

Several grassland-associated SGCN respond negatively to livestock grazing. Short-eared Owl is a ground-nester that selects dense grass canopy in ungrazed or lightly-grazed sites. Ferruginous Hawk also requires heavy litter cover and grass canopy for ground nests, but uses shortgrass steppe for hunting prey. Viability of Golden Eagle populations requires maintaining prey habitat where eagles forage. This involves sustaining native grasslands and shrubsteppe landscapes that support the prime habitats for jackrabbits and ground squirrels. The effects of dietary overlap and competition between Bighorn Sheep and livestock are likely intensified on shared winter ranges and when preferred bunchgrass forage senesces. Whereas the proximate effect of livestock grazing on these SGCN may be the removal of grass and forbs important as forage and cover, the ultimate effect may be perpetuation of weedy annuals that outcompete native plants these SGCN are uniquely adapted to.

Objective	Strategy	Action(s)	Target SGCNs
Support proper livestock	Consider livestock grazing in a site-	Designate allotments and schedule grazing periods based on factors such as elevation, weather, and plant growth (e.g., limit	Greater Sage-Grouse Ferruginous Hawk Golden Eagle

Objective	Strategy	Action(s)	Target SGCNs
grazing management that maintains rangeland health and habitat quality (Otter 2012).	specific context over time where vegetative condition can be manipulated by the timing, intensity, duration, and frequency of grazing practices (Otter 2012).	duration of hot season use). Conduct fine-scale habitat assessments to inform grazing management. Consider resting (placing in nonuse status) a unit for a period to achieve identified resource objective(s). Build in support for an option of "grass reserve units." Seek and apply the best possible tools and techniques to influence the distribution of livestock. Consider the distribution of, and access to, stock water in springs, seeps, wet meadows, potholes across the uplands late in the summer relative to perennial stream access. Support adequate funding and personnel to collect and analyze livestock grazing-related monitoring and rangeland health data. Undertake adaptive management changes related to existing grazing permits where improper grazing is determined to be the causal factor in not meeting habitat characteristics.	Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Grizzly Bear Bighorn Sheep

Species designation, planning & monitoring

Several winter records of mixed flocks of Black and Gray-crowned Rosy-Finch exist for this section and habitat target; however, records contain sparse data other than location and estimated flock size. Improved reporting to include proportion of Black Rosy-Finch in mixed flocks and food items consumed is needed to better understand the wintering ecology of this species. Information is lacking on the status of SGCN invertebrates in this habitat target, including the Lyrate Mountainsnail, 5 species of bees, 2 butterflies, and numerous taxa comprising the Spur-throated Grasshopper (*Melanoplus*) Species Group. Many of these invertebrates are currently thought to be either Idaho or regional endemics. Investigations are needed to determine if species are extant in the Beaverhead Mountains Section, if genetic work is needed to determine taxonomic uniqueness, and to assess species-specific threats.

Objective	Strategy	Action(s)	Target SGCNs
Improve knowledge of the distribution and abundance of SGCN species occurring in Lower Montane–Foothill Grassland & Shrubland habitats of the	Improve knowledge of the wintering ecology of Black Rosy-Finch.	Develop a reporting protocol for recording Black Rosy-Finch winter observations and accumulate and maintain an atlas of documented wintering locations.	Black Rosy-Finch

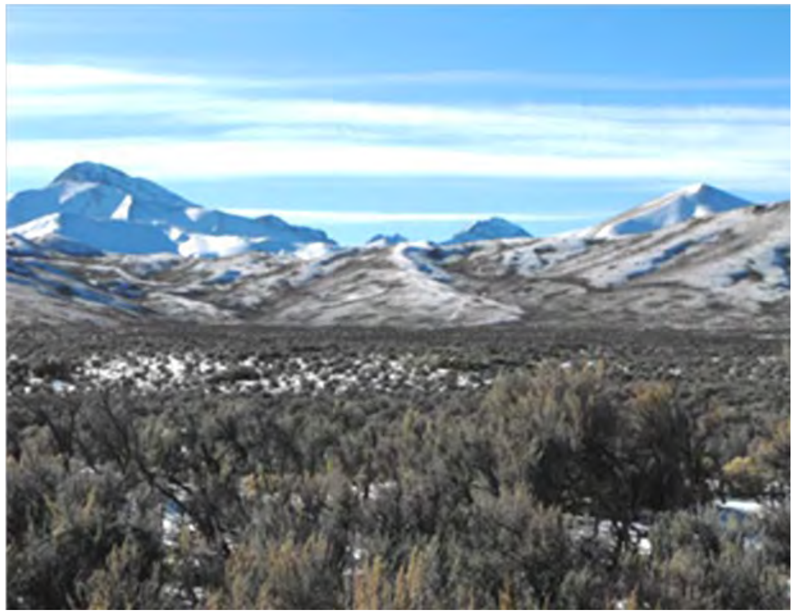
Objective	Strategy	Action(s)	Target SGCNs
Beaverhead Mountains Section.			
	Conduct surveys and implement long-term population monitoring programs.	Conduct surveys to determine occurrence, distribution, and habitat associations of Lower Montane–Foothill Grassland & Shrubland invertebrate taxa. Protect and conserve known breeding sites and larval host plants. Investigate the nature and extent of threats to SGCN invertebrate taxa in this section and habitat target.	Lyrate Mountainsnail Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta*) Monarch Gillette's Checkerspot Spur-throated Grasshopper (*Melanoplus*) Species Group

Target: Sagebrush Steppe

Sagebrush-steppe habitats dominate the landscape of the Beaverhead Mountains Section, forming approximately 53% of its land base. These arid habitat types are prevalent across the intermontane basins and foothills located in the rain shadow of the central Idaho mountains. Communities are characterized by an open shrub canopy and sparse to dense herbaceous layer dominated by perennial graminoid associates and typically have a microbiotic crust of lichens and mosses binding the upper surface of the soil. Sagebrush-steppe habitats in this section are relatively intact compared to the highly fragmented landscapes in other regions of Idaho. This is attributed to the high proportion of sagebrush-steppe habitats in public ownership, primarily under BLM management. These habitats are largely continuous and extensive, supporting connectivity for species at multiple spatial scales. Although relatively pristine climax sagebrush-steppe communities do occur in this section, most sites have been modified to some degree by a legacy of past livestock grazing which has rendered disturbed stands less ecologically complex than the mosaic that they replaced (Daubenmire 1966).

Within the greater expanse of sagebrush steppe is frequent inclusions of Semi-Desert Shrubland & Steppe–Saltbush Scrub that form continuous shrubsteppe habitat. These pockets are concentrated on the arid and semiarid alluvial fans and terraces of the Lemhi, Salmon, and Pahsimeroi valleys at lowest elevations. Stands are usually dominated by a mix of several shrubs or dwarf shrubs, but total vegetation cover is low (<30%). Dominant shrubs may include fourwing saltbush (*Atriplex canescens* [Pursh] Nutt.), shadscale saltbush (*A. confertifolia* [Torr. & Frém.] S. Watson), bud sagebrush (*Picrothamnus desertorum* Nutt.), spiny hopsage (*Grayia spinosa* [Hook.] Moq.), and winterfat (*Krascheninnikovia lanata* [Pursh] A. Meeuse & Smit). The herbaceous layer is often sparse and dominated by perennial grasses, especially Indian ricegrass (*Achnatherum hymenoides* [Roem. & Schult.] Barkworth) and sand dropseed (*Sporobolus cryptandrus* [Torr.] A. Gray). The forb layer can be diverse, but forms sparse cover. These unique inclusions, which primarily occur on private and BLM lands, are valuable in providing structural and compositional diversity to the sagebrush-steppe landscape.

This section's heterogeneous mix of semiarid, mesic, and montane sagebrush steppe groups influences the ecology of associated birds, mammals, reptiles, and invertebrates. The low vertical structural diversity of these habitats provides fewer habitat layers for wildlife, resulting in lower diversity in some taxa. But what this habitat may lack in variety, it makes up for in specificity. Characteristic sagebrush obligates in this section include Greater Sage-Grouse, Sage Thrasher, Sagebrush Sparrow (*Artemisiospiza nevadensis*), and Pygmy Rabbit. A large proportion of sagebrush steppe in this section comprises Greater Sage-Grouse PHMAs (Fig. 5.3). Sagebrush steppe types also support a suite of grassland-associated birds including Ferruginous Hawk, Golden Eagle, Long-billed Curlew, Burrowing Owl (*Athene cunicularia*), Short-eared Owl, and Common Nighthawk. Grass-dominated sagebrush steppe provides important foraging areas preferred by Bighorn Sheep.



Upper Pahsimeroi Valley © 2009 Beth Waterbury

Target Viability

Good. Sagebrush steppe is generally in good ecological condition across this section. Sagebrush-steppe communities are extensive, strongly continuous, and exhibit a diversity of age classes and structure. Most sagebrush-steppe habitat in this section is in public ownership, and is therefore less vulnerable to rangewide threats of habitat fragmentation and conversion to agriculture prevalent in areas of mixed ownership. This system is relatively resilient to the fire–cheatgrass cycle affecting many areas in Idaho's Snake River Plain, but may become less so under future climate warming scenarios. Pockets of Semi-Desert Shrubland & Steppe–Saltbush Scrub within the Sagebrush Steppe target appear less viable. These sites are typically the hottest, driest, and lowest elevation sites in the section and, therefore, have low site potential compared to cool, mesic sagebrush sites (Maestas and Campbell 2014). Such sites are more sensitive to impacts from improper livestock grazing or noxious weed invasions due to low potential resilience and resistance.

Prioritized Threats and Strategies for Sagebrush Steppe

High Rated Threats to Sagebrush Steppe in the Beaverhead Mountains

Improper livestock grazing management

Sagebrush-steppe ecosystems in this section did not evolve with large ungulate herds (e.g., American Bison [*Bison bison*]), and their grasses were poorly adapted for introductions of domestic grazers. Consequently, legacy livestock grazing practices have impacted the composition, structure, and productivity of this system in some locations. These impacts included loss of the microbiotic layer, loss of native seral grasses, reduction in herbaceous biomass, increase of shrub cover, and facilitated invasions of nonnative grasses and forbs. Past range management has involved the use of fire, herbicides, and chaining to remove dense sagebrush canopies and reestablish grass forage through reseeding of crested wheatgrass (*Agropyron cristatum*), a nonnative perennial bunchgrass. Present-day grazing continues to influence species composition and structure of sagebrush-steppe communities. Grazing tends to increase shrub cover and reduce the understory of more palatable herbaceous vegetation. The encroachment of dry conifer woodlands into sagebrush habitats has generally been ascribed to some combination of fire exclusion, livestock grazing (both directly and through its influence on fire), and climate. Livestock grazing in Semi-Desert Shrubland & Steppe–Saltbush Scrub communities requires sensitive application due to low grazing capacities, slow rates of recovery for existing deteriorated areas, and potential damage to soils and microbiotic crusts. These sites are best suited for livestock use during dormant periods, as plants can withstand much less grazing pressure and have higher mortality rates if grazed during growth periods (West and Gasto 1978). These communities are highly susceptible to invasion by saltlover (*Halogeton glomeratus* [M. Bieb.] C.A. Mey.), prickly Russian thistle (*Salsola tragus* L.), and cheatgrass (*Bromus tectorum* L.) and are difficult and slow to restore.

SGCN species particularly sensitive to improper grazing include ground-nesting birds such as Greater Sage-Grouse, Long-billed Curlew, Burrowing Owl, Short-eared Owl, Common Nighthawk, and Sagebrush Sparrow, where removal of herbaceous vegetation reduces nest concealment, thereby increasing exposure to predation or nest parasitism. Areas with grazing-induced dense sagebrush cover are often avoided by foraging Ferruginous Hawks (Howard and Wolfe 1976). Cattle have been reported to have little deleterious effect on Bighorn Sheep if they do not graze on critical winter ranges (Tesky 1993).

A noteworthy long-term trend on public land has been replacement of season-long cattle grazing with various rotational grazing systems designed to maintain or improve rangeland health. However, challenges persist in the realm of insufficient funds for federal land management agency oversight and insufficient monitoring of allotments to assess rangeland health and evaluate trends in rangeland condition, as well as grazing permit compliance.

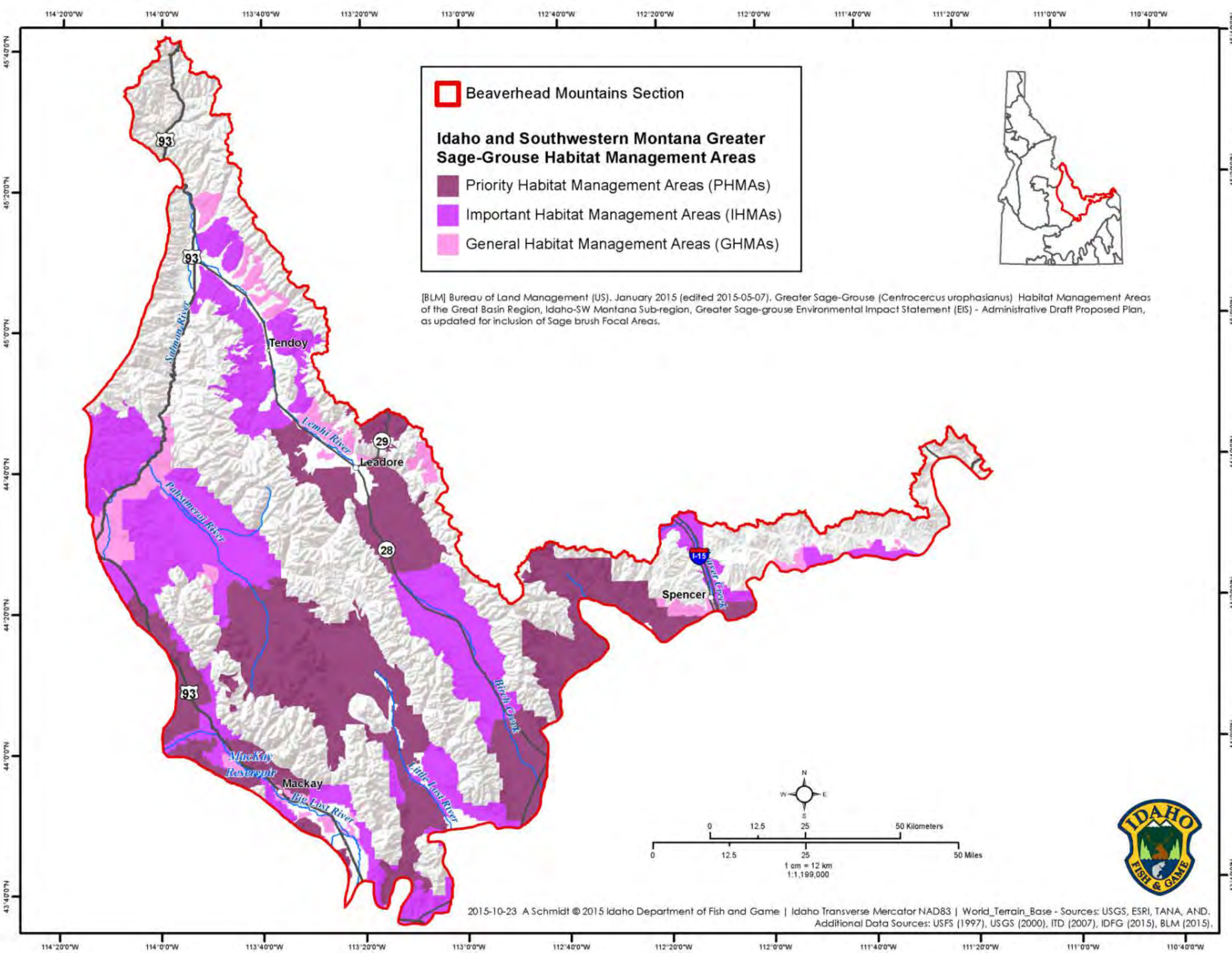


Fig. 5.3 Greater Sage-Grouse Habitat Management Areas in the Beaverhead Mountains Section

Objective	Strategy	Action(s)	Target SGCNs
Support proper livestock grazing management that maintains rangeland health and habitat quality (Otter 2012).	Manage the timing, intensity, duration, and frequency of grazing practices to manipulate vegetative condition (Otter 2012).	Prioritize permit renewals and land health assessments for allotments with declining Sage-Grouse populations (Otter 2012). Consider winter grazing regimes in areas with substantial inclusions of Semi-Desert Shrubland & Steppe–Saltbush Scrub habitat. Conduct fine-scale habitat assessments to inform grazing management. Consider resting (placing in nonuse status) a unit for a period to achieve identified resource objective(s). Build in support for an option of "grass reserve units." Seek and apply the best possible tools and techniques to influence the distribution of livestock. Consider the distribution of, and access to, stock water in springs, seeps, wet meadows, potholes across the uplands late in the summer relative to perennial stream access. Support adequate funding and personnel to collect and analyze livestock grazing-related monitoring and rangeland health data. Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter 2012).	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep
	Implement the livestock grazing management framework outlined in the Governor's Alternative (see Otter 2012).	Inform affected permittees and landowners regarding Sage-Grouse habitat needs and conservation measures (Idaho Sage-grouse Advisory Committee 2006). Incorporate Sage-Grouse habitat characteristics (Tables 3–5 of the Governor's Alternative) into relevant resource management plans as the desired conditions. Prioritize allotments for permit renewal and assessment process for allotments with declining Sage-Grouse populations. Conduct fine-scale habitat assessments to inform grazing management. Undertake adaptive management changes related to existing grazing permits where improper grazing is determined to be the causal factor in not meeting habitat characteristics.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep

Objective	Strategy	Action(s)	Target SGCNs
Further understand potential impacts to sagebrush-associated biota from livestock grazing.	Assess the impacts (both negative and, potentially, positive) of livestock grazing on sagebrush-steppe obligate passerines.	Implement new, properly designed, and replicated experiments involving a variety of alternative grazing treatments (including no grazing at all) across the spectrum of major shrubsteppe habitat types (Rotenberry 1998). Conduct experiments over multiple years (Rotenberry 1998).	Sage Thrasher Sagebrush Sparrow
Support the continued responsible use of federal lands for grazing to maintain open spaces and important habitat conditions that benefit wildlife.	Implement Western Governors' Association (WGA) policy for public lands grazing (for details, see WGA Policy Resolution 2015-03).	Use sound, science-based management decisions for federal lands and base these decisions upon flexible policies that take into account local ecological conditions and state planning decisions.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep

Transportation & service corridors

Infrastructure such as roads, highways, and high-voltage transmission lines (Governor's Executive Order No. 2015-04; Otter 2015) is a major feature of most landscapes and is identified as a primary threat in the Governor's Alternative (Otter 2012). These features impose an array of direct and indirect effects on wildlife. The most visible and well-documented impact of roads is direct mortality of wildlife through wildlife-vehicle collisions. Indirect effects on wildlife include habitat loss and fragmentation (and associated threats to demographic and genetic connectivity), increased human disturbance or access, facilitated spread of invasives, and increased risk of predation. Studies suggest populations of sagebrush-steppe obligate and dependent wildlife species are particularly sensitive to these impacts (Braun 1998, Connelly et al. 2004). In the Beaverhead Mountains Section, major paved roads intersecting sagebrush-steppe habitats include I-15, US 93, and State Highways 28, 29, and 33. These roads constitute a major anthropogenic footprint within the Challis and Upper Snake Sage-Grouse Planning Areas (SGPA). Both Challis and Upper Snake are among SGPAs with the greatest total major road mileage in Idaho (Idaho Sage-grouse Advisory Committee 2006). These SGPAs constitute 2 of 8 SGPAs in Idaho with >50% of their area potentially influenced by major roads, based on a 10 km (6.2 mi) buffer outward from each side of these roads to account for an influence from predation and noise disturbance (Connelly et al. 2004). Numerous secondary road systems (e.g., paved, county, primitive) also potentially influence sagebrush-steppe habitat and associated wildlife through factors such as increased human access, off-highway vehicle use, spread of invasive species, increased risk of wildfire, and increased mortality from collisions. Major transmission lines also occur in this section, primarily located in highway right-of-ways. Tall structures such as transmission towers in sagebrush-steppe ecosystems provide ravens and raptors with elevated substrates for perching and nesting where trees are rare or nonexistent. These structures are thought to concentrate ravens and raptors along utility corridors, which may increase the risk of predation to Greater Sage-Grouse, Pygmy Rabbit, and other sagebrush-dependent wildlife.

Objective	Strategy	Action(s)	Target SGCNs
Reduce impacts of roads and utility lines to sagebrush steppe-associated wildlife.	Coordinate the development and siting of roads and utility lines with relevant agencies and industry.	Avoid siting and construction of new power lines and associated features in "designated" habitat (see Avian Power Line Interaction Committee [APLIC]. 2015 Best Management Practices for Electric Utilities in Sage-Grouse Habitat.) Follow management actions outlined in the Governor's Executive Order No. 2015-04 (Otter 2015) as it pertains to PHMA (Core), IHMA, and GHMA when proposing to develop transportation and service corridors. Work with key agencies and stakeholders to ensure that roads, transmission lines and other linear infrastructure avoid sensitive habitat areas.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep
	Minimize unrestricted cross-country travel (Otter 2012) in sensitive habitat—Priority (Core) and Important habitat areas for Sage-Grouse.	Limit OHV travel to existing roads, primitive roads, and trails in areas where travel management planning has not been completed or is in progress. Prioritize the completion of Comprehensive Transportation Management Travel Plans (CTMTPs) (Otter 2012). Locate areas and trails to minimize disturbance to Sage-Grouse and to protect ESA-listed species and their habitats; allow for route upgrade, closure of existing routes, timing restrictions, seasonal closures, and creation of new routes to help protect habitat and meet user group needs to reduce the potential for pioneering new unauthorized routes (BLM 2015). Conduct road upgrades and maintenance outside the Sage-Grouse breeding season to avoid disturbance on leks (BLM 2015).	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep
	Increase visibility of utility lines in key Sage-Grouse movement corridors.	Identify and map areas where key Sage-Grouse movement corridors and utility lines overlap. Mark those sections of distribution lines where Sage-Grouse mortality due to line collisions has been documented.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl

Fences

Due to a long history of livestock production, fences are ubiquitous throughout the sagebrush-steppe habitats of this section. Sagebrush-steppe wildlife is adapted to landscapes with few vertical features or obstructions. Consequently for wildlife inhabiting sagebrush steppe, fences can reduce habitat suitability through habitat fragmentation, obstruction of movement corridors (e.g., woven-wire fencing), and injury or mortality from fence collision. Avian SGCN potentially vulnerable to fence collisions and entanglement include Greater Sage-Grouse, Ferruginous Hawk, Golden Eagle, Burrowing Owl, and Short-eared Owl (Fitzner 1975). Fences pose particular collision hazards to Greater Sage-Grouse when located <2 km from known leks, where fence segments lack wooden fence posts, and where fence segments exceed 4 m (13.1 ft) (Stevens et al. 2012). Fence marking may reduce risk of fence collision by Greater Sage-Grouse by as much as 83% (Stevens et al. 2012). Wooden fence posts may facilitate predation of Greater Sage-Grouse by eagles, hawks, and ravens. Although fences pose some potential threat to sagebrush-steppe habitat, it is important to recognize their utility in grazing management programs designed to achieve improved ecosystem health.

Objective	Strategy	Action(s)	Target SGCNs
To the extent practicable, reduce the impacts of fences and livestock management facilities on wildlife populations.	Implement grazing management programs that take into account wildlife habitats and needs (e.g., Otter 2012).	Mark fences to reduce wildlife collisions (Stevens et al. 2012a, b). Identify and remove unnecessary fences or other structures (Otter 2012, [BLM] Bureau of Land Management (US) 2015). When placing new fences or other structural range improvements (such as corrals, loading facilities, water tanks, and windmills), consider their impact on Sage-Grouse (Otter 2012) and other wildlife. Place new structures (e.g., corrals, loading facilities, water storage tanks, windmills) in accordance with guidance documents (e.g., Otter 2012 for Sage-Grouse leks) and within existing disturbance corridors or in unsuitable habitat (BLM 2015).	Greater Sage-Grouse Ferruginous Hawk

Noxious weeds & invasive annual grasses

The invasion of nonnative grasses and forbs is a major threat to sagebrush-steppe habitats and in some areas takes precedence over all other ecological concerns. Invasive species are recognized as the primary extinction risk factor for Greater Sage-Grouse across its range (USDI-Fish and Wildlife Service 2005) and are identified as a primary threat to Sage-Grouse in Idaho by the Governor's Alternative (Otter 2012). The Beaverhead Mountains Section lies within the Mountain Valleys Sage-Grouse Conservation Area, which is considered at lower risk to invasive species than other areas of the state. The Challis and Upper Snake Sage-Grouse Working Groups of this section identified invasive plant species as high risk factors within their respective Planning Areas, citing adverse impacts from displacement of desirable species, altered fire frequencies, reduced value of sagebrush-steppe habitat (Challis Sage-Grouse Local Working Group 2007, Upper Snake Sage-Grouse Local Working Group 2009). Noxious weeds (e.g., spotted knapweed) and invasive annual grasses (e.g., cheatgrass) have colonized some of sagebrush habitat types of this section at low- and mid-elevations. Though the cheatgrass/fire cycle is not as pervasive an issue in this section as the Snake River Plain, the predicted climate warming scenario for this region may generate the biophysical conditions favored for cheatgrass establishment.

Objective	Strategy	Action(s)	Target SGCNs
Effectively control and restore areas dominated by invasive, nonnative annual grasses at a rate greater than the rate of spread.	Implement large-scale experimental activities to remove cheatgrass and other invasive annual grasses through various tools (DOI 2015).	Implement The Idaho Invasive Species Strategic Plan 2012–2016 ([ISDA] Idaho State Department of Agriculture 2012). Support the development of a framework for a national invasive species Early Detection and Rapid Response (EDRR) program (DOI 2105). Locate and coordinate installation of long-term studies and subsequent monitoring to test the efficacy of large-scale application of integrated pest management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Support the use of Plateau® herbicide in controlling cheatgrass. Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006). Work with County Cooperative Weed Management Areas to prevent the introduction, reproduction, and spread of designated noxious weeds and invasive nonnative plants.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep

Species designation, planning & monitoring

Information is lacking on the status of SGCN invertebrates in this habitat target, including the Lyrate Mountainsnail, 4 species of bees, and numerous grasshopper taxa. Many of these invertebrates are currently thought to be either Idaho or regional endemics. Investigations are needed to determine if species are extant the Beaverhead Mountains Section, if genetic work is needed to determine taxonomic uniqueness, and to assess species-specific threats.

Objective	Strategy	Action(s)	Target SGCNs
Improve knowledge of the distribution and abundance of SGCN invertebrates potentially occurring in Sagebrush-steppe habitats	Conduct surveys and implement long-term population monitoring programs.	Conduct surveys to determine occurrence, distribution, and habitat associations of the Lyrate Mountainsnail. Conduct surveys to determine occurrence, distribution, and habitat associations of sagebrush-associated bumble bees. Conduct surveys to determine	Lyrate Mountainsnail Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Idaho Point-headed Grasshopper A Grasshopper (*Argiacris amissuli*)

Objective	Strategy	Action(s)	Target SGCNs
of the Beaverhead Mountains Section.		occurrence, distribution, and habitat associations of sagebrush-associated grasshoppers. Protect known breeding sites.	A Grasshopper (*A. militaris*) Spur-throated Grasshopper (*Melanoplus*) Species Group
		Investigate the primary host plants of the Idaho Point-headed Grasshopper and its predicted response to climate change. Develop a species distribution model to inform monitoring program and habitat management.	Idaho Point-headed Grasshopper

Spotlight Species of Greatest Conservation Need: Pygmy Rabbit

The Pygmy Rabbit is the smallest of North American rabbits and hares and a specialist of sagebrush deserts in portions of 8 western states including Idaho. Pygmy Rabbits are patchily distributed in areas with dense, mature sagebrush and deep, loamy soils suitable for digging residential burrow systems and separate shallow natal burrows (Green and Flinders 1980, Rachlow et al. 2005). Suitable habitats are found in intermontane valleys, alluvial fans, drainage bottoms, plateaus, and rolling sagebrush plains of Idaho at elevations ranging from 900 to 2,380 m (2,800 to 7,800 ft). Burrow systems are often associated with areas of distinctive mounded microtopography supporting taller sagebrush and deeper soils called "mima-mounds." Pygmy Rabbit is considered a sagebrush-obligate species because it's highly dependent on sagebrush for food and shelter throughout its life cycle. Sagebrush provides essential nutrition comprising 30 to 50% of the diet of Pygmy Rabbits during summer and >90% during winter (Wilde 1978, Green and Flinders 1980). Sagebrush also provides cover from predators and thermal extremes in the sage-steppe environment, and offers structural support to facilitate subnivean (under the snow) burrowing under deep snow conditions (Katzner and Parker 1997).

Pygmy Rabbit © 2008 Beth Waterbury

Pygmy rabbit populations in the Beaverhead Mountains Section are some of the most robust in the state given the large, continuous extent of suitable sagebrush-steppe habitats in public ownership. The upper Lemhi Valley has been a key site for cutting-edge research on Pygmy Rabbits lead by Dr. Janet Rachlow of the University of Idaho and many student and faculty collaborators (http://rachlowlab.weebly.com/pubs.html). Their work, supported by state and federal agencies, has significantly advanced the understanding of Pygmy Rabbit ecology and factors critical to conserving the species in Idaho and the Intermountain West.

Spotlight Species of Greatest Conservation Need: Idaho Point-headed Grasshopper

The Idaho Point-headed Grasshopper (*Acrolophitus pulchellus*) is a rare Idaho endemic insect found in dwarf-shrubland and steppe habitats of Idaho's Birch Creek and Big Lost River (Sinks) drainages. Prior to 2010, the species was known from only 17 records dating from 1883 to 1993. Surveys in 2010 confirmed its persistence at historical localities and increased knowledge of its distribution, habitat associations, and life history. Idaho Point-headed Grasshoppers occupy alluvial fan and stream terrace landforms characterized by sparse vegetation, surface gravels, vagrant lichens, and intact biological soil crusts. The species is thought to be ground-dwelling and a specialist feeder on stemless mock goldenweed (*Stenotus acaulis* [Nutt.] Nutt.), a cushion-form forb common to the Sinks Drainages to which the grasshopper is remarkably camouflaged. Key habitat occurs on public rangelands managed by the BLM and FS. Management that promotes proper livestock grazing management, restricts OHV travel to designated routes, controls noxious weeds, and uses native species for range restoration will help to conserve Idaho Point-headed Grasshopper populations and their habitat.

Female (left) and male Idaho Point-headed Grasshoppers on stemless mock goldenweed © 2010 Beth Waterbury

Target: Alpine & High Montane Scrub, Grassland & Barrens

The Beaverhead Mountains Section contains the greatest area and highest proportion of alpine landcover (5%) than any other section in Idaho. Alpine communities are found at elevations ranging from 2,100 to 3,650 m (7,000–12,000 ft) and occur in notable extents in the Lemhi and Big Lost River mountain ranges. Wind and its effect on snow movement has a strong local effect, producing wind-scoured fell fields, dry turf, snow accumulation heath communities, and short-growing-season snowbed sites. Fell fields are typically free of snow during the winter as they are found on ridgetops, upper slopes and exposed saddles, whereas dry turf is found on gentle to moderate slopes, flat ridges, valleys, and basins where soils are relatively stabilized and water supply is more constant. Vegetation occurs as a mosaic of small patch plant communities. Alpine bedrock and scree types consist of exposed rock and talus in steep upper mountain slopes and windswept summits. Sparse cover of forbs, grasses, low shrubs, and scrubby trees may be present with total vascular plant cover typically less than 10–25%. The hydrology is strongly associated with snowmelt and springs which often sustain high mountain lakes. Backcountry recreation use includes hiking, angling, backpacking, and horse-packing in summer, and snowmobiling and skiing in winter. Alpine communities of this section provide nesting habitat for Black Rosy-Finch, and year-round habitat for Hoary Marmot. Mountain Goats occupy alpine areas with sufficient steep, rocky escape terrain. Winter distribution concentrates on wind-scoured ridges and south-facing slopes where forage is available. Wolverines are strongly associated with alpine climatic conditions and habitats, particularly in summer.

Rocky Canyon, Lemhi Range © 2006 Chris Murphy

Target Viability

Good. A significant portion of alpine habitats in this section are protected as wilderness study areas or roadless areas. Remaining alpine habitats are characterized as “de facto” wilderness due to remoteness, minimal roads and infrastructure, and generally inhospitable conditions for human habitation. Recreational activities are perceived as being low density and low impact on alpine habitats and wildlife. Alpine-associated biota are sensitive to climatic factors and are likely to have low adaptive capacity to climate change.

Prioritized Threats and Strategies for Alpine & High Montane Scrub, Grassland & Barrens

High Rated Threats to Alpine & High Montane Scrub, Grassland & Barrens in the Beaverhead Mountains

Changes in precipitation & broad-scale hydrologic regimes

Observed and predicted trends in climate vary widely across Idaho because of the state's complex topography. Nowhere is this variation more pronounced than in alpine habitats, which contain some of the sharpest environmental gradients found in continental regions. Despite the buffering effect of complex terrain, climate model projections for Idaho and the Pacific Northwest predict progressively warmer and wetter conditions, with worsening summer drought. Given projected temperature increases, the region is expected to transition from a snow-dominated system to one more rain-dominated. Changes in the length and depth of snow cover may influence the composition and distribution of alpine flora and fauna. Overall, high-elevation species ranges are expected to contract as a result of vertical migration, because the amount of mountainous land area decreases as one gains elevation and less area is available for species to inhabit. The most vulnerable species may be those that are genetically poorly adapted to rapid environmental change, reproduce slowly, disperse poorly, or are isolated or highly specialized.

Objective	Strategy	Action(s)	Target SGCNs
Increase understanding of adaptation responses of alpine biota to climate change.	Support and conduct research into ecological aspects of climate change in alpine systems.	Work with researchers to develop models to predict how wildlife species will cope with changing climatic and environmental conditions. Conduct wildlife species vulnerability assessments supported by predictive models referenced above.	Clark's Nutcracker Black Rosy-Finch Wolverine Grizzly Bear Mountain Goat Bighorn Sheep Hoary Marmot
Maintain connectivity among patchy alpine habitats.	Identify and secure a connected network of alpine habitats to facilitate dispersal, migrations, and range shifts caused by climate change.	Identify, assess, and prioritize critical connectivity gaps for a range of alpine-associated wildlife species. Work with communities, government agencies, academia, and organizations to identify opportunities for maintaining and restoring landscape connectivity.	Clark's Nutcracker Black Rosy-Finch Wolverine Grizzly Bear Mountain Goat Bighorn Sheep Hoary Marmot Spur-throated Grasshopper (Melanoplus) Species Group

Species designation, planning & monitoring

Alpine systems are challenging to inventory due to logistical difficulties of access, short growing or reproductive seasons, and variable weather influenced by high mountain topography. Consequently, population data are lacking for many alpine-associated species. Concerns about the status of alpine obligates in the face of climate change have underscored the need to gather data on all aspects of their ecology, distributions, and populations. Alpine SGCN for which significant data gaps exist are addressed below. These species could be effectively monitored through a multispecies monitoring approach.

Objective	Strategy	Action(s)	Target SGCNs
Determine status of alpine obligate SGCN.	Conduct surveys and implement long-term monitoring programs for Black Rosy-Finch.	Conduct breeding season surveys to determine distributions and characterize nesting habitat. Implement monitoring programs in occupied habitats. Monitor nonbreeding populations to better understand the scale and scope of threats in anthropogenic environments.	Black Rosy-Finch
	Conduct surveys and implement long-term monitoring programs for Hoary Marmot.	Conduct breeding season surveys to determine distributions and characterize alpine habitats. Implement monitoring programs in occupied habitats. Assess the importance of predation as a mortality factor and identify important predators.	Hoary Marmot
	Conduct surveys and implement long-term monitoring for a suite of alpine-associated insects.	Conduct surveys to determine occurrence, distribution, and habitat associations of alpine-associated insects.	Alpine Tiger Beetle Hunt's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Beartooth Copper A Grasshopper (*Argiacris militaris*) A Grasshopper (*Barracris petraea*) Spur-throated Grasshopper (*Melanoplus*) Species Group

Target: Riverine–Riparian Forest & Shrubland

Riverine–riparian systems comprise the most diverse, dynamic, and complex habitat types in the Beaverhead Mountains Section, but account for only 1% of its area. They occur on floodplains and terraces of permanent and intermittent rivers and streams, but may also be found along backwaters, lakes, ponds, reservoirs, and irrigation ditches. Dominant trees include black cottonwood (*Populus trichocarpa*) and quaking aspen. Shrub components include willow (*Salix* sp.), water birch (*Betula occidentalis*), mountain alder (*Alnus rhombifolia*), red-osier dogwood (*Cornus sericea*), Wood's rose (*Rosa woodsii*), common snowberry (*Symphoricarpos albus*) and golden currant (*Ribes aureum*). Herbaceous understories are diverse, varying in response to the amount of light-penetrating overstory canopies and disturbance history.

Salmon River, Lemhi County © 2010 Jon Flinders

In the Beaverhead Mountains Section, riverine systems are remarkably varied in size, composition, and structure. Most 1st- and 2nd-order streams include habitat within the relatively high-gradient channels of headwater and small streams. Examples include innumerable montane and subalpine streams draining the Beaverhead, Salmon River, Lemhi, Lost River, Centennial, and Henrys Lake Mountains. Characteristic vegetation may include conifer and deciduous broad-leaved trees with highly diverse shrub and herbaceous understories. The upper reaches of 3rd-order streams such as the Lemhi and Pahsimeroi rivers occupy broad, low-gradient valleys and are dominated by willow and water birch. Lower reaches can support modest cottonwood galleries. The Salmon River and Big Lost River are the principle 4th-order streams in this section. Portions of their floodplains support some of the best late-seral cottonwood galleries in this section, although they are somewhat fragmented due to agricultural clearing, livestock grazing, and land development on surrounding private lands. Riparian systems of the Little Lost, Birch, Medicine Lodge, and Beaver–Camas drainages contain a diverse mix of shrubs dominated by willows (e.g., *Salix exigua*, *S. lasiolepis*, *S. lutea*, *S. lucida* ssp. *caudata*, *S. melanopsis*), water birch (*Betula occidentalis*), and gray alder (*Alnus incana*).

Riverine–riparian systems provide important habitat for a diverse array of aquatic and terrestrial biota, including keystone species such as American Beaver, salmon, and cottonwood. Riverine–riparian systems of this section provide migration corridor, juvenile rearing, spawning, or resident habitat for 5 species of ESA-listed fish. These systems also support numerous aquatic invertebrates (e.g., Western Pearlshell, Lolo Sawfly, caddisflies), breeding populations of amphibians (e.g., Western Toad), and avian SGCN including Harlequin Duck (*Histrionicus histrionicus*), Common Nighthawk, and Lewis's Woodpecker. Bighorn Sheep frequent the riverine systems to access water and green forage, particularly along the Salmon River. The juxtaposition of riparian forests to cliffs and rock outcrops provides abundant roosting and foraging habitat for bats. Fishers occupy montane riparian forests in the Beaverhead Mountains, and Grizzly Bears patrol select streams in the Greater Yellowstone Area foraging for spawning cutthroat trout.

Target Viability

Fair to Good. The riverine habitats in this section rate an overall good condition based on free-flowing status of the Salmon River and its primary tributaries (e.g., no synthetic barriers), relatively low level of watershed development, large connected habitats for listed salmonids and anadromous Pacific Lamprey, and an abundance of roadless and little-roaded federal lands that have high ecological integrity. These areas account for a substantial portion of the section and serve as habitat strongholds for multiple species of fish and wildlife. However, some riverine–riparian habitats are not pristine and have been affected to varying degrees by land uses including irrigated agriculture, livestock grazing, road construction, logging, and mining. Over a century of instream flow alterations have substantially altered the riparian zones of numerous streams. Over 4,000 points of water diversion have been constructed in the watersheds of this section for crop irrigation, some resulting in complete hydrologic disconnect from higher-order streams. Conservation programs designed to reconnect priority tributaries (e.g., Lemhi and Pahsimeroi watersheds) are making significant gains in opening access to additional spawning and rearing habitat for Chinook Salmon (*Oncorhynchus tshawytscha*), Steelhead, and other focal fish and wildlife species.

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

High Rated Threats to Riverine–Riparian Forest & Shrubland in the Beaverhead Mountains

Water diversions

Diversion of water from the rivers and streams in the Beaverhead Mountains Section was coincident with Euro-American settlement of the region beginning in the 1860s. Water diversions co-occurred with numerous other human impacts to riparian systems including harvest of riparian forests for fuel, shelter, and land clearing, livestock grazing, wetland drainage, mining, and logging. As noted above, thousands of active water diversions exist in this section in support of agriculture. The engineering of water diversions constitutes a major perturbation of fluvial processes and riparian conditions in this arid landscape. Water diversions can drastically alter stream flow regimes producing many synergistic effects including disruption of flood and channel forming processes, floodplain/stream linkages, recruitment of riparian vegetation, fish migration and access to suitable spawning and rearing habitat, and water temperature regimes for coldwater fish. High water temperatures typically coincide with high ambient air temperatures in late summer. Agricultural water diversions are at their highest and streamflows generally are at their lowest during this time frame. Reductions in streamflow, coupled with warm air temperatures, can create thermal barriers that block migration of adult native salmonids to spawning grounds, decrease juvenile salmonid rearing habitat, and result in poor growth and survival (Maret et al. 2006). Human activities that remove riparian shading can accentuate this increased water temperature.

Objective	Strategy	Action(s)	Target SGCNs
Minimize impacts to riverine–riparian systems from water diversions.	Increase tributary connectivity to benefit native fish populations.	Improve connectivity of tributaries that are currently intercepted by irrigation complexes. Modify diversion structures (e.g., gravel pushup dams) to provide for anadromous and resident fish migration. Implement fish screening in tributaries after dewatering and passage issues are resolved.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU)
	Implement irrigation efficiencies to improve minimum streamflows.	Purchase instream water rights or negotiate flow agreements with water users to enhance instream flows. Consolidate irrigation ditches to increase water savings.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU)
	Reduce instream water temperatures.	Restore and protect shade-providing and bank-stabilizing riparian vegetation.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU)

Active riparian vegetation removal

Many of the same attributes that contribute to the high productivity and biodiversity of riparian systems are of high economic value to human society. Consequently, the floodplains of the Beaverhead Mountains Section are productive not only for their complex wildlife habitats and linkages to aquatic biota, but also because they are the most productive lands for agriculture and are highly desirable for human dwellings. This is reflected in the high proportion of private landownership in the low ground topography of this section. Livestock and hay production agriculture is prevalent along the major tributaries and rivers in this section. Clearing and occasional burning of riparian vegetation is commonly employed to maximize pasture area and set back riparian succession. Development of "riverfront" homesites has accelerated loss and fragmentation of riparian habitat through clearing to improve river views and to create fire-defensible space around structures. Riparian vegetation removal may be subsidized under government programs to reduce the risk of fire in wildland-urban interface environments. Significant losses of late-seral cottonwood gallery forests have occurred in recent years under the US Army Corps of Engineers' levee system vegetation management, designed to reduce flood risk to communities living and working behind these levees.

Objective	Strategy	Action(s)	Target SGCNs
Conserve, maintain and restore riparian habitats on public and private lands.	Increase public awareness of the multiple values and benefits of riparian habitat.	Incorporate and implement appropriate riparian management and stewardship guidelines in public and private land management programs/decisions. Distribute *Stream Care: A Guide for Property Owners in the Upper Salmon River Watershed* pamphlet to riverfront landowners. Incorporate riparian ecology information and management guidelines into wildland fire education programs. Designate suitable sites as Important Bird Areas to foster community interest and stewardship.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Harlequin Duck Common Nighthawk Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Monarch
	Conserve riparian habitats through land use planning.	Develop land use ordinances that establish adequate setbacks and limits on riparian vegetation removal on all watercourses, including ephemeral streams. Encourage "no net loss" policies for late-seral cottonwood forests. Negotiate variances on vegetation standards for US Army Corps of Engineers-maintained levees. Minimize vegetation clearing for road building on public lands.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Harlequin Duck Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Monarch
	Conserve riparian habitats through active restoration and protection programs.	Restore riparian vegetation through planting of native trees and shrubs. Identify and survey intact blocks of mature cottonwood forest, using agency or citizen scientists. Use voluntary cooperative efforts (i.e., Conservation Reserve Enhancement Program [CREP]) and incentive programs to conserve, maintain and restore riparian habitats on private lands.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Harlequin Duck Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Monarch

Improper livestock grazing management

Riparian areas have historically and continue to be of vital importance to the livestock industry due to their productivity and nexus with water. Livestock tend to congregate in riparian and wetland areas and use the vegetation much more intensively than the vegetation of adjacent uplands. Many of the broad floodplain riparian zones of the Beaverhead Mountains Section, formerly complex mosaics of deciduous forest, beaver marsh, and wet prairie, have been converted to simple agro-ecosystems of pastures and croplands. Within public lands grazing allotments, headwaters and tributaries have maintained relatively good riparian functionality. However, downstream lower gradient stream reaches have been considerably altered by the effects of forage removal, soil compaction, streambank trampling, channelization, and the introduction of invasive plants. Resulting losses of ecosystem structure and composition, particularly in deciduous woodland riparian stands of cottonwood, alder, or willow, decrease riparian habitat value for terrestrial wildlife (e.g., avian nesting) and aquatic biota.

Objective	Strategy	Action(s)	Target SGCNs
Maintain riverine health and riparian habitat quality in the presence of livestock grazing.	Develop and implement livestock grazing management regimes that are compatible with riparian conservation objectives.	Selectively fence livestock from riparian zones, streambanks, and restoration sites and provide off-stream water sources. Manage seasonal timing of grazing to increase cottonwood, willow, aspen, and grass cover. Plant and maintain riparian vegetation between pastures and waterways to help filter and minimize high-nutrient runoff. Control invasive weeds to prevent colonization in sensitive riparian habitats.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Harlequin Duck Sandhill Crane Common Nighthawk Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Grizzly Bear Monarch

Changes in precipitation & broad-scale hydrologic regimes

Anthropogenic climate change is altering stream hydrology and its associated biota in the Rocky Mountain West (Rieman and Isaak 2010). The timing of stream runoff steadily advanced during the latter half of the 20th century and now occurs 1–3 weeks earlier due largely to concurrent decreases in snowpack and earlier spring melt (Stewart et al. 2005). Climate models predict a trend toward a decrease in snow water equivalent and a general increase in winter precipitation in the form of rain, particularly at lower elevations. Generally drier conditions are anticipated for the southern Rocky Mountains, inclusive of the Beaverhead Mountains Section. Climate change could profoundly impact aquatic and riparian systems by increasing water temperatures, variability in flow timing and amount, and risk of extreme climate events such as floods, droughts, and wildfires. These stresses in turn may affect changes in the composition of the riparian plant community and its susceptibility to invasions by invasive plants. Projected changes may detrimentally impact aquatic and riparian species such as Chinook Salmon, Bull

Trout (*Salvelinus confluentus*), Lewis's Woodpecker, and aquatic invertebrates that are the focus of conservation efforts in this section.

Objective	Strategy	Action(s)	Target SGCNs
Restore streams to improve stream geomorphology, increase water quality, extend the hydroperiod, and provide in-stream and riparian wildlife habitat.	Manage American Beaver (*Castor canadensis*) populations to maximize dam densities in compatible landscapes.	Evaluate status of beaver populations in the Section. Identify key watersheds for increased beaver dam densities. Restore riparian habitat where conditions limit beaver populations in key watersheds. Conduct outreach to engage stakeholders in key areas. Engage trappers and sportsman organizations in management programs to maximize beaver populations and long-term fur harvest opportunities. Manage trapping seasons to ensure that beavers continue to contribute to healthy riparian systems in the Beaverhead Mountains Section. Where appropriate, conduct translocation projects. Manage beavers to minimize property damage and conflicts.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Harlequin Duck Sandhill Crane Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Grizzly Bear Monarch
	Implement irrigation efficiencies to improve minimum streamflows.	Purchase instream water rights or negotiate flow agreements with water users to enhance instream flows. Consolidate irrigation ditches to increase water savings.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad
Increase acreage of riparian habitat in protected status.	Develop policies, programs, and incentives to conserve highest quality riparian habitats.	Identify, assess, and prioritize largest and most continuous patches of cottonwood forest and target for protection. Conserve highest quality cottonwood forests through land exchanges, conservation easements, or purchase.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Sandhill Crane Common Nighthawk Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Fisher Grizzly Bear Monarch

Species designation, planning & monitoring

Information is lacking on the status of Harlequin Duck, bumble bees, and several aquatic invertebrates in this habitat target. The Beaverhead Mountains Section is outside of the Harlequin Duck's breeding stronghold in Idaho (Selway River north to the Canada border); however, breeding pairs and out-migrating hatch-year birds have been documented in recent years. The Section contains several suitable breeding streams, defined as relatively undisturbed with high elevation gradients; cold, clear, and swift water; rocky substrates; and forested bank vegetation. Distribution and abundance of Harlequin Duck has not been assessed in this section since 2008. Although widespread across the western US and Canada, little is known about the status of SGCN bumble bees in this section. Riparian habitats have the potential to support an abundance and diversity of native flowers for pollen and nectar resources. Aquatic invertebrate SGCN lacking information includes bivalve, gastropod, and insect taxa that could be effectively monitored through a multispecies monitoring approach.

Objective	Strategy	Action(s)	Target SGCNs
Implement a Harlequin Duck population monitoring program.	Develop partnerships, funding and capacity to conduct breeding surveys statewide on a regular basis.	Conduct spring pair surveys and summer brood surveys following the protocol established in the Harlequin Duck Conservation Assessment and Strategy for the US Rocky Mountains (Cassirer et al. 1996). Where local declines are apparent, expand surveys upstream of historically occupied stream reaches. Coordinate surveys with MT, WY, WA, OR, BC, AB to facilitate a northwest regional population assessment. Incorporate Harlequin Duck surveys into riverine multitaxa monitoring programs.	Harlequin Duck
Determine status of SGCN invertebrates associated with riverine–riparian habitats.	Conduct surveys and implement long-term monitoring programs for SGCN aquatic bivalves.	Conduct surveys for Western Pearlshell to determine distributions and characterize habitat; implement long-term monitoring. Incorporate bivalve surveys into riverine multitaxa monitoring programs.	Western Pearlshell
	Conduct surveys and implement long-term monitoring programs for SGCN pondsnails.	Conduct surveys for pondsnails to determine distributions and characterize habitat; implement long-term monitoring. Incorporate pondsnail surveys into riverine multitaxa monitoring programs.	Pondsnail (*Stagnicola*) Species Group
	Conduct surveys and implement long-term monitoring programs for SGCN insect taxa.	Conduct surveys for SGCN bumble bees to determine distributions and characterize habitat; implement long-term monitoring. Conduct surveys for Lolo Mayfly to determine distributions and characterize habitat; implement long-term monitoring. Conduct surveys for A Mayfly (Cinygma dimicki) to determine distributions and	Lolo Mayfly A Mayfly (*Cinygma dimicki*) Hunt's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Lolo Sawfly Tiny Forestfly A Caddisfly (*Eocosmoecus*

Objective	Strategy	Action(s)	Target SGCNs
		characterize habitat; implement long-term monitoring. Conduct surveys for Lolo Sawfly to determine distributions and characterize habitat; implement long-term monitoring. Conduct surveys for SGCN caddisflies to determine distributions and characterize habitat; implement long-term monitoring.	*schmidi*) A Caddisfly (*Rhyacophila oreia*) A Caddisfly (*Goereilla baumanni*) A Caddisfly (*Sericostriata surdickae*)

Spotlight Species of Greatest Conservation Need: Lewis's Woodpecker

Lewis's Woodpecker is a locally common but patchily distributed woodpecker of open ponderosa pine forest, open riparian woodland dominated by cottonwood, and logged or burned pine forest. Breeding populations occur throughout Idaho except in the southeastern portion of the state (Tobalske 1997). Lewis's Woodpecker is among the most unique of North American woodpeckers in the development of flycatching behavior, nest preference for well-decayed snags or old nest holes of primary excavators, and its striking plumage of glossy greenish-black, silver-white, and salmon-red described as "a curious mix" by famed explorer and namesake Meriwether Lewis. Suitable nesting habitat includes an open canopy (30% tree canopy closure), availability of nest cavities and perches, dead and downed woody debris, a brushy understory offering ground cover, and abundant insect prey (Saab and Dudley 1998). Outside of the breeding season, Lewis's Woodpecker is nomadic, following locally abundant food resources including fruit and nuts. Partly due to this nomadic nature, population size for this species is difficult to determine (Bock 1970, Tobalske 1997).

Lewis's Woodpecker © 2006 www.naturespicsonline.com

Lewis's Woodpecker is a State of the Birds 2014 Yellow Watch List species due to declining population trends and predicted severe deterioration in the future suitability of breeding conditions (Rosenberg et al. 2014). Primary conservation actions and management considerations to benefit this species include retention of cottonwood riparian forests and snag components, maintenance of natural stream flow patterns that promote natural recruitment of cottonwood seedlings, proper livestock grazing management to maintain understory shrub communities, and introduction of fire in lower montane conifers to restore open forest structure and create burned forest habitat.

Target: Springs & Groundwater-Dependent Wetlands

These mesic systems are scarce resources in the semiarid Beaverhead Mountains Section, and are generally regarded as biodiversity hot spots. These habitats are typically seeps, springs, and wet meadows occurring on gentle to steep slopes from floodplain to montane forest elevations. Meadows are often dominated by rhizomatous graminoids such as sedges, grasses, and rushes, and forbs are diverse and often lush. Unique examples of this type in this section include the Birch Creek Fen, a groundwater-fed peatland with numerous rare plants located at the Lemhi-Clark county line, and Chilly Slough, a large, spring-fed, wet-meadow-stream complex located in the Thousand Springs Valley, north of the town of Mackay, in Custer County, Idaho.

Big Springs, Pahsimeroi Valley © 2015 Windy Davis

The interface of these mesic systems with adjacent arid uplands creates the ultimate platform for biotic diversity. Springs, seeps, and wet meadows function as critical surface water sources linking uplands, riparian zones, and stream channels. They serve as important foraging areas for avian communities, particularly if associated with nearby riparian or forest habitats (Saab and Rich 1997). In mosaics with sagebrush steppe, springs, seeps, and wet meadows are a critical habitat component for several avian SGCN including Greater Sage-Grouse, Sandhill Crane (*Grus canadensis*), Long-billed Curlew, Burrowing Owl, and Short-eared Owl (Rich et al. 2005). The grasses present in mesic meadows are important in providing food and cover for birds directly, and in providing a substrate for a volume and diversity of insects that serve as additional food items. Connelly et al. (2000) recognized wet meadows as important late brood-rearing habitat for Sage-Grouse, characterized by relatively moist conditions with succulent forbs in or adjacent to sagebrush cover. As elements within forested communities, these systems provide important breeding habitats for amphibians. Because of the abundance of insects, these systems are important foraging sites for bats.

Target Viability

Poor. These systems form relatively rare islands of robust herbaceous vegetation within large patches of more xeric systems such as sagebrush steppe, lower montane grasslands, and Dry Lower Montane–Foothill Forest. These sites are highly attractive to domestic livestock and wildlife as sources of palatable green forage and free water. A legacy of heavy livestock grazing and continued season-long grazing in some areas have altered the structure, composition, and function of these habitat types. Springs, seeps, and wet meadows are also attractive features to OHV recreationists whose use may cause soil compaction and erosion, alter hydrologic processes, destroy vegetation, and facilitate the colonization of invasive weeds.

Prioritized Threats and Strategies for Springs & Groundwater-Dependent Wetlands

Very High Rated Threats to Springs & Groundwater-Dependent Wetlands in the Beaverhead Mountains

Changes in precipitation & broad-scale hydrologic regimes

Precipitation is critical to the existence of springs, seeps, and groundwater-dependent wetlands, and the size, frequency, and duration of precipitation events are key factors influencing their recharge. Climate change is expected to decrease ground and surface water quantity and increase the duration and intensity of drought, and these systems will be a direct indicator of these changes. Decreased discharge would likely result in reduced flow from springs, lower base flow in feeder streams, and loss of groundwater-fed wetlands. Factors such as higher air temperatures and evaporation could further exacerbate drying trends. Springs, seeps, and meadows in poor or compromised ecological condition may lack the resiliency needed to persist under drought conditions. The implications for Greater Sage-Grouse and sympatric wildlife are concerning, as springs, seeps, and wet meadows within sagebrush-steppe habitats are often the only natural water sources across vast areas.

Objective	Strategy	Action(s)	Target SGCNs
Increase health and resiliency of springs, seeps, and groundwater-dependent wetlands to combat the effects of climate change.	Implement climate mitigation strategies to improve the resilience and resistance of springs, seeps, and groundwater-dependent wetlands.	Realign, restore, and renovate key mesic systems that are not functioning properly. Reduce or eliminate additive nonclimate ecosystem stresses (e.g., high road densities, water depletions, water pollution). Locate and collect locally-sourced seeds of desirable native plant species for revegetation and restoration efforts. Ensure that administrative and permitted activities on public lands do not contribute to the reduction of surface or groundwater that supplies springs, seeps, small ponds, and wetlands.	Western Toad Greater Sage-Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Grizzly Bear Bighorn Sheep Hunt's Bumble Bee Western Bumble Bee

Objective	Strategy	Action(s)	Target SGCNs
		Monitor ecological condition at springs, seeps, and groundwater-dependent wetlands for future evaluation of possible effects from climate change.	Suckley's Cuckoo Bumble Bee Monarch Gillette's Checkerspot

High Rated Threats to Springs & Groundwater-Dependent Wetlands in the Beaverhead Mountains

Improper livestock grazing

Livestock impacts to springs, seeps, and wet meadows are widespread in the Beaverhead Mountains Section. Livestock tend to congregate in riparian and wetland areas due to the availability of palatable forage and prolonged plant phenology. Direct impacts to vegetation result from herbage removal by foraging livestock. Where use is high for a sequence of years, the composition of the plant community may change as the more palatable species lose vigor and decrease throughout the site. This impact is heightened during drought periods. Trampling by livestock can penetrate, compact, and reconfigure wetland soils into hummocks and pugs. Hummocks are elevated soil and vegetation pedestals separated by inter-hummock channels of bare, compacted soil (pugs) caused by the shearing and compressional impacts of livestock hooves. Soil compaction restricts root growth, reduces soil water-holding capacity, reduces soil productivity, and contributes to water runoff and soil erosion (Fitch and Ambrose 2003).

Objective	Strategy	Action(s)	Target SGCNs
Manage livestock grazing to improve springs and ground-water dependent systems.	Manage grazing intensity, frequency, and/or season of use to provide sufficient opportunity to encourage plant vigor, regrowth, and organic matter contribution to soils.	Selectively fence livestock from springs, seeps, wetlands, and restoration sites and provide off-stream water sources. Limit duration of hot season use. Employ rest/rotation grazing systems. Build in support for an option of "grass reserve units." Manage the timing of grazing to minimize compaction of medium texture soils that are seasonally saturated, and the intensity of use to minimize churning of soils that are saturated. Seek and apply the best possible tools and techniques to influence the distribution of livestock.	Western Toad Greater Sage-Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Grizzly Bear Bighorn Sheep Hunt's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch Gillette's Checkerspot

Target: Lakes, Ponds & Reservoirs

Lakes, Ponds & Reservoirs are rare water features in the Beaverhead Mountains Section, but they are of high importance from standpoints of fish and wildlife diversity, water storage, and recreation. These ecosystems include aquatic habitats in permanently- to seasonally-flooded natural lakes and deep ponds in topographic depressions and dammed river channels. Examples in this section include Williams Lake in the Salmon River Mountains, Summit Reservoir on the Pahsimeroi–Little Lost divide, and Mackay Reservoir in the Big Lost River Valley. Also included in this system are high mountain lakes occurring at upper montane, subalpine, and alpine elevations. They typically occur in glacial cirques and hanging valleys where bedrock or moraine deposits form the depression containing the lake or pond. The prevalence of rugged mountain topography in this section forms hundreds of high mountain lakes. These can occur as a series (e.g., paternoster lakes) and in hanging valleys where 1st-order creeks connect many of the lakes.

Lakes, ponds, and reservoirs of this section provide rare and strategic “stepping stone” refugia for waterbirds, waterfowl, and shorebirds migrating through the arid, intermountain expanse of the Pacific Flyway. Open water habitat and lacustrine fringe wetlands provide breeding and foraging habitat for many SGCN including Western Toad, Sandhill Crane, Long-billed Curlew, Common Nighthawk, and all 5 species of SGCN bats. The larger lakes, particularly Mackay and Summit reservoirs, are seasonally visited by migratory or dispersing Western Grebe (*Aechmophorus occidentalis*), Clark’s Grebe (*Aechmophorus clarkii*), American White Pelican (*Pelecanus erythrorhynchos*), Common Loon (*Gavia immer*), Franklin’s Gull (*Leucophaeus pipixcan*), Ring-billed Gull (*Larus delawarensis*), California Gull (*Larus californicus*), Caspian Tern (*Hydroprogne caspia*), and Black Tern (*Chlidonias niger*). Many high mountain lakes harbor populations of introduced cutthroat (*Oncorhynchus clarkii*), Rainbow (*O. mykiss*), and Brook (*Salvelinus fontinalis*) trout to provide recreational opportunities for anglers. Williams Lake and Mackay Reservoir are regionally important year-round fisheries that constitute an important component of local recreation economies. Williams Lake, Mackay Reservoir, and Summit Reservoir are also popular bird-watching destinations.

Mackay Reservoir inlet © 2010 Beth Waterbury

Target Viability

Good. Viability of these lacustrine habitats is considered good. Long-term viability of the larger lakes and reservoirs in this section is deemed stable due to priority maintenance of human beneficial uses (irrigation, recreation) that directly and indirectly conserve fish and wildlife habitats. Viability of high mountain lake systems is generally considered good due to low levels of human disturbance and protections afforded by Roadless Areas, Wilderness Study Areas, and the inherent remoteness and isolation of these lakes. Ecological and biological aspects of maintaining healthy amphibian populations and potential impacts to downstream native fish populations are considered in determining how alpine lakes are managed (IDFG 2013). The primary issues in this system are short- and long-term impacts of climate change.

Prioritized Threats and Strategies for Lakes, Ponds & Reservoirs

High Rated Threats to Lakes, Ponds & Reservoirs in the Beaverhead Mountains

Changes in precipitation & broad-scale hydrologic regimes

Climate models predict a trend toward a decrease in snow water equivalent and a general increase in winter precipitation in the form of rain, particularly at lower elevations. Generally drier conditions are anticipated for the southern Rocky Mountains, inclusive of the Beaverhead Mountains Section. Snowpack volume size strongly affects the hydrologic budget of lakes, ponds, and reservoirs in this section, as well as the timing of ice-off. Declines in snowpack and warming temperatures may reduce the volume and area of open water habitat used by fish and wildlife. Predicted changes in ambient air temperatures will subsequently affect the thermal characteristics of Lakes, Ponds & Reservoirs. Resulting warmer water temperatures could lead to enhanced nutrient inputs and affect water quality by promoting algal blooms and impairing food web functions and seasonal patterns of productivity.

Objective	Strategy	Action(s)	Target SGCNs
Increase health and resiliency of Lakes, Ponds & Reservoirs to combat the effects of climate change.	Implement climate mitigation strategies to improve the resilience and resistance of Lakes, Ponds & Reservoirs.	Research options for managing this habitat under forecasted climate models. Work with other relevant agencies, organizations, and user groups across the Beaverhead Mountains Section to address climate change mitigation for Lakes, Ponds & Reservoirs under forecasted conditions (i.e., drought) to include development of proactive management alternatives implementable at the local project level. Reduce or eliminate additive nonclimate ecosystem stresses (e.g., recreational impacts, water inefficiencies, water pollution). Ensure that administrative and permitted activities on public lands do not contribute to the reduction of surface or groundwater that supplies Lakes, Ponds & Reservoirs. Monitor ecological condition at Lakes, Ponds & Reservoirs for future evaluation of possible	Western Toad Common Nighthawk Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
		effects from climate change. Conduct microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate induced stressors. Support efforts to increase public awareness of climate change impacts to local landscapes and wildlife dependent on them.	

Target: Agricultural Lands

Agricultural lands in the Beaverhead Mountains Section comprise about 4% of the land base and include irrigated forage crops and pasture tied to beef-cattle production. Forage crops are primarily improved pasture grasses with legume components that are irrigated by flood, wheel line, or center pivot systems. Some alfalfa and grain crops are also produced. Primary agricultural areas in this section are the Salmon, Lemhi, Pahsimeroi, Little Lost, and Big Lost river valleys. Most of these lands are sited in productive valley floodplains with availability of water and milder climates. Hay and pasture crops, which are largely flood-irrigated, emulate native mixed-grass and tall-grass prairie habitats for breeding grassland birds, including Bobolink (*Dolichonyx oryzivorus*), Sandhill Crane, Long-billed Curlew, and Short-eared Owl. These

Lemhi Valley hayfield © 2014 Beth Waterbury

"surrogate" grasslands are large enough in size to support viable populations of these avian SGCN. Hayfields are typically planted with improved pasture grasses with legume components that provide quality pollen and nectar sources for pollinators. Because of their customary proximity to riverine and riparian areas, agricultural lands support late-seral cottonwood forests required for Great Blue Heron (*Ardea herodias*) rookeries and Bald Eagle (*Haliaeetus leucocephalus*) nesting and encompass important anadromous fish migration, rearing, and spawning habitats. Many working ranches in the Lemhi and Pahsimeroi river valleys have invested in watershed restoration projects such as riparian and instream habitat restoration, fish migration barrier removal, irrigation diversion fish-screening, and instream flow enhancement, which have benefited the natural production of Chinook salmon and steelhead, and help to conserve many other aquatic and terrestrial species.

Target Viability

Fair. Conservation work on behalf of ESA-listed salmonids drives the conversion of flood irrigation methods preferred by grassland birds to center pivot systems. Center pivot irrigation is facilitating the conversion of grass/legume hay crops to more lucrative and intensively farmed crops such as alfalfa or grains that have relatively little benefit to grassland birds. The ability for grassland birds to successfully breed on working lands hinges on hay cutting regimes that are compatible with the bird's nesting phenology. As ground-nesters, grassland birds are highly susceptible to mortality and nest failure from hay cutting that overlaps directly with peak nesting. Early and frequent mowing of hay crops can destroy nests and eggs, kill fledglings, or cause adults to abandon their nests. Agricultural lands in this section are under increasing pressure from subdivision and development.

Prioritized Threats and Strategies for Agricultural Lands

High Rated Threats to Agricultural Lands in the Beaverhead Mountains

Loss & conversion of hayfields & pasturelands

Conversion of current flood irrigation systems to center pivot agriculture often results in crop conversions to more intensively-farmed commodities (e.g., alfalfa). Such conversions would result in loss of breeding habitat suitability for Bobolink. Nesting Bobolinks prefer areas with reliable irrigation flow and wetter portions of flood irrigated fields (Wittenberger 1978). Reliably moist areas promote the growth of forbs which provide greater cover (Bollinger 1995), correlate to a predictable abundance of caterpillars (the primary food of nestlings) (Wittenberger 1978), and may be critical for maintaining temperature and concealment of nests (Pleszczynska 1978). Hay growers producing for beef-cattle tend to cut hay at later dates largely compatible with the nesting phenology of grassland birds. Conversion to grass mixtures with shorter growing seasons would result in higher susceptibility to mortality and nest failure from hay cutting that overlaps with peak nesting.

Objective	Strategy	Action(s)	Target SGCNs
Maintain and enhance hay-producing agriculture in the Beaverhead Mountains Section.	Develop incentives to keep working lands in hay and pasture production.	Partner with Natural Resources Conservation Service (NRCS), other relevant agencies, and hay producers to use existing Farm Bill programs (i.e., Conservation Stewardship Program [CSP], Environmental Incentives Program [EQIP]) to conserve hay and pasture agriculture. Develop new financial incentive programs to conserve hay and pasture agriculture. Partner with the Upper Salmon Basin Watershed Project to implement restoration projects mutually beneficial for hay/pasture agriculture and anadromous fish.	Steelhead (Snake River DPS) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Greater Sage-Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Bobolink Hunt's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
	Maintain	Work with NRCS to develop a flood-	Western Toad

Objective	Strategy	Action(s)	Target SGCNs
	flood-irrigation methods in hayfields and pasturelands.	irrigation special initiative under EQIP or flood-irrigation enhancement under CSP. Closely evaluate effects of flood irrigation conversion to center pivot irrigation on terrestrial wildlife.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Bobolink Hunt's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
	Foster a community conservation ethic that values working lands.	Actively partner with hay producers to promote and implement sustainable, cooperative conservation practices. Support beef cattle marketing alliances that increase the brand and market value of locally-sourced, grass-fed beef. Support programs (e.g., Land and Water Conservation Fund) that provide funding support for conservation easements.	Steelhead (Snake River DPS) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Greater Sage-Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Bobolink Hunt's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Spotlight Species of Greatest Conservation Need: Bobolink

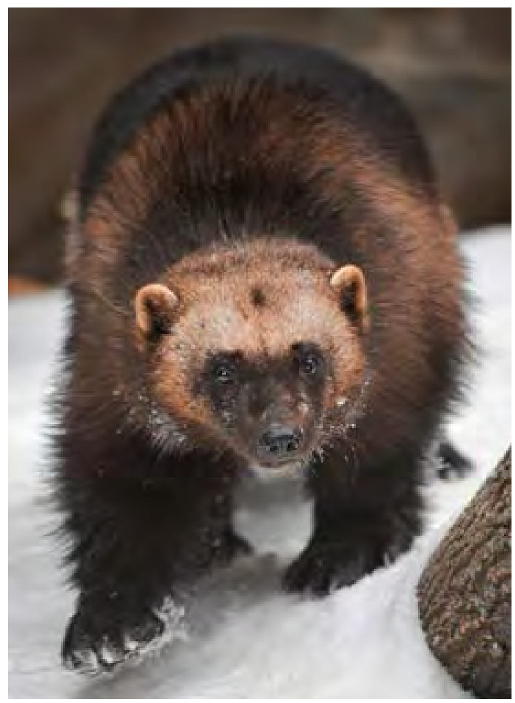
The Bobolink is a medium-sized bird of the Blackbird family that breeds in grassland and low-intensity agricultural habitats of Idaho. Nesting habitat includes large hayfields, pastures, fallow fields, and meadows with high grass-to-forb ratios and few shrubs or trees. Bobolinks and other grassland-dependent birds have experienced some of the most pronounced declines among bird groups on the North American continent (Sauer et al. 2005). The Bobolink is identified as a The State of the Birds 2014 Watch List species (Rosenberg et al. 2014) and a "Common Bird in Steep Decline" whose continental populations have declined by ≥50% over the past 40 years (Berlanga et al. 2010).

Bobolink male © 2014 Dave Faike

Rangewide Bobolink declines are attributed to a large net loss of hayfields and changes in timing and frequency of hay cutting. As a late migrant and ground-nester, Bobolinks are highly susceptible to mortality and nest failure from hay cutting that overlaps directly with peak nesting (Nocera et al. 2007). In the Beaverhead Mountains Section, Bobolinks are closely tied to working ranchlands—and specifically to private ranchlands in hay and beef cattle production where hay cutting regimes (early to mid-July) are largely compatible with Bobolink nesting. In less compatible areas of Idaho, delayed haying initiatives and other Farm Bill and working lands conservation programs offer viable options to conserve Bobolinks while defraying hay producers' costs for potential declines in hay nutritional quality or monetary value.

Target: Wolverine

The Wolverine is a large, rare mustelid that occupies remote subalpine and alpine habitats of the Beaverhead Mountains Section. An estimated population of ≤18 individuals occurs within major blocks of primary habitat in the Beaverhead, Centennial, Lemhi, and Lost River mountain ranges (IDFG 2014). This population is part of the larger metapopulation of wolverines occupying the northern US Rocky Mountains. Primary habitats correspond to public lands managed by the Salmon–Challis and Caribou–Targhee National Forests. Most primary wolverine habitat within these forests is managed for multiple-use, with a few areas designated as roadless in each mountain range. Dozens of historic and contemporary wolverine records exist for this section, and verified observations (e.g., specimens, DNA samples, diagnostic photos, captures) are regularly reported for all mountain ranges except the Lost River Range.



Wolverine © Geoffrey Kuchera

Two "Tier I" Wolverine Priority Conservation Areas (PCA) are identified for this section along the Centennial and Henrys Lake Mountains (IDFG 2014). Tier I denotes PCAs with the highest conservation need based on potential wolverine use, cumulative threats, and amount of unprotected habitat. The balance of PCAs in this section are ranked "Tier II" based on lower levels of cumulative threats. The divide along the Centennial and Beaverhead mountains, and to a lesser degree the Lemhi Range, comprises a key "central artery" for wolverine gene flow in the northern Rocky Mountains linking the Greater Yellowstone Ecosystem with the Salmon–Selway and Northern Continental Divide ecosystems (Schwartz et al. 2009). The mountains of this section comprise the southern periphery of occupied wolverine habitat in the northern Rockies and are particularly vulnerable to climate-driven reductions in size and connectivity of habitat islands (Aubrey et al. 2007, Schwartz et al. 2009, Copeland et al. 2010).

Target Viability

Fair. Wolverine habitat in the Beaverhead Mountains Section occurs in disjunct "sky island" patches on the periphery of core populations in the Salmon–Selway Ecosystem and the species' overall distribution in North America. Climate warming and shrinking snow cover may amplify the fragmented nature of wolverine habitat in this section resulting in diminished connectivity and a subpopulation more vulnerable to extirpation. The narrow, island-like configuration of primary wolverine habitat in this section provides extensive front-country access for licensed trappers and potential risk of nontarget wolverine capture. Dispersed snow sports recreation, transportation corridors, and residential/commercial development are considered low level threats in this section.

Prioritized Threats and Strategies for Wolverine

High Rated Threats to Wolverine in the Beaverhead Mountains

Connectivity, small populations, & extirpation risk

Wolverine populations at the southern end of their current US range (i.e., Beaverhead Mountain Section) exhibit low effective population sizes (number of individuals in a population who contribute offspring to the next generation), restricted gene flow, and perhaps some degree of population fragmentation. Given populations are small and movement between populations is limited, populations are more susceptible to inbreeding. Genetic exchange with the larger Canadian–Alaskan population is deemed necessary to ensure genetic viability in the long term. Connectivity between wolverine habitats and subpopulations is critically important to avert further isolation and localized extirpation risk. Climate pattern uncertainty further compounds the challenges to wolverine demography. Climate models tested by McKelvey et al. (2011) predicted that large (>1,000 km^2) continuous areas of wolverine habitat will likely persist into the 21st century (e.g., northwestern Montana, along the Montana–Idaho border, Greater Yellowstone Area). However, these models predicted that central Idaho may be lost as a population source given highly fragmented spring snow cover and associated loss of connectivity. Consequent loss of habitat suitability (i.e., spring snow cover, warming temperatures) may result in extirpation of wolverines from a significant portion of currently occupied range (Copeland et al. 2010, US Fish and Wildlife Service 2010).

Objective	Strategy	Action(s)	Target SGCNs
Facilitate connectivity among wolverine subpopulations to enhance genetic exchange and population demographics.	Identify and characterize movement corridors important for maintaining genetic exchange and diversity among wolverine subpopulations.	Refine and aggregate wolverine movement corridor and genetic exchange models to predict existing movement pathways. Contribute wolverine genetic samples to connectivity model analysis.	Wolverine
Conserve habitat to support viable wolverine populations.	Secure appropriate conservation status on priority	Conserve corridors and transitional habitats between ecosystem types through both traditional and nontraditional mechanisms (e.g., land exchanges, conservation easement	Wolverine

Objective	Strategy	Action(s)	Target SGCNs
	movement corridors to achieve an ecologically connected network of public/private conservation areas to facilitate migrations, range shifts, and other transitions caused by climate change.	tax incentives, Land and Water Conservation Fund) to enhance habitat values and maintain working landscapes under climate change. Identify, assess, and prioritize critical connectivity gaps and needs across current conservation areas, including areas likely to serve as refugia in a changing climate. Assist private landowners with information and resources to conserve wildlife corridors across their properties. Support and strengthen conservation programs (e.g., Farm Bill, Partners for Fish and Wildlife, etc.) that provide resources for conserving wolverine habitat and connectivity. Provide wolverine and other wildlife data and maps to local governments, land managers, and transportation departments to avoid, minimize, or mitigate impacts from new infrastructure developments on wolverine habitats. Continue the partnership with Idaho Transportation Department (ITD) and Federal Highway Administration (FHWA) to develop and monitor traffic volume, wildlife-vehicle collisions, and other metrics needed to identify connectivity and high risk areas for road mortality or road crossing avoidance. Work with ITD to design connectivity and crossing mitigation consistent with FHWA Handbook for Design and Evaluation of Wildlife Crossing Structures in North America. Work with ITD to avoid and reduce barriers or impediments to connectivity and crossings.	
Collaborate across multiple jurisdictions and spatial scales to achieve wolverine conservation.	Facilitate local conservation actions tiered to statewide objectives (IDFG 2014).	As warranted, establish and support local working groups to advise conservation activities in Wolverine Priority Conservation Areas.	Wolverine
Support the development and use of inventory and monitoring systems to assess wolverine vulnerability to climate change.	Support, coordinate, and where necessary develop inventory, monitoring, observation, and information systems at multiple scales	Develop, refine, and implement monitoring protocols that provide key information needed for managing and conserving wolverine and alpine/subalpine communities in a changing climate. Work with researchers to develop regionally downscaled Global Climate Models (using the most current models and emission scenarios) and associated climate indicators (e.g., snow data) to support a	Wolverine

Objective	Strategy	Action(s)	Target SGCNs
	to detect and describe potential climate impacts on wolverines.	wolverine vulnerability assessment. Produce regional to subregional projections of future climate change impacts on physical, chemical, and biological conditions for Idaho ecosystems, particularly alpine and subalpine communities.	

Target: Bighorn Sheep

Bighorn Sheep in the Beaverhead Mountains Section are patchily distributed along its peninsular mountain ranges. Habitats are typified by rugged canyons, sagebrush-steppe foothills, and dry coniferous forests and grasslands. Summer ranges often extend to alpine grasslands, while winter ranges are mostly sagebrush or mountain mahogany types where snow depths are moderated. Bighorn Sheep populations are managed in Idaho with a separate species management plan (IDFG Bighorn Sheep Management Plan 2010). Sheep occurrence In the Beaverhead Mountains Section is defined within 7 Population Management Units (PMUs), described in detail in the Bighorn Sheep Management Plan (2010): Tower–Kriley, North Beaverhead, South Beaverhead, North Lemhi, South Lemhi, Lost River, and Lionhead. The north part of the Middle Main Salmon River PMU also occurs in this section.

Bighorn Sheep ewe and lamb © 2010 Greg Painter

Both the Tower–Kriley and Lionhead PMUs have small (<30 individuals), isolated populations whose greatest value is wildlife viewing and education (IDFG 2010). Management direction for these PMUs is to maintain or increase numbers. The South Lemhi and South Beaverhead PMUs each have <50 individuals. Management direction for both PMUs is to reduce risk of contact with domestic sheep and try to increase populations where separation can be maintained. These PMUs were the focus of a study initiated in 2011 to determine use areas, seasonal movements, population estimates, survival rates, production, and health status. The North Beaverhead and North Lemhi PMUs are larger populations that appear to be increasing. A 2014 aerial survey of the North Beaverhead PMU indicated an all-time high population of 85–90 sheep with a lamb:ewe ratio of 50 (IDFG 2014). Both PMUs are at risk from disease transmission from domestic sheep, primarily farm flocks on private land. Management direction is to continue increasing populations, reduce contact with domestic sheep, and pursue habitat improvement opportunities. These PMUs were also the focus of the 2011 study mentioned above. The Lost River PMU is a relatively large population of about 260 individuals with a ewe:lamb ratio of 41 according to a March 2015 aerial survey (IDFG 2015). In 2005, this PMU received an augmentation of 62 sheep from Montana. Just prior to that augmentation, IDFG entered into a Memorandum of Understanding (MOU) with the BLM and FS to enhance management of Bighorn Sheep. More recently, this population has become a focus for trophy ram hunting opportunity. The management direction for this PMU is to increase the population via habitat maintenance or improvement.

Bighorn Sheep have high cultural, hunting, and watchable wildlife value to tribal members, local residents, and visitors to the area. Populations in this section face threats from habitat loss, transmission of disease from domestic sheep and goats (including pack goats and weed-eating goats), poaching, vehicle collisions, and disturbance from human activities during critical life cycle stages.

Target Viability for Bighorn Sheep

Good. Bighorn Sheep are widely distributed across the Beaverhead Mountain Section and some PMUs have good viability in terms of population structure and habitat quality. The North and South Beaverhead PMUs have the potential to mix with Montana populations, which have experienced recent disease exposure. Tower–Kriley, North and South Lemhi, and Lost River PMUs also have risk of disease exposure. Vehicle collisions may be a significant source of mortality for the Tower–Kriley PMU and limit population growth. Although habitat conditions are good throughout sheep seasonal ranges, opportunities for habitat enhancement projects should always be exploited for improvement or maintenance.

Prioritized Threats and Strategies for Bighorn Sheep

High rated threats to Bighorn Sheep in the Beaverhead Mountains

Noxious weeds & invasive nonnative plants

The semiarid nature of Bighorn Sheep habitat in the 7 PMUs in this section makes it susceptible to noxious weed invasion, particularly after wildfires or prescribed fires. Cheatgrass, spotted knapweed, and rush skeletonweed could all affect winter range productivity. Little fire activity has taken place in recent history. Most natural starts have been suppressed making noxious weed infestations relatively small. Most current infestations are limited to road or trail corridors.

Objective	Strategy	Action(s)	Target SGCNs
Control or eradicate noxious weeds.	Work with FS, BLM, and other partners to control or reduce noxious weed occurrence (IDFG 2010).	Participate in County Cooperative Weed Management Area partnerships. Identify and map noxious weed patches and share maps and associated data with the appropriate land manager. Provide technical assistance and encouragement to land managers for post-fire habitat restoration activities in key Bighorn Sheep habitats. Provide native grass and shrub seed recommendations to land managers.	Bighorn Sheep

Disease transmission

Bighorn Sheep are vulnerable to disease transmission from domestic sheep and goats throughout most of their range in the Beaverhead Mountains Section. Domestic sheep and goats can potentially pose a risk of contact to Bighorn Sheep both on private and public land that is near Bighorn Sheep distribution. Small farm flocks pose a risk primarily where Bighorn Sheep winter range is adjacent to private property. This could occur in all PMUs except Lionhead. FS domestic sheep allotments that border or overlap Bighorn Sheep distribution could pose an increased threat of interaction between Bighorn Sheep and domestic sheep and goats. Even with aggressive efforts to separate them, foraying wild sheep could come in contact with domestic sheep and goats. A third possible source of disease transmission is incidental contact with pack goats on backcountry trails. All PMUs but Tower–Kriley have backcountry trails within their boundaries.

Objective	Strategy	Action(s)	Target SGCNs
Reduce disease transmission to Bighorn Sheep from domestic sheep and goats.	Actively monitor Bighorn Sheep movements and health status.	Capture or euthanize Bighorn Sheep after contact if found in an area (removal zone) where contact with domestic sheep or goats is likely (IDFG 2010). Encourage double-fencing where appropriate and practical (WAFWA 2007; (IDFG and ISDA 2008). Work with ranchers to seasonally coordinate grazing patterns (WAFWA 2007; IDFG and ISDA 2008).	Bighorn Sheep
Educate the public about wild/domestic sheep disease transmission.	Engage in productive dialogue with various user groups.	Schedule speaking engagements with Idaho Wool Growers Association to share latest research on wild/domestic disease transmission and provide recommendations for separation (IDFG 2010). Seek out and speak to organized pack goat groups about risk of disease transmission. Develop signs for trailheads with information on avoiding contact with Bighorn Sheep.	Bighorn Sheep

Medium rated threats to Bighorn Sheep in the Beaverhead Mountains

Off Highway Vehicle (OHV) use on undesignated routes or in undesignated areas

Research is lacking into the specific effects of off-highway vehicle (OHV) use on Bighorn Sheep behavior and habitat use (IDFG 2010). However, the large body of research on other wild ungulate species indicates that OHV disturbance can have significant impacts on behavior and habitat use (Wisdom et al. 2004). Also, OHVs allow much greater access to the remote places Bighorn Sheep inhabit. This may result in increased disturbance and displacement, higher potential for illegal harvest, and lower herd productivity. All PMUs in this section are subject to some level of OHV impacts.

Objective	Strategy	Action(s)	Target SGCNs
Manage motorized recreation.	Enforce Travel Management Plans. The Department will	Provide law enforcement officers and conservation officers maps and locations of potential conflicts between Bighorn Sheep and motorized	Bighorn Sheep

Objective	Strategy	Action(s)	Target SGCNs
The Department will work with other land and resource management agencies to ensure that critical areas of habitat are protected from inadvertent disturbance associated with recreation activities such as hiking, OHV use, low-altitude aerial activity, rock climbing, or trail riding (IDFG 2010).	support investigations into the effects of different types and levels of human activities on Bighorn Sheep (IDFG 2010). In areas where recreation is considered to be a factor limiting the success of a Bighorn Sheep population, IDFG will work with land managers and the public to mitigate the effects of disturbance associated with recreation (IDFG 2010).	recreation. Increase BLM/FS law enforcement officer and IDFG conservation officer patrols in areas where Bighorn Sheep are vulnerable to motorized disturbance. Use remote camera technology to monitor potential conflict areas.	
Increase awareness about OHV impacts on Bighorn Sheep.	Provide education to OHV users.	Develop pamphlet outlining potential impacts from motorized disturbance and tips for minimizing disturbance. Post signs at specific roads/trailheads urging users to comply with Travel Management Plans and minimize disturbance.	Bighorn Sheep

Altered fire regimes

Natural fire intervals have been altered throughout Bighorn Sheep range in the Beaverhead Mountains Section. Little fire activity has taken place within PMU boundaries in recent history. Most natural starts have been suppressed, particularly where lower elevation winter range is near to ranch and residential structures. Some natural starts in higher elevation portions of the North Lemhi and Lost River PMUs have been allowed to burn within predefined perimeters. Many years of fire suppression has resulted in lowered productivity of Bighorn Sheep range, primarily because of conifer encroachment and subsequent loss of mountain shrub/grassland communities (Dibb and Quinn 2008).

Objective	Strategy	Action(s)	Target SGCNs
Improve quality and quantity of Bighorn Sheep habitat (IDFG 2010).	Where succession and conifer encroachment have significantly affected Bighorn Sheep habitats, IDFG will work closely with land managers and encourage them to adopt fire and habitat management practices to benefit Bighorn Sheep (IDFG 2010).	Identify and map conifer encroachment on Bighorn Sheep winter range where habitat quantity and quality are compromised. Provide technical assistance and encouragement to land managers for habitat improvement projects. Provide native grass and shrub seed recommendations to land managers.	Bighorn Sheep

Target: Pollinators

Pollinators contribute substantially to the food production systems of Idaho, to the economic vitality of the agricultural sector, and to the biodiversity in the ecosystems they inhabit. Pollinators are keystone species in most terrestrial ecosystems, playing a critical role in maintaining natural plant communities and ensuring production of seeds in most flowering plants. Pollinators also comprise a major prey item for many birds and mammals. The viability of pollinator populations has been impacted over recent decades from habitat loss, pesticide use, and introduced diseases. In recognition of widespread pollinator declines, President Obama issued a memorandum in June 2014 directing executive departments and agencies to create a federal strategy to promote the health of pollinators. This memorandum has elevated conservation concern, fostered partnerships, and generated financial resources to affect pollinator conservation in the US.

Monarchs and showy milkweed © 2014 Beth Waterbury

Little is known about pollinator assemblages in the Beaverhead Mountains Section. A recent survey by IDFG in Lemhi County documented breeding populations of Monarch (Waterbury and Ruth 2015) and additional SGCN pollinators including 5 bee species and 2 butterflies are likely to occur based on estimated range (Table 5.2). Surveys and monitoring are needed to assess their current status, distribution, and potential threats in this section.

Target Viability

Good. Pollinator viability is presumed to be secure based on extensive area and relatively good ecological condition of native plant communities in surrounding public lands. Most agricultural land consists of hayfields planted to mixes selected for beef-cattle production containing cultivar grasses, legumes (i.e., clovers, alfalfa), and residual native grasses, which attract a diversity of insects and pollinators. Monarch surveys in Lemhi County documented various anthropogenic impacts at 90% of showy milkweed (*Asclepias speciosa*) sites including herbicide spraying and mowing of roadside populations, burning of irrigation ditches, herbicide spraying at margins of cultivated fields, livestock trampling, and OHV impacts (Waterbury and Ruth 2015). Use of glyphosate and neonicotinoid pesticides, implicated in declining bee populations, is low in this section (Thelin and Stone 2013).

Prioritized Threats and Strategies for Pollinators

High rated threats to Pollinators in the Beaverhead Mountains

Anthropogenic impacts to Monarch breeding habitat

The North American Monarch Conservation Plan identified several factors contributing to the steady decline of monarchs (Commission for Environmental Cooperation 2008). A key factor is the loss of Monarch breeding habitat due to ongoing declines of native milkweeds (*Asclepias* spp.), their obligate larval host plants. Milkweed losses are attributed to an array of factors including urban development, broad-scale use of post-emergent herbicides in agro-systems, and intensive management of roadside vegetation (e.g., herbicide application, mowing). Factors most relevant in the Beaverhead Mountains Section appear to be loss and degradation of milkweed due to intensive roadside and agricultural management (Waterbury and Ruth 2015).

Objective	Strategy	Action(s)	Target SGCNs
Work with key constituencies to adopt best management practices to protect, create, and enhance milkweed habitats.	Work with Idaho Transportation Department and local governments to adopt voluntary Monarch-friendly management techniques in road right-of-ways.	Avoid broadcast herbicide or insecticide spraying of roadside vegetation; spot-spray invasive weeds with a well-targeted technique. Delay roadside mowing of milkweed until after August 15 to minimize impacts to breeding monarchs. Limit roadside mowing to the first 8 ft of the roadside inslope. Plant native seed mixes including local species of milkweed during right-of-way construction.	Monarch
	Work with ranchers to adopt voluntary Monarch-friendly management techniques on agricultural lands.	Promote milkweed plantings in field margins as a means to restore monarch habitat in agricultural landscapes. Create and use demonstration sites based on this model. Connect landowners with opportunities or incentives through Farm Bill, NRCS, or US Fish and Wildlife Service conservation programs to create, enhance, or manage lands to support monarchs. Identify existing and potential agricultural production systems that are compatible with Monarch habitat, and devise strategies to maintain and expand these systems (e.g., cost sharing, market incentives, and certification programs) to create markets for ecosystem services. Use prescribed burning between late September and April 1. Avoid broadcast herbicide or insecticide spraying of milkweed patches; spot-spray invasive weeds with a well-targeted technique.	Monarch

Objective	Strategy	Action(s)	Target SGCNs
		Develop best management practices for minimizing the susceptibility of livestock to accidental milkweed poisoning, while maintaining usefulness of the habitat to monarchs.	
	Right-of-way (ROW) habitat management.	Develop guidelines for monarch habitat creation, enhancement, maintenance and monitoring in utility or railroad ROW areas. Identify potential rights-of-way partners and encourage Monarch-friendly management on their land. Provide information and resources necessary to be successful in creating, enhancing, or maintaining monarch habitat in these areas.	Monarch
	Increase planting of small garden habitats for monarchs.	Facilitate expansion of Monarch Waystation, Wild for Monarchs, North American Butterfly Association Butterfly Habitat, National Wildlife Federation certified habitats, and other programs throughout breeding range. Provide support for creation of schoolyard gardens by working through existing granting programs.	Monarch
Increase public awareness of monarchs and their milkweed host plants.	Develop public education and outreach materials for milkweeds.	Develop materials to share information about milkweeds, and to address concerns about weediness and toxicity held by some portions of the general public. Develop and distribute promotional materials describing the importance of milkweed to monarchs.	Monarch

Species designation, planning & monitoring

In addition to conservation actions to address specific threats, some SGCN pollinators require inventory and monitoring to assess their current status and distribution in Idaho. As such, we identify needs for 7 species in the table below and identify appropriate actions.

Objective	Strategy	Action(s)	Target SGCNs
Determine status of target pollinators potentially occurring in the Beaverhead Mountains Section.	Conduct surveys to detect occurrence of target pollinators.	Conduct pan trap and netting surveys for bees in spring, summer, or fall depending on bee species preference for certain genera of plants. Conduct hand net surveys for Beartooth Copper and Gillette's Checkerspot adults and visual surveys for larvae in June/July.	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Hunt's Bumble Bee A Mason Bee (Hoplitis producta) Beartooth Copper Gillette's Checkerspot

Beaverhead Mountains Section Team

An initial version of the Beaverhead Mountains Section project plan was completed for the 2005 Idaho State Wildlife Action Plan (formerly Comprehensive Wildlife Conservation Strategy). A small working group developed an initial draft of the Section Plan, which was then reviewed by a wider group of partners and stakeholders during a 2-day workshop held at the Idaho Department of Fish and Game Headquarters office, Boise, Idaho in January 2015. That draft was then subsequently distributed for internal review within the Idaho Department of Fish and Game in June 2015. Since then, we have continued to work with key internal and external stakeholders to improve upon the plan. Individuals, agencies, and organizations involved in this plan are listed in Table 5.3.

Table 5.3 Individuals, agencies, and organizations involved in developing this plan [a]

First name	Last name	Affiliation
Beth	Waterbury*	Idaho Department of Fish and Game, Salmon Region
Jody	Brostrom	US Fish and Wildlife Service
Rita	Dixon* b	Idaho Department of Fish and Game, Headquarters
Ryan	Beatty	Bureau of Land Management, Challis Field Office
Laura	Berglund	US Fish and Wildlife Service
Sabrina	Derusseau	Caribou–Targhee National Forest, Dubois Ranger District
Casey	Kristopherson	Custer County Weed Management
Colleen	Moulton	Idaho Department of Fish and Game, Headquarters
Chris	Murphy	Idaho Department of Fish and Game, Headquarters
Mark	Olson	Natural Resources Conservation Service
Chuck	Peterson	Idaho State University
Nick	Salafsky	Foundations of Success
Greg	Schoby	Idaho Department of Fish and Game, Salmon Region
Bret	Stansberry	Idaho Department of Fish and Game, Salmon Region
Jeremey	Varley	Lemhi County Cooperative Weed Management Area

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

6. Challis Volcanics Section

Section Description

The Challis Volcanics Section is centrally located in the Middle Rockies–Blue Mountains Ecoregion. The section is named for its extensive and compositionally diverse belt of volcanic rocks derived from an Eocene episode of intense volcanism. The section occurs in the geographic center of the state from the Smoky Mountains in the southwest to the Pioneer Mountains and Big Lost River Valley in the southeast, north through the Salmon River Mountains to the Big Creek drainage in the Frank Church–River of No Return Wilderness (Fig. 6.1, Fig. 6.2).

Railroad Ridge, White Cloud Peaks © 2011 Beth Waterbury

This section contains approximately 35,450 km^2 (13,690 mi^2) and ranges in elevation from 1,200 to 3,600 m (4,000 to 11,800 ft). The section is dominated by no fewer than 6 distinct mountain ranges including the Smoky, Pioneer, Boulder, White Cloud, White Knob, and Salmon River mountains. Climate is generally characterized by a Pacific-influenced moist wintertime regime and dry summer conditions. Climate may be further moderated by a rain shadow effect from the high mountain barrier to the west and by local elevational and other topographic effects of the complex terrain. Precipitation ranges from 25 to 120 cm (10 to 47 in) annually with an average of 56 cm (22 in). About half of precipitation occurs as snow during fall, winter, and spring.

Public lands account for 92% of the section's land base with most under federal management by the US Forest Service (FS) and Bureau of Land Management (US) (BLM). Federal lands include several specially-designated protected areas comprising Inventoried Roadless Areas, Wilderness Study Areas, Research Natural Areas, Wild and Scenic River segment, the recently designated Jim McClure–Jerry Peak, White Clouds, and Hemingway–Boulders wilderness areas, and portions of the Frank Church–River of No Return Wilderness. These rugged and remote areas are highly sought destinations for hunting, fishing, trapping, horse packing, whitewater rafting, and many other recreational pursuits. In addition to recreation and terrestrial and aquatic habitats, federal lands are also managed for livestock grazing, wood products, and diverse mineral commodities. Private lands are generally concentrated on valley bottoms adjacent to water courses. The section's population center is the Wood River Valley, including Ketchum, Hailey, and Bellevue. Development in this scenic valley has been rapid and extensive during recent decades.

Surrounding agricultural lands produce alfalfa, malting barley, seed potatoes, beef cattle, and sheep. Beef cattle and hay/alfalfa forage production are the primary uses on private land in the small, rural community of Challis.

Similar to the sections to its east and west, the Challis Volcanics encompasses vast, relatively intact natural landscapes supporting a diverse array of fish and wildlife. Included are significant core ranges for Wolverine (*Gulo gulo*), Pronghorn (*Antilocapra americana*), Mountain Goat (*Oreamnos americanus*), Bighorn Sheep (*Ovis canadensis*), Elk (*Cervus canadensis*), and Mule Deer (*Odocoileus hemionus*), as well as key spawning habitat for Pacific Lamprey (*Entosphenus tridentatus*), Steelhead (*Oncorhynchus mykiss*), Chinook Salmon (*Oncorhynchus tshawytscha*), and Bull Trout (*Salvelinus confluentus*), and migratory corridor for federally endangered Sockeye Salmon (*Oncorhynchus nerka*). The region's geologic complexity and high relief give rise to extensive and exceptional cliff and rock habitat supporting nesting raptors and numerous bat species.

Surface water features in this section comprise less than 1% of its area. Deep snowpack in the mountains south of the Salmon River feed the Big Wood, Little Wood, West Fork Big Lost, and East Fork Salmon river systems. North of the Salmon River, mountain snowpack feeds into the Yankee Fork Salmon, Middle Fork Salmon, and Big Creek rivers. Hundreds of alpine lakes dot the section's mountainous terrain. The Salmon River system within this section is designated as critical habitat for Snake River Basin Steelhead, Snake River spring/summer-run Chinook Salmon, and Bull Trout. River systems of the Wood River Basin support the endemic Wood River Sculpin (*Cottus leiopomus*) and populations of native Redband Trout (*Oncorhynchus mykiss gairdneri*).

Native shrubland and grassland communities compose an estimated 50% of the section. Collectively, these groups represent important plant and animal species habitats, provide basic natural resource commodities, and constitute important elements of biological diversity. Shrubland types include many taxa of sagebrush with mountain big sagebrush (*Artemisia tridentata* Nutt. subsp. *vaseyana* [Rydb.] Beetle)–bluebunch wheatgrass (*Pseudoroegneria spicata* [Pursh] Á. Löve), and Wyoming big sagebrush (*A. t.* Nutt. subsp. *wyomingensis* Beetle & Young)–Idaho fescue (*Festuca idahoensis* Elmer) associations being most prevalent. Sagebrush-steppe communities provide critical forage resources for Pronghorn, Bighorn Sheep, Elk, and Mule Deer and important habitat for at-risk species such as Greater Sage-Grouse (*Centrocercus urophasianus*), Long-billed Curlew (*Numenius americanus*), and Pygmy Rabbit (*Brachylagus idahoensis*). A large proportion of sagebrush steppe in this section comprises Greater Sage-Grouse Habitat Management Areas (Fig. 6.3) as developed by the State and federal land management agencies (see Attachment 1, Fig. 2-1; BLM 2015). Deciduous shrublands typically occur on steep canyon slopes below treeline in mosaics with low-elevation grasslands and sagebrush. Characteristic of this community is a high diversity of shrub, forb, and grass species that provide abundant food and cover for numerous birds, mammals, reptiles, amphibians, and invertebrates. This section contains outstanding examples of curl-leaf mountain mahogany (*Cercocarpus ledifolius* Nutt.) scrublands primarily on steep, dry slopes and ridges with warm, southeast through west-facing aspects. These stands are heavily used by wild ungulates, notably as winter range for Mountain Goat, Bighorn Sheep, Moose (*Alces americanus*), and Elk, and as year-round habitat for Mule Deer.

Conifer forests are a dominant vegetation type in this section, comprising about 40% of the land cover. Western Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), subalpine fir (*Abies lasiocarpa* [Hook.] Nutt.), and whitebark pine (*Pinus albicaulis* Engelm.) forests occur at highest elevations, with lodgepole pine (*Pinus contorta* Douglas ex Loudon) and Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) forests at mid elevations. All forest types have experienced moderate to extensive mortality in recent decades from insect, disease, and fire disturbance. These perturbations contribute to forest patch, pattern, and structural heterogeneity, which in turn enhance biological diversity. Forested communities provide important summer and transitional habitat for Mountain Lion (*Puma concolor*), American Black Bear (*Ursus americanus*), Elk, Mule Deer, and other big game, and food and cover for numerous birds, small mammals, amphibians, and terrestrial invertebrates. Whitebark pine, quaking aspen (*Populus tremuloides* Michx.), cottonwood (*Populus* L.), and Utah juniper (*Juniperus osteosperma* [Torr.]) forest types are more restricted in extent, but comprise unique and ecologically important communities on this landscape. Considered a keystone and foundational species, whitebark pine is a major subalpine component of this section. Quaking aspen tends to occur in small, isolated stands as a seral tree species in aggregate with conifers or along water courses. Cottonwood forests are another broad-leaved deciduous forest type most extensive on the Big Wood, West Fork Big Lost, East Fork Salmon, and mainstem Salmon river systems. Here they are typically confined to narrow streamside bands within floodplains. Utah juniper woodlands occupy rocky foothills at the southernmost ends of the Pioneer and White Knob mountains, typically forming open-canopied savannahs.

The section's multiple mountain ranges with elevations over 3,600 m (11,811 ft) contribute to well-developed alpine communities, including community types unique to Idaho (Richardson and Henderson 1999). Alpine areas provide important ecological services by capturing snow and storing runoff to sustain the section's primary watersheds and downstream uses. Although faunal diversity is low compared to other habitats, alpine species are typically specialized to exploit the harsh environment. Characteristic species include Black Rosy-Finch (*Leucosticte atrata*), American Pika (*Ochotona princeps*), Wolverine, Mountain Goat, and Hoary Marmot (*Marmota caligata*). Alpine areas are largely in public ownership and protected as wilderness, thus, human impacts have been relatively low compared to other ecosystems.

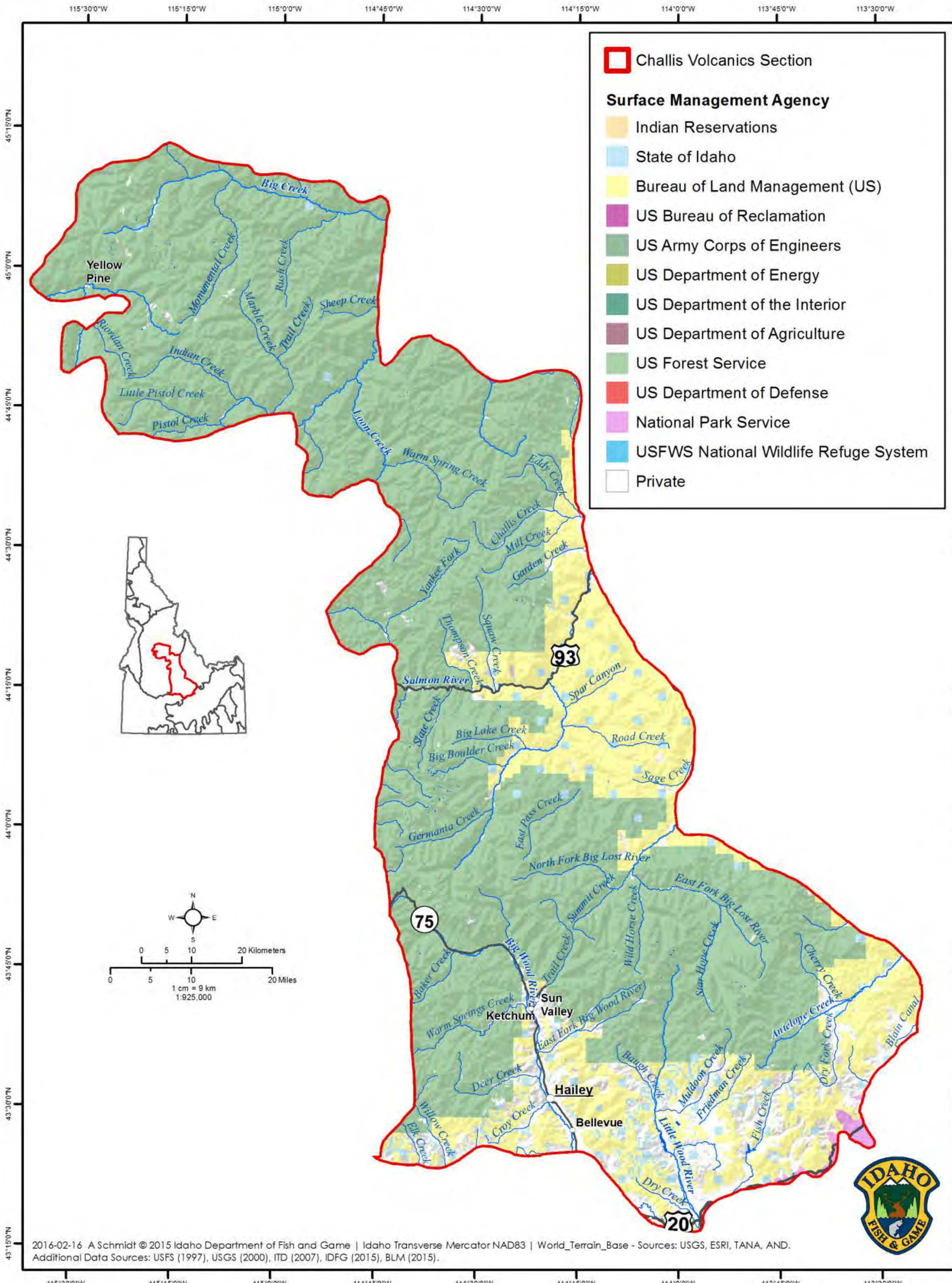


Fig. 6.1 Map of Challis Volcanics surface management

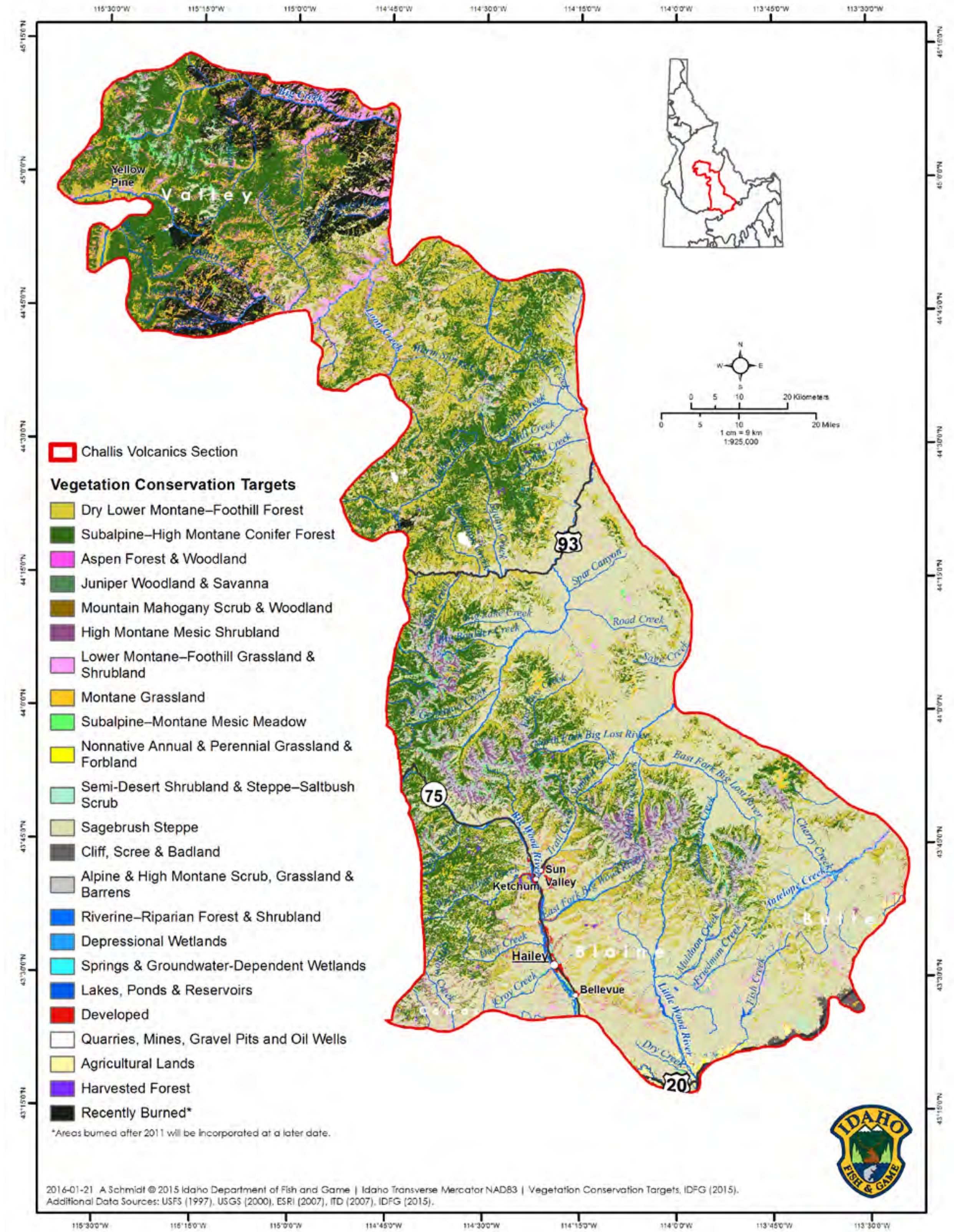


Fig. 6.2 Map of Challis Volcanics vegetation conservation targets

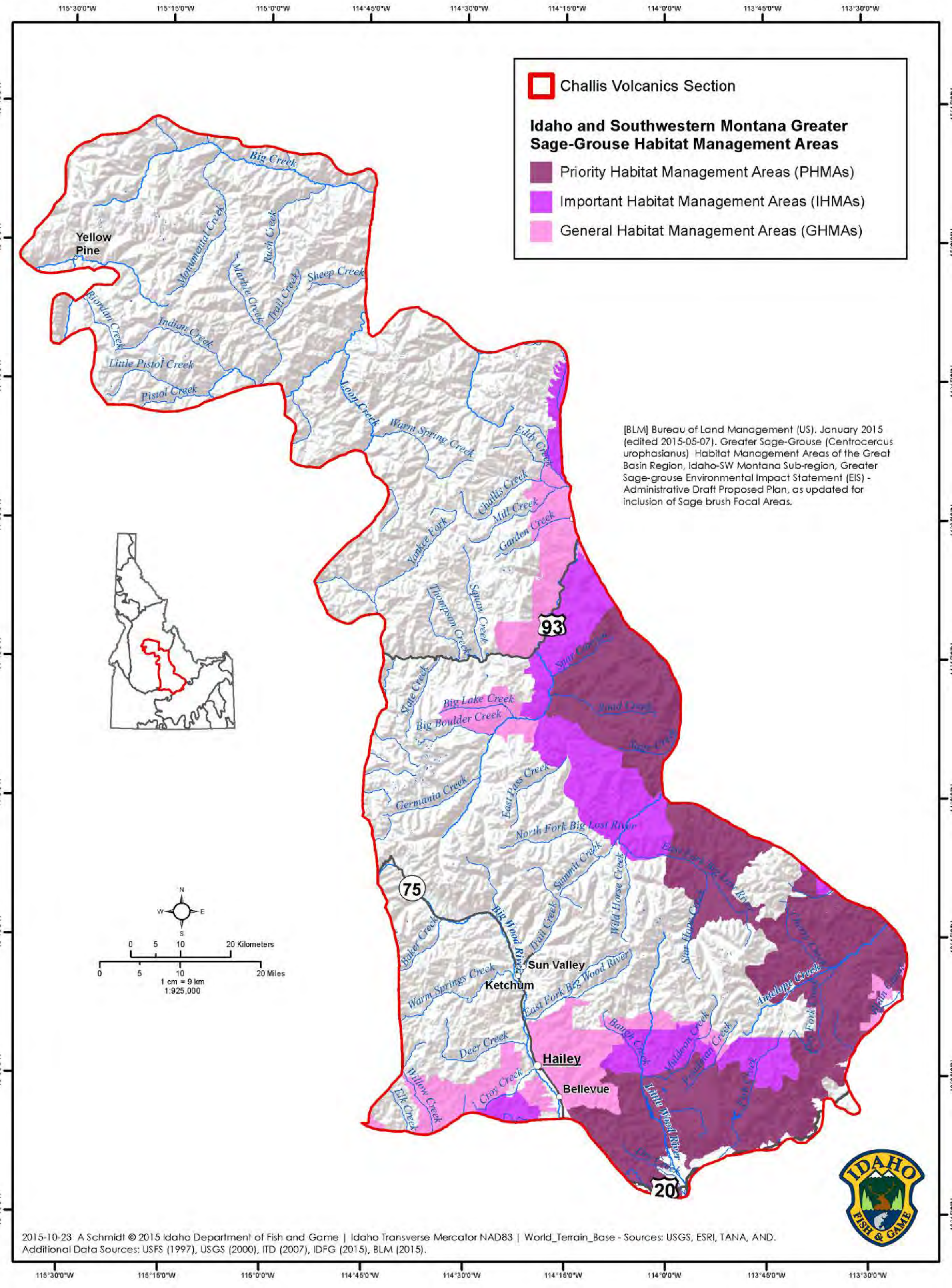


Fig. 6.3 Greater Sage-Grouse Habitat Management Areas in the Challis Volcanics Section

Conservation Targets in the Challis Volcanics

We selected 9 habitat targets (6 upland, 3 aquatic) that represent the major ecosystems in the Challis Volcanics as shown in Table 6.1. Each of these systems provides habitat for key species of greatest conservation need (SGCN), i.e., "nested targets" (Table 6.2) associated with each target. All SGCN management programs in the Challis Volcanics have a nexus with habitat management programs. We provide a high-level summary of current viability status for each target. Conservation of the habitat targets listed below should conserve most of the nested species within them. However, we determined that at least 2 taxa (Wolverine, Bighorn Sheep) and 2 assemblages (Bats, Pollinators) face special conservation needs and thus are presented as explicit species targets as shown in Table 6.1.

Table 6.1 At-a-glance table of conservation targets in the Challis Volcanics

Target	Target description	Target viability	Nested targets (SGCN)	
Dry Lower Montane–Foothill Forest	Forms 15% of section's land base at mid-elevations. Douglas-fir and lodgepole pine types are dominant with ponderosa pine component at the north end. Utah juniper woodlands occur on rocky foothills at the far south end. Quaking aspen and mountain mahogany may be intermixed.	*Fair*. Fire suppression has created conditions highly susceptible to insect outbreaks and high-intensity stand-replacing fires. Lack of disturbance has also suppressed vigor of understory vegetation and allowed extensive areas of Douglas-fir to encroach on grassland and sagebrush-steppe habitats.	*Tier 1* *Tier 2* *Tier 3*	Wolverine Western Toad Ferruginous Hawk Golden Eagle Lewis's Woodpecker Silver-haired Bat Hoary Bat Bighorn Sheep Great Gray Owl Common Nighthawk Olive-sided Flycatcher Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Spur-throated Grasshopper (*Melanoplus*) Species Group
Subalpine–High Montane Conifer Forest	Comprises 24% of section's land base. Generally forms the highest-elevation forests including the upper treeline ecotone with alpine habitat. This section contains important populations of whitebark pine, a keystone and foundation species of this target.	*Fair*. Altered fire regimes are favoring succession of fire-intolerant trees more susceptible to high-severity fires. The threat posed by white pine blister rust, in synergy with Mountain Pine Beetle, altered fire regimes, and climate change, threatens the viability of whitebark pine communities and the ecosystem services they provide.	*Tier 1* *Tier 2* *Tier 3*	Wolverine Western Toad Golden Eagle Silver-haired Bat Hoary Bat Bighorn Sheep Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Black Rosy-Finch Little Brown Myotis Mountain Goat A Miner Bee (*Andrena aculeata*)

Target	Target description	Target viability	Nested targets (SGCN)	
Aspen Forest & Woodland	Aspen is an uncommon (<2% of land base) yet important habitat in this section. Although small in extent, aspen communities harbor high biodiversity, maintain water storage capacity for watersheds, and offer recreation and scenic value to humans.	*Poor*. Aspen decline across the western US is attributed to altered fire regimes and heavy ungulate grazing leading to poor regeneration. Recurring drought as a result of climate change could exacerbate aspen decline.	*Tier 2*	Western Toad Lewis's Woodpecker Silver-haired Bat Hoary Bat
			Tier 3	Great Gray Owl Common Nighthawk Olive-sided Flycatcher Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis
Lower Montane–Foothill Grassland & Shrubland	Comprising 3% of the section's land base, this target includes a subset of grasslands, shrub steppe, and deciduous shrubland types found below the lower treeline and extending up into high montane zones. This is a compositionally diverse habitat supporting numerous SGCN.	*Fair*. Altered fire regimes have resulted in dry conifer encroachment and dense shrublands outside the range of natural historic variation. Livestock grazing use has altered species composition. Invasive weeds have pioneered on many road and trail systems.	*Tier 1*	Greater Sage-Grouse Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Bighorn Sheep
			Tier 3	Short-eared Owl Common Nighthawk Black Rosy-Finch Townsend's Big-eared Bat Western Small-footed Myotis Hunt's Bumble Bee Monarch Spur-throated Grasshopper (*Melanoplus*) Species Group
Sagebrush Steppe	This system covers 53% of the section's land base and is characterized by an open shrub canopy and sparse to dense herbaceous layer dominated by perennial grasses. Microbiotic crusts are typically present. Sagebrush-steppe habitats are relatively intact compared to more fragmented landscapes in other sections.	*Good*. Target is extensive, strongly continuous, and exhibits a diversity of age classes and structure. Most is in public ownership, thus, less vulnerable to rangewide threats of habitat fragmentation and conversion to agriculture common in areas of mixed ownership. Target is relatively resilient to the fire/cheatgrass cycle in this section.	*Tier 1*	Greater Sage-Grouse
			Tier 2	Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Bighorn Sheep
			Tier 3	Short-eared Owl Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Hunt's Bumble Bee Spur-throated Grasshopper (*Melanoplus*) Species Group
Alpine & High	Target contains a	*Good*. Most of this	*Tier 1*	Wolverine

Target	Target description	Target viability	Nested targets (SGCN)	
Montane Scrub, Grassland & Barrens	relatively large area of alpine land cover (2%) relative to other sections in Idaho. System is concentrated in the newly designated Wilderness Areas of the Boulder and White Cloud mountains. Target supports wildlife species specialized for cold, snowy environments.	system is protected as Wilderness Area. Other areas are "de facto" wilderness due to remoteness and inhospitable conditions for human habitation. Alpine wildlife is sensitive to climatic factors and may have low adaptive capacity to climate change.		Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Golden Eagle Bighorn Sheep
			Tier 3	Clark's Nutcracker Black-Rosy Finch Mountain Goat Hoary Marmot Hunt's Bumble Bee A Grasshopper (*Argiacris keithi*) A Grasshopper (*Argiacris militaris*) Spur-throated Grasshopper (*Melanoplus*) Species Group
Riverine–Riparian Forest & Shrubland	This system includes rivers and streams, including aquatic habitats and their associated terrestrial riparian habitats. Major river systems are the Big Wood, Little Wood, West Fork Big Lost, East Fork Salmon, Yankee Fork Salmon, Middle Fork Salmon, and Big Creek.	*Fair* to *Good*. System accounts for <1% of land area, but supports diverse array of aquatic and terrestrial biota, including keystone species (salmon, American Beaver, cottonwood) and migration, juvenile rearing, spawning, or resident habitat for 5 ESA-listed fish species. Water diversions have resulted in perturbation of fluvial processes and riparian conditions in this section.	*Tier 1*	Pacific Lamprey Steelhead (Snake River Basin DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run) Yellow-billed Cuckoo Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Western Toad Harlequin Duck Lewis's Woodpecker Silver-haired Bat Hoary Bat Bighorn Sheep Western Pearlshell A Mayfly (*Ephemerella alleni*)
			Tier 3	Sandhill Crane Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis A Mayfly (*Parameletus columbiae*) Hunt's Bumble Bee Monarch Tiny Forestfly A Caddisfly (*Eocosmoecus schmidi*) A Caddisfly (*Limnephilus challisa*) A Caddisfly (*Psychoglypha smithi*) A Caddisfly (*Sericostriata surdickae*)
Springs & Groundwater-	This target includes seeps, springs, and	*Poor*. These systems are highly	*Tier 1*	Greater Sage-Grouse Western Bumble Bee

Target	Target description	Target viability	Nested targets (SGCN)	
Dependent Wetlands	wet meadows occurring on gentle to steep slopes from floodplain to montane forest elevations. These are rare mesic features in a semiarid landscape, thus attract a diversity of wildlife and invertebrate species.	attractive to livestock and wildlife as sources of palatable green forage and water. Improper livestock grazing and OHV impacts can cause soil compaction and erosion, destroy vegetation, facilitate spread of invasive weeds, and alter hydrologic processes.	 *Tier 2* *Tier 3*	Suckley's Cuckoo Bumble Bee Western Toad Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Silver-haired Bat Hoary Bat Bighorn Sheep Sandhill Crane Short-eared Owl Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Hunt's Bumble Bee Monarch
Lakes, Ponds & Reservoirs	Target comprises all natural lakes and deep ponds, created waterbodies of all sizes, and dammed river channels. Includes Jimmy Smith Lake, Herd Lake, and Mosquito Flats, Little Wood, and Fish Creek reservoirs. Includes hundreds of high mountain lakes in upper montane, subalpine, and alpine elevations.	*Good*. Large lakes/reservoirs established for irrigation water storage benefit fish and wildlife. High mountain lake fish-stocking programs should continue to balance recreational opportunity and maintenance of native amphibian populations. Climate change may impair lake temperatures and productivity.	*Tier 2* *Tier 3*	Western Toad Long-billed Curlew Silver-haired Bat Hoary Bat Sandhill Crane Common Nighthawk Western Small-footed Myotis Little Brown Myotis
Bat Assemblage	The Challis Volcanics' vast, natural landscape provides a diversity of suitable habitats for bats, but knowledge of bat distribution, abundance, and habitat associations is incomplete and fragmentary.	*Presumed Good.* Surveys and monitoring are needed to locate hibernacula, assess local levels of disturbance or destruction of roosting habitats, identify seasonal movement patterns and migration corridors, and assess risks associated with white-nose syndrome.	*Tier 2* *Tier 3*	Silver-haired Bat Hoary Bat Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis
Wolverine	The Wolverine population in this	*Fair*. Climate warming and	*Tier 1*	Wolverine

Target	Target description	Target viability	Nested targets (SGCN)	
	section is part of the Salmon–Selway core population occupying the central Idaho mountains complex. Most primary habitat is within designated Wilderness Areas.	shrinking snow cover may amplify the fragmented nature of Wolverine habitat at the southern end of this section resulting in diminished connectivity and a subpopulation more vulnerable to extirpation.		
Bighorn Sheep	Bighorn Sheep are distributed within 4 contiguous Population Management Units: Middle Fork Salmon River, Middle Main Salmon River, East Fork Salmon River, and Pioneers (see IDFG Bighorn Sheep Management Plan 2010).	*Good*. Some PMUs stable in terms of population size and structure.	*Tier 2*	Bighorn Sheep
Pollinators	There is insufficient data on SGCN pollinator species in this section.	*Good*. Presumably based on large spatial extent and good condition of native plant communities in surrounding public lands.	*Tier 1*	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 3	A Mason Bee (*Hoplitis producta*) A Miner Bee (*Andrena aculeata*) Hunt's Bumble Bee Monarch

Table 6.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Challis Volcanics

Taxon	Conservation targets: Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Aspen Forest & Woodland	Lower Montane–Foothill Grassland & Shrubland	Sagebrush Steppe	Alpine & High Montane Scrub, Grassland & Barrens	Riverine–Riparian Forest & Shrubland	Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Bat Assemblage	Wolverine	Bighorn Sheep	Pollinators
LAMPREYS													
Pacific Lamprey (*Entosphenus tridentatus*)[1]							X						
RAY-FINNED FISHES													
Steelhead (Snake River Basin DPS) (*Oncorhynchus mykiss*)[1]							X						
Sockeye Salmon (Snake River ESU) (*Oncorhynchus nerka*)[1]							X						
Chinook Salmon (Snake River spring/summer-run ESU) (*Oncorhynchus tshawytscha*)[1]							X						
AMPHIBIANS													
Western Toad (*Anaxyrus boreas*)[2]	X	X	X				X	X	X				
BIRDS													
Harlequin Duck (*Histrionicus histrionicus*)[2]							X						
Greater Sage-Grouse (*Centrocercus urophasianus*)[1]				X	X			X					
Ferruginous Hawk (*Buteo regalis*)[2]	X			X	X			X					
Golden Eagle (*Aquila chrysaetos*)[2]	X	X		X	X	X		X					
Sandhill Crane (*Grus canadensis*)[3]							X	X	X				
Long-billed Curlew (*Numenius americanus*)[2]				X	X			X	X				
Yellow-billed Cuckoo (*Coccyzus americanus*)[1]							X						
Burrowing Owl (*Athene cunicularia*)[2]				X	X			X					
Great Gray Owl (*Strix nebulosa*)[3]	X	X	X										
Short-eared Owl (*Asio flammeus*)[3]				X	X			X					
Common Nighthawk (*Chordeiles minor*)[3]	X		X	X	X		X	X	X				
Lewis's Woodpecker (*Melanerpes lewis*)[2]	X		X				X						
Olive-sided Flycatcher (*Contopus cooperi*)[3]	X	X	X										
Clark's Nutcracker (*Nucifraga columbiana*)[3]	X	X				X							
Sage Thrasher (*Oreoscoptes montanus*)[2]					X								
Sagebrush Sparrow (*Artemisiospiza nevadensis*)[2]					X								
Black Rosy-Finch (*Leucosticte atrata*)[3]	X	X		X		X							
MAMMALS													
Pygmy Rabbit (*Brachylagus idahoensis*)[2]					X								
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]	X		X	X	X		X	X		X			

Taxon	Conservation targets												
	Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Aspen Forest & Woodland	Lower Montane–Foothill Grassland & Shrubland	Sagebrush Steppe	Alpine & High Montane Scrub, Grassland & Barrens	Riverine–Riparian Forest & Shrubland	Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Bat Assemblage	Wolverine	Bighorn Sheep	Pollinators
Silver-haired Bat (*Lasionycteris noctivagans*)[2]	X	X	X				X	X	X	X			
Hoary Bat (*Lasiurus cinereus*)[2]	X	X	X				X	X	X	X			
Western Small-footed Myotis (*Myotis ciliolabrum*)[3]	X		X	X	X		X	X	X	X			
Little Brown Myotis (*Myotis lucifugus*)[3]	X	X	X				X	X	X	X			
Wolverine (*Gulo gulo*)[1]	X	X				X					X		
Mountain Goat (*Oreamnos americanus*)[3]		X				X							
Bighorn Sheep (*Ovis canadensis*)[2]	X	X		X	X	X	X	X				X	
Hoary Marmot (*Marmota caligata*)[3]						X							
BIVALVES													
Western Pearlshell (*Margaritifera falcata*)[2]							X						
INSECTS													
A Mayfly (*Ephemerella alleni*)[2]							X						
A Mayfly (*Parameletus columbiae*)[3]							X						
A Miner Bee (*Andrena aculeata*)[3]		X											X
A Mason Bee (*Hoplitus producta*)[3]	X	X		X									X
Hunt's Bumble Bee (*Bombus huntii*)[3]				X	X	X	X	X					X
Morrison's Bumble Bee (*Bombus morrisoni*)[1]				X	X		X						X
Western Bumble Bee (*Bombus occidentalis*)[1]				X	X	X	X	X					X
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]				X	X	X	X	X					X
Monarch (*Danaus plexippus*)[3]				X			X	X					X
A Grasshopper (*Argiacris keithi*)[3]						X							
A Grasshopper (*Argiacris militaris*)[3]						X							
Spur-throated Grasshopper (*Melanoplus*) Species Group[3]	X			X	X	X							
Tiny Forestfly (*Malenka tina*)[3]							X						
A Caddisfly (*Eocosmoecus schmidi*)[3]							X						
A Caddisfly (*Limnephilus challisa*)[3]							X						
A Caddisfly (*Psychoglypha smithi*)[3]							X						
A Caddisfly (*Sericostriata surdickae*)[3]							X						

Target: Dry Lower Montane–Foothill Forest

Dry Lower Montane–Foothill Forest communities comprise about 15% of this section. They typically occur at the lower treeline ecotone immediately above valley grasslands or sagebrush steppe and shrublands. Douglas-fir is the predominant forest type, but lodgepole pine and limber pine (*Pinus flexilis* James) forests may intermix. Ponderosa pine (*Pinus ponderosa* Lawson & C. Lawson) is a codominant canopy tree at the northern end of the section, and Utah juniper (*Juniperus osteosperma* [Torr.]) woodlands are found on rocky foothills at the southern end of the section. Quaking aspen and curl-leaf mountain mahogany (*Cercocarpus ledifolius* Nutt.) can also be intermixed. Fire suppression has interrupted the natural fire regime in this habitat type, resulting in unnaturally high tree densities with greater competition, less vigor, and growth; susceptibility to insect outbreaks; and high risk of stand-replacing fires. Absence of fire has also suppressed vigor of understory vegetation and allowed extensive areas of Douglas-fir to encroach on grassland and sagebrush-steppe habitats. Most of this community type occurs on public lands managed by FS and BLM.

Fish Creek, Pioneer Mountains © 2010 Brenda Erhardt

This ecosystem supports several SGCN including Ferruginous Hawk (*Buteo regalis*), Great Gray Owl (*Strix nebulosa*), Olive-sided Flycatcher (*Contopus cooperi*), Clark's Nutcracker (*Nucifraga columbiana*), and Bighorn Sheep. Lewis's Woodpecker (*Melanerpes lewis*) is present where ponderosa pine is a dominant component, and Western Toad (*Anaxyrus boreas*) occurs in kettle holes within lodgepole pine forests. This forest type provides wintering habitat for mixed flocks of Black and Gray-crowned Rosy-Finch, and is routinely patrolled by Wolverines scavenging for large mammal carrion. This system provides abundant snag and live-tree structure for bat roosting and insect prey for bat foraging.

Target Viability

Fair. Nearly a century of fire suppression in most of this forest type has created conditions highly susceptible to insect outbreaks and high-intensity stand-replacing fires. Absence of fire disturbance also results in Douglas-fir encroachment of quaking aspen forests, ecotonal grasslands, and sagebrush-steppe communities. Noxious weeds such as spotted knapweed (*Centaurea stoebe* L.) have colonized many roads in this forest type, particularly at lower-elevation sites.

Prioritized Threats and Strategies for Dry Lower Montane–Foothill Forest

High Rated Threats to Dry Lower Montane–Foothill Forest in the Challis Volcanics

Altered fire regimes

These forest types evolved under the influence of frequent, low-severity fire that maintained relatively open stands of a mix of fire resistant species. Nearly a century of fire suppression has dramatically shifted successional patterns, reduced spatial heterogeneity of forest types, increased the density of small shade-tolerant trees, and produced an unnatural accumulation of ground fuels. These conditions, further exacerbated by drought and warmer temperatures, have led to massive insect outbreaks and tree mortality. As a result, many low- and mid-elevation conifer forests in this section are susceptible to uncharacteristically large, high-intensity, stand-replacing fires. The continuing absence of fire in the dry montane forest type has allowed extensive areas of Douglas-fir to encroach into montane and foothill grasslands, sagebrush-steppe habitats, and aspen forests. Absence of fire has also altered diversity, habitat structure, and productivity of understory shrubs, forbs, and grasses. Systems lacking early to mid-seral stages support fewer native ungulates such as mule deer and elk, which comprise important year-round carrion prey for wolverine (Copeland 1996).

Objective	Strategy	Action(s)	Target SGCNs
Restore characteristic fire regime and forest structure in Dry Lower Montane–Foothill Forest systems.	Coordinate actions with federal land management agencies and municipalities.	Engage and involve forest collaboratives in the development and implementation of forest restoration projects. Incorporate prescribed fire treatments in restoration projects. Use managed natural fire for forest restoration where/when appropriate. Incorporate mechanical thinning treatments to reduce stand densities where appropriate. Develop landscape-level models that evaluate commodity production, fire risk, forest health, and habitat needs of fish and wildlife in an integrated fashion.	Western Toad Ferruginous Hawk Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Olive-sided Flycatcher Clark’s Nutcracker Black Rosy-Finch Townsend’s Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep A Mason Bee (*Hoplitus producta*) Spur-throated Grasshopper (*Melanoplus*) Species Group
		Increase forest seral heterogeneity to improve reproductive performance and overall herd health of wild ungulates.	Wolverine
		Retain stands and mosaics of mature late-seral trees in near proximity to meadows and montane grasslands.	Great Gray Owl
Where appropriate,	Improve targeting of fuels	Evaluate opportunities for harvesting and removal of	Western Toad Ferruginous Hawk

Objective	Strategy	Action(s)	Target SGCNs
develop more aggressive strategies to reduce fuel load.	reduction opportunities and implementation.	biomass to meet treatment objectives and supply local biofuel facilities. Forest vegetation management includes evaluation opportunities for harvesting and removal of biomass to meet treatment objectives. Use stewardship contracts to achieve public land management goals in rural communities.	Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Olive-sided Flycatcher Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Wolverine Bighorn Sheep A Mason Bee (*Hoplitus producta*) Spur-throated Grasshopper (*Melanoplus*) Species Group
Change societal perceptions to accept fire as a beneficial tool for forest stewardship.	Develop effective stakeholder outreach on the role of wildland fire in forest health.	Engage forest collaboratives to promote benefits of forest restoration techniques, including use of fire. Develop and disseminate public outreach products on fire ecology in dry forest systems (news releases, presentations, brochures, articles).	Western Toad Ferruginous Hawk Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Olive-sided Flycatcher Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Wolverine Bighorn Sheep A Mason Bee (*Hoplitus producta*) Spur-throated Grasshopper (*Melanoplus*) Species Group
Minimize conflicts between fire suppression and forest health policies.	Develop growth management policies in Wildland-Urban Interface areas.	Develop local land use ordinances to minimize rural/urban sprawl into wildlands. Incorporate climate change and fire behavior information into growth management and rural interface community planning initiatives.	Western Toad Ferruginous Hawk Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Olive-sided Flycatcher Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Wolverine Bighorn Sheep A Mason Bee (*Hoplitus*

Objective	Strategy	Action(s)	Target SGCNs
			producta) Spur-throated Grasshopper (*Melanoplus*) Species Group

Forest insect pests & disease

Dry forest types in the Smoky, Pioneer, and Salmon River mountain ranges have experienced extensive tree mortality in the last decade associated with widespread outbreaks of Mountain Pine Beetle (*Dendroctonus ponderosae*) and Western Spruce Budworm Moth (*Choristoneura occidentalis*). Outbreaks often develop in dense stands of mature age-class lodgepole pine, mid-sized ponderosa pine, and homogeneous Douglas-fir forests. Warming climatic conditions and continued fire suppression have intensified insect outbreaks in this region. Extensive tree mortality associated with insect and disease outbreaks can significantly influence successional pathways and forest community composition. Other short- and long-term forest processes such as water yield and wildfire extent and severity can also be affected by tree mortality associated with insect outbreaks.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the potential for large-scale loss of Dry Lower Montane–Foothill Forest stands to insect outbreaks.	Implement restorative forest management at the landscape level.	Identify and strategically place forest restoration treatments in landscape locations and orientations for maximum benefit. Conduct risk assessments and appropriately prioritize areas for treatment. Restore appropriate stocking levels, species composition, and stand structure to levels more consistent with conditions under which host trees and insect/pathogen species coevolved.	Western Toad Ferruginous Hawk Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Olive-sided Flycatcher Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Wolverine Bighorn Sheep Spur-throated Grasshopper (*Melanoplus*) Species Group

Changing temperature & precipitation regimes

Current climate models predict changing precipitation patterns and warming temperatures for the Challis Volcanics Section. Precipitation and temperature changes may be of great enough magnitude to exceed the environmental tolerances of existing plant species and their related fauna and ecosystem services from portions of the this section. Change in precipitation from snow to rain is much more likely to induce earlier summer plant dormancy, lengthen the fire season, and shorten the wetland saturation period (van Mantgem et al. 2009). Predicted temperature increases for central Idaho show at least a 6-fold increase of area burned by wildfire (relative to the median annual area burned during 1950–2003) with each 1 °C (1.8 °F) of temperature increase (Littell et al. 2009). The goal of dry forest restoration should be to develop more open structure consistent with historical disturbance regimes (Arno et al. 1995, Stephens et al. 2012). This goal creates forests more resilient to and compatible with a warmer and drier future.

Objective	Strategy	Action(s)	Target SGCNs
Increase resiliency of Dry Lower Montane–Foothill Forest types to climate pattern uncertainty.	Actively implement restorative forest management at the landscape level.	Employ silvicultural and prescribed fire treatments to restore characteristic forest stand structure, fuel loading, and vegetative heterogeneity. Incorporate climate change mitigation strategies in forest and resource management plans.	Western Toad Ferruginous Hawk Golden Eagle Great Gray Owl Common Nighthawk Lewis's Woodpecker Olive-sided Flycatcher Clark's Nutcracker Black Rosy-Finch Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Wolverine Bighorn Sheep A Mason Bee (*Hoplitus producta*) Spur-throated Grasshopper (*Melanoplus*) Species Group

Noxious weeds & invasive annual grasses

The invasion of nonnative grasses and forbs is now a threat to Dry Lower Montane–Foothill Forest. These invasive weeds were historically considered a low-elevation problem; however, they are now spreading to higher elevations and spreading rapidly in some mid-elevation areas. Noxious weeds (e.g., spotted knapweed) and invasive annual grasses (e.g., cheatgrass [*Bromus tectorum*]) have colonized some habitat types of this section at lower and mid-elevations. Noxious weeds and invasive annual grasses replace native forbs and grasses, reduce forage quality for herbivorous wildlife, and increase the risk of intensified fire regimes. The predicted warming trends for this region may generate the biophysical conditions favored for further cheatgrass establishment.

Objective	Strategy	Action(s)	Target SGCNs
Control or eradicate noxious weeds.	Work with FS, BLM, and other partners to control or reduce noxious weed occurrence.	Participate in County Cooperative Weed Management Area collaboratives. Map and identify noxious weed patches and provide to the appropriate land manager. Use biological controls (insects) on infestations of spotted knapweed. Conduct aggressive weed management as part of post-fire habitat restoration. Monitor roads and trails leading into key wildlife habitats for presence of weeds	Western Toad Golden Eagle Great Gray Owl Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Wolverine Bighorn Sheep A Mason Bee (*Hoplitus producta*) Spur-throated Grasshopper (*Melanoplus*) Species Group

Objective	Strategy	Action(s)	Target SGCNs
		and treat aggressively if detected. Provide native grass and shrub seed recommendations to land managers.	

Improper livestock grazing management

Improper grazing tends to increase shrub cover and reduce the understory of more palatable herbaceous vegetation. Mesic drainage bottoms tend to attract and hold livestock during the hottest part of the summer, which causes overbrowsing and trampling of sensitive riparian areas within the Dry Lower Montane–Foothill Forest. Persistent grazing can reduce native perennials, increase bare ground, and intensify the expansion of noxious weeds and annual grasses (Johnson and Swanson 2005). SGCN species particularly sensitive to improper grazing in the Dry Lower Montane–Foothill Forest include ground-nesting birds (e.g., Common Nighthawk [*Chordeiles minor*]) where removal of herbaceous vegetation reduces nest concealment, thereby increasing exposure to predation or nest parasitism. Challenges persist in the realm of insufficient funds for federal land-management agency oversight and insufficient monitoring of allotments to assess forest rangeland health and evaluate trends in rangeland condition, as well as grazing permit compliance.

Objective	Strategy	Action(s)	Target SGCNs
Support proper livestock grazing management that maintains rangeland health and habitat quality.	Consider livestock grazing in a site-specific context over time where vegetative condition can be manipulated by the timing, intensity, duration, and frequency of grazing practices.	Conduct fine-scale habitat assessments to inform grazing management. Consider resting (placing in nonuse status) a unit for a period to achieve identified resource objective(s). Build in support for an option of "grass reserve units." Seek and apply the best possible tools and techniques to influence the distribution of livestock. Consider the distribution of, and access to, stock water in springs, seeps, wet meadows, and potholes across the uplands late in the summer relative to perennial stream access. Support adequate funding and personnel to collect and analyze livestock grazing-related monitoring and rangeland health data. Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter 2012).	Western Toad Ferruginous Hawk Golden Eagle Common Nighthawk Lewis's Woodpecker Black Rosy-Finch Bighorn Sheep A Mason Bee (*Hoplitus producta*)

Target: Subalpine–High Montane Conifer Forest

Subalpine–High Montane Conifer Forest communities comprise a substantial portion of this section (approximately 24%) and generally form the elevationally uppermost forests, including the upper-treeline ecotone with the alpine. Characteristic trees are subalpine fir, Engelmann spruce, whitebark pine, lodgepole pine, limber pine, and quaking aspen, which form variable canopies from nearly closed to open or patchy with intervening grasslands and shrublands. Subalpine fir and Engelmann spruce form climax or long-lived seral forests in this section, with periodic disturbance from windthrow, avalanches, and more prominently, insect outbreaks and stand-replacing fire. Lodgepole pine forest types occur in cold-air drainages as seral even-aged stands. Whitebark pine and limber pine are prevalent forest types in upper subalpine environments where they are important foundation and keystone species. The threat posed by the introduced pathogen that causes white pine blister rust, in synergy with Mountain Pine Beetle, altered fire regimes, and predicted warming trends, threatens the sustainability of these fragile 5-needled pine communities.

Spruce Gulch Lake, Salmon River Mountains, Idaho, 2015 IDFG

Subalpine forests and woodlands in this section are almost exclusively managed by the FS and form expansive, continuous, and largely unroaded habitat strongholds for a wide range of wildlife. Characteristic species include Wolverine, Mountain Goat, Bighorn Sheep, Clark's Nutcracker, and Black Rosy-Finch. Boggy sites within subalpine forests also harbor Western Toad, and decay-prone spruce and fir trees provide roosting and natal sites for bats. A variety of native ungulate species use this habitat type for summer range where mixed openings and delayed plant phenology produce favorable forage.

Target Viability

Fair. The Challis Volcanics contains a substantial holding of the keystone species whitebark pine. Whitebark pine has decreased from its historical extent due to synergistic actions of white pine blister rust and Mountain Pine Beetle. Reduction of this keystone species may have implications on habitat quality, intensity of snowpack melt, and species composition at high elevations. Nearly a century of fire suppression in this forest type has created conditions susceptible to insect outbreaks, high-intensity stand-replacing fires, and Douglas-fir encroachment of aspen forests, ecotonal grasslands, and sagebrush-steppe communities.

Prioritized Threats and Strategies for Subalpine–High Montane Conifer Forest

High Rated Threats to Subalpine–High Montane Conifer Forest in the Challis Volcanics

Changing temperature & precipitation regimes

Current climate models predict changing precipitation patterns and warming temperatures for the Challis Volcanics Section. Precipitation and temperature changes may be of great enough magnitude to exceed the environmental tolerances of existing plant species and their related fauna and ecosystem services from portions of this section. Change in precipitation from snow to rain is much more likely to induce earlier summer plant dormancy, lengthen the fire season, and shorten the wetland saturation period (van Mantgem et al. 2009). Predicted temperature increases for central Idaho show at least a 6-fold increase of area burned by wildfire (relative to the median annual area burned during 1950–2003) with each 1 °C (1.8 °F) of temperature increase (Littell et al. 2009). This trajectory suggests that without active forest management, Subalpine–High Montane Conifer Forest systems will become less resilient and less compatible with a warmer and drier future.

Objective	Strategy	Action(s)	Target SGCNs
Increase resiliency of Subalpine–High Montane Conifer Forest types to climate pattern uncertainty.	Actively implement restorative forest management at the landscape level.	Develop landscape-level models that evaluate commodity production, fire risk, forest health, and habitat needs of fish and wildlife in an integrated fashion. Identify and prioritize areas for immediate restoration treatments. Incorporate prescribed fire treatments in restoration projects. Use managed natural fire for forest restoration where/when appropriate. Incorporate mechanical thinning treatments to reduce stand densities and crown cover where appropriate. Favor retention of fire-tolerant tree species and restore fine-scale patchiness. Retain older age-class or large trees as part of a managed stand to create structural and age-class heterogeneity. Engage and involve forest collaboratives in the development and implementation of forest restoration projects.	Western Toad Golden Eagle Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Black Rosy-Finch Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine Mountain Goat Bighorn Sheep A Miner Bee (*Andrena aculeata*) A Mason Bee (*Hoplitus producta*)

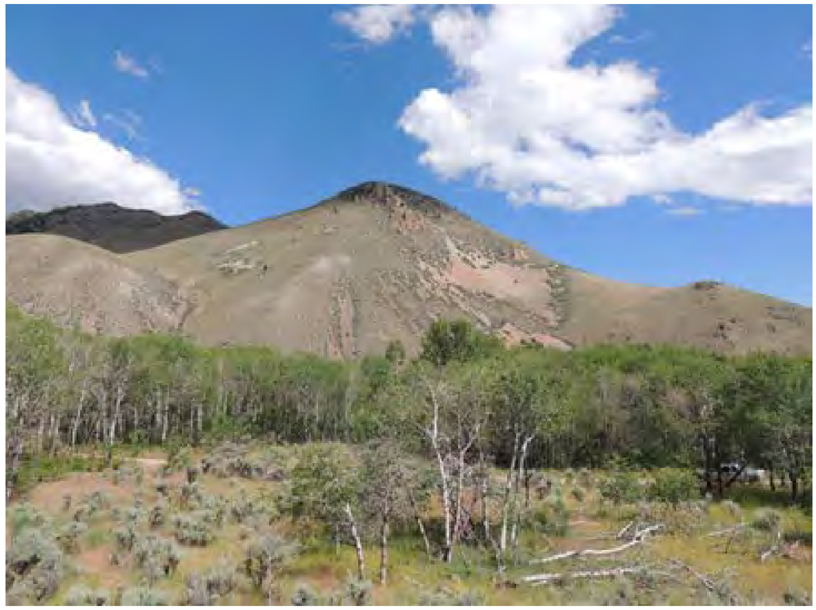
Insects & disease in 5-needled pines

Whitebark pine and limber pine are native 5-needled pines considered foundation species of high-elevation settings of this section. These woodland types serve a variety of key ecological roles, including providing food resources for Clark's Nutcracker, squirrels, and other birds and improving snow retention. Populations of whitebark and limber pines in this section have been extensively and severely impacted by epidemics of Mountain Pine Beetle and white pine blister rust. Current forecasts for warming climate change suggest continued optimal conditions for pine beetle outbreaks for many decades (Hicke and Logan 2009). The introduced pathogen that causes white pine blister rust poses a more insidious threat given it affects all aspects of the 5-needled pine forest regeneration process and will impair ecosystem recovery long after pine beetle epidemics phase out. Continued losses of whitebark and limber pines in this section could adversely modify hydrologic processes critical to listed anadromous fish and other aquatic-associated species in the Challis Volcanics Section.

Objective	Strategy	Action(s)	Target SGCNs
Ensure future persistence and viability of whitebark pine.	Support and implement long-term strategies to restore whitebark pine (i.e., A Range-Wide Restoration Strategy for Whitebark Pine (Pinus albicaulis) (Keane et al. 2012).	Collect whitebark pine seed for genetic testing, gene conservation, rust screening, and operational planting. Cultivate rust-resistant whitebark pine seedlings to out-plant to disturbed areas. Allow wildfire to treat potentially declining areas to reduce competing subalpine fir and create caching habitat for Clark's Nutcrackers. Preserve putative rust-resistant cone-bearing trees as cultivated and natural seed sources. Plant burned areas with rust-resistant whitebark pine seedlings. Use stand-level treatments to restore high value or critical declining stands, especially those stands that are distant from seed sources, that contain putative rust-resistant cone-bearing trees, or that are too valuable to lose from uncontrolled wildfire (e.g., Clark's Nutcracker habitat). Inventory, monitor, evaluate, and adaptively manage treatment sites.	Clark's Nutcracker Black Rosy-Finch Wolverine Mountain Goat

Target: Aspen Forest & Woodland

Aspen is an important yet uncommon (<1% of land base) vegetation community in most of the Challis Volcanics Section. Aspen is somewhat more abundant in the upper Big Wood River Valley, the upper East Fork of the Salmon, and the higher elevations of the Salmon River Mountains because of higher precipitation. Although small in scale, healthy aspen communities harbor high biodiversity and are critically important to Mule Deer, Elk, nesting birds, bats, amphibians, and pollinator insects. In addition, they maintain water storage capacity for watersheds and offer recreation and scenic value to humans. Aspen stands in this section are typically small (<4 ha [10 acres]) and interspersed with conifers or part of a riparian area. Although aspen is naturally seral in this section, it has declined about 60% since European settlement (Bartos 2001). This decline has been due primarily to changes in fire regimes and heavy ungulate browsing leading to poor regeneration. Within this section, aspen is found in lower elevation dry forest, montane riparian areas, subalpine forest, subalpine meadows and shrublands, and mountain big sagebrush stands.



Garden Creek, Salmon River Mountains © 2015 Beth Waterbury

Recent fire activity in the Big Creek and Middle Fork Salmon River vicinities, Ketchum area, White Cloud Mountains, and Salmon River Mountains west of Challis have certainly benefited aspen stands by removing encroaching conifers and encouraging aspen suckering. In addition, land managers and their partners have made significant progress in the last decade to inventory aspen stands and assess their condition and likelihood for successful treatment. Notable efforts include restoration of aspen stands in the Pioneer Mountains and Salmon River Mountains west of Challis on the Salmon–Challis National Forest, and projects implemented by Lava Lake Land and Livestock in the Fish Creek, Copper Creek, and Little Wood drainages.

Target Viability

Aspen condition is poor over most of the section, primarily from conifer encroachment and heavy ungulate browsing. Climate change resulting in less precipitation, higher temperatures, and recurring drought could exacerbate aspen decline. The rapid rate of development in the Big Wood River Valley may be reducing aspen abundance. Recent fire activity is probably benefiting stands that were previously declining from conifer encroachment and lack of disturbance. In addition, forest restoration projects taking place around the section are resulting in improved aspen stand conditions.

Prioritized Threats and Strategies for Aspen Forest & Woodland

High rated threats to Aspen Forest & Woodland in the Challis Volcanics

Changing precipitation & temperature patterns

Long range climate models predict hotter and drier conditions for the Challis Volcanics Section. A bioclimate model developed for aspen in the Central Rockies predicts a 40–75% decline in the extent of aspen range by the decade surrounding 2060 (Rehfeldt et al. 2009). In fact, the effects of drought and warmer temperatures have already become evident in the form of Sudden Aspen Decline (SAD) documented over the last decade in parts of the Central Rockies (Morelli and Carr 2011). Within this section, it is difficult to determine if this phenomenon has occurred, as many of these stands are small and already stressed from conifer encroachment and extensive ungulate browsing.

Objective	Strategy	Action(s)	Target SGCNs
Increase resiliency of aspen stands to altered precipitation and temperature regimes.	Implement actions aimed at increasing the health and vigor of existing stands.	Identify stands with high levels of conifer encroachment and implement conifer removal, retaining large-diameter snags, diseased trees, and green trees (conifer and deciduous) for nest-building birds. Use prescribed burning to stimulate suckering and stand expansion. Thin conifers upslope from aspen stands to increase water availability. Erect barriers such as fencing and stacking of felled conifers to protect treated stands from livestock and wild ungulate damage. Use expertise of collaborative aspen working groups to achieve objective.	Western Toad Great Gray Owl Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis

Improper livestock grazing management

Regeneration and recruitment of aspen stands has been hindered by improper livestock grazing in this section. Many poor-condition stands are in mesic drainage bottoms (e.g., Salmon River Mountains, East Fork Salmon drainage, Pioneer Mountains) that attract and hold livestock during the hottest part of the summer. Long-term grazing retards aspen recruitment at a level that can affect overall stand age-structure and its long-term presence on the landscape (Beschta et al. 2014). Although detrimental browsing pressure by native ungulates may occur, especially where winter densities are high (Smith et al. 2001), these animals are widespread over their range and impacts to aspen recruitment are often not measurable (DeByle 1985).

Objective	Strategy	Action(s)	Target SGCNs
Promote and ensure	Work with and encourage	Identify aspen stands where recruitment is impaired by livestock browsing or physical	Western Toad Great Gray Owl

Objective	Strategy	Action(s)	Target SGCNs
compliance of proper livestock grazing management.	land managers to improve livestock grazing management where damage is occurring.	damage. Work with federal agency range specialists and allotment permittees to modify grazing practices to reduce impacts on aspen regeneration. Deploy remote cameras in heavily browsed aspen stands to determine level of wild ungulate use. Use expertise of collaborative aspen working groups to achieve objective.	Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis

Altered fire regimes

Natural fire intervals have been altered throughout the Challis Volcanics Section. Recent, significant fires have occurred west of Ketchum, on the west flank of the White Cloud Mountains, in the Salmon River Mountains north of Stanley and west of Challis, and in the Big Creek and Middle Fork Salmon drainages. With the exception of the latter 2 areas, all fires have been vigorously suppressed because of human safety and property concerns. Some natural starts in higher elevations have been allowed to burn within predefined perimeters. Fire suppression, which allows competing conifers to suppress aspen regeneration, has been identified as the primary driver behind the decline of aspen in the West (Kulakowski et al. 2013).

Objective	Strategy	Action(s)	Target SGCNs
Promote restoration of natural fire regimes.	Increase use of prescribed fire and mechanical treatments to mimic natural fire history.	Identify and map conifer encroachment within aspen stands where regeneration is compromised. Provide technical assistance and encouragement to land managers for aspen improvement projects. Assist with post-treatment monitoring. Engage with and participate in the Central Idaho Aspen Working Group to achieve aspen restoration objectives.	Western Toad Great Gray Owl Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis

Target: Lower Montane–Foothill Grassland & Shrubland

This target comprises approximately 3% of the section's land area and includes a subset of grasslands, shrub steppe, and deciduous shrubland types found below the lower treeline and extending up into high montane zones. Grasslands are prevalent on warmer, drier sites, especially at higher elevation. Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) are predominant grasses but a variety of cool-season graminoids may be present. Shrublands often occur on cooler, more mesic sites, including the steep slopes of canyons, north aspects, and toeslopes. Common shrubs include Saskatoon serviceberry (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*), rose (*Rosa* spp.), blue elderberry (*Sambucus nigra* ssp. *cerulea*), common snowberry (*Symphoricarpos albus*), and oceanspray

(*Holodiscus discolor*). Forb diversity is typically high in both mesic and dry aspects of this community.

Several SGCN are associated with this compositionally diverse habitat. Bighorn Sheep use the grasslands to graze on preferred grasses and forbs, but may seasonally shift to subsist on shrubs. Grassland and shrubland habitats provide nesting, brood-rearing, and foraging sites for Greater Sage-Grouse, Short-eared Owl (*Asio flammeus*), Burrowing Owl (*Athene cunicularia*), and Long-billed Curlew. Open slopes of intermountain valleys are used by Black Rosy-Finch during winter storms or while higher country is covered in snow (Johnson 2002). The wide variety of grasses, forbs, and shrubs in this habitat type provide abundant nectar and pollen resources for a diverse assemblage of pollinator species.

Blue Mountain, Salmon River Mountains © 2015 Windy Davis

Target Viability

Fair. Lower Montane–Foothill Grassland & Shrubland communities generally occur at lower elevations at the interface of private lands. Consequently, they have a long history of human use, both for commodity purposes (e.g., livestock grazing), and as an area where effective fire exclusion was practiced early on and eventually altered the historic disturbance regime. Changes in fire intensity and frequency have resulted in Douglas-fir invasion in many areas, or the development of dense shrublands outside the range of natural historic variation. In some areas, improper livestock grazing has altered plant species composition, soil compaction, nutrient levels, and vegetative structure. Invasive weeds have pioneered many roads and trails in this system, affecting the structure and composition of this target.

Prioritized Threats and Strategies for Lower Montane–Foothill Grassland & Shrubland

High Rated Threats to Lower Montane–Foothill Grassland & Shrubland in the Challis Volcanics

Improper livestock grazing management

Livestock grazing is the most widespread economic land use in this system and a legacy activity that has modified much of this vegetative community from its historical condition. Livestock grazing can have a keystone effect on these habitats where livestock occur at economically meaningful densities (Bock et al. 1993). For example, livestock grazing can change grassland habitat features that directly influence birds by reducing ground-nesting cover, substrate for an abundance and diversity of insect prey, grass and forb seed sources, and herbaceous cover and foliage height diversity for mammalian prey. The trampling action of livestock can degrade biological soil crusts, which are essential features of arid steppe plant communities that reduce soil evaporation, aid in nitrogen fixation of plants, and inhibit the establishment of invasive nonnative species such as cheatgrass and spotted knapweed (Belnap et al. 2001). Nonnative weed species not only outcompete native bunchgrasses, but are also susceptible to larger and more frequent fires.

Several grassland-associated SGCN respond negatively to improper livestock grazing that alters native habitat features, most notable being the Greater Sage-Grouse. Whereas the proximate effect of livestock grazing on these SGCN may be the removal of grass and forbs important as forage and cover, the ultimate effect may be perpetuation of weedy annuals that outcompete native plants these SGCN are uniquely adapted to.

Objective	Strategy	Action(s)	Target SGCNs
Support proper livestock grazing management that maintains rangeland health and habitat quality (Otter 2012).	Consider livestock grazing in a site-specific context over time where vegetative condition can be manipulated by the timing, intensity, duration, and frequency of grazing practices (Otter 2012).	Prioritize permit renewals and land health assessments for allotments with declining Sage-Grouse populations (Otter 2012). Conduct fine-scale habitat assessments to inform grazing management. Develop grazing regimes that maintain grass and forb structure and species diversity. Consider resting (placing in nonuse status) a unit for a period to achieve identified resource objective(s). Build in support for an option of "grass reserve units." Seek and apply the best possible tools and techniques to influence the distribution of livestock. Consider the distribution of, and access to, stock water in springs, seeps, wet meadows, and potholes across the uplands late in the summer relative to perennial stream access. Support adequate funding and personnel to collect and analyze livestock grazing–related monitoring and rangeland health data. Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter 2012).	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Bighorn Sheep
		Enhance the growth of forbs to ensure their ability to reproduce and to provide nectar and pollen throughout the growing season by setting grazing levels to allow forbs to flower and set seed. Leave nearby ungrazed areas to provide	A Mason Bee (*Hoplitus producta*) Hunt's Bumble Bee Morrison's Bumble Bee

Objective	Strategy	Action(s)	Target SGCNs
		reserves for pollinator populations. Minimize grazing during periods when flowers are already scarce (e.g., midsummer) to maintain forage for pollinators, especially for bumble bee species. Minimize livestock concentrations in one area by rotating livestock grazing timing and location to help maintain open, herbaceous plant communities that are capable of supporting a wide diversity of butterflies and other pollinators. Include protection of pollinator species in grazing management plans.	Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Altered fire regimes

Fire is a naturally occurring but highly variable natural disturbance in this system. Although fire has historically played a part in its composition and distribution, the system is not always fire driven. Although fire suppression has abetted the encroachment of Douglas-fir into some grasslands and shrublands, many sites in this section are too xeric to support tree growth, even in the absence of fire. Likewise, fire suppression has allowed the development of shrub communities dominated by old, dense, and decadent shrubs with substantial amounts of fuels. Consequently, fires that do occur are likely to be high severity, and system recovery slow.

Objective	Strategy	Action(s)	Target SGCNs
Restore characteristic fire regimes in Lower Montane–Foothill Grassland & Shrubland systems.	Coordinate actions with federal land management agencies, livestock permittees, municipalities, and other stakeholders.	Identify and map key areas in need of restoration treatments. Implement targeted restoration techniques including prescribed burning, seeding, mechanical treatment, and/or changes in livestock grazing regimes. Work with livestock grazing permittees and private landowners to implement fuel treatment actions on their lands and allotments as part of strategic landscape efforts (DOI 2015). Implement aggressive and targeted application of both proven techniques and the rapid investigation and implementation of new practices to control cheatgrass and spotted knapweed, and mitigate habitat impacts from unwanted rangeland fire (DOI 2015). Implement prescribed burns outside the blooming period in pollinator foraging habitat (i.e., burn in late fall to early spring and early or late in the day).	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Common Nighthawk Bighorn Sheep A Mason Bee (*Hoplitus producta*) Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Objective	Strategy	Action(s)	Target SGCNs
		Allow adequate recovery of pollinator populations between controlled burns in one area (dependent on the ecosystem and specific management goals).	
Reduce conifer encroachment in Lower Montane–Foothill Grassland & Shrubland systems.	Targeted removal of Douglas-fir or Utah juniper to remove young-age class trees expanding into grassland and shrubland communities.	Mechanical treatment of Douglas-fir/Utah juniper in key areas including lop and lay, mastication, and lop and scatter methods. Exclude old-growth Douglas-fir or Utah juniper stands from any vegetation treatments. Use categorical exclusions to conduct treatments on public lands.	Greater Sage-Grouse Ferruginous Hawk, Golden Eagle Long-billed Curlew Common Nighthawk Bighorn Sheep A Mason Bee (*Hoplitus producta*) Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Noxious weeds & invasive annual grasses

The invasion of nonnative grasses and forbs is a threat within this target habitat type. Noxious weeds (e.g., spotted knapweed) and annual grasses (e.g., cheatgrass) have colonized some areas of native grasslands and shrublands. Site disturbances such as intensive fire or improper livestock grazing that reduces native plant vigor or creates conditions optimal for noxious weed establishment (e.g., destruction of soil crusts due to trampling) has led to the establishment of invasive, nonnative species in this habitat type; this problem is exacerbated in areas of lower precipitation where nonnative cheatgrass is able to outcompete native grasses by using early spring moisture while native grasses remain dormant. These low-quality noxious weeds are replacing more nutritious forbs and grasses, lowering forage quality and increasing the risk of intensified fire regimes. The predicted warming trends for this region may generate the biophysical conditions favored for cheatgrass establishment.

Objective	Strategy	Action(s)	Target SGCNs
Control or eradicate noxious weeds.	Work with FS, BLM, and other partners to control or reduce noxious weed occurrence.	Participate in County Cooperative Weed Management Area collaboratives. Map and identify noxious weed patches and provide to the appropriate land manager. Use biological controls (insects) on infestations of spotted knapweed. Conduct aggressive weed management as part of post-fire habitat restoration. Monitor roads and trails leading into key wildlife habitats for presence of weeds and treat aggressively if detected.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep A Mason Bee (*Hoplitus producta*) Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch Spur-throated Grasshopper (*Melanoplus*) Species

Objective	Strategy	Action(s)	Target SGCNs
		Provide native grass and shrub seed recommendations to land managers.	Group

Target: Sagebrush Steppe

Sagebrush-steppe habitats dominate the landscape of the Challis Volcanics Section, forming approximately 53% of its land base. These arid habitat types are prevalent across the intermontane basins and foothills located in the rain shadow of the central Idaho mountains. Plant communities are characterized by an open shrub canopy and sparse to dense herbaceous layer dominated by perennial graminoid associates and typically have a microbiotic crust of lichens and mosses binding the upper surface of the soil. Sagebrush-steppe habitats in this section are relatively intact compared to the highly fragmented landscapes in other regions of Idaho. This is attributed to the high proportion of sagebrush-steppe habitats in public ownership, primarily under BLM management. These habitats are largely continuous and extensive, supporting connectivity for species at multiple spatial scales. This section encompasses extensive and continuous tracts of Greater Sage-Grouse Habitat Management Areas (Fig. 6.3). This section also includes the Challis Wild Horse and Burro Herd Management Area (HMA). Though the HMA appropriate management level is set at 185 horses, the population estimate has ranged in recent years to as high as 366. Although relatively pristine climax sagebrush-steppe communities occur in this section, most sites have been modified to some degree by a legacy of past livestock grazing, which has rendered disturbed stands less ecologically complex than the mosaic that they replaced (Daubenmire 1966).

Spar Canyon Pygmy Rabbit habitat © 2010 Beth Waterbury

Within the greater expanse of sagebrush steppe are frequent inclusions of semi–desert shrubland & steppe–saltbush scrub that form continuous shrubsteppe habitat. These pockets are concentrated on arid alluvial soils of Bradbury Flat, Antelope Flat, Little Antelope Flat, Spar Canyon, and Malm Gulch at lowest elevations. Stands are usually dominated by a mix of several shrubs or dwarf shrubs, but total vegetation cover is low (<30%). Dominant shrubs may include fourwing saltbush (*Atriplex canescens*), shadscale saltbush (*Atriplex confertifolia*), bud sagebrush (*Picrothamnus desertorum*), spiny hopsage (*Grayia spinosa*), and winterfat (*Krascheninnikovia* *lanata*). The herbaceous layer is often sparse and dominated by perennial grasses, especially Indian ricegrass (*Achnatherum hymenoides*) and sand dropseed (*Sporobolus cryptandrus*). The forb layer can be diverse, but forms sparse cover. These unique inclusions, which primarily occur on private and BLM land, are valuable in providing structural and compositional diversity to the sagebrush-steppe landscape.

This section's heterogeneous mix of semiarid, mesic, and montane sagebrush steppe groups influences the ecology of associated birds, mammals, reptiles, amphibians, and invertebrates. The low vertical structural diversity of these habitats provides fewer habitat layers for wildlife, resulting in lower diversity in some taxa. But what this habitat may lack in variety, it makes up for in specificity. Characteristic sagebrush obligates of this section are Greater Sage-Grouse, Sage Thrasher (*Oreoscoptes montanus*), Sagebrush Sparrow (*Artemisiospiza nevadensis*), and Pygmy Rabbit. Sagebrush-steppe types also support a suite of grassland-associated birds including Ferruginous Hawk, Golden Eagle, Long-billed Curlew, Burrowing Owl, Short-eared Owl, and Common Nighthawk. Grass-dominated sagebrush steppe provides important foraging areas preferred by Bighorn Sheep and Elk.

Target Viability

Sagebrush-steppe communities in this section are in good condition, extensive, strongly continuous, and exhibit a diversity of age classes and structure. Exceptions are found in the relatively flat, front-range areas where past livestock and wild horse grazing has contributed to depauperate herbaceous understories with intact sagebrush overstories. Most sagebrush-steppe habitat in this section is in public ownership, and is therefore less vulnerable to rangewide threats of habitat fragmentation and conversion to agriculture prevalent in areas of mixed ownership. This system is relatively resilient to the fire–cheatgrass cycle affecting many areas in Idaho's Snake River Plain, but may become less so under future climate warming scenarios predicted for this region. Pockets of Semi-Desert Shrubland & Steppe–Saltbush Scrub within the Sagebrush Steppe target appear less viable. These sites are typically the hottest, driest, and lowest elevation sites in the section and, therefore, have low site potential compared to cool, mesic sagebrush sites (Maestas and Campbell 2014). Such sites are more sensitive to impacts from improper livestock grazing or invasive weed species due to low potential resilience and resistance.

Prioritized Threats and Strategies for Sagebrush Steppe

High Rated Threats to Sagebrush Steppe in the Challis Volcanics

Improper livestock grazing management

Sagebrush-steppe ecosystems in this section did not evolve with large ungulate herds, and their grasses were poorly adapted for introductions of domestic cattle, sheep, and horses. Consequently, legacy livestock grazing practices have impacted the composition, structure, and productivity of this system in some locations. These impacts included loss of the microbiotic layer, loss of native grasses, reduction in herbaceous biomass, increase of shrub cover, and facilitated invasions of nonnative grasses and forbs. Past range management practices have involved the use of prescribed fire, herbicides, and plowing/mowing to remove dense sagebrush canopies and reestablish grass forage through reseeding of crested wheatgrass (*Agropyron cristatum*), a nonnative perennial bunchgrass.

Present-day grazing by domestic livestock and wild horses continues to influence species composition and structure of sagebrush-steppe communities by increasing shrub cover and reducing the understory of more palatable herbaceous vegetation. The colonization of dry conifer woodlands into sagebrush habitats has generally been ascribed to some combination of fire exclusion, livestock grazing (both directly and through its influence on fire), and climate. Livestock grazing in Semi-Desert Shrubland & Steppe–Saltbush Scrub communities requires sensitive application due to low grazing capacities, slow rates of recovery for existing deteriorated areas, and potential damage to soils and microbiotic crusts. These sites are best suited for livestock use during dormant periods, as plants can withstand much less grazing pressure and have higher mortality rates if grazed during growth periods (West and Gasto 1978). These communities are highly susceptible to invasion by halogeton (*Halogeton glomeratus*), Russian thistle (*Kali tragus*), and cheatgrass and are difficult and slow to restore.

SGCN species particularly sensitive to improper grazing include ground-nesting birds such as Greater Sage-Grouse, Long-billed Curlew, Burrowing Owl, Short-eared Owl, Common Nighthawk, Sagebrush Sparrow, and Grasshopper Sparrow, where removal of herbaceous vegetation reduces nest concealment, thereby increasing exposure to predation, weather, or nest parasitism. Areas with grazing-induced dense sagebrush cover are often avoided by foraging Ferruginous Hawks (Howard and Wolfe 1976). Cattle have been reported to have little deleterious effect on Bighorn Sheep and Elk if they do not graze on critical winter ranges (Tesky 1993).

A noteworthy long-term trend on public land has been replacement of season-long cattle grazing with various rotational grazing systems designed to maintain or improve rangeland health. However, challenges persist in the realm of insufficient funds for federal land management agency oversight and insufficient monitoring of allotments to assess rangeland health and evaluate trends in rangeland condition, as well as grazing permit compliance.

Objective	Strategy	Action(s)	Target SGCNs
Support proper livestock grazing management that maintains rangeland health and habitat quality.	Manage the timing, intensity, duration, and frequency of grazing practices to manipulate vegetative condition (Otter 2012).	Prioritize permit renewals and land health assessments for allotments with declining Sage-Grouse populations (Otter 2012). Designate allotments and schedule grazing periods based on factors such as elevation, weather, and plant growth (e.g., limit duration of hot season use). Consider winter grazing regimes in areas with substantial inclusions of Semi-Desert Shrubland & Steppe–Saltbush Scrub habitat. Conduct fine-scale habitat assessments to inform grazing management.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Spur-throated Grasshopper

Objective	Strategy	Action(s)	Target SGCNs
		Consider resting (placing in nonuse status) a unit for a period to achieve identified resource objective(s). Build in support for an option of "grass reserve units." Seek and apply the best possible tools and techniques to influence the distribution of livestock. Consider the distribution of, and access to, stock water in springs, seeps, wet meadows, and potholes across the uplands late in the summer relative to perennial stream access. Support adequate funding and personnel to collect and analyze livestock grazing-related monitoring and rangeland health data. Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter 2012). Continue to monitor and manage Wild Horses in the Challis Herd Management Area to maintain populations at the appropriate management level of 185 individuals.	(*Melanoplus*) Species Group
	Implement the livestock grazing management framework outlined in the Governor's Alternative (see Otter 2012).	Inform affected permittees and landowners regarding Sage-Grouse habitat needs and conservation measures (Idaho Sage-grouse Advisory Committee 2006). Incorporate GRSG Seasonal Habitat Objectives (Table 2-2 in BLM 2015) into relevant resource management plans and projects. Prioritize permit renewals and land health assessments for allotments with declining Sage-Grouse populations (Otter 2012). Conduct fine-scale habitat assessments to inform grazing management. Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Spur-throated Grasshopper (*Melanoplus*) Species Group

Objective	Strategy	Action(s)	Target SGCNs
		2012).	
Further understand potential impacts to sagebrush-associated biota from livestock grazing.	Assess the impacts (negative and positive) of livestock grazing on sagebrush-steppe obligate passerines.	Implement new, properly designed, and replicated experiments involving a variety of alternative grazing treatments (including no grazing at all) across the spectrum of major shrubsteppe habitat types (Rotenberry 1998). Conduct experiments over multiple years (Rotenberry 1998).	Sage Thrasher Sagebrush Sparrow
Support the continued responsible use of federal lands for grazing to maintain open spaces and important habitat conditions that benefit wildlife.	Implement Western Governors' Association (WGA) policy for public lands grazing (for details, see WGA Policy Resolution 2015-03).	Use sound, science-based management decisions for federal lands and base these decisions upon flexible policies that take into account local ecological conditions and state planning decisions.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Spur-throated Grasshopper (*Melanoplus*) Species Group

Transportation & service corridors

Infrastructure such as roads, highways, high-voltage transmission lines, and cell phone towers (Governor's Executive Order No. 2015-04; Otter 2015) is identified as a primary threat (Otter 2012) and causes fragmentation and direct loss of shrubsteppe habitats (US Fish and Wildlife Service 2014). The most visible and well-documented impact of roads is direct mortality of wildlife through wildlife-vehicle collisions. Indirect effects on wildlife include habitat loss and fragmentation, increased human disturbance or access, facilitated spread of invasives, and increased risk of predation. Studies suggest populations of sagebrush-steppe obligate and dependent wildlife species are particularly sensitive to these impacts (Braun 1998, Connelly et al. 2004). In the Challis Volcanics Section, major paved roads intersecting sagebrush-steppe habitats include State Highways 20, 26, and 75. These roads constitute a major anthropogenic footprint within the Challis, East Magic Valley, and Upper Snake Sage-Grouse Planning Areas (SGPA). Both Challis and Upper Snake are among SGPAs with the greatest total major road mileage in Idaho (Idaho Sage-grouse Advisory Committee 2006). These SGPAs constitute 2 of 8 SGPAs in Idaho with >50% of their area potentially influenced by major roads, based on a 10 km (6.2 mi) buffer outward from each side of these roads to account for an influence from predation and noise disturbance (Connelly et al. 2004). Numerous secondary road systems (e.g., paved, county, primitive) also potentially influence sagebrush-steppe habitat and associated wildlife through factors such as increased human access, OHV use, spread of invasive species, increased risk of wildfire, and increased mortality from collisions. Major transmission lines also occur in this section, primarily located in highway right-of-ways. Tall structures such as transmission towers in sagebrush-steppe ecosystems provide ravens and raptors with elevated substrate for perching and nesting where trees are rare or nonexistent. These structures are thought to concentrate ravens and raptors along utility corridors, which may increase the risk of predation to Greater Sage-Grouse, Pygmy Rabbit, and other sagebrush-dependent wildlife.

Objective	Strategy	Action(s)	Target SGCNs
Reduce impacts of roads and utility lines to sagebrush steppe-associated wildlife.	Coordinate the development and siting of roads and utility lines with relevant agencies and industry.	Avoid siting and construction of new power lines and associated features in "designated" habitat (see Avian Power Line Interaction Committee [APLIC]. 2015 Best Management Practices for Electric Utilities in Sage-Grouse Habitat). Follow management actions outlined in the Governor's Executive Order No. 2015-04 (Otter 2015) as it pertains to PHMA (Core), IHMA, and GHMA when proposing to develop transportation and service corridors. Work with key agencies and stakeholders to ensure that roads, transmission lines and other linear infrastructure avoid sensitive habitat areas.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Spur-throated Grasshopper (*Melanoplus*) Species Group
	Minimize disturbance to Sage-Grouse and sagebrush-associated wildlife from unrestricted cross-country travel.	Prioritize the completion of Comprehensive Transportation Management Travel Plans (CTMTPs) (Otter 2012). Locate areas and trails to minimize disturbance to Sage-Grouse and other species sensitive to OHV disturbance; use route upgrade, closure of existing routes, timing restrictions, seasonal closures, and creation of new routes to help protect habitat and reduce the potential for pioneering new unauthorized routes (BLM 2015). Conduct road upgrades and maintenance outside the Sage-Grouse breeding season to avoid disturbance on leks (BLM 2015).	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Spur-throated Grasshopper (*Melanoplus*) Species Group
	Increase visibility of utility lines in key Sage-Grouse movement corridors.	Identify and map areas where key Sage-Grouse movement corridors and utility lines overlap. In identified high-risk areas, mark	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl

Objective	Strategy	Action(s)	Target SGCNs
		utility lines with bird flight markers or other suitable device to reduce Sage-Grouse collisions.	

Fences

Due to a long history of livestock production, fences are ubiquitous throughout the sagebrush-steppe habitats of this section. Sagebrush-steppe wildlife is adapted to landscapes with few vertical features or obstructions. Consequently for wildlife inhabiting sagebrush steppe, fences can reduce habitat suitability through habitat fragmentation, obstruction of movement corridors (e.g., woven-wire fencing), and injury or mortality from fence collision. Avian SGCN potentially vulnerable to fence collisions and entanglement include Greater Sage-Grouse, Ferruginous Hawk, Golden Eagle, Burrowing Owl, and Short-eared Owl (Fitzner 1975). Fences pose particular collision hazards to Greater Sage-Grouse when located <2 km from known leks, where fence segments lack wooden fence posts, and where fence segments exceed 4 m (13.1 ft) (Stevens et al. 2012). Fence marking may reduce risk of fence collision by Greater Sage-Grouse by as much as 83% (Stevens et al. 2012). Wooden fence posts may facilitate predation of Greater Sage-Grouse by eagles, hawks, and ravens. Although fences pose some potential threat to sagebrush-steppe habitat, it is important to recognize their utility in grazing management programs designed to achieve proper grazing management.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the impacts of fences on Sage-Grouse and other sagebrush-associated wildlife.	Work with landowners and land management agencies to identify fences (including new fences) that may pose risk for collision mortality.	Work with local utilities, landowners, and land management agencies to identify and mark problem fences. Apply wildlife-friendly fencing standards when constructing or modifying fences (e.g., Paige 2012). Identify and remove unnecessary fences or other structures (Otter 2012, [BLM] Bureau of Land Management (US) 2015). When placing new fences or other structural range improvements (such as corrals, loading facilities, water tanks, and windmills), consider their impact on Sage-Grouse (Otter 2012). Place new, taller structures (e.g., corrals, loading facilities, water storage tanks, windmills) at least 1 km from occupied leks (Otter 2012) and within existing disturbance corridors or in unsuitable habitat (BLM 2015).	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Short-eared Owl

Noxious weeds & invasive annual grasses

The invasion of nonnative grasses and forbs is a major threat to sagebrush-steppe habitats and in some areas takes precedence over all other ecological concerns. Invasive species are recognized as the primary extinction risk factor for Greater Sage-Grouse across its range (USDI-

Fish and Wildlife Service 2005) and are identified as a primary threat to Sage-Grouse in Idaho by the Governor's Alternative (Otter 2012). The Challis Volcanics Section lies within the Mountain Valley Sage-Grouse Conservation Area, which is considered at lower risk to invasive species than other areas of the state. The Challis and Upper Snake Sage-Grouse Working Groups of this section identified invasive plant species as high risk factors within their respective Planning Areas, citing adverse impacts from displacement of desirable species, altered fire frequencies, and reduced value of sagebrush-steppe habitat (Challis Sage-Grouse Local Working Group 2007, Upper Snake Sage-Grouse Local Working Group 2009). Noxious weeds (e.g., spotted knapweed and skeletonweed) and invasive annuals (e.g., cheatgrass) and perennials (e.g., Kentucky bluegrass) have colonized and become naturalized in some of the sagebrush habitat types of this section at lower and mid-elevations. Though the cheatgrass/fire cycle is not as pervasive an issue in this section as the Snake River Plain, the predicted warming trends for this region may generate the biophysical conditions favored for cheatgrass establishment.

Objective	**Strategy**	**Action(s)**	**Target SGCNs**
Effectively control and restore areas dominated by invasive, nonnative annual grasses at a rate greater than the rate of the spread.	Implement large-scale experimental activities to remove cheatgrass and other invasive annual grasses through various tools (DOI 2015).	Support the development of a framework for a national invasive species Early Detection and Rapid Response (EDRR) program (DOI 2105). Locate and coordinate installation of long-term studies and subsequent monitoring to test the efficacy of large-scale application of integrated pest management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Support the use of Plateau® herbicide in controlling cheatgrass. Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006). Work with County Cooperative Weed Management Areas to prevent the introduction, reproduction, and spread of designated noxious weeds and invasive nonnative plants.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Spur-throated Grasshopper (*Melanoplus*) Species Group

Target: Alpine & High Montane Scrub, Grassland & Barrens

The Challis Volcanics Section contains a relatively large area of alpine landcover (2%) relative to other sections in Idaho. Most alpine habitats are within the newly designated Jim McClure–Jerry Peaks, Hemingway–Boulders, and White Clouds wilderness areas. Alpine communities are found at elevations ranging from 2,100 to 3,650 m (7,000 to 12,000 ft) and occur in notable extents in the Salmon River, White Knob, and Pioneer mountain ranges. Wind and its effect on snow movement has a strong local effect, producing wind-scoured fell fields, dry turf, snow accumulation heath communities, and short growing season snowbed sites. Fell fields are typically free of snow during the winter as they are found on ridgetops, upper slopes and exposed saddles, whereas dry turf is found on gentle to moderate slopes, flat ridges, valleys, and basins where soils are relatively stabilized and water supply is more constant. Vegetation occurs as a mosaic of small patch plant communities. Alpine bedrock and scree types consist of exposed rock and talus in steep upper mountain slopes and windswept summits. Sparse cover of forbs, grasses, low shrubs, and scrubby trees may be present with total vascular plant cover typically less than 10–25%. The hydrology is strongly associated with snowmelt and springs which often sustain high mountain lakes. Backcountry recreation use includes hiking, fishing, backpacking, hunting, trapping, and horse-packing in summer/fall, and snowmobiling and skiing in winter. Alpine communities of this section provide nesting habitat for Black Rosy-Finch, and year-round habitat for Hoary Marmot. Mountain Goats occupy alpine areas with sufficient steep, rocky escape terrain. Winter distribution concentrates on wind-scoured ridges and south-facing slopes where forage is available. Wolverines are strongly associated with alpine climatic conditions and habitats, particularly in summer.

Chinese Wall, Railroad Ridge © 2011 Beth Waterbury

Target Viability

Good. A large portion of alpine habitats in this section are protected as Wilderness Area, Wilderness Study Areas or Roadless Areas. Remaining alpine habitats are characterized as “de facto” wilderness due to remoteness, minimal roads and infrastructure, and generally inhospitable conditions for human habitation. Recreational activities are perceived as being low density and low impact on alpine habitats and wildlife. Alpine-associated biota are sensitive to climatic factors and are likely to have low adaptive capacity to climate change.

Prioritized Threats and Strategies for Alpine & High Montane Scrub, Grassland & Barrens

High rated threats to Alpine & High Montane Scrub, Grassland & Barrens in the Challis Volcanics

Changes in precipitation & broad-scale hydrologic regimes

Observed and predicted trends in climate vary widely across Idaho because of its complex topography. Nowhere is this variation more pronounced than in alpine habitats, which contain some of the sharpest environmental gradients found in continental regions. Despite the buffering effect of complex terrain, climate model projections for Idaho and the Pacific Northwest predict progressively warmer and wetter conditions, with worsening summer drought. Given projected temperature increases, the region is expected to transition from a snow-dominated system to one more rain dominated. Changes in the length and depth of snow cover may influence the composition and distribution of alpine flora and fauna. Overall, high-elevation species ranges are expected to contract as a result of vertical migration, because the amount of mountainous land area decreases as one gains elevation and less area is available for species to inhabit. The most vulnerable species may be those that are genetically poorly adapted to rapid environmental change, reproduce slowly, disperse poorly, and are isolated or highly specialized.

Objective	Strategy	Action(s)	Target SGCNs
Increase understanding of adaptation responses of alpine biota to climate change.	Support and conduct research into ecological aspects of climate change in alpine systems.	Work with researchers to develop models to predict how wildlife species will cope with changing climatic and environmental conditions. Conduct wildlife species vulnerability assessments supported by predictive models referenced above. Use long-term Mountain Goat population survey datasets to evaluate occupied habitats in a changing climate.	Clark's Nutcracker Black Rosy-Finch Wolverine Mountain Goat Bighorn Sheep Hoary Marmot Hunt's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Grasshopper (*Argiacris keithii*) A Grasshopper (*Argiacris militaris*) Spur-throated Grasshopper (*Melanoplus*) Species Group
Maintain connectivity among patchy alpine habitats.	Identify and secure a connected network of alpine habitats to facilitate dispersal, migrations, and range shifts caused by climate change.	Identify, assess, and prioritize critical connectivity gaps for a range of alpine-associated wildlife species. Work with communities, government agencies, academia, and organizations to identify opportunities for maintaining and restoring landscape connectivity.	Clark's Nutcracker Black Rosy-Finch Wolverine Mountain Goat Bighorn Sheep Hoary Marmot Hunt's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Grasshopper (*Argiacris keithii*) A Grasshopper (*Argiacris militaris*) Spur-throated Grasshopper (*Melanoplus*) Species Group

Species designation, planning & monitoring

Alpine systems are challenging to inventory due to logistical difficulties of access, short growing or reproductive seasons, and variable weather influenced by high mountain topography. Consequently, population data are lacking for many alpine-associated species. Concerns about the status of alpine obligates in the face of climate change have underscored the need to gather data on all aspects of their ecology, distributions, and populations. Alpine SGCN for which significant data gaps exist are addressed below. These species could be effectively monitored through a multispecies monitoring approach.

Objective	Strategy	Action(s)	Target SGCNs
Determine status of SGCN alpine obligates.	Conduct surveys and implement long-term monitoring programs for Black Rosy-Finch.	Conduct breeding season surveys to determine distributions and characterize nesting habitat. Implement monitoring programs in occupied habitats. Monitor nonbreeding populations to better understand the scale and scope of threats in anthropogenic environments.	Black Rosy-Finch
	Conduct surveys and implement long-term monitoring programs for Hoary Marmot.	Conduct breeding season surveys to determine distributions and characterize alpine habitats. Implement monitoring programs in occupied habitats. Assess the importance of predation as a mortality factor and identify important predators.	Hoary Marmot
	Conduct surveys and implement long-term monitoring for a suite of alpine invertebrates.	Conduct surveys and monitoring for SGCN pollinators. Conduct surveys and monitoring for SGCN alpine-associated grasshoppers.	Hunt's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Grasshopper (*Argiacris keithii*) A Grasshopper (*A. militaris*) Spur-throated Grasshopper (*Melanoplus*) Species Group

Spotlight Species of Greatest Conservation Need: Black Rosy-Finch

The Black Rosy-Finch is an uncommon songbird that breeds in alpine habitats of the Intermountain West. In Idaho, its breeding range is patchily distributed in high elevation peaks of the state's central mountains complex. Breeding habitat includes cliff crevices and large-boulder rock slides providing nest sites with protection from falling rocks, rain, hail, and ground predators. Nests are usually placed on north-facing cliffs overlooking snowfields or glaciers. These surfaces collect windblown insects and seeds on which the Black Rosy-Finch feeds, and may be a required habitat feature for nest-site selection (Johnson 2002). Black Rosy-Finches lay 5 eggs and raise 1 brood per breeding season, fledging from 24 July to 28 August. Winter range includes alpine areas to lowlands where wind or patchy snow cover exposes seed-feeding areas. In Idaho, winter range extends south and east of the central Idaho mountains but not further north.

Black Rosy-Finch on winter range © 2014 Beth Waterbury

The Challis Volcanics Section contains a large proportion of Idaho's breeding and wintering habitat for the Black Rosy-Finch. Prime breeding habitats include the high alpine peaks of the Hemingway–Boulders, White Clouds, and Jim McClure–Jerry Peak Wilderness Areas, and the Pioneer and White Knob mountains. In winter, Black Rosy-Finches can be found in large mixed flocks with the more abundant Gray-crowned Rosy-Finch, occasionally visiting bird feeders in rural residential areas.

Due to the inaccessibility of their alpine nesting habitat and nomadic winter behavior, Black Rosy-Finches are among the least studied of North American birds. As a result, there is currently no information on population trend for this species rangewide or within Idaho. Most high-altitude breeding areas are within protected areas or are largely protected because of their remoteness. However, Black Rosy-Finch is identified on The State of the Birds 2014 Yellow Watch List due to its small population, narrowly distributed breeding population, and decline in the future suitability of breeding habitat. The potential impacts of global warming on alpine breeding habitat (loss of permanent snowfields, rising treelines) are the most pressing concerns for this unique species.

Spotlight Species of Greatest Conservation Need: Hoary Marmot

The Hoary Marmot is an alpine specialist and one of the largest members of the squirrel family (Sciuridae) in North America. Distributed in western North America from Alaska to the Cascades and northern Rocky Mountains, this species reaches the southern limits of its range in Idaho and western Montana. Hoary Marmots are poorly documented in Idaho, with sparse records from the Selkirk, Bitterroot, Beaverhead, Boulder, White Cloud, and Salmon River mountain ranges.

Hoary Marmot © 2011 Beth Waterbury

Hoary Marmots inhabit large boulder fields, talus slopes, and rock slides adjacent to mesic meadows, where they forage on a variety of forbs, grasses, and sedges. Highly gregarious, Hoary Marmots live in colonies and excavate burrows used as shelter from predators and weather, and as communal hibernacula through the long alpine winter. Hoary Marmots rely on winter snowpack for insulation from harsh winter temperatures. Shallow snowpack and early spring snowmelt is related to higher mortality, particularly for young of the year (Braun et al. 2011).

Information is needed to assess the distribution of Hoary Marmot populations in Idaho, develop methods for monitoring populations, and identify this temperature-sensitive species' key risk factors for climate change vulnerability.

Target: Riverine–Riparian Forest & Shrubland

This system is characterized by riparian forests and woodlands contiguous to and affected by surface and subsurface water. Riverine–riparian systems provide important wetland functions (e.g., water quality protection, flood control, fish and wildlife habitat) disproportionate to their small areal extent (<1%) in this section. Riparian systems are highly variable in size, composition, and structure, reflecting the complex relief and geology of this section.

The Big Wood and Little Wood rivers are southerly trending systems draining the Boulder and Pioneer mountains of this section. At montane to subalpine elevations, riparian forests and woodlands occur in both wide glacial-carved valley bottoms and narrow, high gradient tributaries where fluvial landforms (e.g., gravel bars) are frequently absent. At these upper elevations, forested riparian communities are dominated by Engelmann spruce, subalpine fir, lodgepole pine, or quaking aspen. These communities are tolerant of periodic flooding and high water tables, often supported by snowmelt moisture. In the lower forested zone and below lower treeline, riparian forests and woodlands occur along streams or on river floodplains receiving annual to episodic flooding, including major deposition events. The Big Wood River and mid-sections of the Little Wood River support broad-leaved deciduous forests commonly dominated by black cottonwood, (*Populus balsamifera* ssp. *trichocarpa*) with lesser amounts of Rydberg's cottonwood (*P. acuminate*), and occasional quaking aspen. Riparian forests are often in mosaic with tall willow shrublands and diverse herbaceous understories. Riparian systems in the Big Wood River drainage have been fragmented and impaired by a number of activities including livestock grazing, recreation, water development (e.g., irrigation diversions, hydropower development, wells), and housing development.

The northerly trending drainages of this section include the Salmon River mainstem, the East Fork Salmon River, and a mid-elevation reach of the Middle Fork Salmon River. At higher elevations, riparian systems contain the conifer and aspen woodlands that line montane and subalpine streams. At mid-montane elevations to below lower treeline, tree species typically present include black cottonwood, quaking aspen, Douglas-fir, and, along the banks of the Middle Fork Salmon River, ponderosa pine. Large bottomlands in the East Fork Salmon River and mainstem Salmon River upstream of Challis have extensive cottonwood galleries, but most have been fragmented or impacted by livestock grazing, diking, and stream channelization. Along the Salmon River upstream from Challis, cottonwood stands are highly fragmented, generally decadent, and often limited to a line of trees at river's edge with few riparian shrubs in the understory. Being in a wilderness area, the riparian communities and streams in the Middle Fork Salmon River drainage are in a natural state and considered in pristine condition (IDFG 2013).

Big Wood River © 2012 Talo Pinto

Riverine–riparian systems provide important habitat for a diverse array of aquatic and terrestrial biota, including keystone species such as cottonwood, American Beaver (*Castor canadensis*), and salmon. Avian SGCN associated with cottonwood galleries in the Big Wood River drainage include Common Nighthawk and Lewis's Woodpecker. Recent and verified Yellow-billed Cuckoo (*Coccyzus americanus*) records exist for the Big Wood River at the Challis Volcanics section southern boundary. Riparian systems along the Big Wood and Little Wood rivers support productive streams for Rainbow Trout (*Oncorhynchus mykiss*), Brown Trout (*Salmo trutta*), Brook Trout (*Salvelinus fontinalis*), Mountain Whitefish (*Prosopium williamsoni*), the endemic Wood River

Sculpin, and aquatic invertebrates. Riverine-riparian systems of the Salmon River and its tributaries provide key habitat for natural spawning populations of spring/summer Chinook and summer Steelhead, as well as native fluvial and resident Redband Trout, Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*), Bull Trout, and Mountain Whitefish. Shaded reaches of Salmon River mainstem tributaries provide critical thermal refugia for anadromous and resident fish species during the summer months. The continued connectivity and reconnection of these riverine systems is vital to achieving sustainable fisheries in this region. Riverine-riparian habitats in the Salmon River drainage also support numerous aquatic invertebrates (e.g., Western Pearlshell (*Margaritifera falcata*), mayflies, caddisflies), breeding populations of amphibians (e.g., Western Toad), and avian SGCN including Harlequin Duck (*Histrionicus histrionicus*), Common Nighthawk, and robust populations of Lewis's Woodpecker. The interspersion of cliffs and rock outcrops in close proximity to riparian habitats provides abundant roosting and foraging habitat for bats in this section.

Target Viability

Fair. The major rivers and tributaries and associated riparian habitats of this section have experienced substantial anthropogenic impacts. In the Big Wood River drainage, the development of irrigation projects, urbanization (e.g., home building, road construction), and conversion to cropland have resulted in degradation, fragmentation, and permanent losses of riparian habitat. The natural hydrograph of most stream systems in this drainage is altered by dams, diversions, and wells (Jankovsky-Jones 1997). The Little Wood River is impacted by a reservoir and channelization of lower reaches. Lateral flows (across the flood plain) are limited by channelization, levees, instream structures such as rip rap and emergency flood control structures. Diversion canals are present on the Big Wood downstream of Hailey for agriculture use. Grazing practices have impacted the structure and species composition of riparian areas throughout the drainage, affecting the long-term viability of cottonwood stands on the Big Wood River and other streams (Jankovsky–Jones 1997). At upper elevations, recreation contributes to compaction of soils, elimination of vegetation, and reduction of woody species regeneration. Many of the Salmon River drainages have good to excellent viability due to the free-flowing status of the Salmon River and its primary tributaries (e.g., no synthetic barriers), large connected habitats for listed salmonids, and an abundance of roadless and little-roaded federal lands with high ecological integrity. These areas account for a substantial portion of the section and serve as habitat strongholds for multiple species of fish and wildlife. However, areas of poor to fair riparian viability attributed to irrigated agriculture, livestock grazing, road construction, logging, and mining do occur. These activities often result in alteration of stream hydrographs and lowered water quality due to loss of thermal cover along streams, loss of filtering functions, and decreased bank stability.

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

High rated threats to Riverine–Riparian Forest & Shrubland in the Challis Volcanics

Water diversions

Diversion of water from the rivers and streams in the Challis Volcanics Section was coincident with Euro-American settlement of the region beginning in the 1860s. Water diversions co-occurred with numerous other human impacts to riparian systems including harvest of riparian forests for fuel, shelter, and land clearing, livestock grazing, wetland drainage, mining, and logging. As noted above, hundreds of surface water diversions exist in this section in support of agriculture. The engineering of water diversions constitute a major perturbation of fluvial processes and riparian conditions in this arid landscape. Water diversions can drastically alter stream flow regimes producing many synergistic effects including disruption of flood and channel forming processes, floodplain/stream linkages, recruitment of riparian vegetation, fish migration and access to suitable spawning and rearing habitat, and water temperature regimes for coldwater fish. High water temperatures typically coincide with high ambient air temperatures in late summer. Agricultural water diversions are at their highest and streamflows generally are at their lowest during this time frame. Reductions in streamflow, coupled with warm air temperatures, can create thermal barriers that block migration of adult native salmonids to spawning grounds, decrease juvenile salmonid rearing habitat, and result in poor growth and survival (Maret et al. 2006). Human activities that remove riparian shading can accentuate this increased water temperature.

Objective	Strategy	Action(s)	Target SGCNs
Minimize impacts to riverine-riparian systems from water diversions.	Correct fish passage impediments such as irrigation diversions and dewatered stream segments that delay or restrict anadromous and resident fish access to thermal refugia and to spawning and rearing tributaries.	Work with irrigation districts, landowners, the Upper Salmon Basin Watershed Project, state and federal agencies, and other partners to identify and screen or repair irrigation diversions where needed. Modify diversion structures (e.g., gravel pushup dams) to improve connectivity for anadromous and resident fish. Continue evaluation of the current screening program to explore opportunities for improvements.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU)
	Improve minimum streamflows and fish passage through irrigation efficiencies.	Continue to participate and support efforts through the Upper Salmon Basin Watershed Project and other voluntary, collaborative programs to transfer or purchase water rights to provide adequate flows in main-rivers and tributaries. Pursue the reconnection of tributaries through improved irrigation delivery systems, ditch consolidations, permanent head gates, stream channel	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU)

Objective	Strategy	Action(s)	Target SGCNs
		improvements, dry year lease options, and/or permanent leases. Continue to improve flows in mainstem river reaches during peak irrigation season. Maintain or improve in-stream flows through critical review of water right applications, and by working with private irrigators and irrigation districts to pursue water savings projects. Work with IDWR on strategies such as water lease/rentals, source switches, and minimum flow agreements. Work with IDWR on strategies to provide enhanced flows.	
	Reduce instream water temperatures.	Work with state and federal agencies, irrigation districts, and landowners on developing wetlands on irrigation returns to improve water quality. Work with state and federal agencies, irrigation districts, and landowners to restore and protect shade-providing and bank-stabilizing riparian vegetation.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU)

Active riparian vegetation removal

Many of the same attributes that contribute to the high productivity and biodiversity of riparian systems are of high economic value to human society. Consequently, the floodplains of the Challis Volcanics Section are productive for not only their complex wildlife habitats and linkages to aquatic biota, they are the most productive lands for agriculture and highly desirable for human dwellings. This is reflected in the high proportion of private landownership in the low ground topography of this section. Livestock, hay, and grain production agriculture is prevalent along the major tributaries and rivers in this section. Clearing and occasional burning of riparian vegetation is commonly employed to maximize croplands and set back riparian succession. Development of "riverfront" homesites has accelerated loss and fragmentation of riparian habitat through clearing to improve river views and to create fire-defensible space around structures. Riparian vegetation removal may be subsidized under government programs to reduce the risk of fire in wildland-urban interface environments.

Objective	Strategy	Action(s)	Target SGCNs
Conserve, maintain and restore riparian habitats on public and private lands.	Increase public awareness of the multiple values and benefits of riparian habitat.	Incorporate and implement appropriate riparian management and stewardship guidelines in public and private land management programs/decisions.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake

Objective	Strategy	Action(s)	Target SGCNs
		Distribute *Stream Care: A Guide for Property Owners in the Upper Salmon River Watershed* pamphlet to riverfront landowners. Incorporate riparian ecology information and management guidelines into wildland fire education programs. Provide riparian vegetation objectives to land management agencies where grazing, development, or other activities have degraded riparian zones. Designate suitable sites as Important Bird Areas to foster community engagement in riparian conservation.	River spring/summer-run ESU) Western Toad Harlequin Duck Sandhill Crane Common Nighthawk Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Western Pearlshell Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
	Conserve riparian habitats through land use planning.	Develop land use ordinances that establish adequate building setbacks and limits on riparian vegetation removal on all water courses, including ephemeral streams. Encourage policies of no net loss for late-seral cottonwood forests. Negotiate variances on vegetation standards for Army Corps of Engineers-maintained levees. Minimize vegetation clearing for road building on public lands.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Harlequin Duck Sandhill Crane Common Nighthawk Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Western Pearlshell Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee
	Conserve riparian habitats through active restoration and protection programs.	Maintain hydrologic function within watersheds to enhance water-holding capacity and maintain water-dependent native plant communities. Maintain vegetative structure in riparian areas including grass and herbaceous structure for pollinator nesting and cover needs.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Harlequin Duck

Objective	Strategy	Action(s)	Target SGCNs
		Control the introduction and spread of nonnative invasive species. Minimize human disturbance at bird nesting and bat roosting sites during the breeding season. Restore riparian vegetation through planting of native trees and shrubs. Use site-adapted native seed in riparian restoration to promote pollinator-preferred plant species. Identify and survey intact blocks of mature cottonwood forest, using agency or citizen scientists. Use voluntary cooperative efforts (i.e., Conservation Reserve Enhancement Program) and incentive programs to conserve, maintain and restore riparian habitats on private lands. Work with FS, BLM, and grazing permittees to reestablish healthy riparian vegetation through livestock management improvements. Participate in grazing allotment management plan reviews. Work with agencies and landowners to eliminate grazing practices that negatively impact riparian and aquatic habitats. See recommended actions under Improper livestock grazing management section below.	Sandhill Crane Common Nighthawk Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Western Pearlshell Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Improper livestock grazing management

Riparian areas have historically and continue to be of vital importance to the livestock industry due to their productivity and nexus with water. Livestock tend to congregate in riparian and wetland areas and use the vegetation much more intensively than the vegetation of adjacent uplands. Many of the broad floodplain riparian zones of the Challis Volcanics Section, formerly complex mosaics of deciduous forest, beaver marsh, and wet prairie, have been converted to simple agro-ecosystems of pastures and croplands. Within public lands grazing allotments, headwaters and tributaries have maintained relatively good riparian functionality. However, downstream lower gradient stream reaches have been considerably altered by the effects of forage removal, soil compaction, streambank trampling, channelization, and the introduction of invasive plants. The resulting losses of ecosystem structure and composition, particularly in riparian stands of cottonwood, willow, and aspen, decrease riparian habitat value for terrestrial wildlife (e.g., avian nesting) and aquatic biota.

Because riparian conditions are highly variable from site to site (e.g., hydrology, soils, climate, plant species), no single livestock grazing strategy will fit all situations. Ideally, livestock grazing management plans would be tailored to incorporate site-specific riparian habitat objectives. Livestock grazing systems that combine periods of use with nonuse such as deferred-rotation, rest-rotation, high intensity-low frequency, and short-duration, can be effective management tools to increase livestock productivity, achieve riparian habitat objectives, and maintain biological diversity.

Objective	Strategy	Action(s)	Target SGCNs
Maintain riverine health and riparian habitat quality in the presence of livestock grazing.	Develop and implement livestock grazing management regimes that are compatible with riparian conservation objectives.	Work with land management agencies, grazing permittees, and private landowners to determine site-specific riparian habitat objectives and tailor grazing management plans to help meet those objectives. Maintain proper stocking rates, season of use, and livestock distribution to protect riparian and adjacent upland habitats. Consider excluding livestock from riparian areas with high risk and poor recovery potential when there is no practical way to protect those riparian areas while grazing adjacent uplands. Locate livestock water gaps on short, straight, stable sections of streams with gently sloped banks. Manage riparian pastures as separate units in a rotation grazing system. Ensure adequate residual vegetative cover is left after grazing to ensure soil stabilization during high flows and to provide for seasonal cover and forage for wildlife. Maintain a diversity of riparian woodland age classes to provide a long-term source of mature trees, multiple vegetation layers, and snags. Develop water and shade in upland areas to help distribute livestock pressure from riparian areas. Ensure that stock tanks are equipped with escape ramps to prevent small birds and mammals from drowning. Improve livestock distribution and forage	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Harlequin Duck Sandhill Crane Common Nighthawk Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Western Pearlshell Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Objective	Strategy	Action(s)	Target SGCNs
		use by placing salt and mineral blocks away from riparian areas and adjacent uplands. Locate livestock handling facilities and collection points outside of riparian areas. Control invasive weeds to prevent colonization in sensitive riparian habitats.	

Changing precipitation & broad-scale hydrologic regimes

Anthropogenic climate change is altering stream hydrology and its associated biota in the Rocky Mountain West (Rieman and Isaak 2010). The timing of stream runoff steadily advanced during the latter half of the 20th century and now occurs 1 to 3 weeks earlier due largely to concurrent decreases in snowpack and earlier spring melt (Stewart et al. 2005). Climate models predict a trend towards a decrease in snow water equivalent and a general increase in winter precipitation in the form of rain, particularly at lower elevations. Generally drier conditions are anticipated for the southern Rocky Mountains, inclusive of the Challis Volcanics Section. Climate change could profoundly impact aquatic and riparian systems by increasing water temperatures, variability in flow timing and amount, and risk of extreme climate events such as floods, droughts, and wildfires. These stresses, in turn, may effect changes in the composition of the riparian plant community and its susceptibility to invasions by invasive plants. Projected changes may detrimentally impact aquatic and riparian species such as Chinook Salmon, Bull Trout, Wood River Sculpin, Lewis's Woodpecker, and aquatic invertebrates that are the focus of conservation efforts in this section.

Objective	Strategy	Action(s)	Target SGCNs
Increase capacity for water storage to combat the effects of climate change.	Restore American Beaver (*Castor canadensis*) as a climate adaptation strategy.	Develop plan to restore American Beaver to unoccupied drainages of Challis Volcanics Section. Identify key watersheds. Conduct outreach to engage stakeholders in key areas. Do site preparation work. Manage trapping seasons to ensure that beavers continue to contribute to healthy riparian systems in the Challis Volcanics Section. Translocate beaver from source. Monitor actions.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Harlequin Duck Sandhill Crane Common Nighthawk Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Western Pearlshell Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
	Implement irrigation efficiencies to	Purchase instream water rights or negotiate flow agreements with water users to enhance	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River

Objective	Strategy	Action(s)	Target SGCNs
	improve minimum streamflows.	instream flows. Consolidate irrigation ditches to increase water savings.	ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Harlequin Duck
Increase acreage of riparian habitat in protected status.	Develop policies, programs, and incentives to conserve highest quality riparian habitats.	Identify, assess, and prioritize largest and most contiguous patches of cottonwood forest and target for protection. Conserve highest quality cottonwood forests through land exchanges, conservation easements, or purchase.	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Western Pearlshell Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Development in floodplains

The Big Wood River valley has undergone extensive and rapid development in the last decade with most of this development taking place within and adjacent to riparian areas. This has resulted in the conversion of complex riparian ecosystems into manicured, park-like communities with simple understories dominated by nonnative plant species, some of which are invasive. Changes to water quality and increased use of pesticides can have detrimental effects on fish and aquatic invertebrates. Increased human activity in these riparian areas can reduce their suitability as breeding and foraging habitat for species such as Lewis's Woodpecker, Silver-haired Bat, Hoary Bat, and Common Nighthawk. The Big Wood River floodplain supports a significant portion of the late seral cottonwood galleries in this section. Development not only reduces the extent of existing galleries, but often inhibits recruitment of young cottonwoods to perpetuate the community. Increasing residential development is evident along the lower East Fork Salmon River and mainstem Salmon River, but at relatively modest levels.

Objective	Strategy	Action(s)	Target SGCNs
Minimize loss and degradation of riverine and riparian habitats due to anthropogenic activities.	Seek improved land and water management practices that significantly protect and enhance fish and wildlife habitat.	Work closely with county planning and zoning agencies and IDWR to prevent channel and riparian degradation and development in natural flood plains. Work with government agencies, private landowners and developers, and conservation groups to make protection and enhancement of fish and wildlife habitat and water quality a	Pacific Lamprey Steelhead (Snake River DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Sandhill Crane Common Nighthawk Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat

Objective	Strategy	Action(s)	Target SGCNs
		primary concern in land use decisions. Ensure restoration of habitat or mitigation of habitat loss whenever possible. Provide riparian vegetation objectives to land management agencies where grazing, development, or other activities have degraded riparian zones.	Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Western Pearlshell Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Species designation, planning & monitoring

Data is lacking on the current population status of and specific threats to several endemic, aquatic invertebrates in the Challis Volcanics Section. Conservation actions should therefore focus on improving our knowledge of all aspects of their ecology, distributions, and abundance, and clarifying the nature and extent of threats where appropriate. The species below could be effectively monitored through a multispecies monitoring approach.

Objective	Strategy	Action(s)	Target SGCNs
Determine status of SGCN aquatic invertebrates.	Conduct surveys and implement long-term monitoring programs for aquatic invertebrates.	Conduct surveys to determine distributions and habitat associations. Implement monitoring programs in occupied habitats. Characterize the scope and scale of threats to these species and develop appropriate conservation actions.	Western Pearlshell A Mayfly (*Ephemerella alleni*) A Mayfly (*Parameletus columbiae*) Tiny Forestfly A Caddisfly (*Eocosmoecus schmidi*) A Caddisfly (*Limnephilus challisa*) A Caddisfly (*Psychoglypha smithi*) A Caddisfly (*Sericostriata surdickae*)

Target: Springs & Groundwater-Dependent Wetlands

These mesic systems are scarce resources in the semiarid Challis Volcanics Section, and are generally regarded as biodiversity hot spots. These habitats are typically seeps, springs, and wet meadows occurring on gentle to steep slopes from low elevation floodplains to alpine forests. Meadows are often dominated by rhizomatous graminoids, such as sedges, grasses, and rushes; forbs are diverse and often lush. Unique examples of this type include the East Fork of the Salmon River and Little Wood River/High Five wetlands in Custer and Blaine counties, respectively.

The interface of these mesic systems with adjacent arid uplands creates the ultimate platform for biotic diversity. Springs, seeps, and wet meadows function as critical surface water sources linking uplands, riparian zones, and stream channels. They serve as important foraging areas for avian communities, particularly if associated with nearby riparian or forest habitats (Saab and Rich 1997). In mosaics with sagebrush steppe, springs, seeps, and wet meadows are a critical habitat component for several avian SGCN including Greater Sage-Grouse, Sandhill Crane (*Grus canadensis*), Long-billed Curlew, Burrowing Owl, and Short-eared Owl (Rich et al. 2005). The grasses present in mesic meadows are important in providing food and cover for birds directly, and in providing a substrate for a volume and diversity of insects which serve as additional food items. Connelly et al. (2004) recognize wet meadows as important late brood-rearing habitat for Sage-Grouse, characterized by relatively moist conditions with succulent forbs in or adjacent to sagebrush cover. As elements within forested communities, these systems provide important breeding habitats for amphibians. Because of the abundance of insects, these systems are important foraging sites for bats. These habitat types also provide critical fawning/calving areas for Mule Deer, Pronghorn, and Elk.

Corral Basin, Broken Wagon Creek © 2015 Beth Waterbury

Target Viability

Poor. These systems form relatively rare islands of robust herbaceous vegetation within large patches of more xeric systems such as sagebrush steppe, lower montane grasslands, and Dry Lower Montane–Foothill Forest. These sites are highly attractive to domestic livestock and wildlife as sources of palatable green forage and free water. A legacy of improper livestock grazing and, in some areas, associated spring developments to provide additional livestock water has altered the structure, composition, and function of these habitat types. Springs, seeps, and wet meadows are also attractive features to recreationists whose use may cause soil compaction and erosion, alter hydrologic processes, destroy vegetation, and facilitate the colonization of invasive weeds.

Prioritized Threats and Strategies for Springs & Groundwater-Dependent Wetlands

Very High rated threats to Springs & Groundwater-Dependent Wetlands in the Challis Volcanics

Changing precipitation & broad-scale hydrologic regimes

Precipitation is critical to the existence of springs, seeps, and groundwater-dependent wetlands, and the size, frequency, and duration of precipitation events are key factors influencing their recharge and persistence. Climate change is expected to decrease ground and surface water quantity and increase the duration and intensity of drought, and these systems will be a direct indicator of these changes. Decreased discharge would likely result in reduced flow from springs, lower base flow in feeder streams, and loss of groundwater-fed wetlands. Factors such as higher air temperatures and evaporation could further exacerbate drying trends. Springs, seeps, and meadows in poor or compromised ecological condition may lack the resiliency needed to persist under drought conditions. The implications for Greater Sage-Grouse and sympatric wildlife are concerning, as springs, seeps, and wet meadows within sagebrush-steppe habitats are often the only natural water sources across vast areas.

Objective	Strategy	Action(s)	Target SGCNs
Increase health and resiliency of springs, seeps, and groundwater-dependent wetlands to combat the effects of climate change.	Implement climate mitigation strategies to improve the resilience and resistance of springs, seeps, and groundwater-dependent wetlands.	Realign, restore, and renovate key mesic systems that are not functioning properly. Reduce or eliminate additive nonclimate ecosystem stresses (e.g., high road densities, water depletions, water pollution). Locate and collect locally-sourced seeds of desirable native plant species for revegetation and restoration efforts. Explore the use of locally produced biochar to sequester carbon, reduce erosion, and enhance soil productivity and water retention. Ensure that administrative and permitted activities on public lands do not contribute to the reduction of surface or groundwater that supplies springs, seeps, small ponds, and wetlands. Monitor ecological condition at springs, seeps, and groundwater-dependent wetlands for future evaluation of possible effects from climate change.	Western Toad Greater Sage-Grouse Sandhill Crane Long-billed Curlew Short-eared Owl Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Hunt's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

High rated threats to Springs & Groundwater-Dependent Wetlands in the Challis Volcanics

Improper livestock grazing

Livestock impacts to springs, seeps, and wet meadows are widespread in the Challis Volcanics Section. Livestock tend to congregate in riparian and wetland areas due to the availability of palatable forage and prolonged plant phenology, particularly during the hot grazing season. Direct impacts to vegetative composition and productivity result from herbage removal by foraging livestock. Where utilization is high for a sequence of years, the composition of the plant community may change as the more palatable species lose vigor and decrease throughout the site. This impact is heightened during drought periods. Trampling by livestock can penetrate, compact, and reconfigure soil into pugs and hummocks. Soil compaction restricts root growth, reduces soil water-holding capacity, reduces soil productivity, and contributes to water runoff and soil erosion (Fitch and Ambrose 2003).

Objective	Strategy	Action(s)	Target SGCNs
Manage livestock grazing to improve Springs & Groundwater-Dependent Wetlands systems.	Manage grazing intensity, frequency, and/or season of use to provide sufficient opportunity to encourage plant vigor, regrowth, and organic matter contribution to soils.	Work with land management agencies, grazing permittees, and private landowners to determine site-specific spring/seep/wetland objectives and tailor grazing management plans to help meet those objectives. Selectively fence livestock from springs, seeps, wetlands, and restoration sites and provide off-stream water sources. Limit duration of hot season use. Employ rest/rotation grazing systems. Build in support for an option of "grass reserve units." Manage the timing of grazing to minimize compaction of medium texture soils that are seasonally saturated, and the intensity of use to minimize churning of soils that are saturated. Seek and apply the best possible tools and techniques to influence the distribution of livestock. Ensure adequate residual vegetative cover is left after grazing to ensure soil stabilization during high flows and to provide for seasonal cover and forage for wildlife. Improve livestock distribution and forage use by placing salt and mineral blocks away from springs/seeps/wetlands and adjacent uplands. Locate livestock handling facilities and collection points outside of springs/ground-water dependent wetlands.	Western Toad Greater Sage-Grouse Sandhill Crane Long-billed Curlew Short-eared Owl Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Hunt's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Target: Lakes, Ponds & Reservoirs

Lakes, ponds, and reservoirs are infrequent in the Challis Volcanics Section (less than 1% of the land area), but they are of high importance from standpoints of fish and wildlife diversity, water storage, and recreation. These ecosystems include aquatic and wetland habitats in permanently to seasonally flooded natural lakes and deep ponds in topographic depressions. Examples in this section include Jimmy Smith Lake in the East Fork Salmon River drainage, Mosquito Flats Reservoir in the Salmon River Mountains, and Little Wood and Fish Creek reservoirs in the Little Wood River Valley. Also included in this system are numerous high mountain lakes occurring at upper montane, subalpine, and alpine elevations. They typically occur in glacial cirques and hanging valleys where bedrock or moraine deposits form the depression containing the lake or pond. The prevalence of rugged mountain topography in this section forms hundreds of high mountain lakes. These can occur as a series (e.g., paternoster lakes) and in hanging valleys where 1st order creeks connect many of the lakes.

Jimmy Smith Lake © 2015 Greg Painter

Lakes, ponds, and reservoirs of this section provide rare and strategic “stepping stone” refugia for waterbirds, waterfowl, and shorebirds migrating through the arid, intermountain expanse of the Pacific Flyway. Open water habitat and lacustrine fringe wetlands provide breeding and foraging habitat for many SGCN including Western Toad, Sandhill Crane, Common Nighthawk, and most SGCN bats. Many high mountain lakes harbor populations of introduced Cutthroat Trout (*Oncorhynchus clarkii*), Rainbow Trout, Brook Trout, and Arctic Grayling (*Thymallus arcticus*) to provide recreational opportunities for anglers. Little Wood Reservoir and Jimmy Smith Lake are regionally important as year-round fisheries.

Target Viability

Viability of these lacustrine habitats is considered good. Long-term viability of the larger lakes and reservoirs in this section is deemed stable due to priority maintenance of human beneficial uses (irrigation, recreation) that directly and indirectly conserve fish and wildlife habitats. Viability of high mountain lake systems is generally considered good due to low levels of human disturbance and protections afforded by Roadless Areas, Wilderness Study Areas, and the inherent remoteness and isolation of these lakes. Ecological and biological aspects of maintaining healthy amphibian populations and potential impacts to downstream native fish populations are considered in determining how alpine lakes are managed (IDFG 2013). The primary issues in this system are short- and long-term impacts of climate change.

Prioritized Threats and Strategies for Lakes, Ponds & Reservoirs

High rated threats to Lakes, Ponds & Reservoirs in the Challis Volcanics

Changing precipitation & broad-scale hydrologic regimes

Climate models predict a trend towards a decrease in snow-water equivalent and a general increase in winter precipitation in the form of rain, particularly at lower elevations. Generally drier conditions are anticipated for the southern Rocky Mountains, inclusive of the Challis Volcanics Section. Snowpack amount strongly affects the hydrologic budget of lakes, ponds, and reservoirs in this section, as well as the timing of ice-off. Declines in snowpack and warming temperatures may reduce the volume and area of open water habitat used by fish and wildlife. Predicted changes in ambient air temperatures will subsequently affect the thermal characteristics of Lakes, Ponds & Reservoirs. Resulting warmer water temperatures could lead to enhanced nutrient inputs and affect water quality by promoting algal blooms and impairing food web functions and seasonal patterns of productivity.

Objective	Strategy	Action(s)	Target SGCNs
Increase health and resiliency of Lakes, Ponds & Reservoirs to combat the effects of climate change.	Implement climate mitigation strategies to improve the resilience and resistance of Lakes, Ponds & Reservoirs.	Research options for managing this habitat under forecasted climate models. Work with other relevant agencies, organizations, and user groups across the Challis Volcanics Section to address climate change mitigation for Lakes, Ponds & Reservoirs under forecasted conditions (i.e., drought) to include development of proactive management alternatives implementable at the local project level. Reduce or eliminate additive nonclimate ecosystem stresses (e.g., recreational impacts, water inefficiencies, water pollution). Ensure that administrative and permitted activities on public lands do not contribute to the reduction of surface or groundwater that supplies Lakes, Ponds & Reservoirs. Monitor ecological condition at Lakes, Ponds & Reservoirs for future evaluation of possible effects from climate change. Conduct microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate induced stressors. Support efforts to increase public awareness of climate change impacts to local landscapes and wildlife dependent on them.	Western Toad Common Nighthawk Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis

Target: Bat Assemblage

The Challis Volcanics' vast, natural landscape provides a diversity of suitable habitats for bats. Extensive areas of mixed conifer forest support tree-roosting bats, including Silver-haired and Hoary bats. The section's complex geomorphology gives rise to an abundance of cliffs and rock crevice habitat features available for roosts, maternity colonies, and perhaps hibernacula. The region's long history of mining for silver, lead, copper, and other ores produced a legacy of inactive and abandoned mines creating surrogate cave habitat suitable for winter hibernacula. Knowledge of bats in the Challis Volcanics is incomplete and fragmentary. Information is needed on species distribution, abundance, and habitat associations to effectively develop and implement conservation strategies. What little is known of bats in this section has been gleaned from assessments of abandoned mines on FS and BLM lands to detect and mitigate public health and safety hazards. In 2015, BLM and IDFG partnered to conduct a landscape-scale bat survey of BLM lands within the Challis Volcanics and Beaverhead Mountains sections to fill some of these data gaps. Survey results will provide preliminary information on distribution, activity centers, and habitat associations of bats in this section, but are also expected to highlight further information needs vital to developing section-specific conservation strategies and actions.

Hoary Bat © 2014 Daniel Neal

Target Viability

Insufficient data to assess the viability of the Bat Assemblage in this section.

Prioritized Threats and Strategies for Challis Volcanics Bat Assemblage

Species designation, planning & monitoring

Although relevant information can be extrapolated from other regions to a certain extent, it is essential to understand the conservation status of bats in this section and their vulnerability to both local and pervasive rangewide threats. Surveys and monitoring are needed to locate hibernacula, assess local levels of disturbance or destruction of roosting habitats, identify seasonal movement patterns and migration corridors, and assess risks associated with white-nose syndrome (WNS). Public education on the importance and benefits of bats is needed to counter misconceptions that create challenges for the conservation of bats. Expanded collaboration across jurisdictional boundaries is increasingly important to the persistence of migratory species such as the Silver-haired Bat and Hoary Bat.

Objective	Strategy	Action(s)	Target SGCNs
Conduct research, inventory, and monitoring to	Determine species occurrence, distribution, seasonal	Conduct targeted surveys to locate key roosting sites such as caves, mines, snags, and bridges to determine species use, seasonal use, and significance to Idaho populations.	Silver-haired Bat Hoary Bat Townsend's Big-eared Bat Western Small-

Objective	Strategy	Action(s)	Target SGCNs
collect basic biological information on bats.	patterns, and general habitat associations for bat species in this section.	Participate in the North American Bat Monitoring Program to monitor trends in bat populations at local, state, regional and continental scales. Conduct hibernacula monitoring and surveillance for WNS, adhering to guidance presented in WNS decontamination protocols. Identify potential foraging areas, water resources, and migration corridors and conduct surveys to verify their seasonal use by bats. Refine distribution maps to reflect the most current information, and to identify areas with information gaps to be targeted for surveys. Develop and evaluate new population-monitoring techniques. Identify potential threats and monitor impacts to populations. Identify and define species-specific population units relevant for conservation planning and research. Identify research projects and pursue needed funding to answer specific questions about bat biology, potential threats, or habitat management strategies. Leverage resources and coordinate efforts among entities conducting bat survey, monitoring, research, and management activities to share data and provide efficiencies.	footed Myotis Little Brown Myotis
Minimize loss and degradation of bat habitat.	Develop management standards and guidelines for bats and include them in new and existing plans that direct habitat and species management activities.	Develop best management practices for bats and provide them to land management agencies, tribes, nonprofit organizations, and private landowners in user-friendly formats that can be distributed on the web or in printed informational pamphlets. Specifically develop best management practices for forest bats including firewood cutting, fuels reduction treatments, salvage logging of burned forests, treatment of insect infestations, commercial timber management, and recreational developments. Identify all important natural and artificial roosts and prioritize for protection the sites that support the largest or most diverse populations and sites that support SGCN. Protect, restore, maintain, and monitor key flight and migratory corridors. Protect, restore, maintain, and monitor open water drinking sites, especially in arid areas.	Silver-haired Bat Hoary Bat Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
		Monitor the effectiveness of management actions implemented for bat conservation, including bat gates, artificial roosts, and other restoration and protection efforts.	
Reverse undue negative social misconceptions of bats that pose a serious impediment to bat conservation.	Establish and quantify the economic and social impacts of bats in Idaho.	Conduct research to quantify the economic values of bats in Idaho, with emphasis on consumption of crop, garden, and forest pests. Coordinate with local health officials to develop educational programs regarding verified disease risks associated with bats.	Silver-haired Bat Hoary Bat Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis
	Develop and distribute educational materials to key audiences.	Determine public attitudes and understanding of bats and bat/diseases relationships, to determine how best to direct educational efforts. Produce information packets that describe the best management practices for conserving bats, targeted at foresters, ranchers, public health officials, and the public interested in backyard wildlife. Develop and lead bat conservation and education workshops for teachers, biologists, and other specialized groups. Involve the public in citizen science projects such as acoustic monitoring and roost exit counts to help foster bat advocates among the public.	Silver-haired Bat Hoary Bat Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis

Target: Wolverine

Wolverine kits at Snow Lake, White Cloud Peaks © 2012 Bryan Tilly

The Wolverine is a large, rare mustelid that occupies remote subalpine and alpine habitats of this section. The population in this section is part of the Salmon–Selway core population occupying the central Idaho mountains complex (IDFG 2014). Primary habitats in the Challis Volcanics correspond to public lands managed by Salmon–Challis, Sawtooth, and Payette National Forests. With the recent designation of new Wilderness Areas in the Boulder and White Cloud mountains, most of the primary wolverine habitat is permanently protected. Other primary habitats are managed as Roadless Areas or for multiple use. Dozens of historic and contemporary wolverine records exist for this section, and verified observations (e.g., specimens, DNA samples, diagnostic photos, captures) are regularly reported for all mountain ranges in this section.

No "Tier I" Wolverine Priority Conservation Areas (PCA) are designated for this section (IDFG 2014). Tier I denotes PCAs with the highest conservation need based on potential wolverine use, cumulative threats, and amount of unprotected habitat. Most PCAs in this section are ranked "Tier II" based on lower levels of cumulative threats. A few PCAs within the Frank Church River of No Return Wilderness ranked "Tier III," reflecting high proportion of PCA areas in permanent land protection and low cumulative threats. The north-south axis of this section encompasses a continuum in Wolverine habitat suitability, with the north half being within the core of the Salmon-Selway Ecosystem and the southern end being at its periphery. Wolverine populations at this southern extent of the Challis Volcanics may be particularly vulnerable to climate-driven reductions in size and connectivity of habitat islands (Aubry et al. 2007, Schwartz et al. 2009, Copeland et al. 2010).

Target Viability

Fair. Most wolverine habitat in the Challis Volcanics Section can be characterized as core, contiguous habitat, the southern end being the exception. Here, habitat occurs in disjunct "sky island" patches on the periphery of core populations in the Salmon-Selway Ecosystem and the species' overall distribution in North America. Climate warming and shrinking snowcover may amplify the fragmented nature of wolverine habitat in this section resulting in diminished connectivity and a subpopulation more vulnerable to extirpation. The Smoky, Pioneer, and White Knob mountains contain extensive areas of front-country access for licensed trappers and potential risk of nontarget wolverine capture. Dispersed snow sports recreation and road densities are considered moderate level threats in this section (IDFG 2014).

Prioritized Threats and Strategies for Wolverine

High rated threats to Wolverine in the Challis Volcanics

Connectivity, small populations, & extirpation risk

Wolverine populations at the southern end of their current US range (i.e., Challis Volcanics Section) exhibit low effective population sizes (number of individuals in a population who contribute offspring to the next generation), restricted gene flow, and perhaps some degree of population fragmentation. Given populations are small and movement between populations is limited, populations are more susceptible to inbreeding. Genetic exchange with the larger Canadian/Alaskan population is deemed necessary to ensure genetic viability in the long-term. Connectivity between wolverine habitats and subpopulations is critically important to avert further isolation and localized extirpation risk. Climate pattern uncertainty further compounds the challenges to wolverine demography. Climate models tested by McKelvey et al. (2011) predicted that large (>1,000 km^2) contiguous areas of wolverine habitat will likely persist into the 21st century (e.g., northwestern Montana, along the Montana-Idaho border, Greater Yellowstone Area). However, these models predicted that central Idaho may be lost as a population source given highly fragmented spring snow cover and associated loss of connectivity. Consequent loss of habitat suitability (i.e., spring snow cover, warming temperatures) may result in extirpation of wolverines from a significant portion of currently occupied range (Copeland et al. 2010, US Fish and Wildlife Service 2010).

Objective	Strategy	Action(s)	Target SGCNs
Facilitate connectivity among wolverine subpopulations to enhance genetic exchange and population demographics.	Identify and characterize movement corridors important for maintaining genetic exchange and diversity among wolverine subpopulations.	Refine and aggregate wolverine movement corridor and genetic exchange models to predict existing movement pathways. Contribute wolverine genetic samples to connectivity model analysis.	Wolverine
Conserve habitat to support viable wolverine populations.	Secure appropriate conservation status on priority movement corridors to achieve an ecologically connected network of public/private conservation areas to facilitate migrations, range shifts, and other transitions caused by climate change.	Conserve corridors and transitional habitats between ecosystem types through both traditional and nontraditional mechanisms (e.g., land exchanges, conservation easement tax incentives, Land and Water Conservation Fund) to enhance habitat values and maintain working landscapes under climate change. Identify, assess, and prioritize critical connectivity gaps and needs across current conservation areas, including areas likely to serve as refugia in a changing climate. Assist private landowners with information and resources to conserve wildlife corridors across their properties. Support and strengthen conservation programs (e.g., Farm Bill, Partner for Wildlife, etc.) that provide resources for purposes of conserving wolverine habitat and connectivity. Provide wolverine and other wildlife data and maps to local governments, land managers, and transportation departments to avoid, minimize, or mitigate impacts from new infrastructure developments on wolverine habitats. Continue the partnership with Idaho Transportation Department (ITD) and Federal Highway Administration (FHWA) to develop and monitor traffic volume, wildlife-vehicle collisions, and other metrics needed to identify connectivity and high risk areas for road mortality or road crossing avoidance. Work with ITD to design connectivity and crossing mitigation consistent with FHWA Handbook for Design and Evaluation of Wildlife Crossing Structures in North America. Work with ITD to avoid and reduce barriers or impediments to connectivity and crossings.	Wolverine

Objective	Strategy	Action(s)	Target SGCNs
Collaborate across multiple jurisdictions and spatial scales to achieve wolverine conservation.	Facilitate local conservation actions tiered to statewide objectives (IDFG 2014).	As warranted, establish and support local working groups to advise conservation activities in Wolverine Priority Conservation Areas.	Wolverine
Support the development and use of inventory and monitoring systems to assess wolverine vulnerability to climate change.	Support, coordinate, and where necessary develop inventory, monitoring, observation, and information systems at multiple scales to detect and describe potential climate impacts on wolverines.	Develop, refine, and implement monitoring protocols that provide key information needed for managing and conserving wolverine and alpine/subalpine communities in a changing climate. Work with researchers to develop regionally downscaled Global Climate Models (using the most current models and emission scenarios) and associated climate indicators (e.g., snow data) to support a wolverine vulnerability assessment. Produce regional to subregional projections of future climate change impacts on physical, chemical, and biological conditions for Idaho ecosystems, particularly alpine and subalpine communities.	Wolverine

Target: Bighorn Sheep

Bighorn Sheep is an iconic species of high cultural, hunting, and watchable wildlife value to Native American Tribes and the public at large. The Challis Volcanics, along with the Idaho Batholith, supports the only native Bighorn Sheep remaining in Idaho. These native Rocky Mountain Bighorn Sheep were never extirpated from the Salmon River drainage and represent the largest populations in the state (IDFG 2010). Bighorn Sheep in the Challis Volcanics Section are patchily distributed from the Middle Fork Salmon drainage in the north to the Pioneer Mountains in the south. Habitat in the Middle Fork Salmon is typified by rugged canyons and dry, coniferous forest-grassland habitats with low road densities. From the Salmon River Mountains south, habitat grades from sagebrush steppe at lower elevations through dry, coniferous forest-grasslands to alpine at the highest elevations.

Rocky Mountain Bighorn Sheep © 2010 Paul Tessier

Bighorn Sheep populations are managed in Idaho with a separate species management plan (IDFG Bighorn Sheep Management Plan 2010). Sheep occurrence In the Challis Volcanics is defined within 4 contiguous Population Management Units (PMUs), described in detail in the Bighorn Sheep Management Plan (2010): Middle Fork Salmon River, Middle Main Salmon River, East Fork Salmon River, and Pioneers.

The Middle Fork PMU covers the Middle Fork Salmon River drainage including Big Creek and has the largest population of sheep in the state at about 500-550 individuals. Fire has played a substantial habitat management role in the PMU, burning 800,000 acres since 2000 (IDFG 2010). Although this has certainly been beneficial to sheep populations, it has also resulted in increased noxious weed invasion. The population appears to still be disease-limited as evidenced by low lamb:ewe ratios. The management direction is to increase population levels by improving habitat and controlling noxious weeds (IDFG 2010).

The Middle Main Salmon River PMU encompasses the tributaries on the west side of the Salmon River between Clayton and Salmon. The population appears to be stable at right around 200 animals. Lamb:ewe ratios rebounded quickly after the early 1990s die-off and remain at about 30 lambs:100 ewes. Because of their proximity to a major highway and agricultural land, these sheep are at risk of disease transmission from domestic farm flocks and increased mortality from vehicle collisions. As with the middle Fork PMU, the management direction is to increase the population by habitat improvement, noxious weed control, and maintaining separation with domestic sheep and goats.

The East Fork PMU contains the entire East Fork Salmon River drainage as well as a small portion of the tributaries of the upper Salmon River southeast of Stanley. The population reached almost 200 animals in the late 1980s before declining 50% in the early 1990s, much the same as other PMUs. The lamb:ewe ratio declined to around 10 and has not increased. The management direction for this PMU is to increase population levels and will be the focus of increased research effort to determine limiting factors to population growth.

The Pioneers PMU covers much of the upper Big Lost River drainage. Although it has been identified as a PMU, it does not have a persistent bighorn population and is not managed to maintain a population. Bighorn Sheep, mainly young rams, are observed here periodically and are probably dispersing from the Lost River population or the East Fork population. Management direction is to work to maintain separation of bighorns and domestic sheep and prevent bighorns that have contacted domestic sheep and goats from returning to their source populations.

Target Viability

Bighorn Sheep are distributed widely across the Challis Volcanics and are in good condition in terms of population structure, disease-free status, and habitat quality. The Middle Fork PMU is a population stronghold and is relatively well protected from disease transmission and further noxious weed infestations. The Middle Main PMU also has a stable population, but may be at a higher risk from disease transmission from adjacent domestic farm flocks. The East Fork PMU may be vulnerable to disease transmission because of dispersing sheep returning to the population from the south where there are several domestic sheep allotments. This PMU may benefit the most from habitat manipulations.

Prioritized Threats and Strategies for Bighorn Sheep

Very High rated threats to Bighorn Sheep in the Challis Volcanics

Disease transmission

Bighorn Sheep are vulnerable to disease transmission from domestic sheep and goats throughout most of their range in the Challis Volcanics. Small farm flocks pose a risk primarily where Bighorn Sheep winter range is adjacent to private property. FS domestic sheep allotments that border or overlap Bighorn Sheep distribution could pose an increased threat of interaction between Bighorn Sheep and domestic sheep and goats. Another possible source of disease transmission to Bighorn Sheep could be incidental contacts with pack goats on backcountry trails. All 4 PMUs have backcountry trails within their boundaries.

Objective	Strategy	Action(s)	Target SGCNs
Work to reduce the effects of disease on Bighorn Sheep populations.	Advocate and work towards maintaining spatial and temporal separation between Bighorn Sheep and domestic sheep and goats.	Work with willing domestic sheep permittees, FS, and BLM to identify and implement Best Management Practices (e.g., limit estrus ewes near wild sheep populations, develop effective grazing patterns, track and report missing livestock) to maintain separation between Bighorn Sheep and domestic sheep and goats. Work with FS, BLM, and other land management agencies to identify appropriate alternative management options. Capture or euthanize foraying wild sheep after contact with domestic sheep or goats (IDFG 2010). Capture or euthanize feral livestock when contact with Bighorn Sheep is suspected or confirmed (IDFG 2010). Encourage double-fencing where appropriate and practical (WAFWA 2007; IDFG and ISDA 2008). Work with ranchers to seasonally coordinate grazing patterns (WAFWA 2007; IDFG and ISDA 2008).	Bighorn Sheep
Improve education and outreach efforts regarding risks associated with contact between Bighorn Sheep and domestic sheep and goats.	Collaborate with ISDA and Idaho Woolgrowers to develop education and outreach strategies.	Work with a key representative(s) from the livestock production sector to act as a mediator between agencies and producers to open the door to better communications between both groups on science and management issues. Seek out and speak to organized pack goat groups about risk of disease transmission. Develop signs for trailheads with information on avoiding contact with wild Bighorn Sheep.	Bighorn Sheep

High rated threats to Bighorn Sheep in the Challis Volcanics

Motorized recreation

There is a lack of research into the specific effects of OHV use on Bighorn Sheep behavior and habitat use (IDFG 2010). However, the large body of research on other ungulate species indicates that OHV disturbance can have significant impacts on behavior and habitat use (Wisdom et al. 2004). Also, OHVs allow much greater access to the remote places where Bighorn Sheep live. This may result in increased disturbance and displacement, higher potential for illegal harvest, and lower herd productivity. Disturbance from OHVs is less likely for the Middle Fork PMU since most of it is within designated wilderness or roadless habitat. On the other hand, Middle Main and East Fork PMUs are much more likely to be impacted by both legal and illegal OHV use.

Objective	Strategy	Action(s)	Target SGCNs
Manage motorized recreation. The Department will work with other land and resource management agencies to ensure that critical areas of habitat are protected from inadvertent disturbance associated with recreational activities such as hiking, OHV use, low-altitude aerial activity, rock climbing, or trail riding (IDFG 2010).	Enforce Travel Management Plans. The Department will support investigations into the effects of different types and levels of human activities on Bighorn Sheep (IDFG 2010). In areas where recreation is considered to be a factor limiting the success of a Bighorn Sheep population, IDFG will work with land managers and the public to mitigate the effects of disturbance associated with recreation (IDFG 2010).	Provide Law Enforcement Officers (LEO) and Conservation Officers maps and locations of potential conflicts between wild sheep and motorized recreation. Increase BLM and FS LEO patrols and IDFG patrols in areas where Bighorn Sheep are vulnerable to motorized disturbance. Use remote camera technology to monitor potential conflict areas.	Bighorn Sheep
Increase awareness about OHV impacts on Bighorn Sheep.	Provide education to OHV users.	Develop pamphlet outlining potential impacts from motorized disturbance and tips for minimizing disturbance. Post signs at specific roads/trailheads urging users to minimize disturbance.	Bighorn Sheep

Upland nonnative invasive plants

The semiarid nature of some Bighorn Sheep habitat in all 4 PMUs makes it susceptible to noxious weed invasion, particularly after wildfires or prescribed fires. Cheatgrass, knapweed, and rush skeleton-weed could all affect winter range productivity. Middle Fork PMU has been most impacted by wildfire in the past 15 years and some lower elevation dry sites have been infested with noxious weeds. The Middle Main and East Fork PMUs have had much less wildfire activity, but have higher road densities that allow noxious weeds to gain a foothold. Consequently, most current infestations are limited to road corridors.

Objective	Strategy	Action(s)	Target SGCNs
Control or eradicate noxious weeds.	Work with FS, BLM, and other partners to control or reduce noxious weed occurrence (IDFG 2010).	Continue to participate in County Cooperative Weed Management Area collaboratives. Map and identify noxious weed patches and provide to the appropriate land manager. Provide technical assistance and encouragement to land managers for post-fire habitat restoration activities in key wild sheep habitats. Provide native grass and shrub seed recommendations to land managers.	Bighorn Sheep

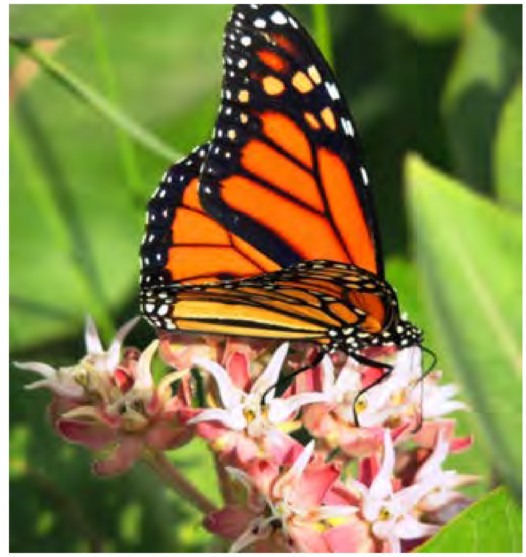
Altered fire regimes

Natural fire intervals have been altered throughout Bighorn Sheep range in the Challis Volcanics. The Middle Fork PMU has experienced the most natural fire history because it is in remote terrain with little or no human population or structures. The East Fork PMU has some areas, mainly subalpine or alpine summer habitat, where natural fire starts are allowed to burn. Lower elevation winter range is nearby ranch and residential structures so any natural fire starts in these areas are subject to aggressive suppression. Similarly, most of the Middle Main PMU is subject to some level of suppression activity. Many years of fire suppression has resulted in lowered productivity of wild sheep range, primarily because of conifer encroachment and subsequent loss of mountain shrub/grassland communities (Dibb and Quinn 2008).

Objective	Strategy	Action(s)	Target SGCNs
Improve quality and quantity of Bighorn Sheep habitat (IDFG 2010).	Where succession and conifer encroachment have significantly affected Bighorn Sheep habitats, IDFG will work closely with land managers and encourage them to adopt fire and habitat management practices to benefit Bighorn Sheep (IDFG 2010).	Identify and map conifer encroachment on wild sheep winter range where habitat quantity and quality are compromised. Provide technical assistance and encouragement to land managers for habitat improvement projects. Provide native grass and shrub seed recommendations to land managers.	Bighorn Sheep

Target: Pollinators

Pollinators contribute substantially to the food production systems of Idaho, to the economic vitality of the agricultural sector, and to the biodiversity in the ecosystems they inhabit. Pollinators are keystone species in most terrestrial ecosystems, playing a critical role in maintaining natural plant communities and ensuring production of seeds in most flowering plants. Pollinators also comprise a major prey item for many birds and mammals. The viability of pollinator populations has been impacted over recent decades from habitat loss, pesticide use, and introduced diseases. In recognition of widespread pollinator declines, President Obama issued a memorandum in June 2014 directing executive departments and agencies to create a federal strategy to promote the health of pollinators. This memorandum has elevated conservation concern, fostered partnerships, and generated financial resources to promote pollinator conservation across the US.



Monarch nectaring on showy milkweed © 2014 Beth Waterbury

Little is known about pollinator assemblages in the Challis Volcanics Section. Although there are no Monarch records for this section, showy milkweed (*Asclepias speciosa*) populations have been documented in the Carey and Challis vicinities (Xerces Society 2015), suggesting availability of Monarch breeding habitat. An additional 5 SGCN bee species may occur in this section based on estimated ranges and presence of suitable habitats (Table 6.2). Surveys and monitoring are needed to assess their current status, distribution, and potential threats in this section.

Target Viability

Good. Pollinator viability is presumed to be secure based on large spatial extent and relatively good ecological condition of native plant communities in surrounding public lands. A large segment of agricultural land in the Big Wood, Little Wood, East Fork Salmon, and Round Valley (Challis) drainages consist of hayfields planted to mixes selected for beef-cattle production. Hayfields are often planted to cultivar grasses, legumes (i.e., clovers, alfalfa), and residual native grasses, which attract a diversity of insects and pollinators. Use of glyphosate and neonicotinoid pesticides, implicated in declining bee populations, is typically low for pasture and hay crops (Thelin and Stone 2013). However, use of these pesticides could increase with conversion of forage lands to more intensively cultivated crops such as wheat, alfalfa, and soybeans.

Prioritized Threats and Strategies for Pollinators

Species designation, planning & monitoring

Gathering baseline data on pollinator populations is essential to assess their current distribution and status, identify potential threats, and develop effective management and conservation actions. As such, we identify needs for 6 species in the table below and identify appropriate actions.

Objective	**Strategy**	**Action(s)**	**Target SGCNs**
Determine status of target pollinators potentially occurring in the Challis Volcanics Section.	Conduct surveys to detect occurrence of target pollinators.	Conduct pan trap and netting surveys for bees in spring/summer/fall depending on bee species preference for certain genera of plants. Conduct hand net surveys for Monarch adults (May to August) and visual surveys for larvae in June/July/August.	A Mason Bee (*Hoplitis producta*) A Miner Bee (*Andrena aculeata*) Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Challis Volcanics Section Team

An initial version of the Challis Volcanics Section project plan was completed for the 2005 Idaho State Wildlife Action Plan (formerly Comprehensive Wildlife Conservation Strategy). A small working group developed an initial draft of the Section Plan (Miradi v. 0.12), which was then reviewed by a wider group of partners and stakeholders during a 2-day workshop held at the Idaho Department of Fish and Game Headquarters office, Boise, Idaho in January 2015 (this input was captured in Miradi v. 0.14). Since then, we have continued to work with key internal and external stakeholders to improve upon the plan. Individuals, agencies, and organizations involved in this plan are listed in Table 6.3.

Table 6.3 Individuals, agencies, and organizations involved in developing this plan [a]

First name	Last name	Affiliation
Rita	Dixon* [b]	Idaho Department of Fish and Game, Headquarters
Beth	Waterbury*	Idaho Department of Fish and Game, Salmon Region
Bret	Stansberry*	Idaho Department of Fish and Game, Salmon Region
Jody	Brostrom	US Fish and Wildlife Service
Chad	Fealko	NOAA Fisheries
Bobbi	Filbert	US Forest Service, Sawtooth National Forest
Sonya	Knetter	Idaho Department of Fish and Game, Headquarters
Chris	Murphy	Idaho Department of Fish and Game, Headquarters
Colleen	Moulton	Idaho Department of Fish and Game, Headquarters
Greg	Painter	Idaho Department of Fish and Game, Salmon Region
Gary	Power	Salmon Valley Stewardship, Lemhi Forest Restoration Group, former Idaho Fish and Game Commissioner, retired IDFG Salmon Region Supervisor
Nick	Salafsky	Foundations of Success
Angie	Schmidt	Idaho Department of Fish and Game, Headquarters
Greg	Schoby	Idaho Department of Fish and Game, Salmon Region
Jessie	Shallow	Idaho Department of Fish and Game, Salmon Region
Leona	Svancara	Idaho Department of Fish and Game, Headquarters
Ross	Winton*	Idaho Department of Fish and Game, Magic Valley Region
Bart	Zwetzig	Bureau of Land Management, Challis Field Office

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

7. Blue Mountains Section

Section Description

The Blue Mountains Section is part of the Middle Rockies–Blue Mountains Ecoregion. The Idaho portion of the Blue Mountains, the subject of this review, comprises west-central Idaho from the lower Payette River valley in the south, north to the Lower Salmon River, west from the Snake River and Hells Canyon at state line to include portions of the Little Salmon River, Little Weiser River, and Squaw Creek drainages (Figure 7.1, 7.2). The Blue Mountains spans a 225 to 3,100 m (750 to 9,400 ft) elevation range. This is an arid to semiarid region that generally receives 23 to 46 cm (9 to 18 in) of precipitation annually at lower elevations. Higher elevations receive 43 to 254 cm (17 to 100 in) annually, which falls predominantly during the winter and often as snow.

Middle Fork Brownlee Creek Cecil D Andrus Wildlife Management Area, Washington County, Idaho © 2004 Anna Owsiak

The Blue Mountains Section is predominantly rural and devoted to agricultural production of livestock and crops for livestock production. Agriculture is generally irrigated with either flood or sprinkler irrigation, mostly supplied by diversion from the Snake, Little Salmon, Weiser, and Payette rivers. Major hydroelectric and water storage reservoirs include Brownlee, Oxbow, and Hells Canyon on the Snake River. Urban and suburban development is associated primarily with distinct population centers within river valleys, and the rural–urban interface is expanding. The section's aridity has given rise to water management programs, including water storage, delivery, and regulation of usage to support agriculture as well as urban and suburban areas.

The section provides numerous outdoor recreational opportunities for hunting, angling, trail riding, hiking, camping, birdwatching, and river rafting. Recreation and agriculture are the dominant land uses in the region. The Hells Canyon National Recreation Area and Hells Canyon Wilderness lie within the west central and northwest portion of this section. Sections of the Snake River within and outside of the National Recreation Area are designated as both wild and scenic. Approximately 47% of section lands are under federal ownership and management by the US Forest Service (FS) and Bureau of Land Management (US) (BLM).

A tradition of cattle and sheep ranching exists in the Blue Mountains, and farming and ranching remain major land uses. Agriculture is primarily small family operations with generational ties to the lands. Livestock grazing occurs on open range on a mix of private, state, and federal lands.

This section historically supported extensive logging and small gold and silver mines. Today, a limited, but still commercially viable logging and mineral extraction industry exists for both these raw materials.

The Blue Mountains contains important intact canyon grassland and forest habitats for species including Bighorn Sheep (*Ovis canadensis*) and Northern Idaho Ground Squirrel (*Urocitellus brunneus*). The section's sagebrush steppe habitat has been highly altered by the biological invasion of nonnative plants, particularly invasive annual grasses introduced from the Eurasian Steppe biome such as cheatgrass (*Bromus tectorum* L.) and medusahead (*Taeniatherum caput-medusae* [L.] Nevski). These plants affect many aspects of sagebrush steppe ecology, but perhaps most importantly, the presence of invasive annual grasses alters fire regimes. In some areas, increased intensity and frequency of wildfires has resulted in conversion from shrub-dominated habitats to nonnative annual grasslands, which has reduced habitat value to shrubsteppe obligate species. In some areas, the altered habitat has favored species that benefit from less shrub cover, including early-seral and grassland-dependent species. This has been particularly true at lower elevation sites formerly dominated by Wyoming big sagebrush (*Artemisia tridentata* Nutt. subsp. *wyomingensis* Beetle & Young) and bitterbrush (*Purshia tridentata*, Beetle & Young). However, some areas remain dominated by native vegetation and provide important habitat for species such as Sharp-tailed Grouse (*Tympanuchus phasianellus*), Long-billed Curlew (*Numenius americanus*), and Southern Idaho Ground Squirrel (*U. endemicus*).

Aquatic and wetland habitat is important for most wildlife in this arid landscape and is obligatory for fish, aquatic invertebrates, and amphibious mammals and amphibians. In-stream habitat and riparian habitat are usually intrinsically linked in terms of their condition and value as fish and wildlife habitat. Wetlands and riparian habitat tend to have the highest vegetation productivity within the landscape and are key habitat types for foraging herbivores (invertebrates to large ungulates). Dense cover associated with wetland and riparian habitat is also favorable for many types of wildlife. In addition, high insect abundance is associated with these areas of greater primary productivity, and wetland and riparian habitat is essential for many insectivorous animals, notably bats and neotropical migratory birds.

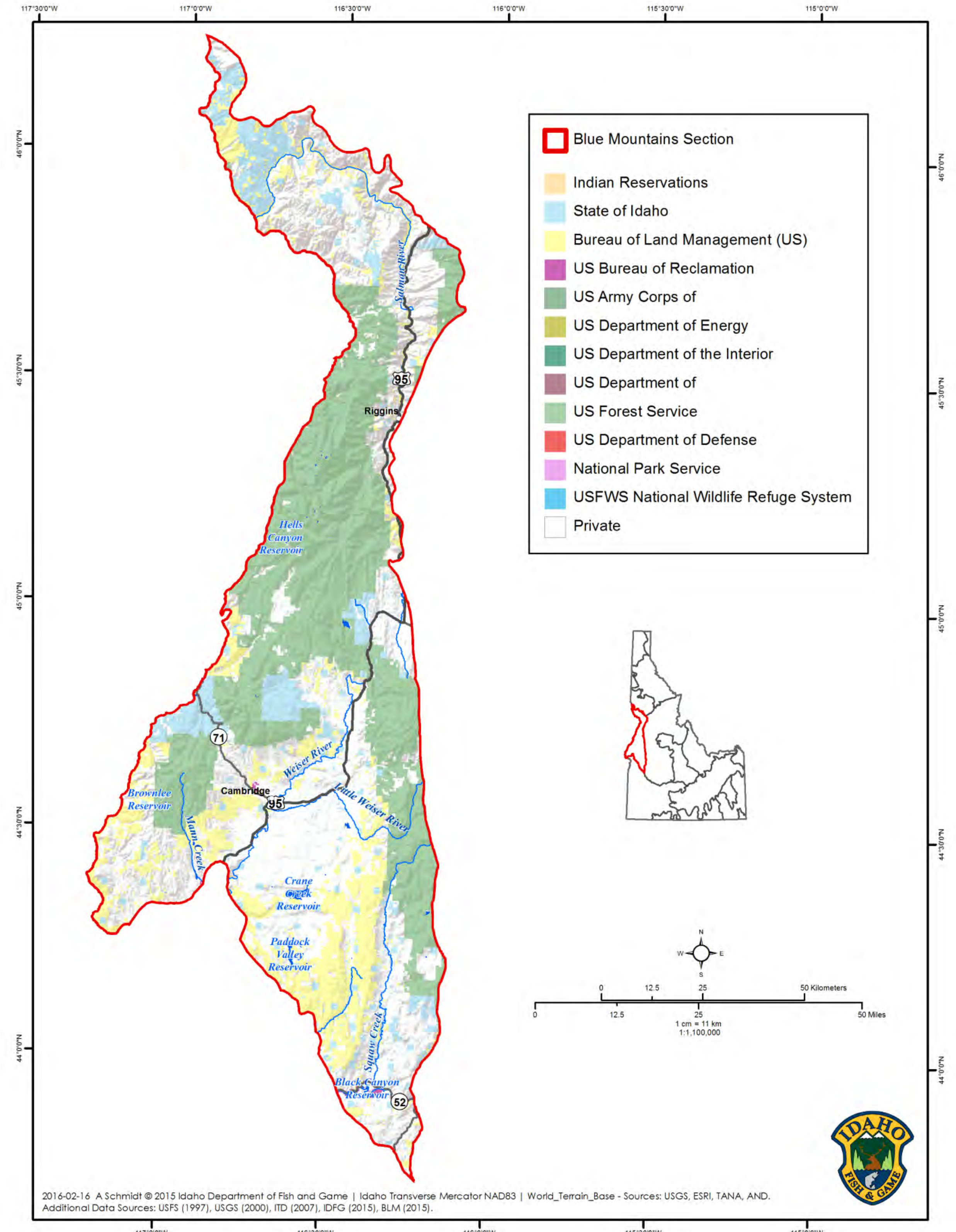


Fig. 7.1 Map of Blue Mountains surface management

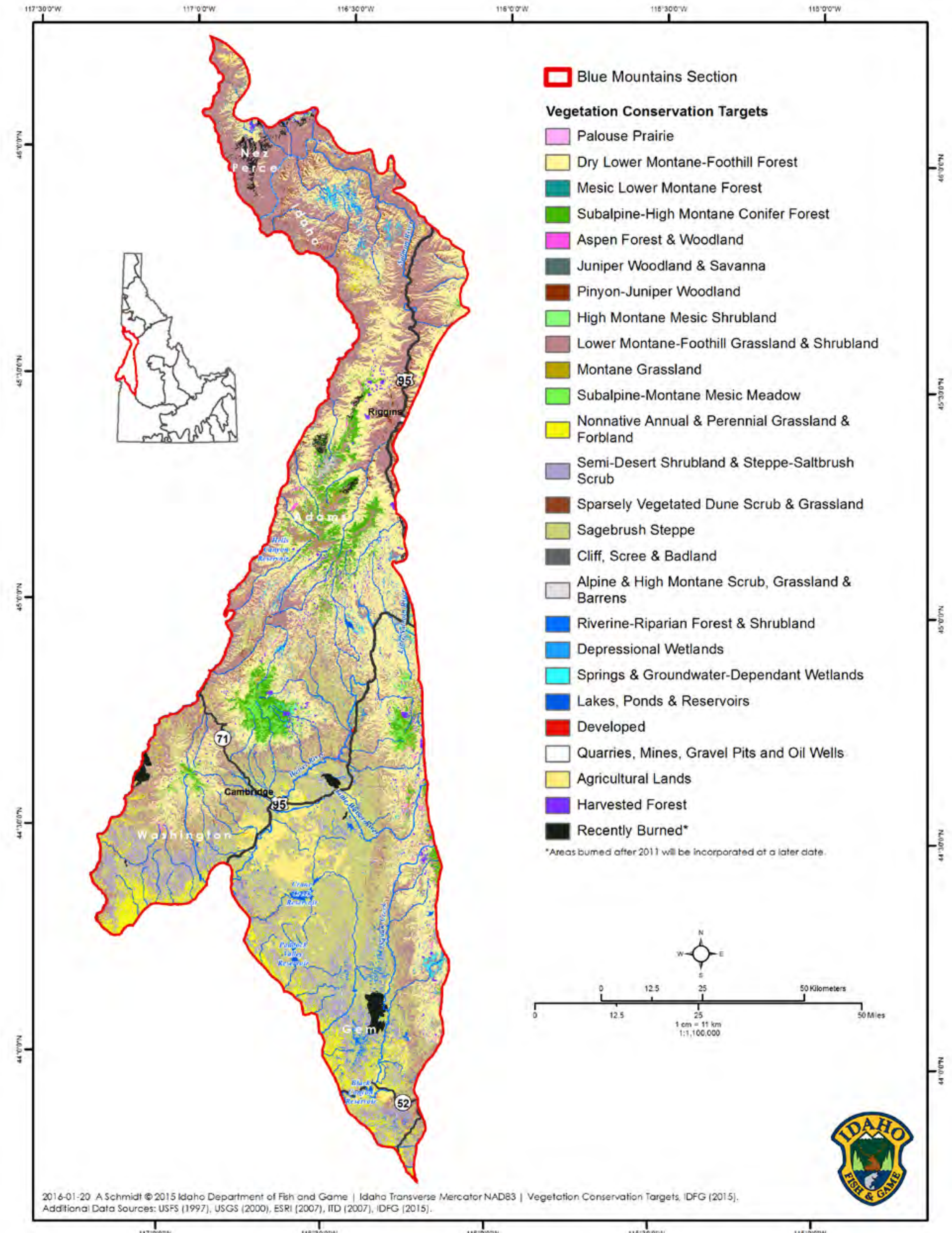


Fig. 7.2 Map of Blue Mountains vegetation conservation targets

Conservation Targets in the Blue Mountains

We selected 6 habitat targets (4 upland, 2 aquatic) that represent the major ecosystems in the Blue Mountains as shown in Table 7.1. Each of these systems provides habitat for key species of greatest conservation need (SGCN), i.e., "nested targets" (Table 7.2) associated with each target. All SGCN management programs in the Blue Mountains have a nexus with habitat management programs. We provide a high-level summary of current viability status for each target. Conservation of the habitat targets listed below should conserve most of the nested species within them. However, we determined that at least 4 taxa—Bighorn Sheep (addressed in separate management plan at http://fishandgame.idaho.gov/public/wildlife/planBighorn.pdf), Northern Idaho Ground Squirrel, Southern Idaho Ground Squirrel, and insect pollinators—face special conservation needs and thus are presented as explicit species targets as shown in Table 7.1.

Table 7.1 At-a-glance table of conservation targets in the Blue Mountains

Target	Target description	Target viability	Nested targets (SGCN)	
Dry Lower Montane–Foothill Forest	Includes wetter meadow patches important to the Northern Idaho Ground Squirrel.	*Fair.* Forest systems intact and functional, but are increasingly impacted by insect and disease outbreaks tied to changing weather patterns. Wildfire scope and severity are increasingly impacting forest health. Housing development expanding into forest systems.	*Tier 1*	Northern Idaho Ground Squirrel Whorled Mountainsnail
			Tier 2	Mountain Quail Silver-haired Bat Hoary Bat Bighorn Sheep Lyrate Mountainsnail Deep Slide Mountainsnail Striate Mountainsnail
			Tier 3	Lewis's Woodpecker White-headed Woodpecker Olive-sided Flycatcher Clark's Nutcracker Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Salmon Coil Boulder Pile Mountainsnail Coeur d'Alene Oregonian Western Flat-whorl Shiny Tightcoil Spur-throated Grasshopper (*Melanoplus*) Species Group
Lower Montane–Foothill Grassland & Shrubland	Higher elevations of the Salmon River valley, Little Salmon, and Hells Canyon have conifer forest that extends downslope on northern aspects and valleys. Mountain shrub components form understory and patches within this	*Good.* Much of habitat is intact. Annual invasive grasses are prevalent below about 1,200 m (4,000 ft) elevation. Bitterbrush not regenerating in competition with invasive annuals; sagebrush and other shrubs are successfully	*Tier 1*	Greater Sage-Grouse Southern Idaho Ground Squirrel Seven Devils Mountainsnail Whorled Mountainsnail Lava Rock Mountainsnail Salmon Oregonian Cottonwood Oregonian
			Tier 2	Mountain Quail Sharp-tailed Grouse Long-billed Curlew Burrowing Owl Silver-haired Bat Hoary Bat

Target	Target description	Target viability	Nested targets (SGCN)	
	mosaic. Lower slopes and south-facing slopes are grasslands systems.	regenerating. Inappropriate fire regimes are impacting the system.		Bighorn Sheep Lyrate Mountainsnail Costate Mountainsnail Deep Slide Mountainsnail Striate Mountainsnail
			Tier 3	Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Salmon Coil Southern Tightcoil Boulder Pile Mountainsnail Coeur d'Alene Oregonian
Sagebrush Steppe	Sagebrush-steppe systems occur at all elevations across the Blue Mountains. It is important to maintain a mosaic of sagebrush in different seral stages.	*Poor* to *Fair*. Habitat is highly altered and in poor ecological condition, dominated by invasive annual grasslands with an altered fire regime.	*Tier 1*	Greater Sage-Grouse Southern Idaho Ground Squirrel
			Tier 2	Sharp-tailed Grouse Long-billed Curlew Burrowing Owl Sagebrush Sparrow Silver-haired Bat Hoary Bat Bighorn Sheep Costate Mountainsnail Deep Slide Mountainsnail
			Tier 3	Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Mountain Goat Boulder Pile Mountainsnail
Riverine–Riparian Forest & Shrubland	Rivers and streams, including aquatic habitats and their associated terrestrial riparian habitats, and off channel wetlands, springs and seeps. Includes the Snake, Weiser, and Little Weiser River systems and their tributaries.	*Fair*. Many riverine systems are still mostly intact. Erosion and other impacts of channelization beginning to be addressed on a local level.	*Tier 1*	Steelhead (Snake River Basin DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring/summer-run ESU) Greater Sage-Grouse Pixie Pebblesnail Marbled Disc Salmon Oregonian Cottonwood Oregonian
			Tier 2	Mountain Quail Sharp-tailed Grouse Long-billed Curlew Lewis's Woodpecker Silver-haired Bat Hoary Bat

Target	Target description	Target viability	Nested targets (SGCN)	
				Bighorn Sheep Western Pearlshell A Riffle Beetle (*Bryelmis idahoensis*)
			Tier 3	Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Western Ridged Mussel Pondsnail (*Stagnicola*) Species Group Rotund Physa Nez Perce Pebblesnail Coeur d'Alene Oregonian Columbia River Tiger Beetle Monarch Spur-throated Grasshopper (*Melanoplus*) Species Group Boise Snowfly A Caddisfly (*Cheumatopsyche logani*) A Caddisfly (*Eocosmoecus schmidi*) A Caddisfly (*Homophylax auricularis*) A Caddisfly (*Rhyacophila oreia*) A Caddisfly (*Sericostriata surdickae*)
Springs & Groundwater-Dependent Wetlands	Includes a subset of groundwater-dependent ecosystems such as springs and seeps, geothermal springs, alkaline wetlands, and wet and mesic meadows.	*Fair*. Habitat area has been negatively impacted by concentrated livestock use, invasive plants and heavy erosion.	*Tier 1*	Greater Sage-Grouse
			Tier 2	Mountain Quail Sharp-tailed Grouse Silver-haired Bat Hoary Bat Bighorn Sheep Pristine Pyrg
			Tier 3	Sandhill Crane Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Mountain Goat Pondsnail (*Stagnicola*) Species Group Monarch
Agricultural Lands	Broad, flat valley bottoms are primarily in agricultural production, particularly livestock and crops for livestock production.	*Good*. Conversion of agricultural lands to urban and suburban development and long-term water availability.	*Tier 1*	Greater Sage-Grouse Southern Idaho Ground Squirrel
			Tier 2	Sharp-tailed Grouse Long-billed Curlew Burrowing Owl Silver-haired Bat Hoary Bat
			Tier 3	Sandhill Crane Common Nighthawk

Target	Target description	Target viability	Nested targets (SGCN)	
				Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Monarch
Bighorn Sheep	Bighorn Sheep are an iconic species in the Blue Mountains. Main populations in central and northern portions; few to no sheep in southern portion of section. Threats faced include disease transmission from domestic sheep and goats, and potential poaching. Two Population Management Units (PMUs) across the Blue Mountains (IDFG 2010).	*Poor*. Currently population is well below habitat carrying capacity. Conflicts with domestic sheep impact populations.	*Tier 2*	Bighorn Sheep
Northern Idaho Ground Squirrel	Section supports all but one known Northern Idaho Ground Squirrel colony.	*Fair*. Half of populations occur on private lands with no long-term protections. Many habitat issues need to be addressed. Recovery goals for population size and security have not been attained.	*Tier 1*	Northern Idaho Ground Squirrel
Southern Idaho Ground Squirrel	The Southern Idaho Ground Squirrel is endemic to approximately 291,500 ha (720,500 acres) in Gem, Payette, Washington, and Adams counties. This is an exceptionally limited species range.	*Good*. Populations have rebounded from an apparent 1998–2001 population decline and now occupy most of the historical distribution. The population decline driver has not been determined.	*Tier 1*	Southern Idaho Ground Squirrel
Pollinators	Pollinators provide an essential ecosystem service which benefits	*Fair.* Many pollinators are declining range wide.	*Tier 1*	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee

Target	Target description	Target viability	Nested targets (SGCN)	
	agricultural producers, agricultural consumers, and gardeners. Many pollinators, but particularly bees, are experiencing population declines.		*Tier 3*	A Miner Bee (*Perdita barri*) A Miner Bee (*Perdita salicis euxantha*) A Miner Bee (*Perdita wyomingensis sculleni*) Hunt's Bumble Bee Yellow Bumble Bee A Mason Bee (*Hoplitis orthognathus*) A Moth (*Grammia eureka*) Johnson's Hairstreak Monarch Gillette's Checkerspot

Table 7.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Blue Mountains

Taxon	Conservation targets									
	Dry Lower Montane–Foothill Forest	Lower Montane–Foothill Grassland & Shrubland	Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Springs & Groundwater-Dependent Wetlands	Agricultural Lands	Bighorn Sheep	Northern Idaho Ground Squirrel	Southern Idaho Ground Squirrel	Pollinators
RAY-FINNED FISHES										
Steelhead (Snake River Basin DPS) (*Oncorhynchus mykiss*)[1]				X						
Sockeye Salmon (Snake River ESU) (*Oncorhynchus nerka*)[1]				X						
Chinook Salmon (Snake River fall-run ESU) (*Oncorhynchus tshawytscha*)[1]				X						
Chinook Salmon (Snake River spring/summer-run ESU) (*Oncorhynchus tshawytscha*)[1]				X						
BIRDS										
Mountain Quail (*Oreortyx pictus*)[2]	X	X		X	X					
Greater Sage-Grouse (*Centrocercus urophasianus*)[1]		X	X	X	X	X				
Sharp-tailed Grouse (*Tympanuchus phasianellus*)[2]		X	X	X	X	X				
Sandhill Crane (*Grus canadensis*)[3]					X	X				
Long-billed Curlew (*Numenius americanus*)[2]		X	X	X		X				
Burrowing Owl (*Athene cunicularia*)[2]		X	X			X				
Short-eared Owl (*Asio flammeus*)[3]		X	X							
Common Nighthawk (*Chordeiles minor*)[3]		X	X		X	X				
Lewis's Woodpecker (*Melanerpes lewis*)[2]	X			X						
White-headed Woodpecker (*Picoides albolarvatus*)[3]	X									
Olive-sided Flycatcher (*Contopus cooperi*)[3]	X									
Clark's Nutcracker (*Nucifraga columbiana*)[3]	X									
Sagebrush Sparrow (*Artemisiospiza nevadensis*)[2]			X							
Grasshopper Sparrow (*Ammodramus savannarum*)[3]		X	X							
MAMMALS										
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]	X	X	X	X	X	X				
Silver-haired Bat (*Lasionycteris noctivagans*)[2]	X	X	X	X	X	X				
Hoary Bat (*Lasiurus cinereus*)[2]	X	X	X	X	X	X				
Western Small-footed Myotis (*Myotis ciliolabrum*)[3]	X	X	X	X	X	X				
Little Brown Myotis (*Myotis lucifugus*)[3]	X	X	X	X	X	X				
Mountain Goat (*Oreamnos americanus*)[3]					X					
Bighorn Sheep (*Ovis canadensis*)[2]	X	X	X	X	X		X			
Northern Idaho Ground Squirrel (*Urocitellus brunneus*)[1]	X							X		

Taxon	Dry Lower Montane–Foothill Forest	Lower Montane–Foothill Grassland & Shrubland	Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Springs & Groundwater-Dependent Wetlands	Agricultural Lands	Bighorn Sheep	Northern Idaho Ground Squirrel	Southern Idaho Ground Squirrel	Pollinators
	Conservation targets									
Southern Idaho Ground Squirrel (*Urocitellus endemicus*)[1]		X	X			X			X	
BIVALVES										
Western Pearlshell (*Margaritifera falcata*)[2]				X						
Western Ridged Mussel (*Gonidea angulata*)[3]				X						
GASTROPODS										
Pondsnail (*Stagnicola*) Species Group[3]				X	X					
Rotund Physa (*Physella columbiana*)[3]				X						
Nez Perce Pebblesnail (*Fluminicola gustafsoni*)[3]				X						
Pixie Pebblesnail (*Fluminicola minutissimus*)[1]				X						
Pristine Pyrg (*Pristinicola hemphilli*)[2]					X					
Marbled Disc (*Discus marmorensis*)[1]				X						
Salmon Coil (*Helicodiscus salmonaceus*)[3]	X	X								
Seven Devils Mountain Snail (*Oreohelix hammeri*)[1]		X								
Lyrate Mountainsnail (*Oreohelix haydeni*)[2]	X	X								
Costate Mountainsnail (*Oreohelix idahoensis*)[2]		X	X							
Deep Slide Mountainsnail (*Oreohelix intersum*)[2]	X	X	X							
Boulder Pile Mountainsnail (*Oreohelix jugalis*)[3]	X	X	X							
Striate Mountainsnail (*Oreohelix strigosa goniogyra*)[2]	X	X								
Whorled Mountainsnail (*Oreohelix vortex*)[1]	X	X								
Lava Rock Mountainsnail (*Oreohelix waltoni*)[1]		X								
Salmon Oregonian (*Cryptomastix harfordiana*)[1]		X		X						
Coeur d'Alene Oregonian (*Cryptomastix mullani*)[3]	X	X		X						
Cottonwood Oregonian (*Cryptomastix populi*)[1]		X		X						
Western Flat-whorl (*Planogyra clappi*)[3]	X	X								
Southern Tightcoil (*Ogaridiscus subrupicola*)[3]		X								
Shiny Tightcoil (*Pristiloma wascoense*)[3]	X	X								
INSECTS										
Columbia River Tiger Beetle (*Cicindela columbica*)[3]				X						
A Riffle Beetle (*Bryelmis idahoensis*)[2]				X						
A Miner Bee (*Perdita barri*)[3]										X
A Miner Bee (*Perdita salicis euxantha*)[3]										X
A Miner Bee (*Perdita wyomingensis sculleni*)[3]										X
Yellow Bumble Bee (*Bombus fervidus*)[3]										X

Taxon	Conservation targets: Dry Lower Montane–Foothill Forest	Lower Montane–Foothill Grassland & Shrubland	Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Springs & Groundwater-Dependent Wetlands	Agricultural Lands	Bighorn Sheep	Northern Idaho Ground Squirrel	Southern Idaho Ground Squirrel	Pollinators
Hunt's Bumble Bee (*Bombus huntii*)[3]										X
Morrison's Bumble Bee (*Bombus morrisoni*)[1]										X
Western Bumble Bee (*Bombus occidentalis*)[1]										X
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]										X
A Mason Bee (*Hoplitis orthognathus*)[3]										X
A Moth (*Grammia eureka*)[3]										X
Johnson's Hairstreak (*Callophrys johnsoni*)[3]										X
Monarch (*Danaus plexippus*)[3]				X	X	X				X
Gillette's Checkerspot (*Euphydryas gillettii*)[3]										X
Spur-throated Grasshopper (*Melanoplus*) Species Group[3]	X			X						
Boise Snowfly (*Utacapnia nedia*)[3]				X						
A Caddisfly (*Cheumatopsyche logani*)[3]				X						
A Caddisfly (*Eocosmoecus schmidi*)[3]				X						
A Caddisfly (*Homophylax auricularis*)[3]				X						
A Caddisfly (*Rhyacophila oreia*)[3]				X						
A Caddisfly (*Sericostriata surdickae*)[3]				X						

Target: Dry Lower Montane–Foothill Forest

Dry Lower Montane–Foothill Forest is a significant habitat in the central portion of the Blue Mountains. It accounts for approximately 26% of the land area in this section and restoration is a high priority. This conifer forest habitat occurs at lower elevations and along major river corridors. It is typically the first forest zone above grassland or shrubland and transitions to subalpine forest at the higher-elevation end of its range. Ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) are dominant tree species, occurring in open stands with a variety of grasses and/or shrubs in the understory, such as pinegrass (*Calamagrostis rubescens*), Idaho fescue, Mallow ninebark (*Physocarpus malvaceus*), white spirea (*Spiraea betulifolia*), and snowberry (*Symphoricarpos* spp.). Frequent, low-intensity wildfire historically maintained open stand conditions with widely spaced large trees. These forests have been important for timber harvest and recreation due to their accessibility.

Mixed conifer dry montane forest, Adams County, Idaho © Anna Owsiak

Most of the Dry Lower Montane–Foothill Forest in the Blue Mountains occurs on federally managed land, within the Payette National Forest. Over the last decade US Forest Service (USFS) management direction has focused on restoring dry pine forests toward historical range of variability for structure (e.g., tree species, size classes, canopy cover) and ecological function (e.g., fire regime).

Target Viability

The condition of Dry Lower Montane–Foothill Forest varies across the section from good to fair. The amount of habitat is still relatively high within its historic distribution, but nearly a century of fire suppression and timber harvest have changed conditions in many stands, particularly those outside wilderness areas. Forests have grown in with dense thickets of smaller-diameter trees, canopy cover is higher, large-diameter trees and snags are less abundant, and tree species composition has changed from predominantly early-seral species such as ponderosa pine and western larch (*Larix occidentalis*)to a greater abundance of less fire-resistant species such as grand fir (*Abies grandis*). As a result, the potential for more lethal fires has increased. These changes have affected habitat conditions for SGCN that occur in Dry Lower Montane–Foothill Forest, such as Lewis's Woodpecker and White-headed Woodpecker. Housing development is expanding into forest areas, especially in the Council and New Meadows areas, increasing fragmentation and motorized impacts in forests.

Spotlight Species of Greatest Conservation Need: White-headed Woodpecker

The White-headed Woodpecker (*Picoides albolarvatus*) is considered a permanent resident of Blue Mountains coniferous forests, although some may migrate to lower elevations during winter months. Preferred breeding habitat is montane coniferous forests with sparse understory and a relatively open canopy, dominated by ponderosa pine. They are highly limited by suitable habitat, nesting in forests with large-diameter trees and snags indicative of old growth systems. Abundance of mature pines is crucial to provide a food source as well as snags and high stumps used for nesting. These birds can thrive in recently burned or cut areas provided that large standing trees are still present. Changes in fire scope and severity pose a threat to the retention of mature trees and large diameter and high-cut stumps.

This woodpecker is currently listed as a "Sensitive Species" by the US Forest Service in the Intermountain and Northern regions of the western United States.

Prioritized Threats and Strategies for Dry Lower Montane–Foothill Forest

High rated threats to Dry Lower Montane–Foothill Forest in the Blue Mountains

Changes in precipitation & broad-scale hydrologic regimes

Intensified drought due to increasing temperatures and changing precipitation patterns is increasing the vulnerability of forests to insect and disease outbreaks, and wildfire scope and severity. Snowpack levels are decreasing and winter temperatures are increasingly milder, creating conditions favorable for pathogen insect survival. More moisture is falling as rain during winter months, changing hydrologic regimes within this habitat and in lower elevation habitats whose headwaters lie within the section. Less snowpack equates to more drought stress to native plants, and increases conditions for drought adapted invasive species to establish.

Objective	Strategy	Action(s)	Target SGCNs
Improve landscape resilience to climate change.	Manage for diverse, healthy plant communities able to resist stresses including drought and drought mediated impacts such as invasion by nonnative plants and wildfire.	Research options for managing this habitat under forecasted climate models. Work with other agencies, organizations and user groups across the Blue Mountains to address climate change impacts across landscapes, and refine land management planning options and alternatives down to local level implementable projects where possible. Engage in trust building efforts with impacted stakeholders to develop individual and social support for proposed land management actions and restoration activities (Gordon et al. 2014).	Mountain Quail White-headed Woodpecker Olive-sided Flycatcher Clark's Nutcracker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Northern Idaho Ground Squirrel Bighorn Sheep

Objective	Strategy	Action(s)	Target SGCNs
		Engage in microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate induced stressors. Engage in researching to identifying plants useful for habitat restoration or enhancement from current climate regimes that are forecast to be local future climate regimes. Support efforts to increase public and political awareness of climate change impacts to local landscapes and wildlife dependent on them. Research options for managing livestock grazing in this habitat under forecasted climate models (i.e.-drought conditions). Work with agencies, organizations and livestock operators to use this information to both be proactive and refine land management planning options and alternatives down to local level implementable projects. Implement livestock drought management alternatives on IDFG owned lands.	Salmon Coil Lyrate Mountainsnail Boulder Pile Mountainsnail Striate Mountainsnail Whorled Mountainsnail Coeur d'Alene Oregonian Western Flat-whorl Shiny Tightcoil Spur-throated Grasshopper (*Melanoplus*) Species Group

Historic & current fire suppression

Fires historically burned at more frequent intervals (Havlina, 1995), resulting in a more patchy mosaic of different seral stages. Wildfires in this system are becoming larger and more intense. Altered fire cycles favor invasive plants and habitat conversion to less desirable species. Longer return fire intervals are allowing conifer invasion into historic meadow habitats, negatively impacting Northern Idaho Ground Squirrel which requires open meadow habitats in association with forest.

Objective	Strategy	Action(s)	Target SGCNs
Restore historic fire intervals.	Increase fire frequency on the landscape.	Work with federal agencies to develop and implement policies that move fire management from reactive to proactive. Increase number of low intensity controlled burns to create a better seral condition mosaic across the landscape and increase habitat conditions favored by Northern Idaho Ground Squirrel.	Mountain Quail White-headed Woodpecker Olive-sided Flycatcher Clark's Nutcracker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Northern Idaho Ground Squirrel Salmon Coil Lyrate Mountainsnail Boulder Pile Mountainsnail Striate Mountainsnail

Objective	Strategy	Action(s)	Target SGCNs
			Whorled Mountainsnail Coeur d'Alene Oregonian Western Flat-whorl Shiny Tightcoil Spur-throated Grasshopper (*Melanoplus*) Species Group

Target: Lower Montane–Foothill Grassland & Shrubland

This habitat type accounts for approximately 25% of the land area in the Blue Mountains Section. Preservation of good quality habitat and restoration are high priorities. Higher elevations of the Salmon River, Little Salmon, and Hells Canyon drainages have conifer forest that extends downslope on northern aspects and valleys. Mountain shrub components include mallow ninebark, snowberry , and serviceberry (*Amelanchier alnifolia*), which form understory and patches within this mosaic. Lower slopes and south-facing slopes are fire-maintained grassland systems dominated by bluebunch wheatgrass and Idaho fescue, with patches of sagebrush and bitterbrush. Scattered patches of Douglas-fir and ponderosa pine occur primarily in drainages and on north-facing slopes. Lengthened fire return intervals have allowed conifers to expand into former grasslands and shrublands.

Indian Creek drainage, tributary of Snake River, Idaho © 2014 Anna Owsiak

Overall, this habitat is in good condition and a large portion is under management by federal agencies. The northern and southern ends of this target are impacted more by noxious weeds, especially yellow star-thistle and invasive annual grasses. Fire return intervals are longer than historic levels, leading to increased fuel loads and greater wildfire severity in scale and scope. Fire is a historically dominant ecosystem process in this target, with forest and shrub components dependent on fire for long term sustainability (Havlina 1995). Because of both changes in fire intervals and invasive annual grasses, bitterbrush—an important big game winter forage—is failing to regenerate, potentially resulting in trophic changes in shrublands.

Target Viability

Much of the habitat is intact and in desirable, native vegetation. Annual invasive grasses are prevalent below about 1,220 m (4,000 ft) elevation, especially on the northern and southern ends of the target and on west and south-facing slopes. Bitterbrush is not regenerating due to competition with invasive annuals. Increased wildfire scope and severity in combination with invasive annuals is negatively impacting successful shrub regeneration and establishment in the northern and southern ends of the target. In Hells Canyon forests (including shrublands), fire is a dominant ecosystem process in the creation of landscape mosaics, in governing species distribution, and in the maintenance of biological diversity. The return of historic fire regimes is needed to sustain a desirable, seral mosaic and, in some cases, ensure bitterbrush regeneration (Havlina 1995).

Prioritized Threats and Strategies for Lower Montane–Foothill Grassland & Shrubland

Very High rated threats to Lower Montane–Foothill Grassland & Shrubland in the Blue Mountains

Changes in precipitation & broad-scale hydrologic regimes

Intensified drought due to increasing temperatures and changing precipitation patterns is increasing the vulnerability of this habitat to wildfire and noxious weed and invasive grass invasion. Wildfire scope and severity is increasing. Snowpack levels are decreasing and winter temperatures are increasingly milder, creating conditions favorable for pathogen insect survival and invasive annual grasses. More moisture is falling as rain during winter months, changing hydrologic regimes within this habitat and in lower elevation habitats whose headwaters lie within the section. Less snowpack equates to more drought stress to native plants, and increases conditions for drought adapted invasive species to establish.

Objective	Strategy	Action(s)	Target SGCNs
Improve landscape resilience to climate change.	Manage for diverse, healthy plant communities able to resist stresses including drought and drought mediated impacts such as invasion by nonnative plants and wildfire.	Research options for managing this habitat under forecasted climate models. Work with other agencies, organizations, and user groups across the Blue Mountains to address climate change impacts across landscapes, and refine land management planning options and alternatives down to local level implementable projects where possible. Engage in trust building efforts with impacted stakeholders to develop individual and social support for proposed land management actions and restoration activities (Gordon et al. 2014). Engage in microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate induced stressors. Engage in research to identify plants useful for habitat restoration or enhancement from current climate regimes that are forecast to be local future climate regimes. Support efforts to increase public and political awareness of climate change impacts to local	Mountain Quail Sharp-tailed Grouse Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Gastropod Assemblage*

Objective	Strategy	Action(s)	Target SGCNs
		landscapes and wildlife dependent on them. Research options for managing livestock grazing in this habitat under forecasted climate models (i.e., drought conditions). Work with agencies, organizations, and livestock operators to use this information to both be proactive and refine land management planning options and alternatives down to local level implementable projects. Implement livestock drought management alternatives on IDFG owned lands.	

*Gastropod Assemblage includes the following species: Salmon Coil, Seven Devils Mountainsnail, Lyrate Mountainsnail, Costate Mountainsnail, Deep Slide Mountainsnail, Boulder Pile Mountainsnail, Striate Mountainsnail, Whorled Mountainsnail, Lava Rock Mountainsnail, Salmon Oregonian, Coeur d'Alene Oregonian, Cottonwood Oregonian, and Southern Tightcoil.

Noxious weeds & invasive annual grasses

In the Blue Mountains, noxious weeds and invasive annual grasses (e.g., cheatgrass) have colonized many of the sagebrush and grassland habitats at the northern and southern ends of the target. Annual grasses primarily dominate below 1,220 m (4,000 ft) elevations on west and south-facing slopes and on flatter benches. Yellow star-thistle is a major invader in the Snake River Breaks on the northern end of the target, and it continues to move south and into other areas. Rush skeletonweed , spotted knapweed (*Centarea maculosa*) and hoary cress are well represented, crowd out native grasses and forbs, and are effective at preventing reestablishment of native species. Wildfire, off road motorized vehicle use and concentrated livestock use are the most common disturbance vectors creating opportunities for invasion within this target.

Objective	Strategy	Action(s)	Target SGCNs
Effectively control and restore areas dominated by invasive, nonnative annual grasses and yellow star-thistle at a rate greater than the rate of the spread (DOI 2015).	Implement large-scale experimental activities to reduce invasive annual grass and yellow star-thistle through integrated pest management.	Locate and coordinate installation of long-term studies and subsequent monitoring to test the efficacy of large-scale application of integrated pest management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Support the use of Plateau® herbicide in controlling cheatgrass. Explore the use of MB 906®, a bacteria soil amendment for the suppression of annual grass, in restoration efforts, commercially available fall 2015. Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006). Incorporate desirable nonnative plant species capable of outcompeting invasive annual	Mountain Quail Sharp-tailed Grouse Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep

Objective	Strategy	Action(s)	Target SGCNs
		grasses as the first transitional step in restoration of perennial vegetation on annual grass and noxious weed dominated sites. Increase application of biocontrol agents to target noxious weeds in areas with minimal conventional access options.	Gastropod Assemblage *
Maintain diverse, resilient native plant communities capable of resisting noxious weed invasion.	Reduce the amount, size and scope of disturbance to intact native habitats.	Create strategic fire breaks in human use landscapes, building upon existing roads and terrain features. Use targeted grazing and desirable nonnative vegetation in landscapes dominated by human uses (grazing, roads, private lands…) and infested with annual invasives. Use controlled burns to return historic fire cycles to intact habitats. Balance the use of fire with the potential for invasion when designing and locating projects. Work with livestock producers to implement fuels treatments on their lands and allotments (DOI 2015). Develop Rural Fire Protection Districts (RFPDs) to help suppress and fight fires. Promote certified weed-free seeds/forage (Referenced in 2006 Sage-Grouse Plan, p. 4-52) Support efforts to increase management of motorized vehicle use on public lands to reduce additional weed transmission and establishment. Work with other agencies and organizations to increase signage and use of other communication methods for providing public information on the impacts of OHV use and noxious weed spread. Support efforts to implement and enforce federal travel management plans. Work with federal and state agencies, and private producers to alter livestock management to reduce disturbance caused by concentrated livestock use in areas at highest risk for noxious weed invasion.	Mountain Quail Sharp-tailed Grouse Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Gastropod Assemblage *

*Gastropod Assemblage includes the following species: Salmon Coil, Seven Devils Mountainsnail, Lyrate Mountainsnail, Costate Mountainsnail, Deep Slide Mountainsnail, Boulder Pile Mountainsnail, Striate Mountainsnail, Whorled Mountainsnail, Lava Rock Mountainsnail, Salmon Oregonian, Coeur d'Alene Oregonian, Cottonwood Oregonian, and Southern Tightcoil.

High rated threats to Lower Montane–Foothill Grassland & Shrubland in the Blue Mountains

Historic & current fire suppression

Fires historically burned at more frequent intervals (Havlina 1995), resulting in a more patchy mosaic of different seral stages. Wildfires in this system are becoming larger and more intense. Altered fire cycles favor invasive plants and habitat conversion to less desirable species. Longer return fire intervals are allowing conifer invasion into historic grass and shrublands and in some cases are preventing successful shrub regeneration (Havlina 1995).

Objective	Strategy	Action(s)	Target SGCNs
Restore historic fire intervals.	Increase fire frequency on the landscape.	Work with federal agencies to develop and implement policies that move fire management from reactive to proactive. Increase number of low intensity controlled burns to create a better seral mosaic across the landscape. Strategically develop projects to minimize the potential for noxious weed invasion.	Mountain Quail Sharp-tailed Grouse Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Gastropod Assemblage*

*Gastropod Assemblage includes the following species: Salmon Coil, Seven Devils Mountainsnail, Lyrate Mountainsnail, Costate Mountainsnail, Deep Slide Mountainsnail, Boulder Pile Mountainsnail, Striate Mountainsnail, Whorled Mountainsnail, Lava Rock Mountainsnail, Salmon Oregonian, Coeur d'Alene Oregonian, Cottonwood Oregonian, and Southern Tightcoil.

Improper livestock grazing management

In the context of this plan, "improper" is defined as grazing beyond the capacity of the resource in either direction (e.g., overuse such as along riparian areas that need protection; i.e., need to for seasonal adjustments). Negative impacts of grazing are typically associated with persistent heavy grazing. In the Governor's Alternative (Otter 2012), improper livestock grazing management is considered a secondary threat with monitoring and management actions tailored accordingly.

In the Blue Mountains, factors that contribute to improper livestock grazing on federal lands include the lack of flexibility for timing of grazing written within existing federal allotment permits, insufficient funds for federal land management agency oversight and a backlog of existing allotment renewal work, and insufficient monitoring (i.e., lack of appropriate rangeland health assessment monitoring data gathered annually on a consistent basis to support trend analysis). Consequently, some management decisions are compromised by a lack of appropriate data.

On private lands, contributing factors include established cultural grazing traditions, lack of economic incentive to alter operating methods, and lack of awareness of alternative methods and benefits.

Objective	Strategy	Action(s)	Target SGCNs
Manage livestock to maintain rangeland health and habitat quality (Otter 2012).	Manage the timing, intensity, duration, and frequency of grazing practices to manipulate vegetative condition (Otter 2012).	Prioritize permit renewals and land health assessments for allotments with declining Sage-Grouse populations (Otter 2012). Inform affected permittees and landowners regarding Sage-Grouse habitat needs and conservation measures (Idaho Sage-grouse Advisory Committee 2006). Incorporate GRSG Seasonal Habitat Objectives (Table 2-2 in BLM 2015) into relevant resource management plans and projects. Use the Sage-Grouse Habitat Assessment Framework (Stiver et al. 2015) with an appropriate sampling design to conduct fine-scale habitat assessments to inform grazing management. Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter 2012).	Mountain Quail Sharp-tailed Grouse Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Gastropod Assemblage*
Maintain or enhance wildlife values on working ranches.	Develop partnerships that work to improve rangeland ecological condition.	Find key community leaders within the livestock industry to help facilitate the broader use of livestock management techniques that reduce concentrated livestock use in critical areas (springs, riparian), and result in improved rangeland ecological health. Promote use of Farm Bill Programs to improve rangelands and other wildlife habitats on private lands. Support efforts to disseminate information on livestock management alternatives that improve rangeland ecological health. Support and partner on habitat restoration efforts on private lands. Work with local Soil and Water Conservation Districts to get habitat and wildlife priorities included in District priorities.	Mountain Quail Sharp-tailed Grouse Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Gastropod Assemblage*
	Maintain MOU between Idaho State Department of Agriculture	Involve permittees in providing monitoring information, the interpretation of monitoring data, & providing input into grazing	Mountain Quail Sharp-tailed Grouse Long-billed Curlew Burrowing Owl

Objective	Strategy	Action(s)	Target SGCNs
	(ISDA) and BLM as it pertains to grazing management.	management adjustments to meet the goals and objectives of federal land management agencies and the permittees (Sanders 2006).	Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Gastropod Assemblage*
Support the continued responsible use of federal lands for grazing to maintain open spaces and important habitat conditions (e.g., year-round water sources) that benefit wildlife (WGA Policy Resolution 2015-03).	Implement Western Governors' Association (WGA) policy for public lands grazing (for details, see WGA Policy Resolution 2015-03).	Use sound, science-based management decisions for federal lands and base these decisions upon flexible policies that take into account local ecological conditions and state planning decisions.	Mountain Quail Greater Sage-Grouse Sharp-tailed Grouse Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Southern Idaho Ground Squirrel Gastropod Assemblage*

*Gastropod Assemblage includes the following species: Salmon Coil, Seven Devils Mountainsnail, Lyrate Mountainsnail, Costate Mountainsnail, Deep Slide Mountainsnail, Boulder Pile Mountainsnail, Striate Mountainsnail, Whorled Mountainsnail, Lava Rock Mountainsnail, Salmon Oregonian, Coeur d'Alene Oregonian, Cottonwood Oregonian, and Southern Tightcoil.

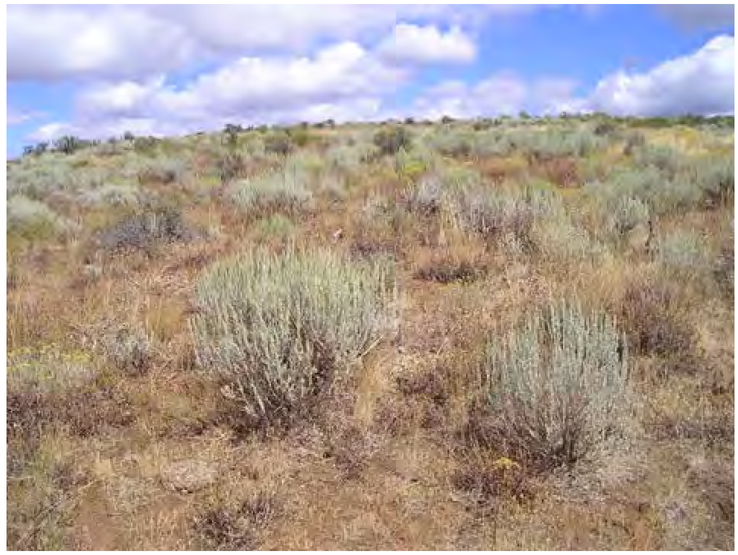
Species designation, planning & monitoring

Mountain Quail would benefit from the following additional management actions:

Objective	Strategy	Action(s)	Target SGCNs
Increase knowledge of current population status.	Monitor population status.	Conduct periodic assessments of species status relative to habitat conditions and management opportunities.	Mountain Quail

Target: Sagebrush Steppe

Sagebrush steppe within the Blue Mountains is widely distributed from low elevation, semiarid settings to more moist and mountainous areas. Dwarf sagebrush-steppe comprised of black (*Artemesia nova*) and scabland sagebrush (*A. rigida*) occurs on rocky ridges, benches, and slopes. Big sagebrush-steppe, dominated by any of several subspecies of big sagebrush (*A. tridentata*), occurs on plains, alluvial fans, foothills, ridges, and mountain slopes with bitterbrush (*Purshia tridentata*) and rabbitbrush (*Ericameria* spp.) often intermixed. The understory is grass-dominated and includes Sandberg bluegrass (*Poa secunda*), Idaho fescue (*Festuca idahoensis*), and bluebunch wheatgrass (*Pseudoroegneria spicata*). Invasive annual grasses, including cheatgrass (*Bromus tectorum*), and medusahead (*Taeniatherum caput-medusae*), are widespread and dominate heavily disturbed sites. Forbs are diverse, and include arrowleaf balsamroot (*Balsamorhiza sagittata*), Indian paintbrush (*Castilleja* spp.), hawksbeard (*Crepis* spp.), and buckwheat (*Eriogonum* spp.).



Sagebrush steppe with mixed annual grass understory, Washington County, Idaho © Anna Owsiak

Sagebrush steppe is a highly altered and fragmented biome in the Blue Mountains. It accounts for approximately 20% of the land area in this section and stabilization and restoration are high priorities. Agricultural conversion, human development, wildfire, and invasion of nonnative annual grasses and noxious weeds have left only remnant stands in good ecological health.

In the Blue Mountains, resource management programs affecting wildlife habitat within sagebrush steppe are currently focused towards considerations for Greater Sage-Grouse hereafter Sage-Grouse; *Centrocercus urophasianus*) and Southern Idaho Ground Squirrel populations. Many other species are reliant on sagebrush-steppe habitat and ultimately benefit from resource management programs, including Sharp-tailed Grouse, Mule Deer (*Odocoileus hemionus*), and Pronghorn (*Antilocapra americana*). Bitterbrush, an important component of sagebrush steppe and forage for big game, is in decline throughout the section. Bitterbrush is unable to successfully establish in competition with invasive annual grasses. Livestock grazing continues to be a predominant land use activity within sagebrush steppe, on both private and public lands.

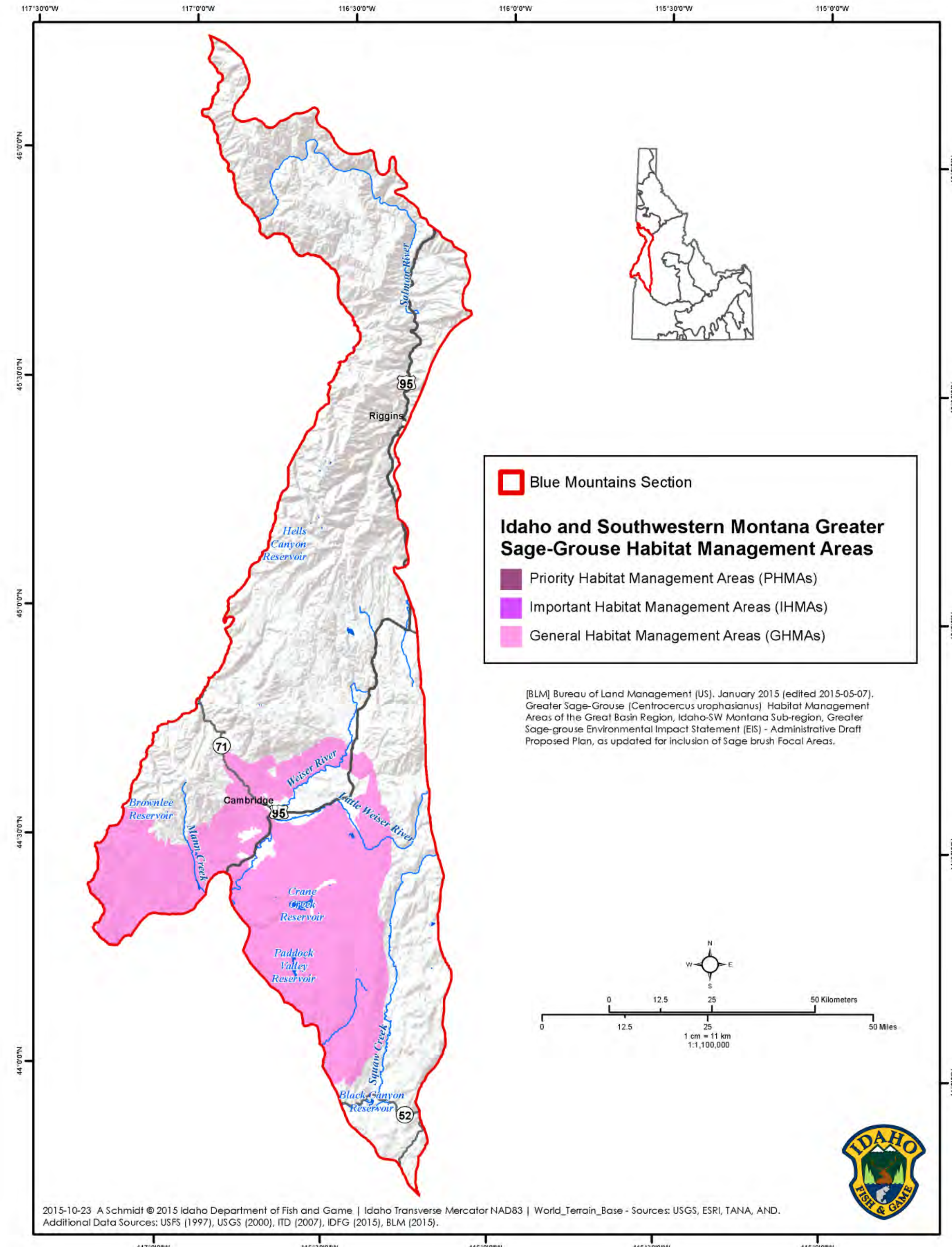


Fig. 7.3 Map of Idaho and Southwestern Montana Greater Sage-Grouse Habitat Management Areas in the Blue Mountains

Target Viability

Poor to *Fair.* Sagebrush steppe condition varies across the section, from poor to pockets of good. Most remaining sagebrush contains significant annual grass invasion, greatly reducing the habitat value and increasing its susceptibility to wildfire. Sagebrush steppe along the Snake River canyon is vulnerable to lightning-caused wildfires and invasive annual grasses thrive along the Snake River below 1,220 m (4,000 ft) elevation, on the Weiser and Little Weiser River breaks, and on most low gradient lands. Large scale wildfire is increasing and some areas have burned multiple times in the last decade. Historically, livestock grazing was heavy across this habitat type, and riparian habitats on private rangelands adjacent to sagebrush steppe continue to be heavily used. Noxious weeds in addition to annual grasses pose a serious threat to this habitat, specifically yellow star-thistle (*Centaurea solstitialis* L.) and rush skeletonweed (*Chondrilla juncia*).

Prioritized Threats and Strategies for Sagebrush Steppe

Very High rated threats to Sagebrush Steppe in the Blue Mountains

Changes in precipitation & broad-scale hydrologic regimes

Intensified drought due to increasing temperatures and changing precipitation patterns is a driver in creating conditions that lead to larger, more intense rangeland fires. The amount and timing of water affects sagebrush growth (Germino 2014). Less snowfall in the winter and most precipitation falling as rain have direct ramifications in that cheatgrass is active in early winter due to adequate warmth and moisture required for germination and growth (N. DeCrappeo, DOI Northwest Climate Science Center, pers. comm.). Less snowpack leads to a drier spring and summer, subsequent drought conditions for native plants, and drying out of cheatgrass. Dry and highly flammable plant material can result in an increase in fire frequency exacerbated by warmer temperatures (N. DeCrappeo, DOI Northwest Climate Science Center, pers. comm.).

Objective	Strategy	Action(s)	Target SGCNs
Improve landscape resilience.	Manage for diverse, healthy plant communities able to resist stresses including drought and drought mediated impacts such as invasion by nonnative plants and wildfire.	Research options for managing this habitat under forecasted climate models. Work with other agencies, organizations, and user groups within the Blue Mountains to address climate change impacts across landscapes and refine land management planning options and alternatives down to local level implementable projects where possible. Engage in trust building efforts with stakeholders to develop individual and social support for proposed land management actions and restoration activities (Gordon et al. 2014). Engage in microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate induced stressors.	Sharp-tailed Grouse Greater Sage-Grouse Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sagebrush Sparrow Grasshopper Sparrow Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Southern Idaho Ground Squirrel Costate Mountainsnail Deep Slide Mountainsnail

Objective	Strategy	Action(s)	Target SGCNs
		Engage in research to identify plants useful for habitat restoration or enhancement from current climate regimes that are forecast to be local future climate regimes. Support efforts to increase public and political awareness of climate change impacts to local landscapes and wildlife dependent on them. Research options for managing livestock grazing in sagebrush steppe habitat under forecasted climate models (i.e., drought conditions). Work with agencies, organizations, and livestock operators to use this information to both be proactive and refine land management planning options and alternatives down to local level implementable projects. Implement livestock drought management alternatives on IDFG owned lands.	
	Restore American Beaver (*Castor canadensis*) as a climate adaptation strategy to increase water holding capacity of landscape.	Develop plan to restore American Beaver to Blue Mountains systems. Identify key watersheds that would benefit from beavers and minimize conflicts with agricultural activities. Conduct outreach to engage stakeholders in key areas. Do site preparation work. Manage trapping seasons to ensure that beavers continue to contribute to healthy riparian systems in the Blue Mountains. Translocate beaver from source. Monitor actions.	Sharp-tailed Grouse Greater Sage- Grouse Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sagebrush Sparrow Grasshopper Sparrow Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Mountain Goat Bighorn Sheep Southern Idaho Ground Squirrel

Increased frequency & intensity of wildfire

The increased frequency and intensity of wildfire is considered a primary threat to the sagebrush-steppe ecosystem and to the many sagebrush-steppe species that depend on it, including Greater Sage-Grouse (Otter 2012, US Fish and Wildlife Service 2014). The accelerated invasion of nonnative annual grasses—in particular cheatgrass and medusahead create conditions that lead to larger, more intense rangeland fires (DOI 2015). This contributes to the continued fragmentation, degradation, and loss of shrub steppe habitats.

Habitat management within GHZs is intended to facilitate multiple use activities to prevent siting them in higher level zones (Otter 2012). More aggressive wildfire and invasive species management practices are recommended to prevent further encroachment of these 2 primary threats into Core (CHZ) and Important (IHZ) zones (Otter 2012). Local working group combined with Coordinated Weed Management Area efforts are to be the main focus (Otter 2012) for improving habitat, including addressing fuel loads and wildfire issues.

Within the Blue Mountains sagebrush steppe, wildfire is increasing in scope and severity. Burned areas are nearly continuous, with little if any sagebrush inclusions within them. Invasive annual grasses are significantly impacting fire behavior and outcomes. Annual grass dominance is shortening fire return intervals and preventing the reestablishment of sagebrush and other shrubs.

Objective	Strategy	Action(s)	Target SGCNs
Manage wildfires to minimize loss of sagebrush habitat.	Improve fire suppression protocols and resource allocations to limit habitat losses to wildfire.	Support development and implementation of Rangeland Fire Protection Associations (RFPAs) (e.g., Idaho Code § 38-104B and Governor's Executive Order 2015-04) (Otter 2015). During high fire danger conditions, stage initial attack and secure additional resources closer to priority areas, with particular consideration of the West Owyhee, Southern, and Desert Conservation Areas to ensure quicker response times in or near Sage-Grouse habitat (BLM 2015). Create and maintain effective fuel breaks to modify fire behavior and increase fire suppression effectiveness based on criteria outlined in the Governor's Alternative (Otter 2012).	Greater Sage-Grouse Southern Idaho Ground Squirrel Long-billed Curlew Sharp-tailed Grouse Sagebrush Sparrow Burrowing Owl Silver-haired Bat Hoary Bat Bighorn Sheep Costate Mountainsnail Deep Slide Mountainsnail Common Nighthawk Grasshopper Sparrow Short-eared Owl Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis
Increase post-fire restoration success (DOI 2015).	Expand the use of desirable nonnative seeds and seedlings in to accelerate efforts to improve and restore post-fire rangeland health in annual grass dominated areas.	Coordinate and collaborate across agencies on climate trend data as it relates to acquisition, storage, and distribution of seeds (DOI 2015). Use of nonnatives should be limited to transitional, noninvasive species, replaced by natives in subsequent ecological restoration or during natural successional processes (DOI 2015).	Greater Sage-Grouse Southern Idaho Ground Squirrel Long-billed Curlew Sharp-tailed Grouse Sagebrush Sparrow Burrowing Owl Silver-haired Bat Hoary Bat Bighorn Sheep Costate Mountainsnail Deep Slide Mountainsnail Common Nighthawk Grasshopper Sparrow Short-eared Owl Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis
Commit to multiyear investments in restoration (DOI	Support long-term strategies for the restoration of sagebrush-	Map hot spots of restoration activity or investment to help identify trends and opportunities for greater efficiency and leveraging of funds	Greater Sage-Grouse Southern Idaho Ground Squirrel Long-billed Curlew

Objective	Strategy	Action(s)	Target SGCNs
2015)	steppe ecosystems, including consistent long-term monitoring protocols and adaptive management for restored areas (DOI 2015).	(DOI 2015). Support a cross-jurisdictional consortium of agencies, organizations and partners dedicated to implementation of restoration, monitoring, and adaptive management activities leading to a healthy sagebrush-steppe ecosystem (DOI 2015).	Sharp-tailed Grouse Sagebrush Sparrow Burrowing Owl Silver-haired Bat Hoary Bat Bighorn Sheep Costate Mountainsnail Deep Slide Mountainsnail Common Nighthawk Grasshopper Sparrow Short-eared Owl Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis
Maintain intact sagebrush stands to limit fragmentation and minimize direct habitat loss.	Protect remaining sagebrush from destruction by wildfire.	Suppress wildfires in Sage-Grouse habitat, commensurate with threatened and endangered species habitat or other critical habitats to be protected (BLM 2015). Develop fuel breaks in areas dominated by invasive annual grasses adjacent to Wyoming big sagebrush stands.	Greater Sage-Grouse Southern Idaho Ground Squirrel Long-billed Curlew Sharp-tailed Grouse Sagebrush Sparrow Burrowing Owl Silver-haired Bat Hoary Bat Bighorn Sheep Costate Mountainsnail Deep Slide Mountainsnail Common Nighthawk Grasshopper Sparrow Short-eared Owl Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis

Noxious weeds & invasive annual grasses

Invasive species are considered a primary threat to Sage-Grouse in Idaho in the Governor's Alternative (Otter 2012) and a primary threat to shrubsteppe habitats by the US Fish and Wildlife Service (2014). In addition, the accelerated invasion of nonnative annual grasses—in particular cheatgrass and medusahead—is one of the primary drivers of larger, more intense rangeland fires and directly threatens the habitat of Sage-Grouse and other sagebrush-steppe dependent wildlife (DOI 2015). In the Blue Mountains, noxious weeds and invasive annual grasses (e.g., cheatgrass) have colonized many of the sagebrush habitat types, particularly at lower-elevation sites and in much of the rangelands within the West Central Sage Grouse Conservation Area. In addition, species such as rush skeletonweed and hoary cress (*Cardarua draba*) crowd out native grasses and forbs, and are effective at preventing reestablishment of native species.

Objective	Strategy	Action(s)	Target SGCNs
Effectively control and restore areas dominated by invasive,	Implement large-scale experimental activities to remove	Implement The Idaho Invasive Species Strategic Plan 2012–2016 ([ISDA] Idaho State Department of Agriculture 2012). Develop integrated weed management	Greater Sage-Grouse Southern Idaho Ground Squirrel Long-billed Curlew Sharp-tailed Grouse

Objective	Strategy	Action(s)	Target SGCNs
nonnative annual grasses at a rate greater than the rate of the spread (DOI 2015)	cheatgrass and other invasive annual grasses through various tools (DOI 2015).	programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Develop large-scale application of integrated weed management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Support the use of Plateau® herbicide in controlling cheatgrass. Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006). Target areas that contain cheatgrass and other invasive or noxious species to minimize competition and favor establishment of desired species (BLM 2015). Support the development of a framework for a national invasive species Early Detection and Rapid Response (EDRR) program (DOI 2015).	Sagebrush Sparrow Burrowing Owl Silver-haired Bat Hoary Bat Bighorn Sheep Costate Mountainsnail Deep Slide Mountainsnail Common Nighthawk Grasshopper Sparrow Short-eared Owl Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis

High rated threats to Sagebrush Steppe in the Blue Mountains

Improper livestock grazing management

In the context of this plan, "improper" is defined as grazing beyond the capacity of the resource in either direction (e.g., overuse such as along riparian areas that need protection; i.e., there needs for seasonal adjustments). Negative impacts of grazing are typically associated with persistent heavy grazing. In the Governor's Alternative (Otter 2012), improper livestock grazing management is considered a secondary threat with monitoring and management actions tailored accordingly.

Livestock grazing can affect wildlife habitat in many ways (Krausman et al. 2009). For example, livestock grazing can change habitat features that directly influence birds by reducing plant species diversity and biomass (Reynolds and Trost 1981, Bock and Webb 1984, Saab et al. 1995). Alternatively, changes in water and nutrient cycling caused by grazing can promote the spread of invasive species, which then degrade native bird habitats by altering fire and disturbance regimes (Rotenberry 1998). Sagebrush systems are particularly sensitive to grazing disturbance (Mack and Thompson 1982).

In the Blue Mountains, factors that contribute to this problem include the lack of flexibility for timing of grazing written within existing federal allotment permits, insufficient funds for federal land management agency oversight and a backlog of existing allotment renewal work, and insufficient monitoring (i.e., lack of appropriate rangeland health assessment monitoring data gathered annually on a consistent basis to support trend analysis). Consequently, some management decisions are compromised by a lack of appropriate data. No specific application is given to livestock grazing in the GHMA.

Objective	Strategy	Action(s)	Target SGCNs
Manage livestock to maintain rangeland health and habitat quality (Otter 2012).	Manage the timing, intensity, duration, and frequency of grazing practices to manipulate vegetative condition (Otter 2012).	Prioritize permit renewals and land health assessments for allotments with declining Sage-Grouse populations (Otter 2012). Inform affected permittees and landowners regarding Sage-Grouse habitat needs and conservation measures (Idaho Sage-grouse Advisory Committee 2006). Incorporate GRSG Seasonal Habitat Objectives (Table 2-2 in BLM 2015) into relevant resource management plans and projects. Use the Sage-Grouse Habitat Assessment Framework (Stiver et al. 2015) with an appropriate sampling design to conduct fine-scale habitat assessments to inform grazing management. Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter 2012).	Greater Sage-Grouse Southern Idaho Ground Squirrel Long-billed Curlew Sharp-tailed Grouse Sagebrush Sparrow Silver-haired Bat Hoary Bat Bighorn Sheep Costate Mountainsnail Deep Slide Mountainsnail Common Nighthawk Grasshopper Sparrow Short-eared Owl Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis
	Maintain MOU between Idaho State Department of Agriculture (ISDA) and BLM as it pertains to grazing management.	Involve permittees in providing monitoring information, the interpretation of monitoring data, & providing input into grazing management adjustments to meet the goals and objectives of federal land management agencies and the permittees (Sanders 2006).	Greater Sage-Grouse Southern Idaho Ground Squirrel Long-billed Curlew Sharp-tailed Grouse Sagebrush Sparrow Silver-haired Bat Hoary Bat Bighorn Sheep Costate Mountainsnail Deep Slide Mountainsnail Common Nighthawk Grasshopper Sparrow Short-eared Owl Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis
Assess the impacts (both negative and, potentially, positive) of livestock grazing on	Implement new, properly designed and replicated experiments involving a variety of	Conduct experiments over multiple years (Rotenberry 1998).	Greater Sage-Grouse Sharp-tailed Grouse Sagebrush Sparrow

Objective	Strategy	Action(s)	Target SGCNs
sagebrush-steppe obligate songbirds (Rotenberry 1998).	alternative grazing treatments (including no grazing at all) across the spectrum of major shrubsteppe habitat types (Rotenberry 1998).		
Maintain or enhance wildlife values on working ranches.	Develop partnerships that work to maintain and improve wildlife habitat on private lands.	Work with NRCS and local Soil and Water Conservation Districts to provide technical assistance to private landowner/grazers and collaborate on habitat improvement projects to improve private lands for wildlife. Work with local Soil and Water Conservation Districts to get fish, wildlife, and habitat priorities incorporated into District priorities.	Greater Sage-Grouse Southern Idaho Ground Squirrel Long-billed Curlew Sharp-tailed Grouse Sagebrush Sparrow Burrowing Owl Silver-haired Bat Hoary Bat Bighorn Sheep Costate Mountainsnail Deep Slide Mountainsnail Common Nighthawk Grasshopper Sparrow Short-eared Owl Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Boulder Pile Mountainsnail
Support the continued responsible use of federal lands for grazing to maintain open spaces and important habitat conditions (e.g., year-round water sources) that benefit wildlife (WGA Policy Resolution 2015-03).	Implement Western Governors' Association (WGA) policy for public lands grazing (for details, see WGA Policy Resolution 2015-03).	Use sound, science-based management decisions for federal lands and base these decisions upon flexible policies that take into account local ecological conditions and state planning decisions.	Greater Sage-Grouse Southern Idaho Ground Squirrel Long-billed Curlew Sharp-tailed Grouse Sagebrush Sparrow Silver-haired Bat Hoary Bat Bighorn Sheep Costate Mountainsnail Deep Slide Mountainsnail Common Nighthawk Grasshopper Sparrow Short-eared Owl Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis

Target: Riverine–Riparian Forest & Shrubland

Riverine wetlands occur in river and stream channels, their floodplains, and riparian vegetation influenced by stream channel hydrology (Brinson et al. 1995). The inclusion of riparian habitat in this definition of "riverine" is broader than that of Cowardin et al. (1979), which only includes wetlands found within the channel. The dominant water sources in riverine are overbank flooding from the channel and subsurface shallow water table connections between the stream channel and wetlands (i.e., hyporheic zone) (Brinson et al. 1995). Other water sources include overland runoff from adjacent uplands, tributaries, and precipitation. Flow may be perennial, perennial but interrupted (e.g., alternating between surface flow emanating in channel bottom upwellings and subsurface flow), or ephemeral/intermittent (flowing only temporarily in response to seasonal runoff but sometimes leaving isolated pools after flow subsides). Surface flows are seasonally complex and in multiple directions (e.g., down valley, out of the channel into the floodplain, and return from floodplain back into the channel). Water also moves laterally in the shallow groundwater table between the channel and riparian zones, as well as out of the system through infiltration into deep groundwater. At their headwaters, riverine wetlands are often replaced by slope wetlands (e.g., seeps and springs), or where topographical contours become closed, depressional or lacustrine wetlands. Dams may create depressional or lacustrine wetlands that interrupt a riverine wetland corridor. The lack of stream channel and floodplain morphology and/or lack of floodplain connectivity to a stream channel (either overbank or subsurface) are good indicators of a change in wetland type.

Grade Creek, Cecil D Andrus WMA, Idaho © 2014 Anna Owsiak

In the Blue Mountains, the riverine ecosystem includes a variety of important aquatic habitat types including:

1st- to 3rd-order streams—This type includes habitat within the channels of headwater and relatively small streams. Examples include numerous montane streams in the Blue Mountains. Baseflows of perennial streams are supported by springs much of the year. These streams tend to have high gradients and water velocities where scouring and erosion exports much of the fine material in the watershed during brief snowmelt runoff periods or large thunderstorm precipitation events (i.e., flash floods). Floodplains and valley bottoms tend to be narrow, confined by canyon walls or mountain slopes. This geomorphic and hydrologic setting creates aquatic habitats dominated by boulders, cobbles, gravel, and less mobile large woody debris. There are few pools and many rapids. Aquatic communities are usually dominated by shredder and collector macroinvertebrates and small fish (e.g., Redband Trout, Sculpin species [*Cottus* spp.], etc.).

Where canyons widen and fill with alluvium, streams have lower gradients and higher sinuosity. In these settings, they flow through willow bottoms, meadows, and, frequently, pastures and hayfields. The Weiser River is an example of a large, but low-order stream flowing in a broad alluvial valley.

Cougar Creek waterfall, tributary of Snake River, Idaho © 2012 Anna Owsiak

Waterfalls—This habitat occurs where streams or rivers fall vertically or nearly vertically down a cliff face or over a bedrock ledge. Water may be mostly free of contact with a rock face, creating a unique habitat on the wet rock face behind the veil of water and a deep plunge pool at the fall's base. Alternatively, water may fan out, maintaining contact with a rock face or fall in a series of smaller falls over rock outcrops (e.g., a cascade). Waterfalls support aquatic organisms uniquely adapted to extremely high water velocities, and plants and animals that require cool, constantly moist rocky habitats. These are relatively common habitats in the Blue Mountains, occurring mostly in association with the Salmon and Snake rivers and their tributaries. Waterfalls in 1st order streams of the Blue Mountains are often seasonal or intermittent.

4th+ order Streams and Rivers—This type includes habitat within the channels of larger streams and rivers. Aquatic communities tend to be dominated by collector and grazer macroinvertebrates and larger fish. The Weiser and Little Weiser rivers flow out of mountains and into broad alluvial valleys. These rivers have lower gradients and water velocities than low-order streams, and also have naturally higher sinuosity. Originally, this geomorphology allowed for the deposition of cobble, gravel, sand, and woody debris on alluvial bars, and the formation of floodplains in wider valleys. Aquatic habitats were a mix of cobbles, gravel, sand, and mobile woody debris resulting in many pools, riffles, and glides. The Snake River above Hells Canyon Dam is now a serious of slack pools, with regulated peak flows and an inability to form new gravel and cobble alluvial bars necessary for sustaining native riparian vegetation. It is now a more stable river system with more homogenous aquatic and riparian communities and narrowed floodplains. There are cobble-dominated aquatic habitats where gradients are higher and choked by fine sediment in low gradient areas and the main reservoir pools. The Snake River below Hells Canyon Dam and the lower Salmon

Weiser River, Idaho © 2012 Mike Larkin

River both maintain their free-flowing forms. These free-flowing aquatic systems have narrow but dynamic floodplains and moderate gradients. Aquatic habitats include many pools and glides behind boulder-choked rapids interspersed with cobble riffles and sandy alluvial bars.

The riverine ecosystem supports the following riparian forest, shrubland, and herbaceous vegetation types (see Idaho Vegetation appendix for complete descriptions of each type):

- G796 Northern Rocky Mountain Lowland and Foothill Riparian Forest
- G510 Interior West Ruderal Riparian Forest and Scrub (limited to Lower Weiser Basin)
- G506 Rocky Mountain and Great Basin Montane Riparian Forest
- G526 Rocky Mountain and Great Basin Lowland and Foothill Riparian Shrubland
- G527 Western Montane-Subalpine Riparian and Seep Shrubland
- Foothill and Canyon Meadow and Herbaceous Riparian and Seep Vegetation

Target Viability

Fair. Snake River system is highly altered. Weiser and Little Weiser rivers are highly impacted by human uses and poor stream/riparian management. High sediment loads, actively eroding cut banks and minimal riparian area widths are common in human use landscapes, which ultimately increase water temperatures and decrease water quality. Human-caused sediment loads are significant for the Weiser River, and subsequently the Snake River, especially during high water events, from the prevalence of actively eroding stream banks. More riparian systems are intact and in better condition in forested federal landownerships where stream headwaters lie. Rangeland riparian areas are highly impacted and frequently in fair or poor condition from current and historic concentrated livestock use. The lower Salmon River and Snake River below Hells Canyon Dam are in good condition, including most of its tributaries lying within federal lands and the National Recreation and Wilderness areas.

Lower Salmon River, Idaho © 2007 Chris Murphy

Spotlight Species of Greatest Conservation Need: Chinook Salmon and Steelhead

In the Blue Mountains, Chinook Salmon and Steelhead are native to the Snake and Salmon rivers. Snake River fall-run Chinook Salmon historically were found spawning in the Snake River upriver to the Hagerman Valley and in lower portions of the Salmon and Clearwater rivers. Populations of both using the tributaries above Hells Canyon Dam (and earlier upriver dams) were eliminated with the construction of the Hells Canyon complex in the 1950s. Currently, wild and hatchery Steelhead are found in the Snake River downriver of Hells Canyon Dam.

The construction of dams on the mainstem Snake and Columbia rivers has reduced survival of migrating juveniles and adults, and blocked access to nearly half their historic range. Both species are affected by multiple threats, including changes in run timing of juveniles and adults, impacts from stream diversions, the loss of riparian cover, sedimentation, and artificial barriers to stream passage. The addition of hatchery programs to mitigate for lost habitat and survival of fish has introduced potential genetic impacts to wild stocks.

Brownlee Reservoir of the Snake River, near Brownlee Dam, Idaho © 2015 Anna Owsiak

The status of listed populations of spring/summer-run Chinook Salmon in the Salmon Basin and summer Steelhead in the Salmon and Clearwater Basin was formally evaluated in 2011. At that time NOAA Fisheries determined that these species maintain their Threatened status (50 CFR Parts 223 and 224; August 15 2011). Snake River fall-run Chinook ESU retained its Threatened status in 2011 as well, however a petition to delist the species in 2015 (a result of substantial increases in abundance) presented substantial scientific evidence indicating that the petitioned action may be warranted and a status review was initiated to determine whether delisting is warranted (80 FR22468; April 22 2015).

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

Very High rated threats to Riverine–Riparian Forest & Shrubland in the Blue Mountains

Nutrient enrichment from agriculture

Historic and current agricultural practices have reduced riparian widths that formerly captured and retained nutrient runoff from both agriculture (fertilizers and pesticides) and livestock (animal waste) operations. Current agricultural practices emphasize the use of maximum amounts of fertilizer in general, much of which gets leached into water systems as it moves through the soil. The Snake River acts as the nutrient drain for most of southern Idaho, and Brownlee Reservoir is increasingly impacted by fish disease episodes and die-offs as both water temperatures and nutrient levels increase. The Weiser River has over one quarter of its linear miles of river banks actively eroding (Mike Larkin, pers. comm.), contributing both sediment and nutrients to the system.

Objective	Strategy	Action(s)	Target SGCNs
Manage agricultural nutrient waste to prevent impacts	Capture and retrain nutrients.	Support and promote the use of Farm Bill programs by private landowners that improve ability to retain nutrients and minimize their entry into waterbodies.	Steelhead (Snake River Basin DPS) Sockeye Salmon

Objective	Strategy	Action(s)	Target SGCNs
to water systems.		Increase riparian width and subsequent proper function and condition through the use of exclusion fencing and riparian pasture management for grazed riparian systems, and implement active restoration of riparian habitats. Develop off-site watering sources for livestock in conjunction with exclusion fencing. Encourage and support the use of Best Management Practices for waste and nutrient management in agricultural systems.	(Snake River ESU) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring-run ESU) Western Pearlshell Western Ridged Mussel

High rated threats to Riverine–Riparian Forest & Shrubland in the Blue Mountains

Changes in precipitation & broad-scale hydrologic regimes

Snowpack levels are decreasing and more moisture is falling as rain during winter months, changing hydrologic regimes. Less snowpack equates to more drought stress to native plants, and increases conditions favorable for drought-adapted invasive species to establish. Less precipitation also results in lower in-stream water levels, higher water temperatures, and conversion of cold water systems to warm water systems during summer and irrigation months.

Objective	Strategy	Action(s)	Target SGCNs
Improve landscape resilience to climate change.	Increase water storage capacity within landscape to maintain in-stream flows.	Enhance natural storage of water in headwaters or major rivers and streams. Develop in-stream agreements with irrigation districts/private landowners to retain adequate in-stream flows.	Steelhead (Snake River Basin DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring-run DSU) Mountain Quail Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Western Pearlshell Western Ridged Mussel Terrestrial Gastropod Assemblage* Insect Assemblage**
	Manage for diverse, healthy plant communities able to resist stresses including	Research options for managing riverine systems and riparian forest and shrubland habitats under forecasted climate models. Work with other agencies, organizations, and user groups across the Blue	Steelhead (Snake River Basin DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake

Objective	Strategy	Action(s)	Target SGCNs
	drought and drought-mediated impacts such as invasion by nonnative plants and wildfire.	Mountains to address climate change impacts across landscapes, and refine land management planning options and alternatives down to local level implementable projects where possible. Engage in trust building efforts with impacted stakeholders to develop individual and social support for proposed land management actions and restoration activities (Gordon et al. 2014). Engage in microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate induced stressors. Engage in research to identify plants useful for habitat restoration or enhancement from current climate regimes that are forecast to be local future climate regimes. Support efforts to increase public and political awareness of climate change impacts to local landscapes and wildlife dependent on them.	River spring-run DSU) Mountain Quail Sharp-tailed Grouse Long-billed Curlew Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Western Pearlshell Western Ridged Mussel Terrestrial Gastropod Assemblage* Insect Assemblage**

*Terrestrial Gastropod Assemblage includes these species: Pondsnail (*Stagnicola*) Species Group, Rotund Physa, Nez Perce Pebblesnail, Pixie Pebblesnail, Marbled Disc, Salmon Oregonian, Coeur d'Alene Oregonian, Cottonwood Oregonian.
**Insect assemblage includes these species: A Riffle Beetle (*Bryelmis idahoensis*), Columbia River Tiger Beetle, Monarch, Spur-throated Grasshopper (*Melanoplus*) Species Group, Boise Snowfly, A Caddisfly (*Cheumatopsyche logani*), A Caddisfly (*Eocosmoecus schmidi*), A Caddisfly (*Homophylax auricularis*), A Caddisfly (*Rhyacophila oreia*), A Caddisfly (*Sericostriata surdickae*).

Improper livestock grazing management

Improper livestock grazing within riverine habitats has resulted in the loss of riparian width and plant and wildlife diversity, created opportunities for noxious weed and invasive plant invasion, increased stream temperature and stream width, changed stream hydrology and biotic composition, increased nutrient loads, and lowered water oxygen levels.

Insufficient monitoring (i.e., lack of appropriate rangeland health assessment monitoring data gathered annually on a consistent basis to support trend analysis) also contributes to improper livestock grazing within the Blue Mountains. Consequently, some management decisions are compromised by a lack of appropriate data.

Objective	Strategy	Action(s)	Target SGCNs
Properly manage livestock grazing to maintain riparian health	Implement Best Management Practices for riparian grazing systems and	Support and promote the use of Farm Bill programs by private landowners. Increase riparian width and	Steelhead (Snake River Basin DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake

Objective	Strategy	Action(s)	Target SGCNs
and habitat quality.	grazing infrastructure improvements.	subsequent proper function and condition through the use of exclusion fencing and riparian pasture management for grazed riparian systems. Develop off-site watering sources for livestock in conjunction with exclusion fencing. Conduct fine-scale habitat assessments to inform grazing management. Undertake adaptive management changes related to existing grazing permits where improper grazing is determined to be the causal factor in declining rangeland health.	River fall-run ESU) Chinook Salmon (Snake River spring-run DSU) Mountain Quail Sharp-tailed Grouse Long-billed Curlew Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Western Pearlshell Western Ridged Mussel Terrestrial Gastropod Assemblage* Insect Assemblage**
	Maintain MOU between Idaho State Department of Agriculture (ISDA) and BLM as it pertains to grazing management.	Involve permittees in providing monitoring information, the interpretation of monitoring data, & providing input into grazing management adjustments to meet the goals and objectives of federal land management agencies and the permittees (Sanders 2006).	Steelhead (Snake River Basin DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring-run DSU) Mountain Quail Greater Sage-Grouse Sharp-tailed Grouse Long-billed Curlew Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Western Pearlshell Western Ridged Mussel Terrestrial Gastropod Assemblage* Insect Assemblage**
	Reduce erosion sediment and nutrient loads associated with livestock grazing.	Expand riparian widths through the use of exclusion fencing and active, soft restoration activities to naturally stabilize stream banks and diffuse stream energy during high-water events. Develop off-site watering sources for livestock in conjunction with exclusion fencing. Streamline and improve permitting process for projects intended to	Steelhead (Snake River Basin DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring-run DSU) Mountain Quail Greater Sage-Grouse Sharp-tailed Grouse Long-billed Curlew Lewis's Woodpecker

Objective	Strategy	Action(s)	Target SGCNs
		restore aquatic habitats. Work with Soil and Water Conservation Districts to get a draft Stream Restoration Permit (in process through IDWR) approved and in use. On restoration projects, work with nonriprap materials. Use willow plantings, recontour stream banks, use logs instead of riprap as Adam County Soil and Water Conservation District is doing on the Little Weiser River and IDFG is doing on the Little Salmon River.	Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Western Pearlshell Western Ridged Mussel Terrestrial Gastropod Assemblage* Insect Assemblage**
Support the continued responsible use of federal lands for grazing to maintain open spaces and important habitat conditions (e.g., year-round water sources) that benefit wildlife (WGA Policy Resolution 2015-03).	Implement WGA policy for public lands grazing (for details, see WGA Policy Resolution 2015-03).	Use sound, science-based management decisions for federal lands and base these decisions upon flexible policies that take into account local ecological conditions and state planning decisions.	Steelhead (Snake River Basin DPS) Sockeye Salmon (Snake River ESU) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring-run DSU) Mountain Quail Greater Sage-Grouse Sharp-tailed Grouse Long-billed Curlew Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Western Pearlshell Western Ridged Mussel Terrestrial Gastropod Assemblage* Insect Assemblage**

*Terrestrial Gastropod Assemblage includes these species: Pondsnail (*Stagnicola*) Species Group, Rotund Physa, Nez Perce Pebblesnail, Pixie Pebblesnail, Marbled Disc, Salmon Oregonian, Coeur d'Alene Oregonian, Cottonwood Oregonian.
**Insect assemblage includes these species: A Riffle Beetle (*Bryelmis idahoensis*), Columbia River Tiger Beetle, Monarch, Spur-throated Grasshopper (*Melanoplus*) Species Group, Boise Snowfly, A Caddisfly (*Cheumatopsyche logani*), A Caddisfly (*Eocosmoecus schmidi*), A Caddisfly (*Homophylax auricularis*), A Caddisfly (*Rhyacophila oreia*), A Caddisfly (*Sericostriata surdickae*).

Invasive aquatic plants & invertebrates

In the Blue Mountains, invasive aquatic plants and invertebrates pose a significant threat to Snake River reservoirs, due to their high nutrient loads, warm water temperatures, slow flow rates, and high recreation use patterns. Invasives, especially invasive invertebrates, have the potential to cause significant damage to infrastructure management on dams and water diversion structures, resulting in significant control expenditures once they are in the system. Monitoring has been conducted for invasive invertebrate species such as Zebra Mussel (*Dreissena polymorpha*) and quagga mussel (*Dreissena bugensis*), but they have not yet been detected.

Invasive plants already exist within the Snake River system, including Eurasian watermilfoil (*Myriophyllum spicatum* L.). There is significant potential for additional noxious weeds to invade this system. They too can impact infrastructure management and recreation.

Objective	Strategy	Action(s)	Target SGCNs
Manage invasive species.	Minimize opportunity for additional noxious and invasive species introductions.	Increase efforts to intercept potentially contaminated watercraft before they enter Idaho waterbodies. Continue and expand detection efforts including boat washing stations and inspections. Work with local, state and federal weed control partners to Increase educational efforts about personal responsibility to manage watercraft and actions to prevent transporting invasive species. Use EDRR methods for new invaders.	Western Pearlshell Western Ridged Mussel

Species designation, planning & monitoring

Pixie Pebblesnail

The Idaho population of the Pixie Pebblesnail historically occurred in the Weiser River. The species may potentially be extinct. Little is known about the life history needs of this snail.

Objective	Strategy	Action(s)	Target SGCNs
Determine population status.	Develop survey strategies.	Conduct surveys to determine presence or absence of snail. Gather life history information from which to determine status and life history needs of snail. Make and implement management recommendations based on gathered information if/when snail populations are confirmed.	Pixie Pebblesnail

Target: Springs & Groundwater-Dependent Wetlands

This target contains a subset of groundwater-dependent ecosystems (GDEs), specifically springs and groundwater-dependent slope wetlands (e.g., meadows, seep-fed tree- or shrub-dominated wetlands). Springs are GDEs where groundwater discharges at the ground surface, often through complex subsurface flow paths (Stevens and Meretsky 2008), including both cold and hot (geothermal) springs. Spring-dependent communities of plants and animals often exist where springs emerge. A variety of other wetland types are also dependent on groundwater-fed subsurface flows and seasonal seeps. Within this section, GDE wetlands include fens; marshes, shrublands, and woodland swamps in sloped settings; and wet and mesic meadows. Groundwater-dependent wetlands often occur on sloping land with gradients that range from steep hillsides to nearly imperceptible slopes. Slope wetlands differ from Depressional Wetlands by the lack of closed contours. Groundwater sources can originate from either a regional aquifer or from localized infiltration of surface water (e.g., precipitation, seasonal flooding). Water flow is downslope and unidirectional. Groundwater-dependent wetlands lose water primarily by subsurface outflow, surface flows, and evapotranspiration. Groundwater-dependent wetlands may develop channels, but the channels serve only to convey water away from the groundwater-dependent wetland. Definitions are modified from US Forest Service Gen. Tech. Report WO-86a (March 2012) and Brinson et al. (1995).

Grassland slope spring–seep. Cecil D Andrus WMA, Cambridge, Idaho © Anna Owsiak

In the Blue Mountains, GDE wetlands are important and widespread. Most occurrences of GDEs are in the form of springs and seeps emanating from basalt canyon walls, talus, toeslopes of bluffs, and canyon grassland slopes. These include geothermal springs scattered in the lower Salmon and Snake rivers. Seasonally-moist sloped seeps are widely scattered throughout the section, perched on basaltic bedrock. These form isolated pockets of wet or mesic meadow vegetation within extensive sagebrush steppe or mixed conifer woodlands that are important for a variety of wildlife, including Greater Sage-Grouse, Mountain Quail, and Bighorn Sheep.

The Springs & Groundwater-Dependent Wetlands ecosystem supports the following riparian forest, shrubland, and herbaceous vegetation types (see Idaho Vegetation Appendix for complete descriptions of each type):

- G526 Rocky Mountain and Great Basin Lowland and Foothill Riparian Shrubland
- G527 Western Montane–Subalpine Riparian and Seep Shrubland
- Foothill and Canyon Meadow and Herbaceous Riparian and Seep Vegetation.

Target Viability

Fair. Many spring/seep systems are negatively impacted from concentrated livestock use, resulting in erosion and establishment of nonnative plants. Water content and output of these systems is directly tied to snowpack and rain levels. Changes in hydrologic regimes and weather patterns are impacting spring systems. Spring systems within the federal lands not subjected to grazing by livestock (Hells Canyon Recreation Area and Hells Canyon Wilderness) are often in better condition.

Prioritized Threats and Strategies for Springs & Groundwater-Dependent Wetlands

High rated threats to Springs & Groundwater-Dependent Wetlands in the Blue Mountains

Changes in precipitation & broad-scale hydrologic regimes

Intensified drought due to increasing temperatures and changing precipitation patterns is impacting the ability of these systems to maintain water availability, plant health, and system resiliency. Snowpack levels are decreasing and more moisture is falling as rain during winter months, changing hydrologic regimes. Less snowpack equates to more drought stress to native plants, and increases conditions favorable for drought-adapted invasive species to establish. Spring and seep systems may be lost altogether if drought conditions become severe enough.

Objective	Strategy	Action(s)	Target SGCNs
Improve landscape resilience to climate change.	Manage for diverse, healthy plant communities able to resist stresses including drought and drought mediated impacts such as invasion by nonnative plants and wildfire.	Research options for managing groundwater-dependent wetlands under forecasted climate models. Work with other agencies, organizations and user groups across the Blue Mountains to address climate change impacts across landscapes, and refine land management planning options and alternatives down to local level implementable projects where possible. Engage in trust building efforts with impacted stakeholders to develop individual and social support for proposed land management actions and restoration activities (Gordon et al. 2014). Engage in microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate induced stressors. Engage in research to identify plants useful for habitat restoration or enhancement from current climate regimes that are forecast to be local future climate regimes. Support efforts to increase public and political	Mountain Quail Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Mountain Goat Bighorn Sheep Pondsnail (*Stagnicola*) Species Group Pristine Pyrg Monarch

Objective	Strategy	Action(s)	Target SGCNs
		awareness of climate change impacts to local landscapes and wildlife dependent on them.	

Improper livestock grazing management

Concentrated livestock grazing within Springs & Groundwater-Dependent Wetlands has resulted in the loss of native plant and wildlife diversity, created opportunities for noxious weed invasion, increased sedimentation of springs and loss of water storage capacity at the spring site, and changed biotic composition.

Objective	Strategy	Action(s)	Target SGCNs
Proper livestock grazing management maintains spring/seep integrity and habitat quality.	Reduce concentrated livestock impacts to spring/seep systems.	Support and promote the use of Farm Bill programs by private landowners to develop off site water sources for livestock on private lands. Develop off-site watering sources for livestock in conjunction with exclusion fencing.	Mountain Quail Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Mountain Goat Bighorn Sheep Pondsnail (*Stagnicola*) Species Group Pristine Pyrg Monarch
	Maintain MOU between Idaho State Department of Agriculture (ISDA) and BLM as it pertains to grazing management.	Involve permittees in providing monitoring information, the interpretation of monitoring data, & providing input into grazing management adjustments to meet the goals and objectives of federal land management agencies and the permittees (Sanders 2006).	Mountain Quail Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Mountain Goat Bighorn Sheep Pondsnail (*Stagnicola*) Species Group Pristine Pyrg Monarch

Noxious weeds & invasive annual grasses

Invasive species are considered a primary threat to Sage-Grouse in Idaho in the Governor's Alternative (Otter 2012) and a primary threat to shrubsteppe habitats by the US Fish and Wildlife Service (2014). The State of Idaho has developed *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012).

In the Blue Mountains, noxious weeds and invasive annual grasses (e.g., cheatgrass) have colonized many habitat types, including Springs & Groundwater-Dependent Wetlands. Noxious weed infesting these groundwater-dependent systems include both riparian (Canada thistle), upland species (spotted knapweed , leafy spurge [*Euphorbia esula*]) and invasive grasses. These invaders crowd out native grasses and forbs, are effective at preventing reestablishment of native species, and are easily transported to new locations by human, livestock, and wildlife.

Objective	Strategy	Action(s)	Target SGCNs
Manage noxious and invasive weeds to minimize impacts to system.	Control weeds and restore desirable vegetation in degraded habitats.	Implement *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012). Support the development of a framework for a national invasive species EDRR program (DOI 2105). Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006). Incorporate desirable nonnative plant species capable of outcompeting invasive species as the first transitional step in restoring perennial vegetation at sites dominated by invasive species. Use integrated pest management techniques to treat weeds across the landscape	Mountain Quail Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Pondsnail (*Stagnicola*) Species Group Pristine Pyrg Monarch
	Reduce concentrated livestock use.	Develop off-site watering sources for livestock in conjunction with exclusion fencing to protect sensitive wet areas and spring sources. Actively manage livestock to reduce concentrated use at spring and wetland locations. Use active restoration to improve degraded sites.	Mountain Quail Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Mountain Goat Bighorn Sheep Pondsnail (*Stagnicola*) Species Group Pristine Pyrg Monarch

Target: Agricultural Lands

Portions of this habitat consists of a mosaic of remnant stands of sagebrush and other xeric brush species intermixed with rangeland dominated by invasive annual grasses, including cheatgrass, medusahead, jointed goatgrass (*Aegilops cylindrical*), and ventenata (*Ventenata dubia*), but also includes native bunchgrasses and forbs, and planted desirable nonnative grasses and forbs such as intermediate wheatgrass (*Thinopyrum intermedium*) and alfalfa (*Medicago sativa*). These lands are primarily used for dryland livestock grazing and planted nonnative grasslands are common on Conservation Reserve Program lands. The other portion of this habitat consists of historically wet meadows and valley bottoms now converted to working agricultural lands, including irrigated pastures, hay, and crop fields.

Irrigated and dryland agriculture, and private foothill grazing lands typical of this section. Cambridge, Idaho © 2012 Anna Owsiak

Most irrigated agricultural lands lie within river valleys. These irrigate lands provide important habitat for Long-bill Curlew and foraging Greater Sage-Grouse, especially irrigated alfalfa fields.

Invasive annuals are particularly well-established on these rangelands at lower elevation and south-facing slopes and ridges, and the associated fire regime in this system has resulted in the functional loss of shrubs over large areas. Consequently, only remnant stands of sagebrush remain with much of the understory dominated by cheatgrass. Historic fires have been reseeded with crested wheatgrass (*Agropyron cristatum* [L.] Gaertn.) and other nonnative grass species. Agricultural lands contains some remnant Sage-Grouse habitats, characterized as General Sage-Grouse Habitat Management Zones as defined by the Governor's Alternative (see p. 6, Otter 2012). Sharp-tailed Grouse (*Tympanuchus phasianellus*) occupy a variety of steppe habitats and winter in deciduous shrubs (e.g., chokecherry [*Prunus virginiana* L.])at higher elevations. Sage-Grouse winter in remnant steppe habitat in the Crane Creek/Indian Valley area. Managing rangeland plant diversity and wildfire are priorities.

Target Viability

Fair to Good. Large expanses of dryland habitat have been converted to stands of invasive annual grasses and subjected to altered fire regimes, which result in the functional loss of shrubs. Some dryland areas remain dominated by native vegetation, but they are mostly isolated patches. Some habitat is being lost by conversion to housing and other development. Invasive plants common to irrigated and dry agricultural lands include Canada thistle (*Cirsium arvense*), scotch thistle (*Onopordum acanthium*), and rush skeletonweed. Changes in snowpack and moisture patterns may have greater impacts to these habitats in the future.

Prioritized Threats and Strategies for Agricultural Lands

High rated threats to Agricultural Lands in the Blue Mountains

Changes in precipitation & broad-scale hydrologic regimes

Intensified drought due to increasing temperatures and changing precipitation patterns is increasing the vulnerability of this habitat to wildfire and noxious weed and invasive grass invasion. Wildfire scope and severity is increasing. Snowpack levels are decreasing and winter temperatures are increasingly milder, creating conditions favorable for pathogen insect survival and invasive annual grasses. More moisture is falling as rain during winter months, changing hydrologic regimes within this habitat and in lower elevation habitats with headwaters within this section. Less snowpack equates to more drought stress to native plants, and increases conditions for drought-adapted invasive species to establish.

Objective	Strategy	Action(s)	Target SGCNs
Improve landscape resilience to climate change.	Manage for diverse, healthy plant communities able resist changing and forecasted environmental conditions. Conditions include drought and drought-mediated impacts such as invasion by nonnative plants and wildfire.	Use desirable nonnative vegetation and seed sources on rangeland improvement projects able to out-compete invasive annual grasses common to agricultural rangelands. Manage fuel loads to reduce severity of wildfire while still meeting rangeland health standards. Install drought tolerant green strip vegetation in strategic locations within the landscape to assist in managing wildfire. Work with other agencies, organizations, and user groups across the Blue Mountains to address climate change impacts across landscapes, and refine land management planning options and alternatives down to local level implementable projects where possible. Engage in trust building efforts with impacted stakeholders to develop individual and social support for proposed land management actions and restoration activities (Gordon et al. 2014). Engage in microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate induced stressors. Engage in research to identify plants useful for habitat restoration or enhancement from current climate regimes that are forecast to be	Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Long-billed Curlew Burrowing Owl Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Southern Idaho Ground Squirrel Monarch

Objective	Strategy	Action(s)	Target SGCNs
		local future climate regimes. Support efforts to increase public and political awareness of climate change impacts to local landscapes and wildlife dependent on them. Support exploring options for managing livestock grazing in this habitat under forecasted climate models (i.e., drought conditions). Work with agencies (NRCS), organizations (Soil and Water Conservation Districts), and livestock operators to use this information to both be proactive and refine land management planning options and alternatives down to local level implementable projects.	

Species designation, planning & monitoring

The Southern Idaho Ground Squirrel (SIGS) would benefit from the additional management actions identified below:

Objective	Strategy	Action(s)	Target SGCNs
Maintain dryland plant diversity and productivity	Manage livestock use to promote forage availability during critical SIGS foraging periods.	Work with livestock operators to adjust grazing regimes to maximize retention of early season (Feb-June) forbs and grass diversity and productivity.	Southern Idaho Ground Squirrel
	Improve existing habitat quality.	Design and implement rangeland restoration projects that maximize plant species diversity.	Southern Idaho Ground Squirrel

Target: Bighorn Sheep

Bighorn Sheep is an iconic western species, frequently associated with wilderness and the steep, rugged canyon country of Hells Canyon and the Salmon River. Sheep were native to both the lower Salmon and Snake river canyons. The Hells Canyon population was extirpated in the early 1900s, with the last Bighorn Sheep reported killed there in 1925. Reintroductions of Bighorn Sheep to Hells Canyon have increased populations there, but disease issues continue to limit populations in both the Snake and lower Salmon rivers.

Most Bighorn Sheep habitat lies within federal- and state-managed lands, and portions are in good condition. Changes in climate and historic fire cycles are impacting Bighorn Sheep habitat. Larger, more severe wildfires are becoming more frequent, and annual grass and noxious weed invasion has occurred in habitats below about 1,200 m (4,000 ft) elevations. Habitat modeling indicates the Snake and Salmon rivers could support higher numbers of Bighorn Sheep than both currently do.

Bighorn Sheep ram, Cecil D Andrus Wildlife Management Area, Cambridge, Idaho © 2009 Ken Miracle

Bighorn Sheep populations are managed in Idaho under a separate species management plan (IDFG Bighorn Sheep Management Plan 2010). Sheep occurrence in the Blue Mountains is defined within 2 Population Management Units (PMUs), described in detail in the Bighorn Sheep Management Plan (2010): Hells Canyon and the Lower Salmon River. In addition, Idaho actively participates in the Hells Canyon Initiative, a multistate and multiagency effort that is working to address issues impacting Bighorn Sheep in Hells Canyon and ultimately improve Bighorn Sheep populations.

Target Viability

Poor. The overall population status of Bighorn Sheep is well below objectives for each of the 2 PMUs in this section. Disease, specifically bronchopneumonia, is the primary factor limiting population growth. The most robust populations are in the northern portion of Hells Canyon on the Snake River. The last few remaining Bighorn Sheep on the south portion of the section near Brownlee Dam were removed in 2015. IDFG will evaluate future transplants intended to reestablish this population once private domestic sheep issues local to the area are addressed. Habitats traditionally occupied by Bighorn Sheep are in good to very good condition overall; most are in federal ownership and have some level of special designation (National Recreation, Wild River and Wilderness areas). On the northern and southern portions of this target habitat, annual invasive grasses are dominant below about 1,200 m (4,000 ft). Yellow star-thistle is widespread throughout the northern end of the section, and there is potential for additional large-scale invasion by other noxious weeds including rush skeletonweed and spotted knapweed . Wildfire scope and severity are increasing from changes to precipitation and climate patterns, and from lengthening fire return intervals.

Prioritized Threats and Strategies for Bighorn Sheep

Very High rated threats to Bighorn Sheep in the Blue Mountains

Disease transmission

Disease was a significant factor in the historic decline of Bighorn Sheep and is a key factor limiting recovery throughout Idaho (IDFG 2010). Bronchopneumonia increases adult and lamb mortality, affecting Bighorn Sheep population stability in the Blue Mountains.

Bighorn Sheep are vulnerable to organisms carried by healthy domestic sheep and goats, and once these organisms are transmitted, there is no effective treatment in Bighorn Sheep. Minimizing or eliminating the potential for contact between domestic sheep and goats and Bighorn Sheep is the most important management direction for Bighorn Sheep populations (IDFG 2010). Even with aggressive efforts to separate them, foraying wild sheep could come in contact with domestic sheep and goats, and straying domestic sheep and goats with Bighorn Sheep. Another possible source of disease transmission could be incidental contacts with pack goats on backcountry trails. Both the Snake and Salmon rivers have backcountry trails within their boundaries.

All populations in Hells Canyon have experienced intermittent adult mortality and low lamb recruitment due to pneumonia-caused mortalities (IDFG 2010).

Objective	Strategy	Action(s)	Target SGCNs
Work to reduce the effects of disease on Bighorn Sheep populations.	Advocate and work towards maintaining spatial and temporal separation between Bighorn Sheep and domestic sheep and goats.	Continued implementation of Interim Strategy for Managing Separation Between Bighorn Sheep and Domestic Sheep in Idaho, (IDFG and ISDA 2008). Provide federal land managers with Bighorn Sheep data to assist with allotment management. Work with land management agencies to identify appropriate alternative management options. (IDFG 2010). Strategically purchase or negotiate conservation easements on key private parcels to remove the potential for contact between Bighorn Sheep and domestic sheep. Work with a key representative(s) from the livestock production sector to act as a mediator between agencies and producers to open the door to better communications between both groups on science and management issues.	Bighorn Sheep

Objective	Strategy	Action(s)	Target SGCNs
		Engage in trust building efforts with impacted stakeholders to develop individual and social support for proposed land management actions and restoration activities (Gordon 2014). Use domestic goats for weed control in low or no risk areas only. Work with Idaho Power Company to remove potential for domestic sheep or goats to be present on their private housing complexes associated with Brownlee, Oxbow, and Hells Canyon Dams. Work with ranchers to seasonally coordinate grazing patterns (WAFWA 2007; IDFG and ISDA 2008) Capture or euthanize wild sheep and stray domestic sheep or goats if found in an area (removal zone) where contact is likely (IDFG 2010). Encourage double-fencing where appropriate and practical (WAFWA 2007; IDFG and ISDA 2008). Share latest research on wild/domestic disease transmission and provide recommendations for separation (IDFG 2010). Seek out and speak to organized pack goat groups about risk of disease transmission. Develop signs for trailheads with information on avoiding contact between Bighorn Sheep and domestic pack goats.	

High rated threats to Bighorn Sheep in the Blue Mountains

Noxious weeds & invasive annual grasses

In the Blue Mountains, noxious weeds and invasive annual grasses (e.g., cheatgrass) have colonized many habitat types, including those important for Bighorn Sheep. Yellow star-thistle, spotted knapweed and rush skeletonweed are three weed species especially adept at colonizing and dominating habitats important to Bighorn Sheep. These invaders crowd out native grasses and forbs, are effective at preventing reestablishment of native species, and are easily transported to new locations by human, livestock, and wildlife activities. Concentrated livestock grazing on private and public lands has impacted springs, seeps, and riparian areas, creating disturbance opportunities for noxious weed invasion at these sites.

Biocontrol agents are essential to managing noxious weeds in the rugged canyon lands of the Snake and Salmon rivers because of their limited access and steep terrain. It will be increasingly important to request and support efforts to further expand and fund the development of biocontrol agents.

Objective	Strategy	Action(s)	Target SGCNs
Effectively control and restore areas impacted by invasive and noxious weeds at rates higher than invasion spread rates.	Control and manage established noxious and invasive weeds.	Support the development of a framework for a national invasive species EDRR program (DOI 2105). Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006). Incorporate desirable nonnative plant species capable of outcompeting invasive species as the first transitional step in restoration at sites dominated by invasive species, especially annual grasses. Coordinate and cooperate with state and federal agencies to apply integrated pest management techniques to treat weeds across the greater landscape with emphasis on biocontrol in area with low accessibility. Support research and development of additional biocontrol agents, especially agents for yellow star-thistle. Explore the use of MB 906®, a bacteria soil amendment for the suppression of annual grass, in restoration efforts; commercially available fall 2015. Develop, participate in, and build upon multiagency/organization partnerships, including Cooperative Weed Management Areas to address weed issues across land ownership and management boundaries.	Bighorn Sheep
	Reduce concentrated livestock use at springs and riparian areas within grazed Bighorn Sheep habitat.	Develop off-site watering sources for livestock in conjunction with exclusion fencing to protect sensitive wet areas and spring sources. Work with livestock producers to reduce concentrated livestock use at spring and riparian locations. Use active restoration to improve degraded sites.	Bighorn Sheep

Target: Northern Idaho Ground Squirrel

The Northern Idaho Ground Squirrel is a rare, endemic small mammal that occurs at <60 sites in Adams and Valley counties in west-central Idaho. The Blue Mountains supports all currently known extant Northern Idaho Ground Squirrel colonies except one, making this species a critically important conservation target for this section. Northern Idaho Ground Squirrel was listed as Threatened under the Endangered Species Act in April 2000, with a Recovery Plan published in 2003 (US Fish and Wildlife Service 2003). Colonies are distributed in the Bear Creek, Lick Creek, Lost Creek, Weiser River, and Mud Creek drainages, where Northern Idaho Ground Squirrel inhabits dry montane meadows, such as open areas of grasses and forbs surrounded by ponderosa pine (*Pinus ponderosa*) or Douglas-fir (*Pseudotsuga menziesii*) forest (Yensen 1991). The US Forest Service manages land on which roughly half of the known sites occur, with the remaining sites on private land, including those dedicated to commercial timber production and grazing.

Conservation direction for Northern Idaho Ground Squirrel is detailed in the Recovery Plan (US Fish and Wildlife Service 2003). Recovery goals address population size, spatial distribution, and security, as well habitat restoration needed to sustain and expand populations.

Target Viability

Fair. The number of known occupied sites has increased since federal listing, in part a result of more consistent survey effort but also due to changing population distribution on the landscape. However, many of these sites support fewer than 20 individuals and remain geographically and genetically isolated from one another. This makes them vulnerable to genetic drift, inbreeding, and attendant loss of viability and at risk to outbreaks of disease or local extirpation due to natural population fluctuations. The degree to which plague is suppressing population growth is unknown but currently being investigated through research. Population size, distribution, and security are substantially below recovery goals set forth in the recovery plan. Populations on private land (fully half the number of known sites) are at risk from rural residential development. The Payette National Forest prioritizes management to improve NIDGS habitat, but appropriate timber management prescriptions are still to be tested and take time to implement, particularly because prescribed fire is a critical component of habitat improvement.

Northern Idaho Ground Squirrel, Lick Creek Lookout, Idaho © 2013 Carolyn Gillan

Prioritized Threats and Strategies for Northern Idaho Ground Squirrel

High rated threats to Northern Idaho Ground Squirrel in the Blue Mountains

Historic & current fire suppression

Fires historically burned at more frequent intervals (Havlina 1995), resulting in a more patchy mosaic of different seral stages and maintained natural openings. Longer return fire intervals resulting from fire suppression have allowed conifer invasion into historic grass and shrublands and in some cases are preventing successful shrub regeneration (Havlina 1995). This encroachment has reduced the amount of habitat available to ground squirrels and closed off dispersal corridors between colonies (Sherman and Runge 2002). Altered fire cycles favor invasive plants and habitat conversion to less desirable species, resulting in poorer quality food plants that lack the nutritional value squirrels need to sustain prolonged hibernation (Sherman and Runge 2002, Yensen 2004).

Objective	Strategy	Action(s)	Target SGCNs
Restore historic fire intervals	Increase fire frequency on the landscape.	Work with federal agencies to develop and implement policies that move fire management from reactive to proactive. Increase number of low intensity controlled burns to create a better seral mosaic across Northern Idaho Ground Squirrel habitat and within the greater landscape. Strategically develop projects to minimize the potential for noxious weed invasion. Engage in trust building efforts with impacted stakeholders to develop individual and social support for proposed land management actions and restoration activities (Gordon et al. 2014).	Northern Idaho Ground Squirrel

Rural development

Populations on private land (fully half the number of known sites) are at risk from rural residential development. Both Adams and Valley counties contain rural private lands desired for housing development. There has been some subdivision of agricultural lands for housing development, especially during the height of the housing bubble (about 2006), and commercial timber lands are increasingly managed for real estate as part of company portfolios. Several key private properties with Northern Idaho Ground Squirrel sites are already on the real estate market, and could potentially be subdivided. Should several private properties that currently host the most robust and largest numbers of NIDGS be subdivided, the impacts could be catastrophic for population security and longevity.

Objective	Strategy	Action(s)	Target SGCNs
Private lands host robust and secure populations of Northern Idaho Ground Squirrel.	Maintain intact habitat for Northern Idaho Ground Squirrel on privately owned lands.	Work with private landowners to develop conservation easements on private lands supporting Northern Idaho Ground Squirrel to secure and protect critical habitat.	Northern Idaho Ground Squirrel

Dam construction & inundation

A key Northern Idaho Ground Squirrel colony is located at Lost Valley Reservoir. The reservoir serves as the headwaters of the Weiser River and is an irrigation storage reservoir for Council, Cambridge, and Midvale, Idaho. Proposals to raise the reservoir have periodically been brought forward, including in the past year when it was brought out as a possible alternative to the construction of Galloway Dam, near Weiser, Idaho.

The Lost Valley Northern Idaho Ground Squirrel colony occupies habitat within the proposed new high water mark at the 1,463 m (4,800 ft) contour line. Raising the reservoir's height to this mark would flood out a significant portion of this colony and inundate habitat that the US Forest Service has invested significant resources in improving to facilitate Northern Idaho Ground Squirrel expansion. The Lost Valley colony is believed to function as a source population from which NIDGS dispersal has occurred. The proposed reservoir expansion would impede population recovery from impacts at this Northern Idaho Ground Squirrel site (Northern Idaho Ground Squirrel Technical Working Group Position Statement #1 2008).

Objective	Strategy	Action(s)	Target SGCNs
Continue work to move Northern Idaho Ground Squirrel populations towards recovery goals.	Make sure importance of this Northern Idaho Ground Squirrel population to recovery is understood and the impacts to recovery if this site is impacted by proposed water storage augmentation actions.	Keep local political leaders informed of current population status and recovery actions conducted to move the species towards recovery. Continue working with federal land managers to increase acres of suitable Northern Idaho Ground Squirrel habitats for current populations to expand into.	Northern Idaho Ground Squirrel

Target: Southern Idaho Ground Squirrel

The Southern Idaho Ground Squirrel is endemic to approximately 291,500 ha (720,500 acres) in Gem, Payette, Washington, and Adams counties, Idaho (US Fish and Wildlife Service 2014), concentrated in the foothills north of the Payette River from Weiser east to Squaw Butte. Investigations into the status of this species began in the 1980s (Yensen 1985). At that time, SIDGS populations were suspected to be declining, but not necessarily imperiled. During the late 1990s, however, resurveys indicated a dramatic decline (Yensen 1999 2000), and this information led to this taxon being designated a candidate for listing under ESA in 2001 (Fed Regist. 66:54808–54832).

Southern Idaho Ground Squirrel © US Fish and Wildlife Service

Southern Idaho Ground Squirrel populations occur in a mosaic of shrubland and grassland habitats common to foothills rangelands and pastures. They are also frequently associated with mowed fields, primarily alfalfa, found in drainage and valley bottoms. In some areas, habitat changes are driven by invasion of weedy annual grasses—particularly cheatgrass and medusahead—which displace native plants. The reduced plant diversity affects forage value and alters the timing of plant productivity because the nonnative grasses tend to senesce in late spring (e.g., late May through early June), a period when Southern Idaho Ground Squirrels are completing the accumulation of energy reserves prior to entering estivation in June.

Target Viability

Good. Populations have rebounded from an apparent 1998–2001 population crash and now occupy most of the historical distribution. The driver of the population crash, however, has not been determined.

Prioritized Threats and Strategies for Southern Idaho Ground Squirrel

High rated threats to Southern Idaho Ground Squirrel in the Blue Mountains

Noxious weeds & invasive annual grasses

In the Blue Mountains, noxious weeds and invasive annual grasses (e.g., cheatgrass) have colonized many habitat types, including those important for Southern Idaho Ground Squirrel. These invaders crowd out native grasses and forbs, are effective at preventing reestablishment of native species, and combined with changing precipitation patterns, are altering fire cycles and increasing fire return intervals. This is also preventing the reestablishment of sagebrush and other brush species once they are lost to wildfire and/or other causes.

Objective	Strategy	Action(s)	Target SGCNs
Effectively control and restore areas impacted by invasive and noxious weeds at rates higher than invasion spread rates.	Control and manage established noxious and invasive weeds.	Support the development of a framework for a national invasive species EDRR program (DOI 2105). Promote certified weed-free seeds/forage. Incorporate desirable nonnative plant species capable of outcompeting invasive species as the first transitional step in restoration at sites dominated by invasive species, especially annual grasses. Use integrated pest management techniques to treat weeds across the greater landscape with emphasis on biocontrol in area with low accessibility. Support research and development of additional biocontrol agents, especially for annual grasses. Explore the use of MB 906®, a bacteria soil amendment for the suppression of annual grass, in restoration efforts; commercially available fall 2015. Develop, participate in, and build upon multiagency/organization partnerships, including Cooperative Weed Management Areas, to address weed issues across land ownership and management boundaries.	Southern Idaho Ground Squirrel

Sylvatic plague

Wildlife diseases have the potential to cause synchronized population declines across all or part of a species range. Plague is of particular interest considering that it is caused by a pathogen that is nonnative to North America and is especially important to sciurid populations. Plague may occur broadly in mammalian assemblages and remain undetected with standard assays (Biggins et al. 2010). Some sciurid rodents—notably ground squirrels and prairie dogs—tend to be among species most susceptible to plague, and occurrence of the pathogen in a population may be enzootic (when the infection is maintained in the population without the need for external inputs). This disease may mediate population dynamics and community interactions by affecting fitness differentially among species within the small mammal community.

Objective	Strategy	Action(s)	Target SGCNs
Plague is managed to a level of few to no impacts on Southern Idaho Ground Squirrel populations.	Evaluate the effects of enzootic plague occurrence on Southern Idaho Ground Squirrel populations.	Characterize the small mammal community sympatric with Southern Idaho Ground Squirrel populations. Characterize flea loads on Southern Idaho Ground Squirrel and other species within the sympatric small mammal community. Experimentally evaluate the effects of enzootic plague on Southern Idaho Ground Squirrel survival rates and competitive interactions within the small mammal community.	Southern Idaho Ground Squirrel
	Manage plague epizootic outbreaks to maximize population recovery.	Develop and implement approach for detecting and evaluating mortality events to detect plague epizootic outbreaks. Use insecticidal dusts strategically to reduce mortality in key areas in the event of an epizootic outbreak.	Southern Idaho Ground Squirrel
	Treat Southern Idaho Ground Squirrel to prevent plague outbreaks.	Evaluate experimental oral inoculation through food pellets being tested in conservation programs directed at black-footed ferrets. Once feasible, may be effective for use on Southern Idaho Ground Squirrel.	Southern Idaho Ground Squirrel

Target: Pollinators

Pollinators provide an essential ecosystem service which benefits agricultural producers, agricultural consumers, and gardeners (Mader et al. 2011) in the Blue Mountains. A wide range of taxa, including birds and numerous insects provide pollination activities in Idaho. Three butterflies (Johnson's Hairstreak, Gillette's Checkerspot, and Monarch), 8 bees (Yellow Bumble Bee, Hunt's Bumble Bee, Morrison's Bumble Bee, Western Bumble Bee, Suckley's Cuckoo Bumble Bee, 2 Miner Bees, and a Mason Bee) and 1 moth comprise the group of 12 SGCN pollinators known to occur within this section.

Many pollinators, but particularly bees, are known to be experiencing population declines throughout North America (Mader et al. 2011) and those declines may be occurring within the Blue Mountains as well. Population declines and local die offs occur for a variety of reasons including habitat loss, pesticide exposure, and climate change (Mader et al. 2011). The Blue Mountains is ripe with opportunity to address these threats and improve the status of SGCN pollinators. Farmers, land managers, roadway authorities, municipalities, and homeowners can all contribute to pollinator conservation in direct and productive ways.

Target Viability

Fair. Many pollinators are declining rangewide.

Prioritized Threats and Strategies for Pollinators

Very High rated threats to Pollinators in the Blue Mountains

Pesticides

Pollinators are negatively affected by pesticides, especially insecticides. Impacts occur from absorbing pesticides through the exoskeleton, drinking nectar containing pesticides, and carrying pollen laced with pesticides back to colonies (Mader et al. 2011). Neonicotinoids are the most widely used insecticide on earth, and are particularly harmful to bee populations in causing dramatic die-offs (Hopwood et al. 2012,Mineau and Palmer 2013). Neonicotinoids are used on crops, pet collars, home and garden products, and as seed coatings, to name a few of their applications. They are often used pre-emptively, as in the case of seed coatings, instead of when pests are actually present. Although neonicotinoids are much less acutely toxic to farm workers, they are highly toxic to wildlife. A single corn seed coated with neonicotinoids can kill 80,000 bees and up to 10 birds (Mineau and Palmer 2013). Sublethal doses also can have significant, chronic reproductive impacts (Mineau and Palmer 2013). Neonicotinoids have also been detected in streams in Idaho (Hladik and Kolpin 2015). This genre of insecticides is suspected to play a part in the significant decline of insectivorous birds, but research is needed.

Western Bumble Bee © Derrick Ditchburn (The Xerces Society)

Significant benefits to pollinators can be achieved through reducing the use of, and pollinator exposure to, pesticides (Mader et al. 2011).

Objective	Strategy	Action(s)	Target SGCNs
Reduce native pollinator exposure to pesticides (Mader et al. 2011).	Encourage adherence to the principles of integrated pest management and encourage use of environmentally benign pesticides at small scales.	Conduct and support educational activities which encourage potential pesticide applicators to eliminate use of pesticides where practical, apply the minimum amount of chemical necessary and apply when pollinators are least active (i.e., nighttime, when flowers are not blooming) (Mader et al.	A Miner Bee(*Perdita barri*) A Miner Bee (*P. salicis euxantha*) A Miner Bee (*P. wyomingensis sculleni*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) A Moth (*Grammia eureka*)

Objective	Strategy	Action(s)	Target SGCNs
		2011). Specifically target urban homeowners in educational efforts in the elimination of pesticide use, or proper application of pesticides (Mader et al. 2011). Conduct and support workshops which discuss pesticides in relation to other pollinator habitat management concerns (Mader et al. 2011).	Johnson's Hairstreak Monarch Gillette's Checkerspot
Reduce native pollinator exposure to pesticides on IDFG administered property (Mader et al. 2011).	Implement measures to reduce or eliminate pesticide use on IDFG Wildlife Management Areas and other properties (Mader et al. 2011).	Use the minimum recommended amount of pesticide (Mader et al. 2011). Apply pesticides at times when pollinators are least active such as nighttime, cool periods, low wind activity, and when flowers are not blooming (Mader et al. 2011). Mow or otherwise remove flowering weeds before applying pesticides (Mader et al. 2011).	A Miner Bee(*Perdita barri*) A Miner Bee (*P. salicis euxantha*) A Miner Bee (*P. wyomingensis sculleni*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) A Moth (*Grammia eureka*) Johnson's Hairstreak Monarch Gillette's Checkerspot
Eliminate use of neonicotinoid insecticides (Hopwood et al. 2012).	Increase public education and awareness on the detrimental effects of neonicotinoids on bees (Hopwood et al. 2012).	Develop and distribute educational material. Distribute to municipalities, counties, agriculture producers, habitat managers, and other property owners (Hopwood et al. 2012). Prohibit use of neonicotinoids on state lands, particularly IDFG Wildlife Management Areas.	A Miner Bee(*Perdita barri*) A Miner Bee (*P. salicis euxantha*) A Miner Bee (*P. wyomingensis sculleni*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) A Moth (*Grammia eureka*) Johnson's Hairstreak Monarch Gillette's Checkerspot

Habitat loss

Pollinators require foraging and nesting habitat. Providing both types of habitat within close proximity to each other is the best way to ensure pollinator success. Protecting, enhancing, and creating pollinator habitat can be a fun and rewarding way to engage with local communities. Educating landowners and managers about techniques to reduce land management impacts to pollinators is an essential component to pollinator habitat management.

Objective	Strategy	Action(s)	Target SGCNs
Reduce impact of land management practices on pollinators (Mader et al. 2011).	Educate about, and implement practices which benefit pollinators. (Mader et al. 2011).	Work with land managers and livestock grazers to maintain diverse native forb communities on public and private rangelands. Support the development of outreach materials that provide information on grazing methods that support pollinators. Where prescribe fire is used implement pollinator friendly burning protocols including rotational burning of ≤30% of each site every few years, leave small unburned patched intact, avoid burning too frequently (no more than every 5–10 years), avoid high intensity fires unless the burn goal is tree removal. Work with Idaho Transportation Department to implement proper roadside pollinator habitat management (Mader et al. 2011).	A Miner Bee(*Perdita barri*) A Miner Bee (*P. salicis euxantha*) A Miner Bee (*P. wyomingensis sculleni*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) A Moth (*Grammia eureka*) Johnson's Hairstreak Monarch Gillette's Checkerspot
Conserve and improve existing pollinator habitat.	Identify and delineate high value pollinator habitats for use in management planning decisions.	Map existing major known pollinator habitat. Provide maps of important pollinator habitats to area land managers. Identify and recognize landowners providing pollinator habitat. Support and provide habitat management educational opportunities (Mader et al. 2011) to public and private land managers. Support and conduct surveys for native milkweed; map locations and provide to land managers for local level decision making. Initiate seed saving program (Mader et al. 2011). Conduct monarch monitoring on IDFG Wildlife Management Areas to determine presence and use of existing milkweed patches.	A Miner Bee(*Perdita barri*) A Miner Bee (*P. salicis euxantha*) A Miner Bee (*P. wyomingensis sculleni*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) A Moth (*Grammia eureka*) Johnson's Hairstreak Monarch Gillette's Checkerspot
	Increase acres of high quality pollinator habitat.	Increase milkweed populations through seedings and plantings. Use grazing to maintain open, forb-dominated plant communities that support a diversity of pollinator insects, through the correct use timing and intensity of stocking rate (Black et al. 2006). Promote the use of Farm Bill Programs for pollinator conservation. (Stine et al. 2015)	A Miner Bee(*Perdita barri*) A Miner Bee (*P. salicis euxantha*) A Miner Bee (*P. wyomingensis sculleni*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis*

Objective	Strategy	Action(s)	Target SGCNs
		Increase the use of biocontrol agents as part of integrated pest management for noxious weed control to reduce herbicide use and impacts.	*orthognathus*) A Moth (*Grammia eureka*) Johnson's Hairstreak Monarch Gillette's Checkerspot
Create new urban and rural pollinator habitat.	Develop programs to encourage urban landowners to create pollinator habitat.	Provide pollinator habitat workshops for homeowners and rural land owners. Provide pollinator educational materials for homeowners and landowners. Develop and support incentives for homeowners to create pollinator habitat in urban yards. Work with municipalities and businesses to create urban pollinator habitat.	A Miner Bee(*Perdita barri*) A Miner Bee (*P. salicis euxantha*) A Miner Bee (*P. wyomingensis sculleni*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) A Moth (*Grammia eureka*) Johnson's Hairstreak Monarch Gillette's Checkerspot

High rated threats to Pollinators in the Blue Mountains

Noxious weeds & invasive annual grasses

Invasive species have the ability to outcompete and exclude native forbs and flowering shrubs important to native pollinators. Habitats under stress from changing temperature and precipitation patterns, increased wildfire scope and severity, and a host of other stressors, are more susceptible to invasion. Although noxious weeds may provide pollinators with alternative food sources and breeding habitat, it is not well known which, if any pollinator species can sustain themselves within invasive dominated habitats.

Objective	Strategy	Action(s)	Target SGCNs
Increase understanding of how altered landscapes are used by and sustain pollinators.	Understand how noxious and invasive plants are used by native pollinators.	Develop research protocols to determine the use of nonnative plants by native pollinators and whether nonnative plants are able to meet pollinator life history requirement in impacted habitats. Share results with applicable land and pollinator managers. Use results in land management planning.	A Miner Bee(*Perdita barri*) A Miner Bee (*P. salicis euxantha*) A Miner Bee (*P. wyomingensis sculleni*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee

Objective	Strategy	Action(s)	Target SGCNs
			A Mason Bee (*Hoplitis orthognathus*) A Moth (*Grammia eureka*) Johnson's Hairstreak Monarch Gillette's Checkerspot
Sustain and improve habitats for native pollinators. Restore diverse forb communities to degraded habitats.	Control and manage established noxious and invasive weeds, and prevent further invasion of minimally impacted habitats.	Support the development of a framework for a national invasive species EDRR program (DOI 2105). Use Integrated Pest Management techniques to treat weeds across the greater landscape with emphasis on biocontrol in area with low accessibility. Support research and development of additional biocontrol agents to reduce the need for pesticide use to control noxious weeds. Explore the use of MB 906®, a bacteria soil amendment for the suppression of annual grass, in restoration efforts; commercially available fall 2015. Promote/require the use of certified weed-free seeds/forage. Incorporate desirable nonnative plant species capable of outcompeting invasive species as the first transitional step in restoration at sites heavily dominated by invasive species. Develop and build upon multiagency/organization partnerships, including Cooperative Weed Management Areas, to address weed and restoration issues across land ownership and management boundaries, and to provide educational opportunities on the impacts of invasive plants on native pollinators. Work with wildland fire and land managers to proactively take steps to manage wildfire potential in high quality pollinator habitat on public and private lands. This includes developing strategic firebreaks, green stripping and other actions aimed at reducing the scope and severity of wildfires and acres impacted.	A Miner Bee(*Perdita barri*) A Miner Bee (*P. salicis euxantha*) A Miner Bee (*P. wyomingensis sculleni*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) A Moth (*Grammia eureka*) Johnson's Hairstreak Monarch Gillette's Checkerspot

Species designation, planning & monitoring

Actions to enhance pollinator habitat will be most effective with knowledge of the current status of SGCN populations. Initiation of long term monitoring will allow a continuous data stream to assess conservation activities.

Objective	Strategy	Action(s)	Target SGCNs
Determine pollinator population status.	Conduct surveys and implement long term pollinator monitoring program.	Conduct surveys to identify colonies and breeding locations of pollinator SGCN. Research critical host plants for pollinator SCGN. Use information gathered in land use management decisions. Protect known breeding sites for native pollinators.	A Miner Bee(*Perdita barri*) A Miner Bee (*P. salicis euxantha*) A Miner Bee (*P. wyomingensis sculleni*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis orthognathus*) A Moth (*Grammia eureka*) Johnson's Hairstreak Monarch Gillette's Checkerspot

Blue Mountains Section Team

A small working group developed an initial draft of the Blue Mountains Section Plan (Miradi v. 0.12), which was then reviewed by a wider group of partners and stakeholders during a 2-day workshop held at the Idaho Department of Fish and Game Headquarters office, Boise, Idaho in August 2014 (this input was captured in Miradi v. 0.14). That draft was then subsequently distributed for additional stakeholder input including a half-day meeting in December 2014. Since then, we have continued to work with key internal and external stakeholders to improve upon the plan. Materials in this document are based on Miradi v. 0.35. Individuals, agencies, and organizations involved in this plan are listed in Table 7.3.

Table 7.3 Individuals, agencies, and organizations involved in developing this plan [a]

First name	Last name	Affiliation
Rita	Dixon* [b]	Idaho Department of Fish and Game, Headquarters
Anna	Owsiak*	Idaho Department of Fish and Game, Southwest Region
Bill	Bosworth*	Idaho Department of Fish and Game, Southwest Region, Nampa
Juliet	Barenti	US Fish and Wildlife Service
Kerry	Barnowe-Meyer	Nez Perce Tribe
Justin	Barrett	Idaho Department of Fish and Game, Clearwater Region
Regan	Berkley	Idaho Department of Fish and Game, Southwest Region, McCall
Joanne	Bonn	US Forest Service Northern Region (R1), Nez Perce-Clearwater National Forests
Greg	Burak	US Fish and Wildlife Service
Frances	Cassirer	Idaho Department of Fish and Game, Clearwater Region
Ana	Egnew	Payette National Forest
Diane	Evans Mack	Idaho Department of Fish and Game, Southwest Region, McCall
Lance	Hebdon	Idaho Department of Fish and Game, Headquarters
Dave	Hopper	US Fish and Wildlife Service
Tony	Hulthuizen	Idaho Power
Allison	Johnson	US Forest Service Northern Region (R1), Nez Perce-Clearwater National Forests
Craig	Johnson	Bureau of Land Management (US) (BLM)
Michelle	Kemner	Idaho Department of Fish and Game, Southwest Region, Nampa
Joe	Kozfkay	Idaho Department of Fish and Game, Southwest Region, Nampa
Kristin	Lohr	US Fish and Wildlife Service
Sal	Pallazolo	Idaho Department of Fish and Game, Headquarters
Hollie	Miyasaki	Idaho Department of Fish and Game, Upper Snake

First name	Last name	Affiliation
Ann	Moser	Idaho Department of Fish and Game, Headquarters
Colleen	Moulton	Idaho Department of Fish and Game, Headquarters
Chris	Murphy	Idaho Department of Fish and Game, Headquarters
Sal	Palazzolo	Idaho Department of Fish and Game, Headquarters
Jason	Pyron	US Fish and Wildlife Service
Nick	Salafsky	Foundations of Success
Mark	Sands	Idaho Department of Fish and Game, Southwest Region, Nampa
Joel	Sauder	Idaho Department of Fish and Game, Clearwater Region
Angie	Schmidt	Idaho Department of Fish and Game, Headquarters
Garry	Seloske	US Forest Service Northern Region (R1), Nez Perce-Clearwater National Forests
Brad	Smith	Idaho Conservation League
Leona	Svancara	Idaho Department of Fish and Game, Headquarters
Art	Talsma	The Nature Conservancy
Joe	Weldon	Bureau of Land Management (US) Idaho

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

8. Yellowstone Highlands Section

Section Description

The Yellowstone Highlands Section lies within the Middle Rocky Mountain Ecoregion in Fremont and Teton counties, Idaho (Fig. 8.1) and represents a geologic and topographic transitional area between the eastern Snake River Plain and the active volcanic field in Yellowstone National Park (Christiansen 1982). The dominant geologic features in this area are 3 calderas, which are large basin-shaped volcanic depressions (http://volcanoes.usgs.gov/vsc/glossary/caldera.html retrieved Nov 1, 2015).

The Island Park, Henrys Fork, and Yellowstone calderas formed during three cycles of rhyolitic volcanism over a two million year period (Christiansen 2000). The Island Park Caldera, likely the largest symmetrical caldera on earth, was formed in the first eruption 2 million years ago when a massive volcano extending well onto the Yellowstone plateau collapsed. Another cycle of volcanism 1.3 million years ago created the smaller Henrys Fork Caldera within the western portion of the Island Park Caldera. A third volcanic cycle that vented in eastern Yellowstone created lava flows on the eastern border of Island Park (Christiansen 1982). The Yellowstone Highland's geologic past is reflected in its current topography, hydrology and namesakes like Island Park, the Island Park Caldera, or simply the Caldera.

View of the Yellowstone Highlands from Warm Butte © Terry Thomas

The area's topography is comprised of an elevated plateau ranging in elevation from 1,500–2,500m (5,100–8,500 ft), bounded on the northwest by Thurmon Ridge, and on the east by the westernmost portions of the Yellowstone Plateau, including the Madison Plateau and the Moose Creek Butte. Between these rugged features, the basin floor is relatively flat (Christiansen 1982). The Yellowstone Highlands also includes portions of two small alluvial valleys, Shotgun Valley and Henrys Lake Flat; and a portion of one large mountain valley, the Teton Valley (Van Kirk and Benjamin 2000). For purposes of geographic continuity and to best incorporate existing regional conservation and management activities, Shotgun Valley, Henrys Lake Flat, and Teton Valley are incorporated into this section in their entirety (Fig. 8.2).

Most of the land (66%) in the Yellowstone Highlands Section falls within the boundary of the Caribou–Targhee National Forest, nearly 17% is private lands, 6.5% is State of Idaho lands, 5.3% falls within Yellowstone National Park, 3.24% is Bureau of Land Management (BLM), and 0.65% is owned by the US Bureau of Reclamation (BOR).

Precipitation ranges from 51 to 114 cm (20 to 45 in) annually with most occurring during the fall, winter, and spring. Precipitation occurs mostly as snow above 1,800 m (6,000 ft) and as rain during the growing season. The climate is generally cold and moist. Temperature averages 2–8 °C (35–47 °F). The growing season lasts 25–120 days with a shorter growing season at higher elevations. The Yellowstone Highlands is a moisture surplus area, where precipitation exceeds evapotranspiration (Clark and Minta 1994). Winter snowfall on the Madison and Pitchstone Plateaus in Yellowstone National Park is a key source of recharge for springs in the Island Park Caldera (Benjamin 2000).

The Henrys Fork of the Snake River emanates from large springs at the eastern edge of Island Park Basin near the base of the Madison Plateau, at a seam between two different aged lava flows (Buffalo Lake and Lava Creek Flows) (Benjamin 2000). Big Springs is the hydrologic source of the Henrys Fork based on maximum annual discharge (Van Kirk and Benjamin 2000), and along with other large volume springs (Lucky Dog Springs, Chick Creek, Buffalo River, Toms Creek, Snow Creek, and Warm River Springs), provides approximately half the streamflow in the upper Henrys Fork watershed (Benjamin 2000). The western portion of the watershed is fed by snowmelt from the Centennial Mountains (Benjamin 2000). The Henrys Fork River flows south through the Island Park basin before cutting its way through the southern rim of the calderas over a series of dramatic falls, including the 114-foot Mesa Falls, before descending onto the Snake River Plain near Ashton, Idaho.

The Yellowstone Highlands are a major component of the Greater Yellowstone Ecosystem (GYE), one of the largest "intact" ecosystems remaining in the temperate zones of the world (Keiter and Boyce 1991). The GYE includes up to 8,903,092 ha (22 million acres) and incorporates two national parks, portions of six national forests, three national wildlife refuges, BLM holdings, private and tribal lands (http://www.nps.gov/yell/learn/nature/ecosystem.htm, November 3, 2015). The Yellowstone Highlands, including Teton Valley, arguably comprise the core habitats of the GYE in Idaho.

Terrestrial fauna of the GYE is unique due to its completeness. Unlike nearly any other location in the contiguous US, most species of birds and mammals present in pre-European settlement times are currently present with relatively viable populations (Hansen 2006). Among the superlative wildlife resources of the GYE are one of the largest Elk (*Cervus elaphus*) herds in North America, one of the few Grizzly Bear (*Ursus arctos*) populations in the contiguous United States, and persistence of regionally rare or at-risk species such as Wolverine (*Gulo gulo*), Trumpeter Swan (*Cygnus buccinator*) and Common Loon (*Gavia immer*). Noss et al. (2002) rated the ecological importance of 43 "megasites" within the GYE based on dual criteria of irreplaceability and vulnerability. Two of the megasites analyzed, "Teton River" and "Henrys Fork," encompass most of the Yellowstone Highlands. The Henrys Fork Megasite ranked as number 1 in the GYE for irreplaceability of resources and was ranked number 2 in the combined ranking (irreplaceability and vulnerability). Teton River had the highest combined rank of all megasites in the GYE (Noss et al. 2002). These rankings reflect other work by Hansen (2006) that suggests, in general, lower elevation lands in the GYE have some of the most productive habitats, but also face many looming threats, particularly on private lands. Also, it highlights the conservation importance of the Yellowstone Highlands for maintaining the ecological integrity of the GYE.

The Yellowstone Highlands also comprises the eastern flank of the High Divide region of Idaho and Montana. This region is a national conservation priority landscape that encompasses the headwaters for the Missouri and Columbia watersheds, and is the centerpiece for habitat connectivity between the Greater Yellowstone area, northern Montana, and Central Idaho (http://heart-of-rockies.org/where-we-work/high-divide/high-divide-collaborative/). The natural amenities of this landscape are attracting new residents that are driving expansive rural residential development. Within the High Divide (including the Yellowstone Highlands), the number of single-family homes has nearly tripled in the last 50 years, from about 28,000 homes in 1963 to 75,000 in 2013. More than half of these new homes were built in unincorporated portions of rural counties. In the next 10 years, an estimated 150 square miles of currently undeveloped private land will be altered by low-density rural residential development (http://headwaterseconomics.org/economic-development/local-studies/high-divide). Fremont and Teton counties experienced some of the most significant growth within this region. In the 1990s and 2000s, Teton County had one of the highest population growth rates in the Western US. Its new home growth was the 6th fastest in the United States. Most of that real estate development occurred in rural areas outside of towns (within the Teton River riparian corridor, and the foothills of the Teton and Big Hole mountain ranges) (http://www.sonoraninstitute.org/where-we-work/montana/835-teton-county.html).

Grizzly mother and cub © Terry Thomas

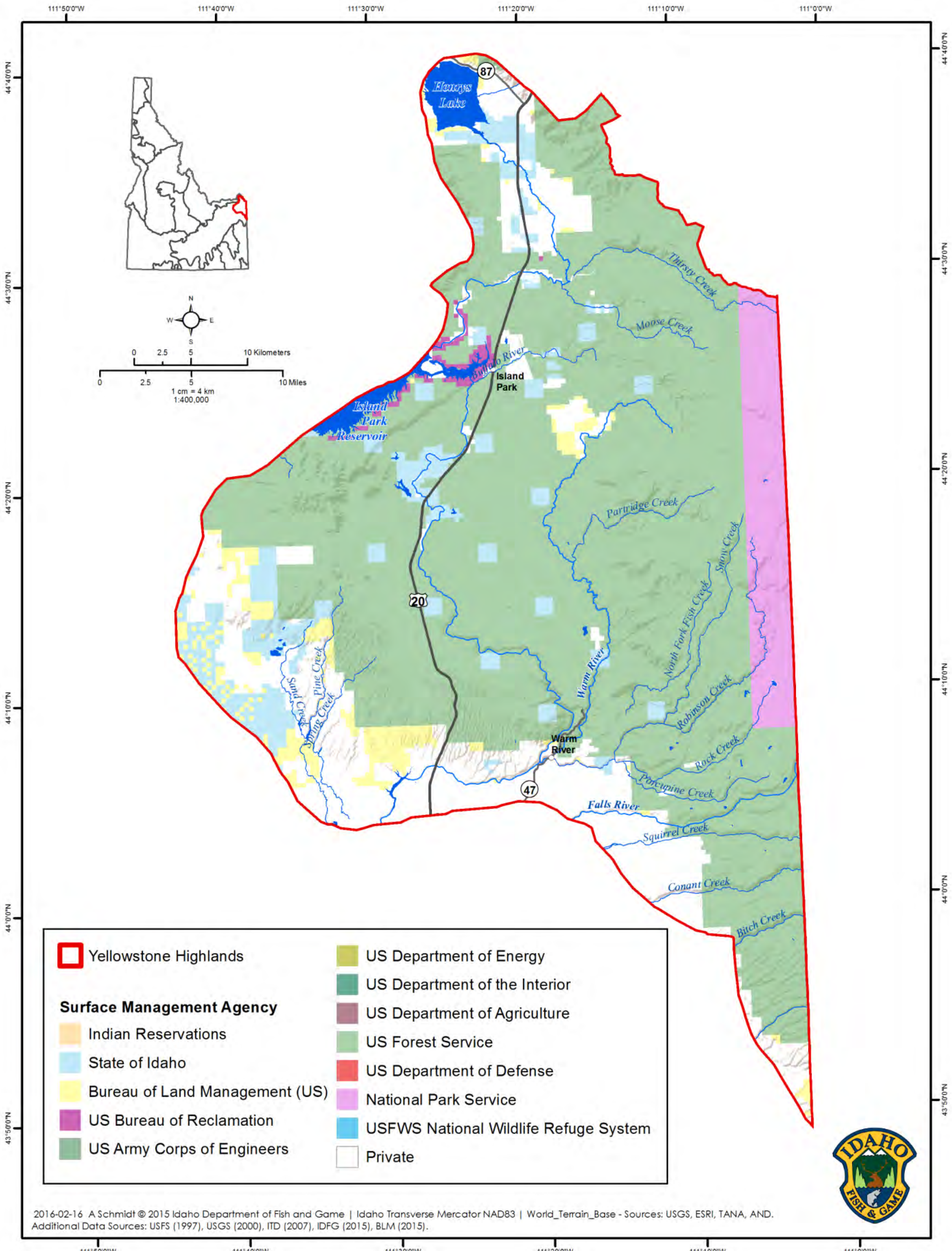


Fig. 8.1 Map of Yellowstone Highlands surface management

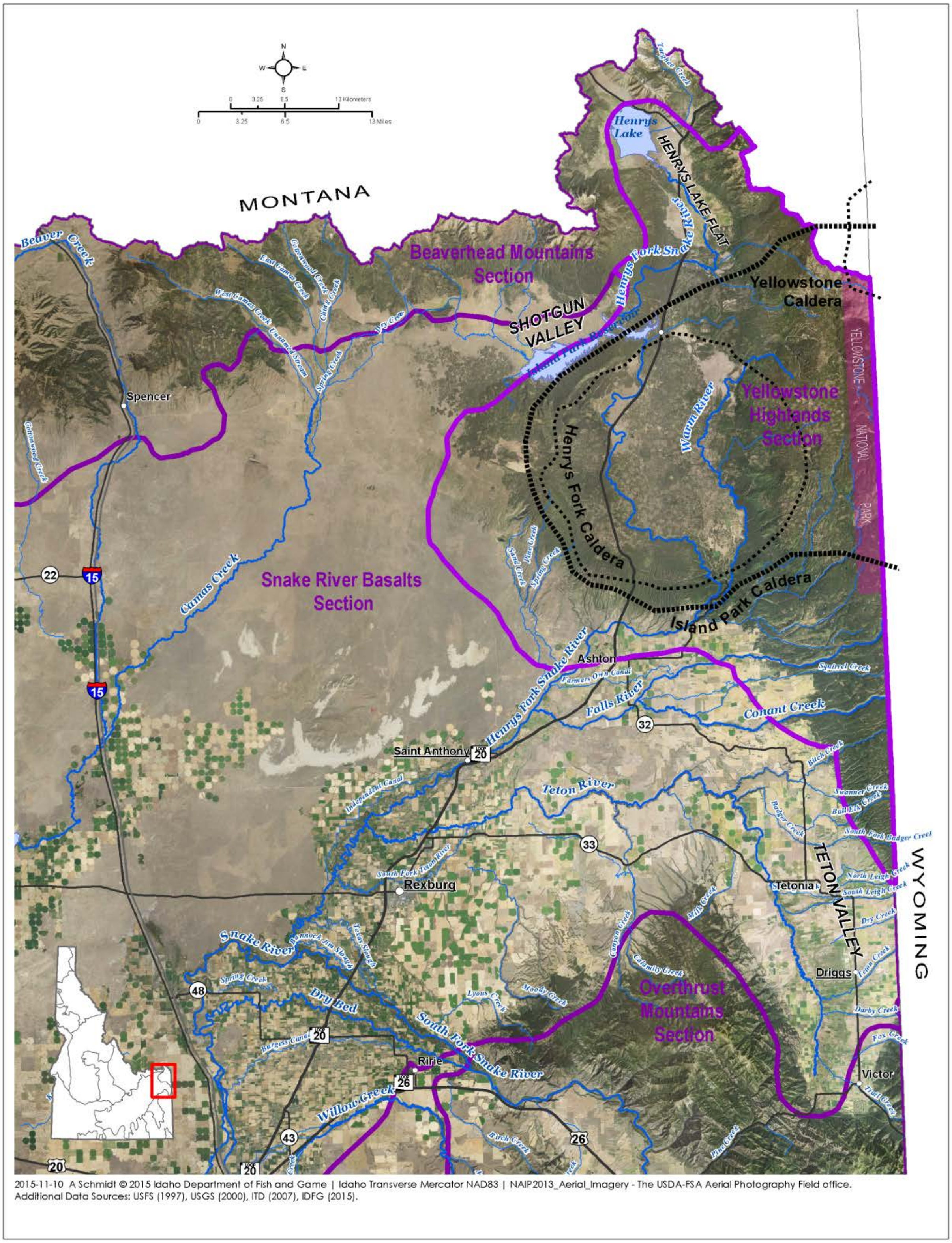


Fig. 8.2 Detail of Yellowstone Highlands with Henrys Lake Flat, Shotgun Valley, and Teton Valley

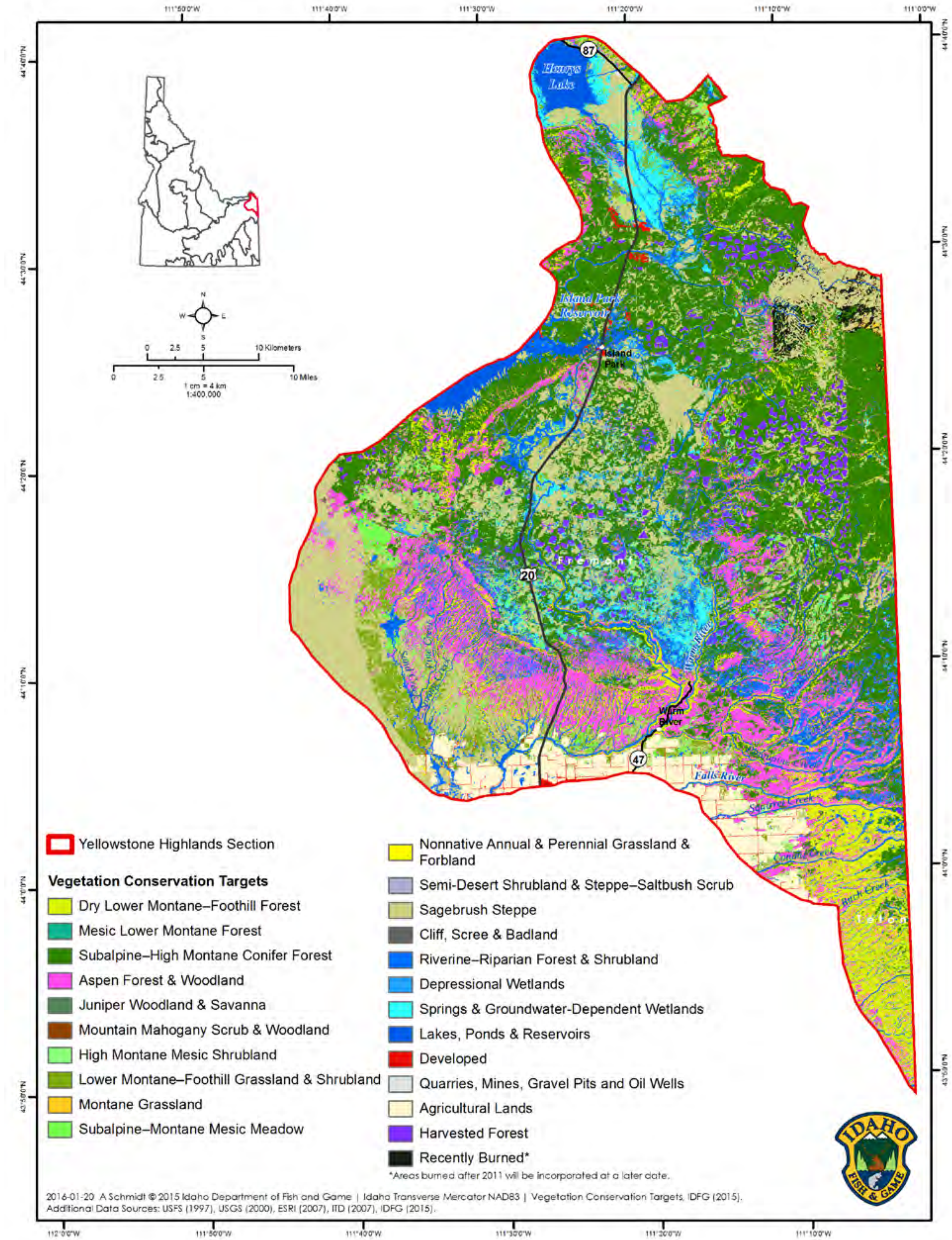


Fig. 8.3 Map of Yellowstone Highlands vegetation conservation targets

Conservation Targets in the Yellowstone Highlands

We selected 5 habitat targets that represent major ecosystems and/or priority landscapes in the Yellowstone Highlands (Table 8.1). Each of these systems provides habitat for key species of greatest conservation need (SGCN), i.e., "nested targets" associated with each target. Conservation of the habitat targets listed below should conserve most of the nested species within them. However, we determined that at least 2 additional species/guilds (Ungulate Migration and Grizzly Bear) face special conservation needs and thus are presented as explicit targets as shown in Table 8.1.

Table 8.1 At-a-glance table of conservation targets in the Yellowstone Highlands

Target	Target description	Target viability	Nested targets (SGCN)	
Montane Forest Mosaic	The Yellowstone Highlands forested areas "are primarily lodgepole pine types (70%) that contain small pockets of aspen, sagebrush/grass, grass meadows, and mountain brush. Douglas-fir (10%) and mixed lodgepole pine/Douglas-fir (15%) cover types provide some diversity in the area."	*Fair*. Forest patch size, species composition, and structure do not reflect historical patterns and frequencies of disturbance. Current dominance by even-aged lodgepole stands limits benefits to wildlife.	*Tier 1*	Wolverine Grizzly Bear Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Western Toad Silver-haired Bat Hoary Bat
			Tier 3	Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Kriemhild Fritillary Monarch Gillette's Checkerspot
Mountain Brush–Aspen Ecotone	A large ecotone that forms the southern boundary of the section on the caldera rim from Mesa Falls to the Sand Creek Ponds.	*Fair* to *Good*. Conversion of habitat via rural residential development at lower elevations, associated fire suppression, and road development threaten the integrity and resiliency of aspen on this landscape.	*Tier 1*	Grizzly Bear
			Tier 2	Western Toad Northern Leopard Frog Sharp-tailed Grouse Silver-haired Bat Hoary Bat
			Tier 3	Great Gray Owl Little Brown Myotis
Riverine–Riparian Forest & Shrubland	Rivers and streams, including aquatic habitats and their associated terrestrial riparian habitats. Includes the upper Henrys Fork subwatershed and a portion of the Teton River subwatershed.	*Fair* to *Good*. High quality fisheries. Some portions of the Section are nearly pristine (e.g., Bitch Creek, some reaches of the Henrys Fork) while others are impacted by adjacent land use	*Tier 2*	Western Toad Northern Leopard Frog Trumpeter Swan Common Loon Western Grebe American White Pelican Caspian Tern Silver-haired Bat Hoary Bat Western Pearlshell Rocky Mountain Duskysnail

Target	Target description	Target viability	Nested targets (SGCN)	
		and/or water withdrawals (e.g., Box Canyon, Henrys Lake Outlet).	*Tier 3*	Sandhill Crane Little Brown Myotis Pondsnail (*Stagnicola*) Species Group Monarch Gillette's Checkerspot A Caddisfly (*Glossosoma idaho*)
Wetlands	Includes groundwater-dependent wetlands (e.g., springs, seeps, mesic meadows, fens) and Depressional Wetlands (e.g., vernal pools, marshes, and meadows).	*Good*. Some wetlands have been negatively impacted by anthropogenic factors, while others are highly functional (e.g., forest vernal pools and fens).	*Tier 1*	Greater Sage-Grouse Grizzly Bear
			Tier 2	Western Toad Northern Leopard Frog Trumpeter Swan Common Loon Western Grebe American White Pelican White-faced Ibis Long-billed Curlew California Gull Caspian Tern Bobolink Silver-haired Bat Hoary Ba
			Tier 3	Sandhill Crane Franklin's Gull Ring-Billed Gull Short-eared Owl Little Brown Myotis Monarch Gillette's Checkerspot
Henrys Lake Flat	This target conforms to the BLM-designated Henrys Lake ACEC boundary and includes important ungulate transitional, calving and fawning habitat; the main tributary to the Henrys Fork; and is important for large carnivore connectivity. In addition, the area supports State rare wetlands and SGCNs.	*Fair*. Despite highly functional protected portions of the target, like The Nature Conservancy's (TNC) Flat Ranch Preserve, the area is currently impacted and threatened by rural residential development.	*Tier 1*	Wolverine Grizzly Bear
			Tier 2	Western Toad Trumpeter Swan Western Grebe American White Pelican Long-billed Curlew California Gull Caspian Tern Silver-haired Bat Hoary Bat
			Tier 3	Sandhill Crane Franklin's Gull Ring-billed Gull Short-eared Owl Little Brown Myotis
Ungulate Migration	This target is intended to capture the process of ungulate seasonal migration	*Good*. Currently, US Hwy 20 presents a threat to connectivity and	*Tier 1*	Greater Sage-Grouse Wolverine Grizzly Bear

Target	Target description	Target viability	Nested targets (SGCN)	
	and resource use through the area as well as more localized species movement. Includes seasonal, transitional, and stopover habitat.	potential expansions to the route would decrease permeability. Rural residential development also poses current and future threats to key transitional habitat in Shotgun Valley, Henrys Lake Flat, and the south rim of the caldera.	*Tier 2*	Sharp-tailed Grouse
Grizzly Bear	Island Park and Teton Valley represent the current suitable and occupied habitat for GYE Grizzly Bears in Idaho. Successful management of Grizzly Bear requires addressing both habitat threats and human dimension threats. Thus, it is important to have this target separate from the habitat targets.	*Good*. Grizzly Bear population in the Greater Yellowstone Distinct Population Segment is recovered.	*Tier 1*	Grizzly Bear Wolverine

Table 8.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Yellowstone Highlands

Taxon	Conservation targets						
	Montane Forest Mosaic	Mountain Brush–Aspen Ecotone	Riverine–Riparian Forest & Shrubland	Wetlands	Henrys Lake Flat	Ungulate Migration	Grizzly Bear
AMPHIBIANS							
Western Toad (*Anaxyrus boreas*)[2]	X		X	X	X		
Northern Leopard Frog (*Lithobates pipiens*)[2]			X	X			
BIRDS							
Trumpeter Swan (*Cygnus buccinator*)[2]			X	X			
Greater Sage-Grouse (*Centrocercus urophasianus*)[1]				X			
Sharp-tailed Grouse (*Tympanuchus phasianellus*)[2]		X					
Common Loon (*Gavia immer*)[2]			X				
Western Grebe (*Aechmophorus occidentalis*)[2]							
American White Pelican (*Pelecanus erythrorhynchos*)[2]							
White-faced Ibis (*Plegadis chihi*)[2]							
Sandhill Crane (*Grus canadensis*)[3]			X	X			
Long-billed Curlew (*Numenius americanus*)[2]				X	X		
Franklin's Gull (*Leucophaeus pipixcan*)[3]				X	X		
Ring-billed Gull (*Larus delawarensis*)[3]				X	X		
California Gull (*Larus californicus*)[2]				X	X		
Caspian Tern (*Hydroprogne caspia*)[2]			X	X			
Great Gray Owl (*Strix nebulosa*)[3]	X						
Short-eared Owl (*Asio flammeus*)[3]				X	X		
Olive-sided Flycatcher (*Contopus cooperi*)[3]	X						
Clark's Nutcracker (*Nucifraga columbiana*)[3]	X						
Bobolink (*Dolichonyx oryzivorus*)[2]				X			
MAMMALS							
Silver-haired Bat (*Lasionycteris noctivagans*)[2]	X	X	X	X	X		
Hoary Bat (*Lasiurus cinereus*)[2]	X	X	X	X	X		
Little Brown Myotis (*Myotis lucifugus*)[3]	X	X	X	X	X		
Wolverine (*Gulo gulo*)[1]	X				X	X	X
Grizzly Bear (*Ursus arctos*)[1]	X	X		X	X	X	X
BIVALVES							
Western Pearlshell (*Margaritifera falcata*)[2]			X				
GASTROPODS							

Taxon	Montane Forest Mosaic	Mountain Brush–Aspen Ecotone	Riverine–Riparian Forest & Shrubland	Wetlands	Henrys Lake Flat	Ungulate Migration	Grizzly Bear
	Conservation targets						
Pondsnail (*Stagnicola*) Species Group[3]			X				
Rocky Mountain Duskysnail (*Colligyrus greggi*)[2]			X				
INSECTS							
Western Bumble Bee (*Bombus occidentalis*)[1]	X						
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]	X						
Kriemhild Fritillary (*Boloria kriemhild*)[3]	X						
Monarch (*Danaus plexippus*)[3]	X		X	X			
Gillette's Checkerspot (*Euphydryas gillettii*)[3]	X		X	X			
A Caddisfly (*Glossosoma idaho*)[3]			X				

Target: Montane Forest Mosaic

Most of the land covered by this target is on the Caribou–Targhee National Forest (CTNF) within the Ashton–Island Park and Teton Basin Ranger Districts. The CTNF recently completed a forest-wide, mid-level vegetation map and description, where existing plant communities were assigned to "dominance types" based on the most abundant species of the ecologically dominant life form (e.g., the most abundant tree species in forests or woodlands, USDA 2014).

The map units are based on forest Ranger Districts and do not exactly conform to the Yellowstone Section boundary. Also, portions of Ranger Districts lie in Wyoming. However, a combination of dominance type descriptions and dominance type mapping allows a valuable estimate of the major forest habitat types within the Yellowstone Highlands.

Most of the Ashton/Island Park Ranger District is currently mapped within the lodgepole pine (*Pinus contorta* Douglas ex Loudon) dominance type (54% of land area) and Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco)–lodgepole dominance type (5%). Therefore, dominance type mapping of lodgepole pine indicates coverage of almost 60% of the land area. Another estimate of lodgepole dominance of the Yellowstone Highlands is provided by a summary of Caribou–Targhee Geographic Areas. Much of the Yellowstone Highlands is within the Island Park Tablelands and the Madison–Pitchstone Plateau Geographic Areas, which is described as approximately 70% lodgepole pine. Other forest habitat dominance types that occur within the Yellowstone Highlands, although in a much lower extent than lodgepole, include spruce-fir (*Picea–Abies*), conifer-mix, Douglas-fir, and quaking aspen (*Populus tremuloides* Michx.). Forest lands in the Teton Basin Ranger District, in general, have a more favorable mosaic of dominance types that are productive for wildlife.

Island Park lodgepole pine landscape © Terry Thomas

Lodgepole pine provides cover for large animals such as bears and elk, but biological diversity in dense, mature lodgepole is low (Lotan and Perry 1983). As seral lodgepole is replaced by climax spruce-fir forest, biodiversity increases, particularly for birds (Lotan and Perry 1983). Hanson (2009) describes Douglas-fir as moderately high in net primary productivity and species richness. Other than riparian habitats, aspen forests support the highest biodiversity in the intermountain west (Kay 1997). Essentially, the Yellowstone Highlands are dominated by forests that have a low value for sustaining biodiversity, whereas forests that have high biological diversity are relatively scarce on the landscape.

Common understory associates of the lodgepole pine forests at sagebrush ecotones include mountain big sagebrush (*Artemisia tridentata* Nutt. subsp. *vaseyana* [Rydb.] Beetle), antelope bitterbrush (*Purshia tridentata* [Pursh] DC.), and Idaho fescue (*Festuca idahoensis* Elmer). Common interior canopy understory types include white spirea (*Spiraea betulifolia* Pall.), mountain snowberry (*Symphoricarpos oreophilus* A. Gray), grouse whortleberry (*Vaccinium scoparium* Leiberg ex Coville), arrowleaf balsamroot (*Balsamorhiza sagittata* [Pursh] Nutt.), silvery lupine (*Lupinus argenteus* Pursh), mountain brome (*Bromus marginatus* Nees ex Steud.), pinegrass (*Calamagrostis rubescens* Buckley), elk sedge, and Kentucky bluegrass (*Poa pratensis* L.) (Bowerman et al. 1999; USDA 2014). Douglas-fir–lodgepole pine dominance types contain understory plants that may include white spirea, mountain snowberry, pinegrass, and timothy (*Phleum pratense* L.) (USDA 2014).

There are approximately 77,429 acres (12.2% of land area) of Douglas-fir forest mapped in the Ashton-Island Park District (USDA 2014). However, most of this is mapped in the Centennial Range and on the southern slopes of the Island Park Caldera (within the Mountain Brush–Aspen Ecotone Conservation Target discussed elsewhere). There are scattered occurrences of Douglas-fir around Henrys Lake Flat, Thurmon Ridge, and in the southeast portion of the

Yellowstone Highlands within elevations of 6,100-7,500 ft (USDA 2014). Common understory components of this dominance type at ecotones and within forest canopies are Rocky Mountain Maple (*Acer glabrum*), Saskatoon serviceberry (*Amelanchier alnafolia*), mountain big sagebrush, snowbrush ceanothus (*Ceanothus cuneatus*), common (*Symphoricarpos albus*) and mountain snowberry, big huckleberry (*Vaccinium membranaceum*), grouse whortleberry, heartleaf arnica (*Arnica cordifolia*), balsamroot, silvery lupine, mule-ears (*Wyethia amplexicaulis*), western coneflower (*Rudbeckia occidentalis*), smooth brome (*Bromus inermis*), elk sedge, pinegrass, and basin wildrye (*Leymus cinereus*) (USDA 2014). Mature Douglas-fir trees along the caldera rim have had outbreaks of spruce budworm and Douglas-fir beetle in the past decade. These infestations have diminished, but could recur and expand with projected changes in climate (USDA 2014).

Mixed Conifer dominance types (existing various combinations of supalpine fir, Douglas-fir, lodgepole, and Engelmann spruce) occur around the Henrys Lake Flat and as a scattered component elsewhere in the Yellowstone Highlands within elevational ranges of 6,700 to 8,200 ft. Understory shrubs may include Rocky Mountain maple, basin big sagebrush (*Artemisia tridentata ssp. Tridentate*), mountain big sagebrush, snowfield sagebrush (*Artemesia spiciformis*), ceanothus, and mountain snowberry (USDA 2014). Spruce-fir dominance types (Engelmann spruce [*Picea engelmannii* Parry ex Engelm.] or Engelmann spruce–subalpine fir [*Abies lasiocarpa*] forests) have a minimal occurrence within the Yellowstone Highlands, primarily around Henrys Lake Flat. These forests have herbaceous understories of mountain brome, nodding bluegrass, white marsh marigold, and sticky geranium (USDA 2014).

Aspen is a minor, scattered component in the Yellowstone Highlands Montane Forest Mosaic. Only 3% of the land area is an aspen dominance type. Within these types understory shrubs variably present may include Rocky Mountain maple, Saskatoon serviceberry, low sagebrush, mountain big sagebrush, snowbrush ceanothus, chokecherry, antelope bitterbrush, white spirea, common snowberry, mountain snowberry, and thinleaf huckleberry. Herbaceous plants may include nettleleaf giant hyssop, sticky geranium, mule-ears, mountain brome, and bulbous bluegrass (USDA 2014).

Another 5% of the Ashton/Island Park Ranger Districts are mapped as either Aspen–Conifer or Conifer–Aspen (depending on relative compositions) (USDA 2014). These dominance types reflect the pervasive encroachment of aspen forests by conifers, primarily Douglas-fir in the Yellowstone Highlands. Widespread encroachment of conifers into aspen types has been further documented during a collaborative effort by the CTNF and Idaho Department of Fish and Game (IDFG) to assess risk to existing aspen during the summer of 2015 (IDFG and FS unpublished data).

Aspen forests are considered a Keystone Species, which is "a species that affects the survival and abundance of many other species in the community" and whose loss may result in a "relatively significant shift in the composition of the community and sometimes even in the physical structure of the environment" (Wilson 1992). The relatively scarce aspen composition in the Yellowstone Highlands, combined with the dominance of lodgepole pine, limits the value of the Yellowstone Highlands for sustaining biodiversity (Bartos and Amacher 1998), including Idaho SGCN.

Several montane forest habitats that occur in the Yellowstone Highlands are described by Hanson (2009) as being at greatest risk in the GYE. These are Aspen (1% of land area in GYE), low-elevation Douglas-fir (5% of GYE), mature and old growth coniferous forest (5% of GYE). The key threats in aspen habitat types are a lack of disturbance that reduces conifer encroachment and allows initiation of regeneration. Douglas-fir habitats are threatened by fire exclusion and rural residential development, while mature coniferous forests are most threatened by habitat fragmentation from roads (Hanson 2009).

Target Viability

Fair. Current dominance by even-aged lodgepole pine and habitat fragmentation by roads impact the quality of wildlife habitat in the Yellowstone Highlands.

Spotlight Species of Greatest Conservation Need: Great Gray Owl

The Great Gray Owl (*Strix nebulosa*) is North America's largest owl (in length but not weight) and occupies northern forests around the world. In North America its range encompasses most of the boreal forest of Alaska and Canada and montane forests in the northern Rockies and Sierra mountain ranges.

Great Gray Owl family in Yellowstone Highlands Douglas-fir forest © TomVezo.com

Great Gray Owls nest in old raptor or corvid nests, broken-topped snags, dwarf mistletoe and rust brooms, or artificial structures in forest-dominated landscapes (Bouchart 1991). On the Targhee National Forest, most known Great Gray nests are in goshawk nests or in broken-topped snags (S. Derusseau, Wildlife Biologist CTNF, pers. comm.). In eastern Idaho, Great Grays commonly nest in lower montane mid- to late-successional Douglas-fir with an open understory. Elevation ranges of nests found in southeast Idaho and northwestern Wyoming ranged from 1,524 to 3,000 m (4,999 to 9,842 ft) with an average elevation of 2,078 m (6,816 ft) (Franklin 1988). Although nests sites are usually within relatively dense forest canopy, they are typically situated close to openings (Bouchart 1991). One study in Idaho found that the average distance from a Great Gray Owl nest to an opening was 143 m (Franklin 1987).

Forest openings that are relatively close to the nest site are important for adult foraging. Great Gray Owls feed primarily on Northern Pocket Gophers (*Thomomys talpoides*) and Voles (*Microtus spp.*) that are often abundant in meadows and other forest openings. After fledging, young

Great Gray Owls leave the nest and climb to adjacent roosts in the nest stand canopy. According to Franklin (1988), survival of young depends on the availability of roosts (particularly leaning or deformed trees accessible from the nest tree) that are high enough to provide protection from predators; and forested habitat within a 500 m radius surrounding the nest.

Great Gray Owls are an indicator of a healthy Montane Forest Mosaic because management of their habitat requires a landscape-scale and long-term view of forest succession (Hayward and Verner 1994). More specifically, Great Gray Owl conservation requires natural disturbance agents such as fire and insects to ensure adequate presence of foraging habitats including meadows and open forest, and forest management practices that allow mid- to lower-elevation conifers to transition to structurally complex later successional forests.

Prioritized Threats and Strategies for Montane Forest Mosaic

High rated threats to Montane Forest Mosaic in the Yellowstone Highlands

Altered fire regimes

Frequent, low–intensity fires maintain a naturally diverse stand composition and structure that benefits a wide range of wildlife including Idaho SGCNs. Fire-dependent habitats such as Dry Lower Montane–Foothill Forest were probably subject to a moderate severity fire regime in pre-settlement times, with fire return intervals of 30 to 100 years. Since 1900, fire suppression policies have contributed to densification of low– mid-elevation conifer forests. This eliminates more valuable conifer habitats, such as lodgepole pine/steppe grassland community types (Habeck 1994). It also results in fuel build-up and a likelihood of more severe fire regime, further exacerbating the lack of complexity in conifer forests.

Fire suppression has also greatly reduced the presence of aspen in the forested landscape on the Targhee National Forest. Over the past 150 years, there has been an estimated 40% decline in the amount of aspen acres on the Targhee National Forest, primarily due to fire suppression. This is a major decrease in composition from historic ranges of variability (USDA 1997).

The growth of the wildland–urban interface (essentially rural development at the forest boundary) complicates fire management due to the nearby presence of dwellings and other structures in forested habitat that might otherwise benefit from a burn.

Objective	Strategy	Action(s)	Target SGCNs
Manage forests for a diversity of structure and composition. Maintain or restore productive and diverse populations of plants. Maintain conifer types and early successional stages and	Use methods of vegetation treatment that emulate natural disturbance and successional processes. Restore natural disturbance regimes (e.g., beaver activity).	To the extent possible, Allow naturally-caused (lightning) fires to play their role in the ecosystem by allowing them to burn (i.e., Managing wildfire for resource benefit; CTNF Management Plan 2003 p. 3-4) Implement a variety of vegetation management projects on federal, state, and privately managed lands (these could include prescribed fire and mechanical treatments such as thinning, timber harvest, etc.) across the Section to return areas to early seral conditions. Although a variety of benefits can be realized from these projects,	Western Toad Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine Grizzly Bear Western Bumble Bee

Objective	Strategy	Action(s)	Target SGCNs
restore disturbance processes through beaver management, vegetation management, and fire.		restoration of proper ecological functions and benefits to wildlife habitat should be the primary drivers. When planning treatments on federal, state, and private lands, the treatment of noxious and invasive weeds should be integral to project planning, and appropriate actions both during and following project implementation should take place to prevent establishment of noxious/invasive weeds. Reintroduce beaver where appropriate.	Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch Gillette's Checkerspot

Motorized access & recreation (state, county, legal secondary roads)

Roads can have negative impacts on fish, amphibians, reptiles, birds, and mammals (Joslin and Youmans 1999). Numerous studies of wildlife have demonstrated physiological, displacement, and indirect impacts from active roads and trails (Canfield et al. 1999).

Roads on the Targhee National Forest are a significant source of fragmentation of forest habitats. As of 1997, there were approximately 2,791 miles of existing roads on the Targhee National Forest. According to the Targhee National Forest Revised Plan (1997) "the current road system has created resource conflicts with wildlife, fish and watersheds"(USDA 1997).

A common technique for managing the impacts of roads and trails on the Targhee National Forest is the use of administrative closures. However, according to Canfield et al. (1999) "Once the original purpose of a forest road is satisfied (normally a timber sale), management agencies tend to assume that daily traffic is primarily recreational in nature. Accordingly, many roads have been gated under the assumption that limited use by "administrative traffic" will not unduly disturb elk and other wildlife. Unfortunately, this assumption is untrue, and even a limited amount of administrative traffic behind closed gates provides more than adequate reinforcement of the avoidance behavior".

Objective	Strategy	Action(s)	Target SGCNs
Maintain adequate security habitat for wildlife.	Work with the appropriate land and road management agencies to ensure adequate security habitat during the development of road and trail projects.	Balance road density standards with the amount of secure habitat. Identify and evaluate for each project proposal and the cumulative effects of all activities, including past, current, and future projects. Continue to provide input into the planning process for all roads and new construction. Recommend that roads, trails, other infrastructure, etc., be located to avoid habitat components important to seasonal wildlife use (e.g., wintering Sharp-tailed Grouse, migrating Mule Deer and Elk, etc.).	Trumpeter Swan Sandhill Crane Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Wolverine Grizzly Bear

Objective	Strategy	Action(s)	Target SGCNs
		Recommend that new roads that are not compatible with area management objectives and are no longer needed be restricted or decommissioned. Where appropriate, recommend seasonal closures and/or vehicle restrictions bases on seasonal wildlife use.	

Target: Mountain Brush–Aspen Ecotone

The Mountain Brush–Aspen Ecotone encompasses the southwest and southern rim and slopes of the Island Park Caldera (Ashton Hill) and its slopes from Island Park to Ashton. It ranges in elevation from approximately 1,585-2,195 m (5,200 ft to 7,200 ft) and includes national forest lands at the upper and mid-elevations and private lands from mid-elevations down to the toe of the slope. The forest habitats at upper elevations are primarily Douglas-fir. Other forest dominance types mapped by USDA (2014) in order of relative abundance are Aspen, Conifer Mix, Douglas-fir–lodgepole pine mix, aspen–conifer mix.

Ashton Hill © Eddie Shea

The southwest portion of the ecotone (on public and private lands) is covered by the largest expanse of the Bigtooth Maple Mix dominance type on the Targhee National Forest. Trees and/or small forest stands scattered within the Bigtooth Maple complex include aspen, juniper woodlands, conifer, and conifer aspen mix (USDA 2014). This type has diverse shrub species that include bigtooth maple, Rocky Mountain maple, black hawthorn, Saskatoon serviceberry, low sagebrush, mountain big sagebrush, common chokecherry, and common snowberry. The lower slopes of the Mountain Brush–Aspen Ecotone are primarily privately owned with scattered inholdings of BLM and State of Idaho Lands (Fig. 8.1). The habitat types present in this zone are lower montane woodlands, Bigtooth Maple Mix, and sagebrush steppe (Fig. 8.3).

Sagebrush steppe occurs on foothills and lower slopes and is a vegetational transition between the woodlands and mountain brush of this ecotone to the relatively flat expanses of sagebrush-steppe of the Snake River Basalts Section. The dominant shrubs are mountain big sagebrush with bitterbrush. Common grasses are Indian ricegrass, needle-and-thread, Sandberg bluegrass, Idaho fescue, bluebunch wheatgrass, and basin wildrye. Forbs are diverse, their cover reflecting moisture availability (IDFG 2015).

Foothill and lower montane riparian shrublands along Sand Creek, Pine Creek, Spring Creek, and other permanent, intermittent, and ephemeral streams are scattered throughout the ecotone. A diverse mix of shrubs are present, especially willows, gray alder, black hawthorn, Woods' rose, chokecherry, common snowberry, golden currant, redosier dogwood, and Rocky Mountain maple. The herbaceous layer is diverse, but cover varies depending on the density of the shrub overstory and amount of flood-scouring (IDFG 2015).

At-risk quaking aspen stand with encroaching conifers (juniper and Douglas-fir) near Ashton, Idaho © Tamara Sperber

The vegetational mosaic in this landscape creates some of the richest wildlife habitat in the Ashton–Island Park area. This ecotone hosts high amphibian diversity including Western Toad (*Anaxyrus boreas*), Northern Leopard Frog (*Rana pipiens*), Columbia Spotted Frog (*Rana luteiventris*), Boreal Chorus Frog (*Pseudacris maculata*), and Blotched Tiger Salamander (*Ambystoma tigrinum melanostictum*). The rich shrub and forb diversity and complex vertical structure provide excellent habitat for breeding songbirds and Ruffed Grouse (*Bonasa umbellus*), winter habitat for Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*), transitional habitat for big game moving to and from winter range on the Sand Creek Desert, and fawning habitat for Mule Deer (*Odocoileus hemionus*). During mild winters, the lower slopes of this ecotone also provide big game wintering habitat.

Target Viability

Fair to Good. Conversion of habitat via rural residential development at lower elevations, associated fire suppression, and road development threaten the integrity and resiliency of aspen and mountain shrub communities on this landscape.

Prioritized Threats and Strategies for Mountain Brush–Aspen Ecotone

Very High rated threats to Mountain Brush–Aspen Ecotone in the Yellowstone Highlands

Altered fire regimes

Aspen is a key driver of wildlife values in the Mountain Brush–Aspen Ecotone. Aspen requires disturbance to regenerate and thwart conifer encroachment. In general, disturbance refers to natural or human-generated fire, logging, avalanche, etc. These disturbances all serve to reset succession away from dominant late seral conifers towards early seral aspen and mountain shrublands. Fire plays an important role in the maintenance of seral stages and stand structure. Aspen regenerates after fire or stand disturbances through root sprouting. Conifer invasion, or encroachment, commonly a result of wildfire suppression policies dating back 100 years and activities such as improper timing and levels of livestock grazing that remove fine fuels and surface litter needed to carry fire, is likely the number one reason for aspen decline. Further, studies on aspen have determined that the transition from a fire-shaped ecosystem to one protected from fire results in profound changes in ratios of aspen to conifer and is the driver for changes in forest dynamics. In one study, conifer coverage increased from 15% to 50% and aspen decreased from 37% to 8% over a 100-year period (Gallant et al. 2003).

Objective	Strategy	Action(s)	Target SGCNs
Optimize extent of aspen and mountain brush communities.	Increase the number of acres of young age class/early seral stands. Improve diversity of age class structure/manage conifer encroachment. Protect, maintain and enhance remnant stands and high-quality stands.	To the extent possible, allow naturally caused (lightning) fires to play their role in the ecosystem by allowing them to burn (e.g., managing wildfire for resource benefit). Prescribed fire. Mechanical treatments. Consider the implementation of relevant design features/mitigation measures described in the Aspen Toolbox prepared by the Eastern Idaho Aspen Working Group (www.EIAWG.org) and other guidance documents when implementing mechanical treatments and prescribed fire. Often these measures should be incorporated to prevent damage to existing aspen trees and ensure survival of roots to provide for adequate suckering post treatment (Cox et al. 2009, Bartos 2007, Shepperd 2000).	Western Toad Sharp-tailed Grouse Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine Grizzly Bear Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch Gillette's Checkerspot

High rated threats to Mountain Brush–Aspen Ecotone

Rural housing development

Rural residential development expanded significantly along the lower elevation private lands within this area during the 1990s and early 2000s. Rural development in this area impacts important lower elevation habitats through direct loss and fragmentation. It also represents a systemic threat to habitat integrity of the Mountain Brush–Aspen Ecotone by undermining tolerance for beneficial wildfires and prescribed burns, which are necessary to sustain the biological value of the ecotone. Fire suppression on higher-elevation national forest lands also represents a threat to the viability of this conservation target.

Objective	Strategy	Action(s)	Target SGCNs
Work Collaboratively with Fremont County.	Where appropriate, provide technical service on fish and wildlife issues to	Provide timely technical service to Fremont county on potential impacts to important mountain brush habitat, SGCNs, big game migration, calving/fawning habitat to balance county growth with wildlife and habitat	Western Toad Northern Leopard Frog Sharp-tailed Grouse Silver-haired Bat Hoary Bat

Objective	Strategy	Action(s)	Target SGCNs
	County leaders.	protection.	Little Brown Myotis Wolverine Grizzly Bear Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch Gillette's Checkerspot
Protect and restore private lands.	Improve stewardship of mountain brush habitat on private lands. Advance ongoing easement programs for mountain brush habitat on private lands.	Support programs/efforts that facilitate partnership with willing private landowners to restore mountain brush habitat. Work with willing private landowners interested in protecting key parcels with conservation easements. Support conservation partners, (NRCS, Teton Regional Land Trust, TNC) in securing financial resources to support ongoing conservation easement acquisitions.	Western Toad Northern Leopard Frog Sharp-tailed Grouse Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine Grizzly Bear Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch Gillette's Checkerspot

Motorized access & recreation (state, county, legal secondary roads)

Outdoor recreation (hiking, camping, wildlife watching, photography, horse-back riding, motorized recreation) in the West is popular, due primarily to large tracts of public land available for use. All-terrain vehicles, including motorcycles, roads and trails, both managed and un-authorized, create management concerns and negative environmental impacts including proliferation of illegal roads/trails, creation of new pathways for the spread of invasive plants, soil erosion, displacement of wildlife sensitive to human and vehicle activity, habitat fragmentation, and sportsmen dissatisfaction.

Objective	Strategy	Action(s)	Target SGCNs
Maintain adequate security habitat for wildlife.	Work with the appropriate land and road management agencies to ensure adequate security habitat during the development of road and trail projects.	Balance road density standards with the amount of secure habitat. Identify and evaluate for each project proposal and the cumulative effects of all activities, including past, current, and future projects. Continue to provide input into the planning process for all roads and new construction. Recommend that roads, trails, other infrastructure, etc., be located to avoid habitat components important to seasonal wildlife use (e.g., wintering Sharp-tailed Grouse, migrating Mule Deer and Elk, etc.)	Sharp-tailed Grouse Wolverine Grizzly Bear

Objective	Strategy	Action(s)	Target SGCNs
		Recommend that new roads that are not compatible with area management objectives and are no longer needed be restricted or decommissioned. Where appropriate, recommend seasonal closures and/or vehicle restrictions based on seasonal wildlife use.	

Target: Riverine–Riparian Forest & Shrubland

Riverine aquatic, riparian, and wetland habitats occur in, and adjacent to, river and stream channels. They include floodplains and riparian vegetation influenced by stream channel hydrology. Riparian habitat is included in this definition of riverine wetlands and is described below. The dominant water sources are overbank flooding from the channel and subsurface shallow water table connections between the stream channel and wetlands (Brinson et al. 1995). Other water sources are overland runoff from adjacent uplands, tributaries, and precipitation. Flow may be perennial, perennial but interrupted, or ephemeral/intermittent. Surface flows are complex seasonally and in multiple directions. Water also moves laterally in the shallow groundwater table between the channel and riparian zones, as well as out of the system through infiltration into deep groundwater.

The Yellowstone Highlands encompasses portions of the Upper Henrys Fork subwatershed and the Teton subwatersheds of the Henrys Fork of the Snake River. The principal riverine features in the section are the Henrys Fork River, Buffalo River, Fall River, Warm River, Bitch Creek, and Teton River, which are important habitats for native fish and other biota. Much of the baseflow of these streams and rivers are supported by springs. The Yellowstone Cutthroat Trout (YCT; *Oncorhynchus clarkii bouvieri*) is the only trout native to the Henrys Fork and Teton watersheds (Behnke 1992), but widespread decline of the YCT in the Henrys Fork watershed has resulted from hybridization with Rainbow Trout (*Oncorhynchus mykiss*) and (Brook Trout (*Salvelinus fontinalis*) (Gregory and Griffith 2000). Native Mountain Whitefish (*Prosopium williamsoni*) are common throughout the drainage as are several species of nongame fish.

Teton River riverine habitat © Rob Cavallaro

Currently, the Henrys Fork River is a world-renowned sport fishery comprised of nonnative Rainbow Trout, Brown Trout, and limited numbers of YCT. The fisheries of the Upper Henrys Fork subwatershed (primarily located in the Yellowstone Highlands), and a short reach of the lower Henrys Fork collectively, supports 851 jobs and an estimated annual economic contribution of 29 million dollars to Fremont County, Idaho communities. Total economic output is >50 million dollars (Loomis 2005).

The maintenance of the high-quality fishery in the upper Henrys Fork River is dependent on ensuring adequate winter baseflows and maintaining the integrity of winter refugia found at springheads. Both of these habitat elements are crucial for overwinter survival of juvenile trout (Van Kirk and Benjamin 2000).

The Teton River subwatershed is an important system for conservation of YCT, which has been an important catalyst for conservation in the Upper Snake Region of Idaho and within the GYE. YCT in the Teton subwatershed occurs sympatrically with nonnative Rainbow Trout, rainbow-cutthroat hybrids, and Brook Trout. Bitch Creek, a free-flowing tributary of the Teton River, is one of the two most important spawning tributaries for YCT in the Upper Snake Watershed in Idaho. In some reaches of this subwatershed, irrigation diversions have negatively impacted YCT by disrupting connectivity to spawning and rearing habitats or otherwise degrading habitats.

Riverine aquatic habitats in the Yellowstone Highlands provide regionally significant habitat for migrating and wintering waterbirds, particularly Trumpeter Swan and other waterfowl. The Henrys Fork, Buffalo, and Teton rivers are particularly important to wintering Trumpeter Swans that depend on the combination of open water habitat maintained by springs and aquatic vegetation to overwinter. Harriman Wildlife Refuge and Teton Basin are two Idaho Important Bird Areas (IBA) in the Yellowstone Highlands that were designated primarily for the value of their riverine habitats to waterbirds.

Terrestrial riparian habitats in the Yellowstone Highlands are primarily tree and shrub dominated. At higher elevations or in cold air drainages, Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) commonly form open riparian woodlands along streams with lush herbaceous understories. Typical riparian shrubs in higher, colder environments are willows (e.g., *Salix boothii*, *S. drummondiana*, and *S. geyeriana*), which sometimes form extensive stands filling valley bottoms with sedge (*Carex* spp.), bluejoint (*Calamagrostis canadensis*), or other herbs in the understory. At lower elevations, black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) and quaking aspen (*Populus tremuloides*) line some stream and river reaches, with Rocky Mountain juniper (*Juniperus scopulorum*) in canyons. Typical lower elevation shrubs include coyote willow (*Salix exigua*), redosier dogwood (*Cornus sericea*), and black hawthorn (*Crataegus douglasii*). These riparian habitats provide important habitat for birds, bats, and pollinators, while stabilizing streambanks and providing large woody debris important for properly functioning aquatic habitat.

Target Viability

Fair to *Good.* Many reaches within the Caribou–Targhee National Forest have high-quality fisheries aquatic and riparian habitat while others are impacted by adjacent land use and/or water withdrawals (e.g., Box canyon, Henrys Lake Outlet) that impact both instream and riparian habitats. Less than 20% of rivers and streams in the Upper Henrys Fork and Teton subwatersheds are water quality limited. Sediment and nutrient pollution, flow alteration, and high temperature resulting from water diversion, irrigated agriculture, and livestock grazing are not common stressors (NPCC 2004). However, housing development, flow alteration and diversions for agriculture, and riparian habitat fragmentation from land uses (e.g., livestock grazing) are locally important (NPCC 2004). Using the model of landscape integrity, which incorporates mapped land uses and stressors to estimate condition, Murphy et al. (2012*b*) found that 66% of riverine–riparian habitat in the Yellowstone Highlands is in Very Good condition and 26% is in Fair condition. However, this model may overestimate on-the-ground condition because it does not include the extent of nonnative species invasion and livestock grazing.

Several major water storage projects were completed in the upper Henrys Fork Basin during the early 20th century to support agricultural development on the Snake River Plain. In 1923, an organization of farmers constructed a dam across the Henrys Lake Outlet, raising Henrys Lake approximately 5 m and creating 111 million m^3 of storage (Van Kirk and Benjamin 2000). Grassy Lake Dam on the Fall River and Island Park Dam on the Henrys Fork were both completed in 1939. The Island Park Reservoir has 167 million m^3 of storage and has had profound effects on the hydrology and fisheries of the Upper Henrys Fork watershed (Van Kirk and Benjamin 2000). These projects have disrupted river hydrology by altering the natural hydrograph, leading to changes in riparian and aquatic habitat condition and function. In some reaches of this subwatershed, irrigation diversions have negatively impacted YCT aquatic habitat by disrupting connectivity to spawning and rearing habitats or otherwise degrading riparian habitat condition and function. Documented impacts to habitat quality in both the Upper Henrys Fork and Teton River subwatersheds include altered pool/riffle ratios, increased fine sediment, decreased shade and streambank stability, and nonnative species (NPCC 2004). The Upper Henrys Fork is also impacted by changes in discharge, while the Teton River is susceptible to excessive low flows (NPCC 2004).

Spotlight Species of Greatest Conservation Need: Trumpeter Swan

Trumpeter Swan, the largest waterfowl species in North America, was once threatened with extinction due primarily to unregulated harvest. Trumpeter feathers were sought after for quill pens, women's hats, and for use as powder puffs. Establishment of refuges and legal protection has brought Trumpeter Swan back from the brink and several populations are thriving. In Idaho, Trumpeter Swan is designated as an SGCN due to the small size of the breeding population and threats to its breeding and wintering habitat.

Trumpeters in eastern Idaho are part of the Rocky Mountain Population (RMP) that numbers approximately 7,000 individuals. Most RMP swans breed in Canada but there is a smaller struggling breeding flock in the Greater Yellowstone area (Idaho, Wyoming, Montana). Despite the ongoing recovery of RMP Trumpeter Swans, the viability of the Greater Yellowstone Flock remains a conservation challenge as production at nest sites in eastern Idaho and Yellowstone National Park are perennially low. In the Yellowstone Highlands, the average number of active Trumpeter Swan nest sites since 2012 is five (Henry 2012, 2013; Shea 2014*a*,*b*).

Nesting Trumpeter Swans require large, isolated, productive wetlands to breed. These sites are increasingly rare on many public lands. In an effort to increase the Greater Yellowstone population of Trumpeter Swan, IDFG, Teton Regional Land Trust, US Fish and Wildlife Service (FWS), Wyoming Wetlands Society, Trumpeter Swan Society, and private landowners are releasing captive-reared cygnets (young swans) into suitable habitat on conservation easement properties in Teton Valley. The goal is to establish a bond between the released cygnets and selected wetlands that will result in eventual new swan breeding territories over the next 10–15 years. Other conservation initiatives in the Yellowstone Highlands include establishing nesting islands in potentially suitable breeding habitat, and wetland restoration/enhancement.

Wintering Trumpeters on the Teton River © Beach Huntsman

Although trumpeters breed in relatively low numbers in the State, eastern Idaho provides the most important winter habitat for trumpeters in the Rocky Mountains. Both Canadian and Greater Yellowstone birds winter along the Henrys Fork, South Fork, Teton, and Main Snake River corridors. In the Yellowstone Highlands, the most important wintering habitat is the Henrys Fork from Last Chance to Pine Haven and the Teton River including both valley and canyon reaches. In mid-winter, key habitats are shallow river reaches, sand/gravel bars, sloughs and their associated aquatic bed wetlands; and adjacent farm fields for foraging and loafing.

The Great Northern Land Conservation Cooperative has identified Trumpeter Swan as a conservation target for the Rocky Mountains due to its iconic status and sensitivity to climate-related impacts on its breeding habitat (Chambers et al. 2013).

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

High rated threats to Riverine–Riparian Forest & Shrubland in the Yellowstone Highlands

Dams & water diversions

Several major water storage projects were completed in the upper Henrys Fork Basin during the early 20th century to support agricultural development on the Snake River Plain. In 1923, an organization of farmers constructed a dam across the Henrys Lake Outlet, raising Henrys Lake approximately 5 m and creating 111 million m^3 of storage (Van Kirk and Benjamin 2000). Grassy Lake Dam on the Fall River and Island Park Dam on the Henrys Fork were both completed in 1939. The Island Park Reservoir has 167 million m^3 of storage and has had profound effects on the hydrology and fisheries of the Upper Henrys Fork watershed (Van Kirk and Benjamin 2000).

Existing and proposed future diversions have the potential to limit the complexity of riverine aquatic and riparian systems and negatively impact YCT conservation.

Objective	Strategy	Action(s)	Target SGCNs
Preserve the ecological function of riverine aquatic and riparian habitat in the upper Henrys Fork and Teton subwatersheds.	Engage with BOR, Idaho Department of Water Resources, water users and the public on strategic issues related to current and future water use.	Provide technical expertise and input on crucial riverine habitats and habitat functions to help guide the ongoing BOR Henrys Fork Basin Study. Educate landowners and the public on the importance of natural hydrologic regimes for sustaining riparian vegetation and associated SGCNs.	Western Toad Northern Leopard Frog Trumpeter Swan Sharp-tailed Grouse Silver-haired Bat Hoary Bat Little Brown Myotis Grizzly Bear Western Pearlshell Pondsnail Species Group Rocky Mountain Duskysnail Monarch Gillette's Checkerspot A Caddisfly (*Glossosoma idaho*)
Maximize ecological function on the Henrys Fork River.	Optimize winter flows in the Henrys Fork.	Engage with water user groups on winter releases from Island Park dam, through participation in the Henrys Fork Watershed Council.	Trumpeter Swan Western Pearlshell Pondsnail Species Group Rocky Mountain Duskysnail A Caddisfly (*Glossosoma idaho*)
	Restore Henrys Lake Outlet riparian habitat.	Engage with landowners and other partners to establish/improve riparian habitat.	Western Toad Trumpeter Swan American White Pelican Sandhill Crane Franklin's Gull Ring-billed Gull California Gull Caspian Tern Silver-haired Bat Hoary Bat Little Brown Myotis Grizzly Bear Western Pearlshell Pondsnail Species Group Rocky Mountain Duskysnail Monarch Gillette's Checkerspot A Caddisfly (*Glossosoma idaho*)
Maximize ecological function on the Teton River.	Maintain hydrologic integrity of Bitch Creek.	Engage with stakeholders for protecting hydrologic, instream, and riparian habitat integrity.	Sharp-tailed Grouse Sandhill Crane Silver-haired Bat Hoary Bat Little Brown Myotis Grizzly Bear Western Pearlshell Pondsnail Species Group Rocky Mountain Duskysnail Monarch Gillette's Checkerspot A Caddisfly (*Glossosoma idaho*)

Objective	Strategy	Action(s)	Target SGCNs
	Where appropriate, restore/improve connectivity to fluvial tributaries of the Teton River.	Seek public-private partnership to improve hydrologic, instream and riparian habitat on Teton Creek, Trail Creek and other important fluvial tributaries of the Teton River.	Trumpeter Swan Sharp-tailed Grouse Sandhill Crane Long-billed Curlew Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine Grizzly Bear Western Pearlshell Pondsnail Species Group Rocky Mountain Duskysnail Kriemhild Fritillary Monarch Gillette's Checkerspot A Caddisfly (*Glossosoma idaho*)
Ensure reservoir operations protect existing riverine and wetland ecological function.	Work with stakeholders to develop reservoir management strategies.	Work with Henrys Fork Watershed Council.	Trumpeter Swan Common Loon Western Grebe American White Pelican White-faced Ibis Sandhill Crane Long-billed Curlew Ring-billed Gull California Gull Caspian Tern Western Pearlshell Pondsnail Species Group Rocky Mountain Duskysnail A Caddisfly (*Glossosoma idaho*)

Loss & degradation of habitat on private lands

The cumulative effects of human land uses have resulted in degradation or loss of riparian and aquatic habitat and the important functions they provide. Land uses causing impacts are agriculture and livestock grazing (medium in both Upper Henrys Fork and Teton subwatersheds), housing development (medium in Upper Henrys Fork, high in Teton), recreation, and, to a lesser extent, timber harvest (NPCC 2004). Other than housing development, all of these land uses occur on both public and private land. The following impacts have been documented at high levels in the Upper Henrys Fork and Teton River subwatersheds (NPCC 2004): reduced shading of streams by riparian trees and shrubs; decreased streambank stability; increased fine sediment; and higher noxious and invasive nonnative plant species populations. When deeply-rooted native trees, shrubs, and herbaceous riparian vegetation are reduced by development (and associated roads and bridges), livestock, and recreation, streambank stability declines, leading to sediment input and instream aquatic habitat changes (e.g., less woody debris, changes to pool/riffle ratios, etc. NPCC 2004). The loss of riparian habitat complexity and structure negatively impacts SGCN bats, amphibians, and pollinators, while also leading to less quality habitat for aquatic invertebrates and amphibians. Other observed stressors to riparian and aquatic habitat are related to floodplain development, such as armoring streambanks (e.g., rip-rap) and building of levees for flood control. Roads, bridges, and culverts associated with development are additional major stressors observed in the Yellowstone Highlands.

Cumulatively, land uses have fragmented riparian habitat, reducing connectivity necessary for species movements. This can disrupt species life stage needs and reduce genetic diversity.

Objective	Strategy	Action(s)	Target SGCNs
Conserve or restore the ecological integrity and function of streams and rivers in the Teton and Upper Henrys Fork River subwatersheds.	Collaborate with landowners and conservation partners to improve the ecological integrity and function of riverine aquatic and riparian habitat.	Support programs/efforts (e.g. conservation easements, Farm Bill programs, etc.) that educate landowners and facilitate partnership with willing landowners to restore and protect riverine aquatic and terrestrial riparian habitats. Determine riparian and stream channel condition and function, ownership status, restoration needs, sources of stressors, and management needs at a reach-specific scale through riparian condition and function assessments; incorporate SGCN habitat requirements. Implement site-specific projects based on site prioritization using assessment results. Develop site-specific implementation plans for stream channel and riparian vegetation restoration, including measurable objectives and time frames. Acquire and/or secure key riparian habitats through conservation easements, fee-title acquisition, landowner agreements, or long-term management rights. Seek public-private partnerships to improve hydrologic, instream, and riparian habitat on Teton Creek, Trail Creek, and other important tributaries of the Teton River. Where possible, restore or improve connectivity to fluvial tributaries of the Teton River. Improve stream channels and riparian habitats by removing unnecessary dikes and restoring natural meanders to straightened channels. Restore or stabilize stream reaches that have become unstable (e.g., braided channels, downcutting, etc.) due to land management practices. Engage with landowners and other partners in projects to establish and restore Henrys Lake Outlet riparian habitat. Monitor and evaluate the effectiveness of channel and riparian habitat protection, stewardship, and restoration; adapt management to meet objectives based on monitoring.	Western Toad Northern Leopard Frog Trumpeter Swan Sharp-tailed Grouse Silver-haired Bat Hoary Bat Little Brown Myotis Western Pearlshell Monarch Gillette's Checkerspot A Caddisfly (*Glossosoma idaho*)

Changing precipitation patterns

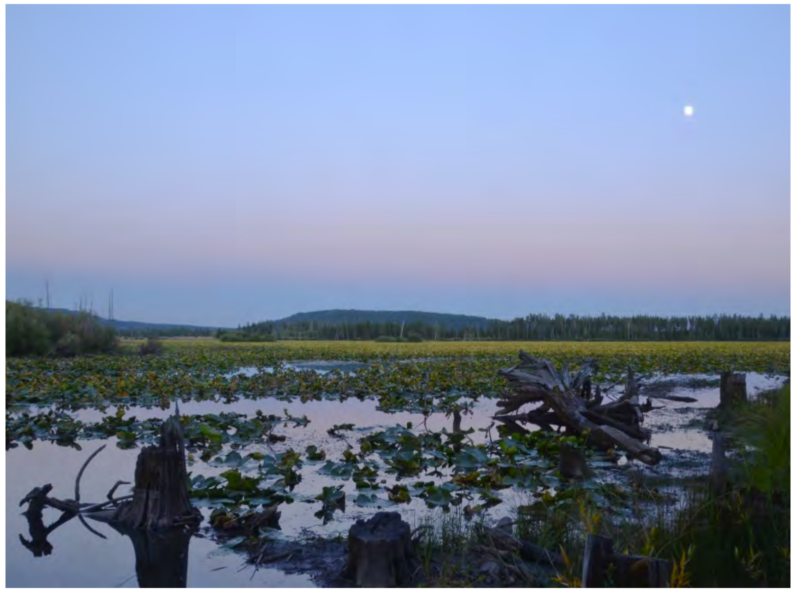
Yellowstone National Park has experienced decreasing annual precipitation and increasing summer temperatures during the last 25 years, and drought is more common (McMenamin et al. 2008). As a result, riparian and wetland habitats and the species dependent on them are in decline (McMenamin et al. 2008, Ray et al. 2015). Similar climate change patterns and declines in riparian and wetland habitats are likely to occur throughout the Yellowstone Highlands based on observed and projected warming leading to increased evaporation and decreases in snow pack resulting in less snowmelt runoff for streams and rivers (Ray et al. 2015). Beavers have historically been important in the Yellowstone Highlands for slowing and storing surface water runoff, raising groundwater tables, expanding wetland habitat, and improving soil moisture for riparian vegetation (NPCC 2004). Restoration of beaver populations plays an important role in mitigating the effects of climate change in watersheds (Ray et al. 2015).

Objective	Strategy	Action(s)	Target SGCNs
Improve resiliency of riverine and riparian habitats to climate change through planning and actions.	Incorporate climate change data and models in strategic planning to guide research, management, and conservation actions to improve resiliency of riverine and riparian habitat.	Assemble and summarize relevant climate information, such as temperature, precipitation, and runoff data, needed for strategic climate change mitigation planning. Identify knowledge gaps that inhibit prioritization and action. Initiate research to address knowledge gaps. Combined with current and projected runoff data, identify the location, extent, and condition of streams and rivers most vulnerable to climate change (Ray et al. 2015) and which will benefit most from beaver reintroduction. Educate landowners and the public on the benefits of beavers for mitigating climate change impacts. Conduct beaver translocations into appropriate habitat identified during prioritization. Monitor and evaluate the effectiveness of riparian restoration and beaver reintroduction projects.	Western Toad Northern Leopard Frog Trumpeter Swan Sharp-tailed Grouse American White Pelican Silver-haired Bat Hoary Bat Little Brown Myotis Western Pearlshell Monarch Gillette's Checkerspot A Caddisfly (*Glossosoma idaho*)

Target: Wetlands

The dominant depressional and spring and groundwater-dependent wetland habitats in the Yellowstone Highlands are palustrine emergent and palustrine scrub-shrub (Jankovsky–Jones 1996). Lacustrine limnetic wetlands within ponds, lakes, and reservoirs are included in this target.

Depressional Wetlands occur in shallowly-flooded depressions such as oxbows, created wetlands, shallow lakes and reservoirs, beaver ponds, and marshes. Spring and groundwater-fed wetlands are typically seeps and springs on gentle to steep slopes, including peatland fens, mesic and wet meadows, and shrub-dominated wetlands.



Mesa Marsh Targhee National Forest © Terry Thomas

Numerous large wetlands and wetland complexes in the Island Park area are associated with Henrys Lake, Island Park Reservoir, and springs. These waterbodies support diverse wetland types including aquatic vegetation, wet mudflat, emergent marsh, swamp forests, fens, and meadows. Lake- and reservoir-associated wetlands in Island Park are key habitats supporting SGCN waterbirds. Large volume springs originating on the eastern margin of the Island Park Caldera are important for supporting over 50% of the base flow of Henrys Fork above Ashton. These springs provide thermal refugia for fish and other aquatic biota all year (Van Kirk and Benjamin 2000), and open water areas for waterfowl, including Trumpeter Swan, during winter. Other springs support fens dominated by woollyfruit sedge (*Carex lasiocarpa*) and other specially adapted and rare plants. Vernal pools are scattered throughout coniferous forests on the CTNF. These small basins are typically <0.5 acre and their principal hydrologic source is snowmelt. There are approximately 2,200 acres of wet meadow habitats mapped on the Ashton–Island Park and Teton Basin Ranger Districts (USDA 2014). These meadows are most often dominated by graminoids, such as water sedge (*Carex aquatilis*), forbs such as California false hellebore (*Veratrum californicum*), or are weedy herbaceous communities. A number of ponds with marsh and aquatic vegetation such as Mesa Marsh, Upper and Lower Goose lakes, and Tule Lake provide the current or potential principal nesting habitats for Trumpeter Swan and Common Loon in the Yellowstone Highlands.

In Teton Valley, almost 10% of the land area is designated as wetlands. Dominant types are meadows, emergent marsh, and fens. Depressional Wetlands support emergent marshes dominated by sedges (*Carex* spp.), common spikerush (*Eleocharis palustris*), and bulrush (*Schoenoplectus* spp.). Common fen plants include bog birch (*Betula glandulosa*) and analogue sedge (*Carex simulata*). Meadows are frequently dominated by sedges (e.g., *Carex* *nebrascensis*, *C. utriculata*), Baltic rush (*Juncus balticus*), shrubby cinquefoil (*Dasiphora floribunda*), and tufted hairgrass (*Deschampsia caespitosa*). Introduced forage grasses such as reed canarygrass (*Phalaris arundinacea*) characterize wetlands used for haying and livestock pasture. There are also several large created and restored wetlands and wetland complexes that are key habitats for avian wildlife. Many of these wetlands are concentrated along the Teton River corridor and occur on private lands.

California false hellebore meadow on the CTNF © Rob Cavallaro

Several sites from the Yellowstone Highlands are designated as statewide priorities for conservation by IDFG (Murphy et al. 2012*a*). The sites are Henrys Lake, Henrys Fork–Flat Ranch, and Teton Basin. All of these sites are threatened by changing precipitation patterns and rural residential development, but are also the focus of major collaborative public–private conservation efforts.

Henrys Lake has extensive wetland complexes along the north, east, and southwest lakeshores. Geyer's, Booth's, and diamondleaf willows (*Salix geyeriana*, *S. boothii*, *S. planifolia*) are present along streams entering the valley from adjacent mountains. Where springs are present, Wolf's and shortfruit willow (*Salix wolfii*, *S. brachycarpa*) communities are common. Rare white spruce (*Picea glauca*) swamps occur on the north lake shore, and five rare plant species are documented in this wetland complex (Murphy et al. 2012*a*). Henrys Lake is an Idaho IBA due to its importance to breeding and foraging waterbirds, including Red-necked Grebe (*Podiceps grisegena*), Trumpeter Swan, Greater Sandhill Crane (*Grus canadensis*), and American

Blue camas in wet meadow, Shotgun Valley © Rob Cavallaro

White Pelican (*Pelecanus erythrorhynchos*). TNC and other partners have protected approximately 3,600 acres of private lands around Henrys Lake that help to preserve and buffer wetland function.

The Henrys Fork–Flat Ranch site is a large wet meadow complex interspersed with springs, seeps, and creeks that subsidize flows of the Henrys Fork River. The site is a mosaic of meadow types, ranging from beaked sedge (*Carex utriculata*), common spikerush, and analogue sedge in wet depressions to tufted hairgrass on slightly drier soil. Booth's willow communities occur on streambanks and silver sagebrush (*Artemisia cana*) occurs on margins (Murphy et al. 2012*a*). TNC has protected approximately 1,300 acres of this area in the Flat Ranch Preserve. Most of the remaining area is private and State of Idaho lands. The extensive wet meadows support regionally significant nesting concentrations of Long-billed Curlew (*Numenius americanus*), Short-eared Owl (*Asio flammeus*), and Greater Sandhill Crane.

Teton Basin is an extensive wetland complex in the cold, high mountain basin between the Big Hole Range and Teton Mountains. Numerous fluvial streams from the west slope of the Tetons and spring-fed creeks emanating from the valley floor converge to form the headwaters of the Teton River. Among these spring-nourished habitats are large areas of peat soils (fen wetlands). Riparian and wetland communities along the Teton River and tributaries typically contain a mosaic of sedge, Baltic rush, grassy meadows, shrubby cinquefoil, willow riparian shrublands, and cottonwood and aspen forests. Within the Teton Basin there are several large subcomplexes including Woods Creek Fen, the Foster's Slough Wetland Complex, and the lower Teton Creek corridor that are individually recognized as Idaho wetland conservation priorities (Jankovsky–Jones 1996). Teton Regional Land Trust, based in Driggs, Idaho, has protected >11,000 acres of lands via conservation easement agreements with willing private landowners. Much of this protected land base protects or buffers important wetlands. Teton Basin is designated as an Idaho IBA due to its importance to nesting waterbirds, wintering Trumpeter Swans, and premigration staging Sandhill Cranes.

Other important large wetland complexes that are priorities for conservation in the Yellowstone Highlands include CTNF wetlands and Island Park Reservoir/Shotgun Valley.

CTNF wetlands are a crucial component of landscape-scale wetland conservation due to their extensive distribution across the Yellowstone Highlands landscape, type diversity, and relatively high functional value. The northern and western shore of Island Park Reservoir and adjacent Shotgun Valley support mudflats, aquatic vegetation, marsh, and meadow wetland types. The land ownership is a mix of Harriman State Park, BLM, private, and State of Idaho lands. In 2008, Island Park Reservoir was designated as an Idaho IBA. The foundation of the Island Park Reservoir IBA designation is the breeding bird concentrations in reservoir-influenced wetlands. During the nesting season, the north shore wetlands are used by at least 10,000 breeding birds representing a great variety of colonial waterbirds including Ring-billed (*Larus delawarensis*) and California Gull (*Larus californicus*), Caspian Tern (*Hydroprogne caspia*), Black-crowned Night Heron (*Nycticorax nycticorax*), Western Grebe (*Aechmophorus occidentalis*), Eared Grebe (*Podiceps nigricollis*), White-faced Ibis (*Plegadis chihi*), and American White Pelican. In late summer and early fall, the shallows and mudflats around the island support thousands of ducks, geese, and migrating shorebirds. Wet meadow habitats in Shotgun Valley support high concentrations of nesting Long-billed Curlew and provide regionally significant brood-rearing habitat for Greater

Sage-Grouse (*Centrocercus urophasianus*) nesting in the Sand Creek Desert. Several created wetlands on private lands support breeding and foraging habitat for Trumpeter Swans.

Target Viability

Good. Some wetlands are negatively impacted by anthropogenic factors, while others are highly functional (forest vernal pools and fens). Challenges to maintaining good ecological condition and maximizing ecological function of wetlands across the Yellowstone Highlands are improper livestock grazing, changing precipitation patterns, rural residential development, decreased beaver abundance, and both human-caused and natural disturbances. Using the model of landscape integrity, which incorporates mapped land uses and stressors to estimate condition, most wetlands in the Yellowstone Highlands are in Very Good condition (e.g., 58% of Depressional Wetlands, 55% of lakes, ponds, and reservoirs, and 64% of spring and groundwater-dependent wetlands; Murphy et al. 2012*b*). Although a substantial number of wetlands are in good ecological condition (especially in the Island Park area), where adequately buffered from forest practices, roads, or other development, this model likely overestimates on-the-ground condition because it does not accurately include the extent of nonnative species invasion and livestock grazing. For example, human land uses (e.g., mostly ranching and residential) comprised over 70% of the area adjacent to a limited number of Depressional Wetlands assessed in the Teton Basin (Murphy and Weekley 2012). These wetlands were in fair ecological condition, primarily impacted by hydrologic alterations, followed by nonnative plant species invasion and alterations to vegetation and soil (e.g., most often livestock related). However, substantial wetland conservation efforts are in place to protect and restore wetlands throughout the Upper Henrys Fork and Teton River subwatersheds.

Wetland habitat mosaic along lower Teton Creek © Rob Cavallaro

Spotlight Species of Greatest Conservation Need: Greater Sandhill Crane

The Intermountain West Joint Venture (IWJV) identified Greater Sandhill Cranes as an umbrella species to serve as a vehicle for wetland conservation in the Intermountain West. An umbrella species is "a species whose conservation is expected to confer protection to a large number of naturally co-occurring species" (Roberge and Angelstam 2004). According to the IWJV, Sandhill Cranes "had the broadest connectivity to partners across the Intermountain West, had high population reliance on Intermountain West landscapes, exhibited strong relationships to wetland habitats amenable to existing conservation programs, and possessed sufficient population-habitat data to inform planning models" (http://iwjv.org/wetland-focal-strategies). Therefore, conservation of Sandhill Cranes has the potential to benefit many other important wildlife species including invertebrates, fish, amphibians, reptiles, songbirds, waterfowl, and big game.

Sandhill Cranes and Trumpeter Swans foraging in a spring barley field in Teton Valley © Tamara Sperber

Sandhill Cranes in the Yellowstone Highlands are part of the Rocky Mountain Population (RMP) which includes approximately 20,000 birds. The breeding range for RMP cranes is centered around the Greater Yellowstone Area including the Yellowstone Highlands. Henrys Lake Flat and Teton Valley both support large nesting concentrations of Sandhill Cranes, and Teton Valley is one of the most important pre-migration staging areas for Rocky Mountain Sandhills in the West.

Sandhill Cranes arrive in Teton Valley from their wintering areas in the Central Rio Grande Valley of New Mexico and adjacent habitats in Mexico beginning in late March through April. Subadult, nonbreeding cranes often gather in unplowed grain fields, pastures, and other open habitats to forage and socialize in small flocks. Breeding adult cranes head straight for their wetland nesting territories. Isolated wetlands around the valley support nesting cranes, but the largest concentrations occur on the east side of the Teton River and on Henrys Lake Flat. During breeding, cranes require wetlands surrounded by protected open space ideally comprised of pasture, meadows, or sage steppe habitats. Wetlands are preferred nesting areas because of the increased cover afforded by flooded habitat, robust wetland vegetation, and abundant protein-rich food such as small mammals and invertebrates, which are crucial for egg-producing females and newly hatched chicks.

Sandhill Cranes lay 2 eggs, typically in the latter part of May. The chicks hatch after about 30 days. When the second chick has hatched, the adults move the family into dense cover where, for the next 2 months they will carefully attend their chicks as they grow and begin to develop flight. Isolated wetland habitats are crucial to support Sandhill Crane egg-laying, incubation, and early brood-rearing activities.

Sandhill Crane chicks fledge approximately 70 days after hatching and, by late August, many crane families and nonbreeding subadults are leaving their nesting/summering areas to gather in flocks at special premigration staging areas. In the Greater Yellowstone Area, the premigration period extends from late August to early October. This period is vitally important for Rocky Mountain Sandhill Cranes as it allows flocks to fully form while cranes forage intensively, usually in wetlands, pastures, and cutover barley and wheat fields prior to their long migration south.

Every night during the fall, Sandhill Crane flocks roost in isolated wetlands. Through the night, cranes rest while standing in water that comes partway up their legs but is not deep enough to wet their feathers. To consistently provide appropriate water levels from year to year for roosting cranes, it is necessary to have a variety of sheltered wetlands to allow for varying annual water conditions. Some managed wetland roosts are used consistently, while the use of natural roosts varies depending on available water.

In Teton Valley, crane flocks leave their night roosts to gather in harvested barley fields on the west side of the Teton River. Island Park nesting cranes may leave the area for fall premigration staging areas; or they may stage in large wet meadow complexes in the Yellowstone Highlands. Cranes prefer to forage as close to their night roosts as possible, usually within 2.5 km (IDFG unpublished data).

Prioritized Threats and Strategies for Wetlands

High rated threats to Wetlands in the Yellowstone Highlands

Improper livestock grazing management

Improper livestock grazing removes current growth, decreasing pollinator plants and altering habitat structure for other species. The productivity and survival of native trees, shrubs, and deeply rooted herbaceous species can decline, resulting in less soil stability. Soil can become compacted or eroded, resulting in stream head-cutting through meadows that lowers groundwater and leads to wetland replacement by upland species and nonnative invasive weeds. Increased fine sediment, decreased shading of aquatic communities, poor streambank stability, and larger populations of nonnative invasive plant species are all outcomes of improper livestock grazing documented in the Yellowstone Highlands (NPCC 2004). Livestock grazing is a medium level stressor across both Teton and Henrys Fork subwatersheds (NPCC 2004), mostly associated with Springs & Groundwater-Dependent Wetlands such as mesic and wet meadows, but also occurring in riverine–riparian habitat. However, this stressor can be locally high where improper livestock grazing directly impacts crucial habitat for SGCNs. For example, Mountain Marshsnail (Pondsnail) (*Stagnicola montanensis*) is absent from springs polluted by fine sediment that can result from trampling and overgrazing by livestock (Frest 1999).

Objective	Strategy	Action(s)	Target SGCNs
Protect, enhance, and restore ecological condition and function of springs and other wetland habitats negatively impacted by improper grazing.	Work with livestock operators to improve ecological condition of wetlands.	Inventory, prioritize, and map wetlands in need of restoration and protection based on condition and use by SGCNs. Use Best Management Practices to protect high priority sites. Work with land management agencies and private landowners to implement grazing regimes that promote sustaining and recruiting native trees, shrubs, and deeply rooted herbaceous species. Collaborate with federal and state land managers on allotment reviews and revisions. Educate partners, agency personnel, and livestock operators on the need for protecting and restoring wetlands.	Western Toad Northern Leopard Frog Trumpeter Swan Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Long-billed Curlew Short-eared Owl Bobolink Silver-haired Bat Hoary Bat Little Brown Myotis Grizzly Bear Pondsnail Species Group Western Bumble Bee Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch

Loss & degradation of wetland habitat on private lands

The cumulative effects of human land uses have resulted in degradation or loss of riparian and aquatic habitat and the important functions they provide. Habitat fragmentation is a high level stressor in the Teton subwatershed and a medium level stressor in the Upper Henrys Fork (NPCC 2004). Land uses within, or immediately adjacent, to wetlands observed in the Yellowstone Highlands include agriculture (e.g., especially pasturing and haying), housing development, road construction and maintenance, trail development, and construction and maintenance of utility corridors (NPCC 2004). These activities often remove wetland vegetation, facilitate nonnative species invasion, increase water pollution (e.g., sediment, nutrients, bacteria, toxic chemicals), and degrade and fragment wildlife habitat. For example, the potential negative effects of water pollutants on amphibians are well studied. Across most groups of amphibians, water pollutant exposure (especially toxic chemicals) causes a moderate, but significant decrease in amphibian survival (14%) and biomass (8%), but an extremely large increase in the frequency of body abnormalities (Egea-Serrano 2012). In addition, people and pets disturb wildlife populations during recreational activities. Roads are associated with direct vehicle-caused wildlife mortality.

Objective	Strategy	Action(s)	Target SGCNs
Protect and restore wetlands on private lands using easements or related programs, with a focus on Henrys Lake Flat, Henrys Fork River, Teton Basin, Island Park Reservoir, and	Work with landowners and partners to protect and restore wetlands and improve stewardship on private lands using a variety of conservation programs and	Identify wetlands vulnerable to development and prioritize sites in need of protection and restoration. Support/initiate programs/efforts (e.g. Farm Bill, NAWCA, Soil Conservation Commission, etc.) that facilitate partnership with willing private landowners to restore and protect wetlands. Provide technical support to land trusts	Western Toad Northern Leopard Frog Trumpeter Swan Sharp-tailed Grouse White-faced Ibis Sandhill Crane

Objective	Strategy	Action(s)	Target SGCNs
Shotgun Valley.	mechanisms.	working with willing private landowners to protect wetlands with conservation easements or other tools. Support conservation partners, (NRCS, Teton Regional Land Trust, TNC, etc.) in securing financial resources to support conservation easement acquisitions. Seek public-private partnerships to identify willing landowners and funding to support a conservation easement program in Shotgun Valley. Work with Harriman State Park and willing private landowners to maintain extraordinary wetland values associated with the northwest shore of Island Park Reservoir, associated island habitat, and crucial Sage-Grouse and waterbird breeding areas.	Long-billed Curlew Short-eared Owl Bobolink Silver-haired Bat Hoary Bat Little Brown Myotis Grizzly Bear Pondsnail Species Group Western Bumble Bee Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch
Protect, maintain, and/or restore habitat and hydrologic function of springs, seeps, marshes, and meadows.	Collaborate with land management agencies, landowners, and NGOs to Implement projects to protect, maintain, and/or improve habitat and hydrologic function of springs, seeps, marshes, and meadows.	Work with land management agencies and private landowners to secure funds and create incentives for control of noxious weeds. Stabilize headcuts and raise the water table of incised channels in meadows, remove barriers to natural water movement in and out of wetlands. Restore wetland vegetation with locally adapted native trees, shrubs, and deeply rooted native herbaceous species. Where feasible, maintain or increase duration of saturation and shallow flooding in meadows and marshes. Where feasible, use mechanical disturbance, fire, herbicides (if safe for aquatic biota), seasonal flooding, seeding, and/or other treatments where appropriate and practical to increase diversity and productivity of wet meadows and marshes.	Western Toad Northern Leopard Frog Trumpeter Swan Greater Sage-Grouse White-faced Ibis Sandhill Crane Long-billed Curlew Short-eared Owl Bobolink Grizzly Bear Pondsnail Species Group Western Bumble Bee Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch

Changing precipitation patterns

Yellowstone National Park has experienced decreasing annual precipitation and increasing summer temperatures during the last 25 years, and drought is more common (McMenamin et al. 2008). As a result, the number of ponds and Depressional Wetlands completely drying up has increased 4-fold. This has led to a significant decline in amphibian populations, including

Western Toad (*Anaxyrus boreas*; McMenamin et al. 2008). Other species, including Trumpeter Swan and Sandhill Crane, may also be negatively impacted by long-term wetland desiccation (Ray et al. 2015). Similar climate change patterns and declines in Depressional Wetlands are likely to occur throughout the Yellowstone Highlands based on observed and projected warming leading to increased evaporation and decreased snowmelt runoff (Ray et al. 2015).

Objective	Strategy	Action(s)	Target SGCNs
Improve resiliency of wetland habitats to climate change through planning and actions.	Incorporate climate change data and models in strategic planning to guide research, management, and conservation actions (e.g., beaver restoration) to improve resiliency of wetland habitat.	Assemble and summarize relevant climate information, such as temperature, precipitation, and runoff data, needed for strategic climate change mitigation planning. Identify knowledge gaps that inhibit prioritization and action. Initiate research to address knowledge gaps. Combined with current and projected runoff data, identify the location, extent, and condition of wetlands most vulnerable to climate change (Ray et al. 2015) and which will benefit most from beaver reintroduction. Educate landowners and the public on the benefits of beavers for mitigating climate change impacts. Conduct beaver translocations into appropriate habitat identified during prioritization. Monitor and evaluate the effectiveness of riparian restoration and beaver reintroduction projects.	Western Toad Northern Leopard Frog Trumpeter Swan Greater Sage-Grouse Sharp-tailed Grouse White-faced Ibis Sandhill Crane Long-billed Curlew Short-eared Owl Bobolink Silver-haired Bat Hoary Bat Little Brown Myotis Grizzly Bear Pondsnail Species Group Western Bumble Bee Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch

Target: Henrys Lake Flat

This landscape includes Henrys Lake and the surrounding mosaic of mostly open habitats. It is a mix of land ownership including BLM, Idaho Department of Lands, Harriman State Park and one of the larger concentrations of private lands in Island Park. The Henrys Lake Flat (HLF) ranges in elevation from approximately 6,400–6,800 ft. Most of HLF is described by USDA (2014) as montane and riparian herblands. Common herbs of the lower elevations include pasture grasses, horsetail (*Equisetum* spp.), water sedge (*Carex aquatilis*), Nebraska sedge (*Carex nebrascensis*), Kentucky bluegrass (*Poa pratensis*), tufted hairgrass (*Deschampsis caespitosa*), common spikerush, Baltic rush (*Juncus balticus*), mule-ears (*Wyethia* spp.) and slender cinquefoil (*Potentilla gracilis*).

Dominant shrubs include shrubby cinquefoil (*Dasiphora floribunda*), Wolf's, Geyer's and Booth's willow (*Salix wolfii, S. geyeriana, S. boothii*) in riparian areas and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) in uplands. Cattails (*Typha latifolia*) are common flooded emergent plants. Forested habitat on the periphery of the HLF is primarily coniferous including lodgepole pine and Douglas-fir, although scattered aspen (*Populus tremuloides*) groves occur in various locations (BLM 1997). There are a variety of state rare plants that occur in the HLF including hoary willow (*Salix candida*) and green-keeled cottongrass (*Eriophorum viridicarinatum*). A rare white spruce (*Picea glauca*) community exists on the northwest corner of Henrys Lake.

The Nature Conservancy's Flat Ranch © TNC

HLF is identified by several agencies and/or nongovernmental organizations as a priority landscape for conservation. The BLM classifies Henrys Lake as an *Area of Critical Environmental Concern* (ACEC) due to its extraordinary value to wetlands and wildlife (BLM 1997). Specifically, BLM designated Henrys Lake, including the HLF, as an ACEC to facilitate "protection of riparian, wildlife, recreation, and water quality resources from land disposal, unrestricted rights-of-way, and development as well as other adverse impacts" and to "increase opportunities to pursue future protection and acquisition projects to augment the unique resources on public lands" (BLM 1997). TNC's 1,450 acre Flat Ranch Preserve, located on the HLF seven miles west of Yellowstone National Park, is a working cattle ranch where conservation and sustainable ranching practices are applied to promote highly functional habitats. The Flat Ranch is a lynchpin for surrounding private lands conservation and restoration. The IDFG identifies both HLF and the Flat Ranch as high conservation priorities in the *Idaho Wetland Conservation Prioritization Plans* (IDFG 2005; 2012). The BLM designation of HLF as an ACEC, along with protection of TNC's Flat Ranch, has helped generate interest and funds to work with willing private landowners interested in conservation. To date, TNC, BLM, and other partners have worked with private landowners to protect over 3,600 acres of private lands in permanent conservation easements.

IDFG formally designated HLF as an IBA due to its high value to breeding and migrating waterbirds. HLF is a regionally important Greater Sandhill Crane nesting area, subadult concentration area and, periodically, a fall staging area. The area also supports the highest known concentration of nesting Long-billed Curlews in east Idaho. Trumpeter Swan and other waterfowl use Henrys Lake for foraging and roosting. Colony-nesting waterbirds that breed in Island Park Reservoir, Henrys Lake, Sheridan Reservoir, and other areas spend some time foraging on HLF. Special status colony-nesting species documented as breeding or foraging on HLF include Red-necked Grebe, Forster's Tern (*Sterna forsteri*), Caspian Tern, White-faced Ibis, Ring-billed Gull, California Gull, Franklin's Gull (*Leucophaeus pipixcan*) and American White Pelican.

Henrys Lake Flat as seen from the Henrys Lake Mountains © Rob Cavallaro

The HLF's geographic position makes it an important zone of connectivity (and a potential barrier) for wildlife moving between Yellowstone National Park and surrounding national forest lands. This area is particularly crucial to big game and large carnivores.

The HLF provides important fawning/calving and transitional habitat for Elk, Moose (*Alces alces*), Pronghorn (*Antilocapra americana*), Mule Deer, and White-tailed Deer (*Odocoileus virginianus*). The HLF provides summer habitat for these species, as well as important movement paths for seasonal migrants. During spring (late May to early June), Pronghorn from Montana move into the HLF by crossing Raynolds Pass and traveling southeast along the Henrys Lake Mountains. Many Pronghorn spend the summer in the HLF, while others proceed further south into other areas within the Island Park Caldera. Elk also use the HLF for calving. During an Elk calf survival and movement research project conducted in the spring of 2009, the sagebrush flats surrounding Henrys Lake (including the HLF) were heavily used for calving and early calf rearing (IDFG unpublished data).

Target Viability

Fair. Despite some public ownership and almost 5,000 acres protected in conservation easements, or other protected private lands, much of the HLF is threatened by current and potential rural housing development.

Spotlight Species of Greatest Conservation Need: Long-billed Curlew

Long-billed Curlew is a grassland-nesting sandpiper and the largest shorebird in North America. Curlews that breed in Idaho are known to winter in both California and Mexico in a variety of habitats, including shoreline/estuarine habitats of the Gulf of California and interior grassland and agricultural habitats of Mexico as well as the Central Valley and Imperial Valley (Salton Sea area) in California. In winter, Idaho curlews depend to some degree on wetlands and flooded agricultural fields for foraging (http://ibo.boisestate.edu/curlewtracking/locations). Long-billed Curlews arrive on their nesting grounds in the Yellowstone Highlands sometime in April, where males begin raucous vocal and aerial displays to establish territories and attract mates. Nest initiation timing can vary considerably depending on snowpack.

Long-billed Curlew nesting on the Henrys Lake Flat © Chris Little

Curlews nest on the ground, preferentially on flat, grazed grasslands. After hatching, Long-billed Curlew chicks move toward wetland habitats (Foster–Willfong 2003). Proximity to wetlands may influence nest site selection as chick mortality may be reduced with lesser travel distances to wetland habitats (Saalfield et al. 2010). Wetlands may also provide enhanced cover from predators.

A study evaluating multiscale habitat selection by Long-billed Curlews, across their breeding range in the US, found that curlew numbers are positively correlated with wetland habitats on a local scale and hay/pasture areas on a landscape scale. These results highlight the importance of a conservation strategy that incorporates large protected grassland landscapes, interspersed with emergent wetlands and/or irrigated hay and pasture lands (Saalfield et al. 2010).

The most important breeding habitat in the Upper Snake Watershed occurs in Henrys Lake Flat–Shotgun Valley and Teton Valley, primarily on private lands that have a combination of wet meadow/wetland habitats, open space, and livestock grazing. Maintaining these important nesting areas will require collaboration with working landowners to preserve traditional ranching practices and wetlands.

Prioritized Threats and Strategies for Henrys Lake Flat

Very High rated threats to Henrys Lake Flat in the Yellowstone Highlands

Rural housing development

Henrys Lake Flat is one of the larger blocks of private lands in island Park. Due to the natural and recreational amenities present in this landscape it has received high residential development pressure over the past 20 years.

Objective	Strategy	Action(s)	Target SGCNs
Work collaboratively with Fremont County.	Where appropriate, provide technical service on fish and wildlife issues to county leaders.	Provide timely technical service to Fremont County on potential impacts to important wetlands, SGCNs, big game migration, and calving/fawning habitat to balance county growth with wildlife and habitat protection.	Western Toad Trumpeter Swan Western Grebe Sandhill Crane Long-billed Curlew Great Gray Owl Short-eared Owl Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine Grizzly Bear Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch Gillette's Checkerspot
Protect and restore wetlands on private lands.	Improve stewardship of wetland habitat on private lands.	Support programs/efforts that facilitate partnership with willing private landowners to restore wetlands.	
	Advance ongoing easement programs for wetlands on private lands in HLF.	Work with willing private landowners interested in protecting key parcels with conservation easements. Support conservation partners, (NRCS, Teton Regional Land Trust, TNC) in securing financial resources to support conservation easement acquisitions. Support TNC in their efforts to maximize wetland function and wildlife values on the Flat Ranch Preserve.	

Target: Ungulate Migration

The Yellowstone Highlands is part of an ungulate migration complex that includes high-elevation lands of Yellowstone National Park and the Targhee National Forest, mid-elevation stopover, fawning and calving habitats found in Shotgun Valley, HLF, the south rim of the Island Park Caldera, and Teton Basin. It also includes portions of regionally significant wintering areas, specifically the Teton River Canyon System (including lower Bitch and Badger Creeks) and the Sand Creek Desert. Therefore, maintaining ungulate migration as an ecological function in the

Yellowstone Highlands is more difficult than just protecting a single "corridor." Rather, conserving ungulate migration requires coordination of conservation action that maintains habitat quality (including security) on national forest lands, recognizes and protects key seasonal ranges on private lands, and maintains permeability of highways and forest roads.

Heavy winter snow accumulations make the Yellowstone Highlands Ecosection unsuitable for most wintering ungulates (a portion of the Moose populations are year-round residents of the Ecosection; Andreasen et al. 2014). However, these same moist conditions, relative to the neighboring sagebrush-steppe habitats, result in desirable vegetation composition and spring-fall vegetation growth, making this Ecosection high-quality transition range and spring-fall habitat for Mule Deer, White-tailed Deer, Moose, Elk, and Pronghorn. Therefore, seasonal migration is a necessity for most ungulates using this section as they winter at lower elevations outside of the Ecosection and migrate into or through the Yellowstone Highlands to take advantage of spring fawning/calving habitats and lush spring-fall forage within or adjacent to this Ecosection.

Most Elk, Mule Deer, and Moose inhabiting the central portion of the Yellowstone Highlands during the spring-fall migrate to the west and southwest into the sagebrush-steppe habitats of the Sand Creek desert to winter (Brown 1985, Andreasen et al. 2014). Most Elk and Moose inhabiting the southern portion of the Ecosection on the west slope of the Teton Range will move west to winter in the foothills and riparian bottoms of Teton Valley. Most Mule Deer inhabiting this portion of the Ecosection will move west into the canyon habitats of the Teton River, Bitch Creek, Badger Creek, and Falls River to winter. Most Elk inhabiting the northern portion of the section around Henrys Lake will move north into the Madison Valley of Montana to winter. Pronghorn summering in the northern portion of the Ecosection will also move north into Montana's Madison Valley or southwest into the sagebrush-steppe habitats of Shotgun Valley or the Sand Creek desert. Less is known about the seasonal movements of White-tailed Deer in the Ecosection, though they likely move to the riparian portions of many of the same winter habitats described above. Fall migrations out of the Ecosection typically occur in November, though the exact timing is species

Cow Elk in Yellowstone Highlands © Rob Cavallaro

and snowfall dependent (i.e., smaller ungulates like Mule Deer migrate with less snowfall than larger ungulates like Elk).

During the returning spring migration (typically during May), many pregnant females will take advantage of lush transition range habitats within the Ecosection (e.g., aspen habitats) for mid-migration parturition. Once the newborn is able to travel, the migration continues. Brown (1985) describes important Elk calving habitats (e.g., Big Bend Ridge), migration corridors, and calf-rearing habitats (i.e., summer range) within the Ecosection that are still used today. Many of these same areas are used for parturition by migrating Mule Deer and Moose.

Some migrating ungulates use this Ecosection solely as transition range as they pass through it to summer ranges in Yellowstone National Park, Teton National Park, or Wyoming. Elk migrate along the northern edge of the Ecosection from the Madison Valley of Montana into Yellowstone National Park (Hamlin and Ross 2002, Grigg 2007). Some Elk and Mule Deer migrate from the Sand Creek desert, through the south-central portion of the Ecosection north of Ashton, into the southwest corner of Yellowstone National Park (Brown 1985). Still other Mule Deer and Elk migrate out of Teton Canyon and the Teton Valley through the southern tip of the Ecosection into summer ranges in Teton National Park and Wyoming as far east as Jackson Lake.

Mule Deer moving into Bitch Creek in the Yellowstone Highlands © Rob Cavallaro

Target Viability

Good, although there are significant threats to future viability. US Hwy 20 presents a threat to connectivity, and potential expansions to the route would decrease permeability. Rural residential developments also pose current and future threats to key seasonal habitats in Teton basin, Shotgun Valley, HLF, and Ashton Hill.

Prioritized Threats and Strategies for Ungulate Migration

Very High rated threats to Ungulate Migration in the Yellowstone Highlands

Rural housing development

Most transitional and winter habitats used by big game in the Yellowstone Highlands are a mosaic of public and privately owned lands. Key habitats such as the Teton Canyon System, Teton Front, Ashton Hill/Big Bend Ridge, Shotgun Valley, and Henrys Lake Flat are all impacted by rural residential development and have the potential to be further fragmented by future development.

Objective	Strategy	Action(s)	Target SGCNs
Protect core big game habitats on public lands to help minimize potential bottlenecks/impacts on adjacent private lands.	Participate in Idaho Falls District BLM Resource Management Plan Revision to protect important big game habitat on public lands.	Incorporate big game transitional, winter and other key habitats into long-range planning process.	Western Toad Northern Leopard Frog Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine Grizzly Bear
	Participate in BLM Resource Advisory Committee.	Communicate with committee members on issues related to conservation of important big game habitats.	
	Engage with Caribou–Targhee National Forest staff.	Incorporate big game transitional, winter and other key habitats into project and long-range planning process.	
Protect regional big game migrations across a mosaic of land ownership.	Advance public/private partnership through the High Divide Conservation partnership.	Implement strategic protection and stewardship of lands between Yellowstone National Park and the Frank Church Wilderness to ensure long-term protection of big game winter, transitional, and other habitats.	Western Toad Northern Leopard Frog Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine Grizzly Bear
Work Collaboratively with Fremont and Teton County.	Where appropriate, provide technical service on fish and wildlife issues to county leaders.	Work with Teton County to refine/update their Natural Resource Overlays as appropriate. Provide timely technical service to counties on potential impacts to important big game habitat.	Western Toad Northern Leopard Frog Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine
Protect and restore big game habitat on private lands.	Improve stewardship of big game habitat on private lands.	Support/Initiate programs/efforts that facilitate partnership with willing private landowners to protect big game habitat.	

Objective	Strategy	Action(s)	Target SGCNs
	Advance ongoing easement programs protecting wildlife movement on private lands in HLF, Henrys Fork River, and Teton Basin.	Support land trusts working with willing private landowners interested in protecting big game winter, transitional, and other habitats with conservation easements. Support conservation partners, (NRCS, Teton Regional Land Trust, TNC) in securing financial resources to support conservation easement acquisitions.	Grizzly Bear
	Expand partner-driven big game protection program into Shotgun Valley.	Seek public-private partnership to identify willing landowners and funding to support a conservation easement program in Shotgun Valley.	

Motorized access & recreation (US, state, county, legal secondary roads)

The negative effect of roads is recognized as a major impact to wildlife populations worldwide (Eigenbrod et al. 2009). Road ecology has developed into an important discipline of wildlife management with increasing contributions to wildlife journals, books, conferences, symposia, and management guidelines (Eifgenbrod et al. 2009). In addition to direct mortality from vehicle collisions, road ecologists have identified the "road-effect zone," which is the extent of significant ecological effects from the edge of a road.

The primary vehicular access into and through the Yellowstone Highlands is US Highway 20, commonly referred to as the Yellowstone Highway. US 20 connects the communities of the Snake River Plain in east Idaho, and tourists from around the world, with West Yellowstone, Montana and Yellowstone National Park. US 20 through the Yellowstone Highlands bisects the migration routes of Elk, Moose, Mule Deer and other wildlife, and the impacts of highway crossings on regional ungulate migrations is a substantial regional concern (Andreasen et al. 2014). Other highways with implications for current and future wildlife movement are Idaho State Highways 87, 33, and 32. There are 615 mi of motorized roads on the Ashton–Island Park Ranger District and as of 1997, there were approximately 2,791 miles of existing legal roads on the Targhee National Forest. According to the Targhee National Forest Revised Plan (1997) "the current road system has created resource conflicts with wildlife, fish and watersheds" (USDA 1997).

Objective	Strategy	Action(s)	Target SGCNs
Maximize permeability of highways for ungulates in the Yellowstone highlands.	Collaborate with the Idaho Transportation Department (ITD) and other partners to incorporate best practices for wildlife crossing into highway planning and construction.	Work with ITD, Fremont County, and the Henrys Fork Legacy Partnership to develop strategies and actions that enable improved function of ungulate migrations across US Highways 20 and 87 in Island Park. Work with ITD and Teton County to enable improved function of ungulate migrations across US Highways 32 and 33.	Wolverine Grizzly Bear

Objective	Strategy	Action(s)	Target SGCNs
Maintain adequate security habitat for important seasonal big game habitats on public lands.	Work with the appropriate land and road management agencies to ensure adequate security habitat during the development of road and trail projects.	Balance road density standards with the amount of secure habitat. Identify and evaluate for each project proposal and the cumulative effects of all activities, including past, current, and future projects. Continue to provide input into the planning process for all roads and new construction. Recommend that roads, trails, other infrastructure, etc., be located to avoid habitat components important to seasonal wildlife use (e.g., wintering Sharp-tailed Grouse, migrating Mule Deer and Elk, etc.) Recommend that roads that are not compatible with area management objectives and are no longer needed be restricted or decommissioned. Where appropriate, recommend seasonal closures and/or vehicle restrictions based on seasonal wildlife use.	Western Toad Northern Leopard Frog Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine Grizzly Bear

Target: Grizzly Bear

Grizzly Bear was listed as threatened under the Endangered Species Act (ESA) in 1975 due to population declines that limited Grizzlies to 2% of their historic range south of Canada. In 2007, the FWS designated Grizzlies in the Greater Yellowstone area as a Distinct Population Segment (Yellowstone DPS) and removed them from the federal list of endangered and threatened wildlife (FWS 2007). According to the FWS,

> *The Yellowstone grizzly bear population is no longer an endangered or threatened population pursuant to the Endangered Species Act of 1973, as amended, based on the best scientific and commercial data available. Robust population growth, coupled with State and Federal cooperation to manage mortality and habitat, widespread public support for grizzly bear recovery, and the development of adequate regulatory mechanisms has brought the Yellowstone grizzly bear population to the point where making a change to its status is appropriate (Federal Register 2007).*

In this action, the FWS recognized recovery in the Yellowstone DPS, while maintaining ESA protection for the remaining Grizzly Bear populations in the contiguous US (FWS 2007). In 2009, a federal district judge overturned the delisting ruling, placing Grizzly Bears back on the threatened species list claiming: "(1) the Conservation Strategy that guides management after delisting was unenforceable and nonbinding on state and federal agencies, and (2) that the FWS did not adequately consider the impacts of the potential loss of whitebark pine nuts, a Grizzly Bear food source." An appeals court upheld this ruling in 2011.

In 2013, the Interagency Grizzly Bear Study Team (IGBST) published Response of Yellowstone Grizzly Bears to changes in food resources: a synthesis (IGBST 2013) to address concerns over the impacts of potential loss of whitebark pine nuts as a food source. In 2013, the Yellowstone Ecosystem Subcommittee accepted the findings in this report and recommend that Grizzly Bears be removed from their ESA Threatened status.

The Grizzly Bear Recovery Plan was established in 1993 and revised in 2006 and established the goal of sustaining the Grizzly Bear population at or above 500 bears in the GYE. The current minimum population estimate for the Yellowstone Grizzly DPS is 714 (IGBST 2014). Another indication of recovery is that annual population growth of Grizzlies in the Yellowstone DPS has slowed (Van Manen et al. 2015). A study of vital rates of Grizzly Bears in the Yellowstone DPS found that the slowing population growth of Grizzly Bears is most strongly associated with increasing Grizzly Bear density and likely indicates that the population is at or approaching carrying capacity (Van Manen et al. 2015).

Grizzly Bear Information sign on the CTNF © Rob Cavallaro

Despite population recovery of Yellowstone Grizzly Bears, they remain a conservation reliant species (Schwartz et al. 2009). According to Scott et al. (2005), a species is conservation reliant when the threats to its persistence cannot be eliminated, but require continuous management to maintain population levels. The primary threat facing Grizzly Bears in the Yellowstone DPS is human-caused mortality; and a primary management challenge is managing and monitoring this mortality. This may be a particular challenge in the Yellowstone Highlands of Idaho where hazards affecting Grizzly Bear survival are elevated relative to other areas of the Yellowstone DPS (Schwartz et al. 2009). Schwartz et al. (2009) completed a risk assessment model for Yellowstone Grizzlies and identified the two most important predictors of survival as 1) the amount of secure habitat within a bear's home range and 2) road densities outside of secure habitat. Island Park within the Yellowstone Highlands is identified as a high risk landscape for Grizzly Bear mortality in this model (Schwartz et al. 2009).

Due to the robust Grizzly population and presence of anthropogenic threats, reducing and resolving human-bear conflicts will be an important management activity in the Yellowstone Highlands. Conflicts are incidents where bears injure people, damage property, obtain anthropogenic foods, kill or injure livestock, damage beehives, or obtain vegetables or fruit from gardens or orchards (Gunther et al. 2004). The Idaho portion of the Yellowstone DPS has had a generally increasing trend of Grizzly Bear-human conflicts since 2005 (IGBST 2014). In 2014, 2 Grizzlies were killed, one illegally by a hunter and a second in a management response resulting from livestock depredation (IGBST 2014). In 2015, 2 Grizzlies were killed in management actions that resulted from conflicts related to bears seeking anthropogenic food sources and subsequently threatening human safety.

The IGBST has proposed designation of a Demographic Monitoring Area (DMA; Fig. 8.4) to monitor and manage Grizzly Bear mortalities in the future across state and administrative boundaries. The DMA is drawn from suitable habitat defined by the FWS (2007), expanded to include adjacent potential mortality sink areas to facilitate mortality management in a scope appropriate to long-term conservation (IGBST 2012). Most of the DMA in Idaho lies within the Yellowstone Highlands and adjacent areas of the Henrys Lake Mountains, Centennial Range, Shotgun Valley, and Teton Valley.

Upon delisting, management of Yellowstone Grizzlies in Idaho will be guided by the Yellowstone Grizzly Bear Management Plan (2002), prepared by Idaho's Yellowstone Grizzly Bear Delisting Advisory Team. The recommendations in the table below are derived from this plan.

Target Viability

Good. The Grizzly population in the Yellowstone Highlands has likely reached its biological and social carrying capacity.

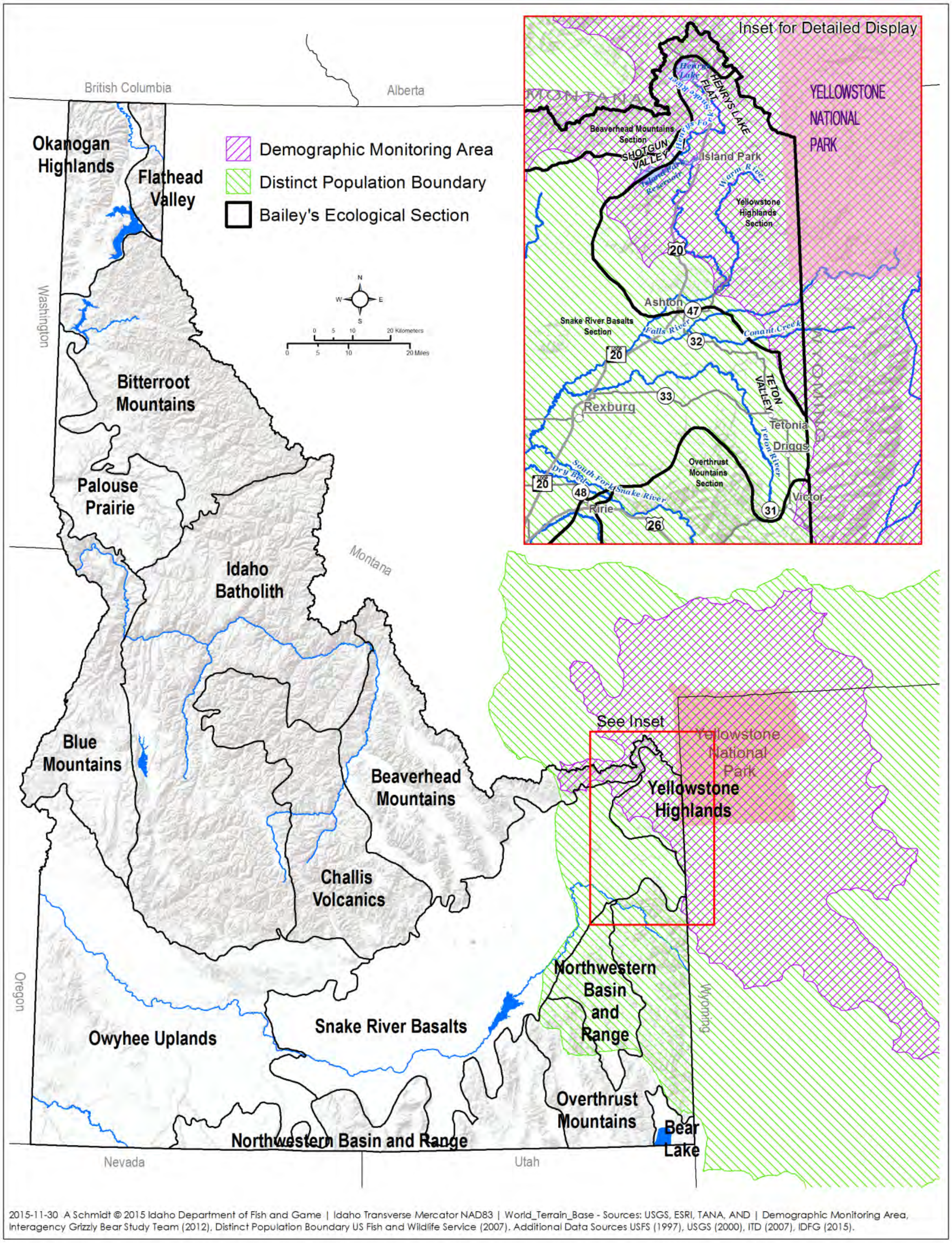


Fig. 8.4 Proposed Grizzly Bear Demographic Monitoring Area (DMA) Map

Prioritized Threats and Strategies for Grizzly Bear

High rated threats to Grizzly Bear in the Yellowstone Highlands

Human–wildlife conflict

The primary threat facing Grizzly Bears in the Yellowstone DPS is human-caused mortality; and a primary management challenge is managing and monitoring this mortality. This may be a particular challenge in the Yellowstone Highlands of Idaho where hazards affecting Grizzly Bear survival are elevated relative to other areas of the Yellowstone DPS (Schwartz et al. 2009). Schwartz et al. (2009) completed a risk assessment model for Yellowstone grizzlies and identified the two most important predictors of survival as 1) the amount of secure habitat within a bear's home range and 2) road densities outside of secure habitat. Island Park within the Yellowstone Highlands is identified as a high risk landscape for Grizzly Bear mortality in this model (Schwartz et al. 2009).

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Objective	Strategy	Action(s)	Target SGCNs
Minimize/manage conflicts with rural communities, recreationists, and livestock producers in Grizzly Bear country.	Develop, implement, and disseminate a coordinated information and education program to minimize human–Grizzly Bear conflict.	Provide education programs through schools, community presentations, news releases, etc. Continue to cooperate with Federal Resource Management agencies to provide safety literature at trail heads and offices in Grizzly Bear habitat. Support local efforts that develop "Bear Smart Communities." Coordinate with other agencies to develop bear education programs for specific user groups (hunters, anglers, campers, etc.)	Grizzly Bear
	Work with county planners in bear country to consider Grizzly Bear–human safety in county planning.	Provide technical service during community planning related to strategies for avoiding potential human/bear conflicts.	Grizzly Bear
	Respond in a timely and	Work with the public and agency partners to remove or mitigate the source of conflict.	Grizzly Bear

Objective	Strategy	Action(s)	Target SGCNs
	efficient manner to nuisance bear conflicts.	Remove bears from the population when they present an imminent public safety risk or will be an ongoing source of livestock depredation.	
Reduce anthropogenic factors that promulgate Grizzly Bear mortality.	Advance easement programs to minimize potential human/bear conflicts.	Support land trusts working with willing private landowners interested in protecting rural lands with conservation easements in the Yellowstone Highlands.	Western Toad Northern Leopard Frog Trumpeter Swan Greater Sage-Grouse Sharp-tailed Grouse Sandhill Crane Long-billed Curlew Great Gray Owl Short-eared Owl Silver-haired Bat Hoary Bat Little Brown Myotis Wolverine Grizzly Bear
	Work with the appropriate land and road management agencies to ensure Grizzly Bear security considerations during the development of road and trail projects.	Balance road density standards with the amount of secure habitat. Identify and evaluate for each project proposal and the cumulative effects of all activities, including past, current, and future projects. Continue to provide input into the planning process for all roads and new construction. Recommend that roads, trails, other infrastructure, etc., be located to avoid habitat components important to Grizzly Bears. Recommend that roads that are not compatible with area management objectives and are no longer needed be restricted or decommissioned. Where appropriate, recommend seasonal closures and/or vehicle restrictions based on Grizzly Bear or other resource needs.	

Yellowstone Highlands Section Team

An initial version of the Yellowstone Section project plan was completed for the 2005 Idaho State Wildlife Action Plan. In 2014, a small working group developed an initial draft of the Section Plan (see Miradi v. 0.9), which was then reviewed by a wider group of partners and stakeholders during a 2-day workshop held at the Idaho Department of Fish and Game Southeast Regional office, Pocatello in January 2015 (this input captured in Miradi v 0.14). Subsequent to that workshop, team leads hosted a 1-day meeting in February 2015 with key US Forest Service staff to seek their input. Since then, we have continued to work with key internal and external stakeholders to improve upon the plan. Individuals, agencies, and organizations involved in this plan are listed in Table 8.3.

Table 8.3 Individuals, agencies, and organizations involved in developing this plan [a]

First name	Last name	Affiliation
Rob	Cavallaro* [b]	Idaho Department of Fish and Game, Upper Snake Region
Matt	Pieron*	Idaho Department of Fish and Game, Upper Snake Region
Rita	Dixon	Idaho Department of Fish and Game, Headquarters
Mark	Arana	Bureau of Reclamation, Snake River Area Office
Tom	Bassista	Idaho Department of Fish and Game, Upper Snake Region
Sabrina	DeRusseau	US Forest Intermountain Region (R4), Caribou–Targhee National Forest
Tammy	Fletcher	US Forest Intermountain Region (R4), Caribou–Targhee National Forest
Lee	Mabey	US Forest Intermountain Region (R4), Caribou–Targhee National Forest
Nisa	Marks	US Fish and Wildlife Service
Chris	Murphy	Idaho Department of Fish and Game, Headquarters
Liz	Davy	US Forest Intermountain Region (R4), Caribou–Targhee National Forest
Ryan	Newman	Bureau of Reclamation (US)
Kathy	Rinaldi	Greater Yellowstone Coalition
Shane	Roberts	Idaho Department of Fish and Game, Upper Snake Region
Quinn	Shurtliff	Gonzales–Stoller Surveillance, LLC
Tamara	Sperber	Teton Regional Land Trust
Matthew	Ward	The Nature Conservancy in Idaho

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

9. Overthrust Mountains Section

Section Description

The Overthrust Mountains Section is part of the Utah–Wyoming Rocky Mountains Ecoregion. The Idaho portion of the Overthrust Mountains, the subject of this review, comprises much of southeastern Idaho, from the Snake River Range in the northeast, west to the Bannock Range, and south to the Idaho–Utah border, not including Bear Lake Valley in the southeast (Fig. 9.1, Fig. 9.2). Elevation ranges from 1,300–3,000 m (4,400 to 9,900 ft). Sedimentary rock formations, such as limestones, siltstone, sandstones, and shales, are predominant. Climate is influenced by prevailing winds and the general north–south orientation of the mountain ranges. Precipitation ranges from 40–100 cm (16–40 in) annually with most occurring during the fall, winter, and spring. Precipitation occurs mostly as snow above 1,800 m (6,000 ft). Most precipitation falls as snow in the winter. Summers are dry. Annual average temperature is 2–10 °C (35–50 °F). The growing season lasts 80–120 days.

Landscapes of the Overthrust Mountains are characterized by minor mountain ranges and broad valleys. Mountain ranges include the Snake River, Caribou, Webster, Aspen, Portneuf, Bannock, and Bear River ranges. Linear valleys and ridges are the products of thrust faults. Rivers are of two major drainage basins, flowing either into the Snake River or the Great Basin. Important rivers include the South Fork of the Snake River, the Portneuf River, portions of the Bear River, and the upper Blackfoot River. A few lakes and wet meadows are associated with higher elevations above 1,500 m (5,000 ft). The aridity of this region requires water management programs, including water storage, delivery, and regulation of usage to support agriculture, which is generally irrigated with either flood or sprinkler irrigation mostly supplied by diversion from the Snake and Bear rivers. Major hydroelectric and water storage reservoirs include Palisades Reservoir on the South Fork of the Snake River, Oneida Narrows Reservoir on the Bear River, and multiple small reservoirs scattered throughout the section.

Population centers are primarily along the Portneuf and Bear rivers and include Pocatello and Preston. Approximately 70% of the land is forested; however, timber harvest has declined in the past two decades. Livestock grazing, phosphate mining, and recreation are major land uses today. This section provides outdoor recreational opportunities for hunting, angling, trail-riding, hiking, wildlife viewing, kayaking, and river rafting.

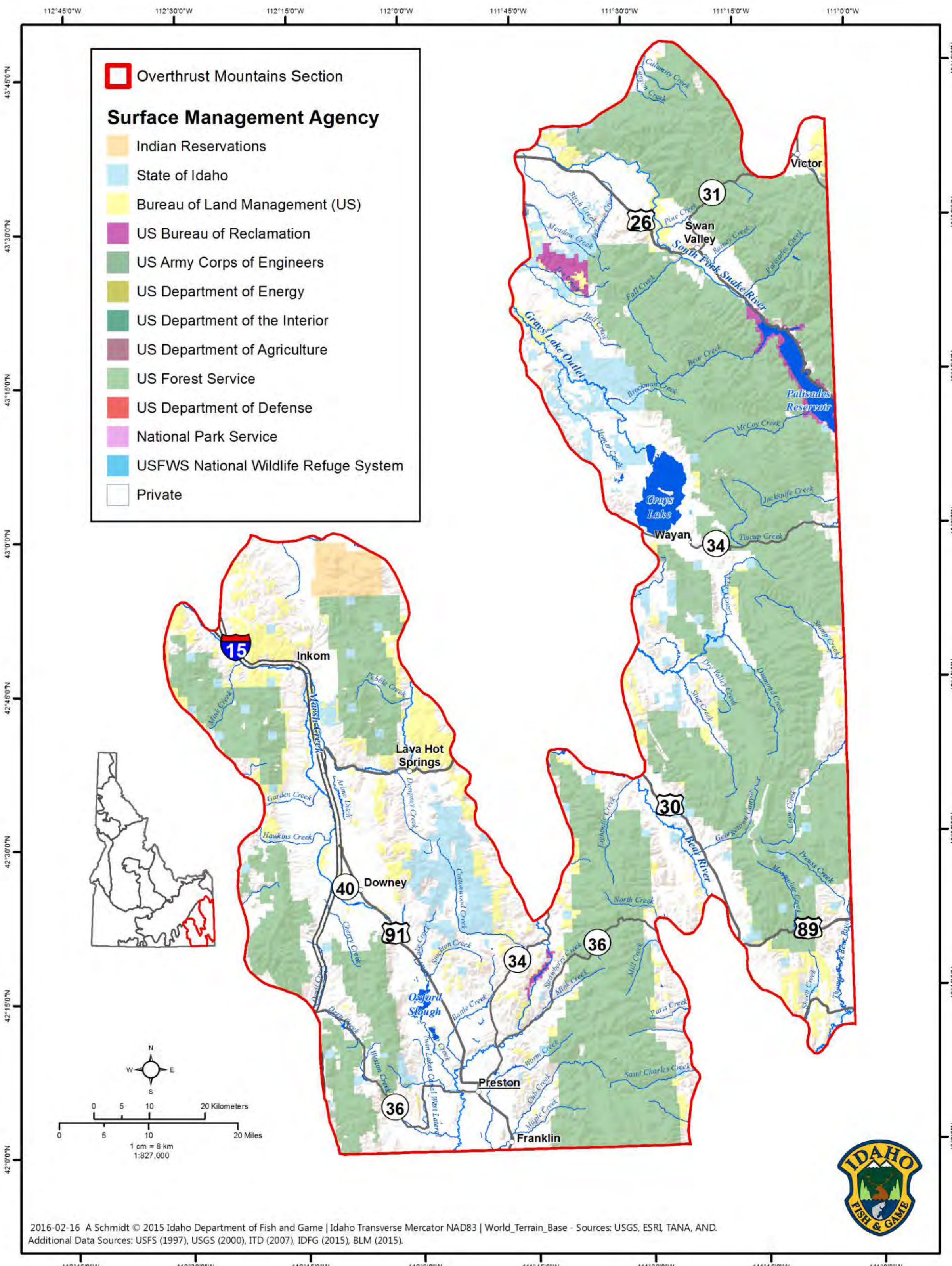

Fig. 9.1 Map of Overthrust Mountains surface management

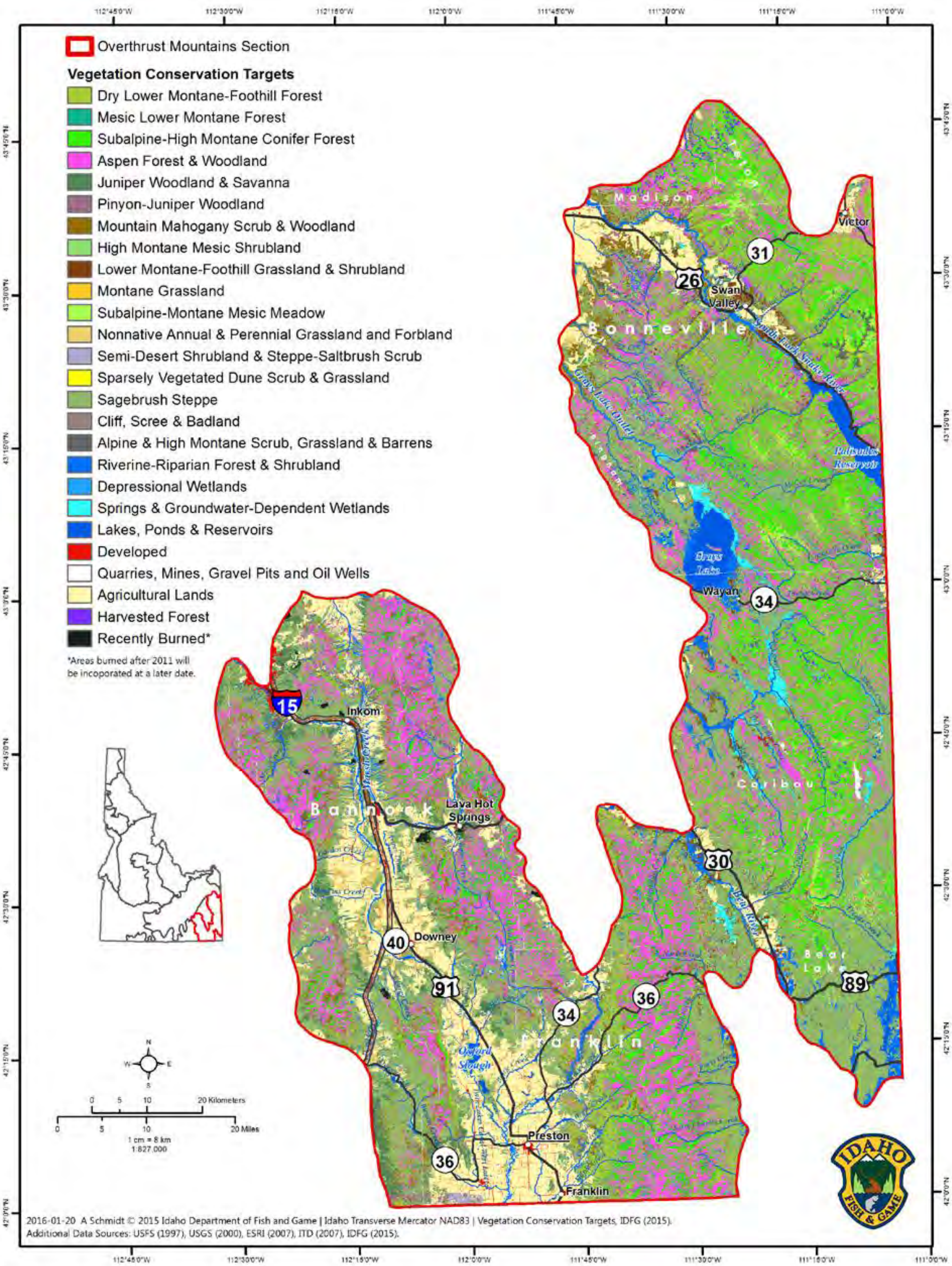

Fig. 9.2 Map of Overthrust Mountains vegetation conservation targets

Conservation Targets in the Overthrust Mountains

We selected 6 habitat targets that represent the major ecosystems in the Overthrust Mountains as shown in Table 9.1. Each of these systems provides habitat for key species of greatest conservation need (SGCN), i.e., "nested targets" (Table 9.2) associated with each target. All SGCN management programs in the Overthrust Mountains have a nexus with habitat management programs. Conservation of the habitat targets listed below should conserve most of the nested species within them. However, we determined that 2 additional taxonomic groups (Bats and Pollinators) face special conservation needs and thus are presented as explicit species targets as shown in Table 9.1.

Table 9.1 At-a-glance table of conservation targets in the Overthrust Mountains

Target	Target description	Target viability	Nested targets (SGCN)	
Aspen Forest & Woodland	Aspen Forest & Woodland is dominated by open to dense canopies of quaking aspen, some without a significant conifer component (<25% relative tree cover), others, depending on seral stage, may have high conifer component (≥25%). The understory structure may be complex with multiple shrub and herbaceous layers, or simple with just an herbaceous layer. The herbaceous layer may be dense or sparse, dominated by graminoids and/or forbs.	*Good* to *Poor.* Stands in some areas are healthy and regenerating naturally. In other areas, prescribed fires and mechanical treatments have resulted in successful regeneration and/or enhancement of aspen stands. Conversely, some stands once thought to be stable aspen communities are disappearing, being encroached upon by conifers and maple, and lack a mosaic of age classes.	*Tier 1* *Tier 2* *Tier 3*	Grizzly Bear Sharp-tailed Grouse Silver-haired Bat Hoary Bat Kriemhild Fritillary Monarch
Dry Lower Montane–Foothill Forest	Over 11% of the Overthrust Mountains Section is comprised of Dry Lower Montane–Foothill Forest. This habitat target includes extensive Douglas-fir forests, occasionally with limber pine and lodgepole pine.	*Fair.* 70-80% of the Dry Lower Montane–Foothill Forest acres are classified as mature or old. For the most part, these forested areas are outside of the historic fire regimes, particularly for	**Tier 1** *Tier 2* *Tier 3*	Grizzly Bear Thin-ribbed Mountainsnail Hoary Bat Silver-haired Bat Lyrate Mountainsnail Great Gray Owl Little Brown Myotis Townsend's Big-eared Bat Western Small-footed Myotis Monarch

Target	Target description	Target viability	Nested targets (SGCN)	
	Extensive patches of bigtooth maple are a common occurrence in areas of the Overthrust Mountains. Overall, this target often occurs at the lower treeline immediately above valley grasslands, or sagebrush steppe and shrublands.	nonlethal fires. Some past timber harvest practices, livestock grazing practices, and suppression of disturbances, particularly wildfire, have created landscapes that are prone to more intense disturbances than in the past due to the buildup of mature and older vegetation.		
Subalpine–High Montane Conifer Forest	This habitat target includes the matrix forests of the subalpine zone. The tree canopy consists of Engelmann spruce and subalpine fir dominating either mixed or alone. Engelmann spruce can dominate sites (with minimal subalpine fir) in eastern Idaho where continental climate regime is most noticeable.	*Fair.* Engelmann spruce/subalpine fir communities on the Forest have been assessed as being at high risk. Approximately 80% of acres are mature and old, with increasing stand densities and ladder fuels. Engelmann spruce/subalpine fir is at risk primarily due to the dominance of mature and old age structure and changes in the historic nonlethal fire regimes.	*Tier 1* *Tier 2* *Tier 3*	Wolverine Grizzly Bear Hoary Bat Silver-haired Bat A Tiger Beetle Great Gray Owl Kriemhild Fritillary Monarch Spur-throated Grasshopper (*Melanoplus*) Species Group
Sagebrush Steppe	Over 30% of the Overthrust Mountains Section is comprised of sagebrush steppe that consists of communities of Wyoming and Basin big sagebrush and at lower elevations and Mountain big sagebrush at higher elevations along with perennial grasses and forbs.	*Fair.* Habitat is intact in some areas, but in others, altered and degraded by shrub removal and overgrazing, with low grass and forb cover and diversity. Conifer encroachment and development fragments sagebrush-steppe habitat.	*Tier 1* *Tier 2* *Tier 3*	Greater Sage-Grouse Sharp-tailed Grouse Golden Eagle Long-billed Curlew Sage Thrasher Pygmy Rabbit A Tiger Beetle (*Cicindela decemnotata montevolans*) Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Monarch
Riverine–	Lotic ecosystems	*Fair.* Within the	*Tier 1*	Yellow-billed Cuckoo

Target	Target description	Target viability	Nested targets (SGCN)	
Riparian Forest & Shrubland	(rivers and streams, including aquatic habitats and their associated terrestrial riparian woodland and shrubland habitats). Includes the South Fork Snake, Blackfoot, Bear, and Portneuf river systems. Vegetation directly adjacent to the South Fork Snake River and associated streams, dominated by narrow-leaf cottonwood with an intact and diverse understory in the Overthrust Mountains Section. Within the section, Yellow-billed Cuckoo habitat is associated with cottonwood habitats in riparian forests adjacent to the South Fork Snake River.	Overthrust Mountains, the South Fork Snake River is impounded by a major dam that significantly changes the hydrograph (Palisades). Numerous smaller dams, largely for irrigation diversion or hydropower generation, also form impediments to water flow and animal movements elsewhere in the Overthrust Mountains. Riparian habitats associated with riverine systems, particularly cottonwood forests, are at risk and require conservation action.	 *Tier 2* *Tier 3*	Bear Lake Springsnail Northern Leatherside Chub Northern Leopard Frog Harlequin Duck Trumpeter Swan Hoary Bat Silver-haired Bat Rocky Mountain Duskysnail Sandhill Crane Common Nighthawk Little Brown Myotis Western Small-footed Myotis Pondsnail (*Stagnicola*) Species Group Rotund Physa Utah Sallfly California Floater
Depressional–Groundwater-Dependent Wetland Complexes	In the Overthrust Mountains Section, both depressional and groundwater-dependent wetlands occur. However, in the context of this plan for the Overthrust Mountains Section, this target refers largely to Grays Lake NWR and Oxford Slough, which can both be described as Depressional–Groundwater Dependent	*Fair.* Semipermanent and permanent wetlands, Grays Lake and Oxford Slough, are managed as National Wildlife Refuges and are relatively protected, but seasonal and temporary wet-meadow wetlands and semipermanent wetlands that occur on private lands have been historically altered by grazing or	Tier 2 Tier 3	Northern Leopard Frog Western Toad American Bittern Black Tern Long-billed Curlew Trumpeter Swan White-faced Ibis Franklin's Gull Sandhill Crane

Target	Target description	Target viability	Nested targets (SGCN)	
	Wetland Complexes. In the Overthrust Mountains Section, this target also includes flood-irrigated habitats.	draining. Wetland habitats at Grays Lake NWR are highly altered from modified drainage and altered hydrologic regimes resulting in habitat degradation. Flood-irrigated habitats are being converted to center-pivot irrigated fields which reduces the availability of flooded habitat for birds such as White-faced Ibis.		
Bat Assemblage	There is an abundance of roosting habitat for bats in the Overthrust Mountains including abandoned mines, caves, forests, and anthropogenic roosts. Minnetonka Cave occurs in this section. Minnetonka is Idaho's largest and most popular show cave, with >33,000 tourists visiting each summer. Species at the cave include those that are potentially the most vulnerable to white-nose syndrome (WNS). This site is a major hibernaculum for species such as Little Brown Myotis and Townsend's Big-eared Bat.	*Fair to Good.* Most known bat roosts currently occupied. Main concerns include fatality associated with wind energy, AML closures, and potential spread of WNS. Adjacent sections to Overthrust Mountains have multiple wind farms that have been shown to cause mortality of Silver-haired and Hoary Bat. Minnetonka cave could be an introduction site for WNS in Idaho, due to the volume of tourists visiting the cave. Although measures are employed to reduce the risk, this site remains a high priority for WNS surveillance.	Tier 2 Tier 3	Silver-haired Bat Hoary Bat Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis
Pollinators	Pollinators provide an essential ecosystem service, which benefits agricultural	*Fair.* Many pollinators, but particularly bees, are known to be experiencing	Tier 1 Tier 3	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Hunt's Bumble Bee

Target	Target description	Target viability	Nested targets (SGCN)
	producers, agricultural consumers, and gardeners (Mader et al. 2011) in the Overthrust Mountains.	population declines throughout North America and those declines may be occurring within the Overthrust Mountains as well. Population declines and local die-offs occur for a variety of reasons including habitat loss, pesticide exposure, and climate change.	A Mason Bee Monarch

Table 9.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Overthrust Mountains

Taxon	Conservation targets: Aspen Forest & Woodland	Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Depressional–Groundwater-Dependent Wetland Complexes	Bat Assemblage	Pollinators
RAY-FINNED FISHES								
Northern Leatherside Chub (*Lepidomeda copei*)[2]					X			
AMPHIBIANS								
Western Toad (*Anaxyrus boreas*)[2]						X		
Northern Leopard Frog (*Lithobates pipiens*)[2]					X	X		
BIRDS								
Trumpeter Swan (*Cygnus buccinator*)[2]					X	X		
Harlequin Duck (*Histrionicus histrionicus*)[2]					X			
Greater Sage-Grouse (*Centrocercus urophasianus*)[1]				X				
Sharp-tailed Grouse (*Tympanuchus phasianellus*)[2]	X			X				
American Bittern (*Botaurus lentiginosus*)[2]						X		
White-faced Ibis (*Plegadis chihi*)[2]						X		
Golden Eagle (*Aquila chrysaetos*)[2]				X				
Sandhill Crane (*Grus canadensis*)[3]					X	X		
Long-billed Curlew (*Numenius americanus*)[2]				X		X		
Franklin's Gull (*Leucophaeus pipixcan*)[3]						X		
Black Tern (*Chlidonias niger*)[2]						X		
Yellow-billed Cuckoo (*Coccyzus americanus*)[1]					X			
Great Gray Owl (*Strix nebulosa*)[3]		X	X					
Common Nighthawk (*Chordeiles minor*)[3]				X	X			
Sage Thrasher (*Oreoscoptes montanus*)[2]				X				
MAMMALS								
Pygmy Rabbit (*Brachylagus idahoensis*)[2]				X				
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]		X		X			X	
Silver-haired Bat (*Lasionycteris noctivagans*)[2]	X	X	X		X		X	
Hoary Bat (*Lasiurus cinereus*)[2]	X	X	X		X		X	
Western Small-footed Myotis (*Myotis ciliolabrum*)[3]		X		X	X		X	
Little Brown Myotis (*Myotis lucifugus*)[3]		X		X	X		X	
Wolverine (*Gulo gulo*)[1]			X					
Grizzly Bear (*Ursus arctos*)[1]	X	X	X					
BIVALVES								

Taxon	Conservation targets							
	Aspen Forest & Woodland	Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Depressional–Groundwater-Dependent Wetland Complexes	Bat Assemblage	Pollinators
California Floater (*Anodonta californiensis*)[3]					X			
GASTROPODS								
Pondsnail (*Stagnicola*) Species Group[3]					X			
Rotund Physa (*Physella columbiana*)[3]					X			
Rocky Mountain Duskysnail (*Colligyrus greggi*)[2]					X			
Bear Lake Springsnail (*Pyrgulopsis pilsbryana*)[1]					X			
Lyrate Mountainsnail (*Oreohelix haydeni*)[2]		X						
Thin-ribbed Mountainsnail (*Oreohelix tenuistriata*)[1]		X						
INSECTS								
A Tiger Beetle (*Cicindela decemnotata montevolans*)[2]			X	X				
Hunt's Bumble Bee (*Bombus huntii*)[3]								X
Morrison's Bumble Bee (*Bombus morrisoni*)[1]								X
Western Bumble Bee (*Bombus occidentalis*)[1]								X
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]								X
A Mason Bee (*Hoplitis producta subgracilis*)[3]								X
Kriemhild Fritillary (*Boloria kriemhild*)[3]	X		X					
Monarch (*Danaus plexippus*)[3]	X	X	X	X				X
Spur-throated Grasshopper (*Melanoplus*) Species Group[3]			X					
Utah Sallfly (*Sweltsa gaufini*)[3]					X			

Target: Aspen Forest & Woodland

Compared to coniferous forests, aspen stands are rich in understory shrubs and herbaceous species (Gruell and Loope 1974), making them particularly attractive to wildlife. Mitton and Grant (1996) suggest that in the arid West, aspen stands are second only to riparian areas in habitat importance. Well-managed aspen stands are high in biodiversity, so maintaining aspen communities is sustaining biodiversity. Aspen Forest & Woodland is dominated by open to dense canopies of quaking aspen (*Populus tremuloides*), some without a significant conifer component (<25% relative tree cover), others, depending on seral stage, may have a high conifer component (≥25%). The understory structure may be complex with multiple shrub and herbaceous layers, or simple with just an herbaceous layer. The herbaceous layer may be dense or sparse, dominated by graminoids and/or forbs. Aspen communities that are stable and self-perpetuating have individuals that are replaced by progeny without disturbance. However, stable aspen stands in the Overthrust Mountains Section are rare. Most aspen stands in the Overthrust Mountains are seral, meaning they will be replaced by some other climax community if disturbance (usually fire) is eliminated. A truly healthy aspen stand will be comprised of multiaged stems ranging from new shoots to mature and aging trees. Significant standing dead trees will add to the diversity of the stand and the diversity of wildlife, particularly cavity-nesting

Aspen grove near beaver ponds, South Fork Mink Creek, Idaho © Becky Abel

birds and bats.

Although aspen management tends to focus on the aspen trees themselves, in reality, it is the native aspen community as a whole that creates all the benefits ascribed to aspen. The community that exists with aspen is as important as the aspen themselves. An aspen grove with a smooth brome (*Bromus inermis*) or Kentucky bluegrass (*Poa pratensis*) understory can be depauperate even though the aspen themselves may be healthy. A dense and vibrant understory promotes high wildlife diversity, forage production, water storage and erosion control. One important measure of appropriate understory structural and compositional diversity is whether it forms a recognizable native plant association as defined by Forest Plans, Resource Management Plans, or other habitat descriptions such as habitat and community typing (EIAWG 2014).

Target Viability

Good to *Poor.* Aspen Forest & Woodland in some areas are healthy and regenerating naturally. In other areas, prescribed fires and mechanical treatments have enhanced aspen stands and stimulated successful regeneration. Conversely, some aspen communities once considered stable are disappearing, being encroached upon by conifers and maple, and lack a mosaic of age classes. In other areas where aspen is a seral species, it is replaced by conifer vegetation at alarming rates (Eastern Idaho Aspen Working Group [EIAWG], pers. comm.). Phosphate mining is an important land use in the Overthrust Mountains Section, and footprints of reclaimed mines will never again support aspen or other native plant communities.

As described in the 2003 Revised Forest Plan for the Caribou–Targhee National Forest, approximately 40-50% of the aspen cover type acres are mature or old. Another 142,000 acres have succeeded to conifer, largely due to fire suppression, livestock grazing, and natural succession. Over the past 100-150 years, there has been an estimated 40% decline in the amount of aspen acres on the Forest (CTNF 2003, p. 2-4). Continuing declines in aspen stands are resulting in both a reduction in the amount of aspen and a reduction in the quality of remaining aspen. As an early successional tree species, aspen is dependent on disturbance (often fire) and susceptible to overbrowsing. Where possible, aspen community health should be improved and maintained through restoration of the historical large-scale fire regime and proper grazing to prevent overbrowsing and impacts to the understories. Declines in aspen communities will likely not be reversible without active management. The goal of management should be to restore and maintain long-term function of the aspen stand. Potential active management to restore aspen communities in the West includes reduction of conifer competition, stand rejuvenation, and control of overbrowsing by livestock.

Quaking aspen in southeast Idaho, IDFG

Prioritized Threats and Strategies for Aspen Forest & Woodland

Very High rated threats to Aspen Forest & Woodland in the Overthrust Mountains

Lack of disturbance

Aspen thrive on disturbance that restricts conifer invasion and reduces self-competition. However, disturbance that results in the loss of regenerative suckers is detrimental. In general, disturbance refers to natural or human-generated fire, logging, slashing, or other activities intended to reduce or remove conifer dominion over aspen and release aspen regeneration.

Fire plays an important role in the maintenance of seral stages and stand structure. Aspen regenerates through root sprouting after fire or stand disturbances. Conifer invasion, or encroachment, commonly a result of wildfire suppression policies dating back 100 years and activities such as improper timing and levels of livestock grazing that remove fine fuels and surface litter needed to carry fire, is likely the number one reason for aspen decline. Further, studies on aspen have determined that the transition from a fire-shaped ecosystem to one protected from fire results in profound changes in ratios of aspen to conifer and is the driver for changes in forest dynamics. In one study, conifer coverage increased from 15% to 50% and aspen decreased from 37% to 8% over a 100-year period (Gallant et al. 2003).

Objective	Strategy	Action(s)	Target SGCNs
Increase disturbance to return to historical ratios of aspen and conifer cover.	Increase the number of acres of young age class/early seral stands. Improve diversity of age class structure. Protect, maintain, and enhance remnant stands and high-quality stands.	To the extent possible, allow naturally-caused (lightning) fires to play their role in the ecosystem by allowing them to burn (a.k.a. managing wildfire for resource benefit). Prescribed fire. Mechanical treatments. Consider the implementation of relevant design features/mitigation measures described in the Aspen Toolbox prepared by the Eastern Idaho Aspen Working Group (www.EIAWG.org) and other guidance documents when implementing mechanical treatments and prescribed fire. Often these measures should be incorporated to prevent damage to existing aspen trees and ensure survival of roots to provide for adequate suckering post treatment (Cox et al. 2009, Bartos 2007, Shepperd 2000).	Grizzly Bear Sharp-tailed Grouse Silver-haired Bat Hoary Bat Monarch Kriemhild Fritillary

High rated threats to Aspen Forest & Woodland in the Overthrust Mountains

Motorized use

Outdoor recreation (hiking, camping, wildlife watching, photography, horseback riding, motorized recreation) in the West is popular, due primarily to large tracts of public land available for use. All-terrain vehicles, including motorcycles, ATVs, UTVs, and snowmobiles, are used by >27% of the population in the western US (Cordell et al. 2005). Roads and trails, both managed and unauthorized, create management concerns and negative environmental impacts including creation of new pathways for the spread of invasive plants, soil erosion, displacement of wildlife sensitive to human and vehicle activity, habitat fragmentation, and sportsmen dissatisfaction.

Objective	Strategy	Action(s)	Target SGCNs
Reduce road-related impacts on aspen stands.	Agencies work together to improve/develop	Use existing roads and trails for management actions whenever possible.	Grizzly Bear Sharp-tailed Grouse

Objective	Strategy	Action(s)	Target SGCNs
	travel management plans on state and federal lands.	As opportunities present (such as during watershed improvement projects or other land management activities), close or relocate existing roads that are located in aspen stands. Prioritize closures in areas with the highest road densities or disturbance concerns. Establish seasonal closures of roads to protect wildlife during critical timeframes (breeding, overwintering, etc.). Limit new road construction to the extent possible. Where new roads are needed, avoid routing any segments through aspen stands unless there are overriding safety or resource issues. Roads and trails constructed to implement prescribed fire or mechanical treatment projects should be temporary and recontoured and reseeded after completion of the project; prior to treatments, ensure there is funding identified and secured for rehabilitating the roads and trails after the project is completed. Temporary roads and trails should be blocked to prevent public use during the life of the project. All roads and trails, including temporary roads, should be monitored during and after the project for weed infestations using an early detection rapid response protocol.	Silver-haired Bat Hoary Bat Monarch Kriemhild Fritillary
	Reduce/Eliminate unauthorized user-created trails and roads.	Increase funding to implement and enforce closures. Pursue funding from and increase collaboration with partners. Increase enforcement presence on state and federal lands. Prioritize enforcement in areas with the highest user-created trails and road densities or disturbance concerns. Educate the public on negative impacts to habitat and wildlife. Close and rehabilitate illegally created trails as soon as possible after they are discovered.	Grizzly Bear Sharp-tailed Grouse Silver-haired Bat Hoary Bat Monarch Kriemhild Fritillary

Medium–High rated threats to Aspen Forest & Woodland in the Overthrust Mountains

Livestock grazing management that is inconsistent with aspen restoration objectives

Livestock grazing, when it exceeds the capacity of the resource, can negatively impact aspen by causing stand failure through removal of suckers or young trees and/or bark damage to mature trees. Grazing impacts can also include depletion of root reserves, removal of fine fuels that would allow fire to carry through the stand, reduction in litter that protects roots, reduces erosion, and conserves moisture, soil compaction, and invasion of undesirable plants as desirable plants are reduced in quantity and/or vigor. Excessive grazing by livestock can dramatically influence aspen stand regeneration. Kay (2001) determined that reducing grazing pressure on aspen could lead to improved multiaged stand condition in stable aspen not suffering from conifer encroachment. Changing grazing management is often essential to slow the decline of aspen habitat. However, it may not reverse the decline if conifer encroachment is occurring. Management actions, coupled with improved livestock management will, in most cases be necessary.

Objective	Strategy	Action(s)	Target SGCNs
Livestock grazing management that is consistent with aspen restoration objectives and maintains healthy understory and potential for regeneration.	Limit timing of grazing activities in aspen to avoid habitat degradation.	Grazing in aspen habitat should be avoided in the spring and fall; late summer grazing is the best time to use aspen stands. Enforce timing restriction.	Grizzly Bear Sharp-tailed Grouse Silver-haired Bat Hoary Bat Monarch Kriemhild Fritillary
	Limit intensity of grazing activities in aspen to avoid habitat degradation.	Aspen habitats should be lightly to moderately grazed at most and carefully monitored for appropriate use. Exclude livestock from aspen stands that are degraded. Exclude livestock use from areas where aspen restoration or improvement projects have occurred until the objectives of the project have been met (i.e., regenerating aspen can support browsing). On state and federally-managed lands or other areas where grazing plans exist, ensure utilization criteria are not exceeded in aspen stands. As with other sensitive areas (such as riparian zones) as soon as utilization levels are met, livestock should be moved to other areas (other pastures, etc.). Ensure that AUMs track with declining forage abundance in areas of conifer encroachment. Incorporate aspen guidelines from the Aspen Toolbox into Allotment Management Plans	Grizzly Bear Sharp-tailed Grouse Silver-haired Bat Hoary Bat Monarch Kriemhild Fritillary

Objective	Strategy	Action(s)	Target SGCNs
		and other site-specific grazing management plans used on state and federal public lands.	
	Limit duration of grazing activities in aspen to avoid habitat degradation.	Grazing pressure relief on aspen regeneration should not be based on length of time but rather on sucker growth and development. Salting and water developments should be moved well away from aspen groves to minimize the duration of time livestock spend in aspen.	Grizzly Bear Sharp-tailed grouse Silver-haired Bat Hoary Bat Monarch Kriemhild Fritillary

Noxious weeds & invasive annual grasses

Invasive plants, nonnative plants that have a strong propensity to spread into native habitats, are a threat to aspen communities and to aspen restoration efforts. Some of these plants are noxious weeds. Others, such as Kentucky bluegrass and smooth brome, are preferred grasses for livestock but are extremely aggressive and can quickly dominate aspen stands. Aspen communities in particular may be even more susceptible to invasion because they have fertile soils, high moisture, and are often situated next to higher moisture environments such as meadows, wetlands, and riparian areas. Aspen are also often disturbance-dependent, creating the exact environment needed for invasive species to invade otherwise intact native habitat. Humans are commonly the main vector for introduction of invasive species into new habitats. Seeds travel into the new area via equipment and clothing and active management may actually increase this threat if precautions are not followed. Seeds of some invasive plants are wind-disbursed and can easily invade a project if there is a seed source nearby and if the project opens the canopy and exposes soil. Invasive grasses planted adjacent to native aspen stands commonly advance into the aspen stands by seed and by rhizome where they can form near monocultures in the understory.

An example of conifer encroachment in a quaking aspen stand in eastern Idaho © Terry Thomas

Objective	Strategy	Action(s)	Target SGCNs
Effectively control and restore areas dominated by noxious and invasive plants	Implement large-scale experimental activities to remove upland nonnative	Support the development of a framework for a national invasive species Early Detection and Rapid Response (EDRR) program (DOI 2105). Locate and coordinate installation of long-	Grizzly Bear Sharp-tailed Grouse Silver-haired Bat Hoary Bat Monarch

Objective	Strategy	Action(s)	Target SGCNs
at a rate greater than the rate of the spread.	invasive plants through various tools (DOI 2015).	term studies and subsequent monitoring to test the efficacy of large-scale application of integrated pest management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Explore the use of both herbicides and biological controls to control cheatgrass. Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006). Ensure that all equipment and field clothing brought to project areas are free from weed seed. Carefully monitor and treat project areas for weed invasion for at least 3-5 years post project. Do not plant aggressive invasive grasses and crops adjacent to aspen stands or include them in rehabilitation mixes.	Kriemhild Fritillary

Species designation, planning & monitoring

Objective	Strategy	Action(s)	Target SGCNs
Obtain data for species with significant data gaps.	Increase survey and monitoring work.	Conduct inventories to establish baseline data from which occupancy monitoring can occur.	Silver-haired Bat Hoary Bat Monarch Kriemhild Fritillary

Spotlight Species of Greatest Conservation Need: Migratory Tree-Roosting Bats

The Silver-haired Bat (*Lasionycteris noctivagans*) and Hoary Bat (*Lasiurus cinereus*) are migratory SGCN that primarily roost in or on trees. Silver-haired Bats are medium-sized with black or dark brown, silver-tipped hairs, and short, rounded ears. Females form small maternity colonies of up to 70 individuals almost exclusively in trees at least 15 m above the ground, including inside natural hollows and bird-excavated cavities or under loose bark of large snags. Clusters of large trees are a habitat requirement, as individuals change roosts frequently and use multiple roosts within a limited area throughout the summer. Silver-haired Bats hibernate in hollow trees, under sloughing bark, in rock crevices, and occasionally under wood piles, in leaf litter, under foundations, and in buildings, mines, and caves (WBWG 2015*b*). Hoary Bats can be distinguished from all other Idaho bat species by a combination of their relatively large size, frosted fur with a "hoary" appearance, golden coloration around the face, rounded ears, and furred interfemoral membrane. Hoary Bats roost solitarily in foliage of both coniferous and deciduous trees, near the ends of branches, 3-12 m above the ground, and usually at the edge of a clearing. The swift, direct flight of this species makes it easy to distinguish on the wing from most US bats (WBWG

2015*a*). Seasonal records of both species suggest considerable north-south movements during migration. Hoary Bats are especially long-distance migrants; some individuals migrate >2,000 km (Cryan et al. 2004). Individuals overwinter in warmer, more southern climates, although wintering sites have not been well-documented and no specific migration routes have been discerned. Hoary Bats are often found flying in waves of large groups during fall migration, whereas spring migration is apparently less organized (WBWG 2015*a*).

Silver-haired and Hoary bats are listed as Tier 2 SGCN. Fatality monitoring studies indicate large numbers of both species are killed at wind-energy facilities across Idaho. Wind-energy facilities in the West generally report lower bat mortality than other areas of the US. Recent analyses report a mean of 1.29 bats killed per installed Megawatt (MW) in western states (Hein et al. 2013). Surprisingly, a wind-energy facility located in eastern Idaho reported an estimated fatality rate of 7.04 bats per MW in 2012 for a total estimate of 557 fatalities over 3 seasons (Tetra Tech 2015). Reasons for higher mortality in eastern Idaho are poorly understood; however, higher mortality rates may indicate that wind-energy facilities are located at important topological features that bats use during migration (Abel, pers. comm.). Because bats are long-lived with low reproductive potential, sustained mortality of this magnitude is likely to result in the loss of entire colonies, loss of benefits to the agriculture industry, as well as additional state and/or federal listings.

Target: Dry Lower Montane–Foothill Forest

Over 11% of the Overthrust Mountains Section is comprised of Dry Lower Montane–Foothill Forest. This habitat target includes extensive Douglas-fir (*Pseudotsuga menziesii*) forests, occasionally with limber pine (*Pinus flexilis*), and lodgepole pine (*P. contorta*). Mountain mahogany (*Cercocarpus ledifolius*) and quaking aspen can also be intermixed. Extensive patches of bigtooth maple (*Acer grandidentatum*) are a common occurrence in areas of the Overthrust Mountains. Important understory components include shrubs such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), snowbrush ceanothus (*Ceanothus velutinus*), rocky mountain juniper (*Juniperus scopulorum*), chokecherry (*Prunus virginiana*), Antelope Bitterbrush (*Purshia tridentate*), common snowberry (*Symphoricarpos albus*), mountain snowberry (*S. oreophilus*), Saskatoon Serviceberry (*Amelanchier alnifolia*), creeping barberry (*Mahonia repens*), and others. Graminoids include pinegrass (*Calamagrostis rubescens*), several species of sedges (elk sedge [*Carex geyeri*], Ross' sedge [*C. rossii*]) and fescues (Idaho fescue [*Festuca idahoensis*], spike fescue [*Leucopoa kingie*]), bunchgrasses (bluebunch wheatgrass [*Pseudoroegneria spicata*]) and others. Forbs include yarrow (*Achillea millefolium*) arrowleaf balsamroot (*Balsamorhiza sagittata*) and many others in the aster family, including species of Phlox, Lupine, and milkvetch.

Overall, this target often occurs at the lower treeline immediately above valley grasslands, or sagebrush steppe and shrublands. In the Overthrust Mountains section, Dry Lower Montane–Foothill Forest typically occurs in canyons and draws, especially in the Bannock and Portneuf ranges to the west, with a broader distribution in the Bear River, Caribou, and Snake River ranges to the east.

Target Viability

Fair. As described in the 2003 Revised Forest Plan for the Caribou–Targhee National Forest, 70–80% of the Dry Lower Montane–Foothill Forest acres are classified as mature or old (CTNF 2003). For the most part, these forested areas are outside of the historic fire regimes, particularly for nonlethal fires. Some past timber harvest practices, livestock grazing practices, and suppression of disturbances, particularly wildfire, have created landscapes that are prone to more intense disturbances than in the past due to the buildup of mature and older vegetation. Accepting that disturbances are inevitable, as well as critical to ecosystem function, means management actions need to focus on making watersheds resilient to these disturbances over the long-term while reducing recovery time. As these forests continue to age, the risk and potential severity of disturbances increase (CTNF 2003). Although disturbances are lacking in many areas, the presence of invasive plant species (such as cheatgrass [*Bromus tectorum*] and thistle), present a challenge to federal, state, and private land managers as attempts to enhance habitats can further the establishment of these species. If not carefully planned and executed, habitat improvement projects can inadvertently spread these species, potentially negating any benefits.

Prioritized Threats and Strategies for Dry Lower Montane–Foothill Forest

Very High rated threats to Dry Lower Montane–Foothill Forest in the Overthrust Mountains

Lack of disturbance

Fire-dependent habitats such as Dry Lower Montane–Foothill Forest were probably subject to a moderate severity fire regime in pre-settlement times, with fire return intervals of 30-100 years. Frequent, low–intensity fires maintain stand composition and structure. In the Overthrust Mountains Section, fire in this habitat has recently been infrequent. Emphasis on protecting property and a lack of understanding of the benefits of fire among the public has led to fire suppression. Fire suppression contributes to outbreaks of Mountain Pine Beetle (*Dendroctonus ponderosae*), widespread decline in habitat quality, and increased risk of large–scale, severe fires. The growth of the wildland/urban interface increases the risk of wildfire and places habitat at higher risk of loss through stand-replacing fires. This habitat tends toward mature seral stages and stands that are homogenous rather than have a mosaic of age classes.

Objective	Strategy	Action(s)	Target SGCNs
Manage forests for a diversity of structure and composition. Maintain or restore productive and diverse populations of plants. Maintain conifer types and early successional stages and restore	Use methods of vegetation treatment that emulate natural disturbance and successional processes.	To the extent possible, Allow naturally-caused (lightning) fires to play their role in the ecosystem by allowing them to burn (i.e., managing wildfire for resource benefit; CTNF 2003 p. 3-4). Implement a variety of vegetation management projects on federal, state and privately managed lands (these could include prescribed fire and mechanical treatments such as thinning, timber harvest, etc.) across	Great Gray Owl Grizzly Bear Hoary Bat Little Brown Myotis Silver-haired Bat Western Small-footed Myotis Townsend's Big-eared Bat Lyrate Mountainsnail Thin-ribbed Mountainsnail

Objective	Strategy	Action(s)	Target SGCNs
disturbance processes through vegetation management, endemic insect and disease disturbances, and fire.		the Section to return areas to early seral conditions. Although a variety of benefits can be realized from these projects, restoration of proper ecological functions and benefits to wildlife habitat should be the primary drivers. Prioritize treatments on state and federal lands in areas that would benefit wildlife and their habitats during critical periods. (e.g., thinning to increase shrubs and other winter browse in big game wintering areas, etc.). When planning treatments on federal, state, and private lands, the treatment of noxious and invasive weeds should be integral to project planning, and appropriate actions both during and following project implementation should take place to prevent establishment of noxious/invasive weeds.	Monarch

High rated threats to Dry Lower Montane–Foothill Forest in the Overthrust Mountains

Noxious weeds & invasive annual grasses

Presence of noxious weeds such as cheatgrass, leafy spurge (*Euphorbia esula*), dyer's wood (*Isatis tinctoria*), yellow toadflax (*Linaria vulgaris*), musk thistle (*Carduus nutans*) and others compete with native understory grasses and forbs as well as recruitment of young trees. Weeds are spread by livestock, wildlife, and vehicles.

Objective	Strategy	Action(s)	Target SGCNs
Effectively control and restore areas dominated by noxious and invasive plants at a rate greater than the rate of the spread.	Implement large-scale experimental activities to remove upland nonnative invasive plants through various tools (DOI 2015).	Support the development of a framework for a national invasive species EDRR program (DOI 2105). Locate and coordinate installation of long-term studies and subsequent monitoring to test the efficacy of large-scale application of integrated pest management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Explore the use of both herbicides and biological controls to control cheatgrass. Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee	Great Gray Owl Grizzly Bear Hoary Bat Little Brown Myotis Silver-haired Bat Western Small-footed Myotis Townsend's Big-eared Bat Lyrate Mountainsnail Thin-ribbed Mountainsnail Monarch

Objective	Strategy	Action(s)	Target SGCNs
		2006). Ensure that all equipment and field clothing brought to project areas are free from weed seed. Carefully monitor and treat project areas for weed invasion for at least 3-5 years post project. Do not plant aggressive invasive grasses and crops adjacent to aspen stands or include them in rehabilitation mixes	

Motorized use

Outdoor recreation (hiking, camping, wildlife watching, photography, horse-back riding, motorized recreation) in the West is popular, due primarily to large tracts of public land available for use. All-terrain vehicles, including motorcycles, ATVs, UTVs, and snowmobiles, are used by >27% of the population in the western US (Cordell et al. 2005). Roads and trails, both managed and un-authorized, create management concerns and negative environmental impacts including creation of new pathways for the spread of invasive plants, soil erosion, displacement of wildlife sensitive to human and vehicle activity, habitat fragmentation, and sportsmen dissatisfaction.

Objective	Strategy	Action(s)	Target SGCNs
Reduce road barriers to wildlife.	Coordinate development/ location of key corridors.	Work with key agencies and stakeholders to ensure that roads and other linear infrastructure avoid sensitive habitat areas.	Great Gray Owl Grizzly Bear Hoary Bat Little Brown Myotis Silver-haired Bat Western Small-footed Myotis Townsend's Big-eared Bat Lyrate Mountainsnail Thin-ribbed Mountainsnail Monarch
Minimize unrestricted cross-country travel (Otter 2012) in sensitive habitat—Priority (Core) and Important habitat areas for Sage-Grouse.	Develop and enact travel management plans and regulations to manage impacts to wildlife populations.	Limit OHV travel to existing roads, primitive roads, and trails in areas where travel management planning has not been completed or is in progress. Prioritize the completion of Comprehensive Transportation Management Travel Plans (CTMTPs) (Otter 2012). Locate areas and trails to minimize disturbance to Sage-Grouse and other species sensitive to OHV disturbance; use route	Great Gray Owl Grizzly Bear Hoary Bat Little Brown Myotis Silver-haired Bat Western Small-footed Myotis Townsend's Big-eared Bat Lyrate

Objective	Strategy	Action(s)	Target SGCNs
		upgrade, closure of existing routes, timing restrictions, seasonal closures, and creation of new routes to help protect habitat and reduce the potential for pioneering new unauthorized routes (BLM 2015). Conduct road upgrades and maintenance outside sensitive seasons to avoid disturbance (BLM 2015). Reward people for identifying and reporting illegal roads and trails or reporting users violating the travel plan.	Mountainsnail Thin-ribbed Mountainsnail Monarch

Species designation, planning & monitoring

Grizzly Bear

In recent years, Grizzly Bear (*Ursus arctos*) have been observed in small numbers adjacent to the South Fork Snake River in areas of the Snake River Range and Caribou Range. This area is outside of the Primary Conservation Area (PCA) for Grizzly Bear, which is secure for Grizzly Bear, providing habitat conditions that ensure a recovered population is maintained and allow bears to continue to expand outside of the PCA (ICST 2007). In this area of the Overthrust Mountains Section, successful management of Grizzly Bear will depend upon state and federal agencies that consider needs of Grizzly Bear while managing lands for other wildlife and natural resources (ICST 2007). The challenge lies in managing increasing human-bear conflicts in new expansion areas such as the one described here.

Objective	Strategy	Action(s)	Target SGCNs
State and federal lands that support Grizzly Bear expansion.	Consider habitat needs of Grizzly Bear when managing lands for other wildlife and natural resource uses (IYGBDAT 2002). Proactively manage Human-Grizzly Bear conflicts (IYGBDAT 2002).	Monitor habitat conditions for Grizzly Bear outside the PCA. Evaluate and mitigate potential impacts to Grizzly Bear and their habitat using the criteria and standards in the Grizzly Bear Conservation Strategy (ICST 2007). Consider the need for secure habitat for Grizzly Bear when developing Travel Management Plans on state and federal lands. Conflict areas will be documented routinely and prioritized to focus proactive management actions to minimize conflicts. Address existing and potential human activities that may cause future conflicts, including permitting new grazing allotments in Grizzly Bear-occupied areas of the Overthrust Mountains Section.	Grizzly Bear

Target: Subalpine–High Montane Conifer Forest

This habitat target includes the matrix forests of the subalpine zone. Sites are cold year-round, and precipitation is predominantly in the form of snow, which may persist until summer. Snowpacks are deep and late-lying in avalanche or drift zones, but thinner on wind-swept

Caribou Mountain, Southeast Idaho © Becky Abel

ridges. Summers are cool and dry. The tree canopy consists of Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) dominating either mixed or alone. Engelmann spruce can dominate sites (with minimal subalpine fir) in eastern Idaho where continental climate regime is most noticeable. Douglas-fir may persist in forest stands long periods without regeneration. Lodgepole pine is a common species in many forest patches, present in both mixed conifer/quaking aspen stands and pure lodgepole pine stands where wildfires have occurred. Upper elevation examples may have more woodland physiognomy, and whitebark pine (*Pinus albicaulis*) exclusively in the northern portions of the section or limber pine throughout the section can be a seral component. Understory species may include mountain Saskatoon serviceberry (*Amelanchier alnifolia*), big sagebrush, rocky mountain juniper (*Juniperus scopulorum*), creeping barberry, Oregon boxleaf (*Paxistima myrsinites*), mallow ninebark, gooseberry currant (*Ribes montigenum*), russet buffaloberry, and grouse whortleberry (*Vaccinium scoparium*). Shrub cover is low under dense canopies or on xeric sites where grasses and forbs characteristic of subalpine grasslands or mountain big sagebrush shrublands are more common. Important herbs include western needlegrass (*Achnatherum occidentale*), pussytoes (*Antennaria* spp.), prickly sandwort, heartleaf arnica, broadleaf arnica (*Arnica latifolia*), timber milkvetch, pinegrass, elk sedge, Ross' sedge, buckwheat (*Eriogonum* spp.), aster (*Eurybia* spp.), sticky geranium (*Geranium viscosissimum*), silvery lupine (*Lupinus argenteus*), sidebells wintergreen (*Orthilia secunda*), sickletop lousewort (*Pedicularis racemosa*), low beardtongue (*Penstemon humilis*), poke knotweed (*Polygonum phytolacaefolium*), and hookedspur violet (*Viola adunca*). Disturbance includes occasional ice and wind dessication, blowdown, avalanches, and insect outbreaks. In the Overthrust Mountains Section, this habitat target, like the Dry Lower Montane–Foothill Forest target, tends toward more mature seral stages and would benefit from increased disturbance from fire and other treatments to create a mosaic of age classes.

The Overthrust Mountains Section is thought to be an important area for Wolverine (*Gulo gulo*) dispersal from Idaho into Utah and Colorado. The Overthrust Mountains includes Tier 1 and Tier 2 PCAs for Wolverine, as identified in the 2014 Management Plan for the Conservation of Wolverines in Idaho (IDFG 2014). Priority Conservation Areas were calculated based on potential wolverine use, cumulative threats, and amount of unprotected habitat. The Bear River Range was identified as being of the highest priority (Tier 1) for Wolverine conservation in the Overthrust Mountains. Among threats to Wolverine conservation, climate change, small populations and limited connectivity, dispersed snow sports recreation, human infrastructure, incidental trapping and shooting, and knowledge gaps have all been identified as affecting Wolverine in Idaho (IDFG 2014).

Stewart Canyon Ridge, Caribou range, Idaho, IDFG

Target Viability

Fair. As described in the 2003 Revised Forest Plan for the Caribou–Targhee National Forest (CTNF 2003), Engelmann spruce/subalpine fir communities on the Forest have been assessed as being at high risk. Approximately 80% of acres are mature and old, with increasing stand densities and ladder fuels. The Engelmann spruce/subalpine fir is at risk primarily due to the dominance of mature and old age structure and changes in the historic nonlethal fire regimes. Some past timber harvest practices, livestock grazing practices, and suppression of disturbances, particularly wildfire, have created landscapes that are prone to more intense disturbances than in the past due to the buildup of mature and older vegetation. Accepting that disturbances are inevitable, as well as critical to ecosystem function, means management actions need to focus on making watersheds resilient to these disturbances over the long-term while reducing recovery time. As these forests continue to age, the risk and potential severity of disturbances increase (CTNF 2003). In some areas, especially areas of exceptionally dense conifer, understories have been degraded or lost (as result of being shaded out by the overstory), limiting the usefulness of these areas to wildlife.

Caribou Mountain, Southeast Idaho © Caribou–Targhee National Forest

Prioritized Threats and Strategies for Subalpine–High Montane Conifer Forest

High rated threats to Subalpine–High Montane Conifer Forest in the Overthrust Mountains

Lack of disturbance

Fire-dependent habitats such as Subalpine–High Montane Conifer Forest were probably subject to a moderate severity fire regime in pre-settlement times, with fire return intervals of 30-100 years. Fire is important for maintaining a range of seral stages characteristic of subalpine forests. The natural fire disturbance regime is of relatively infrequent, mixed- to high-severity fire that results in a patchwork of forests with varying stand structure and composition. In the Overthrust Mountains Section, fire in this habitat has recently been infrequent. Emphasis on protecting property and a lack of understanding of the benefits of fire among the public has led to fire suppression. Fire suppression contributes to insect outbreaks, widespread decline in habitat quality, and increased risk of large-scale, severe fires. This habitat tends toward mature seral stages and stands that are homogenous rather than have a mosaic of age classes.

Objective	Strategy	Action(s)	Target SGCNs
Manage forests for a diversity of structure and composition. Maintain or restore productive and diverse populations of plants. Maintain conifer types and early successional stages and restore disturbance	Use methods of vegetation treatment that emulate natural disturbance and successional processes. Restore natural disturbance regimes (e.g., beaver activity).	To the extent possible, Allow naturally-caused (lightning) fires to play their role in the ecosystem by allowing them to burn (i.e., managing wildfire for resource benefit; CTNF 2003 p. 3-4). Implement a variety of vegetation management projects on federal, state, and privately managed lands (these could include prescribed fire and mechanical treatments such as thinning, timber harvest, etc.) across the Section to return areas to early seral conditions. Although a variety of benefits can be realized from these projects, restoration of proper ecological functions and benefits to wildlife habitat	Wolverine Grizzly Bear Hoary Bat Silver-haired Bat Kriemhild Fritillary Monarch Spur-throated Grasshopper (*Melanoplus*) Species Group

Objective	Strategy	Action(s)	Target SGCNs
processes through vegetation management and fire.		should be the primary drivers. When planning treatments on federal, state, and private lands, the treatment of noxious and invasive weeds should be integral to project planning, and appropriate actions both during and following project implementation should take place to prevent establishment of noxious/invasive weeds. Reintroduce beaver where appropriate.	

Species designation, planning & monitoring

Great Gray Owl

Great Gray Owls (*Strix nebulosa*) are considered a contrast species, which means they require the juxtaposition of early- and late-seral stages for foraging and for nesting and roosting and this juxtaposition must be considered when managing the spatial arrangement of habitats in order to meet all aspects of life functions for Great Gray Owl. Specifically, large contiguous areas with small forest openings would benefit Great Gray Owl as well as other SGCNs (Silver-haired Bat and Hoary Bat). Snags are a special habitat feature for Great Gray Owls. They do not build their own nests but rely on existing platforms such as stick nests originally created by other birds or formed by dwarf mistletoe brooms, depressions in broken-topped dead trees, stumps, or artificial platforms (Wisdom et al. 2000).

Objective	Strategy	Action(s)	Target SGCNs
Maintain or increase foraging and nesting habitat for Great Gray Owls.	Restore meadow habitat adjacent to nesting habitat where conifer encroachment is reducing meadow size. Increase nest site availability (e.g., open forest habitat).	Work with land managers to identify and fund restoration actions. Install nest platforms where appropriate.	Great Gray Owl
Minimize nest site disturbance for Great Gray Owl.	Educate wildlife watchers and photographers about sensitivity of nesting owls.	Write articles about disturbance during wildlife viewing for Windows for Wildlife. Present information to Audubon Society chapters. Create an informational brochure to disseminate to photographers and wildlife watchers.	Great Gray Owl

Target: Sagebrush Steppe

Over 30% of the Overthrust Mountains Ecosection is comprised of Sagebrush Steppe. Communities of Wyoming and Basin big sagebrush (*Artemisia tridentata* ssp. *wyomingensis* and *A. tridentata* ssp. *tridentata*) occur at lower elevations while Mountain big sagebrush is found at higher elevations along with perennial grasses and forbs. Livestock grazing is an important land-use activity within this area. Although resource management programs affecting wildlife habitat within Sagebrush Steppe are currently dominated by considerations for Greater Sage-Grouse (*Centrocercus urophasianus*; Sage-Grouse) populations, many other species are reliant on sagebrush-steppe habitat. One area of the Overthrust Mountains, the Sheep Creek Hills, supports a small population of Pygmy Rabbit (*Brachylagus idahoensis*).

Target Viability

Fair. Habitat varies from generally intact and in good ecological condition to highly degraded. Sagebrush steppe in the Sheep Creek Hills north of Bear Lake Plateau remains relatively intact and supports healthy populations of Sage-Grouse and a small population of Pygmy Rabbit.

Paris Peak, Bear River Range, Southeast Idaho © Caribou–Targhee National Forest

Sagebrush steppe on the east side of the Bear River Range including the Paris Hills is fragmented from residential development as well as mining activities but continues to support populations of Sage-Grouse and is an Important (IHMA) Greater Sage-Grouse Habitat Management Area (Fig. 9.3). The middle Portneuf Valley has been converted largely to agricultural lands and habitat that remains is fragmented and grazed heavily. On the Caribou–Targhee National Forest, 40% of the sagebrush acres have a canopy cover greater than 15% with an increase in bare ground and soil loss. With the dense overstory, the understory vegetation is diminishing. Sagebrush steppe across the Overthrust Mountains has been impacted by extensive conifer encroachment (CTNF 2003).

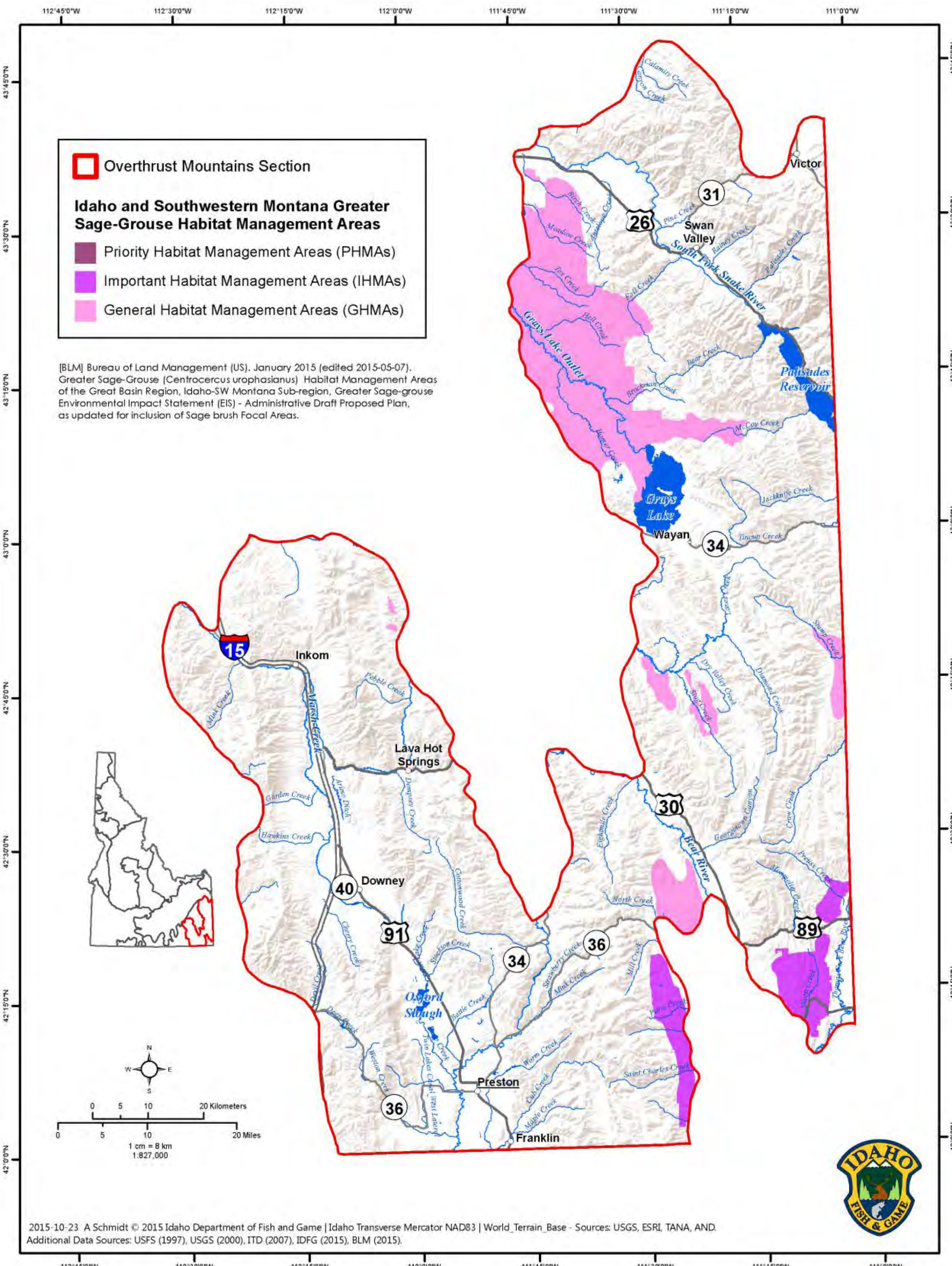

Fig. 9.3 Map of Idaho and Southwestern Montana Greater Sage-Grouse Habitat Management Areas in the Overthrust Mountains

Prioritized Threats and Strategies for Sagebrush Steppe

High rated threats to Sagebrush Steppe in the Overthrust Mountains

Livestock grazing management that is inconsistent with sagebrush steppe management objectives

In the context of this plan, "improper" is defined as grazing beyond the capacity of the resource in either direction (e.g., overuse such as along riparian areas that need protection; i.e., there needs to be seasonal adjustments). Negative impacts of grazing are typically associated with persistent heavy grazing. In the Governor's Alternative (Otter 2012), improper livestock grazing management is considered a secondary threat with monitoring and management actions tailored accordingly.

Livestock grazing can affect wildlife habitat in many ways (Krausman et al. 2009). For example, improper livestock grazing management can change habitat features that directly influence birds by reducing plant species diversity and biomass (Reynolds and Trost 1981, Bock and Webb 1984, Saab et al. 1995). In addition, changes in water and nutrient cycling caused by improper grazing management can promote the spread of invasive species, which then degrade native bird habitats by altering fire and disturbance regimes (Rotenberry 1998). Sagebrush systems are particularly sensitive to grazing disturbance (Mack and Thompson 1982).

In the Overthrust Mountains, factors that contribute to this problem include insufficient funds for federal and state land management agency oversight, and insufficient monitoring (i.e., lack of appropriate rangeland health assessment monitoring data gathered annually on a consistent basis to support trend analysis). Consequently, some management decisions are compromised by a lack of appropriate data. On private lands, contributing factors include overuse, overgrazing, lack of protections on sensitive areas (riparian areas, aspen stands) and in some cases eradication of the sagebrush component (to improve forage).

Objective	Strategy	Action(s)	Target SGCNs
Manage livestock to maintain rangeland health and habitat quality (Otter 2012).	Manage the timing, intensity, duration, and frequency of grazing practices to manipulate vegetative condition (Otter 2012).	Prioritize permit renewals and land health assessments for allotments with declining Sage-Grouse populations (Otter 2012). Inform affected permittees and landowners regarding Sage-Grouse habitat needs and conservation measures (Idaho Sage-grouse Advisory Committee 2006). Incorporate GRSG Seasonal Habitat Objectives (Table 2-2 in BLM 2015) into relevant resource management plans and projects. Use the Sage-Grouse Habitat Assessment Framework (Stiver et al. 2015) with an appropriate sampling design to conduct fine-scale habitat assessments to inform	Greater Sage-Grouse Golden Eagle Sage Thrasher Sharp-tailed Grouse Pygmy Rabbit A Tiger Beetle (*Cicindela decemnotata montevolans*) Common Nighthawk Western Small-footed Myotis Townsend's Big-eared Bat Little Brown Myotis Monarch

Objective	Strategy	Action(s)	Target SGCNs
		grazing management. Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter 2012).	
	Maintain MOU between ISDA and BLM as it pertains to grazing management.	Involve permittees in providing monitoring information, the interpretation of monitoring data, & providing input into grazing management adjustments to meet the goals and objectives of federal land management agencies and the permittees (Sanders 2006).	
Assess the impacts (both negative and, potentially, positive) of livestock grazing on sagebrush-steppe obligate passerines (Rotenberry 1998).	Implement new, properly designed and replicated experiments involving a variety of alternative grazing treatments (including no grazing at all) across the spectrum of major shrubsteppe habitat types (Rotenberry 1998).	Conduct experiments over multiple years (Rotenberry 1998).	
Maintain or enhance wildlife values on working ranches.	Develop partnerships that help keep sustainable grazing the prevailing land use (Krausman et al. 2009).		
Support the continued responsible use of federal lands for grazing to maintain open spaces and important habitat conditions (e.g., year-round water sources) that benefit wildlife (WGA Policy Resolution 2015-03).	Implement Western Governors' Association (WGA) policy for public lands grazing (for details, see WGA Policy Resolution 2015-03).	Use sound, science-based management decisions for federal and state managed lands and base these decisions upon flexible policies that take into account local ecological conditions and state planning decisions.	

Motorized use

Outdoor recreation (hiking, camping, wildlife watching, photography, horseback riding, motorized recreation) in the West is popular, due primarily to large tracts of public land available for use. All-terrain vehicles, including motorcycles, ATVs, UTVs, and snowmobiles, are used by >27% of the population in the western US (Cordell et al. 2005). Habitat degradation, displacement, and wildlife harassment are some environmental impacts caused by motorized vehicle use (Ouren et al. 2007). Infrastructure such as roads and highways is a primary threat to Sage-Grouse and other sagebrush steppe-associated species by causing the fragmentation and direct loss of shrubsteppe habitats (Otter 2012; Fed Regist. 79[234]:72464–72465). In addition, recreation in the form of Off Highway Vehicle (OHV) use is considered a secondary threat to Sage-Grouse in the Governor's Alternative (Otter 2012).

Objective	Strategy	Action(s)	Target SGCNs
Reduce road barriers to wildlife.	Coordinate development/ location of key corridors.	Work with key agencies and stakeholders to ensure that roads and other linear infrastructure avoid sensitive habitat areas.	Golden Eagle Sharp-tailed Grouse Pygmy Rabbit A Tiger Beetle Common Nighthawk Western Small-footed Myotis Townsend's Big-eared Bat Little Brown Myotis Monarch
Minimize unrestricted cross-country travel (Otter 2012) in sensitive habitat—Priority (Core) and Important habitat areas for Sage-Grouse.	Develop and enact travel management plans and regulations to manage impacts to wildlife populations.	Limit OHV travel to existing roads, primitive roads, and trails in areas where travel management planning has not been completed or is in progress. Prioritize the completion of CTMTPs (Otter 2012). Locate areas and trails to minimize disturbance to Sage-Grouse and other species sensitive to OHV disturbance; use route upgrade, closure of existing routes, timing restrictions, seasonal closures, and creation of new routes to help protect habitat and reduce the potential for pioneering new unauthorized routes (BLM 2015). Conduct road upgrades and maintenance outside the Sage-Grouse breeding season to avoid disturbance on leks (BLM 2015). Implement seasonal trail closures, buffer zones around Golden Eagle nests, and suitable location of staging areas to minimize OHV effects (Steenhof et al. 2014).	

Species designation, planning & monitoring

Multiple species identified as SGCN are declining as a result of unknown causes. The priority for many of these species in the coming years is to identify what is/are the root cause(s) of their apparent decline, and to develop strategies to address them.

Objective	Strategy	Action(s)	Target SGCNs
Determine cause(s) of decline for nightjar species in Idaho.	Work with Western Working Group Partners in Flight (WWG PIF) and the Pacific Flyway Nongame Technical Committee (PFNTC) to assess causes(s) of decline.	Assist WWG PIF with adjusting current Nightjar Survey Network protocols to collect data that will inform potential cause(s) of decline, including assessments of insect prey populations and their habitats. Work with WWG PIF and PFNTC to identify opportunities for research on contaminant impacts.	Common Nighthawk
Determine benefits of Sharp-tailed Grouse and Greater Sage-Grouse management activities on nontarget species.	Develop songbird monitoring strategy on Sharp-tailed Grouse and Greater Sage-Grouse management areas.	Work with NGOs, such as Intermountain Bird Observatory and Klamath Bird Observatory, and agency partners to develop protocol/sampling.	Sage Thrasher

Target: Riverine–Riparian Forest & Shrubland

Riverine wetlands occur in river and stream channels. They include floodplains and riparian vegetation influenced by stream channel hydrology. Riparian habitat is included in this definition of riverine wetlands and is described below. The dominant water sources are overbank flooding from the channel and subsurface shallow water table connections between the stream channel and wetlands (Brinson et al. 1995). Other water sources are overland runoff from adjacent uplands, tributaries, and precipitation. Flow may be perennial, perennial but interrupted, or ephemeral/intermittent. Surface flows are complex seasonally and in multiple directions. Water also moves laterally in the shallow groundwater table between the channel and riparian zones, as well as out of the system through infiltration into deep groundwater.

In the Overthrust Mountains Section, the riverine ecosystem includes a variety of important aquatic habitat types, including the headwaters and relatively small 1st- to 3rd-order streams in numerous mountain ranges (e.g., Snake River, Caribou, Webster, Aspen, Portneuf, Bannock, and Bear River ranges) and 4th+ order streams and larger rivers such as the South Fork of the Snake River, Bear River, and Portneuf River.

Low-elevation riparian forests and woodlands are found along permanent, intermittent, and ephemeral streams, or on river floodplains. Persistence depends on annual to episodic flooding which creates alluvial features suitable for tree reproduction and sufficient groundwater. In the Overthrust Mountains, this habitat is occurs primarily along the South Fork of the Snake River (South Fork) and represents the largest cottonwood riparian forest left in the western US. This forest shelters one of the most diverse breeding landbird communities in the Greater Yellowstone Ecosystem including the rare western Yellow-billed cuckoo (*Coccyzus americanus*). The South Fork provides secure winter habitat for thousands of waterfowl including hundreds of Trumpeter Swans (*Cygnus buccinator*). There is some evidence that the South Fork cottonwood forest provides important stopover habitat for migrating landbirds. Its importance as stopover habitat may be accentuated by regional aspen declines (IDFG 2010).

Three common plant community types on established flood plains along the South Fork include narrowleaf cottonwood (*Populus angustifolia*) with red osier dogwood (*Cornus sericea*), narrowleaf cottonwood with silverberry (*Elaeagnus commutata*), and narrowleaf cottonwood with goldenaster (*Heterotheca villosa*). Wetter, more recently disturbed riparian sites are frequently represented by the presence of narrowleaf cottonwood seedlings and saplings, reed canarygrass (*Phalaris arundinacea*), water birch (*Betula occidentalis*), sandbar willow (*Salix exigua*), and yellow willow (*S. eriocephala*). On drier sites, particularly outside of the levy along the lower South Fork Snake, Rocky Mountain juniper (*Juniperus scopulorum*), Canada goldenrod (*Solidago canadensis*), skunkbush sumac (*Rhus tilobata*), and licorice root (*Glycyrrhiza lepidota*) are common understory components (Merigliano 1996). These forests and woodlands require flooding and some gravels for seedling establishment. Sites are subject to temporary flooding during spring runoff. Underlying gravels may keep the water table just below the ground surface and are favored substrates for cottonwood. Large bottomlands may have large occurrences, but most have been cut over or cleared for agriculture.

Target Viability

Fair. Within the Overthrust Mountains, the South Fork Snake River is impounded by a major dam that significantly changes the hydrograph (Palisades). Numerous smaller dams, largely for irrigation diversion or hydropower generation, also form impediments to water flow and animal movements elsewhere in the Overthrust Mountains. Riparian habitats associated with riverine systems, particularly cottonwood forests, are at risk and require conservation action. Dams control flooding and long-term viability is questionable because flood control projects have changed the hydrograph. Riparian areas seldom receive flows high enough to cause the scouring needed to expose bare mineral soil for cottonwood regeneration. Constrained flows also reduce the ability of the rivers to carry sediments to downstream habitats.

Spotlight Species of Greatest Conservation Need: Western Yellow-billed Cuckoo

The rule to list the western Yellow-billed Cuckoo as threatened was published in the Federal Register in 2014. The western distinct population segment of the Yellow-billed Cuckoo includes Idaho, and the South Fork Snake River has been identified in the proposed critical habitat for cuckoos in the state. Breeding western Yellow-billed Cuckoos are riparian obligates and nest almost exclusively in low to moderate elevation riparian woodlands with native broadleaf trees and shrubs that are 20 hectares (ha) or more in extent within arid to semiarid landscapes. At the landscape level, the amount of cottonwood–willow-dominated vegetation cover and the width of riparian habitat influence western Yellow-billed Cuckoo breeding distribution. Riparian patches used by breeding cuckoos vary in size and shape, ranging from a relatively contiguous stand of mixed native/nonnative vegetation to an irregularly shaped mosaic of dense vegetation with open areas (Halterman et al. 2015). Cuckoos eat a wide variety of prey items. These are primarily large arthropods such as grasshoppers and caterpillars, but may also include frogs, spiders, tent caterpillars, and a variety of other insects. Evidence suggests that population levels and breeding may be closely tied to abundance of certain food items (Halterman et al. 2015).

The decline of the western Yellow-billed Cuckoo is primarily the result of riparian habitat loss and degradation. Principal causes of riparian habitat destruction, modification, and degradation in the range have occurred from alteration of hydrology due to dams, water diversions, management of river flow that differs from natural hydrologic patterns, channelization, and levees and other forms of bank stabilization that encroach into the floodplain. These losses are further exacerbated by conversion of floodplains for agricultural uses, such as crops and livestock grazing. In combination with altered hydrology, these threats promote the conversion of existing primarily native habitats to monotypic stands of nonnative vegetation, reducing the suitability of riparian habitats for the cuckoo (Halterman et al. 2015).

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

Very High rated threats to Riverine–Riparian Forest & Shrubland in the Overthrust Mountains

Changes in precipitation & broad-scale hydrologic regimes

During the 21st century, most projections indicate the Pacific Northwest will become progressively warmer and wetter, although summer drought may worsen. Current projections indicate temperatures in the region will increase 0.1 °C to 0.6 °C per decade through at least 2050, and although warming is expected across all seasons, the largest temperature increases will occur in summer (Kunkel et al. 2013). Given projected temperature increases, much of the western US is expected to transition from a snow-dominated system to one more rain-dominated, spring snowpack is expected to decline, especially at warmer low to mid-elevations, and existing snow is expected to continue melting earlier (Pierce and Cayan 2013), changing hydrologic regimes within this habitat. Less snowpack equates to more drought stress to native plants, and increases conditions for drought-adapted invasive species to establish.

Objective	Strategy	Action(s)	Target SGCNs
Improve landscape resilience.	Manage for diverse, healthy plant communities able to resist stresses including drought and drought mediated impacts such as invasion by nonnative plants and wildfire. Increase capacity for water storage to combat the effects of climate change.	Research options for managing this habitat under forecasted climate models. Work with other agencies, organizations, and user groups across the Overthrust Mountains to address climate change impacts across landscapes, and refine land management planning options and alternatives down to local level, implementable projects where possible. Engage in microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate induced stressors.	Yellow-billed Cuckoo Northern Leopard Frog Rocky Mountain Duskysnail Hoary Bat Silver-haired Bat Little Brown Myotis Western Small-footed Myotis Sandhill Crane Trumpeter Swan Pondsnail (*Stagnicola*) Species Group Bear Lake Springsnail Utah Sallfly California Floater

Objective	Strategy	Action(s)	Target SGCNs
		Engage in researching to identifying plants useful for habitat restoration or enhancement from current climate regimes that are forecast to be local future climate regimes. Support efforts to increase public and political awareness of climate change impacts to local landscapes and wildlife dependent on them. Research options for managing livestock grazing in this habitat under forecasted climate models (i.e., drought conditions). Work with agencies, organizations, and livestock operators to use this information to both be pro-active and refine land management planning options and alternatives down to local level implementable projects. Implement livestock drought management alternatives on IDFG-owned lands.	

High rated threats to Riverine–Riparian Forest & Shrubland in the Overthrust Mountains

Dams & water diversions

Water diversion affects peak flows, resulting in narrowing of riparian corridor that provides critical habitat for Yellow-billed Cuckoos. These habitats need periodic flooding to maintain suitable, multilayered riparian habitat. Controlled river flows and the resulting near monoculture of mature/decadent cottonwood in some river systems has likely resulted in a major loss of suitable breeding habitat for this species, and will likely continue as water demands continue to climb.

Objective	Strategy	Action(s)	Target SGCNs
Improve recharge to the rivers and associated wetlands.	Support aquifer recharge.	Actively participate in efforts to increase appropriate aquifer recharge efforts that will benefit fish and wildlife resources.	Northern Leatherside Chub Yellow-billed Cuckoo Northern Leopard Frog Rocky Mountain Duskysnail Hoary Bat Silver-haired Bat Little Brown Myotis Western Small-footed Myotis Sandhill Crane Trumpeter Swan Pondsnail (*Stagnicola*)
Improve compliance with water use.	IDWR and water masters evaluate adjudication and enforce violations.	Work with partners to determine methods to improve compliance.	
Improve hydrograph to better mimic	Work with Bureau of Reclamation to	Maintain appropriate winter flows to minimize impacts to aquatic species	

Objective	Strategy	Action(s)	Target SGCNs
natural variation.	find ways to reshape flows and restore periodic flooding to key riparian habitats. Maintain and protect water quality.	Build in periods of high flows annually to mimic spring runoff. Seek opportunities to create flows that can periodically mimic a 25-year event. Avoid siting new diversions, dams, and hydropower developments on streams and rivers with important wildlife habitat. Introduce buffer zones along montane riparian habitats to maintain riparian structure and function. Avoid activities in the adjacent uplands that alter runoff and water quality such as clear-cut logging, road construction, and mining. Study and monitor potential transportation hazards associated with road and rail shipment of chemical products adjacent to breeding streams. Develop preparation and response plans to any transportation incident involving hazardous materials. Avoid locating mining structures, support facilities, and roads within riparian areas. For approved activities, require a reclamation plan, reclamation bonds, and monitoring to assure chemical, physical, hydrologic, and biological stream stability.	Species Group Bear Lake Springsnail Utah Sallfly California Floater Harlequin Duck Northern Leopard Frog Rocky Mountain Duskysnail Trumpeter Swan Pondsnail (*Stagnicola*) Species Group Bear Lake Springsnail Utah Sallfly California Floater
Reduce the trend in cottonwood forest loss.	Work with landowners to protect remaining cottonwood forest.	Support efforts to use LWCF funds to acquire an interest in cottonwood forest areas. Educate landowners/managers about the values of cottonwood forests Work with landowners to restore cottonwood forests when possible.	Yellow-billed Cuckoo Hoary Bat Silver-haired Bat Little Brown Myotis Western Small-footed Myotis

Livestock grazing management that is inconsistent with riparian forest and shrubland management objectives

Livestock grazing can affect wildlife habitat in many ways (Krausman et al. 2009). For example, livestock grazing can change habitat features that directly influence birds by reducing plant species diversity and biomass (Reynolds and Trost 1981, Bock and Webb 1984, Saab et al. 1995). In the Riverine–Riparian Forest & Shrubland in the Overthrust Mountains Section, livestock grazing can impact breeding western Yellow-billed Cuckoos that nest along the South Fork Snake River by changing the structure of the understory and introducing invasive plant species.

In the Overthrust Mountains, factors that contribute to this problem include insufficient funds for federal land management agency oversight, and insufficient monitoring (i.e., lack of appropriate rangeland health assessment monitoring data gathered annually on a consistent basis to support trend analysis). Consequently, some management decisions are compromised by a lack of appropriate data.

Objective	Strategy	Action(s)	Target SGCNs
Protect streamside riparian vegetation.	Control Livestock grazing in sensitive wetland and riparian areas.	Introduce buffer zones along montane riparian habitats to maintain quality structure and function, including snags and woody debris. Manage grazing (length and timing of season, stock levels, location, development of water sources) to maintain stream bank stability and riparian vegetation (especially shrubs). Create exclusion fencing along aquatic areas. Encourage salting at least ¼ mile away from riparian/wetland areas where possible. Encourage managers to restrict riparian use during the autumn months when livestock are more likely to browse on shrubs.	Yellow-billed Cuckoo Northern Leopard Frog Harlequin Duck Rocky Mountain Duskysnail Hoary Bat Silver-haired Bat Little Brown Myotis Western Small-footed Myotis Sandhill Crane Trumpeter Swan Pondsnail (*Stagnicola*) Species Group Bear Lake Springsnail Utah Sallfly California Floater

Species designation, planning & monitoring

Multiple species identified as SGCN are declining as a result of unknown causes. The priority for many of these species in the coming years is to identify what is/are the root cause(s) of their apparent decline, and develop a strategy for addressing it.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of decline in Yellow-billed Cuckoos.	Participate in coordinated monitoring. Develop research projects focused on potential causes of decline.	Work with Arizona Department of Game and Fish and WWG PIF on Competitive State Wildlife Grant Proposal for a west-wide cuckoo survey. Collaborate with WWG and other partners on projects that address declines of this species.	Yellow-billed Cuckoo
Monitor population trends for Trumpeter Swan.	Participate in coordinated monitoring.	Collaborate with FWS and other organizations on projects that address the status of this species.	Trumpeter Swan
Reduce potential impacts of	Reduce use of neonicotinoids on the landscape.	Ban use of neonicotinoids as seed coatings. Prohibit use of neonicotinoids on IDFG-	Yellow-billed Cuckoo Common

Objective	Strategy	Action(s)	Target SGCNs
neonicotinoids on insectivorous birds.	Encourage adherence to the principles of Integrated Pest Management and encourage use of environmentally benign pesticides at small scales.	administered lands, particularly Wildlife Management Areas. Work with Natural Resources Conservation Service (NRCS) to prohibit use of neonicotinoids on conservation easement/Farm Bill properties. Suspend use of neonicotinoids to allow scientific review of impacts. Work with American Bird Conservancy to develop agricultural industry-targeted outreach materials to inform of impacts to both wildlife and crop health.	Nighthawk
Determine level of impacts of neonicotinoids on insectivorous birds.	Conduct research on impact levels on watershed scale. Update EPA thresholds for incident reporting, which are currently set too low.	Provide relevant bird and bat data to American Bird Conservancy for on-going research project. Develop neonicotinoid-free communities and watersheds to provide means for comparing with communities and watersheds that are exposed to neonicotinoids. Work with American Bird Conservancy and other NGOs on project design and implementation. Provide support for American Bird Conservancy's efforts to update EPA thresholds.	Yellow-billed Cuckoo Common Nighthawk
Reduce potential impacts of power lines.	Improve distribution of markers on power lines where strikes occur.	Work with Idaho Power and other entities to install markers in problematic areas on existing lines or in potentially problematic areas of new developments.	Trumpeter Swan

Target: Depressional–Groundwater-Dependent Wetland Complexes

In the Overthrust Mountains Section, this target includes all Depressional Wetlands and groundwater-dependent wetlands, but in large part comprises Grays Lake NWR and Oxford Slough Waterfowl Production Area wetland complexes.

Depressional Wetlands occur in topographic depressions. Elevation contours are closed, thus allowing the accumulation of surface water. Dominant water sources are a combination of precipitation, groundwater discharge, lateral subsurface flow, seasonally high water tables, overland flow from adjacent uplands, or other sources. The direction of flow is normally from the surrounding uplands toward the center of the depression. Depressional Wetlands may have any combination of inlets and outlets or lack them completely. Dominant hydrodynamics are seasonal vertical fluctuations. Depressional Wetlands lose water through intermittent or perennial drainage from an outlet, by evapotranspiration, or infiltration to groundwater. Vernal pools, playas, old oxbows or meanders that are disconnected from river floodplains, and many constructed wetlands are common examples of Depressional Wetlands. Depressional Wetlands supporting emergent marshes or swamp forests may accumulate significant amounts of organic matter.

Flood-irrigated habitats (FIH) serve as surrogate Depressional Wetlands that largely mimic natural wetlands historically created by natural flooding. Many FIH, particularly perennial pasture and haylands, occur in historic wet meadow and wetland footprints of intermountain valleys and basins. Shallow, flooded areas provide important foraging habitat for White-faced Ibis (*Plegadis chihi*), Sandhill Crane (*Grus canadensis*), and other waterbirds. The timing and duration of surface flooding on FIHs varies widely, often reflecting annual variation in snowpack and streamflow conditions. The spread of surface water across FIH mimics natural hydrologic processes and contributes to important ecological functions such as hydrating soils, recharging aquifers, recycling and circulating water, ameliorating stream temperatures through soil saturation and discharge, and increasing the persistence of hydric habitats during the growing season (C. Colson, pers. comm.).

Grays Lake NWR, Southeast Idaho, IDFG

This target also contains a subset of groundwater-dependent ecosystems (GDEs), specifically Springs & Groundwater-Dependent Wetlands. Springs are GDEs where groundwater discharges at the ground surface, often through complex subsurface flow paths (Stevens and Meretsky 2008), including both cold and hot (geothermal) springs. Spring-dependent communities of plants and animals often exist where springs emerge. A variety of other wetland types are also dependent on groundwater fed subsurface flows and seasonal seeps. For our purposes, GDE wetlands include fens; marshes, shrublands, and woodland swamps in sloped settings; wet and mesic meadows; and alkaline-saline wetlands. Groundwater-dependent wetlands often occur on sloping land with

Shorty's Overlook at Grays Lake, southeast Idaho © FWS

gradients ranging from steep hillsides to nearly imperceptible. Slope wetlands differ from Depressional Wetlands by the lack of closed contours. Groundwater sources can be either a regional aquifer or from localized infiltration of surface water (e.g., precipitation, seasonal flooding). Water flow is downslope and unidirectional. Groundwater-dependent wetlands lose water primarily by subsurface outflow, surface flows, and evapotranspiration. Groundwater-dependent wetlands may develop channels, but they serve only to convey water away from the wetland.

Target Viability

Fair. Early human settlement patterns in the Intermountain West were closely associated with water and wetland resources. Wide-scale and systematic development of water resources for agricultural, energy, industrial, and domestic uses has had tremendous impacts on wetland systems. These and other anthropogenic modifications reduced abundance of wetlands in western states 30–91% between the 1780s and mid-1980s, with an estimated loss of 57% of historic wetlands in the Intermountain West (Dahl 1990, Ratti and Kadlec 1992). On private lands, seasonal and temporary wet-meadow wetlands and semipermanent wetlands have been altered from historic conditions by grazing or draining. Grays Lake NWR and Oxford Slough WPA are semipermanent and permanent wetlands managed as relatively protected refuges. However, wetland habitats at Grays Lake NWR are degraded as a result of drainage and unnatural hydrologic regimes. Wildlife productivity has been substantially reduced from the 1940-50s. Annual drawdown of Grays Lake has impacted Sandhill Crane (*Grus canadensis*) nest success and recruitment. Breeding pairs of Trumpeter Swans are not producing at replacement levels and lack suitable water to fledge cygnets in most years (W. Smith, pers. comm.).

Conversion and degradation of natural wetlands impacts a variety of wetland-dependent species, including several SGCNs, such as White-faced Ibis and American Bittern (*Botaurus lentiginosus*). There are 6 colonies of White-faced Ibis in Idaho. This species requires deep wetland bulrush marshes for breeding and shallowly-flooded habitat for foraging, which includes both natural wetlands and flood-irrigated agricultural fields. Loss of natural wetlands within 20 km of White-faced Ibis breeding colonies threatens the viability of Ibis. American Bittern require large, intact bulrush and cattail marshes for breeding (Lowther et al. 2009). Marshes that have become decadent are not typically suitable for this species, and numbers of bitterns using a marsh that has transitioned to a decadent condition dwindle quickly. In Idaho, this habitat is limited mostly to National Wildlife Refuges and IDFG Wildlife Management Areas. In addition, groundwater extraction resulting in loss of marsh habitat is the greatest threat to Black Terns (*Chlidonias niger*) in Idaho (Heath et al. 2009).

Clark's Cut water control structure at Grays Lake, southeast Idaho © FWS

Prioritized Threats and Strategies for Depressional–Groundwater-Dependent Wetland Complexes

Very High rated threats to Depressional–Groundwater-Dependent Wetland Complexes in the Overthrust Mountains

Changes in precipitation & broad-scale hydrologic regimes

During the 21st century, most projections indicate the Pacific Northwest will become progressively warmer and wetter, although summer drought may worsen. Current projections indicate temperatures in the region will increase 0.1 °C to 0.6 °C per decade through at least 2050, and although warming is expected across all seasons, the largest temperature increases will occur in summer (Kunkel et al. 2013). Given projected temperature increases, much of the western US is expected to transition from a snow-dominated system to one more rain-dominated, spring snowpack is expected to decline, especially at warmer low to mid-elevations, and existing snow is expected to continue melting earlier (Pierce and Cayan 2013), changing hydrologic regimes within this habitat. Less snowpack equates to more drought stress to native plants, and increases conditions for drought-adapted invasive species to establish.

Objective	Strategy	Action(s)	Target SGCNs
Assess potential impacts of drought on wetland-dependent birds.	Conduct wetland connectivity assessment in the West.	Work with PFNTC to develop and implement a connectivity assessment. Consider a landscape conservation design approach to prioritize and identity appropriate actions.	American Bittern Black Tern Long-billed Curlew Trumpeter Swan White-faced Ibis Franklin's Gull Sandhill Crane
Improve landscape resilience.	Manage for diverse, healthy plant communities able to resist stresses including drought and drought mediated impacts such as invasion by nonnative plants and wildfire. Increase capacity for water storage to combat the effects of climate change.	Research options for managing this habitat under forecasted climate models. Work with other agencies, organizations and user groups across the Overthrust Mountains to address climate change impacts across landscapes, and refine land management planning options and alternatives down to local level implementable projects where possible. Engage in microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate-induced stressors. Engage in researching to identifying plants useful for habitat restoration or enhancement from current climate regimes that are forecast to be local future climate regimes. Support efforts to increase public and political awareness of climate change impacts to local landscapes and wildlife	Northern Leopard Frog Western Toad American Bittern Black Tern Long-billed Curlew Trumpeter Swan White-faced Ibis Franklin's Gull Sandhill Crane

Objective	Strategy	Action(s)	Target SGCNs
		dependent on them. Research options for managing livestock grazing in this habitat under forecasted climate models (i.e., drought conditions). Work with agencies, organizations and livestock operators to use this information to both be pro-active and refine land management planning options and alternatives down to local level implementable projects. Implement livestock drought management alternatives on IDFG-owned lands.	

High rated threats to Depressional–Groundwater-Dependent Wetland Complexes in the Overthrust Mountains

Livestock grazing management that is inconsistent with Depressional–Groundwater-Dependent Wetland Complexes management and restoration objectives

Habitat management at Grays Lake focuses on measures to benefit cranes and waterfowl. Vegetation is manipulated by hay cutting, cattle grazing, and controlled burns, creating feeding and nesting sites for a variety of bird species. In addition, diversion from springs for livestock water affects adjacent habitats.

Objective	Strategy	Action(s)	Target SGCNs
Livestock grazing management that is consistent with Depressional–Groundwater-Dependent Wetland Complexes management and restoration objectives.	Limit timing of grazing activities to avoid habitat degradation and trampling nests.	Time grazing activities to avoid critical nesting periods. Enforce timing restriction.	Northern Leopard Frog Western Toad Black Tern Long-billed Curlew Trumpeter Swan Sandhill Crane
	Limit intensity of grazing activities to avoid habitat degradation.	Wetland habitats should be lightly- to moderately-grazed at most and carefully monitored for appropriate use. Exclude livestock from areas that are degraded. Exclude livestock use from areas where improvement projects have occurred until the objectives of the project have been met. On state and federally-managed lands or other areas where grazing plans exist, ensure utilization criteria are not exceeded. As soon as utilization levels are met, livestock should be moved to other areas (other pastures, etc.).	Northern Leopard Frog Western Toad Black Tern Long-billed Curlew Trumpeter Swan Sandhill Crane

Objective	Strategy	Action(s)	Target SGCNs
		Ensure that AUMs track with declining forage abundance.	
	Limit duration of grazing activities to avoid habitat degradation.	Grazing pressure relief should not be based on length of time but rather on habitat condition.	Northern Leopard Frog Western Toad Black Tern Long-billed Curlew Trumpeter Swan Sandhill Crane

Water management altering hydrograph

In the Overthrust Mountains Section, hydrograph as well as flow direction of Grays Lake has been altered, resulting in a loss of flow into the Willow Creek System. Hydrologic modification to Grays Lake began when Clark's Cut was completed to drain the basin to the south in 1924 and the natural north outlet blocked by a water control structure. The current water drawdown schedule requires rapid drawdown of water from May 10 to June 24 each year. This annual spring drainage and drawdown removes all but 0.5 ft of water and compels this water level to be maintained through the summer and early fall. The unnatural hydroperiod causes this large montane wetland basin to go dry in many years. Impassable culverts and dewatering for irrigation has resulted in a loss of connectivity between wetland systems. In recent years, predation at nesting colonies has become a significant concern in some locations for White-faced Ibis and Franklin's Gull (*Leucophaeus pipixcan*). For some species, increased predation is directly related to low water levels. IDFG staff has documented concerning White-faced Ibis and Franklin's Gull predation at Oxford Slough WPA during ibis banding activities. US Fish and Wildlife Service (FWS) unsuccessfully attempted to determine the predator, using remote cameras in subsequent years. The predator(s) and reason for their sudden interest in, and access to, the colony remain unknown.

Water supply, management, and allocation in the West are dominant themes for waterbird conservation. Although these themes have innumerable aspects, the PFNTC and their partners, including the Intermountain West Joint Venture, identified an assessment of wetland connectivity across the Pacific Flyway as an important first step (Pacific Flyway Council 2015).

Objective	Strategy	Action(s)	Target SGCNs
Maintain/restore natural wetlands in the proper functioning condition.	Work with private landowners and land managers to identify opportunities for increasing the availability of suitable natural wetlands for foraging White-faced Ibis.	Work with partners, such as Ducks Unlimited, to identify areas within 20 km of the colonies that were historically classified as natural wetlands and have hydrologic potential for restoration. Work with Land Trusts to determine opportunities for restoration on private lands with high hydrologic potential for restoration.	Northern Leopard Frog Western Toad American Bittern Black Tern Long-billed Curlew Trumpeter Swan White-faced Ibis Franklin's Gull Sandhill Crane
Increase breeding habitat	Manage key wetlands to	Work with land managers, such as FWS, to develop wetland management actions	American Bittern

Objective	Strategy	Action(s)	Target SGCNs
availability for American Bittern.	benefit this species.	that would benefit this species. Conduct targeted surveys on managed lands to determine if actions taken are having the intended impact.	
Determine source and level of predation within the waterbird colony at Oxford Slough WPA.	Conduct research at Oxford Slough to determine if observed predation on White-faced Ibis and Franklin's Gulls within the colony is limiting this population.	Work with FWS to develop predation assessment project on the WPA.	White-faced Ibis Franklin's Gull
Increase breeding habitat availability for Black Terns.	Restore and protect key marsh habitats, particularly in northern Idaho.	Assess status of recently suitable habitat, and explore opportunities for restoring and protecting these habitats.	Black Tern

Conversion from flood-irrigated habitat to center-pivot irrigation

Over the past two decades, there has been an alarming trend in water use conversion. Since 1995, flood irrigated habitats (FIHs) in the Intermountain West have declined by 23% (123,000 acres/year) while sprinkler irrigated acres have increased correspondingly. This conversion may reflect the direct, unidirectional loss of potential wetland habitat for wildlife. Sixteen percent of those FIHs have been converted to center-pivot sprinkler irrigation. Sprinkler irrigation techniques dramatically reduce the amount of standing or flowing surface water on fields making them less attractive as foraging habitat for wetland birds. Aside from the direct loss of habitat to birds and other wildlife, this trend may have negative implications for watershed resiliency affecting fisheries, flood-plain fragmentation, and tolerance of climatic variability. Throughout the West, the conversion to sprinkler irrigation has been incentivized through federal programs, including the USDA Farm Bill programs, for perceived water use efficiencies. However, studies have indicated that incentivizing sprinkler conversion may not provide the intended or perceived water savings, economic return, or environmental benefits. Typically sprinkler irrigation originates as a groundwater withdrawal with virtually no groundwater return or input, while flood-irrigation imparts surface withdrawal resulting in a groundwater input. The latter is more representative of historical floodplain hydrologic processes. The loss of FIHs is of particular concern within 20 km of White-faced Ibis breeding colonies, as it threatens the viability of Ibis in Idaho (C. Colson, pers. comm).

Objective	Strategy	Action(s)	Target SGCNs
Maintain flood-irrigated habitats within 20 km of White-faced Ibis breeding colonies.	Work with the NRCS on incentives to maintain flood agriculture.	Work with NRCS to develop and/or promote flood irrigation initiatives through the Regional Conservation Partnership Program. Work with NRCS to develop a flood irrigation enhancement for the Conservation Stewardship Program.	White-faced Ibis Sandhill Crane Franklin's Gull Long-Billed Curlew

Objective	Strategy	Action(s)	Target SGCNs
		Work with Ducks Unlimited and other NGOs to conduct habitat projects that encourage retention of flood-irrigation habitat. Use Habitat Improvement Program (HIP) funding to leverage funds to encourage retention of flood-irrigated habitat. Work with US Fish and Wildlife Service to determine if Partners for Wildlife funding may be used to help private landowners wanting to provide flood irrigated lands for wildlife.	
Determine acreage of flood irrigated habitat needed to sustain healthy breeding populations of white-faced ibis and other wetland-dependent species.	Work with partners to develop a west-wide assessment of flood-irrigation needs for wildlife.	Work with Pacific Flyway Nongame Technical Committee and Western Working Group of Partners in Flight to develop and implement assessment.	White-faced Ibis Franklin's Gull

Species designation, planning & monitoring

Multiple species identified as SGCN are declining as a result of unknown causes. The priority for many of these species in the coming years is to identify what is/are the root cause(s) of their apparent decline, and develop a strategy for addressing it.

Objective	Strategy	Action(s)	Target SGCNs
Reduce potential impacts of power lines.	Improve distribution of markers on power lines where strikes occur.	Work with Idaho Power and other entities to install markers in problematic areas on existing lines or in potentially problematic areas of new developments.	Trumpeter Swan
Determine current distribution and abundance of American Bitterns.	Participate in coordinated monitoring. Identify hot spots for conservation.	Conduct repeat surveys of effort initiated in early 2000s to determine where species distribution and density has changed.	American Bittern

Target: Bat Assemblage

Declines in bat populations at both continental and local levels have led to concern about the future of migratory and resident bats in Idaho (Ellison et al. 2003). Insectivorous bats are difficult to study because of their small size and nocturnal, volant behavior, making conservation and management of bats more challenging than many other mammals (Kunz and Racey 1998). In addition, bats are vulnerable to rapid declines in abundance because of their low reproductive rates and specialized behaviors (O'Shea and Bogan 2003). Reasons for declines are many: habitat loss, modification, and fragmentation; roost site disturbances; wind turbine-caused mortality; pesticides; and emerging pathogens have all been implicated (Kunz et al. 2007, Baerwald et al. 2008). Declines in abundance of bats could have far-reaching consequences, as bats help to maintain functional ecosystems (Kunz et al. 2011) and provide economic benefits to Idaho's agricultural industry (e.g., pest insect control) in excess of $300 million (Boyles et al. 2011).

Western Small-footed Myotis in Niter Ice Cave, southeast Idaho © David Kampwerth

There are at least 45 species of bats that occur in North America, and 14 insectivorous species have been documented in Idaho (O'Shea and Bogan 2003). Five species of bats have been designated as SGCN. Tier 2 species include Hoary and Silver-haired Bat, and Tier 3 species include Little Brown Myotis (*Myotis lucifugus*), Western Small-footed Myotis (*M. ciliolabrum*), and Townsend's Big-eared Bat (*Corynorhinus townsendii*). All five SGCN bats occur in the Overthrust Mountains Section.

There is an abundance of roosting habitat for bats in the Overthrust Mountains including abandoned mines, caves, forests, and anthropogenic roosts. Minnetonka Cave occurs in this section. Minnetonka Cave is Idaho's largest and most popular show cave, with >33,000 tourists visiting each summer. Species found within the cave include those that are potentially the most vulnerable to white-nose syndrome (WNS). This site is a hibernaculum for SGCNs such as Little Brown Myotis, Western Small-footed Myotis and Townsend's Big-eared Bat.

Target Viability

Fair to *Good.* The main concerns to bat conservation in the Overthrust Mountains include introduction of WNS, fatality associated with wind energy facilities, Abandoned Mine Land closures, and roost disturbance. Adjacent Sections to Overthrust Mountains have multiple wind energy facilities that have been shown to cause direct mortality of Silver-haired and Hoary Bat. Because of the volume of out-of-state tourists, Minnetonka Cave is a potential introduction site for WNS in Idaho. Although measures are employed to reduce the risk of spreading WNS fungus at Minnetonka Cave, this site remains a high priority for WNS surveillance.

Prioritized Threats and Strategies for Bat Assemblage

Very High rated threats to Bat Assemblage in the Overthrust Mountains

White-nose syndrome

The most recent emerging threat to species of bats in Idaho is WNS, a disease that is causing significant declines in abundance of bats that hibernate in caves and abandoned mines in the eastern United States and Canadian provinces. WNS is caused by a conspicuous white fungus, *Pseudogymnoascus* (formerly *Geomyces*) *destructans* (*Pd*), which invades and erodes skin tissue, causing hibernating bats to arouse more frequently and prematurely deplete fat reserves, resulting in nearly 100% mortality of infected individuals (Cryan et al. 2010). WNS and/or the presence of *Pd* has been confirmed in 29 states and 5 Canadian provinces and will likely continue spreading to other areas in North America in the near future. Species of bats in Idaho that could be most affected by this disease include Little Brown Myotis (Tier 3 SGCN), Western Small-footed Myotis (Tier 3 SGCN), Long-eared Myotis (*Myotis evotis*), Big Brown Bat (*Eptesicus fuscus*), Canyon Bat (*Parastrellus hesperus*), and Townsend's Big-eared Bat (Tier 3 SGCN); however, all species that hibernate in the state are considered vulnerable to WNS.

Townsend's Big-eared Bats in Niter Ice Cave, southeast Idaho © David Kampwerth

Objective	Strategy	Action(s)	Target SGCNs
A standard method for addressing conservation of bats in the face of westward spread of WNS.	Develop strategic plan for WNS in Idaho.	Work with partners and stakeholders to develop a statewide strategic plan for WNS, including protocols for surveillance and response to the introduction of the disease in Idaho.	Little Brown Myotis Western Small-footed Myotis Townsend's Big-eared Bat
Gather baseline data on presence and relative abundance of bats in Idaho before WNS enters the state.	Survey and monitor bat populations in Idaho.	Conduct hibernacula surveys every 2 years at known hibernacula to monitor population trends. Conduct noninvasive counts at known maternity colonies. Conduct standard, repeatable surveys across the landscape to monitor trends in activity and to locate previously unknown maternity colonies/important habitats for bats.	Little Brown Myotis Western Small-footed Myotis Townsend's Big-eared Bat
Minimize the risk of WNS spreading to Idaho bats to	Follow established national protocols (FWS	Use of clothing, footwear, and gear that was previously used in a confirmed or suspected WNS-affected state or region is prohibited in Idaho.	Little Brown Myotis Western Small-footed Myotis

Objective	Strategy	Action(s)	Target SGCNs
the greatest extent possible.	2012).	Appropriate decontamination of clothing, footwear, and gear is required prior to entry and after exit of any Idaho cave or mine. Choose caving gear that can be effectively decontaminated; if gear cannot be effectively decontaminated, dedicate that gear to a specific site.	Townsend's Big-eared Bat
	Educate the public on the importance of bats and the threat of WNS.	Disseminate educational materials to partners, stakeholders, media, and interested public. Participate in educational presentations on bats, WNS, and clean caving. Develop relationships with local caving grottos to encourage involvement in WNS surveillance, bat counts, educational programs, etc.	Little Brown Myotis Western Small-footed Myotis Townsend's Big-eared Bat Hoary Bat Silver-haired Bat
Early detection of *Pd* and WNS.	Follow national protocols for targeted WNS surveillance (USGS 2015).	Prioritize sites for WNS surveillance program. Collect swab samples from bats at priority hibernacula for *Pd* testing. Collect samples from substrates within priority hibernacula for *Pd* testing. Report and investigate suspicious mortality of ≥10 bats; collect dead and/or dying bats to submit for *Pd* testing.	Little Brown Myotis Western Small-footed Myotis Townsend's Big-eared Bat

High rated threats to Bat Assemblage in the Overthrust Mountains

Wind energy development

Wind energy development is expanding rapidly across the western US, and research has documented alarming mortality of bats at these facilities (Arnett et al. 2008, Cryan and Barclay 2009, Cryan 2011). Idaho currently rates 17th overall for installed wind capacity, at 973 megawatts (MW; AWEA 2014), a surprising 30% increase from 2012. The potential exists for additional development of wind energy in Idaho, which could negatively affect bats that use these lands. Species of bats in Idaho that are killed at wind energy facilities are predominantly Hoary (Tier 2 SGCN), Silver-haired (Tier 2 SGCN), and Big Brown bats. Because bats are long-lived with low reproductive potential, increased mortality is likely unsustainable and could result in the loss of entire colonies, loss of benefits to the agriculture industry, as well as additional state and/or federal listings. Currently, no continental-scale monitoring programs have been developed to assess bat fatalities at wind energy facilities (Boyles et al. 2011); however, unprecedented numbers of bats have been killed (Cryan and Barclay 2009, Cryan 2011).

Objective	Strategy	Action(s)	Target SGCNs
Develop the best solutions for protecting bats	Cooperation between IDFG and wind energy	Establish a wind energy working group in Idaho between IDFG and wind energy companies and other stakeholders.	Hoary Bat Silver-haired Bat

Objective	Strategy	Action(s)	Target SGCNs
as well as providing alternative forms of energy.	companies.		
Gather baseline data on presence and relative abundance of bats in Idaho.	Survey and monitor bat populations in Idaho.	Conduct standard, repeatable surveys across the landscape to monitor trends in activity and to locate previously unknown maternity colonies/important habitats for bats.	Hoary Bat Silver-haired Bat
Obtain public support for bat conservation.	Educate the public on the importance of bats and the effects of wind energy on bats.	Disseminate educational materials to partners, stakeholders, media, and interested public. Participate in educational presentations on bats and wind energy.	Hoary Bat Silver-haired Bat

Target: Pollinators

Pollinators provide an essential ecosystem service which benefits agricultural producers, agricultural consumers, and gardeners (Mader et al. 2011) in the Overthrust Mountains. Monarchs and five bees (Hunt's Bumble Bee [*Bombus huntii*], Morrison's Bumble Bee [*Bombus morrisoni*], Western Bumble Bee [*Bombus occidentalis*], Suckley's Cuckoo Bumble Bee [*Bombus suckleyi*], A Mason Bee [*Hoplitis producta subgracilis*]) compose the group of 6 SGCN pollinators that are known to occur within this section.

Many pollinators, in particular, bees, are known to be experiencing population declines throughout North America. These declines may be occurring within the Overthrust Mountains as well. Population declines and local die-offs can stem from habitat loss, pesticide exposure, and climate change (Mader et al. 2011). Farmers, habitat managers, roadway authorities, municipalities, and homeowners can all contribute to pollinator conservation in clear and productive ways.

Target Viability

Fair. Many pollinators are declining rangewide. Declines in pollinator populations can be traced to a multitude of causes, such as intensive agricultural practices, use of certain pesticides, and habitat loss and degradation (NRC 2007). Some species such as bumble bees and honey bees have experienced declines as a result of the spread of pathogens and disease from commercially produced colonies to native populations (NRC 2007). Climate change is also expected to provide additional challenges to pollinator populations, ranging from disruption of migratory paths of pollinators such as hummingbirds and bats, to decoupling of plant-pollinator interactions when plants and pollinators respond differently to climate cues.

Prioritized Threats and Strategies for Pollinators

Very High rated threats to Pollinators in the Overthrust Mountains

Pesticides

Pollinators are negatively affected by pesticides through absorption, drinking nectar containing pesticides, and carrying pollen laced with pesticides back to colonies (Mader et al. 2011). Neonicotinoids are particularly harmful to bee populations and can cause dramatic die-offs (Hopwood et al. 2012). Although the most effective pollinator-benefitting strategy is to eliminate pesticide use, significant benefit for pollinators can still be achieved through reducing use of, and pollinator exposure to, pesticides (Mader et al. 2011).

Objective	Strategy	Action(s)	Target SGCNs
Reduce native pollinator exposure to pesticides.	Educate habitat managers, farmers, municipalities, and small property owners in methods to eliminate pesticide use.	Conduct educational activities which encourage potential pesticide applicators to eliminate use of pesticides where practical. Where pesticides must be used, encourage applicators to apply the minimum amount of chemical necessary and apply when pollinators are least active (i.e., nighttime and when flowers are not blooming). Specifically target urban homeowners in educational efforts in the elimination of or proper application of pesticides. Conduct workshops which discuss pesticides in relation to other pollinator habitat management concerns (Mader et al. 2011).	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*)
Reduce native pollinator exposure to pesticides on IDFG administered property.	Implement measures to reduce or eliminate pesticide use on IDFG WMAs and other properties.	Use the minimum recommended amount of pesticide. Apply pesticides at times when pollinators are least active such as nighttime, cool periods, low wind activity, and when flowers are not blooming. Mow or otherwise remove flowering weeds before applying pesticides (Mader et al. 2011).	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*)
Eliminate use of neonicotinoid insecticides.	Education measures on the detrimental effects of neonicotinoids on bees.	Develop and distribute educational material. Distribute to municipalities, counties, agriculture producers, habitat managers, and other property owners. Do not employ the use of neonicotinoids on IDFG administered lands (Hopwood et al. 2012).	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*)

Habitat loss

Pollinators require foraging and nesting habitat. Providing both types of habitat within close proximity to each other is the best way to ensure pollinator success. Protecting, enhancing, and creating pollinator habitat can be a fun and rewarding way to engage with local communities. Educating land managers about techniques to reduce land management impacts to pollinators is an essential component to pollinator habitat management.

Objective	Strategy	Action(s)	Target SGCNs
Reduce impact of land management practices on pollinators.	Educate about and implement practices which benefit pollinators.	Reduce grazing impacts by limiting grazing to one third to one fourth of management areas per season. Implement pollinator beneficial mowing techniques including use of flushing bar, cutting at ≤8 mph, maintaining a high minimum cutting height of ≥12–16 inches, mowing only in daylight hours, mow in a mosaic instead of an entire site. Where prescribed fire is used, implement pollinator-friendly burning protocols including rotational burning of ≤30% of each site every few years, leave small unburned patches intact, avoid burning too frequently (no more than every 5–10 years), avoid high-intensity fires unless the burn goal is tree removal. Work with Idaho Transportation Department to implement proper roadside pollinator habitat management (Mader et al. 2011).	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee *(Hoplitis producta subgracilis)* Monarch
Conserve existing pollinator habitat.		Map existing major known pollinator habitat. Identify and recognize landowners providing pollinator habitat and provide habitat management educational opportunity. Conduct surveys for native milkweed. Initiate seed saving program (Mader et al. 2011).	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee *(Hoplitis producta subgracilis)* Monarch
Create new urban and rural pollinator habitat.	Develop programs to encourage urban landowners to create pollinator habitat.	Provide pollinator habitat workshops for homeowners and rural land owners. Provide other educational materials for homeowners. Provide an incentive program for homeowners to create pollinator habitat in urban yards. Add pollinator habitat to IDFG regional office landscaping across the state. Work with municipalities and businesses to	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee *(Hoplitis producta subgracilis)* Monarch

Objective	Strategy	Action(s)	Target SGCNs
		create urban pollinator habitat. Provide bee nest boxes for purchase at IDFG regional offices.	

High rated threats to Pollinators in the Overthrust Mountains

Species designation, planning & monitoring

Actions to enhance pollinator habitat will be most effective with knowledge of the current status of SGCN populations. Initiation of long-term monitoring will allow a continuous data stream to assess conservation activities.

Objective	Strategy	Action(s)	Target SGCNs
Determine pollinator population status.	Conduct surveys and implement long-term pollinator monitoring program.	Conduct surveys to identify colonies and breeding locations of bee SGCN. Protect known breeding sites.	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee *(Hoplitis producta subgracilis)*
Climate monitoring.	Monitor climate variables and species co-occurrence over time.	Develop climate monitoring program using a variety of microclimate variables along with co-occurrence of associated SGCN.	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*)

Overthrust Mountains Section Team

An initial version of the Overthrust Mountains Section project plan was completed for the 2005 Idaho State Wildlife Action Plan (formerly Comprehensive Wildlife Conservation Strategy). A small working group developed an initial draft of the Section Plan (Miradi v. 0.31), which was then reviewed by a wider group of partners and stakeholders during a 2-day workshop held at the Idaho Department of Fish and Game Southeast Regional Office, Pocatello, Idaho in January 2015 (this input was captured in Miradi v. 0.34). That draft was then subsequently distributed for additional stakeholder input including a half-day meeting in February 2015. Since then, we have continued to work with key internal and external stakeholders to improve upon the plan and develop this document. Individuals, agencies, and organizations involved in this plan are listed in Table 9.3.

Table 9.3 Individuals, agencies, and organizations involved in developing this plan [a]

First name	Last name	Affiliation
Becky	Abel*	Idaho Department of Fish and Game, Southeast Region becky.abel@idfg.idaho.gov | 208 236 1258
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Quinn	Shurtliff	Gonzales–Stoller Surveillance, LLC
Ryan	Hillyard	Idaho Department of Fish and Game, Southeast Region
Martha	Wackenhut	Idaho Department of Fish and Game, Southeast Region
Paul	Wackenhut	Idaho Department of Fish and Game, Southeast Region
Chuck	Peterson	Idaho State University
Ty	Matthews	US Fish and Wildlife Service
Bill	Smith	US Fish and Wildlife Service
Sandi	Fisher	US Fish and Wildlife Service, Eastern Idaho Field Office
Diane	Probasco	US Forest Service Intermountain Region (R4), Palisades–Teton Basin Ranger Districts

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

10. Palouse Prairie Section

Section Description

The Palouse Prairie Section, part of the Columbia Plateau Ecoregion, is located along the western border of northern Idaho, extending west into Washington (Fig. 10.1, Fig. 10.2). This section is characterized by dissected loess-covered basalt plains, undulating plateaus, and river breaks. Elevation ranges from 220 to 1,700 m (722 to 5,577 ft). Soils are generally deep, loamy to silty, and have formed in loess, alluvium, or glacial outwash. The lower reaches and confluence of the Snake and Clearwater rivers are major waterbodies. Climate is maritime influenced. Precipitation ranges from 25 to 76 cm (10 to 30 in) annually, falling primarily during the fall, winter, and spring, and winter precipitation falls mostly as snow. Summers are relatively dry. Average annual temperature ranges from 7 to 12 °C (45 to 54 °F). The growing season varies with elevation and lasts 100 to 170 days.

Palouse Prairie grassland remnant on Gormsen Butte, south of Moscow, Idaho with cropland surrounding © 2008 Janice Hill

Population centers within the Idaho portion of the section are Lewiston and Moscow, and small agricultural communities are dispersed throughout. Outdoor recreational opportunities include hunting, angling, hiking, biking, and wildlife viewing. The largest Idaho Department of Fish and Game (IDFG) Wildlife Management Area (WMA) in Idaho, Craig Mountain WMA, is partially located within this section.

The deep and highly-productive soils of the Palouse Prairie have made dryland farming the primary land use in this section. Approximately 44% of the land is used for agriculture with most farming operations occurring on private land. The majority (83%) of the land in the Palouse Prairie is in private ownership. In addition, timber harvest has been another important land use, and private and corporate timber companies are responsible for most of the logging operations within this section.

The rural rolling hills of farmland dominate the Palouse Prairie Section. Scattered among the farmland lie patches of some of the last remaining Palouse Prairie grasslands in the world. Palouse Prairie grasslands are characterized by a mixture of perennial bunchgrasses, forbs, and low shrubs with a particularly high cover and diversity of forbs. Forb cover is commonly higher than grass cover. Dominant native bunchgrasses include Idaho fescue (*Festuca idahoensis*

Elmer), bluebunch wheatgrass (*Pseudoroegneria spicata* [Pursh] Á. Löve), and prairie Junegrass (*Koeleria macrantha* [Ledeb.] Schult.). However, nonnative species have spread to many of the remaining Palouse Prairie grasslands. These include such aggressive weeds as North Africa grass (syn. ventenata; *Ventenata dubia* [Leers] Coss.), tall oatgrass (*Arrhenatherum elatius* [L.] P. Beauv. ex J. Presl & C. Presl), and rush skeletonweed (*Chondrilla juncea* L.). Palouse Prairie grasslands are home to such grassland-reliant species as the Giant Palouse Earthworm (*Driloleirus americanus*), Short-eared Owl (*Asio flammeus*), and Common Nighthawk (*Chordeiles minor*). Since many of these Palouse Prairie grassland remnants are small remnants in a fragmented landscape, and privately owned, management and conservation of these remnants remains a challenge. Accordingly, landowners seeking out technical support and/or financial assistance for voluntary conservation efforts should contact local jurisdictions (e.g., Soil and Water Conservation Districts [Conservation Districts], county agencies) and state (e.g., IDFG, Idaho Department of Lands [IDL]) and federal (US Fish and Wildlife Service [FWS], Natural Resources Conservation Service [US] [NRCS], and USDA Farm Service Agency [FSA]) agencies for assistance.

Below the undulating topography of the Palouse, tributaries to the Clearwater River have cut steep gorges into the plateau. Slopes support the same bunchgrasses and the vegetation in general is similar to that of the Palouse Prairie grasslands, however slopes are steeper, soils shallower and often more well drained, and aspects more severe. These grasslands have traditionally been considered "canyon grasslands." Deciduous shrublands occur on many north facing canyon slopes. Along streams and rivers, canyon grasslands extend beyond the riparian areas often transitioning into mixed-conifer forest as elevation increases. The treeless terrain of canyon grasslands provides important wildlife habitat for species such as Short-eared Owl and Common Nighthawk. Soils in the canyon grasslands are shallower than the deep loessial soils found in Palouse Prairie grasslands. Canyon grasslands are also drier than the Palouse Prairie grasslands. Much of the canyon grasslands in this section are grazed by livestock as most are privately owned. Some canyon grasslands remain intact and in good condition, but much of this habitat has been invaded by nonnative plants such as cheatgrass (*Bromus tectorum* L.) and yellow star-thistle (*Centaurea solstitialis* L.).

Currently, forests within the Palouse Prairie Section are a mixture of conifer species and are mostly dominated by Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) and grand fir (*Abies grandis* [Douglas ex D. Don] Lindl.). Western white pine (*Pinus monticola*) was historically more common but blister rust, fire suppression, and timber harvest have vastly reduced the distribution of this species. Ponderosa pine (*Pinus ponderosa*) was also likely more abundant in these forests prior to fire suppression and timber harvesting. Several wildlife species are reliant on this habitat including Fisher (*Pekania pennanti*) and many bird species such as Great Gray Owl (*Strix nebulosa*), Lewis's Woodpecker (*Melanerpes lewis*), White-headed Woodpecker (*Picoides albolarvatus*), and Olive-sided Flycatcher (*Contopus cooperi*).

Similar to Palouse Prairie grasslands, the development of agricultural lands has altered much of the wetland and riverine habitat within the Palouse Prairie Section. Historically, seasonally moist or wet meadows were widespread in the Palouse, occurring in valleys and on flats (Servheen et al. 2002). Meadows were dominated by sedges (e.g. *Carex* L.), tufted hairgrass (*Deschampsia cespitosa* (L.) P. Beauv.), and culturally important small camas (*Camassia quamash* (Pursh)

Greene). Many wetlands, meadows, and riparian areas have been drained and converted to cropland, and as a result the water table has dropped allowing reed canarygrass (*Phalaris arundinacea* L.) or other nonnative species to invade these habitats (Servheen et al. 2002). Relict camas meadows remain near Weippe and Grangeville and sedge meadows occur in forested montane settings. Currently, livestock water reservoirs and farm ponds are the most common Depressional Wetlands present. The remaining aquatic and wetland habitats are important to many terrestrial and aquatic species. Western Toad (*Anaxyrus boreas*) and Great Gray Owl depend on wetland habitats. Several anadromous fish including Pacific Lamprey (*Entosphenus tridentatus*), Steelhead (*Oncorhynchus mykiss*), and Chinook Salmon (*O. tshawytscha*) inhabit the rivers and streams within the Clearwater Basin. There are many other fish and wildlife species that use riparian areas and wetlands since resources such as water, food, and cover are primarily available in these habitats.

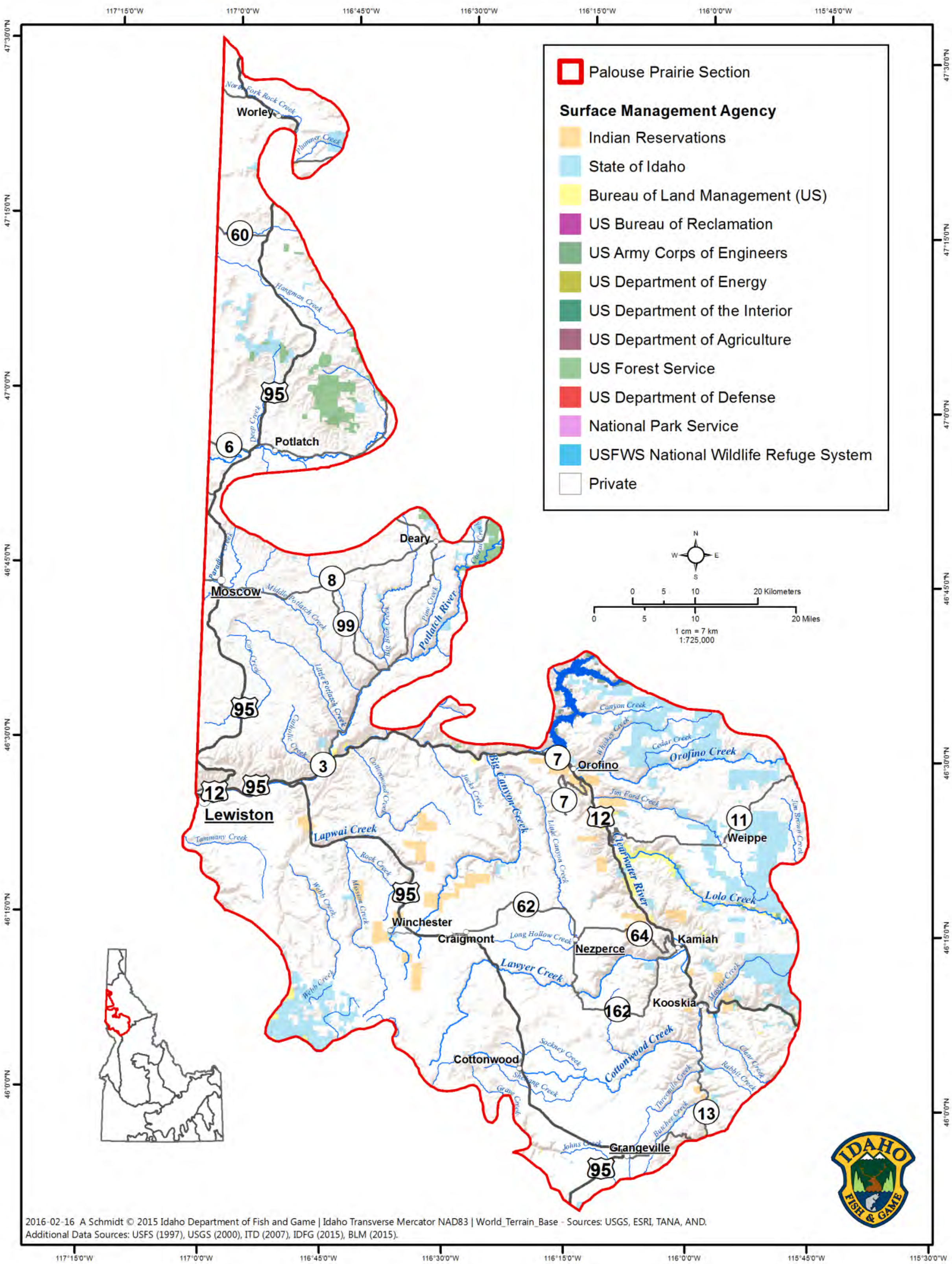


Fig. 10.1 Map of Palouse Prairie surface management

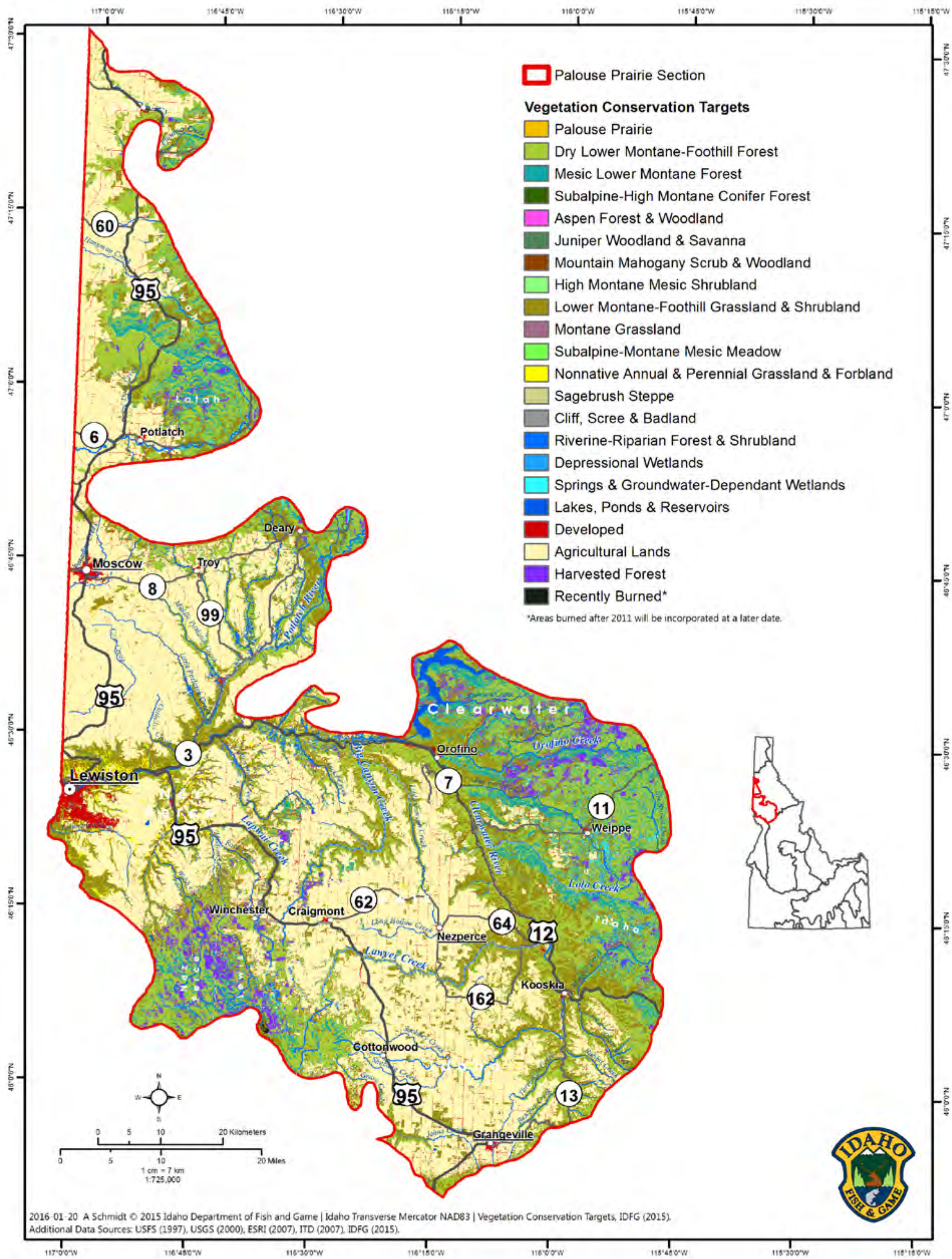


Fig. 10.2 Map of Palouse Prairie vegetation conservation targets

Conservation Targets in the Palouse Prairie

We selected 7 habitat targets (4 upland, 3 aquatic) that represent the major ecosystems in the Palouse Prairie as shown in Table 10.1. Each of these systems provides habitat for key species of greatest conservation need (SGCN), i.e., "nested targets" (Table 10.2) associated with each target. All SGCN management programs in the Palouse Prairie have a nexus with habitat management programs. We provide a high-level summary of current viability status for each target. Conservation of the habitat targets listed below should conserve most of the nested species within them.

Table 10.1 At-a-glance table of conservation targets in the Palouse Prairie

Target	Target description	Target viability	Nested targets (SGCN)	
Dry Lower Montane–Foothill Forest	Mostly dominated by Douglas-fir and ponderosa pine. Adjoins canyon grasslands, Palouse Prairie Grasslands, Mesic Lower Montane Forest, or the boundary of the Bitterroot Mountains Section.	*Poor* to *Good.* Variable condition depending on past management and landownership. Largely modified and fragmented by timber harvest, roads, fire suppression, shorter timber rotations reducing abundance of late-seral forests, snags, and coarse woody debris.	*Tier 2*	Lewis's Woodpecker Fisher
			Tier 3	Great Gray Owl Olive-sided Flycatcher White-headed Woodpecker Spur-throated Grasshopper (*Melanoplus*) Species Group
Mesic Lower Montane Forest	Mixed conifer forest dominated by grand fir and western red cedar. Typically occurs on north aspects and borders Dry Lower Montane–Foothill Forest and riparian areas.	*Poor* to *Good.* Variable condition depending on past management and landownership. Largely modified and fragmented by timber harvest, roads, fire suppression, shorter timber rotations reducing abundance of late-seral forests, snags coarse woody debris, and loss of western white pine.	*Tier 2*	Fisher
			Tier 3	Great Gray Owl Olive-sided Flycatcher
Lower Montane–Foothill Grassland & Shrubland	Occurring within river breaks and steep canyons. Characterized by a mixture of bunchgrasses and forbs with shrubs scattered throughout. Floristically similar to Palouse Prairie Grasslands but are generally warmer and drier and have shallower soils.	*Fair.* Invasive weeds and improper grazing have degraded the habitat.	*Tier 1*	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Mission Creek Oregonian
			Tier 3	Short-eared Owl Grasshopper Sparrow Common Nighthawk A Miner Bee (*Perdita salicis euxantha*) A Miner Bee (*Andrena aculeata*) Hunt's Bumble Bee Monarch Yellow Bumble Bee
Palouse Prairie	Usually found on	*Very Poor.* Various	*Tier 1*	Morrison's Bumble Bee

Target	Target description	Target viability	Nested targets (SGCN)	
Grasslands	uncultivated ridges surrounded by cropland. Comprised of a mixture of perennial bunchgrasses, forbs, and low shrubs. The north slopes tend to have higher forb diversity, and south slopes tend to have a higher cover of nonnative plants.	assessments suggest that the vast majority (>99%) has been fragmented and converted to arable lands, dominated by nonnative invasive plant species. Remnant patches are small and isolated, making it one of the most imperiled habitat types in the US.	 *Tier 2* *Tier 3*	Western Bumble Bee Suckley's Cuckoo Bumble Bee Giant Palouse Earthworm Short-eared Owl Common Nighthawk Grasshopper Sparrow A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Yellow Bumble Bee Hunt's Bumble Bee Monarch
Depressional Wetlands	Depressional Wetlands occur in depressions and old stream meander scars with closed topographic contours. Includes wetlands associated with agricultural land uses.	*Very Poor*. Many have been lost to agricultural conversion. Others have been created where associated with livestock water reservoirs and farm ponds.	*Tier 2*	Western Toad
Springs & Groundwater-Dependent Wetlands	Includes most wet meadows and groundwater fed wetlands that have a downhill drainage point.	*Very Poor*. Many have been lost to agricultural conversion. Remaining meadows are often degraded by invasive species and improper livestock grazing.	*Tier 2*	Western Toad
Riverine–Riparian Forest & Shrubland	Rivers and streams, including aquatic habitats and their associated terrestrial riparian habitats. Includes the Clearwater, Potlatch, and Palouse River systems.	*Poor*. Many have been heavily altered to accommodate anthropogenic uses including but not limited to human development and agricultural production. Water quality and hydrologic processes are often impaired due to human land uses in the watershed.	*Tier 1* *Tier 2* *Tier 3*	Pacific Lamprey Steelhead (Snake River Basin DPS) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad Western Pearlshell Nez Perce Pebblesnail A Mayfly (*Paraleptophlebia traverae*) A Mayfly (*Paraleptophlebia falcula*) A Mayfly (*Parameletus columbiae*) Cascades Needle Fly Idaho Snowfly Palouse Snowfly Straight Snowfly Umatilla Willowfly

Table 10.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Palouse Prairie

Taxon	Conservation targets: Dry Lower Montane–Foothill Forest	Mesic Lower Montane Forest	Lower Montane–Foothill Grassland & Shrubland	Palouse Prairie Grasslands	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Riverine–Riparian Forest & Shrubland
LAMPREYS							
Pacific Lamprey (*Entosphenus tridentatus*)[1]							X
RAY-FINNED FISHES							
Steelhead (Snake River Basin DPS) (*Oncorhynchus mykiss*)[1]							X
Chinook Salmon (Snake River fall-run ESU) (*Oncorhynchus tshawytscha*)[1]							X
Chinook Salmon (Snake River spring/summer-run ESU) (*Oncorhynchus tshawytscha*)[1]							X
AMPHIBIANS							
Western Toad (*Anaxyrus boreas*)[2]					X	X	X
BIRDS							
Great Gray Owl (*Strix nebulosa*)[3]	X	X				X	
Short-eared Owl (*Asio flammeus*)[3]			X	X			
Common Nighthawk (*Chordeiles minor*)[3]			X	X			
Lewis's Woodpecker (*Melanerpes lewis*)[2]	X						
White-headed Woodpecker (*Picoides albolarvatus*)[3]	X						
Olive-sided Flycatcher (*Contopus cooperi*)[3]	X	X					
Grasshopper Sparrow (*Ammodramus savannarum*)[3]			X	X			
MAMMALS							
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]							
Silver-haired Bat (*Lasionycteris noctivagans*)[2]							
Hoary Bat (*Lasiurus cinereus*)[2]							
Little Brown Myotis (*Myotis lucifugus*)[3]							
Fisher (*Pekania pennanti*)[2]	X	X					
BIVALVES							
Western Pearlshell (*Margaritifera falcata*)[2]							X
GASTROPODS							
Nez Perce Pebblesnail (*Fluminicola gustafsoni*)[3]							X
Mission Creek Oregonian (*Cryptomastix magnidentata*)[1]			X				
INSECTS							
A Mayfly (*Paraleptophlebia falcula*)[3]							X

Taxon	Conservation targets						
	Dry Lower Montane–Foothill Forest	Mesic Lower Montane Forest	Lower Montane–Foothill Grassland & Shrubland	Palouse Prairie Grasslands	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Riverine–Riparian Forest & Shrubland
A Mayfly (*Paraleptophlebia traverae*)[3]							X
A Mayfly (*Parameletus columbiae*)[3]							X
A Miner Bee (*Andrena aculeata*)[3]			X	X			
A Miner Bee (*Perdita salicis euxantha*)[3]			X	X			
Yellow Bumble Bee (*Bombus fervidus*)[3]			X	X			
Hunt's Bumble Bee (*Bombus huntii*)[3]			X	X			
Morrison's Bumble Bee (*Bombus morrisoni*)[1]			X	X			
Western Bumble Bee (*Bombus occidentalis*)[1]			X	X			
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]			X	X			
Monarch (*Danaus plexippus*)[3]			X	X			
Spur-throated Grasshopper (*Melanoplus*) Species Group[3]	X						
Straight Snowfly (*Capnia lineata*)[3]							X
Idaho Snowfly (*Capnia zukeli*)[3]							X
Palouse Snowfly (*Isocapnia palousa*)[3]							X
Cascades Needlefly (*Megaleuctra kincaidi*)[3]							X
Umatilla Willowfly (*Taenionema umatilla*)[3]							X
WORMS							
Giant Palouse Earthworm (*Driloleirus americanus*)[2]				X			

Target: Dry Lower Montane–Foothill Forest

Dry Lower Montane–Foothill Forest accounts for 22% of the land cover in this section. These forests are currently dominated by Douglas-fir with grand fir occurring in moist microsites. Ponderosa pine was also likely more abundant in these forests prior to fire suppression and timber harvesting. In places where canyon grasslands do not border on Palouse Prairie grasslands, they are bordered by these forests as elevation increases. These dry forests may also adjoin mesic forests and Palouse Prairie grasslands on ridges surrounded by cropland and often occur as inclusions within the grasslands. The boundary of the Palouse Prairie Section is occupied by these forests as they adjoin the Bitterroot Mountains Section. Forest habitat in this section is predominantly privately owned, but some areas are publicly owned. A portion of these forests is managed by the Nez Perce–Clearwater National Forests, Palouse Ranger District. McCroskey

State Park, managed by the Idaho Department of Parks and Recreation, contains some of this forest type. Stands at higher elevations on Craig Mountain WMA are publicly owned and managed by the IDFG. Several corporate and private timber companies, such as Potlatch Corporation and Bennett Lumber Products, Inc., own large portions of forests in this section.

Target Viability

Poor to *Good.* Dry forests of the Palouse Prairie have been largely modified by forest management practices. Timber harvest and fire suppression acitivities have contributed to the reduction of ponderosa pine and have changed the composition of the forests, making them less diverse, more dominated by shade tolerant species, and more prone to stand-replacing wildfire. More specifically, timber harvest practices, such as shorter timber rotations, larger cut units, and reseeding with different species have reduced the abundance of late-seral ponderosa pine forest, snags, and coarse woody debris; in addition, these practices have also fragmented the landscape and altered forest species composition. These changes likely affect at-risk species that live in this habitat type, including Great Gray Owl, Lewis's Woodpecker, White-headed Woodpecker, and Fisher. Condition of these forests vary from poor to good, dependent on past management and landownership. In general, forests that have been largely modified and fragmented by timber harvest, fire suppression, and road development are in poor to fair condition.

Prioritized Threats and Strategies for Dry Lower Montane–Foothill Forest

Very High rated threats to Dry Lower Montane–Foothill Forest in the Palouse Prairie

Altered fire regimes (decreased frequency of low intensity fire & increased severity of wildfire)

Fires throughout the West are now more severe than historically. In dry mixed-conifer forests, decades of fire suppression have resulted in an increase in fuel loading, shifts in species composition toward shade tolerant species less resistent to fire, and increases in fire severity. Many legacy stands of ponderosa pine are at risk of being lost to fire. Because of fire suppression, these stands often have an understory of Douglas-fir, grand fir, or lodgepole pine (*Pinus contorta*), which serve as ladder fuels when fire does occur, making them more severe.

Objective	Strategy	Action(s)	Target SGCNs
Reintroduce frequent, low-intensity fire to the landscape.	Reduce fuel loading and increase fuel continuity.	Use various thinning techniques and/or slashing to broaden the burn window. Use dry season prescribed fire to replicate the effects of natural fires pattern, resulting in shrub rejuvenation and recruitment of new shrubs from seed bank.	Great Gray Owl Lewis's Woodpecker White-headed Woodpecker Olive-sided Flycatcher Fisher
Trend the landscape toward its historic natural	Allow natural fires to burn.	Use a combination of mechanical treatments and prescribed fire to redistribute age classes.	Great Gray Owl Lewis's Woodpecker White-headed

Objective	Strategy	Action(s)	Target SGCNs
range of variability.	Use timber harvest and prescribed burns to create desired fuel conditions across larger landscapes.	Work with Conservation Districts, NRCS, IDL, and other federal, state, and local agencies to develop forest management plans.	Woodpecker Olive-sided Flycatcher Fisher

High rated threats to Dry Lower Montane–Foothill Forest in the Palouse Prairie

Timber harvest management

Much of this forest type within the Palouse Prairie is managed in such a way that trends the landscape away from the natural range of varitability in terms of age structure, patch size, and species composition. These forests are fragmented by high road densities and varying land ownership and accompanying management. Many are on short rotations, and there is often little incentive to restore an appropriate species composition and to restore long-lived seral species such as ponderosa pine.

Objective	Strategy	Action(s)	Target SGCNs
Reestablish appropriate tree species distribution and composition.	Where appropriate, use timber harvest to target shade-tolerant species. Protect legacy seral trees. Restore long-lived, early seral, fire-dependent tree species to the landscape.	Use thinning and selective harvest techniques to restructure forest species community to historically-present species. Inventory legacy stands of seral tree species Take proactive steps to protect legacy stands from uncharacteristic wildfire. Activities may include removal of second-growth shade-tolerant subcanopy, fuel reduction, slashing, thinning, prescribed fire, etc. After timber harvest or stand-replacing fire, and on appropriate sites, restock with early long-lived seral species (e.g., ponderosa pine). Encourage appropriate re-entry interval for forest treatments.	Great Gray Owl Lewis's Woodpecker White-headed Woodpecker Olive-sided Flycatcher Fisher
Trend age class and patch size toward Natural Range of Variability.	Manage timber on a landscape level. Move forest fragmentation pattern toward Natural Range of Variability.	Use management activities (e.g., harvest and prescribed fire) to move the landscape toward its natural range of variability in terms of patch size and distribution. Consider age and patch size in adjacent stands to accomplish this at a landscape level. Work with Conservation Districts, NRCS, IDL, and other federal, state, and local agencies to develop forest management plans. Identify and decommission unneeded roads.	Great Gray Owl Lewis's Woodpecker White-headed Woodpecker Olive-sided Flycatcher Fisher

Noxious weeds & invasive plant species

Nonnative, invasive, and noxious plants are a pervasive problem in the Palouse Prairie Section. The highly-modified nature of the landscape allows for many mechanisms of invasion. Many of the dry mixed-conifer forests , especially the forest margins, are threatened with invasion by spotted knapweed (*Centaurea maculosa*), oxeye daisy (*Leucanthemum vulgare*), orange hawkweed (*Pilosella aurantiaca*), and meadow hawkweed (*Hieracium caespitosum*). Portions of these forests with open canopies and forest margins can be invaded by Japanese brome (*Bromus japonicus*), ventenata, orchard grass (*Dactylis glomerata*), and tall oatgrass. In general noxious weed and invasive species are most problematic in disturbed, open-canopy sites. These nonnative invasive species simplify habitats, displace native species, as well as decrease forage and nesting resources for wildlife.

Objective	Strategy	Action(s)	Target SGCNs
Limit the spread of existing noxious weed and invasive plant species populations.	Inventory populations, improve record-keeping and coordination among stakeholders.	Implement *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012). Work with County Weed Departments to organize effective weed management programs at the local level. Conduct inventory efforts throughout the area. Coordinate data collection, management and analysis through local working groups. Ensure consistency in data across partners and stakeholders. Implement Early Detection and Rapid Response (EDRR).	Great Gray Owl Olive-sided Flycatcher Spur-throated Grasshopper (*Melanoplus*) Species Group
Restore areas dominated by invasive species.	Implement large-scale activities to remove invasive species.	Coordinate and implement integrated pest management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015).	Great Gray Owl Olive-sided Flycatcher Spur-throated Grasshopper (*Melanoplus*) Species Group
	Revegetate areas dominated by invasive species.	Work with Conservation Districts and other federal, state, and local agencies as well as local experts to assist with revegetation efforts with an emphasis on the use of native plants. Emphasize weed eradication in travel corridors, campgrounds, and on trails to prevent weed spread.	
Increase public awareness on the effects of noxious weeds and invasive plants on wildlife habitat.	Expand education programs that highlight the importance of weed control.	Promote educational programs that highlight the damage invasive plants cause to wildlife and its habitat. Provide information about the risk of weed transport on clothing and vehicles and instruct on how to limit this.	Great Gray Owl Olive-sided Flycatcher

Road density & motorized recreation

Much of this habiat type exists within the front country where road densities are often high. Much of the area is impacted by historic road systems that are no longer needed for management, but often used for motorized recreation. In addition, OHV use in undesignated areas can lead to degradation of forested areas. Such use can increase erosion, user conflicts, spread of invasive species, damage to cultural sites, disturbance to wildlife, and destruction of wildlife habitat. Considered an important issue on state, industrial, and private lands as well as one of the US Forest Service's (FS)' "four threats" (Idaho Forest Action Plan, June 2010, Revised May 2012)—Note: need to create citation.

Objective	Strategy	Action(s)	Target SGCNs
Minimize the effects of roads and motorized recreation on wildlife.	Ensure that wildlife values are incorporated into travel management plans. Increase effectiveness of road closures where they're in place. Reduce road density across landscape.	Participate in FS travel management planning efforts. Continue to work with other state, federal, and private land managers on travel management issues. Work with private landowners to help prevent trespass on their property, especially by unauthorized motorized vehicles. Work with land managers to identify and address problem areas. Recontour first 100 yards of roads to be placed in long-term storage, which prevents unauthorized motorized vehicle access. Physically decommission unneeded roads.	Fisher

Target: Mesic Lower Montane Forest

Moist areas (mainly found on north slopes) adjoining Dry Lower Montane–Foothill Forest are occupied by Mesic Lower Montane Forest which accounts for approximately 5% of the land cover in this section. Mesic forest may also border riparian areas at lower elevations. Grand fir is dominant in the overstory with western redcedar (*Thuja plicata*) and Douglas-fir as frequent associates within the canopy. Western white pine was historically more common, but white pine blister rust (caused by the fungal pathogen *Cronartium ribicola*), fire suppression, and timber harvest have vastly reduced the distribution of this species. Mesic forests are often centuries old due to long fire return intervals with stand-replacing fires occurring every 150 to 500 years and moderate fires every 50 to 100 years (Crawford 2011). Fire suppression has created mixed-aged stands with increased fuel loads that make the forest more susceptible to high-intensity and stand-replacing fires. Insect, disease, windfall, and ice events are also important disturbances in this forest type.

Target Viability

Poor to *Good*. Forest pests and forest management practices have dramatically altered mesic forests of the Palouse Prairie. The most striking change is the near disappearance of western white pine. This tree used to dominate these forests but multiple factors have contributed to its decline. White pine blister rust, fire suppression, and timber harvest have effectively eliminated western white pine from northern Idaho forests. These practices not only reduced western white pine but also changed the composition of the forests, making them less diverse and more susceptible to larger stand-replacing fires. These changes have likely affected at-risk species that live in this habitat type, including Great Gray Owl, Olive-sided Flycatcher, and Fisher. The condition of these forests varies from poor to good, dependent on past management and landownership. In general, forests that have been largely modified and fragmented by timber harvest, fire suppression, and road development are in poor to fair condition. Good-condition western redcedar groves exist but these are rare in the Palouse Prairie Section.

High rated threats to Mesic Lower Montane Forest in the Palouse Prairie

Timber harvest management

Much of this forest type within the Palouse Prairie is managed in such a way that trends the landscape away from the natural range of varitability in terms of age structure, patch size, and species composition. These forests are fragmented by high road densities and varying land ownership and accompanying management. Many are on short rotations, and there is often little incentive to restore an appropriate species composition and to restore long-lived seral species such as western larch and western white pine.

Objective	Strategy	Action(s)	Target SGCNs
Reestablish appropriate tree species distribution and composition.	Where appropriate, use timber harvest to target shade-tolerant species.	Use thinning and selective harvest techniques to restructure forest species community to historically-present species.	Great Gray Owl Olive-sided Flycatcher Fisher
	Protect legacy seral trees.	Inventory legacy stands of seral tree species. Take proactive steps to protect legacy stands from uncharacteristic wildfire. Activities may include removal of second-growth shade-tolerant subcanopy, fuel reduction, slashing, thinning, prescribed fire, etc.	
	Restore long lived, early seral, fire dependent tree species to the landscape.	After timber harvest or stand-replacing fire, and on appropriate sites, restock with early long-lived seral species (e.g., western larch and western white pine) where appropriate. Encourage appropriate re-entry interval for forest treatments.	
Trend age class and patch size toward Natural Range of Variability.	Manage timber on a landscape level.	Use management activities (e.g., harvest and prescribed fire) to move the landscape toward its natural range of variability in terms of patch size and distribution. Consider age and patch size in adjacent stands to accomplish this at a landscape level. Work with Conservation Districts, NRCS, IDL, and other federal, state, and local agencies to develop forest management plans.	Great Gray Owl Olive-sided Flycatcher Fisher

Objective	Strategy	Action(s)	Target SGCNs
	Move forest fragmentation pattern toward Natural Range of Variability.	Identify and decommission unneeded roads.	

Forest insect pests & diseases

When at endemic population levels, native forest insects and disease play a critical role in maintaining the health of the forest ecosystem by removing individuals or small groups weakened by drought, injury, or fire (USDA Forest Service 2010). However, when large stands of trees are stressed by prolonged drought and/or dense stocking, outbreaks of forest insects and disease can impact tree growth, forest composition and cause extensive tree mortality (USDA Forest Service 2010). Severe outbreaks of forest insects and pathogens can even cause the conversion of forest to shrublands or grasslands. The impact on forest composition from large scale outbreaks is predicted to increase as climate change decreases precipitation and increases temperatures (USDA Forest Service 2010). The introduction of the nonnative white pine blister rust (*Cronartium ribicola*) has reduced western white pine to 5% of its original distribution across the interior Pacific Northwest. This caused changes in forest composition from relatively stable, fire- and disease- tolerant western white pine forests to forests dominated by the fire and disease-intolerant species such as Douglas-fir and grand fir (USDA Forest Service 2013).

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk of stand-replacing pine beetle or root fungus infestations.	Use integrative pest management strategies. Increase diversity of stand ages, size classes and tree species (KPNZ Climate et al. 2010). Promote responsible firewood harvest/transport.	Use pheromones to protect stands (beetle whispering) (Kegley and Gibson 2004). Thin stands to ≤60 basal area. Remove debris that attracts pine beetles. Cut out infected trees (mistletoe) (IDL 2015).	
Increase number of rust-resistant western white pine in the ecosystem (USDA Forest Service 2013).	Continue developing genetics of disease resistant trees. Planting rust–resistant western white pine during restoration efforts.	Conserve and protect any old-growth western white pine on the landscape. Determine if rust-resistant (Neuenschwander et al. 1999). Planting rust-resistant trees in openings that are also *Ribes* free (Neuenschwander et al. 1999). Monitor and remove any signs of the rust on planted trees (USDA Forest Service 2013).	Olive-sided Flycatcher Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis

Road density & motorized recreation

Much of this habitat type exists within the front country where road densities are often high. Much of the area is impacted by historic road systems that are no longer needed for management, but often used for motorized recreation. In addition, OHV use in undesignated areas can lead to degradation of forested areas. Such use can increase erosion, user conflicts, spread of invasive species, damage to cultural sites, disturbance to wildlife, and destruction of wildlife habitat. Considered an important issue on state, industrial, and private lands as well as one of FS's "four threats" (Idaho Forest Action Plan, June 2010, Revised May 2012).

Objective	Strategy	Action(s)	Target SGCNs
Minimize the effects of roads and motorized recreation on wildlife.	Ensure that wildlife values are incorporated into travel management plans.	Participate in FS travel management planning efforts. Continue to work with other state, federal, and private land managers on travel management issues.	Great Gray Owl Fisher
	Increase effectiveness of road closures where they're in place.	Work with private landowners to help prevent trespass on their property, especially by unauthorized motorized vehicles. Work with land managers to identify and address problem areas.	
	Reduce road density across landscape.	Recontour first 100 yards of roads to be placed in long-term storage, which prevents unauthorized motorized vehicle access. Physically decommission unneeded roads.	

Target: Lower Montane–Foothill Grassland & Shrubland

In the Palouse Prairie, nearly 18% of the land cover is classified as Lower Montane–Foothill Grassland & Shrubland. This conservation target is characterized by a mixture of bunchgrasses and forbs with shrubs scattered throughout and is similar to Palouse Prairie grasslands floristically. Ecologists have referred to the vegetation of this section as "canyon grasslands." The major difference between these 2 habitats can be attributed to topography and soils—canyon grasslands occur within river breaks and steep canyons and have much shallower soils than Palouse Prairie grasslands. Canyon grasslands and shrublands are also warmer and drier than Palouse Prairie grasslands. Like the Palouse Prairie grasslands, south aspects tend to be more weedy than the northerly aspects. Many of the more mesic grasslands on the cooler, northerly aspects are similar in composition to Palouse Prairie grasslands. As in the Palouse Prairie grasslands, deciduous shrublands dominated by common snowberry (*Symphoricarpos albus* (L.) S.F. Blake), mallow ninebark (*Physocarpus malvaceus* (Greene) Kuntze), rose (*Rosa* L. spp.), and black hawthorn (*Crataegus douglasii* Lindl.) are intermixed on northerly facing slopes.

Large expanses of these grasslands are primarily found along the Palouse, Clearwater, and Snake rivers, but may also be found in tributary canyons. Because the canyons are too steep and soils are more shallow, little has been plowed compared to the Palouse Prairie grasslands. Much of the canyon grasslands have been grazed by sheep and cattle. Livestock grazing has contributed to nonnative weed invasions, which are widespread throughout these grasslands. Cheatgrass, yellow star-thistle, and other aggressive weeds have invaded and degraded large portions of the canyon grasslands (Gray et al. 2005).

Target Viability

Fair. Unlike the Palouse Prairie grasslands, most canyon grasslands have not been widely converted to other land uses (Weddell and Lichthardt 1998). The soils were too shallow and the slopes were too steep to plow. However, the rugged terrain did not restrict extensive grazing of these grasslands. Grazing has altered much of the canyon grasslands, but there are likely some areas too steep and far from water that did not receive heavy grazing pressure (Weddell and Lichthardt 1998). These areas may be in good condition, but overall condition for this target is fair considering the intractable problem of invasive weeds. Landownership and terrain may present challenges to conserving and protecting this target as most of these grasslands are privately owned and on steep slopes. Landowner cooperation is important to successful conservation and restoration projects. Nevertheless, even if landowners are willing, the steep canyons may be difficult and expensive to restore. The steep slopes may limit the use of machinery for site preparation and seeding and make restoration projects labor intensive. The warm and dry conditions can be problematic for planning seeding and other restoration projects.

Spotlight Species of Greatest Conservation Need: Bumble Bees

Bumble bees are vitally important pollinators of wild and domesticated flowering plants. Nationwide, native pollinators (mostly bees) are estimated to provide >3 billion dollars in free pollination services to agriculture producers (Xerces 2013a). Furthermore, native bees are superior pollinators compared to domesticated honey bees (Xerces 2013b). There are >30 species of bumble bees in the western United States, with 15 of those historically occurring in the Palouse Prairie Section (Hatten et. al 2013). Five bumble bee species have been identified as SGCN: Hunt's, Morrison's, Suckley's Cuckoo, Western, and Yellow bumble bees. These species are at risk principally because of loss of habitat, habitat degradation, and rangewide declines in abundance. The Yellow Bumble Bee is the only known significant pollinator of Spalding's Catchfly (*Silene spaldingii*), an ESA-listed threatened plant species (Tubbesing et al. 2014).

Prioritized Threats and Strategies for Lower Montane–Foothill Grassland & Shrubland

Very High rated threats to Lower Montane–Foothill Grassland & Shrubland in the Palouse Prairie

Noxious weeds & invasive plant species

The invasion of nonnative and noxious plants is a pervasive threat to the canyon grasslands. Much of the grasslands, especially south-facing slopes, have been invaded by nonnative plants such as cheatgrass, yellow star-thistle, bur chervil (*Anthriscus caucalis*), and rush skeletonweed. These nonnatives displace native species and degrade habitat quality. Minimizing the invasion and spread of noxious weeds and other nonnative plants within canyon grasslands is possible but can be an arduous task as the terrain is rugged and steep.

Objective	Strategy	Action(s)	Target SGCNs
Minimize the invasion and spread of nonnative, invasive, or noxious plants.	Use integrated management strategies and grazing plans.	Use chemical (fertilizers & pesticides), mechanical (mowing, disking, etc.), biological (insects, fungi, etc.), and cultural (e.g., targeted grazing, burning, etc.) techniques to control weeds. Restore native plant communities.	Short-eared Owl Common Nighthawk Grasshopper Sparrow A Miner Bee (*Perdita salicis euxantha*) A Miner Bee (*Andrena aculeata*) Hunt's Bumble Bee Monarch Morrison's Bumble Bee Suckley's Cuckoo Bumble Bee Western Bumble Bee Yellow Bumble Bee
	Expand educational programs that highlight the importance of noxious weed control.	Promote educational programs that highlight the damage noxious weeds and invasive plants cause to wildlife and its habitat; include information on how to prevent new invasions.	

High rated threats to Lower Montane–Foothill Grassland & Shrubland in the Palouse Prairie

Decreased frequency & increased severity of wildfire

As a result of fire suppression and altered fire regimes, wildfires are less frequent in the canyon grasslands. When fires are less frequent, fuels can increase and create more severe fires. Severe fires can likely result in a shift in species composition as aggressive nonnative plants, especially cheatgrass, can outcompete native species for newly available resources.

Objective	Strategy	Action(s)	Target SGCNs
Reintroduce frequent, low-intensity fire to the landscape.	Reduce fuel loading, increase fuel continuity, and reintroduce fire. Allow natural fires to burn in areas at low risk of nonnative species invasion.	Use dry season prescribed fire for desired grass, forb, and shrub response. Use natural and prescribed burns to create desired fuel conditions across larger landscapes.	Short-eared Owl Common Nighthawk Grasshopper Sparrow A Miner Bee (*Perdita salicis euxantha*) A Miner Bee (*Andrena aculeata*) Hunt's Bumble Bee Monarch Morrison's Bumble Bee Suckley's Cuckoo Bumble Bee Western Bumble Bee Yellow Bumble Bee
Restore native species to the landscape.	Reestablish appropriate species distribution and composition.	After fire and on appropriate sites, seed with native grass, forb, and shrub species.	Short-eared Owl Common Nighthawk Grasshopper Sparrow A Miner Bee (*Perdita salicis euxantha*) A Miner Bee (*Andrena aculeata*) Hunt's Bumble Bee Monarch Morrison's Bumble Bee Suckley's Cuckoo Bumble Bee Western Bumble Bee Yellow Bumble Bee

Improper livestock grazing management

Grazing practices that result in the overuse of available forage can have many negative impacts on soil health, water quality, and wildlife habitat. Often habitat degradation, such as weed encroachment and loss of desired perennial vegetation, results in the loss of plant diversity. Changes in plant species composition (i.e., encroachment of noxious or invasive plants and loss of desirable vegetation) often results in the loss of wildlife use and the use by livestock. Adopting alternative grazing regimes through lowered stocking rates, grazing intensity, timing of grazing and size of pastures can all help decrease loss of habitat quality for wildlife and livestock.

Objective	Strategy	Action(s)	Target SGCNs
Restore plant diversity.	Use appropriate grazing techniques to restore plant diversity. Improve outreach and education to livestock producers.	Partner with landowners to develop grazing management plans that minimize negative impacts to canyon grasslands and associated wildlife. Provide information about the use of grazing management tools that increase both species diversity and forage production simultaneously.	Short-eared Owl Common Nighthawk Grasshopper Sparrow A Miner Bee (*Perdita salicis euxantha*) A Miner Bee (*Andrena aculeata*) Hunt's Bumble Bee Monarch Morrison's Bumble Bee Suckley's Cuckoo Bumble Bee Western Bumble Bee Yellow Bumble Bee

Species designation, planning & monitoring

In addition to conservation actions to address specific threats, some species require inventory and monitoring to assess their current status and distribution in Idaho. As such, we identify needs for one species in the section below and identify appropriate actions.

Objective	Strategy	Action(s)	Target SGCNs
Increase our current understanding of the status of terrestrial gastropods.	Determine the true distribution and rarity of poorly documented terrestrial gastropods.	Revisit historical sites for species that have not been detected in >20 years in Idaho, to see if the species is still present. Where locally appropriate, expand on existing fieldwork.	Mission Creek Oregonian

Target: Palouse Prairie Grasslands

The Palouse Prairie grasslands lie within the Lower Montane–Foothill Grassland & Shrubland system but have been identified as a separate conservation target due to differences in extent, threats, and conservation strategies required to sustain each of these habitats. The extent of Palouse Prairie grasslands has dramatically decreased as most have been converted to cropland. Agriculture is an important land-use activity within this area, but small and dispersed native grasslands still remain. These remnants, which occupy less than 1% of the land cover, are usually on uncultivated ridges surrounded by cropland that extends throughout the entire Palouse Prairie Section. Native grasslands are found on rolling uplands and are comprised of a mixture of perennial bunchgrasses, forbs, and low deciduous shrubs. Usually the north slopes have higher forb diversity and will have higher cover of Idaho fescue, prairie Junegrass, and native shrubs. The dominant native bunchgrass on south aspects is bluebunch wheatgrass. South slopes tend to have a higher cover of nonnative plant species.

Of the remaining Palouse Prairie grasslands, many are being invaded by nonnative invasive plants. Ventenata has been documented on these grassland remnants for over a decade and is effectively displacing the native perennial bunchgrasses. In addition to ventenata, invasion by other problematic weeds such as rush skeletonweed, yellow star-thistle, and tall oatgrass are degrading wildlife habitat in Palouse Prairie grasslands. Communities dominated by nonnative species are not as favorable as intact native communities for at-risk species.

Target Viability

Very Poor. By the early 1900s, much of the Palouse Prairie grasslands had been converted to agricultural uses. The rich and deep soils were excellent for growing wheat and legumes. Areas that were too rocky and steep to plow remained but have experienced major degradation by heavy livestock grazing and subsequent invasion by nonnative plant species. It is estimated that only 0.1% of these grasslands remain in a natural state (Noss et al. 1995), and they represent a high conservation priority in this section. The condition of Palouse Prairie grasslands is generally very poor since remnants are small, fragmented, located on private land, and threatened by nonnative plant species. Some good-condition remnants persist on the landscape and are in need of protection if they are to remain viable for future generations. These good-condition grassland remnants are small, but are of conservation value and the value may increase with their proximity to other remnants (Looney 2008). Many Palouse Prairie remnants are on private land surrounded by cropland and usually do not have protection from development and other land use changes that may have negative impacts. However, at some sites, it appears that cropland may serve as protection from roads and other weed corridors.

Spotlight Species of Greatest Conservation Need: Giant Palouse Earthworm

The Giant Palouse Earthworm (*Driloleirus americanus*) is an endemic species of the Inland Northwest. The distribution and ecology of the species is poorly understood, but it has been most consistently found in native Palouse Prairie grasslands and other closely related habitats. In the past 30 years, individuals have been reported from <12 locations from northern Idaho and eastern Washington. Individuals discovered in recent years were around 25 cm (10 inches) in length, far shorter than the historically reported 0.9 m (3 ft) that earned them the moniker “giant.” The IDFG, FWS, University of Idaho, and others have partnered to develop appropriate survey protocols to address the scientific challenges associated with Giant Palouse Earthworm surveys. Preservation of Palouse Prairie grassland remnants is important to the conservation of this unique species.

Prioritized Threats and Strategies for Palouse Prairie Grasslands

Very High rated threats to Palouse Prairie Grasslands in the Palouse Prairie

Noxious weeds & invasive plant species

Noxious weeds and invasive plant species represent the most pervasive and serious threat to the viability and diversity of the Palouse Prairie plant community. The highly-modified nature of the landscape allows for many mechanisms of invasion. Ironically, the arable lands matrix that Palouse Prairie remnants are embedded within can serve as a protective barrier for some remnants. Lack of access via roads and trails helps to minimize the spread of some invasive plant species. However, it does not entirely protect against invasion. Ventenata, also known as wiregrass or North Africa grass, is a particulaly problematic invasive plant species in Palouse Prairie grasslands that is displacing native species and seriously degrading habitat quality. Bur chervil and rush skeletonweed also pose serious threats.

Objective	Strategy	Action(s)	Target SGCNs
Minimize the invasion by nonnative, invasive, or noxious plants into Palouse Prairie remnants.	Develop mechanisms for EDRR and reporting of suspected new plants by the general public and a formal network of amateur and professional collectors.	Partner with federal, state, and NGOs to inventory current condition of remnants; revisit each on a rotating basis to monitor for invasive plant species. As necessary, spray or manually remove invasive plants.	Short-eared Owl Common Nighthawk Grasshopper Sparrow A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch Giant Palouse Earthworm
	Promote planting native buffers surrounding remnants. Develop educational programs on how to prevent spread of invasive species.	Partner with local Conservation Districts, FWS, NRCS, FSA, and other local federal and state agencies to provide local expertise and to find funding sources. Promote the use of a diverse mix of native species.	
Maintain existing Palouse Prairie remnants and control or prevent the spread of invasive plants.	Use integrated pest management strategies. Consider Palouse Prairie remnants when making decisions about rural development.	Use chemical, mechanical, biological, and cultural techniques for maintaining native plants. Promote educational programs that highlight the damage invasive plants cause to wildlife and its habitat. Provide recommendations to local and county planning with respect to rural development decisions. Integrate wildlife and habitat into development decisions. Promote native plant species in conservation programs.	Short-eared Owl Common Nighthawk Grasshopper Sparrow A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch Giant Palouse Earthworm

Conversion to agriculture, residential development & associated infrastructure

With >99% of this habitat type converted to arable lands, each remaining remnant is important. High commodity crop prices, as well as new farming equipment and techniques now make it feasible to farm some of these sites. Furthermore, because remnants are often scenic (and therefore desirable property), they are at risk to rural development, including housing development and the associated infrastructure and roads.

Objective	Strategy	Action(s)	Target SGCNs
Preserve existing Palouse Prairie remnants.	Establish and promote restoration/protection subsidies for landowners and cooperators.	Identify funding sources and willing landowners that are open to easements or sale. Increase the value of remnants to make it profitable to conserve them while considering the overall spatial distribution of remnants. Develop language for farmland lease covenants to protect wildlife habitat (i.e., there might be financial incentive to mitigate perceived lost income). Conduct outreach and education to work with landowners that share similar goals and values as conservation organizations. Take advantage of new landownership through partnerships developed with landowners and conservation organizations by using projects and funding sources that benefit wildlife.	Short-eared Owl Common Nighthawk Grasshopper Sparrow A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch Giant Palouse Earthworm
	Recommend that local city and county zoning rules promote the preservation of remnants.	Ensure that conservation entities play a role in stakeholder discussions about local zoning rules.	
	Work with landowners to plant native buffers surrounding remnants or convert fields close to remnants to native vegetation.	Partner with FWS, Conservation Districts, NRCS, FSA, and other federal, state, and local agencies to provide professional expertise on this process and to help find funding sources for these projects. Promote the use of a diverse mix of native grasses, forbs, and shrubs to optimize wildlife habitat.	
Preserve rangelands.	Minimize conversion of rangelands to crop fields.	Use FSA and NRCS incentive programs to maintain rangelands. Develop grazing plan to maintain or increase habitat diversity.	Short-eared Owl Common Nighthawk Grasshopper Sparrow A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita

Objective	Strategy	Action(s)	Target SGCNs
			salicis euxantha) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch Giant Palouse Earthworm

Medium rated threats to Palouse Prairie Grasslands in the Palouse Prairie

Off-target application of pesticides & herbicides on remnants

Intact Palouse Prairie grasslands are rare. Most of this habitat type (>99%) has been converted into arable land. The remnants of this habitat type are typically small (<2 ha; 5 acres), confined to steep or rocky sites, and privately owned. Remnants are embedded in a farming landscape where pesticides and herbicides are used to improve crop yield. When these chemicals are applied, it is common for overspray to drift onto grassland remnants; pesticides can kill native polinators and other wildlife species, and herbicides can eliminate native plant species, degrading habitat quality.

Objective	Strategy	Action(s)	Target SGCNs
Increase floral and faunal diversity on Palouse Prairie remnants.	Minimize and mitigate the effects of overspray of pesticides and herbicides applied to adjacent farmlands.	Assist agricultural producers in obtaining and implementing precision agricultural technology to apply pesticides and herbicides only at targeted locations and only in amounts needed. Use GPS mapping technology to map remnants for use in precision agricultural applications. Revegetate areas where accidental herbicide overspray occurs with an emphasis on the use of native plants. Plant native buffers surrounding remnant vegetation to protect remnants from future overspray and expand ecological function of remnants for pollinators and wildlife.	A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch
	Promote pollinator-friendly chemicals and application methods.	Work with NRCS, FSA, Conservation Districts, and other federal, state, and local agencies to limit the use of pesticides and herbicides that are shown to have a severe negative effect on diverse ecosystems by limiting available farm incentives.	A Miner Bee (*Andrena aculeata*) A Miner Bee (*Perdita salicis euxantha*) Yellow Bumble Bee Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Monarch

Target: Depressional Wetlands

Depressional Wetlands within the Palouse Prairie primarily occur in topographic depressions and old meander scars and occupy less than 1% of the land cover. Surface water accumulates in these depressions with water sources being a combination of precipitation, groundwater discharge, lateral subsurface flow, seasonally-high water tables, overland flow from adjacent uplands, or canals or ditches. The direction of flow is normally from the surrounding uplands toward the center of the depression. These wetlands lose water through intermittent or perennial drainage from an outlet, by evapotranspiration, or infiltration to ground water. By and large, Depressional Wetlands on the Palouse Prairie have been drained and converted to agriculture. However, some old meander scars that retain water have become wetlands. These meander scars occur along floodplains of rivers that have migrated or have been channelized. Wetlands associated with meander scars can be found in the Hangman Creek, Palouse River, and Potlatch River drainages. Old meander scars that are usuallly disconnected from river floodplains become inundated during spring flooding events. Currently, created and enhanced wetlands associated with livestock water reservoirs and farm ponds are the most common depressional habitats present. Some of these wetland ponds dry out seasonally (e.g., analagous to vernal pools) while others remain wet year-round. Wildlife species that roam the Palouse Prairie may seek refuge in these wetlands as they can be a reliable source of food, water, and cover. They also provide important breeding areas for amphibians, such as the Western Toad.

Target Viability

Very Poor. Depressional Wetlands within the Palouse Prairie have nearly disappeared as many wetlands were drained to improve crop production. The few natural Depressional Wetlands that still exist are primarliy old meader scars along the Hangman Creek, Palouse River, and Potlatch River drainages and are usually surrounded by cropland, often hayfields. In general, Depressional Wetlands are in poor condition on the Palouse Prairie. When wetlands were drained and dried up, this effectively lowered the water table to a level suitable for reed canarygrass to thrive (Servheen et al. 2002). Many of these wetlands are in some stage of conversion to reed canarygrass. However, depressions that retain water into the summer months are still occupied by native aquatic-emergent plant communities.

Prioritized Threats and Strategies for Depressional Wetlands

Very High rated threats to Depressional Wetlands in the Palouse Prairie

Agricultural runoff

Modern farming practices rely on widespread use of broad spectrum herbicides, pesticides, and fertilizers to manage crop production in the Palouse. The 2000 National Water Quality Inventory, reported that agricultural nonpoint source (NPS) pollution was the leading source of water quality impacts on surveyed rivers and lakes, the second largest source of impairments to wetlands, and a major contributor to contamination of surveyed estuaries and groundwater (EPA 2014). Agricultural activities that cause NPS pollution include, but are not limited to, plowing too often or at the wrong time, and improper, excessive, or poorly-timed application of pesticides, irrigation water, and fertilizer (EPA, 2014).

Objective	Strategy	Action(s)	Target SGCNs
Reduce nonpoint pollutants from agricultural fields including sediment, nutrients, fungicides, and pesticides.	Promote responsible timing and application of fertilizers, herbicides, and pesticides.	Promote precision agriculture to reduce total amount of chemicals applied. Educate land managers on proper timing and amounts of chemicals through Integrated Pest Management techniques specific to the Palouse. Promote agricultural practices that reduce overall possibility of sediment delivery into wetlands.	Western Toad
	Create buffers to capture agricultural runoff and leaching.	Use Conservation Districts, NRCS, and FSA programs to create natural buffers around wetlands and linked water sources. Use Conservation Districts and US Department of Agriculture (USDA) programs to build sediment basins in areas that have captured soil erosion to contain agricultural pollution runoff to the site.	

Hydrologic alterations & habitat loss/degradation

Currently, natural Depressional Wetlands are rare due to modern day land management techniques, including drain tiling and ditching, which results in the rapid release of water storage, loss of native vegetation, and expansion of nonnative species such as reed canarygrass and meadow foxtail (*Alopecurus pratensis* L.; Servheen et al. 2002). The functions provided by created agricultural Depressional Wetlands can be enhanced with sometimes relatively minor modifications to adjacent land uses.

Objective	Strategy	Action(s)	Target SGCNs
Reduce wetland degradation.	Promote responsible grazing through fencing and rest/rotation plans.	Create riparian pasture areas that will be grazed on a 3–5 year rotation. As appropriate, use high-intensity, short-duration grazing strategies. Create buffers around remaining wetlands using voluntary programs available through Conservation Districts, NRCS, and FSA programs. Aid in the development of water sources for livestock, so livestock can be excluded from wetland areas. Work with corporate timber, FS, IDL, and others to identify wetland systems that would benefit from protection from grazing.	Western Toad
	Incentivize voluntary retirement of grazing in strategic areas.	Educate schools, and other public forums in wetland ecology, restoration, and mitigation.	
	Implement an environmental	Provide education and outreach relating to	

Objective	Strategy	Action(s)	Target SGCNs
	education program. Reduce the extent of pesticide, herbicide, and/or fungicide overspray.	proper pesticide, herbicide, and/or fungicide application.	
Restore and build wetlands.	Promote voluntary conservation programs.	Restore and create wetlands using voluntary programs available through Conservation Districts, NRCS, and FSA programs. Remove drain tiles that drain lowland agricultural areas that were historically wetlands. Work with Conservation Districts, NRCS, and FSA to create incentives to encourage increases in water holding capacity of farm fields.	Western Toad

High rated rated threats to Depressional Wetlands in the Palouse Prairie

Changes in temperature & precipitation regimes

Warmer temperatures, resulting in less snowfall in the winter and more precipitation falling as rain, have a direct ramification on the extent and duration of flooding in Depressional Wetlands. This also leads to a drier spring and summer because of reduced snowpack groundwater storage, resulting in less water availability for wetlands and drought conditions for native plants (N. Decrappeo, DOI Northwest Climate Science Center, pers. comm.). The resulting trend away from semipermanently flooded marshes toward seasonally flooded Depressional Wetlands will likely result in less available amphibian breeding habitat. The overall loss of available Depressional Wetlands increases spring runoff flows and decreases summer flows in streams and rivers due to a loss of water storage and infiltration in all watersheds within the Palouse.

Objective	Strategy	Action(s)	Target SGCNs
Increase capacity for water storage to combat the effects of climate change.	Promote voluntary conservation programs.	Use Conservation Districts, NRCS, and FSA programs to build sediment basins and wetlands in low-gradient areas that meet land use requirements for a wetland. Work with Conservation Districts, NRCS, and FSA to create incentives to encourage increases in water holding capacity of farm fields.	Western Toad

Noxious weeds & invasive plant & animal species

Due to the loss of hydrologic conditions in and around Depressional Wetlands, nonnative, invasive, and noxious plant species are able to colonize areas that were historically occupied by native species. Typically, native species, once excluded, are unable to gain a foothold and recover. Degraded areas have reduced habitat diversity and are of minimal value to wildlife. On the Palouse Prairie, reed canarygrass is a pervasive threat to aquatic systems.

Objective	Strategy	Action(s)	Target SGCNs
Minimize the spread of invasive plant and animal species.	Improve education about invasive species, how they are spread, and what is at risk.	Partner with the Idaho Department of Agriculture (ISDA) on ongoing educational programs. Expand message into new demographics (e.g., OHV enthusiasts, hunting regulations, public service announcements).	Western Toad
	Continue to expand monitoring and control of aquatic invasive plant and animal species.	Partner with ISDA on ongoing educational programs. Continue boat wash stations.	

Improper livestock grazing management

Grazing practices that result in the overuse of available forage can have many negative impacts on soil health, water quality, and wildlife habitat. Often habitat degradation, such as weed encroachment and loss of desired perennial vegetation, results in the loss of plant diversity. Changes in plant species composition (i.e., encroachment of noxious or invasive plants and loss of desirable vegetation) often results in the loss of both wildlife and livestock use. Adopting alternative grazing regimes through lowered stocking rates, grazing intensity, timing of grazing, and size of pastures can all help to decrease the loss of habitat quality for wildlife and livestock.

Objective	Strategy	Action(s)	Target SGCNs
Maintain or restore functionality of depressional wetland areas.	Develop grazing and farm management plans; assist in identifying potential funding sources.	Work with NRCS and FSA to develop grazing management plans that minimize negative impacts (e.g., bank erosion, increased sediment loads) to wetlands.	Western Toad

Target: Springs & Groundwater-Dependent Wetlands

Springs & Groundwater-Dependent Wetlands within the Palouse Prairie Section occur on sloping land with gradients that range from steep hillsides to nearly imperceptible slopes. Less than 1% of the land cover is this section are classified as slope wetlands. These wetlands differ from Depressional Wetlands by the lack of closed contours. Seasonal seeps and wet and mesic meadows are also considered groundwater-dependent wetlands. Historically, seasonally moist or wet meadows within the Palouse Prairie were often dominated by culturally important small camas (*Camassia quamash* [Pursh] Greene), sedges (e.g. *Carex* L.), tufted hairgrass (*Deschampsia cespitosa* (L.) P. Beauv.), Rocky Mountain iris (*Iris missouriensis* Nutt.), American bistort (*Polygonum bistortoides* Pursh), mule-ears (*Wyethia amplexicaulis* [Nutt.] Nutt.), and other forbs (Servheen et al. 2002). These meadows and wetlands were common prior to Euro-American settlement in valleys and on flats, but most were lost when areas were drained for cropland. Relict camas meadows remain near Weippe and Grangeville and sedge-dominated wet meadows occur in forested montane settings, such as on Craig Mountain. In these wetlands, groundwater discharges at the ground surface, often through complex subsurface flow paths (Stevens and Meretsky 2008). Groundwater sources can be from localized infiltration of surface water (e.g., precipitation, seasonal flooding). Water flow is downslope and unidirectional. Groundwater-dependent wetlands lose water primarily by subsurface outflow, surface flows, and evapotranspiration. Groundwater-dependent wetlands may develop channels, but these serve only to convey water away from the wetland. Wetlands are important habitat for a variety of wildlife species and provide breeding and foraging habitat for Western Toad.

Target Viability

Very Poor. Groundwater-dependent wetlands are more abundant than Depressional Wetlands within the Palouse Prairie Section, but are still considered sparse. The camas meadows that used to dominate portions of the Palouse Prairie have largely been drained and converted to cropland. Many seeps and springs have been appropriated for livestock water supply. Many meadows within the Palouse Prairie are generally in poor condition. Livestock grazing has degraded these meadow communities. There are some good-condition meadows at Craig Mountain WMA. Although these meadows have historically been grazed, cattle no longer use these meadows regularly, and their condition is improving.

Prioritized Threats and Strategies for Springs & Groundwater-Dependent Wetlands

Very High rated threats to Springs & Groundwater-Dependent Wetlands in the Palouse Prairie

Agricultural runoff

Modern farming practices rely on widespread use of broad spectrum herbicides, pesticides, and fertilizers to manage crop production in the Palouse. The 2000 National Water Quality Inventory, reported that NPS pollution was the leading source of water quality impacts on surveyed rivers and lakes, the second largest source of impairments to wetlands, and a major contributor to contamination of surveyed estuaries and groundwater (EPA, 2014). Agricultural activities that cause NPS pollution include, but are not limited to, plowing too often or at the wrong time, and improper, excessive, or poorly-timed application of pesticides, irrigation water, and fertilizer (EPA, 2014).

Objective	Strategy	Action(s)	Target SGCNs
Reduce nonpoint pollutants from agricultural fields including sediment, nutrients, fungicides, and pesticides.	Promote responsible timing and application of fertilizers, herbicides, and pesticides.	Promote precision agriculture to reduce total amount of chemicals applied. Educate land managers on proper timing and amounts of chemicals through Integrated Pest Management techniques specific to the Palouse.	Western Toad
	Create buffers to capture agricultural runoff and leaching.	Promote agricultural practices that reduce overall possibility of sediment delivery into wetlands. Use Conservation Districts, NRCS, and FSA programs to create natural buffers around wetlands and linked water sources.	

Objective	Strategy	Action(s)	Target SGCNs
		Use Conservation Districts and USDA programs to build sediment basins in areas that have captured soil erosion to contain agricultural pollution runoff to the site.	

Hydrologic alterations & habitat loss/degradation

The seasonally moist or wet meadows are a type of palustrine, emergent wetland (Cowardin et al. 1979, Smith et al. 1995) that was once widespread in the Palouse. Euro-American missionaries and settlers dramatically altered these areas for farming purposes. Currently, wet meadows are rare due to modern day land management techniques, including drain tiling and ditching, which results in the rapid release of water storage, loss of native vegetation, and expansion of nonnative species such as reed canarygrass and meadow foxtail (Servheen et al. 2002). Historic and current road and railway beds also alter surface flow patterns. Streams through meadows have been straightened and become incised, lowering the water table and drying out wetland habitat.

Objective	Strategy	Action(s)	Target SGCNs
Reduce wetland degradation.	Promote responsible grazing through fencing and rest/rotation plans.	Create riparian pasture areas that will be grazed on a 3–5 year rotation. As appropriate, use high-intensity, short-duration grazing strategies. Create buffers around remaining wetlands using voluntary programs available through Conservation Districts, NRCS, and FSA programs. Aid in the development of water sources for livestock, so that livestock can be excluded from wetland areas.	Western Toad Great Gray Owl
	Incentivize voluntary retirement of grazing in strategic areas.	Work with corporate timber, FS, IDL, and others to identify wetland systems that would benefit from protection from grazing.	
	Implement an environmental education program.	Conduct educational programs at schools, and other public forums in wetland ecology, restoration, and mitigation.	
	Reduce the extent of pesticide, herbicide, and/or fungicide overspray.		
Restore and build wetlands.	Promote voluntary conservation programs to	Restore and create wetlands using voluntary programs available through Conservation Districts, NRCS, and FSA programs. Plug or fill ditches (e.g., as in Weippe Prairie restoration).	Western Toad Great Gray Owl

Objective	Strategy	Action(s)	Target SGCNs
	restore hydrologic processes supporting groundwater-dependent wetlands.	Remove historic unused road and rail beds from meadows. Reroute current roads away from meadows. Restore natural stream meander patterns and channel morphology on straightened and incised meadow streams. Remove drain tiles that drain lowland agricultural areas that were historically wetlands. Work with Conservation Districts, NRCS, and FSA to create incentives to encourage increases in water holding capacity of farm fields.	

High rated threats to Springs & Groundwater-Dependent Wetlands in the Palouse Prairie

Changes in temperature & precipitation regimes

Groundwater dependent wetlands are dependent on both aquifer recharge from precipitation infiltration. Warmer temperatures, resulting in less snowfall in the winter and more precipitation falling as rain, have a direct ramification on the extent and wetness of groundwater dependent wetlands. These conditions result in deeper water tables during the summer which allows upland native and nonnative plants (including trees) to invade meadows. This also leads to a drier spring and summer because of reduced snowpack water storage, creating drought conditions for native plants (N. Decrappeo, DOI Northwest Climate Science Center, pers. comm.). The overall loss of spring and groundwater-dependent wetlands increases spring runoff flows and decreases summer flows in streams and rivers due to a loss of water infiltration and storage in all watersheds within the Palouse.

Objective	Strategy	Action(s)	Target SGCNs
Increase capacity for water storage to combat the effects of climate change.	Promote voluntary conservation programs.	Use Conservation Districts, NRCS, and FSA programs to build sediment basins and wetlands in low-gradient areas that meet land use requirements for a wetland. Work with Conservation Districts, NRCS, and FSA to create incentives to encourage increases in water holding capacity of farm fields.	Western Toad

Noxious weeds & invasive plant species

Due to the loss of hydrologic conditions in and around Springs & Groundwater-Dependent Wetlands, nonnative, invasive, and noxious plant species are able to move into areas that were historically occupied by native species. Typically, native species, once excluded, are unable to gain a foothold and recover. Degraded areas have reduced habitat diversity and are of minimal value to wildlife. On the Palouse Prairie, reed canarygrass is a pervasive threat to wetland systems.

Objective	Strategy	Action(s)	Target SGCNs
Minimize the spread of invasive plants.	Improve education about invasive species, how they are spread, and what is at risk.	Partner with ISDA on ongoing educational programs. Expand message into new demographics (e.g., OHV enthusiasts, hunting regulations, public service announcements).	Western Toad Great Gray Owl
	Continue and expand monitoring and control of aquatic invasives.	Partner with ISDA on ongoing educational programs. Continue boat wash stations.	

Improper grazing management

Grazing practices that result in the overuse of available forage can have many negative impacts on soil health, water quality, and wildlife habitat. Often habitat degradation, such as weed encroachment and loss of desired perennial vegetation, results in the loss of plant diversity. Changes in plant species composition (i.e., encroachment of noxious or invasive plants and loss of desirable vegetation) often results in the loss of both wildlife and livestock use. Adopting alternative grazing regimes through lowered stocking rates, grazing intensity, timing of grazing and size of pastures can all help to decrease the loss of habitat quality for wildlife and livestock.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the impacts of grazing on wetland systems.	Develop grazing and farm management plans; assist in identifying potential funding sources.	Work with partnering agencies and landowners to develop grazing management plans that minimize negative impacts (e.g., bank erosion, increased sediment loads) to wetlands. Encourage the use of Best Management Practices that benefit wildlife.	Western Toad Great Gray Owl

Conifer encroachment

Meadow systems embedded within forested ecosystems are highly influenced by disturbance, or lack thereof. Fire suppression and altered hydrology has often led to conifer encroachment into meadows, threatening the open structure, plant diversity, and other unique characteristics of these important habitats.

Objective	Strategy	Action(s)	Target SGCNs
Maintain and restore meadow systems.	Reduce conifer encroachment.	Restore historical fire regime to meadow systems. Raise the water table of meadows affected by stream incisement. Encourage native plant establishment. Maintain open meadows through active conifer removal.	Western Toad Great Gray Owl

Target: Riverine–Riparian Forest & Shrubland

Riverine wetlands and riparian habitat within the Palouse Prairie primarily occur within river and stream channels of the Clearwater, Potlatch, and Palouse River systems and their tributaries, and occupy nearly 3% of the land cover. The dominant water sources in these systems are overbank flooding from the channel and subsurface shallow water table connections between the stream channel and wetlands (Smith et al. 1995). Other water sources include overland runoff from adjacent uplands, tributary flow, and precipitation. Flow may be perennial to intermittent. In the Palouse Prairie, the riverine ecosystem is comprised of a variety of important aquatic habitat types including headwaters and small streams (1st- to 3rd-order streams) and larger rivers (4th+ order streams and rivers). Examples of small streams within the Palouse Prairie are the headwater streams of the Palouse and Potlatch rivers. These streams tend to have high gradients and water velocities where scouring and erosion exports much of the fine material in the watershed during brief snowmelt runoff periods or large thunderstorm precipitation events (i.e., flash floods). Floodplains and valley bottoms tend to be narrow. These streams can provide important spawning habitat for Steelhead. Western redcedar Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), alder (*Alnus* Mill.), Drummond's willow (*Salix drummondiana* Barratt ex Hook.), other shrubs, and a variety of herbs line higher elevation streams, providing bank stability, woody debris, and shade to aquatic communities. Many small streams within the Palouse Prairie have been impacted by tiling and draining of riparian areas for agricultural production. Larger rivers (4th+ order river), which include the Lower Snake and Clearwater rivers, provide habitat for anadromous fish species such as Pacific Lamprey, Steelhead, and Chinook Salmon. These rivers have lower gradients and water velocities than low-order streams, and also naturally have higher sinuosity. Originally, this geomorphology allowed for the deposition of sediment on alluvial bars and the formation of floodplains in wider valleys. These riverine alluvial substrates support riparian vegetation dominated by willow (e.g., *Salix exigua* Nutt., *S. melanopsis* Nutt.), black cottonwood (*Populus balsamifera* L. ssp. *trichocarpa* (Torr. & A. Gray ex Hook.) Brayshaw), and alder. However, major upstream dams on both of these rivers have reduced peak flows and prevented these rivers from forming new alluvial bars necessary for sustaining native riparian vegetation, especially black cottonwood forests. Combined with flood control levees, these are now more stable river systems with more homogenous aquatic and riparian communities and narrowed floodplains.

Unnamed Creek in the Palouse Prairie, stream with no riparian habitat in foreground, Palouse Prairie remnant in the background © 2015 Tiege Ulschmid

Target Viability

Poor. The riverine systems of the Palouse are generally in poor condition. Many have been heavily altered to accommodate anthropogenic uses including, but not limited to, human development (e.g., hydroelectric production, flood control, urbanization, transportation systems) and agricultural production. Alterations typically include straightening of tributaries in the upper watersheds to pass water and reduce flooding potential, removal of riparian buffers that would protect rivers from pollutants, and removal of in-stream complexity. These alterations typically result in heavy incision downstream, loss of stream complexity that would benefit fish species, loss of floodplain connectivity, and higher potential of pollutants mobilizing down waterways. Alterations have the potential to negatively impact both resident and anadromous fish populations that reside in the riverine systems through direct habitat loss as well as habitat degradation from decreases in water quality and quantity (e.g., hydroelectric production, flood control, urbanization, transportation systems), and inputs from agricultural and other synthetic pollution.

Spotlight Species of Greatest Conservation Need: Anadromous Fish (Steelhead, fall-run and spring/summer-run Chinook Salmon) (cross reference Idaho Batholith Section)

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

Very High rated threats to Riverine–Riparian Forest & Shrubland in the Palouse Prairie

Agricultural runoff

Modern farming practices rely on widespread use of broad spectrum herbicides, pesticides, and fertilizers to manage crop production in the Palouse. The 2000 National Water Quality Inventory, reported that NPS pollution was the leading source of water quality impacts on surveyed rivers and lakes, the second largest source of impairments to wetlands, and a major contributor to contamination of surveyed estuaries and groundwater (EPA, 2014). Agricultural activities that cause NPS pollution include, but are not limited to, plowing too often or at the wrong time, and improper, excessive, or poorly-timed application of pesticides, irrigation water, and fertilizer (EPA, 2014).

Objective	Strategy	Action(s)	Target SGCNs
Reduce nonpoint pollutants from agricultural fields including sediment, nutrients, fungicides, and pesticides.	Promote responsible timing and application of fertilizers, herbicides, and pesticides.	Promote precision agriculture to reduce total amount of chemicals applied. Educate land managers on proper timing and amounts of chemicals through Integrated Pest Management techniques specific to the Palouse.	Pacific Lamprey Steelhead (Snake River Basin DPS) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad
	Create buffers to capture agricultural runoff	Promote agricultural practices that reduce overall possibility of sediment delivery into wetlands.	

Objective	Strategy	Action(s)	Target SGCNs
	and leaching.	Use Conservation Districts, NRCS, and FSA programs to create natural riparian buffers around wetlands and linked water sources. Promote the use of a variety of native species in buffers; a mix of trees, shrubs, grasses, forbs, and sedges would be best for wildlife and the variety of rooting depths would capture the most pollutants and prevent them from entering the stream. Use Conservation Districts and USDA programs to build sediment basins in areas that have captured soil erosion to contain agricultural pollution runoff to the site.	

Changes in precipitation & broad-scale hydrologic regimes

Precipitation patterns in the region appear to be shifting toward a wetter, rainfall-dominated regime in late winter and spring, possibly increasing the number and severity of rain-on-frozen-ground events. This also leads to a drier spring and summer because diminished snowpacks have limited ability to charge a watershed throughout the year. Loss of year-round groundwater recharge can result in drought conditions for native plants, which allows weeds to invade. Less groundwater recharge may decrease total available slope and Depressional Wetlands available to continually charge a watershed and support stream base flows long after precipitation stops in a given annual rain cycle. Rain-on-snow events and lack of holding capacity in upper watersheds increases flashiness (i.e., higher spring runoff highs, and lower summer run off lows) and decreases late season water infiltration. Less available water leads to less available habitat for fish species, as well as potentially increases the likelihood of predation and less favorable or detrimental living conditions, including dissolved oxygen, increased water temperatures, and decreased rearing habitat for certain fish species. Within areas of intense anthropogenic alterations, little native vegetation remains that would aid in streambank stability, provide root structure to improve soil-moisture holding capacity, and provide shade over adjacent streams. The excessive removal of this streamside habitat is coupled with straightening and ditching of the watershed, thereby decreasing the amount of moisture-holding capacity and increasing the flashiness of the overall watershed. This lends itself to excessive flow events that scour banks making reestablishment of new vegetation difficult.

Objective	Strategy	Action(s)	Target SGCNs
Restore hydrologic function and restore riparian habitats.	Create partnerships interested in collaborative restoration. Reduce the amplitude of hydrologic flow and erosion and sedimentation	Strategically identify important, sensitive, and critical areas that have been damaged or destroyed. Remove drain tiles in agricultural areas. Restore native habitat on the periphery of croplands to slow snowmelt. Reconnect streams into historic channels and floodplains.	Pacific Lamprey Steelhead (Snake River Basin DPS) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring/summer-run ESU)

Objective	Strategy	Action(s)	Target SGCNs
	rates. Raise water table for incised and channelized streams.	Restore stream meanders. Restore and replant native riparian habitats along streams. Use American Beaver to accomplish hydrologic and habitat restoration. Encourage acceptance and tolerance of beavers through education and outreach. Provide tools/equipment for landowners to facilitate living with beavers (e.g., chicken wire to protect trees, information on how to minimize flooding, etc.).	Western Toad

High rated threats to Riverine–Riparian Forest & Shrubland in the Palouse Prairie

Improper grazing management

Grazing practices that result in the overuse of available forage can have many negative impacts on soil health, water quality, and wildlife habitat. Often habitat degradation, such as weed encroachment and loss of desired perennial vegetation, results in the loss of plant diversity. Changes in plant species composition (i.e., encroachment of noxious or invasive plants and loss of desirable vegetation) often results in the loss of both wildlife and livestock use. Nutrient loading by livestock into riparian systems can be detrimental to resident fish and amphibian populations. Therefore, water quality can be greatly reduced by having livestock in or adjacent to riparian areas. Adopting alternative grazing regimes through lowered stocking rates, grazing intensity, timing of grazing, and size of pastures can all help to decrease loss of habitat quality for wildlife and livestock.

Objective	Strategy	Action(s)	Target SGCNs
Restore hydrologic function and restore riparian habitats.	Reduce impacts of grazing on riparian systems.	Partner with landowners to develop grazing management plans that minimize negative impacts (e.g., bank erosion, increased sediment loads) on riparian zones and stream quality.	Pacific Lamprey Steelhead (Snake River Basin DPS) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad

Road development

The Palouse Prairie's topography lends itself to roads that are often built along creeks and up draws, the same areas that riparian and wetland habitats can be found. Develolpment of new roads often leads to habitat removal through drainages to accommodate the road. Current roads may be poorly designed and increase sediment production to streams. Roads may impede or disrupt stream flows due to dysfunctional culverts or undersized bridges.

Objective	Strategy	Action(s)	Target SGCNs
Improve water quality and preserve riparian habitat.	Minimize sedimentation and erosion due to roads. Ensure hydrologic processes are maintained or restored.	Use proper planning and engineering techniques to ensure that adverse effects of new roads are minimized. Create partnerships to evaluate current road structure, culverts, and bridges to identify where road removal or repair can improve water quality and hydrologic function.	Pacific Lamprey Steelhead (Snake River Basin DPS) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad

Invasive aquatic, riparian & invertebrate species

Due to the loss of hydrologic conditions in and around riparian areas, nonnative, invasive, and noxious plant species are able to colonize areas that were historically occupied by native species. Typically, native species, once excluded, are unable to gain a foothold and recover. Degraded areas have reduced habitat diversity and are of minimal value to wildlife. On the Palouse Prairie, reed canarygrass is a pervasive threat to wetland systems. Invasive invertebrate species have the potential to seriously degrade habitat quality for wildlife and cause severe economic damage.

Objective	Strategy	Action(s)	Target SGCNs
Minimize the spread of aquatic invasive plant and invertebrate species.	Improve education about invasive species, how they are spread, and what is at risk. Continue and expand monitoring and control of aquatic invasive species.	Partner with ISDA on ongoing educational programs. Expand message into new demographics (e.g., OHV enthusiasts, hunting regulations, public service announcements). Partner with ISDA on ongoing education program. Continue boat wash stations.	Pacific Lamprey Steelhead (Snake River Basin DPS) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring/summer-run ESU) Western Toad

Out of basin passage issues for anadromous fish species

Dams pose challenges to upstream and downstream migration of anadromous fish species to and from their spawning and rearing areas.

Objective	Strategy	Action(s)	Target SGCNs
Provide connectivity between spawning and rearing habitat for anadromous fish.	Enhance fish passage.	Continue work with federal, state, and tribal organizations on current fish passage and hydrosystem management issues.	Pacific Lamprey Steelhead (Snake River Basin DPS) Chinook Salmon (Snake River fall-run ESU) Chinook Salmon (Snake River spring/summer-run ESU)

Species designation, planning & monitoring

In addition to conservation actions to address specific threats, some species require inventory and monitoring to assess their current status and distribution in Idaho. As such, we identify needs for 9 species in the section below and identify appropriate actions.

Western Pearlshell

Approximately 7% of the known Idaho distribution of this aquatic bivalve is found within the Palouse Prairie. Little is known about the actual distribution within the section, but it is closely associated with high-quality waters primarily in rivers and large streams. Further study is required to learn more about its actual distribution and potential threats.

Nez Perce Pebblesnail

This newly described species was discovered as a result of recent molecular analyses (Hershler and Liu 2012). Because of its recent discovery, its distribution and ecology are poorly known. It is believed to occur in the lower portions of the Clearwater, Snake, and Salmon rivers and their associated tributaries.

3 Mayfly Species

Three species of stream-dwelling mayflies that occur in the Palouse Prairie Section have limited distributions that warrant inventory work. *Paraleptophlebia traverae* historically occurred in the Grangeville area, but has not been found since the 1930s. It is potentially extinct. *P. falcula* is known from a few observations in the headwater streams of the Palouse River around Laird Park. *Parameletus columbiae* has not been found in Idaho since 1965; it historically occurred in the Bitterroot Mountains Section as well.

Cascades Needlefly

Known from a small number of locations in Clearwater and Latah counties, Cascades Needlefly is a refugium species from the last ice age. This species is also found in Oregon and Washington and is associated with seeps and springs with cold, clean water.

Snowfly Species

Three species of stream-dwelling snowflies that occur in the Palouse Prairie Section have limited distributions that warrant inventory work. The Idaho Snowfly is known from a handful of locations in Latah County. The distribution of the Straight Snowfly also appears to be limited to a handful of locations in Latah County. Both species have not been found since the 1980s and were petitioned for listing under ESA in 2010 (Xerces Society 2010). The Palouse Snowfly is believed to have a somewhat wider distribution, occuring in southeast Washington, northeast Oregon, and north-central Idaho. It is a recently-described species that is thought to be associated with relatively pristine, gravel-based streams and rivers (Zegner and Baumann 2004).

Umatilla Willowfly

The Umatilla Willowfly occurs in Latah County in Idaho and has also been found in northeast Oregon. It is known to occur in creeks and small rivers but has rarely been reported, collected as part of invertebrate sampling efforts.

Objective	Strategy	Action(s)	Target SGCNs
Increase our current understanding of the status of poorly-documented stream invertebrates.	Determine the true distribution and rarity of poorly-documented stream invertebrates.	Revisit historical sites for species that have not been detected in >20 years in Idaho, to see if the species is still present. Where locally appropriate, expand existing fieldwork to include aquatic invertebrates.	Nez Perce Pebblesnail A Mayfly (*Paraleptophlebia traverae*) A Mayfly (*Paraleptophlebia falcula*) A Mayfly (*Parameletus columbiae*) Cascades Needlefly Idaho Snowfly Palouse Snowfly Straight Snowfly Umatilla Willowfly Western Pearlshell

Palouse Prairie Section Team

An initial version of the Palouse Prairie Section project plan was completed for the 2005 Idaho State Wildlife Action Plan (formerly Comprehensive Wildlife Conservation Strategy). A small working group developed an initial draft of the Section Plan, which was then reviewed by a wider group of partners and stakeholders during a 2-day workshop held at the IDFG Panhandle Regional Office, Coeur d'Alene, Idaho in February 2015. Since then, we have continued to work with key internal and external stakeholders to improve upon the plan. Individuals, agencies, and organizations involved in this plan are listed in Table 10.3.

Table 10.3 Individuals, agencies, and organizations involved in developing this plan [a]

First name	Last name	Affiliation
Joel	Sauder*	Idaho Department of Fish and Game, Clearwater Region
Tiege	Ulschmid*	Idaho Department of Fish and Game, Clearwater Region
Joshua	White*	Idaho Department of Fish and Game, Clearwater Region
Juliet	Barenti	US Fish and Wildlife Service
Brett	Bowersox	Idaho Department of Fish and Game, Clearwater Region
Terry	Cundy	Potlatch Forest Holdings, Inc.
Rita	Dixon*	Idaho Department of Fish and Game, Headquarters
Kas	Dumroese	USDA Forest Service, Rocky Mountain Research Station, Moscow Forestry Sciences Laboratory
Brenda	Erhardt	Latah Soil and Water Conservation District
Cristy	Garris	Foundations of Success
Terry	Gray	Independent Consultant
Clay	Hayes	Idaho Department of Fish and Game, Clearwater Region
Trish	Heekin	Latah Soil and Water Conservation District
Jacie	Jensen	Farmer, Native Seed Producer
Chris	Johnson	Natural Resources Conservation Service
Craig	Johnson	Bureau of Land Management
Juanita	Lichthardt	Idaho Department of Fish and Game, Headquarters
Andrew	Mackey	Idaho Department of Fish and Game, Clearwater Region
Kristen	Pekas	Idaho Department of Fish and Game, Clearwater Region
Lynn	Rasmussen	Nez Perce Soil and Water Conservation District
Derrick	Reeves	Idaho Department of Lands
Dave	Skinner	Retired Plant Materials Center
Leona	Svancara	Idaho Department of Fish and Game, Headquarters

First name	Last name	Affiliation
Kevin	Traylor	Natural Resources Conservation Service
Amy	Trujillo	Executive Director, Palouse Land Trust

[a] Apologies for any inadvertent omissions.
[b] An asterisk “*” denotes team leader(s) and contact point if you would like to become involved in this work.

11. Northwestern Basin and Range Section

Section Description

The Northwestern Basin and Range Section lies within the Intermountain Semi-Desert Province and covers portions of northern Nevada, south-central Oregon, southeastern Idaho, and northern Utah. In Idaho, the section is represented by 2 distinct segments, which cover 14,770 km², or 6.8% of the land area in the state (Fig. 11.1, Fig. 11.2). The larger segment extends from the southern Bruneau Canyon east to the crest of the Bannock Range near Pocatello, then south to the Malad Valley. The sinuous northern boundary represents the margins of the Snake River Plain to the north; the southern boundary is the state border, which separates Idaho from the adjacent Nevada and Utah. The smaller segment encompasses Basin and Range topography from the mouth of the Snake River Canyon north of Idaho Falls, south through Soda Springs to approximately the Gentile Valley, north and west through the Portneuf Range, and north along the Snake River Plain.

Albion Mountains, City of Rocks National Reserve, Idaho © 2014 Jessica Irwin

The Basin and Range is dominated by 2 landforms: the series of north–south trending, nearly parallel mountain ranges, and the interposing broad, flat basins that together provide the region's descriptive name. The characteristic wedge-shaped mountains result from uplifting along fault zones, often forming steep-fronted escarpments on the upthrown aspects, as in the Jim Sage and Cotterel mountains bordering the Raft River Valley. The deep, sediment-filled basins are products of episodic glaciation, volcanism, inundation, and the persistent weathering of exposed mineral surfaces. Alluvial fans are common at the mouths of canyons and are major contributors of sediment. Rolling hills and deeply-dissected plateaus are other common landforms. In Idaho, elevation ranges from approximately 1,300 m (4,265 ft) in basin locations to >3,150 m (10,335 ft) at Cache Peak, the highest mountain south of the Snake River.

The Northwestern Basin and Range climate is described as semiarid with cold, wet winters, wet springs, and hot summers. Maritime weather systems dominate during winter and spring; summer weather is influenced by continental air masses. Most precipitation occurs from fall through spring, and summers are typically dry. Annual precipitation ranges from approximately 20 cm (8 in) in the lowest basins to >50 cm (20 in) in the higher mountains. Most precipitation falls as snow during the winter. Monsoonal moisture and associated thunderstorms provide intermittent and often heavy rainfall during summer. The growing season is elevation-dependent, ranging from 30 to 140 days (Ross and Savage 1967).

The Northwestern Basin and Range is rugged and geographically isolated, particularly the canyon and desert locations in Owyhee County, and the mountain ranges in Twin Falls and Cassia counties. Mountains contain a mixture of state and federal ownership and little private property. Livestock grazing, mining, and outdoor recreation are the principal land uses. Most private property is located in productive agricultural areas, notably the Arbon and Gem valleys and in the disjunct eastern segment. Agriculture is by far the principal economic activity and clustered rural development has followed the road and rail corridors needed to support commerce. Towns in the section are small, originating as stage stops or resting locations for emigrants traveling west. The advent of industrial-scale irrigation at the beginning of the 20th century allowed these settlements to become major agricultural producers. Mining occurs in isolated locations throughout the section, but the scale and economic contributions from this industry are overshadowed by agriculture. Phosphate mining however, is the most important economic activity in southeast Idaho, which is centered around Soda Springs, the largest city in the section with just over 3,000 residents (2010 census).

Most surface water in the Northwestern Basin and Range occurs in small mountain streams. Discharge from mountain basins is highly variable and most surface water seeps into mountain-front alluvial fans before reaching the basin floors (Chambers et al. 2011). Where flows are sufficient to overcome infiltration losses, surface water is appropriated for agriculture. Groundwater pumping is used to supplement agriculture where surface water is limiting. Many springs have been developed exclusively for livestock use. Notable river systems include the Bruneau and Jarbidge in Owyhee County and the Blackfoot, Bear, and Portneuf rivers in Bingham and Caribou counties. The Idaho portion of the Jarbidge River was designated as "Wild" in 2009, and as critical habitat for Bull Trout (*Salvelinus confluentus*) in 2010. Independence Lakes, in the upper Green Creek drainage, is the only system of natural lakes in the entire Southern Division of the Sawtooth National Forest (Sawtooth NF) (USFS 2012). Blackfoot Reservoir is the only large reservoir in the section, supplying the Fort Hall Indian Reservation with irrigation water. Most surface waters drain to the Snake River; a few streams, including the Bear and Malad rivers, drain to interior basins in Nevada and Utah. Most streams on the Sawtooth NF are rated as "functioning at risk" or "not functioning appropriately" (USFS 2012). Despite the intermittent nature of many of these streams, strong populations of Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*) still occur where suitable habitat exists. The highest concentration of impaired waters, as defined by Section 303(d) of the Clean Water Act, occurs in the Arbon Valley.

Several habitat types have been selected as conservation targets for their value to wildlife and human populations. Riverine–Riparian Forest & Shrubland supports a disproportionate fraction of the total biodiversity in the Northwestern Basin and Range. Although essential for aquatic organisms, these systems also support diverse avian, bat, terrestrial mammal, and invertebrate communities as well as livestock. Stream corridors serve as migration routes for ungulates that move between summer and winter ranges. The character of riparian areas varies widely, influenced by topography, aspect, and elevation. Vegetation may consist of deciduous trees and shrubs such as willow (*Salix* L.), quaking aspen (*Populus tremuloides* Michx.), and/or cottonwood (*Populus* L.) or herbaceous growth characterized by grasses, emergent macrophytes, and shrubs (SAIC 2013). Assessment of riparian areas on the Sawtooth NF indicates that many are considered to be functioning at risk (USFS 2012). Primary threats include invasive species, improper livestock grazing management, dispersed recreation, fire exclusion, and water diversions.

The Northwestern Basin and Range in Idaho is dominated by big sagebrush (*Artemisia tridentata* Nutt.) shrubland and steppe habitat in basin, foothill, and arid mountain locations, except where displaced by agriculture or seeded perennial grasslands. It is a primary conservation target and supports a broad variety of game, nongame, and species of greatest conservation need (SGCN), many of which are considered sagebrush obligates. Key species include Greater Sage-Grouse (hereafter Sage-Grouse, *Centrocercus urophasianus*), Bighorn Sheep (*Ovis canadensis*), Pygmy Rabbit (*Brachylagus idahoensis*), and Grasshopper Sparrow (*Ammodramus savannarum*). Most of the sagebrush steppe in the Section lies within the Idaho Southern Greater Sage-Grouse Conservation Area; the small segment west of the Jarbidge River lies within the Idaho West Owyhee Conservation Area (see Attachment 1, Fig. 2-14, Idaho and Southwestern Montana Greater Sage-Grouse Approved RMP Amendment, hereafter Idaho and Southwestern Montana GRSG ARMPA; BLM 2015). The entire area includes a mix of designated Priority (PHMA), Important (IHMA), and General (GHMA) Greater Sage-Grouse Habitat Management Areas (Fig. 11.3), as defined by the Idaho and Southwestern Montana GRSG ARMPA (see Attachment 1, Fig. 2-1; BLM 2015). The principal conservation issues affecting sagebrush are generally disturbance related and include altered fire regimes, an increasing prevalence of invasive species, and fragmentation. The extent and magnitude of these problems make restoration measures costly and difficult to implement.

Pinyon–Juniper Woodland in the City of Rocks National Reserve, Idaho © 2011 Lynn Kinter

High-elevation forest and woodland habitats occur mainly on north aspects above 2,000 m, where precipitation is sufficient to support tree growth. Forests are characterized by a mixture of conifers including Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco), lodgepole pine (*Pinus contorta* Douglas ex Loudon), limber pine (*Pinus flexilis* James), and subalpine fir (*Abies lasiocarpa* [Hook.] Nutt.). Quaking aspen (*Populus tremuloides* Michx.), an important and declining habitat type, is also present. Mountain shrub communities comprised of mountain big sagebrush (*A. t.* subsp. *vaseyana* [Rydb.] Beetle), chokecherry (*Prunus virginiana* L.), Saskatoon serviceberry (*Amelanchier alnifolia* [Nutt.] Nutt. ex M. Roem.), and common snowberry (*Symphoricarpos albus* [L.] S.F. Blake) are common and open grasslands occur on wide ridgetops. These habitats are important to many endemic, at-risk, and SGCN species including the endemic South Hills population of Red Crossbill (*Loxia curvirostra*). Primary conservation issues include habitat loss, shifting precipitation patterns, altered fire regimes, and fragmentation resulting from a variety of human activities.

Pinyon–juniper–mountain mahogany woodland & savanna is a prominent woodland habitat complex and conservation target in the Northwestern Basin and Range. Woodlands transitionally occur between xeric, low-elevation shrubsteppe habitats and more mesic coniferous forests. They exhibit lower tree heights and more open canopies than forested areas. Rocky Mountain juniper (*Juniperus scopulorum* Sarg.) and Utah juniper (*Juniperus osteosperma* [Torr.]), although native, have been managed as invasive species on public and private lands for >60 years and large areas have been eradicated to promote grasslands and shrublands, primarily for livestock forage. Juniper encroachment is frequently implicated in the loss of sagebrush and other mountain shrub communities as well as population declines of sagebrush-dependent species. Pinyon–juniper woodlands also support a diverse assemblage of birds, particularly in winter, when berries and seeds provide an important source of food. Future management will require balancing the habitat needs of SGCN from both pinyon–juniper and sagebrush in a climate predicted to favor further expansion of juniper.

Curl-leaf mountain mahogany (*Cercocarpus ledifolius* Nutt.) is exceptionally long-lived, but stands may be seral to conifers under favorable precipitation cycles. The species is not fire-tolerant and expanded its range during the 20th century as a result of fire suppression. Curl-leaf mountain mahogany is palatable to Mule Deer (*Odocoileus hemionus*) and Elk (*Cervus canadensis*) and is also consumed by livestock. It provides important year-round cover for ungulates and nesting and foraging habitat for a variety of birds. Prolonged drought, shifting fire regimes, and invasive species compose the primary conservation issues affecting the extent and quality of this conservation target.

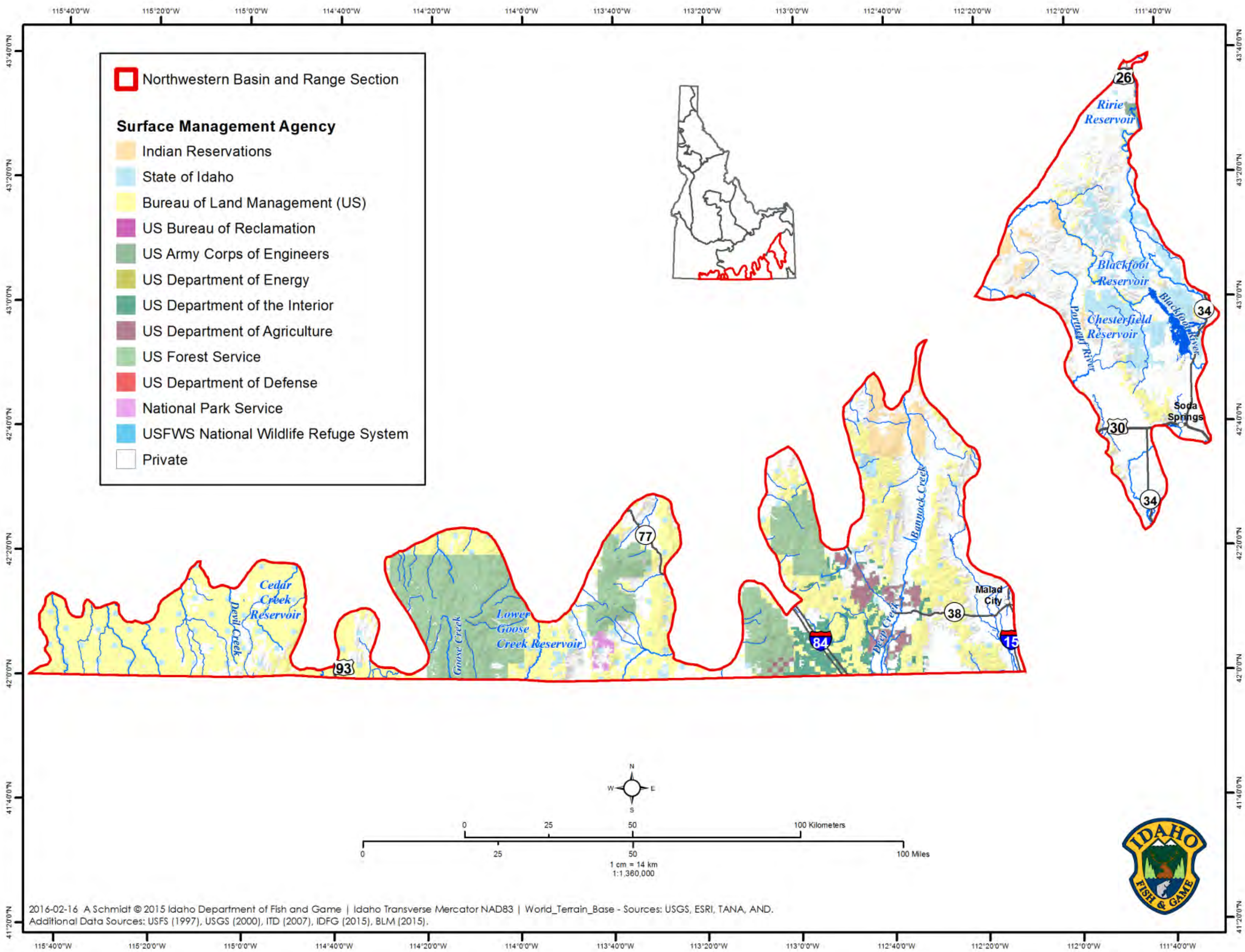


Fig. 11.1 Map of Northwestern Basin and Range surface management

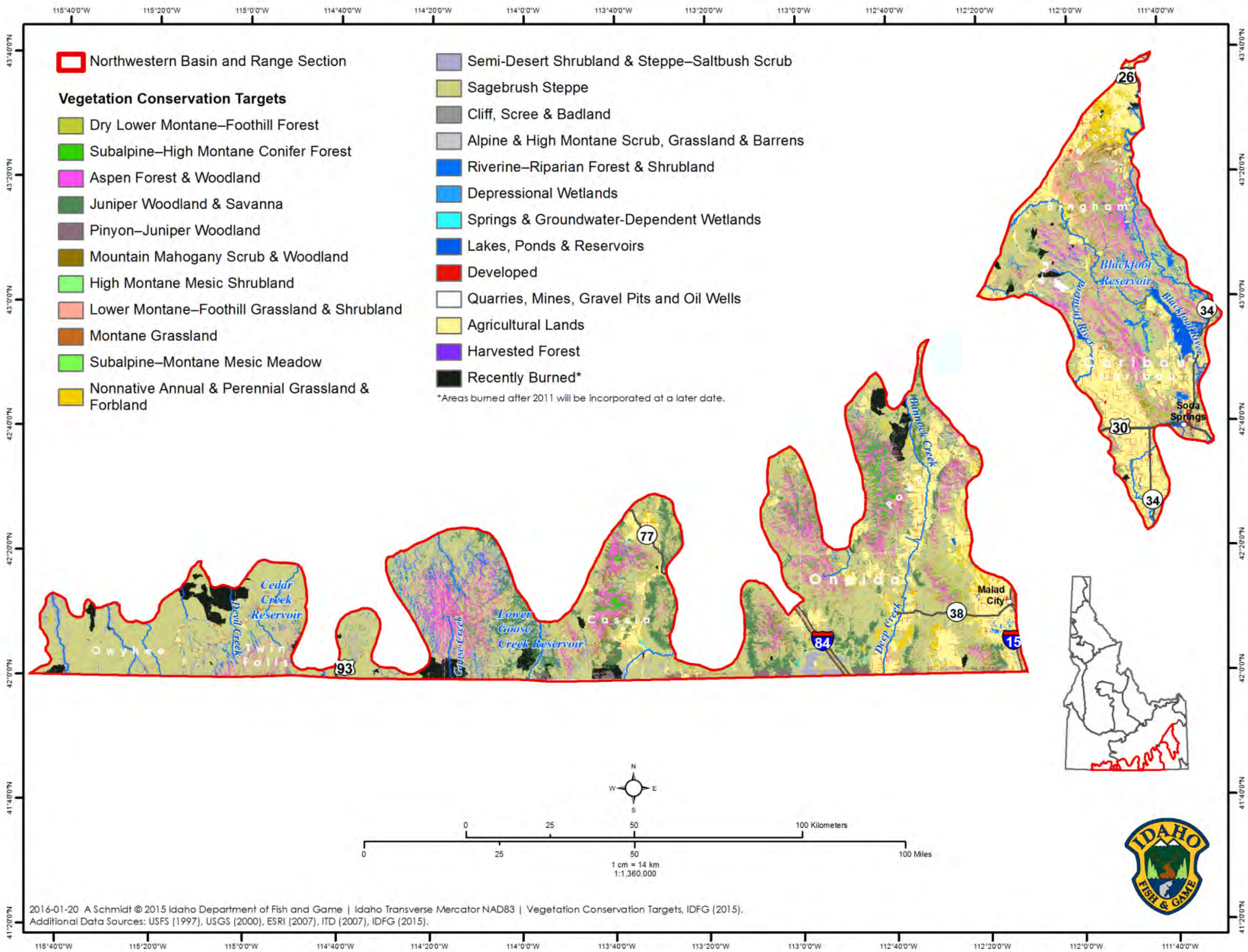


Fig. 11.2 Map of Northwestern Basin and Range vegetation conservation targets

Conservation Targets in the Northwestern Basin and Range

Successful conservation of wildlife requires that we implement measures to protect, preserve, improve, or restore habitat at a meaningful scale. The landscape is frequently the most efficient scale for maximizing conservation effort as multiple species usually realize some benefit. We identified 5 habitat targets (4 terrestrial, 1 aquatic) that represent much of the biological diversity in Idaho's Northwestern Basin and Range (Table 11.1). These habitats support unique assemblages of SGCN, identified here as nested targets, in addition to a variety of game and nongame wildlife (Table 11.2). We assess viability for each target by evaluating current condition and factors that impact habitat quality, then establish management objectives, strategies, and actions for guiding landscape-scale conservation measures. We acknowledge the limited role that Idaho Department of Fish and Game (IDFG) has in implementing those measures, as our agency manages only a small amount of land, but it is our imperative to communicate priorities for wildlife and wildlife habitat to those agencies for which conservation is mandated.

We determined that at least 2 taxa—Colonial Waterbirds and Bighorn Sheep (also addressed in a separate management plan at http://fishandgame.idaho.gov/public/wildlife/planBighorn.pdf)—warrant additional conservation measures beyond those focused solely on habitat. These species are afforded conservation target status and discussed separately. We summarize current management direction, priorities, and conservation actions outlined in IDFG management and/or other applicable plans.

Table 11.1 At-a-glance table of conservation targets in the Northwestern Basin and Range

Target	Target description	Target viability	Nested targets (SGCN)	
Sagebrush Steppe	All big sagebrush habitat types with an emphasis on areas identified as priority sagebrush habitat for the Sage-Grouse. Shrub steppe is typically dominated by perennial grasses (>25% cover) with open to moderately dense basin big sagebrush, Wyoming big sagebrush, threetip sagebrush, or antelope bitterbrush in the overstory.	*Fair.* Sagebrush Steppe is reduced from its historical extent. Much of the remaining habitat is fragmented, impacted by a variety of human activities, and degraded by invasive weeds. Fire regimes have been altered by invasive annual grasses, producing uncharacteristically large range fires. In some areas, juniper encroachment is negatively impacting sagebrush habitat.	*Tier 1*	Greater Sage-Grouse Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee
			Tier 2	Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Bighorn Sheep
			Tier 3	Sandhill Crane Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Hunt's Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*)

Target	Target description	Target viability	Nested targets (SGCN)	
				Monarch
Pinyon–Juniper–Mountain Mahogany Woodland & Savanna	Includes Utah juniper, Rocky Mountain juniper and/or or singleleaf pinyon. Singleleaf pinyon is restricted to extreme southern Idaho. Elsewhere juniper occurs singly or in mixed stands. All species generally occur between 1,200 and 2,300 m (3,900 and 7,500 ft) and are often associated with a major shrub component. Curl-leaf mountain mahogany habitats occur on the dry and rocky soils of mountain slopes, plateaus, and ridges at elevations ranging from 1,200 to 2,600 m (3,937 to 8,530 ft).	*Good* (Pinyon–Juniper). Abundance has been increasing rangewide. Climate modeling suggests further expansion of this community type as the region warms and precipitation patterns shift. Prolonged drought, altered fire regimes, and invasive nonnative species are changing the dynamics of this system. Juniper is frequently implicated in reducing the extent and quality of sagebrush and other mountain shrub communities, and management activities favoring shrub habitat may reduce the extent of these woodlands.	*Tier 1* *Tier 2* *Tier 3*	Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Golden Eagle Pinyon Jay Bighorn Sheep Short-eared Owl Common Nighthawk Hunt's Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*)
Subalpine–High Montane Conifer Forest	These are the matrix forests of the upper montane and subalpine zone, occurring from 900 m (2,950 ft) up to the subalpine–alpine transition. They are comprised of evergreen conifers, broad-leaved cold-deciduous trees, and isolated cold-deciduous conifer stands. Characteristic trees include subalpine fir, lodgepole pine, limber pine, and quaking aspen.	*Fair.* Extent of this habitat is reduced from historical levels. Remaining habitat is fragmented and has been altered to some degree by a legacy of fire suppression and other human activities. Stands are more susceptible to disease and insect outbreaks and are at an increased risk from wildfire due to changing climate patterns. Climate modeling predicts these trends will continue in the future.	*Tier 2* *Tier 3*	Western Toad Red Crossbill (South Hills population) Silver-haired Bat Hoary Bat Townsend's Big-eared Bat Little Brown Myotis Kriemhild Fritillary
Managed Perennial Grasslands	Managed perennial grasslands and NRCS-enrolled properties, e.g., Conservation Reserve Program (CRP) and State Acres for	*Good.* Acreages enrolled in CRP and SAFE programs in most of the section are at the maximum acreage allowed by	*Tier 1*	Greater Sage-Grouse Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee

Target	Target description	Target viability	Nested targets (SGCN)	
	Wildlife Enhancement (SAFE) lands.	law or reasonably expected to be enrolled. An increased focus on native plant species seed mixes in SAFE (and to some extent CRP) has improved stand quality. Finally, this system supports desired indicator species (i.e., Sharp-tailed Grouse).	*Tier 2*	Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl
			Tier 3	Sandhill Crane Short-eared Owl Common Nighthawk Grasshopper Sparrow Hunt's Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*) Monarch
Riverine–Riparian Forest & Shrubland	Rivers and streams, including all associated riparian habitats. Includes the Jarbidge, Blackfoot, and Bear River systems and their tributaries and all other 1st- through 4th-order streams in the section.	*Fair.* Many streams in the section are classified as 303(d) (impaired waters) by the Idaho Department of Environmental Quality. Riverine habitats face substantial threats from improper livestock grazing; altered fire regimes; dams, diversions and channel degradation; poor water quality; altered precipitation and temperature regimes; and loss of riparian habitat. Land use practices suggest current trends will continue.	*Tier 1*	Bear Lake Springsnail
			Tier 2	Northern Leatherside Chub Western Toad Northern Leopard Frog Western Grebe Clark's Grebe American White Pelican Caspian Tern Rocky Mountain Duskysnail
			Tier 3	Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis A Miner Bee (*Hesperapis kayella*) A Caddisfly (*Eocosmoecus schmidi*) Snake River Pilose Crayfish California Floater
Colonial Waterbirds	Colonial Waterbirds nest at Blackfoot Reservoir on 2–3 islands and within emergent vegetation along the shoreline. Threats include water level fluctuations, competition with other species, and disturbance from management and recreational activities.	*Fair.* Viability of the colonial waterbird population at Blackfoot Reservoir is fair because of a downward trend for some species (e.g., pelican and tern), lack of data for others (grebes), and ongoing management activities on the nesting island that may negatively impact nontarget SGCN.	Tier 2	Western Grebe Clark's Grebe American White Pelican California Gull Caspian Tern
			Tier 3	Ring-billed Gull
Bighorn Sheep	Small populations occupy the Bruneau–	*Good.* Jim Sage PMU contains an	*Tier 2*	Bighorn Sheep

Target	Target description	Target viability	Nested targets (SGCN)
	Jarbidge canyons and the Jim Sage Mountains. In addition to habitat threats, Bighorn Sheep also face threats from disease transmission from domestic sheep and goats, and disturbance from human activities during critical life cycle stages.	estimated 80–100 individuals. Based on habitat models, the population is estimated to be at or near carrying capacity. The South Hills PMU contains <15 individuals and viability is poor due to low populations, conflicts with domestic livestock, and habitat concerns.	

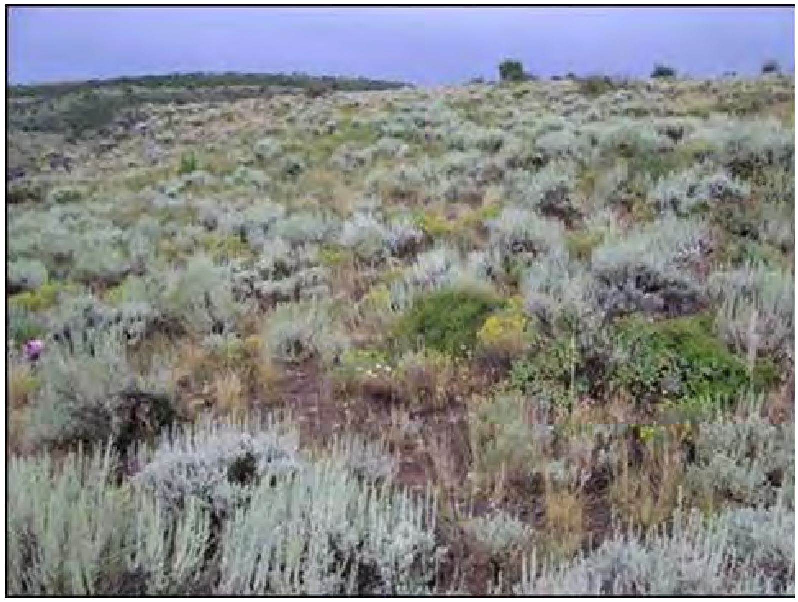
Table 11.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Northwestern Basin and Range

Taxon	Conservation targets: Subalpine–High Montane Conifer Forest	Pinyon–Juniper–Mountain Mahogany Woodland & Savanna	Managed Perennial Grasslands	Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Colonial Waterbirds	Bighorn Sheep
RAY-FINNED FISHES							
Northern Leatherside Chub (*Lepidomeda copei*)[2]					X		
AMPHIBIANS							
Western Toad (*Anaxyrus boreas*)[2]	X				X		
Northern Leopard Frog (*Lithobates pipiens*)[2]					X		
BIRDS							
Greater Sage-Grouse (*Centrocercus urophasianus*)[1]			X	X			
Sharp-tailed Grouse (*Tympanuchus phasianellus*)[2]			X	X			
Western Grebe (*Aechmophorus occidentalis*)[2]					X	X	
Clark's Grebe (*Aechmophorus clarkii*)[2]					X	X	
American White Pelican (*Pelecanus erythrorhynchos*)[2]					X	X	
Ferruginous Hawk (*Buteo regalis*)[2]			X	X			
Golden Eagle (*Aquila chrysaetos*)[2]		X	X	X			
Sandhill Crane (*Grus canadensis*)[3]			X	X	X		
Long-billed Curlew (*Numenius americanus*)[2]			X	X			
Ring-billed Gull (*Larus delawarensis*)[3]						X	
California Gull (*Larus californicus*)[2]						X	
Caspian Tern (*Hydroprogne caspia*)[2]					X	X	
Burrowing Owl (*Athene cunicularia*)[2]			X	X			
Short-eared Owl (*Asio flammeus*)[3]		X	X	X			
Common Nighthawk (*Chordeiles minor*)[3]		X	X	X			
Pinyon Jay (*Gymnorhinus cyanocephalus*)[2]		X					
Sage Thrasher (*Oreoscoptes montanus*)[2]				X			
Sagebrush Sparrow (*Artemisiospiza nevadensis*)[2]				X			
Grasshopper Sparrow (*Ammodramus savannarum*)[3]			X	X			
Red Crossbill (South Hills population) (*Loxia curvirostra*)[2]	X						
MAMMALS							
Pygmy Rabbit (*Brachylagus idahoensis*)[2]				X			
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]	X			X	X		
Silver-haired Bat (*Lasionycteris noctivagans*)[2]	X						
Hoary Bat (*Lasiurus cinereus*)[2]	X						
Little Brown Myotis (*Myotis lucifugus*)[3]	X				X		
Bighorn Sheep (*Ovis canadensis*)[2]		X		X			X

Taxon	Subalpine–High Montane Conifer Forest	Pinyon–Juniper–Mountain Mahogany Woodland & Savanna	Managed Perennial Grasslands	Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Colonial Waterbirds	Bighorn Sheep
	Conservation targets						
BIVALVES							
California Floater (*Anodonta californiensis*)[3]					X		
GASTROPODS							
Rocky Mountain Duskysnail (*Colligyrus greggi*)[2]					X		
Bear Lake Springsnail (*Pyrgulopsis pilsbryana*)[1]					X		
INSECTS							
Hunt's Bumble Bee (*Bombus huntii*)[3]		X	X	X			
Morrison's Bumble Bee (*Bombus morrisoni*)[1]		X	X	X			
Western Bumble Bee (*Bombus occidentalis*)[1]		X	X	X			
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]		X	X	X			
A Mason Bee (*Hoplitis producta subgracilis*)[3]		X	X	X			
A Miner Bee (*Hesperapis kayella*)[3]					X		
Kriemhild Fritillary (*Boloria kriemhild*)[3]	X						
Monarch (*Danaus plexippus*)[3]			X	X			
A Caddisfly (*Eocosmoecus schmidi*)[3]					X		
CRAYFISH							
Snake River Pilose Crayfish (*Pacifastacus connectens*)[3]					X		

Target: Sagebrush Steppe

Sagebrush steppe is the dominant habitat in the Northwestern Basin and Range and is a priority conservation concern as it contains much of the section's biological diversity. It is distinguished by an overstory of sagebrush (*Artemisia* L.) and an understory of perennial grasses and forbs. It occurs between the salt desert communities in the lowest basins and alpine meadows and forests in mountainous areas (Miller and Eddleman 2001). Sagebrush steppe is structurally and compositionally diverse and occurs over a wide range of climatic and physiographic gradients. Large swaths of sagebrush steppe in the Northwestern Basin and Range have been disturbed and/or fragmented, reducing its value for wildlife. Although current resource management is driven by concerns over declining Sage-Grouse populations, numerous other sagebrush-dependent species show evidence of decline. Factors that may be contributing to these declines include improper livestock grazing, energy development, and invasive plants. Grazing is the predominant land use on both public and private lands throughout the section. Intact stands of sagebrush also provide winter range for Mule Deer and Elk, year-round habitat for Pronghorn (*Antilocapra americana*), and support a variety of SGCN such as Pygmy Rabbit (*Brachylagus idahoensis*) and Sagebrush Sparrow (*Artemisiospiza nevadensis*).



South Hills, Idaho, 2004 IDFG

Target Viability

Fair. The target viability rating for sagebrush steppe is fair. Much of the Wyoming big sagebrush (*Artemisia tridentata* Nutt. subsp. *wyomingensis* Beetle & Young) and basin big sagebrush (*Artemisia tridentata* Nutt. subsp. *tridentata*) habitat in the valleys of southeastern Idaho has been converted to agriculture. At higher elevations, mountain big sagebrush (*Artemisia tridentata* Nutt. subsp. *vaseyana* [Rydb.] Beetle) communities are diminishing due to conifer encroachment from juniper woodlands in arid locations and Douglas-fir or subalpine fir in more mesic sites. Condition of remaining sagebrush habitats is variable, ranging from very poor in sites experiencing high-magnitude disturbances to good or excellent in undisturbed sagebrush steppe and mountain big sagebrush communities. Large fires have affected sagebrush in Owyhee and Twin Falls counties and although rehabilitation efforts are ongoing, the results of these efforts will not be known for some time. Unburned sagebrush in Owyhee and Twin Falls counties is subject to livestock grazing and other impacts, but is generally regarded as intact.

Both short- and long-term trends for sagebrush habitat are downward. Intensive agriculture in Idaho began in the early 20th century and contributed to a significant loss of sagebrush on arable land, the introduction of invasive species, and the fragmentation of remaining stands. These losses continued as range improvements, efforts to increase forage grasses and reduce sagebrush cover continued through the latter half of the century. More recently, large fires and conifer encroachment have resulted in additional losses to sagebrush habitat. Fires, exacerbated by climate change are predicted to increase in frequency and magnitude, threatening remaining sagebrush communities. Other anthropogenic impacts such as those associated with transportation, energy development, and recreation are not expected to subside and in some instances may increase. Restoration projects at a scale necessary to reverse these trends are both difficult and expensive to implement.

Spotlight Species of Greatest Conservation Need: Greater Sage-Grouse

Greater Sage-Grouse is the only "tier 1" vertebrate SGCN that inhabits the Northwestern Basin and Range. Populations are discontinuous, separated by mountain ranges or large tracts of agricultural land in some of the eastern basins. In general, abundance increases from east to west, as does the proportion of designated Priority (PHMA) and Important (IHMA) Greater Sage-Grouse Habitat Management Areas (Fig. 11.3). The largest concentrations of Sage-Grouse occur in the Browns Bench and Shoshone Basin areas. Telemetry data indicate these birds are part of a larger population that extends south into Nevada. Connectivity between eastern Idaho populations and Utah populations has not been investigated. Population declines in southern Idaho have been reliably reported since about 1996, culminating with a sharp drop following the Murphy Complex Fire of 2007; they have been slowly recovering since.

The October 2, 2015 announcement by the US Fish and Wildlife Service (FWS) that listing the Greater Sage-Grouse was not warranted has placed the onus for conservation on cooperative management between state and federal agencies. Conservation issues and management actions are provided in the *2006 Conservation Plan for the Greater Sage-grouse in Idaho* (Idaho Sage-grouse Advisory Committee 2006). Higher-level direction for habitat management priorities is provided in the *Federal Alternative of Governor C.L. "Butch" Otter for Greater Sage-Grouse Management in Idaho* (hereafter Governor's Alternative; Otter 2012) and included in the Idaho and Southwestern Montana GRSG ARMPA (BLM 2015). Conservation actions on state endowment lands are identified in *the Idaho State Board of Land Commissioners Greater Sage-Grouse Conservation Plan* (Idaho State Board of Land Commissioners 2015). Private landowners with permits on state endowment land may also agree to voluntarily use best management practices on their private lands. Landowners may also be eligible for technical and financial assistance to implement voluntary conservation practices through the Natural Resources Conservation Service's (NRCS) Sage-Grouse Initiative. Sage-Grouse habitat in the Northwestern Basin and Range is a mix of Priority (PHMA), Important (IHMA), and General (GHMA) (see Fig. 11.3), as developed by the State and federal land management agencies and found in the *Idaho and Southwestern Montana GRSG ARMPA* (see Attachment 1, Fig. 2-1; BLM 2015).

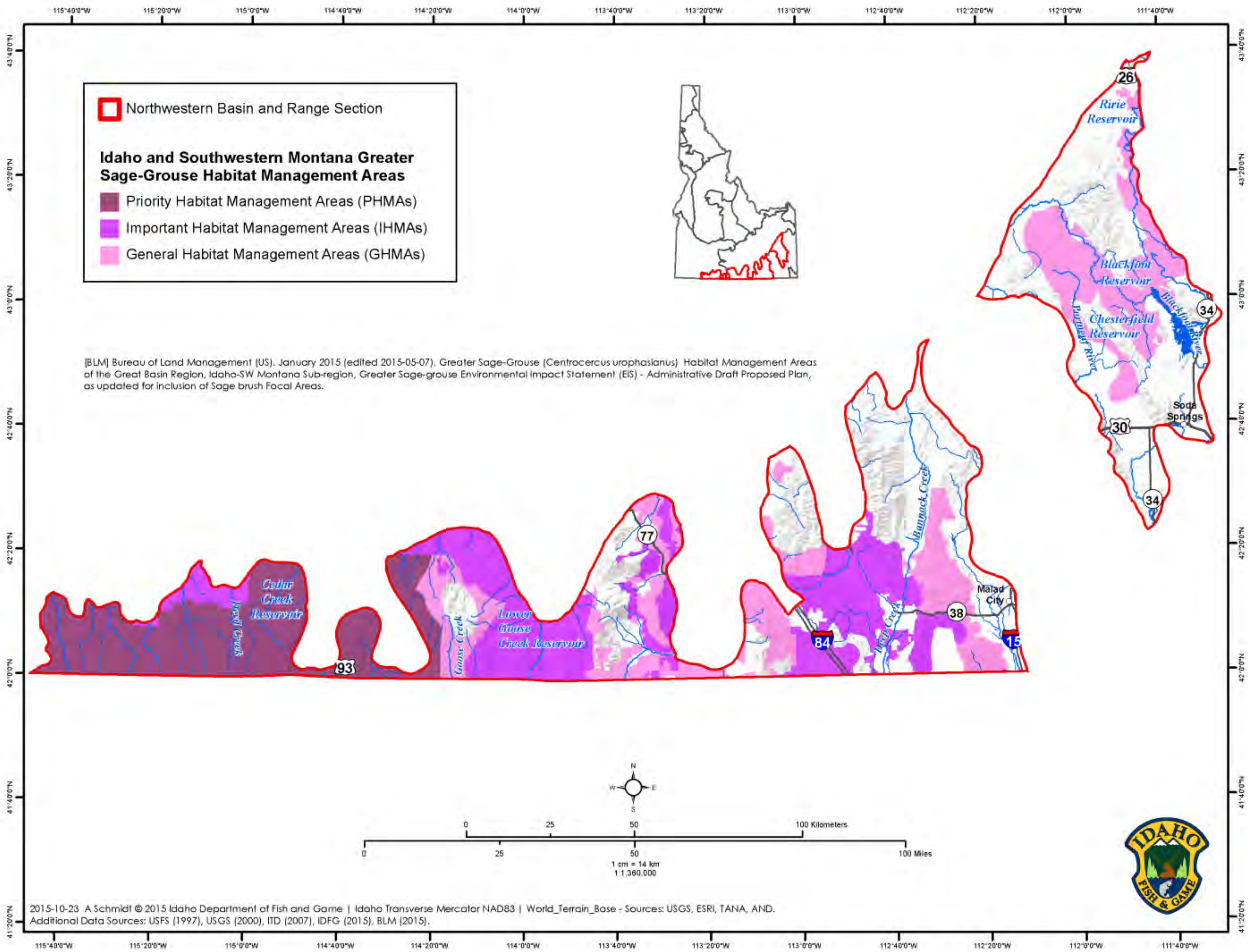


Fig. 11.3 Map of Idaho and Southwestern Montana Greater Sage-Grouse Habitat Management Areas

Prioritized Threats and Strategies for Sagebrush Steppe

Very High rated threats to Sagebrush Steppe in the Northwestern Basin and Range

Increased frequency & severity of wildfire

The increased frequency and intensity of wildfire is considered a primary threat to the sagebrush-steppe ecosystem and to the many sagebrush-steppe species that depend on it, including Sage-Grouse (Otter 2012, FWS 2014). The accelerated invasion of nonnative annual grasses, the spread of juniper, and the effects of intensified drought and climate change have created conditions leading to larger, more intense rangeland fires across the Great Basin. This contributes to the ongoing fragmentation and loss of shrubsteppe habitats. Almost the entire extent of the Northwestern Basin and Range is rated as "very high" for burn probability (DOI 2015; also see Fig. 11.4).

That portion of the Northwestern Basin and Range occurring in Owyhee, Twin Falls, and Cassia counties is especially vulnerable to lightning-caused wildfire, as continental weather systems drive convective thunderstorm activity here during the driest part of the year. Protection of this key system and restoration of degraded areas is a priority. Habitat management within the Greater Sage-Grouse Priority Habitat Management Area (PHMA) (BLM 2015) should be conservative and focused on preserving large tracts of intact sagebrush, developing habitat resiliency, and improving sustainability.

Objective	Strategy	Action(s)	Target SGCNs
Manage wildfires to minimize loss of sagebrush habitat.	Improve fire suppression protocols and resource allocations to limit habitat losses to wildfire.	Support development and implementation of Rangeland Fire Protection Associations (e.g., Idaho Code § 38-104B and Governor's Executive Order 2015-04) (Otter 2015). During high fire danger conditions, stage initial attack and secure additional resources closer to priority areas, with particular consideration of the Southern and Desert Conservation Areas to ensure quicker response times in or near Sage-Grouse habitat (BLM 2015). Create and maintain effective fuel breaks in areas dominated by cheatgrass and medusahead to modify fire behavior and increase fire suppression effectiveness based on criteria outlined in the Governor's Alternative (Otter 2012).	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*) Monarch
Increase the likelihood of post-fire vegetation restoration success (DOI	Expand the use of native seeds and seedlings to restore post-fire rangeland vegetation (DOI	Reallocate use of native seed from ESR projects outside of PHMA or IHMA (or ESA-listed species habitat) to those inside it in years when preferred native seed is in short supply (BLM 2015).	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Sage Thrasher

Objective	Strategy	Action(s)	Target SGCNs
2015).	2015).	Collect native seed from across the entirety of a species range to conserve germ plasm for research and restoration and enhance vegetation resilience in uncertain future environments. Develop and use interagency climate data to tailor site-specific vegetation restoration plans. Sagebrush-steppe restoration should incorporate an appropriate mix of native vegetation to support all habitat needs of Sage-Grouse and other sagebrush-dependent species. To the extent possible, limit the use of nonnative species for emergency site stabilization and the creation of fire breaks.	Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*) Monarch
Restore degraded habitat.	Support long-term strategies for sagebrush steppe restoration including consistent long-term monitoring protocols and adaptive management for restored areas (DOI 2015).	Assess current restoration activities to identify successful techniques, improve efficiency, and to help leverage funding for future restoration needs. Materially support cross-jurisdictional revegetation, monitoring, and adaptive management efforts for landscape-level sagebrush steppe restoration.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee
Maintain intact sagebrush stands to limit fragmentation and minimize direct habitat loss.	Protect Wyoming big sagebrush from destruction by wildfire.	Suppress wildfires in Sage-Grouse habitat, commensurate with threatened and endangered species habitat or other critical habitats to be protected (BLM 2015). Develop fuel breaks in areas dominated by invasive annual grasses adjacent to Wyoming big sagebrush stands.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*) Monarch

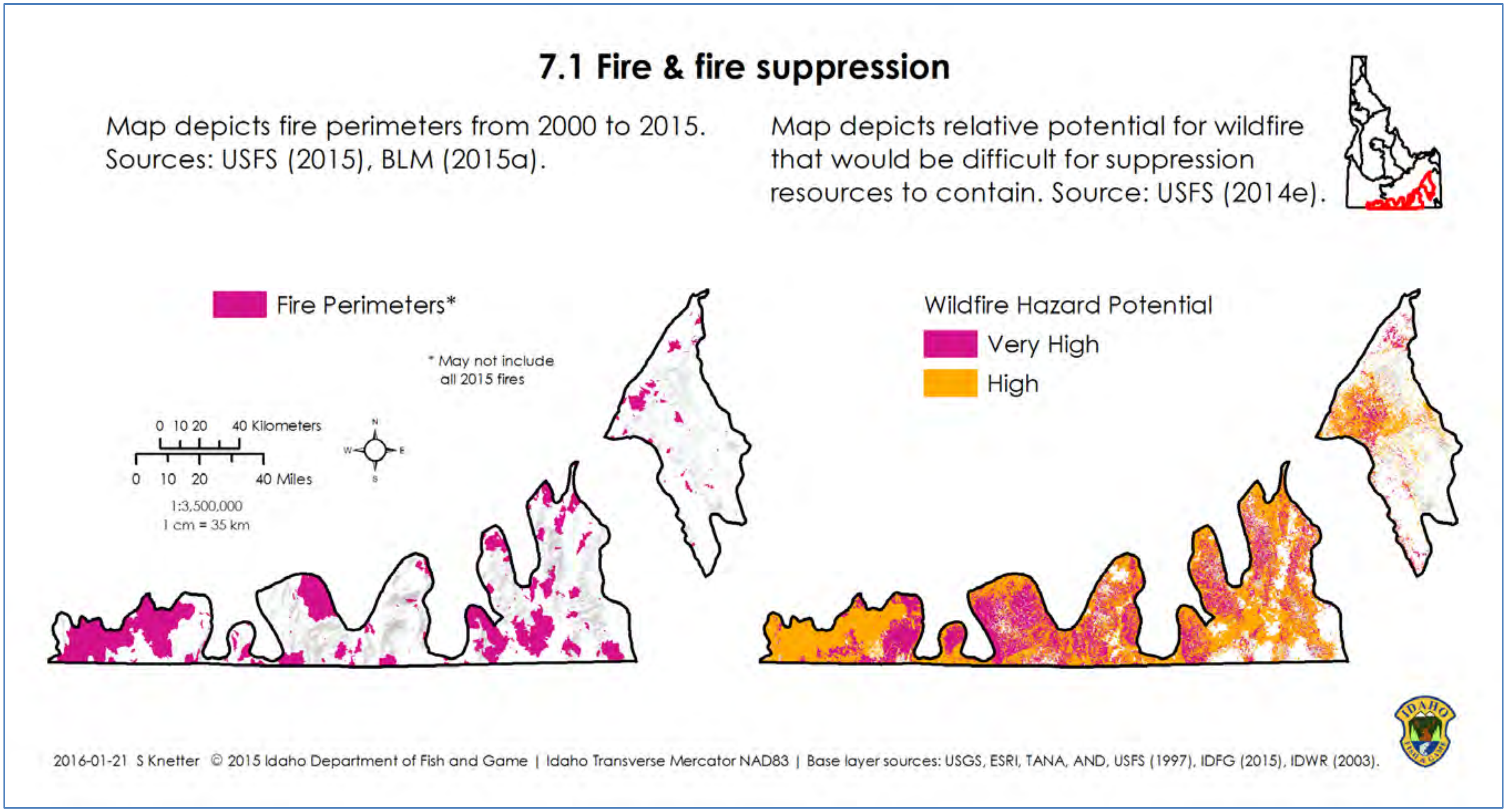


Fig. 11.4 Map of fire perimeters and relative potential for wildfire in the Northwestern Basin and Range

High rated threats to Sagebrush Steppe in the Northwestern Basin and Range

Noxious weeds & invasive annual grasses

Invasive species are considered a primary threat to Sage-Grouse in Idaho in the Governor's Alternative (Otter 2012) and likewise cited as a primary threat to shrubsteppe habitats by the FWS (2014). In addition, the accelerated invasion of nonnative annual grasses, in particular cheatgrass and medusahead, is one of the primary drivers of larger, more intense rangeland fires across the Great Basin and directly threatens the habitat of Sage-Grouse and other sagebrush-steppe dependent wildlife (DOI 2015). In the Northwestern Basin and Range, noxious weeds and invasive annual grasses (e.g., cheatgrass) crowd out native grasses and most forbs and have colonized many of the sagebrush habitat types, particularly in lower-elevation sites and in ecologically degraded areas (Fig. 11.5). Heavily-infested areas have already become or will likely convert to monocultures of annual grasses.

Objective	Strategy	Action(s)	Target SGCNs
Limit introduction of new weeds into areas where they do not occur.	Improve weed management tools and techniques. Aggressively manage nonnative undesirable plant species.	Implement *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012). Develop integrated weed management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Develop large-scale application of integrated weed management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Support the use of Plateau® herbicide in controlling cheatgrass. Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006). Target areas that contain cheatgrass and other invasive or noxious species to minimize competition and favor establishment of desired species (BLM 2015). Support the development of a framework for a national invasive species Early Detection and Rapid Response (EDRR) program (DOI 2015).	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*) Monarch

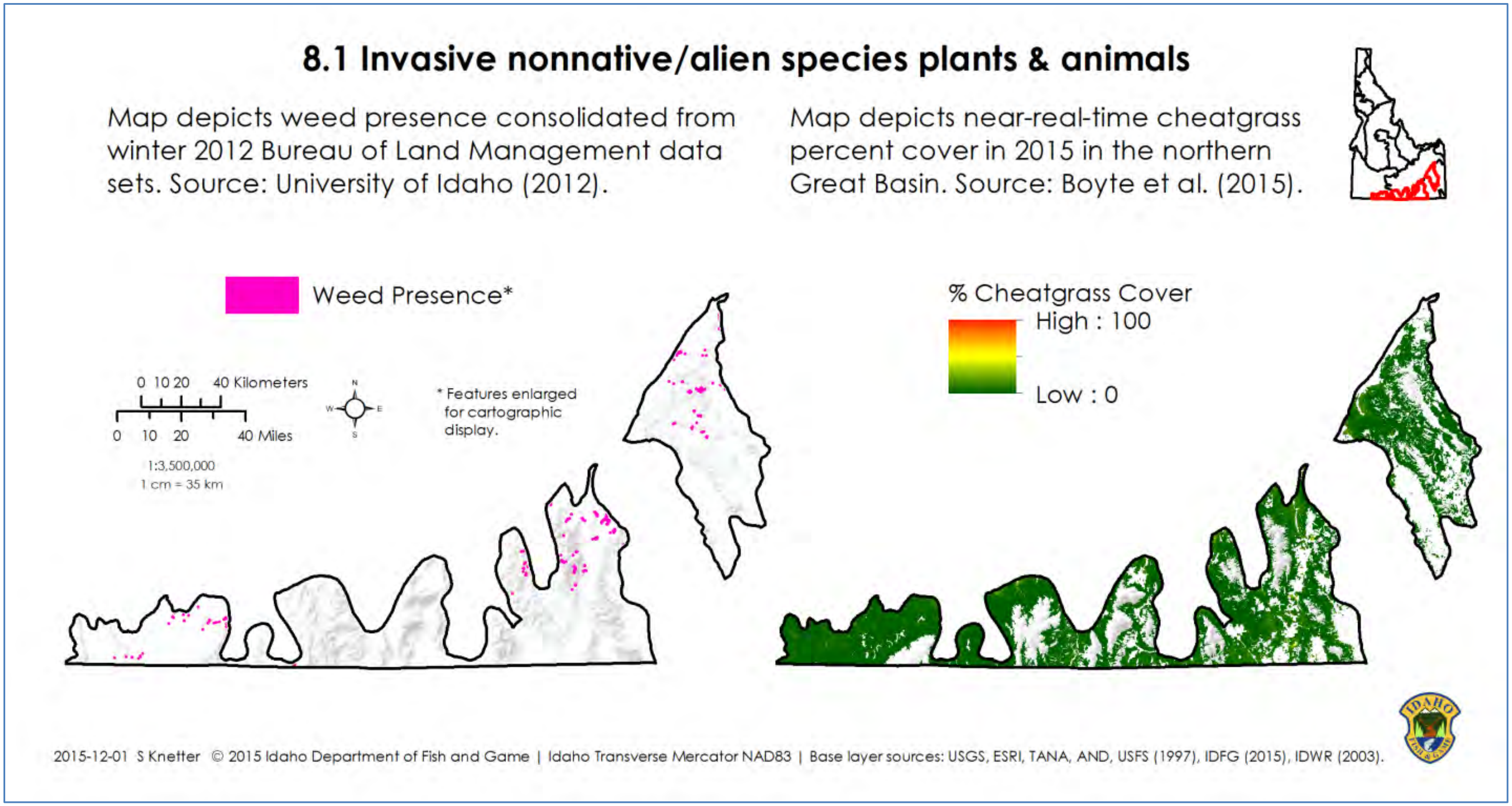


Fig. 11.5 Map of weed presence and cheatgrass percent cover in the Northwestern Basin and Range

Juniper encroachment

The expansion of native junipers (*Juniperus occidentalis* Hook. and *J. osteosperma* [Torr.]) into sagebrush-steppe habitats has degraded this ecosystem, reducing habitat suitability for sagebrush obligates. A study in eastern Oregon by the Nature Conservancy and the NRCS showed that Sage-Grouse abandoned sagebrush habitat once conifer cover reached 4%. Juniper encroachment has been cited as a growing problem across portions of southeast Idaho and locally in south-central Idaho. Altered fire regimes have allowed juniper to expand into long-established sagebrush-steppe ecosystems, increasing fire intensity when rangeland wildfires become crown fires in juniper. From a climate change perspective, southern Idaho is predicted to have less sagebrush and more woodland cover types (e.g., juniper) in the future.

Objective	Strategy	Action(s)	Target SGCNs
Reduce juniper encroachment into sagebrush steppe.	Remove phase 1 and phase 2 juniper stands to reduce juniper expansion into sagebrush steppe.	Prioritize treatments near occupied Sage-Grouse leks and other seasonal Sage-Grouse habitats. Use site-specific analysis to refine the location for specific areas to be treated.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Hunt’s Bumble Bee Morrison’s Bumble Bee Western Bumble Bee Suckley’s Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*) Monarch

Improper livestock grazing management

We define “improper” grazing as grazing beyond the capacity of the resource (e.g., overuse as often occurs along riparian areas) or occasionally as underuse where lack of grazing contributes to increased fuel loads. This differs from commonly accepted rangeland definitions where improper is simply synonymous with forage overuse.

The effects of improper livestock grazing on sagebrush steppe are pervasive and well documented (e.g., Kauffman and Krueger 1984, Fleischner 1994, Belsky et al. 1999). For example, livestock grazing can change habitat features that directly influence birds by reducing plant species diversity and biomass (Reynolds and Trost 1981, Bock and Webb 1984, Saab et al. 1995). Changes in water and nutrient cycling caused by grazing can also promote the spread of invasive species, which then degrade native bird habitats by altering fire and disturbance regimes (Rotenberry 1998, Knick et al. 2003). Sagebrush systems west of the Rocky Mountains are particularly sensitive to grazing disturbance because they evolved in the absence of large herds of herbivorous mammals such as American Bison (*Bos bison*) (Mack and Thompson 1982).

In the Northwestern Basin and Range, factors that contribute to this problem include insufficient funds for federal land management agency oversight and insufficient monitoring (i.e., lack of appropriate rangeland monitoring data to support trend analysis) to adequately inform rangeland management decisions.

Objective	Strategy	Action(s)	Target SGCNs
Manage livestock to maintain rangeland health and habitat quality (Otter 2012).	Manage the timing, intensity, duration, and frequency of grazing practices to manipulate vegetative condition (Otter 2012).	Prioritize permit renewals and land health assessments for allotments with declining Sage-Grouse populations (Otter 2012). Inform affected permittees and landowners regarding Sage-Grouse habitat needs and conservation measures (Idaho Sage-grouse Advisory Committee 2006). Incorporate GRSG Seasonal Habitat Objectives (Table 2-2 in BLM 2015) into relevant resource management plans and projects. Use the Sage-Grouse Habitat Assessment Framework (Stiver et al. 2015) with an appropriate sampling design to conduct fine-scale habitat assessments to inform grazing management. Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter 2012).	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*) Monarch
	Maintain MOU between ISDA and BLM as it pertains to grazing management.	Involve permittees in providing monitoring information, the interpretation of monitoring data, & providing input into grazing management adjustments to meet the goals and objectives of federal land management agencies and the permittees (Sanders 2006).	
Assess the impacts (both negative and, potentially, positive) of livestock grazing on sagebrush-steppe obligate passerines (Rotenberry 1998).	Design experiments involving a variety of alternative grazing treatments (including no grazing at all) across the spectrum of major shrubsteppe habitat (Rotenberry 1998).	Implement grazing alternatives based on project outcome. Conduct experiments over multiple years (Rotenberry 1998). Work with the University of Idaho to consider adding a sagebrush-obligate passerine component to its long-term study of the impacts of spring grazing on Sage-Grouse.	Sage Thrasher Sagebrush Sparrow

Changes in precipitation & broad-scale hydrologic regimes

The modeled effects of climate change, including intensified drought and changes in precipitation timing and amounts, predict conditions leading to larger, more intense rangeland fires across the entire Great Basin. The amount and timing of water affects sagebrush growth and recruitment and may seriously hinder restoration efforts. Reduced winter snowpack and increased winter rains favor development of cheatgrass and other invasive annuals. The flammability of annual grasses and increased summer temperatures exacerbates fire intensity and shortens fire return intervals. Generally, the most reliable strategies for mitigating climate change impacts in sagebrush steppe are those that promote ecosystem resiliency by preserving areas of high ecological integrity.

Objective	Strategy	Action(s)	Target SGCNs
Mitigate drought impacts by building resiliency into sagebrush-steppe systems.	Conserve intact sagebrush-steppe vegetation and soils by eliminating or reducing nonclimate stressors.	Coordinate livestock and land management planning efforts to achieve rangeland vegetation standards consistent with established federal guidelines. Preserve institutional flexibility for reducing or removing livestock from marginal or degraded land for a time period sufficient to allow full recovery. Protect relict and native-dominated communities by restricting vegetation- and soil-disturbing practices. Protect soils by limiting chemical and biological treatments and mechanical disturbances that disrupt soil structure or processes. Prevent and slow the proliferation of invasive species and other nonnative vegetation. Suppress all fires that occur in areas of high ecological integrity.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*) Monarch
	Restore degraded sagebrush-steppe vegetation where possible.	Prioritize areas of high conservation for restoration. Consider multiple sources to guide restoration of sagebrush habitats (e.g., WIVC 2002).	
Mitigate changes in precipitation & broad-scale hydrologic regimes.	Reduce or remove human and livestock disturbance until hydrologic regimes are restored.	Adjust stocking rates to accurately reflect vegetation and hydrologic conditions. Limit human disturbances, e.g., OHV use and other high-impact recreational activities during periods of prolonged or recurrent drought.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow

Objective	Strategy	Action(s)	Target SGCNs
			Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*) Monarch

Species designation, planning & monitoring

In addition to conservation measures to address habitat threats, some SGCN require inventory and monitoring to assess their current status and distribution in Idaho. We identify information needs for 4 species in sagebrush steppe and propose strategies to determine population status and suggest interim conservation measures where declines are known or suspected.

Long-billed Curlew

Long-billed Curlew (*Numenius americanus*) is the largest North American shorebird and in the Northwestern Basin and Range, occurs in open grasslands, pasture, and disturbed agricultural areas. Idaho represents important breeding territory for this migratory species and although breeding occurs within the Northwestern Basin and Range, it is poorly studied. Currently, this species is ranked G5 (Secure) by NatureServe, S2B (Imperiled) by IDFG, and designated a Type 2 Sensitive Species by BLM Idaho. Rangewide, Long-billed Curlew is believed to be declining, particularly in the Great Plains. BBS data (Sauer et al. 2014) indicate a significant increasing long-term trend of 1.26% per year in the Western BBS Region during the 1966–2013 time interval and suggest a nonstatistically significant increasing short-term trend (2003–2013) of 3.81% per year in Idaho. However, these data may not adequately cover trends for this species. Status and distribution of Long-billed Curlew in the Northwestern Basin and Range have not been determined, and if completed would advance efforts to determine population status at regional and rangewide levels. Systematic surveys and productivity studies are monitoring needs for this species in the Northwestern Basin and Range. Conservation measures that benefit Long-billed Curlew include those that protect, enhance, and restore suitable breeding habitat and limit nest disturbance by humans and livestock. A prominent area to consider for restoration would be the 19,340-ha Curlew National Grassland, which currently has little suitable nesting habitat.

Burrowing Owl

Burrowing Owl (*Athene cunicularia*) occupies grasslands, open sagebrush steppe, and agricultural landscapes across southern Idaho. Currently, this species is ranked G4 (Apparently secure) by NatureServe, S2B (Imperiled) by IDFG, and designated a Type 2 Sensitive Species by BLM Idaho. Western Burrowing Owl (*A. c. hypugaea*) has declined significantly throughout much of its North American range, particularly in Canada. Although local researchers suspect populations are declining in Idaho, BBS data (Sauer et al. 2014) do not indicate statistically significant changes in Idaho or the Western BBS Region for either of 2 time intervals (1966–2013, 2003–2013). The lack of a significant trend may be influenced by low detection rates. As funding and time permit, systematic surveys for Burrowing Owl are recommended for agencies within the Northwestern Basin and Range to determine population status and trend. Survey results from the BLM Four Rivers Field Office in southwest Idaho indicate that 2 years of survey effort is sufficient to provide adequate baseline information for the species. Conservation measures to benefit Burrowing Owl include the protection or expansion of open grassland habitats favored for breeding, and the preservation of native rodent and insect populations by reducing or eliminating chemical control measures near occupied sites.

Short-eared Owl

Short-eared Owl (*Asio flammeus*) is an owl of open terrain and adjacent woodland habitats. It occurs throughout Idaho where suitable habitat and prey are found. NatureServe ranks this species as G5 (Secure) due to its extensive range; IDFG ranks the species as S3 (Vulnerable); and BLM Idaho designated it as a Type 2 Sensitive Species in 2015. Based on data from the BBS, Christmas Bird Count (CBC), and regional and national conservation assessments, the species has undergone substantial rangewide declines (Booms et al. 2014). These declines have spurred interest in accurately determining population status as well as developing broad-scale habitat protection strategies. The Pacific Flyway Nongame Technical Committee (PFNTC) identified coordinated monitoring for Short-eared Owl as a priority new initiative in 2015. The Idaho Bird Conservation Partnership (IBCP) determined the need for a baseline population assessment and potential development of a long-term monitoring program for the species. In 2015, IBCP successfully piloted a volunteer-based, multistate survey effort that provided baseline population estimates for Idaho and Utah. IBCP plans to improve upon and expand the program into 2016 and beyond. Primary conservation concerns are habitat loss and degradation and human disturbance. Beneficial conservation actions for Short-eared Owl include those that protect, enhance, or restore suitable foraging and breeding habitat.

Common Nighthawk

Common Nighthawk (*Chordeiles minor*) is an aerial insectivore with a broad North American distribution. The species is cryptic and crepuscular, and many aspects of its life history are poorly understood. A long-distance migrant, Common Nighthawk breeds throughout North America and winters in South America. In southern Idaho, the species occupies sagebrush steppe where it nests on open, gravelly areas. BBS data (Sauer et al. 2014) reveal statistically significant long-term (1966–2013) and short-term (2003–2013) declines in the Western BBS Region (−2.30% and −1.73% per year, respectively), Great Basin (−1.15% and −1.13% per year, respectively), and numerous individual states, including Idaho (−1.81% and −0.86% per year, respectively), which is cause for concern. The Common Nighthawk is recognized as a Common Bird in Steep Decline in the State of the Birds 2014 Report (NABCI 2014). More consistent monitoring in Idaho is needed to better ascertain the magnitude and cause(s) of decline. Conservation actions that preserve or enhance populations of flying insects would benefit this species.

Objective	Strategy	Action(s)	Target SGCNs
Accurately determine population status and trend	Conduct breeding bird and productivity surveys.	Collaborate with appropriate land management agencies to: 1) Conduct annual or regular	Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk

Objective	Strategy	Action(s)	Target SGCNs
in Idaho.		population surveys of historic, current, and potential breeding sites 2) Design and implement productivity studies to be performed concurrently with population surveys	
		Collaborate with appropriate land management agencies to design and implement a long-term monitoring program.	Short-eared Owl Common Nighthawk
Determine the cause(s) of population decline for nightjar species in Idaho.	Work with Western Working Group Partners in Flight (WWG PIF) and the PFNTC to assess potential causes(s) of decline.	Assist WWG PIF with adjusting current Nightjar Survey Network protocols to collect data that will inform potential cause(s) of decline, including assessments of insect prey populations and their habitats. Work with WWG PIF and PFNTC to identify opportunities for research on the impacts of chemical contaminants on food resources.	Common Nighthawk
Enhance productivity at occupied breeding sites.	Minimize nest disturbance from human activities.	Implement seasonal road and area closures in known nesting locations. Limit livestock use of nesting sites during the breeding season.	Long-billed Curlew
	Protect food resources near occupied sites.	Eliminate chemical control of native rodent and insect populations near occupied sites.	Burrowing Owl
	Enhance or restore degraded breeding habitat.	Practice passive restoration (cessation of disturbance) as an initial strategy where feasible. Use active restoration (seeding, control of invasive species, etc.) where time and funding allow.	Long-billed Curlew Short-eared Owl

Target: Pinyon–Juniper–Mountain Mahogany Woodland & Savanna

Pinyon–Juniper–Mountain Mahogany Woodland & Savanna habitats, a broad macrogroup, are characterized by single species or mixed species stands of Utah juniper (*Juniperus osteosperma* [Torr.]), Rocky Mountain juniper (*Juniperus scopulorum* Sarg.), singleleaf pinyon (*Pinus monophylla* Torr. & Frém.), and curl-leaf mountain mahogany (*Cercocarpus ledifolius* Nutt.) as dominant canopy species. Mountain big sagebrush (*Artemisia tridentata* Nutt. subsp. *vaseyana* [Rydb.] Beetle), black sagebrush (*Artemisia nova* A. Nelson), mountain snowberry (*Symphoricarpos oreophilus* A. Gray), and antelope bitterbrush (Purshia tridentata [Pursh] DC.) are common shrubs found in the understory. Bunchgrasses, such as needle and thread (*Hesperostipa comata* [Trin. & Rupr.] Barkworth), Idaho fescue (*Festuca idahoensis* Elmer), bluebunch wheatgrass (*Pseudoroegneria spicata* [Pursh] Á. Löve), and basin wildrye (*Leymus cinereus* [Scribn. & Merr.] Á. Löve), and forbs such as arrowleaf balsamroot (*Balsamorhiza sagittata* [Pursh] Nutt.) are also common (Rust 1999).

Jim Sage Mountains, Idaho © 2004 Jennifer Miller

Pinyon–juniper dominated habitats occur on dry, rocky soils at elevations ranging from 1,200 to 2,300 m (3,937 to 7,546 ft); curl-leaf mountain mahogany dominated habitats range from 1,200 to 2,600 m (3,937 to 8,530 ft). Both woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events during the growing season, such as frosts and drought, are thought to restrict the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Curl-leaf mountain mahogany woodlands may occur as small- to large-patch forested stands, but most stands occur as open woodlands, shrublands on ridges and steep rimrock slopes, or as savannah in steppe areas. Scattered juniper or pinyon may co-occur.

Pinyon–Juniper–Mountain Mahogany Woodland & Savanna habitats are important for a diversity of Idaho endemic species within the Northwestern Basin and Range. In addition, big game species such as Mule Deer, Elk, and Bighorn Sheep, rely on pinyon–juniper and mountain mahogany woodlands for forage, thermal cover, and security cover throughout the year. The Pinyon Jay (*Gymnorhinus cyanocephalus*) is closely tied to pinyon–juniper woodlands (Gillihan 2006) and in Idaho, is mostly found within the Northwestern Basin and Range.

Target Viability

Good. Pinyon–Juniper–Mountain Mahogany Woodland & Savanna condition across the Northwestern Basin and Range section is considered good. These areas have generally been stable to increasing in occurrence across the landscape. Much of the expansion is attributed to fire suppression (Gruell et al. 1985, Miller and Tausch 2001). Although the current viability of this target is considered good, prolonged drought, shifting fire regimes, and invasive species are changing the dynamics of this system. In addition, although energy extraction and mining activities occur within this system, the scope is extremely limited in the Northwestern Basin and Range and therefore this threat is not currently considered high.

Spotlight Species of Greatest Conservation Need: Pinyon Jay

The following material was adapted from IDFG's 2005 Comprehensive Wildlife Conservation Strategy (IDFG 2005).

The Pinyon Jay is closely tied to pinyon–juniper woodlands, preferring more mature stages of pinyon, which produce more seeds. If habitat conditions are good, a flock may occupy the same home range for decades (Ryser 1985). However, due to the unpredictable nature of the pinyon seed supply, flocks may wander in search of adequate seed sources. The Pinyon Jay has experienced significant declines throughout its range. BBS data (Sauer et al. 2014) reveal statistically significant long-term (1966–2013) and short-term (2003–2013) declines in the US (−4.36% and −3.59% per year, respectively), Western BBS Region (−4.27% and −3.59% per year, respectively), Great Basin (−4.70% and −3.57% per year, respectively), and several western states. These declines led the North American Bird Conservation Initiative to identify the Pinyon Jay as a Yellow Watch List species. No trend data exist for Idaho, likely due to low detection rates and the lack of suitable roads for conducting BBS routes. The greatest threat to Pinyon Jay in Idaho is the land management policy to eradicate pinyon–juniper woodlands because of concern about encroachment into sagebrush communities. In addition, the loss of pinyon–juniper habitat through conversion to other land cover types, including clearing for residential development, is likewise a threat (Gillihan 2006). Retaining patches of unaltered mature pinyon or pinyon–juniper at least 18 km^2 (7 mi^2) in size, which is approximately the area of each flock's home range (Balda and Bateman 1971), is an important conservation action for Pinyon Jay. Colonies are sensitive to human disturbance, so development such as roads or picnic areas should be kept well away from known nesting sites (Gillihan 2006).

Prioritized Threats and Strategies for Pinyon–Juniper–Mountain Mahogany Woodland & Savanna

High rated threats to Pinyon–Juniper–Mountain Mahogany Woodland & Savanna in the Northwestern Basin and Range

Altered fire regimes

Fire regimes, specifically changes in the frequency and severity of wildfire, have been altered throughout the West. Climate change, invasive species expansion, and fire suppression represent examples of factors that have led to these changes. Within the Pinyon–Juniper–Mountain Mahogany Woodland & Savanna systems, the threat of altered fire regimes is multifaceted. The mean fire return interval prior to the European settlement was between 13 and 22 years, but since that time has significantly increased (Miller and Tausch 2001, Gucker 2006). This has allowed Pinyon–Juniper–Mountain Mahogany Woodland & Savanna to expand and mature. In some instances, fire suppression has allowed juniper- and pinyon-dominated woodlands to encroach into adjacent habitats such as sagebrush steppe. Where this has occurred, pinyon–juniper removal has been implemented in an effort to maintain the integrity of sagebrush-steppe habitats, often with Sage-Grouse conservation the primary focus. Conversely, decadent stands of Pinyon–Juniper–Mountain Mahogany Woodland & Savanna are more susceptible to high-intensity fires, carried by the dense crown cover that can have catastrophic impacts to this important habitat type. Curl-leaf mountain mahogany generally does not resprout after fire and these systems need protection from high-intensity fires to retain viable seedbanks for recruitment.

Because of the conflicting outcomes of altered fire regimes on Pinyon–Juniper–Mountain Mahogany Woodland & Savanna, local-scale assessments and inventories should be a management priority. In some scenarios, fire might be an important management tool to improve the capacity of that habitat to support wildlife. In other scenarios, fire could be detrimental to the habitat and fire abatement would be the most appropriate management action. In general, where curl-leaf mountain mahogany is present, reducing the potential for high-intensity fire that could destroy the seedbed and recovery potential would be a priority. In contrast, where pinyon and/or juniper are the dominant species, managers will need to evaluate and prioritize management prescriptions based on species occurrence, seral stage of that particular stand, and desired conservation outcomes.

Objective	Strategy	Action(s)	Target SGCNs
Increase general knowledge on the composition and spatial arrangement of Pinyon–Juniper–Mountain Mahogany Woodland & Savanna patches.	Develop a detailed, high-resolution map layer that illustrates patch dynamics of Pinyon–Juniper–Mountain Mahogany Woodland & Savanna patches.	Initiate efforts to begin development of an accurate, detailed, high-resolution habitat map that would illustrate composition, patch size, and age structure of these woodlands. This effort should include coordination with other state and federal land management agency partners. Ground-truth and monitor to improve map accuracy and to better allow managers to detect changes in habitat. Use the map layer to prioritize where management prescriptions, such as fire abatement or mechanical removal, are needed.	Golden Eagle Short-eared Owl Common Nighthawk Pinyon Jay Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*)
Reduce the extent of curl-leaf mountain mahogany lost to wildfire.	Develop and implement appropriate fire management plans.	Identify curl-leaf mountain mahogany patches needing protection from fire. Work with federal and state land management agencies to coordinate wildfire response prioritization efforts. Where appropriate, use fuels reduction to limit the potential for catastrophic fire events in curl-leaf mountain mahogany	Golden Eagle Short-eared Owl Common Nighthawk Pinyon Jay Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee

Objective	Strategy	Action(s)	Target SGCNs
		dominated habitats. Implement aggressive rehabilitation using techniques such as seeding and planting in areas disturbed by fire.	A Mason Bee (*Hoplitis producta subgracilis*)
Maintain intact old-growth stands of Pinyon–Juniper–Mountain Mahogany Woodland & Savanna.	Protect old growth Pinyon–Juniper–Mountain Mahogany Woodland & Savanna stands from fire.	Suppress all fires in identified old-growth stands of Pinyon–Juniper–Mountain Mahogany Woodland & Savanna in coordination with state and federal land management agencies. Implement aggressive rehabilitation using techniques such as seedling planting in areas disturbed by fire.	Golden Eagle Short-eared Owl Common Nighthawk Pinyon Jay Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*)

Changes in precipitation & broad-scale hydrologic regimes

Intensified drought and climate change is a driver in creating conditions that lead to larger, more intense rangeland fires across the entire Great Basin (DOI 2015). In addition, reduced precipitation degrades the condition of this habitat type, thereby reducing the habitat value for wildlife.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the potential for catastrophic wildfire events.	Develop appropriate fire suppression plans.	Work with state and federal land management agencies as well as private landowners to reduce vulnerability of Pinyon–Juniper–Mountain Mahogany Woodland & Savanna to wildfire. Implement rehabilitation and habitat improvement efforts in desired stands that reduce potential for catastrophic wildfire, such as planting drought-tolerant species.	Golden Eagle Pinyon Jay Bighorn Sheep Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee A Mason Bee (*Hoplitis producta subgracilis*)

Species designation, planning & monitoring

In addition to conservation measures to address habitat threats, some SGCN require inventory and monitoring to assess their current status and distribution in Idaho. We identify information needs for 2 species in Pinyon–Juniper–Mountain Mahogany Woodland & Savanna and propose strategies to determine population status. We also suggest interim conservation measures where appropriate.

Common Nighthawk

Common Nighthawk is an aerial insectivore with a broad North American distribution. The species is cryptic and crepuscular, and many aspects of its life history are poorly understood. A long-distance migrant, it breeds throughout North America and winters in South America. In southern Idaho, it has been recorded in Pinyon–Juniper–Mountain Mahogany Woodland & Savanna, but specific habitat associations are unknown. Common Nighthawk continues to experience significant declines throughout its range. BBS data (Sauer et al. 2014) reveal statistically significant long-term (1966-2013) and short-term (2003-2013) declines in the Western BBS Region (−2.30% and −1.73% per year, respectively), Great Basin (−1.15% and −1.13% per year, respectively), Canada, and numerous US states, including Idaho (−1.81% and −0.86% per year, respectively). The Common Nighthawk is recognized as a Common Bird in Steep Decline in the State of the Birds 2014 Report (NABCI 2014). Studies to clarify habitat associations in this habitat type would inform conservation planning. Actions that preserve or enhance populations of flying insects would be beneficial to this species.

Short-eared Owl

Short-eared Owl is an owl of open terrain and adjacent woodland habitats. Recent surveys indicate higher use of open woodlands and savannas by this species than previously reported. Short-eared Owl occurs throughout Idaho where suitable habitat and prey are found. NatureServe ranks this species as G5 (Secure) due to its extensive range; IDFG ranks the species as S3 (Vulnerable); and BLM Idaho designated it as a Type 2 Sensitive Species in 2015. Based on BBS data, CBC, and regional and national conservation assessments, the species has undergone substantial rangewide declines (Booms et al. 2014). These declines have spurred interest in accurately determining population status as well as developing broad-scale habitat protection strategies. The PFNTC identified coordinated monitoring for Short-eared Owl as a priority new initiative in 2015. The IBCP determined the need for a baseline population assessment and potential development of a long-term monitoring program for the species. In 2015, IBCP successfully piloted a volunteer-based, multistate survey effort that provided baseline population estimates for Idaho and Utah. IBCP plans to improve upon and expand the program into 2016 and beyond. Primary conservation concerns are habitat loss and degradation and human disturbance. Beneficial conservation actions for Short-eared Owl include those that protect, enhance, or restore suitable foraging and breeding habitat.

Objective	**Strategy**	**Action(s)**	**Target SGCNs**
Determine the cause(s) of population decline for nightjar species in Idaho.	Work with Western Working Group Partners in Flight (WWG PIF) and the PFNTC to assess causes(s) of decline.	Assist WWG PIF with adjusting current Nightjar Survey Network protocols to collect data that will inform potential cause(s) of decline, including assessments of insect prey populations and their habitats. Work with WWG PIF and PFNTC to identify opportunities for research on contaminant impacts.	Common Nighthawk
Accurately determine population status and trend in Idaho.	Conduct breeding bird and productivity surveys.	Conduct regular population surveys. Design and implement a long-term monitoring program.	Short-eared Owl

Target: Subalpine–High Montane Conifer Forest

Located at elevations from approximately 900 m (2,953 ft) to the higher subalpine-alpine transition zone, these are the matrix forests of the upper montane and subalpine zone of the Northwestern Basin and Range. Largely comprised of evergreen conifers, broad-leaved cold-deciduous trees also occur as do isolated cold-deciduous conifer stands. Characteristic trees include subalpine fir, Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), lodgepole pine, limber pine, and quaking aspen. Patterning of which forest types occur is driven by the interaction between snow deposition, desiccating winds, soil and substrate characteristics, and the interacting effects of precipitation, temperature, latitude, elevation, and aspect. Occurrences at high elevations are restricted by cold temperatures and are found on warmer southern aspects. At lower elevations, occurrences are restricted by lack of moisture and are found on cooler northern aspects and mesic microsites. Occurrences of these forest types often originate from, and are likely maintained by, stand-replacing disturbances such as avalanches, crown fires, insect outbreaks, disease, or logging. Fire regimes are generally mixed severity or stand-replacing, and of long return intervals, occurring from 150 to 500 years. Insect outbreaks are more frequent and typically occur every 30 to 50 years in some forest types, altering both the structure and composition of stands.

Target Viability

Fair. This conservation target has a viability rating of fair. Much of the Subalpine–High Montane Conifer Forest in the Northwestern Basin and Range has been impacted to some degree by a legacy of human activities, notably logging and fire suppression. Increases in older, decadent stands dominated by shade-tolerant species are accompanied by decreases in shade-intolerant species like quaking aspen. These stands are more susceptible to disease and insect outbreaks and are at an increased risk from wildfire due to changing precipitation and temperature patterns. All management units in the Sawtooth NF Minidoka Ranger District report that Subalpine–High Montane Conifer Forest is either "functioning at risk" or "functioning at risk in some areas." The Sawtooth NF also reports a moderate departure from the historical range of variability for fire for most forest types. Climate modeling predicts temperature increases in the Northwestern Basin and Range will likely exacerbate fire conditions in the future.

The Caribou–Targhee National Forest's (CTNF) Sub-regional Properly Functioning Condition Assessment (FS 2003) indicates the Engelmann spruce/subalpine fir and quaking aspen communities on the forest are at high risk due to departure from historical ranges of variation in sustainability indicators. The risks to lodgepole pine (low level of departure) and Douglas-fir (moderate level of departure) are not as severe. Quaking aspen losses across the forest have been estimated at 40% for the past 100 to 150 years. The Engelmann spruce–subalpine fir complex is at risk primarily from dominance of mature stands and potential for high-severity fires. Quaking aspen stands are mature and decadent, at risk from conifer succession, and with underrepresented early and mid-seral stages. Overall, 70% to 80% of the coniferous forest is in a late seral stage. Some areas have become more susceptible to droughts, insect and disease outbreaks, and other effects of overcrowding. Trends show increasing human development occurring in and around the CTNF. These interface areas historically burned at frequent intervals. Suppression costs increase dramatically in the interface areas as does the pressure to maintain high suppression levels, even in areas that would ecologically benefit from fire.

Spotlight Species of Greatest Conservation Need: Red Crossbill (South Hills population)

The Red Crossbill (*Loxia curvirostra*) is a medium-sized finch found in conifer forests. It is a foraging specialist that uses its distinctive crossed mandibles to extract seeds from conifer cones. The species has at least 10 distinct "types" in North America, each with a unique call note and differences in morphology, core area of occurrence, and patterns of movements. Three types of Red Crossbill are found in the South Hills and Albion Mountains of south-central Idaho (Type 2, 5, and 9). The most abundant type, the South Hills population of Red Crossbill (Type 9), is an endemic and largely sedentary population. It is highly adapted to local food resources and exhibits a high level of reproductive isolation among the sympatric Red Crossbill types (Benkman et al. 2009). Morphological, genetic, and behavioral evidence supports a proposal to recognize the South Hills Crossbill as a distinct species, *Loxia sinesciuris* (Benkman et al. 2009), but thus far has not been accepted by the American Ornithologists' Union.

The South Hills Crossbill uses a local variety of lodgepole pine that has evolved in the absence of Red Squirrel (*Tamiasciurus hudsonicus*), normally a primary consumer of lodgepole pine seeds. Pine cones in these mountain ranges tend to have serotinous pine cones that accumulate and hold seeds in closed or partly closed cones in the canopy for long periods of time until heated by fire. This ecological adaptation provides a large and reliable seed bank on which the South Hills Crossbill depends. Logdepole pine cones have developed larger and thicker scales as a seed defense to crossbills, which in turn has favored the selection of crossbills with larger and deeper bills. The specialized bill shape of the South Hills Crossbill is poorly adapted relative to other Red Crossbill types for foraging on conifers, including lodgepole pine in nearby mountain ranges.

The size of the South Hills Crossbill population is unknown, but because suitable habitat is limited to approximately 70 km^2, the total population is estimated at <10,000 individuals (C. Benkman, University of Wyoming, pers. comm.). Population declines of 63% were reported by Santisteban et al. (2012) between 2003 and 2008, largely because of decreasing adult survival. The proposed cause of the decline was abnormally high summer temperatures (>32 °C) that reduced serotinous cone production and led to premature cone opening and subsequent loss of seeds. Since 2008, temperatures have moderated and South Hills Crossbill populations have increased.

The immediate threat to the South Hills Crossbill is the curtailment of lodgepole pine and seed production in the South Hills and Albion Mountains. Extensive habitat loss from high-severity wildfire could potentially force South Hills Crossbills to relocate to new areas, leaving them at a competitive disadvantage to forage in other nearby lodgepole pine and conifer forests. Should Red Squirrel ever become established within its range, the efficient seed predator will likely outcompete South Hills Crossbill for lodgepole pine seeds, leading to population declines and possibly extirpation. The principal long-term threat to the South Hills Crossbill is climate change, as regional climate models predict reductions of lodgepole pine in southern Idaho with expected increases in temperature (Thompson et al. 1998). Conservation actions to address immediate threats should focus on maintaining the health and extent of lodgepole pine forests. Appropriate management of wildfire and prescribed burning, livestock grazing, and timber and fuelwood harvest would likely provide the greatest benefits. The exclusion of Red Squirrel should also be a management priority for the Sawtooth NF.

Prioritized Threats and Strategies for Subalpine–High Montane Conifer Forest

Very High rated threats to Subalpine–High Montane Conifer Forest in the Northwestern Basin and Range

Fire regimes outside the historical range of variability

Fire is a primary disturbance process in western coniferous forests, influencing vegetation dynamics, composition, and structure. Infrequent high-severity fire events historically occurred in the high-elevation subalpine forests of the Rocky Mountains, recurring at long, but variable intervals. In these systems, high magnitude fire events followed prolonged droughts, which were relatively rare in the cool, subalpine environments (Kipfmueller and Baker 2000, Veblen 2000). Mid- and low-elevation stands may have evolved with a mixed-severity regime, where surface fires occurred more frequently. Climatic patterns and weather are the major determinants of fire intensity and return interval in the Subalpine–High Montane Conifer Forest. Evidence suggests that fire suppression, to a much a lesser extent, has also influenced fire regimes for this forest type, but the effects are thought to be negligible (Kipfmueller and Baker 2000).

As the Northwestern Basin and Range warms, changes to fire regimes in forested systems are expected to occur. High-intensity fire events are predicted to increase in frequency across the section and the extent of large fires may increase. Fire return interval may be shortened, affecting tree regeneration and producing undesirable stand characteristics. Shortened fire return intervals prevent the establishment of late-seral stands and alter species distribution at a landscape scale. In the Sawtooth NF, patchy distribution of forest stands and discontinuous fuels will reduce the likelihood of extensive burns and may benefit early seral species like quaking aspen. Extensive high-severity burns will affect animal distribution across the landscape, as suitable habitat for species dependent on late-seral forests is reduced.

Objective	Strategy	Action(s)	Target SGCNs
Maintain areas of late-seral Subalpine–High Montane Conifer Forest sufficient to support current populations of species dependent on this habitat type.	Preserve remaining stands of late-seral forest that are in excellent ecological condition, particularly large tracts and those with outstanding resource value.	Through survey and assessment, identify stands with exceptional resource value to focus protection measures. Limit human disturbances that alter stand composition, structure, or ecological function in late seral forests. To preserve the discontinuous nature of fuels in the Subalpine–High Montane Conifer Forest, avoid disturbance and the introduction or spread of nonnative annual grasses in adjacent sagebrush and mountain shrub communities. Institute appropriate mechanical treatments in mixed-severity forest stands if desirable outcomes will likely be realized.	Western Toad Red Crossbill (South Hills population) Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis
Elevate the ecological condition and	Where appropriate, restore desired	Identify appropriate treatments to achieve restoration goals with a minimum of inputs and disturbance.	Western Toad Red Crossbill (South Hills

Objective	Strategy	Action(s)	Target SGCNs
resiliency of the Subalpine–High Montane Conifer Forest to better withstand the expected increase in fire occurrence and severity.	forest structure, composition and mix of seral stages to degraded Subalpine–High Montane Conifer Forest.	Work with the appropriate state and federal land management agencies to identify and prioritize stands that would benefit from the application of fire. Work with the appropriate land management agencies to amend current fire suppression strategies to permit a broader range of conditions where beneficial fires are allowed to burn.	population) Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Kriemhild Fritillary

High rated threats to Subalpine–High Montane Conifer Forest in the Northwestern Basin and Range

Improper fuels management & restoration activities

In xeric, low-elevation forests where fire regimes are marked by short-interval, low-severity surface fires, fuel reduction is an important management tool for mitigating risks to life and property and reducing the financial and social costs of fighting fire. Fire suppression and a concomitant increase in available fuels are widely believed responsible for changes to fire regimes in these environments. The cooler Subalpine–High Montane Conifer Forest typically experiences infrequent, high-severity fires occurring as stand-replacing events, or mixed-severity fires with effects dependent on site and environmental characteristics. High-severity fires are driven by climatic, not structural variables and the effects of human manipulations on this fire regime are secondary (Schoennagel et al. 2004). Mechanical fuel reduction is generally ineffective in subalpine forests and imposes structural characteristics outside the natural range of variability. The relative contributions of climate and structure in a mixed-severity fire regime are variable and often difficult to discern, but mechanical fuel treatments may be acceptable for some mixed-severity fire regimes. However, wildfire originating under severe drought often overrides fire-mitigating structural characteristics in a mixed-severity fire regime. Similarly, using a prescribed burn to emulate a low-severity ground fire is not appropriate in a high-severity fire regime.

Objective	Strategy	Action(s)	Target SGCNs
Reduce or eliminate resource damage caused by improper fuels management or restoration treatments.	Ensure that management actions intended to mitigate forest losses from severe wildfire are consistent with existing fire regimes.	Clearly identify existing fire regimes in areas considered for restoration or fuel reduction treatments and prioritize areas where treatments are likely to be effective, e.g., in previously open woodlands. Define and prioritize acceptable treatment methods that improve stand conditions, minimize unintended impacts, and produce stand characteristics likely to be maintained under the current fire regime.	Western Toad Red Crossbill (South Hills population) Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Kriemhild Fritillary
	Implement actions intended to mitigate forest losses from severe wildfire in a	Avoid constructing new roads or other infrastructure, e.g., skidding or landing areas in logging operations and actively decommission infrastructure where practical.	

Objective	Strategy	Action(s)	Target SGCNs
	manner designed to limit damage to soils and vegetation and minimize disturbance to wildlife.	Plan management activities to avoid disrupting critical life stages of forest-dwelling species such as nesting season for birds, maternity season for bats, or when migratory species are present.	

Changes in precipitation & broad-scale hydrologic regimes

The modeled effects of climate change predict changes in precipitation timing and quantity, which will likely affect the severity, frequency, and magnitude of all forest disturbances. The immediate effects are predicted to create conditions conducive to larger, more intense fires across the entire Great Basin, which may result in rapid changes in forest age class distribution and landscape patterns. Decreased snowpack and summer precipitation will increase water stress in forests that normally experience annual drought conditions in summer, leaving them more susceptible to disease and parasites. These effects may be more pronounced in dense stands. The extent of Subalpine–High Montane Conifer Forest may be reduced at the lower limits of its range, reducing habitat for forest-dependent species. Streams and riparian habitat will likely experience negative impacts as snowpack and runoff declines. Generally, the most reliable strategies for mitigating climate change impacts are those that promote ecosystem resiliency by preserving areas of high ecological integrity and adaptive management responsive to changing environmental conditions and shifting plant and animal communities.

Objective	Strategy	Action(s)	Target SGCNs
Mitigate changes in precipitation and broad-scale hydrologic regimes.	Preserve intact stands of Subalpine–High Montane Conifer Forest with high biological diversity.	Limit human disturbance, e.g., OHV use and other high-impact recreational activities to prevent disturbance of vegetation and soil. Control fires that occur in areas of high ecological integrity except where effects are expected to be beneficial. Reduce or remove livestock disturbance to accurately reflect vegetation and hydrologic conditions.	Western Toad Red Crossbill (South Hills population) Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Kriemhild Fritillary

Species designation, planning & monitoring

In addition to conservation measures to address habitat threats, some SGCN require inventory and monitoring to assess their current status and distribution in Idaho. We identify information needs for 1 species in Subalpine–High Montane Conifer Forest and propose strategies to determine population status and suggest interim conservation measures where appropriate.

Western Toad

The Western Toad (*Anaxyrus boreas*) occurs in a variety of habitats statewide. Population status in Idaho is unknown, as are short- and long-term trends. Significant and often dramatic declines have been reported elsewhere across the species' range. Populations south of the Snake River are isolated and small. Proposed revisions to the *Anaxyrus boreas* species group identify southern Idaho populations as the subspecies Boreal Toad (*Anaxyrus boreas boreas*) and place them in the Eastern population, which was petitioned for listing in May 2011 as an endangered or threatened distinct population segment (DPS) under the Endangered Species Act of 1973 (ESA), as amended. In response to this petition, in April 2012, the FWS announced a 90-day finding that substantial biological information exists to warrant a more in-depth examination of the status of the Eastern population of the Boreal Toad and once complete, whether to propose adding the population as a DPS to the federal lists of threatened or endangered wildlife and plants. The Eastern population includes the Southern Rocky Mountain population (southeastern Wyoming, Colorado, and New Mexico) and toad populations in southwestern Wyoming, southeastern Idaho, northeastern Nevada, and Utah (FWS 2012) and possibly much of Nevada (A. Goebel, Florida Gulf Coast University, unpublished data). Recent surveys in southern Idaho failed to detect Western Toad in previously occupied habitat. Dramatic declines in the Eastern population imply additional surveys are warranted in Idaho. Western Toad is threatened by activities that modify, curtail, or eliminate habitat. Avoiding disturbance from timber harvest, livestock grazing, pesticide application, water management, recreation, and roads and other construction activities would be a prudent conservation strategy for the species. In addition, assistance is needed across Idaho in collecting/identifying representative toad tissue samples to support A. Goebel's work to capture the edge of the eastern clade (2015 email from A Goebel, Florida Gulf Coast University, to C Peterson, Idaho State University).

Objective	Strategy	Action(s)	Target SGCNs
Resolve the taxonomic status of Western Toad populations in southeast Idaho.	Assist Florida Gulf Coast University researchers currently studying the eastern population of Western Toad.	Participate in rangewide tissue sample collection for genetic analysis.	Western Toad
Assess the status of Western Toad populations in southeast Idaho.	Use breeding and other targeted survey data.	Continue to conduct breeding surveys at all historic, current, and potential sites annually or every 2–3 years to determine population status and trend.	
Determine causes of population declines in southeast Idaho.	Evaluate known and suspected threats to Western Toad and its habitats.	Prioritize, develop and implement site-specific actions to mitigate or eliminate threats to individuals, populations and habitat.	

Target: Managed Perennial Grasslands

The Conservation Reserve Program (CRP) and SAFE are working lands conservation programs administered by the US Department of Agriculture (USDA) Farm Service Agency (FSA), which convert eligible croplands to permanent vegetation. In Idaho, these programs primarily convert lands that are predominantly dryland wheat to a mixture of perennial grasses and forbs. Both programs are limited and administered on a county by county basis. Not more than 25% of the arable land in a county may be enrolled in CRP or SAFE, collectively. Currently, 42,896 ha (105,998 acres) of land are enrolled in CRP within the Northwestern Basin and Range. The Idaho SAFE program has grown to 18,615 ha (46,000 acres) within the Northwestern Basin and Range, and is limited to 47,470 ha (117,300 acres) statewide. The Farm Bill must be reauthorized every 5 years by Congress. The 2014 Farm Bill required a 39% reduction in CRP from the 2002 limit to 9.7×10^6 ha (24×10^6 acres) nationwide by 2017.

Target Viability

Good. Target viability was evaluated by determining and rating the current condition of key ecological attributes based on professional opinion. The Managed Perennial Grasslands habitat target is in good condition across the section based on 3 key ecological attributes: abundance and patch size of CRP and SAFE stands, vegetative condition of the stands (presence of invasive plants and native species), and presence of desired indicator species (Sharp-tailed Grouse, *Tympanuchus phasianellus*).

Conservation Reserve Program parcel in the Arbon Valley, Idaho © 2009 Jeff Knetter

Acres enrolled in CRP and SAFE are predominantly dryland acres because irrigated land returns a greater income for the landowners when in production than in either of the federal programs. Given that situation, the number of acres enrolled in these programs is rated as "Good." Acreages for the CRP and SAFE programs are at the maximum allowed by the federal government in Caribou and Oneida counties, which represent a substantial portion of the section and rely mostly on dryland farming. Power County is also at the federal limit and relies on dryland farming, but is divided between the Northwestern Basin and Range and the Snake River Basalts section. A decline in managed perennial grassland acreages within the Northwestern Basin and Range in Power County may not necessarily result in a negative net impact to the target SGCN if those acres were merely moved to another part of the county. In that case, the benefits of the target habitat are still available to SGCN. Loss of acres within these counties due to program acreage reductions would negatively impact target SGCN. Bingham, Cassia, and Twin Falls counties also compose a large portion of this section, but have a much greater portion of their arable land under irrigation, so fewer acres are enrolled in CRP and SAFE in these counties.

The average block size of CRP within the section is 20 to 65 ha (49 to 161 acres), which is considered "Fair." This evaluation is based on the assumption that larger block sizes provide more suitable habitat for wildlife species.

Weed control is required as part of the CRP contract so invasive species are not a significant problem; therefore, invasive plant species are rated as in "Good" condition.

Increased emphasis on native species (grasses, forbs, and shrubs) improves the value of the stands for wildlife by increasing plant diversity and providing more appropriate food and cover plant species. During the early years of CRP, this emphasis on natives did not exist. At that time, monocultures of crested wheatgrass (*Agropyron cristatum* [L.] Gaertn.) and smooth brome (*Bromus inermis* Leyss.) were popular seed mixes. Because some of those acres are still present, this condition has been rated as "Fair." The SAFE program and different options within CRP are made by the USDA to encourage landowners to plant more native species.

Finally, an appropriate index of Sharp-tailed Grouse presence is being evaluated and will be rated when data are analyzed.

Spotlight Species of Greatest Conservation Need: Sharp-tailed Grouse

The Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*; hereafter Sharp-tailed Grouse) is one of 7 subspecies (one extinct) of Sharp-tailed Grouse in North America (Connelly et al. 1998). Of the 6 extant subspecies, Columbian Sharp-tailed Grouse has experienced the greatest decline in distribution and abundance (Hamerstrom and Hamerstrom 1961, Miller and Graul 1980). The FWS has been petitioned twice (1995 and 2004) to list Columbian Sharp-tailed Grouse under the ESA. Under both petitions, FWS issued a finding that listing was not warranted (US Department of the Interior 2000, 2006). Idaho supports approximately 60% to 65% of the remaining Sharp-tailed Grouse in the US (Hoffman and Thomas 2007).

Sharp-tailed Grouse appear to have benefited more from CRP than any other prairie grouse (Rodgers and Hoffman 2005) and are closely linked to the success of the CRP and SAFE programs (Mallett 2000). Since its inception in 1985, the CRP has provided thousands of acres of nesting and brood-rearing habitat on private lands in Idaho, resulting in an apparent increase in Sharp-tailed Grouse populations (excerpted from IDFG 2015). Hoffman and Thomas (2007) suggest the possible loss of CRP lands is the single most important immediate threat to Sharp-tailed Grouse in Idaho and across the subspecies' range (excerpted from IDFG 2015).

Prioritized Threats and Strategies for Managed Perennial Grasslands

High rated threats to Managed Perennial Grasslands in the Northwestern Basin and Range

Conversion of acres withdrawn from CRP and SAFE

Although recent general enrollment opportunities exist, the number of CRP acres in Idaho, and within the Northwestern Basin and Range, has declined. This is because of high commodity prices and the 2008 and 2014 congressional reductions in the number of acres that could be enrolled. SAFE acres have helped to mitigate the loss of CRP acres. Although CRP and SAFE efforts have enhanced habitat for grouse and other SGCN, they are not permanent solutions to the decline of available habitat for these species. CRP and SAFE contracts remain active for 10 years and landowners have the option to buy out of contracts early with a penalty. Often, these acres are converted back to agricultural production or rangeland after withdrawal, which reduces the habitat value for wildlife. The NRCS is exploring options to use their conservation programs to preserve the benefits of CRP and SAFE after the contracts expire. This effort would strive to keep expired CRP and SAFE lands in a grass-based system. To date, success has been limited due to high agricultural commodity prices and incentives within the commodity title of the Farm Bill to put expired land back into agricultural production (excerpted from IDFG 2015).

Objective	Strategy	Action(s)	Target SGCNs
Reduce the number of acres being withdrawn from CRP and SAFE.	Support legislation to renew CRP in future Farm Bill legislation.	Work with NRCS, FSA, and the Idaho congressional delegation to ensure renewal (and expansion) of CRP.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle
	Support legislation that provides a financial incentive to stay in the programs.	Work with NRCS, FSA, and the Idaho congressional delegation to ensure that CRP and SAFE payments are high enough to incentivize landowners to keep their land in the programs.	
Influence the land use of acres removed from CRP and SAFE so that wildlife values are protected.	Provide financial incentives to leave acres in perennial grasses.	Work with FSA and other agencies and organizations to develop cost-share programs and alternative uses for acres no longer in CRP.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle
	Develop alternative uses for retired CRP and SAFE acres that benefit wildlife.	Work with FSA and NRCS to develop and promote land uses that provide income for landowners and habitat value for wildlife.	

Species designation, planning & monitoring

In addition to conservation measures to address habitat threats, some SGCN require inventory and monitoring to assess their current status and distribution in Idaho. We identify information needs for 4 species (Long-billed Curlew, Burrowing Owl, Short-eared Owl, Common Nighthawk; cross reference Sagebrush Steppe target) in Managed Perennial Grasslands and propose strategies to determine population status. We also suggest interim conservation measures where appropriate.

Target: Riverine–Riparian Forest & Shrubland

This conservation target encompasses all rivers, streams, and riparian habitats in the Northwestern Basin and Range. Higher order streams (1st through 3rd) are headwater or small montane streams. Many are ephemeral and some exist only as freshets. Spring-fed stream systems in basins or canyon bottoms occur much less frequently. Floodplains and valley bottoms tend to be narrow and aquatic substrates are boulders, cobbles, gravel, and large woody debris. There are few pools and many rapids. Aquatic communities are usually dominated by benthic invertebrates and small fish. Few large rivers traverse the section, and all except the Jarbidge River have either been impounded by dams or impacted by diversions and other human activities. Riverine wetlands occur in river and stream channels. They include floodplains and riparian vegetation influenced by stream channel hydrology. Slope wetlands (e.g., seeps and springs) are often found at their headwaters. Riparian vegetation in the section is dominated by deciduous shrubs and trees, such as willow (*Salix* L.), thinleaf alder (*Alnus incana* [L.] Moench subsp. tenuifolia [Nutt.] Breitung), and redosier dogwood (*Cornus sericea* L.). Wet meadows and marshes are generally characterized by grasses and emergent macrophytes.

Lower Rock Creek Canyon, Idaho © 2006 Julie Randell, Stone Feather Studios

Despite the low occurrence of Riverine–Riparian Forest & Shrubland in the Northwestern Basin and Range (~3% of the total land area), the importance of these habitats to wildlife in this arid region cannot be overstated. They support a disproportionately large fraction of the biological diversity across the section. Aquatic and semiaquatic species are dependent on water for their survival, but 70% to 80% of terrestrial species in the Northwestern Basin and Range are also known to use riverine–riparian habitats for all or part of their life cycles. Populations of native Yellowstone Cutthroat Trout and Bonneville Cutthroat Trout (*Oncorhynchus clarkii utah*) persist where water quality is not significantly impaired. Birds, bats, and many small and large mammals preferentially use riparian areas for foraging and reproductive habitat, and stream corridors often serve as migratory routes for local deer and Elk populations.

Target Viability

Fair. This conservation target has a viability rating of fair. Nearly all riverine and riparian habitats in the Northwestern Basin and Range have been impacted by one or more human activities and all are susceptible to impacts from changing precipitation and temperature patterns. Water quality in most watersheds within the section is impaired, primarily by sediment. Roads and livestock grazing are the main disturbance agents across much of the section; agriculture is the principal disturbance in basins. Severe fires may result in sediment pulses on all landscapes until revegetation can occur. Elevated water temperature is also a significant problem and many streams exceed state water quality standards. Climate modeling predicts temperature increases in the Northwestern Basin and Range that are likely to exacerbate fire and elevated water temperature conditions.

All management units in the Sawtooth NF, Minidoka Ranger District report that riparian vegetation is either "functioning at risk" or "functioning at risk in some areas." Recent monitoring and evaluation reports (2014) and grazing allotment Annual Operating Instructions (AOI), which specify stocking rates and grazing management, suggest this trend is likely to continue. The BLM reports that most of the stream channels and floodplains in the planning area of Idaho and Southwestern Montana Greater Sage-Grouse Approved RMP Amendment (which includes the Northwestern Basin and Range) are not meeting the BLM standard of proper functioning condition (BLM 2015).

Elevated water temperature is also a concern across the planning area. Removal of riparian vegetation by livestock is identified as the primary cause of temperature increases. Demands for water resources and competing management objectives indicate these problems will likely continue or worsen.

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

High rated threats to Riverine–Riparian Forest & Shrubland in the Northwestern Basin and Range

Improper livestock grazing management

In the Northwestern Basin and Range, livestock grazing has been identified by all land management agencies as the single greatest factor influencing riparian habitat extent and quality. A legacy of improperly managed public lands grazing has resulted in riparian ecosystems that are often in poor ecological condition, but may still provide some resource value. Current management seeks to preserve extant high-value riparian ecosystems where they occur or rehabilitate degraded systems such that wildlife and consumptive human needs are served. We define improper grazing as grazing beyond the capacity of the resource (e.g., overuse as often occurs along riparian areas) or occasionally as underuse where lack of grazing contributes to increased fuel loads. This differs from commonly accepted rangeland definitions where improper is simply synonymous with forage overuse.

The effects of improper livestock grazing on riparian habitat in arid and semiarid regions are well documented (e.g., Kauffman and Krueger 1984, Fleischner 1994, Belsky et al. 1999). Generally, improper grazing negatively affects soils, vegetation, wildlife, fish, water quality, and changes fluvial processes that regulate watershed hydrology. Livestock exhibit a strong preference for riparian habitat and use of these areas is disproportionately high, particularly in summer months when shade, water, and high-quality forage are limited or absent in the more xeric uplands.

Objective	Strategy	Action(s)	Target SGCNs
Protect riverine–riparian ecosystems that have high ecological value from impacts associated with improper livestock grazing.	Prioritize riparian areas for protection from livestock grazing impacts.	Identify high-value riparian habitat using existing survey or field data supplemented with additional vegetation assessments where necessary. Increase riparian width and subsequent proper function and condition through the use of wildlife-friendly exclusion fencing and riparian pasture management for grazed riparian systems.	Northern Leatherside Chub Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis California Floater Bear Lake Springsnail A Miner Bee (*Hesperapis kayella*) A Caddisfly (*Eocosmoecus schmidi*) Snake River Pilose Crayfish
Support proper livestock grazing management that maintains or improves riverine–riparian vegetation sufficient for wildlife needs.	Manage the timing, intensity, duration, and frequency of grazing practices on vegetation composition and structure during seasons critical to nesting birds in riparian areas.	Coordinate livestock and land management planning efforts to achieve riparian vegetation standards consistent with established federal guidelines. Preserve institutional flexibility for reducing or removing livestock from marginal or degraded land for a time period sufficient to allow full recovery.	Northern Leatherside Chub Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis California Floater Bear Lake Springsnail A Miner Bee (*Hesperapis kayella*) A Caddisfly (*Eocosmoecus schmidi*) Snake River Pilose Crayfish
Improve water and vegetation quality in riverine–riparian habitats degraded by excessive or improper livestock grazing.	Involve permittees in monitoring and data collection, and providing input into grazing management to meet the range standards of federal land management agencies.	Inform affected permittees and landowners regarding riverine–riparian habitat needs and conservation measures. Prioritize permit renewals and land health assessments for allotments with declining riparian quality. Conduct fine-scale habitat assessments to inform grazing management. Reduce AUMs where necessary to more accurately reflect riparian conditions. Develop water sources for livestock away from stream and riparian habitats. Undertake adaptive management changes related to existing grazing permits where improper grazing is determined to be the causal	Northern Leatherside Chub Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis California Floater Bear Lake Springsnail A Miner Bee (*Hesperapis kayella*) A Caddisfly (*Eocosmoecus schmidi*) Snake River Pilose Crayfish

Objective	Strategy	Action(s)	Target SGCNs
		factor in declining habitat condition.	
Support the responsible use of federal lands for grazing to maintain open spaces and important habitat conditions that benefit wildlife (WGA Policy Resolution 2015-03).	Implement Western Governors' Association (WGA) policy for public lands grazing (for details, see WGA Policy Resolution 2015-03).	Use sound, science-based management decisions for federal lands and base these decisions upon flexible policies that take into account local ecological conditions and state planning decisions.	Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (*Hesperapis kayella*) A Caddisfly (*Eocosmoecus schmidi*) Snake River Pilose Crayfish

Changes in precipitation & broad-scale hydrologic regimes

The modeled effects of climate change include intensified drought and changes to precipitation amounts and timing that may in turn affect stream flows, groundwater recharge, growth and phenology of wetland, riparian, and upland vegetation, and fire regimes. Reduced winter snowpack and increased winter rains alter cycles of water availability and storage. Decreased summer precipitation will impact vegetation growth and survival. Aquatic systems, in addition to changes in water availability, will also have to contend with warming temperatures, lower dissolved oxygen levels, and the possible loss of cold-water biota from lower stream reaches. Water temperature affects physiology, behavior, distribution, and survival of aquatic organisms. Timing and quantity of spring runoff is likely to be reduced and may alter plant phenology. For migratory animal species, phenological shifts may negatively affect condition, fitness, and survival. Changes in species distribution, particularly for some invasive species like tamarisk (*Tamarix* L.) are predicted to occur. Currently, the most reliable site-specific strategies for mitigating climate change impacts in riverine and riparian habitats are those that promote ecosystem resiliency by preserving areas of high ecological integrity and those that promote managing for a changed landscape where maintenance of a previous habitat is no longer feasible. The following objectives, strategies and actions have been developed for use at specific locations.

Objective	Strategy	Action(s)	Target SGCNs
Maintain or improve resiliency in riverine–riparian habitat.	Identify and protect minimally disturbed areas that exhibit high species diversity or other desired ecological characteristics.	Adopt an annual inventory strategy to maintain a current assessment of riverine–riparian habitat resources. Restrict livestock grazing, mining, logging, motorized and nonmotorized recreation, and other high-impact activities to the degree necessary to protect existing high-value conservation areas.	Northern Leatherside Chub Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (*Hesperapis*
	Maximize water availability in riverine–riparian environments using mechanical,	Increase water storage and improve conductivity in riverine habitat where needed by improving hydrology using floodplain restoration, channel reconfiguration, flow augmentation through modification of diversions and other water	

Objective	Strategy	Action(s)	Target SGCNs
	biological or cultural methods.	developments, reintroduction of beaver, protection of cold-water springs, or groundwater recharge. Provide financial incentives or meaningful assistance to private landowners to encourage land stewardship that enhances and protects riverine–riparian habitat and appropriates water for wildlife uses. Improve interagency, regional coordination where possible to expedite restoration and explore avenues to streamline decisions involving water and wildlife resources. Improve capacity to provide technical assistance and incentives to increase storage capacity and to improve conservation, reuse, and water use efficiency by consumptive water users.	*kayella*) A Caddisfly (*Eocosmoecus schmidi*) Snake River Pilose Crayfish
	Improve vegetation condition and proportion of native species in degraded riparian habitat.	Implement vegetation restoration where necessary to accelerate riparian recovery. Practice aggressive weed control in degraded areas until native vegetation is established and resistant to recurring infestations. Broaden the genetic diversity of species used for restoration to accommodate a range of future environmental conditions so that any resultant vegetation community, regardless of specific composition, is tolerant of site conditions.	
	Mitigate or eliminate other threats to riparian habitat where possible.	Limit livestock grazing in riparian areas with fencing or by developing off-site water sources. Restrict mining, logging, motorized and nonmotorized recreation, and other high-impact activities in degraded or recovering areas. Limit these threats to the degree necessary to protect existing high-value conservation areas.	
	Monitor and incorporate species response to environmental conditions.	Focus monitoring on species with low environmental tolerances to detect subtle changes in habitat characteristics and inform decisions on habitat restoration or rehabilitation efforts. Implement immediate management activities to secure populations facing extirpation or an elevated risk of unacceptable losses.	
Adopt a strategy	Reassess	Encourage partnerships with federal, tribal,	Northern

Objective	Strategy	Action(s)	Target SGCNs
of adaptation for systems that have lost resiliency and are unable to mitigate impacts from changing environmental conditions.	conservation goals to align with site conditions and expected environmental changes.	and local government, private landowners, and conservation organizations to create and implement culturally acceptable adaptation and management options for riverine–riparian habitat. Incorporate regional, long-term conservation perspectives when developing local management plans. Have plans in place for areas known to have lost resiliency and aggressively implement when and where opportunities present themselves, e.g., following disturbance events, or as funding and management direction align.	Leatherside Chub Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (*Hesperapis kayella*) A Caddisfly (*Eocosmoecus schmidi*) Snake River Pilose Crayfish

Dams, water diversions & other stream manipulations

Nearly all surface water that enters the basins in the Northwestern Basin and Range is intercepted by water diversions, impoundments, or other structures. Free-flowing segments are often influenced by culverts and sediment generated by roads. Groundwater pumping also affects surface flows, as stream channels lose water where groundwater levels are depleted. Any of these activities may lead to changes in hydrology that alter stream courses, increase sedimentation and nutrient enrichment, and change water temperature and chemistry. These types of alterations typically produce cascading effects, resulting in loss of habitat for invertebrate and vertebrate species. Large dams used for flood control and irrigation create additional downstream problems related to the amount and timing of releases that affect water temperatures, sediment transport, channel morphology, and riparian vegetation establishment. Upstream problems include capture of sediments and pollutants and elevated water temperatures. In the Northwestern Basin and Range, fluctuating lake levels have negatively impacted nesting waterbird colonies. Dams also block instream movement of fish and invertebrates. Drought, livestock, and agricultural needs will increase demand for available surface water and additional withdrawals in the near and distant future.

Objective	Strategy	Action(s)	Target SGCNs
Improve hydrology and restore proper function to riverine–riparian habitats in watersheds affected by water control structures.	Eliminate or modify small impoundments, diversions, and other water control structures where practical.	On public lands, remove outdated, failing or inactive dams, particularly improvised check dams installed in normally dry washes to capture stormwater runoff. Work with appropriate agencies to modify failing or poorly designed/installed culverts and other water conveyances to improve water quality.	Northern Leatherside Chub Western Toad Northern Leopard Frog Western Grebe Clark's Grebe Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee

Objective	Strategy	Action(s)	Target SGCNs
		On private property, work with landowners to improve the design and efficiency of water diversions for livestock to improve water quantity and quality in degraded systems.	(*Hesperapis kayella*) A Caddisfly (*Eocosmoecus schmidi*) Snake River Pilose Crayfish
	Promote wildlife and conservation interests in the operation of large dams.	Where practical, work with appropriate agencies to mimic natural stream flows in downstream reaches of impounded waterways. Work with appropriate agencies to provide sufficient minimum flows to downstream reaches of impounded waterways, particularly during droughts or critical life history stages of aquatic animals.	

Invasive weeds

Invasive weeds are a high-rated threat to riverine–riparian habitat in the Northwestern Basin and Range. Primary impacts include alterations to hydrology (water storage and release) and hydrogeomorphic processes, loss of plant and animal diversity, and reduction in forage value for livestock and wildlife. A variety of noxious weeds have colonized riverine–riparian environments, particularly low-elevation sites and ecologically degraded areas. Severely disturbed sites are at highest risk for establishment and spread of invasive plants as fluvial seed dispersal, chronic soil disturbance, and persistent soil moisture create ideal growth conditions. Tamarisk and Russian olive (*Elaeagnus angustifolia* L.) are problematic across large areas. Tamarisk is predicted to expand as the region warms. Reed canarygrass (*Phalaris arundinacea* L.), broadleaved pepperweed (*Lepidium latifolium* L.), Canada thistle (*Cirsium arvense* [L.] Scop.), and purple loosestrife (*Lythrum salicaria* L.), are widespread in the section and have compromised large areas of riparian habitat. The following objectives, strategies and actions provide a conceptual framework for addressing invasive species in riparian habitat.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the incidence and impacts from invasive weeds on vegetation in riverine–riparian habitat.	Prevent the introduction of invasive species in riverine–riparian habitat that is currently weed-free.	The responsible agency should: identify and manage potential pathways for invasive species introductions, including livestock, recreation, roads and other ground-disturbing activities. Seek input from all stakeholders and engage them in decision-making and implementation. Diligently monitor areas known to be weed-free and respond with aggressive control efforts when new infestations are located. Each year, complete at least one Watershed Assessment for a 5th level HUC watershed. Maintain targeted education and outreach efforts for all stakeholders and provide technical and material support where resources allow.	Western Toad Northern Leopard Frog Western Grebe Clark's Grebe Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (*Hesperapis kayella*) A Caddisfly (*Eocosmoecus schmidi*) Snake River

Objective	Strategy	Action(s)	Target SGCNs
		Promote proven programs like the ISDA Noxious Weed Free Forage and Straw Certification Program to limit the introduction and spread of noxious weeds through forage and straw onto Idaho USFS and BLM lands.	Pilose Crayfish
	Limit the spread of introduced invasive species in riverine–riparian habitat.	Maintain effective multijurisdictional partnerships for collaborative and coordinated control of invasive species across landscapes. Develop and employ an EDRR program to address newly discovered infestations. Implement the plan as early as possible. Close pathways for additional populations, or control the spread of incipient populations into nonimpacted areas. Develop and employ an effective monitoring and surveillance program to follow up on treated areas.	
	Mitigate the ecological and economic impacts resulting from invasive species occurrences.	Use an Integrated Pest Management approach to control established populations. Identify and prioritize key riparian habitats for restoration efforts. Focus maintenance and restoration efforts, within disturbed watersheds that have the greatest potential for restoration of hydrologic function, riparian, water quality, and aquatic values. Use native plant species from genetically local sources to the extent practical for riparian restoration and revegetation projects.	

Mining pollution

Much of the mining pollution in southeast Idaho is generated by open-pit or contour strip mining of phosphate ore near Soda Springs. Of particular concern is the contamination of water, soils, and vegetation with selenium, a chemical leached from waste dumps and inactive or abandoned phosphate mines. Selenium is highly soluble and is easily transported by water. Weathering of exposed rock also results in airborne releases where exposure may occur via inhalation of fugitive dust. Toxic levels of selenium have been detected in soils, sediments, ground and surface water, vegetation, and wildlife near phosphate mines. Vertebrates appear to be the most susceptible taxa to selenium poisoning and more than 60 head of livestock in southeast Idaho have been fatally poisoned by selenium. Wildlife mortality has not been documented, but selenium has been detected in muscle and organ tissue in fish and wild ungulates, prompting warnings against consumption. Impacts from mining cover approximately 17,000 acres in the Southeast Idaho Phosphate Mining Resource Area (FWS 2014). Most of the active, inactive, and proposed mines in the region do not occur within the Northwestern Basin and Range. However, nearly all are located in watersheds that drain into the Blackfoot River, one of the largest rivers in the eastern Northwestern Basin and Range.

Objective	Strategy	Action(s)	Target SGCNs
Minimize the exposure of humans, wildlife, and habitat to selenium and other toxins generated by mining activities.	Maintain IDFG's role as a Trustee in the DOI Natural Resource Damage Assessment and Restoration Program Southeast Idaho Phosphate Mine Site.	Advocate for mitigation and restoration commitments from mining companies during planning for remediation and restoration activities.	Western Toad Northern Leopard Frog Western Grebe Clark's Grebe Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (*Hesperapis kayella*) A Caddisfly (*Eocosmoecus schmidi*) Snake River Pilose Crayfish
	Protect human health by preventing accidental ingestion of selenium-contaminated substances.	Continue to monitor water, vegetation, and animal tissues for selenium levels in affected watersheds. Ensure adequate warnings are provided to the public where selenium levels are known to be elevated in wildlife and vegetation.	

Species designation, planning & monitoring

In addition to conservation measures to address habitat threats, some SGCN require inventory and monitoring to assess their current status and distribution in Idaho. We identify information needs for 3 species in Riverine–Riparian Forest & Shrubland: Bear Lake Springsnail, Snake River Pilose Crayfish, and Rocky Mountain Duskysnail. We propose strategies to determine population status as well as suggest interim conservation measures where appropriate.

Bear Lake Springsnail

The Bear Lake Springsnail (*Pyrgulopsis pilsbryana*) is known from 13 sites in the Bear River drainage of Idaho, Utah, and Wyoming. Most are in Bear Lake and Franklin counties in southeast Idaho where the sites are clustered in an area stretching <80 km (<50 mi). The species is ranked G2 (Imperiled) by NatureServe and S1 (Critically Imperiled) by IDFG. The Bear Lake Springsnail is known to inhabit large, cold springs. Little else is known of the ecology or habitat needs of the species. Population status is unknown. Frest (1999) identifies habitat alteration arising from water appropriation and livestock use as the primary threats. Research to ascertain population status, trends, and habitat requirements are the most pressing needs for the Bear Lake Springsnail. Conservation measures that minimize disturbance to habitat and preserve water quantity and quality are logical for an aquatic species with such a restricted distribution.

Snake River Pilose Crayfish

The Snake River Pilose Crayfish (*Pacifastacus connectens*) is known from the Snake River drainage in south-central Idaho west to the closed desert lakes basins of eastern Oregon, specifically Harney Basin and one likely aberrant occurrence from Bear Lake in the closed Bonneville Basin of eastern Idaho and northern Utah. The holotype was collected in Upper Salmon Falls Creek in 1914. Conservation status of the species is unknown. The species is almost completely data deficient and there are no contemporary surveys of its distribution or conservation status (Larsen and Olden 2011). The American Fisheries Society recognizes its conservation status as stable, though there is no basis for the designation. NatureServe has assigned it a status of G3G4; in Idaho, Snake River Pilose Crayfish has no official status. Potential threats to Snake River Pilose Crayfish are largely generalized from literature, but include habitat loss or degradation. A more tangible threat is the introduction of invasive crayfish species to areas occupied by Snake River Pilose Crayfish. The Virile Crayfish (*Orconectes virilis*) has widely replaced the Pilose Crayfish (*P. gambelii*) from stretches of the Bear River in southwestern Wyoming, and has also been reported from upper Snake River tributary streams of southern Idaho (Clark and Lester 2005). The most immediate conservation need for this species is a current status assessment and comparison to the known historic distribution to gauge the current level of displacement by introduced crayfishes.

Objective	Strategy	Action(s)	Target SGCNs
Accurately determine population status and trends of several SGCN in Idaho.	Use historical observations and survey data to improve knowledge of distribution.	Resurvey historically-occupied sites annually or at regular intervals. Expand surveys to include adjacent suitable habitat. Consider installation of trapping arrays to assist survey efforts for Snake River Pilose Crayfish.	Bear Lake Springsnail Snake River Pilose Crayfish Rocky Mountain Duskysnail
	Identify habitats crucial to Bear Lake Springsnail and occupancy of those habitats.	Develop habitat conservation guidelines based on identified habitat preferences.	Bear Lake Springsnail
Assess and verify displacement of Snake River Pilose Crayfish by invasive crayfish species.	Determine cause(s) of displacement.	Compare historical and current distribution of both species Conduct surveys and trapping to determine if site occupancy is exclusive. Assess habitat conditions at occupied sites.	Snake River Pilose Crayfish

Target: Colonial Waterbirds

Blackfoot Reservoir is a large, 18,000-acre body of water administered by the Bureau of Indian Affairs. Established in 1910 for the purpose of agricultural irrigation to the Fort Hall Indian Reservation and surrounding lands around Blackfoot, Idaho, this particular reservoir and adjacent habitat created by the reservoir provides valuable habitat for a suite of wildlife, particularly Colonial Waterbirds. Several SGCN rely on Blackfoot Reservoir for nesting. These species include Western Grebe (*Aechmophorus occidentalis*), Clark's Grebe (*Aechmophorus clarkii*), American White Pelican (*Pelecanus erythrorhynchos*), Ring-billed Gull (*Larus delawarensis*), California Gull (*Larus californicus*), and Caspian Tern (*Hydroprogne caspia*). Grebe species nest in the emergent vegetation surrounding the reservoir while American White Pelican and the 2 gull species nest on Gull Island within Blackfoot Reservoir.

Presumably, Blackfoot Reservoir colonies originated shortly after construction of the Blackfoot Dam. However, persecution by anglers, fluctuating water levels, predation, and other unknown factors likely limited successful nesting (FWS 1984, Burleigh 1972). Surveys conducted in the mid-1980s documented adult birds on Gull Island, but no evidence of nesting American White Pelican (Trost 1985). In 1991 and 1992, IDFG contracted with USDA Wildlife Services to remove native predators (American Badger, *Taxidea taxus*) from Gull Island. The following year (1993) was the first record of American White Pelican production at Blackfoot Reservoir when 80 to 100 nearly-fledged young were observed (Trost and Gerstell 1994). Beginning in 2002, American White Pelicans have been surveyed annually while gull species have been surveyed every 3 to 4 years. Survey data on grebe species are limited.

In 2002, IDFG counted 1,352 breeding American White Pelican pairs on Gull Island. The colony increased to a peak of 3,418 breeding birds in 2007. Between 2010 and 2015, the colony averaged 1,860 (range 724 to 3,034) breeding birds. A growing population of American White Pelican on the island has resulted in measured increases in predation on native Yellowstone Cutthroat Trout. Since 2010, IDFG has implemented management actions to alleviate predation pressure on important trout fisheries (IDFG Forthcoming 2016). For example, installing nest exclusion fences and flagging on Gull Island to reduce the availability of suitable nest substrates for American White Pelican.

Colonial Waterbirds at Blackfoot Reservoir are a valuable conservation target despite continued management challenges between American White Pelican and trout fisheries. Future management at Blackfoot Reservoir will require careful monitoring of colonial waterbirds as well as native trout species to meet desired objectives.

Target Viability

Fair. Viability of the colonial waterbird population at Blackfoot Reservoir is fair because of a downward trend for some species (American White Pelican and Caspian Tern), lack of data for others (grebes), and ongoing management activities on the nesting island that may negatively impact nontarget SGCN. IDFG survey data specific to Blackfoot Reservoir waterbird colonies indicate a downward trend for American White Pelican and Caspian Tern, and no distinct trend for the other nesting SGCN (Ring-billed and California Gull, Western and Clark's Grebe; IDFG unpublished data). Statewide, Ring-billed and California Gull nesting populations have declined by >50% in the past 10 years (IDFG unpublished data) and nesting success and recruitment of Western and Clark's Grebe are extremely low (B. Flanders–Wanner, pers. comm.). Conversely, American White Pelican appears to be stable in Idaho and westwide (C. Moulton and M. Wackenhut, IDFG, in review).

Prioritized Threats and Strategies for Colonial Waterbirds

High rated threats to Colonial Waterbirds in the Northwestern Basin and Range

Water level fluctuations & unknown causes of decline

Fluctuating water levels are a significant issue for Western and Clark's Grebe. Most Western and Clark's Grebe colonies are located on reservoirs, or along rivers susceptible to water fluctuations that result from dam operations. Rapid increases in water levels results in nest flooding, while rapid releases of water results in nests that are no longer accessible to grebes.

Although significant declines in these 2 grebe species have been documented in Idaho and significant, if not complete, nesting failure is regularly documented at locations where surveys have been conducted, the reason for this decline and failure is currently unknown. Blackfoot Reservoir is a regularly-used nesting site for these grebe species, but they have not been surveyed at this location and it is not known whether they are experiencing the same significant breeding issues as seen in the rest of the state.

Objective	Strategy	Action(s)	Target SGCNs
Determine breeding status on Blackfoot Reservoir.	Conduct breeding season surveys on the reservoir.	Work with grebe experts to develop monitoring strategy for this location.	Western Grebe Clark's Grebe
Assess potential impacts of water level fluctuations on breeding success on Blackfoot Reservoir.	Work with partners to conduct research on this colony.	Collaborate with FWS on proposed research project.	Western Grebe Clark's Grebe

Population management activities & competition with native species

Until as recently as 2006, 8 Ring-billed and California Gull nesting colonies existed in Idaho. Six of these were also nesting locations for Caspian Tern (IDFG 2007). By 2014, only five of these historic colonies remained active, including Blackfoot Reservoir, representing 41% of the 2006 population. Since 2010, much of Gull Island at Blackfoot Reservoir has been fenced during the breeding season to limit American White Pelican nesting; nevertheless, this is the only colony that has remained relatively stable over the last 20 years with 5,000 to 7,000 pairs of nesting gulls.

Caspian Tern has mostly disappeared from Idaho and currently nests reliably in only one location—Island Park Reservoir. Until 2009, an average of 35 pairs nested regularly at Blackfoot Reservoir on Gull Island (Trost 1994, IDFG unpublished data). The last known nest attempt of this species at Blackfoot was in 2013, when one pair initiated nesting on the island (IDFG unpublished data), and it was the only nest attempt documented since 2008. This species is highly sensitive to disturbance, but it is also typically at a competitive disadvantage when nesting with other colonial species, such as gulls and American White Pelican. Caspian Tern initiates nesting later than these other colonial species, and is therefore either pushed out because of lack of space, or is subject to high predation pressure from the gulls, which are often already feeding chicks. At Blackfoot Reservoir, Caspian Terns typically attempted to nest in the low-lying areas away from the rest of the Colonial Waterbirds. If and when water levels rose in the spring after snowmelt, their nests would flood. Management of the island since 2010 to limit American White Pelican nesting is likely also deterring nest attempts at this location.

Objective	Strategy	Action(s)	Target SGCNs
Maintain nesting island availability.	Monitor breeding population in concert with fencing activities on Gull Island to ensure population remains stable.	Conduct colony surveys at least once every 3 years as long as fencing activities continue.	Ring-billed Gull California Gull Caspian Tern
Reduce impacts of competition	Create areas on Gull Island for late	Work with FWS, Pacific Region, to develop protocol for creating late-breeding	Caspian Tern

Objective	Strategy	Action(s)	Target SGCNs
with other nesting species on Caspian Tern.	breeding initiation.	initiation areas. Work with land managers, such as FWS, to test protocol on Blackfoot Reservoir.	

Recreational disturbance

Human disturbance is a concern for the nesting colony of American White Pelican, Ring-billed and California Gull, and Caspian Tern on Gull Island in Blackfoot Reservoir. Persecution by local anglers took place here as late as the early 1960s, deterring successful American White Pelican nesting (FWS 1984, Burleigh 1972). With increased management activities at this location to limit American White Pelican nesting, it is critical that additional human disturbance is minimized.

Western and Clark's Grebe are sensitive to boating activities from nest initiation through brood-rearing. Boat wake can inundate or flip nests, causing nest failure, and inattentive boat use too close to grebes carrying young can result in separation of the young from adults, and ultimately mortality of the separated young.

Objective	Strategy	Action(s)	Target SGCNs
Reduce recreational disturbance.	Educate public about nesting colony sensitivity. Enforce state and federal laws pertaining to the disturbance of nesting migratory birds.	Create and post obvious signage at colony to deter disturbance. Create boating no-wake zones around nesting colonies, and monitor their effectiveness. Create signage at boat launches informing the public of grebe colony presence and recommendations for reducing recreational impacts.	Western Grebe Clark's Grebe American White Pelican Caspian Tern

Spotlight Species of Greatest Conservation Need: American White Pelican & Native Cutthroat Trout Management Challenges

This section is adapted from IDFG's draft "Management Plan for the Conservation of American White Pelican in Idaho: A ten-year plan (2016–2025) to conserve American White Pelican populations and manage impacts to fisheries resources in Idaho."

The American White Pelican is a colonial-nesting, fish-eating waterbird that inhabits lakes, rivers and wetlands in the interior western US. American White Pelican populations in Idaho are part of a distinct, migratory western population that breeds in northern latitudes roughly west of the Continental Divide and winters in marine habitats along the southern Pacific Coast. American White Pelican nests predominantly on permanent islands in freshwater lakes where predators are effectively excluded. In Idaho, all 3 active nesting colonies occupy islands created by the construction of large reservoirs. One of the 3 colonies is located in the Northwestern Basin and Range, on Gull Island in Blackfoot Reservoir. Idaho currently supports approximately 16% of the western American White Pelican breeding population and is the third largest relative contributor to this nesting population. Current threats to western populations include relatively few colonies, large fluctuations in colony size and productivity, hydrologic alterations, disease pandemics, and possibly West Nile virus. Idaho identifies the American White Pelican as a SGCN due to few occurrences (i.e., breeding colonies) in the state, a significant proportion (16%) of the western US population breeds in Idaho, and multiple threats, including climate change and disease.

American White Pelican populations in Idaho generally forage on abundant nongame fish, generating little controversy or causing few impacts to aquatic resources. The Blackfoot Reservoir colony, however, is measurably impacting native Yellowstone Cutthroat Trout populations, creating a conflict between American White Pelican conservation and fisheries management objectives. The Yellowstone Cutthroat Trout is not recognized as an SGCN.

Beginning in 2003, concentrations of 50 to 100 American White Pelicans began foraging at the mouth of the Blackfoot River. Since then, the frequency and abundance of American White Pelicans foraging on migrating fish has increased commensurate with the American White Pelican nest count trends on Gull Island. During a 4-year study of wild Yellowstone Cutthroat Trout in the Blackfoot River, predation rates by American White Pelican typically exceeded 20% and even exceeded 60% in one river segment. Low river flows augment predation by forcing migrating Yellowstone Cutthroat Trout to navigate water too shallow to provide effective escape cover. Current climate modeling suggests that low flow conditions are likely to appear more frequently in the future and may even become a regular occurrence.

Adult American White Pelican, Blackfoot Reservoir, Idaho © 2005 Colleen Moulton

Providing high-quality sport fisheries and angling opportunities and maintaining a viable American White Pelican breeding population are priorities for IDFG. Management actions are therefore necessary to protect fisheries as American White Pelican colony size and productivity fluctuates annually, while at the same time ensuring the persistence of nesting American White Pelicans on the landscape. In 2010, IDFG began using nest exclusion fencing and fladry to limit occupancy and breeding activity on Gull Island. The goal has been to maintain a breeding population of 700 American White Pelicans at Blackfoot Reservoir. Hazing activities along Blackfoot River have been implemented to minimize impacts to migrating Yellowstone Cutthroat Trout, sometimes with lethal reinforcement, as authorized by a depredation permit issued by the FWS. Also authorized by the same permit, nest destruction occurs annually on Blackfoot Reservoir islands in an attempt to meet breeding American White Pelican population objectives. Ongoing and future management will be challenged to mitigate the impacts of American White Pelican on native Yellowstone Cutthroat Trout and to balance the conservation and management of these 2 species.

Target: Bighorn Sheep

Bighorn Sheep populations are managed in Idaho with a separate species management plan (IDFG 2010). Sheep occurrence in the Northwestern Basin and Range is defined within 2 Population Management Units (PMUs), described in detail in the Bighorn Sheep Management Plan (IDFG 2010): the Jim Sage and South Hills. Bighorn Sheep in the Jim Sage PMU occur between 1,500 and 2,400 m, primarily on lands administered by the BLM, but occasionally on private lands also. The landscape is characterized by moderately rugged canyons and low mountains with predominantly shrubsteppe vegetation on the lower elevations and south slopes. Bighorn Sheep in this PMU do not exhibit seasonal migration. From 1988 through 2004, the Department embarked on a program to reestablish Bighorn Sheep into historic range in several locations in Cassia County including the Jim Sage and Albion mountains. From 2000 to 2004, 93 Bighorn Sheep were released into historic habitat on the Jim Sage and Albion mountains. The Jim Sage population has increased steadily and now contains an estimated 80 to 100 individuals (IDFG 2010).

The South Hills is an isolated mountain range covering approximately 1,600 km^2. The dominant landform is low mountains bisected by moderately rugged canyons. Lower elevations and south- and west-facing slopes are predominantly shrubsteppe vegetation and juniper woodlands. Lodgepole pine and quaking aspen communities occur at higher elevations. Suitable habitat for Bighorn Sheep occurs in the Rock Creek, Dry Creek, and Big Cottonwood Creek drainages between 1,400 and 2,100 m. Bighorn Sheep principally use Sawtooth NF lands, but also use lands managed by the BLM, Idaho Department of Lands, and IDFG. Bighorn Sheep in this PMU do not exhibit seasonal migration. From 1986 to 1993, 50 Bighorn Sheep were released into the Big Cottonwood Creek drainage and 24 were released into the East Fork of Dry Creek. In 1989, the Bighorn Sheep in Big Cottonwood experienced a die-off and despite additional releases, numbers continued to decline. Currently, <15 Bighorn Sheep persist in the PMU. Reintroduction efforts are considered impractical due to several issues, including the proximity of domestic sheep and goats, motorized recreation, and habitat issues such as juniper encroachment (IDFG 2010).

Target Viability

Good. Viability for Bighorn Sheep in the South Hills is poor due to low populations, conflicts with domestic livestock, and habitat concerns. Viability for the Jim Sage population is good. The population is estimated to be near carrying capacity using habitat models.

Prioritized Threats and Strategies for Bighorn Sheep

Very High rated threats to Bighorn Sheep in the Northwestern Basin and Range

Disease transmission via domestic sheep

Disease was a significant factor in the historic decline of Bighorn Sheep and is a key factor limiting recovery throughout Idaho (IDFG 2010). Respiratory disease (pneumonia) is the most significant disease, resulting in negative effects on populations through increased adult and lamb mortality. Effects can be serious and long-lasting, no effective vaccines exist, and once pathogens are introduced, there is currently no effective treatment. The most likely sources of pathogen introduction into Bighorn Sheep populations are domestic sheep and goats, and other Bighorn Sheep (USFS 2006, WAFWA 2007, CAST 2008, Schommer and Woolever 2008; excerpted from IDFG 2010).

Objective	Strategy	Action(s)	Target SGCNs
Work to reduce the effects of disease on Bighorn Sheep populations.	Advocate and work toward maintaining spatial and temporal separation between Bighorn Sheep and domestic sheep and goats.	Work with livestock permittees to develop and implement "Best Management Policies" to assist in ensuring physical separation of livestock, consistent with Idaho Code (IDFG 2010). Collaborate with ISDA and the Idaho Wool Growers Association to develop education and outreach efforts to inform owners of domestic sheep and goats of the risks associated with comingling and provide recommendations to avoid contact (IDFG 2010). Increase knowledge of movement patterns, habitat use, survival, etc. using radio-marked Bighorn Sheep.	Bighorn Sheep
	Monitor populations for presence of disease.	Conduct investigations of known disease events and their impacts on individual herds (IDFG 2010). Obtain biological samples from all Bighorn Sheep handled, to determine exposure to pathogens, and to develop individual herd health histories of Bighorn Sheep in Idaho (IDFG 2010).	

High rated threats to Bighorn Sheep in the Northwestern Basin and Range

Altered fire regimes

Fire suppression has altered habitats by allowing encroachment of conifer species into mountain shrub communities, reducing forage. Conversely, wildfire in shrubsteppe habitats results in loss of forage.

Objective	Strategy	Action(s)	Target SGCNs
Reduce conifer encroachment into mountain shrub habitat.	Where succession and conifer encroachment are limiting Bighorn Sheep habitat, work closely with appropriate agencies to maintain or restore mountain shrub habitat.	Use mechanical methods or controlled fire to reduce or remove conifers from mountain shrub habitat.	Bighorn Sheep
Reduce impacts of wildfire in mountain shrub habitats.	Develop fire plans that prioritize suppression in important habitats.	Provide land management agencies with maps detailing important shrubsteppe habitat within Bighorn Sheep range.	Bighorn Sheep

Changes in precipitation & broad-scale hydrologic regimes

The modeled effects of climate change suggest changes in precipitation timing and quantity is likely to impact the severity, frequency, and magnitude of all forest disturbances. The immediate effects are predicted to create conditions conducive to larger, more intense fires across the entire Great Basin, which may result in rapid changes in forest age class distribution and landscape patterns. The amount and timing of precipitation affects vegetation growth and recruitment and may seriously hinder restoration efforts on degraded sites.

Northwestern Basin and Range Section

An initial version of the Northwestern Basin and Range Section project plan was completed for the 2005 Idaho State Wildlife Action Plan (formerly Comprehensive Wildlife Conservation Strategy). In 2014, a small working group developed an initial draft of the section plan (Miradi v. 0.39), which was then reviewed by a wider group of partners and stakeholders during a 2-day workshop held at the Idaho Department of Fish and Game, Southeast Regional Office, Pocatello in January 2015 (this input captured in Miradi v. 0.41). This draft was then subsequently distributed for additional internal review within the Idaho Department of Fish and Game in June 2015. Since then, we have continued to work with key internal and external stakeholders and subject matter experts to improve upon the plan. Materials in this document are based on Miradi v. 0.53. Individuals and organizations/agencies involved in this plan are shown in Table 11.3.

Table 11.3 Individuals, agencies, and organizations involved in developing this plan [a]

First name	Last name	Affiliation
Zach	Lockyer*	Idaho Department of Fish and Game, Southeast Region
Dean	Rose*	Idaho Department of Fish and Game, Southeast Region
Tim	Weekley	Idaho Department of Fish and Game, Headquarters
Arnie	Brimmer	Idaho Department of Fish and Game, Southeast Region
Rita D	Dixon	Idaho Department of Fish and Game, Headquarters
Brett	Gullett	Idaho Department of Fish and Game, Southeast Region
Deborah	Koziol	Natural Resources Conservation Service
James	Kumm	Bureau of Land Management (US), Idaho Falls District, Pocatello Field Office
Paul	Makela	Bureau of Land Management (US)
Colleen	Moulton	Idaho Department of Fish and Game, Headquarters
Charles R	Peterson	Idaho State University
Quinn	Shurtliff	Gonzales–Stoller Surveillance, LLC
Travis	Stone	Shoshone–Bannock Tribes
Martha	Wackenhut	Idaho Department of Fish and Game, Southeast Region

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

12. Owyhee Uplands Section

Section Description

The Owyhee Uplands Section is part of the Columbia Plateau Ecoregion. The Idaho portion, the subject of this review, comprises southwestern Idaho from the lower Payette River valley in the northwest and the Camas Prairie in the northeast, south through the Hagerman Valley and Salmon Falls Creek Drainage (Fig. 12.1, Fig. 12.2). The Owyhee Uplands spans a 1,200 to 2,561 m (4,000 to 8,402 ft) elevation range. This arid region generally receives 18 to 25 cm (7 to 10 in) of annual precipitation at lower elevations. At higher elevations, precipitation falls predominantly during the winter and often as snow.

The Owyhee Uplands has the largest human population of any region in Idaho, concentrated in a portion of the section north of the Snake River—the lower Boise and lower Payette River valleys, generally referred to as the Treasure Valley. This area is characterized by urban and suburban development as well as extensive areas devoted to agricultural production of crops for both human and livestock use. Among the conservation issues in the Owyhee Uplands include the ongoing conversion of agricultural lands to urban and suburban development, which limits wildlife habitat values. In addition, the conversion of grazing land used for ranching to development likewise threatens wildlife habitat. Accordingly, the maintenance of opportunity for economically viable ranching operations is an important consideration in protecting open space. The aridity of this region requires water management programs, including water storage, delivery, and regulation for agriculture, commercial, and residential uses. Agricultural fields are irrigated with either flood irrigation, mostly supplied by diversion from the Snake, Boise, and Payette rivers, or sprinkler irrigation supplied by groundwater pumping. Major hydroelectric and water storage reservoirs include CJ Strike and Swan Falls reservoirs on the Snake River. Reaches of the Boise and Payette rivers within the Owyhee Uplands are controlled by upstream dams.

Lower Deep Creek, Owyhee Uplands, Idaho © 2011 Will Whelan

In stark contrast, the portion of the Owyhee Uplands to the south of the Snake River is a topographically rugged, remote, and sparsely populated area. This area is high-desert sagebrush steppe. The Owyhee Mountain Range (oriented north-south in western Owyhee County) is the dominant landform with stands of quaking aspen (*Populus tremuloides* Michx.), curl-leaf mountain mahogany (*Cercocarpus ledifolius* Nutt.), and western juniper (*Juniperus occidentalis* Hook.) in a mosaic of mountain brush, meadow, and sagebrush (*Artemisia* L.). Water discharge from higher elevations feeds many small streams that serve as the headwaters of the Owyhee, Bruneau, and Middle Snake drainages. Portions of the Bruneau and Owyhee rivers are designated Wild and Scenic Rivers. Most of this area is managed by the Bureau of Land Management (BLM), which administers 9 areas designated as wilderness, including the Owyhee Canyonlands Wilderness.

Livestock ranching and farming are major land uses in the Owyhee Uplands. This industry includes large corporate and small family operations that use a mix of private, state, and federal lands.

Historically, miners and prospectors excavated numerous gold mines in this section. Today, gold extraction supports a few commercially important business operations.

The Owyhee Uplands contains some of the most important sagebrush steppe in Idaho including the highest density of occupied Greater Sage-Grouse (hereafter Sage-Grouse, *Centrocercus urophasianus*) leks in the state. In some areas, this habitat type has been altered by the establishment of nonnative plants, particularly invasive annual grasses introduced from the Eurasian Steppe biome, including cheatgrass (*Bromus tectorum* L.) and medusahead (*Taeniatherum caput-medusae* [L.] Nevski). These species affect many aspects of sagebrush-steppe ecology, but perhaps most importantly, the presence of invasive annual grasses alters fire regimes. In some areas, increased frequency and severity of wildfires has resulted in conversion from shrub-dominated habitats to nonnative annual grasslands, which has reduced habitat value for shrubsteppe obligate species. The altered habitat has favored species that benefit from less shrub cover, including early-seral and grassland-dependent species. This has been particularly true at lower-elevation sites formerly dominated by Wyoming big sagebrush (*A. tridentata* Nutt. subsp. *wyomingensis* Beetle & Young).

Aquatic and wetland habitats in the Owyhee Uplands are a limiting resource for many species of fish and wildlife in this arid landscape. High value meadow habitats are primarily located on private land because homesteaders needed good water and forage production to make a living on their limited allotments of 160 acres. Actions proposed in the Owyhee Uplands Section that relate to upland, meadow, or riparian habitats on private land are voluntary and require consent of the landowner. In-stream habitat and riparian habitat are usually intrinsically linked in terms of their condition and value as fish and wildlife habitats. Wetlands and riparian habitats tend to have the highest vegetation productivity within the landscape and represent key habitat types for foraging herbivores. Dense vegetation cover associated with wetland and riparian habitats is also favorable for many types of wildlife. In addition, high insect populations are associated with these areas of greater primary productivity, and wetland and riparian habitats are essential for many insectivorous animals, such as bats and Neotropical migratory birds.

Most Owyhee Uplands river systems lie within steep, deeply-incised canyons. The rugged terrain and steep canyon walls provide habitats for Bighorn Sheep (*Ovis canadensis*), high concentrations of nesting raptors, and a diverse assemblage of bat species.

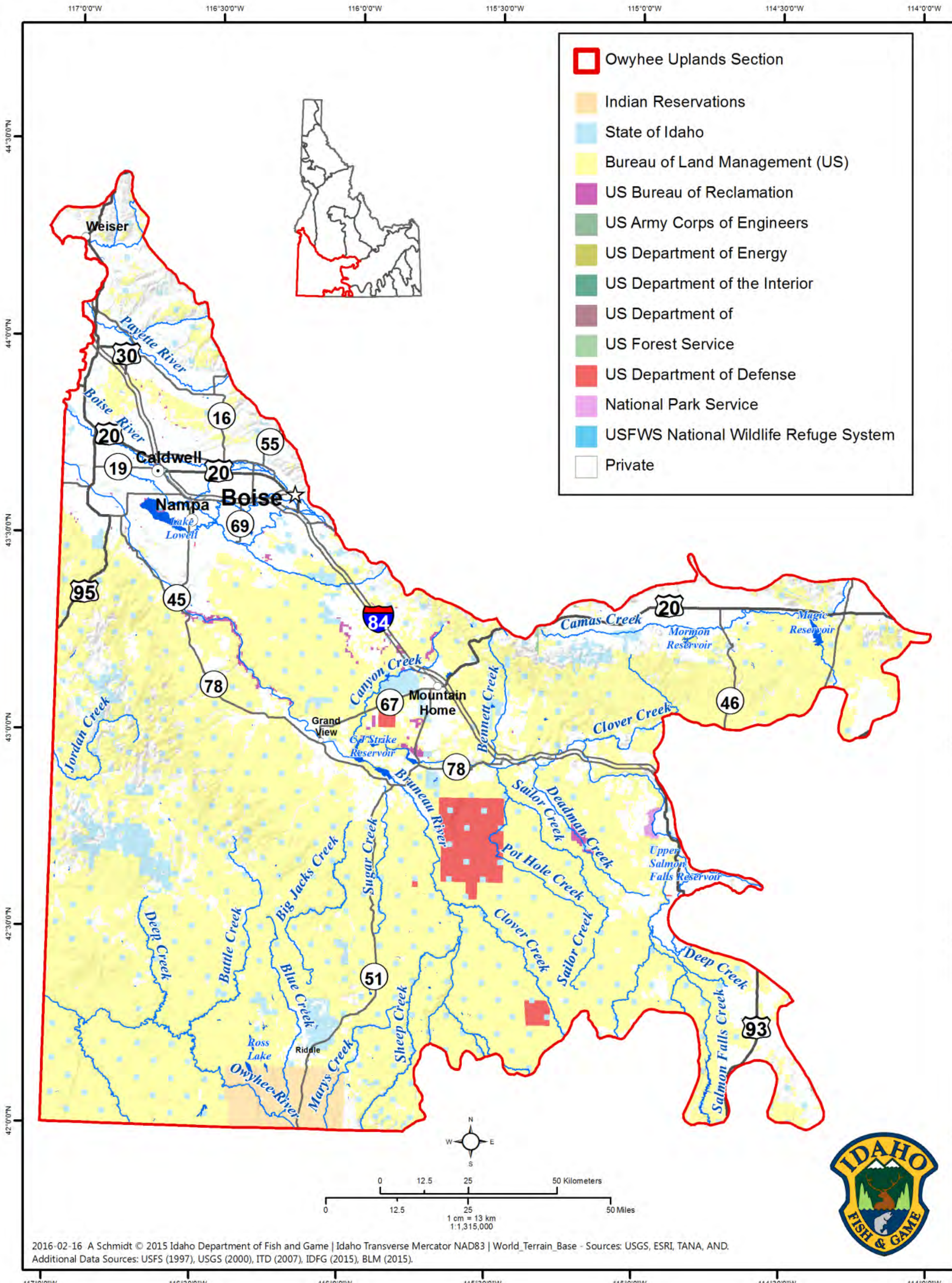


Fig. 12.1 Map of Owyhee Uplands surface management

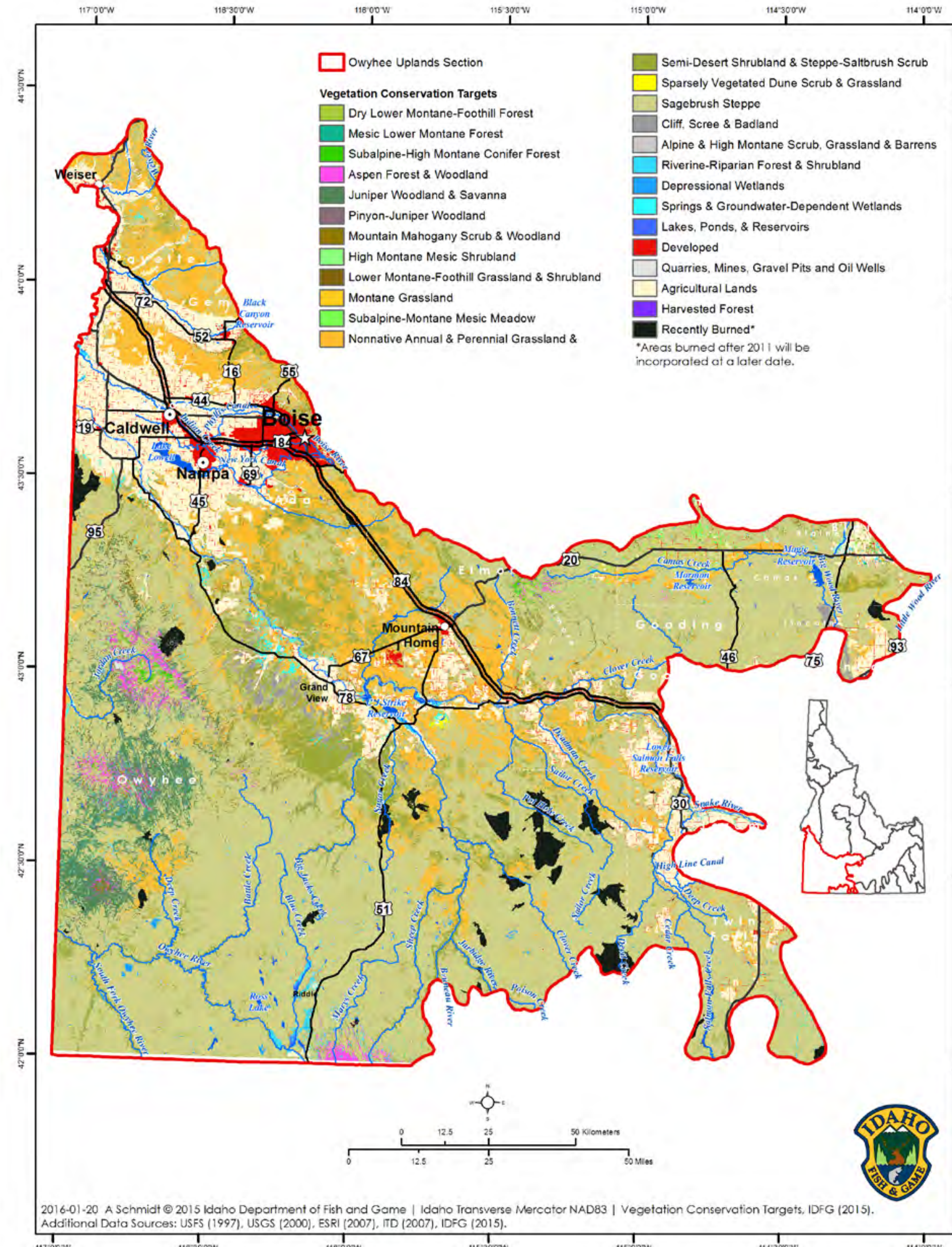


Fig. 12.2 Map of Owyhee Uplands vegetation conservation targets

Conservation Targets in the Owyhee Uplands

We selected 7 habitat targets (3 upland, 4 aquatic) that represent the highest priorities for wildlife conservation in the Owyhee Uplands as shown in Table 12.1. Species of greatest conservation need (SGCN) are associated with each habitat, i.e., "nested targets" (Table 12.2). The intent of the recommended "Objectives, Strategies, and Actions" is to direct resources toward improving the quality of these habitats for wildlife. Management of the habitat targets listed below will contribute to improving population viability for the species nested within them. Research and monitoring topics, such as species designation, ecological research, or planning, are summarized at the end of each target habitat if additional information is needed to support management programs. Such projects are often species-specific and include disease investigation and management.

Table 12.1 At-a-glance table of conservation targets in the Owyhee Uplands

Target	Target description	Target viability	Nested targets (SGCN)	
Semi-Desert Shrubland & Steppe–Saltbush Scrub	Combines "Semi-Desert Shrubland & Steppe" and "Saltbush Scrub." Xeric landscape dominated by salt desert scrub. In this section, often on ancient alkaline lacustrine deposits.	*Fair* to *Good*. In many areas, invasive weeds have affected plant diversity and created dense stands of annual grasses and forbs.	*Tier 2*	Ferruginous Hawk Golden Eagle Burrowing Owl
			Tier 3	Short-eared Owl Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Great Basin Collared Lizard
Sparsely Vegetated Dune Scrub & Grassland	Bruneau Dunes, Weiser Dunes, Windmill Dunes, and other unnamed scattered dune complexes.	*Fair*. Large areas dominated by cheatgrass and other invasive annuals.	*Tier 1*	Bruneau Dune Tiger Beetle
			Tier 2	An Ant-like Flower Beetle (*Amblyderus owyhee*) Lined June Beetle (*Polyphylla devestiva*)
			Tier 3	A Grasshopper (*Argiacris militaris*)
Sagebrush Steppe	Sagebrush steppe systems at all elevations across the Owyhee Uplands. This target comprises a variety of sagebrush types, habitat structure, and seral stages.	*Poor* to *Very Good*. Habitat is intact in good ecological condition in some areas, but in others, dominated by invasive annual grasslands with an altered fire regime.	*Tier 1*	Greater Sage-Grouse Southern Idaho Ground Squirrel Morrison's Bumble Bee
			Tier 2	Ferruginous Hawk Golden Eagle Burrowing Owl Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Silver-haired Bat Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Wyoming Ground Squirrel Alpine Tiger Beetle
			Tier 3	Short-eared Owl Common Nighthawk Hunt's Bumble Bee A Miner Bee (*Hesperapis kayella*)

Target	Target description	Target viability	Nested targets (SGCN)	
Riverine–Riparian Forest & Shrubland	All rivers and streams, including aquatic habitats and their associated terrestrial riparian habitats.	*Fair*. Rivers and associated riparian habitat are predominantly affected by water management, degraded water quality, and changes in hydrology.	*Tier 1*	Columbia Spotted Frog Yellow-billed Cuckoo Snake River Physa Bruneau Hot Springsnail Bliss Rapids Snail
			Tier 2	Western Toad Woodhouse's Toad Northern Leopard Frog California Gull Silver-haired Bat Hoary Bat
			Tier 3	Ring-billed Gull Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis California Floater Western Ridged Mussel Snake River Pilose Crayfish A Mayfly (*Paraleptophlebia jenseni*) Duckhead Snowfly Boise Snowfly
Depressional Wetlands	Precipitation-fed systems ranging from infrequent to semipermanent or permanently flooded. Includes playas, vernal pools, shallow marshes, and deep water marshes.	*Fair*. Habitat area has been greatly reduced in many sites. Altered by invasive weeds and hydrologic disturbance.	*Tier 1*	Columbia Spotted Frog
			Tier 2	Woodhouse's Toad Northern Leopard Frog American Bittern White-faced Ibis Black Tern
			Tier 3	Sandhill Crane Raptor Fairy Shrimp
Springs & Groundwater-Dependent Wetlands	Primarily springs and seeps, geothermal springs, alkaline-saline wetlands, and wet and mesic meadows.	*Poor* to *Fair*. The current area occupied by springs and groundwater-dependent wetlands is reduced from historic extent. Numerous hydrologic alterations.	*Tier 1*	Columbia Spotted Frog Greater Sage-Grouse Banbury Springs Limpet Bruneau Hot Springsnail Bliss Rapids Snail
			Tier 2	American Bittern Silver-haired Bat Hoary Bat
			Tier 3	Sandhill Crane Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis
Lakes, Ponds & Reservoirs	This ecosystem includes all natural lakes and deep ponds, dam-altered naturally formed lakes, and created	*Fair*. Water level fluctuations and land bridging of nesting islands, as a result of unusually low water levels, are the main issues.	*Tier 1*	Columbia Spotted Frog
			Tier 2	Western Grebe Clark's Grebe American White Pelican California Gull Caspian Tern

Target	Target description	Target viability	Nested targets (SGCN)	
	waterbodies of all sizes that fit the lacustrine definition.		*Tier 3*	Ring-billed Gull Pondsnail (*Stagnicola*) Species Group
Bat Assemblage	The Owyhee Uplands contains the full complement of bat species found in the state (14 spp.)	*Good*. Main concerns include fatality associated with wind energy, AML closures, and potential incidence of white-nose syndrome (WNS).	*Tier 2* *Tier 3*	Silver-haired Bat Hoary Bat Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis

Table 12.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Owyhee Uplands

Taxon	Conservation targets: Semi-Desert Shrubland & Steppe–Saltbush Scrub	Sparsely Vegetated Dune Scrub & Grassland	Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Bat Assemblage
AMPHIBIANS								
Western Toad (*Anaxyrus boreas*)[2]				X		X		
Woodhouse's Toad (*Anaxyrus woodhousii*)[2]				X	X	X		
Northern Leopard Frog (*Lithobates pipiens*)[2]				X	X	X		
Columbia Spotted Frog (Great Basin DPS) (*Rana luteiventris*)[1]				X	X	X	X	
BIRDS								
Greater Sage-Grouse (*Centrocercus urophasianus*)[1]			X			X		
Western Grebe (*Aechmophorus occidentalis*)[2]							X	
Clark's Grebe (*Aechmophorus clarkii*)[2]							X	
American White Pelican (*Pelecanus erythrorhynchos*)[2]							X	
American Bittern (*Botaurus lentiginosus*)[2]					X	X		
White-faced Ibis (*Plegadis chihi*)[2]					X	X		
Ferruginous Hawk (*Buteo regalis*)[2]	X		X					
Golden Eagle (*Aquila chrysaetos*)[2]	X		X					
Sandhill Crane (*Grus canadensis*)[3]						X		
Long-billed Curlew (*Numenius americanus*)[2]			X					
Ring-billed Gull (breeding population) (*Larus delawarensis*)[3]				X			X	
California Gull (breeding population) (*Larus californicus*)[2]				X			X	
Caspian Tern (*Hydroprogne caspia*)[2]							X	
Black Tern (*Chlidonias niger*)[2]					X			
Yellow-billed Cuckoo (*Coccyzus americanus*)[1]				X				
Burrowing Owl (*Athene cunicularia*)[2]	X		X					
Short-eared Owl (*Asio flammeus*)[3]	X		X					
Common Nighthawk (*Chordeiles minor*)[3]	X		X			X		
Sage Thrasher (*Oreoscoptes montanus*)[2]			X					
Sagebrush Sparrow (*Artemisiospiza nevadensis*)[2]			X					
Grasshopper Sparrow (*Ammodramus savannarum*)[3]			X					
MAMMALS								
Pygmy Rabbit (*Brachylagus idahoensis*)[2]			X					
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]			X	X	X	X		X
Silver-haired Bat (*Lasionycteris noctivagans*)[2]			X	X	X	X	X	X

Taxon	Conservation targets							
	Semi-Desert Shrubland & Steppe–Saltbush Scrub	Sparsely Vegetated Dune Scrub & Grassland	Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Bat Assemblage
Hoary Bat (*Lasiurus cinereus*)[2]			X	X	X	X	X	X
Western Small-footed Myotis (*Myotis ciliolabrum*)[3]			X	X	X	X		X
Little Brown Myotis (*Myotis lucifugus*)[3]				X	X	X		X
Bighorn Sheep (*Ovis canadensis*)[2]	X		X					
Dark Kangaroo Mouse (*Microdipodops megacephalus*)[2]			X					
Columbia Plateau (syn. Merriam's) Ground Squirrel (*Urocitellus canus*)[2]			X					
Wyoming Ground Squirrel (*Urocitellus elegans nevadensis*)[2]			X					
Southern Idaho Ground Squirrel (*Urocitellus endemicus*)[1]			X					
REPTILES								
Great Basin Collared Lizard (*Crotaphytus bicinctores*)[3]	X							
BIVALVES								
California Floater (*Anodonta californiensis*)[3]				X				
Western Ridged Mussel (*Gonidea angulata*)[3]				X				
CRUSTACEANS								
Raptor Fairy Shrimp (*Branchinecta raptor*)[3]					X			
Snake River Pilose Crayfish (*Pacifastacus connectens*)[3]				X				
GASTROPODS								
Banbury Springs Limpet (*Lanx* sp. 1)[1]						X		
Pondsnail (*Stagnicola*) Species Group[3]							X	
Snake River Physa (*Physa natricina*)[1]				X				
Bruneau Hot Springsnail (*Pyrgulopsis bruneauensis*)[1]				X		X		
Bliss Rapids Snail (*Taylorconcha serpenticola*)[1]				X		X		
INSECTS								
An Ant-like Flower Beetle (*Amblyderus owyhee*)[2]		X						
Alpine Tiger Beetle (*Cicindela plutonica*)[2]			X					
Bruneau Dune Tiger Beetle (*Cicindela waynei*)[1]		X						
Lined June Beetle (*Polyphylla devestiva*)[2]		X						
A Mayfly (*Paraleptophlebia jenseni*)[3]				X				
Hunt's Bumble Bee (*Bombus huntii*)[3]			X					
Morrison's Bumble Bee (*Bombus morrisoni*)[1]			X					
A Miner Bee (*Hesperapis kayella*)[3]			X					
A Grasshopper (*Argiacris militaris*)[3]		X						

Taxon	Conservation targets							
	Semi-Desert Shrubland & Steppe–Saltbush Scrub	Sparsely Vegetated Dune Scrub & Grassland	Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Bat Assemblage
Spur-throated Grasshopper (*Melanoplus*) Species Group[3]								
Duckhead Snowfly (*Capnura anas*)[3]				X				
Boise Snowfly (*Utacapnia nedia*)[3]				X				

Target: Semi-Desert Shrubland & Steppe–Saltbush Scrub

This system comprises a variety of cover types dominated by mixed xeric-adapted shrubs and native grasses. The same management strategies apply to both Semi-Desert Shrubland and Steppe, and Saltbush Scrub because they share similar traits in terms of shrub composition and structure, and occur in a similar climatic zone. This habitat type occurs where substrates include sandstone talus, fine-textured alluvium, sand, clay, loams, cinder, cobbles, or coarse gravels, often on alluvial flats and fans, plateaus, bluffs, and similar landforms. Within the Owyhee Uplands, this system is characteristic of alkaline lacustrine deposits that form low foothills in the Treasure Valley, including the Owyhee Front, the Boise Foothills, and foothills and plains along the Payette, and Snake River valleys. The system also occurs along the lower slopes and valley bottoms of the upper Owyhee drainage, albeit discontinuously and not extensively, and grading to sagebrush-steppe habitat.

Owyhee Front near Oreana, Idaho, 2010 IDFG

Vegetation is characterized by sparse shrubs ranging from 5 to 30% vegetative cover. Shrubs may include shadscale (*Atriplex confertifolia* [Torr. & Frém.] S. Watson), fourwing saltbush (*A. canescens* [Pursh] Nutt.), bud sagebrush (*Picrothamnus desertorum* Nutt.), winterfat (*Krascheninnikovia lanata* [Pursh] A. Meeuse & Smit), and greasewood (*Sarcobatus vermiculatus* [Hook.] Torr.). Characteristic grasses include Indian ricegrass (*Achnatherum hymenoides* [Roem. & Schult.] Barkworth), Thurber's needlegrass (*A. thurberianum* [Piper] Barkworth), and needle and thread (*Hesperostipa comata* [Trin. & Rupr.] Barkworth). Biological soil crusts are often an important habitat component considering that usual soil types are highly erodible (Blaisdell and Holmgren 1984). Often this system transitions to a sagebrush-dominated system, particularly along edaphic, aspect, and elevational gradients.

This habitat type supports a high diversity of rodents—particularly granivores—and reptiles adapted to its sparse vegetation and sometimes specializing on unique edaphic conditions. Thus, this habitat type is often heavily used by snakes, raptors, and mesocarnivores attracted to this prey base.

In some areas large expanses have been infested with invasive annual grasses. Although semidesert habitat is typically not susceptible to intensive fires owing to the sparse vegetation, an intensified fire regime may occur at sites with dense growth of invasive plants.

Target Viability

Fair to Good. This habitat is normally characterized by sparse vegetation having an open canopy structure and an abundance of bare soil. In many areas, invasive weeds have affected plant diversity and created dense stands of annual grasses and forbs. This change in habitat structure affects suitability for reptiles, birds, and small mammals, which in turn affects higher trophic levels. Invasive annual plants also have affected fire frequency, resulting in the loss of shrubs in some areas, such as along the Owyhee Front.

Spotlight Species of Greatest Conservation Need: Burrowing Owl

The Burrowing Owl (*Athene cunicularia*) breeds in the deserts and grasslands of western North America and winters in the southern US and Mexico. Breeding habitat is characterized by low-growing grasses and shrubs (Klute et al. 2003). In the Owyhee Uplands, breeding sites are primarily in xeric, lower-elevation landscapes sparsely vegetated with grasses, shrubs, and forbs. Burrowing Owls nest in abandoned mammal burrows. In the Owyhee Uplands, burrows are predominantly abandoned American Badger (*Taxidea taxus*) burrows, especially where foraging badgers are excavating ground squirrels (e.g., Great Basin [syn. Piute] Ground Squirrel, *Urocitellus mollis* and Southern Idaho Ground Squirrel, *Urocitellus endemicus*). Thus, ground squirrel and badger population dynamics may affect Burrowing Owl nest site availability, population density, and distribution. Burrowing Owl prey comprises insects and small vertebrates. Land use and agricultural practices affect small mammal and insect prey availability, and pest control activities, in particular, may have unintended negative consequences for Burrowing Owl nest success (Klute et al. 2003). The expansion of nest predators, particularly populations of Common Raven (*Corvus corax*), is of concern for Burrowing Owl populations in some areas. For example, researchers documented visitation by ravens to scavenge cached prey items or take Burrowing Owl chicks at 66% of studied natural and artificial nests in the Owyhee Uplands (J. Belthoff pers. comm.). This increase in predation risk is likely attributable to the conversion of shrub-dominated landscapes to nonnative grasslands (i.e., cheatgrass), which makes nesting owls more visible and increases the availability of nesting structures (e.g., transmission lines) for ravens. Habitat conditions and causes of mortality outside Idaho on migration routes or particularly in wintering areas may affect population viability.

Prioritized Threats and Strategies for Semi-Desert Shrubland & Steppe–Saltbush Scrub

High rated threats to Semi-Desert Shrubland & Steppe–Saltbush Scrub in the Owyhee Uplands

Utility & service lines

Tall structures, such as utility poles and lattice towers, provide perching and nesting habitat for Common Raven and may reduce habitat use by Burrowing Owls and other species adapted to low-growing vegetation. Power lines also pose an electrocution risk to large birds, including the Golden Eagle (*Aquila chrysaetos*).

Objective	Strategy	Action(s)	Target SGCNs
Minimize population-level effects to wildlife from OHV use along maintenance roads associated with powerlines.	Manage OHV travel to avoid negative consequences for wildlife population viability.	Design OHV travel plans to avoid key areas for wildlife where viability would be affected by vehicle-caused mortality or habitat avoidance. Target weed abatement programs to minimize establishment and propagation of invasive weed stands in disturbed soils. Enforce travel regulations to minimize vehicle trespass and development of pioneered trails.	Ferruginous Hawk Golden Eagle Short-eared Owl Burrowing Owl Great Basin Collared Lizard
Minimize electrocution risk to raptors from transmission lines.	Evaluate, remediate and construct power transmission lines following Avian Power Line Interaction Committee protocols.		Ferruginous Hawk Golden Eagle Short-eared Owl

Off highway vehicle (OHV) use on undesignated routes or in undesignated areas

The Owyhee Front is close to the largest human population center in Idaho and the area is frequently used for recreation in the form of off-highway vehicle use (OHV) (IDFG 2010). OHV use has increased dramatically over recent decades, and unregulated and illegal OHV use in Bighorn Sheep habitat has also increased over the last 10–15 years (IDFG 2010). Enforcement is challenging due to the remoteness of the area (IDFG 2010). The prevalence of roads, trails, and OHV use may reduce the ability of sheep to move undisturbed between patches of habitat (IDFG 2010). In addition, OHV trail systems affect habitat use by reptiles (Munger et al. 2003), reducing the amount of habitat available to some species.

Objective	Strategy	Action(s)	Target SGCNs
Minimize population-level effects to wildlife from OHV use.	Manage OHV travel to avoid negative consequences for wildlife population viability.	Limit general recreational OHV travel to existing roads, primitive roads, and trails in areas where travel management planning has not been completed or is in progress. This action is not intended to prevent necessary administrative and/or permitted uses that include a variety of management activities such as infrastructure inspection and repair as well as use for ranch, range, and livestock management (e.g., moving livestock, repairing fences,	Ferruginous Hawk Golden Eagle Short-eared Owl Burrowing Owl Bighorn Sheep Great Basin Collared Lizard

Objective	Strategy	Action(s)	Target SGCNs
		checking water sources, distributing salt etc.). Design OHV travel plans to avoid key areas for wildlife where viability would be affected by vehicle-caused mortality or habitat avoidance. Target weed abatement programs to minimize establishment and propagation of invasive weed stands in disturbed soils. Enforce travel regulations to minimize vehicle trespass and development of pioneered trails.	

Increased frequency & severity of wildfire

Historically, the semidesert habitat was largely not susceptible to intensive fires owing to the sparse vegetation. However, an intensified fire regime may occur at sites with dense growth of invasive plants. Invasive plants affect the physical structure of sparsely-vegetated habitat when plants grow on normally bare soil patches (West 1994, Paysen et al. 2000). This increase in standing biomass increases the capacity for fire propagation through stands. Although many shrubs within this system may resprout following fire, the increased frequency and severity of wildfire may cause the loss of less resilient cover components resulting in a possible conversion to nonnative grassland (West 1994). This contributes to the ongoing fragmentation and loss of shrub-dominated habitats. Almost the entire extent of the Owyhee Uplands is rated as “very high” with respect to burn probability (DOI 2015).

Objective	Strategy	Action(s)	Target SGCNs
Reduce the number of acres of habitat lost to wildfire.	Coordinate actions with An Integrated Rangeland Fire Management Strategy (DOI 2015) and the Governor’s Alternative (Otter 2012).	Request and place additional firefighting resources and establish new Incident Attack Centers (Otter 2012). Create and maintain fuel breaks in strategic locations to modify fire behavior and increase fire suppression effectiveness based on criteria outlined in the Governor’s Alternative (Otter 2012) where such fuel breaks do not result in undesirable habitat loss or fragmentation.	Ferruginous Hawk Golden Eagle Burrowing Owl Short-eared Owl Common Nighthawk Great Basin Collared Lizard
Develop more aggressive strategies to reduce fine fuel loads (Otter 2012).	Improve targeting of fuels reduction opportunities and implementation (DOI 2015).	Explore opportunities to provide support to livestock grazing permittees and private landowners to implement fuel treatment actions as part of strategic, landscape efforts (DOI 2015). Work with livestock producers to	Ferruginous Hawk Golden Eagle Burrowing Owl Short-eared Owl Common Nighthawk Great Basin

Objective	Strategy	Action(s)	Target SGCNs
		implement fuels treatment on their lands and allotments (DOI 2015). Implement aggressive and targeted application of both proven techniques and the rapid investigation and implementation of new practices to control cheatgrass and mitigate habitat impacts from unwanted rangeland fire (DOI 2015).	Collared Lizard
Increase post-fire restoration success (DOI 2015).	Expand the use of native seeds and seedlings to accelerate efforts to improve and restore post-fire rangeland health (DOI 2015).	Collect native seed for use in developing commercial seed and for long-term seed banking to ensure conservation of germ plasm to promote climate resilience and long-term rangeland health (DOI 2015). Coordinate and collaborate across agencies on climate trend data as it relates to seeds (DOI 2015). Increase seed production and the grow-out of genetically appropriate native plant species for the restoration (DOI 2015). Limit the use of nonnative species (e.g., to achieve site stabilization, wildfire breaks, or invasive plant control) to transitional, noninvasive species, replaced by natives in subsequent ecological restoration or during natural successional processes (DOI 2015).	Ferruginous Hawk Golden Eagle Burrowing Owl Short-eared Owl Common Nighthawk Great Basin Collared Lizard
Commit to multiyear investments in restoration (DOI 2015).	Support long-term strategies for the restoration of sagebrush-steppe ecosystems, including consistent long-term monitoring protocols and adaptive management for restored areas (DOI 2015).	Map hot spots of restoration activity or investment to help identify trends and opportunities for greater efficiency and leveraging of funds (DOI 2015). Support a cross-jurisdictional consortium of agencies, organizations and partners dedicated to implementation of restoration, monitoring, and adaptive management activities (DOI 2015).	Ferruginous Hawk Golden Eagle Burrowing Owl Short-eared Owl Common Nighthawk Great Basin Collared Lizard

Noxious weeds & invasive annual plants

Invasive plants affect the physical structure of sparsely-vegetated habitat when plants grow on normally bare soil patches (West 1994, Paysen et al. 2000). This increase in standing biomass increases the capacity for fire propagation through stands. Invasion of nonnative annual grasses, in particular cheatgrass, is one of the primary drivers of larger, more intense rangeland fires across the Great Basin in this habitat type (West 1994). Range fires may cause changes in shrub cover composition or may result in loss of shrub diversity and/or conversion to grassland systems. New approaches to managing cheatgrass and medusahead continue to emerge, including soil microbes (e.g., Harding and Raizada 2015) that may prove feasible for broad control programs. *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012) was developed to guide the State's invasive species management.

Objective	Strategy	Action(s)	Target SGCNs
Control invasive plants and restore areas dominated by invasive, nonnative annual grasses at a rate greater than the rate of the spread.	Implement large-scale experimental activities to remove cheatgrass and other invasive annual grasses through various tools (DOI 2015).	Implement *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012). Develop information to identify key areas necessary to maintain viable populations of SGCN and their prey. Prioritize key wildlife areas degraded by invasive plants for vegetation management and restoration programs. Manage anthropogenic activities to minimize the establishment and spread of invasive plants. Develop invasive species Early Detection and Rapid Response (EDRR) programs. Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006). Develop and evaluate restoration techniques to reduce biomass of invasive plants; for example, explore the use of MB 906®, a bacteria soil amendment for the suppression of annual grasses. Develop and build upon multiagency/organization partnerships, including Cooperative Weed Management Areas, to address weed issues across land ownership and management boundaries.	Ferruginous Hawk Golden Eagle Burrowing Owl Short-eared Owl Common Nighthawk Great Basin Collared Lizard

Species designation, planning & monitoring

The raptor SGCN in this habitat type (e.g., Ferruginous Hawk, Golden Eagle, Burrowing Owl, Short-eared Owl) rely on abundant prey populations, including small mammals. Maintaining abundant prey is partly achieved through habitat management programs. However, some key prey populations (e.g., populations of lagomorphs, such as Black-tailed Jackrabbit, *Lepus californicus*) may be affected by disease outbreaks or undergo enigmatic population fluctuations. For example, an epizootic plague outbreak in Great Basin (syn. Piute) Ground Squirrel populations during 2015 caused high mortality rates, which may have had consequences for prey availability and raptor breeding productivity. Investigations are needed to evaluate prey population dynamics in the context of diseases.

Objective	Strategy	Action(s)	Target SGCNs
Manage the effects of disease, including plague, on vulnerable small mammal populations.	Monitor outbreaks of plague and other diseases. Investigate the effects of small mammal diseases and disease vectors on small mammal population status.	Investigate small mammal mortality events to determine causative factors and contribute to interagency coordination of any relevant public health programs. Characterize small mammal populations and associated disease vectors. Evaluate the effects of plague and/or other small mammal diseases on population dynamics.	Ferruginous Hawk Golden Eagle Burrowing Owl Short-eared Owl

Target: Sparsely Vegetated Dune Scrub & Grassland

This target includes sparsely vegetated dune and grassland systems including the Bruneau Dunes, Weiser Dunes, Windmill Dunes, and other unnamed scattered dune complexes. The Bruneau River enters the Snake River at CJ Strike Reservoir (Bruneau Arm) and the landmass between the 2 rivers makes up the Bruneau Thumb, comprised of a mix of basaltic rock intermixed with aeolian sand deposits. The landscape is made up of a mix of cultivated lands and annual grass-dominated uplands. The immediate vicinity of the reservoir includes sand dunes, in particular those at Bruneau Dunes. The Eagle Cove area of the Snake River creates a unique stellate (star-shaped) dune that, due to the wind currents and shape of the cove, remains in its current location (Murphy 1973) creating habitats not found anywhere else in Idaho. The dunes are occupied by several endemic invertebrates. Proximity to productive wetlands and the presence of unique sand dune habitat make this an important biodiverse area.

Bruneau Dunes State Park, Snake River, Idaho, 2007 IDFG

Target Viability

Fair. Dune habitat condition is fair. This area has large areas dominated by cheatgrass and other invasive annuals. A substantial loss of habitat area has been documented, and remaining habitat contains extensive invasive plants. Bruneau Dune Tiger Beetle populations are in low numbers and have a fragmented distribution.

Spotlight Species of Greatest Conservation Need: Bruneau Dune Tiger Beetle

Bruneau Dune Tiger Beetle (*Cicindela waynei*) is found only within Bruneau Dunes State Park and a few adjacent sand-dominated blowouts. Habitat suitability is affected by nonnative vegetation encroachment (e.g., cheatgrass, prickly Russian thistle [*Kali tragus*] and tall tumblemustard [*Sisymbrium altissimum* L.]) (Anderson 1992, Baker et al. 1994, 1997, Bosworth et al. 2010) and changing precipitation patterns crucial to spring emergence and reproduction. This species of ground beetle is a sand-obligate species that requires healthy early-seral dune habitats with a mosaic of cobble and open sand. Cobble is required for larval survival and open dunes for breeding (both mating and oviposition) and the pursuit of prey. Currently, approximately 75% of previously occupied habitat is now unoccupied. Maintenance of core habitat identified by Bosworth et al. (2010) and potential expansion into restored areas should be a priority.

Spotlight Species of Greatest Conservation Need: Lined June Beetle (*Polyphylla devestiva*)

This endemic scarab, found only in southwestern Idaho, is closely tied to healthy early-seral dune habitats with the presence of sand-associated native perennial forbs and grasses. When originally described in 1966, it was associated with sand systems along the Snake River from Homedale to Bruneau (Young 1966), but due to habitat changes resulting from invasive species encroachment, it has recently only been observed at Celebration Park and Bruneau Dunes. This species is rhizophagous, feeding on the roots of a variety of sand-associate plants (primarily native grasses) and like many sand-associate scarabs, is physiologically and behaviorally adapted to sand-dominated habitats (Andrews and Gilbert 1992) and is often unable to survive under surrounding desert conditions (Hardy and Andrews 1987). No formal surveys have been conducted on this species and as a result, its presence at historic sites as well as population status remains unknown.

Prioritized Threats and Strategies for Sparsely Vegetated Dune Scrub & Grassland

Very High rated threats to Sparsely Vegetated Dune Scrub & Grassland in the Owyhee Uplands

Invasive plant species

Mitigating the loss of occupied habitat as a result of invasive plant species is the highest priority for Bruneau Dune Tiger Beetle, Lined June Beetle, and all sand-associated fauna; this issue has been identified by multiple authors for 2 decades.

Objective	Strategy	Action(s)	Target SGCNs
Remove invasive annual grasses and reduce spread from adjacent areas.	Test the effectiveness of best available annual-grass-mitigating actions.	Conduct trials using prescribed fire, Imazapic (a selective herbicide), and when released, annual grass biopesticides.	Bruneau Dune Tiger Beetle Lined June Beetle

Objective	Strategy	Action(s)	Target SGCNs
Determine potential impacts of herbicides on tiger beetle viability.	Where appropriate, assess the exposure to herbicides and evaluate potential impacts on beetle populations.	Conduct bioassays of intended treatment herbicides on endemic invertebrates occupying sand-dominated systems in southern Idaho.	Bruneau Dune Tiger Beetle Lined June Beetle

Species designation, planning & monitoring

We have an inadequate understanding of the population status of Bruneau Dune Tiger Beetle. Regular status assessments of occupied and recently-colonized habitats are important as the effectiveness of management actions continues to be evaluated. Likewise, the status of this population of Lined June Beetle and its life history have not been fully documented or updated. To better understand the species and its habitat needs, surveys of historic sites are needed.

Objective	Strategy	Action(s)	Target SGCNs
Assess the status of Bruneau Dune Tiger Beetle populations.	Conduct regular monitoring of occupied, historic, and potentially recent colonization sites at Bruneau Dunes, the Windmill Site and other suitable and historic localities.	Conduct a population survey of adults and larvae at all historic, current, and potential sites every 2–3 years to determine status and effectiveness of treatments. Explore the potential for translocation of gravid or recently-emerged adults from core habitat areas to locations where extirpation has occurred.	Bruneau Dune Tiger Beetle
Determine the status of historic populations of Lined June Beetle.	Conduct surveys for Lined June Beetle in Canyon, Elmore, and Owyhee counties.	Conduct light-trap surveys in July to survey for males and flighted females. Conduct night sand surface surveys for females.	Lined June Beetle

Target: Sagebrush Steppe

Sagebrush steppe is the pivotal ecological system in the Owyhee Uplands and therefore among the highest conservation priorities for this section. Sagebrush spans a wide variety of plant communities. As a habitat it is diverse, and in the Owyhee Uplands not all landscapes having sagebrush face the same management priorities or have the same conservation value or management needs. Variation in stand structural characteristics, vegetation composition, and disturbance regimes shapes the suitability and habitat value of various landscapes, which drives

Snake River Plain near Boise, Idaho, 2015 IDFG

habitat management priorities. Although resource management programs affecting wildlife habitat within sagebrush steppe are currently dominated by considerations for Sage-Grouse populations, many other species are reliant on sagebrush-steppe habitat. Disturbance regimes play an important role in determining habitat value in sagebrush steppe. Some species, including the Pygmy Rabbit (*Brachylagus idahoensis*), tend to occur in mature, undisturbed habitat. Others, such as the Long-billed Curlew (*Numenius americanus*), are associated with more disturbed habitat. Thus, some areas that have minimal to no value for Sage-Grouse are important for other high-priority species or species assemblages such as Pygmy Rabbit, Southern Idaho Ground Squirrel, and sagebrush-obligate passerine birds.

Much of the area south of the Snake River and west of the Bruneau and Jarbidge rivers is generally intact sagebrush-dominated systems. The Bruneau Escarpment, a high-elevation plateau running between the Owyhee Mountains and the Jarbidge Mountains, is dominated by little sagebrush (*Artemisia arbuscula* Nutt.) on the tabletops and both Wyoming (*Artemisia tridentata* Nutt. subsp. *wyomingensis* Beetle & Young) and mountain big sagebrush (*A. t.* Nutt. subsp. *vaseyana* [Rydb.] Beetle) below the tables. South and west of the Owyhee River, sagebrush steppe is mostly dominated by Wyoming big sagebrush, and some areas are in pristine condition. In contrast, cheatgrass has invaded the landscape along and within the canyonlands and within the eastern half of Juniper Basin. Livestock grazing is a common land-use activity within this area.

Sagebrush habitat in the Bennett and Picabo Hills, Camas Prairie, and lower Wood River Valley is mostly in good condition and comprises a variety of sagebrush types, perennial grasses, and forbs.

Most of the sagebrush steppe in the Owyhee Uplands lies within the Idaho West Owyhee Greater Sage-Grouse Conservation Area, but also extends into the Idaho Desert and Idaho Southern Conservation Areas (see Attachment 1, Fig. 2-14, Idaho and Southwestern Montana Greater Sage-Grouse Approved RMP Amendment, hereafter Idaho and Southwestern Montana GRSG ARMPA; BLM 2015). The entire area includes a mix of designated Priority (PHMA), Important (IHMA), and General (GHMA) Greater Sage-Grouse Habitat Management Areas (Fig. 12.3) as developed by the State and federal land management agencies (see Attachment 1, Fig. 2-1; BLM 2015). PHMA, IHMA, and GHMA are defined as follows:

> PHMA—BLM-administered lands identified as having the highest value to maintaining sustainable GRSG populations. Areas of PHMA largely coincide with areas identified as priority areas for conservation in the FWS's COT report. These areas include breeding, late brood-rearing, winter concentration areas, and migration or connectivity corridors.
>
> IHMA—BLM-administered lands that provide a management buffer for PHMA and connect patches of PHMA. IHMA encompass areas of generally moderate to high conservation value habitat and populations but that are not as important as PHMA. There are no IHMA designated within southwestern Montana.
>
> GHMA—BLM-administered lands where some special management will apply to sustain GRSG populations; areas of occupied seasonal or year-round habitat outside of PHMA or IHMA.

Target Viability

Poor to *Very Good*. Sagebrush Steppe condition varies across the section from poor to very good. Habitat in the basin east of the Bruneau Escarpment to the Bruneau River, which is dominated by Wyoming big sagebrush, is generally intact and in good ecological condition. With the exception of its vulnerability to wildfire, this area is somewhat resilient to disturbance. The Wyoming big sagebrush-dominated landscape south and west of the Owyhee River is likewise generally intact and geographically isolated from human disturbance. This extremely remote area is vulnerable to lightning-caused wildfire, and invasive annual grasses thrive along the canyon rims of the South Fork and Little Owyhee rivers. Historically, livestock grazing was heavy in the most xeric habitat types. Some sagebrush habitat in the Owyhee Mountains has been impacted by extensive juniper encroachment. Some areas are in poor to fair condition, and large expanses have been converted to stands of invasive annual grasses and subject to altered fire regimes, which results in the functional loss of shrubs.

Spotlight Species of Greatest Conservation Need: Greater Sage-Grouse

Although previously a candidate for listing as endangered or threatened under the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; ESA), on October 2, 2015, the US Fish and Wildlife Service (FWS) announced a 12-month finding that listing the Greater Sage-Grouse was not warranted. However, the Greater Sage-Grouse and its habitat remains a management priority in Idaho. Its population status varies across the Owyhee Uplands. A remnant population occupies the area north and west of Mountain Home, Idaho, which is dominated by invasive annual grasses. This small population (<100 birds) is stable based on lek route counts, but fires that burned in 2012 and 2013 continue to affect Sage-Grouse habitat use in the area. The mesic meadows around Fairfield and most of the area west of the Bruneau and Jarbidge rivers in Owyhee County contain stable populations that occupy mostly intact, native sagebrush shrublands. The Owyhee County portion contains the highest density of occupied Sage-Grouse leks in the state. The population east of the Jarbidge River declined following the Murphy Complex Fire of 2007. However, lek route data show that the population is slowly increasing. Sage-Grouse that occupy the sagebrush-dominated slopes along the northern portion of the Owyhee Mountains are generally stable. However, wildfire, OHV use, energy development, and juniper encroachment are management concerns within this area.

Conservation issues and management actions are provided in the *2006 Conservation Plan for the Greater Sage-grouse in Idaho* (Idaho Sage-grouse Advisory Committee 2006). Higher-level direction for habitat management priorities is provided in the *Federal Alternative of Governor C.L. "Butch" Otter for Greater Sage-Grouse Management in Idaho* (hereafter Governor's Alternative; Otter 2012) and included in the Idaho and Southwestern Montana GRSG ARMPA (BLM 2015). Conservation actions on state endowment lands are identified in the *Idaho State Board of Land Commissioners Greater Sage-Grouse Conservation Plan* (Idaho State Board of Land Commissioners 2015). Where IDL has regulatory and assistance activities on private land, conservation measures will be voluntary Best Management Practices (BMPs) because IDL does not have the statutory authority within its regulatory programs or assistance activities to require adoption by authorized parties. Regulatory and assistance activities include Abandoned Mine Lands Projects, Dredge and Placer Mine Permits, Mine Reclamation Plan Approvals, and Oil and

Gas Permits (seismic imaging surveys, well drilling). Where appropriate, IDL will include recommended BMPs within its authorizing documents to encourage compliance. Landowners may also be eligible for technical and financial assistance to implement voluntary conservation practices through the Natural Resources Conservation Service's (NRCS) Sage-Grouse Initiative. Sage-Grouse habitat in the Owyhee Uplands is predominantly Priority (PHMA) and Important (IHMA) (see Fig. 12.3), as developed by the State and federal land management agencies and found in the *Idaho and Southwestern Montana GRSG ARMPA* (see Attachment 1, Fig. 2-1; BLM 2015).

Spotlight Species of Greatest Conservation Need: Southern Idaho Ground Squirrel

The Southern Idaho Ground Squirrel is endemic to approximately 291,500 ha (720,500 acres) in Gem, Payette, Washington, and Adams counties, Idaho (FWS 2014), concentrated in the foothills north of the Payette River from Weiser east to Squaw Butte. Investigations into the status of this species began in the 1980s (Yensen 1985). At that time, populations were suspected to be declining, but not necessarily imperiled. During the late 1990s, however, resurveys indicated a dramatic population decline (Yensen 1999, 2000), and this information led to this taxon being designated a candidate for listing under ESA in 2001 (Fed Regist. 66:54808–54832). However, on 2015 October 8, FWS announced a 12-month finding that candidate status for Southern Idaho Ground Squirrel was not warranted (FWS 2015*b*).

Southern Idaho Ground Squirrel populations occur in a mosaic of shrubland and grassland habitat. In some areas, habitat changes are driven by invasion of weedy annual grasses—particularly cheatgrass and medusahead—which displaces native plants, reduces plant diversity and nutritional resources, and alters the timing of plant productivity. These nonnative grasses tend to senesce in late spring (e.g., late May through early June), a period when Southern Idaho Ground Squirrels are completing the accumulation of energy reserves prior to entering estivation in June.

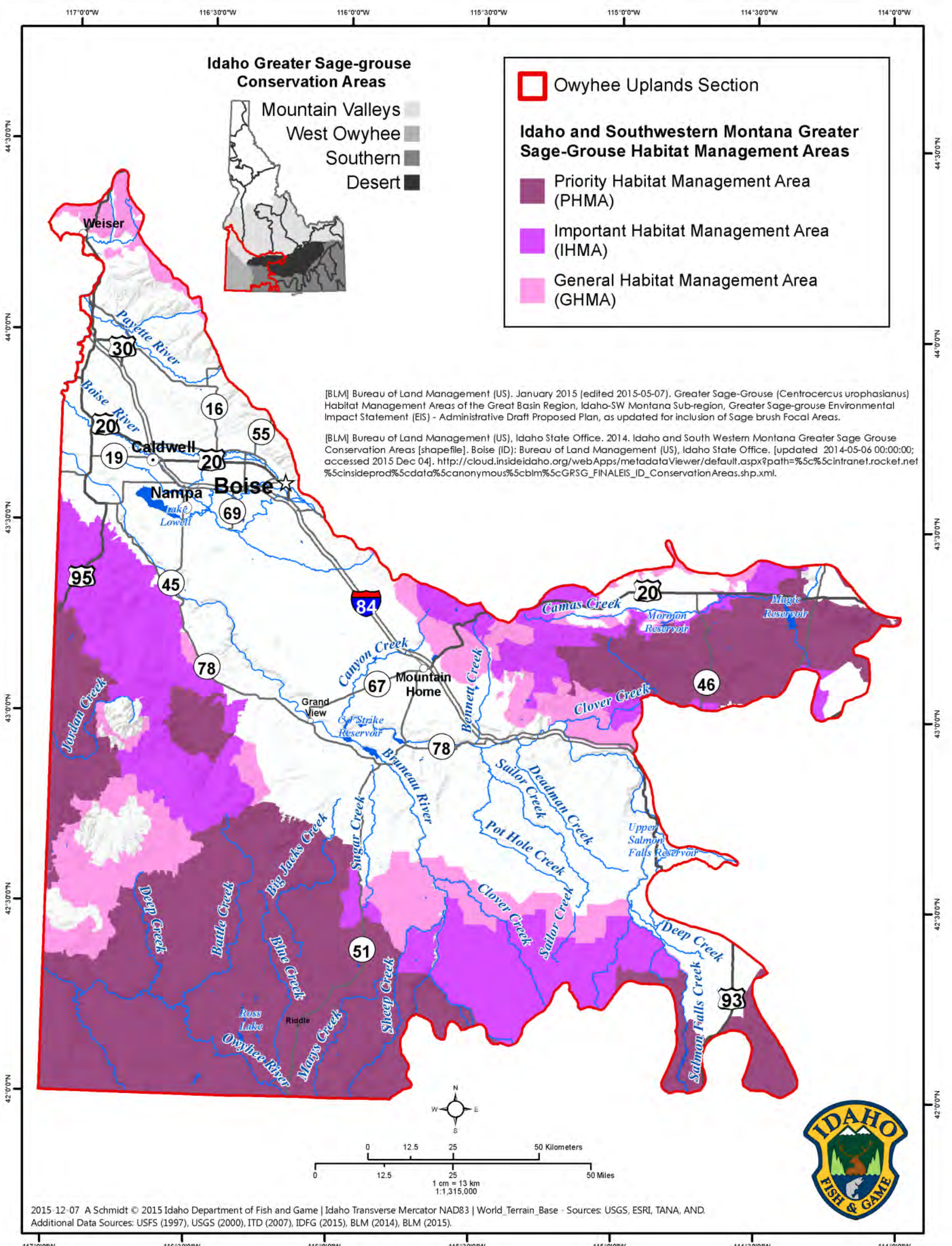


Fig. 12.3 Map of Idaho and Southwestern Montana Greater Sage-Grouse Habitat Management Areas in the Owyhee Uplands

Prioritized Threats and Strategies for Sagebrush Steppe

Very High rated threats to Sagebrush Steppe in the Owyhee Uplands

Increased frequency & severity of wildfire

The increased frequency and severity of wildfire (see Fig. 12.4) is considered a primary threat to the sagebrush-steppe ecosystem and to the many sagebrush-steppe species that depend on it, including Sage-Grouse ([FWS] US Fish and Wildlife Service 2014b; Otter 2012). In the Desert and West Owyhee Greater Sage-Grouse Conservation Areas in particular (see Fig. 2-14; BLM 2015), wildfire is a more serious issue relative to other areas of the state (Otter 2012). The accelerated invasion of nonnative annual grasses—in particular cheatgrass and medusahead—and the spread of juniper into the sagebrush-steppe ecosystem (coupled with the effects of intensified drought and climate change), create conditions that lead to larger, more intense rangeland fires across the Great Basin (DOI 2015). This contributes to the ongoing fragmentation and loss of shrubsteppe habitats. Almost the entire extent of the Owyhee Uplands is rated as "very high" with respect to burn probability (DOI 2015).

Certain remote areas of the Owyhee Uplands, e.g., the intact Wyoming big sagebrush basin between the Bruneau Escarpment and the Bruneau River and the area south and west of the Owyhee River, are especially vulnerable to lightning-caused wildfire. Protection of intact sagebrush-steppe areas and restoration management of degraded areas is a priority for this key system. In terms of fire suppression, habitat management within the Greater Sage-Grouse PHMA (BLM 2015) should be aggressive and is intended to maintain large tracts, habitat resiliency, and sustainability.

Objective	Strategy	Action(s)	Target SGCNs
Manage wildfires to minimize loss of sagebrush habitat.	Improve fire suppression protocols and resource allocations to limit habitat losses to wildfire.	Support development and implementation of Rangeland Fire Protection Associations (e.g., Idaho Code § 38-104B and Governor's Executive Order 2015-04) (Otter 2015). During high fire danger conditions, stage initial attack and secure additional resources closer to priority areas, with particular consideration of the West Owyhee, Southern, and Desert Conservation Areas to ensure quicker response times in or near Sage-Grouse habitat (BLM 2015). Create and maintain effective fuel breaks to modify fire behavior and increase fire suppression effectiveness based on criteria outlined in the Governor's Alternative (Otter 2012).	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel
Reduce the risk of wildfire impacts by managing fuel loads in a manner that can potentially reduce the rate of fire	Use cooperatively planned targeted grazing practices as a means to incrementally reduce the potential for	Recognize sustainable animal agricultural use as a means to incrementally reduce fuel accumulation, continuity of fuels, and wildfire impacts under moderate and advantageous climatic conditions (Strand et al. 2014).	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's)

Objective	Strategy	Action(s)	Target SGCNs
travel, lower intensity, increase burn patchiness, and reduce total fuel consumption.	catastrophic wildfire (Launchbaugh et al. 2008).		Ground Squirrel Southern Idaho Ground Squirrel
Increase post-fire restoration success (DOI 2015)	Expand the use of native seeds and seedlings to accelerate efforts to improve and restore post-fire rangeland health (DOI 2015).	Reallocate use of native seed from emergency stabilization and rehabilitation (ESR) projects outside of PHMA or IHMA (or ESA-listed species habitat) to those inside it in years when preferred native seed is in short supply (BLM 2015). Collect native seed from across the distribution of the species for use in developing commercial seed and for long-term seed banking to ensure conservation of germ plasm to promote climate resilience and long-term rangeland health (DOI 2015). Coordinate and collaborate across agencies on climate trend data as it relates to seeds (DOI 2015). Increase seed production and the grow-out of genetically appropriate native plant species for the restoration of the sagebrush steppe, which will provide necessary structure and habitat, as well as dietary and other benefits for Sage-Grouse (DOI 2015). Limit the use of nonnative species (e.g., to achieve site stabilization, fuel breaks, or invasive plant control) to transitional, noninvasive species, replaced by natives in subsequent ecological restoration or during natural successional processes (DOI 2015).	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel
Restore degraded habitat.	Support long-term strategies for the restoration of sagebrush-steppe ecosystems, including consistent long-term monitoring protocols and adaptive management for restored areas (DOI 2015).	Map hot spots of restoration activity to help identify trends and opportunities for greater efficiency and leveraging of funds (DOI 2015). Support a cross-jurisdictional consortium of agencies, organizations and partners dedicated to restoration, monitoring, and adaptive management activities leading to a healthy sagebrush-steppe ecosystem (DOI 2015).	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel
Maintain intact	Protect Wyoming big	Suppress wildfires in Sage-Grouse habitat, commensurate with threatened and endangered	Greater Sage-Grouse

Objective	Strategy	Action(s)	Target SGCNs
sagebrush stands to limit fragmentation and minimize direct habitat loss.	sagebrush from destruction by wildfire.	species habitat or other critical habitats to be protected (BLM 2015). Develop fuel breaks in areas dominated by invasive annual grasses adjacent to Wyoming big sagebrush stands.	Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel

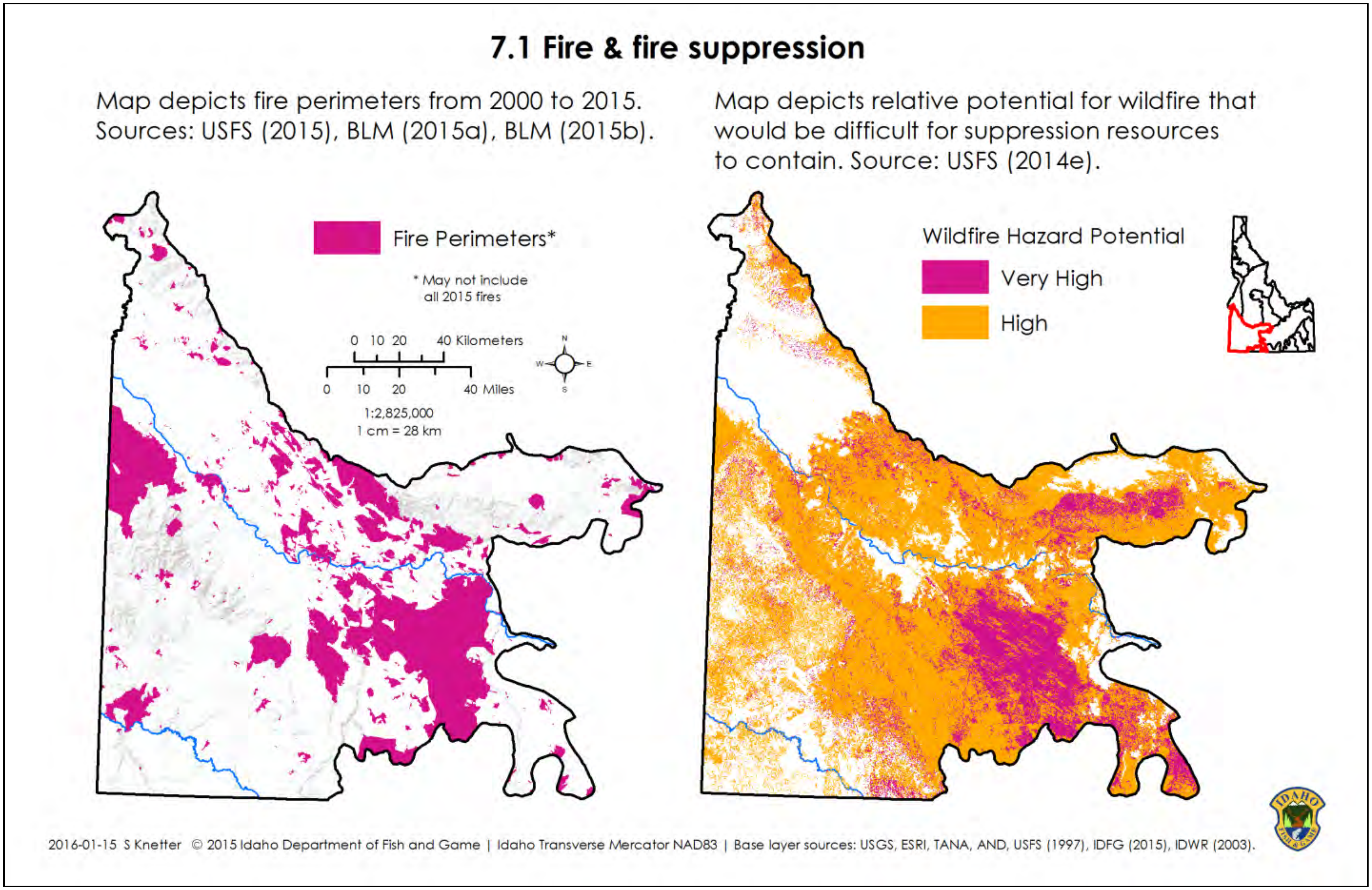


Fig. 12.4 Map of fire perimeters and relative potential for wildfire in the Owyhee Uplands

Noxious weeds & invasive annual grasses

Invasive species (see Fig. 12.5) are considered a primary threat to Sage-Grouse in Idaho in the Governor's Alternative (Otter 2012) and a primary threat to shrubsteppe habitats by the FWS (2014b). The State of Idaho has developed *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012). In the Owyhee Uplands, noxious weeds (e.g., rush skeletonweed [*Chondrilla juncea* L.]) and invasive annual grasses have colonized many sagebrush habitat types and replaced native herbaceous vegetation, particularly at lower-elevation sites. The accelerated invasion of nonnative annual grasses is one of the primary drivers of larger, more intense rangeland fires across the Great Basin (DOI 2015).

Objective	Strategy	Action(s)	Target SGCNs
Limit introduction of new weeds into areas where they do not occur.	Improve weed management tools and techniques. Aggressively manage nonnative undesirable plant species.	Implement *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012). Develop integrated weed management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Develop large-scale application of integrated weed management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Support the use of Plateau® herbicide in controlling cheatgrass. However, because Plateau® has been documented to also impact some native forb species (see DeGraff and Johns 2013, BSU study); this herbicide should be used with caution in areas outside of cheatgrass monocultures. Exercise caution with respect to herbicide and/or pesticide use to avoid negative impacts on SGCN and ESA-listed species. Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006). Target areas that contain cheatgrass and other invasive or noxious species to minimize competition and favor establishment of desired species (BLM 2015). Support the development of a framework for a national invasive species EDRR program (DOI 2015).	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel

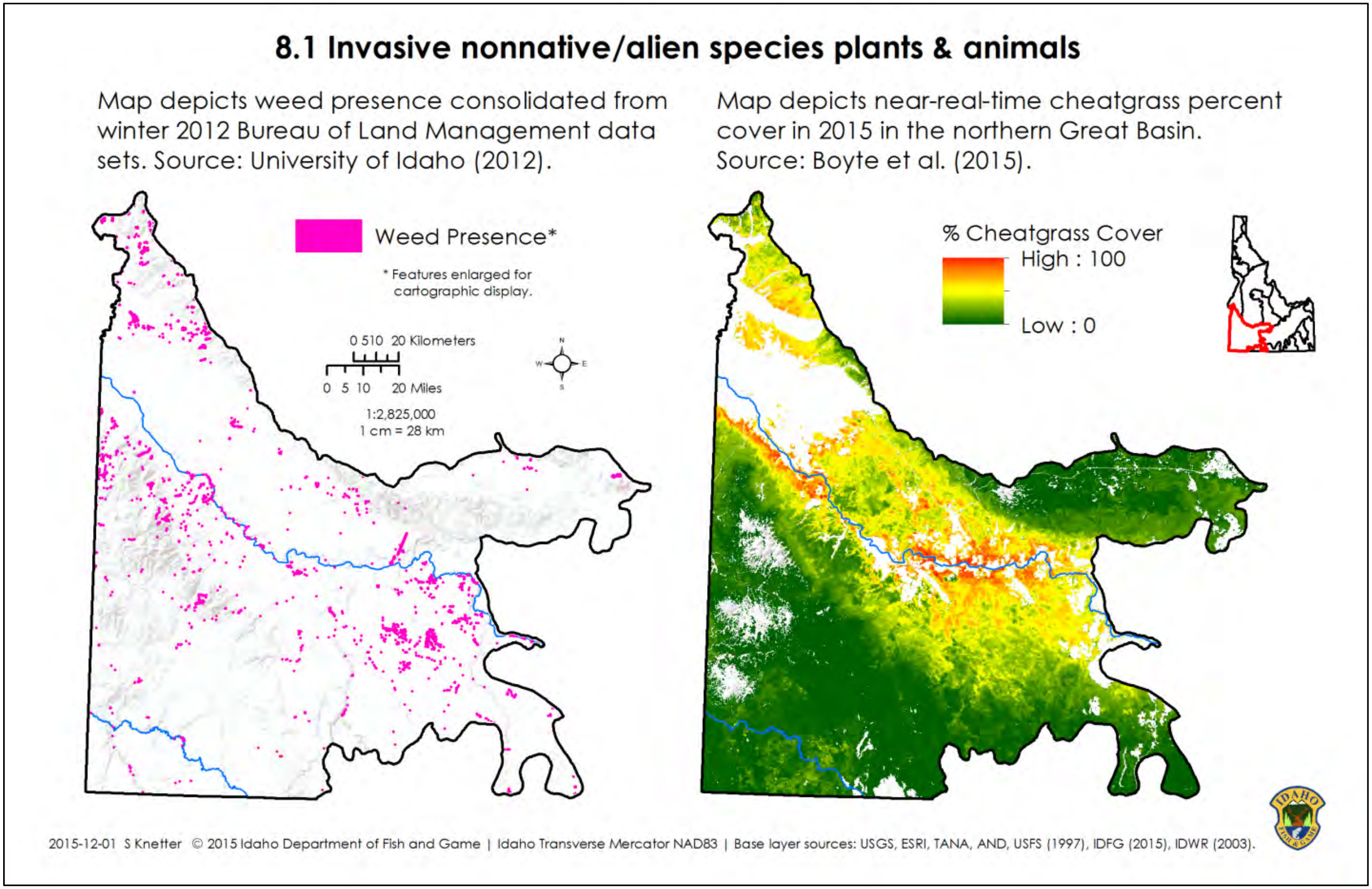


Fig. 12.5 Map of weed presence and cheatgrass percent cover in the Owyhee Uplands

High rated threats to Sagebrush Steppe in the Owyhee Uplands

Energy development & related infrastructure

Energy development and related infrastructure (e.g., oil and gas development, mines, geothermal wells, commercial wind projects) (Governor's Executive Order No. 2015-04; Otter 2015) are identified as a primary threat and contribute to the fragmentation and loss of shrubsteppe habitats ([FWS] US Fish and Wildlife Service 2014b; Otter 2012). Wind turbines can increase mortality rates for Golden Eagle (*Aquila chrysaetos*) (Tack and Fedy 2015), and Hoary (*Lasiurus cinereus*) and Silver-haired (*Lasionycteris noctivagans*) bats, and these tall structures have the potential to displace wildlife averse to the moving turbine blades (e.g., Sage-Grouse). In addition, the Owyhee Uplands has potential for geothermal and solar energy development.

Objective	Strategy	Action(s)	Target SGCNs
Minimize the effects of energy development and related infrastructure.	Manage energy infrastructure siting.	Work with key agencies and stakeholders to develop voluntary recommended criteria to consider when siting infrastructure to be compatible with wildlife. Infrastructure related to energy development must follow recommendations outlined in the Governor's Executive Order No. 2015-04 (Otter 2015) as it pertains to PHMA (Core), IHMA, and GHMA. Where IDL has regulatory and assistance activities on private land, conservation measures will be voluntary BMPs because IDL does not have the statutory authority within its regulatory programs or assistance activities to require adoption by authorized parties. Regulatory and assistance activities include Abandoned Mine Lands Projects, Dredge and Placer Mine Permits, Mine Reclamation Plan Approvals, and Oil and Gas Permits (seismic imaging surveys, well drilling). Where appropriate, IDL will include recommended BMPs within its authorizing documents to encourage compliance (see Idaho State Board of Land Commissioners 2015; Otter 2015). Develop Idaho Decision Support Tool to assist developers with appropriately siting projects. Develop information to identify priority wildlife habitat and migration routes. Support development of avian and bat protection plans and negotiate siting and operational mitigation to minimize effects on wildlife populations.	Greater Sage-Grouse Golden Eagle Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Silver-haired Bat Hoary Bat Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel

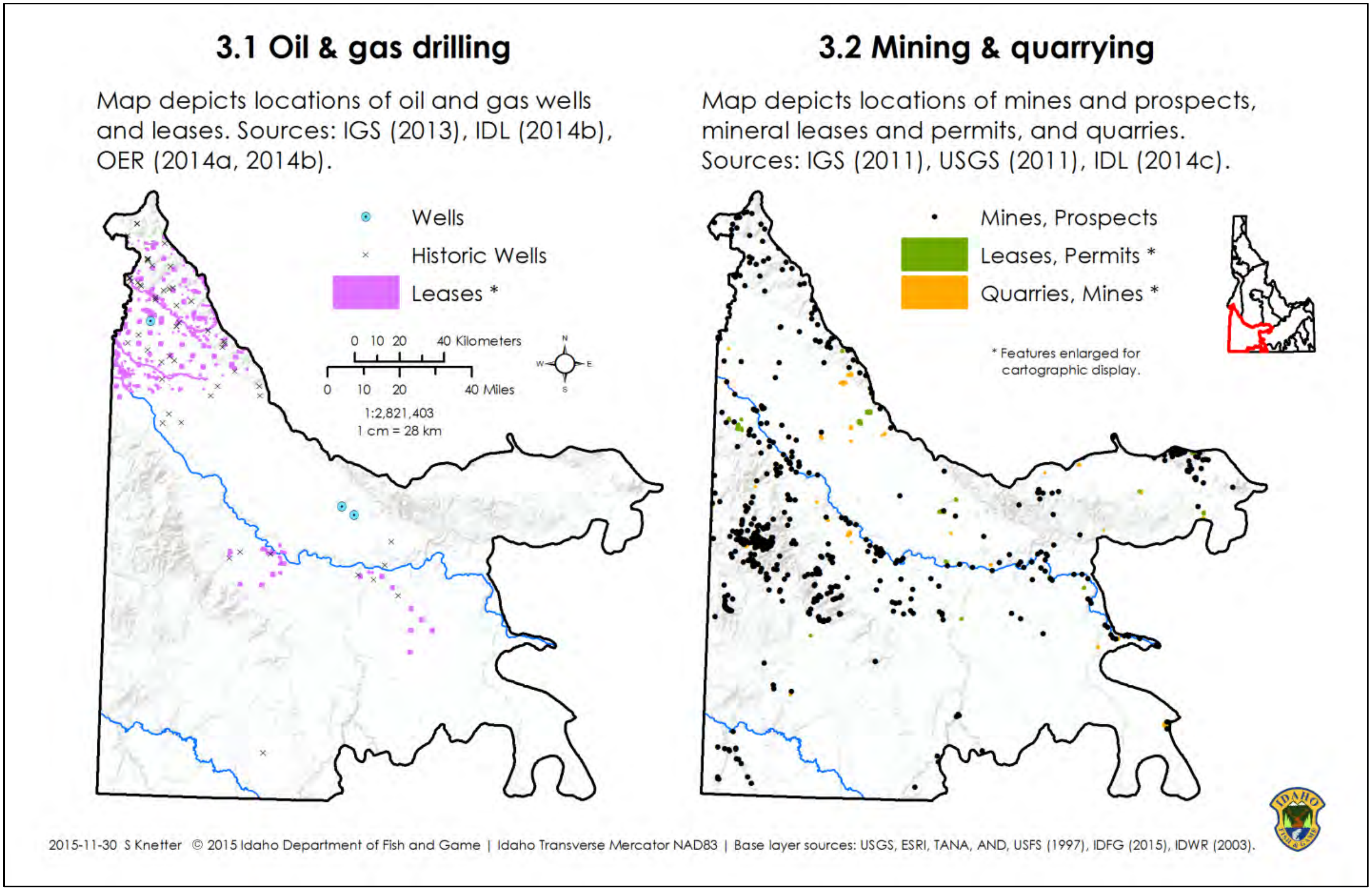


Fig. 12.6 Map of oil and gas wells and leases, and mines and prospects, mineral leases and permits, and quarries in the Owyhee Uplands

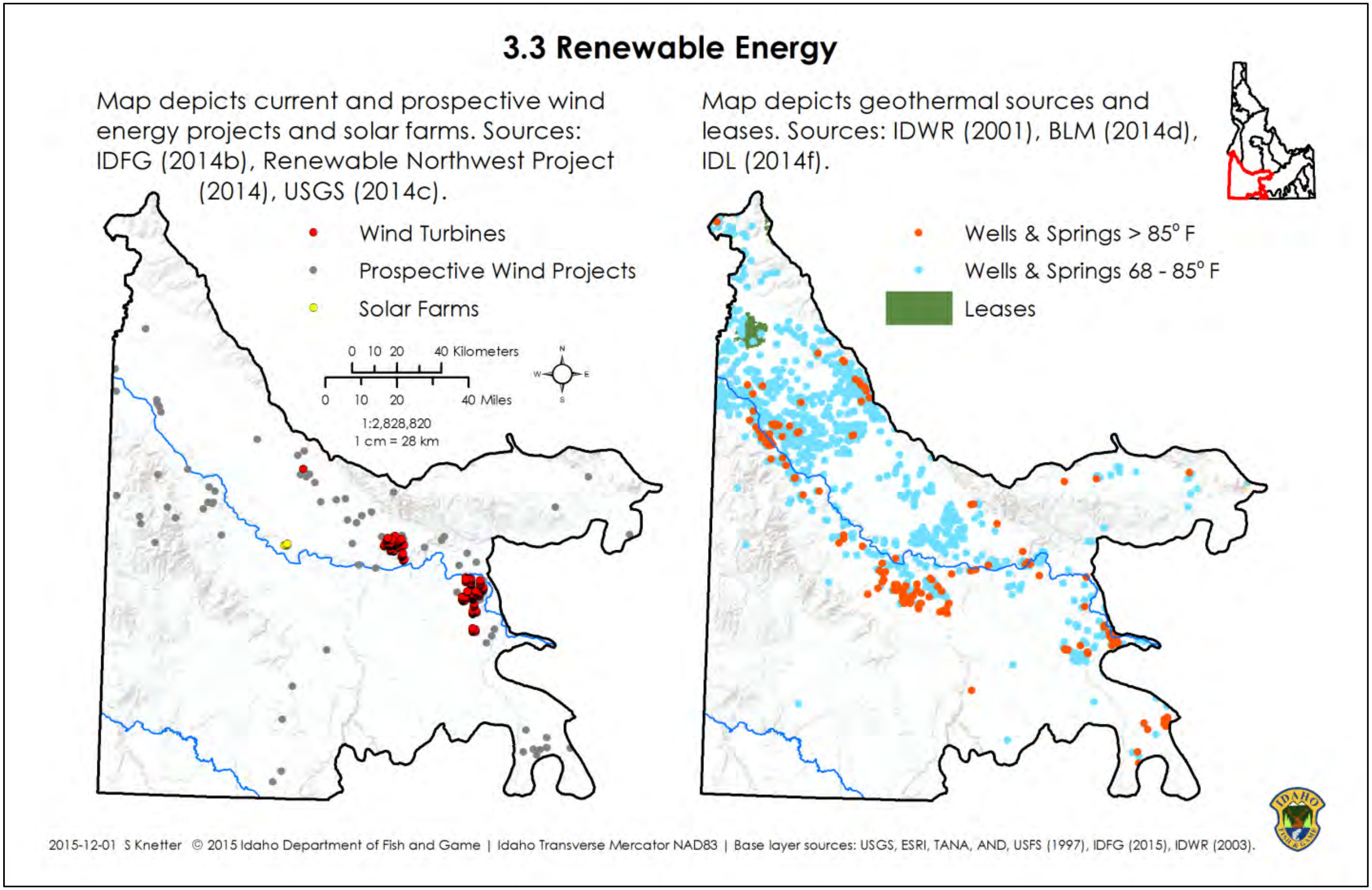


Fig. 12.7 Map of current and prospective wind energy projects and solar farms, and geothermal sources and leases in the Owyhee Uplands

Transportation & service corridors

Infrastructure such as roads, highways, high-voltage transmission lines, and cell phone towers (Governor's Executive Order No. 2015-04; Otter 2015) is identified as a primary threat (Otter 2012) and causes fragmentation and direct loss of shrubsteppe habitats FWS (2014b). Electrocution and collision with power lines is an important source of mortality for large birds, including the Golden Eagle. Idaho Power Company has a program for retrofitting poles and constructing new lines to minimize wildlife mortality and follows Avian Power Line Interaction Committee (APLIC) protocols for reducing electrocution risk.

Objective	Strategy	Action(s)	Target SGCNs
Reduce road & utility line construction in key habitats.	Coordinate development and location of new roads and transmission lines.	Develop recommended criteria to consider when siting and constructing new power lines and associated features in "designated" habitat (see [APLIC] Avian Power Line Interaction Committee 2015). Follow management actions outlined in the Governor's Executive Order No. 2015-04 (Otter 2015) as it pertains to PHMA (Core), IHMA, and GHMA when proposing to develop transportation and service corridors. Work with key agencies and stakeholders to route roads, transmission lines, and other linear infrastructure based on recommended criteria to avoid sensitive habitat areas. Develop Idaho Decision Support Tool to assist developers with appropriately siting projects.	Greater Sage-Grouse Golden Eagle Short-eared Owl Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel
Minimize bird electrocutions and collisions with transmission lines.	Modify existing power lines that pose collision or electrocution hazards.	Mark those sections of distribution lines where evidence is collected that Sage-Grouse or raptor mortality occurs due to collisions.	Greater Sage-Grouse Golden Eagle Short-eared Owl
Minimize the potential for bird collisions with fences.	Work with landowners and land management agencies to identify fences (including new fences) that may pose risk for collision mortality.	Work with local utilities, landowners, and land management agencies to identify and mark problem fences. Apply wildlife-friendly fencing standards when constructing or modifying fences (e.g., Paige 2012). Identify and remove unnecessary fences or other structures ([BLM] Bureau of Land Management (US) 2015; Otter 2012). When placing new fences or other structural range improvements (such as corrals, loading facilities, water tanks, and windmills), consider their impact on Sage-Grouse (Otter 2012).	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Short-eared Owl
Reduce the number of tall structures in this habitat.	Site new structures in areas where key wildlife populations	Place new, taller structures (e.g., corrals, loading facilities, water storage tanks, windmills) at least 1 km from occupied leks (Otter 2012) and within existing disturbance corridors or in unsuitable habitat (BLM 2015).	Greater Sage-Grouse

Objective	Strategy	Action(s)	Target SGCNs
	would not be affected.		

Off highway vehicle (OHV) use on undesignated routes and in undesignated areas

Recreation in the form of OHV use is considered a secondary threat to Sage-Grouse in the Governor's Alternative (Otter 2012). Increasing OHV use in southwestern Idaho has been implicated in the decline of Golden Eagle occupancy, success, and productivity of territories in close proximity to recreational trails and parking areas (Steenhof et al. 2014; K. Steenhof and J. Heath, pers. comm. citing R. Spaul, unpubl. manuscript).

Objective	Strategy	Action(s)	Target SGCNs
Minimize unrestricted cross-country travel (Otter 2012) in sensitive habitat—Priority (Core) and Important habitat areas for Sage-Grouse.	Develop and enact travel management plans and regulations to manage impacts to wildlife populations.	Limit general recreational OHV travel to existing roads, primitive roads, and trails in areas where travel management planning has not been completed or is in progress. This action is not intended to prevent necessary administrative and/or permitted uses that include a variety of management activities such as infrastructure inspection and repair as well as use for ranch, range, and livestock management (e.g., moving livestock, repairing fences, checking water sources, distributing salt etc.). Locate areas and trails to minimize disturbance to Sage-Grouse and other species sensitive to OHV disturbance; use route upgrade, closure of existing routes, timing restrictions, seasonal closures, and creation of new routes to help protect habitat and reduce the potential for pioneering new unauthorized routes (BLM 2015). Conduct road upgrades and maintenance outside the Sage-Grouse breeding season to avoid disturbance on leks (BLM 2015). Implement seasonal trail closures, buffer zones around Golden Eagle nests, and suitable location of staging areas to minimize OHV effects (Steenhof et al. 2014). On federal and state lands, permits govern the use of these lands by private entities and therefore the above actions include an exemption for permitted activities.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel

Residential & commercial development

Urbanization causes the direct loss and fragmentation of shrubsteppe habitats FWS (2014b). Infrastructure that includes discrete, large-scale anthropogenic features such as airports, landfills, and residential and commercial subdivisions, etc. is a primary threat to Sage-Grouse (Otter 2012). Reduced profitability of ranching and agriculture combined with increased land values can lead to the conversion of rural properties of agricultural value to exurban and suburban developments.

Objective	Strategy	Action(s)	Target SGCNs
Manage residential and commercial development to minimize negative consequences for wildlife populations.	Maintain land uses that do not generate the infrastructure, disturbance, and/or habitat conversion associated with exurban and urban development. Develop partnerships that help keep sustainable grazing the prevailing land use (Krausman et al. 2009).	Use subsidies, funding, and cost-sharing programs to support profitability of agricultural land uses beneficial to or compatible with wildlife and minimize development potential. Assist private landowners with programs like the Sage Grouse Initiative or other NRCS programs. Work with land trusts and other NGOs to develop conservation easements and acquisitions where appropriate and feasible. Work with county and local Planning and Zoning to support their decision-making process and avoid unnecessary losses of intact habitat. Avoid implementing competing objectives, strategies, and actions in a manner that may diminish economically sustainable animal agricultural use of private lands.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Burrowing Owl Short-eared Owl Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Columbia Plateau (syn. Merriam's) Ground Squirrel Wyoming Ground Squirrel Southern Idaho Ground Squirrel

Juniper encroachment

The expansion of native western juniper into sagebrush-steppe habitats has degraded this ecosystem, reducing habitat suitability for sagebrush obligates. Although the scope of western juniper encroachment into the sagebrush-steppe ecosystem in the Owyhee Uplands is isolated (primarily in the Owyhee Mountains), its existing impact and potential future impact on sagebrush-steppe habitats is significant. Factors contributing to juniper expansion are complex and include fire regimes, climate, soil moisture, and atmospheric carbon dioxide (e.g., Knapp et al. 2001). From a climate change perspective, southern Idaho is predicted to have less sagebrush and more woodland cover types (e.g., juniper) in the future.

Objective	Strategy	Action(s)	Target SGCNs
Reduce juniper encroachment into sagebrush steppe.	Remove phase 1 and phase 2 juniper stands to reduce juniper expansion into sagebrush steppe.	Prioritize treatments near occupied Sage-Grouse leks and other seasonal Sage-Grouse habitats. Use site-specific analysis to refine the location for specific areas to be treated. Juniper removal in wilderness areas should be a last resort management action. Loss of habitat due to juniper encroachment should be met with increases in the amount of priority or important habitat in other areas to maintain or increase overall habitat availability.	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow Pygmy Rabbit

Medium rated threats to Sagebrush Steppe in the Owyhee Uplands

Improper livestock grazing management & associated infrastructure

In the context of this plan, "improper" is defined as grazing beyond the capacity of the resource in either direction (e.g., overuse such as along riparian areas that need protection). Improper grazing management that results in persistent heavy grazing may lead to negative outcomes whereas proper grazing management does not. In the Governor's Alternative (Otter 2012), improper livestock grazing management is considered a secondary threat with monitoring and management actions tailored accordingly.

When improperly managed, livestock grazing can affect wildlife habitat in many ways (Krausman et al. 2009). For example, livestock grazing can change habitat features that directly influence birds by reducing plant species diversity and biomass (Reynolds and Trost 1981, Bock and Webb 1984, Saab et al. 1995). Alternatively, changes in water and nutrient cycling caused by grazing can promote the spread of invasive species, which then degrade native bird habitats by altering fire and disturbance regimes (Knick et al. 2003; Rotenberry 1998). Livestock grazing tends to be somewhat monocultural, and especially in recent years, the conversion from sheep to cattle has resulted in cattle being nearly the sole herbivore. Historically, the Owyhee Uplands were grazed by wild horses (*Equus caballus*), deer (*Odocoileus* spp.), Elk (*Cervus canadensis*), and Pronghorn (*Antilocapra americana*).

Livestock grazing infrastructure (e.g., fences, corrals, loading facilities, water tanks and windmills) can impact Sage-Grouse (Otter 2012) as well as other rangeland-associated wildlife. For example, an Idaho study documented a high risk of Sage-Grouse colliding with fences, particularly around leks (Stevens et al. 2012a, b). Other structures can provide artificial nesting sites for nest predators. Activities associated with livestock production, such as feedlots, can facilitate nest predators or parasitism by Brown-headed Cowbird (*Molothrus ater*) (Vander Haegen and Walker 1999, Goguen and Matthews 2000). Finally, water developments that were not fitted with escape ramps have been implicated in wildlife drownings.

Objective	Strategy	Action(s)	Target SGCNs
Identify and implement proper grazing management to maintain or enhance the ecological integrity of the landscape and/or otherwise initiate progress toward management objectives.	Manage the timing, intensity, duration, and frequency of grazing practices to manipulate vegetative condition (Otter 2012).	Prioritize permit renewals and land health assessments for allotments with declining Sage-Grouse populations (Otter 2012). Inform affected permittees and landowners regarding Sage-Grouse habitat needs and conservation measures (Idaho Sage-grouse Advisory Committee 2006). Increase the cooperative coordinated development of Allotment Management Plans to best meet wildlife objectives over the broadest landscape. Incorporate GRSG Seasonal Habitat Objectives (Table 2-2 in BLM 2015) into relevant resource management plans and projects while considering the potential conflicts with habitat parameters for other species.	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Bighorn Sheep Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel

Objective	Strategy	Action(s)	Target SGCNs
		Use the Sage-Grouse Habitat Assessment Framework (Stiver et al. 2015) with an appropriate sampling design to conduct fine-scale habitat assessments to inform grazing management. Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter 2012).	
	Maintain and promote the rangeland monitoring Memorandum of Understanding (MOU) between Idaho State Department of Agriculture (ISDA) and BLM, which provides a collaborative framework for photo monitoring and review of rangeland photo data on BLM-managed lands across Idaho.	Involve permittees in providing monitoring information, the interpretation of monitoring data, and providing input into grazing management adjustments to meet the goals and objectives of federal land management agencies and the permittees (Sanders 2006).	
Assess the impacts (both negative and, potentially, positive) of livestock grazing on sagebrush-steppe obligate songbirds (Rotenberry 1998).	Design experiments involving a variety of alternative grazing treatments (including no grazing at all) across the spectrum of major shrubsteppe habitat (Rotenberry 1998).	Implement grazing alternatives based on project outcome. Conduct experiments over multiple years (Rotenberry 1998). Work with the University of Idaho to consider adding a sagebrush-obligate passerine component to its long-term study of the impacts of spring grazing on Sage-Grouse.	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel
To the extent practicable, reduce the impacts of fences and livestock management facilities on	Implement grazing management programs that take into account wildlife habitats and needs (e.g., Otter	Mark fences to reduce wildlife collisions (Stevens et al. 2012a, b). Identify and remove unnecessary fences or other structures ([BLM] Bureau of Land Management (US) 2015; Otter 2012). When placing new fences or other structural	Greater Sage-Grouse Ferruginous Hawk Sage Thrasher Sagebrush Sparrow Pygmy Rabbit

Objective	Strategy	Action(s)	Target SGCNs
wildlife populations.	2012).	range improvements (such as corrals, loading facilities, water tanks, and windmills), consider their impact on Sage-Grouse (Otter 2012) and other wildlife. Place new structures (e.g., corrals, loading facilities, water storage tanks, windmills) in accordance with guidance documents (e.g., Otter 2012 for Sage-Grouse leks) and within existing disturbance corridors or in unsuitable habitat (BLM 2015). Develop water sources for livestock to allow access to water by wildlife, including bats and birds that drink while in flight. Discourage management activities (such as water development or fencing) that may focus interspecific competition in important seasonal Bighorn Sheep habitats (IDFG 2010)	Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel
Expand availability of water sources where needed.	Develop livestock water sources (e.g., troughs) so they are compatible with local wildlife populations.	Retrofit tanks with escape ladders. Design tanks to be wildlife friendly. Consider unintended consequences of water development, including range expansion of water-dependent predators or competitors into previously unsuitable areas.	Greater Sage-Grouse Ferruginous Hawk Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Bighorn Sheep Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel

Changes in precipitation & broad-scale hydrologic regimes

Much of the Owyhee Uplands Section is transitioning from a snow-dominated system to one more rain-dominated (Klos et al. 2014), decreasing the length of the snow season by nearly a month (Nayak et al. 2010). Increasing temperatures and decreasing snowpack, especially at warmer low to mid-elevations, equates to more drought stress to native plants and increasing conditions for drought-adapted invasive species to establish. Intensified drought also drives conditions that lead to larger, more intense rangeland fires across the entire Great Basin (DOI 2015). The amount and timing of precipitation also affects sagebrush growth and recruitment and may seriously hinder restoration efforts. Generally, the most reliable strategies for mitigating these climate change impacts in sagebrush steppe are those that promote ecosystem resiliency by preserving areas of high ecological integrity. Juniper reduction also has the hypothetical potential to mitigate the effects of drought.

Objective	Strategy	Action(s)	Target SGCNs
Increase landscape resilience.	Manage for diverse, healthy plant communities able to resist stresses including drought and drought-mediated impacts such as invasion by nonnative plants and wildfire.	Research options for managing this habitat under forecasted climate models. Work with other agencies, organizations and user groups across the Owyhee Uplands to address climate change impacts across landscapes, and refine land management planning options and alternatives down to local level implementable projects where possible. Engage in microclimate monitoring to better identify and understand local pockets of environmental opportunity to enhance habitat resistance to climate induced stressors. Engage in research to identify plants useful for habitat restoration or enhancement from current climate regimes that are forecast to be local future climate regimes. Support efforts to increase public and political awareness of climate change impacts to local landscapes and wildlife dependent on them. Research options for managing livestock grazing in this habitat under forecasted climate models (i.e., drought conditions). Work with agencies, organizations, and livestock operators to use this information to both be proactive and refine land management planning options and alternatives down to local level implementable projects.	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow Pygmy Rabbit Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Southern Idaho Ground Squirrel
	Manage vegetation to improve groundwater recharge and soil moisture.	Evaluate the effects of juniper removal and other vegetation treatments on soil moisture and groundwater levels.	

Species designation, planning & monitoring

In addition to conservation actions to address specific threats, some species require inventory and monitoring to assess their current status and distribution in Idaho. As such, we identify needs for 6 species in the section below and identify appropriate actions.

Greater Sage-Grouse

West Nile virus (WNV) is considered a secondary threat in the Governor's Alternative (Otter 2012), and was first detected in Sage-Grouse in Idaho in 2006. Sage-Grouse are highly susceptible to the virus with close to 100% mortality rate in infected birds (Clark et al. 2006). The disease can reduce population growth by 6% to 9% per year (Clark et al. 2006). WNV was detected in Sage-Grouse in Owyhee County in 2006. Trend counts based on lek surveys showed a 25% overall decline in Sage-Grouse between 2006 and 2007 in Owyhee County. Early detection of WNV in Sage-Grouse can help managers better assess risk and determine further actions (e.g., alert the public, restrict seasons, and increase monitoring). WNV also affects other avian species and has the potential to cause population declines in some raptors, waterbirds, and other birds.

Objective	Strategy	Action(s)	Target SGCNs
Reduce impacts of WNV on wildlife populations.	Continue to cooperate with regional and state-level WNV monitoring and surveillance efforts (Idaho; Idaho Sage-grouse Advisory Committee 2006). Develop information for and implement land management activities that reduce risk of transmission.	Increase public awareness and education of the impacts of WNV on Sage-Grouse and encourage them to report observations of dead Sage-Grouse. Consider closing Sage-Grouse hunting seasons in areas affected by WNV. Test all captured Sage-Grouse for presence of WNV antibodies. Monitor and assess mortality events in bird populations, including corvids and raptors, to detect WNV outbreaks. Assess mosquito ecology and status in areas where SGCNs are vulnerable to West Nile virus. See the Governor's Alternative (Otter 2012) and BLM (2015; App C, p. C-11 to C-12) for additional actions with respect to WNV and Sage-Grouse.	Greater Sage-Grouse American White Pelican Ferruginous Hawk Golden Eagle Ring-billed Gull Yellow-billed Cuckoo Common Nighthawk

Bighorn Sheep

Bighorn Sheep rams in the E. Fork Owyhee River, Idaho © 2012 Jake Powell

Bighorn Sheep are vulnerable to respiratory disease caused by pathogenic organisms. Respiratory disease (pneumonia) causes increased adult and lamb mortality and has been characterized as "a significant factor in the historic decline of bighorn sheep" and a "key factor limiting recovery throughout Idaho" (IDFG 2010). Pathogenic organisms can be transmitted to uninfected Bighorn Sheep herds by healthy domestic sheep and goats, and no effective treatment has been developed to treat the disease once it is established in a herd.

The Idaho Bighorn Sheep Management Plan states "the most important management direction to reduce the impact of disease on Bighorn Sheep populations is to minimize or eliminate contacts between Bighorn Sheep and domestic sheep and goats that could result in disease transmission" (IDFG 2010).

Objective	**Strategy**	**Action(s)**	**Target SGCNs**
Reduce effects of disease on Bighorn Sheep populations.	Advocate and work toward maintaining spatial and temporal separation between Bighorn Sheep and domestic sheep and goats.	Work with willing domestic sheep permittees, FS, and BLM to identify and implement BMPs (e.g., limit estrus ewes near wild sheep populations, develop effective grazing patterns, track and report missing livestock) to maintain separation between Bighorn Sheep and domestic sheep and goats. Work with FS, BLM, and other land management agencies to identify appropriate alternative management options. Capture or euthanize wild sheep and stray domestic sheep or goats if found in an area (removal zone) where contact is likely (IDFG 2010). Work with ranchers to seasonally coordinate grazing patterns (WAFWA 2007, IDFG and ISDA 2008).	Bighorn Sheep

Objective	Strategy	Action(s)	Target SGCNs
		Collaborate with others to develop vaccines and treatments for pathogens to prevent transmission of disease among domestic sheep and Bighorn Sheep (IDFG 2010)	
	Improve education and outreach efforts regarding risks associated with contact between Bighorn Sheep and domestic sheep and goats.	Collaborate with ISDA and Idaho Wool Growers Association to develop education and outreach strategies.	Bighorn Sheep
	Monitor PMUs for pathogen incidence and disease outbreaks.	Obtain biological samples to determine exposure to pathogens and develop individual herd health histories (IDFG 2010).	Bighorn Sheep

Dark Kangaroo Mouse

The Idaho population of the Dark Kangaroo Mouse (*Microdipodops megacephalus*) is restricted to an area in the extreme southwest corner of Idaho that comprises <64 km^2 (25 mi^2) in the Little Owyhee River drainage. Currently this population is taxonomically identified as a subspecies, *M. megacephalus atrirelictus*. Preliminary analysis of molecular data has suggested that the Idaho population and a population in north-central Nevada represent a distinct species (Hafner et al 2008, Hafner and Upham 2011, Hafner 2013, unpublished data).

Dark Kangaroo Mouse individuals are infrequently captured with standard live-trapping techniques, so additional work may be needed to develop approaches for monitoring the status of this population. No monitoring programs exist to evaluate population status relative to habitat conditions and management needs, including responses to any habitat management or restoration.

Columbia Plateau (syn. Merriam's) Ground Squirrel

Columbia Plateau (syn. Merriam's) Ground Squirrel (*Urocitellus canus*) occurs south of the Snake River and west of Reynolds Creek. Range disjunction between *U. canus* and Great Basin (syn. Piute) Ground Squirrel (*U. mollis*) is not well demonstrated; contact zones could result in hybrids, but this topic has not been investigated. Current distribution and status is uncertain, complicated by the difficulty in differentiating *U. canus* and *U. mollis*; as of January 2014, extirpation from Idaho remains a possibility, but extant colonies have been reported in the Owyhee foothills in the Reynolds Creek vicinity. Efforts are needed to determine the identity of ground squirrel populations in northwest Owyhee County, to characterize distribution, contact zones between Columbia Plateau (syn. Merriam's) Ground Squirrel and Great Basin (syn. Piute) ground squirrel populations, and reevaluate the taxonomic positions of the nominal taxa.

Wyoming Ground Squirrel

The distribution of Wyoming Ground Squirrel (*Urocitellus elegans nevadensis*) is poorly-documented in southwest Idaho. These populations are widely disjunct from the range of *U. e.*

aureus in the mountains of central Idaho. Southwest populations are members of the subspecies *nevadensis*, which is otherwise restricted to northern Nevada. This species occupies sagebrush steppe at the disturbed end of the spectrum.

Southern Idaho Ground Squirrel

Populations of this locally endemic ground squirrel have undergone enigmatic fluctuations. These fluctuations may be related to habitat conditions, but populations may also be affected by disease outbreaks. Plague invaded Idaho during eastward expansion of the pathogenic bacteria, *Yersinia pestis*, since its introduction in California during the 1800s, reaching Idaho around 1940. Ground squirrels are among species most susceptible to mortality from plague, and extreme population declines could follow epizootic outbreaks. Also, survival rates may be depressed by enzootic occurrence of disease, which has the potential to mediate competitive interactions with other small mammals less susceptible to plague. New efforts elsewhere are underway to develop oral vaccines against plague for at-risk mammal populations. At this time, additional information is needed to evaluate the effects of plague on Idaho small mammal populations.

Objective	Strategy	Action(s)	Target SGCNs
Monitor population viability relative to habitat conditions and management needs.	Establish methods for assessing and monitoring status.	Evaluate sampling methods and develop monitoring protocols. Conduct periodic assessments of species status relative to habitat conditions and management opportunities. Work with Oregon Department of Fish and Wildlife and the Nevada Department of Wildlife to coordinate management of cross-border populations.	Dark Kangaroo Mouse Columbia Plateau (syn. Merriam's) Ground Squirrel Wyoming Ground Squirrel Southern Idaho Ground Squirrel
Determine status and taxonomic validity of Columbia Plateau (syn. Merriam's) Ground Squirrel populations.	Reevaluate subspecific relationships and species designations within the Columbia Plateau (syn. Merriam's) ground squirrel group.	Develop and implement surveys and sampling, and develop analytical products to determine population status, biogeographic patterns, and conservation priorities.	Columbia Plateau (syn. Merriam's) Ground Squirrel
Increase our current understanding of the status of Wyoming Ground Squirrel.	Determine the status of Wyoming Ground Squirrel.	Develop and implement surveys intended to characterize distribution and status of this ground squirrel taxon.	Wyoming Ground Squirrel
Manage the effects of disease, including plague, on vulnerable small mammal populations.	Monitor outbreaks of plague and other diseases. Investigate the effects of small mammal	Investigate small mammal mortality events to determine causative factors and contribute to interagency coordination of any relevant public health programs. Characterize small mammal populations and associated disease vectors.	Southern Idaho Ground Squirrel

Objective	Strategy	Action(s)	Target SGCNs
	diseases and disease vectors on small mammal population status.	Evaluate the effects of plague and/or other small mammal diseases on population dynamics.	
Evaluate the effects of energy development, primarily natural gas, on the Southern Idaho Ground Squirrel.			Southern Idaho Ground Squirrel

Target: Riverine–Riparian Forest & Shrubland

Riverine and riparian habitats are located in the Owyhee Uplands with a portion of the Snake River and several of its major tributary river systems, including portions of Salmon Falls Creek, Bruneau, Owyhee, Boise, and Payette drainages. In the southern portion of the region, high tributaries of the Owyhee, Bruneau, and Middle Snake drainages originate in the Owyhee Mountains where many smaller streams are intermittent or have seasonal subsurface flows. Base flows of perennial streams are supported by springs much of the year. The Boise and Payette rivers originate in the Idaho Batholith.


Snake River near Walters Ferry, Idaho © 2010 Chris Murphy

The aridity of this region requires water management programs, including water storage, delivery, and regulation frameworks to support agriculture. Major hydroelectric and water storage reservoirs include CJ Strike and Swan Falls reservoirs on the Snake River, and the lower reaches of the Boise and Payette rivers are controlled by upstream dams and are confined by flood control levees.

Ample and diverse riparian vegetation provides many benefits, including stabilizing banks and diffusing the energy of moving water, particularly during floods. This reduces erosion and sediment loading and reduces streambed downcutting. Riparian wetlands can serve as a water retention and storage opportunity, reducing the rate of downstream water movement. Riparian vegetation also reduces stream temperature (Zoellick 2004). In the overall arid Owyhee Uplands section, riparian vegetation is invaluable for fish (e.g., see Dewalter et al. 2015) and wildlife habitat, being particularly important for herbivores owing to high vegetation productivity as well as dense cover. In addition, high insect populations are associated with these areas of greater primary productivity, and wetland and riparian habitat is essential for many insectivorous animals, notably bats and Neotropical migratory birds.

Target Viability

Fair. Rivers and riparian habitat are predominantly affected by anthropogenic disturbance, degraded water quality, changes in hydrology, and other physical disturbances to soils and vegetation (e.g., improper livestock grazing, development). Large river ecosystems, such as the lower Boise, Payette, and Snake rivers, have been severely altered by dams, diversions, agriculture, flood control, transportation, and urbanization. Using the model of landscape integrity, which incorporates mapped land uses and stressors to estimate condition, about half of riverine and riparian habitat is in "Very Good" condition (Murphy et al. 2012). This model greatly overestimates on-the-ground condition because it does not include localized nonnative species invasion, recreation impacts, flood control development, or livestock grazing impacts. Field rapid assessments of 19 riparian wetlands in the Owyhee Uplands found these wetlands (averaged across samples) were in the "Good" condition class (Murphy and Schmidt 2010, Murphy and Weekley 2012). Primary stressor groups were hydrologic modifications, invasive nonnative plant species, and disturbance to soils. The landscape context of riparian wetlands is highly variable, although numerous stressors are observed in buffers surrounding wetlands assessed in agricultural and urban landscapes.

Spotlight Species of Greatest Conservation Need: Northern Leopard Frog

Northern Leopard Frog (*Lithobates pipiens*) has potentially been extirpated from the lower Payette, lower Boise, and much of the mid-Snake river drainage. Surveys during 1994 and 1995 in Twin Falls County failed to detect populations at historical locations (McDonald 1996). Another survey revealed previously undetected populations in southern Idaho (Makela 1998), but since 2005, only a handful of incidental observations have been made in south-central Idaho. Causes of population decline and extirpation have not been determined, but possible causes could include disease (e.g., amphibian chytridiomycosis, a disease caused by a fungal pathogen, *Batrachochytrium dendrobatidis* [*Bd*]) or competition and predation by introduced American Bullfrog (*Lithobates catesbeianus*). Leopard Frogs were last documented on the Payette and Boise Rivers during the 1970s, and the last specimen or literature records on the Snake River below Grandview were also documented during that decade. However, incidental sightings in the Grandview and Bruneau vicinities along the Snake River were reported during 2004–2006, suggesting that remnant populations could persist in the mid-Snake drainage (IDFG data).

Spotlight Species of Greatest Conservation Need: Columbia Spotted Frog (Great Basin DPS)

Populations of Columbia Spotted Frog (*Rana luteiventris*) south of the Snake River in Owyhee and Twin Falls counties are disjunct, isolated from neighboring populations by extensive areas of unoccupied and unsuitable habitat. The FWS included this portion of the species' range in the Great Basin Distinct Population Segment (DPS), which was designated a Candidate for ESA listing during 1993 (FWS 1993). After being on the Candidate list for 22 years, the FWS announced on October 8, 2015, a 12-month finding of "not warranted" for the Columbia Spotted Frog Great Basin DPS, and removed it from the Candidate list (FWS 2015*b*). A draft management plan (IDFG 2010) lists priority management needs and actions. This plan was developed in conjunction with FWS and with input from a multiagency technical working group. Populations in southern Idaho typically occur in riparian wetlands, beaver ponds, spring-fed pools and wet meadows, and artificial livestock watering ponds and reservoirs. Riparian woody vegetation is predominantly willow (*Salix* L.). Adjacent upland habitat is often dominated by sagebrush, juniper, mountain mahogany, and aspen.

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

High rated threats to Riverine–Riparian Forest & Shrubland in the Owyhee Uplands

Improper livestock grazing management

In the context of this plan, "improper" is defined as grazing beyond the capacity of the resource in either direction (e.g., overuse such as along riparian areas that need protection or underuse where lack of grazing contributes to increased fuel loads; i.e., need for seasonal adjustments).

Livestock seek out wetlands for forage and for shade. When livestock grazing is uncontrolled, livestock use within the riparian/wetland areas may become excessive. Too much vegetation may be removed or trampled, causing the loss of riparian width and vegetation cover, reduced plant and wildlife diversity, and opportunities for noxious weed and undesirable plant invasion. Loss of riparian vegetation can destabilize banks, increase runoff rates, and increase flow shear stress (function of the fluid forces per unit area) during high-flow events. This can result in increased erosion, sediment loading, and increased rate of streambed downcutting and associated lowered water tables. Incised and channelized streams can lead to disconnected and drained floodplains, which may prevent regeneration of riparian vegetation even after proper management is restored. Livestock trampling may cause undercut banks to collapse, causing sediment loading and creating shallow, wide watercourses. As a result, water temperatures increase, sometimes dramatically, especially when coupled with the loss of shading from riparian vegetation.

Objective	Strategy	Action(s)	Target SGCNs
Manage livestock grazing to maintain or restore riparian condition and habitat quality.	Implement BMPs for riparian grazing systems and grazing infrastructure improvements.	Support and promote the use of Farm Bill programs by private landowners. Increase riparian width and subsequent proper function and condition through the use of wildlife-friendly exclusion fencing and riparian pasture management for grazed riparian systems. Develop off-site watering sources or water gaps for livestock in conjunction with wildlife-friendly exclusion fencing. Incorporate GRSG Seasonal Habitat Objectives (Table 2-2 in BLM 2015) into relevant resource management plans and projects. Conduct fine-scale habitat assessments to inform grazing management. Undertake adaptive management changes related to existing grazing	Western Toad Columbia Spotted Frog Sandhill Crane Yellow-billed Cuckoo Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
		permits where improper grazing is determined to be the causal factor in declining habitat condition.	
	Reduce erosion sediment and nutrient loads associated with livestock grazing.	Expand riparian widths through the use of wildlife-friendly exclusion fencing and active restoration activities to stabilize streambanks and diffuse stream energy during high-water events. Develop off-site watering sources and/or manage stream access for livestock in conjunction with exclusion fencing. Develop and support programs to encourage or provide incentives for agricultural setbacks from rivers, streams, runoff channels, and riparian habitat. Streamline and improve permitting process for projects intended to restore aquatic habitats. Work with Soil and Water Conservation Districts to get a draft Stream Restoration Permit (in process through Idaho Department of Water Resources) approved and in use.	Western Toad Columbia Spotted Frog Sandhill Crane Yellow-billed Cuckoo Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis
	Incorporate measures to maintain natural flow levels and periodicity, channel resilience, and riparian habitat in land-use plans.	Use sound, science-based management decisions for federal lands and base these decisions upon flexible policies that take into account local ecological conditions and state planning decisions. Seek improved range and riparian management through federal land-use planning activities (e.g., IDFG Fisheries Management Plan 2013–2018).	Western Toad Columbia Spotted Frog Sandhill Crane Yellow-billed Cuckoo Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis
Restore river and riparian habitat to functioning condition.	Manage American Beaver (*Castor canadensis*) populations to maximize dam densities in compatible landscapes.	Evaluate opportunity and need for beaver population restoration. Identify watersheds where beaver dam densities should and could be increased. Restore riparian habitat where conditions limit beaver populations in key watersheds. Engage trappers and sportsman organizations in management	Western Toad Columbia Spotted Frog Sandhill Crane Yellow-billed Cuckoo Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-

Objective	Strategy	Action(s)	Target SGCNs
		programs to maximize beaver populations for long-term fur harvest opportunities. Where appropriate, conduct translocation projects. Manage beavers to minimize property damage and conflicts.	footed Myotis Little Brown Myotis
	Use river and riparian restoration to mitigate the effects of climate change, water pollution, stream channel erosion, loss of surface water, and other conditions that are difficult to remedy; actively restore habitat conditions of value for fish and wildlife.	Develop projects to restore, diversify, and expand riparian vegetation where it has failed to naturally regenerate. Develop and implement restoration projects to restore degraded channels, reestablish stream flow and hydrologic process, and reduce erosion and runoff. Construct wetlands intended to provide or enhance fish and wildlife habitat and manage water quality and retention.	Western Toad Columbia Spotted Frog Sandhill Crane Yellow-billed Cuckoo Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis

Travel management & infrastructure

Roads are often located in drainage bottoms, adjacent to and sometimes through riparian habitat. River and stream crossings may be undeveloped such that vehicles traverse the streambed, or culverts or bridges used to span the channel. Poorly situated roads can affect stream sedimentation, damage floodplains, constrain river dynamics, or fragment riparian habitat. Culverts that are improperly placed or are affected by erosion can become barriers to fish movement or instigate rapid erosion, including formation of headcuts. Bridges can provide roosting structures for bats and birds and may also be used to facilitate safe wildlife crossings.

Objective	Strategy	Action(s)	Target SGCNs
Minimize damage to fish and wildlife habitat from roads and associated infrastructure.	Manage travel to reduce loss of sensitive river, stream, and riparian habitat. Identify and correct existing culverts that present a barrier to fish and wildlife movements or cause habitat degradation from flow impediments or erosion. Mitigate damage through post-construction restoration and providing structures that are beneficial to wildlife.	Install and maintain culverts to correct barriers arising from their placement or installation technique. Realign or close roads having serious impacts to streams, rivers, or key riparian habitat. Design new crossing structures that facilitate desirable fish and wildlife movements. Add wildlife-centered design elements, such as bat roost structures, to bridge construction projects.	Western Toad Columbia Spotted Frog Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis Western Ridged Mussel Snake River Physa Bruneau Hot Springsnail Bliss Rapids Snail

Dams & water diversions

Flooding and the associated scouring and sediment changes are critical for river systems. Active floodplains contain riverside wetlands and redistributed fine and coarse materials. Regeneration of native black cottonwood (*Populus balsamifera* L. subsp. *trichocarpa* [Torr. & A. Gray ex Hook.] Brayshaw) stands is reduced when disturbance regimes associated with natural hydrographs and hydroperiods are disrupted and conditions required for seed dispersal and germination are not created. High flows also establish new channels, create oxbows and keep low-gradient rivers moving within their floodplain. Dams and water diversions change the hydrograph of a river. Periods of flooding may be shortened or stopped completely. Discharges from dams can come at unusual times and can be restricted during critical periods for wildlife. Rivers are no longer allowed to move within their floodplains. Dams constructed without accommodations for fish migrations and movement create barriers that have implications for population viability and access to important habitat. Diversions for irrigation or other uses reduce river and stream flows, sometimes completely dewatering streams necessary for aquatic and riparian species.

Objective	Strategy	Action(s)	Target SGCNs
Flow regime in dammed rivers mimics natural flow regime, including seasonal and long-term flow variations.	Work with agency partners and stakeholders to manage flows to benefit fish and wildlife.	Consider needs and benefits of fish and wildlife populations in decision-making process regarding new dams and existing dam management. Seek opportunities to create flows that mimic maximum feasible flow events to support or mimic natural flow conditions.	Yellow-billed Cuckoo Silver-haired Bat Hoary Bat California Floater Western Ridged Mussel Snake River Physa Bliss Rapids Snail
Riparian systems remain functional in dammed river systems.	Work with landowners to protect riparian tracts, particularly mixed-age cottonwood forest. Manage suburban and urban development in riparian zones and floodplains, which often happens when flood risks are reduced below dams.	Strategically implement voluntary land swaps, acquisitions, or easements to minimize development. When possible, work with landowners to restore riparian habitat, such as cottonwood forests. Work with county planning and zoning to discourage subdivision development within floodplains and particularly within cottonwood forests.	Yellow-billed Cuckoo Silver-haired Bat Hoary Bat

Nonnative species

Invasive plants and invertebrates can alter habitat structure and ecological function. Predation by nonnative and invasive animals can lead to lower densities of native species and, in some situations, cause local or regional extirpations of native species. Interspecific competition between native and nonnative species can also arise when nonnative and native species overlap in terms of habitat or food requirements. Some nonnative aquatic species have been intentionally introduced for sportfish recreation, but in other situations introductions have been unintentional or accidental (e.g., "aquatic hitchhikers," escapes from rearing facilities, etc.) or from illegal releases. In addition to important implications for Idaho's wildlife, nonnative species may have direct economic impacts. An example is the cost of Zebra Mussel (*Dreissena polymorpha*) invasion in eastern North America. The State of Idaho has developed *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012).

Objective	Strategy	Action(s)	Target SGCNs
No new populations of unwanted nonnative species are established.	Do not allow importation of species that are identified as Invasive Species by the ISDA.	Implement *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012). Support ISDA's regulation of invasive species and maintenance of the Idaho Invasive Species List. Develop and implement surveillance programs to support EDRR to new invasions.	Western Toad Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog Western Ridged Mussel Snake River Physa Bruneau Hot Springsnail Bliss Rapids Snail
Unwanted populations of nonnative aquatic species are eliminated.	Identify and document nonnative aquatic animal occurrence.	Maintain information databases to document and track nonnative species occurrence and status. Support programs intended to detect new occurrences of unwanted species before they are well-established.	Western Toad Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog Western Ridged Mussel Snake River Physa Bruneau Hot Springsnail Bliss Rapids Snail
	Develop and apply techniques to remove populations of unwanted nonnative species.	Develop, maintain, and implement protocols for responding to new occurrences of unwanted species. Use and integrate control techniques to achieve objectives of reducing unwanted populations to nonfunctioning levels.	Western Toad Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog Western Ridged Mussel Snake River Physa Bruneau Hot Springsnail Bliss Rapids Snail
Economically important populations of nonnative aquatic animals are managed to minimize negative consequences for maintaining native fish and wildlife populations.	Manage populations that may affect high-priority animal populations.	Install barriers to expansion of unwanted aquatic animal populations. Apply harvest management programs to reduce or remove sport fish from areas where they are having unwanted effects. Use chemical, mechanical, and other treatments to reduce or remove unwanted populations.	Western Toad Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog Western Ridged Mussel Snake River Physa Bruneau Hot Springsnail Bliss Rapids Snail

Nutrient enrichment & chemical pollution

Historical and current management practices have reduced riparian widths that formerly captured and retained nutrient runoff from both agriculture (fertilizers and pesticides) and livestock (animal waste) operations. Introduction of excess nutrients and undesired chemicals into surface water can be from either a point source (i.e., from a single source and discharge location) or a nonpoint source (i.e., from diffuse, multiple sources). Excess fertilizers, organic wastes, and pesticides can leach into water systems. The Snake River acts as the nutrient drain for most of southern Idaho, and reservoirs are impacted by fish disease episodes and die-offs as both water temperatures and nutrient levels increase.

An emerging threat is neonicotinoid insecticides. Developed in the 1990s, neonicotinoids have become the most widely-used insecticides on earth. They are used on crops, pet collars, home and garden products, and as seed coatings to name a few. They are often used pre-emptively, as in the case of seed coatings, instead of only when pests are actually present. Although they are much less acutely toxic to farm workers, they are highly toxic to wildlife. A single corn seed coated with neonicotinoids can kill 80,000 bees and up to 10 birds (Mineau and Palmer 2013). Sublethal doses also can have significant, chronic reproductive impacts (Mineau and Palmer 2013). Neonicotinoids have also been detected in streams in Idaho (Hladik and Kolpin 2015). This genre of insecticides is suspected to play a part in the significant decline of insectivorous birds, such as Common Nighthawk, but research is needed.

Objective	Strategy	Action(s)	Target SGCNs
Agricultural nutrient waste is managed to prevent impacts to water systems.	Provide incentives for private landowners to reduce runoff.	Support and promote the use of Farm Bill programs by private landowners that improve the ability to minimize and retain nutrients. Develop and support programs to encourage or provide incentives for agricultural setbacks from rivers, streams, runoff channels, and riparian habitat. Encourage and support the use of BMPs.	Western Toad Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog Western Ridged Mussel Snake River Physa Bruneau Hot Springsnail Bliss Rapids Snail
	Minimize runoff by increasing riparian habitat width and developing proper function and condition.	In grazed riparian systems, manage livestock to develop desired riparian structural and functional components. Develop and support programs to encourage or provide incentives for agricultural setbacks from rivers, streams, runoff channels, and riparian habitat. Develop off-site watering sources for livestock in	Western Toad Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog Western Ridged Mussel Snake River Physa Bruneau Hot Springsnail Bliss Rapids Snail

Objective	Strategy	Action(s)	Target SGCNs
		conjunction with exclusion fencing. Where applicable, use wildlife-friendly exclusion fencing and riparian pasture management for grazed riparian systems. Implement active restoration of riparian habitats where opportunities and need exist.	
Nonpoint source pollution is managed to levels that have no effect on fish and wildlife.	Develop wetlands to remove pollutants; manage and mitigate nonpoint source pollution.	Construct new wetlands in strategic areas to manage nonpoint source pollution. Manage and restore existing wetlands to manage nonpoint source pollution.	Western Toad Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog Western Ridged Mussel Snake River Physa Bruneau Hot Springsnail Bliss Rapids Snail
Determine cause(s) of decline for nightjar species in Idaho.	Work with Western Working Group Partners in Flight (WWG PIF) and the Pacific Flyway Nongame Technical Committee (PFNTC) to assess causes(s) of decline.	Assist WWG PIF with adjusting current Nightjar Survey Network protocols to collect data that will inform potential cause(s) of decline. Work with WWG PIF and PFNTC to identify opportunities for research on contaminant impacts.	Common Nighthawk
Reduce potential impacts of neonicotinoids on insectivorous birds and native insects.	Reduce use of neonicotinoids on the landscape. Encourage adherence to the principles of Integrated Pest Management and encourage use of environmentally-benign pesticides at small scales.	Ban the use of neonicotinoids as seed coatings. Cooperate with IDL to reduce or eliminate any use of neonicotinoids on state endowment Trust Lands, and IDFG on Wildlife Management Areas. Work with NRCS to prohibit use of neonicotinoids on conservation easement/Farm Bill properties. Suspend the use of neonicotinoids to allow scientific review of impacts. Work with American Bird Conservancy to develop agricultural industry-targeted outreach materials to inform of impacts to both wildlife and crop health.	Yellow-billed Cuckoo Common Nighthawk A Mayfly (*Paraleptophlebia jenseni*) Duckhead Snowfly Boise Snowfly
Determine level of	Conduct research on	Provide relevant bird and bat	Yellow-billed Cuckoo

Objective	Strategy	Action(s)	Target SGCNs
impacts of neonicotinoids on insectivorous birds and native insects.	impact levels at watershed scale. Update EPA thresholds for incident reporting, which are currently set too low.	data to American Bird Conservancy for ongoing research project. Develop neonicotinoid-free communities and watersheds to provide means for comparing with communities and watersheds that are exposed to neonicotinoids. Work with American Bird Conservancy and other NGOs on project design and implementation. Provide support for American Bird Conservancy's efforts to update EPA thresholds.	Common Nighthawk A Mayfly (*Paraleptophlebia jenseni*) Duckhead Snowfly Boise Snowfly

Changes in temperature, precipitation & broad-scale hydrologic regimes

Changes in precipitation type (rain compared to snow), seasonal timing, and amount are expected. Snowpack levels are decreasing and more moisture is falling as rain during winter months, changing hydrologic regimes. Less snowpack equates to more drought stress to native plants, and increases conditions favorable for drought adapted invasive species to establish. Less precipitation also results in lower in-stream water levels, higher water temperatures, and conversion of cold water systems to warm water systems during summer and irrigation months. Climate change decreases water flow, sometimes changing flow regimes from perennial to intermittent. Rapid runoff from heavy rain, sudden melting of the snowpack, or rain-on-snow events have the potential to destroy riparian vegetation or create rapid erosion and stream channel alterations.

Objective	Strategy	Action(s)	Target SGCNs
River and riparian habitat is resilient to the effects of climate change.	Manage for intact and functional riparian zones and river systems.	Apply management programs and incentives to support development and maintenance of ecologically functioning riparian zones.	Western Toad Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog Sandhill Crane Yellow-billed Cuckoo Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis Western Ridged Mussel Snake River Physa Bruneau Hot Springsnail Bliss Rapids Snail
River and riparian habitat that is not currently functioning	Manage American Beaver populations to maximize dam densities in	Evaluate opportunity and need for beaver population restoration. Identify watersheds where	Western Toad Columbia Spotted Frog Sandhill Crane Yellow-billed Cuckoo Common Nighthawk

Objective	Strategy	Action(s)	Target SGCNs
despite current land management is restored to functioning condition.	compatible landscapes.	beaver dam densities should and could be increased. Restore riparian habitat where conditions limit beaver populations in key watersheds. Engage trappers and sportsman organizations in management programs to maximize beaver populations for long-term fur harvest opportunities. Where appropriate, conduct translocation projects. Manage beavers to minimize property damage and conflicts.	Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis
	Use river and riparian restoration to mitigate the effects of climate change, water pollution, stream channel erosion, loss of surface water, and other conditions that are difficult to remedy; actively restore habitat conditions of value for fish and wildlife.	Develop projects to restore, diversify, and expand riparian vegetation where it has failed to naturally regenerate. Develop and implement restoration projects to restore degraded channels, reestablish stream flow and hydrologic process, and reduce erosion and runoff. Construct wetlands intended to provide or enhance fish and wildlife habitat and manage water quality and retention.	Western Toad Columbia Spotted Frog Sandhill Crane Yellow-billed Cuckoo Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis

Medium rated threats to Riverine–Riparian Forest & Shrubland in the Owyhee Uplands

Groundwater withdrawal

Water is a limiting resource and urban and suburban uses, fish and wildlife habitat, industrial uses, agriculture, and other interests compete for it. Economics and availability drive decisions about the source of water for these competing interests. For example, agricultural irrigation practices have been transitioning from flood irrigation to direct on-site groundwater pumping. This shift is related to system efficiency, labor costs, and water costs. In some circumstances, overuse of water withdrawn from groundwater aquifers has led to a lowering of the water table, causing reduction of stream and river levels. In addition, wells that remove water from subsurface storage in floodplains and other wetlands lower the water table and cause normally standing water to more rapidly percolate through underlying substrates. Aside from affecting availability of surface water and aquatic habitat, lowered subsurface water tables can reduce floodplain and riparian habitat.

Objective	Strategy	Action(s)	Target SGCNs
Manage groundwater withdrawal to sustain surface water flows and riparian habitat.	Work with land and water managers to identify opportunities for balancing competing demands for groundwater.	Evaluate programs intended to recharge aquifers and implement those not compromising fish and wildlife habitat. Create market incentives for reducing demand. Apply Farm Bill and other programs intended to provide incentives for applying BMPs. Create incentives to match crop types to water systems and availability.	Yellow-billed Cuckoo Western Ridged Mussel Banbury Springs Limpet Snake River Physa Bruneau Hot Springsnail Bliss Rapids Snail

Species designation, planning & monitoring

Amphibian pathogens

Diseases have been implicated in the decline and extinction of amphibian populations worldwide. Amphibian chytridiomycosis, a disease caused by a fungal pathogen, *Batrachochytrium dendrobatidis* (*Bd*), has been of particular importance, although other pathogens, such as ranavirus, are also relevant. Although *Bd* was detected in an Owyhee Mountain population of Columbia Spotted Frog during the early 2000s, *Bd* is no longer considered a threat to the persistence of spotted frog populations (FWS 2015c). However, *Bd* has been documented to affect Western Toad (*Anaxyrus boreas*) populations. Actions are needed to examine occurrence of these nonnative aquatic species to provide empirical support for management decision-making.

Objective	Strategy	Action(s)	Target SGCNs
Minimize the introduction and spread of pathogens.	Implement protocols to minimize the introduction and spread of pathogens.	Follow recommended decontamination protocols during surveys and monitoring. Survey for *Bd* and other pathogens in amphibian populations. Document and investigate mortality events that may be related to pathogen outbreaks.	Western Toad Woodhouse's Toad Northern Leopard Frog

Ring-billed and California Gull

Until as recently as 2009, the Owyhee Uplands contained 1 nesting island along the Snake River used by Ring-billed Gull (*Larus delawarensis*) and California Gull (*Larus californicus*). This nesting island has since become inactive, and a new colony has become established within a fenced industrial settling pond in shrubsteppe habitat. Gulls nesting at this location are faced with multiple threats, including mortality from heavy truck traffic, malnutrition, and predation.

Objective	Strategy	Action(s)	Target SGCNs
Encourage the	Discourage use of	Work with landowner to remove the	Ring-billed Gull

Objective	Strategy	Action(s)	Target SGCNs
colony to return to the Snake River to nest.	current location for nesting.	fence surrounding the settling pond and/or establish a hazing protocol within the fence to discourage nesting. Conduct surveys at both the current and historic nesting locations to determine if actions to discourage nesting are having the intended effect.	California Gull

Northern Leopard Frog population status

The status of the Northern Leopard Frog in the Owyhee Uplands is unknown. To better understand species status, surveys of historical and potentially occupied sites are needed.

Objective	Strategy	Action(s)	Target SGCNs
Determine the status of the historic populations of Northern Leopard Frog.	Conduct surveys with particular focus on historical distribution.	Conduct surveys to evaluate current status and restoration opportunities.	Northern Leopard Frog

Target: Depressional Wetlands

Vernal pools, playas, old oxbows or meanders that are disconnected from river floodplains and ponded wetlands with emergent marsh and aquatic bed habitats are common examples of Depressional Wetlands. Surface water accumulates from adjacent uplands in areas of closed contours, and the direction of flow is normally from the surrounding uplands toward the center of the depressional wetland. Dominant hydrodynamics are seasonal fluctuations in water depth. Depressional Wetlands lose water through intermittent or perennial drainage from an outlet, evapotranspiration, or infiltration to ground water.

Jewel Wetland Complex, Snake River near Payette, Idaho © 2010 Chris Murphy

Emergent marshes, typically supporting tall plants such as broadleaf cattail (*Typha latifolia* L.) and hardstem bulrush (*Schoenoplectus acutus* [Muhl. ex Bigelow] Á. Löve & D. Löve), occur throughout the Owyhee Uplands. Other common types of Depressional Wetlands in the Owyhee Uplands include vernal pools and playas.

The Owyhee Uplands has more vernal pools and playas than any other part of the state. Vernal pools are precipitation-filled Depressional Wetlands that flood during winter and spring, but dry by early summer. Playas are more intermittently and less predictably flooded than vernal pools, and are more likely to have alkaline water and evaporative salt deposits. They often support specialized plants and invertebrates.

Playa, Snake River Plain near Mountain Home, Idaho © 2008 Tim Weekley

Target Viability

Fair. The current area occupied by Depressional Wetlands in the Owyhee Uplands is likely reduced from historic extent. This is especially true in former floodplains of the Boise, Payette, and Snake River valleys where oxbow and meander wetlands have been drained and filled for agricultural and urban land uses. However, these losses have been partly offset by the creation of numerous Depressional Wetlands in agricultural and urban areas for the purpose of processing wastewater (e.g., irrigation return, stormwater) and restoration of wildlife habitat. Using the model of landscape integrity, which incorporates mapped land uses and stressors to estimate condition, most Depressional Wetlands are in “Very Good” condition (Murphy et al. 2012). This model likely overestimates on-the-ground condition because many vernal pools and playas occur in the minimally-developed landscape of the Owyhee Plateau or on less-developed Wildlife Management Areas and does not include the extent of nonnative species. However, field rapid assessments of Depressional Wetlands in the Owyhee Uplands found these wetlands (averaged across samples) were in the “Fair “condition class (Murphy and Schmidt 2010, Murphy and Weekley 2012, Weekley and Murphy 2012). For example, 48% of 80 vernal pools and playas assessed were in “Fair” condition (Weekley and Murphy 2012).

Prioritized Threats and Strategies for Depressional Wetlands

High rated threats to Depressional Wetlands in the Owyhee Uplands

Improper livestock grazing management & agricultural modifications

Livestock grazing affects many Depressional Wetlands in the Owyhee Uplands (Murphy and Schmidt 2010, Murphy and Weekley 2012). Livestock disturbance to Depressional Wetlands can be managed with stocking rates and timing stocking to avoid wetland flooding in ephemeral systems. Depressional Wetlands are also often affected by modifications for livestock or other agricultural purposes, including levees, ditches or drainage pipes, and water control structures. Wetland alterations are often intended to manage seasonal flooding or drain flooded sites to improve site value for agricultural purposes. Wetlands may also be dredged to extend the availability of surface water for livestock. Excavated livestock water reservoirs were documented at 13% of assessed vernal pools and playas (Weekley and Murphy 2012). Excavations can cause erosion of the playa or pool bottom from water draining into the reservoir, accelerate playa and vernal pool desiccation, and cause establishment of invasive nonnative plants (Euliss and Mushet 2004). Livestock disturbance to vernal pools and playas has been rated moderate to heavy at 51% of assessed wetlands (Weekley and Murphy 2012). Observed effects of livestock use included alteration of vegetation composition and structure, soil compaction and churning, elevated nutrient inputs, increased erosion and channeling, and the establishment of nonnative plants (Weekley and Murphy 2012). Light grazing in vernal pools can prolong water availability and reduce competition from nonnative vegetation (Pyke and Marty 2005). Similarly, targeted grazing has been used during drawdown periods in emergent marshes to control undesirable vegetation.

Objective	Strategy	Action(s)	Target SGCNs
Maintain high water quality, native vegetation, and ecological integrity of depressional	Manage livestock use and disturbance to wetlands to maintain or improve wildlife habitat.	Use temporary and permanent wildlife-friendly fencing to manage livestock access to wetland habitat. Manage livestock access to maintain vegetation and avoid damage to soils.	Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog American

Objective	Strategy	Action(s)	Target SGCNs
wetland habitat.		Provide off-site water sources for livestock excluded from pools or flooded sites and include wildlife escape ramps. Provide livestock ramps or other hardened livestock access points to water when off-site watering sources are not preferred or are infeasible. Where appropriate, develop management plans that change seasons of use or prescribe rest for areas with vernal pools and playas.	Bittern White-faced Ibis Sandhill Crane Black Tern Raptor Fairy Shrimp
Minimize extent of habitat loss or degradation by improper livestock grazing management.	Restore sites degraded by improper livestock grazing management. Mitigate habitat loss by constructing new wetlands designed for wildlife benefits.	Develop funding and public-private partnerships to restore wetlands degraded by improper livestock grazing management. Restore hydrologic function by removing unnecessary control structures, obliterating relict ditches and drainage pipes, filling excavated reservoirs that lower water tables, and restoring water supply. Develop projects to construct wildlife-friendly wetlands. Design livestock water sources to benefit wildlife and minimize potential for invasive species establishment, which could include, e.g., shallow-water impoundments that dry periodically to mimic natural Depressional Wetlands or including water control structures to allow depth to be varied and to allow periodic draw-down and desiccation.	Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog American Bittern White-faced Ibis Sandhill Crane Black Tern Raptor Fairy Shrimp

Nonnative invasive plants & animals

Noxious weeds and invasive plants are frequently observed in Depressional Wetlands in the Owyhee Uplands (Murphy and Schmidt 2010, Murphy and Weekley 2012). Twenty-nine percent of assessed vernal pools and playas had at least moderate infestation of nonnative invasive plants (Weekley and Murphy 2012). Litter from annual nonnative plants has been shown to accumulate on playas and reduce cover of native plants, such as Davis' pepperweed (*Lepidium davisii* Rollins) (Moseley 1995). Some seeded perennial plants, such as forage kochia (*Bassia prostrata* [L.] A.J. Scott) and intermediate wheatgrass (*Thinopyrum intermedium* [Host] Barkworth & D.R. Dewey), may also reduce cover of Idaho endemic plants such as Davis' pepperweed and Idaho pepperweed (*Lepidium papilliferum* [L.F. Hend.] A. Nelson & J.F. Macbr.) that are restricted to playas and/or slickspot microsite habitats (see Harrison et al. 2000). Emergent marshes are susceptible to invasion by Canada thistle (*Cirsium arvense* [L.] Scop.), climbing nightshade (*Solanum dulcamara* L.), common reed (*Phragmites australis* [Cav.] Trin. ex Steud.), purple loosestrife (*Lythrum salicaria* L.), reed canarygrass (*Phalaris arundinacea* L.), and Russian olive (*Elaeagnus angustifolia* L.). Water management can stabilize water levels in these normally dynamic systems. Stabilized water levels can lead to decreased plant diversity and productivity (Murphy 2014). In emergent marshes with stable hydrologic regimes, native broadleaf cattail (*Typha latifolia* L.) and nonnative narrowleaf cattail (*T. angustifolia* L.) often become extremely dense, minimizing structural and compositional diversity of vegetation and decreasing marsh productivity. Shallow, ephemeral systems that are excavated to create deep, constantly flooded systems are focal areas for Common Carp (*Cyprinus carpio*), American Bullfrog, and nonnative plant invasions. Shallow-water wetlands are sometimes converted to deep water wetlands and ponds by mining operations (e.g., gravel mine ponds) or for agricultural water storage, recreation (e.g., fishing ponds), or aesthetics (e.g., decorative ponds).

Objective	Strategy	Action(s)	Target SGCNs
Prevent establishment of new populations of unwanted nonnative species.	Do not allow importation of species that are identified as Invasive Species by the ISDA. Develop and implement surveillance programs and partnerships to support EDRR to new invasions.	Implement *The Idaho Invasive Species Strategic Plan, 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012). Support ISDA's regulation of invasive species and maintenance of the Idaho Invasive Species List. Contribute to collaborations, working groups, and public-private partnerships to support and improve surveillance and response programs.	Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog American Bittern White-faced Ibis Sandhill Crane Black Tern Raptor Fairy Shrimp
Eliminate established populations of nonnative aquatic species.	Identify and document nonnative aquatic animal occurrence.	Maintain information databases to document and track nonnative species occurrence and status. Support programs and partnerships intended to detect new occurrences of unwanted species before they become well-established.	Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog American Bittern White-faced Ibis Sandhill Crane Black Tern Raptor Fairy Shrimp
	Develop and apply techniques to remove populations of unwanted nonnative species.	Develop, maintain, and implement protocols and partnerships for responding to new occurrences of unwanted species. Use and integrate control techniques to achieve objectives of reducing unwanted populations to nonfunctioning levels. Contribute to development of tools, techniques, and protocols for managing nonnative and invasive species.	Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog American Bittern White-faced Ibis Sandhill Crane Black Tern Raptor Fairy Shrimp
Maintain ecological function and disturbance processes.	Manage disturbance and water availability to manage invasive species.	Use fire, livestock grazing, or other prescribed disturbance to manage invasive species. At managed sites, use seasonal flooding or drawdowns to mimic natural wetland hydrology and simulate long-term natural fluctuations	Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog

Objective	Strategy	Action(s)	Target SGCNs
		between wet years and extreme drought years to reduce establishment of carp, bullfrog, and other nonnative species exploiting stabilized systems.	American Bittern White-faced Ibis Sandhill Crane Black Tern Raptor Fairy Shrimp
Minimize negative impacts of economically important populations of nonnative aquatic animals on native fish and wildlife populations.	Manage populations that may affect high-priority animal populations.	Install barriers to expansion of unwanted aquatic animal populations. Apply harvest management programs to reduce or remove sport fish from areas where they are having unwanted effects. Use chemical, mechanical, and/or other treatments to reduce or remove unwanted populations.	Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog Raptor Fairy Shrimp

Nutrient, sediment & bacterial pollutants from agricultural and urban runoff

Many emergent marsh Depressional Wetlands in the Owyhee Uplands receive water from agricultural and/or urban runoff (e.g., irrigation return, stormwater). Runoff often carries sediment, bacteria, nutrients, and toxic pollutants (e.g., pesticides, metals, road de-icer, etc.) (IDEQ 2003). Urban wastewater, septic systems, and stormwater are significant contributors of phosphorus, bacteria (e.g., *Escherichia coli*), and chemicals (IDEQ 2003). Although wetlands retain and biologically process pollutants, excess sediment, bacteria, and nutrients can diminish beneficial functions (Murphy and Weekley 2012). Water pollution affects habitat quality (e.g., Egea–Serrano 2012). Sediment fills Depressional Wetlands, reducing their extent, altering the hydrologic regime, and changing the plant community. Excess nutrients can promote excessive plant and algal growth resulting in eutrophication. Urban wastewater, septic systems, and stormwater are significant contributors of phosphorus, bacteria (e.g., *Escherichia coli*), and chemicals (IDEQ 2003).

Objective	Strategy	Action(s)	Target SGCNs
Reduce agricultural nutrient waste and chemical runoff to prevent impacts to water systems.	Provide incentives for private landowners to reduce runoff. Minimize runoff by increasing riparian habitat width and developing proper function and condition. Develop capacity of wetlands to remove	Support and promote the use of Farm Bill programs by private landowners that improve the ability to minimize and retain nutrients. Develop and support programs to encourage or provide incentives for agricultural setbacks from wetlands. Implement voluntary, incentive-based, cost-effective, market-based pollution reduction approaches such as pollution and ecosystem services credit markets. Construct new wetlands in strategic areas to manage nonpoint source pollution. Support programs for collecting, managing, and interpreting water quality data.	Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog American Bittern White-faced Ibis Sandhill Crane Black Tern

Objective	Strategy	Action(s)	Target SGCNs
	pollutants. Manage and mitigate nonpoint source pollution.	Identify and address sources of water quality degradation. Support programs that develop, disseminate, and promote application of BMPs for improving water quality. Create, enhance, and restore emergent marsh Depressional Wetlands with designs that maximize water quality. Implement BMPs to reduce bacterial inputs to wetlands, such as modernized and efficient waste management and storage systems (including septic systems) and livestock management. Implement BMPs to reduce nutrient inputs to wetlands, such as improved nutrient management as well as modernized and efficient wastewater storage and management systems.	

Medium rated threats to Depressional Wetlands in the Owyhee Uplands

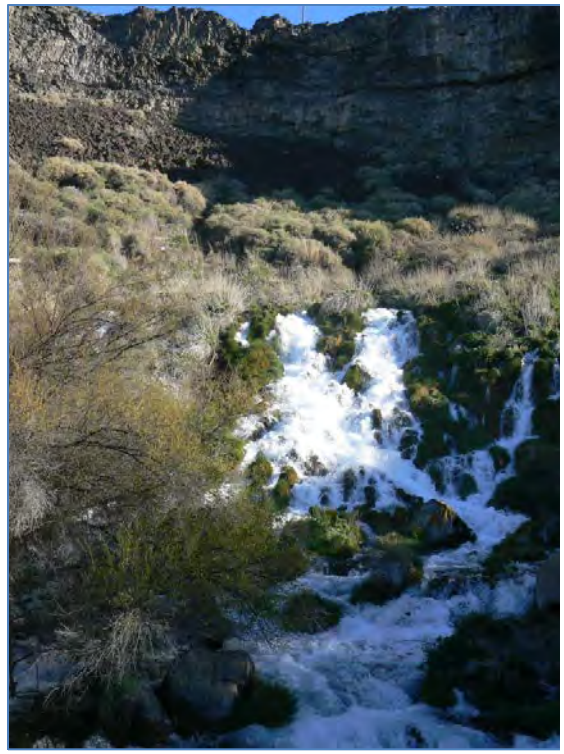
Roads

Roads constructed through Depressional Wetlands are not prevalent but have important effects on depressional wetland habitat in the Owyhee Uplands. In one study, <10% of assessed vernal pools and playas in the Owyhee Uplands were directly impacted by roads (Weekley and Murphy 2012). Primary impacts of roads include soil compaction, increased soil erosion, sediment loading, and decreased infiltration rates. In addition, roads promote nonnative plant dispersal.

Objective	Strategy	Action(s)	Target SGCNs
Minimize negative impacts of roads on Depressional Wetlands.	Manage travel to reduce or avoid impacts to depressional wetland habitat.	Close or reroute roads that cross or affect wetlands. Avoid road construction within or adjacent to wetland habitat (BLM 2015). Alter roads, or design new roads, to prevent or minimize sediment delivery to wetlands from the road surface (BLM 2015). Harden road surfaces to minimize erosion. Avoid the use of road de-icer or other chemicals toxic to wildlife within or adjacent to wetlands.	Woodhouse's Toad Northern Leopard Frog Columbia Spotted Frog American Bittern White-faced Ibis Sandhill Crane Black Tern Raptor Fairy Shrimp

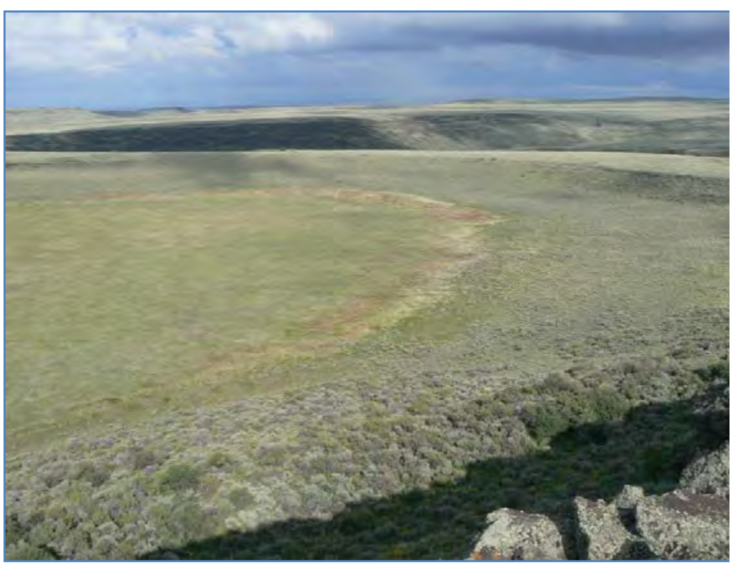
Target: Springs & Groundwater-Dependent Wetlands

This target contains a subset of groundwater-dependent ecosystems (GDEs), specifically springs and groundwater-dependent slope wetlands (e.g., meadows, seep-fed tree- or shrub-dominated wetlands). Groundwater-dependent wetlands often occur on sloping land with gradients that range from steep hillsides to nearly imperceptible slopes. Slope wetlands differ from Depressional Wetlands by the lack of closed contours. Groundwater sources can originate from either a regional aquifer or from localized infiltration of surface water (e.g., precipitation, seasonal flooding). Water flow is downslope and unidirectional. Groundwater-dependent wetlands lose water primarily by subsurface outflow, surface flows, and evapotranspiration. Groundwater-dependent wetlands may develop channels, but the channels serve only to convey water away from the groundwater-dependent wetland.



Niagara Springs, Snake River, Idaho © 2007 Chris Murphy

In the Owyhee Uplands, most occurrences of GDEs are in the form of springs and seeps emanating from basalt canyon walls, talus, and toeslopes of bluffs. These include geothermal springs concentrated in the lower Bruneau River valley. The Owyhee Uplands Section supports several of the most important large groundwater-dependent wetland complexes. Important GDE wetlands include Duck Valley Indian Reservation, Centennial Marsh on Camas Prairie, and spring-fed Silver Creek. Wetland vegetation communities in Duck Valley and the Camas Creek drainage are closely associated with runoff resulting in spring flooding and seeps, and consist of several rush species, sedges, small camas (*Camassia quamash* [Pursh] Greene), and other emergent plants.



Seep at China Hat, Sheep Creek, Owyhee Plateau, Idaho © 2009 Chris Murphy

Numerous high volume springs fed by the Snake River aquifer emerge from basalt walls and alcoves on the northern side of the Snake River Canyon on the eastern border of the Owyhee Uplands. Important, high-quality springs include Box Canyon, Banbury Springs, Billingsley Creek, Malad Gorge, and Thousand Springs. These provide critical habitat for endemic mollusks.

Alkaline-saline wetlands occur throughout the Owyhee Uplands in areas of groundwater discharge where evaporative alkali and salt deposits accumulate in the soil. Such wetlands support unique communities of plants and invertebrates adapted to these high pH and salt-rich soils.

Spanning the high-elevation area north of the East Fork Owyhee River from Big Springs down to Riddle, and Deep Creek to the escarpment, lies an area characterized by large seeps and springs dominated by native grasses and forbs, rocky sites, and tablelands dominated by little sagebrush (*Artemisia arbuscula* Nutt.). This area comprises most of the Sage-Grouse brood-rearing habitat west of the Bruneau River and a high percentage of year-round habitat for Pronghorn (*Antilocapra americana*).

Target Viability

Poor to *Fair*. The current area occupied by Springs & Groundwater-Dependent Wetlands in the Owyhee Uplands is significantly reduced from historic extent. Water from many seeps and springs has been diverted for agricultural and livestock production, resulting in less water available for wetland and aquatic habitat. In 1 study, about 61% of groundwater-dependent wetlands were classified in “Very Good” condition and 34% in “Fair” condition (Murphy et al. 2012). This model likely overestimates on-the-ground condition because many meadows occur in the minimally developed landscape of the Owyhee Plateau and the model does not account for the impacts of livestock grazing and localized water development on these habitats. However, limited field rapid assessments of groundwater-dependent wetlands in the Owyhee Uplands found these wetlands (averaged across samples) were in the “Good” condition class (Murphy and Schmidt 2010, Murphy and Weekley 2012). Primary stressor groups included invasive nonnative plant species followed by hydrologic modifications and soil disturbance. Springs in the Snake River and Bruneau River canyons are reduced by agricultural groundwater pumping. The landscape context of groundwater-dependent wetlands is often “Fair” to “Good,” with a moderate number of stressors in wetland buffers because many seeps and springs are located in undeveloped areas of the Owyhee Plateau. Springs in the Snake River Canyon are sometimes buffered by cliff topography, but occur in an otherwise agricultural landscape.

Prioritized Threats and Strategies for Springs & Groundwater-Dependent Wetlands

Very High rated threats to Springs & Groundwater-Dependent Wetlands in the Owyhee Uplands

Groundwater withdrawal

Water is a limiting resource. Overuse of water withdrawal from groundwater aquifers affects springs. Because regional aquifers can be extensive, the negative impacts of withdrawal on spring flows can be observed many miles from where pumping takes place (Sada et al. 2001, University of Idaho 2002, Brown et al. 2009, (Abele 2011)). For example, since the 1950s, an increase in groundwater pumping for irrigation on the Snake River Plain, combined with less recharge from surface irrigation, has resulted in decreased spring discharge in the Snake River Canyon by 500,000 acre ft per year (University of Idaho 2002).

Groundwater withdrawal has been identified as the most serious threat to Bruneau Hot Springsnail (*Pyrgulopsis bruneauensis*) (Wood 2000), an ESA-listed species endemic to natural springs within the lower Bruneau River drainage and that occurs in thermally-influenced springs. For example, reductions in spring flows limit the extent and quality of aquatic Bruneau Hot Springsnail habitat (Mladenka 1992, Wood 2000, FWS 2002, Lysne 2003). Intensive groundwater pumping for irrigation during the last 35 years (e.g., 66,200 acre ft per year) has resulted in a drop in the regional aquifer of up to 30 ft (Berenbrock 1993, FWS 2002, Northwest Power and Conservation Council 2004a). As a result, discharge from the geothermal spring habitat for the Bruneau Hot Springsnail along Hot Creek and the Bruneau River has significantly decreased or completely dried up (Mladenka 1992, FWS 2002). Prior to extensive groundwater withdrawal, about 10,100 acre ft were discharged annually from these springs (Berenbrock 1993).

Many flood-irrigated habitats (FIH) occur in historic wet meadow and wetland footprints of intermountain valleys and basins. These FIHs, particularly perennial pasture and hayfields in the historic floodplain, serve as surrogate wetlands that largely mimic the historic ecological function of natural flooding in the floodplain. These surrogate wetland functions are particularly manifested when diverted surface water for flood-irrigation originates from snowpack driven rivers and streams. Although the timing and duration of surface flooding on FIHs varies widely, many reflect annual environmental variation in snowpack and streamflow conditions. The spread of surface water across FIH mimics natural hydrologic processes and contributes to important ecological functions including soil hydration, aquifer recharge, water recycling/circulation, ameliorating stream temperatures through soil saturation and discharge, and increasing persistence of hydric habitats during the growing season.

Over the past 2 decades, surface-irrigated habitats in the Intermountain West have declined by 23% (123,000 acres/year) while sprinkler-irrigated acres have increased correspondingly. Sprinkler irrigation techniques dramatically reduce the amount of standing or flowing surface water on fields, which makes them less attractive as foraging habitat for wetland birds. Throughout the West, the conversion to sprinkler irrigation has been incentivized through federal programs, including the USDA Farm Bill programs, for perceived water use efficiencies. However, studies have indicated that incentivizing sprinkler conversion may not provide the intended or perceived water savings, economic return, or environmental benefits. Typically, sprinkler irrigation originates as a groundwater withdrawal with virtually no groundwater return or input while flood irrigation imparts surface withdrawal resulting in a groundwater input. The latter is more representative of historical floodplain hydrologic processes.

Objective	Strategy	Action(s)	Target SGCNs
Increase the quality and extent of spring and groundwater-dependent	Work with land and water managers to identify opportunities for balancing	Identify and build multistakeholder partnerships for long-term water conservation across the Snake and Bruneau River basins. Promote agricultural practices that reduce groundwater irrigation pumping, such as	White-faced Ibis Sandhill Crane Long-billed Curlew Banbury

Objective	Strategy	Action(s)	Target SGCNs
wetland habitats.	competing demands for groundwater.	fallowing ground, changing crops to less water-intensive species, increasing irrigation efficiency, and converting to surface water sources where possible. Acquire water rights or easements, where opportunities arise. Support continuation of moratoriums on new groundwater pumping. Evaluate programs intended to recharge aquifers and implement those not compromising fish and wildlife habitat. Create market incentives for reducing demand. Apply Farm Bill and other programs intended to provide incentives for applying BMPs. Create incentives to match crop types to water systems and availability.	Springs Limpet Bruneau Hot Springsnail Bliss Rapids Snail
Manage irrigation practices to balance groundwater withdrawal, recharge, and stream flow.	Work with stakeholders to identify water management priorities for wildlife and incentivize beneficial management approaches.	Where appropriate, work with NRCS to develop flood irrigation initiatives through the Regional Conservation Partnership Program. Work with NRCS to develop a flood irrigation enhancement for the Conservation Stewardship Program. Work with Ducks Unlimited and other NGOs to conduct habitat projects that encourage retention of flood irrigation agriculture in converted floodplains and wetlands. Use Habitat Improvement Program funding to leverage funds to encourage retention of flood irrigation agriculture. Work with FWS to determine if Partners for Fish and Wildlife funding may be used to help private landowners wanting to provide flood-irrigated lands for wildlife. To minimize unintended hydrologic consequences associated with land-use changes, increase the integration of water and land-use planning and actively communicate this message to stakeholders and decision makers (Van Kirk et al. 2012).	White-faced Ibis Sandhill Crane Long-billed Curlew Banbury Springs Limpet Bruneau Hot Springsnail Bliss Rapids Snail

High rated threats to Springs & Groundwater-Dependent Wetlands in the Owyhee Uplands

Improper livestock grazing management

The semiarid climate of the Owyhee Uplands, which contributes to an overall scarcity of surface water, tends to concentrate livestock around seeps and springs. Observed negative impacts from improper livestock grazing at springs and groundwater-dependent wetlands primarily relate to the alteration of vegetation and damage to soil. Improper livestock management can lead to loss or decrease of trees and shrubs (e.g., aspen and willows) and deeply-rooted native herbaceous vegetation; this reduces protective cover for wildlife, shading of aquatic habitat, and stabilization of soils (Sada et al. 2001, NPCC 2004b, (Abele 2011)). It can cause increased runoff energy and soil erosion due to spring outflow bank trampling, soil compaction, and reduced vegetative protection resulting in incised drainages and headcuts; this lowers the groundwater table and dries out seep-fed meadows (Sada et al. 2001, NPCC 2004b, (Abele 2011)). Improper grazing management can also cause elevated fine sediment and organic materials entering springs from spring banks and adjacent uplands (Abele 2011), which can impact spring-dependent mollusks by smothering rocks, sand, and gravel upon which their food, algal films, grows (Varricchione et al. 1998, Wood 2000, NPCC 2004a).

Objective	Strategy	Action(s)	Target SGCNs
Ensure that all springs, seeps, and groundwater-dependent wetlands are in "Proper Functioning Condition" (NPPC 2004b).	Manage livestock grazing around meadows, springs, and seeps that promotes desired vegetation structure and composition.	Evaluate on a case-by-case basis the viability of livestock exclosure fencing to protect meadows, springs, and seeps; install and maintain exclosures where needed (Otter 2012). When fencing is used, mark fences to minimize wildlife collision. Inventory, prioritize, and map springs in need of restoration and protection. Actively restore riparian vegetation (e.g., plantings) and aquatic habitat in springs that have been degraded. Work with willing livestock operators to implement BMPs. Provide input for allotment management plans to ensure springs are protected.	Western Toad Columbia Spotted Frog Greater Sage-Grouse White-faced Ibis Sandhill Crane Long-billed Curlew Common Nighthawk Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis

Stream rechannelization & water diversion

Diversion of springs and alteration of their outflow channels for livestock watering, hydroelectric power production, aquaculture, recreation, domestic use, or other purposes directly threatens aquatic and terrestrial groundwater-dependent habitats by reducing water volume, creating species migration barriers, directly destroying physical habitat and vegetation, and reducing biological diversity (Sada et al. 2001). Decreased water volume results in decreased soil moisture necessary for supporting riparian vegetation (Abele 2011). Reductions in water depth may be associated with greater exposure to UVB radiation and higher susceptibility to disease in amphibians. Although considered a restoration action, thinning or removing dense vegetation and digging out sediment within springs can harm aquatic habitat for springsnails if done inappropriately or too often (Abele 2011). Dams that pool spring outflows for livestock water or other uses can benefit some species, but they reduce linear habitat extent, alter the thermal regime, and can eliminate species specifically adapted to flowing springs (Sada et al. 2001). In the Owyhee Uplands, developed spring pools may concentrate Columbia Spotted Frog and increase the risk of disease and predation (Engle 2001). Roads, OHV trails, and dispersed recreation trampling (e.g., camping, picnicking, angling, hiking) can also negatively impact springs, seeps, and meadows by diverting or channelizing surface and subsurface flows away from wetlands (Sada et al. 2001, (Abele 2011)). Other spring developments, such as those that use a pipe or box to fully capture the spring source and direct water to a livestock watering trough or other use, reduce habitat extent and quality. Such developments reduce and degrade overwintering sites of Columbia Spotted Frog (Munger et al. 2002). Overall, diversion and outflow alteration reduces spring flow and decreases the ability of the spring to flush fine sediments or other pollutants (Varricchione et al. 1998, Wood 2000, NPCC 2004a). Mitigation of this threat is often difficult and expensive because it may require purchase of water rights or removal of physical infrastructure (Abele 2011).

Objective	Strategy	Action(s)	Target SGCNs
Locally protect and restore springs for endemic mollusks and other spring-dependent plants and animals measured by maintaining or increasing spring flows, improving spring outflow channel aquatic habitat condition, and increasing the quality of riparian vegetation condition (NPPC 2004a).	Work with partners to protect and restore Snake River and lower Bruneau River springs by improving or maintaining spring flows, spring outflow channel aquatic habitat, and riparian vegetation condition (NPPC 2004a).	Preserve undeveloped and minimally-impacted natural springs that have high value for endemic mollusks by using conservation funding programs for private lands. Acquire water rights or easements, where opportunities arise, to locally increase spring flows for endemic mollusks. Work with Idaho Power Company, Idaho Department of Parks and Recreation, NGO conservation partners, and private water users to restore spring habitat by reestablishing flows and riparian vegetation. Concentrate recreational use and access in one area in lieu of dispersed access points by creating boardwalks, bridges,	Banbury Springs Limpet Bruneau Hot Springsnail Bliss Rapids Snail

Objective	Strategy	Action(s)	Target SGCNs
		and foot paths for spring access; restricting vehicles and equipment to existing access roads; and using nonmotorized off-trail travel in areas not accessible by roads (Abele 2011). Reintroduce locally extirpated mollusks where spring hydrology has been restored.	
Protect, maintain, and/or restore aquatic habitat and hydrologic function of springs, seeps, and meadows as measured by increased extent and duration of saturated wetland vegetation, increased continuity of flowing water, decreased fine sediment input to spring outflow channels, increased diversity and productivity of plant communities, and maintained or expanded use of habitat by SGCN.	Implement projects to protect, maintain, and/or improve aquatic habitat and hydrologic function of springs, seeps, and meadows.	Locate points of diversion on a spring away from source to provide naturally flowing habitat for spring-dependent species (Abele 2011). Use boulders, anchored large wood, beaver, or other methods to stabilize headcuts and raise the water table of incised channels in seep-fed meadows; scatter small logs (e.g., juniper) to disperse overland flow (Abele 2011). Avoid, or decrease frequency of, vegetation clearing and/or digging out silt in springs (Abele 2011). Remove barriers to spring flow; locate any necessary impoundments as far from the spring source as possible. Where feasible, maintain or increase the duration of saturation and shallow flooding in meadows during late spring to keep groundwater closer to the surface for longer periods in summer to maximize invertebrate production and plant germination. Concentrate recreational use and access in lieu of dispersed sites; prevent new roads and trails, relocate roads and trails, and eliminate OHV access.	Columbia Spotted Frog Greater Sage-Grouse American Bittern Sandhill Crane Common Nighthawk
Protect, maintain, and/or restore terrestrial riparian and wetland vegetation of springs, seeps, and meadows as measured by	Implement projects to protect, maintain, and/or improve terrestrial riparian and wetland vegetation of springs, seeps,	Plant locally-adapted native trees, shrubs, and deeply-rooted native herbaceous species to shade out undesirable, invasive vegetation and stabilize soil on spring outflow banks.	Columbia Spotted Frog Greater Sage-Grouse American Bittern Sandhill Crane Common Nighthawk

Objective	Strategy	Action(s)	Target SGCNs
increased extent of hydric plant species, increased native species diversity and productivity of plant communities, decreased percent of flora comprised of nonnative species, and maintained or expanded use of habitat by SGCN.	and meadows.	Use mechanical disturbance (e.g., disking, mowing, harrowing, etc.), fire, herbicides, seasonal flooding, seeding, and/or other treatments where appropriate and practical to increase diversity and productivity of wet meadows.	

Upland & aquatic invasive species

Invasive nonnative species displace native vegetation and alter food webs of springs and groundwater-dependent wetlands (Sada et al. 2001). Russian olive (*Elaeagnus angustifolia* L.), tamarisk (*Tamarix* L.), purple loosestrife (*Lythrum salicaria* L.), common reed, waterthyme (syn. Hydrilla; Hydrilla *verticillata* [L. f.] Royle) (geothermal springs), and other invasive and noxious nonnative plants have degraded native spring habitats in the Owyhee Uplands. The presence of noxious weeds and nonnative invasive plants was the most frequently observed stressor in this habitat during field rapid assessments in the Owyhee Uplands (Murphy and Schmidt 2010, Murphy and Weekley 2012). Native western juniper trees have colonized some springs and meadows due to meadow dessication and lack of wildfire. Encroaching juniper can alter the hydrologic regime and eliminate meadow plant communities. Introduced mollusks and predators (e.g., nonnative fish, American Bullfrog) also displace native spring-adapted biota (Sada et al. 2001). For example, invasive nonnative tilapia (*Oreochromis* spp., *Tilapia zillii*) negatively impact Bruneau Hot Springsnail populations in Hot Creek, which is an outflow of a spring (Myler and Minshall 2000). The State of Idaho has developed *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012).

Objective	Strategy	Action(s)	Target SGCNs
Prevent establishment of new populations of unwanted nonnative species.	Do not allow importation of species that are identified as Invasive Species by the ISDA.	Implement *The Idaho Invasive Species Strategic Plan 2012–2016* (ISDA 2012). Support ISDA's regulation of invasive species and maintenance of the Idaho Invasive Species List. Develop and implement surveillance programs to support EDRR to new invasions. Work with Cooperative Weed Management Areas to maintain awareness of new noxious weeds and invasive species, and to coordinate control programs.	Western Toad Columbia Spotted Frog Banbury Springs Limpet Bruneau Hot Springsnail Bliss Rapids Snail
Reduce encroachment by native western	Remove juniper from springs and meadows to	Use site-specific analysis to refine the location for specific areas to be treated.	Western Toad Columbia Spotted Frog Banbury Springs Limpet

Objective	Strategy	Action(s)	Target SGCNs
juniper into springs and meadows.	minimize the harmful effects on these systems.		Bruneau Hot Springsnail Bliss Rapids Snail
Eliminate unwanted populations of nonnative aquatic species.	Identify and document nonnative aquatic animal occurrence.	Maintain information databases to document and track nonnative species occurrence and status. Support programs intended to detect new occurrences of unwanted species before they are well established. Control invasive plants (reed canarygrass, tamarisk) through the use of fire, water-safe herbicides, seasonal flooding, seeding, cutting, and/or other treatments in an integrated approach. Use water-safe herbicides only as last resort.	Western Toad Columbia Spotted Frog Banbury Springs Limpet Bruneau Hot Springsnail Bliss Rapids Snail
	Develop and apply techniques to remove populations of unwanted nonnative species.	Develop and implement protocols for responding to new occurrences of unwanted species. Use and integrate control techniques to achieve objectives of reducing unwanted populations to nonfunctioning levels.	Western Toad Columbia Spotted Frog Banbury Springs Limpet Bruneau Hot Springsnail Bliss Rapids Snail
Manage economically important populations of nonnative aquatic animals to minimize negative consequences for native fish and wildlife populations.	Manage populations that may affect high-priority animal populations.	Install barriers to expansion of unwanted aquatic animal populations. Apply harvest management programs to reduce or remove sport fish from areas where they are having unwanted effects. Use chemical, mechanical, and other treatments to reduce or remove unwanted populations.	Western Toad Columbia Spotted Frog Banbury Springs Limpet Bruneau Hot Springsnail Bliss Rapids Snail

Medium rated threats to Springs & Groundwater-Dependent Wetlands in the Owyhee Uplands

Nutrient enrichment & sediment from agricultural runoff

Agricultural irrigation water and municipal wastewater can infiltrate into groundwater resulting in springs with excess nutrient levels (Sada et al. 2001). This can result in changes to aquatic habitat. For example, elevated nutrients may result in excess plant or algae growth that changes the food web required by endemic biota. Groundwater is at risk of nutrient, pesticide/herbicide, or other toxic chemical contamination where there is high agricultural use of fertilizer, high densities of septic systems and urban land use, confined animal feeding operations (including dairies and feedlots), and injection wells for wastewater disposal (Brown et al. 2009, IDEQ 2010). Sediment enters spring outflow channels from adjacent agricultural activity. All of these activities exist above the Snake River Plain aquifer, which feeds spring systems in the Snake River Canyon (IDEQ 2010, IDFG 2013).

Objective	Strategy	Action(s)	Target SGCNs
Measurably reduce nutrient contamination in aquifers, especially nitrate, to protect and improve groundwater quality.	Use cooperative multistakeholder approaches including education and incentives for landowners; monitoring and evaluation; and implementing agricultural, industrial, and residential BMPs (IDEQ 2010).	Implement nutrient management plans at confined animal feeding operations to control runoff and infiltration of animal waste; monitor effectiveness of implementation (IDEQ 2010). Implement BMPs for preventing groundwater and spring pollution from agricultural practices (IDEQ 2010) such as irrigation water management, nutrient management, pest management, conservation crop rotation, residue management, prescribed grazing, upgrade of irrigation systems and technologies to improve efficiency, filter strips and riparian buffers, and sediment basins and pumpback systems. Buffer springs from development by ≥50 m (Sada et al. 2001). Inspect existing septic systems when new homes or other structures are developed (IDEQ 2010). Monitor groundwater quality to determine effectiveness of BMPs (IDEQ 2010). Use incentive programs to reduce the impact of agricultural or other production on groundwater quality (IDEQ 2010).	Banbury Springs Limpet Bruneau Hot Springsnail Bliss Rapids Snail

Development of springs for aquaculture

In addition to impacts related to water diversion (see prior discussion), in the Snake River Canyon, development of springs for the purpose of aquaculture has decreased water quality in spring outflows and the Snake River (IDFG 2013, IDEQ 2015). Commercial aquaculture has increased nutrient levels (especially phosphorus) in groundwater, springs, and the Snake River, resulting in an overall decrease in aquatic habitat extent and quality (IDFG 2013, IDEQ 2015). Solid and liquid pollutants in wastewater discharged from aquaculture can include excess feed for fish, fecal matter, nutrients (especially phosphorus), algae, parasites and pathogens, drugs and chemicals, and warm water (IDEQ 2015), all of which can enter spring systems. Aquaculture can also be a source for nonnative species introduction. Discharges alter water temperature and chemistry, increase turbidity, decrease oxygen in water, and increase nutrients, which increase the risk of eutrophication in receiving waterbodies (IDEQ 2015). Poorly functioning wastewater treatment ponds may also cause groundwater contamination.

Objective	Strategy	Action(s)	Target SGCNs
Protect water quality of springs	Work with regulatory	Ensure that regulatory agencies have the resources necessary to enforce regulations	Banbury Springs Limpet

Objective	Strategy	Action(s)	Target SGCNs
and aquatic habitat for endemic mollusks by preventing water pollution from aquacultural facilities.	agencies and aquaculture operators to prevent pollution of springs and associated aquatic habitat for endemic mollusks.	and monitor discharge to prevent water quality degradation. Implement design and carryout production that prevents nutrients and waste from entering groundwater. Collect and reuse nutrients (e.g., fertilizer) to minimize potential pollution of groundwater. Implement BMP plans for waste management.	Bruneau Hot Springsnail Bliss Rapids Snail

Species designation, planning & monitoring

Sandhill Crane

Three Sandhill Crane (*Grus canadensis*) populations exist in the Owyhee Uplands. They include the Lower Colorado River Valley Population (LCRVP), Pacific Coast Population (PCP), and the Rocky Mountain Population (RMP). Lower Colorado River Valley and RMP cranes nest in riparian and palustrine wetlands in a matrix of semidesert xeric habitat found in Blaine, Elmore, Gem, Owyhee, Payette, and Washington counties. Pacific Coast Population cranes stage in the Payette River valley west of Emmett in Gem and Payette counties during spring.

These 3 populations occupy multiple habitats during the course of Sandhill Crane round-trip movements from nesting to wintering areas; each of the populations pose different management challenges. The Association of Fish and Wildlife Agencies' Migratory Shore and Upland Game Bird Working Group selected migratory Sandhill Crane populations as a focus for the development of an individual funding strategy for priority research and management needs because of their unique life history characteristics, separate from the other hunted species of webless migratory birds.

Objective	Strategy	Action(s)	Target SGCNs
Assess the effects of habitat change on Sandhill Crane populations.	Coordinate research and management efforts to identify limiting factors throughout the range of RMP cranes.	Map the extent of summer, staging, and wintering habitat, and assess patterns of associated ownership and land use that characterize the LCRVP and RMP landscapes. Develop spatially-explicit rangewide models that predict landscape carrying capacity and anthropogenic changes (e.g., water use and rural development) that impact habitat availability, abundance, and configuration. Identify and examine broad-scale landscape stressors (e.g., drought and anthropogenic changes) that influence rangewide demographic patterns in LCRVP and RMP cranes.	Sandhill Crane

Target: Lakes, Ponds & Reservoirs

Reservoir behind Swan Falls Dam with emergent marsh fringe, Snake River, Idaho © 2007 Chris Murphy

Lakes, Ponds & Reservoirs include aquatic and wetland habitats in permanently- to seasonally-flooded lakes and reservoirs with extensive areas of deep water and/or wave-eroded beach or bedrock shorelines (Cowardin et al. 1979). This habitat includes waterbodies that are more than 8 ha (20 acres) in area and have water depth exceeding 2 m (6.6 ft) at low water (Cowardin et al. 1979). However, natural deep water ponds and lakes are rare in the Owyhee Uplands. Several large reservoirs exist that were created primarily for hydroelectric (e.g., CJ Strike Reservoir) and irrigation water storage (Lake Lowell, Magic Reservoir, Salmon Falls Creek Reservoir). Several smaller reservoirs on the Snake River also exist, created for hydroelectric production (e.g., Bliss, Lower and Upper Salmon, Swan Falls). In addition, numerous smaller reservoirs exist that were primarily created for irrigation water storage. Most of these reservoirs have areas of emergent vegetation and aquatic bed vegetation on their fringes, as well as riparian vegetation on their shores. Availability of open water is a rare commodity in the arid west. As a result, Lakes, Ponds & Reservoirs in the Owyhee Uplands are of critical importance to many aquatic birds for both breeding and foraging including Western Grebe (*Aechmophorus occidentalis*), Clark's Grebe (*Aechmophorus clarkii*), Ring-billed Gull, California Gull, and Caspian Tern (*Hydroprogne caspia*).

Target Viability

Fair. Water level fluctuations and land bridging of nesting islands, as a result of unusually low water levels, are the main issues. Water level fluctuations, from both dam operations and boat wake, results in grebe nests that become flooded or inaccessible. Land bridging of nesting islands in reservoirs of the Owyhee Uplands has resulted in the loss of 2 (out of 8 statewide) historic nesting colonies of gulls and Caspian Tern.

Spotlight Species of Greatest Conservation Need: Western and Clark's Grebes

Clark's Grebe is one of many Idaho birds identified on The State of the Birds 2014 Yellow Watch List, which highlights species that are either range restricted (small range and population), or are more widespread but with troubling declines and high threats (Rosenberg et al. 2014). Both Western Grebe and Clark's Grebe breed in the Owyhee Uplands and face similar threats. In the Owyhee Uplands, all breeding sites are in anthropogenic habitat. Both species nest at CJ Strike

Reservoir (32 nests, 67 birds) and Western Grebe also nests at Deer Flat National Wildlife Refuge. Boat wakes cause flooding of nests. At Deer Flat National Wildlife Refuge, the Refuge does not have control over water levels, as Lake Lowell is an irrigation reservoir. The daily operations of the dam can result in grebe nests becoming flooded or stranded above waterline, resulting in nest failure.

Prioritized Threats and Strategies for Lakes, Ponds & Reservoirs

Medium rated threats to Lakes, Ponds & Reservoirs in the Owyhee Uplands that have a High impact on at least one target

Water level fluctuations in reservoirs

Existing large reservoirs mimic lake habitat, but reservoirs have widely fluctuating levels and often have high disturbance from recreation. Although reservoirs may attract lake-adapted species, habitat may not be optimal. Lake-adapted bird colonies may be susceptible to disturbance or nests may be destroyed by changing reservoir levels. Fluctuating water levels is a significant issue for both Western and Clark's Grebe. Most Western and Clark's Grebe colonies are located on reservoirs, or along rivers susceptible to water level fluctuations resulting from dam operations. Rapid increase in water levels results in nest flooding, while rapid releases of water results in nests that are no longer accessible to grebes. All grebe colonies that have been monitored in recent years, including the colony at Deer Flat National Wildlife Refuge, have shown extremely low nesting success and recruitment (B. Flanders–Wanner, pers. comm.). One potential contributor is water level fluctuations at the colony level, resulting from boat wake and daily operations at dams.

Objective	Strategy	Action(s)	Target SGCNs
Reduce grebe nest failure.	Work with FWS, Bureau of Reclamation (BOR), and irrigation districts to reduce water level fluctuations during grebe nesting period.	Create boating no-wake zones around nesting colonies, and monitor their effectiveness. Develop BMPs with BOR for water level management around grebe colonies. Work with FWS to determine opportunities for reducing water level fluctuation issues on Deer Flat National Wildlife Refuge.	Western Grebe Clark's Grebe
Increase grebe nest success and recruitment.	Investigate potential causes of low nesting success and recruitment of Western and Clark's Grebes in Idaho.	Collaborate with FWS on proposed research project.	Western Grebe Clark's Grebe
Minimize disturbance to sensitive sites (e.g., colonial bird breeding colonies) to maximize habitat values of necessary reservoirs.	Manage recreation and other activities to maximize habitat value.	Work with land and water managers to manage recreational activities to minimize disturbance at Western and Clark's Grebe colonies.	Western Grebe Clark's Grebe American White Pelican Caspian Tern

Drought & water management impacts

Until as recently as 2006, 8 nesting colonies of Ring-billed Gull and California Gull existed in Idaho, including three in the Owyhee Uplands: Magic Reservoir, Mormon Reservoir, and Smith Island in the Snake River (cross reference Riverine–Riparian Forest & Shrubland). In addition, Magic and Mormon reservoirs also provided nesting habitat for Caspian Tern (IDFG 2007). Low water levels in these reservoirs, presumably driven by drought and low snow levels in the mountains (T. Gregory, IDFG, pers. comm.), have created land bridges at both Mormon and Magic Reservoir colonies. If gulls and terns attempt to nest at these sites at all, land bridging results in high predation rates on both young and adults. The Mormon Reservoir colony has been inactive since 2009; the Magic Reservoir colony has been inactive since 2010. Both of these colonies have been inactive because of land bridging (IDFG unpublished data). To our knowledge, only 1 new colony has become established, and it is in an unsuitable location.

Caspian Terns have mostly disappeared from Idaho, and currently nest reliably in only one location—Island Park Reservoir. This species is highly sensitive to the land bridging issue, but is also typically at a competitive disadvantage when nesting with other colonial species such as gulls and pelicans. Terns initiate nesting later than these other colonial species, and are therefore either pushed out because of lack of space, or they are subject to high predation pressure from the gulls that are often already feeding chicks.

Objective	Strategy	Actions	Target SGCNs
Assess potential impacts of drought on aquatic birds.	Conduct wetland connectivity assessment in the West.	Work with PFNTC to develop and implement a connectivity assessment.	Western Grebe Clark's Grebe American White Pelican American Bittern White-faced Ibis Sandhill Crane Long-billed Curlew Ring-billed Gull California Gull Caspian Tern Black Tern
Increase island nesting habitat availability.	Work with resource managers to identify opportunities at Magic and Mormon reservoirs.	Work with water managers to develop and implement water level management guidelines during the breeding season that balance irrigation and wildlife needs. Work with land managers, such as FWS, to create new nesting locations that will not be subject to low water level concerns in the foreseeable future.	California Gull Ring-billed Gull Caspian Tern
Reduce impacts of competition with other nesting species on Caspian Tern.	Create areas on nesting islands for late breeding initiation.	Work with FWS, Pacific Region, to develop protocol for creating late-breeding initiation areas. Work with land managers, such as FWS, to test protocol on a historic Caspian Tern nesting island that has seen recent nesting attempts (e.g., Minidoka NWR, Blackfoot Reservoir).	Caspian Tern

Target: Bat Assemblage

Bats as small K-selected vertebrates are long-lived, slowly reproducing organisms that maintain relatively stable populations (Findley 1993). Bats use caves, rock shelters, hollows of various kinds, buildings, and foliage as roosts. Some hibernate in the winter while other species migrate considerable distances. The Owyhee Uplands contains all 14 bat species that occur in Idaho, all members of the Family Vespertilionidae (vesper bats), which includes aerial insectivores and gleaners. The Owyhee Uplands Bat Assemblage is focused on the 5 bat SGCN: Townsend's Big-eared Bat (*Corynorhinus townsendii*), Silver-haired Bat, Hoary Bat, Western Small-footed Myotis (*Myotis ciliolabrum*), and Little Brown Myotis (*M. lucifugus*). In addition to more generalized habitat threats, which have been addressed elsewhere in this document, bats face taxa-specific threats such as roost loss or entombment from Abandoned Mine Land (AML) closures, fatality associated with wind turbine strikes, roost loss or direct mortality associated with pest control activities, and the potential incidence of white-nose syndrome (WNS).

Maternity colony Myotis cluster photographed for survey purposes, Snake River, Idaho, 2015 IDFG

Target Viability

Good. Main concerns include fatality associated with wind energy, AML closures, and potential incidence of WNS. Surveillance efforts in Idaho (coordinated with the National Wildlife Health Center) have not yet detected WNS nor *Pd*.

Prioritized Threats and Strategies for the Bat Assemblage

Very High rated threats to the Bat Assemblage in the Owyhee Uplands

Abandoned Mine Lands (AML) closures

Mining remains an integral part of the cultural, economic, and ecological fabric of the West. Over time, however, once rich prospects gave way to abandoned shafts and adits, creating subterranean complexes. These mines have become of fundamental importance to bat ecology and the relationship between bats and mines is well documented (Riddle 1995, Pierson 1998, Tuttle and Taylor 1998, Meier and Garcia 2000, Vories and Throgmorton 2000). Bats use abandoned underground mines for day roosts, night roosts, maternity colonies, hibernacula (winter resting areas), swarming sites (where bats congregate at certain times of the year), and temporary migratory stopover sites. However, these same mines often present safety hazards for humans. Although the Idaho Department of Lands (IDL) and federal land management agencies (e.g., FS, BLM) have existing AML programs to identify hazardous mines and implement appropriate closure procedures, preclosure biological evaluations are often of limited scope and intensity. If not carefully managed, this threat has the potential to eliminate many critical bat roosting and hibernating sites. Further study is also needed to understand the subtle aspects of roost use and to assess the impacts of reclamation efforts (Sherwin et al. 2009). In addition, some gated mine entrances have become nonfunctional to bats when erosion or invasive nonnative vegetation blocks the portal. Other closures have changed the airflow pattern that may render the mine unsuitable to bats. Some gates have been vandalized, which creates a human safety hazard. To ensure both the success of AML programs and the continued accessibility and use by bats, agencies should conduct post-closure monitoring on a subset of gated mines.

Many of the following objectives, strategies, and actions have been adapted from Sherwin et al. (2009) *Managing Abandoned Mines for Bats*.

Objective	Strategy	Action(s)	Target SGCNs
Manage abandoned mine lands as part of a roosting landscape to maintain various types of subterranean habitat (and associated roost types).	Develop collaborative partnership to achieve broader bat conservation and to ensure adequate mitigation.	Identify project partners and protocols; implement best management practices. Establish project goals, priorities, tasks, targets, and desired outcomes. Develop and implement comprehensive project management plan for efficient, collaborative program. Require effective communication among partners. Develop comprehensive safety plan that adequately addresses the requirements of all collaborating partners (e.g., industry, state, and federal) on the project. Establish safety standards; require training for personnel; communication protocols; and emergency procedures and contingencies. In coordination with partners, establish significance by identifying the objectives of closure projects and determine what biological threshold(s) will trigger protection rather than destructive closure of the mine). Define biological significance and management priorities locally. Use decision tree outlined in Sherwin et al. (2009) to determine whether to base management decisions on BATS or on HABITAT.	Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
Minimize negative impacts on bats and/or other wildlife associated with closure projects.	Manage mine-closure projects to ensure the goals of the project are accomplished.	Of mines slated for closure, conduct pre-closure bat surveys to identify and protect critical bat roosts. Following site evaluations, base reclamation decisions on a balance between physical safety and the practicality of protection versus actual or potential roosting quality and the site's absolute or relative significance in the landscape. In mines where multiple uses occur throughout the year, implement activities during a time when fewer bats are in the mine and impacts will be minimized. Install bat-friendly closures (fitted with administrative closures) at mines deemed to be important bat habitat. Include adequate exclusions for destructive closures as a routine part of mine reclamation programs to minimize the risk of entombing bats in closed workings (see Sherwin et al. 2009 for further details). Conduct post-closure monitoring to evaluate whether bats are still using the mine. Organize a workshop for state & federal agency biologists on assessing mines as bat habitat.	Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis
Minimize potential risk of transferring WNS or other diseases to bats.		Follow accepted decontamination protocols for known infectious-disease risks, e.g., WNS, when conducting internal underground surveys.	
Minimize the loss of mines that have significant bat use and are scheduled for destructive closure.	Identify mitigation sites (i.e., replacement habitat).	Find existing abandoned mines or caves that will provide suitable replacement habitat and then secure them for the bats in perpetuity. Conduct research on the potential value of creating artificial subterranean roosts to enhance the availability of subterranean habitat.	
Maintain bats in active mines.		Since the impacts for many mining activities are poorly understood, use caution when continuing mining activities while large numbers of bats roost within a mine.	
Obtain critical information to guide future management efforts, rectify past management mistakes, and provide information about past successes.	Use an adaptive management framework.	Ensure that protective and/or destructive closures continue to function as designed. The integrity of closures should be monitored annually for the first 4 to 5 years, with the timing adjusted after that to meet local needs; sites with a history of human visitation, especially in regions where gate vandalism is prevalent, may require 3 to 4 visits during periods of peak public use during the first pre-closure year.	

Owyhee Uplands Section Team

An initial version of the Owyhee Uplands Section project plan was completed for the 2005 Idaho State Wildlife Action Plan (formerly Comprehensive Wildlife Conservation Strategy). The Owyhee Uplands was selected as one of 2 initial pilot sections for the 2015 Idaho State Wildlife Action Plan revision. A small working group developed an initial draft of the section plan (Miradi v. 0.12), which was then reviewed by a wider group of partners and stakeholders during a 2-day workshop held at the Idaho Department of Fish and Game Headquarters office, Boise, Idaho, in August 2014 (this input was captured in Miradi v. 0.14). That draft was then subsequently distributed for additional stakeholder input including a half-day meeting in December 2014. Since then, we have continued to work with key internal and external stakeholders and subject matter experts to improve upon the plan. Individuals, agencies, and organizations involved in this plan are listed in Table 12.1.

Table 12.1 Individuals, agencies, and organizations involved in developing this plan [a]

First name	Last name	Affiliation
Rita	Dixon* [b]	Idaho Department of Fish and Game, Headquarters
Bob	Unnasch*	The Nature Conservancy in Idaho
Jon	Beals	Idaho Governor's Office of Species Conservation
Regan	Berkley	Idaho Department of Fish and Game, Southwest Region
William R	Bosworth	Idaho Department of Fish and Game, Southwest Region
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Todd	Hopkins	Great Basin Landscape Conservation Cooperative
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First name	Last name	Affiliation
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Ann	Moser	Idaho Department of Fish and Game, Headquarters
Colleen	Moulton	Idaho Department of Fish and Game, Headquarters
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Lisa	Nutt	US Forest Service Intermountain Region
Brian	Oakey	Idaho State Department of Agriculture
Sal	Palazzolo	Idaho Department of Fish and Game, Headquarters
Dave	Pilliod	USGS Forest and Rangeland Ecosystem Science Center
Katie	Powell	US Fish and Wildlife Service
Wyatt R	Prescott	Idaho Cattle Association
Jason	Pyron	US Fish and Wildlife Service Idaho
Nick	Salafsky	Foundations of Success
Bruce	Schoeberl	Bureau of Land Management (US) Idaho
Delwyne	Trefz	Owyhee County, Natural Resources Committee Member
Joe	Weldon	Bureau of Land Management (US) Idaho
Craig	White	Idaho Department of Fish and Game, Southwest Region
Ross	Winton	Idaho Department of Fish and Game, Magic Valley Region

[a] Apologies for any inadvertent omissions.

[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

13. Snake River Basalts Section

Section Description

The Snake River Basalts Section, part of the Snake River Plain Ecoregion, is located in south central and eastern Idaho (Fig. 13.1, Fig. 13.2). Much of the section is comprised of extensive plains, isolated buttes, and block–faulted mountains. The surface is a lava plateau with a thin windblown soil layer covering it. Lava flows and basalt are prevalent throughout the area and vary in thickness from less than 30 m (100 ft.) to thousands of meters. Shield volcanoes, cinder cones, and lava ridges are common. Craters of the Moon National Monument and Preserve, Hell's Half Acre Lava Field and the Great Rift are examples of the recent volcanic features. Many of these volcanic features also create hundreds, if not thousands, of lava tubes and caves. Elevation ranges from 900 to 2,000 m (3,000 to 6,000 ft). The Snake River, Teton River, Springfield Reservoir, American Falls Reservoir, Lake Walcott, and Mud Lake are major waterbodies, and few other perennial surface waterbodies are present. Precipitation ranges from 12–30 cm (5–12 in) annually and is evenly distributed throughout the fall, winter, and spring, but is low in the summer. Precipitation during summer months is generally lost to evaporation. Average annual temperature ranges from 4–13°C (40–58°F). The growing season ranges from 60–165 days, decreasing from west to east and with elevation. Enough precipitation falls in some foothills for dry farming.

Aged basaltic canyons, Gooding, Idaho © 2015 Ross Winton

The Snake River Basalts Section provides critical breeding and stopover habitat for hundreds of thousands of migratory shorebirds and waterbirds, waterfowl, and upland birds. There are 2 National Wildlife Refuges (NWR [Minidoka and Camas NWRs]) and eight state managed wildlife areas (Chester Segment Sand Creek, Cartier, Deer Parks, Mud Lake, Market Lake, Carey Lake, Sterling, and Niagara Springs Wildlife Management Areas [WMAs]) that provide secure habitat during migration, particularly in spring. The northern end of American Falls Reservoir is also recognized as critical habitat for migrating shorebirds.

Population centers include Arco, Driggs, Dubois, Rexburg, Idaho Falls, Pocatello, Burley, Gooding, and Twin Falls, and small communities are dispersed primarily along the Snake River corridor and lesser waterways. The Snake River Basalts Section provides opportunities for outdoor recreational activities such as hunting, angling, hiking, bird watching, river rafting, and trail riding. Agriculture is important economically in the Snake River Basalts. Most land considered arable is under irrigated or dry-farm agriculture. Much of the remaining ground is grazed by livestock. Agricultural crops can provide value to wildlife but this often creates conflicts as well. Flood irrigation often acts as a surrogate for wetlands lost to development. However, sprinkler irrigation is quickly replacing the less efficient but more wildlife-friendly flood irrigation.

Wherever surface water exists in this arid environment, it is an important component of the landscape. Riparian corridors wind through arid desert creating habitat for a wide variety of obligate and semiobligate species. Riparian areas and wetlands tend to have the highest vegetation productivity within the landscape and are key habitat for foraging herbivores. There are two major impoundments on the Snake River (American Falls and Lake Walcott), two lesser impoundments in Idaho Falls and four more outside the section but that control water that passes through the system (Henrys Lake, Island Park Reservoir, Jackson Lake, Palisades Reservoir). Significant groundwater pumping from the Snake River Aquifer occurs and has caused concern for water users in the Twin Falls area. Aquifer recharge has become a significant issue and will impose greater influence in the future. The cottonwood forests that exist along the Snake and Teton Rivers are highly valued as habitat for a wide number of wildlife species, including the recently federally listed Yellow-billed Cuckoo (*Coccyzus americanus*). These forests are most valuable when left intact with multiple layers of vegetation.

The Snake River Basalts Section contains significant Priority and Important Greater Sage-Grouse (hereinafter, Sage-Grouse, *Centrocercus urophasianus*) habitat. Much of this habitat is reasonably intact but large wildfires continue to reduce habitat quantity and quality. In some areas, the habitat is being altered by invasion of nonnative annuals, especially cheatgrass (*Bromus tectorum*) which can change fire regimes. In other areas, increased intensity and frequency of wildfires has resulted in conversion from shrub-dominated habitats to nonnative annual grasslands which has reduced habitat value to shrubsteppe obligate species. Conversion of rangeland habitat to cultivars of a perennial nonnative grass, crested wheatgrass (*Agropyron cristatum*), has resulted in reduced habitat value for shrubsteppe obligate species across many thousands of acres within the Snake River Basalts. Crested wheatgrass has proven difficult to remove once established and is competitive enough to thwart establishment of native species.

The Bureau of Land Management has established three Areas of Critical Environmental Concern (ACEC) within the Snake River Basalts. They are: Snake River, North Menan Butte, and Nine Mile Knoll/St. Anthony Sand Dunes. US Department of the Interior (DOI), Bureau of Land Management (BLM), Idaho State Office BLM Manual 1613, dated 9/29/1988, describes ACEC as: "ACEC designations highlight areas where special management attention is needed to protect, and prevent irreparable damage to, important historic, cultural, and scenic values, fish, or wildlife resources or other natural systems or processes; or to protect human life and safety from natural hazards. The ACEC designation indicates to the public that the BLM recognizes that an area has significant values and has established special management measures to protect those values. In addition, designation also serves as a reminder that significant value(s) or resource(s) exist which must be accommodated when future management actions and land use proposals are considered near or within an ACEC." There are also 4 BLM Resource Natural Areas (RNA) within the Snake River Basalts (St. Anthony Sand Dunes, North Menan Butte, Reid Canal Island, and China Cup Butte RNAs).

A major player in the Snake River Basalts is the Idaho National Laboratory (INL) run by the Department of Energy. At 890 square miles (569,135 acres), the INL is one quarter the size of Yellowstone National Park and almost the size of Rhode Island and is 6.48% of the total area of this section. It is a restricted-access facility with many thousands of acres of sage-steppe habitat. Facilities are concentrated in a few areas and roads are the only major developments on much of the INL. The INL completed a Candidate Conservation Agreement for Sage-Grouse with the US Fish and Wildlife Service (FWS) in 2014. This agreement outlines steps the INL will take to reduce impacts to Sage-Grouse and improve habitat. The INL is also involved in research on bats and big game species, among others.

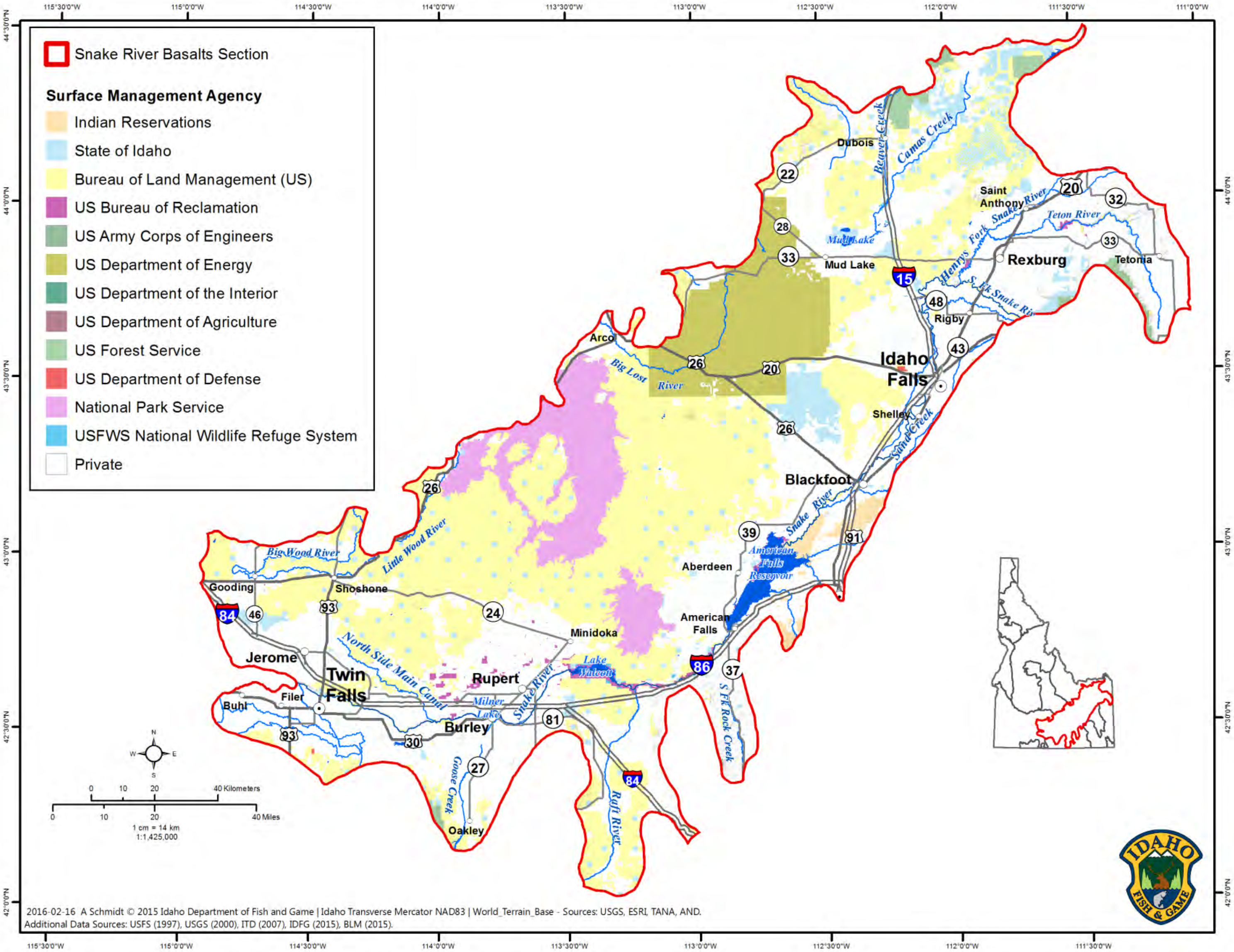


Fig. 13.1 Map of Snake River Basalts surface management

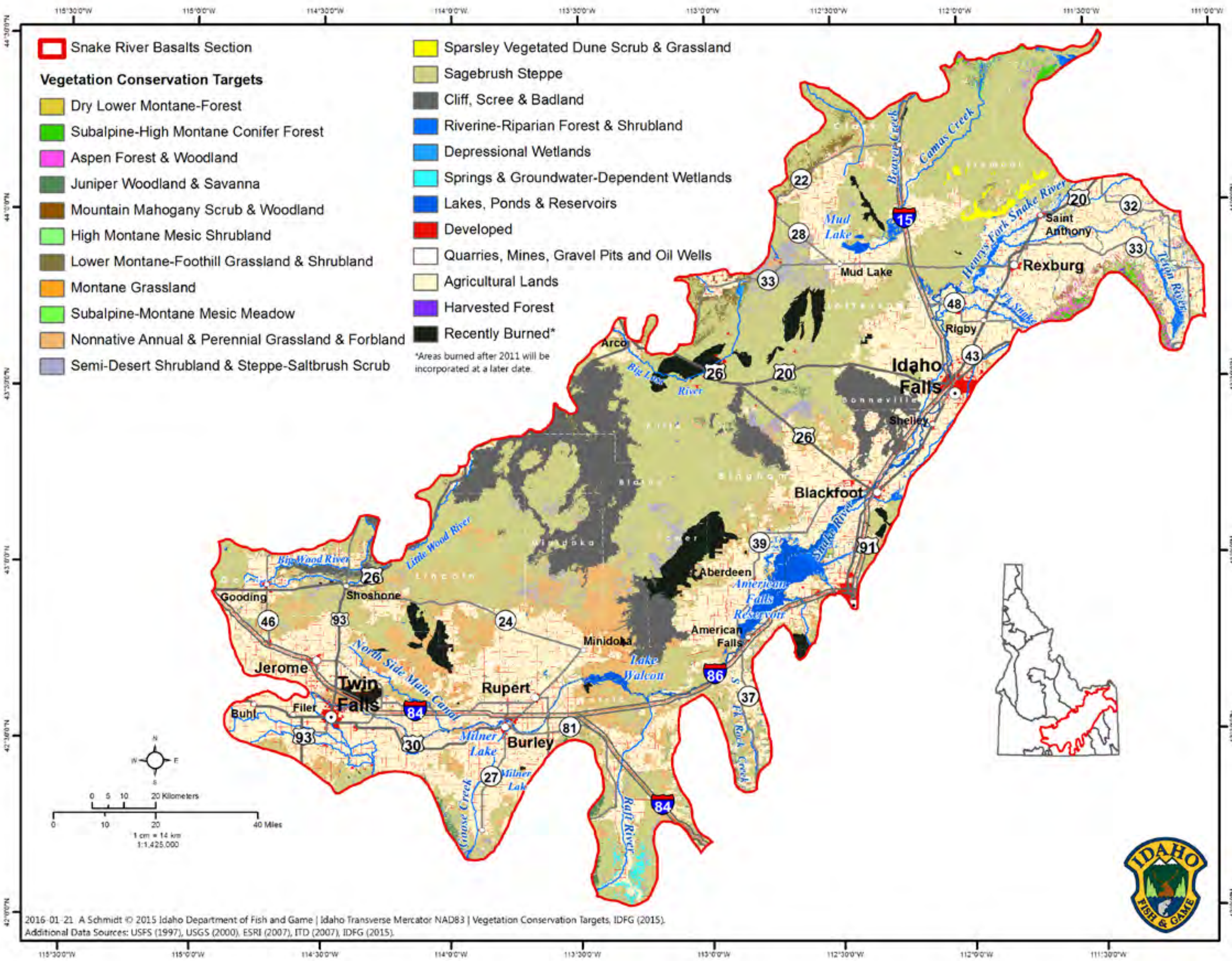


Fig. 13.2 Map of Snake River Basalt vegetation conservation targets

Conservation Targets in the Snake River Basalts

We selected nine habitat targets (four terrestrial and five aquatic or semi-aquatic) that represent the major ecosystems in the Snake River Basalts as shown in Table 13.1. Each of these systems provides habitat for key species of greatest conservation need (SGCN), i.e., “nested targets” (Table 13.2) associated with each target. All SGCN management programs in the Snake River Basalts have a nexus with habitat management programs. We provide a high-level summary of current viability status for each target. Conservation of the habitat targets listed below should conserve most of the nested species within them.

Table 13.1 At-a-glance table of conservation targets in the Snake River Basalts

Target	Target description	Target viability	Nested targets (SGCN)	
Sagebrush Steppe	Sagebrush-steppe systems occur at all elevations across the Snake River Basalts. It is important to maintain a mosaic of sagebrush in different seral stages. The sagebrush-steppe target also includes native perennial grass and forb species associated with sagebrush communities.	*Fair*. Habitat is intact and in good ecological condition in some areas, but in others, particularly those dominated by invasive annual grasslands with an altered fire regime, they are in fair to poor condition.	*Tier 1*	Greater Sage-Grouse Morrison’s Bumble Bee
			Tier 2	Pygmy Rabbit Hoary Bat Ferruginous Hawk Golden Eagle Burrowing Owl Long-billed Curlew Sharp-tailed Grouse Sagebrush Sparrow Sage Thrasher Idaho Point-headed Grasshopper A Metallic Wood-boring Beetle (*Chrysobothris idahoensis*)
			Tier 3	Western Small-footed Myotis Townsend's Big-eared Bat Little Brown Myotis Grasshopper Sparrow Common Nighthawk Short-eared Owl A Metallic Wood-boring Beetle (*Agrilus pubifrons*) Hunt’s Bumble Bee Monarch A Mason Bee (*Hoplitis producta subgracilis*) A Long-horned Beetle (*Judolia gaurotoides*) Spur-throated Grasshopper (*Melanoplus*) Species Group
Managed Perennial Grasslands	This target includes Conservation Reserve Program (CRP) and other public and privately managed grasslands. CRP lands have been	*Good*. Currently, the maximum acres allowed by law are enrolled in these two programs. Many thousands of acres are in	*Tier 1*	Greater Sage-Grouse
			Tier 2	Sharp-tailed Grouse Burrowing Owl Ferruginous Hawk Long-billed Curlew Golden Eagle

Target	Target description	Target viability	Nested targets (SGCN)	
	converted from arable land into mixed native and nonnative perennial grasses and forbs as well as native shrubs under the CRP. This umbrella program also includes the State Acres for Wildlife program (SAFE). CRP occurs most extensively at lower elevations and is typically in close association with shrub–steppe habitats.	rhizomatous grass cover and habitat values would improve significantly through conversion to a mix of more wildlife-friendly species.	*Tier 3*	Grasshopper Sparrow Common Nighthawk Sandhill Crane Short-eared Owl
Sparsely Vegetated Dune Scrub & Grassland	Sparsely Vegetated Dune Scrub & Grassland systems that includes the St. Anthony Dunes, Dietrich Dunes, Walcott Dunes, and other unnamed scattered dune complexes in the section.	*Fair.* Large areas dominated by cheatgrass and other invasive perennial and annuals plant species.	*Tier 2*	An Ant-like Flower Beetle (*Amblyderus owyhee*) A Miner Bee (*Calliopsis barri*) Idaho Dunes Tiger Beetle
			Tier 3	A Leafcutting Bee (*Ashmeadiella sculleni*) Wiest's Primrose Sphinx
Riverine–Riparian Forest & Shrubland	Rivers and streams, including aquatic habitats and their associated terrestrial riparian habitats. Includes the Main Snake, Henrys Fork, South Fork, and Teton rivers as well as the lower reaches of the Big Wood River.	*Fair* to *Good.* Many riverine systems are still mostly intact. Riparian habitats associated with riverine systems, particularly cottonwood forests, are at risk and require conservation action.	*Tier 1*	Yellow-billed Cuckoo Snake River Physa Bliss Rapids Snail
			Tier 2	Clark's Grebe Western Grebe Western Pearlshell Silver-haired Bat
			Tier 3	California Floater A Caddisfly (*Glossosoma idaho*) Western Ridged Mussel A Mayfly (*Parameletus columbiae*) Snake River Pilose Crayfish
Depressional Wetlands	Rainfed systems ranging from infrequent to semipermanent or permanently flooded. Includes playas, vernal pools, shallow marshes and meadows, and	*Fair.* Habitat area has been greatly reduced in many sites. Altered hydrologic regimes and issues with invasive weeds.	*Tier 2*	Northern Leopard Frog Western Toad Long-billed Curlew American Bittern White-faced Ibis American White Pelican Trumpeter Swan Western Grebe Black Tern Clark's Grebe

Target	Target description	Target viability	Nested targets (SGCN)	
	deep water marshes.		*Tier 3*	Franklin's Gull Sandhill Crane Monarch
Springs & Groundwater -Dependent Wetlands	Includes a subset of groundwater-dependent ecosystems such as springs and seeps, geothermal springs, alkaline-saline wetlands, and wet and mesic meadows.	*Fair* to *Good*. Habitat area has been greatly reduced in many sites.	*Tier 1*	Snake River Physa Bliss Rapids Snail
			Tier 2	Northern Leopard Frog Western Toad Black Tern White-faced Ibis Clark's Grebe Long-billed Curlew American Bittern Western Grebe Deseret Mountainsnail
			Tier 3	Franklin's Gull Sandhill Crane California Floater A Caddisfly (*Glossosoma idaho*) Western Ridged Mussel Pondsnail (*Stagnicola*) Species Group
Lakes, Ponds & Reservoirs	This ecosystem includes all irrigation/artificial ponds and natural lakes, dam-altered naturally formed lakes, and created waterbodies of all sizes that fit the lacustrine definition. Includes large reservoirs (American Falls and Mud Lake, Lake Walcott), irrigation/artificial ponds and natural lakes (Market & Mud Lakes). The greatest threat of change is the potential to heighten dams and increase storage capacity.	*Good.* Lakes and reservoirs in the Snake River Basalts are stable at this time.	*Tier 2*	Clark's Grebe Western Grebe California Gull Caspian Tern American White Pelican Trumpeter Swan White-faced Ibis
			Tier 3	Ring-billed Gull Pondsnail (*Stagnicola*) Species Group Franklin's Gull
Lava Flows, Kipukas, Caves & Tubes	Includes kipukas, caves, lava tubes, ice caves, and associated endemic plants and wildlife. Includes open woodlands within kipukas (limber	*Fair*. In theory, kipukas should be reference areas. However, invasive plant species and human uses have found their way into most	*Tier 1*	Blind Cave Leiodid Beetle
			Tier 2	A Metallic Wood-boring Beetle (*Chrysobothris horningi*) A Metallic Wood-boring Beetle (*Chrysobothris idahoensis*) A Cave Obligate Mite (*Flabellorhagidia pecki*) A Cave Obligate Millipede (*Idagona*

Target	Target description	Target viability	Nested targets (SGCN)	
	pines, juniper, Douglas-fir in older lava flows).	kipukas. The location of many caves and lava tubes is not public knowledge and thus they may be reasonably safe from disturbance.		*westcotti*) A Cave Obligate Harvestman (*Speleomaster lexi*) A Cave Obligate Harvestman (*Speleomaster pecki*)
			Tier 3	Western Small-footed Myotis Townsend's Big-eared Bat Little Brown Myotis A Yellow-masked Bee (*Hylaeus lunicraterius*)

Table 13.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Snake River Basalts

Taxon	Conservation targets: Sagebrush Steppe	Mixed Perennial Grasslands	Sparsely Vegetated Dune Scrub & Grassland	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Lava Flows, Kipukas, Caves & Tubes
AMPHIBIANS								
Western Toad (*Anaxyrus boreas*)[2]					X	X		
Northern Leopard Frog (*Lithobates pipiens*)[2]					X	X		
BIRDS								
Trumpeter Swan (*Cygnus buccinator*)[2]					X		X	
Greater Sage-Grouse (*Centrocercus urophasianus*)[1]	X	X						
Sharp-tailed Grouse (*Tympanuchus phasianellus*)[2]	X	X						
Western Grebe (*Aechmophorus occidentalis*)[2]				X	X	X	X	
Clark's Grebe (*Aechmophorus clarkii*)[2]				X	X	X	X	
American White Pelican (*Pelecanus erythrorhynchos*)[2]					X		X	
American Bittern (*Botaurus lentiginosus*)[2]					X	X		
White-faced Ibis (*Plegadis chihi*)[2]					X	X	X	
Ferruginous Hawk (*Buteo regalis*)[2]	X	X						
Golden Eagle (*Aquila chrysaetos*)[2]	X	X						
Sandhill Crane (*Grus canadensis*)[3]		X			X	X		
Long-billed Curlew (*Numenius americanus*)[2]	X	X			X	X		
Franklin's Gull (*Leucophaeus pipixcan*)[3]					X	X	X	
Ring-billed Gull (*Larus delawarensis*)[3]							X	
California Gull (*Larus californicus*)[2]							X	
Caspian Tern (*Hydroprogne caspia*)[2]							X	
Black Tern (*Chlidonias niger*)[2]					X	X		
Yellow-billed Cuckoo (*Coccyzus americanus*)[1]				X				
Burrowing Owl (*Athene cunicularia*)[2]	X	X						
Short-eared Owl (*Asio flammeus*)[3]	X	X						
Common Nighthawk (*Chordeiles minor*)[3]	X	X						
Sage Thrasher (*Oreoscoptes montanus*)[2]	X							
Sagebrush Sparrow (*Artemisiospiza nevadensis*)[2]	X							
Grasshopper Sparrow (*Ammodramus savannarum*)[3]	X	X						
MAMMALS								
Pygmy Rabbit (*Brachylagus idahoensis*)[2]	X							
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]	X							X

Taxon	Conservation targets							
	Sagebrush Steppe	Mixed Perennial Grasslands	Sparsely Vegetated Dune Scrub & Grassland	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Lava Flows, Kipukas, Caves & Tubes
Silver-haired Bat (*Lasionycteris noctivagans*)[2]				X				
Hoary Bat (*Lasiurus cinereus*)[2]	X							
Western Small-footed Myotis (*Myotis ciliolabrum*)[3]	X							X
Little Brown Myotis (*Myotis lucifugus*)[3]	X							X
ARACHNIDS								
A Cave Obligate Harvestman (*Speleomaster lexi*)[2]								X
A Cave Obligate Harvestman (*Speleomaster pecki*)[2]								X
A Cave Obligate Mite (*Flabellorhagidia pecki*)[2]								X
BIVALVES								
Western Pearlshell (*Margaritifera falcata*)[2]				X				
California Floater (*Anodonta californiensis*)[3]				X		X		
Western Ridged Mussel (*Gonidea angulata*)[3]				X		X		
AQUATIC GASTROPODS								
Pondsnail (*Stagnicola*) Species Group[3]						X	X	
Snake River Physa (*Physa natricina*)[1]				X		X		
Bliss Rapids Snail (*Taylorconcha serpenticola*)[1]				X		X		
TERRESTRIAL GASTROPODS								
Deseret Mountainsnail (*Oreohelix peripherica*)[2]						X		
MILLIPEDES								
Idaho Lava Tube Millipede (*Idagona westcotti*)[2]								X
INSECTS								
An Ant-like Flower Beetle (*Amblyderus owyhee*)[2]			X					
A Metallic Wood-boring Beetle (*Agrilus pubifrons*)[3]	X							
A Metallic Wood-boring Beetle (*Chrysobothris horningi*)[2]								X
A Metallic Wood-boring Beetle (*Chrysobothris idahoensis*)[2]	X							X
Idaho Dunes Tiger Beetle (*Cicindela arenicola*)[2]			X					
A Long-horned Beetle (*Judolia gaurotoides*)[3]	X							
Blind Cave Leiodid Beetle (*Glacicavicola bathyscioides*)[1]								X
A Mayfly (*Parameletus columbiae*)[3]				X				
A Miner Bee (*Calliopsis barri*)[2]			X					
Hunt's Bumble Bee (*Bombus huntii*)[3]	X							
Morrison's Bumble Bee (*Bombus morrisoni*)[1]	X							

Taxon	Conservation targets: Sagebrush Steppe	Mixed Perennial Grasslands	Sparsely Vegetated Dune Scrub & Grassland	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Springs & Groundwater-Dependent Wetlands	Lakes, Ponds & Reservoirs	Lava Flows, Kipukas, Caves & Tubes
A Yellow-masked Bee (*Hylaeus lunicraterius*)[3]								X
A Leafcutting Bee (*Ashmeadiella sculleni*)[3]			X					
A Mason Bee (*Hoplitis producta subgracilis*)[3]	X							
Monarch (*Danaus plexippus*)[3]	X				X			
Wiest's Primrose Sphinx (*Euproserpinus wiesti*)[3]			X					
Idaho Point-headed Grasshopper (*Acrolophitus pulchellus*)[2]	X							
Spur-throated Grasshopper (*Melanoplus*) Species Group[3]	X							
A Caddisfly (*Glossosoma idaho*)[3]				X		X		
CRUSTACEANS								
Snake River Pilose Crayfish (*Pacifastacus connectens*)[3]				X				

Target: Sagebrush Steppe

Sagebrush Steppe is among the largest targets on the landscape and one of the highest conservation priorities for the Snake River Basalts section. Sagebrush spans a wide variety of plant communities and as a habitat it is diverse. In the Snake River Basalts, not all landscapes having sagebrush face the same management priorities or have the same conservation value or management needs. Variation in stand structural characteristics, vegetation composition, and disturbance regimes shapes the suitability and habitat value of various landscapes, which, in turn, drives habitat management priorities for different regions. Although resource management programs affecting wildlife habitat within sagebrush steppe are currently dominated by considerations for Sage-Grouse populations, many other species are reliant on sagebrush-steppe habitat. Some areas have minimal to no value for Sage-Grouse management but are important for other high-priority species or species assemblages such as the Long-billed Curlew (*Numenius americanus*), Common Nighthawk (*Chordeiles minor*), and several Coleopteran and Hymenopteran insect species.

Most of the sagebrush steppe in the Snake River Basalts lies within the Idaho Desert and Idaho Southern Greater Sage-Grouse conservation areas (see Fig. 2-14, Idaho and Southwestern Montana Greater Sage-Grouse Approved RMP Amendment, hereafter Idaho and Southwestern Montana GRSG ARMPA; BLM 2015), but also extends into significant portions of the Idaho West Owyhee Greater Sage-Grouse Conservation Area; the entire area includes a mix of designated Priority (PHMA), Important (IHMA), and General (GHMA) Greater Sage-Grouse Habitat Management Areas (see Fig. 13.3), as developed by the State and federal land management agencies (see Attachment 1, Fig. 2-1; BLM 2015).

Sagebrush-steppe habitat in the Snake River Basalts Section, Indian Creek, Idaho © 2004 Mark Fleming

The largest area of sagebrush steppe in the Snake River Basalts is often called the Big Desert and encompasses the INL, non-lava portions of Craters of the Moon National Monument and Preserve, and surrounding areas north and west of the Snake River. The Big Desert sagebrush community is described as an intermixing of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and Great Basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) mixed with several shrub species including green rabbitbrush (*Chrysothamnus viscidiflorus*). Habitats found at the base of the Big and Little Lost River drainages also possess a mosaic of other sporadically occurring shrubs such as shadscale saltbush (*Atriplex confertifolia*) and winterfat (*Krascheninnikovia lanata*). The herbaceous stratum of this plant community is typically sparse to moderate in terms of cover. Species composition of native grasses may be quite variable from one stand to another; however, bottlebrush squirreltail (*Elymus elymoides*), Sandberg bluegrass (*Poa secunda*), streambank wheatgrass (*Elymus lanceolatus*), and Indian ricegrass (*Achnatherum hymenoides*) are among the most abundant grass species. Forbs present on more diverse sites may include: Hood's phlox (*Phlox hoodii*), *Chenopodium* spp., *Eriogonum* spp., and western tansymustard (*Descurainia pinnata*). Cover from nonnative species ranges from absent to moderate, the most abundant of which are cheatgrass, crested wheatgrass, and desert alyssum (*Alyssum desertorum*)(Shive et al. 2011).

Within the Snake River Basalts, the Sand Creek Desert makes up a good portion of the northeastern part of the section and encompasses most of the lowland desert sagebrush habitats north and west of the Henrys Fork. Moser and Murphy (2015) describe two dominant plant communities in the Sand Creek Desert, basin big sagebrush or mountain big sagebrush, with basin big sagebrush tending to co-dominate in areas of deeper sand. Where found, bitterbrush/needle and thread communities are often associated basin big sagebrush. Rocky Mountain juniper (*Juniperus scopulorum*) and taller shrubs, such as chokecherry (*Prunus virginiana*), are also common in areas with less consolidated sandy substrates. Common native perennials include needle and thread, western wheatgrass (*Pascopyrum smithii*), Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass, and Parsnipflower buckwheat (*Eriogonum heracleoides*). Soils are excessively well drained, with fine Aeolian deposited sands atop basaltic bedrock. In addition to being botanically diverse, the Sand Creek Desert also provides important winter range for a wide variety of wildlife species in the Greater Yellowstone Ecosystem.

The Raft River and Rockland valleys are associated with the Snake River Basalts Section and are surrounded by higher elevation habitats included in the Northwest Basin and Range Section. The lowland habitats in these two valleys are dominated by Wyoming/Great Basin big sagebrush greasewood complex. Vegetation cover of this community type consists of the shrub community of Great Basin big sagebrush, Wyoming big sagebrush, green rabbitbrush, greasewood (*Sarcobatus vermiculatus*), and scattered juniper (*Juniperus osteosperma*) trees (BLM 2010). The understory is a sparse mix of both native and nonnative grasses and forbs. Common grasses include Sandberg bluegrass, squirreltail, Indian ricegrass, Great Basin wild rye (*Elymus cinereus*), crested wheatgrass, and cheatgrass. Common forbs include halogeton (*Halogeton glomeratus*), Hood's phlox, and globemallow (*Sphaeralcea ambigua*). Much of the ground is bare or consists of cryptogrammic soils or rock (BLM 2010). Sage- and Sharp-tailed Grouse lek and raise broods in the lowland areas of both river valleys. Pygmy rabbits (*Brachylagus idahoensis*) are also known to occur in areas dominated with mature stands of sagebrush and having suitable soil substrates.

Target Viability

Fair. Sagebrush steppe condition varies across the section from poor to very good. Habitat in areas dominated by cheatgrass are highly susceptible to wildfire and are generally in poor condition. Habitats within the Big Desert east of Craters of the Moon National Monument and Preserve and on the INL site are made up of a mosaic of successional stages as a result of fire but in general are intact and relatively healthy. Likewise, Sand Creek Desert sagebrush steppe is in relatively good condition and there remain large pockets of mature intact Basin and Wyoming Big Sage communities. Wildfire and the introduction and spread of invasive weeds that perpetuate increased fire cycle are the greatest threat to sagebrush-steppe habitats in the Snake River Basalts Section. Historically, livestock grazing was heavy in the most xeric habitat types, and in combination with extensive fire in some locations has led to degraded habitat quality and low native species presence.

Spotlight Species of Greatest Conservation Need: Short-eared Owl

Within the Snake River Basalts, Short-eared Owls (*Asio flammeus*) are associated with open landscapes such as marshes, grasslands, shrubsteppe, and agricultural lands (e.g., pastures, stubble fields, and hayfields). Breeding habitats typically support sufficient vegetation (primarily grasses and forbs) to provide ground-nesting and roosting cover and are in close proximity to productive and open hunting areas with abundant supplies of small mammals. Short-eared Owl feeds almost exclusively on small mammals with voles (*Microtus* spp.) making up the bulk of its diet. Miller et al. (*In Review*) estimated 3,046 adults in Idaho during the breeding season in 2015, with a significant percentage of those birds being located in the Snake River Basalts and Owyhee Uplands sections. This species' nomadic lifestyle makes assessing population status difficult. All available data suggest significant declines throughout its range. BBS data in particular suggest a decline in the western BBS region and Idaho from 1966–2013 (−1.8% and −2.7% per year, respectively) and 2003–2013 (−1.4% and −3%, respectively) and as such they have been identified as a common bird in steep decline (NABCI 2014). However, there are deficiencies in the data sets used to calculate these estimates (primarily low sample size and extremely low relative abundance for this species since they are only sporadically detected using standard BBS protocols). Conservation of this species is closely tied to the restoration of shrubsteppe habitats in concert with Greater Sage-Grouse conservation activities. It is also a high priority to continue to work with the Pacific Flyway Council's Nongame Technical Committee and partners to develop a coordinated monitoring project that will be used to target habitat conservation for this species.

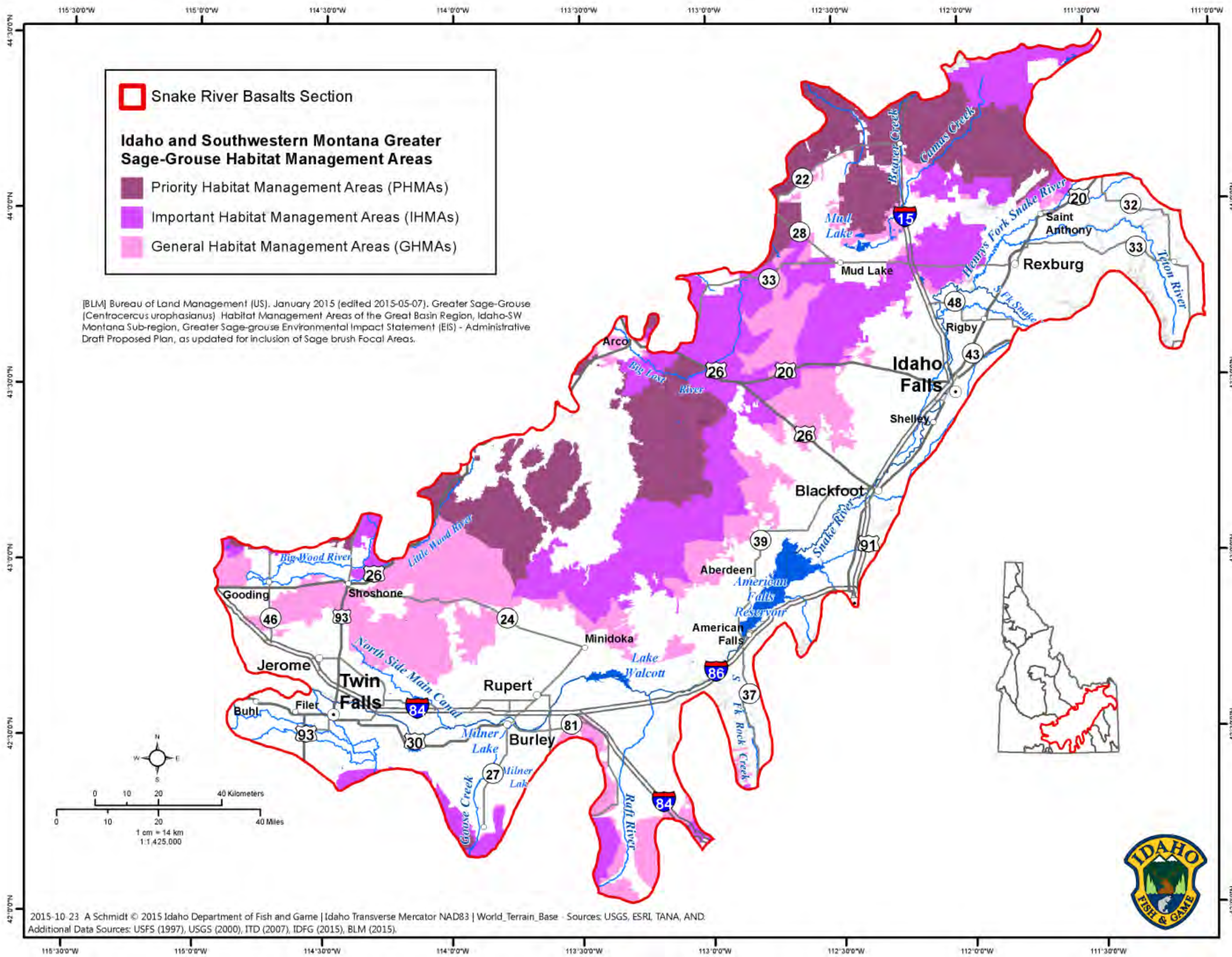


Fig. 13.3 Idaho and Southwestern Montana Greater Sage-Grouse Habitat Management Areas

Prioritized Threats and Strategies for Sagebrush Steppe

Very High rated threats to Sagebrush Steppe in the Snake River Basalts

Increased frequency & intensity of wildfire

The increased frequency and severity of wildfire is considered a primary threat to the sagebrush-steppe ecosystem and to the many sagebrush-steppe species that depend on it, including Sage-Grouse (Otter 2012, US Fish and Wildlife Service 2014). The accelerated invasion of nonnative annual grasses—in particular cheatgrass and medusahead—and the spread of juniper into the sagebrush-steppe ecosystem (coupled with the effects of intensified drought and climate change), create conditions that lead to larger, more intense rangeland fires across the Great Basin (DOI 2015).

Objective	Strategy	Action(s)	Target SGCNs
Manage wildfires to minimize loss of sagebrush habitat.	Improve fire suppression protocols and resource allocations to limit habitat losses to wildfire.	Support development and implementation of Rangeland Fire Protection Associations (RFPAs) (e.g., Idaho Code § 38-104B and Governor's Executive Order 2015-04) (Otter 2015). During high fire danger conditions, stage initial attack and secure additional resources closer to priority areas, with particular consideration of the West Owyhee, Southern, and Desert Conservation Areas to ensure quicker response times in or near Sage-Grouse habitat (BLM 2015). Create and maintain effective fuel breaks to modify fire behavior and increase fire suppression effectiveness based on criteria outlined in the Governor's Alternative (Otter 2012).	Greater Sage-Grouse Short-eared Owl Sage Thrasher Sagebrush Sparrow
Work with researchers to develop new techniques for annual grass weed control.	Engage with and explore the effectiveness of new soil bacteria as a biocontrol for invasive annual grasses.	Support and collaborate with researchers at the University of Idaho to gauge the effectiveness of soil bacteria and other new treatments for cheatgrass and other invasive annual grasses.	Greater Sage-Grouse Long-billed Curlew Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow
Develop more aggressive strategies to reduce fuel loads (Otter 2012).	Improve targeting of fuels reduction opportunities and implementation (DOI 2015).	Explore opportunities to provide support to livestock grazing permittees and private landowners to implement fuel treatment actions as part of strategic, landscape efforts (DOI 2015). Work with livestock producers to implement fuel treatments on their lands and allotments (DOI 2015). Implement aggressive and targeted application of both proven techniques and the rapid investigation and	Greater Sage-Grouse Sage Thrasher Sagebrush Sparrow

Objective	Strategy	Action(s)	Target SGCNs
		implementation of new practices to control cheatgrass and mitigate habitat impacts from unwanted rangeland fire (DOI 2015).	
Increase post-fire restoration success (DOI 2015).	Expand the use of native seeds and seedlings to accelerate efforts to improve and restore post-fire rangeland health (DOI 2015).	Collect native seed for use in developing commercial seed and for long-term seed banking to ensure conservation of germ plasm to promote climate resilience and long-term rangeland health (DOI 2015). Coordinate and collaborate across agencies on climate trend data as it relates to seeds (DOI 2015). Increase seed production and the grow-out of genetically appropriate native plant species for the restoration (DOI 2015). Limit the use of nonnative species (e.g., to achieve site stabilization, wildfire breaks, or invasive plant control) to transitional, noninvasive species, replaced by natives in subsequent ecological restoration or during natural successional processes (DOI 2015).	Greater Sage-Grouse Short-eared Owl Sage Thrasher Sagebrush Sparrow
Commit to multiyear investments in restoration (DOI 2015).	Support long-term strategies for the restoration of sagebrush-steppe ecosystems, including consistent long-term monitoring protocols and adaptive management for restored areas (DOI 2015).	Map hot spots of restoration activity or investment to help identify trends and opportunities for greater efficiency and leveraging of funds (DOI 2015). Support a cross-jurisdictional consortium of agencies, organizations and partners dedicated to implementation of restoration, monitoring, and adaptive management activities (DOI 2015).	Greater Sage-Grouse Short-eared Owl Sage Thrasher Sagebrush Sparrow
Maintain intact sagebrush stands to limit fragmentation and minimize direct habitat loss.	Protect Wyoming big sagebrush from destruction by wildfire.	Suppress wildfires in Sage-Grouse habitat, commensurate with threatened and endangered species habitat or other critical habitats to be protected (BLM 2015). Develop fuel breaks in areas dominated by invasive annual grasses adjacent to Wyoming big sagebrush stands.	Greater Sage-Grouse Western Small-footed Myotis Little Brown Myotis Townsend's Big-eared Bat Hoary Bat

Noxious weeds & invasive annual grasses

Invasive species are considered a primary threat to Sage-Grouse in Idaho in the Governor's Alternative (Otter 2012) and a primary threat to shrubsteppe habitats by the US Fish and Wildlife Service (2014). The State of Idaho has developed *The Idaho Invasive Species Strategic Plan*

2012–2016 ([ISDA] Idaho State Department of Agriculture 2012). In addition, the accelerated invasion of nonnative annual grasses—in particular cheatgrass and medusahead—is one of the primary drivers of larger, more intense rangeland fires across the Great Basin and directly threatens the habitat of Sage-Grouse and other sagebrush-steppe dependent wildlife (DOI 2015). In the Snake River Basalts, noxious weeds and invasive annual grasses (e.g., cheatgrass) have colonized many of the sagebrush habitat types. In addition, species such as knapweed crowd out native grasses and most forbs.

Objective	Strategy	Action(s)	Target SGCNs
Limit introduction of new weeds into areas where they do not occur.	Improve weed management tools and techniques. Aggressively manage nonnative undesirable plant species.	Implement *The Idaho Invasive Species Strategic Plan 2012–2016* ([ISDA] Idaho State Department of Agriculture 2012). Develop integrated weed management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Develop large-scale application of integrated weed management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Support the use of Plateau® herbicide in controlling cheatgrass. Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006). Target areas that contain cheatgrass and other invasive or noxious species to minimize competition and favor establishment of desired species (BLM 2015). Support the development of a framework for a national invasive species Early Detection and Rapid Response (EDRR) program (DOI 2015).	Greater Sage-Grouse Monarch

High rated threats to Sagebrush Steppe in the Snake River Basalts

Improper livestock grazing management

In the context of this plan, "improper" is defined as grazing beyond the capacity of the resource in either direction (e.g., overuse such as along riparian areas that need protection; i.e., there needs to be seasonal adjustments). Negative impacts of grazing are typically associated with persistent heavy grazing. In the Governor's Alternative (Otter 2012), improper livestock grazing management is considered a secondary threat with monitoring and management actions tailored accordingly.

Livestock grazing can affect wildlife habitat in many ways (Krausman et al. 2009). For example, livestock grazing can change habitat features that directly influence birds by reducing plant species diversity and biomass (Reynolds and Trost 1981, Bock and Webb 1984, Saab et al. 1995). Alternatively, changes in water and nutrient cycling caused by grazing can promote the spread of invasive species, which then degrade native bird habitats by altering fire and disturbance regimes (Rotenberry 1998). Sagebrush systems are particularly sensitive to grazing disturbance (Mack and Thompson 1982).

In the Snake River Basalts, factors that contribute to this problem include the lack of Allotment Management Plans (AMPs), insufficient funds for federal land management agency oversight, and insufficient monitoring (i.e., lack of appropriate rangeland health assessment monitoring data gathered annually on a consistent basis to support trend analysis). Consequently, some management decisions are compromised by a lack of appropriate data.

Objective	Strategy	Action(s)	Target SGCNs
Manage livestock to maintain rangeland health and habitat quality (Otter 2012).	Manage the timing, intensity, duration, and frequency of grazing practices to manipulate vegetative condition (Otter 2012).	Prioritize permit renewals and land health assessments for allotments with declining Sage-Grouse populations (Otter 2012). Inform affected permittees and landowners regarding Sage-Grouse habitat needs and conservation measures (Idaho Sage-grouse Advisory Committee 2006). Incorporate GRSG Seasonal Habitat Objectives (Table 2-2 in BLM 2015) into relevant resource management plans and projects. Use the Sage-Grouse Habitat Assessment Framework (Stiver et al. 2015) with an appropriate sampling design to conduct fine-scale habitat assessments to inform grazing management. Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter 2012).	Greater Sage-Grouse Long-billed Curlew Monarch
	Maintain MOU between ISDA and BLM as it pertains to grazing management.	Involve permittees in providing monitoring information, the interpretation of monitoring data, and providing input into grazing management adjustments to meet the goals and objectives of federal land management agencies and the permittees (Sanders 2006).	
Assess the impacts (both negative and, potentially, positive) of livestock grazing on sagebrush-steppe obligate passerines (Rotenberry 1998).	Design experiments involving a variety of alternative grazing treatments (including no grazing at all) across the spectrum of	Implement grazing alternatives based on project outcome. Conduct experiments over multiple years (Rotenberry 1998). Work with the University of Idaho to consider adding a sagebrush-obligate passerine component to its long-term study of the impacts of spring grazing on Sage-Grouse.	Sage Thrasher Sagebrush Sparrow

Objective	Strategy	Action(s)	Target SGCNs
	major shrubsteppe habitat (Rotenberry 1998).		
Maintain or enhance wildlife values on working ranches.	Develop partnerships that help keep sustainable grazing the prevailing land use (Krausman et al. 2009).	Work with NRCS and local Soil and Water Conservation Districts to provide technical assistance to private landowner/grazers and collaborate on habitat improvement projects to improve private lands for wildlife. Work with local Soil and Water Conservation Districts to get fish, wildlife, and habitat priorities incorporated into District priorities.	Greater Sage-Grouse Long-billed Curlew
Support the continued responsible use of federal lands for grazing to maintain open spaces and important habitat conditions (e.g., year-round water sources) that benefit wildlife (WGA Policy Resolution 2015-03).	Implement Western Governors' Association (WGA) policy for public lands grazing (for details, see WGA Policy Resolution 2015-03).	Use sound, science-based management decisions for federal lands and base these decisions upon flexible policies that take into account local ecological conditions and state planning decisions.	Greater Sage-Grouse Long-billed Curlew
Create range status assessments to determine preseason range readiness.	Implement large-scale experimental activities to remove cheatgrass and other invasive annual grasses through various tools (DOI 2015).	Support the development of a framework for a national invasive species EDRR program (DOI 2105). Locate and coordinate installation of long-term studies and subsequent monitoring to test the efficacy of large-scale application of integrated pest management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015). Support the use of Plateau® herbicide in controlling cheatgrass. Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006).	Greater Sage-Grouse

Species designation, planning & monitoring

We have an inadequate understanding of the current population status of several Hymenopteran (*Bombus huntii*, *Bombus morrisoni*, *Hoplitis producta subgracilis*), Coleopteran (*Agrilus pubifrons*, *Chrysobothris idahoensis*, *Judolia gaurotoides*), and Orthopteran (*Acrolophitus pulchellus*) insect species associated with sagebrush steppe in the Snake River Basalts. The status of their populations and their life histories have not been fully documented or updated. To better understand these species and their habitat needs, surveys of historic sites are needed to determine occupancy and also provide a template for other potentially suitable habitat to survey to add to the knowledge of their distribution.

Objective	**Strategy**	**Action(s)**	**Target SGCNs**
Determine the status of the historic populations of several sagebrush-associated SGCN species.	Conduct surveys throughout the section, prioritized by SGCN tier and specific microhabitat association.	Conduct yellow pan trap and sweep surveys for *Agrilus pubifrons*, *Bombus huntii*, *Bombus morrisoni*, *Chrysobothris idahoensis*, *Hoplitis producta subgracilis*. Conduct surveys for *Acrolophitus pulchellus* in suitable habitats in the Little and Big Lost drainages. Attempt to survey for *Judolia gaurotoides* using Lindgren Funnels, purple sticky traps and flower sweeps. Assess collection records for these species in nondigitized regional collections. Examine the distribution of *Melanoplus* and assess species distribution and interspecies relatedness. Examine the distribution and habitat use of bat species associated with sagebrush steppe.	*Acrolophitus pulchellus* *Agrilus pubifrons* *Bombus huntii* *Bombus morrisoni* *Chrysobothris idahoensis* *Hoplitis producta subgracilis* *Judolia gaurotoides* Monarch *Melanoplus* Species Group Western Small-footed Myotis Little Brown Myotis Townsend's Big-eared Bat Hoary Bat

Target: Managed Perennial Grasslands

Sharp-tailed Grouse on CRP in the Rockland Valley, Idaho, 2010 IDFG

CRP and SAFE are working lands conservation programs administered by the US Department of Agriculture (USDA) Farm Service Agency (FSA), which convert eligible croplands to permanent vegetation. In Idaho, these programs converted predominantly dryland wheat land to a mixture of perennial grasses and forbs. Both programs are limited and administered on a county basis. CRP acres are limited in each county to 20% of the arable land. Within the Snake River Basalts, only one county has reached maximum acres enrolled as of 2015. There are currently (as of 2015)168,760 acres enrolled in CRP within the Snake River Basalts, of which 59,308 acres are considered high quality (CRP-SAFE: native grass mix, forb heavy mix, pollinator mix).

The Federal Farm Bill must be reauthorized every five years by Congress. The 2014 Farm Bill required a 39% reduction in CRP from the 2002 limit to 9.7 million hectares (24 million acres) nationwide by 2017. Hoffman and Thomas (2007) suggest the possible loss of CRP lands is the single most important immediate threat to Sharp-tailed grouse (STG; *Tympanuchus phasianellus columbianus*) in Idaho and across the subspecies' range (Excerpt, Idaho Department of Fish and Game 2015).

Target Viability

Good. The Managed Perennial Grasslands habitat target is in "Good" condition across the section based on 3 Key Ecological Attributes: Abundance and patch size of CRP and SAFE stands, vegetative condition of the stands, and presence of desired indicator species. Power County has reached its maximum allowed acres under CRP but this county is split between the Overthrust Mountains and the Snake River Basalts. A decline in the acreages within the section in Power County may not necessarily result in a negative net impact to the target SGCN if those acres were merely moved to another county. In that case, the benefits of the target habitat are still available to the SGCNs. Loss of acres within these counties due to Federal cuts would negatively impact the target SGCNs. Cassia and Twin Falls counties are a large presence in the section but have a much greater portion of their arable land under irrigation. Because this increases the monetary value of that land, much less of it is enrolled in CRP and SAFE. There is little likelihood that will ever change. The current number of acres enrolled is rated as "Good." The average block size of CRP within the section is 22 hectares (55 acres) which is considered "Fair." Weed control is required as part of the CRP contract so invasive species are not a significant problem. Because of this regulatory control, invasive plant species are rated as in "Good" condition. Increased emphasis on native species (grasses, forbs and shrubs) is improving the value of the stands for wildlife and has been rated as "Fair." Finally, the presence of Sharp-tailed Grouse is being evaluated and will be rated when data are analyzed. The future of the program will be dependent on renewal of the Federal Farm Bill.

Spotlight Species of Greatest Conservation Need: Sharp-tailed Grouse

The Sharp-tailed Grouse is one of seven subspecies (one extinct) of Sharp-tailed Grouse in North America (Connelly et al. 1998). Of the six extant subspecies of Sharp-tailed Grouse, the CSTG has experienced the greatest decline in distribution and abundance (Hamerstrom and Hamerstrom 1961, Miller and Graul 1980). CSTG have been petitioned twice (1995 and 2004) for listing under the Endangered Species Act. Under both petitions, the finding was CSTG were not warranted (US Department of the Interior 2000, 2006). Idaho supports ~60-65% of the remaining CSTG in the United States (Hoffman and Thomas 2007).

CSTG appear to have benefitted more from CRP than any other prairie grouse (Rodgers and Hoffman 2005) and are closely linked to the success of the CRP and SAFE programs (Mallett 2000). Since its inception in 1985, CRP has provided many thousand acres of nesting and brood-rearing habitat on private lands in Idaho, resulting in an apparent increase in CSTG populations (Excerpt, Idaho Department of Fish and Game 2015).

Prioritized Threats and Strategies for Managed Perennial Grasslands

High rated threats to Managed Perennial Grasslands in the Snake River Basalts

Changes in precipitation patterns

Intensified drought and climate change are drivers in creating conditions that lead to larger, more intense and more frequent wildfires. Fire is often used as a tool for improving CRP and SAFE fields. Fire removes excessive vegetation and stimulates growth. However, some fields have been enrolled long enough that sagebrush is encroaching with an appropriate understory. With SAFE contracts, shrub establishment is a component of the restoration plan and wildfire would be detrimental to program objectives. In these instances, wildfire can reverse an appropriate habitat trend. In addition, reduced precipitation degrades the condition of the current CRP plantings, thereby reducing the habitat value, and reduces the likelihood of successful new seedings.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the chance of wildfire affecting CRP and SAFE fields.	Develop appropriate fire suppression plans.	Work with NRCS, private landowners, and neighboring Federal land managers to reduce vulnerability of CRP acres to wildfire.	Greater Sage-Grouse Sharp-tailed Grouse

Conversion of CRP & SAFE acreage when withdrawn from programs

Although there have been recent general enrollment opportunities, the total number of CRP acres in Idaho has declined. This is because high grain prices have encouraged producers to remove acres from the program, and the 2008 and 2014 Congressional reductions in the number of acres that could be enrolled. SAFE acres have helped to mitigate the loss of CRP acres. Although CRP and SAFE efforts have enhanced habitat for grouse and other SGCNs, they are not permanent solutions. CRP and SAFE contracts are active for 10 years and a landowner has the option to buy-out of their contract earlier with a penalty. Often these acres are converted back to agricultural production or rangeland after they are withdrawn which reduces the habitat value for wildlife. The Natural Resource Conservation Service (NRCS) is exploring options to use their conservation programs to preserve the benefits of CRP and SAFE after the contracts expire. This effort would strive to keep expired CRP and SAFE lands in a grass-based system. To date, success has been limited due to high agricultural commodity prices and incentives within the commodity title of the Farm Bill to put expired land back into agricultural production (Excerpt, Idaho Department of Fish and Game 2015).

Objective	Strategy	Action(s)	Target SGCNs
Reduce the number of acres being withdrawn from CRP and SAFE.	Support legislation to renew CRP in future Farm Bills.	Work with NRCS, FSA, and the Idaho Congressional delegation to ensure renewal (and expansion) of CRP.	Greater Sage-Grouse Sharp-tailed Grouse Grasshopper Sparrow
	Support legislation that provides a financial incentive to stay in the programs.	Work with NRCS, FSA, and the Idaho Congressional delegation to ensure that CRP and SAFE payments are high enough to entice landowners to keep their land in the programs.	

Objective	Strategy	Action(s)	Target SGCNs
	Support legislation that establishes contracts longer than 10 years.		
Influence the land use of acres removed from CRP and SAFE so that wildlife values are protected.	Provide financial incentives to leave acres in perennial grasses. Develop alternative uses for retired CRP and SAFE acres that benefit wildlife.	Work with FSA and other agencies and organizations to develop cost-share programs and alternative uses for acres no longer in CRP. Work with FSA and NRCS to develop and promote land uses that provide income for landowners and habitat value for wildlife.	Greater Sage-Grouse Sharp-tailed Grouse Grasshopper Sparrow

Target: Sparsely Vegetated Dune Scrub & Grassland

This target includes sparsely vegetated dune and grassland systems including the St. Anthony Dunes, Walcott Dunes, Deitrich Dunes, and other unnamed scattered dune complexes in the section. The landscape around these complexes is made up of a mix of cultivated lands and sagebrush steppe or annual grass-dominated uplands. Dunes create habitats not found anywhere else in Idaho and are occupied by several endemic invertebrates.

Early to mid-seral sand dune habitat in the Snake River Basalts. Walcott Dunes, Idaho © 2014 Ross Winton

Target Viability

Fair. Dune habitat condition is fair. This area has large areas dominated by cheatgrass and other invasive annuals. Nevertheless, the presence of unique sand dune habitat make this an important biodiverse area. In recent decades there has been substantial loss of sand-dominated habitats in the Snake River Basalts Section, with much of the remaining habitat being dominated by invasive plants.

Spotlight Species of Greatest Conservation Need: Idaho Dunes Tiger Beetle

Idaho Dunes Tiger Beetle (*Cicindela arenicola*) is found in intact early and mid-seral sand-dominated habitats in south-central and eastern Idaho. Habitat suitability is affected by nonnative vegetation encroachment (e.g., cheatgrass, prickly Russian thistle [*Kali tragus*], and tall tumblemustard [*Sisymbrium altissimum* L.] and nonnative grasses [*Agropyron cristatum* and *Agropyron fragile*]) (Anderson 1992, Bauer 1996, Bosworth et al. 2010) and changing precipitation patterns crucial to spring emergence and reproduction. This species of ground beetle is a sand-obligate species that requires healthy early-seral dune habitats and open sand. Habitat loss is a significant threat to the persistence of the species and efforts to reestablish stabilized dunes and protect currently open early seral habitat should be a priority.

Prioritized Threats and Strategies for Sparsely Vegetated Dune Scrub & Grassland

Very High rated threats to Sparsely Vegetated Dune Scrub & Grassland in the Snake River Basalts

Invasive plant species

Mitigating the loss of unstabilized sand-dominated habitat as a result of invasive plant species is the highest priority for this target. Vegetation encroachment and succession, while a natural process, is increased in systems becoming over-colonized by invasive species. Idaho Dunes Tiger Beetle, An Ant-like Flower Beetle (*Amblyderus owyhee*), Wiest's Primrose Sphinx, and a wide variety of other sand-associated fauna are dependent on early to mid-successional habitats with active moving sand. The effects of encroaching invasive weeds on Idaho sand-associated species has been well documented for several decades.

Objective	Strategy	Action(s)	Target SGCNs
Remove invasive weeds from early and mid-seral habitats and reduce spread from adjacent areas.	Test the effectiveness of best available annual-grass-mitigating actions.	Conduct trials using prescribed fire, Imazapic (a selective herbicide), and when released, annual grass biopesticides.	Idaho Dunes Tiger Beetle An Ant-like Flower Beetle (*Amblyderus Owyhee*) Wiest's Primrose Sphinx Moth
Determine potential impacts of cheatgrass treatment herbicides on tiger beetle viability.	Where appropriate, assess the exposure to herbicides and evaluate potential impacts on beetle populations.	Conduct bioassays of intended treatment herbicides on endemic invertebrates occupying sand-dominated systems in southern Idaho.	Idaho Dunes Tiger Beetle

High rated threats to Sparsely Vegetated Dune Scrub & Grassland in the Snake River Basalts

Introduction, maintenance & spread of crested wheatgrass

Many historic sand-dominated habitats have been seeded over in recent decades either through intentional means (Idaho State Conservation Effort 1996) or as a part of reseeding efforts after wildlife where dunes habitat and sagebrush steppe are often indistinguishable. This practice has been documented primarily in south-central Idaho in an attempt to convert dune systems into agricultural lands. Care should be taken when reseeding with nonnative perennial species as sand-dominated systems can become permanently stabilized and habitat can be directly or indirectly lost through the source sand on which they depend. In some cases, the fires that cause significant losses to sagebrush-steppe habitats actually encourage the reestablishment of dormant dune systems.

Objective	Strategy	Action(s)	Target SGCNs
Develop restoration strategies that identify sand-dominated habitats in fire prone areas and ensure that they are not permanently stabilized.	Identify sand-dominated sites, e.g., those in Makela 1994.	Incorporate sand-dominated habitats into fire restoration strategies in southern Idaho, and attempt to retain them on the landscape. Develop a list of suitable native species for reseeding that would not significantly alter sand systems, such as Indian ricegrass or yellow wildrye (*Leymus flavescens* [Scribn. & J.G. Sm.] Pilg.).	Idaho Dunes Tiger Beetle

Species designation, planning & monitoring

We have an inadequate understanding of the current population status of Idaho Dunes Tiger Beetle. Regular status assessments of occupied and recently-colonized habitats are important as the effectiveness of management actions continues to be evaluated. Likewise, the status of the populations of Wiest's Primrose Sphinx Moth, An Ant-like Flower Beetle (*Amblyderus owyhee*), A Miner Bee (*Calliopsis barri*), and A Leafcutting Bee (*Ashmeadiella sculleni*) and their life histories have not been fully documented or updated. To better understand these species and their habitat needs, surveys of historic sites are needed.

Objective	Strategy	Action(s)	Target SGCNs
Monitor the status of Idaho Dunes Tiger Beetle populations.	Conduct regular monitoring of occupied, historic, and potentially recent colonization sites at St. Anthony, Dietrich Dunes, Walcott Dunes, and other suitable and historic localities.	Conduct a population survey of adults and larvae at all historic, current, and potential sites every 2–3 years to determine status and effectiveness of treatments when and where they are conducted. Explore the potential for translocation of gravid or recently-emerged adults from core habitat areas to locations where extirpation has occurred.	Idaho Dunes Tiger Beetle
Determine the status of the historic populations of several sand-associated	Conduct surveys in Lincoln, Jerome, Minidoka, Power, Blaine, Butte, Bingham, Bonneville,	Conduct light-trap surveys in the summer to survey for *Amblyderus owyhee*. Conduct yellow pan trap and sweep surveys for *Calliopsis barri*, and *Ashmeadiella sculleni*. Conduct night evening primrose surveys for *Euproserpinus wiesti* attendance. Assess	*Amblyderus owyhee* Wiest's Primrose Sphinx Moth *Calliopsis barri* *Ashmeadiella*

Objective	Strategy	Action(s)	Target SGCNs
SGCN species.	Jefferson, Madison, Freemont, and Clark counties.	collection records for these species in nondigitized regional collections.	*sculleni*

Target: Riverine–Riparian Forest & Shrubland

Riverine wetlands occur in river and stream channels, their floodplains, and riparian vegetation influenced by stream channel hydrology (Brinson et al. 1995). The inclusion of riparian habitat in this definition of "riverine" is broader than that of Cowardin et al. (1979), which only includes wetlands found within the channel. The dominant water sources in Riverine–Riparian Forest & Shrubland are overbank flooding from the channel and subsurface shallow water table connections between the stream channel and wetlands (i.e., hyporheic zone) (Brinson et al. 1995). Other water sources include overland runoff from adjacent uplands, tributaries, and precipitation. Flow may be perennial, perennial but interrupted (e.g., alternating between surface flow emanating in channel bottom upwellings and subsurface flow), or ephemeral/intermittent (flowing only temporarily in response to seasonal runoff but sometimes leaving isolated pools after flow subsides). Surface flows are complex seasonally and in multiple directions (e.g., down valley, out of the channel into the floodplain, and return from floodplain back into the channel). Water also moves laterally in the shallow groundwater table between the channel and riparian zones, as well as out of the system through infiltration into deep groundwater (i.e., a "losing" stream). At their headwaters, riverine wetlands are often replaced by slope wetlands (e.g., seeps and springs), or where topographical contours become closed, depressional, or lacustrine wetlands. Dams may create depressional or lacustrine wetlands that interrupt a riverine wetland corridor. The lack of stream channel and floodplain morphology and/or lack of floodplain connectivity to a stream channel (either overbank or subsurface) are good indicators of a change in wetland type.

Little Wood River north of Richland, Idaho © 2014 Ross Winton

The Snake River Basalts Riverine–Riparian Forest & Shrubland target is dominated by the Snake River system which runs the length of the ecoregion and is comprised of: the South Fork, Henrys Fork, and Main Snake River. Most other rivers and streams are tributaries to this main artery. The most important tributaries are: Teton River, Big Wood River, Little Wood River, and Raft River. Camas Creek flows into a closed basin. Within the Snake River Basalts, the Henrys Fork begins north of Chester, Idaho and extends to the confluence with the South Fork near Menan, Idaho. The Henrys Fork has significant riparian/wetland areas associated with numerous sloughs along its length. Two WMAs, Chester Segment of Sand Creek WMA and Cartier WMA, protect some of these resources, and BLM owns significant property along the river including some of the larger islands. Farming and rural housing developments occur to river's edge in many places. There are three irrigation diversions and one irrigation/hydropower diversion. Teton River joins the Henrys Fork just west of Sugar City, Idaho. Teton Regional Land Trust has been active in conserving lands within the Chester area. Much of the river bank in that area is under conservation easement to preclude further development.

The upper Teton River includes Teton Basin from Driggs, Idaho north and west. This section of the river is slow with meandering oxbows. It is mostly private, but again, the Teton Regional Land Trust has been active in this area with conservation easements and restoration projects to conserve and restore this river stretch. The Teton River flows through a canyon section of largely public property beginning several miles north of Highway 33. Beginning downstream of Bitch Creek, the river is heavily impacted both instream and on adjacent sidehills, by the flooding and failure of Teton Dam in 1975. Sediment slumping and rockslides from the hillsides have altered river function by creating new rapids and broad shallow pools. This is most obvious at the dam site. Recovery has been slow and full recovery isn't expected without intervention. Below the dam, the river runs through 100% private land. It is farmed to river's edge in many locations, but rural housing developments are few. Both the Teton River and the Henrys Fork are subject to flooding during wet years. Recharge of adjacent wetlands, channel movement, and other ecological functions occur at these times. Because of the low gradient of these rivers, the floodplain is extensive.

The South Fork of the Snake River flows 66 miles (11 miles of which are in the Snake River Basalts Section) across eastern Idaho from the outlet of the Palisades Reservoir to the confluence with the Henrys Fork River near Rexburg, Idaho. The South Fork Snake supports the largest cottonwood riparian forest left in the western United States (BLM 2010). Common plant community types on established flood plains along the South Fork include narrowleaf cottonwood/red osier dogwood (*Populus angustifolia/Cornus sericea*), narrowleaf cottonwood/silverberry (*P. angustifolia/Elaeagnus commutata*), and narrowleaf cottonwood/goldenaster (*P. angustifolia/ Heterotheca villosa*). Wetter, more recently disturbed riparian sites, are frequently represented by the presence of narrowleaf cottonwood seedlings/saplings, reed canarygrass (*Phalaris arundinacea*) water birch (*Betula occidentalis*), sandbar willow (*Salix exigua*), and yellow willow (*Salix eriocephala*). On drier sites, particularly outside of the levy along the lower South Fork Snake (below Heise), Rocky Mountain juniper, Canada goldenrod (*Solidago canadensis*), skunkbush sumac (*Rhus tilobata*), and licorice root (*Glycyrrhiza lepidota*) are common understory components (Merigliano 1996).

The Deer Parks area of the Main Snake River lies just downstream from the confluence of the Henrys Fork and the South Fork Snake rivers. Forested riparian habitat of the Deer Parks area of the Main Snake River has similar plant species composition to that found along the South Fork Snake. However, large monotypic stands of sandbar willow are common and the forest patches are generally less extensive. Land ownership along the Deer Parks reach of the Snake River is primarily BLM with scattered private parcels. From Roberts to Idaho Falls, the cottonwood and riparian forests along the Main Snake are almost completely absent, reduced to a narrow band at water's edge. Scattered islands, some private, some owned by BLM, provide remnant habitat. However, these are often highly disturbed sites. Farmed fields extend to the banks of the river and subdivisions are expanding along the banks. There are two irrigation diversions and two hydropower diversions in this reach.

Between Idaho Falls and Blackfoot, the Main Snake River flows largely through private lands. Much of the river is farmed or grazed to high water's edge. Between Firth and Blackfoot, there are increasing acres of cottonwood riparian forest, some owned by BLM but mostly privately owned. Remnant cottonwood forests are highly fragmented and disturbed and several are platted for subdivisions. Numerous residences have been built within the 50-100 year flood plain and the river is highly constrained to its present location.

Interior forested riparian communities along the Main Snake River from Blackfoot, Idaho to American Falls Reservoir are characterized by a narrowleaf cottonwood overstory with scattered box elder (*Acer negundo*). The forest mid-story is variably comprised of Russian olive (*Elaeagnus angustifolia*), Rocky Mountain juniper, and willow species. Common understory shrubs include skunkbush, gooseberry (*Ribes* spp.), and snowberry (*Symphoricarpos* spp.). Plant communities along the river banks are variably comprised of narrowleaf cottonwood, willow, and scattered red-osier dogwood. Dominant herbaceous vegetation at drier riparian sites includes western wheatgrass with patches of cheatgrass, rush (*Juncos* spp.), and licorice root. Herbaceous vegetation at wetter sites consists of quackgrass (*Agropyron repens*), timothy (*Phleum* spp.), Kentucky bluegrass (*Poa pratensis*), scattered sedge (*Carex* spp.) and rush, and various mesic forbs (BLM 2009).

Below American Falls Dam, the river changes dramatically. The riparian area is a narrow band as the river moves through rangeland and farm fields. Cottonwood forests are absent, although they existed historically, and basalt constrains the river in places. Minidoka NWR is part of this river reach and offers protection for wildlife species. From Milner Dam to Hansen Bridge, the Main Snake River runs through private land. Even the islands in this stretch are privately owned. This section is the beginning of a deepening canyon stretch where agriculture is eventually confined to the rim and does not reach the river. During the irrigation season, over half of the water is diverted at Milner Dam for irrigation. From Hansen Bridge to Shoshone Falls, there is significant BLM property and the river remains constrained in basalts. Twin Falls Hydropower project is in this section, further changing hydrology. Shoshone Falls is a major landmark and historic obstacle to fish dispersal upstream and has often been used as a dividing line between western and eastern species within the Great Basin.

Target Viability

Fair to *Good.* Within the Snake River Basalts, the Snake River system is impounded by four major dams that significantly change the hydrograph (Island Park, Palisades, American Falls, and Lake Walcott). Numerous smaller dams, largely for irrigation diversion or hydropower generation, also form impediments to water flow and animal movements. There may be hundreds of irrigation diversions between Palisades and Island Park reservoirs and Twin Falls near the western edge of the ecoregion.

Riparian habitats associated with riverine systems, particularly cottonwood forests, are at risk and require conservation action. Long-term viability is questionable because flood control projects have changed the hydrograph. Riparian areas seldom receive flows high enough to cause the scouring needed to expose bare mineral soil for cottonwood regeneration. Constrained flows also reduce the ability of the rivers to develop natural channels.

Spotlight Species of Greatest Conservation Need: Yellow-billed Cuckoo

In Idaho, Yellow-billed Cuckoo occurs most frequently in low-elevation cottonwood forests (Groves et al. 1997a, Taylor 2000, Idaho CDC 2005) with thick willow dominated understories (Laymon et al. 1993). Sites with 80 ha or greater of intact mature cottonwood forest are highly likely to be occupied by this species (Laymon 1998). Sites with flowing water also increase the likelihood of occupancy because of an increase in prey base and cooler temperatures, which provide optimal conditions for nesting (Johnson 2014). Invasive species and other factors that cause a degradation of habitat are major threats to Yellow-billed Cuckoo (Saab 1999, Johnson 2013). The South Fork and mainstem of the Snake River comprise stronghold habitat for the federally listed, western distinct population segment of Yellow-billed Cuckoo (Reynolds and Hinckley 2005).

Spotlight Species of Greatest Conservation Need: Snake River Physa

This aquatic snail is endemic to Idaho, occurring in a limited reach of the middle Snake River. The historic range is thought to extend from the Hagerman reach to Grandview. Recent investigations have shown this species to occur outside of this historic range to as far downstream as Ontario, Oregon and as far upstream as Minidoka Dam. Fewer than 50 individuals are thought to have been collected from the Snake River (US Fish and Wildlife Service 1995). No live individuals have been found in recent years and the current status of populations is unknown. It occupies swift currents on a variety of substrates, but little is known of its biology or true distribution in the Snake River.

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

High rated threats to Riverine–Riparian Forest & Shrubland in the Snake River Basalts

Dams & water diversions

Flooding and the associated scouring and sediment changes are critical for many river systems. Flooding recharges riverside wetlands, creates favorable seedbeds for some species, and redistributes fine and coarse materials. High flows also establish new channels, create oxbows, and keep low gradient rivers moving within their floodplain. Dams and water diversions change the hydrograph of a river. Periods of flooding may be shortened or stopped completely.

Discharges from dams can come at unusual times and can be restricted during critical periods for wildlife. Rivers are no longer allowed to move within their floodplains.

Objective	Strategy	Action(s)	Target SGCNs
Improve recharge to the rivers and associated wetlands.	Support aquifer recharge.	Actively participate in efforts to increase appropriate aquifer recharge efforts that will benefit fish and wildlife resources.	Yellow-billed Cuckoo Snake River Physa Bliss Rapid Snail California Floater A Caddisfly (*Glossoma idaho*) Silver-haired Bat Western Ridged Mussel A Mayfly (*Parameletus columbia*) Western Pearlshell Snake River Pilose Crayfish
Improve compliance with water use.	Idaho Department of Water Resources (IDWR) and water masters evaluate adjudication and enforce rules.	Encourage water masters to resolve conflicts quickly.	Yellow-billed Cuckoo Snake River Physa Bliss Rapid Snail California Floater A Caddisfly (*Glossoma idaho*) Silver-haired Bat Western Ridged Mussel A Mayfly (*Parameletus columbiae*) Western Pearlshell Snake River Pilose Crayfish
Improve hydrograph to better mimic natural variation.	Work with Bureau of Reclamation (BOR) to find ways to reshape flows.	Maintain appropriate winter flows to minimize impacts to aquatic species. Build in periods of high flows annually to mimic spring runoff. Seek opportunities to create flows that can periodically mimic a 25-year event.	Yellow-billed Cuckoo Snake River Physa Bliss Rapid Snail California Floater A Caddisfly (*Glossoma idaho*) Silver-haired Bat Western Ridged Mussel A Mayfly (*Parameletus columbiae*) Western Pearlshell Snake River Pilose Crayfish
Reduce the trend in cottonwood forest loss.	Work with landowners to protect remaining cottonwood forest.	Support efforts to use LWCF funds to acquire an interest in cottonwood forest areas. Educate landowners/managers about the values of cottonwood forests and work with landowners to restore cottonwood forests when possible. Work with county Planning and Zoning to discourage subdivision development within floodplains and particularly within cottonwood forests.	Yellow-billed Cuckoo Silver-haired Bat

Improper livestock grazing

Livestock seek out wetlands for forage and for shade. When livestock grazing is uncontrolled, livestock use within the riparian/wetland areas may become excessive. Too much vegetation may be removed or trampled, undercut banks may collapse, sediment increases, and the water course shallows. As a result, water temperatures increase, sometimes dramatically.

Objective	Strategy	Action(s)	Target SGCNs
Improve wetland habitats impacted by grazing.	Control livestock grazing in sensitive riparian areas.	Create exclusion fencing along aquatic areas.	Yellow-billed Cuckoo Snake River Physa Bliss Rapid Snail California Floater A Caddisfly (*Glossoma idaho*) Silver-haired Bat Western Ridged Mussel A Mayfly (*Parameletus columbiae*) Western Pearlshell Snake River Pilose Crayfish
	Encourage livestock managers to take proactive steps to reduce the amount of time livestock spend in riparian areas.	Encourage salting at least ¼ mile away from riparian/wetland areas where possible.	Yellow-billed Cuckoo Snake River Physa Bliss Rapid Snail California Floater A Caddisfly (*Glossoma idaho*) Silver-haired Bat Western Ridged Mussel A Mayfly (*Parameletus columbiae*) Western Pearlshell Snake River Pilose Crayfish
Improve riparian vegetation.	Reduce livestock use of woody plants.	Encourage managers to restrict riparian use during the autumn months when livestock are more likely to browse on shrubs.	Yellow-billed Cuckoo Silver-haired Bat Western Grebe Clark's Grebe

Rural housing development

Rural housing development is increasing along most river corridors. Cottonwood forests are particularly attractive for development. Development not only fragments habitat but also impacts floodplain functions. Once development occurs, flood control in several forms is required to protect the infrastructure. Cottonwood forests and associated riparian/wetland areas can be expected to decline and eventually disappear with continued development.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the trend in cottonwood forest loss.	Work with landowners to protect remaining cottonwood forest.	Support efforts to use LWCF funds to acquire an interest in cottonwood forest areas. Educate landowners/managers about the values of cottonwood forests. Work with landowners to restore cottonwood forests when possible. Work with county Planning and Zoning to	Yellow-billed Cuckoo Silver-haired Bat

Objective	Strategy	Action(s)	Target SGCNs
		discourage subdivision development within floodplains and particularly within cottonwood forests. Work with Land Trusts to protect relatively intact areas. Work with landowners to reduce fragmentation impacts from vehicles and noxious weeds.	
Restore riverbanks to native vegetation.	Work with private landowners to restore select areas.	Work with NRCS to develop/promote incentives and programs to restore riverine habitats.	Yellow-billed Cuckoo Silver-haired Bat Clark's Grebe Western Grebe

Groundwater withdrawal for agricultural & urban use

In recent decades, agricultural irrigation practices have been transitioning from traditional surface water diversion and transport to direct on-site groundwater pumping. In certain parts of the Snake River Basalts, this over-utilization of water withdrawn from the aquifer has led to a lowering of the water table which has caused many streams, and in some cases rivers, to lower significantly or disappear altogether. In addition, wells removing water for large urban areas also lowers the water table and causes normally standing water to more rapidly percolate through underlying substrates.

Objective	Strategy	Action(s)	Target SGCNs
Find alternative water use techniques that minimize water consumption while allowing more water to persist in rivers and streams.	Work with land and water managers to identify opportunities for increasing the availability or decreasing utilization of water resources.	Work with partners and agencies to encourage aquifer recharge to revitalize ground water resources. Reduce use and increase regulation of ground water resources.	Yellow-billed Cuckoo
Work with IDWR to determine criteria that establish suitable periods for recharge.	Create a balance between winter/ spring high flows and the need to maintain water in rivers and streams for wildlife year-round.	Recharge aquifer during periods of excess while not taxing aquatic systems during sensitive periods.	Yellow-billed Cuckoo Snake River Physa Bliss Rapid Snail California Floater A Caddisfly (Glossoma idaho) Silver-haired Bat Western Ridged Mussel A Mayfly (*Parameletus columbiae*) Western Pearlshell Snake River Pilose Crayfish

Target: Depressional Wetlands

Vernal pools, playas, old oxbows, or meanders that are disconnected from river floodplains (often supporting swamp forests or emergent marshes), and many constructed wetlands (with emergent marsh and aquatic bed habitats) are common examples of Depressional Wetlands. Elevation contours are closed, thus allowing the accumulation of surface water from adjacent uplands. The direction of flow is normally from the surrounding uplands toward the center of the depressional wetland. Dominant hydrodynamics are seasonal vertical fluctuations. Depressional Wetlands lose water through intermittent or perennial drainage from an outlet, by evapotranspiration, or infiltration to ground water.

Emergent marshes, typically supporting tall plants such as broadleaf cattail (*Typha latifolia L.*) and hardstem bulrush (*Schoenoplectus acutus* [Muhl. ex Bigelow] Á. Löve & D. Löve), occur throughout the Snake River Basalts and are important for breeding and migratory waterbirds, as well as amphibians. They most frequently occur in agricultural and urban landscapes where they occupy created and managed wetlands and pond fringes. Examples include wildlife habitat wetlands on Idaho Department of Fish and Game (IDFG) WMAs (Mud Lake and Market Lake WMAs) and Camas NWR, gravel mine ponds, urban landscape and rural farm ponds, reservoir fringes, and irrigation and storm-water detention and treatment wetlands. Accumulated water as a result of agricultural practices such as flood-irrigation and low-lying flooded portions of fields are also important depressional features in the Snake River Basalts due to their importance for migrating and breeding waterbirds.

Camas National Wildlife Refuge wetland marshes. Camas NWR, Idaho © 2006 Colleen Moulton

In the Snake River Basalts, shallow open water areas in emergent marshes and on the fringes of reservoirs or ponds support beds of submerged and floating aquatic vegetation, which are important food sources for migratory waterfowl. Emergent marshes with seasonal drawdown periods, such as at the many managed marshes, often have mudflats, which are important for shorebirds. Playas also occur in closed topographic depressions such as craters and intermixed among tube and other lava features. Playas are intermittently and unpredictably flooded and typically have alkaline water and evaporative salt deposits (though not always). These playas offer important resting and feeding stations for migratory waterfowl, shorebirds, and wading birds. Locations in the northern portions of the Big Desert (e.g., Big Lake) possess intermittently flooded playas and large alkali flats primarily within the boundaries of the INL site.

Target Viability

Fair. Habitat area has been greatly reduced in many sites. Altered hydrologic regimes and issues with invasive weeds are key threats. Changes in precipitation patterns have also reduced the seasonal presence of standing water in vernal pools and playas.

Spotlight Species of Greatest Conservation Need: White-faced Ibis

There are 6 colonies of White-faced Ibis (*Plegadis chihi*) in Idaho, and two of the largest colonies are located at Market and Mud Lake WMAs. This species requires deep wetland bulrush (*Scirpus* L.) marshes for breeding and shallowly-flooded habitat for foraging, which includes both natural wetlands and flood-irrigated agricultural fields. Loss of flood-irrigated habitats within 20 km of White-faced Ibis breeding colonies threatens the viability of Ibis. Fluctuating water levels in reservoirs is also a significant issue for White-faced Ibis and several other waterbirds species. Historically, White-faced Ibis and other water birds foraged in naturally occurring wetlands, floodplains, and wet meadows. Flood irrigation agriculture closely mimics the historic cycle of spring over-bank flooding of wet meadows in which these birds depend on to forage. Work in the Snake River Basalts Section indicates that White-faced Ibis in particular are highly reliant upon these flood-irrigated habitats (Moulton et al. 2013). However, since 1995, surface-irrigated habitats in the Intermountain West have declined by 23% (123,000 acres/year) while sprinkler-irrigated acres have increased. Currently, there is adequate nesting habitat to support existing or expanded ibis colonies. The limiting factor for maintaining or expanding the population is maintaining abundant foraging habitat.

Prioritized Threats and Strategies for Depressional Wetlands

High rated threats to Depressional Wetlands in the Snake River Basalts

Groundwater withdrawal for agricultural and urban use

In recent decades, agricultural irrigation practices have been transitioning from traditional surface water diversion and transport to direct on-site groundwater pumping. In certain parts of the Snake River Basalts, this overuse of water withdrawn from the aquifer has led to a lowering of the water table which has caused many depressional associated wetlands and marshes to lower or disappear altogether. In addition, wells removing water for large urban areas also lowers the water table and causes normally standing water to more rapidly percolate through underlying substrates.

Objective	Strategy	Action(s)	Target SGCNs
Maintain/restore natural wetlands in the proper functioning condition.	Work with private landowners and land managers to identify opportunities for increasing the availability of natural wetlands.	Work with partners, such as Ducks Unlimited, to identify areas within 20 km of the colonies that were historically classified as natural wetlands and have hydrologic potential for restoration. Work with Land Trusts to determine opportunities for restoration on	White-faced Ibis Sandhill Crane Franklin's Gull Monarch Northern Leopard Frog Western Toad Trumpeter Swan

Objective	Strategy	Action(s)	Target SGCNs
		private lands with high hydrologic potential for restoration.	
	Work with private landowners and managers to identify opportunities for maintaining/ restoring natural wetlands within 20 km of White-faced Ibis breeding colonies.	Work with private landowners and federal agencies to identify areas suitable for using beavers to restore wetland habitats.	

Conversion from flood-irrigated agriculture to center-pivot irrigation

Flood-irrigated agricultural lands provide valuable waterbird foraging habitat. In some areas, this habitat component is lost when traditional flood irrigation is replaced by center-pivot irrigation. However, decisions to convert to center pivot are often contingent on overriding needs to improve water-use efficiency to retain stream and river flows. Thus, these decisions involve competing interests of flooded wildlife habitat, in-stream habitat needs of aquatic species, aquifer withdrawals, and aquifer recharge.

Many flood-irrigated habitats (FIH) occur in historic wet meadow and wetland footprints of intermountain valleys and basins. These FIHs, particularly perennial pasture and hayfields in the historic floodplain, serve as surrogate wetlands that largely mimic the historic ecological function of natural flooding in the floodplain. These surrogate wetland functions are particularly manifested when diverted surface water for flood-irrigation originates from snowpack-driven rivers and streams. Although the timing and duration of surface flooding on FIHs varies widely, many reflect annual environmental variation in snowpack and streamflow conditions. The spread of surface water across FIH mimics natural hydrologic processes and contributes to important ecological functions including soil hydration, aquifer recharge, water recycling/circulation, ameliorating stream temperatures through soil saturation and discharge, and increasing persistence of hydric habitats during the growing season.

Over the past 2 decades, an alarming trend in water use conversion has occurred. Since 1995, surface-irrigated habitats in the Intermountain West have declined by 23% (123,000 acres/year) while sprinkler-irrigated acres have increased correspondingly. This conversion may reflect the direct, unidirectional loss of up to 1.85 million acres of potential wetland habitat for wildlife. Sixteen percent of those FIHs have been converted to sprinkler irrigation. Sprinkler irrigation techniques dramatically reduce the amount of standing or flowing surface water on fields, which makes them less attractive as foraging habitat for wetland birds. Aside from the direct loss of habitat to birds and other wildlife, this trend may have negative implications for watershed resiliency that affects fisheries, floodplain fragmentation, and tolerance of climatic variability. Throughout the West, the conversion to sprinkler irrigation has been incentivized through federal programs, including the USDA Farm Bill programs, for perceived water use efficiencies. However, studies have indicated that incentivizing sprinkler conversion may not provide the intended or perceived water savings, economic return, or environmental benefits. Typically, sprinkler irrigation originates as a groundwater withdrawal with virtually no groundwater return or input while flood irrigation imparts surface withdrawal resulting in a groundwater input. The latter is more representative of historical floodplain hydrologic processes.

Work in eastern Idaho indicates that White-faced Ibis in particular are highly reliant upon these flood-irrigated habitats (Moulton et al. 2013). The loss of these habitats is of highest concern within 20km of breeding colonies, as it threatens the viability of ibis in Idaho.

Objective	Strategy	Action(s)	Target SGCNs
Maintain flood-irrigated agricultural fields.	Work with the NRCS on incentives to maintain flood agriculture. Work with the NRCS on incentives to maintain flood agriculture within 20 km of White-faced Ibis breeding colonies.	Work with NRCS to develop flood irrigation initiatives through the Regional Conservation Partnership Program. Work with NRCS to develop a flood irrigation enhancement for the Conservation Stewardship Program. Work with Ducks Unlimited and other NGOs to conduct habitat projects that encourage retention of flood-irrigation agriculture. Use Habitat Improvement Program funding to leverage funds to encourage retention of flood-irrigation agriculture. Work with FWS to determine if Partners for Wildlife funding may be used to help private landowners wanting to provide flood irrigated lands for wildlife.	White-faced Ibis Monarch
Determine acreage of flood-irrigated habitat needed to sustain healthy breeding populations of White-faced Ibis and other wetland-dependent species.	Work with partners to develop a west-wide assessment of flood-irrigation needs for wildlife.	Work with Pacific Flyway Nongame Technical Committee and Western Working Group of Partners in Flight to develop and implement assessment.	White-faced Ibis Sandhill Crane Franklin's Gull Long-billed Curlew

Target: Springs & Groundwater-Dependent Wetlands

This target contains a subset of groundwater-dependent ecosystems (GDEs), specifically springs and groundwater-dependent slope wetlands (e.g., meadows, seep-fed tree- or shrub-dominated wetlands). Springs are GDEs where groundwater discharges at the ground surface, often through complex subsurface flow paths (Stevens and Meretsky 2008), including both cold and hot (geothermal) springs. Spring-dependent communities of plants and animals often exist where springs emerge. A variety of other wetland types are also dependent on groundwater-fed subsurface flows and seasonal seeps. For our purposes, GDE wetlands include fens; marshes, shrublands, and woodland swamps in sloped settings; wet and mesic meadows; and alkaline-saline wetlands. Groundwater-dependent wetlands often occur on sloping land with gradients that range from steep hillsides to nearly imperceptible slopes. Slope wetlands differ from Depressional Wetlands by the lack of closed contours. Groundwater sources can originate from either a regional aquifer or from localized infiltration of surface water (e.g., precipitation, seasonal flooding). Water flow is downslope and unidirectional. Groundwater-dependent wetlands lose water primarily by subsurface outflow, surface flows, and evapotranspiration. Groundwater-dependent wetlands may develop channels, but the channels serve only to convey water away from the groundwater-dependent wetland. Definitions are modified from US Forest Service Gen. Tech. Report WO-86a (March 2012) and Brinson et al. (1995).

In the Snake River Basalts, GDE wetlands are important and widespread. Most occurrences of GDEs are in the form of springs and seeps emanating from basalt canyon walls, talus, and toeslopes of bluffs. These include geothermal springs concentrated near Craters of the Moon National Monument and Preserve, but also occurring elsewhere (e.g., along the Snake River). Seasonally-moist sloped seeps are widely scattered throughout the section, perched on basaltic or rhyolitic bedrocks. These form isolated pockets of wet or mesic meadow vegetation within extensive sagebrush steppe and are important for a variety of wildlife, including Greater Sage-Grouse.

Market Lake wetlands and migrating waterfowl, Market Lake WMA, Idaho © 2012 Terry Thomas

Numerous high volume springs fed by the Snake River aquifer emerge from basalt walls and alcoves on the northern side of the Snake River canyon on the western border of the Snake River Basalts section. These springs are highly valued for their high water quality and unique aquatic ecosystems that support a variety of rare species. Housing development, aquaculture, and other developments, water quality impairments, groundwater pumping for irrigation, roads, and water diversion are all threats to this ecosystem.

The Snake River Basalts section supports several large groundwater-dependent wetland complexes in high desert basins, which represent several of the most important wetlands in the state. Important GDE wetlands include Camas NWR, Mud Lake and Market Lake WMAs, and Crystal Springs. They support seasonally- and shallowly-flooded sedge (Carex L. spp.) and rush (Juncus L. spp.) wet meadows and common spikerush (Eleocharis palustris [L.] Roem. & Schult.)

communities. These basins are seasonally flooded by runoff in the spring but sustained by groundwater seepage in the summer. These two characteristics make many of these locations depressional and groundwater dependent wetlands. These wetland complexes support numerous nesting waterbird species, and attract large numbers of migratory waterfowl and shorebirds.

Target Viability

Poor. Habitat area has been greatly reduced in many sites. Lowered water table leads to severely altered hydrologic regimes. These springs and wetlands are also highly susceptible to aquatic and terrestrial weed invasion. Housing development, aquaculture and other developments, water quality impairments, groundwater pumping for irrigation, and water diversion are all threats to this ecosystem.

Spotlight Species of Greatest Conservation Need: Bliss Rapids Snail

The Bliss Rapids Snail is an endemic species that inhabits springs and spring-influenced river reaches. Occupied sites are in flowing water having coarse, stable substrates and excellent water quality. Water temperatures generally range from 15 to 16 °C. This species is typically absent from areas with impoundments and major depth fluctuations, warm-water environments, whitewater, and sites dominated by aquatic macrophytes (Hershler et al. 1994, US Fish and Wildlife Service 1995). This aquatic snail is endemic to the Snake River and associated springs. Historically, this species occurred from Indian Cove Bridge to Twin Falls (Hershler et al. 1994). Populations occur in the lower reaches of the Malad River and in the Snake River between the springs above Hagerman and King Hill (W. Clarke, Idaho Power Company, pers. comm.).

Prioritized Threats and Strategies for Springs & Groundwater-Dependent Wetlands

High rated threats to Springs & Groundwater-Dependent Wetlands in the Snake River Basalts

Groundwater withdrawal for agricultural & urban use

In recent decades, agricultural irrigation practices have been transitioning from traditional surface water diversion and transport to direct on-site groundwater pumping. In certain parts of the Snake River Basalts, this over-utilization of water withdrawn from the aquifer has led to a lowering of the water table, which has caused diminished flows in many Snake River adjacent springs and lowered water levels in many GDEs in the section.

Objective	Strategy	Action(s)	Target SGCNs
Find alternative water use techniques that minimize water consumption while allowing more water to persist in the aquifer and	Work with land and water managers to identify opportunities for increasing the availability or decreasing utilization of	Work with partners and agencies to encourage aquifer recharge to revitalize ground water resources. Reduce use and increase regulation of ground water resources.	Bliss Rapids Snail Deseret Mountainsnail Northern Leopard Frog Western Toad White-faced Ibis Sandhill Crane California Floater A Caddisfly (*Glossosoma idaho*)

Objective	Strategy	Action(s)	Target SGCNs
emerge as springs or wet marshes.	water resources.		Western Ridged Mussel Franklin's Gull Pondsnail (*Stagnicola*) Species Group
Work with IDWR to determine criteria that establish suitable periods for recharge.	Create a balance between winter/ spring high flows and the need to maintain water in rivers and streams for wildlife year-round.	Recharge aquifer during periods of excess while not taxing aquatic systems during sensitive periods.	Snake River Physa Bliss Rapids Snail Deseret Mountainsnail Northern Leopard Frog Western Toad Black Tern Long-billed Curlew American Bittern White-faced Ibis Sandhill Crane California Floater A Caddisfly (*Glossosoma idaho*) Western Ridged Mussel Franklin's Gull Pondsnail (*Stagnicola*) Species Group

Improper livestock grazing

In the context of this target, "improper" is defined as grazing beyond the capacity of the resource in either direction (e.g., overuse such as along riparian areas that need protection; need for seasonal adjustments). Livestock grazing can affect wildlife habitat in many ways (Krausman et al. 2009). For example, changes in water and nutrient cycling caused by grazing can promote the spread of invasive species, which then degrade native bird habitats by altering fire and disturbance regimes (Rotenberry 1998). In the Snake River Basalts, factors that contribute to this problem include the lack of AMPs, insufficient funds for federal land management agency oversight, and insufficient monitoring (i.e., lack of appropriate rangeland health assessment monitoring data gathered annually on a consistent basis to support trend analysis). Consequently, some management decisions are compromised by a lack of appropriate data.

Objective	Strategy	Action(s)	Target SGCNs
Support the continued responsible use of federal lands for grazing to maintain open spaces and important habitat conditions (e.g., year-round water sources) that benefit wildlife (WGA Policy Resolution 2015-03).	Implement WGA policy for public lands grazing (for details, see WGA Policy Resolution 2015-03).	Use sound, science-based management decisions for federal lands and base these decisions upon flexible policies that take into account local ecological conditions and state planning decisions.	Snake River Physa Bliss Rapids Snail Deseret Mountainsnail Northern Leopard Frog Western Toad Black Tern Long-billed Curlew American Bittern White-faced Ibis Sandhill Crane California Floater A Caddisfly (*Glossosoma idaho*) Western Ridged Mussel Franklin's Gull Pondsnail (*Stagnicola*)

Objective	Strategy	Action(s)	Target SGCNs
			Species Group
Improve aquatic habitats impacted by grazing.	Control Livestock grazing in sensitive aquatic areas.	Create exclusion fencing along aquatic areas.	Snake River Physa Bliss Rapids Snail Deseret Mountainsnail Northern Leopard Frog Western Toad Black Tern Long-billed Curlew White-faced Ibis Sandhill Crane California Floater A Caddisfly (*Glossosoma idaho*) Western Ridged Mussel Franklin's Gull Pondsnail (*Stagnicola*) Species Group
	Encourage livestock managers to take proactive steps to reduce the amount of time livestock spend in Riparian areas.	Encourage salting at least ¼ mile away from riparian/wetland areas where possible. Employ riders to move livestock away from sensitive areas.	Snake River Physa Bliss Rapids Snail Deseret Mountainsnail Northern Leopard Frog Western Toad Black Tern Long-billed Curlew White-faced Ibis Sandhill Crane California Floater A Caddisfly (*Glossosoma idaho*) Western Ridged Mussel Franklin's Gull Pondsnail (*Stagnicola*) Species Group
Improve riparian vegetation.	Reduce livestock use of woody plants.	Encourage managers to restrict riparian use during the autumn months when livestock are more likely to browse on shrubs.	Snake River Physa Bliss Rapids Snail Deseret Mountainsnail Northern Leopard Frog Western Toad California Floater A Caddisfly (*Glossosoma idaho*) Western Ridged Mussel Pondsnail (*Stagnicola*) Species Group

Spring development & diversion

In recent decades, the increased need for unallocated water has led to the utilization of spring-fed water sources primarily along the Snake River. These cold and clean water sources are ideal for aquaculture in addition to being easily diverted for other agricultural purposes. Complete development and/or diversion of water from these spring sources causes a loss of habitat and in some cases loss of local endemic rare species.

Objective	Strategy	Action(s)	Target SGCNs
When spring water is allocated for use, allow for a percentage to pass diversions and maintain natural springs and the species that depend on them.	Work with land and water managers to identify opportunities for allocating water for the persistence of spring habitats and associated wildlife species.	Reduce use and increase regulation of ground water resources. Encourage a portion of water resources be allocated for wildlife, rather than overallocation to other uses.	Bliss Rapids Snail Deseret Mountainsnail Northern Leopard Frog Western Toad California Floater A Caddisfly (*Glossosoma idaho*) Western Ridged Mussel Pondsnail (*Stagnicola*) Species Group

Target: Lakes, Ponds & Reservoirs

Mud Lake and riparian fringe, Mud Lake WMA, Idaho © 2013 Terry Thomas

Lacustrine ecosystems (i.e., lakes, ponds, and reservoirs) include aquatic and wetland habitats in permanently- to seasonally-flooded lakes and reservoirs with extensive areas of deep water and often have wave-eroded beach or bedrock shorelines (Cowardin et al. 1979). They are situated in topographic depressions or a dammed river channel with the basin formed along the contour approximating the normal spillway elevation or normal pool elevation; generally lack trees, shrubs, or persistent emergent vegetation; are typically (but not always) >8 ha (20 acres) in area; and have water depths exceeding 2 m (6.6 ft) at low water (Cowardin et al. 1979). The limnetic zone includes all nonvegetated deep water aquatic habitats and the littoral zone includes all wetland habitats (e.g., floating or submerged aquatic vegetation, or sometimes emergent vegetation with low cover) extending from the shoreward boundary to a depth of 2 m (6.6 ft) below low water or to the maximum extent of nonpersistent emergent vegetation if these grow at depths greater than 2 m (e.g., submerged aquatic vegetation). For our purposes, the persistent emergent or aquatic vegetation bordering or forming islands within lakes, deep ponds, and reservoirs (called lacustrine fringe wetlands) are included in emergent marsh or aquatic bed groups.

In the Snake River Basalts, this ecosystem includes all natural lakes and deep ponds, dam-altered naturally formed lakes, and created waterbodies of all sizes that fit the lacustrine definition. Natural deep water ponds and lakes are rare in the Snake River Basalts section. Several large reservoirs exist that were created primarily for hydroelectric and irrigation water storage (Milner Reservoir, Lake Walcott, American Falls Reservoir and Mud Lake). The shoreline and upper portion of Lake Walcott, American Falls Reservoir, Mud and Market Lakes, and their associated adjacent wetlands and ponds provide habitat for a variety of breeding waterbirds and shorebirds. In addition, numerous smaller reservoirs exist that were primarily created for irrigation water storage. Most of these reservoirs have areas of emergent vegetation and aquatic bed vegetation on their fringes, as well as riparian vegetation on their shores, which can be important for migratory, wintering, and breeding waterfowl and other waterbirds. Stormwater detention ponds, golf course ponds, or other landscaped ponds represent lacustrine habitat in urban areas of the section. In addition, hundreds of small livestock water reservoirs dot the landscape across rural and undeveloped areas of the Snake River Basalts.

Freshwater mudflats are found scattered throughout the temperate regions of the western interior of North America. They form when seasonally flooded, shallow lake and deep marshes dry during summer, when reservoirs are drawn down, or sometimes on river floodplains after spring flows subside. Mudflats may be absent in any one year because of year-to-year variation in water levels, but must be exposed before vegetation can develop from the seedbank. Mudflats range in physiognomy from sparsely-vegetated mud to extensive herbaceous vegetation comprised of low-statured annual plants (both native and nonnative). These are valuable habitats for shorebirds and waterbirds, such as White-faced Ibis, during spring and fall migration. American Falls Reservoir, in particular, provides critical stopover habitat for these species.

Target Viability

Good. Main issues for this system are wildlife-related, e.g., boat wake floods grebe nests, and fluctuations in water levels can result in grebe nests flooding or exposure of island nesting colonies.

Spotlight Species of Greatest Conservation Need: Caspian Tern

In the western interior, Caspian Terns (*Hydroprogne caspia*) generally nest on open, fairly flat islands or islets of lakes, reservoirs, and rivers. In Idaho, this species appears to always nest in mixed-species colonies, particularly colonies with California Gulls (*Larus californicus*). Nests are placed on either bare ground or in shallow scrapes, and lined with pebbles, grasses, mosses, and other vegetation. This species forages over lakes, reservoirs, rivers, and sloughs and preys almost exclusively on fish. Approximately 75 pairs currently breed at Island Park Reservoir in Idaho—this is now the only nesting location in the state. As recently as 2007, this species also nested at Blackfoot, Magic, and Mormon reservoirs, and Bear Lake and Minidoka National Wildlife refuges—in 2015, however, none of these locations were known to support nesting populations of Caspian Terns. Colony surveys conducted in Idaho indicate that the population of breeding adults has declined by 30% in the past 10 years, and the breeding distribution has contracted to a single colony at Island Park Reservoir. Low water levels, particularly in the IDFG Magic Valley Region, are the most significant threat to Caspian Terns in Idaho. Low water levels in nesting reservoirs has resulted in land-bridging at two historic nesting locations. This species appears to have low tolerance to land-bridging and has abandoned these two nesting islands. Caspian Terns are typically at a competitive disadvantage when nesting with other colonial species, such as California Gulls and American White Pelicans (*Pelecanus erythrorhynchos*). They initiate nesting later than these other colonial species, and may be unable to initiate nesting because of lack of space, or they are subject to high predation pressure from the gulls who are often already feeding chicks. Potentially beneficial management actions include working with water managers to develop and implement water level management guidelines during the breeding season that balance irrigation and wildlife needs, working with land managers to restore or create new nesting locations that will not be subject to low water level concerns in the foreseeable future, minimizing human disturbance of nesting colonies to the extent possible, and creating areas on nesting islands for late breeding initiation.

Prioritized Threats and Strategies for Lakes, Ponds & Reservoirs

High rated threats to Lakes, Ponds & Reservoirs in the Snake River Basalts

Real-time dam operations & water level fluctuations in reservoirs

Wildlife managers typically do not have control over water levels in irrigation reservoirs and canals. Water managers typically do not notify wildlife managers when water releases or holdbacks will occur. Consequently, fluctuating water levels are a significant issue for several waterbird species, including Western Grebe (*Aechmophorus occidentalis*), Clark's Grebe (*Aechmophorus clarkii*), White-faced Ibis, and Franklin's Gull (*Leucophaeus pipixcan*). Most Western and Clark's Grebe colonies are located on reservoirs, or along rivers susceptible to water fluctuations resulting from dam operations. Rapid increase in water levels results in nest flooding, while rapid releases of water results in nests that are no longer accessible to grebes. In addition, the raising of dams to allow for greater reservoir capacity can also have significant short-term and lasting long-term effects on habitat use and productivity of a variety of associated species.

Objective	Strategy	Action(s)	Target SGCNs
Reduce grebe nest failure.	Work with FWS, BOR, and irrigation districts to reduce water level fluctuations during grebe nesting period.	Develop Best Management Practices with BOR for water level management around grebe colonies. Work with FWS to determine opportunities for reducing water level fluctuation issues on Minidoka NWR.	Western Grebe Clark's Grebe
Reduce occurrence of colony failure at Mud Lake WMA.	Maintain water levels during nesting season to minimize nest flooding.	Work with water managers to develop and implement water level management recommendations that reduce nest loss while also meeting irrigation needs.	White-faced Ibis Franklin's Gull
Determine causes of low nesting success and recruitment of Western and Clark's Grebes in Idaho.	Conduct research on existing colonies in Idaho.	Collaborate with FWS on proposed research project.	Western Grebe Clark's Grebe

Drought & water management impacts

Until as recently as 2006, there were eight nesting colonies of Ring-billed Gull (*Larus delawarensis*) and California Gull in Idaho. Six of these were also nesting locations for Caspian Tern (IDFG 2007). Low water levels in nesting reservoirs has resulted in land-bridging at several nesting islands. If gulls attempt to nest at all, land-bridging results in high predation rates on young and adults. Because of land-briding, two nesting colonies are no longer active, and the largest in Idaho (American Falls Reservoir), which is within Snake River Basalts, is declining rapidly from high mortality (IDFG unpublished data). By 2014, only five of these historic colonies were still active, and contained 41% of the 2006 population. To our knowledge, only one new colony has become established, and it is in an unsuitable location (see Owyhee Uplands for more details).

Caspian Terns have mostly disappeared from Idaho, and currently nest reliably in just one location: Island Park Reservoir. This species is highly sensitive to the land-bridging issue, but they are also typically at a competitive disadvantage when nesting with other colonial species, such as gulls and pelicans. They initiate nesting later than these other colonial species, and are therefore either pushed out because of lack of space, or they are subject to high predation pressure from the gulls who are often already feeding chicks. This is of particular concern at Minidoka NWR where Caspian Terns have nested historically, but are no longer present.

Objective	Strategy	Action(s)	Target SGCNs
Increase nesting habitat availability.	Work with land and water managers to identify opportunities at historic and/or new locations.	Work with water managers to develop and implement water level management guidelines during the breeding season that balance irrigation and wildlife needs. Work with land managers, such as FWS, to restore or create new nesting locations that will not be subject to low water level concerns in the foreseeable future.	California Gull Ring-billed Gull Caspian Tern Trumpeter Swan
Reduce impacts of competition with other nesting species on Caspian Terns.	Create areas on nesting islands for late breeding initiation.	Work with FWS, Pacific Region Migratory Birds and Habitat Program, to develop protocol for creating late breeding initiation areas. Work with land managers, such as FWS, to test protocol on a historic Caspian Tern nesting island that has seen recent nesting attempts (e.g., Minidoka NWR).	Caspian Tern

Species designation, planning & monitoring

We have an inadequate understanding of the current population status of *Stagnicola* species associated with this target. To better understand these species and their habitat needs, surveys of historic sites are needed.

Objective	Strategy	Action(s)	Target SGCNs
Monitor the status of cave-associated fauna.	Conduct regular monitoring of occupied, historic, and potential caves and tubes for SGCN species.	Conduct a population survey of all historic, current, and potential sites every 2–3 years to determine status and possible population trends. Survey caves that have not been previously sampled for the presence of cave invertebrates and bat species.	Pondsnail (*Stagnicola*) Species Group

Target: Lava Flows, Kipukas, Caves & Tubes

Vegetation within the Craters of the Moon National Monument and Preserve is diverse. The area encompasses sparse, vegetated lava and cinder cones; sagebrush steppe; grasslands; wetlands; and montane shrublands, woodlands, and forest. The study area encompasses several hundred kipukas (isolated areas of vegetation surrounded by more recent lava flows) and numerous parks. Many of these areas of relatively pristine native vegetation are protected from disturbances of nonnative species invasion, livestock grazing, and recreational use (Rust and Wolken 2008).

Lava flows at Craters of the Moon National Monument and Preserve with surface cracks and fissures. Craters of the Moon National Monument and Preserve, Idaho © 2015 Terry Thomas

Although some of the younger lava flows are devoid of vegetation, there is surprising diversity among plants and plant communities in the Monument. Lava flows and kipukas show a full range of ecological succession—from pioneer plants, such as lichens and mosses on basalt surfaces, to complex plant communities in kipukas and rangelands bordering lava flows. Rough topography of the lava flows creates numerous microsites where soil and water accumulate to support plants that would normally occur in higher precipitation zones. Limber Pine (*Pinus flexilis*) stands occur on cinder cones and lava flows in the northern part of the Monument. The transition between limber pine and juniper vegetation types occurs between Blacktail Butte and the Craters of the Moon National Wilderness Area. This ecotone normally occurs in montane regions and is an unusual feature for the lava flows (USDI BLM 1980*b*). Quaking Aspen (*Populus tremuloides*) and Douglas-fir (*Pseudotsuga menziesii*) stands are found on some north-facing slopes in the northern portion of the Monument. Riparian and wetland habitats are limited to the northern periphery due to geology, topography, and climate of the area. Early successional plant communities on the cinder cones produce diverse spring wildflower displays (DOI 2014).

Lava flows in the Snake River Basalts are comprised of three geologically young (Late Pleistocene-Holocene) lava fields that lie along the Great Rift: The Wapi Lava Field, The Kings Bowl Lava Field, and the Craters of the Moon Lava Field (DOI 2007). The Great Rift extends southeasterly from the Lava Creek vents for more than 50 miles to somewhere beneath the Wapi Lava Field (Kuntz et al. 1982). The Craters of the Moon Lava Field is the northernmost and largest of the three young lava fields. Kings Bowl Lava Field is the smallest and lies between Craters of the Moon Lava Field and the Wapi Lava Field. These young flows are composed of Pleistocene-age pahoehoe and a'a flows, near-vent tephra deposits, cinder cones, lava cones, and shield volcanoes (Kuntz et al. 1988). These older areas are mantled with loess deposits (windblown silt) and in some places by windblown sand. During the Holocene (last 10,000 years), the most volcanic activity of any of the Eastern Snake River Plain basaltic rift systems was exhibited by these three lava fields associated with the Great Rift (Hughes et al. 1999, DOI 2007).

There are many different kinds of caves associated with the lava flows of the Great Rift. Shelly pahoehoe areas contain many small open tubes and blisters. There are thousands of these small open tubes and blisters in the Monument. Pahoehoe flows can travel more than 20 miles because the ceilings of lava tubes insulate them from heat loss and some of the tubes are greater than 30 ft in height. Some fissure caves associated with the Great Rift can be passable to hundreds of feet below the surface (DOI 2007).

Target Viability

Fair. In theory, kipukas should be reference areas for intact and healthy sagebrush steppe. However, invasive plant species and human uses have found their way into most kipukas. The location of many caves and lava tubes is not public knowledge and thus they may be reasonably safe from disturbance.

Spotlight Species of Greatest Conservation Need: Blind Cave Leiodid Beetle

This beetle is an obligate inhabitant of cave habitat. It is found in 4 widely separated lava-tube caves on the eastern Snake River Plain (Westcott 1968) in Fremont, Butte, Lincoln, and Power counties. The beetle has also been documented in a limestone cave in Wyoming on the west side of the Teton Mountains. Most lava-tube caves have not been surveyed for invertebrates (IDFG 2005). Several of the occupied caves contain perennial ice formations, though, based on the description in Briggs (1974), the Lincoln County cave may not contain ice. Westcott (1968) found beetles on ice and floating in melt-water above the ice floor. Beetles appeared to be particularly partial to ice mounds or large ice stalagmites, the former frequently harboring a variety of live and dead arthropods. Beetles also occur on rock formations. Peck (1970) attracted beetles to bait more commonly among rocks than at the edge of ice or on ice. Naseath (1974) found the beetle on and in holes of highly vesicular basalt. Naseath (1974) believed that the beetle subsists on a bacterium found on fractured lava rock. The beetle may also scavenge dead invertebrates or consume fungus (Westcott 1968).

Prioritized Threats and Strategies for Lava Flows, Kipukas, Caves & Tubes

High rated threats to Lava Flows, Kipukas, Caves & Tubes in the Snake River Basalts

Altered fire regimes

Kipukas are highly sensitive habitats that in recent years have seen an invasion of weed species. Of these weed species, the most impactful is cheatgrass as it alters the fire regimes in this system that is not well adapted to fire. Limber Pine habitats found within the lava flows are also susceptible to fire when invasive weeds such as cheatgrass appear as the dominant understory species.

Objective	Strategy	Action(s)	Target SGCNs
Identify and maintain intact kipukas and Limber Pine stands to minimize direct habitat loss.	Protect kipukas from destruction by wildfire.	Combat cheatgrass to reduce fire frequency using Plateau and other new emerging techniques.	A Metallic Wood-boring Beetle (*Chrysobothris horning*) A Metallic Wood-boring Beetle (*Chrysobothris idahoensis*) Western Small-footed Myotis Townsend's Big-eared Bat Little Brown Myotis A Yellow-masked Bee (*Hylaeus lunicraterius*)

Recreational overuse & misuse

Caves and tubes are highly sensitive environments. Due to the variance in size and shape of these subterranean features, each locality possesses unique temperatures, humidity, and flora and fauna. Species found to occur in 1 cave or tube will not necessarily be found in a nearby tube. For this reason, care must be taken when allowing access to caves and tubes. It is the policy of the National Park Service and BLM to withhold known cave locations from all but administrative agency partners. Local caving grottos are also familiar with the locations of many cave and tube features and are typically responsible in their recreational use of these sites. However, priorities should be made to preserve specific caves that possess unique biological, cultural, and anthropological resources.

Objective	Strategy	Action(s)	Target SGCNs
Identify and prioritize caves and tubes with high wildlife value (e.g. hibernacula, known locality of endemic cavernicolous fauna, etc).	Work with agencies to come up with a list and implement best practices for protecting these resources.	Develop a cave faunal working group to identify and prioritize caves and tubes that make good candidates for increased protection and conservation. Collaborate with agencies to develop survey and monitoring protocols for cave and tube systems and their associated fauna.	Blind Cave Leiodid Beetle A Cave Obligate Mite (*Flabellorhagidia pecki*) A Cave Obligate Millipede (*Idagona westcotti*) Western Small-footed Myotis Townsend's Big-eared Bat Little Brown Myotis A Cave Obligate Harvestman (*Speleomaster lexi*) A Cave Obligate Harvestman (*Speleomaster pecki*)

Objective	Strategy	Action(s)	Target SGCNs
	Monitor identified caves and determine use. Based on use, develop strategies to minimize impacts to the natural state of the caves and tubes.	Collaborate with local grottos to identify caves being regularly visited and determine appropriate management actions if needed. Determine where use occurs as a baseline of potential closures should white-nose syndrome reach Idaho and the fungus be spread by recreational activities.	Blind Cave Leiodid Beetle A Cave Obligate Mite (*Flabellorhagidia pecki*) A Cave Obligate Millipede (*Idagona westcotti*) Western Small-footed Myotis Townsend's Big-eared Bat Little Brown Myotis A Cave Obligate Harvestman (*Speleomaster lexi*) A Cave Obligate Harvestman (*Speleomaster pecki*)

Species designation, planning & monitoring

We have an inadequate understanding of the current population status of Idaho Dunes Tiger Beetle. Regular status assessments of occupied and recently-colonized habitats are important as the effectiveness of management actions continues to be evaluated. Likewise, the status of the populations of Wiest's Primrose Sphinx Moth, *Amblyderus owyhee*, *Calliopsis barri*, and *Ashmeadiella sculleni* and their life histories have not been fully documented or updated. To better understand these species and their habitat needs, surveys of historic sites are needed.

Objective	Strategy	Action(s)	Target SGCNs
Monitor the status of cave-associated fauna.	Conduct regular monitoring of occupied, historic, and potential caves and tubes for SGCN species.	Conduct a population survey of all historic, current, and potential sites every 2–3 years to determine status and possible population trends. Survey caves that have not been previously sampled for the presence of cave invertebrates and bat species.	Blind Cave Leiodid Beetle A Cave Obligate Mite (*Flabellorhagidia pecki*) A Cave Obligate Millipede (*Idagona westcotti*) Western Small-footed Myotis Townsend's Big-eared Bat Little Brown Myotis A Cave Obligate Harvestman (*Speleomaster lexi*) A Cave Obligate Harvestman (*Speleomaster pecki*)
Monitor known bat hibernacula, maternity roosts, and day roosts for presence of white-nose syndrome (WNS).	Collect bat swab/and or cave sediment samples at priority hibernacula and other bat roost locations.	Collect swab samples as part of the WNS surveillance project for baseline data on fungal communities in Snake River Basalts caves and tubes. Continue to take swabs at least every other year to determine if *Pd*/WNS is present.	Western Small-footed Myotis Townsend's Big-eared Bat Little Brown Myotis
Determine the status of the historic populations of several lava-associated SGCN species.	Conduct surveys at Craters of the Moon National Monument and Preserve and adjacent suitable habitat.	Conduct yellow pan trap and sweep surveys for *Chrysobothris horningi*, *Chrysobothris idahoensis*, *Hylaeus lunicraterius.* Assess collection records for these species in nondigitized regional collections.	A Metallic Wood-boring Beetle (*Chrysobothris horning*) A Metallic Wood-boring Beetle (*Chrysobothris idahoensis*) A Yellow-masked Bee (*Hylaeus lunicraterius*)

Snake River Basalts Section Team

An initial version of the Snake River Basalts Section project plan was completed for the 2005 Idaho State Wildlife Action Plan (formerly Comprehensive Wildlife Conservation Strategy). A small working group developed an initial draft of the during a 2-day meeting in December 2014. Since then, we have continued to work with key internal and external stakeholders to improve upon the plan. Materials in this document are based on Miradi v. 0.35. Individuals, agencies, and organizations involved in this plan are listed in Table 13.3.

Table 13.3 Individuals, agencies, and organizations involved in developing this section [a]

First name	Last name	Affiliation
Ross	Winton*	Idaho Department of Fish and Game, Magic Valley Region
Terry	Thomas*	Idaho Department of Fish and Game, Upper Snake Region
Paul	Makela	Bureau of Land Management (US)
Devin	Engelstead	Bureau of Land Management (US), Idaho Falls District, Upper Snake Field Office
Justin	Frye	Bureau of Land Management (US), Idaho Falls District, Upper Snake Field Office
Mark	Arana	Bureau of Reclamation (US) Snake River Area Office
Ryan	Newman	Bureau of Reclamation (US)
Quinn	Shurtliff	Gonzales–Stoller Surveillance, LLC
Jericho	Whiting	Gonzales–Stoller Surveillance, LLC
Colleen	Moulton	Idaho Department of Fish and Game, Headquarters
Todd	Stefanic	National Park Service, Craters of the Moon National Monument and Preserve
Dan	Christopherson	Shoshone-Bannock Tribe
Jack	Depperschmidt	US Department of Energy
Ty	Matthews	US Fish and Wildlife Service
David	Kampwerth	US Fish and Wildlife Service, Eastern Idaho Field Office
Evan	Ohr	US Fish and Wildlife Service, Eastern Idaho Field Office
David	Hopper	US Fish and Wildlife Service, Idaho State Office

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

14. Bear Lake Section

Section Description

The Bear Lake Section is part of the Wyoming Basins Ecoregion. That portion of the Bear Lake Section located in Idaho is the subject of this review. It is located in southeast Idaho, bordering Wyoming to the east and Utah to the south. This section encompasses portions of the Bear River, Bear Lake, the Bear Lake Valley, as well as dry hillsides and ridges to the east of the Lake, referred to as the Bear Lake Plateau. Bear Lake drains through Bear River, which is a tributary of Great Salt Lake (Fig. 14.1).

Bear Lake, IDFG

The Bear Lake Section ranges in elevation from 1,800–2,400 m (5,900–7,800 ft.). Precipitation ranges from 40 to 100 cm (16 to 40 in) annually with most occurring during the fall, winter and spring. Precipitation occurs mostly as snow above 1,800 m (6,000 ft.). Summers are dry with low humidity. Temperature averages 1–9 °C (34–48 °F). The growing season ranges from 50–180 days.

Livestock grazing is the primary land use in this section; however, agricultural production also occurs, with hay and grain being the primary crops. Outdoor recreation is mostly associated with Bear Lake and includes angling, boating, and camping. Other outdoor recreation includes big game, upland game, and waterfowl hunting as well as wildlife viewing. There has been increasing residential development, including second homes, used seasonally, around Bear Lake and the associated uplands. In addition to private land ownership, the section includes Bear Lake National Wildlife Refuge (NWR) managed by the US Fish and Wildlife Service (FWS), public lands administered by the Bureau of Land Management (BLM), and State owned lands administered by the Idaho Department of Lands (IDL). Land ownership for the section is displayed on Fig. 14.1.

The Bear Lake Section contains diverse vegetation and land cover types (Figure 14.2) that provide habitat for a diversity of wildlife species, some of which are unique to the section.

Bear Lake contains a unique fish fauna that includes 4 endemic species: Bear Lake Whitefish (*Prosopium abyssicola*), Bonneville Cisco (*Prosopium gemmifer*), Bonneville Whitefish (*Prosopium spilonotus*), and Bear Lake Sculpin (*Cottus extensus*). Bonneville Cutthroat Trout (*Oncorhynchus clarkii utah*) is present in both Bear Lake and Bear River and represents an important conservation species for the Bear Lake Section. The nonnative Lake Trout (*Salvelinus namaycush*), Rainbow Trout (*Oncorhynchus mykiss*), Brook Trout (*Salvelinus fontinalis*), and Brown Trout (*Salmo trutta*) provide important recreational value; however, they are managed to ensure the persistence of viable populations of native fish species. Because Bear Lake spans both Idaho and Utah, fisheries resources in the lake are managed collaboratively by the 2 states through the implementation of the Bear Lake Fisheries Management Plan (Tolentino and Teuscher 2010).

Wetlands and riparian habitat associated with Bear Lake and the Bear River provide important habitat for a variety of wildlife, most notably migratory waterfowl, waterbirds, and Neotropical migratory landbirds, as well as amphibians and foraging herbivores (invertebrates to large ungulates). The wetlands, most of which are managed by the Bear Lake NWR, provide nesting habitat for important conservation focus species such as Trumpeter Swan (*Cygnus buccinator*), American Bittern (*Botaurus lentiginosus*), White-faced Ibis (*Plegadis chihi*), Franklin's Gull (*Leucophaeus pipixcan*), California Gull (*Larus californicus*), Caspian Tern (*Hydroprogne caspia*), and Clark's Grebe (*Aechmophorus clarkia*). It is one of only 6 locations in the state where White-faced Ibis nest, and one of only 5 where Franklin's Gull nests in the state. Wetlands, wet meadows, and managed pasture provide foraging habitat for White-faced Ibis and American Bittern, and nesting, foraging and staging habitat for Sandhill Crane (*Grus canadensis*).

The upland habitat in Bear Lake Section consists primarily of sagebrush-steppe rangeland managed for livestock grazing. Sagebrush species are predominantly Wyoming big sagebrush (*Artemisia tridentata* Nutt. subsp. *wyomingensis* Beetle & Young) and black sagebrush (*Artemisia nova* A. Nelson). Native grasses, such as bluebunch wheatgrass (*Agropyron specatum*) and needle and thread grass (*Stipa comata*), persist in the sage steppe habitat; however, cheatgrass (*Bromus tectorum*) is a common invasive species. Portions of native shrubsteppe habitat that were converted to agricultural production in the past have been enrolled in the Conservation Reserve Program (CRP) and are currently established as managed perennial grasslands, some of which have sagebrush recolonization. Populations of Greater Sage-Grouse (*Centrocercus urophasianus*), Sharp-tailed Grouse (*Tympanucus phasianellus*), and Pygmy Rabbit (*Brachylagus idahoensis*) depend on sagebrush-steppe habitat to maintain viable populations in the section. Sharp-tailed Grouse have benefited from the establishment of CRP acres.

The Bear Lake Plateau, situated east of Bear Lake and extending to the Wyoming border on the east and the Utah border on the south, is an important big game winter range. Mule Deer (*Odocoileus hemionus*) winter on the Plateau as well as use the riparian and wetlands associated with the Bear River and Bear Lake. In recent years, as many as 3,000 Mule Deer migrate to the Plateau to winter where snow depths are generally moderate to low on the area's extensive south and west facing slopes. The fall/winter movement through the corridor is generally southward from the CTNF through the Sheep Creek Hills across Highway 30, the Union Pacific Railroad tracks, and the Bear River. In addition, because the Bear Lake Plateau as well as adjacent areas contains predicted Wolverine (*Gulo gulo*) habitat (IDFG 2014) the corridor may serve as a dispersal corridor for wolverine. Mule deer roadkills are common in the corridor in the fall, winter, and early spring. These roadkilled carcasses attract scavenging Bald Eagles (*Haliaeetus leucocephalus*) and Golden Eagles (*Aquila chrysaetos*), which are then subject to vehicle collisions as well.

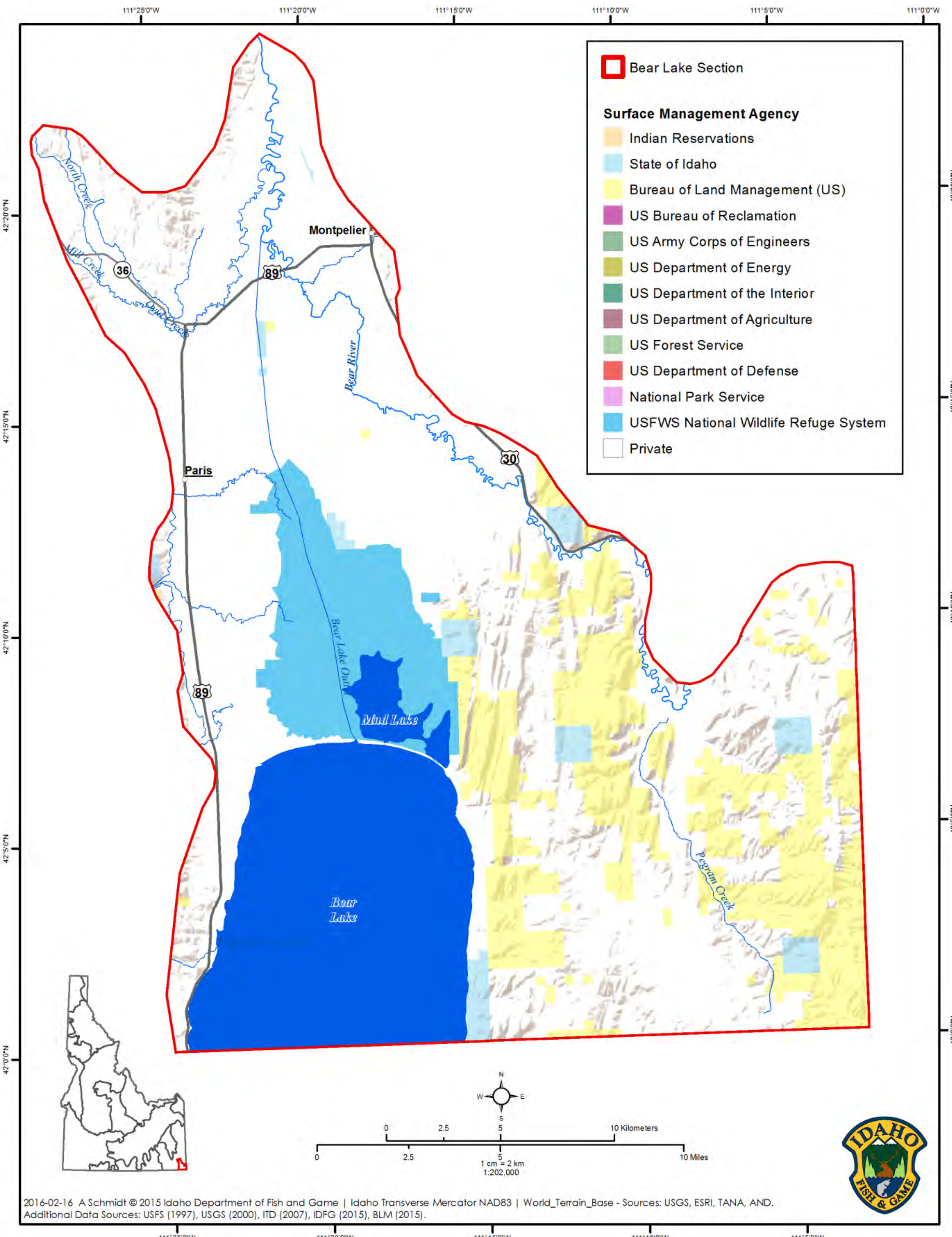


Fig. 14.1 Map of Bear Lake surface management

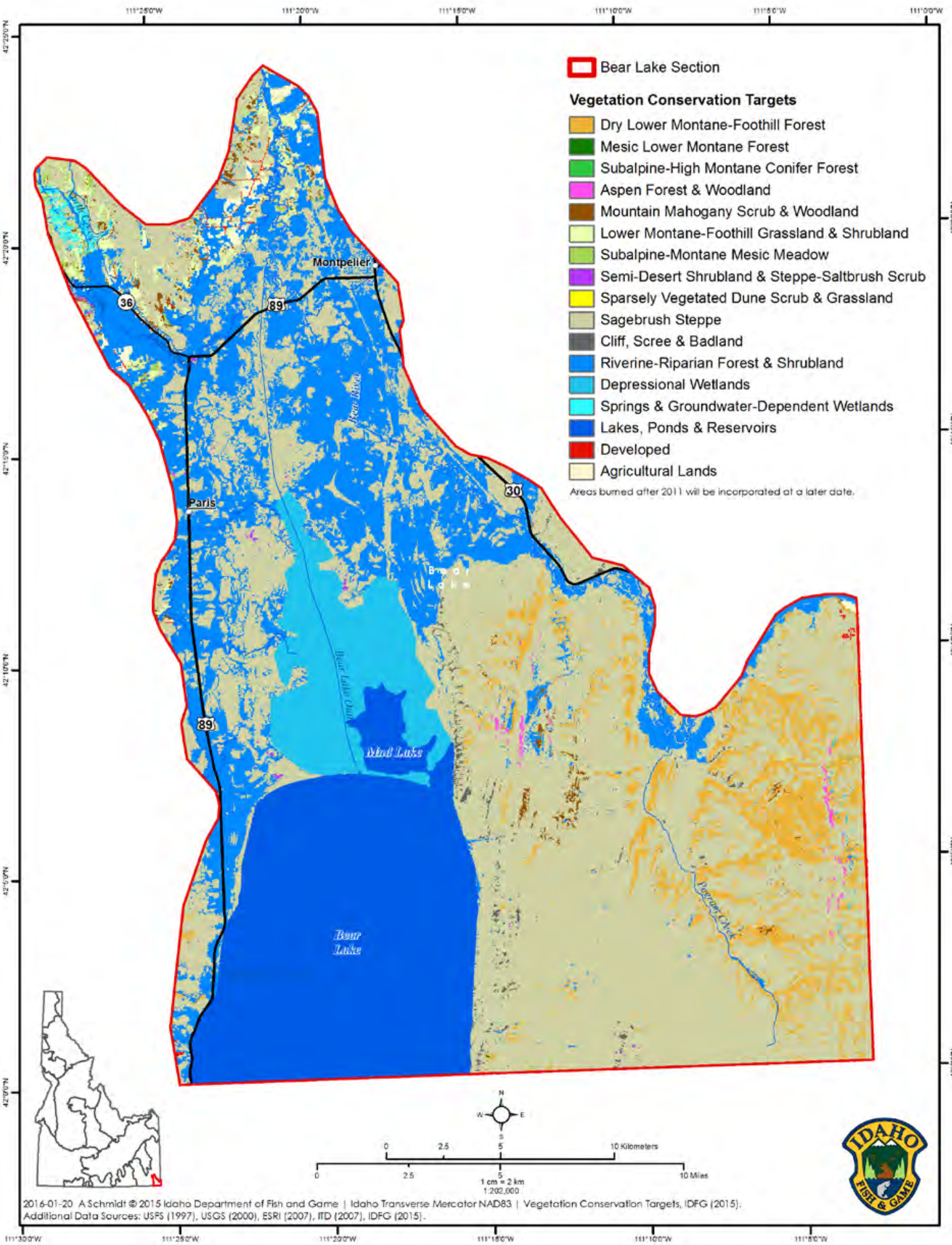


Fig. 14.2 Map of Bear Lake vegetation conservation targets

Conservation Targets in the Bear Lake Section

We selected 3 habitat based targets (1terrestrial and 2 aquatic) that represent the major ecosystems in the Bear Lake Section as shown in Table 14.1. Each of these systems provides habitat for key species of greatest conservation need (SGCN), i.e., "nested targets" (Table 14.2) associated with each target. All SGCN management programs in the Bear Lake Section have a nexus with habitat management programs. We provide a high-level summary of current viability status for each target. Conservation of the habitat targets listed below should conserve most of the nested species within them. However, we determined that at least 3 taxonomic groups—Bear Lake Endemic Fish, colony-nesting birds, and Pollinators—face special conservation needs and thus are presented as explicit species targets as shown in Table 14.1. In addition, we identified a target to preserve an important wildlife movement corridor into the Bear Lake Plateau.

Table 14.1 At-a-glance table of conservation targets in the Bear Lake Section

Target	Target description	Target viability	Nested targets (SGCN)	
Sagebrush Steppe	This is the predominant habitat type in the Bear Lake Section, occurring on the Bear Lake Plateau on the east side of Bear Lake to the Wyoming and Utah borders and also present to a lesser extent on the west side of Bear Lake where it is more fragmented by agriculture and development. This target provides important habitat for a diversity of wildlife species, including several SGCN that are also considered sagebrush obligates.	*Fair*. Sagebrush habitat throughout the section has been reduced by development and conversion to agriculture. Some of agricultural conversion has been enrolled in CRP and there is some sagebrush recolonization into these fields. Fragmentation, invasive species, fire, and sagebrush treatments impact the viability of this target.	*Tier 1*	Greater Sage-Grouse
			Tier 2	Sharp-tailed Grouse Long-billed Curlew Ferruginous Hawk Golden Eagle Sage Thrasher Pygmy Rabbit Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)
			Tier 3	Short-eared Owl Common Nighthawk Townsend's Big-eared Bat Western Small-footed Myotis
Riverine–Riparian Forest & Shrubland	This habitat target encompasses rivers and streams, including aquatic habitat and the associated riparian and wetland vegetation types. This target includes tributaries to Bear Lake and Bear River and its tributaries and Bear River flood plain. This target provided important habitat for a diversity	*Fair*. Riverine systems are fragmented by diversions that remove water for crop and pasture irrigation. In addition, water management has altered the hydrograph of riverine systems. Other impacts affecting this target include water quality, water quantity, and loss of riparian habitat. The	*Tier 1*	Bear Lake Springsnail
			Tier 2	Western Toad Northern Leopard Frog Trumpeter Swan White-faced Ibis Long-billed Curlew Silver-haired Bat Hoary Bat Rocky Mountain Duskysnail
			Tier 3	Sandhill Crane Townsend's Big-eared Bat Western Small-footed Myotis Little Brown Myotis California Floater

Target	Target description	Target viability	Nested targets (SGCN)	
	of wildlife species.	diversion of water from Bear River into Bear Lake for irrigation storage purposes has altered the hydrograph of the Bear River flood plain.		Pondsnail (*Stagnicola*) Species Group Rotund Physa Utah Sallfly
Depressional Wetlands	This habitat target is influenced by snowmelt and rain and wetlands ranges from infrequent to semipermanent or permanently flooded. The target includes primarily shallow water marshes, and deep water marshes in the Bear Lake Section. This target provides important breeding and foraging habitat for many bird species.	*Fair.* The diversion of water from Bear River into the Bear Lake for irrigation storage purposes has altered the hydrology and natural process of large tracts of wetland habitat located at the north end of Bear Lake, much of which is encompassed in the Bear Lake NWR.	*Tier 2* *Tier 3*	Western Toad Northern Leopard Frog Trumpeter Swan Western Grebe Clark's Grebe American Bittern White-faced Ibis California Gull Caspian Tern Black Tern Sandhill Crane Franklin's Gull
Bear Lake Endemic Fish	There are 4 endemic fish species in the Bear Lake Section. There is an assumption that if the populations of endemic fish are healthy, the entire lake ecosystem will be conserved.	*Good*. The Bear Lake Fisheries Management Plan includes population targets for endemic fish species. IDFG and Utah Division of Wildlife Resources monitor fish populations to ensure targets are being met. The Bear Lake Fisheries Management Plan calls for stocking sterile lake trout and rainbow trout and stocking lake trout at a rate that will ensure sustainability of endemic fish populations.	*Tier 2*	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish Bear Lake Sculpin
Movement Corridor	An important wildlife movement corridor exists that links big game summer habitats north of the Bear Lake Plateau with winter range on the Plateau. The corridor may also	*Fair*. Highway 30 and Union Pacific Railroad bisect the wildlife movement corridor. The highway is used extensively by commercial semitrucks as a	*Tier 1* *Tier 2*	Wolverine Golden Eagle

Target	Target description	Target viability	Nested targets (SGCN)
	provide a dispersal corridor for wolverine. Mule deer mortality as they move through this corridor, due to vehicle collisions, is linked to golden and bald eagle mortality resulting from vehicle collisions as well.	'short-cut' between interstates 15 and 80. An estimated 3,000 mule deer move through this corridor to winter on the Bear Lake Plateau. Mule deer/vehicle collisions are common between Montpelier and the Wyoming Border, particularly during the fall and spring migration and during winter months. Mule deer mortalities provide scavenging opportunities for Bald and Golden eagles leading to eagle/vehicle collisions and subsequent eagle mortalities.	
Pollinators	The presence and distribution of SGCN pollinators is not well documented or understood in the Bear Lake Section.	Viability of this target is unknown in the Bear Lake Section.	*Tier 1* Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee *Tier 3* Hunt's Bumble Bee Kriemhild Fritillary Monarch

Table 14.2 Species of greatest conservation need (SGCN) and associated conservation targets in the Bear Lake Section

	Conservation targets					
Taxon	Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Bear Lake Endemic Fish	Movement Corridor	Pollinators
RAY-FINNED FISHES						
Bear Lake Whitefish (*Prosopium abyssicola*)[2]				X		
Bonneville Cisco (*Prosopium gemmifer*)[2]				X		
Bonneville Whitefish (*Prosopium spilonotus*)[2]				X		
Bear Lake Sculpin (*Cottus extensus*)[2]				X		
AMPHIBIANS						
Western Toad (*Anaxyrus boreas*)[2]		X	X			
Northern Leopard Frog (*Lithobates pipiens*)[2]		X	X			
BIRDS						
Trumpeter Swan (*Cygnus buccinator*)[2]		X	X			
Greater Sage-Grouse (*Centrocercus urophasianus*)[1]	X					
Sharp-tailed Grouse (*Tympanuchus phasianellus*)[2]	X					
Western Grebe (*Aechmophorus occidentalis*)[2]			X			
Clark's Grebe (*Aechmophorus clarkii*)[2]			X			
American Bittern (*Botaurus lentiginosus*)[2]			X			
White-faced Ibis (*Plegadis chihi*)[2]		X	X			
Ferruginous Hawk (*Buteo regalis*)[2]	X					
Golden Eagle (*Aquila chrysaetos*)[2]	X				X	
Sandhill Crane (*Grus canadensis*)[3]		X	X			
Long-billed Curlew (*Numenius americanus*)[2]	X	X				
Franklin's Gull (*Leucophaeus pipixcan*)[3]			X			
California Gull (*Larus californicus*)[2]			X			
Caspian Tern (*Hydroprogne caspia*)[2]			X			
Black Tern (*Chlidonias niger*)[2]			X			
Short-eared Owl (*Asio flammeus*)[3]	X					
Common Nighthawk (*Chordeiles minor*)[3]	X					
Sage Thrasher (*Oreoscoptes montanus*)[2]	X					
MAMMALS						
Pygmy Rabbit (*Brachylagus idahoensis*)[2]	X					
Townsend's Big-eared Bat (*Corynorhinus townsendii*)[3]	X	X				
Silver-haired Bat (*Lasionycteris noctivagans*)[2]		X				
Hoary Bat (*Lasiurus cinereus*)[2]		X				
Western Small-footed Myotis (*Myotis ciliolabrum*)[3]	X	X				
Little Brown Myotis (*Myotis lucifugus*)[3]		X				
Wolverine[1]					X	
BIVALVES						
California Floater (*Anodonta californiensis*)[3]		X				
AQUATIC GASTROPODS						

Taxon	Conservation targets: Sagebrush Steppe	Riverine–Riparian Forest & Shrubland	Depressional Wetlands	Bear Lake Endemic Fish	Movement Corridor	Pollinators
Pondsnail (*Stagnicola*) Species Group[3]		X				
Rotund Physa (*Physella columbiana*)[3]		X				
Rocky Mountain Duskysnail (*Colligyrus greggi*)[2]		X				
Bear Lake Springsnail (*Pyrgulopsis pilsbryana*)[1]		X				
TERRESTRIAL GASTROPODS						
Lyrate Mountainsnail (*Oreohelix haydeni*)[2]	X					
INSECTS						
A Tiger Beetle (*Cicindela decemnotata montevolans*)[2]	X					
Hunt's Bumble Bee (*Bombus huntii*)[3]						X
Morrison's Bumble Bee (*Bombus morrisoni*)[1]						X
Western Bumble Bee (*Bombus occidentalis*)[1]						X
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)[1]						X
Kriemhild Fritillary (*Boloria kriemhild*)[3]						X
Monarch (*Danaus plexippus*)[3]						X
Utah Sallfly (*Sweltsa gaufini*)[3]		X				

Target: Sagebrush Steppe

Sagebrush steppe is the most abundant habitat type in the Bear Lake Section, making up nearly 50% of the vegetation cover type in the section. The Bear Lake Plateau on the east side of Bear Lake to the Wyoming and Utah borders is predominantly sagebrush steppe; however, the habitat has been fragmented by past agricultural conversion, some of which has been enrolled in CRP. Portions of the section on the west side of Bear Lake also contain sagebrush-steppe habitat, although it has been fragmented by both agriculture and development.

Sagebrush-steppe habitat on the Bear Lake Plateau, IDFG

Sagebrush species found in the Bear Lake Section are predominantly Wyoming big sagebrush and black sagebrush. Native grasses, such as bluebunch wheatgrass and needle and thread persist in the sagebrush-steppe habitat and cheatgrass is a common invasive species. Agricultural areas that are enrolled in CRP are dominated by nonnative grass species, but sagebrush has begun to encroach into some fields.

A diversity of wildlife species rely on the sagebrush-steppe habitats found in the Bear Lake Section, including several SGCN. Of particular management concern are populations of Greater Sage-Grouse. The Bear Lake Plateau is identified as Priority Habitat Management Area for Sage-Grouse conservation (Fig. 14.3). Sagebrush steppe conservation and management actions that benefit Sage-Grouse are expected to benefit other sagebrush-dependent SGCN.

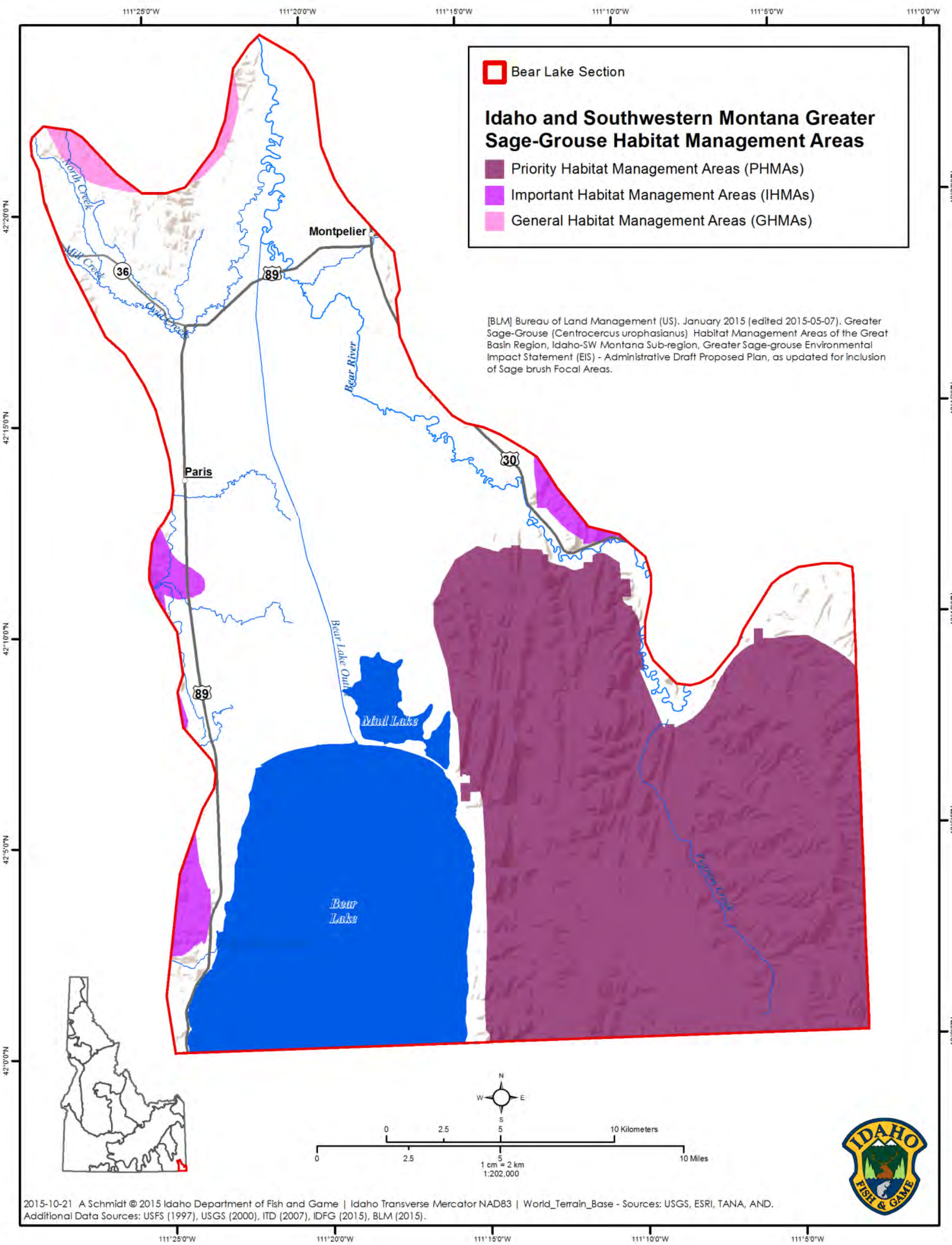


Fig. 14.3 Idaho and Southwestern Montana Greater Sage-Grouse Habitat Management Areas

Target Viability

Fair. Sagebrush-steppe habitat in the Bear Lake Section is generally in fair condition, and is functioning to provide important habitat for sagebrush obligates and other wildlife species. Sagebrush-steppe habitat has been reduced by development and conversion to agriculture. Some of the lands subject to agricultural conversion have been enrolled in CRP and there is some sagebrush recolonization into these fields. Conversion, fragmentation, invasive species, fire, and sagebrush treatments have resulted in not only loss of habitat, but also a decline in the condition of the remaining habitat in many areas. The patchwork of ownership that includes IDL and private property may increase the risk for further habitat loss or degradation from sagebrush treatment projects. BLM lands are fragments with some small acreage isolated tracts that may be subject to disposal in the future, creating an additional risk of potential degradation and loss of sagebrush habitat. The continuation of wildlife habitat enhancement and protection using CRP and other Farm Bill Programs is reliant on federal funding, as such adding an element of uncertainty to the wildlife habitat currently provided on some privately owned lands. Infrastructure, such as roads, power lines, and fences affect this habitat type and the wildlife species present. Invasive plants threaten the capability of this target to provide quality wildlife habitat.

Prioritized Threats and Strategies for Sagebrush Steppe

High rated threats to Sagebrush Steppe in the Bear Lake Section

Nonnative invasive plants

Invasive plant species is a high priority threat to sagebrush habitat in the Bear Lake Section. They have been identified as a primary to Sage-Grouse in Idaho in the Governor's Alternative (Otter 2012). They are also cited as a primary threat to shrubsteppe habitats by the US Fish and Wildlife Service (Fed Regist. 79[234]:72464–72465). The invasion of nonnative annual grasses—in particular cheatgrass and medusahead—is one of the primary drivers of larger, more intense rangeland fires across the Great Basin and directly threatens the habitat of Greater Sage-Grouse and other sagebrush-steppe dependent wildlife (DOI 2015). In the Bear Lake Section, cheatgrass has colonized the sagebrush-steppe habitat, and may influence fire severity and frequency in the future.

Objective	Strategy	Action(s)	Target SGCNs
Reduce invasive plants.	Implement actions to reduce the spread of invasive plants.	Promote certified weed-free seeds and forage. Enforce travel management plans.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Common Nighthawk Sage Thrasher Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)
	Support the use	Explore the use of newly	Greater Sage-Grouse

Objective	Strategy	Action(s)	Target SGCNs
	of experimental approaches to control invasive plants.	developed products or actions to reduce cheatgrass.	Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Common Nighthawk Sage Thrasher Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)
Protect key habitat from loss and degradation.	Implement appropriate management of brush treatments.	Consider wildlife benefits and reduce impacts to wildlife on all public land (BLM, IDL) brush treatments. Conduct treatments using techniques that will reduce the risk of increases of invasive species. Provide, where possible, input on private land brush treatments.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Common Nighthawk Sage Thrasher Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)
Improve/increase native vegetation.	Use native seed and seedlings in habitat restoration projects.	Agency coordination on funding sources to support restoration projects. Collect local seed as sources for native plants to be used in restoration projects. Limit the use of nonnative plant species in restoration projects.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Common Nighthawk Sage Thrasher Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)

Improper livestock grazing management

In the context of this plan, "improper" is defined as grazing beyond the capacity of the resource in either direction (e.g., overuse such as along riparian areas that need protection; i.e., there needs to be seasonal adjustments). Negative impacts of grazing are typically associated with persistent heavy grazing. In the Governor's Alternative (Otter 2012), improper livestock grazing management is considered a secondary threat with monitoring and management actions tailored accordingly.

Livestock grazing can affect wildlife habitat in many ways (Krausman et al. 2009). For example, livestock grazing can change habitat features that directly influence birds by reducing plant species diversity and biomass (Reynolds and Trost 1981, Bock and Webb 1984, Saab et al. 1995). Alternatively, changes in water and nutrient cycling caused by grazing can promote the spread of invasive species, which then degrade native bird habitats by altering fire and disturbance regimes (Rotenberry 1998). Sagebrush systems are particularly sensitive to grazing disturbance (Mack and Thompson 1982).

In the Bear Lake Section, one of the primary risk factors to maintaining viable sagebrush-steppe habitat is the fact that large tracts of sagebrush-steppe habitat are in private ownership, and thus may lack grazing plans and condition monitoring that help ensure best management practices are being used.

Objective	**Strategy**	**Action(s)**	**Target SGCNs**
Promote proper livestock grazing.	Develop, follow, and enforce grazing management plans.	Promote private landowners working with NRCS to develop grazing management plans for their private property. Monitor vegetation condition and adjust AUMs and grazing season as needed to meet standards.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)
	Educate and incentivize landowners.	Promote best management practices for livestock grazing in sagebrush-steppe habitat. Explore opportunities to provide incentives to public land grazers and private landowners to use best management practices.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Common Nighthawk Sage Thrasher Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)
Improve/increase native vegetation.	Use native seed and seedlings in habitat restoration projects.	Agency coordination on funding sources to support restoration projects. Collect local seed as sources for native plants to be used in restoration projects. Limit the use of nonnative plant species in restoration projects.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Common Nighthawk Sage Thrasher Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)

Infrastructure

Infrastructure such as roads, highways, high-voltage transmission lines, and cell phone towers (Governor's Executive Order No. 2015-04; Otter 2015) is identified as a primary threat (Otter 2012) and causes fragmentation and direct loss of shrubsteppe habitats (US Fish and Wildlife Service 2014). Power lines will present a collision risk to bird species and provide hunting perches for raptors and ravens; may have predation implications for species such as Sage-Grouse and Pygmy Rabbit.

A specific proposed project that presents threats to wildlife and wildlife habitat in the Bear Lake Section is the Gateway West Transmission Line Project (http://www.gatewaywestproject.com/). The project's approved route will run the transmission lines through sagebrush-steppe habitat on the Bear Lake Plateau.

Objective	Strategy	Action(s)	Target SGCNs
Reduce impacts of roads and energy transmission projects on wildlife and wildlife habitat.	Implement and enforce travel management plans.	Provide information on travel management through public outreach efforts, provide maps, both hard copies and options to obtain electronically, and maintain on the ground signage.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)
	Coordinate development/ location and management of roads, power lines, pipelines, etc. to avoid important habitat areas and minimize the impact to wildlife.	Place roads and energy related infrastructure away from leks, riparian areas and other sensitive wildlife habitat. Place new roads, power lines, and infrastructure projects along existing corridors or within other altered habitats to the extent possible. Place seasonal closures on roads to protect wildlife during critical time periods, such as wintering, breeding, fawning/calving.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Short-eared Owl Common Nighthawk Sage Thrasher Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)
Reduce bird power line strikes and electrocutions.	Work with power companies to implement practices and install apparatus to reduce collisions and electrocutions.	Keep records of bird power line collisions and electrocutions. Suggest monitor new power lines to document collision and electrocution concerns. Identify and map areas with power line collisions and electrocutions. Promote bury power lines in areas that experience high numbers of bird strikes.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle

Objective	Strategy	Action(s)	Target SGCNs
		Promote attaching bird diverters to make power lines more visible. Promote modifying power line structures to eliminate bird perch/roost sites.	
Reduce the impact of fences as barriers and collision risk for wildlife.	Maintain marked fences near Sage-Grouse leks, in order to increase visibility.	Identify fences near leks. Collaborate with partners to ensure fences are marked for visibility. Use volunteers where appropriate to help maintain marked fences.	Greater Sage-Grouse Sharp-tailed Grouse

Improper habitat treatment & restoration activities

Sagebrush treatments designed to reduce brush and increase grass to benefit grazing continues to be implemented in the Bear Lake Section. These treatments may include burning, herbicide treatment, and mechanical treatment. The fact that large tracts of sagebrush-steppe habitat are privately owned increases the threat of future sagebrush treatments that may impact habitat important to local Greater Sage-Grouse populations, as well as other sagebrush-obligate species. An additional related concern included the practice of using nonnative species for restoration or reseeding projects. Although nonnative species may provide a faster, cheaper alternative compared to native species when habitat has been disturbed or degraded, they typically do not provide equivalent benefits to wildlife species conservation.

Objective	Strategy	Action(s)	Target SGCNs
Improve/ increase native vegetation.	Use native seed and seedlings in habitat restoration projects.	Agency coordination on funding sources to support restoration projects. Collect local seed as sources for native plants to be used in restoration projects. Limit the use of nonnative plant species in restoration projects.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Short-eared Owl Common Nighthawk Sage Thrasher Pygmy Rabbit Townsend's Big-eared Bat Western Small-footed Myotis Lyrate Mountainsnail A Tiger Beetle (*Cicindela decemnotata montevolans*)
Protect key habitat from loss and degradation.	Implement appropriate management of brush treatments.	Consider wildlife benefits and reduce impacts to wildlife on all public land (BLM, IDL) brush treatments. Conduct treatments using techniques that will not result in increases of invasive species.	Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Short-eared Owl Common Nighthawk Sage Thrasher Pygmy Rabbit

Objective	Strategy	Action(s)	Target SGCNs
		Provide, where possible, input on private land brush treatments.	Townsend's Big-eared Bat Western Small-footed Myotis Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)

Species designation, planning & monitoring

In addition to the conservation actions to address specific threats, some species require inventory and monitoring to assess their status and distribution in Idaho. Population monitoring and surveys to determine distribution are needed for several species in the Bear Lake Section.

Objective	Strategy	Action(s)	Target SGCNs
Improve our knowledge of wildlife populations and distribution using the sagebrush-steppe habitat target.	Conduct surveys to monitor species populations.	In collaboration with land management agency partners and private landowners, conduct long-term monitoring surveys at established intervals to document population (as well as distribution) changes. Use volunteers, master naturalists, and citizen scientists to the extent possible.	Greater Sage-Grouse Ferruginous Hawk Golden Eagle Pygmy Rabbit
	Conduct surveys to document species presence, distribution, and abundance.	In collaboration with land management agency partners and private landowners, conduct surveys to document species presence, distribution, and abundance. Use volunteers, master naturalists, and citizen scientists to the extent possible.	Short-eared Owl Common Nighthawk Sagebrush Sparrow Lyrate Mountainsnail A Tiger Beetle (*Cicindela decomnotata montevolans*)

Target: Riverine–Riparian Forest & Shrubland

In the Bear Lake Section, the Riverine–Riparian Forest & Shrubland habitat target encompasses rivers and streams, including aquatic habitat and their associated terrestrial riparian and wetland habitats. This target includes Bear River and its tributaries and the tributaries to Bear Lake. Riparian habitat is the second most abundant habitat type in the Bear Lake Section and accounts for approximately 20% of the vegetation land cover type. Riparian habitat is diverse and includes a variety of grasses, forbs, and woody species such as willow spp., red osier dogwood (*Cornus sericea*), chokecherry (*Prunus virginiana*), and narrowleaf (*Populus angustifolia*) cottonwood associated with the Bear River and small streams. Scattered cottonwoods are found associated with the Bear River in the Dingle area and upstream to the Pegram Creek area. The Riverine–Riparian Forest & Shrubland habitat target also includes wet meadows and wetlands influenced by the river and stream flooding and overflow as well as overland runoff for adjacent uplands as streams and precipitation. This habitat type provides important habitat for a number of SGCN including, breeding areas northern leopard frog and western toad, winter foraging and resting habitat for Trumpeter Swans, foraging habitat for White-faced Ibis and Sandhill Crane, and foraging and roosting habitat for bat species.

Target Viability

Fair. Riverine systems in the Bear Lake Section are affected by water diversions for crop and pasture irrigation. As a result there are negative impacts associated with altered hydrograph, water quality, water quantity, and loss of riparian habitat. The Bear River riparian habitat has been eliminated, reduced, and only in fair condition in many stretches. The diversion of water from Bear River into Bear Lake for irrigation storage purposes has altered the hydrograph of the Bear River flood plain, reducing the viability of the riparian, wet meadow, and riverine wetland habitats. Riverine habitat associated with smaller tributaries is affected by reduced water flows due to water diversions. Wetlands associated with riverine habitat are also affected by water removal through the spring and summer that results in lower than normal flows. The lack of floodplain connectivity to the stream channel affects this habitat target. These conditions affect the capability of this target to support SGCN as diverse as breeding northern leopard frog, wintering Trumpeter Swan, and foraging and roosting bat species. In addition, the wet meadows are often cut for hay and used for livestock grazing, practices that may reduce benefits as nesting and foraging habitat for associated bird species.

Bear River, IDFG

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

High rated threats to Riverine–Riparian Forest & Shrubland in the Bear Lake Section

Improper livestock grazing management

Livestock grazing can affect wildlife habitat in many ways (Krausman et al. 2009). For example, livestock grazing can change habitat features that directly influence birds by reducing plant species diversity and biomass (Reynolds and Trost 1981, Bock and Webb 1984, Saab et al. 1995). Alternatively, changes in water and nutrient cycling caused by grazing can promote the spread of invasive species, which then degrade native bird habitats by altering fire and disturbance regimes (Rotenberry 1998).

In the Bear Lake Section, one of the primary factors that contribute to this problem is the fact that riverine habitat is in private ownership, and may lack grazing plans and condition monitoring.

Objective	Strategy	Action(s)	Target SGCNs
Promote proper livestock grazing.	Develop grazing management plans.	Promote private landowners working with NRCS to develop grazing management plans for their private property. Monitor vegetation condition and adjust AUMs and grazing season as needed to meet standards.	Western Toad Northern Leopard Frog Sandhill Crane Long-billed Curlew Townsend's big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis California Floater Pondsnail (*Stagnicola*) Species Group Rotund Physa Rocky Mountain Duskysnail Bear Lake Springsnail Utah Sallfly
	Educate and incentivize landowners.	Promote best management practices for livestock use of riparian habitats. Explore opportunities to provide incentives to public land grazers and private landowners to use best management practices.	Western Toad Northern Leopard Frog Sandhill Crane Hoary Bat Townsend's Big-eared Bat Silver-haired Bat Western Small-footed Myotis Little Brown Myotis California Floater Pondsnail (*Stagnicola*) Species Group Rotund Physa Rocky Mountain Duskysnail Bear Lake Springsnail Utah Sallfly
Protect and improve riparian habitat.	Develop off-site watering areas and/or gaps to reduce impacts to springs, wetlands, and riparian areas.	Work with land management agencies to identify opportunities to develop off-site watering, particularly along the Bear River and in the Pegram Creek drainage of the Bear Lake Plateau. Where possible work with landowners to develop off-site watering on private property, particularly along the Bear River and in the Pegram Creek drainage of the Bear Lake Plateau, and provide assistance when appropriate and possible. Including providing technical support and identifying possible funding sources.	Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis California Floater Pondsnail (*Stagnicola*) Species Group Rotund Physa Rocky Mountain Duskysnail Bear Lake Springsnail Utah Sallfly
	Install livestock exclusion fencing	Work with land management agencies to identify	Western Toad Northern Leopard Frog

Objective	Strategy	Action(s)	Target SGCNs
	to protect riparian areas.	opportunities to fence riparian areas to better manage grazing effects, particularly along the Bear River and in the Pegram Creek drainage of the Bear Lake Plateau. Where possible work with landowners to use riparian fencing to better manage grazing effects on private property, particularly along the Bear River and in the Pegram Creek drainage of the Bear Lake Plateau, and provide assistance when appropriate and possible. Including providing technical support and identifying possible funding sources.	Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis California Floater Pondsnail (*Stagnicola*) Species Group Rotund Physa Rocky Mountain Duskysnail Bear Lake Springsnail Utah Sallfly

Water management altering hydrograph

The diversion of water for crop and pasture irrigation affects the riverine hydrograph as well as water quality, water quantity, and has resulted in the loss and degradation of riparian habitat. The altered hydrography of the Bear River flood plain, caused by lower than normal flows in the spring and summer, reduces the viability of the riparian, wet meadow, and riverine wetland habitats. The altered hydrograph has resulted in the loss or decline of connectivity within riverine systems and between riverine and floodplain habitat. The diversion of water from streams in the spring results in lower than normal flows, rather than allowing for more natural high water runoff flows that connects and recharges the floodplain.

Objective	Strategy	Action(s)	Target SGCNs
Reduce water use to maintain a more natural hydrograph.	Enroll/maintain acreage in CRP/SAFE and other land conservation programs.	Encourage landowners to work with NRCS to use wildlife conservation practices on private range and agricultural lands.	Western Toad Northern Leopard Frog Trumpeter Swan White-faced Ibis Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis California Floater Pondsnail (*Stagnicola*) Species Group Rotund Physa Rocky Mountain Duskysnail Bear Lake Springsnail Utah Sallfly
	Water use does not exceed water right allocation.	Work with irrigation companies to ensure water use is appropriately allotted. Promote the use of improved	Western Toad Northern Leopard Frog Trumpeter Swan White-faced Ibis Sandhill Crane

Objective	Strategy	Action(s)	Target SGCNs
		equipment for accurate cfs measurement.	Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis California Floater Pondsnail (*Stagnicola*) Species Group Rotund Physa Rocky Mountain Duskysnail Bear Lake Springsnail Utah Sallfly
Maintain/ improve habitat connectivity within riverine systems and between riverine and floodplain habitat.	Limit water use during spring run-off and maintain minimum flows year around.	Work with private landowners and irrigation companies to identify opportunities for water efficacies. Work with partners to establish a minimum flow on Bear River and its tributaries and Bear Lake tributaries.	Western Toad Northern Leopard Frog Trumpeter Swan Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Western Small-footed Myotis Little Brown Myotis California Floater Pondsnail (*Stagnicola*) Species Group Rotund Physa Rocky Mountain Duskysnail Bear Lake Springsnail Utah Sallfly

Infrastructure

Infrastructure such as roads, highways, high-voltage transmission lines, pipelines, towers, and fences can present a threat to many wildlife species. Existing infrastructure causes fragmentation as well as loss of habitat that affects many wildlife species. Roads not only fragment habitat, they are also a source of direct mortality for wildlife species. Power lines will present a collision risk to bird species and provide hunting perches for raptors and ravens; may have predation implications for other species. Collision risk is a particular threat for Trumpeter Swan and Sandhill Crane using riverine habitat in the Bear Lake Section.

A specific proposed project that presents threats to wildlife and wildlife habitat in the Bear Lake Section is the Gateway West Transmission Line Project (http://www.gatewaywestproject.com/). The project's approved route will run the transmission lines through riverine habitat, including Bear River crossings.

Objective	Strategy	Action(s)	Target SGCNs
Reduce impacts of roads and energy transmission projects on wildlife and wildlife habitat.	Coordinate development/ location and management of roads, power lines, pipelines, etc. to avoid important habitat areas and	Place roads and energy related infrastructure away from riparian areas and other sensitive wildlife habitat. Place new roads, power lines, and infrastructure projects along existing corridors or within other altered habitats to the extent possible.	Trumpeter Swan Sandhill Crane

Objective	Strategy	Action(s)	Target SGCNs
	minimize the impact to wildlife.	Place seasonal closures on roads to protect wildlife during critical time periods, such as wintering, breeding, fawning/calving.	
Reduce bird power line strikes and electrocutions.	Work with power companies to implement practices and install apparatus to reduce collisions and electrocutions.	Keep records of bird power line collisions and electrocutions. Monitor new power lines to document collision and electrocution concerns. Identify and map areas with power line collisions and electrocutions. Bury power lines in areas that experience bird strikes. Attach bird diverters to make power lines more visible. Modify power line structures to eliminate bird perch/roosting sites.	Trumpeter Swan Sandhill Crane

Species designation, planning & monitoring

In addition to the conservation actions to address specific threats, some species require inventory and monitoring to assess their status and distribution in Idaho. Population monitoring and surveys to determine distribution are needed for several species in the Bear Lake Section.

Objective	Strategy	Action(s)	Target SGCNs
Improve our knowledge of wildlife populations and distribution using the riverine habitat target.	Conduct surveys to monitor species populations.	In collaboration with land management agency partners and private landowners, conduct long-term monitoring surveys at established intervals to document population (as well as distribution) changes. Use volunteers, master naturalists, and citizen scientists to the extent possible.	Northern Leopard Frog
	Conduct surveys to document species presence, distribution, and abundance.	In collaboration with land management agency partners and private landowners, conduct surveys to document species presence, distribution and abundance. Use volunteers, master naturalists, and citizen scientists to the extent possible.	Western Toad Long-billed Curlew California Floater Pondsnail (*Stagnicola*) Species Group Rotund Physa Rocky Mountain Duskysnail Bear Lake Springsnail Utah Sallfly

Target: Depressional Wetlands

Depressional Wetlands account for approximately 7% of the vegetation land cover type in the Bear Lake Section. The importance of this habitat type in the Bear Lake Section is emphasized by the fact that wetlands are scarce in the Intermountain West due to the arid climate of the region (Ratti and Kadlec 1992), and account for about 1% of the surface area in the Intermountain West (Dahl 1990). The Bear Lake Section wetlands are influenced by snowmelt and rain, and range from infrequent to semipermanent or permanently flooded. In the Bear Lake Section, the target includes primarily shallow water and deep water marshes associated with the Bear Lake NWR. The target also includes wetlands associated with old oxbows and meanders of the Bear River. On the Bear Lake NWR this target provides important nesting habitat for several SGCN bird species, including Trumpeter Swan and American Bittern and colony nesting species such as White-faced Ibis, Caspian Tern, Franklin's Gull, Clark's Grebe, and Western Grebe. This target also provides habitat for Northern Leopard Frog and Western Toad.

Target Viability

Fair. Depressional wetland habitat is generally only in fair condition in the Bear Lake Section, due to impacts of water management and altered hydrologic regimes. The diversion of water from Bear River into the Bear Lake for irrigation storage purposes has altered the hydrology and natural process of large tracts of wetland habitat located at the north end of Bear Lake, much of which is encompassed in the Bear Lake NWR. The abundance of wetlands in western states has been reduced 30–91% between the 1780s and mid-1980s, with an estimated loss of 57% of historic wetlands in the Intermountain West (Dahl 1990, Ratti and Kadlec 1992). Although the rate of wetland loss nationally has slowed over time, the loss of freshwater emergent marsh habitat has continued (Dahl 2006, Copeland et al. 2010). The Bear lake watershed wetlands, now mostly comprised of Bear Lake NWR, have declined from a pre-1900 core-marsh base of 30-35,000 acres to present day core-marsh base of 17,000 acres (FWS 2013).

Trumpeter Swans, Bear Lake NWR, IDFG

Spotlight Species of Greatest Conservation Need: American Bittern

American Bittern is found seasonally in Idaho, breeding in several locations, including managed wetlands associated with State Wildlife Management Areas and National Wildlife Refuges. Nesting habitat chiefly includes freshwater wetlands with tall, emergent vegetation, primarily bulrush and cattail, and rarely dense upland vegetation surrounding wetland habitat. Most nests have been found placed over water that is 5–20 cm deep, in dense emergent vegetation, using surrounding vegetation to construct a platform. Breeding Bird Survey data indicate long-term (1966–2013) population declines in the United States and Western BBS Region of −1.5% and −3.4% per year, respectively. BBS data also indicate both long-term (1966–2013) and short-term (2003–2013) declines in Idaho of greater than −15% per year; however, these trends are based upon extremely small sample sizes and should be interpreted cautiously. Surveys conducted throughout Idaho in 2005–2007 indicated that Bear Lake NWR supported the densest population of American Bitterns in the state (IDFG unpublished data). There is concern at Bear Lake NWR that the once dense population of bitterns, as documented by these surveys, has declined dramatically in recent years. Loss of suitable wetland habitat is of primary concern for American Bitterns, and managing these wetlands for the structural characteristics needed by American Bittern can be a challenge. For example, some sites may need burning to open decadent stands of bulrush and cattail, which can be logistically and financially difficult to accomplish. Impacts of climate change, particularly from drought, are also of concern for this species. Declines in the US may indicate a northern population shift, in part because of habitat destruction and drought at the southern extent of this species' range.

American Bittern, IDFG

Prioritized Threats and Strategies for Depressional Wetlands

High rated threats to Depressional Wetlands in the Bear Lake Section

Mining

This threat specifically refers to the Paris Hills Mine, an underground phosphate mine located near Paris, Idaho. The mine and supporting infrastructure will affect upland sagebrush-steppe habitat; however, the higher concern at this point in the project is that ground water will accumulate in the mine and will need to be pumped from the mine back into the ground. This process may affect wetlands in the valley floor. Anticipated contaminate levels in the waste water are unknown, as are potential negative impacts to wetland habitat and associated wildlife species.

Objective	Strategy	Action(s)	Target SGCNs
Reduce potential effects from mining waste water to wetland habitat and associated fish and wildlife species.	Work with mining company to reduce effects to fish and wildlife and key habitats.	Gain a better understanding of the level and types of contaminates in the waste water and the potential effects on wetland habitat and wildlife from contaminates. Explore alternative techniques to dispose of waste water in order to reduce negative effects.	Western Toad Northern Leopard Frog Trumpeter Swan Western Grebe Clark's Grebe American Bittern White-faced Ibis Sandhill Crane Franklin's Gull California Gull Caspian Tern Black Tern

Invasive aquatic plants & invertebrates

There is an increasing threat to wetland habitat from invasive aquatic plants and invertebrates. This threat includes plants such as purple loosestrife (*Lythrum salicaria*) and phragmites (*Phragmites australis*) and invertebrates such as quagga mussel (*Dreissena bugensis*) and zebra mussel (*Dreissena polymorpha*). These invasive species are transported into areas by boats, vehicles, and on boots and clothing. Once in an area they are easily dispersed in the aquatic system and difficult to control.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the risk of invasive species infestations.	Continue/expand monitoring/control of invasive species.	Explore opportunities for additional funds for increased resources and personnel if needed. Use volunteers and citizen scientists to detect and control invasive species.	Western Toad Northern Leopard Frog Trumpeter Swan Sandhill Crane California Gull Caspian Tern
	Use boat wash stations.	Continue the current Idaho Department of Agriculture program administered at key points. Ensure that boaters using Bear Lake are checked and have access to a boat wash station.	Western Toad Northern Leopard Frog Trumpeter Swan Sandhill Crane California Gull Caspian Tern
	Educate the public on detection and control of invasive species.	Collaboration between resource management agencies and conservation NGOs to develop education materials for public land users and private landowners. These materials should include identification information as well as control measures. Develop an outreach program to distribute materials and provide technical support.	Western Toad Northern Leopard Frog Trumpeter Swan Sandhill Crane California Gull Caspian Tern

Dam management/water storage

Dams that control the flow of water through the Bear Lake NWR marsh for irrigation storage impact the wetlands. The Bear Lake National Wildlife Refuge and Oxford Slough Waterfowl Production Area Comprehensive Conservation Plan states water level management is the overriding factor affecting habitat management strategies for wildlife, particularly nesting birds on the Bear Lake NWR (FWS 2013). The document further summarizes the following alterations and impacts. Alterations: (1) The Bear River now flows into Bear Lake; (2) Bear Lake and Bear Lake NWR marsh have been separated and now serve as irrigation function; (3) Water control structures are used to regulate water levels. Impacts: (1) The marsh now functions as a turbid, brought-flow system as opposed to the historic freshwater discharge system; (2) Sediment deposition occurs at a greater frequency; (3) Excessive turbidity decreases plant germination and growth; (4) Natural spring high water runoff has been replaced with water levels that are regulated annually, rather than seasonally, for storage of spring runoff and release of stored water in summer; (5) Absence of drought has led to less frequency of disturbance (e.g., fire), which has resulted in more homogenous emergent plant communities.

Objective	Strategy	Action(s)	Target SGCNs
Maintain/protect or restore natural wetlands to mimic historic function and value.	Work with private landowners and land managers to identify opportunities to restore, enhance, preserve, and protect wetlands.	Work with partners to secure adequate water supplies for managed wetlands and terminal basins to conserve their ecological integrity and functional values. Work with partners, such as Ducks Unlimited, to identify areas historically classified as natural wetlands and have hydrologic potential for restoration.	Western Toad Northern Leopard Frog Trumpeter Swan Western Grebe Clark's Grebe American Bittern White-faced Ibis Sandhill Crane Franklin's Gull California Gull Caspian Tern Black Tern
Reduce water usage to ensure appropriate water levels in Bear Lake, Bear River, and associated wetlands.	Enroll/maintain acreage in CRP/SAFE and other land conservation programs.	Encourage landowners to work with NRCS to use wildlife conservation practices on private range and agricultural lands.	Western Toad Northern Leopard Frog Trumpeter Swan Western Grebe Clark's Grebe American Bittern White-faced Ibis Sandhill Crane Franklin's Gull California Gull Caspian Tern Black Tern
	Ensure that water use does not exceed water right allocation.	Work with irrigation companies to ensure water use is appropriately allotted. Promote the use of improved equipment for accurate cfs measurement.	Western Toad Northern Leopard Frog Trumpeter Swan Western Grebe Clark's Grebe American Bittern White-faced Ibis Sandhill Crane Franklin's Gull California Gull Caspian Tern Black Tern
Increase island nesting habitat availability.	Work with land and water managers to identify opportunities to	Work with water managers to develop and implement water level management guidelines during the breeding season that balance irrigation and wildlife needs.	California Gull Caspian Tern

Objective	Strategy	Action(s)	Target SGCNs
	improve/enhance island nesting habitat.	Work with land managers, such as FWS, to create new nesting locations that will not be subject to water level concerns in the foreseeable future.	

Water management altering hydrograph

The diversion of water for crop and pasture irrigation affects the riverine hydrograph as well as water quality, water quantity, and has resulted in the loss and degradation of riparian habitat. The altered hydrography of the Bear River flood plain, caused by lower than normal flows in the spring and summer, reduces the viability of Depressional Wetlands. The altered hydrograph has resulted in the loss or decline of connectivity within riverine systems and between riverine and floodplain habitat. The diversion of water from streams in the spring results in lower than normal flows, rather than allowing for more natural high water runoff flows that connects and recharges the floodplain.

Objective	Strategy	Action(s)	Target SGCNs
Reduce water use to maintain a more natural hydrograph.	Enroll/maintain acreage in CRP/SAFE and other land conservation programs.	Encourage landowners to work with NRCS to use wildlife conservation practices on private range and agricultural lands.	Western Toad Northern Leopard Frog Trumpeter Swan Western Grebe Clark's Grebe American Bittern White-faced Ibis Sandhill Crane Franklin's Gull California Gull Caspian Tern Black Tern
	Water use does not exceed water right allocation.	Work with irrigation companies to ensure water use is appropriately allotted. Promote the use of improved equipment for accurate cfs measurement.	Western Toad Northern Leopard Frog Trumpeter Swan Western Grebe Clark's Grebe American Bittern White-faced Ibis Sandhill Crane Franklin's Gull California Gull Caspian Tern Black Tern

Infrastructure

Infrastructure such as roads, highways, high-voltage transmission lines, pipelines, towers, and fences can present a threat to many wildlife species. Existing infrastructure causes fragmentation, as well as loss of habitat that affects many wildlife species. Roads not only fragment habitat, they also are a source of direct mortality for wildlife species. Power lines will present a collision risk to bird species and provide hunting perches for raptors and ravens; may have predation implications for other species. Collision risk is a particular threat for Trumpeter Swan and Sandhill Crane using wetland habitat in the Bear Lake Section.

Objective	Strategy	Action(s)	Target SGCNs
Reduce bird power line strikes and electrocutions.	Work with power companies to implement practices and install apparatus to reduce collisions and electrocutions.	Keep records of bird power line collisions and electrocutions. Monitor new power lines to document collision and electrocution concerns. Identify and map areas with power line collisions and electrocutions. Bury power lines in areas that experience bird strikes. Attach bird diverters to make power lines more visible. Modify power line structures to eliminate bird perch/roosting sites.	Trumpeter Swan Sandhill Crane

Species designation, planning & monitoring

In addition to the conservation actions to address specific threats, some species require inventory and monitoring to assess their status and distribution in Idaho. Population monitoring and surveys to determine distribution are needed for several species in the Bear Lake Section.

Objective	Strategy	Action(s)	Target SGCNs
Improve our knowledge of wetland dependent wildlife populations and distribution.	Conduct surveys to monitor species populations.	In collaboration with land management agency partners and private landowners, conduct long-term monitoring surveys at established intervals to document population (as well as distribution) changes. Use volunteers, master naturalists, and citizen scientists to the extent possible.	Northern Leopard Frog Trumpeter Swan American Bittern White-faced Ibis Franklin's Gull California Gull Caspian Tern
	Conduct surveys to document species presence, distribution, and abundance.	In collaboration with land management agency partners and private landowners, conduct surveys to document species presence, distribution, and abundance. Use volunteers, master naturalists, and citizen scientists to the extent possible.	Western Toad Western Grebe Clark's Grebe Black Tern

Target: Bear Lake Endemic Fish

Bear Lake contains a unique fish fauna that includes 4 endemic species: Bear Lake Whitefish, Bonneville Cisco, Bonneville Whitefish, and Bear Lake Sculpin. The Bonneville Whitefish and Bonneville Cisco provide a unique recreational opportunity on the lake. Bonneville Cutthroat Trout is present in both Bear Lake and Bear River and represent an important conservation and recreation species for the Bear Lake Section. Also present in Bear Lake are nonnative Lake Trout, Rainbow Trout, Brook Trout, Brown Trout, and Yellow Perch (*Perca flavescens*). These species provide important recreational value. Native Utah sucker (*Catostomus ardens*) and Utah chub (*Gila atraria*) are also present in the Lake. Common Carp (*Cyprinus carpio*) are present in the Bear Lake and associated wetland complex (Mud Lake) north of the Lake included in Bear Lake NWR. Carp present a conservation threat to the maintenance of quality aquatic habitat in Bear Lake, the wetland complex north of the lake, and Bear River.

Bear Lake Sculpin, IDFG

Target Viability

Good. Because Bear Lake spans both Idaho and Utah, fisheries resources in the lake are managed collaboratively by the 2 states through the implementation of the Bear Lake Fisheries Management Plan (Tolentino and Teuscher 2010). The Bear Lake Management Plan includes population objectives for endemic fish species. Endemic fish populations are monitored to ensure these population targets are being met. Lake Trout are a predatory species that may present a risk to the populations of endemic fish and other native fish species present in Bear Lake. As such, the Bear Lake Management Plan calls for adjusting Lake Trout stocking if endemic fish populations targets are not met. Nonnative recreational fish present and stocked in Bear Lake are managed to ensure the persistence of viable populations of native fish species. The implicit assumption is that if the populations of endemic fish are healthy, the entire lake ecosystem will be conserved.

Prioritized Threats and Strategies for Bear Lake Endemic Fish

High rated threats to Bear Lake Endemic Fish in the Bear Lake Section

Dam management/water storage

Water is now diverted from the Bear River into Bear Lake to store for annual irrigation needs. The current use of Bear Lake as an irrigation water storage facility results in fluctuating water levels that do not mimic the natural seasonal changes in the Lake's water elevations. Shoreline cobble provides spawning habitat for endemic fish species. Impacts to productions may occur if Bear Lake's water level recedes below areas with spawning cobble due to the drawdown for irrigation purposes.

Objective	Strategy	Action(s)	Target SGCNs
Reduce water usage to help maintain water levels above spawning areas in Bear Lake.	Enroll/maintain acreage in CRP/SAFE and other land conservation programs.	Encourage landowners to work with NRCS to use wildlife conservation practices on private range and agricultural lands.	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish Bear Lake Sculpin
	Water use does not exceed water right allocation.	Work with irrigation companies to ensure water use is appropriately allotted. Promote the use of improved equipment for accurate cfs measurement.	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish Bear Lake Sculpin
	Improve irrigation practices and equipment for more efficient use.	Convert from flood irrigation to sprinkler irrigation.	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish Bear Lake Sculpin
Improve spawning habitat.	Maintain appropriate water levels to provide adequate spawning habitat.	Work with water users and water management entities to maintain appropriate water levels.	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish Bear Lake Sculpin

Invasive aquatic plants & invertebrates

There is an increasing threat to wetland habitat from invasive aquatic plants and invertebrates. This threat includes plants such as purple loosestrife and phragmites and invertebrates such as Quagga Mussel and Zebra Mussel. These invasive species are transported into areas by boats, vehicles, and on boots and clothing. Once in an area they are easily dispersed in the aquatic system and difficult to control.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the risk of invasive species infestations.	Continue/expand monitoring/control of invasive species.	Explore opportunities for additional funds for increased resources and personnel if needed. Explore the use of volunteers and citizen scientists to detect and control invasive species.	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish Bear Lake Sculpin
	Use boat wash stations.	Continue the current Idaho Department of Agriculture program administered at key points. Ensure that boaters using Bear Lake are checked and have access to a boat wash station.	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish Bear Lake Sculpin
	Educate the public on detection and	Collaboration between resource management agencies and conservation NGOs to develop	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish

Objective	Strategy	Action(s)	Target SGCNs
	control of invasive species.	education materials for public land users and private landowners. These materials should include identification information as well as control measures. Develop an outreach program to distribute materials and provide technical support.	Bear Lake Sculpin

Medium rated threats to Bear Lake Endemic Fish in the Bear Lake Section

Predation & competition with introduced fish

Current stock rates and population levels of nonnative fish are not a high conservation concern to endemic fish populations. However, monitoring fish populations and species composition in Bear Lake will continue to be important to detect changes in population status. If changes are detected, the Bear Lake Fisheries Management Plan (Tolentino and Teuscher 2010) provides guidance.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the risk of nonnative fish to impact endemic fish populations.	State agencies will maintain nonnative fish populations at levels that allow for sustaining viable populations of native fish.	Agencies will adjust stock rates of nonnative fish if endemic populations fall below target objectives.	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish Bear Lake Sculpin
	Enforce regulations regarding the unauthorized stocking of fish.	Use public outreach to educate on the potential negative impacts to endemic fish. Use enforcement actions as necessary.	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish Bear Lake Sculpin
	Monitor for presence of undesirable species.	Continue current program to monitor Bear Lake for species composition.	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish Bear Lake Sculpin

Species designation, planning & monitoring

Objective	Strategy	Action(s)	Target SGCNs
Improve our knowledge of endemic fish populations in Bear Lake.	Maintain long-term monitoring of endemic fish populations.	In collaboration with Utah Division of Wildlife Resources conduct long-term monitoring surveys at established intervals to document population changes.	Bear Lake Whitefish Bonneville Cisco Bonneville Whitefish Bear Lake Sculpin

Target: Movement Corridor

An important wildlife movement corridor exists that links big game summer habitats north of the Bear Lake Plateau with winter range on the Plateau. The fall–winter movement through the corridor is generally southward from the Caribou–Targhee National Forest through the Sheep Creek Hills across US Highway 30, the Union Pacific Railroad tracks, and the Bear River. In the spring, deer move northward from the Bear Lake Plateau to their summer range. The most concentrated movement is through an area referred to as Rocky Point. Mule Deer mortality as they move through this corridor, due to vehicle collisions, is linked to Golden and Bald Eagle mortality resulting from vehicle collisions as well. This movement corridor may also provide a dispersal corridor for wolverine (IDFG 2014).

Target Viability

Fair. US Highway 30 and Union Pacific Railroad bisect the wildlife movement corridor. The highway is used extensively by commercial semitrucks as a shortcut between Interstates 15 and 80. An estimated 3,000 Mule Deer move through this corridor to winter on the Bear Lake Plateau. Mule deer–vehicle collisions are common between Montpelier and the Wyoming border, particularly during the fall and spring migration as well as during winter months. Mule Deer mortalities provide scavenging opportunities for Bald and Golden Eagles leading to eagle–vehicle collisions and subsequent eagle mortalities.

Prioritized Threats and Strategies for the Movement Corridor

Medium rated threat to the Movement Corridor in the Bear Lake Section

Vehicle collisions

The Bear Lake Section appears to be a relatively important wintering area for Golden Eagles and Bald Eagles, based on general observations as well as Mid-Winter Bald Eagle Survey data. The average number of Golden Eagles observed during midwinter surveys 1980-2010 was six and ranged from 0–16 http://srfs.wr.usgs.gov/wintergoea/ . The average number of Bald Eagles observed during midwinter surveys 1986-2012 was 7 and ranged from 1–16 http://gis.nacse.org/eagles/routes.php. IDFG has begun placing greater emphasis on documenting and reporting wildlife roadkill in recent years and the data shows that between 2010 and 2014, 10 Golden Eagle and 7 Bald Eagle mortalities were reported from vehicle collisions on Hwy 30 between Montpelier and the Wyoming Border, with the highest concentration in or near the area referred to as Rocky Point https://idfg.idaho.gov/species/roadkill/list.

Objective	Strategy	Action(s)	Target SGCNs
Protect important movement habitat.	Protect connectivity habitat from development to ensure corridor remains intact and to ensure right of way for possible fencing	Obtain Conservation easements for private property with NGO or Agency. Retain BLM and IDL parcels in public ownership.	Wolverine Golden Eagle

Objective	Strategy	Action(s)	Target SGCNs
	and over/under passes.		
Reduce vehicle/wildlife collisions.	Implement animal detection and warning signs	Work with ITD to test animal detection equipment that is linked to warning signs. Work with ITD to install appropriate 'wildlife on roadway' warning signs, such as permanent signs and portable digital reader board signs.	Wolverine Golden Eagle
	Remove wildlife, particularly deer carcasses, from the road sides.	Collaborate with ITD personnel to keep road way clear of carcasses, particularly in the winter.	Wolverine Golden Eagle
	Install wildlife exclusion fencing and associated under/over passes.	Work with ITD to develop a long-range plan for wildlife exclusion fencing with under or over passes for wildlife in the Rocky Point area of US Highway 30. Work with ITD, FWS, and other entities to identify sources and secure funding for wildlife exclusion fencing and under or over passage for wildlife.	Wolverine Golden Eagle

Species designation, planning & monitoring

Roadkills, including Golden Eagle mortalities due to vehicle collisions, should be recorded in the IDFG roadkill database. IDFG and ITD should collaborate to document all roadkills, including Golden Eagle.

Objective	Strategy	Action(s)	Target SGCNs
Identify high risk areas for eagle/vehicle collisions.	Maintain records of eagle mortalities from vehicle collisions.	Coordination between IDFG and ITD to report eagle mortalities on IDFG roadkill reporting system on website.	Golden Eagle

Target: Pollinators

Pollinators provide important ecosystem functions to natural systems in the Bear Lake Section. In addition, pollinators provide an essential ecosystem service that benefits agricultural producers, agricultural consumers, and gardeners (Mader et al. 2011). Two butterflies (Kriemhild Fritillary and Monarch) and 4 bees (Western Bumble Bee, Suckley's Cuckoo Bumble Bee, Hunt's Bumble Bee, and Morrison's Bumble Bee) comprise the group of 6 SGCN pollinators that are known to occur within this section. However, little is known about species distribution and population status.

Target Viability

The viability of this target is not well understood in the Bear Lake Section. However, many pollinators, but particularly bees, are known to be experiencing population declines throughout North America (Mader et al. 2011), and those declines may be occurring within the Bear Lake Section as well. Population declines and local die-offs occur for a variety of reasons including habitat loss, pesticide exposure, and climate change (Mader et al. 2011). Farmers, habitat managers, roadway authorities, municipalities, and homeowners can all contribute to pollinator conservation.

Prioritized Threats and Strategies for Pollinators

High rated threats to Pollinators in the Bear Lake Section

Habitat loss & degradation

Pollinators require foraging and nesting habitat. Providing both types of habitat within close proximity to each other is the best way to ensure pollinator success. Educating land managers about techniques to reduce land management impacts to pollinators is an essential component to pollinator habitat management. Protecting, enhancing, and creating pollinator habitat can provide a positive way to engage with local communities.

Objective	Strategy	Action(s)	Target SGCNs
Reduce impact of land management practices on pollinators.	Educate about and implement practices that benefit pollinators.	Promote the reduction of grazing impacts by limiting grazing to one third to one fourth of management areas per season (Mader et al. 2011). Promote the implementation of pollinator beneficial mowing techniques including use of flushing bar, cutting at ≤8 mph, maintaining a high minimum cutting height of ≥12–16 inches, mowing only in daylight hours, and mow in a mosaic instead of an entire site (Mader et al. 2011). Where prescribed fire is used, promote the implementation of pollinator friendly burning protocols including rotational burning of ≤30% of each site every few years, leave small unburned patches intact, avoid burning too frequently (no more than every 5–10 years), avoid high intensity fires unless the burn goal is tree removal. Work with ITD to implement proper roadside pollinator habitat management.	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch
	Conserve existing pollinator habitat.	Conduct surveys for native milkweed. Initiate seed saving program. Map existing major known pollinator habitat. Identify and recognize landowners providing pollinator habitat and provide habitat management educational opportunity.	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch
Create new urban and rural pollinator habitat.	Develop programs to encourage urban landowners to create pollinator habitat.	Provide pollinator habitat workshops and educational materials for homeowners and rural land owners. Explore ways to provide an incentive program for homeowners to create pollinator habitat. Work with municipalities and businesses to create urban pollinator habitat. Promote the use of and provide bee nest boxes.	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch

Pesticides

Pollinators are negatively affected by pesticides by absorbing pesticides through the exoskeleton, drinking nectar containing pesticides, and carrying pollen laced with pesticides back to colonies (Mader et al. 2011). Neonicotinoids are particularly harmful to bee populations and can cause dramatic die-offs (Hopwood et al. 2012). Although the most effective strategy for benefitting pollinators is to eliminate pesticide use, significant benefit for pollinators can still be achieved through reducing use of and pollinator exposure to pesticides (Mader et al. 2011).

Objective	Strategy	Action(s)	Target SGCNs
Reduce native pollinator exposure to pesticides.	Educate habitat managers, farmers, municipalities, and small property owners in methods to reduce or eliminate pesticide use.	Collaborate with partners to develop and distribute educational materials, including the use of workshops and seminars that encourage the elimination and reduction of pesticide use where practical. As well as provide techniques to do so, such as, apply the minimum amount of chemical necessary and apply when pollinators are least active (i.e., nighttime and when flowers are not blooming) (Mader et al. 2011). Specifically target urban homeowners in educational efforts in the elimination of or proper application of pesticides. Conduct workshops that discuss pesticides in relation to other pollinator habitat management concerns.	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch
	Eliminate use of neonicotinoid insecticides (Hopwood et al. 2012).	Develop and distribute educational material on the detrimental effects of neonicotinoids on bees (Hopwood et al. 2012). Distribute to municipalities, counties, agriculture producers, habitat managers, and other property owners. Do not employ the use of neonicotinoids on IDFG administered lands (Hopwood et al. 2012).	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch
	Reduce native pollinator exposure to pesticides on IDFG administered property.	Use the minimum recommended amount of pesticide. Apply pesticides at times when pollinators are least active such as nighttime, cool periods, low wind activity, and when flowers are not blooming. Mow or otherwise remove flowering weeds before applying pesticides.	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch

Species designation, planning & monitoring

In addition to the conservation actions to address specific threats, some species require inventory and monitoring to assess their status and distribution in Idaho. Having a better understanding of species distribution and population status will enhance the effectiveness of other conservation strategies and actions. Population monitoring and surveys to determine distribution are needed for the SGCN pollinator species in the Bear Lake Section.

Objective	Strategy	Action(s)	Target SGCNs
Improve our knowledge of pollinator populations and distribution.	Conduct surveys to document species presence, distribution, and population status.	Conduct surveys to determine species breeding sites and colonies. Establish long-term monitoring programs. Use volunteers, master naturalists, and citizen scientists to assist with surveys and monitoring.	Hunt's Bumble Bee Morrison's Bumble Bee Western Bumble Bee Suckley's Cuckoo Bumble Bee Kriemhild Fritillary Monarch

Bear Lake Section Team

An initial version of the Bear Lake Section project plan was completed for the 2005 Idaho State Wildlife Action Plan (formerly Comprehensive Wildlife Conservation Strategy). A small working group developed an initial draft of the Section Plan (Miradi v. 0.4), which was then reviewed by a wider group of partners and stakeholders during a 2-day workshop held at the Idaho Department of Fish and Game Pocatello office, Idaho in August 2014 (this input was captured in Miradi v. 0.5). That draft was then subsequently distributed for additional stakeholder input including a 1-day meeting in November 2014 and March 2015. Since then, we have continued to work with key internal and external stakeholders to improve upon the plan. Individuals, agencies, and organizations involved in this plan are listed in Table 14.3.

Table 14.3 Individuals, agencies, and organizations involved in developing this plan [a]

First name	Last name	Affiliation
Martha	Wackenhut*[b]	Idaho Department of Fish and Game, Southeast Region
Quinn	Shurtliff*	Gonzales–Stoller Surveillance, LLC(GSS)
Becky	Abel	Idaho Department of Fish and Game, Southeast Region
Ryan	Hillyard	Idaho Department of Fish and Game, Southeast Region
Ty	Matthews	US Fish and Wildlife Service
Cary	Myler	US Fish and Wildlife Service
Devon	Green	US Forest Service, Caribou–Targhee NF
James	Kumm	Bureau of Land Management (US) (retired)
Charles	Peterson	Idaho State University
Jerry	DeBacker	Sagebrush Steppe Land Trust (retired)

[a] Apologies for any inadvertent omissions.
[b] An asterisk "*" denotes team leader(s) and contact point if you would like to become involved in this work.

Appendixes

Appendix A: Annotated Checklist of Idaho Vertebrates, 2015

Introduction

This checklist serves as a taxonomic resource and reference for scientists, students, amateur naturalists, and others interested in the extant vertebrate fauna of Idaho. Species included in this checklist are restricted to those substantiated by published reports; consequently, they meet the criteria of the peer-review process. The contents of this checklist represent a consensus among the authors and other experts in the field; however, it does not imply complete agreement on all issues.

In the current checklist, for bats, we added one new genus *Tadarida* based on updated distributional records. Also, one new genus, *Pipistrellus* was replaced by *Parastrellus* (Hoofer and Van Den Bussche 2003; Hoofer et al. 2006). Lemoine et al. (2014) described a new species of sculpin, *Cottus schitsuumsh* (Cedar Sculpin), from portions of northern Idaho (the Coeur d'Alene and St. Joe rivers) and western Montana (Clark Fork River). Benkman et al. (2009) described a new species of the Red Crossbill (*Loxia curvirostra*) from Idaho, the South Hills Crossbill (*Loxia sinesciuris* Benkman), which is endemic to the South Hills and Albion Mountains of southern Idaho. Following the publication of this paper, Benkman submitted a proposal to the American Ornithologists' Union (AOU) Committee on Classification and Nomenclature of North and Middle American Birds ("North American Classification Committee," NACC) recommending that the committee recognize the South Hills Crossbill as a new species of Red Crossbill. The proposal was considered but not accepted by the committee (Chesser et al. 2010). That said, given the complexity of Red Crossbill systematics, and the compelling evidence presented by Benkman et al. (2009), we have chosen to recognize South Hills Crossbill as a distinct population in Idaho.

Hoisington–Lopez et al. (2012) demonstrated with nDNA and mtDNA that differentiation between the 2 subspecies of Idaho ground squirrels—*Urocitellus brunneus brunneus* and *Urocitellus brunneus endemicus*—is high and there has been no migration between *U. b. brunneus* and *U. b. endemicus* since their divergence. Furthermore, the authors demonstrated that the 2 taxa inhabit different niches, which provides the opportunity for divergence to occur via differential adaptation. Hoisington–Lopez et al. (2012) further contended that these data, coupled with morphological differentiation documented by Yensen and Sherman (1997), provide compelling evidence that *U. b. brunneus* and *U. b. endemicus* should be elevated to species status, as advocated by Yensen and Sherman (1997). We therefore recognize Northern Idaho Ground Squirrel (*Urocitellus brunneus*) and Southern Idaho Ground Squirrel (*Urocitellus endemicus*) as distinct species.

With few exceptions, common names are adapted from Stebbins (2003) for amphibians and reptiles.

Standard English common names of species are capitalized following conventions adopted by the American Fisheries Society (Page et al. 2013), American Ornithologists' Union (American Ornithologists' Union 2015), and the Society for the Study of Amphibians and Reptiles ([SSAR]

Society for the Study of Amphibians and Reptiles 2015). Exceptions to this include hybrids (e.g., splake) and common names for taxa above the species level (e.g., trout-perches, colubrids), which are not capitalized.

Plan of the List

The list is presented in a phylogenetic sequence of families as is generally understood. Arrangement of the classes, orders, and families generally follows Page et al. (2013) for fishes, American Ornithologists' Union (2015) for birds, Bradley et al. (2014) for mammals. Within families, genera and species are listed alphabetically for fishes, amphibians, mammals, and reptiles; bird species are presented in phylogenetic sequence.

Table A-1. Annotated checklist of Idaho vertebrates, 2015 [a] Bold typeface denotes species of greatest conservation need

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
CLASS PETROMYZONTIDA—LAMPREYS							
ORDER PETROMYZONTIFORMES—LAMPREYS							
Family Petromyzontidae—lampreys							
***Entosphenus tridentatus* (Pacific Lamprey)**	G4	S1				Type 2	E
CLASS ACTINOPTERYGII—RAY-FINNED FISHES							
ORDER ACIPENSERIFORMES—STURGEONS, SPOONFISHES, AND PADDLEFISHES							
Family Acipenseridae—sturgeons							
Acipenser transmontanus (White Sturgeon)	G4	S2				Type 2	GF
***Acipenser transmontanus* (White Sturgeon [Kootenai River DPS])**	G4T1Q	S1	E			Type 1	E
ORDER CLUPEIFORMES—ANCHOVIES AND HERRINGS							
Family Clupeidae—herrings							
Alosa sapidissima (American Shad) I	G5	SNA					GF
ORDER CYPRINIFORMES—MINNOWS AND SUCKERS							
Family Cyprinidae—carps and minnows							
Acrocheilus alutaceus (Chiselmouth)	G5	S4					UW
Carassius auratus (Goldfish) I	G5	SNA					
Couesius plumbeus (Lake Chub)	G5	S3					UW
Ctenopharyngodon idella (Grass Carp) I	G5	SNA					I
Cyprinus carpio (Common Carp) I	G5	SNA					
Gila atraria (Utah Chub)	G5	S4					UW
***Lepidomeda copei* (Northern Leatherside Chub)**	G3	S2			S	Type 2	PNS
Mylocheilus caurinus (Peamouth)	G5	S3					UW
Notropis hudsonius (Spottail Shiner) I	G5	SNA					
Pimephales promelas (Fathead Minnow) I	G5	SNA					
Ptychocheilus oregonensis (Northern Pikeminnow)	G5	S4					UW
Rhinichthys cataractae (Longnose Dace)	G5	S4					UW
Rhinichthys falcatus (Leopard Dace)	G4	S3					UW
Rhinichthys osculus (Speckled Dace)	G5	S5					UW
Rhinichthys umatilla (Umatilla Dace)	G4	S4					UW
Richardsonius balteatus (Redside Shiner)	G5	S5					UW
Siphateles bicolor (Tui Chub) I	G4	SNA					
Tinca tinca (Tench) I	G5	SNA					
Family Catostomidae—suckers							
Catostomus ardens (Utah Sucker)	G5	S4					UW
Catostomus catostomus (Longnose Sucker)	G5	S3					UW
Catostomus columbianus (Bridgelip Sucker)	G5	S4					UW
Catostomus discobolus (Bluehead Sucker)	G4	S3					PNS
Catostomus macrocheilus (Largescale Sucker)	G5	S4					UW
Catostomus platyrhynchus (Mountain Sucker)	G5	S4					UW
Family Cobitidae—loaches							
Misgurnus anguillicaudatus (Oriental Weatherfish) I	G5	SNA					
ORDER SILURIFORMES—CATFISHES							
Family Ictaluridae—North American catfishes							
Ameiurus melas (Black Bullhead) I	G5	SNA					GF
Ameiurus natalis (Yellow Bullhead) I	G5	SNA					GF
Ameiurus nebulosus (Brown Bullhead) I	G5	SNA					GF
Ictalurus furcatus (Blue Catfish) I	G5	SNA					GF
Ictalurus punctatus (Channel Catfish) I	G5	SNA					GF
Noturus gyrinus (Tadpole Madtom) I	G5	SNA					
Pylodictis olivaris (Flathead Catfish) I	G5	SNA					GF
ORDER OSMERIFORMES—SMELTS							

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Family Osmeridae—smelts							
Osmerus mordax (Rainbow Smelt) I	G5	SNA					
ORDER SALMONIFORMES—SALMONS							
Family Salmonidae—trouts and salmons							
Coregonus clupeaformis (Lake Whitefish) I	G5	SNA					GF
Oncorhynchus aguabonita (Golden Trout) I	G5T1	SNA					GF
Oncorhynchus clarkii × O. mykiss (cutbow trout) I		SNA					GF
Oncorhynchus clarkii bouvieri (Yellowstone Cutthroat Trout)	G4T4	S4			S	Type 2	GF
Oncorhynchus clarkii henshawi (Lahontan Cutthroat Trout) I	G4T3	SNA					GF
Oncorhynchus clarkii lewisi (Westslope Cutthroat Trout)	G4T4	S4			S	Type 2	GF
Oncorhynchus clarkii utah (Bonneville Cutthroat Trout)	G4T4	S4			S	Type 2	GF
Oncorhynchus kisutch (Coho Salmon) I	G4	SNA				Type 2	GF
Oncorhynchus mykiss (Rainbow Trout) I	G5	SNA					GF
Oncorhynchus mykiss gairdneri (Redband Trout and Redband Steelhead)	G5T4	S4				Type 2	GF
***Oncorhynchus mykiss* (Steelhead [Snake River Basin DPS])**	G5T2T3Q	S2S3	T		T	Type 1	GF, T
***Oncorhynchus nerka* (Sockeye Salmon [Snake River ESU])**	G5T1Q	S1	E		E	Type 1	GF, E
Oncorhynchus nerka (Kokanee)	G5	SNR					GF
***Oncorhynchus tshawytscha* (Chinook Salmon [Snake River fall-run ESU])**	G5T1Q	S1	T		T	Type 1	GF, T
***Oncorhynchus tshawytscha* (Chinook Salmon [Snake River spring/summer-run ESU])**	G5T1Q	S1	T		T	Type 1	GF, T
***Prosopium abyssicola* (Bear Lake Whitefish)**	G1	S1					GF
Prosopium coulterii (Pygmy Whitefish)	G5	S4					GF
***Prosopium gemmifer* (Bonneville Cisco)**	G3	S3				Type 2	GF
***Prosopium spilonotus* (Bonneville Whitefish)**	G3	S3				Type 2	GF
Prosopium williamsoni (Mountain Whitefish)	G5	S5			S		GF
Salmo salar (Atlantic Salmon) I	G5	SNA					GF
Salmo trutta (Brown Trout) I	G5	SNA					GF
Salvelinus alpinus (Arctic Char) I	G5	SNA					
Salvelinus alpinus oquassa (Sunapee Trout) I	G5T3T4Q	SNA					GF
Salvelinus confluentus (Bull Trout)	G4	S4	T		T	Type 1	GF, T
Salvelinus fontinalis (Brook Trout) I	G5	SNA					GF
Salvelinus fontinalis × S. namaycush (splake) I	GNA	SNA					GF
Salvelinus namaycush (Lake Trout) I	G5	SNA					GF
Thymallus arcticus (Arctic Grayling) I	G5	SNA					GF
ORDER ESOCIFORMES—PIKES AND MUDMINNOWS							
Family Esocidae—pikes and mudminnows							
Esox lucius (Northern Pike) I	G5	SNA					GF
Esox lucius × E. masquinongy (tiger muskellunge) I	GNA	SNA					GF
ORDER PERCOPSIFORMES—TROUT-PERCHES							
Family Percopsidae—trout-perches							
Percopsis transmontana (Sand Roller)	G4	S2					PNS
ORDER GADIFORMES—CODS AND HAKES							
Family Gadidae—cods							
***Lota lota* (Burbot)**	G5	S1				Type 2	GF, E
ORDER CYPRINODONTIFORMES—KILLIFISHES							
Family Poeciliidae—livebearers							
Gambusia affinis (Western Mosquitofish) I	G5	SNA					
Poecilia mexicana (Shortfin Molly) I	G5	SNA					
Poecilia reticulata (Guppy) I	G5	SNA					
Xiphophorus hellerii (Green Swordtail) I	G5	SNA					
ORDER SCORPAENIFORMES—MAIL-CHEEKED FISHES, SCORPIONFISHES, AND SCULPINS							
Family Cottidae—sculpins							
Cottus bairdii (Mottled Sculpin)	G5	S4					UW

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Cottus beldingii (Paiute Sculpin)	G5	S4					UW
Cottus cognatus (Slimy Sculpin)	G5	S3					UW
Cottus confusus (Shorthead Sculpin)	G5	S5					UW
***Cottus extensus* (Bear Lake Sculpin)**	G3	S3				Type 2	PNS
Cottus greenei (Shoshone Sculpin)	G2	S2				Type 2	PNS
Cottus leiopomus (Wood River Sculpin)	G2	S2			S	Type 2	PNS
Cottus rhotheus (Torrent Sculpin)	G5	S3					UW
Cottus schitsuumsh (Cedar Sculpin)	GNR	SNR				Type 2	UW
ORDER PERCIFORMES—PERCH-LIKE FISHES							
Family Centrarchidae—sunfishes							
Lepomis cyanellus (Green Sunfish) I	G5	SNA					GF
Lepomis gibbosus (Pumpkinseed) I	G5	SNA					GF
Lepomis gibbosus × *L. macrochirus* (Pumpkinseed × Bluegill) I		SNA					GF
Lepomis gulosus (Warmouth) I	G5	SNA					GF
Lepomis macrochirus (Bluegill) I	G5	SNA					GF
Micropterus dolomieu (Smallmouth Bass) I	G5	SNA					GF
Micropterus salmoides (Largemouth Bass) I	G5	SNA					GF
Pomoxis annularis (White Crappie) I	G5	SNA					GF
Pomoxis nigromaculatus (Black Crappie) I	G5	SNA					GF
Family Percidae—perches and darters							
Perca flavescens (Yellow Perch) I	G5	SNA					GF
Sander canadensis (Sauger) I	G5	SNA					GF
Sander vitreus (Walleye) I	G5	SNA					GF
Family Cichlidae—cichlids and tilapias							
Amatitlania nigrofasciata (Convict Cichlid) I	G5	SNA					
Oreochromis aureus (Blue Tilapia) I	G5	SNA					
Oreochromis mossambicus (Mozambique Tilapia) I	G5	SNA					
Tilapia zillii (Redbelly Tilapia) I	G5	SNA					
CLASS AMPHIBIA—AMPHIBIANS							
ORDER ANURA—FROGS AND TOADS							
Family Ascaphidae—tailed frogs							
Ascaphus montanus (Rocky Mountain Tailed Frog)	G4	S3					PNS
Family Bufonidae—toads							
***Anaxyrus boreas* (Western Toad)**	G4	S2		S	S	Type 2	PNS
***Anaxyrus woodhousii* (Woodhouse's Toad)**	G5	S2				Type 2	PNS
Family Hylidae—treefrogs							
Pseudacris maculata (Boreal Chorus Frog)	G5	S4					PNS
Pseudacris sierra (Sierran Treefrog)	G5	S5					PNS
Family Ranidae—true frogs							
Lithobates catesbeianus (American Bullfrog) I	G5	SNA					GF, I
***Lithobates pipiens* (Northern Leopard Frog)**	G5	S2				Type 2	PNS
Rana luteiventris (Columbia Spotted Frog)	G4	S4			S		PNS
***Rana luteiventris* (Columbia Spotted Frog [Great Basin DPS])**	G4T2T3Q	S2			S	Type 2	PNS
Family Scaphiopodidae—North American spadefoots							
Spea intermontana (Great Basin Spadefoot)	G5	S4					PNS
ORDER CAUDATA—SALAMANDERS							
Family Ambystomatidae—mole salamanders							
Ambystoma macrodactylum (Long-toed Salamander)	G5	S5					PNS
Ambystoma mavortium (Western Tiger Salamander)	G5	S4					PNS
Family Dicamptodontidae—giant salamanders							
Dicamptodon aterrimus (Idaho Giant Salamander)	G3G4	S4				Type 2	PNS
Family Plethodontidae—lungless salamanders							
Plethodon idahoensis (Coeur d'Alene Salamander)	G4	S3		S		Type 2	PNS
Family Salamandridae—newts							
Taricha granulosa (Rough-skinned Newt) I	G5	SNA					I

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
CLASS AVES—BIRDS							
ORDER ANSERIFORMES—SCREAMERS, SWANS, GEESE, AND DUCKS							
Family Anatidae—ducks, geese, and swans							
Anser albifrons (Greater White-fronted Goose)	G5	S4M					MGB
Chen canagica (Emperor Goose) A	G3G4	SNA					MGB
Chen caerulescens (Snow Goose)	G5	S5M					MGB
Chen rossii (Ross's Goose)	G4	S3M					MGB
Branta bernicla (Brant)	G5	SNA					MGB
Branta hutchinsii (Cackling Goose)	G5	SNR					UW
Branta canadensis (Canada Goose)	G5	S5B, S5N					MGB
Cygnus olor (Mute Swan) I	G5	SNA					
***Cygnus buccinator* (Trumpeter Swan)**	G4	S1B, S4N			S	Type 2	MGB
Cygnus columbianus (Tundra Swan)	G5	S4N, S4M					MGB
Aix sponsa (Wood Duck)	G5	S4B, S4N					MGB
Anas strepera (Gadwall)	G5	S3					MGB
Anas penelope (Eurasian Wigeon)	G5	S1N					MGB
Anas americana (American Wigeon)	G5	S4B, S4N					MGB
Anas rubripes (American Black Duck) A	G5	SNA					MGB
Anas platyrhynchos (Mallard)	G5	S4B, S4N					MGB
Anas discors (Blue-winged Teal)	G5	S2B					MGB
Anas cyanoptera (Cinnamon Teal)	G5	S4B					MGB
Anas clypeata (Northern Shoveler)	G5	S4B, S4N					MGB
Anas acuta (Northern Pintail)	G5	S4B, S4N					MGB
Anas querquedula (Garganey) A	G5	SNA					UW
Anas crecca (Green-winged Teal)	G5	S4B, S4N					MGB
Aythya valisineria (Canvasback)	G5	S3B, S3N					MGB
Aythya americana (Redhead)	G5	S4					MGB
Aythya collaris (Ring-necked Duck)	G5	S4B, S4N					MGB
Aythya fuligula (Tufted Duck) A	G5	SNA					UW
Aythya marila (Greater Scaup)	G5	SNA					MGB
Aythya affinis (Lesser Scaup)	G5	S3B, S3N					MGB
***Histrionicus histrionicus* (Harlequin Duck)**	G4	S1B		S	S	Type 2	MGB
Melanitta perspicillata (Surf Scoter) A	G5	SNA					MGB
Melanitta fusca (White-winged Scoter) A	G5	SNA					MGB
Melanitta americana (Black Scoter) A	G5	SNA					UW
Clangula hyemalis (Long-tailed Duck)	G5	S1N					MGB
Bucephala albeola (Bufflehead)	G5	S1B, S1N					MGB
Bucephala clangula (Common Goldeneye)	G5	S5B, S5N					MGB
Bucephala islandica (Barrow's Goldeneye)	G5	S3B, S3N					MGB
Lophodytes cucullatus (Hooded Merganser)	G5	S4B, S4N					MGB
Mergus merganser (Common Merganser)	G5	S3					MGB
Mergus serrator (Red-breasted Merganser)	G5	S1M					MGB
Oxyura jamaicensis (Ruddy Duck)	G5	S2					MGB
ORDER GALLIFORMES—GALLINACEOUS BIRDS							
Family Odontophoridae—New World quail							
***Oreortyx pictus* (Mountain Quail)**	G5	S2		S	S	Type 2	UGB
Callipepla californica (California Quail) I	G5	SNA					UGB
Callipepla gambelii (Gambel's Quail) I	G5	SNA					UGB
Colinus virginianus (Northern Bobwhite) I	G5	SNA					UGB
Family Phasianidae—partridges, grouse, turkeys, and Old World quail							
Alectoris chukar (Chukar) I	G5	SNA					UGB
Perdix perdix (Gray Partridge) I	G5	SNA					UGB
Phasianus colchicus (Ring-necked Pheasant) I	G5	SNA					UGB
Bonasa umbellus (Ruffed Grouse)	G5	S4					UGB

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
***Centrocercus urophasianus* (Greater Sage-Grouse)**	G3G4	S3			S	Type 2	UGB
Falcipennis canadensis (Spruce Grouse)	G5	S4					UGB
Lagopus leucura (White-tailed Ptarmigan)	G5	SNA					UW
Dendragapus obscurus (Dusky Grouse)	G5	S5					UGB
***Tympanuchus phasianellus* (Sharp-tailed Grouse)**	G4T3	S3			S	Type 2	UGB
Meleagris gallopavo (Wild Turkey) I	G5	SNA					UGB
ORDER GAVIIFORMES—LOONS							
Family Gaviidae—loons							
Gavia stellata (Red-throated Loon) A	G5	SNA					PNS
Gavia pacifica (Pacific Loon)	G5	SNA					PNS
***Gavia immer* (Common Loon)**	G5	S1B, S2N		S	S		PNS
Gavia adamsii (Yellow-billed Loon) A	G4	SNA					PNS
ORDER PODICIPEDIFORMES—GREBES							
Family Podicipedidae—grebes							
Podilymbus podiceps (Pied-billed Grebe)	G5	S3					PNS
Podiceps auritus (Horned Grebe)	G5	S2N					PNS
Podiceps grisegena (Red-necked Grebe)	G5	S2B					PNS
Podiceps nigricollis (Eared Grebe)	G5	S2B, S1N					PNS
***Aechmophorus occidentalis* (Western Grebe)**	G5	S2B					PNS
***Aechmophorus clarkii* (Clark's Grebe)**	G5	S2B					PNS
ORDER CICONIIFORMES—STORKS							
Family Ciconiidae—storks							
Mycteria americana (Wood Stork) A	G4	SNA					PNS
ORDER SULIFORMES—FRIGATEBIRDS, BOOBIES, CORMORANTS, DARTERS, AND ALLIES							
Family Phalacrocoracidae—cormorants							
Phalacrocorax auritus (Double-crested Cormorant)	G5	S4B					PNS
ORDER PELECANIFORMES—PELICANS, HERONS, IBISES, AND ALLIES							
Family Pelecanidae—pelicans							
***Pelecanus erythrorhynchos* (American White Pelican)**	G4	S3B					PNS
Family Ardeidae—herons, bitterns, and allies							
***Botaurus lentiginosus* (American Bittern)**	G4	S1B					PNS
Ixobrychus exilis (Least Bittern) A	G5	SNA					PNS
Ardea herodias (Great Blue Heron)	G5	S5B					PNS
Ardea alba (Great Egret)	G5	S2B					PNS
Egretta thula (Snowy Egret)	G5	S1B					PNS
Egretta caerulea (Little Blue Heron) A	G5	SNA					PNS
Egretta tricolor (Tricolored Heron) A	G5	SNA					PNS
Bubulcus ibis (Cattle Egret)	G5	S1B					PNS
Butorides virescens (Green Heron) A	G5	SNA					PNS
Nycticorax nycticorax (Black-crowned Night-Heron)	G5	S2B, S2N					PNS
Family Threskiornithidae—ibises and spoonbills							
Eudocimus albus (White Ibis) A	G5	SNA					PNS
Plegadis falcinellus (Glossy Ibis)	G5	S1B					PNS
***Plegadis chihi* (White-faced Ibis)**	G5	S2B					PNS
ORDER ACCIPITRIFORMES—HAWKS, KITES, EAGLES, AND ALLIES							
Family Cathartidae—New World vultures							
Cathartes aura (Turkey Vulture)	G5	S5B					PNS
Family Pandionidae—ospreys							
Pandion haliaetus (Osprey)	G5	S4B					PNS
Family Accipitridae—hawks, kites, eagles, and allies							
Elanus leucurus (White-tailed Kite) A	G5	SNA					PNS
Haliaeetus leucocephalus (Bald Eagle)	G5	S5		S	S	Type 2	PNS
Circus cyaneus (Northern Harrier)	G5	S4					PNS
Accipiter striatus (Sharp-shinned Hawk)	G5	S4					PNS

Table A-1. Annotated checklist of Idaho vertebrates, 2015. Continued

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Accipiter cooperii (Cooper's Hawk)	G5	S4					PNS
Accipiter gentilis (Northern Goshawk)	G5	S3			S	Type 2	PNS
Buteo lineatus (Red-shouldered Hawk) A	G5	SNA					PNS
Buteo platypterus (Broad-winged Hawk)	G5	SNA					PNS
Buteo swainsoni (Swainson's Hawk)	G5	S5B					PNS
Buteo jamaicensis (Red-tailed Hawk)	G5	S4					PNS
***Buteo regalis* (Ferruginous Hawk)**	G4	S3B				Type 2	PNS
Buteo lagopus (Rough-legged Hawk)	G5	S4N					PNS
***Aquila chrysaetos* (Golden Eagle)**	G5	S3				Type 2	PNS
ORDER GRUIFORMES—RAILS, CRANES, AND ALLIES							
Family Rallidae—rails, gallinules, and coots							
Coturnicops noveboracensis (Yellow Rail) A	G4	SNA					PNS
Rallus limicola (Virginia Rail)	G5	S3B, S2N					PNS
Porzana carolina (Sora)	G5	S4B, S1N					PNS
Gallinula chloropus (Common Moorhen) A	G5	SNA					PNS
Fulica americana (American Coot)	G5	S4B, S4N					MGB
Family Gruidae—cranes							
***Grus canadensis* (Sandhill Crane)**	G5	S3B					MGB
Grus americana (Whooping Crane) A I	G1	SNA	XN		E		
ORDER CHARADRIIFORMES—SHOREBIRDS, GULLS, AUKS, AND ALLIES							
Family Recurvirostridae—stilts and avocets							
Himantopus mexicanus (Black-necked Stilt)	G5	S4B					PNS
Recurvirostra americana (American Avocet)	G5	S3B, S3M					PNS
Family Haematopodidae—oystercatchers							
Haematopus palliatus (American Oystercatcher) A	G5	SNA					PNS
Family Charadriidae—lapwings and plovers							
Pluvialis squatarola (Black-bellied Plover)	G5	S1M					PNS
Pluvialis dominica (American Golden-Plover)	G5	S1M					PNS
Charadrius nivosus (Snowy Plover) A	G3	SNA					PNS
Charadrius semipalmatus (Semipalmated Plover)	G5	S1M					PNS
Charadrius vociferus (Killdeer)	G5	S4B, S4N					PNS
Charadrius montanus (Mountain Plover) A	G3	SNA					PNS
Family Scolopacidae—sandpipers, phalaropes, and allies							
Actitis macularius (Spotted Sandpiper)	G5	S3B					PNS
Tringa solitaria (Solitary Sandpiper)	G5	S1M					PNS
Tringa melanoleuca (Greater Yellowlegs)	G5	S3M					PNS
Tringa semipalmata (Willet)	G5	S3B					PNS
Tringa flavipes (Lesser Yellowlegs)	G5	S2M					PNS
Bartramia longicauda (Upland Sandpiper)	G5	S1B					PNS
Numenius phaeopus (Whimbrel)	G5	SNA					PNS
***Numenius americanus* (Long-billed Curlew)**	G5	S2B				Type 2	PNS
Limosa haemastica (Hudsonian Godwit) A	G4	SNA					PNS
Limosa fedoa (Marbled Godwit)	G5	S2M					PNS
Arenaria interpres (Ruddy Turnstone) A	G5	SNA					PNS
Calidris canutus (Red Knot) A	G4	SNA					PNS
Calidris pugnax (Ruff) A	G5	SNA					PNS
Calidris acuminata (Sharp-tailed Sandpiper) A	G5	SNA					PNS
Calidris himantopus (Stilt Sandpiper)	G5	SNA					PNS
Calidris alba (Sanderling)	G5	S1M					PNS
Calidris alpina (Dunlin)	G5	S1M					PNS
Calidris bairdii (Baird's Sandpiper)	G5	S2M					PNS
Calidris minutilla (Least Sandpiper)	G5	S3M					PNS
Calidris fuscicollis (White-rumped Sandpiper) A	G5	SNA					PNS
Calidris subruficollis (Buff-breasted Sandpiper) A	G4	SNA					PNS

Table A-1. Annotated checklist of Idaho vertebrates, 2015. Continued

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Calidris melanotos (Pectoral Sandpiper)	G5	S2M					PNS
Calidris pusilla (Semipalmated Sandpiper)	G5	S1M					PNS
Calidris mauri (Western Sandpiper)	G5	S3M					PNS
Limnodromus griseus (Short-billed Dowitcher)	G5	SNA					PNS
Limnodromus scolopaceus (Long-billed Dowitcher)	G5	S4M					PNS
Gallinago delicata (Wilson's Snipe)	G5	S4B, S3N					MGB
Phalaropus tricolor (Wilson's Phalarope)	G5	S4B					PNS
Phalaropus lobatus (Red-necked Phalarope)	G4G5	S3M					PNS
Phalaropus fulicarius (Red Phalarope) A	G5	SNA					PNS
Family Stercorariidae—skuas and jaegers							
Stercorarius pomarinus (Pomarine Jaeger) A	G5	SNA					PNS
Stercorarius parasiticus (Parasitic Jaeger)	G5	SNA					PNS
Stercorarius longicaudus (Long-tailed Jaeger) A	G5	SNA					PNS
Family Alcidae—auks, murres, and puffins							
Synthliboramphus antiquus (Ancient Murrelet) A	G4	SNA					PNS
Family Laridae—gulls, terns, and skimmers							
Rissa tridactyla (Black-legged Kittiwake) A	G5	SNA					PNS
Xema sabini (Sabine's Gull)	G5	SNA					PNS
Chroicocephalus philadelphia (Bonaparte's Gull)	G5	S3M					PNS
Hydrocoloeus minutus (Little Gull) A	G5	SNA					PNS
Rhodostethia rosea (Ross's Gull) A	G3G4	SNA					PNS
***Leucophaeus pipixcan* (Franklin's Gull)**	G4G5	S3B					PNS
Larus canus (Mew Gull) A	G5	SNA					PNS
***Larus delawarensis* (Ring-billed Gull)**	G5	S2B, S2N					PNS
Larus occidentalis (Western Gull) A	G5	SNA					PNS
***Larus californicus* (California Gull)**	G5	S3B, S2N					PNS
Larus argentatus (Herring Gull)	G5	S2N					PNS
Larus thayeri (Thayer's Gull) A	G5	SNA					PNS
Larus glaucoides (Iceland Gull) A	G5	SNA					PNS
Larus fuscus (Lesser Black-backed Gull) A	G5	SNA					PNS
Larus schistisagus (Slaty-backed Gull) A	G5	SNA					PNS
Larus glaucescens (Glaucous-winged Gull)	G5	S1N					PNS
Larus hyperboreus (Glaucous Gull) A	G5	SNA					PNS
Larus marinus (Great Black-backed Gull) A	G5	SNA					PNS
Sternula antillarum (Least Tern) A	G4	SNA					PNS
***Hydroprogne caspia* (Caspian Tern)**	G5	S1B					PNS
***Chlidonias niger* (Black Tern)**	G4	S2B				Type 2	PNS
Sterna hirundo (Common Tern)	G5	SNA					PNS
Sterna paradisaea (Arctic Tern)	G5	SNA					PNS
Sterna forsteri (Forster's Tern)	G5	S2B					PNS
ORDER COLUMBIFORMES—PIGEONS AND DOVES							
Family Columbidae—pigeons and doves							
Columba livia (Rock Pigeon) I	G5	SNA					
Patagioenas fasciata (Band-tailed Pigeon)	G4	SNA					PNS
Streptopelia decaocto (Eurasian Collared-Dove) I	G5	SNA					
Ectopistes migratorius (Passenger Pigeon)	GX	SX					PNS
Zenaida asiatica (White-winged Dove) A	G5	SNA					PNS
Zenaida macroura (Mourning Dove)	G5	S5					MGB
ORDER CUCULIFORMES—CUCKOOS AND ALLIES							
Family Cuculidae—cuckoos, roadrunners, and anis							
***Coccyzus americanus* (Yellow-billed Cuckoo)**	G5	S1B	T		S	Type 1	PNS
Coccyzus erythropthalmus (Black-billed Cuckoo) A	G5	SNA					PNS
ORDER STRIGIFORMES—OWLS							
Family Tytonidae—barn owls							
Tyto alba (Barn Owl)	G5	S4					PNS

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Family Strigidae—typical owls							
Psiloscops flammeolus (Flammulated Owl)	G4	S3B		S	S	Type 2	PNS
Megascops kennicottii (Western Screech-Owl)	G5	S1					PNS
Bubo virginianus (Great Horned Owl)	G5	S5					PNS
Bubo scandiacus (Snowy Owl)	G5	SNA					PNS
Surnia ulula (Northern Hawk Owl)	G5	SNR					PNS
Glaucidium gnoma (Northern Pygmy-Owl)	G4G5	S3					PNS
***Athene cunicularia* (Burrowing Owl)**	G4	S2B				Type 2	PNS
Strix varia (Barred Owl)	G5	S4					PNS
***Strix nebulosa* (Great Gray Owl)**	G5	S3			S		PNS
Asio otus (Long-eared Owl)	G5	S5					PNS
***Asio flammeus* (Short-eared Owl)**	G5	S3				Type 2	PNS
Aegolius funereus (Boreal Owl)	G5	S1			S		PNS
Aegolius acadicus (Northern Saw-whet Owl)	G5	S4					PNS
ORDER CAPRIMULGIFORMES—GOATSUCKERS, OILBIRDS, AND ALLIES							
Family Caprimulgidae—goatsuckers							
***Chordeiles minor* (Common Nighthawk)**	G5	S4B					PNS
Phalaenoptilus nuttallii (Common Poorwill)	G5	S4B					PNS
ORDER APODIFORMES—SWIFTS AND HUMMINGBIRDS							
Family Apodidae—swifts							
***Cypseloides niger* (Black Swift)**	G4	S1B		S		Type 2	PNS
Chaetura vauxi (Vaux's Swift)	G5	S3B				Type 2	PNS
Aeronautes saxatalis (White-throated Swift)	G5	S4B					PNS
Family Trochilidae—hummingbirds							
Archilochus colubris (Ruby-throated Hummingbird) A	G5	SNA					PNS
Archilochus alexandri (Black-chinned Hummingbird)	G5	S5B					PNS
Calypte anna (Anna's Hummingbird) A	G5	SNA					PNS
Calypte costae (Costa's Hummingbird) A	G5	SNA					PNS
Selasphorus platycercus (Broad-tailed Hummingbird)	G5	S5B					PNS
Selasphorus rufus (Rufous Hummingbird)	G5	S4B					PNS
Selasphorus calliope (Calliope Hummingbird)	G5	S4B					PNS
Cynanthus latirostris (Broad-billed Hummingbird) A	G4	SNA					PNS
ORDER CORACIIFORMES—ROLLERS, MOTMOTS, KINGFISHERS, AND ALLIES							
Family Alcedinidae—kingfishers							
Megaceryle alcyon (Belted Kingfisher)	G5	S4					PNS
ORDER PICIFORMES—PUFFBIRDS, JACAMARS, TOUCANS, WOODPECKERS, AND ALLIES							
Family Picidae—woodpeckers and allies							
***Melanerpes lewis* (Lewis's Woodpecker)**	G4	S3B				Type 2	PNS
Melanerpes erythrocephalus (Red-headed Woodpecker) A	G5	SNA					PNS
Melanerpes carolinus (Red-bellied Woodpecker) A	G5	SNA					PNS
Sphyrapicus thyroideus (Williamson's Sapsucker)	G5	S4B					PNS
Sphyrapicus varius (Yellow-bellied Sapsucker) A	G5	SNA					PNS
Sphyrapicus nuchalis (Red-naped Sapsucker)	G5	S4B					PNS
Sphyrapicus ruber (Red-breasted Sapsucker) A	G5	SNA					PNS
Picoides pubescens (Downy Woodpecker)	G5	S4					PNS
Picoides villosus (Hairy Woodpecker)	G5	S4					PNS
***Picoides albolarvatus* (White-headed Woodpecker)**	G4	S2		S	S	Type 2	PNS
Picoides dorsalis (American Three-toed Woodpecker)	G5	S4			S		PNS
Picoides arcticus (Black-backed Woodpecker)	G5	S4		S			PNS
Colaptes auratus (Northern Flicker)	G5	S5					PNS
Dryocopus pileatus (Pileated Woodpecker)	G5	S4					PNS
ORDER FALCONIFORMES—CARACARAS AND FALCONS							
Family Falconidae—caracaras and falcons							
Caracara cheriway (Crested Caracara) A	G5	SNA					PNS

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Falco sparverius (American Kestrel)	G5	S4					PNS
Falco columbarius (Merlin)	G5	S4					PNS
Falco rusticolus (Gyrfalcon)	G5	SNA					PNS
Falco peregrinus (Peregrine Falcon)	G4	S3B		S	S		PNS
Falco mexicanus (Prairie Falcon)	G5	S4					PNS
ORDER PASSERIFORMES—PASSERINE BIRDS							
Family Tyrannidae—tyrant flycatchers							
***Contopus cooperi* (Olive-sided Flycatcher)**	G4	S3B				Type 2	PNS
Contopus sordidulus (Western Wood-Pewee)	G5	S5B					PNS
Empidonax traillii (Willow Flycatcher)	G5	S4B				Type 2	PNS
Empidonax minimus (Least Flycatcher)	G5	S2B					PNS
Empidonax hammondii (Hammond's Flycatcher)	G5	S5B					PNS
Empidonax wrightii (Gray Flycatcher)	G5	S4B					PNS
Empidonax oberholseri (Dusky Flycatcher)	G5	S4B					PNS
Empidonax occidentalis (Cordilleran Flycatcher)	G5	S5B					PNS
Sayornis nigricans (Black Phoebe) A	G5	SNA					PNS
Sayornis phoebe (Eastern Phoebe) A	G5	SNA					PNS
Sayornis saya (Say's Phoebe)	G5	S5B					PNS
Myiarchus cinerascens (Ash-throated Flycatcher)	G5	S4B					PNS
Tyrannus melancholicus (Tropical Kingbird) A	G5	SNA					PNS
Tyrannus vociferans (Cassin's Kingbird) A	G5	SNA					PNS
Tyrannus verticalis (Western Kingbird)	G5	S5B					PNS
Tyrannus tyrannus (Eastern Kingbird)	G5	S5B					PNS
Tyrannus forficatus (Scissor-tailed Flycatcher) A	G5	SNA					PNS
Tyrannus savana (Fork-tailed Flycatcher) A	GNR	SNA					PNS
Family Laniidae—shrikes							
Lanius ludovicianus (Loggerhead Shrike)	G4	S3				Type 2	PNS
Lanius excubitor (Northern Shrike)	G5	S3N					PNS
Family Vireonidae—vireos							
Vireo bellii (Bell's Vireo) A	G5	SNA					UW
Vireo flavifrons (Yellow-throated Vireo) A	G5	SNA					PNS
Vireo plumbeus (Plumbeous Vireo)	G5	S2B					PNS
Vireo cassinii (Cassin's Vireo)	G5	S5B					PNS
Vireo solitarius (Blue-headed Vireo)	G5	SNA					PNS
Vireo gilvus (Warbling Vireo)	G5	S5B					PNS
Vireo philadelphicus (Philadelphia Vireo) A	G5	SNA					PNS
Vireo olivaceus (Red-eyed Vireo)	G5	S4B					PNS
Family Corvidae—crows and jays							
Perisoreus canadensis (Gray Jay)	G5	S2					PNS
***Gymnorhinus cyanocephalus* (Pinyon Jay)**	G5	S3				Type 2	PNS
Cyanocitta stelleri (Steller's Jay)	G5	S5					PNS
Cyanocitta cristata (Blue Jay)	G5	S1N					PNS
Aphelocoma californica (Western Scrub-Jay)	G5	S3					PNS
***Nucifraga columbiana* (Clark's Nutcracker)**	G5	S2					PNS
Pica hudsonia (Black-billed Magpie)	G5	S5					PNS
Corvus brachyrhynchos (American Crow)	G5	S5					MGB
Corvus corax (Common Raven)	G5	S5					PNS
Family Alaudidae—larks							
Eremophila alpestris (Horned Lark)	G5	S5					PNS
Family Hirundinidae—swallows							
Progne subis (Purple Martin) A	G5	SNA					PNS
Tachycineta bicolor (Tree Swallow)	G5	S5B					PNS
Tachycineta thalassina (Violet-green Swallow)	G5	S5B					PNS
Stelgidopteryx serripennis (Northern Rough-winged Swallow)	G5	S4B					PNS
Riparia riparia (Bank Swallow)	G5	S4B					PNS

Table A-1. Annotated checklist of Idaho vertebrates, 2015. Continued

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Petrochelidon pyrrhonota (Cliff Swallow)	G5	S5B					PNS
Hirundo rustica (Barn Swallow)	G5	S5B					PNS
Family Paridae—chickadees and titmice							
Poecile atricapillus (Black-capped Chickadee)	G5	S4					PNS
Poecile gambeli (Mountain Chickadee)	G5	S4					PNS
Poecile rufescens (Chestnut-backed Chickadee)	G5	S5					PNS
Poecile hudsonicus (Boreal Chickadee)	G5	S1					PNS
Baeolophus ridgwayi (Juniper Titmouse)	G5	S1					PNS
Family Aegithalidae—long-tailed tits and bushtits							
Psaltriparus minimus (Bushtit)	G5	S3					PNS
Family Sittidae—nuthatches							
Sitta canadensis (Red-breasted Nuthatch)	G5	S4					PNS
Sitta carolinensis (White-breasted Nuthatch)	G5	S4					PNS
Sitta pygmaea (Pygmy Nuthatch)	G5	S4		S			PNS
Family Certhiidae—creepers							
Certhia americana (Brown Creeper)	G5	S4					PNS
Family Troglodytidae—wrens							
Salpinctes obsoletus (Rock Wren)	G5	S5B					PNS
Catherpes mexicanus (Canyon Wren)	G5	S5					PNS
Troglodytes aedon (House Wren)	G5	S4B					PNS
Troglodytes pacificus (Pacific Wren)	G5	S4					PNS
Cistothorus palustris (Marsh Wren)	G5	S5B, S5N					PNS
Thryomanes bewickii (Bewick's Wren)	G5	S3					PNS
Family Polioptilidae—gnatcatchers and gnatwrens							
Polioptila caerulea (Blue-gray Gnatcatcher)	G5	S5B					PNS
Family Cinclidae—dippers							
Cinclus mexicanus (American Dipper)	G5	S3					PNS
Family Regulidae—kinglets							
Regulus satrapa (Golden-crowned Kinglet)	G5	S5					PNS
Regulus calendula (Ruby-crowned Kinglet)	G5	S4					PNS
Family Turdidae—thrushes							
Sialia mexicana (Western Bluebird)	G5	S3B					PNS
Sialia currucoides (Mountain Bluebird)	G5	S5B					PNS
Myadestes townsendi (Townsend's Solitaire)	G5	S5					PNS
Catharus fuscescens (Veery)	G5	S3B					PNS
Catharus minimus (Gray-cheeked Thrush) A	G5	SNA					PNS
Catharus ustulatus (Swainson's Thrush)	G5	S5B					PNS
Catharus guttatus (Hermit Thrush)	G5	S4B					PNS
Hylocichla mustelina (Wood Thrush) A	G5	SNA					PNS
Turdus migratorius (American Robin)	G5	S5					PNS
Ixoreus naevius (Varied Thrush)	G5	S4					PNS
Family Mimidae—mockingbirds and thrashers							
Dumetella carolinensis (Gray Catbird)	G5	S5B					PNS
Toxostoma curvirostre (Curve-billed Thrasher) A	G5	SNA					PNS
Toxostoma rufum (Brown Thrasher) A	G5	SNA					PNS
***Oreoscoptes montanus* (Sage Thrasher)**	G5	S3B				Type 2	PNS
Mimus polyglottos (Northern Mockingbird)	G5	S1B					PNS
Family Sturnidae—starlings							
Sturnus vulgaris (European Starling) I	G5	SNA					PW
Family Prunellidae—accentors							
Prunella montanella (Siberian Accentor) A	GNA	SNA					PNS
Family Motacillidae—wagtails and pipits							
Anthus rubescens (American Pipit)	G5	S3B					PNS
Family Bombycillidae—waxwings							
Bombycilla garrulus (Bohemian Waxwing)	G5	S4N					PNS

Table A-1. Annotated checklist of Idaho vertebrates, 2015. Continued

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Bombycilla cedrorum (Cedar Waxwing)	G5	S5					PNS
Family Calcariidae—longspurs and snow buntings							
Calcarius lapponicus (Lapland Longspur)	G5	S1N					PNS
Calcarius ornatus (Chestnut-collared Longspur) A	G5	SNA					PNS
Rhynchophanes mccownii (McCown's Longspur) A	G4	SNA					PNS
Plectrophenax nivalis (Snow Bunting)	G5	S4N					PNS
Family Parulidae—wood-warblers							
Seiurus aurocapilla (Ovenbird)	G5	SNA					PNS
Parkesia noveboracensis (Northern Waterthrush)	G5	S4B					PNS
Vermivora chrysoptera (Golden-winged Warbler) A	G4	SNA					PNS
Vermivora cyanoptera (Blue-winged Warbler) A	G5	SNA					PNS
Mniotilta varia (Black-and-white Warbler)	G5	SNA					PNS
Protonotaria citrea (Prothonotary Warbler) A	G5	SNA					PNS
Oreothlypis peregrina (Tennessee Warbler) A	G5	SNA					PNS
Oreothlypis celata (Orange-crowned Warbler)	G5	S4B					PNS
Oreothlypis luciae (Lucy's Warbler) A	G5	SNA					PNS
Oreothlypis ruficapilla (Nashville Warbler)	G5	S4B					PNS
Oreothlypis virginiae (Virginia's Warbler)	G5	S3B				Type 2	PNS
Oporornis agilis (Connecticut Warbler) A	G4	SNA					PNS
Geothlypis tolmiei (MacGillivray's Warbler)	G5	S5B					PNS
Geothlypis trichas (Common Yellowthroat)	G5	S5B					PNS
Setophaga citrina (Hooded Warbler) A	G5	SNA					PNS
Setophaga ruticilla (American Redstart)	G5	S2B					PNS
Setophaga tigrina (Cape May Warbler) A	G5	SNA					PNS
Setophaga americana (Northern Parula) A	G5	SNA					PNS
Setophaga magnolia (Magnolia Warbler)	G5	SNA					PNS
Setophaga castanea (Bay-breasted Warbler) A	G5	SNA					PNS
Setophaga fusca (Blackburnian Warbler) A	G5	SNA					PNS
Setophaga petechia (Yellow Warbler)	G5	S5B					PNS
Setophaga pensylvanica (Chestnut-sided Warbler)	G5	SNA					PNS
Setophaga striata (Blackpoll Warbler)	G5	SNA					PNS
Setophaga caerulescens (Black-throated Blue Warbler) A	G5	SNA					PNS
Setophaga palmarum (Palm Warbler) A	G5	SNA					PNS
Setophaga pinus (Pine Warbler) A	G5	SNA					PNS
Setophaga coronata (Yellow-rumped Warbler)	G5	S5					PNS
Setophaga dominica (Yellow-throated Warbler) A	G5	SNA					PNS
Setophaga nigrescens (Black-throated Gray Warbler)	G5	S4B					PNS
Setophaga townsendi (Townsend's Warbler)	G5	S5B					PNS
Setophaga occidentalis (Hermit Warbler) A	G4G5	SNA					PNS
Setophaga virens (Black-throated Green Warbler) A	G5	SNA					PNS
Cardellina pusilla (Wilson's Warbler)	G5	S4B					PNS
Icteria virens (Yellow-breasted Chat)	G5	S4B					PNS
Family Emberizidae—emberizids							
Pipilo chlorurus (Green-tailed Towhee)	G5	S4B				Type 2	PNS
Pipilo maculatus (Spotted Towhee)	G5	S4					PNS
Pipilo erythrophthalmus (Eastern Towhee) A	G5	SNA					PNS
Peucaea cassinii (Cassin's Sparrow) A	G5	SNA					PNS
Spizella arborea (American Tree Sparrow)	G5	S3N					PNS
Spizella passerina (Chipping Sparrow)	G5	S5B					PNS
Spizella pallida (Clay-colored Sparrow) A	G5	SNA					PNS
Spizella breweri (Brewer's Sparrow)	G5	S4B				Type 2	PNS
Pooecetes gramineus (Vesper Sparrow)	G5	S5B					PNS
Chondestes grammacus (Lark Sparrow)	G5	S4B					PNS
Amphispiza bilineata (Black-throated Sparrow)	G5	S2B				Type 2	PNS
***Artemisiospiza nevadensis* (Sagebrush Sparrow)**	G5	S3B				Type 2	PNS

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Calamospiza melanocorys (Lark Bunting)	G5	S1B					PNS
Passerculus sandwichensis (Savannah Sparrow)	G5	S5B					PNS
***Ammodramus savannarum* (Grasshopper Sparrow)**	G5	S3B				Type 2	PNS
Ammodramus leconteii (Le Conte's Sparrow) A	G4	SNA					PNS
Passerella iliaca (Fox Sparrow)	G5	S4B					PNS
Melospiza melodia (Song Sparrow)	G5	S5					PNS
Melospiza lincolnii (Lincoln's Sparrow)	G5	S5B					PNS
Melospiza georgiana (Swamp Sparrow) A	G5	SNA					PNS
Zonotrichia albicollis (White-throated Sparrow)	G5	S1N					PNS
Zonotrichia querula (Harris's Sparrow)	G5	SNA					PNS
Zonotrichia leucophrys (White-crowned Sparrow)	G5	S5					PNS
Zonotrichia atricapilla (Golden-crowned Sparrow)	G5	SNA					PNS
Junco hyemalis (Dark-eyed Junco)	G5	S5					PNS
Family Cardinalidae—cardinals, saltators, and allies							
Piranga rubra (Summer Tanager) A	G5	SNA					PNS
Piranga olivacea (Scarlet Tanager) A	G5	SNA					PNS
Piranga ludoviciana (Western Tanager)	G5	S5B					PNS
Pheucticus ludovicianus (Rose-breasted Grosbeak)	G5	SNA					PNS
Pheucticus melanocephalus (Black-headed Grosbeak)	G5	S5B					PNS
Passerina caerulea (Blue Grosbeak)	G5	S1B					PNS
Passerina amoena (Lazuli Bunting)	G5	S4B					PNS
Passerina cyanea (Indigo Bunting)	G5	SNA					PNS
Spiza americana (Dickcissel) A	G5	SNA					PNS
Family Icteridae—blackbirds							
***Dolichonyx oryzivorus* (Bobolink)**	G5	S2B					PNS
Agelaius phoeniceus (Red-winged Blackbird)	G5	S5					PNS
Sturnella neglecta (Western Meadowlark)	G5	S5					PNS
Xanthocephalus xanthocephalus (Yellow-headed Blackbird)	G5	S4B					PNS
Euphagus carolinus (Rusty Blackbird) A	G4	SNA					PNS
Euphagus cyanocephalus (Brewer's Blackbird)	G5	S4					PNS
Quiscalus quiscula (Common Grackle)	G5	S1B					PNS
Quiscalus mexicanus (Great-tailed Grackle)	G5	S1B					PNS
Molothrus ater (Brown-headed Cowbird)	G5	S5B					PNS
Icterus cucullatus (Hooded Oriole) A	G5	SNA					PNS
Icterus bullockii (Bullock's Oriole)	G5	S4B					PNS
Icterus galbula (Baltimore Oriole) A	G5	SNA					UW
Icterus parisorum (Scott's Oriole)	G5	S1B					PNS
Family Fringillidae—fringilline and cardueline finches and allies							
Fringilla montifringilla (Brambling) A	GNR	SNA					PNS
Leucosticte tephrocotis (Gray-crowned Rosy-Finch)	G5	S4					PNS
***Leucosticte atrata* (Black Rosy-Finch)**	G4	S2					PNS
Pinicola enucleator (Pine Grosbeak)	G5	S4					PNS
Haemorhous mexicanus (House Finch)	G5	S4					PNS
Haemorhous purpureus (Purple Finch) A	G5	SNA					PNS
Haemorhous cassinii (Cassin's Finch)	G5	S4				Type 2	PNS
Loxia curvirostra (Red Crossbill)	G5	S4					PNS
***Loxia curvirostra* (Red Crossbill [South Hills pop.])**	GNR	S1					PNS
Loxia leucoptera (White-winged Crossbill)	G5	S4					PNS
Acanthis flammea (Common Redpoll)	G5	S3N					PNS
Acanthis hornemanni (Hoary Redpoll) A	G5	SNA					PNS
Spinus pinus (Pine Siskin)	G5	S4					PNS
Spinus psaltria (Lesser Goldfinch)	G5	S5					PNS
Spinus tristis (American Goldfinch)	G5	S5					PNS
Coccothraustes vespertinus (Evening Grosbeak)	G5	S4					PNS
Family Passeridae—Old World sparrows							

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Passer domesticus (House Sparrow) I	G5	SNA					
CLASS MAMMALIA—MAMMALS							
ORDER DIDELPHIMORPHIA—OPOSSUMS							
Family Didelphidae—opossums							
Didelphis virginiana (Virginia Opossum) I	G5	SNA					
ORDER LAGOMORPHA—PIKAS, HARES, AND RABBITS							
Family Leporidae—hares and rabbits							
***Brachylagus idahoensis* (Pygmy Rabbit)**	G4	S3			S	Type 2	UGA
Lepus americanus (Snowshoe Hare)	G5	S3					UGA
Lepus californicus (Black-tailed Jackrabbit)	G5	S4					PW
Lepus townsendii (White-tailed Jackrabbit)	G5	S4					PW
Sylvilagus floridanus (Eastern Cottontail) I	G5	SNA					
Sylvilagus nuttallii (Mountain Cottontail)	G5	S4					UGA
Family Ochotonidae—pikas							
Ochotona princeps (American Pika)	G5	S3					PNS
ORDER SORICOMORPHA—INSECTIVORES							
Family Soricidae—shrews							
Sorex cinereus (Cinereus or Masked Shrew)	G5	S5					UW
Sorex hoyi (American Pygmy Shrew)	G5	S4					UW
Sorex merriami (Merriam's Shrew)	G5	S4					UW
Sorex monticolus (Dusky or Montane Shrew)	G5	S5					UW
Sorex nanus (Dwarf Shrew)	G4	S2					UW
Sorex palustris (American Water Shrew)	G5	S4					UW
Sorex vagrans (Vagrant Shrew)	G5	S5					UW
Family Talpidae—moles							
Scapanus orarius (Coast Mole)	G5	S3				Type 2	UW
ORDER CHIROPTERA—BATS							
Family Molossidae—free-tailed bats							
Tadarida brasiliensis (Brazilian Free-tailed Bat) A	G5	SNA					PNS
Family Vespertilionidae—vesper bats							
Antrozous pallidus (Pallid Bat)	G5	S3				Type 2	PNS
***Corynorhinus townsendii* (Townsend's Big-eared Bat)**	G3G4	S3		S	S	Type 2	PNS
Eptesicus fuscus (Big Brown Bat)	G5	S3				Type 2	PNS
Euderma maculatum (Spotted Bat)	G4	S3			S	Type 2	PNS
***Lasionycteris noctivagans* (Silver-haired Bat)**	G4	S3				Type 2	PNS
***Lasiurus cinereus* (Hoary Bat)**	G4	S3				Type 2	PNS
Myotis californicus (California Myotis)	G5	S3				Type 2	PNS
***Myotis ciliolabrum* (Western Small-footed Myotis)**	G4G5	S3				Type 2	PNS
Myotis evotis (Long-eared Myotis)	G4G5	S3				Type 2	PNS
***Myotis lucifugus* (Little Brown Myotis)**	G3	S3				Type 2	PNS
Myotis thysanodes (Fringed Myotis)	G4	S3		S		Type 2	PNS
Myotis volans (Long-legged Myotis)	G4G5	S3				Type 2	PNS
Myotis yumanensis (Yuma Myotis)	G4G5	S3				Type 2	PNS
Parastrellus hesperus (Canyon Bat)	G5	S3				Type 2	PNS
ORDER CARNIVORA—CARNIVORES							
Family Canidae—dogs, foxes, and wolves							
Canis latrans (Coyote)	G5	S5					PW
Canis lupus (Gray Wolf)	G4G5	S4		S	S	Type 2	BG
Vulpes macrotis (Kit Fox)	G4	S2				Type 2	PNS
Vulpes vulpes (Red Fox)	G5	S4					F
Family Felidae—cats							
Lynx canadensis (Canada Lynx) A	G5	SNA	T		T	Type 1	F, T
Lynx rufus (Bobcat)	G5	S4					F
Puma concolor (Mountain Lion, Cougar, or Puma)	G5	S5					BG
Family Mephitidae—skunks							

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Mephitis mephitis (Striped Skunk)	G5	S4					PW
Spilogale gracilis (Western Spotted Skunk)	G5	S4					PW
Family Mustelidae—weasels, otters, and badgers							
***Gulo gulo* (Wolverine)**	G4	S1		S	P	Type 2	PNS
Lontra canadensis (Northern River Otter)	G5	S4					F
Martes americana (American Marten)	G5	S5					F
Mustela erminea (Ermine or Short-tailed Weasel)	G5	S4					PW
Mustela frenata (Long-tailed Weasel)	G5	S5					PW
Vison vison (American Mink)	G5	S3					F
***Pekania pennanti* (Fisher)**	G5	S2		S	S	Type 2	F
Taxidea taxus (American Badger)	G5	S4					F
Family Procyonidae—raccoons, ringtails, and coatis							
Bassariscus astutus (Ringtail) A	G5	SNA					UW
Procyon lotor (Northern Raccoon)	G5	S5					PW
Family Ursidae—bears							
Ursus americanus (American Black Bear)	G5	S4					BG
***Ursus arctos* (Grizzly Bear)**	G4	S2	T		T	Type 1	BG
ORDER PERISSODACTYLA—ODD-TOED UNGULATES							
Family Equidae—horses and asses							
Equus caballus (Feral Horse) I	GNA	SNA					
ORDER ARTIODACTYLA—EVEN-TOED UNGULATES							
Family Antilocapridae—pronghorn							
Antilocapra americana (Pronghorn)	G5	S4					BG
Family Bovidae—cattle, antelope, sheep, goats, and African exotics							
Bos bison (American Bison) A	G4	SNA					UW
***Oreamnos americanus* (Mountain Goat)**	G5	S3					BG
***Ovis canadensis* (Bighorn Sheep)**	G4	S2		S	S	Type 2	BG
Family Cervidae—deer							
Alces americanus (Moose)	G5	S3					BG
Cervus canadensis (Elk)	G5	S5					BG
Odocoileus hemionus (Mule Deer)	G5	S4					BG
Odocoileus virginianus (White-tailed Deer)	G5	S5					BG
***Rangifer tarandus* (Caribou)**	G5T4	S1	E			Type 1	E
ORDER RODENTIA—RODENTS							
Family Castoridae—beavers							
Castor canadensis (American Beaver)	G5	S4					F
Family Cricetidae—New World mice, rats, and voles							
Lemmiscus curtatus (Sagebrush Vole)	G5	S5					UW
Microtus longicaudus (Long-tailed Vole)	G5	S5					UW
Microtus montanus (Montane Vole)	G5	S4					UW
Microtus pennsylvanicus (Meadow Vole)	G5	S5					UW
Microtus richardsoni (North American or Water Vole)	G5	S4					UW
Myodes gapperi (Southern Red-backed Vole)	G5	S4					UW
Neotoma cinerea (Bushy-tailed Woodrat)	G5	S5					UW
Neotoma lepida (Desert Woodrat)	G5	S4					UW
Ondatra zibethicus (Common Muskrat)	G5	S4					F
Onychomys leucogaster (Northern Grasshopper Mouse)	G5	S4					UW
Peromyscus crinitus (Canyon Deermouse)	G5	S5					UW
Peromyscus maniculatus (North American Deermouse)	G5	S5					UW
Peromyscus truei (Piñon Deermouse)	G5	S3					UW
Phenacomys intermedius (Western Heather Vole)	G5	S5					UW
Reithrodontomys megalotis (Western Harvest Mouse)	G5	S4					UW
***Synaptomys borealis* (Northern Bog Lemming)**	G5	S3		S			UW
Family Dipodidae—jumping mice							
Zapus princeps (Western Jumping Mouse)	G5	S4					UW

Table A-1. Annotated checklist of Idaho vertebrates, 2015. Continued

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Family Erethizontidae—New World porcupines							
Erethizon dorsatum (North American Porcupine)	G5	S5					UW
Family Geomyidae—pocket gophers							
Thomomys idahoensis (Idaho Pocket Gopher)	G4	S4					UW
Thomomys talpoides (Northern Pocket Gopher)	G5	S5					UW
Thomomys townsendii (Townsend's Pocket Gopher)	G4G5	S4					UW
Family Heteromyidae—pocket mice and kangaroo rats							
Dipodomys microps (Chisel-toothed Kangaroo Rat)	G5	S4					UW
Dipodomys ordii (Ord's Kangaroo Rat)	G5	S4					UW
Microdipodops megacephalus **(Dark Kangaroo Mouse)**	G4	S1				Type 2	UW
Perognathus longimembris (Little Pocket Mouse)	G5	S1					UW
Perognathus parvus (Great Basin Pocket Mouse)	G5	S5					UW
Family Muridae—Old World mice and rats							
Mus musculus (House Mouse) I	G5	SNA					
Rattus norvegicus (Norway or Brown Rat) I	G5	SNA					
Family Sciuridae—squirrels							
Ammospermophilus leucurus (White-tailed Antelope Squirrel)	G5	S4					UW
Callospermophilus lateralis (Golden-mantled Ground Squirrel)	G5	S5					PNS
Glaucomys sabrinus (Northern Flying Squirrel)	G5	S4					PNS
Marmota caligata **(Hoary Marmot)**	G5	S4					UW
Marmota flaviventris (Yellow-bellied Marmot)	G5	S4					UW
Otospermophilus variegatus (Rock Squirrel)	G5	S4					PNS
Sciurus carolinensis (Eastern Gray Squirrel) I	G5	SNA					
Sciurus niger (Eastern Fox Squirrel) I	G5	SNA					
Tamias amoenus (Yellow-pine Chipmunk)	G5	S5					PNS
Tamias dorsalis (Cliff Chipmunk)	G5	S3					PNS
Tamias minimus (Least Chipmunk)	G5	S5					PNS
Tamias ruficaudus (Red-tailed Chipmunk)	G5	S4					PNS
Tamias umbrinus (Uinta Chipmunk)	G5	S4					PNS
Tamiasciurus hudsonicus (Red Squirrel)	G5	S5					PNS
Urocitellus armatus (Uinta Ground Squirrel)	G5	S4					UW
Urocitellus beldingi (Belding's Ground Squirrel)	G5	S4					UW
Urocitellus brunneus **(Northern Idaho Ground Squirrel)**	G2	S2	T		T	Type 1	T
Urocitellus canus **(Columbia Plateau [syn. Merriam's] Ground Squirrel)**	G4	S1				Type 2	PNS
Urocitellus columbianus (Columbian Ground Squirrel)	G5	S5					UW
Urocitellus elegans (Wyoming Ground Squirrel)	G5T4	S3					PNS
Urocitellus elegans nevadensis **(Wyoming Ground Squirrel [Southwest Idaho pop.])**	G5T4	S3					PNS
Urocitellus endemicus **(Southern Idaho Ground Squirrel)**	G2T2	S2			S	Type 2	PNS
Urocitellus mollis (Great Basin (syn. Piute) Ground Squirrel)	G5	S4				Type 2	PNS
CLASS REPTILIA—REPTILES							
ORDER SQUAMATA—LIZARDS AND SNAKES							
Family Anguidae—alligator lizards and allies							
Elgaria coerulea (Northern Alligator Lizard)	G5	S4					PNS
Family Crotaphytidae—collared and leopard lizards							
Crotaphytus bicinctores **(Great Basin Collared Lizard)**	G5	S2				Type 2	PNS
Gambelia wislizenii (Long-nosed Leopard Lizard)	G5	S4					PNS
Family Phrynosomatidae—North American spiny lizards							
Phrynosoma douglasii (Pygmy Short-horned Lizard)	G5	S4					PNS
Phrynosoma hernandesi (Greater Short-horned Lizard)	G5	S3					PNS
Phrynosoma platyrhinos (Desert Horned Lizard)	G5	S4					PNS
Sceloporus graciosus (Common Sagebrush Lizard)	G5	S5					PNS
Sceloporus occidentalis (Western Fence Lizard)	G5	S5					PNS
Uta stansburiana (Common Side-blotched Lizard)	G5	S4					PNS

Table A-1. Annotated checklist of Idaho vertebrates, 2015. Continued

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Family Scincidae—skinks							
Plestiodon skiltonianus (Western Skink)	G5	S4					PNS
Family Teiidae—whiptails and allies							
Aspidoscelis tigris (Tiger Whiptail)	G5	S4					PNS
Family Boidae—boas							
Charina bottae (Northern Rubber Boa)	G5	S5					PNS
Family Colubridae—colubrids							
Coluber constrictor (North American Racer)	G5	S5					PNS
Coluber taeniatus (Striped Whipsnake)	G5	S4					PNS
Diadophis punctatus (Ring-necked Snake)	G5	S3		S			PNS
Hypsiglena chlorophaea (Desert Nightsnake)	G5	S3					PNS
Pituophis catenifer (Gophersnake)	G5	S5					PNS
Rhinocheilus lecontei (Long-nosed Snake)	G5	S2				Type 2	PNS
Sonora semiannulata (Western Groundsnake)	G5	S3				Type 2	PNS
Thamnophis elegans (Terrestrial Gartersnake)	G5	S5					PNS
Thamnophis sirtalis (Common Gartersnake)	G5	S4					PNS
Family Viperidae—vipers							
Crotalus oreganus (Western Rattlesnake)	G5	S4					UW
Crotalus viridis (Prairie Rattlesnake)	G5	S4					PNS
ORDER TESTUDINES—TURTLES							
Family Chelydridae—snapping turtles							
Chelydra serpentina (Snapping Turtle) I	G5	SNA					I
Family Emydidae—pond turtles							
Chrysemys picta (Painted Turtle)	G5	S3					PNS
Trachemys scripta (Pond Slider) I	G5	SNA					I

Appendix B: Summary Checklist of Idaho Invertebrates, 2015

Number of Invertebrate Species Order: Family	SGCN No	Yes	SNA	Grand Total
Amphipoda	2	1		3
Crangonyctidae		1		1
Gammaridea	2			2
Anostraca	4	1		5
Branchinectidae	3	1		4
Chirocephalidae	1			1
Araneae	45			45
Agelenidae	3			3
Araneidae	4			4
Corinnidae	1			1
Dictynidae	2			2
Dysderidae	1			1
Gnaphosidae	3			3
Liocranidae	1			1
Lycosidae	7			7
Oxyopidae	1			1
Philodromidae	3			3
Pholcidae	1			1
Salticidae	6			6
Tetragnathidae	1			1
Theridiidae	3			3
Therriidae	1			1
Thomisidae	6			6
Titanoecidae	1			1
Architaenioglossa			2	2
Ampullariidae			1	1
Viviparidae			1	1
Arhynchobdellida	5			5
Erpobdellidae	4			4
Haemopidae	1			1
Astigmata	2			2
Pneumocoptidae	1			1
Psoroptidae	1			1
Basommatophora	38	4	21	63

Number of Invertebrate Species	SGCN			
Order: Family	No	Yes	SNA	Grand Total
Ancylidae	1		2	3
Carychiidae			1	1
Lymnaeidae	17	2	6	25
Physidae	8	2	3	13
Planorbidae	12		9	21
Calanoida	1			1
Diaptomidae	1			1
Chordeumatida		1		1
Conotylidae		1		1
Coleoptera	537	15	16	568
Amphizoidae	2			2
Anobiidae	1		1	2
Anthicidae	12	1	1	14
Buprestidae	10	3		13
Carabidae	136	5	7	148
Cerambycidae	32	1		33
Cetoniidae	1			1
Chrysomelidae	37			37
Chrysomeloidea	1			1
Cleridae	4			4
Coccinellidae	36			36
Cryptophagidae	2			2
Cucujidae	1			1
Cupedidae	1			1
Curculionidae	44		2	46
Dermestidae	2			2
Derodontidae	2			2
Dryopidae	1			1
Dytiscidae	11			11
Elateridae	29	1		30
Elmidae	18	1		19
Geotrupidae	1			1
Haliplidae	1			1
Heteroceridae	2			2
Histeridae	6			6
Hydraenidae	3			3
Hydrophilidae	4			4
Hydroscaphidae	1	1		2
Latridiidae	1			1

Number of Invertebrate Species	SGCN			
Order: Family	No	Yes	SNA	Grand Total
Leiodidae	3	1		4
Limnichidae	1			1
Melandryidae	1			1
Meloidae	8			8
Melolonthidae	3			3
Melyridae	12			12
Mordellidae	5			5
Nitidulidae	3			3
Oedemeridae	1			1
Phalacridae	2			2
Psephenidae	2			2
Rutelidae	1			1
Scarabaeidae	22	1	5	28
Scirtidae	1			1
Silphidae	10			10
Staphylinidae	12			12
Tenebrionidae	46			46
Trogossitidae	1			1
Zopheridae	1			1
Collembola	7			7
Arrhopalitidae	1			1
Bourletiellidae	1			1
Entomobryidae	2			2
Hypogastruridae	1			1
Isotomidae	1			1
Onychiuridae	1			1
Decapoda	2	1	3	6
Astacidae	2	1	1	4
Cambaridae			2	2
Diptera	256		1	257
Agromyzidae	3			3
Anthomyiidae	5			5
Apioceridae	1			1
Asilidae	14			14
Athericidae	1			1
Bibionidae	1			1
Blephariceridae	1			1
Bombyliidae	16			16
Calliphoridae	3			3

Number of Invertebrate Species Order: Family	SGCN No	Yes	SNA	Grand Total
Cecidomyiidae	13			13
Ceratopogonidae	2			2
Chamaemyiidae	3			3
Chironomidae	17			17
Chloropidae	15			15
Conopidae	3			3
Culicidae	2			2
Deuterophlebiidae	2			2
Dolichopodidae	2			2
Ephydridae	3			3
Keroplatidae	1			1
Lauxaniidae	1			1
Milichiidae	4			4
Muscidae	8		1	9
Oestridae	1			1
Oreoleptidae	1			1
Psilidae	1			1
Sarcophagidae	10			10
Scatopsidae	1			1
Sciomyzidae	2			2
Sepsidae	4			4
Simuliidae	7			7
Stratiomyiidae	1			1
Syrphidae	3			3
Tabanidae	5			5
Tachinidae	24			24
Tanyderidae	1			1
Tephritidae	34			34
Therevidae	35			35
Tipulidae	1			1
Ulidiidae	4			4
Ephemeroptera	96	8	1	105
Ameletidae	8	1		9
Ametropodidae	1			1
Baetidae	28			28
Baetiscidae	1			1
Caenidae	7			7
Ephemerellidae	18	2		20
Heptageniidae	19	1	1	21

Number of Invertebrate Species Order: Family	SGCN No	Yes	SNA	Grand Total
Leptohyphidae	3			3
Leptophlebiidae	8	3		11
Polymitarcyidae	1			1
Siphlonuridae	2	1		3
Haplotaxida	42	1		43
Haplotaxidae	1			1
Megascolecidae		1		1
Naididae	23			23
Tubificidae	18			18
Hemiptera	305		25	330
Acanthosomatidae	2			2
Anthocoridae	1			1
Aphididae	58		24	82
Cercopidae	2		1	3
Cicadellidae	82			82
Cicadidae	20			20
Coreidae	1			1
Corimelaenidae	1			1
Corixidae	10			10
Delphacidae	3			3
Diaspididae	1			1
Dictyopharidae	1			1
Eriococcidae	1			1
Gerridae	1			1
Lygaeidae	10			10
Membracidae	4			4
Miridae	59			59
Nabidae	2			2
Notonectidae	3			3
Ortheziidae	1			1
Pentatomidae	23			23
Pseudococcidae	2			2
Psyllidae	5			5
Reduviidae	2			2
Rhopalidae	5			5
Saldidae	1			1
Scutelleridae	2			2
Tingidae	1			1
Veliidae	1			1

Number of Invertebrate Species Order: Family	SGCN No	Yes	SNA	Grand Total
Heterostropha	4			4
Valvatidae	4			4
Hymenoptera	899	15	1	915
Ampulicidae	1			1
Andrenidae	125	5		130
Apidae	145	5	1	151
Argidae	9			9
Braconidae	10			10
Cephidae	2			2
Chalcididae	5			5
Chrysididae	19			19
Chrysidoidea	1			1
Cimbicidae	2			2
Colletidae	33	1		34
Crabonidae	1			1
Crabronidae	46			46
Diprionidae	5			5
Eulophidae	5			5
Eumenidae	15			15
Eupelmidae	1			1
Eurytomidae	2			2
Figitidae	1			1
Formicidae	92			92
Halictidae	55			55
Ichneumonidae	16			16
Masaridae	1			1
Megachilidae	159	3		162
Melittidae	2	1		3
Mutillidae	8			8
Orussidae	1			1
Pamphilidae	3			3
Perilampidae	3			3
Platygasteridae	2			2
Pompilidae	8			8
Proctotrupidae	1			1
Pteromalidae	2			2
Sapygidae	1			1
Scelionidae	7			7
Scoliidae	1			1

Number of Invertebrate Species Order: Family	SGCN No	Yes	SNA	Grand Total
Siricidae	8			8
Sphecidae	23			23
Tenthredinidae	60			60
Torymidae	1			1
Vespidae	11			11
Vespoidea	1			1
Xyelidae	5			5
Isopoda			1	1
Porcellionidae			1	1
Ixodida	2			2
Ixodidae	2			2
Lepidoptera	1054	7	55	1116
Alucitidae	2			2
Cossidae	2			2
Crambidae	15		2	17
Danaidae			1	1
Drepanidae	8			8
Elachistidae	6			6
Erebidae	96	1	8	105
Euteliidae	1			1
Gelechiidae	1			1
Gelichiidae	1			1
Geometridae	61		3	64
Hesperiidae	36		3	39
Lasiocampidae	4			4
Lycaenidae	47	2	3	52
Lyonetiidae	2			2
Noctuidae	584		13	597
Nolidae	4			4
Notodontidae	22			22
Nymphalidae	55	3	9	67
Oecophoridae	15		1	16
Papilionidae	12		3	15
Pieridae	23		4	27
Plutellidae			1	1
Prodoxidae	2			2
Pterophoridae	1			1
Pyralidae	7		1	8
Riodinidae	1			1

Appendix B. Summary checklist of Idaho invertebrates, 2015. Continued

Number of Invertebrate Species Order: Family	SGCN No	Yes	SNA	Grand Total
Saturniidae	9			9
Sesiidae	4			4
Sphingidae	20	1	1	22
Thyrididae	1			1
Torticidae	1			1
Tortricidae	10		2	12
Uraniidae	1			1
Lumbriculida	3			3
Lumbriculidae	3			3
Mesostigmata	8			8
Arctacaridae	1			1
Digamasellidae	4			4
Laelapidae	1			1
Mesostigmata	1			1
Uropodidae	1			1
Neotaenioglossa	5	7	4	16
Hydrobiidae	5	7	2	14
Thiaridae			2	2
Neuroptera	5			5
Chrysopidae	3			3
Hemerobiidae	2			2
Notostraca	1			1
Triopsidae	1			1
Odonata	79		3	82
Aeshnidae	12		2	14
Calopterygidae	1			1
Coenagrionidae	16			16
Cordulegastridae	1			1
Corduliidae	6			6
Gomphidae	8		1	9
Lestidae	6			6
Libellulidae	28			28
Macromiidae	1			1
Opiliones	7	3		10
Ceratolasmatidae	5	1		6
Cladonychiidae		2		2
Phalangodidae	1			1
Sironidae	1			1
Orthoptera	76	6	1	83

Number of Invertebrate Species Order: Family	SGCN No	Yes	SNA	Grand Total
Acrididae	71	6	1	78
Rhaphidophoroidae	1			1
Stenopelmatidae	1			1
Tetigoniidae	1			1
Tettigoniidae	1			1
Tridactylidae	1			1
Plecoptera	95	12	3	110
Capniidae	19	5	1	25
Chloroperlidae	16	2		18
Leuctridae	6	1	1	8
Nemouridae	13	2		15
Peltoperlidae	2	1		3
Periodidae	1			1
Perlidae	4			4
Perlodidae	24		1	25
Perlodinae	1			1
Pteronarcyidae	5			5
Taeniopterygidae	4	1		5
Plumatellida			1	1
Pectinatellidae			1	1
Polydesmida	1			1
Polydesmidae	1			1
Prostigmata	2			2
Bdellidae	1			1
Tetranychidae	1			1
Rhynchobdellida	5			5
Glossiphoniidae	4			4
Piscicolidae	1			1
Sarcoptiformes	2			2
Acaridae	2			2
Scorpiones	4		2	6
Luridae	2			2
Vaejovidae	2		2	4
Siphonaptera	40		1	41
Ceratophyllidae	18			18
Hystrichopsyllidae	18			18
Leptopsyllidae	3			3
Pulicidae	1		1	2
Stylommatophora	63	29	37	129

Appendix B. Summary checklist of Idaho invertebrates, 2015. Continued

Number of Invertebrate Species	SGCN			
Order: Family	No	Yes	SNA	Grand Total
Arionidae	5	7	9	21
Charopidae	1			1
Cionellidae	1			1
Discidae	3	2	1	6
Haplotrematidae	1		2	3
Helicarionidae	2			2
Helicidae			2	2
Helicodiscidae		1		1
Limacidae	1		4	5
Megomphicidae	1			1
Milacidae			1	1
Oreohelicidae	6	10	3	19
Polygyridae	9	6	2	17
Punctidae	3			3
Pupillidae	9		1	10
Rhytididae			1	1
Succineidae	9		2	11
Thysanophoridae	1			1
Valloniidae	4	1	2	7
Vitrinidae	1			1
Zonitidae	6	2	7	15
Thysanoptera	8			8
Aeolothripidae	2			2
Phlaeothripidae	3			3
Thripidae	3			3
Trichoptera	139	17	6	162
Apataniidae	3	2		5
Brachycentridae	4			4
Glossosomatidae	10	1		11
Helicopsychidae	1			1
Hydropsychidae	14	1		15
Hydroptilidae	9			9
Lepidostomatidae	7		1	8
Leptoceridae	13			13
Limnephilidae	35	8	1	44
Odontoceridae	2			2
Philopotamidae	5			5
Phryganeidae	2			2
Polycentropodidae	3			3

Number of Invertebrate Species	SGCN			
Order: Family	No	Yes	SNA	Grand Total
Psychomyiidae	3			3
Rhyacophilidae	27	3	3	33
Rossianidae		1	1	2
Uenoidae	1	1		2
Trombidiformes	5	1		6
Bdellidae	1			1
Eupalopsellidae	1			1
Pyemotidae	1			1
Rhagidiidae		1		1
Thermacaridae	2			2
Unionoida	2	3	1	6
Margaritiferidae	1	1	1	3
Unionidae	1	2		3
Veneroida	23		7	30
Corbiculidae			1	1
Pisidiidae	23		6	29
Grand Total	**3874**	**132**	**192**	**4198**

Appendix C: Idaho Species of Greatest Conservation Need, 2015

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
VERTEBRATES							
CLASS PETROMYZONTIDA—LAMPREYS							
ORDER PETROMYZONTIFORMES—LAMPREYS							
Family Petromyzontidae—lampreys							
Entosphenus tridentatus (Pacific Lamprey)[1]	G4	S1				Type 2	E
CLASS ACTINOPTERYGII—RAY-FINNED FISHES							
ORDER ACIPENSERIFORMES—STURGEONS, SPOONFISHES, AND PADDLEFISHES							
Family Acipenseridae—sturgeons							
Acipenser transmontanus (White Sturgeon [Kootenai River DPS])[1]	G4T1Q	S1	E			Type 1	E
ORDER CYPRINIFORMES—MINNOWS AND SUCKERS							
Family Cyprinidae—carps and minnows							
Lepidomeda copei (Northern Leatherside Chub)[2]	G3	S2			S	Type 2	PNS
ORDER SALMONIFORMES—SALMONS							
Family Salmonidae—trouts and salmons							
Oncorhynchus mykiss (Steelhead [Snake River Basin DPS])[1]	G5T2T3Q	S2S3	T		T	Type 1	GF, T
Oncorhynchus nerka (Sockeye Salmon [Snake River ESU])[1]	G5T1Q	S1	E		E	Type 1	GF, E
Oncorhynchus tshawytscha (Chinook Salmon [Snake River fall-run ESU])[1]	G5T1Q	S1	T		T	Type 1	GF, T
Oncorhynchus tshawytscha (Chinook Salmon [Snake River spring/summer-run ESU])[1]	G5T1Q	S1	T		T	Type 1	GF, T
Prosopium abyssicola (Bear Lake Whitefish)[2]	G1	S1					GF
Prosopium gemmifer (Bonneville Cisco)[2]	G3	S3				Type 2	GF
Prosopium spilonotus (Bonneville Whitefish)[2]	G3	S3				Type 2	GF
ORDER GADIFORMES—CODS AND HAKES							
Family Gadidae—cods							
Lota lota (Burbot)[1]	G5	S1				Type 2	GF, E
ORDER SCORPAENIFORMES—MAIL-CHEEKED FISHES, SCORPIONFISHES, AND SCULPINS							
Family Cottidae—sculpins							
Cottus extensus (Bear Lake Sculpin)[2]	G3	S3				Type 2	PNS
CLASS AMPHIBIA—AMPHIBIANS							
ORDER ANURA—FROGS AND TOADS							
Family Bufonidae—toads							
Anaxyrus boreas (Western Toad)[2]	G4	S2		S	S	Type 2	PNS
Anaxyrus woodhousii (Woodhouse's Toad)[2]	G5	S2				Type 2	PNS
Family Ranidae—true frogs							
Lithobates pipiens (Northern Leopard Frog)[2]	G5	S2				Type 2	PNS
Rana luteiventris (Columbia Spotted Frog [Great Basin DPS])[1]	G4T2T3Q	S2			S	Type 2	PNS
CLASS AVES—BIRDS							
ORDER ANSERIFORMES—SCREAMERS, SWANS, GEESE, AND DUCKS							
Family Anatidae—ducks, geese, and swans							
Cygnus buccinator (Trumpeter Swan)[2]	G4	S1B, S4N			S	Type 2	MGB
Histrionicus histrionicus (Harlequin Duck)[2]	G4	S1B		S	S	Type 2	MGB
ORDER GALLIFORMES—GALLINACEOUS BIRDS							
Family Odontophoridae—New World quail							
Oreortyx pictus (Mountain Quail)[2]	G5	S2		S	S	Type 2	UGB
Family Phasianidae—partridges, grouse, turkeys, and Old World quail							

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Centrocercus urophasianus (Greater Sage-Grouse)[1]	G3G4	S3			S	Type 2	UGB
Tympanuchus phasianellus (Sharp-tailed Grouse)[2]	G4T3	S3			S	Type 2	UGB
ORDER GAVIIFORMES—LOONS							
Family Gaviidae—loons							
Gavia immer (Common Loon)[2]	G5	S1B, S2N		S	S		PNS
ORDER PODICIPEDIFORMES—GREBES							
Family Podicipedidae—grebes							
Aechmophorus occidentalis (Western Grebe)[2]	G5	S2B					PNS
Aechmophorus clarkii (Clark's Grebe)[2]	G5	S2B					PNS
ORDER PELECANIFORMES—PELICANS, HERONS, IBISES, AND ALLIES							
Family Pelecanidae—pelicans							
Pelecanus erythrorhynchos (American White Pelican)[2]	G4	S3B					PNS
Family Ardeidae—herons, bitterns, and allies							
Botaurus lentiginosus (American Bittern)[2]	G4	S1B					PNS
Family Threskiornithidae—ibises and spoonbills							
Plegadis chihi (White-faced Ibis)[2]	G5	S2B					PNS
ORDER ACCIPITRIFORMES—HAWKS, KITES, EAGLES, AND ALLIES							
Family Accipitridae—hawks, kites, eagles, and allies							
Buteo regalis (Ferruginous Hawk)[2]	G4	S3B				Type 2	PNS
Aquila chrysaetos (Golden Eagle)[2]	G5	S3				Type 2	PNS
ORDER GRUIFORMES—RAILS, CRANES, AND ALLIES							
Family Gruidae—cranes							
Grus canadensis (Sandhill Crane)[3]	G5	S3B					MGB
ORDER CHARADRIIFORMES—SHOREBIRDS, GULLS, AUKS, AND ALLIES							
Family Scolopacidae—sandpipers, phalaropes, and allies							
Numenius americanus (Long-billed Curlew)[2]	G5	S2B				Type 2	PNS
Family Laridae—gulls, terns, and skimmers							
Leucophaeus pipixcan (Franklin's Gull)[3]	G4G5	S3B					PNS
Larus delawarensis (Ring-billed Gull)[3]	G5	S2B, S2N					PNS
Larus californicus (California Gull)[2]	G5	S3B, S2N					PNS
Hydroprogne caspia (Caspian Tern)[2]	G5	S1B					PNS
Chlidonias niger (Black Tern)[2]	G4	S2B				Type 2	PNS
ORDER CUCULIFORMES—CUCKOOS AND ALLIES							
Family Cuculidae—cuckoos, roadrunners, and anis							
Coccyzus americanus (Yellow-billed Cuckoo)[1]	G5	S1B	T		S	Type 1	PNS
ORDER STRIGIFORMES—OWLS							
Family Strigidae—typical owls							
Athene cunicularia (Burrowing Owl)[2]	G4	S2B				Type 2	PNS
Strix nebulosa (Great Gray Owl)[3]	G5	S3			S		PNS
Asio flammeus (Short-eared Owl)[3]	G5	S3				Type 2	PNS
ORDER CAPRIMULGIFORMES—GOATSUCKERS, OILBIRDS, AND ALLIES							
Family Caprimulgidae—goatsuckers							
Chordeiles minor (Common Nighthawk)[3]	G5	S4B					PNS
ORDER APODIFORMES—SWIFTS AND HUMMINGBIRDS							
Family Apodidae—swifts							
Cypseloides niger (Black Swift)[2]	G4	S1B		S		Type 2	PNS
ORDER PICIFORMES—PUFFBIRDS, JACAMARS, TOUCANS, WOODPECKERS, AND ALLIES							
Family Picidae—woodpeckers and allies							
Melanerpes lewis (Lewis's Woodpecker)[2]	G4	S3B				Type 2	PNS
Picoides albolarvatus (White-headed Woodpecker)[3]	G4	S2		S	S	Type 2	PNS
ORDER PASSERIFORMES—PASSERINE BIRDS							
Family Tyrannidae—tyrant flycatchers							
Contopus cooperi (Olive-sided Flycatcher)[3]	G4	S3B				Type 2	PNS
Family Corvidae—crows and jays							

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Gymnorhinus cyanocephalus (Pinyon Jay)[2]	G5	S3				Type 2	PNS
Nucifraga columbiana (Clark's Nutcracker)[3]	G5	S2					PNS
Family Mimidae—mockingbirds and thrashers							
Oreoscoptes montanus (Sage Thrasher)[2]	G5	S3B				Type 2	PNS
Family Emberizidae—emberizids							
Artemisiospiza nevadensis (Sagebrush Sparrow)[2]	G5	S3B				Type 2	PNS
Ammodramus savannarum (Grasshopper Sparrow)[3]	G5	S3B					
Family Icteridae—blackbirds							
Dolichonyx oryzivorus (Bobolink)[2]	G5	S2B					PNS
Family Fringillidae—fringilline and cardueline finches and allies							
Leucosticte atrata (Black Rosy-Finch)[3]	G4	S2					PNS
Loxia curvirostra (Red Crossbill [South Hills popn.])[2]	GNR	S1					PNS
CLASS MAMMALIA—MAMMALS							
ORDER LAGOMORPHA—PIKAS, HARES, AND RABBITS							
Family Leporidae—hares and rabbits							
Brachylagus idahoensis (Pygmy Rabbit)[2]	G4	S3			S	Type 2	UGA
ORDER CHIROPTERA—BATS							
Family Vespertilionidae—vesper bats							
Corynorhinus townsendii (Townsend's Big-eared Bat)[3]	G3G4	S3		S	S	Type 2	PNS
Lasionycteris noctivagans (Silver-haired Bat)[2]	G4	S3				Type 2	PNS
Lasiurus cinereus (Hoary Bat)[2]	G4	S3				Type 2	PNS
Myotis ciliolabrum (Western Small-footed Myotis)[3]	G4G5	S3				Type 2	PNS
Myotis lucifugus (Little Brown Myotis)[3]	G3	S3				Type 2	PNS
ORDER CARNIVORA—CARNIVORES							
Family Mustelidae—weasels, otters, and badgers							
Gulo gulo (Wolverine)[1]	G4	S1		S	P	Type 2	PNS
Pekania pennanti (Fisher)[2]	G5	S2		S	S	Type 2	F
Family Ursidae—bears							
Ursus arctos (Grizzly Bear)[1]	G4	S2	T		T	Type 1	BG
ORDER ARTIODACTYLA—EVEN-TOED UNGULATES							
Family Bovidae—cattle, antelope, sheep, goats, and African exotics							
Oreamnos americanus (Mountain Goat)[3]	G5	S3					BG
Ovis canadensis (Bighorn Sheep)[2]	G4	S2		S	S	Type 2	BG
Family Cervidae—deer							
Rangifer tarandus (Caribou)[1]	G5T4	S1	E			Type 1	E
ORDER RODENTIA—RODENTS							
Family Cricetidae—New World mice, rats, and voles							
Synaptomys borealis (Northern Bog Lemming)[3]	G5	S3		S			
Family Heteromyidae—pocket mice and kangaroo rats							
Microdipodops megacephalus (Dark Kangaroo Mouse)[2]	G4	S1				Type 2	
Family Sciuridae—squirrels							
Marmota caligata (Hoary Marmot)[3]	G5	S4					
Urocitellus brunneus (Northern Idaho Ground Squirrel)[1]	G2	S2	T		T	Type 1	T
Urocitellus canus (Columbia Plateau [syn. Merriam's] Ground Squirrel)[2]	G4	S1				Type 2	PNS
Urocitellus elegans nevadensis (Wyoming Ground Squirrel [Southwest Idaho popn.])[2]	G5T4	S3					PNS
Urocitellus endemicus (Southern Idaho Ground Squirrel)[1]	G2T2	S2			S	Type 2	PNS
CLASS REPTILIA—REPTILES							
ORDER SQUAMATA—LIZARDS AND SNAKES							
Family Crotaphytidae—collared and leopard lizards							
Crotaphytus bicinctores (Great Basin Collared Lizard)[3]	G5	S2				Type 2	PNS
INVERTEBRATES							
CLASS ARACHNIDA—ARACHNIDS							
ORDER OPILIONES—DADDY LONGLEGS AND HARVESTMEN							
Family Ceratolasmatidae—harvestmen							

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Aculclavella Species Group (Harvestman Species Group)[3]	GNR	S3Q					
Family Cladonychiidae—harvestmen							
Speleomaster lexi (A Cave Obligate Harvestman)[2]	G1G2	S1					
Speleomaster pecki (A Cave Obligate Harvestman)[2]	G1G2	S1					
ORDER TROMBIDIFORMES—TERRESTRIAL MITES							
Family Rhagidiidae—snipe flies							
Flabellorhagidia pecki (A Cave Obligate Mite)[2]	G1G2	S1					
CLASS BIVALVIA—BIVALVES							
ORDER UNIONOIDA—FRESHWATER MUSSELS							
Family Margaritiferidae—freshwater pearly mussels							
Margaritifera falcata (Western Pearlshell)[2]	G4G5	S2					
Family Unionidae—river mussels							
Anodonta californiensis (California Floater)[3]	G3Q	S3Q				Type 2	
Gonidea angulata (Western Ridged Mussel)[3]	G3	S3					
CLASS BRANCHIOPODA—BRANCHIOPODES							
ORDER ANOSTRACA—BRINE SHRIMP AND FAIRY SHRIMP							
Family Branchinectidae—longhorn fairy shrimps							
Branchinecta raptor (Raptor Fairy Shrimp)[3]	G1	S1					
CLASS DIPLOPODA—MILLIPEDES							
ORDER CHORDEUMATIDA—MILLIPEDES							
Family Conotylidae—millipedes							
Idagona westcotti (Idaho Lava Tube Millipede)[2]	G1G2	S1					
CLASS GASTROPODA—SNAILS AND SLUGS							
ORDER BASOMMATOPHORA—AQUATIC SNAILS							
Family Lymnaeidae—pond snails							
Lanx sp. 1 (Banbury Springs Limpet)[1]	G1	S1	E			Type 1	
Stagnicola Species Group (Pondsnail Species Group)[3]	GNR	SNR					
Family Physidae—bladder snails							
Physa natricina (Snake River Physa)[1]	G1	S1	E			Type 1	
Physella columbiana (Rotund Physa)[3]	G2	S1					
ORDER NEOTAENIOGLOSSA—AQUATIC SNAILS							
Family Hydrobiidae—mud snails							
Colligyrus greggi (Rocky Mountain Duskysnail)[2]	G4	S3Q					
Fluminicola gustafsoni (Nez Perce Pebblesnail)[3]	G2G3	SNR					
Fluminicola minutissimus (Pixie Pebblesnail)[1]	GH	SH					
Pristinicola hemphilli (Pristine Pyrg)[2]	G3	S3					
Pyrgulopsis bruneauensis (Bruneau Hot Springsnail)[1]	G1	S1	E			Type 1	
Pyrgulopsis pilsbryana (Bear Lake Springsnail)[1]	G2	S1					
Taylorconcha serpenticola (Bliss Rapids Snail)[1]	G1	S1	T			Type 1	
ORDER STYLOMMATOPHORA—TERRESTRIAL SNAILS AND SLUGS							
Family Arionidae—roundback slugs							
Hemphillia camelus (Pale Jumping-slug)[3]	G4	S2					
Hemphillia danielsi (Marbled Jumping-slug)[1]	G2G3	SNR					
Hemphillia sp. 1 (A Roundback Slug)[2]	GNR	S2Q					
Magnipelta mycophaga (Magnum Mantleslug)[1]	G3	S2					
Prophysaon coeruleum (Blue-gray Taildropper)[1]	G3G4	S1Q					
Prophysaon dubium (Papillose Taildropper)[1]	G4	S2Q					
Securicauda hermani (Rocky Mountain Axetail)[1]	GNR	S1					
Family Discidae—disc snails							
Anguispira nimapuna (Nimapuna Disc)[3]	G1	S3					
Discus marmorensis (Marbled Disc)[1]	G1G2	S2				Type 2	
Family Helicodiscidae—coils							
Helicodiscus salmonaceus (Salmon Coil)[3]	G2	S2					
Family Oreohelicidae—mountain snails							
Oreohelix hammeri (Seven Devils Mountainsnail)[1]	G1	S1					

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Oreohelix haydeni (Lyrate Mountainsnail)[2]	G2G3	S1					
Oreohelix idahoensis (Costate Mountainsnail)[2]	G1G2	S2				Type 2	
Oreohelix intersum (Deep Slide Mountainsnail)[2]	G1	S1					
Oreohelix jugalis (Boulder Pile Mountainsnail)[3]	G1G2	S1				Type 2	
Oreohelix peripherica (Deseret Mountainsnail)[2]	G2	SNR					
Oreohelix strigosa goniogyra (Striate Mountainsnail)[2]	G5T1Q	S1				Type 2	
Oreohelix tenuistriata (Thin-ribbed Mountainsnail)[1]	GH	SH					
Oreohelix vortex (Whorled Mountainsnail)[1]	G1G2	S1				Type 2	
Oreohelix waltoni (Lava Rock Mountainsnail)[1]	G1G2	S1				Type 2	
Family Polygyridae—land snails							
Allogona lombardii (Selway Forestsnail)[1]	G1	S3					
Cryptomastix harfordiana (Salmon Oregonian)[1]	G3G4	S1					
Cryptomastix magnidentata (Mission Creek Oregonian)[1]	G1	S1					
Cryptomastix mullani (Coeur d'Alene Oregonian)[3]	G4	S4Q					
Cryptomastix populi (Cottonwood Oregonian)[1]	G2	S1					
Cryptomastix sanburni (Kingston Oregonian)[1]	G1	S3					
Family Valloniidae—grass snails							
Planogyra clappi (Western Flat-whorl)[3]	G4G5	S1					
Family Zonitidae—true glass snails							
Ogaridiscus subrupicola (Southern Tightcoil)[3]	G1	S2					
Pristiloma wascoense (Shiny Tightcoil)[3]	G3	S2					
CLASS INSECTA—INSECTS							
ORDER COLEOPTERA—BEETLES AND WEEVILS							
Family Anthicidae—ant-like flower beetles							
Amblyderus owyhee (An Ant-like Flower Beetle)[2]	GNR	S2					
Family Buprestidae—metallic wood-boring beetles							
Agrilus pubifrons (A Metallic Wood-boring Beetle)[3]	GNR	S3					
Chrysobothris horningi (A Metallic Wood-boring Beetle)[2]	GNR	S3					
Chrysobothris idahoensis (A Metallic Wood-boring Beetle)[2]	GNR	S3					
Family Carabidae—ground beetles							
Cicindela arenicola (Idaho Dunes Tiger Beetle)[2]	G1G2	S2				Type 2	
Cicindela columbica (Columbia River Tiger Beetle)[3]	G2	S1				Type 2	
Cicindela decemnotata montevolans (A Tiger Beetle)[2]	GNR	S2					
Cicindela plutonica (Alpine Tiger Beetle)[2]	G3	S2					
Cicindela waynei (Bruneau Dune Tiger Beetle)[1]	G1	S1				Type 2	
Family Cerambycidae—long-horned beetles							
Judolia gaurotoides (A Long-horned Beetle)[3]	GNR	S3Q					
Family Elateridae—click beetles							
Beckerus barri (A Click Beetle)[1]	GNR	S1					
Family Elmidae—riffle beetles							
Bryelmis idahoensis (A Riffle Beetle)[2]	GNR	S3					
Family Hydroscaphidae—skiff beetles							
Hydroscapha redfordi (A Skiff Beetle)[1]	GNR	S1					
Family Leiodidae—round fungus beetles							
Glacicavicola bathyscioides (Blind Cave Leiodid Beetle)[1]	G1G3	S1				Type 2	
Family Scarabaeidae—scarab beetles							
Polyphylla devestiva (Lined June Beetle)[2]	GNR	S2					
ORDER EPHEMEROPTERA—MAYFLIES							
Family Ameletidae—combmouthed minnow mayflies							
Ameletus tolae (A Mayfly)[3]	G1G2	S2					
Family Ephemerellidae—spiny crawler mayflies							
Caurinella idahoensis (Lolo Mayfly)[2]	G3	S2					
Ephemerella alleni (A Mayfly)[2]	G4	S2					
Family Heptageniidae—stream mayflies							
Cinygma dimicki (A Mayfly)[3]	G3	S1					

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Family Leptophlebiidae—prong-gilled mayflies							
Paraleptophlebia falcula (A Mayfly)[3]	G1G2	SNR					
Paraleptophlebia jenseni (A Mayfly)[3]	G2G4	S1					
Paraleptophlebia traverae (A Mayfly)[3]	GH	S1					
Family Siphlonuridae—primitive minnow mayflies							
Parameletus columbiae (A Mayfly)[3]	G2	S1					
ORDER HYMENOPTERA—BEES, WASPS, AND ANTS							
Family Andrenidae—mining bees							
Andrena aculeata (A Miner Bee)[3]	GNR	S3					
Calliopsis barri (A Miner Bee)[2]	GNR	S1					
Perdita barri (A Miner Bee)[3]	GNR	S1					
Perdita salicis euxantha (A Miner Bee)[3]	G5TNR	S3					
Perdita wyomingensis sculleni (A Miner Bee)[3]	GNR	S2					
Family Apidae—cuckoo, carpenter, bumble, and honey bees							
Bombus fervidus (Yellow Bumble Bee)[3]	G4?	S5					
Bombus huntii (Hunt's Bumble Bee)[3]	G5	S5					
Bombus morrisoni (Morrison's Bumble Bee)[1]	G4G5	S4					
Bombus occidentalis (Western Bumble Bee)[1]	G4	S3					
Bombus suckleyi (Suckley's Cuckoo Bumble Bee)[1]	GU	S2					
Family Colletidae—plasterer and masked bees							
Hylaeus lunicraterius (A Yellow-masked Bee)[3]	GNR	S3					
Family Megachilidae—leaf-cutter bees, mason bees, and allies							
Ashmeadiella sculleni (A Leafcutting Bee)[3]	GNR	S2					
Hoplitis orthognathus (A Mason Bee)[3]	GNR	S4					
Hoplitis producta subgracilis (A Mason Bee)[3]	GNR	S4					
Family Melittidae—miner bees							
Hesperapis kayella (A Miner Bee)[3]	GNR	S2					
ORDER LEPIDOPTERA—BUTTERFLIES AND MOTHS							
Family Erebidae—moths							
Grammia eureka (A Moth)[3]	GNR	SNR					
Family Lycaenidae—Gossamer-winged butterflies							
Callophrys johnsoni (Johnson's Hairstreak)[3]	G3G4	S1					
Lycaena phlaeas arctodon (Beartooth Copper)[3]	G5T3T5	S1					
Family Nymphalidae—brush-footed butterflies							
Boloria kriemhild (Kriemhild Fritillary)[3]	G3G4	S2					
Danaus plexippus (Monarch)[3]	G4	S2					
Euphydryas gillettii (Gillette's Checkerspot)[3]	G3	S2					
Family Sphingidae—sphinx moths							
Euproserpinus wiesti (Wiest's Primrose Sphinx)[3]	G3G4	S1					
ORDER ORTHOPTERA—GRASSHOPPERS, CRICKETS, AND KATYDIDS							
Family Acrididae—short-horned grasshoppers							
Acrolophitus pulchellus (Idaho Point-headed Grasshopper)[2]	G1G3	S2				Type 2	
Argiacris amissuli (A Grasshopper)[3]	G1G3	S1					
Argiacris keithi (A Grasshopper)[3]	G1G3	S1					
Argiacris militaris (A Grasshopper)[3]	G3G4	S2					
Barracris petraea (A Grasshopper)[3]	G3?	S2					
Melanoplus Species Group (Spur-throated Grasshopper Species Group)[3]	GNR	S2Q					
ORDER PLECOPTERA—STONEFLIES							
Family Capniidae—small winter stoneflies							
Capnia lineata (Straight Snowfly)[3]	G2	S1					
Capnia zukeli (Idaho Snowfly)[3]	G2	S1					
Capnura anas (Duckhead Snowfly)[3]	G1	SNR					
Isocapnia palousa (Palouse Snowfly)[3]	G3	S3					
Utacapnia nedia (Boise Snowfly)[3]	G3	S1					
Family Chloroperlidae—green stoneflies, sallflies							

Taxon	G-rank	S-rank	ESA	FS R1	FS R4	BLM	IDAPA
Sweltsa durfeei (Lolo Sawfly)[3]	G2	SNR					
Sweltsa gaufini (Utah Sallfly)[3]	G3	S1					
Family Leuctridae—rolled-winged stoneflies							
Megaleuctra kincaidi (Cascades Needlefly)[3]	G3	S1					
Family Nemouridae—spring stoneflies							
Malenka tina (Tiny Forestfly)[3]	G3	S2					
Soyedina potteri (Idaho Forestfly)[3]	G2	S1					
Family Peltoperlidae—roachflies							
Soliperla salish (Clearwater Roachfly)[3]	G2	S1					
Family Taeniopterygidae—winter stoneflies, willowflies							
Taenionema umatilla (Umatilla Willowfly)[3]	G3	S1					
ORDER TRICHOPTERA—CADDISFLIES							
Family Apataniidae—Apataniid case-maker caddisflies							
Apatania barri (A Caddisfly)[3]	GU	SNR					
Manophylax annulatus (A Caddisfly)[3]	G1G3	S1					
Family Glossosomatidae—saddle case-maker caddisflies							
Glossosoma idaho (A Caddisfly)[3]	G2G3	S2					
Family Hydropsychidae—net-spinning caddisflies							
Cheumatopsyche logani (A Caddisfly)[3]	G3G5	SNR					
Family Limnephilidae—northern caddisflies							
Arctopora salmon (A Caddisfly)[3]	G1G3	S3Q					
Eocosmoecus schmidi (A Caddisfly)[3]	G4	S2					
Homophylax acutus (A Caddisfly)[3]	G3G5	SNR					
Homophylax auricularis (A Caddisfly)[3]	G1G3	SNR					
Limnephilus challisa (A Caddisfly)[3]	G1G2	SNR					
Philocasca antennata (A Caddisfly)[3]	G1G3	S1					
Philocasca banksi (A Caddisfly)[3]	G1G3	S1					
Psychoglypha smithi (A Caddisfly)[3]	G1G3	S2					
Family Rhyacophilidae—primitive caddisflies							
Rhyacophila oreia (A Caddisfly)[3]	G1G3	SNR					
Rhyacophila robusta (A Caddisfly)[3]	G2G3	SNR					
Rhyacophila velora (A Caddisfly)[3]	G1G2	SNR					
Family Rossianidae—Rossianid case-maker caddisflies							
Goereilla baumanni (A Caddisfly)[3]	G2	S1					
Family Uenoidae—Uenoid case-maker caddisflies							
Sericostriata surdickae (A Caddisfly)[3]	G3	S3					
CLASS MALACOSTRACA—MALACOSTRACANS							
ORDER AMPHIPODA—AMPHIPODS							
Family Crangonyctidae—Gammarid amphipods							
Stygobromus idahoensis (Idaho Amphipod)[3]	G1G2	S1					
ORDER DECAPODA—CRABS, CRAYFISHES, LOBSTERS, AND SHRIMP							
Family Astacidae—crawfishes, crayfishes							
Pacifastacus connectens (Snake River Pilose Crayfish)[3]	G3G4	SNR					GF
CLASS OLIGOCHAETA—WORMS							
ORDER HAPLOTAXIDA—HAPLOTAXIDS							
Family Megascolecidae—earthworms							
Driloleirus americanus (Giant Palouse Earthworm)[2]	G1	S2					

[1] Tier 1 SGCN are our highest priority for the State Wildlife Action Plan and represent species with the most critical conservation needs, i.e., an early-warning list of taxa that may be heading toward the need for ESA listing.

[2] Tier 2 SGCN are secondary in priority and represent species with high conservation needs—that is, species with longer-term vulnerabilities or patterns suggesting management intervention is needed but not necessarily facing imminent extinction or having the highest management profile.

[3] Tier 3 SGCN include a suite of species that do not meet the above tier criteria, yet still have conservation needs. In general, these species are relatively more common, but commonness is not the sole criterion and often these species have either declining trends rangewide or are lacking in information.

Appendix D: Key Ecological Sections for Each Species of Greatest Conservation Need (SGCN) in Idaho. Species are Arranged First by Priority Tiers and Second by Taxonomic Order.

Species of greatest conservation need	Bear Lake	Beaverhead Mountains	Bitterroot Mountains	Blue Mountains	Challis Volcanics	Flathead Valley	Idaho Batholith	Northwestern Basin and Range	Okanogan Highlands	Overthrust Mountains	Owyhee Uplands	Palouse Prairie	Snake River Basalts	Yellowstone Highlands	Number of Sections/SGCN
TIER 1 (43 Species)															
Pacific Lamprey		X	X		X		X					X			5
White Sturgeon (Kootenai River DPS)						X			X						2
Steelhead (Snake River Basin DPS)		X		X	X		X					X			5
Sockeye Salmon (Snake River ESU)		X		X	X		X								4
Chinook Salmon (Snake River fall-run ESU)				X			X					X			3
Chinook Salmon (Snake River spring/summer-run ESU)		X		X	X		X					X			5
Burbot						X			X						2
Columbia Spotted Frog (Great Basin DPS)											X				1
Greater Sage-Grouse	X	X		X	X			X		X	X		X	X	9
Yellow-billed Cuckoo										X	X		X		3
Wolverine	X	X	X		X	X	X		X	X				X	9
Grizzly Bear		X				X			X	X				X	5
Caribou									X						1
Northern Idaho Ground Squirrel				X			X								2
Southern Idaho Ground Squirrel				X							X				2
Banbury Springs Limpet											X				1
Snake River Physa											X		X		2
Pixie Pebblesnail				X											1
Bruneau Hot Springsnail											X				1
Bear Lake Springsnail	X							X		X					3
Bliss Rapids Snail											X		X		2
Marbled Jumping-slug			X				X								2
Magnum Mantleslug			X			X			X						3

Species of greatest conservation need	Bear Lake	Beaverhead Mountains	Bitterroot Mountains	Blue Mountains	Challis Volcanics	Flathead Valley	Idaho Batholith	Northwestern Basin and Range	Okanogan Highlands	Overthrust Mountains	Owyhee Uplands	Palouse Prairie	Snake River Basalts	Yellowstone Highlands	Number of Sections/SGCN
Blue-gray Taildropper			X												1
Papillose Taildropper			X												1
Rocky Mountain Axetail			X												1
Marbled Disc				X			X								2
Seven Devils Mountainsnail				X											1
Thin-ribbed Mountainsnail										X					1
Whorled Mountainsnail				X											1
Lava Rock Mountainsnail				X			X								2
Selway Forestsnail			X				X								2
Salmon Oregonian				X			X								2
Mission Creek Oregonian			X									X			2
Cottonwood Oregonian				X											1
Kingston Oregonian			X			X									2
Bruneau Dune Tiger Beetle											X				1
A Click Beetle (*Beckerus barri*)			X				X								2
A Skiff Beetle (*Hydroscapha redfordi*)							X								1
Blind Cave Leiodid Beetle													X		1
Morrison's Bumble Bee	X	X	X	X	X	X		X		X	X	X	X		11
Western Bumble Bee	X	X	X	X	X	X	X	X	X	X		X		X	12
Suckley's Cuckoo Bumble Bee	X	X	X	X	X	X	X	X	X	X		X		X	12
TIER 2 (66 species)															
Northern Leatherside Chub								X		X					2
Bear Lake Whitefish	X														1
Bonneville Cisco	X														1
Bonneville Whitefish	X														1
Bear Lake Sculpin	X														1
Western Toad	X	X	X		X	X	X	X	X	X	X	X	X	X	13
Woodhouse's Toad											X				1
Northern Leopard Frog	X		X			X		X	X	X	X		X	X	9
Trumpeter Swan	X									X			X	X	4
Harlequin Duck		X	X		X	X	X		X	X					7
Mountain Quail				X			X								2
Sharp-tailed Grouse	X			X				X		X			X	X	6

Species of greatest conservation need	Bear Lake	Beaverhead Mountains	Bitterroot Mountains	Blue Mountains	Challis Volcanics	Flathead Valley	Idaho Batholith	Northwestern Basin and Range	Okanogan Highlands	Overthrust Mountains	Owyhee Uplands	Palouse Prairie	Snake River Basalts	Yellowstone Highlands	Number of Sections/SGCN
Common Loon						X			X					X	3
Western Grebe	X		X				X	X	X		X		X	X	8
Clark's Grebe	X						X	X			X		X		5
American White Pelican								X			X		X	X	4
American Bittern	X		X						X	X	X		X		6
White-faced Ibis	X									X	X		X	X	5
Ferruginous Hawk	X	X			X			X			X		X		6
Golden Eagle	X	X			X			X		X	X		X		7
Long-billed Curlew	X	X		X	X			X		X	X		X	X	9
California Gull	X							X			X		X	X	5
Caspian Tern	X							X			X		X	X	5
Black Tern	X		X						X	X	X		X		6
Burrowing Owl		X		X	X			X			X		X		6
Black Swift			X			X			X						3
Lewis's Woodpecker		X	X	X	X		X					X			6
Pinyon Jay								X							1
Sage Thrasher	X	X			X			X		X	X		X		7
Sagebrush Sparrow		X		X	X			X			X		X		6
Bobolink		X												X	2
Red Crossbill (South Hills popn.)								X							1
Pygmy Rabbit	X	X			X			X		X	X		X		7
Silver-haired Bat	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14
Hoary Bat	X	X	X	X	X		X	X		X	X	X	X	X	12
Fisher		X	X		X	X	X		X			X			7
Bighorn Sheep		X		X	X		X	X			X				6
Dark Kangaroo Mouse											X				1
Columbia Plateau (syn. Merriam's) Ground Squirrel								X			X				2
Wyoming Ground Squirrel (Southwest Idaho popn.)											X				1
A Cave Obligate Harvestman (*Speleomaster lexi*)													X		1
A Cave Obligate Harvestman (*Speleomaster pecki*)													X		1

Species of greatest conservation need	Bear Lake	Beaverhead Mountains	Bitterroot Mountains	Blue Mountains	Challis Volcanics	Flathead Valley	Idaho Batholith	Northwestern Basin and Range	Okanogan Highlands	Overthrust Mountains	Owyhee Uplands	Palouse Prairie	Snake River Basalts	Yellowstone Highlands	Number of Sections/SGCN
A Cave Obligate Mite (*Flabellorhagidia pecki*)													X		1
Western Pearlshell		X	X	X	X		X					X			6
Idaho Lava Tube Millipede (*Idagona westcotti*)													X		1
Rocky Mountain Duskysnail	X		X					X		X				X	5
Pristine Pyrg			X	X			X								3
A Roundback Slug (*Hemphillia* sp. 1)									X						1
Lyrate Mountainsnail	X	X		X			X			X					5
Costate Mountainsnail				X											1
Deep Slide Mountainsnail				X			X								2
Deseret Mountainsnail													X		1
Striate Mountainsnail				X			X								2
An Ant-like Flower Beetle (*Amblyderus owyhee*)											X		X		2
A Metallic Wood-boring Beetle (*Chrysobothris horningi*)													X		1
A Metallic Wood-boring Beetle (*Chrysobothris idahoensis*)													X		1
Idaho Dunes Tiger Beetle													X		1
A Tiger Beetle (*Cicindela decemnotata montevolans*)	X									X					2
Alpine Tiger Beetle		X									X				2
A Riffle Beetle (*Bryelmis idahoensis*)			X	X			X								3
Lined June Beetle											X				1
Lolo Mayfly		X	X				X								3
A Mayfly (*Ephemerella alleni*)			X		X	X			X						4
A Miner Bee (*Calliopsis barri*)													X		1
Idaho Point-headed Grasshopper		X											X		2
Giant Palouse Earthworm												X			1
TIER 3 (96 Species)															
Sandhill Crane	X	X		X	X		X	X		X	X		X	X	10
Franklin's Gull	X									X			X	X	4
Ring-billed Gull								X			X		X	X	4
Great Gray Owl		X			X		X			X		X		X	6

Species of greatest conservation need	Bear Lake	Beaverhead Mountains	Bitterroot Mountains	Blue Mountains	Challis Volcanics	Flathead Valley	Idaho Batholith	Northwestern Basin and Range	Okanogan Highlands	Overthrust Mountains	Owyhee Uplands	Palouse Prairie	Snake River Basalts	Yellowstone Highlands	Number of Sections/SGCN
Short-eared Owl	X	X		X	X			X			X	X	X	X	9
Common Nighthawk	X	X	X	X	X	X	X	X	X	X	X	X	X		13
White-headed Woodpecker				X			X					X			3
Olive-sided Flycatcher		X	X	X	X	X	X		X			X		X	9
Clark's Nutcracker		X	X	X	X	X	X		X					X	8
Grasshopper Sparrow				X				X			X	X	X		5
Black Rosy-Finch		X			X		X								3
Townsend's Big-eared Bat	X	X	X	X	X	X	X	X	X	X	X	X	X		13
Western Small-footed Myotis	X	X		X	X					X	X		X		7
Little Brown Myotis	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14
Mountain Goat		X	X	X	X	X	X		X						7
Northern Bog Lemming						X			X						2
Hoary Marmot		X	X		X	X	X		X						6
Great Basin Collared Lizard											X				1
Harvestman (*Acuclavella*) Species Group			X				X								2
California Floater	X	X								X	X		X		5
Western Ridged Mussel		X		X		X	X		X		X		X		6
Raptor Fairy Shrimp											X				1
Pondsnail (*Stagnicola*) Species Group	X	X		X						X			X	X	6
Rotund Physa	X		X	X			X			X					5
Nez Perce Pebblesnail				X								X			2
Pale Jumping-slug			X			X	X		X						4
Nimapuna Disc			X				X								2
Salmon Coil			X	X			X		X						4
Boulder Pile Mountainsnail				X			X								2
Coeur d'Alene Oregonian			X	X		X	X		X						5
Western Flat-whorl				X		X	X		X						4
Southern Tightcoil				X											1
Shiny Tightcoil			X	X		X	X		X						5
A Metallic Wood-boring Beetle (*Agrilus pubifrons*)													X		1
Columbia River Tiger Beetle				X											1
A Long-horned Beetle (*Judolia gaurotoides*)													X		1

Species of greatest conservation need	Bear Lake	Beaverhead Mountains	Bitterroot Mountains	Blue Mountains	Challis Volcanics	Flathead Valley	Idaho Batholith	Northwestern Basin and Range	Okanogan Highlands	Overthrust Mountains	Owyhee Uplands	Palouse Prairie	Snake River Basalts	Yellowstone Highlands	Number of Sections/SGCN
A Mayfly (*Ameletus tolae*)			X												1
A Mayfly (*Cinygma dimicki*)		X													1
A Mayfly (*Paraleptophlebia falcula*)			X									X			2
A Mayfly (*Paraleptophlebia jenseni*)											X				1
A Mayfly (*Paraleptophlebia traverae*)												X			1
A Mayfly (*Parameletus columbiae*)			X		X		X					X	X		5
A Miner Bee (*Andrena aculeata*)			X		X							X			3
A Miner Bee (*Perdita barri*)				X											1
A Miner Bee (*Perdita salicis euxantha*)			X	X			X					X			4
A Miner Bee (*Perdita wyomingensis sculleni*)				X			X								2
Yellow Bumble Bee				X								X			2
Hunt's Bumble Bee	X	X	X	X	X			X		X	X	X	X		10
A Yellow-masked Bee (*Hylaeus lunicraterius*)													X		1
A Leafcutting Bee (*Ashmeadiella sculleni*)													X		1
A Mason Bee (*Hoplitis orthognathus*)			X	X			X								3
A Mason Bee (*Hoplitis producta subgracilis*)		X			X			X		X			X		5
A Miner Bee (*Hesperapis kayella*)								X			X				2
A Moth (*Grammia eureka*)				X											1
Johnson's Hairstreak				X			X								2
Beartooth Copper		X													1
Kriemhild Fritillary	X							X		X				X	4
Monarch	X	X	X	X	X	X	X	X	X	X		X	X	X	13
Gillette's Checkerspot		X	X	X			X							X	5
Wiest's Primrose Sphinx													X		1
A Grasshopper (*Argiacris amissuli*)		X													1
A Grasshopper (*Argiacris keithi*)					X		X								2
A Grasshopper (*Argiacris militaris*)		X			X		X								3
A Grasshopper (*Barracris petraea*)		X					X								2
Spur-throated Grasshopper (*Melanoplus*) Species Group		X	X	X	X	X	X		X	X		X	X		10
Straight Snowfly			X									X			2
Idaho Snowfly			X									X			2
Duckhead Snowfly											X				1

Species of greatest conservation need	Bear Lake	Beaverhead Mountains	Bitterroot Mountains	Blue Mountains	Challis Volcanics	Flathead Valley	Idaho Batholith	Northwestern Basin and Range	Okanogan Highlands	Overthrust Mountains	Owyhee Uplands	Palouse Prairie	Snake River Basalts	Yellowstone Highlands	Number of Sections/SGCN
Palouse Snowfly			X									X			2
Boise Snowfly				X											1
Lolo Sawfly		X					X								2
Utah Sallfly	X									X					2
Cascades Needlefly			X				X					X			3
Tiny Forestfly		X			X										2
Idaho Forestfly			X				X								2
Clearwater Roachfly			X												1
Umatilla Willowfly			X									X			2
A Caddisfly (*Apatania barri*)							X								1
A Caddisfly (*Manophylax annulatus*)			X				X								2
A Caddisfly (*Glossosoma idaho*)													X	X	2
A Caddisfly (*Cheumatopsyche logani*)				X			X								2
A Caddisfly (*Arctopora salmon*)							X								1
A Caddisfly (*Eocosmoecus schmidi*)		X	X	X	X		X	X							6
A Caddisfly (*Homophylax acutus*)			X												1
A Caddisfly (*Homophylax auricularis*)				X											1
A Caddisfly (*Limnephilus challisa*)					X		X								2
A Caddisfly (*Philocasca antennata*)			X												1
A Caddisfly (*Philocasca banksi*)			X												1
A Caddisfly (*Psychoglypha smithi*)					X		X								2
A Caddisfly (*Rhyacophila oreia*)		X	X	X			X								4
A Caddisfly (*Rhyacophila robusta*)			X				X								2
A Caddisfly (*Rhyacophila velora*)							X								1
A Caddisfly (*Goereilla baumanni*)		X	X												2
A Caddisfly (*Sericostriata surdickae*)		X	X	X	X										4
Idaho Amphipod							X								1
Snake River Pilose Crayfish								X			X		X		3
Number of SGCN/Section	45	61	71	72	50	31	79	43	36	43	53	38	62	33	

Appendix E: SWAP Vegetation Conservation Target Abstracts

Member National Vegetation Classification Macrogroup/Group Summaries

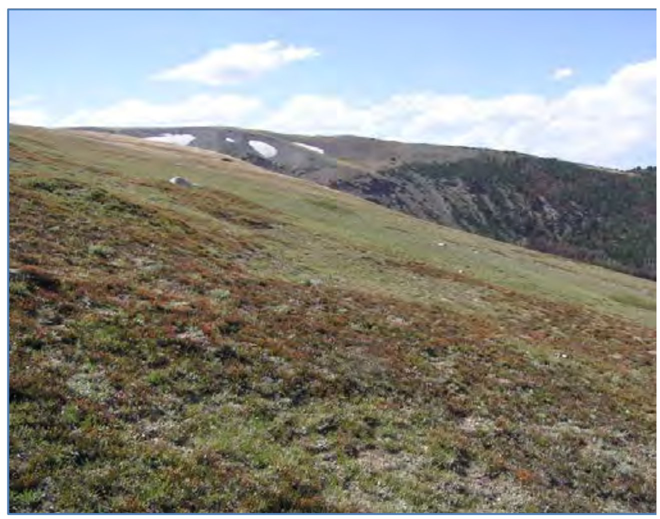
Alpine & High Montane Scrub, Grassland & Barrens

Cushion plant communities, dense sedge and grass turf, heath and willow dwarf-shrubland, wet meadow, and sparsely-vegetated rock and scree found at and above upper timberline. Topography, wind, rock movement, soil depth, and snow accumulation patterns determine distribution of vegetation types in these short growing season habitats.

Alpine Scrub, Forb Meadow & Grassland (M099)

M099. Rocky Mountain & Sierran Alpine Scrub, Forb Meadow & Grassland

Rocky Canyon, Lemhi Mountains, Idaho © 2006 Chris Murphy



Railroad Ridge RNA, White Cloud Mountains, Idaho © 2006 Steve Rust

Cushion plant communities, dense turf, dwarf-shrublands, and sparsely-vegetated rock and scree slopes found at and above upper timberline throughout the Rocky Mountains, Great Basin ranges, and Sierra Nevada. Topography (e.g., ridgetops versus lee slopes), wind, rock movement, and snow accumulation patterns produce scoured fell-fields, dry turf, snow accumulation heath sites, runoff-fed wet meadows, and scree communities. Fell-field plants are cushioned or matted, adapted to shallow drought-prone soils where wind removes snow, and are intermixed with exposed lichen coated rocks. Common species include Ross' avens (*Geum rossii*), Bellardi bog sedge (*Kobresia myosuroides*), twinflower sandwort (*Minuartia obtusiloba*), cushion phlox (*Phlox pulvinata*), moss campion (*Silene acaulis*), and others. Dense low-growing, graminoids, especially blackroot sedge (*Carex elynoides*) and fescue (*Festuca* spp.), characterize alpine turf found on dry, but less harsh soil than fell-fields. Dwarf-shrublands occur in snow accumulating areas and are comprised of heath species, such as moss heather (*Cassiope*), dwarf willows (*Salix arctica*, *S. nivialis*), and mountainheath (*Phyllodoce*). Although many alpine scree slopes are barren, plants adapted to unstable sites, such as eightpetal mountain-avens (*Dryas octopetala*) and singlehead goldenbush (*Ericameria suffruticosa*), sometimes become established.

Subalpine & Alpine Snowbed, Wet Meadow & Dwarf-Shrubland (G520)

G520. Vancouverian & Rocky Mountain Subalpine & Alpine Snowbed, Wet Meadow & Dwarf-Shrubland

Belvidere Creek RNA, Big Creek, Salmon River Mountains, Idaho © 2006 Lisa Harloe

Trinity Mountain RNA, Trinity Mountains, Idaho © 2004 Lisa Harloe

Subalpine to alpine meadow and dwarf shrub communities occurring in cirque basins, adjacent to subalpine lakes, along spring-fed streams, and in avalanche runout zones. The hydrology is tightly associated with snowmelt and springs. This group often occurs as a mosaic of plant associations dominated by sedges (e.g., *Carex scopulorum*, *C. subnigricans*, *C. nigricans*, *C. illota*), rushes (e.g., *Juncus arcticus* ssp. *littoralis*, *J. drummondii*), tufted hairgrass (*Deschampsia caespitosa*), or forbs. Abundant forbs include Sierra shootingstar (*Dodecatheon jeffreyi*), cinquefoil (*Potentilla* spp.), white marsh marigold (*Caltha leptosepala*), subalpine fleabane

(*Erigeron peregrinus*), fringed grass of Parnassus (*Parnassia fimbriata*), giant red Indian paintbrush (*Castilleja miniata*), and bistort (*Polygonum* spp.). Dwarf-shrubs are typically present, including short-height willows (e.g., *Salix planifolia* var. *monica*, *S. arctica*, *S. brachycarpa*, *S. farriae*), shrubby cinquefoil (*Dasiphora floribunda*), and ericaceous shrubs such as huckleberry (*Vaccinium* spp.), pink mountainheath (*Phyllodoce empetriformis*), alpine laurel (*Kalmia microphylla*), and western Labrador tea (*Ledum glandulosum*).

Aspen Forest & Woodland

Open to dense tree canopies of quaking aspen with lush and diverse understories of deciduous shrubs, grasses, sedges, and wildflower forbs. Aspen occurs where there is adequate soil moisture required to meet the high water demand of these trees.

Aspen Forest & Woodland (G222)

G222. Rocky Mountain Subalpine-Montane Aspen Forest & Woodland

Bannock Range, Idaho © 2008 Tim Weekley

Open to dense canopies dominated by quaking aspen (*Populus tremuloides*) with lush and diverse understories often dominated by mesic site deciduous shrubs, such as Saskatoon serviceberry (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*), and mountain snowberry (*Symphoricarpos oreophilus*). Distribution is primarily limited by adequate soil moisture required to meet high evapotranspiration demand. Sites may include uplands where moisture is supplemented by intermittent runoff or groundwater. Understory composition and structure can vary greatly, depending on soil moisture and disturbance history. Forbs, including Fendler's meadow-rue (*Thalictrum fendleri*), mule's ears (*Wyethia amplexicaulis*), and many others, are often abundant. Typical graminoid species include California brome (*Bromus carinatus*), upland sedges (*Carex* spp.), wildrye (*Elymus* spp.), and nonnative Kentucky bluegrass (*Poa pratensis*).

Cliff, Scree & Badland

Sparsely-vegetated (<10% cover) cliffs, canyon walls, mesa and plateau slopes, shale outcrops, clay badlands, volcanic flows, mountain rock outcrops, talus and scree, and cirque and glacial trough walls at all elevations. Plants are drought tolerant and adapted to growing on rock or poorly developed soil. The types and amount of trees, shrubs, herbs, and nonvascular plants present reflect climate and substrate.

Cliff, Scree & Badland Sparse Vegetation (M118)

M118. Intermountain Basins Cliff, Scree & Badland Sparse Vegetation

Mud Flat Oolite ACEC, Poison Creek near Grandview, Idaho © 2013 Chris Murphy

Sparsely-vegetated (<10% cover) cliff and canyon walls, steep mesa and plateau break slopes, shale outcrops, clayey badlands, volcanic deposits, and low elevation mountain talus and scree in the arid and semiarid interior west. Substrates include lava, cinder, ash, tuff, and basalt. Vegetation reflects climate and substrate variability. Characteristic shrubs in ash and badland areas include saltbush (*Atriplex* spp.) and slender buckwheat (*Eriogonum microthecum*) growing with Indian ricegrass (*Achnatherum hymenoides*), princesplume (*Stanleya* spp.), spiderflower (*Cleome* spp.), and annuals. Lava flows, basalt cliffs, rhyolite outcrops, and cinder support scattered limber pine (*Pinus flexilis*), juniper (*Juniperus* spp.), fernbush (*Chamaebatiaria millefolium*), dwarf goldenbush (*Ericameria nana*), spiny greasebush (*Glossopetalon spinescens*), rock spiraea (*Holodiscus dumosus*), Lewis' mock orange (*Philadelphus lewisii*), and antelope bitterbrush (*Purshia tridentata*), and herbaceous species such as cushion buckwheat (*Eriogonum ovalifolium*), scabland penstemon (*Penstemon deustus*), alumroot (*Heuchera* spp.), and wavewing (*Pteryxia* spp.).

Montane–Subalpine Cliff, Scree & Rock Vegetation (M887)

M887. Western North American Temperate Cliff, Scree & Rock Vegetation

Boise Mountains, North Fork Boise River, Idaho © 2003 Chris Murphy

Barren and sparsely-vegetated (<10% cover) rock, cliff, and scree throughout the mountains of western North America. Sites are lower montane to subalpine cliff faces, canyons, cirque and glacial trough walls, rock outcrops, and scree and talus. There can be high cover of lichens, mosses, or spikemosses (*Selaginella* spp.). Trees are patchy, primarily Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), limber pine (*Pinus flexilis*), whitebark pine (*Pinus albicaulis*),


Middle Fork Salmon River, Idaho © 2001 Chris Murphy

quaking aspen (*Populus tremuloides*), and subalpine fir (*Abies lasiocarpa*), with juniper (*Juniperus* spp.) and mountain mahogany (*Cercocarpus ledifolius*) at lower elevations. Scattered shrubs include Saskatoon serviceberry (*Amelanchier alnifolia*), goldenbush (*Ericameria* spp.), rock spiraea (*Holodiscus* dumosus), common juniper (*Juniperus communis*), Lewis' mock orange (*Philadelphus lewisii*), and American red raspberry (*Rubus idaeus*). Herbaceous species are diverse, but have low cover. They include species adapted to rock substrates, such as alumroot (*Heuchera* spp.)., mat rockspiraea (*Petrophyton caespitosum*), and stonecrop (*Sedum* spp.).

Depressional Wetlands

Diverse swamp forest and shrubland, fresh or brackish emergent marsh, aquatic, vernal pool, and mudflat wetland habitats. These occur in any shallowly flooded depression in the landscape, such as floodplain oxbows, and created wetlands, or around lakes, reservoirs, glacial carved ponds, and beaver ponds. Sites are seasonally to permanently flooded and soils are mucky. Emergent plants well-adapted to prolonged flooding include cattail, bulrush, spikerush, pondweed, and others. Vernal pools and mudflats support many annual species.

Swamp Forest (G505)

Rocky Mountain & Great Basin Swamp Forest


Coeur d'Alene River, Idaho © 2008 Chris Murphy

Swamp forests on poorly drained peaty or mucky soils that are saturated or seasonally flooded, occurring in river floodplain oxbows, overflow channels, or glacial kettles, as well as on sloped seeps and springs. Abundant tree species include Engelmann spruce (*Picea engelmannii*), western redcedar (*Thuja plicata*), paper birch (*Betula papyrifera*), lodgepole pine (*Pinus contorta*), and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*). Characteristic shrubs include gray alder (*Alnus incana*), western Labrador tea (*Ledum glandulosum*), devilsclub (*Oplopanax horridus* [Sm.] Miq.), willows (*Salix* spp.), rose spiraea (*Spiraea douglasii*), and bog blueberry (*Vaccinium uliginosum*). Typical herbaceous

Upper Priest River, Idaho © 2007 Chris Murphy

species include bluejoint (*Calamagrostis canadensis*), sedges (*Carex* spp.), Jeffrey's shootingstar (*Dodecatheon jeffreyi*), field horsetail (*Equisetum arvense*), American skunkcabbage (*Lysichiton americanus*), high mountain cinquefoil (*Potentilla flabellifolia*), groundsels (*Packera* spp., *Senecio* spp.), claspleaf twistedstalk (*Streptopus amplexifolius*), and ferns.

Emergent Marsh (M888)

M888. Arid West Interior Freshwater Emergent Marsh

Freshwater to brackish marshes found throughout interior low elevation basins of semiarid temperate western North America (Columbia Basin, Great Basin, Colorado Plateau, and Rocky Mountains). These marshes occur in bottomlands and floodplains, springs, ponds, reservoirs, ditches, streams, managed wetlands, basalt potholes, or dune depressions. They are mostly semipermanently flooded, but range from seasonally to permanently flooded. Tall emergent herbaceous plants growing over 2 m (6.5 ft) in height can be dominant, primarily broadleaf cattail (*Typha latifolia*) and bulrush (*Schoenoplectus* spp.). On the fringes, or in seasonally flooded marshes, shorter-height emergent vegetation may dominate, including spikerush

Hyatt Wetland, Boise River, Idaho © 2010 Chris Murphy

Jewell Wetland, Snake River near Payette, Idaho © 2010 Chris Murphy

(*Eleocharis* spp.), sedge (*Carex* spp.), and bulrush (*Schoenoplectus* spp., *Scirpus* spp.). Aquatic forbs may be interspersed between emergent plants in standing water. Noxious and invasive weeds can be present, including reed canarygrass (*Phalaris arundinacea*) and common reed (*Phragmites australis*).

Wet Mudflat (G525)

G525. Temperate Pacific Freshwater Wet Mudflat

Freshwater mudflats found in seasonally flooded and shallow lakebeds, marshes, river floodplains, and drawdown zones of reservoirs. Mudflats must be exposed before vegetation can develop from the seed bank. They range from sparsely-vegetated mud to extensive, but temporary, mats of herbaceous vegetation. Low-statured annual plants (both native and nonnative) dominate. Species include various annual graminoids (e.g., *Crypsis alopecuroides*, *Cyperus* spp., *Eleocharis acicularis*, *Eragrostis* spp.), small fleshy forbs (e.g., *Anagallis minimus*, *Chenopodium botrys*, *Crassula aquatica*, *Gnaphalium palustre*, *Gratiola neglecta*, *Limosella* spp., *Lindernia dubia*, *Ludwigia palustris*, *Mollugo verticillata*, *Plagiobothrys scouleri*, *Portulaca oleracea*, *Rotala ramosior*, *Veronica peregrina*), and more robust, often nonnative forbs (e.g., *Rumex crispus*, *Xanthium strumarium*, *Rorippa* spp.).

Lloyd Wetland, Snake River near Rupert, Idaho © 2011 Chris Murphy

Vernal Pool (M074)

Weiser River basin near Midvale, Washington County, Idaho © 2009 Chris Murphy

M074. Western North American Vernal Pool

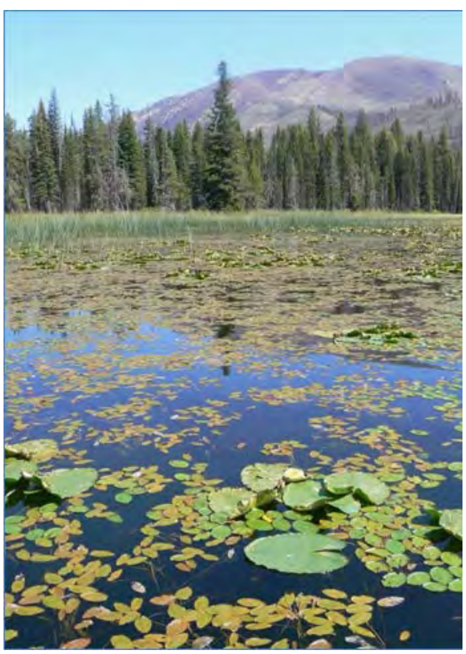
Communities typically dominated by annual plant species and/or silver sagebrush-dominated with high diversity, and sometimes high endemism of plants and invertebrates, forming distinct zones or concentric rings within shallow ephemerally or temporarily flooded precipitation-filled pools. Pools form on hardpan soils with an indurated clay or cemented layer or on shallow soils over bedrock. It is found throughout northwestern interior of North American

(Columbia Basin, northern Great Basin). Characteristic species include needle spikerush (*Eleocharis acicularis*), annual hairgrass (*Deschampsia danthonioides*), popcornflower (*Plagiobothrys* spp.), navarretia (*Navarretia* spp.), milkwort knotweed (*Polygonum polygaloides*), smooth spike-primrose (*Epilobium pygmaeum*), mousetail (*Myosurus* spp.), Carolina foxtail (*Alopecurus carolinianus*), short woollyheads (*Psilocarphus brevissimus*), and calicoflower (*Downingia* spp.). Perennial species include Bolander's sliver sagebrush (*Artemisia cana* ssp. *bolanderi*), common spikerush (*Eleocharis palustris*), mat muhly (*Muhlenbergia richardsonis*), Sandberg's bluegrass (*Poa secunda*, syn. *Poa nevadensis*), and Davis' peppergrass (*Lepidium davisii*), mostly endemic to the Owyhee Uplands.

Aquatic Vegetation (M109)

M109. Western North American Freshwater Aquatic Vegetation

Freshwater aquatic herbaceous vegetation found in reservoirs, lakes, ponds, oxbows, and slow-moving rivers. Occurs in permanently to semipermanently flooded (the latter of which may become mudflats during drawdown) wetlands where restricted to the littoral zone (where light penetration is the limiting growth factor). Floating species may dominate, such as waterfern (*Azolla* spp.), watershield (*Brasenia schreberi*), duckweed (*Lemna minor*), or Rocky Mountain pond-lily (*Nuphar lutea* ssp. *polysepala*). Submerged aquatic vegetation include pondweed (*Stuckenia*, *Potamogeton*), whitewater crowfoot (*Ranunculus aquatilis*), coon's tail (*Ceratophyllum demersum*), watermilfoil (*Myriophyllum* spp.), waterweed (*Elodea* spp.), and others. Some emergent species that are tolerant of persistent flooding can occur in this macrogroup.



Warm Lake, South Fork Salmon River, Idaho © 2008 Chris Murphy

Grays Lake NWR, Idaho © 2013 Chris Murphy

Boreal Freshwater Shrubland, Wet Meadow & Marsh (M870)

M870. North American Arctic & Northern Boreal Freshwater Shrubland, Wet Meadow & Marsh (in part)

Schlepp Marsh, Coeur d'Alene River, Idaho © 2013 Chris Murphy

A diverse macrogroup ranging from boreal Alaska and western Canada, south into northern Idaho, Montana, northeast Washington. It occurs on floodplains, depressions, pond and lake margins, oxbows and abandoned channels, etc., and is characterized by hydrophytic graminoid species in emergent marshes, saturated meadows, and wet shrublands. Composition is similar to riparian shrublands and wet meadows of the Northern Rocky Mountains, but this macrogroup occurs in lower elevation, wider valley bottoms, with lower gradients. Common species include burreed (*Sparganium* spp.), water plantain (*Alisma* spp.), wapato (*Sagittaria* spp.), horsetails (*Equisetum* spp.), sedge (*Carex* spp.), various grasses, rushes (*Juncus* spp.) and bulrush (*Scirpus*, *Schoenoplectus*). Forbs and ferns are common. Shrubs are locally dominant near water courses, especially rose spiraea (*Spiraea douglasii*), gray alder (*Alnus incana*), willow (especially *Salix drummondiana* and *S. sitchensis*), black hawthorn (*Crataegus douglasii*), redosier dogwood (*Cornus sericea*), and common snowberry (*Symphoricarpos albus*).

Semi-natural Wet Shrubland, Meadow & Marsh (M301)

M301. Western North American Ruderal Wet Shrubland, Meadow & Marsh (in part)

Disturbed wetland meadow, marsh, and shrubland habitats of temperate western North America strongly dominated by nonnative weedy species. Native species are low in abundance. Disturbance can include hay cultivation, severe grazing, past land clearing or industry, roads, logging, altered hydrology, and filling or draining. Dominant herbaceous species include introduced grasses, such as bentgrass (*Agrostis* spp.), meadow foxtail (*Alopecurus* spp.), reed canarygrass (*Phalaris arundinacea*), common reed (*Phragmites australis*), and nonnative

Cub River, Bear River, Idaho © 2011 Chris Murphy

bluegrass (*Poa* spp.), and invasive forbs, including Canada thistle (*Cirsium arvense*), paleyellow iris (*Iris pseudacorus*), broadleafed pepperweed (*Lepidium latifolium*), poison hemlock (*Conium maculatum*), purple loosestrife (*Lythrum salicaria*), and others. Common nonnative shrubs include Himalayan blackberry (*Rubus armeniacus*), desert false indigo (*Amorpha fruticosa*), and rose (e.g., *Rosa* spp.).

Alkaline–Saline Wetland (M082)

M082. Warm and Cool Semi-Desert Alkaline–Saline Wetland (in part)

Marshes, wet meadows, and shrublands on alkaline and/or saline soils found throughout much of western North America where evaporation far exceeds precipitation. Sites range from sloped seeps and springs (most commonly) to drainages and pond and playa margins. Flooding or saturation varies, but high groundwater is typical. Vegetation is salt-tolerant. Characteristic shrubs include greasewood (*Sarcobatus vermiculatus*), shrubby cinquefoil (*Dasiphora floribunda*), iodinebush (*Allenrolfea occidentalis*) (locally), and saltbush (*Atriplex* spp.). Abundant herbaceous species are saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), bulrush (*Schoenoplectus*, *Scirpus*), clustered field sedge (*Carex praegracilis*), mountain rush (*Juncus arcticus* ssp. *littoralis*), muhly (*Muhlenbergia* spp.), beaked spikerush (*Eleocharis rostellata*), alkaligrass (e.g., *Puccinellia* spp.), barley (*Hordeum* spp.), wildrye (e.g., *Leymus triticoides*, *L. cinereus*), seaside arrowgrass (*Triglochin maritima*), red glasswort (*Salicornia rubra*), and seepweed (*Suaeda* spp.). Disturbed sites have high amounts of nonnative species, such as kochia (*Bassia* spp.), perennial sowthistle (*Sonchus arvensis*), perennial pepperweed (*Lepidium latifolium*), and tall wheatgrass (*Thinopyrum ponticum*).

Roswell Wildlife Habitat Area (WHA), Snake River near Parma, Idaho © 2012 Chris Murphy

Dry Lower Montane–Foothill Forest

Fire-dependent conifer forests, woodlands, and savannas often dominated by ponderosa pine and Douglas-fir. Stands occur in dry lower montane to foothill settings. Various shrubs and grasses occur in the understory, the species and abundance of which depend on fire history, soils, and climate. Mallow ninebark, white spirea, snowberry, pinegrass, Geyer's sedge, and Idaho fescue are common.

Dry Lower Montane–Foothill Forest (M501)

M501. Central Rocky Mountain Dry Lower Montane–Foothill Forest

Fire-dependent conifer forests, woodlands, and savannas typically dominated by ponderosa pine (*Pinus ponderosa*) and/or Douglas-fir (*Pseudotsuga menziesii*), with limber pine (*Pinus flexilis*) and Rocky Mountain juniper (*Juniperus scopulorum*) on rocky outcrops. Stands are found in dry settings of the lower montane to foothill zones of the interior Pacific Northwest, central and northern Rocky Mountains, and extending east into the northwestern Great Plains. Climate ranges from warm, winter moist in western canyons to cool, summer moist in eastern mountains. Common shrub understory species include Saskatoon serviceberry (*Amelanchier alnifolia*), kinnikinnick (*Arctostaphylos uva-ursi*), sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), mountain mahogany (*Cercocarpus* spp.), common juniper (*Juniperus communis*), mallow ninebark (*Physocarpus malvaceus*), white spirea (*Spiraea betulifolia*), and snowberry (*Symphoricarpos* spp.).

Circle End Creek RNA, South Fork Salmon River, Idaho © 2010 Chris Murphy

Redfish Lake Moraine RNA, Sawtooth Mountains, Idaho © 2005 Steve Rust

Characteristic herbs are pinegrass (*Calamagrostis rubescens*), Geyer's sedge (*Carex geyeri*), Idaho fescue (*Festuca idahoensis*), needle-and-thread (*Hesperostipa comata*), prairie Junegrass (*Koeleria macrantha*), littleseed ricegrass (*Piptatherum micranthum*), Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), heartleaf arnica (*Arnica cordifolia*), timber milkvetch (*Astragalus miser*), and arrowleaf balsamroot (*Balsamorhiza sagittata*). Forbs and graminoids vary, depending on fire history, soils, and local climate.

Willow Creek, South Fork Boise River, Idaho © 2010 Chris Murphy

Cedar Creek, Lost River Range, Idaho © 2010 Brenda Erhardt

High Montane Mesic Shrubland

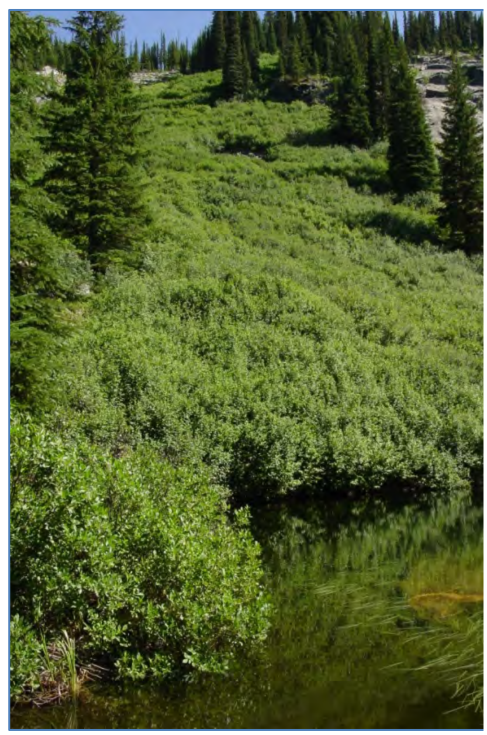
Upper montane and subalpine shrublands composed of a diverse mix of deciduous shrubs, especially Sitka alder, Scouler's willow, Rocky Mountain maple, rusty menziesia, and huckleberry. Stands occur on avalanche chutes or on mountain slopes kept open by fires. Mesic grasses, ferns, and tall forbs are in the understory.

High Montane Mesic Shrubland (G305)

G305. Central Rocky Mountain High Montane Mesic Shrubland

Bruin Mountain RNA, Little French Creek, Salmon River, Idaho © 2009 Chris Murphy

Shrublands occurring in upper montane and subalpine zones composed of a diverse mix of deciduous shrubs. Stands occur on avalanche slopes and chutes or are initiated by fires. Common species include Sitka alder (*Alnus viridis* ssp. *sinuata*), Rocky Mountain maple (*Acer glabrum*), rusty menziesia (*Menziesia ferruginea*), currants (*Ribes* spp.), thimbleberry (*Rubus parviflorus*), Scouler's willow (*Salix scouleriana*), red elderberry (*Sambucus racemosa*), Greene's mountainash (*Sorbus scopulina*), rose meadowsweet (*Spiraea splendens*), huckleberry (*Vaccinium* spp.), occurring in any combination. Important graminoids and forbs include ladyfern (*Athyrium filix-femina*), bromes (*Bromus* spp.), fireweed (*Chamerion angustifolium*), drooping woodreed (*Cinna latifolia*), heartleaf spring beauty (*Claytonia cordifolia*), blue wildrye (*Elymus glaucus*), licoriceroot (*Ligusticum* spp.), Hitchcock's smooth woodrush (*Luzula glabrata* var. *hitchcockii*), bluebells (*Mertensia* spp.), poke knotweed (*Polygonum phytolaccifolium*), arrowleaf groundsel (*Senecio triangularis*), and common beargrass (*Xerophyllum tenax*).



Goat Lake, Patrick Butte RNA, Idaho © 2005 Lisa Harloe

Juniper Woodland & Savanna

Woodlands and savannas characterized by scattered to dense western or Utah juniper trees. Shrub cover varies, but is most commonly mountain mahogany, sagebrush, and bitterbrush. Savannas can support lush perennial bunchgrasses; dense stands have sparse understories. Decreased fire frequency has allowed juniper to colonize sagebrush steppe in some areas.

Utah Juniper Woodland & Savanna (G246)

G246. Colorado Plateau–Great Basin Juniper Woodland & Savanna

Woodlands and savannas characterized by Utah juniper (*Juniperus osteosperma*) in the tree layer and absence of singleleaf pinyon (*Pinus monophylla*). Savannas can have a lush perennial grass layer with scattered Utah juniper trees; closed canopy stands have sparse understories. Shrub cover varies, but is most commonly sagebrush (*Artemisia tridentata*, *A. arbuscula*, *A. nova*), antelope bitterbrush (*Purshia tridentata*), rabbitbrush (*Ericameria*, *Chrysothamnus*), and slender buckwheat (*Eriogonum microthecum*). Characteristic grasses include Indian ricegrass (*Achnatherum hymenoides*), needle-and-thread (*Hesperostipa comata*), saline wildrye (*Leymus salinus*), and bluebunch wheatgrass (*Pseudoroegneria spicata*). Forbs can be diverse but generally have low cover, the most common species being tapertip onion (*Allium acuminatum*), balsamroot (*Balsamorhiza* spp.), tapertip hawksbeard (*Crepis acuminata*), matted buckwheat (*Eriogonum caespitosum*), pricklypear cactus (*Opuntia polyacantha*), longleaf phlox (*Phlox longifolia*), and lambstongue ragwort (*Senecio integerrimus*).

Big Canyon, Goose Creek, Idaho © 2011 Lynn Kinter

Western Juniper Woodland & Savanna (G248)

G248. Columbia Plateau Western Juniper Woodland & Savanna

Castle Creek, Owyhee Mountains, Idaho © 2013 Tim Weekley

Western juniper (*Juniperus occidentalis*) is the diagnostic and dominant species of these woodlands and savannas. In Idaho it occurs in the Owyhee Uplands and a small portion of southern Hells Canyon. Mountain mahogany (*Cercocarpus ledifolius*) may co-dominate some stands. The understory is variable in structure (from sparse in closed-canopy stands to dense shrub or bunchgrass in savannas), and is similar to mesic sagebrush steppe in composition. Characteristic species include big sagebrush (*Artemisia tridentata*), little sagebrush (*Artemisia arbuscula* ssp. *arbuscula*), antelope bitterbrush (*Purshia tridentata*), Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), arrowleaf balsamroot (*Balsamorhiza sagittata*), and Wyeth's buckwheat (*Eriogonum heracleoides*). Changes to fire regimes have allowed western juniper to colonize some sagebrush-steppe stands.

Lower Montane–Foothill Grassland & Shrubland

Grasslands and deciduous shrublands in foothill and lower montane settings with warm, dry summers and cool, moist winters. Fire-maintained grasslands are comprised of perennial bunchgrass (e.g., wheatgrass, fescue, needlegrass, Sandberg bluegrass, etc.) and diverse forbs on varying soils. Snowberry, mallow ninebark, hawthorn, cherry, rose, netleaf hackberry, and smooth sumac shrublands occur on talus and sheltered foothill and canyon slopes. Trees, such as ponderosa pine and Douglas-fir, are uncommon.

Lower Montane, Foothill & Valley Grassland (G273)

G273. Central Rocky Mountain Lower Montane, Foothill & Valley Grassland

Grasslands found at lower montane to foothill elevations with warm, dry summers (but not semiarid) and cool, wet winters, including grasslands commonly known as "Palouse Prairie." Soils are relatively deep and fine-textured supporting cool-season perennial bunchgrasses and forbs (>25% cover). Rough fescue (*Festuca campestris*), Idaho fescue (*Festuca idahoensis*), and bluebunch wheatgrass (*Pseudoroegneria spicata*) are dominant, but other native grasses such as needle-and-thread (*Hesperostipa comata*), needlegrass (Achnatherum spp.), oatgrass (*Danthonia* spp.), basin wildrye (*Leymus cinereus*), prairie Junegrass (*Koeleria macrantha*), western wheatgrass (*Pascopyrum smithii*), and Sandberg's bluegrass (*Poa secunda*) are common. Forb diversity is typically high in both mesic and dry aspects of this group. Characteristic forbs include yarrow (*Achillea millefolium*), arrowleaf balsamroot (*Balsamorhiza sagittata*), Indian paintbrush (*Castilleja* spp.), buckwheat (*Eriogonum* spp.), prairie smoke (*Geum triflorum*), sticky geranium (*Geranium viscosissimum*), little sunflower (*Helianthella uniflora*), houndstongue hawkweed (*Hieracium cynoglossoides*), silky lupine (*Lupinus sericeus*), and slender cinquefoil (*Potentilla gracilis*). Ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) trees are uncommon.

Craig Mountain Wildlife Management Area (WMA), Lower Salmon River, Idaho © 2011 Chris Murphy

Montane–Foothill Deciduous Shrubland (G272)

G272. Central Rocky Mountain Montane-Foothill Deciduous Shrubland


Lower Salmon River, Idaho © 2007 Chris Murphy

Lower montane and foothill deciduous shrublands typically occurring within the matrix of surrounding low-elevation grasslands, sagebrush steppe, or ponderosa pine (*Pinus ponderosa*) - Douglas-fir (*Pseudotsuga menziesii*) woodlands. They are usually found on steep slopes of canyons (e.g., talus) or in areas with some soil development and more mesic conditions than adjacent habitats (drainages, toeslopes, north aspects). The most common dominant shrubs include smooth sumac (*Rhus glabra*), Saskatoon serviceberry (*Amelanchier alnifolia*), netleaf hackberry (*Celtis laevigata* var. *reticulata*), black hawthorn (*Crataegus douglasii*), bitter cherry (*Prunus emarginata*), chokecherry (*Prunus virginiana*), rose (*Rosa* spp.), blue elderberry (*Sambucus nigra* ssp. *cerulea*) common snowberry (*Symphoricarpos albus*), Rocky Mountain maple (*Acer glabrum*), mallow ninebark (*Physocarpus malvaceus*), and oceanspray (*Holodiscus discolor*). A variety of cool-season graminoids and forbs common to lower montane, mesic habitats may be present in the understory.


Palouse, Latah County, Idaho © 2009 Janice Hill

Mesic Lower Montane Forest

Moist conifer forests of the lower montane and montane zones. Climate is maritime influenced. Grand fir, western larch, Douglas-fir, western redcedar, and western hemlock are major trees. Understory vegetation is diverse and lush, comprised of Pacific yew, mesic site deciduous shrubs, numerous forbs (e.g., wild ginger, bride's bonnet, Idaho goldenthread, etc.), and various ferns. Fire return intervals tend to be long.

Mesic Lower Montane Forest (M500)

M500. Central Rocky Mountain Mesic Lower Montane Forest

Mesic to moist conifer forests of the lower montane to montane zone of the central-northern Rocky Mountains and interior Pacific Northwest. Climate is maritime influenced. Grand fir (*Abies grandis*), western larch (*Larix occidentalis*), Engelmann spruce (*Picea engelmannii*), Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), or western hemlock (*Tsuga heterophylla*) are the major dominants. Understory vegetation is often diverse and lush, comprised of mesic site deciduous shrubs, numerous forbs, and various ferns. Typical species include Rocky Mountain maple (*Acer glabrum*), white spirea (*Spiraea betulifolia*), Pacific yew (*Taxus brevifolia*), dwarf bilberry (*Vaccinium cespitosum*), thinleaf huckleberry (*Vaccinium membranaceum*), British Columbia wildginger (*Asarum caudatum*), bride's bonnet (*Clintonia uniflora*), Idaho goldthread (*Coptis occidentalis*), common beargrass (*Xerophyllum tenax*), maidenhair (*Adiantum aleuticum*), western oakfern (*Gymnocarpium dryopteris*), and western swordfern (*Polystichum munitum*). Fire return intervals tend to be long.

Mica Creek, Middle Fork Weiser River, Idaho © 2005 Lisa Harloe

Upper Priest River, Idaho © 2007 Chris Murphy

Montane Grassland

Upper montane to subalpine grasslands dominated by drought tolerant perennial grasses (e.g., fescue, timber oatgrass, spike fescue, wheatgrass, needlegrass), upland sedges, and various forbs on dry sites, particularly south-facing slopes or ridgetops and well-drained meadows. Fire plays a role in maintaining these open grassy areas, as well as drought or cold air accumulation in some meadows.

Montane Grassland (G267)

G267. Central Rocky Mountain Montane Grassland

Upper montane to subalpine grasslands dominated by perennial grasses and forbs on dry sites, particularly south-facing slopes or ridgetops, and in well-drained meadows. Fire plays a role in maintaining these open grassy areas, as well as drought on ridgetops or cold air accumulation in some dry meadows. Typically dominant species, include prairie Junegrass (*Koeleria macrantha*), Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), timber oatgrass (*Danthonia intermedia*), needlegrass (*Achnatherum* spp.), slender wheatgrass (*Elymus trachycaulus*), spike fescue (*Leucopoa kingii*), spike trisetum (*Trisetum spicatum*), squirreltail (*Elymus elymoides*), prairie Junegrass (*Koeleria macrantha*), and a variety of dry-site sedges (*Carex* spp.). Important forbs include yarrow (*Achillea millefolium*), littleleaf pussytoes (*Antennaria microphylla*), prickly sandwort (*Arenaria aculeata*), alpine golden buckwheat (*Eriogonum flavum*), thickstem aster (*Eurybia integrifolia*), Virginia strawberry (*Fragaria virginiana*), pleated gentian (*Gentiana affinis*), silvery lupine (*Lupinus argenteus* ssp. *argenteus*), varileaf cinquefoil (*Potentilla diversifolia*), penstemon (*Penstemon* spp.), goldenweed (*Pyrrocoma* spp.), and western aster (*Symphyotrichum spathulatum*).

Cuddy Mountain, Snake River, Idaho © 2009 Chris Murphy

Hard Butte, Hazard Creek, Little Salmon River, Idaho © 2010 Chris Murphy

Montane Sclerophyll Scrub

Chaparral shrublands dominated by snowbrush ceanothus, often mixed with other montane evergreen or deciduous shrubs. These shrubs are fire-adapted, resprouting vigorously after burning or producing fire-resistant seeds.

Cool Interior Chaparral (M094)

M094. Cool Interior Chaparral

Trinity Mountains, South Fork Boise River, Idaho © 2013 Jessica Irwin

Camas Peak, Soldier Mountains, Idaho © 2004 Jennifer Miller

Chaparral shrublands that occur between low-elevation desert landscapes and higher subalpine woodlands of the Cascades, Sierra Nevada, and interior mountain ranges of the western US, generally among montane forests above 1500 m (4550 ft) elevation. Dominant and diagnostic shrubs include snowbrush ceanothus (*Ceanothus velutinus*), redstem ceanothus (*Ceanothus sanguineus*), greenleaf manzanita (*Arctostaphylos patula*) – (rare in Idaho), each with sclerophyllous growth form, mixed with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), mountain snowberry (*Symphoricarpos oreophilus*), and bitter cherry (*Prunus emarginata*). Most of these chaparral species are fire adapted, resprouting vigorously after burning or producing fire-resistant seeds.

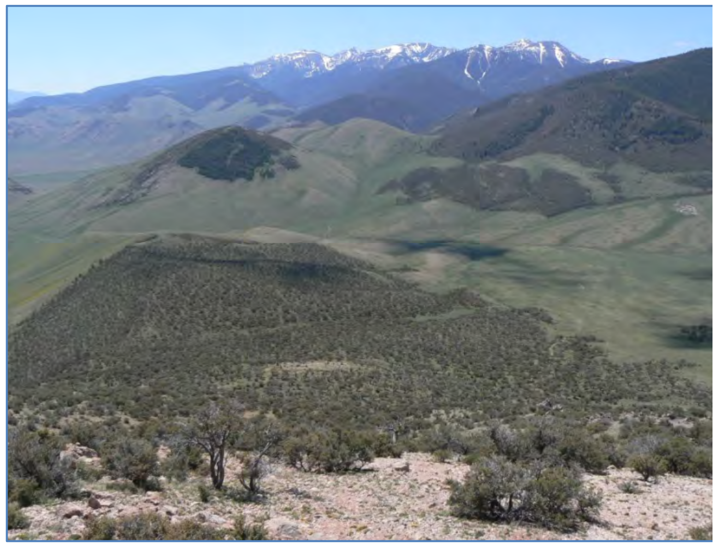
Mountain Mahogany Scrub & Woodland

Curl-leaf mountain mahogany dominates these woodlands and shrublands of canyon, foothill, and mountain slopes. Scattered other trees or shrubs may be present. Understory shrubs, grasses, and forbs are similar to those in sagebrush steppe. Stands are often on rocky calcareous or altered basalt bedrock, where fire is uncommon.

Curl-leaf Mountain Mahogany Scrub & Woodland (G249)

G249. Intermountain Basins Curl-leaf Mountain Mahogany Scrub & Woodland

Curl-leaf mountain mahogany (*Cercocarpus ledifolius*) dominates these woodlands and shrublands of canyon, foothill, and mountain slopes. Scattered other trees (e.g., *Juniperus* spp., *Pinus* spp.) may be present with low cover. Shrubs, especially mountain big sagebrush (*Artemisia tridentata* ssp. vaseyana), bitterbrush (*Purshia tridentata*), and mountain snowberry (*Symphoricarpos oreophilus*), may be present to abundant in the understory. Characteristic herbs include bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), basin wildrye (*Leymus cinereus*), arrowleaf balsamroot (*Balsamorhiza sagittata*), buckwheat (*Eriogonum* spp.), and lambstongue ragwort (*Senecio integerrimus*). Stands commonly form on rocky sites, with calcareous or altered basalt bedrock, where fire is uncommon.



Hawley Mountain, Lost River Range, Idaho © 2008 Chris Murphy

Lower Salmon River, Idaho © 2007 Chris Murphy

Nonnative Annual & Perennial Grassland & Forbland

Disturbed grasslands and scrub found in basins, plains, and foothills, often adjacent to roads, powerlines, developed areas, and in burnt areas. Soils may be compacted and eroded. Dominant nonnative grasses include perennial crested wheatgrass and smooth brome, which have been purposefully seeded, and annual cheatgrass and medusahead. Invasive nonnative annual forbs, such as tall tumblemustard, are common.

Semi-Desert Ruderal Scrub & Grassland (M499)

M499. Western North American Cool Semi-Desert Ruderal Scrub & Grassland

Snake River Plain near New Plymouth, Idaho © 2015 Idaho Natural Heritage Program

Disturbed grasslands and scrub found in semidesert basins, plains, and foothills throughout western North America. Stands often occur adjacent to roads, powerlines, developed areas, and in burnt areas. Soils may be compacted and eroded with biological crusts absent because of disturbance. Dominant nonnative graminoids include crested wheatgrass (*Agropyron cristatum*, which has been purposefully seeded), cheatgrass (*Bromus tectorum*), and medusahead (*Taeniatherum caput-medusae*). Invasive forbs include prickly Russian thistle (*Salsola tragus*), herb sophia (*Descurainia sophia*), tall tumblemustard (*Sisymbrium altissimum*), and clasping pepperweed (*Lepidium perfoliatum*). Noxious weeds may be abundant. Nonnative shrublands are less common, with prostrate summercypress (*Kochia prostrata*) (planted for wildfire prevention) being the main example.

Snake River Plain near Mountain Home, Idaho © 2015 Idaho Natural Heritage Program

Ruderal Grassland & Shrubland (M493)

M493. Western North American Ruderal Grassland & Shrubland

Upland ruderal grasslands, meadows, and shrublands found on human-disturbed sites, and dominated by a mix of nonnative (often purposefully seeded) and generalist native species. Stands occur throughout the western U. S. (Rockies westward) and southwestern Canada in a variety of climate regimes. Sites are moister than semiarid grasslands. These grasslands are common on Conservation Reserve Program lands. Widespread dominant and diagnostic herbs include naturalized forage perennial species such as bentgrass (*Agrostis* spp.), smooth brome (*Bromus inermis*), orchardgrass (*Dactylis glomerata*), quackgrass (*Elymus repens*), timothy (*Phleum pratense*), intermediate wheatgrass (*Thinopyrum intermedium*), and Kentucky bluegrass (*Poa pratensis*). Invasive nonnative shrublands dominated by Scotch broom (*Cytisus scoparius*), Himalayan blackberry (*Rubus armeniacus*), or rose (e.g., *Rosa eglanteria*) are less common.

Palouse, Latah County, Idaho © 2009 Janice Hill

Palouse Prairie Grassland

Low elevation, cool-season fescue and bluebunch wheatgrass grasslands on deep, fine-textured loess soils. This habitat is confined to the Palouse region with warm, dry summers (not semiarid) and cool, wet winters. Forb diversity and productivity is typically high.

Lower Montane, Foothill & Valley Grassland (G273)

G273. Central Rocky Mountain Lower Montane, Foothill & Valley Grassland

Grasslands found at lower montane to foothill elevations with warm, dry summers (but not semiarid) and cool, wet winters, including grasslands commonly known as "Palouse Prairie." Soils are relatively deep and fine-textured supporting cool-season perennial bunchgrasses and forbs (>25% cover). Rough fescue (*Festuca campestris*), Idaho fescue (*Festuca idahoensis*), and bluebunch wheatgrass (*Pseudoroegneria spicata*) are dominant, but other native grasses such as needle and thread (*Hesperostipa comata*), needlegrass (*Achnatherum* spp.), oatgrass (*Danthonia* spp.), basin wildrye (*Leymus cinereus*), prairie Junegrass (*Koeleria macrantha*), western wheatgrass (*Pascopyrum smithii*), and Sandberg's bluegrass (*Poa secunda*) are common. Forb diversity is typically high in both mesic and dry aspects of this group. Characteristic forbs include yarrow (*Achillea millefolium*), arrowleaf balsamroot (*Balsamorhiza sagittata*), Indian paintbrush (*Castilleja* spp.), buckwheat (*Eriogonum* spp.), prairie smoke (*Geum triflorum*), sticky geranium (*Geranium viscosissimum*), little sunflower (*Helianthella uniflora*), houndstongue hawkweed (*Hieracium cynoglossoides*), silky lupine (*Lupinus sericeus*), and slender cinquefoil (*Potentilla gracilis*).

Palouse, Latah County, Idaho © 2012 Trish Heekin

Pinyon–Juniper–Mountain Mahogany Woodland & Savanna

Broadly defined Pinyon–Juniper–Mountain Mahogany Woodland & Savanna occurring on dry foothills and plains. This habitat is characterized by an open to closed tree canopy of western juniper, Utah juniper, singleleaf pinyon (locally in Idaho), and/or mountain mahogany. Understory shrubs include sagebrush, rabbitbrush, and bitterbrush. Herbaceous species are similar to those occurring in mesic sagebrush steppe.

Pinyon–Juniper–Mountain Mahogany Woodland & Savanna (M026)

M026. Intermountain Singleleaf Pinyon–Utah Juniper–Western Juniper Woodland

Castle Creek, Owyhee Mountains, Idaho © 2013 Tim Weekley

Broadly defined Pinyon–Juniper–Mountain Mahogany Woodland & Savanna occurring in dry foothills and plains of the interior western US. This habitat is characterized by an open to closed tree canopy of western juniper (*Juniperus occidentalis*), Utah juniper (*Juniperus osteosperma*), singleleaf pinyon (*Pinus monophylla*) (locally in Idaho), and/or mountain mahogany (*Cercocarpus ledifolius*). Understory shrubs include big sagebrush (*Artemisia tridentata*), little sagebrush (*Artemisia arbuscula*), black sagebrush (*Artemisia nova*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria nauseosa*), antelope bitterbrush (*Purshia tridentata*), wax currant (*Ribes cereum*), and horsebrush (*Tetradymia* spp.). Herbaceous species are similar to those occurring in mesic sagebrush steppe. Common graminoids include needle-and-thread (*Hesperostipa comata*), Idaho fescue (*Festuca idahoensis*), basin wildrye (*Leymus cinereus*), saline wildrye (*Leymus salinus*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Sandberg bluegrass (*Poa secunda*). Forbs, such as arrowleaf balsamroot (*Balsamorhiza sagittata*) and Wyeth's buckwheat (*Eriogonum heracleoides*), may be diverse but typically have low cover.

Pinyon–Juniper Woodland

Lower montane woodlands characterized by an open to dense singleleaf pinyon trees mixed with Utah juniper. The variable understory is similar to montane sagebrush steppe. In Idaho, this habitat is limited to the rocky foothills of the southern Albion Mountains in the vicinity of City of Rocks Reserve.

Pinyon–Juniper Woodland (G247)

G247. Great Basin Pinyon–Juniper Woodland

Lower montane woodlands characterized by an open to dense tree layer of singleleaf pinyon (*Pinus monophylla*), often with codominant Utah juniper (*Juniperus osteosperma*), and variable understories similar to montane sagebrush steppe. In Idaho, this group is limited to the rocky foothills of the southern Albion Mountains in the vicinity of City of Rocks Reserve. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), black sagebrush (*Artemisia nova*), and antelope bitterbrush (*Purshia tridentata*) are common shrubs. Typical understory species are bunchgrasses, such as needle-and-thread (*Hesperostipa comata*), Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and basin wildrye (*Leymus cinereus*), and forbs including arrowleaf balsamroot (*Balsamorhiza sagittata*). Sites are less xeric and have less extreme frosts than Utah juniper and sagebrush-steppe stands occurring downslope.

City of Rocks National Reserve, Idaho © Lynn Kinter

Riverine–Riparian Forest & Shrubland

Riparian forests and shrublands on floodplains and terraces of permanent and intermittent rivers and streams. Persistence depends on annual to episodic flooding that creates alluvial bars suitable for tree and shrub reproduction. Stream baseflows provide sufficient groundwater year-round. Stands also occur along backwaters, lakes, ponds, reservoirs, and irrigation ditches. Sites range from steep v-shaped valleys to broad, flat glacial and river valleys. Frequent trees include cottonwoods, pines, alders, subalpine fir, Engelmann spruce, western redcedar, willows, and Russian olive (or other nonnative species). A diverse mix of shrubs are present, most commonly rose spirea, gray alder, willows, water birch, hawthorns, redosier dogwood, Wood's rose, currants, bog birch, and common snowberry. The herb layer is also diverse, with many wetland grass, sedge, rush, and forb species; their cover inversely related to overstory density and flood-scouring.

Lowland & Foothill Riparian Forest (G796)

G796. Northern Rocky Mountain Lowland & Foothill Riparian Forest

Upper Priest River, Idaho © 2007 Chris Murphy

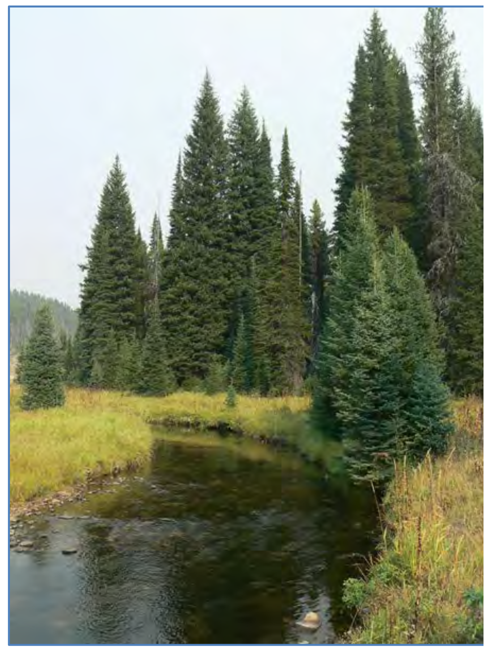
Boise River, Idaho © 2015 Chris Murphy

Low-elevation (foothill, canyon, lower montane) riparian forests and woodlands found along permanent, intermittent, and ephemeral streams, or on river floodplains. Persistence is dependent on annual to episodic flooding that creates alluvial features suitable for tree reproduction and sufficient groundwater. Stands also occur along backwater channels and other wet sites, such as swales and irrigation ditches. Frequently dominant trees are cottonwood (*Populus* spp.), ponderosa pine (*Pinus ponderosa*), white alder (*Alnus rhombifolia*), quaking aspen (*Populus tremuloides*), juniper (*Juniperus* spp.), peachleaf willow (*Salix amygdaloides*), Russian olive (*Elaeagnus angustifolia*), and Western redcedar (*Thuja plicata*). The shrub component is diverse and variable, the most important being common snowberry (*Symphoricarpos albus*), black hawthorn (*Crataegus douglasii*), redosier dogwood (*Cornus sericea*), gray alder (*Alnus incana*), Wood's rose (*Rosa woodsii*), Lewis' mockorange (*Philadelphus lewisii*), willow (*Salix* spp.), water birch (*Betula occidentalis*), and golden currant (*Ribes aureum*). The herbaceous understory is equally diverse, varying in response to the amount of light penetrating overstory canopies and disturbance history.

Montane Riparian Forest (G506)

G506. Rocky Mountain & Great Basin Montane Riparian Forest


Queens River, Middle Fork Boise River, Idaho © 2007 Chris Murphy


Red River, Idaho ©Chris Murphy

Diverse, seasonally flooded riparian forests and woodlands found at montane to subalpine elevations occurring on floodplains or terraces of rivers and streams. They occur in narrow valleys, wide glacial-carved valley bottoms with meadows, or on lake margins. Dominant tree species include subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmanni*), lodgepole pine (*Pinus contorta*), narrowleaf or black cottonwood (*Populus angustifolia*, *P. balsamifera* ssp. *trichocarpa*), quaking aspen (*Populus tremuloides*), and Douglas-fir (*Pseudotsuga menziesii*). Shrubs are diverse and include redosier dogwood (*Cornus sericea*), thinleaf huckleberry (*Vaccinium membranaceum*), gray alder (*Alnus incana*), Rocky Mountain maple (*Acer glabrum*), rusty menziesia (*Menziesia ferruginea*), Sitka alder (*Alnus viridis* ssp. *sinuata*), prickly currant (*Ribes lacustre*), alderleaf buckthorn (*Rhamnus alnifolia*), and western Labrador tea (*Ledum glandulosum*). The herbaceous undergrowth can be lush or sparse, with characteristic species including bluejoint (*Calamagrostis canadensis*), ladyfern (*Athyrium filix-*

femina), mountain sedge (*Carex scopulorum*), arrowleaf groundsel (*Senecio triangularis*), claspleaf twistedstalk (*Streptopus amplexifolius*), and softleaf sedge (*Carex disperma*).

Ruderal Flooded & Swamp Forest (M298)

M298. Interior West Ruderal Flooded & Swamp Forest

Montour WMA, Payette River, Idaho © 2012 Chris Murphy

Low-elevation riparian, lacustrine fringe (often human created), seeps and springs, or agricultural areas fed by irrigation throughout the interior Columbia River Basin, Great Basin, and southwestern U. S. and into Mexico that are dominated by nonnative invasive woody species. Abundant trees include Russian olive (*Elaeagnus angustifolia*), salt cedar (e.g., *Tamarix* spp.), and introduced broad-leaved deciduous trees including maple (*Acer* spp.), green ash (*Fraxinus pennsylvanica*), Plains cottonwood (*Populus deltoides*), willow (*Salix alba*, *S. fragilis*), and elm (*Ulmus* spp.). Invasive nonnative shrubs can be common, such as false indigo (*Amorpha fruticosa*), rose (*Rosa* spp.), and Himalayan blackberry (*Rubus armeniacus*). Invasive and noxious weeds also occur (e.g., *Phalaris arundinacea*, *Elymus repens*, *Cirsium arvense*, *Conium maculatum*, *Solanum dulcamara*).

Lowland & Foothill Riparian Shrubland (G526)

G526. Rocky Mountain & Great Basin Lowland & Foothill Riparian Shrubland

Shoofly Creek, Owyhee Plateau, Idaho © 2013 Chris Murphy

Willow Creek, South Fork Boise River, Idaho 2003 ©Ed Bottum

Foothill and lower montane riparian shrublands occurring along permanent, intermittent, and ephemeral streams. Sites range from steep-sided, v-shaped valleys and to broad, flat river valleys. Some stands are maintained by annual flooding. Settings range from dynamic alluvial bars to stable alluvial terraces, and from margins of floodplain Depressional Wetlands or sloped springs to created wetlands. A diverse mix of shrubs are present, especially willows (e.g., *Salix exigua*, *S. lasiolepis*, *S. lutea*), *S. lucida* ssp. *caudata*, *S. melanopsis*), water birch (*Betula occidentalis*), gray alder (*Alnus incana*), black hawthorn (*Crataegus douglasii*), Woods' rose (*Rosa woodsii*), Lewis' mock orange (*Philadelphus lewisii*), chokecherry (*Prunus virginiana*), common snowberry (*Symphoricarpos albus*), golden currant (*Ribes aureum*), redosier dogwood (*Cornus sericea*), and Rocky Mountain maple (*Acer glabrum*). The herbaceous layer is diverse, but cover varies depending on the density of the shrub overstory and amount of flood-scouring. Important species include common horsetail (*Equisetum arvense*), blue wildrye (*Elymus glaucus*), common spikerush (*Eleocharis palustris*), stinging nettle (*Urtica dioica*), sedge (*Carex* spp.), goldenrod (*Solidago canadensis*, *Euthamia occidentalis*), wild mint (*Mentha arvensis*), smallfruit bulrush (*Scirpus microcarpus*), common ladyfern (*Athyrium filix-femina*), starry false lily of the valley (*Maianthemum stellatum*), sweetcicely (*Osmorhiza berteroi*), and fowl mannagrass (*Glyceria striata*). Introduced forage grasses and noxious weeds are often present.

Montane–Subalpine Riparian & Seep Shrubland (G527)

G527. Western Montane-Subalpine Riparian & Seep Shrubland

Crane Meadow, Elk Creek, Frank Church—River of No Return Wilderness, Idaho © 2007 Chris Murphy

Pole Creek Exclosure RNA, Salmon River, Idaho © 2000 Ed Bottum

South Fork Boise River, Idaho © 2007 Chris Murphy

Bear River, North Fork Boise River, Idaho © 2004 Lisa Harloe

Montane to subalpine riparian shrublands on streambanks, springs, seeps, and alluvial terraces. Sites range from steep, narrow mountain valleys to wide, low-gradient glacial trough bottoms. Seasonal flooding from overbank flows and snowmelt is common, and floodplains vary from high energy to low energy, sinuous meadow channels. This type also occurs in springs, avalanche chutes, and lower montane areas with cold air drainage. Many riparian shrublands are associated with beaver activity. The most characteristic shrubs are willow (e.g., *Salix boothii*, *S. drummondiana*, *S. geyeriana*, *S. wolfii*, *S. planifolia*), gray alder (*Alnus incana*), redosier dogwood (*Cornus sericea*), Sitka alder (*Alnus viridis* ssp. *sinuata*), alderleaf buckthorn (*Rhamnus alnifolia*), currants (e.g., *Ribes* spp.), rose spiraea (*Spiraea douglasii*), Rocky Mountain maple (*Acer glabrum*), thimbleberry (*Rubus parviflorus*), twinberry honeysuckle (*Lonicera involucrata*), bog birch (*Betula glandulosa*), and shrubby cinquefoil (*Dasiphora floribunda*). The most important graminoids are bluejoint (*Calamagrostis canadensis*), sedge (*Carex* spp.), fowl mannagrass (*Glyceria striata*), smallfruit bulrush (*Scirpus microcarpus*), mountain rush (*Juncus arcticus* ssp. *littoralis*), and Kentucky bluegrass (*Poa pratensis*). The most characteristic forbs are lady fern (*Athyrium filix-femina*), heartleaf springbeauty (*Claytonia cordifolia*), common cow parsnip (*Heracleum maximum*), leafybract aster (*Symphyotrichum foliaceum*), giant mountain aster (*Canadanthus modestus*), Columbian monkshood (*Aconitum columbianum*), arrowleaf groundsel (*Senecio triangularis*), and Lyall's angelica (*Angelica arguta*).

Xeric–Riparian Scrub (M095)

M095. Great Basin & Intermountain Xeric-Riparian Scrub

Birch Creek, Owyhee Front near Oreana, Idaho © 2006 Chris Murphy

Open shrublands along intermittently flooded washes found on sandy terraces, wash bottoms, basin floors, and occasionally ephemeral drainages on basalt bedrock. Large flood events are uncommon and unpredictable, but when they do occur massive amounts of sediment, rocks, and wood can be transported. Characteristic shrubs are tolerant of xeric conditions and include fourwing saltbush (*Atriplex canescens*), rubber rabbitbrush (*Ericameria nauseosa*), basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), greasewood (*Sarcobatus vermiculatus*), saltcedar (*Tamarix* spp.), skunkbush sumac (*Rhus trilobata*), arroyo willow (*Salix lasiolepis*), and low sagebrush (*Artemisia arbuscula*) (in rocky washes). Occasional trees may be present, primarily western juniper (*Juniperus occidentalis*) and peachleaf willow (*Salix amygdaloides*). Herbaceous cover is often minimal and comprised of upland shrubsteppe species and species tolerant of only occasional flooding. Nonnative annuals (e.g., *Bromus tectorum*) can be common.

Boreal Freshwater Shrubland, Wet Meadow & Marsh (M870) (in part)

M870. North American Arctic & Northern Boreal Freshwater Shrubland, Wet Meadow & Marsh (in part)

A diverse macrogroup ranging from boreal Alaska and western Canada, south into northern Idaho, Montana, northeast Washington. It occurs on floodplains, depressions, pond and lake margins, oxbows and abandoned channels, etc., and is characterized by hydrophytic graminoid species in emergent marshes, saturated meadows, and wet shrublands. Composition is similar to riparian shrublands and wet meadows of the Northern Rocky Mountains, but this macrogroup occurs in lower elevation, wider valley bottoms, with lower gradients. Common species include burreed (*Sparganium* spp.), water plantain (*Alisma* spp.), wapato (*Sagittaria* spp.), horsetails (*Equisetum* spp.), sedge (*Carex* spp.), various grasses, rushes (*Juncus* spp.) and bulrush (*Scirpus*, *Schoenoplectus*). Forbs and ferns are common. Shrubs are locally dominant near water courses, especially rose spiraea (*Spiraea douglasii*), gray alder (*Alnus incana*), willow (especially *Salix drummondiana* and *S. sitchensis*), black hawthorn (*Crataegus douglasii*), redosier dogwood (*Cornus sericea*), and common snowberry (*Symphoricarpos albus*).

Semi-natural Wet Shrubland, Meadow & Marsh (M301) (in part)

M301. Western North American Ruderal Wet Shrubland, Meadow & Marsh (in part)

Montour WMA, Payette River, Idaho © 2012 Chris Murphy

Disturbed wetland meadow, marsh, and shrubland habitats of temperate western North America strongly dominated by nonnative weedy species. Native species are low in abundance. Disturbance can include hay cultivation, severe grazing, past land clearing or industry, roads, logging, altered hydrology, and filling or draining. Dominant herbaceous species include introduced grasses, such as bentgrass (*Agrostis* spp.), meadow foxtail (*Alopecurus* spp.), reed canarygrass (*Phalaris arundinacea*), common reed (*Phragmites australis*), and nonnative bluegrass (*Poa* spp.), and invasive forbs, including Canada thistle (*Cirsium arvense*), paleyellow iris (*Iris pseudacorus*), broadleafed pepperweed (*Lepidium latifolium*), poison hemlock (*Conium maculatum*), purple loosestrife (*Lythrum salicaria*), and others. Common nonnative shrubs include Himalayan blackberry (*Rubus armeniacus*), desert false indigo (*Amorpha fruticosa*), and rose (e.g., *Rosa* spp.).

Foothill & Canyon Meadow & Herbaceous Riparian Vegetation (Gxyz) (in part)

Gxyz. Rocky Mountain & Great Basin Foothill & Canyon Meadow, Seep & Herbaceous Riparian Vegetation (in part)

Middle Fork Boise River, Idaho © 2004 Lisa Harloe

She Creek, Weiser River near Midvale, Idaho © 2007 Chris Murphy

Nonsaline seasonal wetlands at low elevations, below the transition to montane forests. This group consists of herb-dominated river bars, seep and spring-fed meadows, swales and intermittent drainages, as well as shallowly and seasonally flooded emergent wet meadows. Soils are typically seasonally wet or saturated, often groundwater driven, but completely drying by summer. The hydrology of some meadows is supplemented by irrigation. Graminoid species vary depending on site conditions, but mountain rush (*Juncus arcticus* ssp. *littoralis*), California oatgrass (*Danthonia californica*), sedges (*Carex* spp.), Sandberg bluegrass (*Poa secunda*), common spikerush (*Eleocharis palustris*), Sierra rush (*Juncus nevadensis*), Colorado rush (*Juncus confusus*), western wheatgrass (*Pascopyrum smithii*), meadow barley (*Hordeum brachyantherum*), wheatgrass or wildrye (*Elymus*, *Leymus* spp.), mat muhly (*Muhlenbergia richardsonis*), and threesquare (*Schoenoplectus pungens*) are characteristic. Forbs can be common to dominant, especially camas (*Camassia quamash*), mule-ears (*Wyethia* spp.), tall groundsel (*Senecio hydrophiloides*), slender cinquefoil (*Potentilla gracilis*), white sagebrush

(*Artemisia ludoviciana*), horsetails (*Equisetum* spp.), and others. Introduced forage grasses and noxious weeds can be abundant.

Sagebrush Steppe

Tall or low-height sagebrush shrubland found from low elevation, semiarid settings to mesic and montane areas. Dwarf sagebrush steppe occurs on rocky ridges and benches, gravelly fans, and rocky slopes. Taxa includes black sagebrush (gravelly, calcareous soil), little sagebrush (shallow soil, underlain by clay), and scabland sagebrush (shallow, rocky soil, with buckwheat). Taller big sagebrush or threetip sagebrush steppe occurs on plains, alluvial fans, badlands, foothills, ridges, and mountains. Any subspecies of big sagebrush, each with climate and soil preferences, can dominate, sometimes with bitterbrush and rabbitbrush. The herb layer is grass-dominated, with Indian ricegrass, needle-and-thread, Sandberg bluegrass, Idaho fescue, bluebunch wheatgrass, and cheatgrass on xeric sites, and basin wildrye and mesic species on moist or montane sites. Forbs are diverse, their cover reflecting moisture availability. Microbiotic soil crust occurs on many sites.

Dwarf Sagebrush Shrubland & Steppe (M170)

M170. Great Basin & Intermountain Dwarf Sagebrush Shrubland & Steppe

Owyhee Mountains, Idaho © 2013 Tim Weekley

Broadly defined semiarid dwarf shrubland and steppe occurs on sites such as windblown ridges and benches, gravelly alluvial fans, hilltops, canyons, and rocky slopes. Soils are typically shallow. The shrub layer is dominated by short-height sagebrush taxa, such as black sagebrush (*Artemisia nova*) and prairie sagewort (*Artemisia frigida*) (on gravelly, calcareous soils), little sagebrush (*Artemisia arbuscula* ssp. *arbuscula*) (on shallow soils underlain by clay), early sagebrush (*Artemisia arbuscula* ssp. *longiloba*) and Owyhee sage (*Artemisia papposa*) (on shallow ± alkaline clay), and scabland sagebrush (*Artemisia rigida*) on shallow, poorly drained, lithic soil, often co-occurring with buckwheats (e.g., *Eriogonum sphaerocephalum*, *E. thymoides*). Characteristic grasses include Indian ricegrass (*Achnatherum hymenoides*), onespike danthonia

(*Danthonia unispicata*), Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), and bluebunch wheatgrass (*Pseudoroegneria spicata*). Scattered forbs may include onion (*Allium*), pussytoes (*Antennaria*), balsamroot (*Balsamorhiza*), desertparsley (*Lomatium*), phlox (*Phlox*), and stonecrop (*Sedum*).

Camas Prairie near Fairfield, Idaho © 2008 Chris Murphy

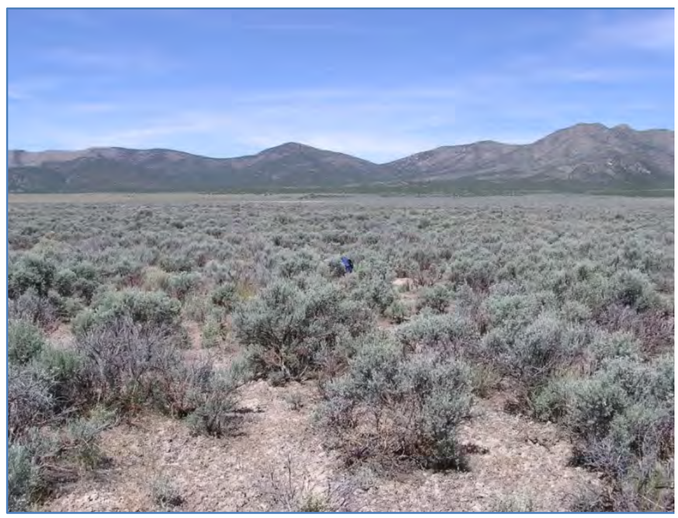
Tall Sagebrush Shrubland & Steppe (M169)

M169. Great Basin & Intermountain Tall Sagebrush Shrubland & Steppe

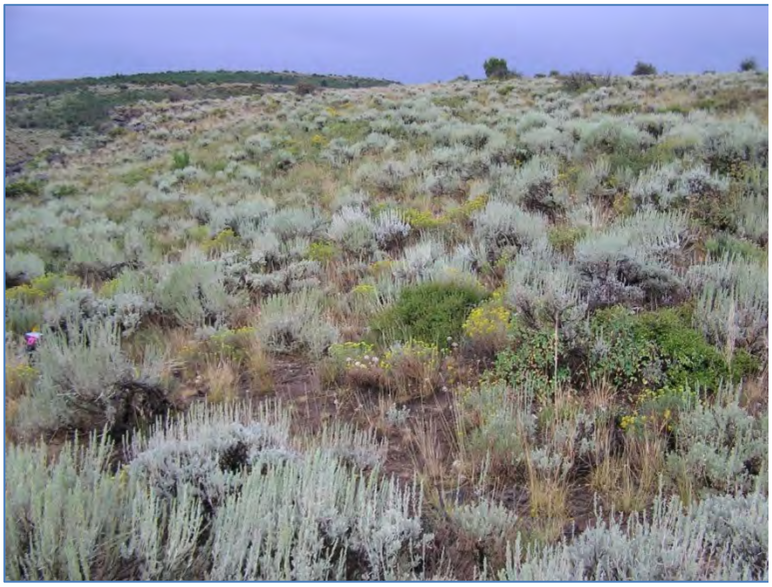
Shoofly Creek, Owyhee Plateau, Idaho © 2013 Chris Murphy

Boise River WMA, Lucky Peak Reservoir, Idaho © 2015 Chris Murphy

Hawley Mountain, Lost River Range, Idaho © 2008 Chris Murphy



Raft River, Idaho © 2006 Idaho Natural Heritage Program



South Hills, Idaho © 2004 Idaho Natural Heritage Program

Widely distributed sagebrush shrubland and shrubsteppe vegetation. Sites range from low elevation and semiarid settings to mesic and montane areas. Stands occur on flat to steep uplands and mountains, broad ridgetops, alluvial fans and terraces, draws, badlands, foothills, and plains. Dominance by any of several subspecies of big sagebrush (*Artemisia tridentata*), each with environmental and soil preferences, or threetip sagebrush (*Artemisia tripartita* ssp. *tripartita*) is characteristic. Antelope bitterbrush (*Purshia tridentata*) is common, while deciduous shrubs, such as Utah serviceberry (*Amelanchier utahensis*) and western snowberry (*Symphoricarpos oreophilus*) co-occur in mesic and montane sites. The herbaceous layer varies, with Indian ricegrass (*Achnatherum hymenoides*), needle-and-thread (*Hesperostipa comata*), Thurber's needlegrass (*Achnatherum thurberianum*), Sandberg bluegrass (*Poa secunda*), Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and others on xeric sites, and California brome (*Bromus carinatus*), elk sedge (*Carex geyeri*), basin wildrye (*Leymus cinereus*), and others on mesic or montane sites. Forbs are diverse, ranging from sparse on xeric sites to lush wildflower displays on mesic and montane sites. Common forbs include milkvetch (*Astragalus* spp.), arrowleaf balsamroot (*Balsamorhiza sagittata*), Indian paintbrush (*Castilleja* spp.), hawksbeard (*Crepis* spp.), fleabane (*Erigeron* spp.), buckwheat (*Eriogonum* spp.), lupine (*Lupinus* spp.), pricklypear cactus (*Opuntia polyacantha*), penstemon (*Penstemon* spp.), phlox (*Phlox* spp.), globemallow (*Sphaeralcea* spp.), and many others. Cheatgrass (*Bromus tectorum*) and other nonnative annuals dominate the understory of disturbed stands. Microbiotic soil crust is also important on many sites.

Semi-Desert Shrubland & Steppe–Saltbush Scrub

Open shrubland, dwarf-scrub, and fire-maintained grassland in semiarid and arid settings such as alluvial fans, canyons, basins, old dunes, benchlands, badlands, break slopes, and playa edges. Soils are sandy and gravelly alluvial or lacustrine deposits (often saline or alkaline). Typical shrubs are shadscale, winterfat, rabbitbrush, horsebrush, and bud sagebrush. The herb layer has low cover of highly drought tolerant bunchgrass and forbs.

Dry Shrubland and Grassland (M171)

M171. Great Basin & Intermountain Dry Shrubland & Grassland

Lower Salmon River, Idaho © 2007 Chris Murphy

Owyhee Front near Oreana, Idaho © 2010 Idaho Natural Heritage Program

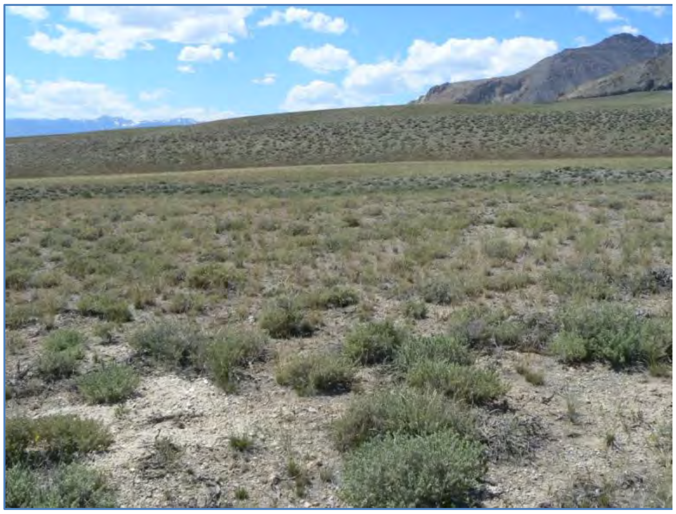

Boise foothills, Idaho © 2007 Chris Murphy

Semiarid or arid open shrubland, dwarf-shrub, grassland, and sparse vegetation found throughout the Intermountain West, extending to the western Great Plains. Settings include windswept mesas, canyons, benchlands, colluvial slopes, alluvial fans and flats, basins and sandy plains, and dunes, with sedimentary or volcanic underlying geology. Soils vary from fine-textured to sandy or rocky. Characteristic shrubs are yellow rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria nauseosa*), and horsebrush (*Tetradymia* spp.). Wide-ranging shrubs indicative of saltbush scrub or sagebrush steppe may be present but not dominant. This macrogroup includes natural, sometimes fire-maintained grasslands in low elevation, semiarid areas (e.g., hot river canyon bottoms). The herbaceous layer is sparse to moderately dense and characterized by Indian ricegrass (*Achnatherum hymenoides*), purple threeawn (*Aristida purpurea*), needle-and-thread (*Hesperostipa comata*), Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and sand dropseed (*Sporobolus cryptandrus*). Forb cover is sparse.

Saltbush Scrub (M093)

M093. Great Basin Saltbush Scrub


Owyhee Front near Oreana, Idaho © 2010 Idaho Natural Heritage Program



East Canyon, Lemhi Range foothills near Howe, Idaho © 2008 Chris Murphy

Widely occurring semidesert shrublands occurring on arid alluvial fans and terraces, mesas and plateaus, playa edges, and bluff slopes. Soils are typically saline and alkaline, often (but not always) derived from calcareous rock and or alluvium. The soil surface can be barren of litter but are sometimes covered by microbiotic crust. Dominant shrubs are fourwing saltbush (*Atriplex canescens*), shadscale (*Atriplex confertifolia*), Gardner's saltbush (*Atriplex gardneri*), winterfat (*Krascheninnikovia lanata*), shortspine horsebrush (*Tetradymia spinosa*), bud sagebrush (*Picrothamnus desertorum*), and spiny hopsage (*Grayia spinosa*). Indian ricegrass (*Achnatherum hymenoides*), squirreltail (*Elymus elymoides*), needle-and-thread (*Hesperostipa comata*), saline wildrye (*Leymus salinus*), Sandberg bluegrass (*Poa secunda*), and cheatgrass (*Bromus tectorum*) are common grasses, but usually have low cover. Forb cover is sparse.

Sparsely Vegetated Dune Scrub & Grassland

Unvegetated to sparsely vegetated (<10% cover) active and partially stabilized sand dunes. Species are adapted to shifting sand and form patchy grasslands, sparse scrub, or clusters of perennial or annual forbs.

Sparsely Vegetated Dune Scrub & Grassland (G775)

G775. Intermountain Sparsely Vegetated Dune Scrub & Grassland

Bruneau Dunes State Park, Snake River, Idaho © 2007 Idaho Natural Heritage Program

St. Anthony Sand Dunes, Sand Creek WMA, Idaho © 2014 Ty Clayton

Unvegetated to sparsely vegetated (<10% cover) active and partially stabilized sand dunes. Species are adapted to shifting sand and form patchy grasslands or sparse scrub. Characteristic species are needle-and-thread (*Hesperostipa comata*), Indian ricegrass (*Achnatherum hymenoides*), yellow wildrye (*Leymus flavescens*), and lemon scurfpea (*Psoralidium lanceolatum*). The most common shrubs are basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), rubber rabbitbrush (*Ericameria nauseosa*), bitterbrush (*Purshia tridentata*), and chokecherry (*Prunus virginiana*). Perennial forbs with low cover include Franklin's sandwort (*Arenaria franklinii*), white sand verbena (*Abronia mellifera*), veiny dock (*Rumex venosus*), common starlily (*Leucocrinum montanum*), evening primrose (*Oenothera* spp.), and Blue Mountain prairieclover (*Dalea ornata*). Annuals occur after periods of favorable precipitation.

Springs & Groundwater-Dependent Wetlands

Wetlands primarily supported by groundwater, either subsurface fluctuations and/or surface discharge. Sites are typically seeps and springs on gentle to steep slopes, but also include high groundwater and upwellings in flat basins. Wetlands include acidic to alkaline peatland fens, forming in cold and persistently saturated settings, supporting specially adapted mosses and plants. Marshes, meadows, and shrublands consisting of salt tolerant plants (e.g., greasewood, saltgrass, etc.) occur on alkaline and/or saline soil with high groundwater. They form where evaporation far exceeds precipitation. Seasonally and shallowly flooded to saturated wet meadows occur in basins and on gentle slopes at all elevations, fed by snow, seeps, and springs. Meadows are often dominated by rhizomatous graminoids, such as sedges, grasses, and rushes. Forbs are diverse and often lush. Swamp forests and wet shrublands (similar to riparian areas) are also supported by seeps and springs.

Bog & Acidic Fen (G284)

M876. North American Boreal & Sub-Boreal Acidic Bog & Fen

Tranquil Basin, Deadwood River, Idaho © 2004 Lisa Harloe

Banner Creek Fen, Middle Fork Salmon River, Idaho © 2004 Lisa Harloe

Lava Butte RNA, Little French Creek, Salmon River, Idaho © 2005 Lisa Harloe

Bogs and fens with peat depths typically exceeding 30 cm extending south from boreal North America into sub-boreal regions of the Pacific Maritimes and Rocky Mountains, the Great Lakes region, and northeast U. S. The pH of acidic fens ranges from 4 to 6. These fens form on slopes with groundwater discharge (e.g., springs) and on floating or anchored mats in kettle ponds, subalpine lakes, or valley lakeshores. As peat accumulates, ridges or mounds may form, often occurring perpendicular to the direction of groundwater flow. This macrogroup is often dominated by a layer of *Sphagnum* mosses, often with ericaceous shrubs such as bog blueberry (*Vaccinium uliginosum*) and alpine laurel (*Kalmia microphylla*), thin-leaved graminoids (e.g., *Carex* spp., *Eleocharis quinqueflora*, *Eriophorum angustifolium*), various adapted forbs (e.g., *Menyanthes trifoliata*, *Comarum palustre*, *Tofieldia glutinosa*), and insectivorous plants (e.g., *Drosera anglica*).

Neutral–Alkaline Fen (G285)

M877. North American Boreal & Sub-Boreal Alkaline Fen

Mays Creek Fen, Sawtooth Valley Peatlands RNA, Salmon River, Idaho © 2007 Chris Murphy

Birch Creek Fen, Birch Creek, Idaho © 2008 Lisa Harloe

Groundwater fed peatlands usually occurring on calcareous parent materials found across boreal North America, extending south into sub-boreal regions of the Rocky Mountains, Great Lakes, and northeastern and north-central U. S. These fens have peat depths of at least 30 cm and pH from 6 to 7.5, and develop on sloped springs and basin upwellings. They also occur as floating mats on kettle ponds or lake margins. Some fens with very high pH (>7.5) may accumulate marl. *Sphagnum* peatmoss and ericaceous shrubs are patchy to absent. Brown mosses, broad-leaved non-ericaceous shrubs including, gray alder (*Alnus incana*), bog birch (*Betula glandulosa*), shrubby cinquefoil (*Dasiphora floribunda*), and willow (*Salix* spp.), thin-leaved graminoids (e.g., *Carex* spp., *Eleocharis quinqueflora*, *Trichophorum* spp., *Triglochin* spp.), and specialized forbs are common.

Alkaline–Saline Wetland (M082)

M082. Warm and Cool Semi-Desert Alkaline–Saline Wetland

Bear Lake NWR, Idaho © 2013 Chris Murphy

Roswell WHA, Snake River near Parma, Idaho © 2012 Chris Murphy

Marshes, wet meadows, and shrublands on alkaline and/or saline soils found throughout much of western North America where evaporation far exceeds precipitation. Sites range from sloped seeps and springs (most commonly) to drainages and pond and playa margins. Flooding or saturation varies, but high groundwater is typical. Vegetation is salt-tolerant. Characteristic shrubs include greasewood (*Sarcobatus vermiculatus*), shrubby cinquefoil (*Dasiphora floribunda*), iodinebush (*Allenrolfea occidentalis*) (locally), and saltbush (*Atriplex* spp.). Abundant herbaceous species are saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), bulrush (*Schoenoplectus*, *Scirpus*), clustered field sedge (*Carex praegracilis*), mountain rush (*Juncus arcticus* ssp. *littoralis*), muhly (*Muhlenbergia* spp.), beaked spikerush (*Eleocharis rostellata*), alkaligrass (e.g., *Puccinellia* spp.), barley (*Hordeum* spp.), wildrye (e.g., *Leymus triticoides*, *L. cinereus*), seaside arrowgrass (*Triglochin maritima*), red glasswort (*Salicornia rubra*), and seepweed (*Suaeda* spp.). Disturbed sites have high amounts of nonnative species, such as kochia (*Bassia* spp.), perennial sowthistle (*Sonchus arvensis*), perennial pepperweed (*Lepidium latifolium*), and tall wheatgrass (*Thinopyrum ponticum*).

Montane Wet Meadow (G521)

G521. Vancouverian & Rocky Mountain Montane Wet Meadow & Marsh

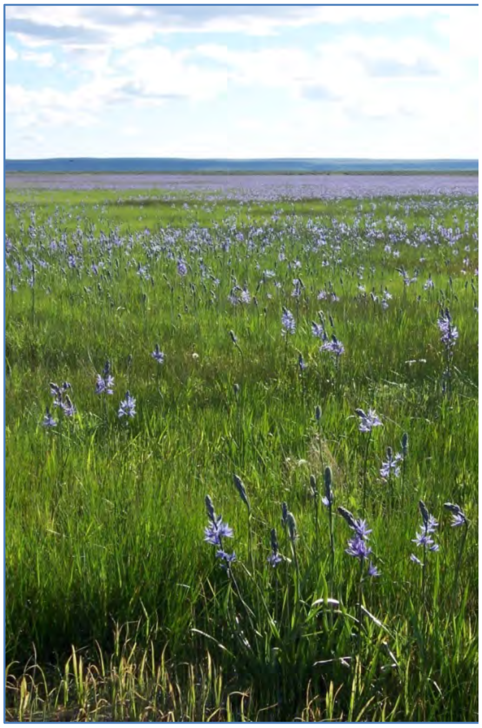
Elk Meadows, Little French Creek, Salmon River, Idaho © 2005 Lisa Harloe

Needles RNA, Gold Fork River, North Fork Payette River, Idaho © 2004 Lisa Harloe

Wet meadows in montane to subalpine settings such as glacial outwash basins, glacial trough valleys, beaver ponds, lakeshores, stream terraces, and toeslope seeps and springs. Sites are seasonally shallowly flooded to saturated, often drying by late summer. Wet meadows can be tightly associated with snowmelt and groundwater. Soils are mostly mineral and hydric soil. Meadows are often dominated by tufted hairgrass (*Deschampsia caespitosa*) and/or densely rhizomatous graminoid species, such as water sedge (*Carex aquatilis*), Northwest Territory sedge (*Carex utriculata*) (or other sedges), bluejoint (*Calamagrostis canadensis*), and mountain rush (*Juncus arcticus* ssp. *littoralis*). Forb species are diverse and include Sierra shooting star (*Dodecatheon jeffreyi*), aster (*Symphyotrichum* spp.), globe penstemon (*Penstemon globosus*), cinquefoil (*Potentilla* spp.), white marsh marigold (*Caltha leptosepala*), camas (*Camassia quamash*), elephanthead (*Pedicularis groenlandica*), and bistort (*Polygonum bistortoides*). Montane marshes, flooded more deeply and persistently than wet meadows can form behind beaver dams and along shorelines of lakes. Shrubs, such as short willows (*Salix* spp.), shrubby cinquefoil (*Dasiphora floribunda*), bog blueberry (*Vaccinium uliginosum*), and bog birch (*Betula glandulosa*), can be locally abundant. Nonnative grasses are common in disturbed meadows.

Foothill & Canyon Seep Herbaceous Vegetation (Gxyz)

Gxyz. Rocky Mountain & Great Basin Foothill & Canyon Meadow, Seep & Herbaceous Riparian Vegetation



Duck Valley Indian Reservation, East Fork Owyhee River, Idaho © 2005 Chris Murphy

Bacon Creek, Weiser River near Cambridge, Idaho © 2007 Chris Murphy

Nonsaline seasonal wetlands at low elevations, below the transition to montane forests. This group consists of herb-dominated river bars, seep and spring-fed meadows, swales and intermittent drainages, as well as shallowly and seasonally flooded emergent wet meadows. Soils are typically seasonally wet or saturated, often groundwater driven, but completely drying by summer. The hydrology of some meadows is supplemented by irrigation. Graminoid species vary depending on site conditions, but mountain rush (*Juncus arcticus* ssp. *littoralis*), California oatgrass (*Danthonia californica*), sedges (*Carex* spp.), Sandberg bluegrass (*Poa secunda*), common spikerush (*Eleocharis palustris*), Sierra rush (*Juncus nevadensis*), Colorado rush (*Juncus confusus*), western wheatgrass (*Pascopyrum smithii*), meadow barley (*Hordeum brachyantherum*), wheatgrass or wildrye (*Elymus*, *Leymus* spp.), mat muhly (*Muhlenbergia richardsonis*), and threesquare (*Schoenoplectus pungens*) are characteristic. Forbs can be common to dominant, especially camas (*Camassia quamash*), mule-ears (*Wyethia* spp.), tall groundsel (*Senecio hydrophiloides*), slender cinquefoil (*Potentilla gracilis*), white sagebrush (*Artemisia ludoviciana*), horsetails (*Equisetum* spp.), and others. Introduced forage grasses and noxious weeds can be abundant.

Swamp Forest (G505) (in part)

G505. Rocky Mountain & Great Basin Swamp Forest (in part)

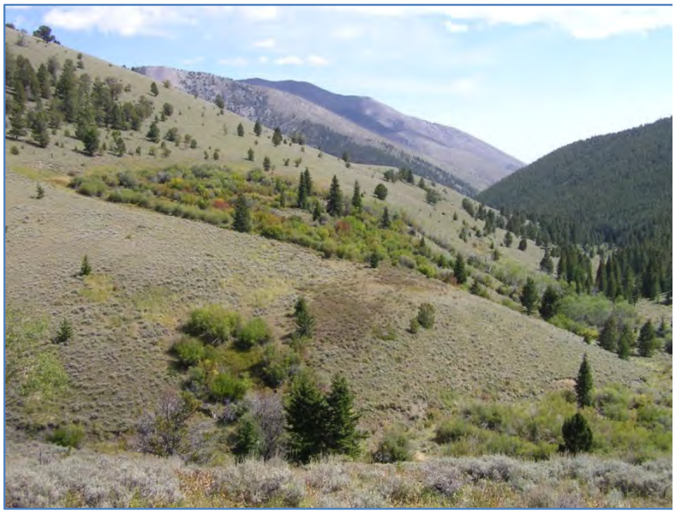
Moose Creek, Frank Church-River of No Return Wilderness, Idaho © 2006 Kristin Williams

Belvidere Creek RNA, Big Creek, Salmon River Mountains, Idaho © 2008 Chris Murphy

Swamp forests on poorly drained peaty or mucky soils that are saturated or seasonally flooded, occurring in river floodplain oxbows, overflow channels, or glacial kettles, as well as on sloped seeps and springs. Abundant tree species include Engelmann spruce (*Picea engelmanni*), western redcedar (*Thuja plicata*), paper birch (*Betula papyrifera*), lodgepole pine (*Pinus contorta*), and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*). Characteristic shrubs include gray alder (*Alnus incana*), western Labrador tea (*Ledum glandulosum*), devilsclub (*Oplopanax horridus* [Sm.] Miq.), willows (*Salix* spp.), rose spiraea (*Spiraea douglasii*), and bog blueberry (*Vaccinium uliginosum*). Typical herbaceous species include bluejoint (*Calamagrostis canadensis*), sedges (*Carex* spp.), Jeffrey's shootingstar (*Dodecatheon jeffreyi*), field horsetail (*Equisetum arvense*), American skunkcabbage (*Lysichiton americanus*), high mountain cinquefoil (*Potentilla flabellifolia*), groundsels (*Packera* spp., *Senecio* spp.), claspleaf twistedstalk (*Streptopus amplexifolius*), and ferns.

Montane–Subalpine Seep Shrubland (G527) (in part)

G527. Western Montane-Subalpine Riparian & Seep Shrubland (in part)



Crooked Creek, Beaverhead Mountains, Idaho
© 2004 Ed Bottum

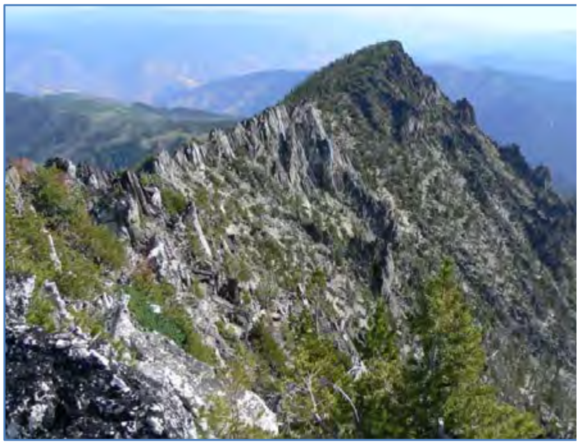
Montane to subalpine riparian shrublands on streambanks, springs, seeps, and alluvial terraces. Sites range from steep, narrow mountain valleys to wide, low-gradient glacial trough bottoms. Seasonal flooding from overbank flows and snowmelt is common, and floodplains vary from high energy to low energy, sinuous meadow channels. This type also occurs in springs, avalanche chutes, and lower montane areas with cold air drainage. Many riparian shrublands are associated with beaver activity. The most characteristic shrubs are willow (e.g., *Salix boothii*, *S. drummondiana*, *S. geyeriana*, *S. wolfii*, *S. planifolia*), gray alder (*Alnus incana*), redosier dogwood (*Cornus sericea*), Sitka alder (*Alnus viridis* ssp. *sinuata*), alderleaf buckthorn (*Rhamnus alnifolia*), currants (e.g., *Ribes* spp.), rose spiraea (*Spiraea douglasii*), Rocky Mountain maple (*Acer glabrum*), thimbleberry (*Rubus parviflorus*), twinberry honeysuckle (*Lonicera involucrata*), bog birch (*Betula glandulosa*), and shrubby cinquefoil (*Dasiphora floribunda*). The most important graminoids are bluejoint (*Calamagrostis canadensis*), sedge (*Carex* spp.), fowl mannagrass (*Glyceria striata*), smallfruit bulrush (*Scirpus microcarpus*), mountain rush (*Juncus arcticus* ssp. *littoralis*), and Kentucky bluegrass (*Poa pratensis*). The most characteristic forbs are lady fern (*Athyrium filix-femina*), heartleaf springbeauty (*Claytonia cordifolia*), common cow parsnip (*Heracleum maximum*), leafybract aster (*Symphyotrichum foliaceum*), giant mountain aster (*Canadanthus modestus*), Columbian monkshood (*Aconitum columbianum*), arrowleaf groundsel (*Senecio triangularis*), and Lyall's angelica (*Angelica arguta*).

Subalpine–High Montane Conifer Forest

High elevation montane and subalpine forests and woodland. Dominant trees are subalpine fir, Engelmann spruce, whitebark pine, lodgepole pine, limber pine, subalpine larch (locally), and mountain hemlock (maritime climate areas). Subalpine to treeline is influenced by wind, snow deposition, severe cold, and avalanches; stand-replacing fire is a major disturbance in the upper montane. Most understories include species adapted to dry, cool summers and cold, snowy winters, although wetter sites support heath and mesic herbs.

Subalpine–High Montane Conifer Forest (M020)

M020. Rocky Mountain Subalpine–High Montane Conifer Forest



Patrick Butte RNA, Salmon River, Idaho © 2010 Chris Murphy

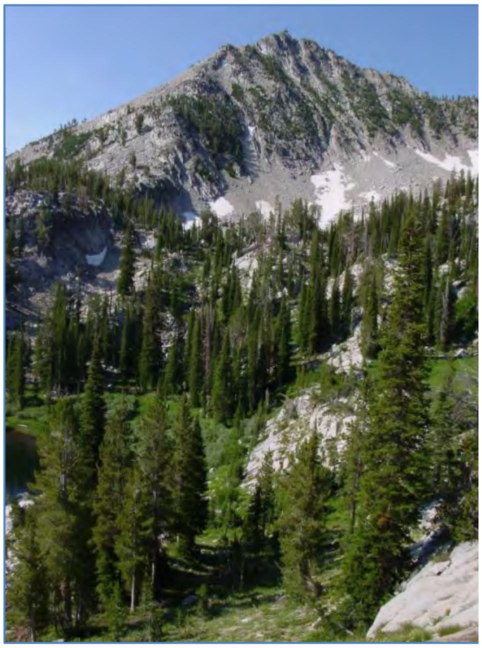
Big Windy Peak, Lemhi Mountains, Idaho © 2014 Jessica Irwin

Redfish Lake Moraine RNA, Sawtooth Mountains, Idaho © 2005 Steve Rust

Coolwater Ridge, Selway River ©Kristen Pekas 2014

High elevation montane and subalpine forests and woodland found throughout the mountainous regions of the western U. S. and southwestern Canada. Characteristic trees are subalpine fir (*Abies lasiocarpa*), subalpine larch (*Larix lyallii*), Engelmann spruce (*Picea engelmanni*), whitebark pine (*Pinus albicaulis*), lodgepole pine (*Pinus contorta*), limber pine (*Pinus flexilis*), quaking aspen (*Populus tremuloides*), and mountain hemlock (*Tsuga mertensiana*) (in maritime-influenced climate areas). Subalpine zones are influenced by wind, snow deposition, severe cold, and avalanches, while stand-replacing fire is a major disturbance in upper montane zones. The understory is a mix of species adapted to dry, cool summers and cold, snowy winters, including common juniper (*Juniperus communis*), grouse whortleberry (*Vaccinium scoparium*), rusty menziesii (*Menziesia ferruginea*), pink mountainheath (*Phyllodoce empetriformis*), bluejoint (*Calamagrostis canadensis*) (where water table is high), pinegrass

(*Calamagrostis rubescens*), Geyer's sedge (*Carex geyeri*), Hitchcock's smooth woodrush (*Luzula glabrata* var. *hitchcockii*), white marsh marigold (*Caltha leptosepala*), claspleaf twistedstalk (*Streptopus amplexifolius*), and common beargrass (*Xerophyllum tenax*).



Trinity Mountain RNA, Trinity Mountains, Idaho © 2004 Lisa Harloe

Bruin Mountain RNA, Little French Creek, Salmon River, Idaho ©Chris Murphy 2009

Subalpine–Montane Mesic Meadow

Montane and subalpine meadows on toeslopes and basin margins. They are dominated by perennial graminoids (e.g., grasses, sedges) and a diverse, lush mix of forbs. Sites are seasonally saturated by snowmelt, but are dry by early summer. They are drier than wet meadows and wetter than montane grasslands.

Subalpine–High Montane Mesic Meadow (M168)

M168. Rocky Mountain & Vancouverian Subalpine-High Montane Mesic Meadow

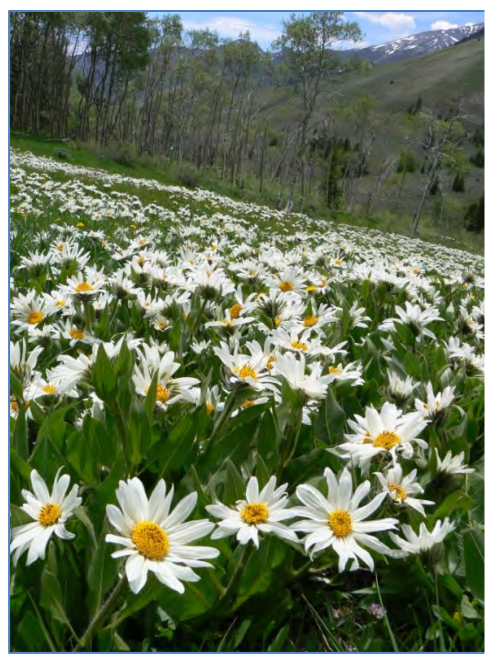
Montane and subalpine mesic meadows from the Rocky Mountains (north and south), west to the Sierra Nevada and eastern Cascades. Sites are seasonally saturated by snowmelt, but are drier than wet meadows (which sometimes occur downslope), yet in wetter positions (e.g., swales, toeslopes, snow accumulation sites) than montane grasslands. Vegetation is composed of low (<1 m) perennial graminoids and/or a diverse and lush mix of forbs. Timber oatgrass (*Danthonia intermedia*), tufted hairgrass (*Deschampsia caespitosa*), and sedges (*Carex* spp.) are characteristic graminoid species. Abundant forbs include yarrow (*Achillea millefolium*), small camas (*Camassia quamash*), fireweed (*Chamerion angustifolium*), fleabane (*Erigeron* spp.), licorice-root (*Ligusticum* spp.), bluebells (*Mertensia* spp.), cinquefoil (*Potentilla* spp.), groundsel

(*Senecio* spp.), goldenrod (*Solidago* spp.), aster (*Eucephalus*, *Symphyotrichum* spp.), western meadowrue (*Thalictrum occidentale*), and mountain deathcamus (*Zigadenus elegans*).

Crane Meadow, Elk Creek, Frank Church-River of No Return Wilderness, Idaho © 2007 Chris Murphy

Sheephorn Mountain, Salmon River, Idaho © 2010 Chris Murphy

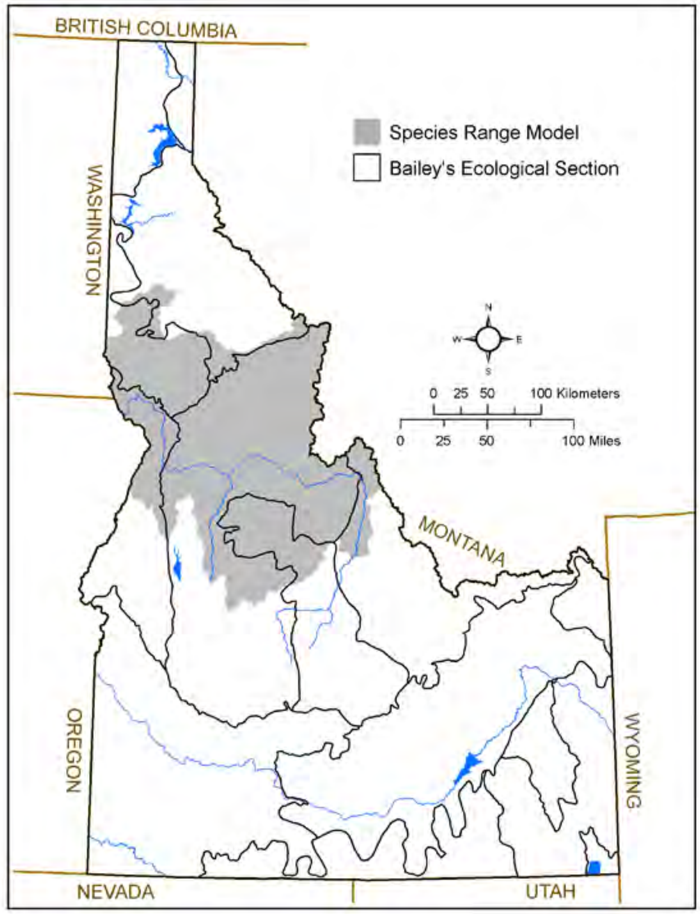
Hidden Lake, Little Salmon River, Idaho © 2009 Chris Murphy



Pass Creek, Lost River Range, Idaho © 2008 Chris Murphy

Appendix F: Species Conservation Status Assessments

Pacific Lamprey
Entosphenus tridentatus



Class: Petromyzontida
Order: Petromyzontiformes
Family: Petromyzontidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Endangered Species
G-rank: G4
S-rank: S1

SGCN TIER: 1
Rationale: Low population size, documented significant decline, IDAPA Endangered Species

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 43,900 km^2 (~16,900 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Challis Volcanics, Idaho Batholith, Palouse Prairie
Population Size in Idaho: 50–250
Description: Pacific Lamprey were historically widespread along the West Coast of the US from Baja California to the Aleutian Islands, but populations have declined in abundance and distribution throughout Califorina, Oregon, Washington, and Idaho. In Idaho, the species was originally distributed in all drainages of the Snake River below Shoshone Falls, except the Palouse River. It is now restricted to the Clearwater and Salmon River drainages and tributaries of the Snake River below Hells Canyon Dam. Once an abundant species used by native peoples for food, Pacific Lamprey now number less than a few hundred.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: In spring, adults spawn at the upstream end of riffle habitat in small, gravel-bottomed streams, and die within days. The larvae or ammocoetes hatch, drift downstream and burrow into silt or sand in areas having low-velocity current where they live for 5 or more years as filter feeders. Ammocoetes transform into macrothalmia (juvenile phase) over several months, developing eyes and teeth, before beginning their migration downstream to the ocean in winter and early spring. They spend 1–3 years in the ocean as a fish parasite before beginning upstream migration into freshwater in late spring. They overwinter in freshwater until they spawn the following spring.

POPULATION TREND
Short-term Trend: Decline 10–30%
Long-term Trend: Decline >90%
Description: Counts of adults returing to Idaho and eastern Oregon at Ice Harbor Dam in the lower Snake River decreased from >40,000 to <1,000 fish after the dam was built. Since 1998, there have not been more than 300 adults counted at Lower Granite Dam, and most years less than 100 adults.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Highly vulnerable
Description: The primary factor affecting the persistence of Pacific Lamprey in Idaho is the design of adult fish passage facilities at hydroelectric projects in the Columbia and Snake Rivers.

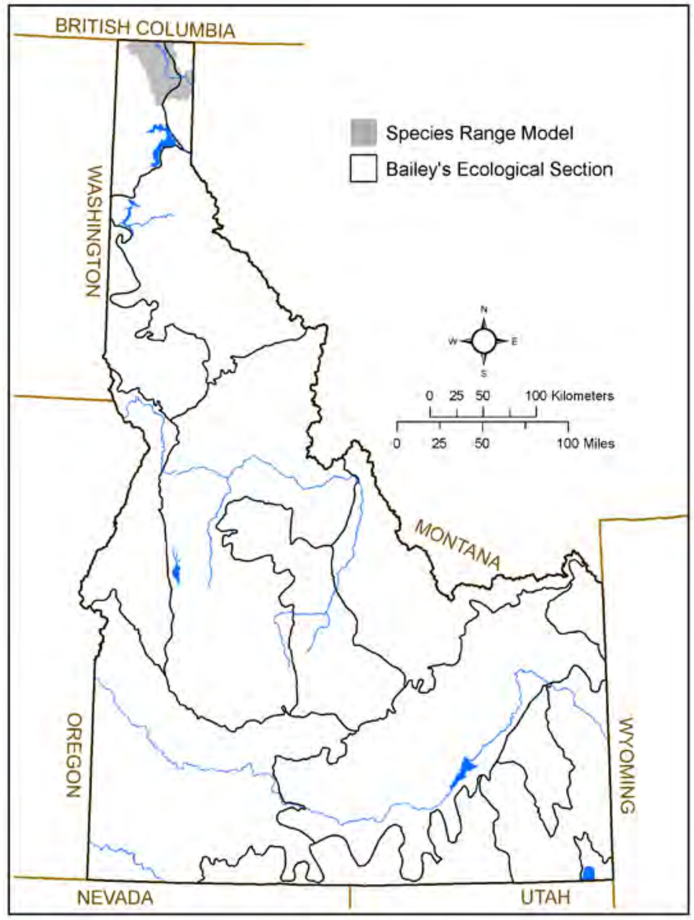
CONSERVATION ACTIONS
Conservation issues and management actions for the species are described in several documents including the IDFG Fisheries Management Plan 2013–2018, Northwest Power and Conservation Council's Columbia River Basin Fish and Wildlife Program 2014, and the Pacific Lamprey Assessment and Template for Conservation Measures.

ADDITIONAL COMMENTS
Pacific Lamprey were petitioned for listing under the ESA in 2003. In 2004, the FWS found that the petition did not provide the required information to indicate that listing the species may be warranted. Idaho became a signatory to the Pacific Lamprey Conservation Initiative in 2012. The Initiative was developed to promote implementation of conservation measures for Pacific Lamprey in Alaska, Washington, Oregon, Idaho and California.

Information Sources: Cochnauer T, Claire C. 2009. Evaluate status of Pacific lamprey in the Clearwater and Salmon River drainages, Idaho. Draft Conservation Plan. Boise (ID): Idaho Department of Fish and Game.; FWS. 2012. Conservation Agreement for Pacific Lamprey (*Entosphenus tridentatus*) in the States of Alaska, Washington, Oregon, Idaho, and California. Portland (OR): US Fish and Wildlife Service.; IDFG. 2013. Fisheries Management Plan 2013–2018. Boise (ID): Idaho Department of Fish and Game.; IDFG. 2011. The status of Pacific lamprey (*Entosphenus tridentatus*) in Idaho. Boise (ID): Idaho Department of Fish and Game.; Luzier CW, Schaller HA, Brostrom JK, Cook-Tabor C, Goodman DH, Nelle RD, Ostrand K, Streif B. 2011. Pacific Lamprey (*Entosphenus tridentatus*) Assessment and Template for Conservation Measures. Portland (OR): US Fish and Wildlife Service.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].

White Sturgeon (Kootenai River DPS)

Acipenser transmontanus pop. 1



Class: Actinopterygii
Order: Acipenseriformes
Family: Acipenseridae

CONSERVATION STATUS & CLASSIFICATION
ESA: Endangered
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 1
IDAPA: Endangered Species
G-rank: G4T1Q
S-rank: S1

SGCN TIER: 1
Rationale: Limited range, multiple threats, ESA listed

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,200 km^2 (~800 mi^2)
Key Ecological Sections: Flathead Valley, Okanogan Highlands
Population Size in Idaho: 250–1,000
Description: The White Sturgeon occurs in large rivers in the Pacific Northwest from central California to southwest Alaska. The Kootenai River population has been geologically isolated from other populations since the last ice age. The population ranges from Kootenay Lake in British Columbia up the Kootenai River through Idaho to Kootenai Falls in Montana.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The White Sturgeon is the largest freshwater fish in North America with the largest verified record being a 630 kg (1,387 lb) fish caught during 1897. Large adults generally occur in the larger, deeper pools of main river channels. Juveniles and subadults seasonally occupy sloughs off the main channel. In the Columbia River, young-of-the-year fish occur in 12-27 m (39-88 ft) of water. Individuals reach sexual maturity at ages 9-16 years, corresponding to lengths of about 1.2 m (4 ft) for males and 1.8 m (6 ft) for females. Females do not spawn annually but repeat spawning at intervals of 3-11 years, depending on food availability. Spawning occurs during the spring at water temperatures of 8–19 °C (48–63 °F), normally in areas with fast current, such as rapids or areas with hard substrates. The White Sturgeon is primarily a benthic feeder. Juveniles feed opportunistically on amphipods, clams, insects, and fish eggs while larger individuals also eat fish, crayfish, and other large items.

POPULATION TREND

Short-term Trend: Decline 10–30%
Long-term Trend: Decline 70–80%
Description: The Kootenai River White Sturgeon population has been in general decline since the mid1960s. In 1997, the population size was estimated at 2,439 fish, with most individuals greater than 25 years of age, and the wild population was augmented with 2,283 hatchery-produced juveniles. By 2011, only an estimated 990 adults remained, with no significant recruitment of juveniles since at least 1974. The current population now consists of the remnant wild population along with hatchery produced juveniles that are estimated to number around 12,000–15,000. Juveniles have been produced from captured wild broodstock at the Kootenai Tribal Hatchery since 1992.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Highly vulnerable
Description: The primary threat to this population is habitat loss and degradation due to the construction of Libby Dam in 1972 and resulting altered river flow patterns and reduced river productivity. The development of agricultural lands has resulted in a loss of habitat for juvenile fish; dikes constructed along the river channel to prevent flooding eliminated slough backwaters, which has caused a decline in juvenile recruitment. Excessive levels of pollutants in the 1950s and 1960s may have also reduced reproduction.

CONSERVATION ACTIONS

Conservation issues and management actions for the species are described in the appropriate section plans. In short, recommended strategies to restore habitat required for natural reproduction include adopting operational guidelines for Libby Dam that provide suitable flows and temperatures for successful recruitment, coordinating planning and implementation of annual flow proposals among involved agencies, monitoring the effects of flow augmentation, and continuing to refine a genetically-sound White Sturgeon conservation aquaculture program.

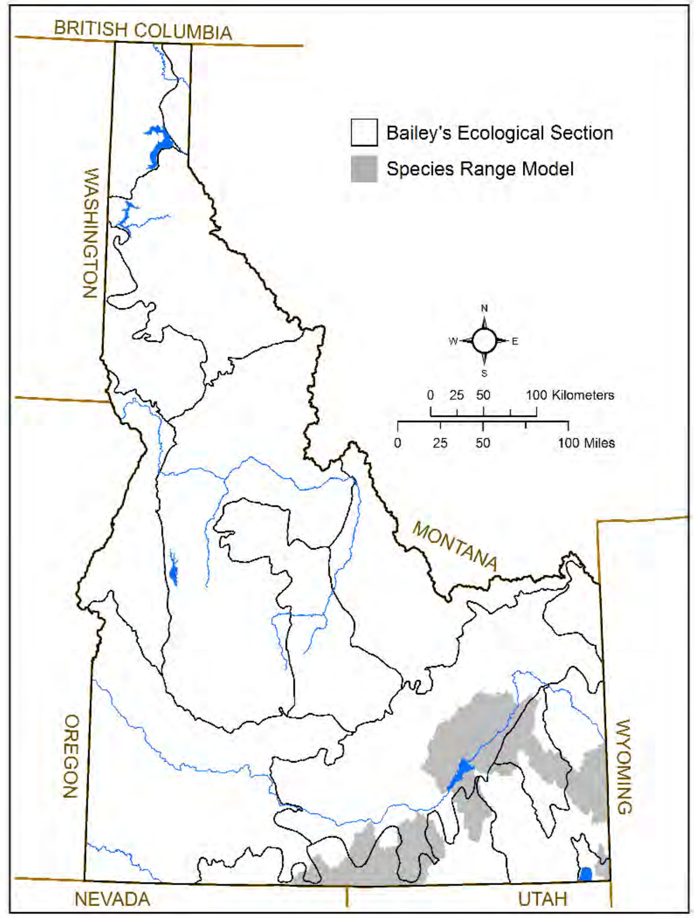
ADDITIONAL COMMENTS

This population of White Sturgeon was listed as Endangered under the ESA in 1994.

Information Sources: Wydoski RS, Whitney RR. 2003. Inland Fishes of Washington. Seattle (WA): University of Washington Press.; FWS. 1999. Recovery Plan for the White Sturgeon (*Acipenser transmontanus*): Kootenai River Population. Portland (OR): US Fish and Wildlife Service.; Paragamian VL. 2012. Kootenai River white sturgeon: synthesis of two decades of research. Endangered Species Research 17:157–167; Beamesderfer R, Garrison T, Anders P. 2014. Abundance and survival of the remnant Kootenai River White Sturgeon population. Moscow (ID): Cramer Fish Sciences.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].

Northern Leatherside Chub

Lepidomeda copei



Class: Actinopterygii
Order: Cypriniformes
Family: Cyprinidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: Sensitive
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G3
S-rank: S2

SGCN TIER: 2
Rationale: Regional endemic, limited range, disjunct populations, IUCN Near Threatened

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 6,600 km^2 (~2,500 mi^2)
Key Ecological Sections: Northwestern Basin and Range, Overthrust Mountains
Population Size in Idaho: Unknown
Description: The historical range of Northern Leatherside Chub encompassed portions of the Bear River drainage at the northeastern margins of the Bonneville Basin in Utah, Idaho, and Wyoming, and in tributaries of the Snake River in Idaho, including Goose Creek and the Wood, Raft, and Salt rivers. Populations persist in the Goose Creek drainage in Cassia County and in the upper Salt River tributaries along the Idaho–Wyoming border. The size of the disjunct populations in Idaho is highly variable but tend to number about 6 to 8 individuals per 100 m (328 ft) of stream. It is difficult to survey for this fish due to its extremely patchy distribution and often low abundance.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This small fish inhabits desert streams of the Bonneville Basin and Snake River drainages in elevation ranges from 1,250 to 2,750 m (4,100–9,000 ft). The temperature range used by this species has been reported to be 10–23 °C (50–73 °F), but optimal conditions may be somewhat narrower, perhaps about 15–20 °C (60–68 °F). Although typically associated with low-velocity and intermediate to deep water habitats, particularly when overhead cover is present, this species also uses a variety of water depths and flows depending on other structural stream features. They have relatively broad diets, eating items in both the stream drift and the substrate,

with insects comprising a large portion of the diet. They can live up to 8 years, reach sexual maturity at age 2 (or >50 mm in length), and spawn at various times depending on temperature.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Decline 30–50%
Description: Population trends in Idaho have not been documented. Rangewide the species is now limited to five of the eight documented historical subbasins. Targeted surveys by IDFG staff during the 1990s failed to find the species in the Little Wood River drainage. Between 1999 and 2005, comprehensive surveys for nongame fish across southern Idaho by IDFG detected the species in 4% of sampled reaches within the known or probable distribution. Recent (2010–2011) targeted surveys successfully located Northern Leatherside Chub in 10 selected streams. In some populations, a number of age classes have been observed, suggesting that reproduction and juvenile recruitment is being maintained. However, other populations appear to have been extirpated, suggesting an overall decline in population size.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threats to this species are the fragmentation and isolation of populations and the introduction of nonnative fish predators (e.g., Brown Trout), which affects Northern Leatherside Chub both directly (e.g., prey) and indirectly (e.g., by acting as a dispersal barrier). In addition, habitat degradation and loss from water development (e.g., diversions and dams) and stream alterations (e.g., channelization, barriers, etc.) may contribute to declines.

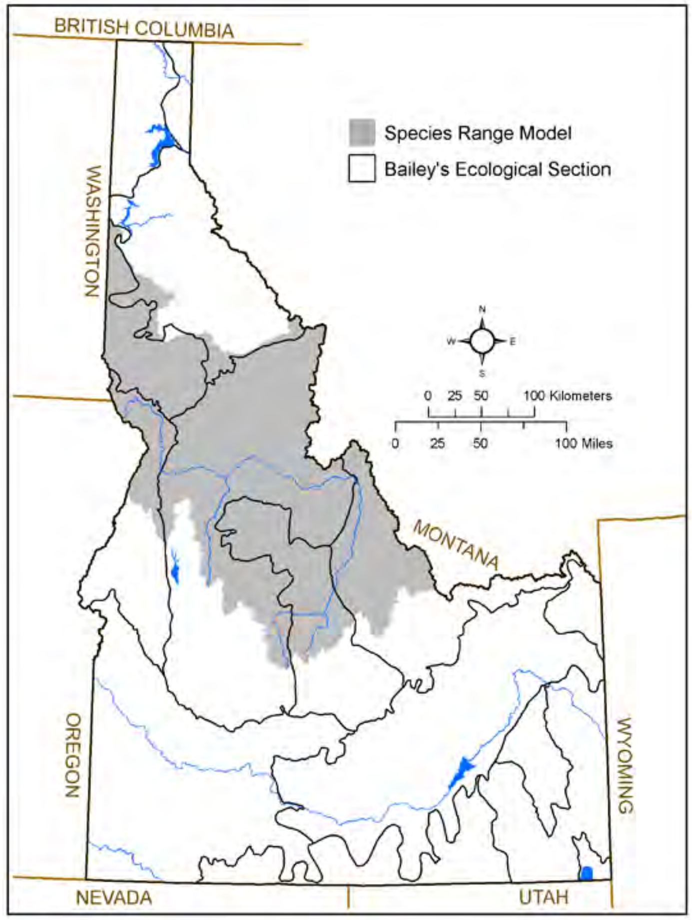
CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, recommended strategies for this species include monitoring the population status and trends, working with conservation partners to address habitat complexity, water quality, and quantity, and managing nonnative invasive species.

ADDITIONAL COMMENTS
This species was 1 of 206 petitioned for listing under the ESA in 2007. In 2011, the FWS completed a status review and concluded it does not warrant protection.

Information Sources: Blakney JR, Loxterman JL, Keeley ER. 2014. Range-wide comparisons of northern leatherside chub populations reveal historical and contemporary patterns of genetic variation. Conservation Genetics 15:757-770.; FWS. 2011. Endangered and Threatened Wildlife and Plants: 12-Month finding on a petition to list Northern Leatherside Chub as Endangered or Threatened. Federal Register 76:63444-63478.; Meyer KA, Lamansky JA Jr, Schill DJ, Zaroban DW. 2013. Nongame fish species distribution and habitat associations in the Snake River Basin of southern Idaho. Western North American Naturalist 73: 20-34.; Keeley ER, Blakney JR, Loxterman JL. 2012. Distribution, abundance, and genetic population structure of Northern Leatherside Chub in the Snake River Basin of Idaho. Pocatello (ID): Idaho State University.; Blakney JR. 2012. historical connectivity and contemporary isolation: Population genetic structure of a rare high-desert minnow, the Northern Leatherside Chub (*Lepidomeda copei*). MS Thesis. Pocatello (ID): Idaho State University.; Dauwalter DC, Wenger SJ, Gardner P. 2014. The role of complexity in habitat use and selection by stream fishes in a Snake River basin tributary. Transactions of the American Fisheries Society 143:1177-1187.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].; Keeley ER, Blakney JR, Loxterman JL. 2012. Distribution, abundance, and genetic population structure of Northern Leatherside Chub in the Snake River Basin of Idaho. Pocatello (ID): Idaho State University.

Steelhead (Snake River Basin DPS)

Oncorhynchus mykiss pop. 13



Class: Actinopterygii
Order: Salmoniformes
Family: Salmonidae

CONSERVATION STATUS & CLASSIFICATION
ESA: Threatened
USFS:
  Region1: No status
  Region 4: Threatened
BLM: Type 1
IDAPA: Game Fish, Threatened Species
G-rank: G5T2T3Q
S-rank: S2S3

SGCN TIER: 1
Rationale: Multiple threats, ESA listed

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 57,600 km^2 (~22,200 mi^2)
Key Ecological Sections: Beaverhead Mountains, Blue Mountains, Challis Volcanics, Idaho Batholith, Palouse Prairie
Population Size in Idaho: 10,000–100,000
Description: Steelhead are native Rainbow/Redband Trout that migrate to the ocean as juvenile fish and return to fresh water as adults to spawn. Historically, Steelhead had access to most of the Clearwater, Salmon, Weiser, Payette, Boise, Owyhee, Bruneau and Salmon Falls Creek drainages in Idaho. However, populations using the tributaries above Hells Canyon Dam were eliminated with the construction of the Hells Canyon complex in the 1950s. Access to the North Fork Clearwater River is blocked by Dworshak Dam. Currently, wild and hatchery Steelhead are found in the Snake River below Hells Canyon Dam, Clearwater, and Salmon River drainages.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Steelhead spawn and rear in stream and small river habitat. Successful egg development and fry emergence depends on clean gravels. Most Steelhead returning to Idaho cross Lower Granite Dam during August-October and over winter in main-stem rivers before spawning the next spring. Spawning occurs in March–May, with fry emergence in mid-summer. Depending on elevation, temperature and stream productivity, Steelhead juveniles will rear in streams for 1–7 years (commonly 2–3) and attain a size of 15–23 cm (6–9 in) before migrating to the ocean. Steelhead remain in the ocean for 1–3 years (commonly 1-2) before returning to natal streams to spawn. Steelhead can return to the ocean and become repeat spawners,

however it is rare for this to occur in Idaho. Diets of juvenile steelhead consist primarily of aquatic and terrestrial insects and other invertebrates. They switch to primarily fish and squid shortly after entering the ocean.

POPULATION TREND
Short-term Trend: Increase 10–25%
Long-term Trend: Decline 80–90%
Description: Average abundance has increased from extremely low levels through much of the 1990s, but there can be large fluctuations between yearly returning migrations. Current 30-year trend data show an average increase of 14% but the 95% confidence interval is 4%-23%.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: The construction of dams on the main stem Snake and Columbia Rivers has reduced survival of juveniles and adults migrating to and from the ocean as they pass through dams and impoundments. Additional effects from dams have resulted in altered hydrographs and water temperatures that affect the run timing of juveniles and adults. Diversions in spawning and rearing streams have removed water, resulting in direct mortality, loss of habitat and migration barriers. Land management activities in adjacent uplands and intentional instream alterations have led to the loss of riparian cover, increased sedimentation, a reduction in woody debris, an increase in stream temperature, and artificial barriers to passage. The addition of hatchery programs to mitigate for lost habitat and survival of fish has introduced genetic concerns about effects to some wild stocks. Declining water quality from increasing development in and along some river and tributary streams can impact fish populations. Climate change may exacerbate habitat threats by altering hydrologic regimes (peak flows, low flows) and stream temperatures, though the effects will vary depending on watershed characteristics. Deleterious climate effects will most likely occur at lower elevations and in altered habitats. Fish growth may improve in high-elevation reaches.

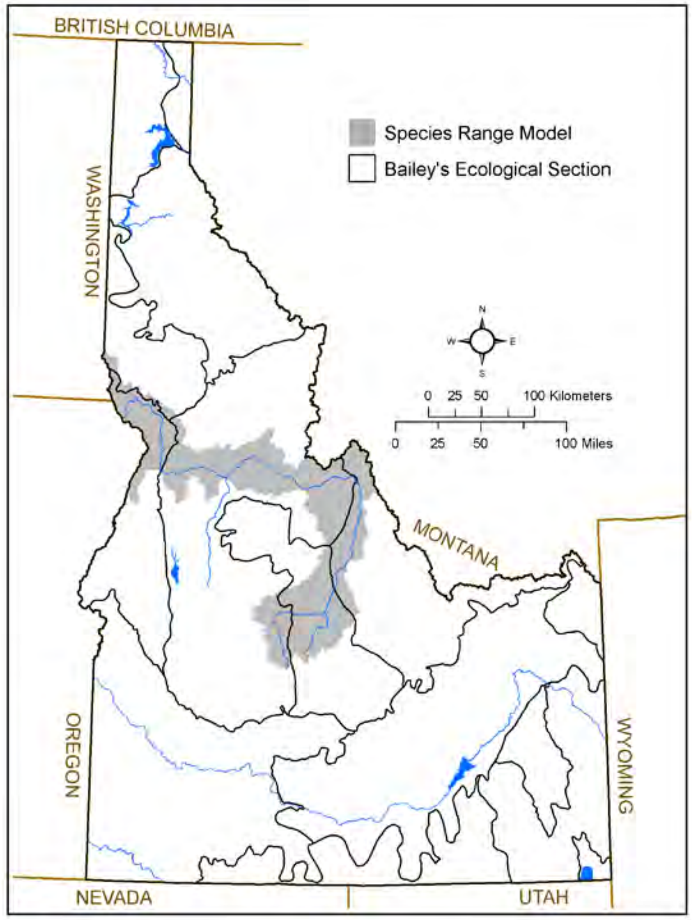
CONSERVATION ACTIONS
Conservation issues and management actions for Steelhead are described in the IDFG Fisheries Management Plan 2013-2018. In short, recommended strategies are to continue to work with federal, tribal, and state agencies and hyropower managers in developing recovery plans and actions to mitigate passage, habitat loss, hatchery and harvest issues, and altered hydrographs. In addition, continue to develop watershed agreements with private landowners and state and federal agencies as needed to address upstream habitat and flow issues to improve life cycle survival.

ADDITIONAL COMMENTS
The Snake River Steelhead population was listed as Threatened under ESA in 1997.

Information Sources: Isaak DJ, Luce CH, Rieman BE, Nagel DE, Peterson EE, Horan DL, Parkes S, Chandler GL. 2010. Effects of climate change and wildfire on stream temperatures and salmonid thermal habitat in a mountain river network. Ecological Applications 20:1350–1371; IDFG. 2013. Fisheries Management Plan 2013–2018. Boise (ID): Idaho Department of Fish and Game.; Copeland T, Idaho Department of Fish and Game, pers. comm.; Behnke RJ. 2002. Trout and Salmon of North America. New York (NY): The Free Press.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].

Sockeye Salmon (Snake River ESU)

Oncorhynchus nerka pop. 1



Class: Actinopterygii
Order: Salmoniformes
Family: Salmonidae

CONSERVATION STATUS & CLASSIFICATION
ESA: Endangered
USFS:
Region1: No status
Region 4: Endangered
BLM: Type 1
IDAPA: Game Fish, Endangered Species
G-rank: G5T1Q
S-rank: S1

SGCN TIER: 1
Rationale: Multiple threats, limited range, ESA Listed

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 19,800 km^2 (~7,600 mi^2)
Key Ecological Sections: Blue Mountains, Beaverhead Mountains, Challis Volcanics, Idaho Batholith
Population Size in Idaho: 1,000–2,500
Description: The natural range of Sockeye Salmon was associated with lake systems accessible to the ocean around the northern Pacific rim from northern California to Japan. In Idaho, Sockeye Salmon historically spawned and reared in the large lakes in the Payette and Salmon River drainages. The Payette Lake population was eliminated in the early 1900s due to dam construction on the Payette River. Currently Sockeye Salmon are only found in lakes in the Stanley basin of the upper Salmon River, primarily Redfish and Alturas lakes. Additionally, they migrate to and from the ocean through the Salmon, Snake and Columbia rivers. Successful adult returns have occurred in the Sawtooth Valley (primarily Redfish Lake) since 2000 with a high of 1,579 Sockeye returning in 2014 (including 453 wild fish).

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Sockeye Salmon in the Snake River basin are an anadromous species that depend on freshwater lakes and access to the ocean. They spawn in gravel areas in lakes, where the juveniles rear for 1-3 years prior to migrating to the sea. There are 2 resident life forms; one spawns in lakes in late fall with most juveniles remaining in the lake, maturing and spawning without rearing in the ocean. The second, more common form known as Kokanee, spawns in tributary streams and moves to lakes during late summer/early fall. While in freshwater lakes,

Sockeye Salmon prefer temperatures near 10 °C (50 °F). Juvenile Sockeye Salmon (smolts) migrate to the ocean at ages 1-3 years and sizes of 7-18 cm (3-7 in). After 1-3 years in the ocean, they return as mature adults reaching the upper Salmon River lakes in mid-summer. Adults returning to Idaho weigh 1-2 kg (3-5 lbs). During their freshwater life, juveniles feed largely on zooplankton. In the ocean they feed upon marine zooplankton and small fish.

POPULATION TREND
Short-term Trend: Increase 10–25%
Long-term Trend: Decline >90%
Description: Counts of adult Sockeye Salmon at the Redfish weir in the 1950-60s averaged over 1,000/year, but decreased to years with no adult returns in the early 1990s. Between 1999 and 2007, more than 355 adults returned from the ocean, primarily because of a large return in 2000. Returns dropped from 2003-2007, but began building in 2008. Adult returns since 2009 have ranged rom a high of 1,579 fish in 2014 (including 453 wild fish) to a low of 257 adults in 2012 (52 wild fish). Sockeye Salmon returns to Alturas Lake ranged from 1 fish in 2002 to 14 in 2010. No fish have returned since 2012.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: The construction of present and past dams on the Columbia, Snake, and Salmon rivers for hydropower and water diversions has adversely affected survival during migration to and from the ocean. Sockeye Salmon are vulnerable to increased temperatures in the migration corridor and, as climate changes, warming thermal regimes of the Snake River may be an issue. Additional concerncs include lowered levels of nutrients in lakes for juvenile life stages, genetic and disease issues with conservation hatchery programs, and the impacts of harvest of juvenile Sockeye Salmon in the Kokanee fisheries.

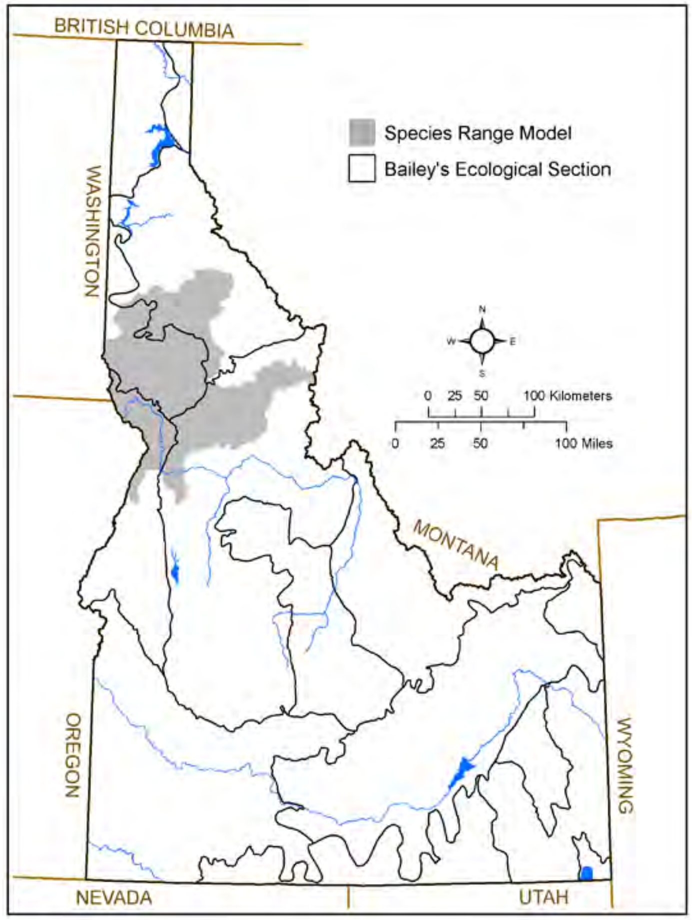
CONSERVATION ACTIONS
Conservation issues and management actions for Sockeye Salmon are described in the ESA Recovery Plan for Snake River Sockeye Salmon and the IDFG Fisheries Management Plan 2013-2018. In short, recommended strategies are to continue to work with federal agencies and the Bonneville Power Administration to improve passage conditions in the lower Snake and Columbia rivers, continue to maintain a conservation hatchery program, and continue to work with partners in evaluating population numbers, nutrient enrichment programs, Kokanee harvest fisheries, and genetic and disease prevention programs.

ADDITIONAL COMMENTS
The Snake River Sockeye Salmon was listed as Endangered under the ESA in 1991.

Information Sources: NMFS. 2015. ESA Recovery Plan for Snake River Sockeye Salmon (*Oncorhynchus nerka*). Portland (OR): NOAA, National Marine Fisheries Service.; Wydoski RS, Whitney RR. 2003. Inland Fishes of Washington. Seattle (WA): University of Washington Press.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].

Chinook Salmon (Snake River fall-run ESU)

Oncorhynchus tshawytscha pop. 2



Class: Actinopterygii
Order: Salmoniformes
Family: Salmonidae

CONSERVATION STATUS & CLASSIFICATION
ESA: Threatened
USFS:
  Region1: No status
  Region 4: Threatened
BLM: Type 1
IDAPA: Game Fish, Threatened Species
G-rank: G5T1Q
S-rank: S1

SGCN TIER: 1
Rationale: Multiple threats, ESA Listed

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 19,800 km^2 (~7,600 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith, Palouse Prairie
Population Size in Idaho: 5,000–10,000 (mature wild individuals)
Description: Chinook Salmon are native to the Snake and Salmon Rivers. Historically, Snake River fall-run Chnook Salmon spawned in the Snake River upriver to the Hagerman Valley and in the lower portions of the Salmon and Clearwater Rivers. Populations using the tributaries above Hells Canyon Dam were eliminated with the construction of the Hells Canyon Complex in the 1950s and earlier upriver dams. The Idaho portion of the Snake River fall-run Chinook Salmon ESU consists of all the Clearwater River drainage up to Lolo Creek, except for the North Fork above Dworshak Dam, the Salmon River drainage upstream to the Little Salmon River, and the Snake River drainage upstream to Hells Canyon Dam. In recent years, the abundance of mature wild Fall Chinook has been between 5,000 and 10,000 individuals.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Chinook Salmon are the largest of any salmon, with adults often exceeding 40-60 lbs after 3-5 years in the ocean. Fall Chinook Salmon use the mainstem of larger rivers to spawn compared to spring/summer runs, which spawn in smaller, higher tributary systems. Adult fall-run Chinook Salmon enter the Snake River from late August through November and normally spawn using gravel/cobble bars in main river channels from late September-October. As with most salmon, adults die after spawning providing a large nutrient source for juvenile fish. Fry emerge in March. Juvenile fall-run Chinook Salmon typically differ from spring/summer Chinook Salmon in

that they begin a slow downstream migration as subyearlings soon after emerging from the gravel and feed on their way to the ocean. The downriver migration peaks in April and lasts through June; most complete the journey in the first year. Optimal water temperatures range from 14–19 °C (59–64 °F) and temperatures that exceed 21 °C (73 °F) are lethal. Juvenile fall-run Chinook Salmon feed on small aquatic invertebrates in both fresh and salt water, primarily insects in freshwater and crustaceans in marine environments. As they grow in saltwater, they quickly change to a fish diet.

POPULATION TREND
Short-term Trend: Increase >25%
Long-term Trend: Decline 50–80%
Description: Historically, approximately half a million fall-run Chinook Salmon traveled up the Columbia River and spawned in the mainstem of the Snake River. The fish run began to decline in the late 1800s, dropping to 72,000 fish in the late 1930s and 29,000 during the 1950s. After dams were constructed on the middle and lower Snake River (1958-1975), counts over Lower Granite Dam below Lewiston dropped to less than 1,000 fish/year, including some hatchery fish that began returning in the early 1980s. In the last 20 years, annual counts of adult fall-run Chinook Salmon over Lower Granite Dam have increased from just over 1,000 fish in 1995 to over 60,000 in 2014, including both hatchery and wild fish.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: The construction and operation of dams on the mainstem Snake and Columbia rivers has reduced survival of migrating juveniles and adults and blocked access to nearly half of the historic range. Additional threats include changes in run timing of juveniles and adults, impacts form stream diversions, loss of riparian cover, sedimentation, and artificial barriers to stream passage. The addition of hatchery programs to mitigate for lost habitat and suvival of fish have introduced genetic concerns about effects to wild stocks.

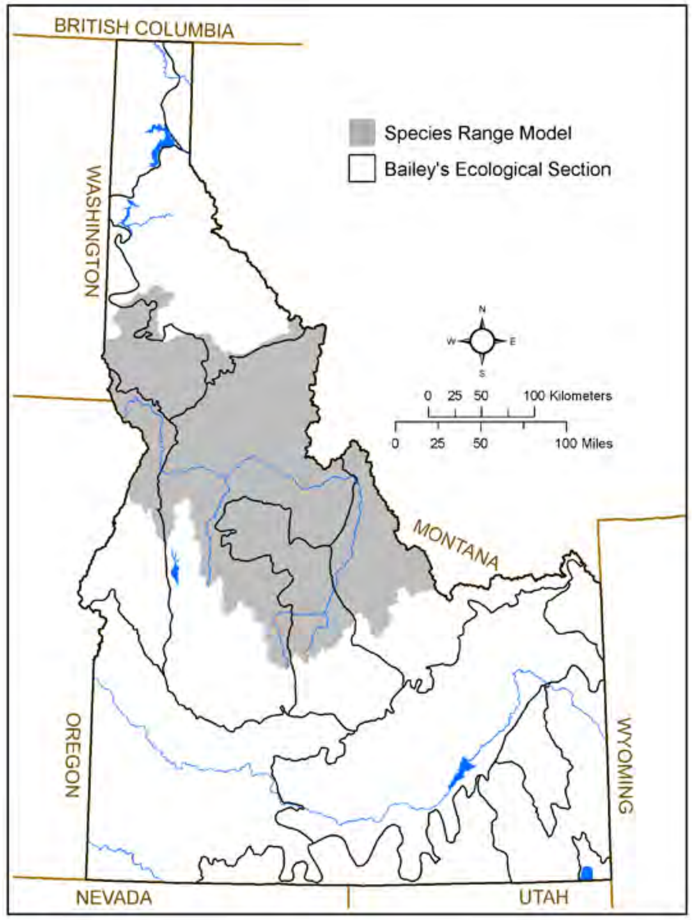
CONSERVATION ACTIONS
Conservation issues and management actions for the species are described in several documents including the Proposed ESA Recovery Plan for Snake River Fall Chinook Salmon and the IDFG Fisheries Management Plan 2013-2018. In short, recommended strategies include continuing to work with federal and state agencies, tribes, and hydropower managers to mitigate passage, habitat loss, harvest and hatchery issues, altered hydrographs, and to develop watershed agreements to address upstream habitat, flow issues, and management of nonnative species.

ADDITIONAL COMMENTS
The Snake River fall-run Chinook Salmon population was listed at threatened under ESA in 1992 and the listing was reaffirmed in 2005 and 2011.

Information Sources: NMFS. 2015. Proposed ESA Recovery Plan for Snake River Fall Chinook Salmon (*Oncorhynchus tshawytscha*). Portland (OR): NOAA, National Marine Fisheries Service.; Wydoski RS, Whitney RR. 2003. Inland Fishes of Washington. Seattle (WA): University of Washington Press.; Irving JS, Bjornn TC. 1981. A forecast of abundance of Snake River fall chinook salmon. Moscow (ID): Idaho Cooperative Fishery Research Unit, University of Idaho.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].

Chinook Salmon (Snake River spring/summer-run ESU)

Oncorhynchus tshawytscha pop. 8



Class: Actinopterygii
Order: Salmoniformes
Family: Salmonidae

CONSERVATION STATUS & CLASSIFICATION
ESA: Threatened
USFS:
Region1: No status
Region 4: Threatened
BLM: Type 1
IDAPA: Game Fish, Threatened Species
G-rank: G5T1Q
S-rank: S1

SGCN TIER: 1
Rationale: Multiple threats, ESA Listed

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 55,600 km^2 (~21,500 mi^2)
Key Ecological Sections: Beaverhead Mountains, Blue Mountains, Challis Volcanics, Idaho Batholith, Palouse Prairie
Population Size in Idaho: 20,000 (mature, wild individuals)
Description: Historically, Snake River spring/summer-run Chinook Salmon spawned in the Snake River tributaries of the Clearwater, Salmon, Weiser, Payette and Boise rivers. Populations using the rivers above Hells Canyon Dam were eliminated with the construction of Hells Canyon Compex from 1955-1967 and earlier upriver dams. Populations in the Clearwater drainage were eliminated or severely depressed by the Lewiston dam in the 1950s. The Idaho portion of the Snake River spring/summer-run Chinook Salmon ESU consists of all of the Salmon River drainage and the Snake River drainage upstream to Hells Canyon Dam. The Clearwater drainage was not included due to the loss of this population in the 1950s, however the reestablished Clearwater River populations are included in conservation efforts.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Chinook Salmon are the largest of any salmon, with adults often exceeding 40-60 lbs after 3-5 years in the ocean. Spring/Summer-run Chinook Salmon use smaller, higher elevation tributary systems for spawning and juvenile rearing compared to fall-run fish, which spawn in the mainstem of larger rivers. They normally spawn in late July-September using gravel bars in summer river and tributary streams. As with most salmon, adults die after spawning and provide a large nutrient source for juvenile fish. Juvenile spring/summer-run Chinook Salmon behave

differently than fall-run Chinook Salmon in that they remain in headwater streams for a year and out-migrate the following spring. Optimal water temperatures range from 14–19 °C (59–64 °F) and temperatures that exceed 21 °C (73 °F) are lethal. Juvenile spring/summer-run Chinook Salmon feed on small aquatic invertebrates, primarily insects in freshwater and crustaceans in marine environments. As they grow in saltwater, they quickly change to a fish diet.

POPULATION TREND

Short-term Trend: Decline >90%

Long-term Trend: Unknown

Description: Historic runs in the Snake River probably exceeded 1 million fish annually in the late 1800s. By the 1950s, the abundance of adult spring/summer-run Chinook Salmon had greatly declined to near 100,000 adults/year. Since the 1960s, counts of spring/summer-run Chinook Salmon adults have declined considerably at the lower Snake River dams. Counts in the 1960s peaked at approximately 79,000 fish, with hatchery returns comprising less than 10% of the total returns. In the 1970s, the runs declined to 67,000 fish with hatchery returns climbing to 22% of the total returns. During the 1980s, maximum salmon returns declined to 40,000 while hatchery returns climbed to an average of 44%. Although the maximum return in the 1990s was similar to the 1980s (44,000 with an average hatchery return of 53%) the minimum count ever recorded occurred during this decade with 2,327 salmon counted at Lower Granite Dam in 1995. Returns were variable in the 2000s with a maximum return of 192,000, a minimum return 31,000, and average hatchery returns comprising 76% of the total.

THREATS

Overall Threat Impact: Medium

Intrinsic Vulnerability: Not intrinsically vulnerable

Description: The primary threat for this species is the construction and operation of hydroelectric dams on the main stem Snake and Columbia rivers, which has blocked access to nearly half of the historic spawning habitat and reduced survival of juveniles and adults migrating to and from the ocean. Additional effects from hydroelectric dams and water storage projects have altered hydrographs and water temperature regimes affecting the timing of juvenile and adult runs. Additional threats include diversions in spawning and rearing streams, loss of riparian cover, sedimentation, genetic concerns, declining water quality, and introductions of nonnative fish.

CONSERVATION ACTIONS

Conservation issues and management actions for the species are described in several documents including the Snake River Spring/Summer Chinook and Steelhead Recovery Plan (in Draft) and the IDFG Fisheries Management Plan 2013-2018. In short, recommended strategies include continuing to work with federal and state agencies, tribes, and hydropower managers to mitigate passage, habitat loss, harvest and hatchery issues, altered hydrographs, and to develop watershed agreements to address upstream habitat, flow issues, and management of nonnative species.

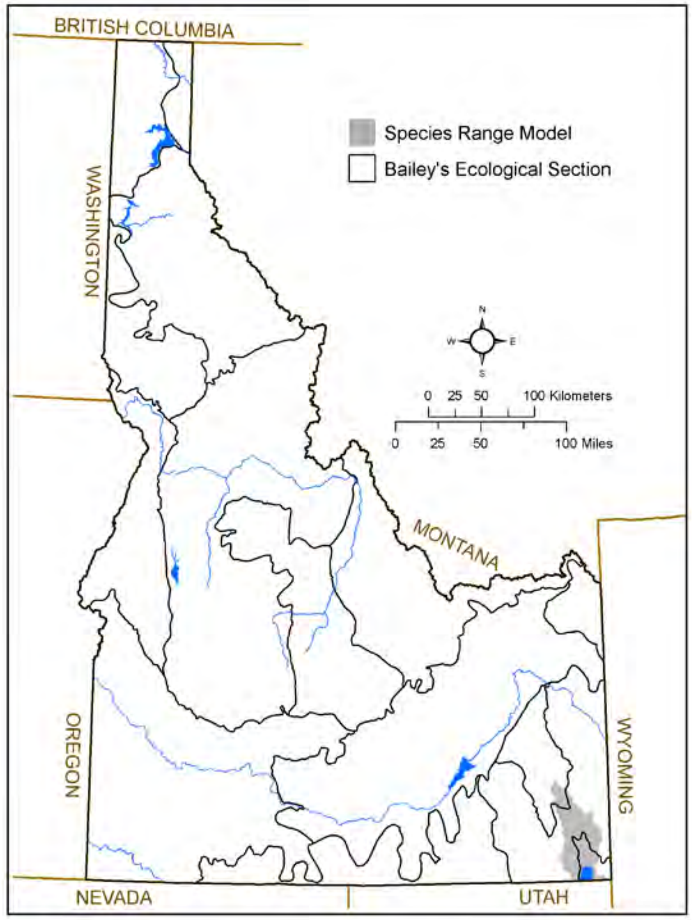
ADDITIONAL COMMENTS

The Snake River spring/summer-run Chinook Salmon population was listed as Threatened under the ESA in 1992. The listing was reaffirmed in 2005 and 2011.

Information Sources: NMFS 2015. Draft ESA Recovery Plan for Idaho Snake River Spring/Summer Chinook Salmon (*Oncorhynchus tshowytscha*) and Snake River Steelhead (*Oncorhynchus mykiss*) Populations. Portland (OR): NOAA, National Marine Fisheries Service.; Wydoski RS, Whitney RR. 2003. Inland Fishes of Washington. Seattle (WA): University of Washington Press.; Matthews GM, Waples RS. 1991. Status review for Snake River spring and summer Chinook salmon. NOAA Tech Memo NMFS F/NWC-200. Seattle (WA): NOAA, National Marine Fisheries Service.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].

Bear Lake Whitefish
Prosopium abyssicola



Class: Actinopterygii
Order: Salmoniformes
Family: Salmonidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Game Fish
G-rank: G1
S-rank: S1

SGCN TIER: 2
Rationale: Endemic, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,600 km^2 (~1,000 mi^2)
Key Ecological Sections: Bear Lake
Population Size in Idaho: >1,000,000
Description: Bear Lake Whitefish are endemic to Bear Lake in extreme southeast Idaho.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This species typically occurs in the benthic zone at water depths greater than 40 m (130 ft). Spawning occurs in mid-February to mid-March in shallow, rocky areas. Ostracods comprise most of the diet, but other invertebrates found on the lake bottom may be consumed.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Relatively Stable (<=10% change)
Description: The Bear Lake Whitefish is monitored annually through standard gillnet surveys. The population appears stable.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable
Description: A lowering of lake levels due to drought and water management could limit spawning and rearing habitat. Increasing human development around the lake could lead to

lowering of water quality due to waste water discharges. Legal and illegal introductions of piscivorous fish could affect populations by increasing predation rate.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the Bear Lake Section plan. In short, the conservation strategies for this species include monitoring the population status and trends and introducing rock substrates at elevations of 5914 and lower to increase spawning habitat and improve spawning success during prolonged drought cycles.

ADDITIONAL COMMENTS

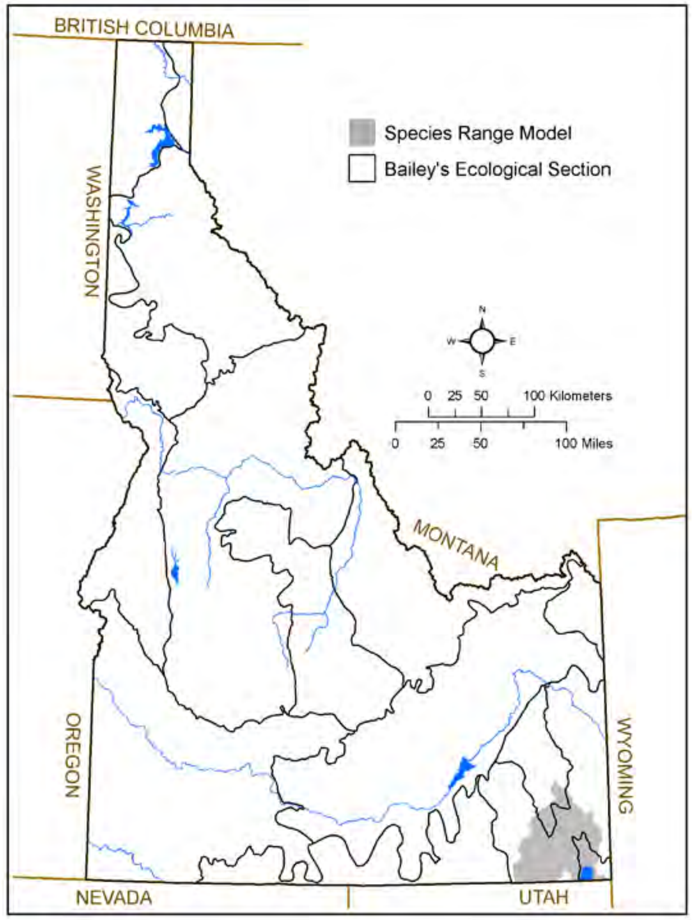
This species was 1 of 206 petitioned for listing under the ESA in 2007. Listing was determined to be not warranted in 2009 due to a lack of information.

Information Sources: Sigler WF, Sigler JW. 1987. Fishes of the Great Basin, A Natural History. Reno(NV): University of Nevada Press.; Tolentino S, Teuscher D. 2010. Bear Lake Fisheries Management Plan. Salt Lake City (UT): Utah Division of Wildlife Resources and Boise (ID): Idaho Department of Fish and Game.; Teuscher D, Idaho Department of Fish and Game, pers. comm.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].

Bonneville Cisco

Prosopium gemmifer



Class: Actinopterygii
Order: Salmoniformes
Family: Salmonidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Game Fish
G-rank: G3
S-rank: S3

SGCN TIER: 2
Rationale: Endemic, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 5,100 km^2 (~2,000 mi^2)
Key Ecological Sections: Bear Lake
Population Size in Idaho: >1,000,000
Description: Bonneville Cisco are endemic to Bear Lake in extreme southeast Idaho. Attempts to introduce the species into other waters in the West have been unsuccessful. The hydroacoustic estimate of abundance in 2008 was approximately 9 million individuals.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This species is typically found in schools in the pelagic zone. Schools are near or below the thermocline when the lake is thermally stratified during the spring to fall months. At night, individuals break from their schools and are widely scattered throughout the lake. Spawning occurs from mid-January to early Febrary over rocky areas along the shoreline, weedbeds, and deeper, rocky shoals. The species feeds almost exclusively on zooplankton.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Relatively Stable (<=10% change)
Description: The Bonneville Cisco is monitored annually through hydroacoustic surveys and comprehensive angler creel surveys at 3-5 year intervals. Hydroacoustic estimates of abundance indicate the population numbered between 2 and 3 million individuals from 1988 to the mid-1990s and between 5 and 10 million individuals from 2000-2008.

THREATS

Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable
Description: A lowering of lake levels due to drought and water management could limit spawning and rearing habitat. Increasing human development around the lake could lead to lowering of water quality due to waste water discharges. Legal and illegal introductions of piscivorous fish could affect populations by increasing predation rate.

CONSERVATION ACTIONS

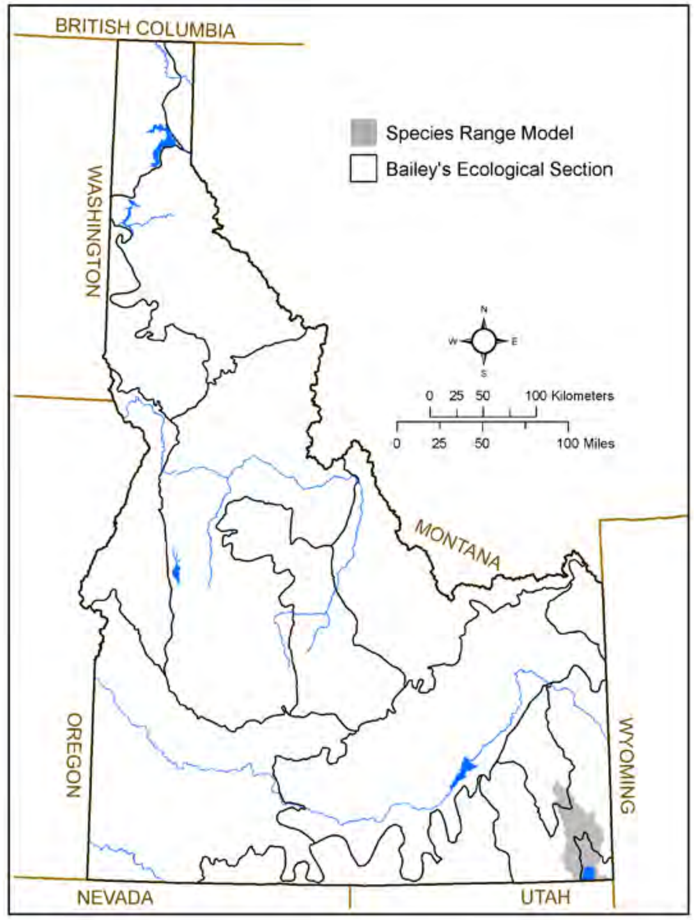
Conservation issues and management actions are described in the Bear Lake Section plan. In short, the conservation strategies for this species include monitoring the population status and trends, reducing trout stocking programs and harvest as necessary, introducing rock substrates at elevations of 5914 and lower to increase spawning habitat and improve spawning success during prolonged drought cycles, and working with water management entities to maintain water levels.

ADDITIONAL COMMENTS

This species was 1 of 206 petitioned for listing under the ESA in 2007. Listing was determined to be not warranted in 2009 due to a lack of information.

Information Sources: Sigler WF, Sigler JW. 1987. Fishes of the Great Basin, A Natural History. Reno(NV): University of Nevada Press.; Tolentino S, Teuscher D. 2010. Bear Lake Fisheries Management Plan. Salt Lake City (UT): Utah Division of Wildlife Resources and Boise (ID): Idaho Department of Fish and Game.; Teuscher D, Idaho Department of Fish and Game, pers. comm.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].

Bonneville Whitefish
Prosopium spilonotus



Class: Actinopterygii
Order: Salmoniformes
Family: Salmonidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Game Fish
G-rank: G3
S-rank: S3

SGCN TIER: 2
Rationale: Endemic, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,600 km^2 (~1,000 mi^2)
Key Ecological Sections: Bear Lake
Population Size in Idaho: >1,000,000
Description: Bonneville Whitefish are endemic to Bear Lake in extreme southeast Idaho.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This species is typically found at depths of 12–30 m (40–100 ft). Spawning occurs from mid-February to early March over rocky areas along the shoreline. The species is omnivorous and consumes plankton and invertebrates found on the lake bottom. Individuals >30 cm (>12 in) are piscivorous and consume other whitefish, Bear Lake sculpin, and other small fish.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Relatively Stable (<=10% change)
Description: The Bonneville Whitefish is monitored annually through standard gillnet surveys and in comprehensive angler creel surveys at 3 to 5 year intervals. The population appears stable.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable

Description: A lowering of lake levels due to drought and water management could limit spawning and rearing habitat. Increasing human development around the lake could lead to lowering of water quality due to waste water discharges. Legal and illegal introductions of piscivorous fish could affect populations by increasing predation rate.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the Bear Lake Section plan. In short, the conservation strategies for this species include monitoring the population status and trends and introducing rock substrates at elevations of 5914 and lower to increase spawning habitat and improve spawning success during prolonged drought cycles.

ADDITIONAL COMMENTS

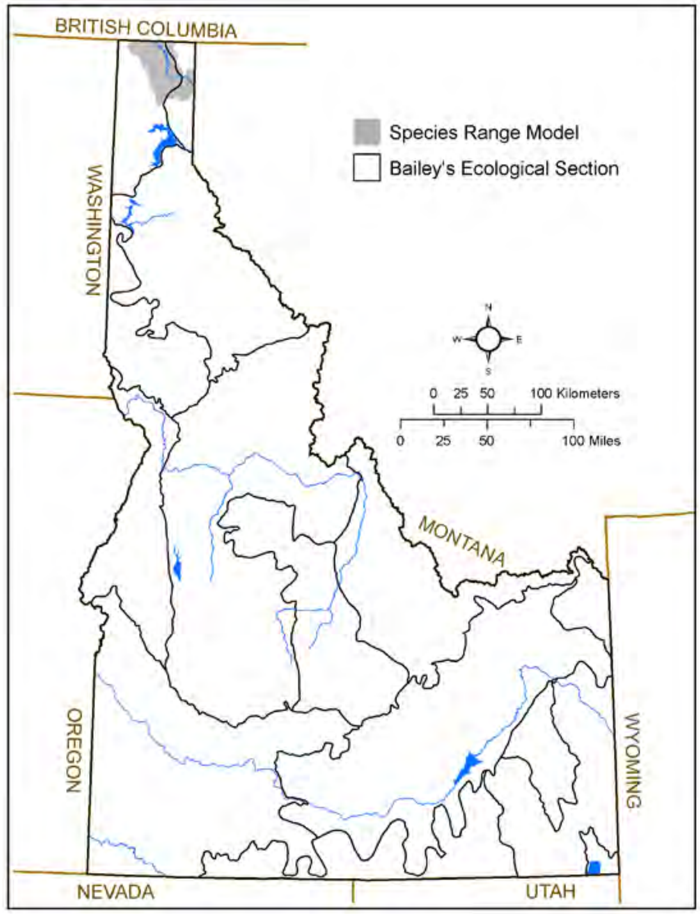
This species was 1 of 206 petitioned for listing under the ESA in 2007. Listing was determined to be not warranted in 2009 due to a lack of information.

Information Sources: Sigler WF, Sigler JW. 1987. Fishes of the Great Basin, A Natural History. Reno(NV): University of Nevada Press.; Tolentino S, Teuscher D. 2010. Bear Lake Fisheries Management Plan. Salt Lake City (UT): Utah Division of Wildlife Resources and Boise (ID): Idaho Department of Fish and Game.; Teuscher D, Idaho Department of Fish and Game, pers. comm.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].

Burbot

Lota lota



Class: Actinopterygii
Order: Gadiformes
Family: Gadidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Game Fish, Endangered Species
G-rank: G5
S-rank: S1

SGCN TIER: 1
Rationale: Low population size, large long term declines, multiple threats, IDAPA Endangered

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,200 km^2 (~800 mi^2)
Key Ecological Sections: Flathead Valley, Okanogan Highlands
Population Size in Idaho: 1–50
Description: Burbot are circumpolar in distribution, extending south just to the northern portions of the conterminous US. In Idaho, they are only found in the Kootenai River drainage. Population estimates (prior to hatchery releases) ranged from 225 in 1997 to 50 Burbot in 2003. Current total population size of Burbot, including hatchery juveniles, is estimated between 2,500-10,000.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Adult Burbot primarily inhabit deep, cool lakes, reservoirs, or rivers. In lakes, Burbot are strongly associated with the bottom and prefer temperatures of 10–12 °C (50–54 °F), remaining below the thermocline. They can attain lengths of 99 cm (39 in) and weigh 8 kg (17 lbs), but most are much smaller (in the 1-3 kg [2-7 lbs] range). Southern populations mature in 3-4 years and females may not spawn each year. Although Burbot can spawn in lakes and rivers, the wild and hatchery produced adults are currently recorded spawning only in the mainstem of the Kootenai River and its tributaries. In rivers, Burbot spawn in low velocity areas in main channels or in side channels behind deposition bars over fine gravel, sand, or silt. The semibuoyant eggs are broadcast above the substrate and may drift but eventually settle into the substrate. Spawning is generally highly synchronized over a short 2-3 week time period in late February to early March when water temperatures are low (1–3 °C [34–39 °F]). Burbot primarily

feed at night, with fry feeding on zooplankton and small aquatic invertebrates and adults mainly feeding on fish.

POPULATION TREND
Short-term Trend: Decline 10–30%
Long-term Trend: Decline >90%
Description: Although common in large portions of their range, the Kootenai population has declined significantly in past years. In the 1960s, the winter fishery on the Kootenai River was thought to have exceeded thousands of pounds of fish in both the commercial and sport harvest. By the late 1970s, the population had collapsed, and was estimated at 150 fish in the mid-1990s and only 50 fish by the early 2000s. With annual mortality estimated at 63%, the wild stock was estimated to be extirpated by 2015. Since 2009, juveniles have been produced from captured wild broodstock on Moyie Lake, British Columbia, and reared at the University of Idaho. Population trends for wild adults continues to decline, but the hatchery juvenile population has increased by >25%.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Highly vulnerable
Description: The primary threat to this species is habitat loss and degredation due to the construction of Libby Dam in 1972. The altered flows associated with hydropower and flood control below Libby Dam has resulted in higher winter velocities, which may restrict or disrupt upstream migration of adults, as well as warmer temperatures, which limit egg hatching success. Daily flow fluctuations for peak power generation may also flush eggs from spawning areas. In addition, nutrient settling above Libby Dam has reduced Burbot productivity of the river and the development of agricultural lands has resulted in a loss of habitat for juvenile fish with the elimination of slough backwaters by the diking of the river channel to prevent flooding.

CONSERVATION ACTIONS
Conservation issues and management actions for the species are described in the Kootenai River/Kootenay Lake Burbot Conservation Strategy (Strategy) and appropriate section plans. The recommended action is to address the operation of Libby Dam considering river flow and temperature requirements for Burbot during the critical prespawn, spawning, and egg incubation periods from December through April. The Strategy also identifies conservation aquaculture as a remedial measure to help strengthen the depressed Burbot stock. In addition, habitat improvements to spawning and rearing locations as well as nutrient additions to increase food during larval rearing are also identified to help sustain and improve the population.

ADDITIONAL COMMENTS
The Kootenai River Burbot were petitioned for listing under the ESA in 2000, but was found as not warranted by the FWS because it did not represent a distinct population segment.

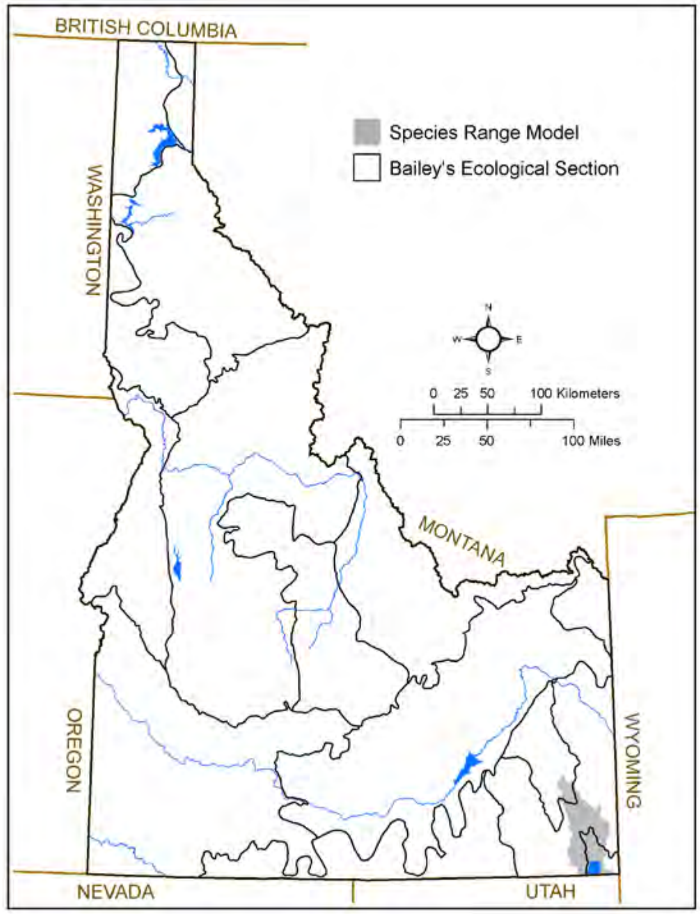
Information Sources: Paragamian VL, Pyper BJ, Daigneault MJ, Beamesderfer RCP, Ireland SC. 2008. Population dynamics and extinction risk of burbot in the Kootenai River, Idaho, USA and British Columbia, Canada. American Fisheries Society Symposium 59:213–234; Paragamian VL, Hansen MJ. 2011. Stocking for rehabilitation of burbot in the Kootenai River, Idaho, USA and British Columbia, Canada. Journal of Applied Ichthyology 27:22–26; KVRI Burbot Committee. 2005. Kootenai River/Kootenay Lake Burbot Conservation Strategy. Bonners Ferry (ID): Kootenai Tribe of Idaho and Moscow (ID): S. P. Cramer and Associates.; Hardy R, Paragamian VL. 2013. A synthesis of Kootenai River Burbot stock history and future managmement goals. Transactions of the American Fisheries Society 142:162–1670; Hardy RS, Stephenson SM, Neufeld MD, Young SP. 2015. Adaptation of lake–origin burbot stocked into a large river environment. Hydrobiologia. DOI: 10.1007/s10750–015–2226–0.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].

Bear Lake Sculpin
Cottus extensus

Class: Actinopterygii
Order: Scorpaeniformes
Family: Cottidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G3
S-rank: S3

SGCN TIER: 2
Rationale: Endemic, range restricted, IUCN Vulnerable



DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,600 km^2 (~1,000 mi^2)
Key Ecological Sections: Bear Lake
Population Size in Idaho: >1,000,000
Description: Bear Lake Sculpin are endemic to Bear Lake in extreme southeast Idaho. The population is estimated to be in the millions.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This species occurs throughout the lake in benthic areas. Individuals spawn near shore in mid-April to mid-May and attach eggs to the undersides of rocks where males guard egg masses. Adults return to deeper waters after spawning. After hatching, fry use currents to disperse from the rocky spawning areas. Sculpins are opportunistic bottom feeders on benthic invertebrates and ostracods.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Relatively Stable (<=10% change)
Description: The Bear Lake Sculpin is monitored by bottom trawl surveys every other year. From 1988 to 1995, mean catch per trawl densities ranged from 25-50 sculpin per trawl, which extrapolates to a minimum whole lake population estimate between 1 and 2 million fish. Since 1995, the density estimates have been greater than 50 sculpin per trawl with a high of 175 sculpin per trawl in the late 1990s.

THREATS

Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable
Description: A lowering of lake levels due to drought and water management could limit spawning and rearing habitat. Increasing human development around the lake could lead to lowering of water quality due to waste water discharges. Legal and illegal introductions of piscivorous fish could affect populations by increasing predation rate.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the Bear Lake Section plan. In short, the conservation strategies for this species include monitoring the population status and trends, reducing trout stocking programs as necessary, introducing rock substrates at elevations of 5914 and lower to increase spawning habitat and improve spawning success during prolonged drought cycles, and working with water management entities to maintain water levels.

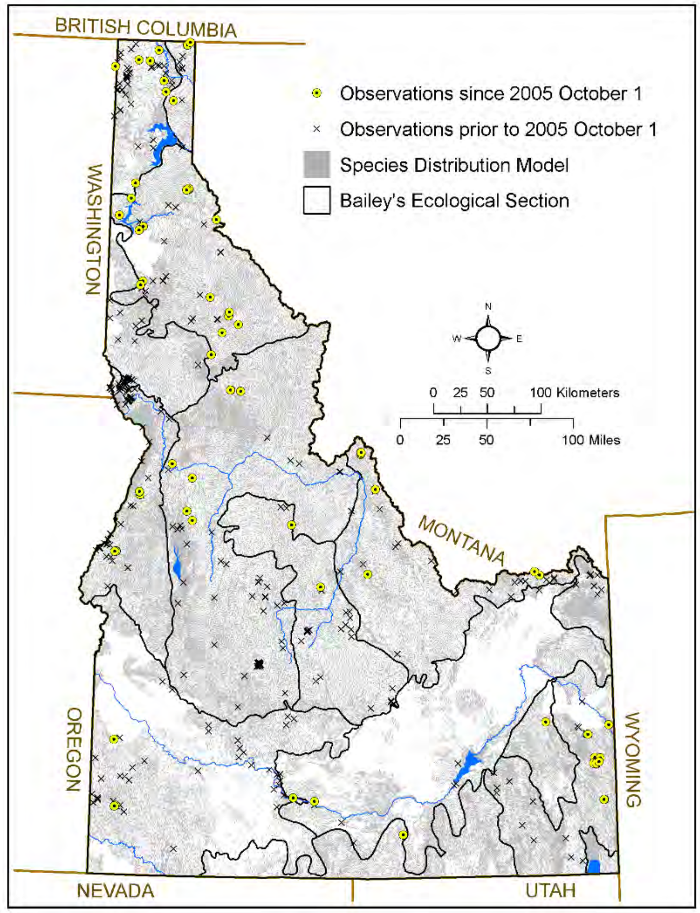
ADDITIONAL COMMENTS

This species was 1 of 206 petitioned for listing under the ESA in 2007. Listing was determined to be not warranted in 2009 due to a lack of information.

Information Sources: Sigler WF, Sigler JW. 1987. Fishes of the Great Basin, A Natural History. Reno(NV): University of Nevada Press.; Tolentino S, Teuscher D. 2010. Bear Lake Fisheries Management Plan. Salt Lake City (UT): Utah Division of Wildlife Resources and Boise (ID): Idaho Department of Fish and Game.; Teuscher D, Idaho Department of Fish and Game, pers. comm.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Fish Distribution Database. [Accessed August 15, 2015].

Western Toad

Anaxyrus boreas



Class: Amphibia
Order: Anura
Family: Bufonidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: Sensitive
  Region 4: Sensitive
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S2

SGCN TIER: 2
Rationale: Significant declines

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 204,000 km^2 (~78,800 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Bitterroot Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Northwestern Basin and Range, Okanogan Highlands, Overthrust Mountains, Owyhee Uplands, Palouse Prairie, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: Unknown
Description: The Western Toad is widespread across the western US and Canada, including most of Idaho. Although it can be found in appropriate habitat throughout much of the state, populations south of the Snake River are disjunct and isolated. The species is still common across much of its range, but has experienced locally dramatic declines in many areas including southeastern Idaho. The total population size in Idaho is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: The Western Toad occurs in a wide variety of habitats, generally within proximity to water, and is found across Idaho from mountain meadows to low elevation deserts. Although primarily terrestrial, breeding occurs in quiet waters including beaver ponds, reservoirs, lakes, streams, marshes, and wet meadows. In Idaho, breeding sites tend to be sparse in some areas, suggesting that environmental tolerances and habitat preferences are limiting.

POPULATION TREND
Short-term Trend: Decline 10–30%

Long-term Trend: Unknown
Description: Significant declines have occurred in multiple areas across the species range, including Colorado, British Columbia, Wyoming, Montana, Yellowstone National Park, and Grand Teton National Park. This species could be experiencing similar declines in Idaho, although recent surveys indicate it is more abundant in some areas of the state than others (e.g., Okanogan Highlands).

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: Amphibians, in general, are susceptible to pathogens, climate change, environmental pollution, ultraviolet-b exposure, and invasive species. The major threats to this species in Idaho are believed to be amphibian chytridiomycosis, a disease caused by a fungal pathogen, *Batrachochytrium dendrobatidis* (*Bd*), and habitat loss and degradation. As part of an amphibian assessment of IDFG's Southeast, Upper Snake, and Salmon regions, 10 swab samples were analyzed for *Bd* in August 2013 and one sample from Buster Lake in the Garden Creek subwatershed of Custer County tested positive.

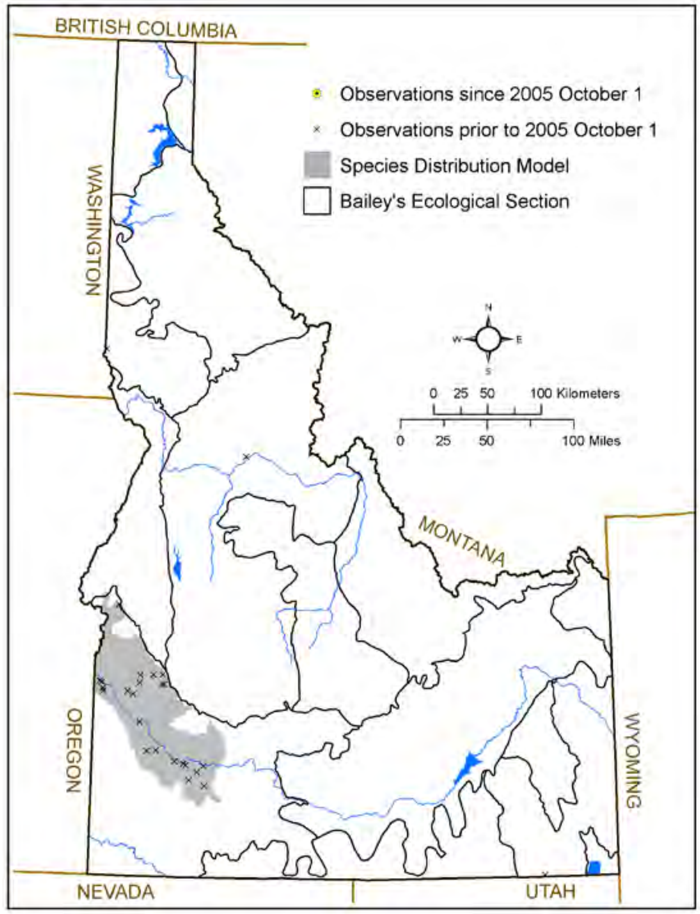
CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, the conservation strategies for this species include determining the status of chytrid fungus in populations, developing a disease monitoring program, managing water quality and quantity, conserving habitats, and monitoring microclimates (particularly in relation to disease).

ADDITIONAL COMMENTS
None.

Information Sources: Hammerson G, Santos–Barrera G, Muths E. 2004. *Anaxyrus boreas*. The IUCN Red List of Threatened Species. Version 2014.2. www.iucnredlist.org. Downloaded on 26 September 2014; McGee M, Keinath D. 2004. Species Assessment for Boreal Toad (*Bufo boreas boreas*) in Wyoming. Cheyenne (WY): University of Wyoming.; Bartelt PE, Klaver RW, Porter WP. 2010. Modeling amphibian energetics, habitat suitability, and movements of western toads, *Anaxyrus* (=*Bufo*) *boreas*, across present and future landscapes. Ecological Modelling 221:2675–2686; IDFG. 2015. Southeast Idaho Northern Leopard Frog and Western Toad Status. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Woodhouse's Toad

Anaxyrus woodhousii



Class: Amphibia
Order: Anura
Family: Bufonidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S2

SGCN TIER: 2
Rationale: Several threats, imperiled, limited range.

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 14,100 km^2 (~5,400 mi^2)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Unknown
Description: Woodhouse's Toad occurs across much of the southwestern and central US and into northern Mexico. The isolated and disjunct populations of the species in parts of the Columbia and Snake River drainages represent the northern extent of its range. Idaho populations occur at a few locations along the western Snake River Plain from approximately Bruneau to Weiser, and are isolated from populations in Nevada and Utah by more than 230 km (126 mi). A single historical record from Lewiston suggests that populations along the upper Columbia River of Oregon and Washington formerly extended to the lower reach of the Snake River. The species is rarely encountered in Idaho.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Woodhouse's Toad requires proximity to shallow-water breeding habitat in shallow quiet waterbodies, including marshes, rain pools, ponds, lakes, reservoirs, and flooded areas. When not breeding, adults inhabit a variety of upland habitats, including relatively dry grassland and shrubland cover types, but more typically mesic river valleys and floodplains, and agricultural areas. Breeding season is variable, and the timing of breeding depends in part on water availability and sometimes occurs in response to rain events.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threat for this species is habitat loss or degradation caused by reduction of floodplain wetlands from river regulation, reclamation of wetlands for development, and modification of wetlands for agricultural, industrial, and residential purposes. Breeding is dependent on the presence and persistence of surface water throughout the breeding and larval periods. The American Bullfrog is a well-established invasive species in this system, and bullfrog populations can compete with Woodhouse's Toad, prey on tadpoles and juveniles, and carry pathogens, such as *Batrachochytrium dendrobatidis* (*Bd*) that causes amphibian chytridiomycosis.

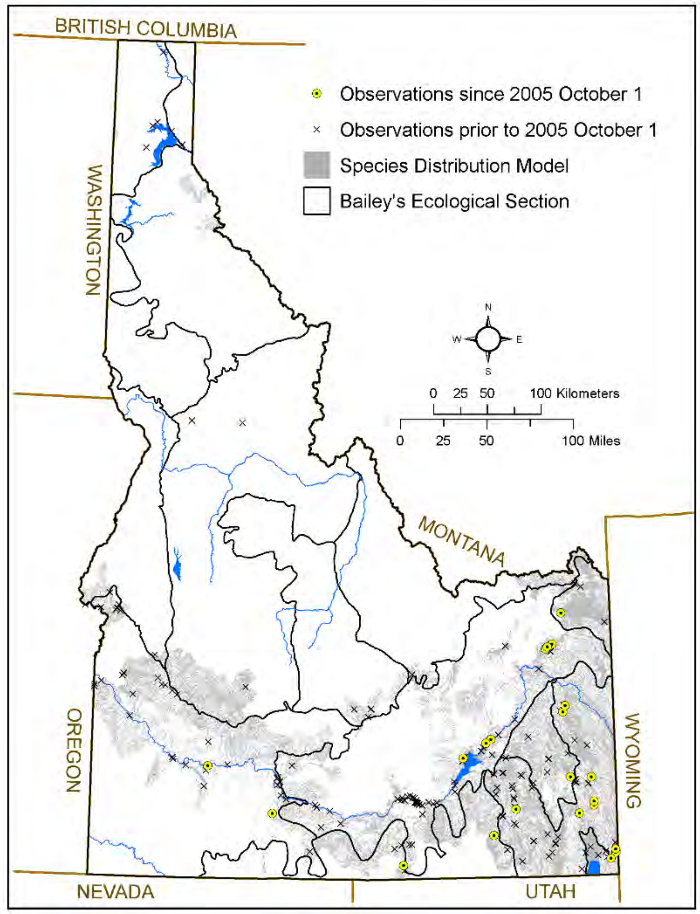
CONSERVATION ACTIONS
Conservation issues and management actions are described in the Owyhee Uplands Section Plan. Management priorities include efforts to maintain or improve ecological function of wetlands existing in riparian and floodplain habitats in managed river systems, evaluating the prevalence of amphibian diseases and seeking opportunities to manage their effects, and controlling invasive aquatic organisms, including the American Bullfrog. Supporting activites include assessing the status of southwest Idaho populations to aid land- and water-use decisions and to support habitat management prioritization.

ADDITIONAL COMMENTS
None.

Information Sources: Hammerson G, Santos–Barrera G. 2004. *Anaxyrus woodhousii*. The IUCN Red List of Threatened Species. Version 2014.2. www.iucnredlist.org. Downloaded on 29 August 2014.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Northern Leopard Frog

Lithobates pipiens



Class: Amphibia
Order: Anura
Family: Ranidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S2

SGCN TIER: 2
Rationale: Significant long term declines, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 79,800 km^2 (~30,800 mi^2)
Key Ecological Sections: Bear Lake, Bitterroot Mountains, Flathead Valley, Northwestern Basin and Range, Okanogan Highlands, Overthrust Mountains, Owyhee Uplands, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: Unknown
Description: The Northern Leopard Frog is widely distributed across much of northern and central North America, but populations in the western US are sparse. In northern Idaho, it was found in the Kootenai, Pend Oreille, and Clark Fork rivers prior to 1955, but is now considered extirpated from this region. In southern Idaho, Northern Leopard Frogs were last documented on the Payette and Boise Rivers during the 1970s, and the last specimen or literature records on the Snake River below Grandview were also documented during that decade. However, incidental sightings in the Grandview and Bruneau vicinities along the Snake River were reported during 2004-2006, suggesting that remnant populations could persist in the mid-Snake drainage. Few incidental observations have been made in south-central Idaho since 2005, and several amphibian surveys in the BLM Four Rivers, Jarbidge and Shoshone Field Offices have yielded no new sightings or observations in historically-occupied habitats. In southeast Idaho, Northern Leopard Frogs occupied 23 of 116 (19.8%) subwatersheds surveyed during an amphibian assessment of IDFG's Southeast, Upper Snake, and Salmon regions. Surveyors documented adult, juvenile, larvae, and egg mass life stages at occupied sites in 2012 and 2014.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.

Description: Northern Leopard Frogs occur in springs, slow streams, marshes, bogs, ponds, canals, floodplains, reservoirs, and lakes; usually permanent water with rooted aquatic vegetation. In summer, this species commonly inhabits wet meadows and fields and usually overwinters underwater. Key habitats along the Snake River include the Bruneau Dunes ponds and adjacent aquatic habitats.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Decline 30–50%
Description: Significant population declines for this species have been documented rangewide. In Idaho, large-scale population extirpations have been documented in the Panhandle and the southwest, extending up the Snake River drainage to perhaps Hagerman.

THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Moderately vulnerable
Description: Primary threats for this species include the loss and degradation of wetland and riparian habitats, disease (i.e., chytridiomycosis, a disease caused by a fungal pathogen, *Batrachochytrium dendrobatidis*), and nonnative bullfrogs. Much of the Idaho range is in areas where wetlands are lost or affected by urban and agricultural development. Introduction of pathogens and population-level effects of disease are potentially related to habitat conditions or to changing climate conditions.

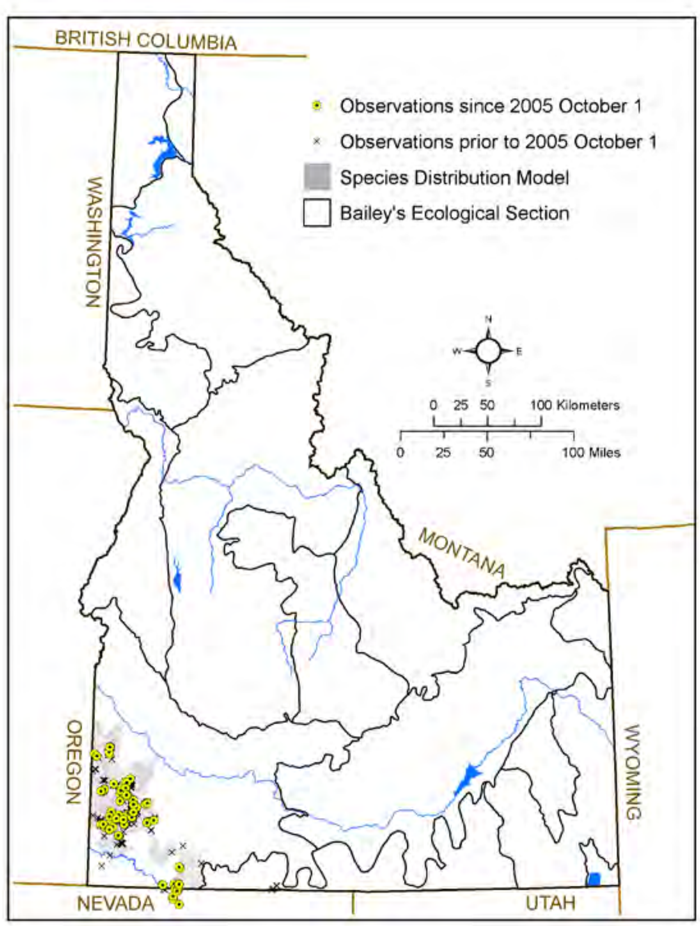
CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, the conservation strategies for this species include managing bullfrogs, assessing potential recovery options in areas where the species has been extirpated, developing a disease monitoring program, managing water quality and quantity, conserving habitats, and monitoring microclimates (particularly in relation to disease).

ADDITIONAL COMMENTS
The Northern Leopard Frog was petitioned for listing under the ESA in 2011, but was determined to be not warranted by the FWS.

Information Sources: Hammerson G, Solís F, Ibáñez R, Jaramillo C, Fuenmayor Q. 2004. Lithobates pipiens. The IUCN Red List of Threatened Species. Version 2014.2. www.iucnredlist.org. Downloaded on 03 September 2014; Makela PD. 1998. A Survey for Northern Leopard Frogs (*Rana pipiens*) in the Snake River Resource Area: 1997. Boise (ID): Bureau of Land Management; IDFG. 2015. Southeast Idaho Northern Leopard Frog and Western Toad Status. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Columbia Spotted Frog (Great Basin DPS)

Rana luteiventris pop. 3



Class: Amphibia
Order: Anura
Family: Ranidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: Sensitive
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4T2T3Q
S-rank: S2

SGCN TIER: 1
Rationale: Distinct population segment, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 6,600 km² (~2,500 mi²)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Unknown
Description: The Columbia Spotted Frog is distributed across northwestern North America from British Columbia and southern Alaska south to central Nevada and Utah. In Idaho, populations south of the Snake River in Owyhee and Twin Falls counties are disjunct, isolated from neighboring populations by extensive areas of unoccupied and unsuitable habitat. The FWS included this portion of the species' range in the Great Basin Distinct Population Segment, which was designated a Candidate for listing under the ESA. Total population size in Idaho is not precisely known, as some populations occur on private land and are not monitored.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Populations in southern Idaho typically occur in patches of wetland habitat that exist in a matrix of semidesert xeric habitat. Wetland habitat is associated with ponds and reservoirs, flooded meadows, small streams, and riparian habitat, including both perennial and seasonally ephemeral systems. Adjacent upland habitat includes sagebrush steppe and other shrubland habitat, juniper woodland, and stands of aspen. Breeding occurs in shallow water in ponds or other quiet waters.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)

Long-term Trend: Decline 10–30%
Description: Extensive surveys in Idaho began in 1996 with monitoring of breeding sites beginning in ca. 2000. Since 2000, breeding site occupancy, total population size, and productivity have fluctuated at monitored sites. Evidence of extirpations have been infrequent, and these events rather localized. Rangewide long-term trend for this population appears downward, particularly in Oregon and Nevada, where occupancy rates at historical sites are estimated at 53% and 60%, respectively. Interpretation of historical data is admittedly problematic.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: Nonnative species, such as Bullfrog and predatory fish (e.g., Brook Trout, bass, etc.), as well as amphibian pathogens have been identified as threats to the persistence of Columbia Spotted Frog populations. Diseases having the potential to cause population decline include ranaviruses and amphibian chytridiomycosis, which is caused by a fungal pathogen, *Batrachochytrium dendrobatidis* (*Bd*). Mortality from chytridiomycosis has been detected in the Great Basin population, but die-offs have not been detected and population-level implications are unknown. Reduction of key habitat elements, such as beaver ponds and riparian floodplain wetalnds, may be affecting population densities and movement corridors, limiting genetic variability.

CONSERVATION ACTIONS

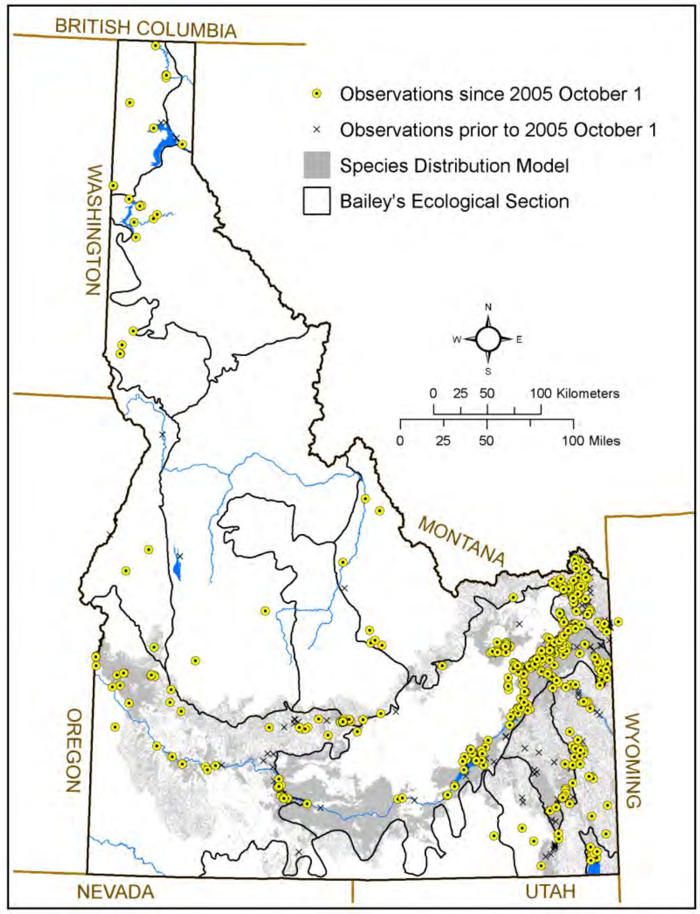
Conservation issues and management actions are described in the 2010 draft Columbia Spotted Frog Great Basin Population Conservation Strategy and in the Owyhee Uplands Section plan. In short, the conservation strategies for this species include evaluating and managing disease, managing the introduction and spread of nonnative competitors and predators, and improving habitat conditions. American Beaver populations are currently being assessed, and restoration of beaver populations may be an important restoration tool in some areas.

ADDITIONAL COMMENTS

In October 2015, following completion of a status review, the FWS found that this species no longer warranted listing under the ESA as a result of collaborative conservation efforts and removed it from the ESA Candidate List.

Information Sources: IDFG. 2010. The Columbia Spotted Frog (*Rana luteiventris*) Great Basin Population Conservation Strategy DRAFT. Boise (ID): Idaho Department of Fish and Game.; FWS. 2009. Species Assessment and Listing Priority Form for the Columbia spotted frog (Great Basin DPS). http://ecos.fws.gov/docs/candforms_pdf/r8/D027_V01.pdf.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Trumpeter Swan
Cygnus buccinator



Class: Aves
Order: Anseriformes
Family: Anatidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: Sensitive
BLM: Type 2
IDAPA: Migratory Game Birds
G-rank: G4
S-rank: S1B, S4N

SGCN TIER: 2
Rationale: Small breeding population size, breeding population decline, multiple threats, significant portion of the Rocky Mountain Population winters in Idaho

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 118,900 km^2 (~45,900 mi^2)
Key Ecological Sections: Bear Lake, Overthrust Mountains, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: 100 in breeding season; 3,000–5,000 overwintering
Description: Rocky Mountain Population (RMP) Trumpeter Swans nest in several flocks from western Canada south to Nevada and Wyoming. A resident population occurs in east Idaho and is part of the Greater Yellowstone breeding flocks. Key nesting areas include Harriman State Park, the Caribou–Targhee National Forest, Market Lake and Sand Creek WMAs, and Camas, Grays Lake, and Bear Lake NWRs. Roughly 100 adults are present during summer, but only 15-25 pairs nest annually; as few as 50% of these successfully fledge young. In winter, migratory swans from Canada mix with resident US flocks. The RMP winters primarily in the Greater Yellowstone area, with >70% in east Idaho in some years. Crucial winter habitat occurs in the Snake, Henrys and South forks of the Snake, and Teton rivers. Field-feeding swan concentrations (100-2,500 birds) occur near the lower Henrys Fork River (Deer Parks WMA), the main Snake River above American Falls Reservoir, Market Lake WMA, and the lower Teton River north of Newdale.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce
Description: Trumpeter Swans nest on relatively undisturbed natural and impounded wetlands with slow and shallow water. Nests are located on islands, muskrat and beaver houses, or exposed hummocks and consist of mounds of emergent vegetation that can reach 3–4 m (9–12 ft) in diameter. Most successful nesting territories occur on state or federally managed wetlands

where water levels and access are controlled during the breeding season. Average clutch size is 3–6 eggs and productivity and cygnet survival are highly variable. Primarily herbivores, many wintering swans have adapted to field feeding on grain, potatoes, and corn when available.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Relatively Stable (<=10% change)
Description: This species once ranged from the Atlantic to the Pacific, but was reduced to near extinction by 1900 and persisted only in small flocks in Alaska and the Rocky Mountains. The RMP has since rebounded in response to hunting restrictions and conservation efforts. While the RMP and Greater Yellowstone breeding flocks have steadily increased from 1993-2015, the number of resident swans in Idaho has shown no statistically significant trend during this period. More recently, however, the number of adults has declined >20%, from 136 individuals in 2005 to 104 in 2015. Annual productivity is variable (15-40 cygnets), but no trend is evident. Mid-winter counts of total swans in the RMP and Idaho from 1972-2014 suggest annual increases of 5.4% and 6.8%, respectively. Winter distribution in the Greater Yellowstone area has shifted substantially—in the last decade Idaho supported 73% of the total RMP, up from 53% during the 1970s and 1980s.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable
Description: Primary threats are the loss and/or degradation habitat from residential development, declining water supplies, and human disturbance. Large concentrations of swans are vulnerable to local habitat changes and stochastic events such as severe winter weather or disease. Power line collisions near nesting and wintering habitat and poaching in wintering areas are also concerns. In their summary of lead poisoning in birds from ammunition and fishing tackle, Haig et al. (2014) noted that despite a large body of scientific literature about toxicological effects of lead on individual birds, controversy exists regarding its impacts at a population level. To date, incidence of lead poisoning of Trumpeter Swans in Idaho has been low. While individual birds may be susceptible to ingest lead shot and tackle as they forage, we have insufficient information to draw any conclusion about population and productivity effects.

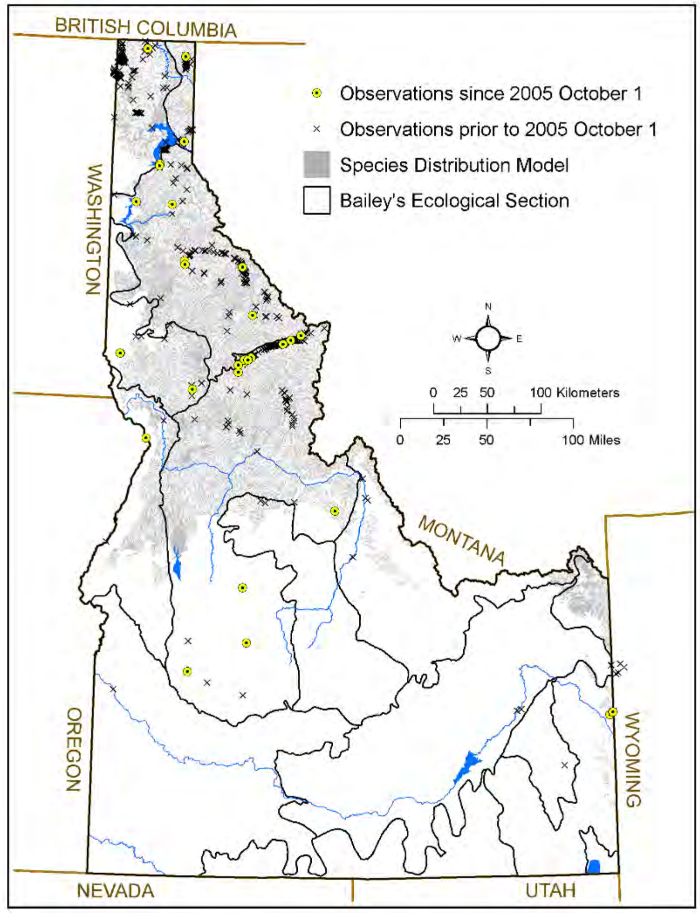
CONSERVATION ACTIONS
Recommended actions include periodic population monitoring, reducing disturbance at breeding sites, maintaining and improving suitable breeding habitat, maintaining crucial winter riverine habitat and agricultural open space in river corridors, installing bird diverters on power lines, examining landscape stressors that influence rangewide demographic patterns, and continuing managed food plots that provide significant winter and early spring forage.

ADDITIONAL COMMENTS
Concentrations of wintering swans provide watchable wildlife opportunities to Idaho citizens.

Information Sources: Banko WE. 1960. The trumpeter swan: its history, habits, and population in the United States. North American Fauna 63; FWS. 2015. Trumpeter swan survey of the Rocky Mountain Population, Winter 2015. Lakewood (CO): US Fish and Wildlife Service; USFS unpublished data; Mitchell CD, Eichholz MW. 2010. Trumpeter Swan (Cygnus buccinator), The Birds of North America Online (Poole A, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Shea RE, Nelson HK, Gillette LN, King JG, Weaver DK. 2002. Restoration of trumpeter swans in North America: a century of progress and challenges. Waterbirds: The International Journal of Waterbird Biology 25: 296–300.; Haig SM, D'Elia J, Eagles-Smith C, Fair JM, Gervais J, Herring G, Rivers JW, Schulz JH. 2014. The persistent problem of lead poisoning in birds from ammunition and fishing tackle. The Condor 116:408–428.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model modified by IDFG biologists).

Harlequin Duck

Histrionicus histrionicus



Class: Aves
Order: Anseriformes
Family: Anatidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: Sensitive
Region 4: Sensitive
BLM: Type 2
IDAPA: Migratory Game Birds
G-rank: G4
S-rank: S1B

SGCN TIER: 2
Rationale: Range restricted, low population size, local declines, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 71,500 km^2 (~27,600 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Okanogan Highlands, Overthrust Mountains
Population Size in Idaho: 100–250
Description: This species occurs in disjunct populations associated with the Pacific and Atlantic coastlines of North America and Asia. In Idaho, approximately 50 pairs breed along a limited number of high quality streams within the Priest River, Kootenai River, Clark Fork, Lake Pend Oreille, St. Joe River, Clearwater River, and the South Fork Snake River watersheds. Individuals marked in Idaho have been observed along the coasts of Washington and southern British Columbia during the nonbreeding season.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This sea duck inhabits shallow, intertidal coastal areas in the winter. In spring, pairs migrate inland to breed on swiftly-flowing mountain streams, usually in the female's natal area. Breeding occurs along relatively undisturbed, 2nd-order or larger streams with high elevation gradients (1-7%), cold and clear water, some areas of shallow water (riffles), gravel to boulder-size substrates, forested bank vegetation, and instream loafing sites (e.g., logs, boulders). Breeding areas are occupied from April to September, but different stream reaches are used during prenesting, nesting, early and late brood-rearing periods. Nests are well-concealed on the ground in dense vegetation, in piles of woody debris, on cliff ledges above the stream, or in hollow trees or snags in the adjacent upland. Males return to the coast to molt once incubation

begins. Eggs hatch in June and July and females and broods migrate in August and September. Breeding pairs reunite each year on the wintering grounds and form long-term monogamous pair bonds. This species is long-lived, exhibits delayed reproduction (at least 3 years old), has low reproductive success (only about one third of Idaho breeding pairs successfully raise a brood to fledging), and exhibits high fidelity to breeding, molting, and wintering areas. Its diet consists of aquatic invertebrates, primarily benthic macroinvertebrates, and fish roe when available.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: The Harlequin Duck has been considered rare in Idaho for over 100 years. Population assessments in 1995, 1996 and 2007 showed no statistically significant difference in the number of breeding pairs statewide, but ducks have disappeared from or have declined in areas where they were formerly present but rare and from centrally located areas where they were once relatively common (e.g., Coeur d'Alene River, Moyie River, Granite Creek (Lake Pend Oreille watershed), St Joe River, Lochsa River). Reasons for declines are unknown. Wintering populations have declined slightly in the Puget Sound, Washington from 1994-2013.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable
Description: Direct or indirect human disturbance such as from timber harvest, road and pipeline construction and maintenance, mining, improper livestock grazing management, shoreline development, recreation, water impoundments and diversions, and other instream activities can reduce habitat, disrupt nesting activities, alter stream flows, reduce water quality, and impact benthic macroinvertebrates. Climate change can exhacerbate these threats by altering the timing and magnitude of peak and low stream flows and increase stream temperatures, which can impact nest success, brood survival, the invertebrate prey base, and eliminate habitat. Exposure to oil spills, heavy metals from mining, and other pollution in breeding and wintering areas can have immediate and long-term impacts on survival.

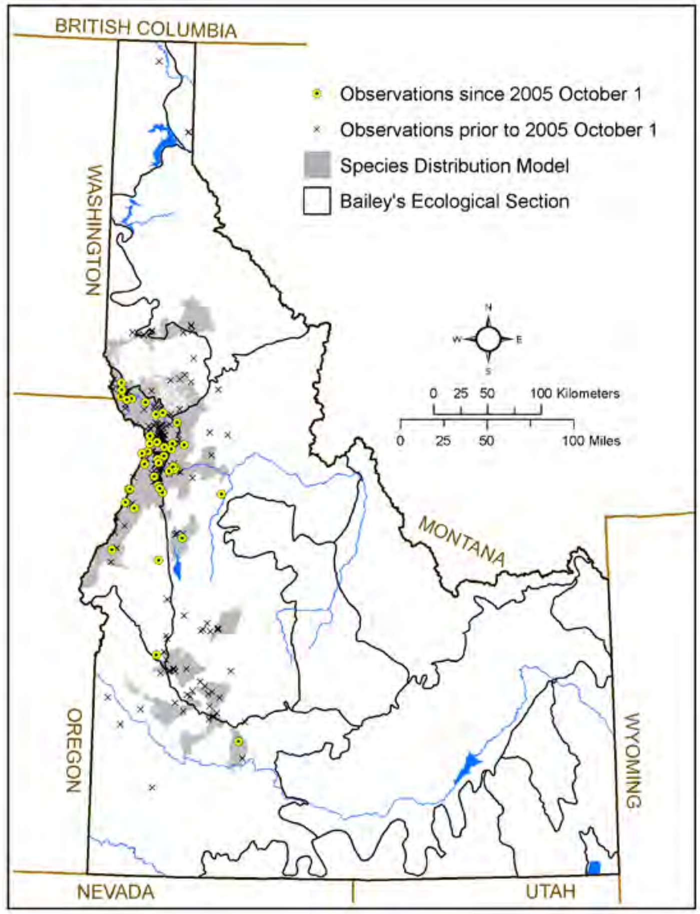
CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, they include working with land managers to maintain the integrity (water quality, quantity, vegetation composition and structure) and natural flow regimes of montane riparian habitats, evaluating factors that influence stream occupancy, reproduction, and survival to support land and recreation management decisions, and incorporating the Harlequin Duck into riverine monitoring programs and assess current distribution and abundance.

ADDITIONAL COMMENTS
See Cassirer et al. (1996) for detailed monitoring protocols.

Information Sources: Cassirer EF, Reichel JD, Wallen RL, Atkinson EC. 1996. Harlequin duck (*Histrionicus histrionicus*) conservation assessment and conservation strategy for the US Rocky Mountains. Lewiston (ID): Idaho Department of Fish and Game; Esler D, Iverson SA. 2010. Female harlequin duck winter survival 11 to 14 years after the Exxon Valdez oil spill. Journal of Wildlife Management; Washington Department of Fish and Wildlife. 2013. WDFW Sea Duck Management Strategies: Draft report to the Washington Fish and Wildlife Commission. Olympia (WA): Washington Department of Fish and Wildlife.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

Mountain Quail

Oreortyx pictus



Class: Aves
Order: Galliformes
Family: Odontophoridae

CONSERVATION STATUS & CLASSIFICATION

ESA: No status
USFS:
  Region1: Sensitive
  Region 4: Sensitive
BLM: Type 2
IDAPA: Upland Game Birds
G-rank: G5
S-rank: S2

SGCN TIER: 2
Rationale: Restricted distribution, low population size, declining habitat quantity and quality

DISTRIBUTION & ABUNDANCE

Range Extent in Idaho: 15,200 km^2 (~5,900 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith
Population Size in Idaho: Unknown
Description: The Mountain Quail is a resident in mountain ranges of western North America from Washington south to Baja California and east to Nevada and Idaho. Mountain Quail remain common along the west of the Sierra Nevada and Cascades ranges, but major declines have occurred in the intermountain West in the last several decades. Mountain Quail occur in Idaho at the extreme northeastern edge of their range, centered in the lower Salmon River Canyon and Hells Canyon along the Snake River. Small, isolated populations likely occur in the Boise Mountains and Bennett Hills in southwest Idaho, and near Dworshak Reservoir in northern Idaho. The current population size is unknown.

HABITAT & ECOLOGY

Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Mountain Quail inhabit brushy, early-successional habitats, often within coniferous forests and on steep slopes. In the western part of their range, habitat requirements are largely met in open or recently logged forest and chaparral vegetation. Within the more arid landscapes of their eastern range, Mountain Quail typically occur in dense shrubs in steep riparian draws. In all habitats, Mountain Quail use areas of dense, tall shrubs, within close proximity to water.

POPULATION TREND

Short-term Trend: Unknown
Long-term Trend: Decline 80–90%
Description: Although populations appear stable in much of the West, significant declines have occurred east of the Cascades and Sierra Nevada ranges, including a 95% decline in occupied habitat in Idaho since 1938. Short-term population trends have not been documented.

THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Population declines are often attributed to deterioration and loss of habitat due to intensive agriculture, improper grazing, and fire suppression. However, there is no direct research or evidence linking declines to specific causes. It is also unknown whether competition for resources with other game birds introduced to Idaho, particularly California Quail and Chukar, is a factor for Mountain Quail. Small, isolated Mountain Quail populations are likely at risk due to extreme environmental events, habitat changes, and genetic isolation.

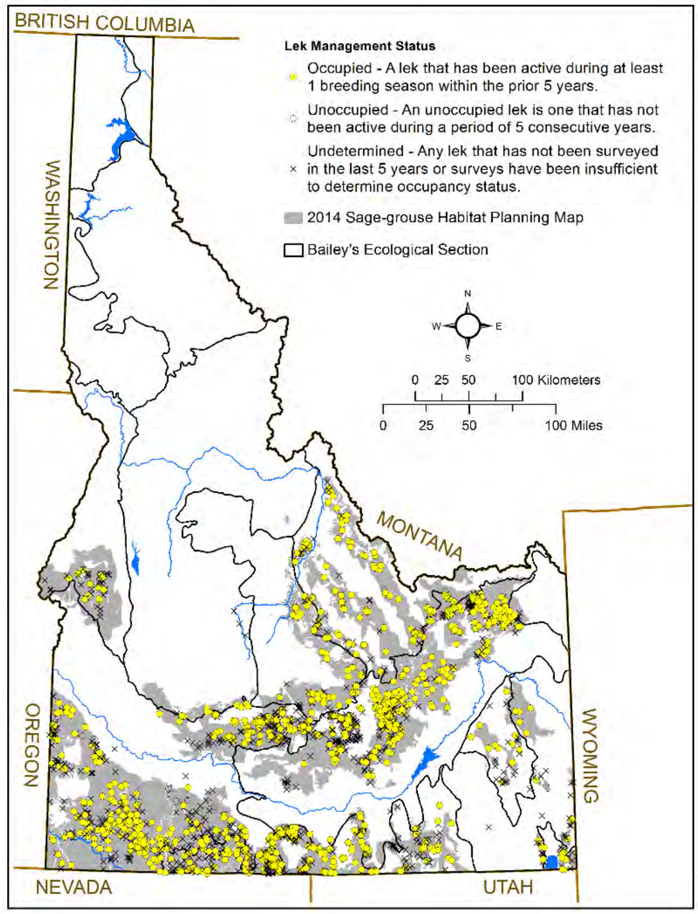
CONSERVATION ACTIONS
Current information on the status of Mountain Quail populations in Idaho is needed.

ADDITIONAL COMMENTS
The Mountain Quail was petitioned for listing under the ESA in 2000 but the FWS concluded listing was not warranted. Although still classified as a game bird, the hunting season for Mountain Quail was closed in Idaho in 1984.

Information Sources: Brennan LA. 1991. Regional tests of a mountain quail habitat model. Northwestern Naturalist 72:100–108; Gutiérrez RJ, Delehanty DJ. 1999. Mountain Quail (*Oreortyx pictus*), The Birds of North America Online (A. Poole, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Moser A. 2004. Statewide survey for Mountain Quail 2003–2004. Boise (ID): Idaho Department of Fish and Game; Ormiston JH. 1966. The food habits, habitat and movements of Mountain Quail in Idaho. MS Thesis. Moscow (ID): University of Idaho.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Greater Sage-Grouse

Centrocercus urophasianus



Class: Aves
Order: Galliformes
Family: Phasianidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: Sensitive
BLM: Type 2
IDAPA: Upland Game Birds
G-rank: G3G4
S-rank: S3

SGCN TIER: 1
Rationale: Multiple threats to habitat, IUCN Near Threatened

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 112,300 km^2 (~43,400 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Blue Mountains, Challis Volcanics, Northwestern Basin and Range, Overthrust Mountains, Owyhee Uplands, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: 50,000-100,000
Description: Greater Sage-Grouse are found in sagebrush steppe habitats in 11 western states and 2 Canadian provinces. Historically, Sage-Grouse occurred throughout southern Idaho, but are now absent from the Snake River plain and parts of southeastern Idaho. Sage-Grouse population estimation is challenging and populations are known to be somewhat cyclical (8–10 year cycles).

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Sage-Grouse are considered a landscape-level, sagebrush-obligate species that require large areas of intact, connected sagebrush to meet seasonal habitat requirements. Sage-Grouse populations are often migratory, moving among breeding and nesting habitat, late-brood rearing habitat, and winter areas. Some Sage-Grouse may move among all seasonal areas or between two distinct ranges, while some are nonmigratory. In general, breeding and nesting habitat requirements include sufficient nesting cover of sagebrush and a healthy understory of perennial grasses and forbs. As the shrubsteppe vegetation desiccates during summer, hens move their broods higher in elevation or to wet meadows. Because Sage-Grouse

almost exclusively eat sagebrush in winter, they require large areas of sagebrush that is free from, or available above, snow.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Decline 50–70%
Description: Greater Sage-Grouse populations experienced historic declines as large areas throughout the west were converted from shrubsteppe habitats to agriculture and other human development. In Idaho, it was estimated that populations declined at an average rate of 1.47% per year from 1965–2003. Various rangewide analyses indicate that although populations experienced historic declines, they have been relatively stable in the last 10-15 years.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: Governor Otter's Sage-Grouse alternative indicated that the primary threats to Sage-Grouse and their habitat in Idaho are wildfires, invasive plant species (primarily invasive annual grasses), and large scale infrastructure. Secondary threats are improper livestock grazing management, recreation, and West Nile virus. Changing climate is exacerbating threats to habitat, particularly drought, invasive species and altered fire regimes.

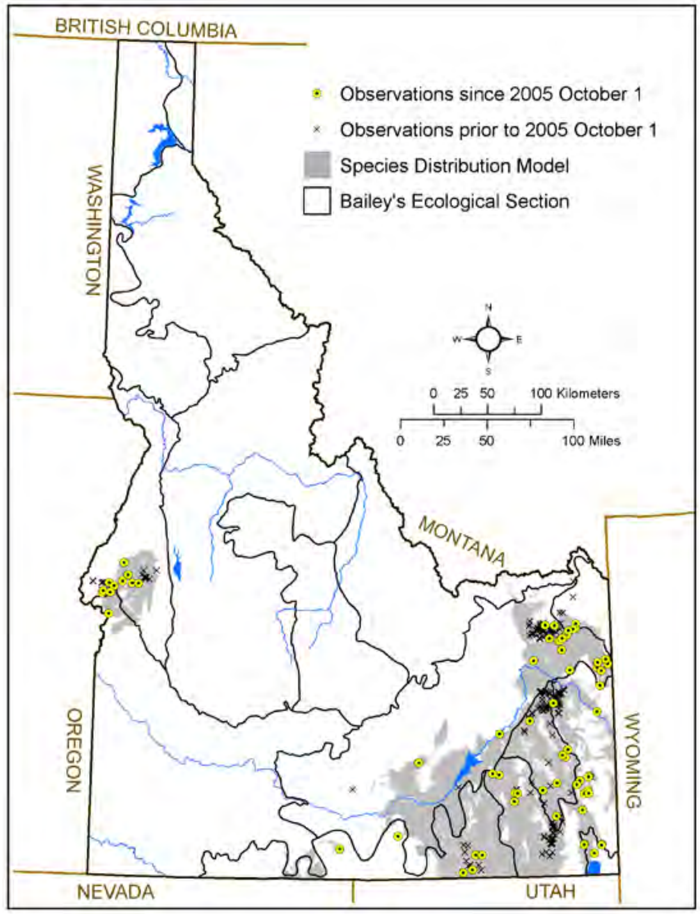
CONSERVATION ACTIONS
Conservation issues and management actions are provided in numerous documents including the 2006 Conservation Plan for the Greater Sage-Grouse in Idaho, the Federal Alternative of Governor C.L. "Butch" Otter for Greater Sage-Grouse Management in Idaho, the Record of Decision for the BLM and USFS's Idaho and Southwestern Montana Sub-regional Greater Sage-Grouse Proposed Land Use Plan Amendment and Final Environmental Impact Statement, the Idaho State Board of Land Commissioners Greater Sage-Grouse Conservation Plan, and the Natural Resource Conservation Service's Sage-Grouse Initiative plan for Idaho. These federal and state plans provide management direction, regulatory mechanisms, and/or voluntary incentives to avoid and minimize impacts to Sage-Grouse habitat from wildfire and invasive plants, infrastructure development, improper livestock grazing, and other threats.

ADDITIONAL COMMENTS
Greater Sage-Grouse were a candidate for listing under the ESA from 2010-2015. In September 2015, the FWS determined that listing the Greater Sage-Grouse as an endangered or threatened species was not warranted.

Information Sources: Bureau of Land Management and US Forest Service. 2015. Records of decisions and resource management plan amendments for the Great Basin region, including the greater sage-grouse sub-regions of Idaho and Southwestern Montana. Washington (DC): US Department of the Interior; Connelly JW, Knick ST, Schroeder MA, Stiver SJ. 2004. Conservation assessment of greater sage-grouse and sagebrush habitats. Cheyenne(WY): Western Association of Fish and Wildlife Agencies.; Idaho Sage-grouse Advisory Committee. 2006. Conservation Plan for the Greater sage-grouse in Idaho. Boise (ID).; Idaho Department of Lands. 2015. Idaho State Board of Land Commissioners Greater Sage-Grouse Conservation Plan. Boise (ID); Idaho Governor's Sage-grouse Task Force. 2012. Federal alternative of Governor C.L. "Butch" Otter for greater sage-grouse management in Idaho. September 5, 2012 version. Boise (ID); 75 FR 13910; 80 FR 59857.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, 2014 Greater Sage-grouse Lek Database. [Accessed August 14, 2015]; BLM Idaho Greater Sage-Grouse Habitat 2014.

Sharp-tailed Grouse

Tympanuchus phasianellus



Class: Aves
Order: Galliformes
Family: Phasianidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: Sensitive
BLM: Type 2
IDAPA: Upland Game Birds
G-rank: G4T3
S-rank: S3

SGCN TIER: 2
Rationale: Multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 114,800 km^2 (~44,300 mi^2)
Key Ecological Sections: Bear Lake, Blue Mountains, Northwestern Basin and Range, Overthrust Mountains, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: 31,000-34,000
Description: The Columbian Sharp-tailed Grouse (CSTG) is 1 of 7 subspecies (1 extinct) of sharp-tailed grouse in North America and was once considered the most abundant and well-known upland game bird in the Pacific Northwest. Of the 6 extant subspecies of sharp-tailed grouse, CSTG has experienced the greatest decline in distribution and abundance. It is reasonably widespread in southeastern Idaho and also occurs in south-central Idaho along the Nevada border and in an isolated portion of western Idaho. Idaho plays a critical role in the continued persistence of populations in the US, as it supports 60-65% of the breeding population.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Columbian Sharp-tailed Grouse are habitat generalists and inhabit a mosaic of agricultural and rangeland communities. Native habitat is characterized by bunchgrass prairie and shrub-bunchgrass rangelands in good to excellent ecological condition for nesting and brood-rearing habitat and tall, deciduous shrub thickets in shrubby riparian zones, mountain-shrub patches, and aspen stands for overwintering. CSTG will also use, and can benefit from, artificially created habitats, such as agricultural fields, seeded rangelands, and Conservation Reserve Program (CRP) or State Acres For wildlife Enhancement (SAFE) fields. During spring, males gather at traditional lek sites that are typically located on low knolls, benches, and

ridgetops slightly higher than surrounding terrain. Usually within 2 km (1.2 mi) of the breeding lek, the female constructs a rudimentary nest on the ground in dense vegetation and lays 10-12 eggs. Seasonal diets include insects, herbaceous forbs, berries, buds of deciduous shrubs and trees, and cultivated plants where available.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Decline 70–80%
Description: Columbian Sharp-tailed Grouse were once widely distributed in Idaho (in >35 of 44 counties). Idaho population declines were first noted during the early 1900s, but major range reduction and declines occurred between 1950 and 1970. Occupied range currently encompasses approximately 35,900 km^2 (13,861 mi^2), or 23% of the historical range estimate of 155,200 km^2 (59,923 mi^2). Since inception in 1985, CRP has provided many thousands of acres of nesting and brood-rearing habitat on private lands in Idaho, resulting in an apparent increase in CSTG populations.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: Habitat loss and fragmentation are responsible for extirpation of CSTG across most of their historical range. Furthermore, habitat loss and degradation continue to be the 2 most unequivocal threats to CSTG throughout their range. Historically, the primary cause of habitat loss was conversion to intensive agriculture; however, in recent years, the primary causes of habitat loss have been residential and commercial development. Modern, large-scale farming and intensive farming practices (e.g., clean farming, autumn plowing, continuous row cropping) have been detrimental to CSTG. The birds may experience nest loss or direct mortality due to cultivation, haying, mowing, and agricultural chemical application. Improper livestock grazing management is often considered a primary factor contributing to the decline in CSTG populations.

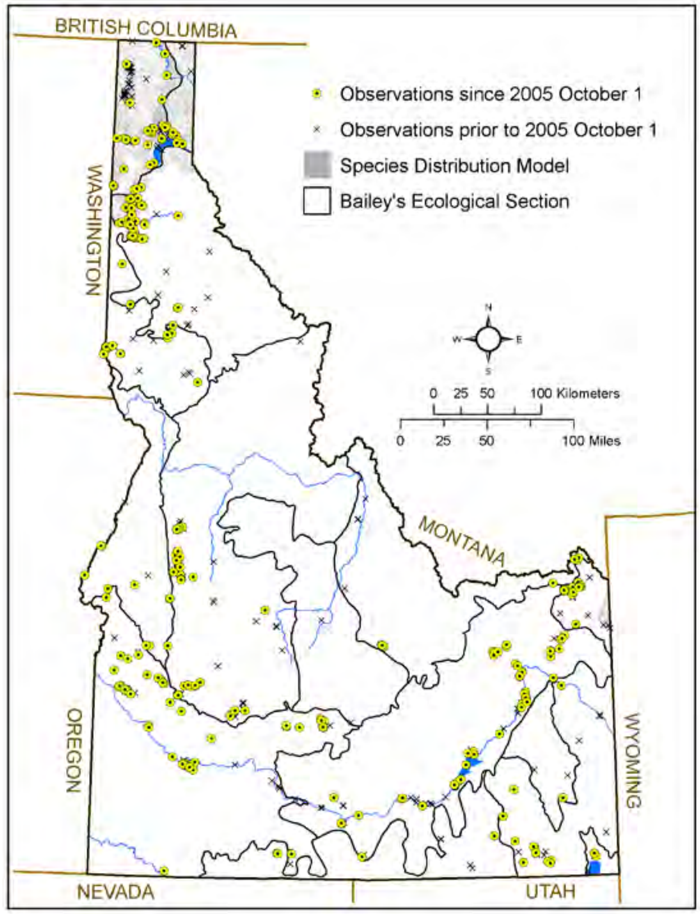
CONSERVATION ACTIONS
Conservation issues and actions are described in the 2015 Management Plan for the Conservation of Columbian Sharp-tailed Grouse in Idaho 2015-2020 and the appropriate section plans. In short, recommended strategies include protecting the quantity and quality of existing habitat (including CRP and SAFE lands), providing incentives and assistance to landowners to improve habitat on private land, implementing a monitoring program that provides annual estimates of productivity, harvest, population abundance, and trend information, and avoiding disturbance to breeding complexes (lands within a 2 km [1.2 mi] radius of occupied leks).

ADDITIONAL COMMENTS
None.

Information Sources: IDFG. 2015. Management plan for the conservation of Columbian sharp-tailed grouse in Idaho 2015–2025. Boise(ID): Idaho Department of Fish and Game; Hoffman RW, Thomas AE. 2007. Columbian sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*): A Technical Conservation Assessment. Fort Collins (CO): USDA Forest Service, Rocky Mountain Region.; Knetter J, Idaho Department of Fish and Game, pers. comm.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Common Loon

Gavia immer



Class: Aves
Order: Gaviiformes
Family: Gaviidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: Sensitive
  Region 4: Sensitive
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S1B, S2N

SGCN TIER: 2
Rationale: Breeding population only, limited distribution, low population size

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 213,700 km^2 (~82,500 mi^2)
Key Ecological Sections: Flathead Valley, Okanogan Highlands, Yellowstone Highlands
Population Size in Idaho: <20
Description: The Common Loon breeds from Alaska south to the northern parts of the conterminous US and winters on the Pacific and Atlantic coasts. Although these birds are commonly seen in Idaho during migration, and have been observed in breeding plumage on 13 lakes in northern and southeastern Idaho, few instances of nesting are confirmed or can be inferred. In the 1990s, nonflying juveniles were observed at Priest Lake, Upper Priest Lake, and the Clark Fork Delta. In recent years, adult pairs have been observed at Island Park Reservoir and nests found at Herman Lake (2012) and Bonner Lake (2014—although this nest was later abandoned). An estimated 1,320 breeding adults are in the Great Basin and Northern Rocky Mountains. Idaho's breeding population size is uncertain, but is likely fewer than 20 individuals.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This species is long-lived, exhibits delayed reproduction (7 years of age), and has low lifetime reproductive potential. Loons are piscivorous, visual predators that require clear, oligotrophic lakes with an abundance of small fish. Lakes are usually larger than 9 ha (22 ac) in size and below 1,800 m (5,905 ft) elevation with forested or rocky shorelines. Nesting occurs in wind-sheltered locations on islands, floating bogs, marshes, muskrat houses, logs, and artificial nest platforms. Common Loons prefer nest sites with open views adjacent to the water and near

drop-offs steep enough to enable an underwater approach. Females produce 1-2 eggs per year and may attempt to renest if their first attempt is unsuccessful.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: Common Loon numbers declined substantially across their southern range during the early and mid-1900s. Widespread shooting, sparked by public belief that loons were depleting game fish populations, contributed to declines. In Idaho, at least 12 lakes historically had nesting pairs, but were apparently extirpated by the mid-1900s. Numbers appear to be steadily increasing in much of the US and Canada. Although no population trends have been documented in Idaho, nesting does occur intermittently. In Montana, the population north of Missoula and west of the Continental Divide appears to be stable or slightly increasing. Although BBS data are considered poor reflections of Common Loon trends, they do indicate statistically significant increases in the US from 1966-2013 (+1.3% per year) and 2003-2013 (+1.7% per year).

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: Human disturbance on nesting lakes can result in nest failure, juvenile mortality, and lake abandonment. Mortality associated with development of solar energy facilities is an emerging threat, particularly for wetland-dependent species. Most solar facilities have no systematic monitoring efforts in place to measure potential impacts on wildlife, yet incidental observations at three facilities in the West from 2012-2014 indicate >1,000 mortalities of at least 160 bird species, including Common Loons. It is suspected that large, flat solar panels resemble waterbodies. Birds crash into the panels while attempting to land and either die upon impact or become grounded (loons cannot take off from land) and perish in the heat.

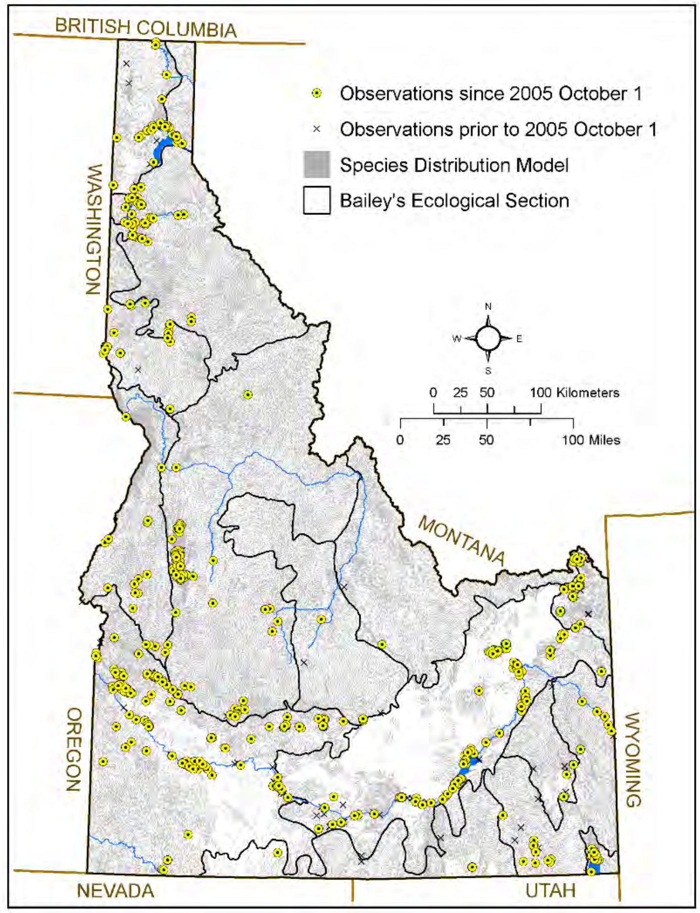
CONSERVATION ACTIONS
Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended strategies include developing a monitoring and protection program for nesting birds, establishing reporting protocols for injured and dead loons, and working with the US Fish and Wildlife Service and the Pacific Flyway Council's Nongame Technical Committee to research and develop operational guidelines intended to minimize wildlife mortality at solar energy facilities.

ADDITIONAL COMMENTS
None.

Information Sources: Evers DC, Paruk JD, Mcintyre JW, Barr JF. 2010. Common Loon (*Gavia immer*), The Birds of North America Online (A. Poole, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; Pacific Flyway Council. 2015. Pacific Flyway Council recommendations, informational notes, and subcommittee reports, March 2015; IDFG unpublished data; N Merz, Kootenai Tribe of Idaho, pers. comm.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model modified by IDFG biologists).

Western Grebe

Aechmophorus occidentalis



Class: Aves
Order: Podicipediformes
Family: Podicipedidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S2B

SGCN TIER: 2
Rationale: Declining population, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Bear Lake, Bitterroot Mountains, Idaho Batholith, Northwestern Basin and Range, Okanogan Highlands, Owyhee Uplands, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: 3,000-4,500
Description: Western Grebes occur seasonally throughout most of the western half of North America where suitable wetlands occur. Most birds winter along the Pacific coast from British Columbia to Baja California, although some winter records at inland locations of open water have been documented. There are approximately 110,000 individuals in North America, and approximately 4,000 of these breed in Idaho. In Idaho, this species breeds along the Snake River drainage in the southern and southeastern parts of the state, at Lake Cascade, and at several locations in the Panhandle. More than half of the state's population breeds at Lake Cascade.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Western Grebes are colonial waterbirds that nest on freshwater lakes or marshes with extensive open water, where they feed primarily on fish. They arrive at Idaho nesting areas in late April to early May. This species is best known for its elaborate courtship displays of running (called "rushing") across the water's surface. They construct a floating platform nest in emergent vegetation protected from wind and waves. Usually nests are in colonies, where the earliest nests establish the core and subsequent nests radiate outward. Some colonies contain hundreds to thousands of nests. Young leave the nest on their parents' backs as soon as they hatch and are raised on the open water. Western Grebes migrate from September through October.

POPULATION TREND

Short-term Trend: Decline 30–50%
Long-term Trend: Unknown
Description: Population trend data for Western Grebes are combined with those for Clark's Grebes because the two species are so similar in appearance that observers typically do not distinguish between them. In the US, BBS data indicate 1.6% annual declines from 1966–2013. In Idaho, BBS data indicate declines of 5% per year during that time period, and even steeper declines of 5.7% per year between 2003 and 2013. Productivity has dropped significantly in recent years at all locations that are monitored regularly, including at Lake Cascade, Lake Lowell, and Minidoka NWR.

THREATS

Overall Threat Impact: Very High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Because Western Grebes build floating nests on the surface of the water, they are particularly vulnerable to droughts, floods, wind-driven waves, and fluctuating water levels. Most nesting colonies in Idaho are located on reservoirs or along rivers susceptible to water fluctuations resulting from dam operations. Rapid increase in water levels results in nest flooding, while rapid releases of water results in nests that are no longer accessible. From nest initiation through brood-rearing, this species is also sensitive to recreational boating activities. Boat wake can inundate or flip nests, causing nest failure, and inattentive boat use too close to Western Grebes carrying young can result in separation of the young from adults, and ultimately mortality of the separated young. Mortality associated with development of solar energy facilities is an emerging threat, particularly for wetland-dependent species. Most solar facilities have no systematic monitoring efforts in place to measure potential impacts on wildlife, yet incidental observations at three facilities in the West from 2012-2014 indicate >1,000 mortalities of at least 160 bird species, including Western Grebes. It is suspected that large, flat solar panels resemble waterbodies. Birds crash into the panels while attempting to land and either die upon impact or become grounded (grebes cannot take off from land) and perish in the heat.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the appropriate section plans. In short, they include developing Best Management Practices for managing water level fluctuations around nesting colonies, identifying opportunities for reducing water level fluctuations, determining causes of high nest failure, and managing recreational boating during the nesting season (e.g., creating no-wake zones and installing interpretive signage).

ADDITIONAL COMMENTS

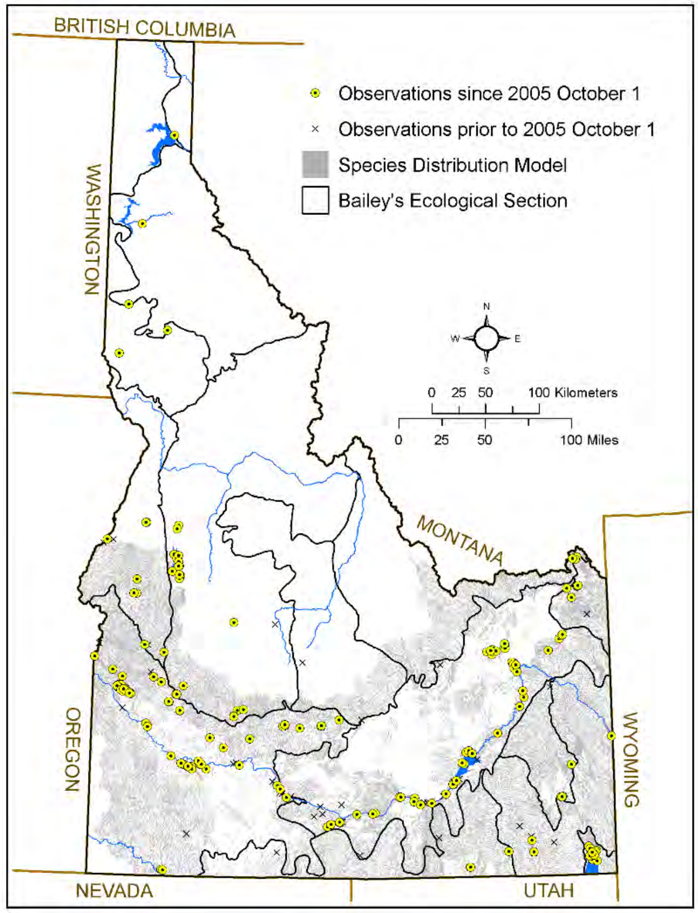
None.

Information Sources: Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DL, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; Pacific Flyway Council. 2015. Pacific Flyway Council recommendations, informational notes, and subcommittee reports, March 2015.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

Clark's Grebe

Aechmophorus clarkii



Class: Aves
Order: Podicipediformes
Family: Podicipedidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S2B

SGCN TIER: 2
Rationale: Population declines, multiple threats to habitat

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 119,600 km^2 (~46,200 mi^2)
Key Ecological Sections: Bear Lake, Bitterroot Mountains, Idaho Batholith, Northwestern Basin and Range, Okanogan Highlands, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: 250-500
Description: Clark's Grebes occur seasonally throughout most of the western half of North America where suitable wetlands occur. Most birds winter along the Pacific coast from British Columbia to Baja California. There are approximately 15,000 individuals in North America, and an estimated 472 of these breed in Idaho. In Idaho, the breeding distribution is primarily associated with the extensive Snake River drainage in the southern and southeastern parts of the state.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Clark's Grebes are colonial waterbirds that nest on freshwater lakes or marshes with extensive open water, where they feed primarily on fish. They arrive at Idaho nesting areas in late April to early May, and are generally found in mixed species flocks with Western Grebes. This species is best known for its elaborate courtship displays of running (called "rushing") across the water's surface. They construct a floating platform nest in emergent vegetation protected from wind and waves. Usually nests are in colonies, where the earliest nests establish the core and subsequent nests radiate outward. Young leave the nest on their parents' backs as soon as they hatch and are raised on the open water. Clark's Grebes depart Idaho nesting sites September through October.

POPULATION TREND
Short-term Trend: Decline 30–50%
Long-term Trend: Unknown
Description: Population trend data for Clark's Grebes are combined with those for Western Grebes because the two species are so similar in appearance that observers typically do not distinguish between them. In the US, BBS data indicate 1.6% annual declines from 1966–2013. In Idaho, BBS data indicate declines of 5% per year during that time period, and even steeper declines of 5.7% per year between 2003 and 2013. Productivity has dropped significantly in recent years at all locations that are monitored regularly, including at Lake Cascade, Lake Lowell, and Minidoka NWR.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Because Clark's Grebes build floating nests on the surface of the water, they are particularly vulnerable to droughts, floods, wind-driven waves, and fluctuating water levels. Most nesting colonies in Idaho are located on reservoirs, or along rivers susceptible to water fluctuations resulting from dam operations. Rapid increase in water levels results in nest flooding, while rapid releases of water results in nests that are no longer accessible. From nest initiation through brood-rearing, this species is also sensitive to recreational boating activities. Boat wake can inundate or flip nests, causing nest failure, and inattentive boat use too close to grebes carrying young can result in separation of the young from adults, and ultimately mortality of the separated young. Mortality associated with development of solar energy facilities is an emerging threat, particularly for wetland-dependent species. Most solar facilities have no systematic monitoring efforts in place to measure potential impacts on wildlife, yet incidental observations at three facilities in the West from 2012-2014 indicate >1,000 mortalities of at least 160 bird species, including Clark's Grebes. It is suspected that large, flat solar panels resemble waterbodies. Birds crash into the panels while attempting to land and either die upon impact or become grounded (grebes cannot take off from land) and perish in the heat.

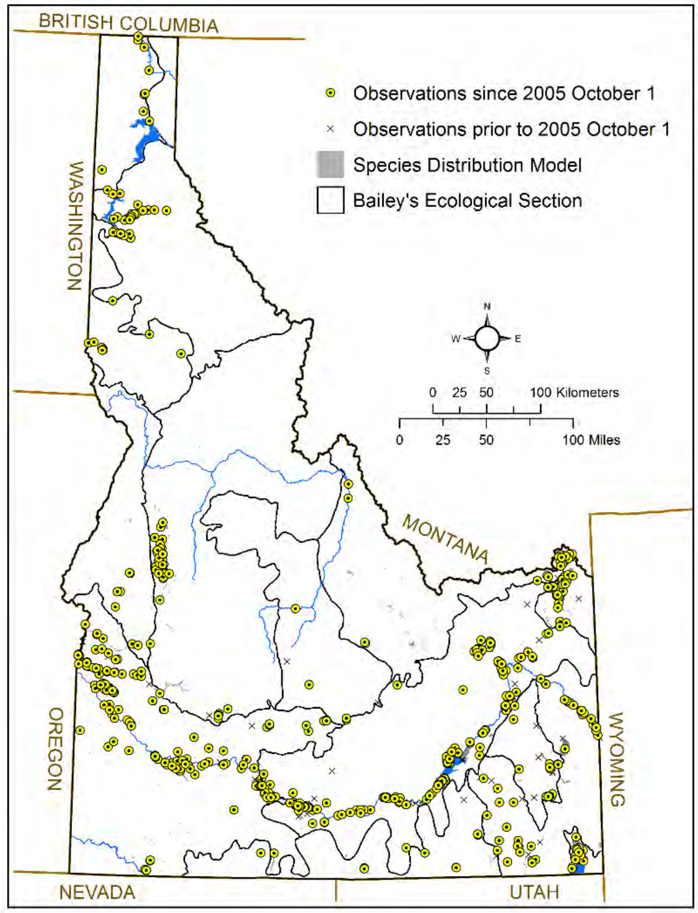
CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, they include developing Best Management Practices for managing water level fluctuations around nesting colonies, identifying opportunities for reducing water level fluctuations, determining causes of high nest failure, and managing recreational boating during the nesting season (e.g., creating no-wake zones and installing interpretive signage).

ADDITIONAL COMMENTS
None.

Information Sources: Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; Pacific Flyway Council. 2015. Pacific Flyway Council recommendations, informational notes, and subcommittee reports, March 2015.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model modified by IDFG biologists).

American White Pelican

Pelecanus erythrorhynchos



Class: Aves
Order: Pelecaniformes
Family: Pelecanidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S3B

SGCN TIER: 2
Rationale: Significant proportion of the western US population breeds in Idaho, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 100,800 km^2 (~38,900 mi^2)
Key Ecological Sections: Northwestern Basin and Range, Owyhee Uplands, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: 3,000-8,000
Description: The American White Pelican breeds in two distinct populations, east and west of the Continental Divide. Winter range includes the Pacific coast from California south to Mexico and along the Gulf of Mexico. The western population is distributed among 17-19 colonies and was estimated at 43,000 birds in 2014. Idaho supports approximately 16% of the western breeding population and is the third largest relative contributor to this population segment. In 2015, 2,151 breeding pairs nested at three locations in Idaho: Minidoka NWR (1,102 pairs), Blackfoot Reservoir (733 pairs), and Island Park Reservoir (316 pairs).

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This fish-eating species nests in colonies predominantly on isolated, permanent islands in freshwater lakes and managed reservoirs. It typically winters on shallow coastal bays, inlets, and estuaries in areas where the minimum January temperature stays above 4° C (40° F). Pelicans marked in Idaho winter on reservoirs and large rivers that remain ice-free. This species is long-lived (average 12-14 years, longevity records > 26 years) and begins breeding at 4+ years. Productivity in the western US averaged 0.38 and 0.30 young fledged per nest from 2000-2009 and 2010-2013, respectively.

POPULATION TREND

Short-term Trend: Increase >25%
Long-term Trend: Relatively Stable (<=10% change)
Description: In the early 1900s, there were approximately 60,000 breeding birds and 24 nesting colonies (4 in Idaho) in the western population segment. By the late 1970s, this population declined to 16,000 breeding birds and 8 nesting colonies (none in Idaho). The subsequent ban of organochlorine pesticide use and an increase in federal and state protections were likely key factors to recovery that began in the 1980s. The population peaked at 46,000 breeding birds in 1992 and has since remained relatively stable. However, average annual productivity declined 67% from 0.96 young fledged per nest in the 1960s to 0.30 young per nest from 2010-2013. In Idaho, this species recolonized in the early 1990s and quickly grew to almost 8,000 breeding birds by 2007. From 2010-2015, the breeding population fluctuated between 3,040 and 7,740 individuals (average 5,680).

THREATS

Overall Threat Impact: Very High
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threats to Pelicans include human disturbance of nesting colonies and climate change. There are indications that the western population is shifting northward, latitudinally, perhaps in response to climate change-related drought conditions in the southern extent of their breeding range. In addition, pelican migration has advanced by more than 2 weeks at the largest known pelican colony in Chase Lake, North Dakota, possibly in response to warmer spring temperatures. This has increased exposure to late winter storms and cold temperatures and negatively impacted productivity (0-4% productivy rate in 4 of 5 years studied). This is a potential concern in Idaho, though arrival dates have not been tracked.

CONSERVATION ACTIONS

Conservation actions for this species are described in more detail in the appropriate section plans. These include working with the Pacific Flyway Council's Nongame Technical Committee to develop and implement a wetland connectivity assessment to address impacts of drought, analyzing trends in population size and productivity, and determining current survivorship rates. The Idaho Pelican Management Plan and Pelican Conservation Strategy provide detailed guidance on maintaining viable breeding populations of pelicans while reducing impacts to native trout and key recreational fisheries.

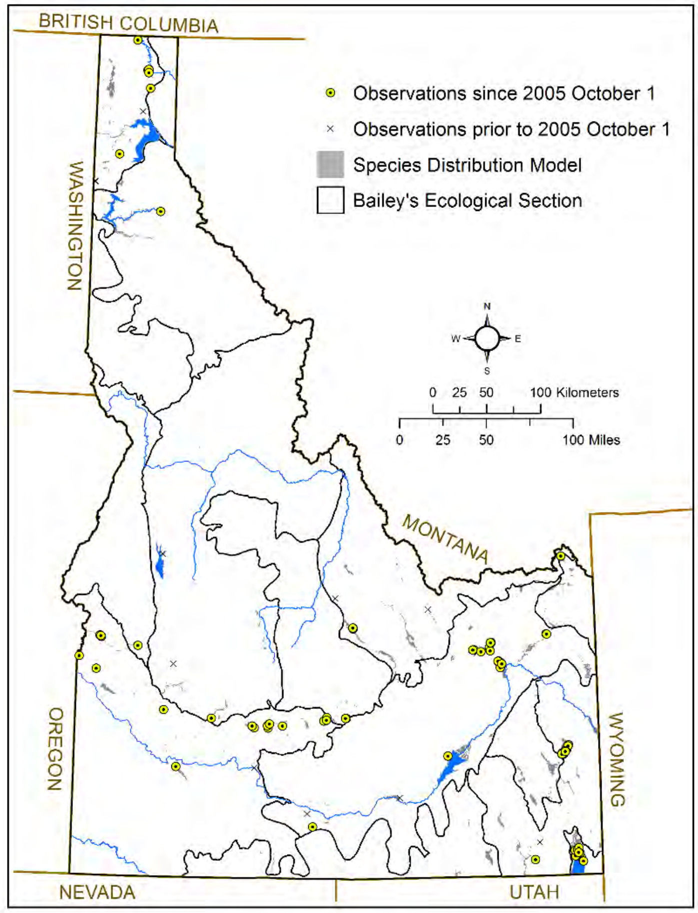
ADDITIONAL COMMENTS

Following the decline in pelican abundance in the western population, the FWS drafted the "Guidelines for the Management of the American White Pelican, Western Population" in 1984 to proactively manage recovery and preclude listing under the ESA.

Information Sources: Sovada MA, Igl LD, Pietz PJ, Bartos AJ. 2014. Influence of climate change on productivity of American white pelicans, *Pelecanus erythrorhynchos*. PLoS ONE 9(1): e83430; IDFG. 2014. Bird conservation strategy: reducing American White Pelican/Yellowstone cutthroat trout conflicts. Boise (ID): Idaho Department of Fish and Game.; Pacific Flyway Council. 2015. Pacific Flyway Council recommendations, informational notes, and subcommittee reports, July 2015; Moulton CE, Wackenhut M. In Review. Changes in population size, productivity, and distribution of western American White Pelicans (*Pelecanus erythrorhynchos*), 1960–2013. Boise (ID): Idaho Department of Fish and Game; IDFG. In Revision. Management plan for the conservation of American White Pelicans in Idaho. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Scott JM, Peterson CR, Karl JW, Strand E, Svancara LK, Wright NW. 2002. A Gap Analysis of Idaho: Final Report. Moscow (ID): Idaho Cooperative Fish and Wildlife Research Unit.

American Bittern

Botaurus lentiginosus



Class: Aves
Order: Pelecaniformes
Family: Ardeidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S1B

SGCN TIER: 2
Rationale: Population declines, threats to wetland habitats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Bear Lake, Bitterroot Mountains, Okanogan Highlands, Overthrust Mountains, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: 4,000-12,000
Description: American Bitterns breed in freshwater marshes throughout the northern half of the US north to approximately 55° latitude in Canada. Winters along southern coastal plain where temperatures remain above freezing. Breeding population is patchily distributed throughout southern Idaho and a couple isolated locations north of Lake Pend Oreille. Population size rangewide is uncertain. Surveys conducted in Idaho in 2009 and 2010 indicate an annually fluctuating population size between 4,000 and 12,000 individuals.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: American Bitterns require large (>10 ha) marshes with tall emergent vegetation (primarily hardstem bulrush and common cattail) for breeding. In Idaho, this habitat is limited mostly to NWRs and IDFG WMAs. Marshes that have become decadent are not typically suitable for this species, and birds using a decadent marsh can quickly dwindle. American Bitterns are strictly carnivorous, feeding primarily on insects, amphibians, crayfish, and small fish and mammals. They mainly forage along shorelines and edges of emergent vegetation, but may also hunt for prey in open, flooded fields. Females typically build nests in dense emergent vegetation over water that is 5-20cm (2-8 in) deep. This species is believed to produce a single brood per year.

POPULATION TREND
Short-term Trend: Decline 80–90%
Long-term Trend: Unknown
Description: North American Breeding Bird Survey data indicate long-term (1966-2013) population declines in the US and the western BBS region of -1.5% and -3.4% per year, respectively. BBS data also indicate both long-term (1966-2013) and short-term (2003-2013) declines in Idaho of greater than -15% per year, however, these trends are based upon extremely small sample sizes and should be interpreted cautiously. There is concern at Bear Lake NWR that the once dense population of bitterns, as documented by surveys in 2005-2007, has declined dramatically in recent years.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Loss of suitable wetland habitat is of primary concern for American Bitterns. In Idaho, suitable habitat is limited mostly to protected lands (NWRs and WMAs) and managing these wetlands for the structural characteristics needed by American Bitterns is a challenge. For example, some sites may require prescribed burns to open decadent stands of bulrush and cattail, which can be logistically and financially difficult to accomplish. Impacts of climate change, particularly from drought, are also of concern for this species. Declines in US may indicate a northern population shift, in part because of habitat destruction and drought at southern extent of this species' range.

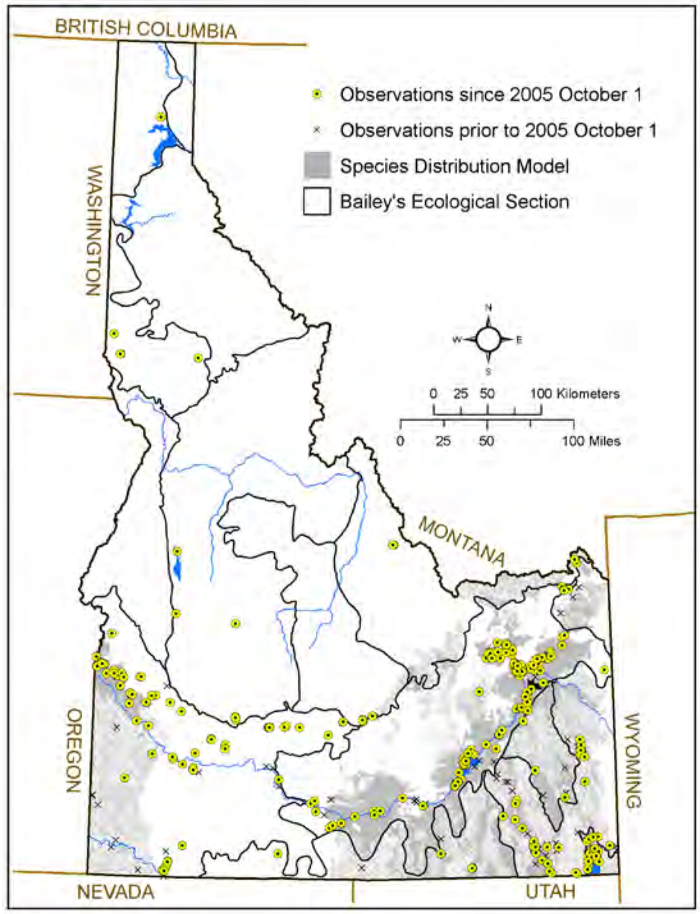
CONSERVATION ACTIONS
Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended strategies include working with the Pacific Flyway Council's Nongame Technical Committee on a wetland connectivity assessment, working with land managers to identify opportunities for increasing the availability of natural wetlands and developing wetland management actions that would benefit this species, and determining current distribution and abundance.

ADDITIONAL COMMENTS
None.

Information Sources: Lowther P, Poole AF, Gibbs JP, Melvin S, Reid FA. 2009. American Bittern (*Botaurus lentiginosus*), The Birds of North America Online (A. Poole, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; M Seamans, FWS, pers. comm.; IDFG unpublished data.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Scott JM, Peterson CR, Karl JW, Strand E, Svancara LK, Wright NW. 2002. A Gap Analysis of Idaho: Final Report. Moscow (ID): Idaho Cooperative Fish and Wildlife Research Unit.

White-faced Ibis

Plegadis chihi



Class: Aves
Order: Pelecaniformes
Family: Threskiornithidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S2B

SGCN TIER: 2
Rationale: Significant threats to habitat and productivity

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 110,100 km^2 (~42,500 mi^2)
Key Ecological Sections: Bear Lake, Overthrust Mountains, Owyhee Uplands, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: >85,000
Description: Over 85,000 breeding birds nest at 6 known locations in Idaho, representing over half of the western states' breeding population: Bear Lake NWR, Duck Valley Indian Reservation, Grays Lake NWR, Market Lake WMA, Mud Lake WMA, and Oxford Slough Waterfowl Production Area. Market Lake and Mud Lake WMAs are the most critical areas for White-faced Ibis in the West, supporting approximately 40% of the Idaho breeding population and 20% of the western breeding population.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: White-faced Ibis are colonial breeders, generally choosing to nest in shallow marshes with dense emergent vegetation. In Idaho, most colonies are found in hardstem bulrush/cattail marshes. Nest platforms are constructed within the bulrush, using bent-over bulrush stalks and adjacent upright stalks. This type of nest construction lends itself to collapse or flooding and nest failure if water levels drop or rise dramatically during the incubation/early nestling period. This species forages for aquatic and moist soil invertebrates in shallowly-flooded wetlands and flood-irrigated croplands. Alfalfa, barley, and native hay meadows are particularly important foraging areas in Idaho and the Intermountain West. After the nesting

season, this species congregates by the thousands to feed on the extensive mudflats of American Falls Reservoir.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: After a decline in the 1960s and 1970s, White-faced Ibis populations have increased in recent years, likely a result of improved nesting and foraging habitat management, a ban on DDT, and increased productivity at large breeding colonies. From 1966–2004, BBS data indicate statistically significant increases in the US (+8.6% per year) and western BBS region (+9.9% per year). The Great Basin population has experienced a four-fold increase since 1985 and, although BBS data do not indicate statistically significant changes in Idaho, Taylor et al. (1989) reported marked increases in the Idaho nesting population.

THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Agricultural conversion to center-pivot from flood irrigation is the biggest threat to this species in Idaho. 40% of Idaho's breeding population resides at Market Lake and Mud Lake WMAs. The surrounding landscape is rapidly losing flood-irrigated habitats that are used extensively by ibis for foraging. Research indicates that ibis nesting at Market Lake WMA are traveling further to forage than previously documented. The ibis colony at Mud Lake WMA is also threatened by rapid water level fluctuations that result in nest flooding and almost complete colony failure in some years. Decreased water levels in some locations, like Oxford Slough Waterfowl Production Area, result in increased access to nesting colonies by predators and significant nesting failure.

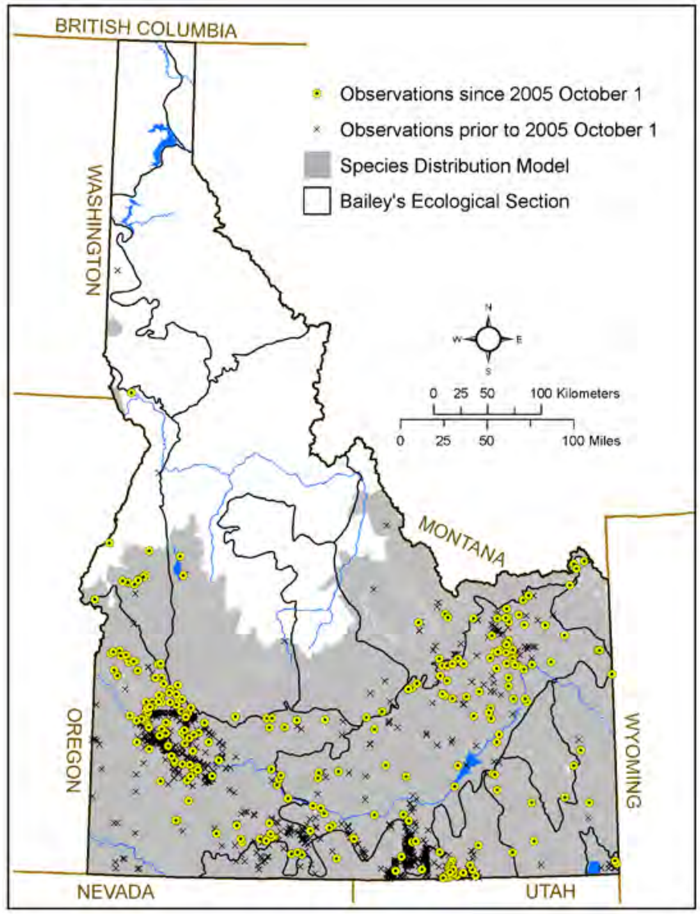
CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. Recommended actions include working with the Natural Resource Conservation Service, private landowners and land managers to identify opportunites to restore natural wetlands suitable for foraging, maintaining flood-irrigated agricultural fields within 20km (12.4 mi) of ibis colonies, and working with water managers to develop and implement water level management recommendations that reduce nest loss while meeting irrigation needs.

ADDITIONAL COMMENTS
None.

Information Sources: Cavitt JF, Jones SL, Wilson NM, Dieni JS, Zimmerman TS, Doster RH, Howe WH. 2014. Atlas of breeding colonial waterbirds in the interior western United States. Denver(CO): US Fish and Wildlife Service; Moulton C, Carlisle J, Brenner K, Cavallaro R. 2013. Assessment of foraging habitats of White-faced Ibis near two important breeding colonies in eastern Idaho. Boise(ID): Idaho Department of Fish and Game; Ryder RR, Manry DE. 1994. White-faced Ibis (*Plegadis chihi*). The Birds of North America Online. (A Poole, editor). Ithaca (NY): Cornell Laboratory of Ornithology. [accessed 2015 Jun 01]; Sauer JR, Hines JE, Fallon J. 2005. The North American Breeding Bird Survey, results and analysis 1966–2004. Version 2005.2. Laurel(MD): USGS Patuxent Wildlife Research Center; Ivey GL, Herziger CP, coordinators. 2005. Intermountain West Waterbird Conservation Plan—A plan associated with the Waterbird Conservation for the Americas initiative. Version 1.0. Portland(OR): US Fish and Wildlife Service Pacific Region; Yee DG, Deuel BE, Bailey SF. 1990. Middle Pacific coast region. American Birds 44:491–494; Taylor DM, Trost CH, Jamison B. 1989. The biology of the White-faced Ibis in Idaho. Western Birds 20:125–133.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model modified by IDFG biologists).

Ferruginous Hawk

Buteo regalis



Class: Aves
Order: Accipitriformes
Family: Accipitridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S3B

SGCN TIER: 2
Rationale: Multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 142,100 km^2 (~54,900 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Challis Volcanics, Northwestern Basin and Range, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: 500–1,000
Description: Ferruginous Hawks breed throughout western North America from southern Canada between the Great Plains and Rocky Mountains south to northern Arizona and New Mexico. They are distributed throughout southern Idaho, primarily in the shrubsteppe communities of the Snake River plain and are relatively uncommon with approximately 625 breeding individuals in the state. Ferruginous Hawks winter in the southern US and Mexico, but a limited number of birds reside year-round in the extreme southern part of Idaho.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: The Ferruginous Hawk inhabits flat and rolling terrain in grassland or shrub steppe regions, typically avoiding high elevation, forest interior, and narrow canyons. It occurs in grasslands, sagebrush and saltbush-greasewood shrublands, and the edges of pinyon-juniper forests. In Idaho, this species is locally abundant at the interface between pinyon-juniper and shrub steppe environments, and it hunts from the air or perch, most frequently near sunrise or sunset. Nests are constructed in trees (primarily junipers), tall shrubs, and on cliffs with up to 8–10 nests per 100 km^2 (39 mi^2) if conditions are favorable. Breeding males in Idaho were estimated to have an average home range of 7–8 km^2 (2.7–3.0 mi^2). Ferruginous Hawk nests are often located

within 0.8km (0.5 mi) of a Swainson's Hawk nest. They typically migrate southward in the fall, but reside year-round in limited numbers in the extreme southern part of the state.

POPULATION TREND
Short-term Trend: Increase >25%
Long-term Trend: Unknown
Description: North American Breeding Bird Survey data do not indicate any significant long-term (1966-2013) or short-term (2003-2013) trends in the US. BBS data do suggest increases in Idaho of 2.1% per year during the period 1966-2013 and 1.9% per year during the period 2003-2013. However, these trends are not statistically significant.

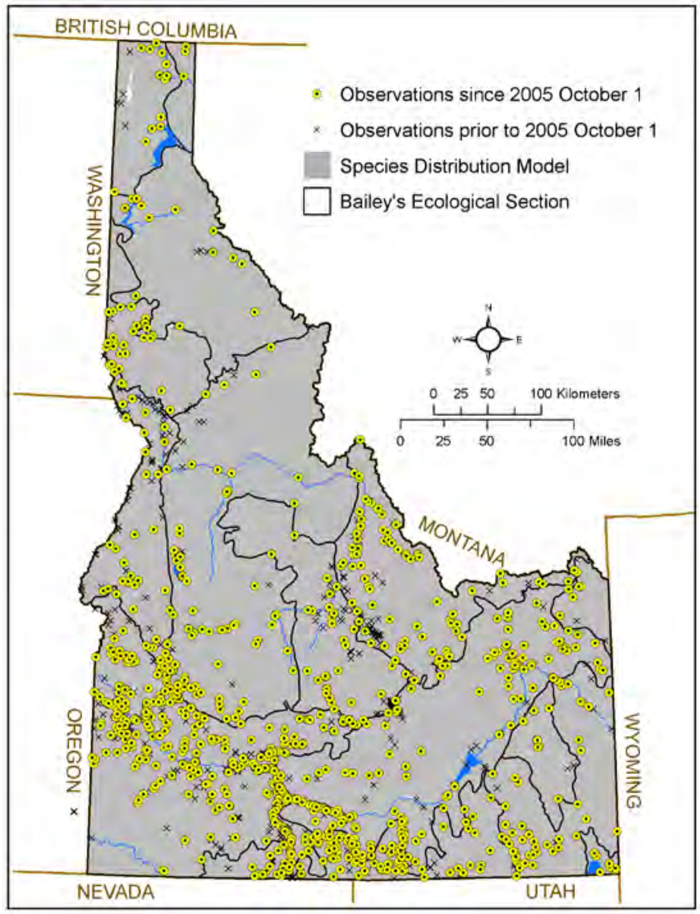
THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Main issues threatening the Ferruginous Hawk appear to be agricultural development and recreational disturbance. Population declines have been attributed to the deleterious effects of cultivation, grazing, poisoning and controlling of small mammals, mining, and fire in nesting habitats. Because this species often nests in tall shrubs (juniper) on rangelands, it is susceptible to human disturbance, particularly from OHV use on public lands. Occasional illegal shooting has been documented for individual birds (Idaho Power Company, pers. comm., 2015) but information is insufficient to draw conclusions about population or productivity effects.

CONSERVATION ACTIONS
Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended strategies include supporting legislation for renewing the Conservation Reserve Program in future Farm Bills, managing off-road travel in nesting areas, promoting best management practices for livestock grazing in sagebrush steppe habitat, and conducting public outreach and hunter education emphasizing native birds are protected species.

ADDITIONAL COMMENTS
None.

Information Sources: Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model modified by IDFG biologists).

Golden Eagle
Aquila chrysaetos



Class: Aves
Order: Accipitriformes
Family: Accipitridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S3

SGCN TIER: 2
Rationale: Multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Challis Volcanics, Northwestern Basin and Range, Overthrust Mountains, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: 1,000–2,500
Description: Golden Eagles are distributed throughout the western half of North America. This species is found throughout Idaho, wherever there is open habitat, but nests primarily in the southern half of the state. There are an estimated 130,000 individuals in North America and approximately 1,600 of these are present in Idaho during the breeding season.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Golden Eagles breed in open and semiopen shrublands, grasslands, and coniferous forests, occurring primarily in canyon land and rimrock terrain. Nesting density in Idaho tends to be higher in areas bordered by shrub steppe and grassland than in areas bordered by agriculture. This species typically forages year-round in open habitats, particularly in shrub habitat, but tends to avoid agriculture, grassland, and burned habitats. Golden Eagles are an opportunistic predator, preying mainly on mammals, but will also feed on carrion, especially during winter. Black-tailed Jackrabbits and Cottontails are main prey items in the Great Basin. Golden Eagles usually nest on cliffs, but will also nest in trees. This species often constructs alternate nests (up to 14) in a single territory and will refurbish and re-use existing nests. Golden Eagles produce 1 brood per season, but will renest when eggs fail to hatch. Average productivity is 0.79 chicks fledged per nest in southwest Idaho.

POPULATION TREND

Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Relatively Stable (<=10% change)
Description: Long-term nesting surveys show declines in western US populations, but not Alaska or Canada. The number of occupied nesting territories declined significantly from 35 to 29 (-0.71% per year) in the Snake River Canyon between 1971 and 1994. However, BBS data do not indicate any statistically significant trends in the western BBS region or in Idaho during the 1966–2013 or 2003–2013 periods.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: Golden Eagles are subject to multiple threats. Nesting population declines have been associated with loss of shrubs and jackrabbit habitat due to widespread fires. Mortality of individual birds from illegal shooting has been documented via power pole surveys in the Snake River Birds of Prey Area (Idaho Power Company, pers. comm., 2015) but statewide information is lacking. As a wide-ranging predator, this species may be negatively affected by wind energy development. Increases in OHV use have been implicated in the decline of Golden Eagle occupancy and nest success in southwest Idaho. Because of their tendency to feed upon carrion, this species is attracted to roadkill and consequently can become subject to vehicle collisions.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the appropriate section plans. In short, recommended strategies include implementing large-scale experimental activites to remove cheatgrass and other invasive annual grasses, developing appropriate fire suppression plans, conducting public outreach and hunter education emphasizing native birds are protected species, working with utilities to identify power lines that may pose a risk for collision or electrocution mortality, working with the Idaho Transportation Department to increase rate of roadkill removal, and managing OHV travel to minimize negative impacts on public lands.

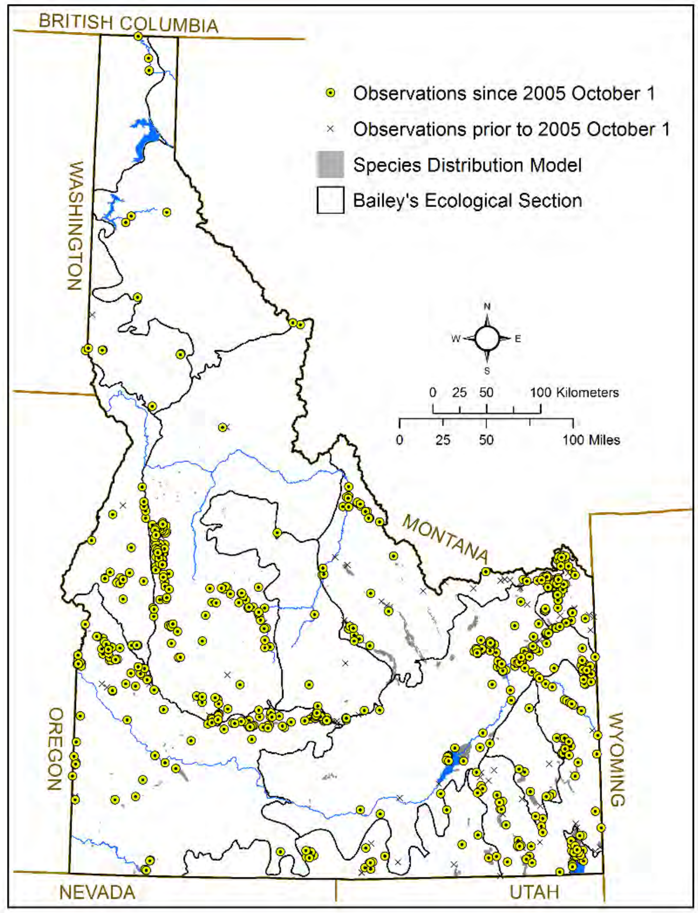
ADDITIONAL COMMENTS

None.

Information Sources: Kochert MN, Steenhof K. 2002. Golden Eagles in the US and Canada; status, trends conservation challenges. Journal of Raptor Research 36(supplement):33–41; Kochert MN, Steenhof K, Mcintyre CL, Craig EH. 2002. Golden Eagle (Aquila chrysaetos), The Birds of North America Online (A. Poole, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Partners in Flight Science Committee 2013. Population Estimates Database, version 2013. Available at http://rmbo.org/pifpopestimates. Accessed 9 Dec 2015; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; Steenhof K, Brown JL, Kochert MN. 2014. Temporal and spatial changes in golden eagle reproduction in relation to increased off highway vehicle activity. Wildlife Society Bulletin 38(4):682–688; Tack JD, Fedy BC. 2015. Landscapes for energy and wildlife: conservation prioritization for Golden Eagles across large spatial scales. PLoS ONE 10(8): e0134781. doi:10.1371/journal.pone.0134781; Millsap B, US Fish and Wildlife Service, pers. comm.; Turley N, Idaho Power, pers. comm.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Sandhill Crane

Grus canadensis



Class: Aves
Order: Gruiformes
Family: Gruidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Migratory Game Birds
G-rank: G5
S-rank: S3B

SGCN TIER: 3
Rationale: Significant proportion of the Rocky Mountain Population breeds and/or stages in Idaho, population declines, multiple threats to habitat

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 195,800 km^2 (~75,600 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Challis Volcanics, Idaho Batholith, Northwestern Basin and Range, Overthrust Mountains, Owyhee Uplands, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: 7,500-10,000
Description: Three crane populations occur in Idaho. The Lower Colorado River Valley Population (LCRVP) breeds in southwest Idaho from the border with Nevada north to New Meadows. The Rocky Mountain Population (RMP) breeds in south-central and eastern Idaho. Lesser Sandhill Cranes in the Pacific Coast Population (PCP) use staging areas in the Treasure and Payette River valleys during spring migration on their way to nesting areas in southern Alaska. In Idaho there are approximately 6,500 birds in the RMP and 1,000 birds in the PCP; there is no population estimate for the LCRVP.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Sandhill Cranes are found in well-watered river valleys, marshes, and meadows typically above 1500 m (5000 ft) elevation. Cranes nest along the edge of cattail and bulrush marshes in the wet meadow-shallow marsh zones and on islands. Following nesting, cranes stage in nearby wetlands in close proximity to cut grain (wheat or barley). Sandhill Cranes are long-lived and have the lowest recruitment rates (5-15% juveniles/total cranes) of any game bird in North America. Generally, they do not breed until 3-5 years of age and lay two eggs each year.

Less than 20% of breeding pairs are successful in raising young each year, and most successful pairs fledge only one young per year.

POPULATION TREND

Short-term Trend: Decline 30–50%

Long-term Trend: Decline (degree unknown)

Description: Sandhill Cranes originally nested in suitable habitat throughout Idaho, but the breeding population decreased rapidly following human settlement. September pre-migration staging surveys indicate the rangewide RMP has been relataively stable in the last 20 years (18,000-20,000 birds), but numbers in Idaho have declined from >10,000 birds in 1987 to 6.500 in 2015. Idaho has supported 22-61% of the RMP (long-term average of 37%). The rangewide RMP has been stable and estimated at 18,000-20,000 birds. The rangewide 20-year trend is increasing for the LCRVP (1,400-2,100 birds) and the PCP (≤25,000 birds).

THREATS

Overall Threat Impact: Medium

Intrinsic Vulnerability: Moderately vulnerable

Description: The primary threat to most Sandhill Crane populations is the loss of wetland habitat to residential and agricultural development. Further, agricultural conversion to center-pivot from flood irrigation has reduced foraging habitat. Large congregations stage during migration and use relatively small areas. This makes them particularly vulnerable to local habitat changes. The juxtaposition of secure wetland habitat and cut grain (wheat and barley) is becoming increasingly rare in Idaho. Human disturbance during migration displaces individuals from traditional staging and breeding areas.

CONSERVATION ACTIONS

Recommended actions include improving population monitoring, maintaining suitable habitat at breeding sites, maintaining or increasing grain fields and roost sites at traditional spring and fall staging areas, and providing incentives and assistance to landowners to improve habitat on private land. It is also important to identify and examine broad-scale landscape stressors (e.g., drought and anthropogenic changes) influencing rangewide demographic patterns in the LCRVP and RMP.

ADDITIONAL COMMENTS

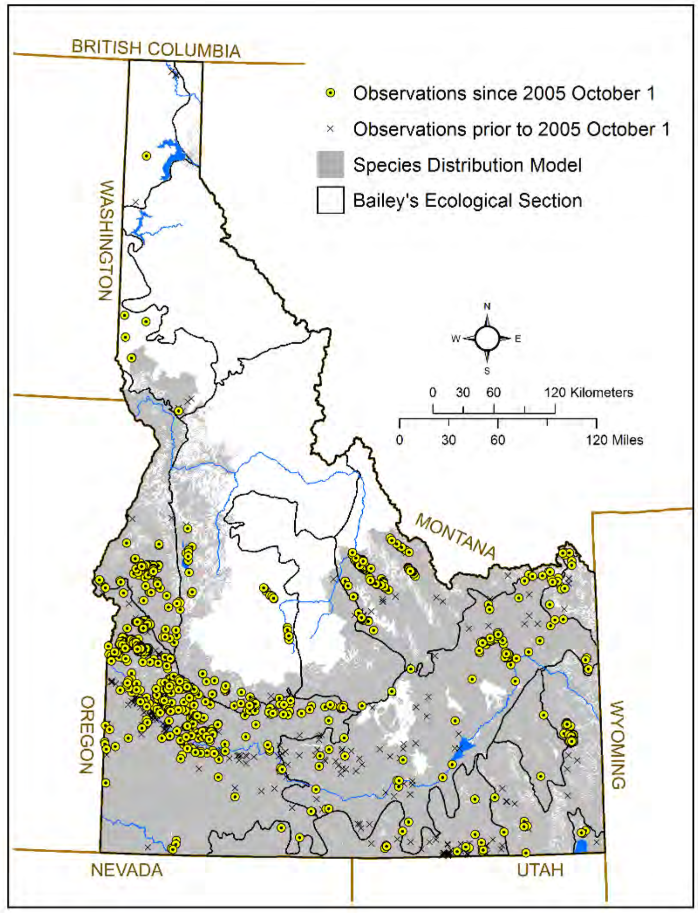
The Sandhill Crane is one of the most ancient species of birds that inhabits North America. Fossil records date back at least 2.5 million years.

Information Sources: Gerber BD, Dwyer JF, Nesbitt SA, Drewien RC, Littlefield CD, Tacha TC, Vohs PA. 2014. Sandhill Crane (*Grus canadensis*). The Birds of North America Online. (A Poole, editor). Ithaca(NY): Cornell Lab of Ornithology; Thorpe PP, Donnelly P, Collins D. 2015. September 2015 survey of the Rocky Mountain Population of Greater Sandhill Cranes. Lakewood(CO): US Fish and Wildlife Service.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Scott JM, Peterson CR, Karl JW, Strand E, Svancara LK, Wright NW. 2002. A Gap Analysis of Idaho: Final Report. Moscow (ID): Idaho Cooperative Fish and Wildlife Research Unit.

Long-billed Curlew

Numenius americanus



Class: Aves
Order: Charadriiformes
Family: Scolopacidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S2B

SGCN TIER: 2
Rationale: Nesting population declines, multiple threats to habitat

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 144,300 km^2 (~55,700 mi^2)
Key Ecological Sections: Beaverhead Mountains, Overthrust Mountains, Owyhee Uplands, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: 2,500–10,000
Description: The Long-billed Curlew is a shorebird that breeds in prairie and intermountain grassland basins of western North America, including southern Idaho. The continental and Great Basin breeding populations are roughly 123,500 and 40,000 individuals, respectively. In Idaho, the current population size is unknown. As of 1980, 3,000–5,000 pairs nested statewide and included nearly 1,000 nesting pairs in the Long-billed Curlew Habitat Area of Critical Environmental Concern (Curlew ACEC), located between the Boise, Payette, and Snake rivers in southwest Idaho. Recent surveys indicate only 80 pairs now nest in the Curlew ACEC and approximately 7,000 adults are present in the larger BLM Four Rivers Field Office area during the breeding season. Curlews that breed in Idaho are known to winter in California and Mexico.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Long-billed Curlews require large, open, and contiguous grasslands for nesting. They prefer areas interspersed with emergent wetlands (important at the local scale) and associated with irrigated hay and pasture landscapes. Nesting areas are generally flat or slightly rolling and dominated by grasses. Curlews nest on the ground in patchy vegetation and lay one clutch per season (commonly 4 eggs). They feed on terrestrial insects, benthic invertebrates, and some

small vertebrates. Flood-irrigated and subirrigated fields are important foraging habitats in breeding, transitional, and wintering areas.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Early naturalists provide qualitative evidence of significant rangewide declines during the last half of the 1800s. Today, the species is still believed to be declining rangewide and particularly in the Great Plains, even though BBS data indicate long-term (1966-2013) and short-term (2003-2013) population increases in both the western BBS region (1.3%/year and 2.8%/year, respectively) and Idaho (1.7%/year and 3.8%/year, respectively). The applicability of BBS to monitor Long-billed Curlew trends has been questioned because routes are typically surveyed in June, when curlews are in the late stage of incubation and are generally inconspicuous, or have already left nesting areas. Recent and ongoing research in Idaho is assessing current population size using more appropriate survey methods that could validate BBS trends.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: The primary threats to Long-billed Curlew are habitat loss, fragmentation, and degradation of large, open grassland nesting habitats. On some public lands in Idaho, especially the Curlew ACEC, secure nesting habitat is lost from increased recreation pressure and associated activities, including OHV use. Mortality of a few individual birds from illegal shooting has been documented particularly in the area of the designated ACEC, but population effects are unknown. On private lands, major threats include the conversion of grasslands to croplands, rural residential development in landscapes formally dominated by ranching, loss and degradation of wetlands and wet meadows, and loss of flood irrigation.

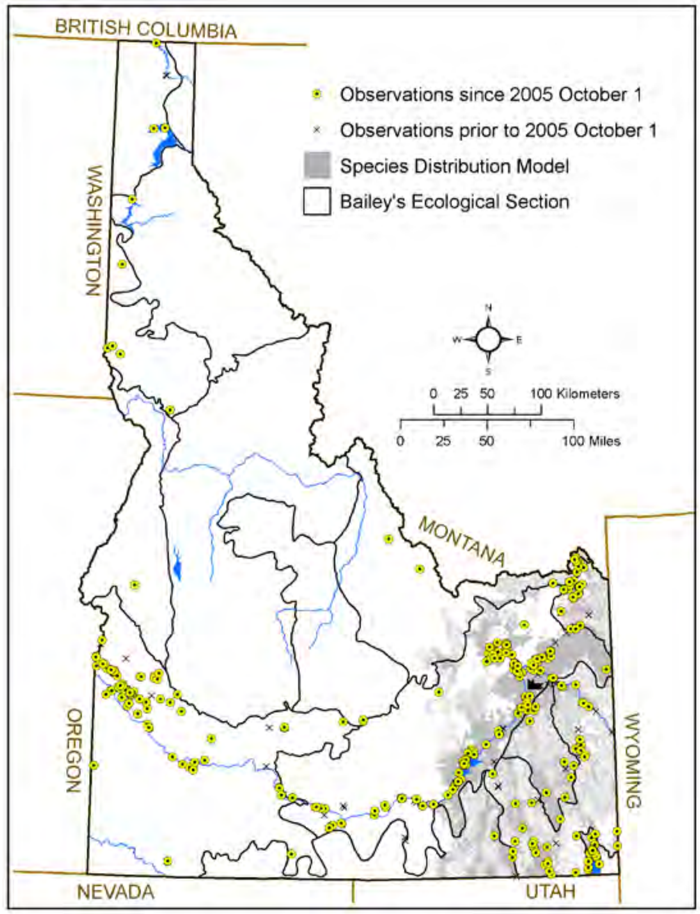
CONSERVATION ACTIONS
Recommended strategies include working with public land managers on travel management plans to minimize fragmentation, disturbance, and direct mortality in nesting areas, examining the causes of populatoin declines in the Curlew ACEC, conducting public and recreational shooter outreach and hunter education emphasizing native birds are protected species, and working with willing private landowners to protect intact blocks of native grassland habitat, perpetuate traditional ranching operations, and preserve flood irrigation practices.

ADDITIONAL COMMENTS
None.

Information Sources: Fellows SD, Jones SL. 2009. Status assessment and conservation action plan for the Long-billed Curlew (*Numenius americanus*). Washington (DC): US Fish and Wildlife Service; Moulton CE 2012. Long-billed Curlew (*Numenius americanus*) and Burrowing Owl (*Athene cunicularia*) populations in the BLM Four Rivers Field Office 2011 Report. Boise(ID): Idaho Department of Fish and Game; Carlisle J, Moulton C. 2012. 2011 abundance and productivity of Long-billed Curlews (*Numenius americanus*) in the Long-billed Curlew Area of Critical Environmental Concern of southwest Idaho. Boise(ID): Idaho Department of Fish and Game and Boise State University, Intermountain Bird Observatory; Saalfield, ST, Conway WC, Haukos DA, Rice M, Jones SL, Fellows SD. 2010. Multiscale habitat selection by Long-billed Curlews (*Numenius americanus*) breeding in the United States. Waterbirds 33(2): 148-161; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

Franklin's Gull

Leucophaeus pipixcan



Class: Aves
Order: Charadriiformes
Family: Laridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G4G5
S-rank: S3B

SGCN TIER: 3
Rationale: Population declines, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Bear Lake, Overthrust Mountains, Snake River Basalts
Population Size in Idaho: 100,000–1,000,000
Description: In the interior western US, there are approximately 158,000 breeding adults. Of these, approximately 124,000 breed in eastern Idaho at Bear Lake and Grays Lake NWRs, Market Lake and Mud Lake WMAs, and Oxford Slough Waterfowl Production Area.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: As the only gull that nests exclusively in marshes, Franklin's Gulls breed in large areas with fairly open emergent vegetation (particularly bulrush/cattail marshes) and deep water. Nests are formed on floating mats built on the water's surface, on muskrat lodges, or on floating debris, and are constructed of dead marsh plants. This species forages in marshes, irrigated agricultural fields, pastures, and other field habitats, preying on grasshoppers, earthworms, grubs, insects, and seeds and other vegetable matter.

POPULATION TREND
Short-term Trend: Decline 10–30%
Long-term Trend: Unknown
Description: Given the behavioral nature of Franklin's Gulls to nest in large colonies in remote areas, and to shift colony locations depending on water conditions, determining population trend is quite difficult and BBS trend data likely are inappropriate. Nevertheless, BBS data suggest

declines in the west and in Idaho during the period 1966–2013 (-7% and -4.4% per year, respectively) and 2003–2013 (-2.9% and -5% per year, respectively). In contrast, colony counts indicate that Franklin's Gulls increased substantially in Idaho between 1993 (approximately 9,000 breeding pairs) and 2010 (62,000 breeding pairs). Idaho trends are therefore uncertain at this time.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Agricultural conversion to center-pivot from flood irrigation is the biggest threat to this species in Idaho. Over 40% of Idaho's breeding population resides at Market Lake and Mud Lake WMAs. The surrounding landscape is rapidly losing flood-irrigated habitats that are used by Franklin's Gulls for foraging. The colony at Mud Lake WMA is also threatened by rapid water level fluctuations that result in nest flooding and significant colony failure in some years. Decreased water levels in some locations, like Oxford Slough Waterfowl Production Area, result in increased access to nesting colonies by predators and significant nesting failure.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the appropriate section plans. In short, recommended actions include working with the Natural Resource Conservation Service, private landowners and land managers to identify opportunites to restore natural wetlands suitable for foraging, maintaining flood-irrigated agricultural fields near nesting colonies, and working with water managers to develop and implement water level management recommendations that reduce nest loss while meeting irrigation needs.

ADDITIONAL COMMENTS

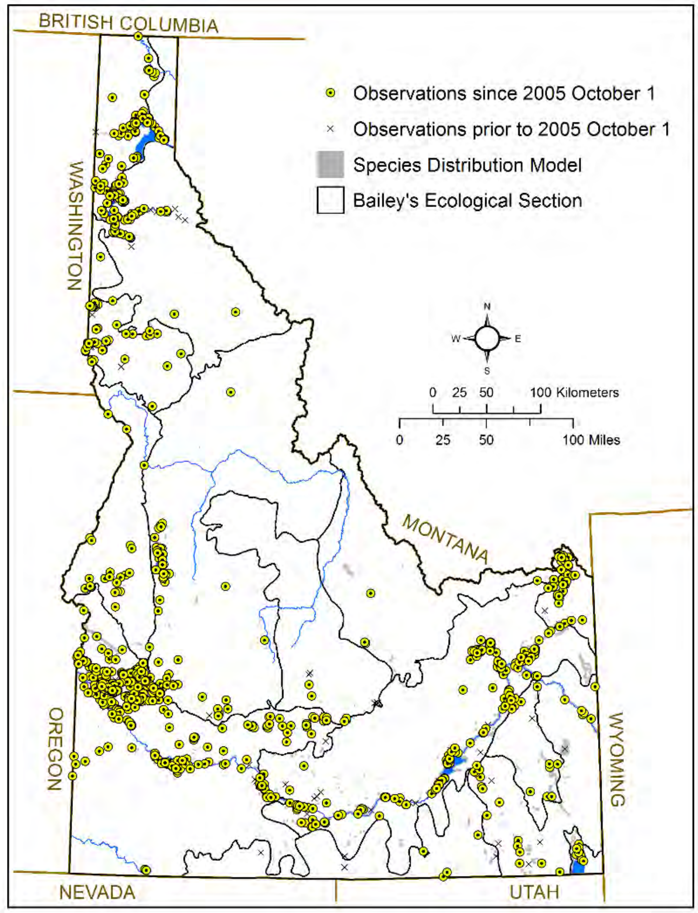
None.

Information Sources: Moulton C, Carlisle J, Brenner K, Cavallaro R. 2013. Assessment of foraging habitats of White-faced Ibis near two important breeding colonies in eastern Idaho. Boise (ID): Idaho Department of Fish and Game; Cavitt JF, Jones SL, Wilson NM, Dieni JS, Zimmerman TS, Doster RH, Howe WH. 2014. Atlas of breeding colonial waterbirds in the interior western United States. Denver (CO): US Fish and Wildlife Service; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model modified by IDFG biologists).

Ring-billed Gull

Larus delawarensis



Class: Aves
Order: Charadriiformes
Family: Laridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S2B, S2N

SGCN TIER: 3
Rationale: Breeding population only, substantial population declines

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 161,400 km^2 (~62,300 mi^2)
Key Ecological Sections: Northwestern Basin and Range, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: 10,000–100,000
Description: Ring-billed Gulls breed from coastal Newfoundland, west to south-central British Columbia, south to southeast Québec, western New York State, southern Michigan, northern South Dakota, southern Wyoming and northeast California/northwest Nevada. There are an estimated 1.7 million Ring-billed Gulls breeding in North America. In the interior western US, there are approximately 15,000 breeding pairs. In the 1990s, approximately 6,000 pairs bred in Idaho at American Falls, Mormon and Magic Reservoirs, and Market Lake and Ted Trueblood WMAs. Currently, there are 2,500 pairs nesting in Idaho at three locations: Blackfoot and Island Park Reservoirs, and Market Lake WMA.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Ring-billed Gulls breed almost exclusively on barren or sparsely-vegetated islands in natural lakes, reservoirs, and rivers. In Idaho, they are generally found nesting with California Gulls and/or Double-crested Cormorants. Nest scrapes are formed on the ground and typically lined with sticks, grasses, leaves, or moss and nests are occasionally reused from year to year. Ring-billed Gulls will use a wide variety of fairly open habitats for foraging, including reservoirs, lakes, irrigation canals, weirs, garbage dumps, feed lots, irrigated agricultural fields, and pastures. This species is highly opportunistic, and will feed on just about any food items that are

possible to consume, although it prefers live animal prey. Ring-billed Gulls will occasionally steal food items from other species, and eat eggs from other nests in the colony.

POPULATION TREND
Short-term Trend: Decline 50–70%
Long-term Trend: Unknown
Description: Patchy distribution of colony sites in the US likely obscures any potential geographically large-scale trends. North American Breeding Bird Survey data do not indicate any significant changes in US, western, or Idaho populations. However, colony surveys conducted in Idaho indicate that the population of breeding adults has declined significantly in the past 10 years, as nesting islands have become unsuitable for nesting because of low water and exposure to predators. As of 2014, only one of five historic colonies was still active (at Market Lake WMA), although two new sites have become colonized (at Blackfoot and Island Park Reservoirs). Combined, these three locations contained only 25% of the 2006 Idaho population. Since 2006, 1 new colony has been documented in southern Ada County. This colony is associated with artificial ponds.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Low water levels, particularly in the IDFG Magic Valley Region, are the most significant threat to Ring-billed Gulls in Idaho. Low water levels in nesting reservoirs has resulted in land-bridging at several nesting islands. Land-bridging results in high predation rates on young and adults, if gulls attempt to nest at these sites at all. Three historic nesting islands are no longer active because of land-bridging. In addition, the nesting colony at Blackfoot Reservoir is subject to human disturbance, and one alternative in a current Bureau of Reclamation water storage study in the Henrys Fork Basin is to raise the level of the Island Park Reservoir. This action, if implemented, would likely flood out this colony, as well as many other colonial nesting birds.

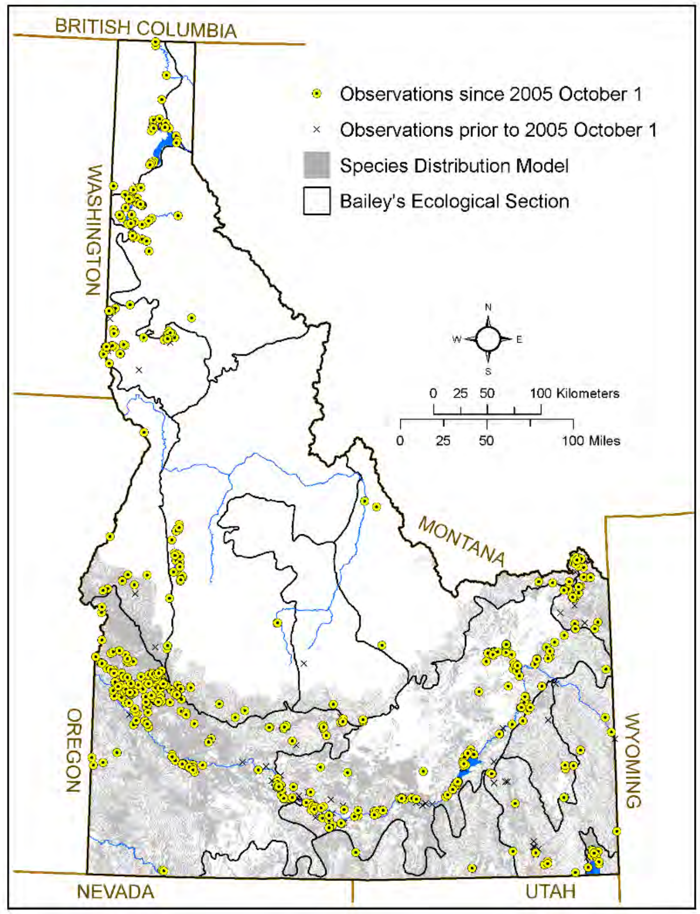
CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, they include working with water managers to develop and implement water level management guidelines during the breeding season that balance irrigation and wildlife needs, working with land managers to restore or create new nesting locations that will not be subject to low water level concerns in the foreseeable future, minimizing human disturbance of nesting colonies to the extent possible, and exploring potential for fencing access routes for land-bridged islands.

ADDITIONAL COMMENTS
None.

Information Sources: Pollet IL, Shutler D, Chardine J, Ryder JP. 2012. Ring–billed Gull (*Larus delawarensis*), The Birds of North America Online (A Poole, Editor). Ithaca (NY): Cornell Lab of Ornithology; Cavitt JF, Jones SL, Wilson NM, Dieni JS, Zimmerman TS, Doster RH, Howe WH. 2014. Atlas of breeding colonial waterbirds in the interior western United States. Denver (CO): US Fish and Wildlife Service; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; IDFG unpublished data.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Scott JM, Peterson CR, Karl JW, Strand E, Svancara LK, Wright NW. 2002. A Gap Analysis of Idaho: Final Report. Moscow (ID): Idaho Cooperative Fish and Wildlife Research Unit.

California Gull

Larus californicus



Class: Aves
Order: Charadriiformes
Family: Laridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S3B, S2N

SGCN TIER: 2
Rationale: Breeding population only, substantial population declines

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Bear Lake, Northwestern Basin and Range, Owyhee Uplands, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: 2,500–10,000
Description: California Gulls breed in scattered locations throughout the Great Basin, northwest Great Plains, and south-central taiga of North America. There are an estimated 414,000 adult California Gulls breeding in North America. In the interior western US, there are approximately 80,000 breeding pairs. In the 1990s, approximately 32,000 pairs bred in Idaho at American Falls, Blackfoot, Mormon and Magic Reservoirs, Bear Lake, Deer Flat, and Minidoka NWRs, and Ted Trueblood WMA. Currently, there are 8,000 pairs nesting in Idaho at four locations: American Falls, Blackfoot, and Island Park Reservoirs, and Minidoka NWR.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: California Gulls breed almost exclusively on barren or sparsely-vegetated islands in natural lakes, reservoirs, and rivers. In Idaho, they are generally found nesting with Ring-billed Gulls and/or Double-crested Cormorants. Nest scrapes are formed on the ground and lined with vegetation, bones, and feathers, and nests are occasionally reused from year to year. This species may travel up to 60 km (37 mi) from the colony to forage. California Gulls will use a wide variety of fairly open habitats for foraging, including reservoirs, lakes, irrigation canals, weirs, garbage dumps, feed lots, irrigated agricultural fields, and pastures. This species is highly opportunistic and will feed on just about any food items that are possible to consume (although

it prefers live animal prey), will occasionally steal food items from other species, and commonly eat eggs from other nests in the colony.

POPULATION TREND
Short-term Trend: Decline 30–50%
Long-term Trend: Unknown
Description: Patchy distribution of colony sites in the US likely obscures any potential geographically large-scale trends. Nevertheless, BBS data suggest declines during the period 1966–2013 in the US (-1.9% per year), western BBS region (-1.5% per year), and Idaho (-7.5% per year), as well as declines in Idaho during the period 2003-2013 (-6.5% per year). Colony surveys conducted in Idaho indicate that the population of breeding adults has declined significantly in the past 10 years, as nesting islands have become unsuitable for nesting because of low water and exposure to predators. As of 2014, only four of eight historic colonies were still active, and contained 41% of the 2006 Idaho population. There is a fifth, recently-established colony in the Owyhee Uplands within a fenced industrial settling pond in shrubsteppe habitat. This colony is likely not viable, however, due to severe mortality from heavy truck traffic, malnutrition, and predation.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Low water levels, particularly in the IDFG Magic Valley Region, are the most significant threat to California Gulls in Idaho. Low water levels in nesting reservoirs has resulted in land-bridging at several nesting islands. Land-bridging results in high predation rates on young and adults, if gulls attempt to nest at these sites at all. Two historic nesting islands are no longer active because of land-bridging, and colony size is declining rapidly at a third because of predation resulting from land-bridging. In addition, the nesting colony at Blackfoot Reservoir is subject to human disturbance, and one alternative in a current Bureau of Reclamation water storage study in the Henrys Fork Basin is to raise the level of the Island Park Reservoir. This action, if implemented, would likely flood out this colony, as well as many other colonial nesting birds.

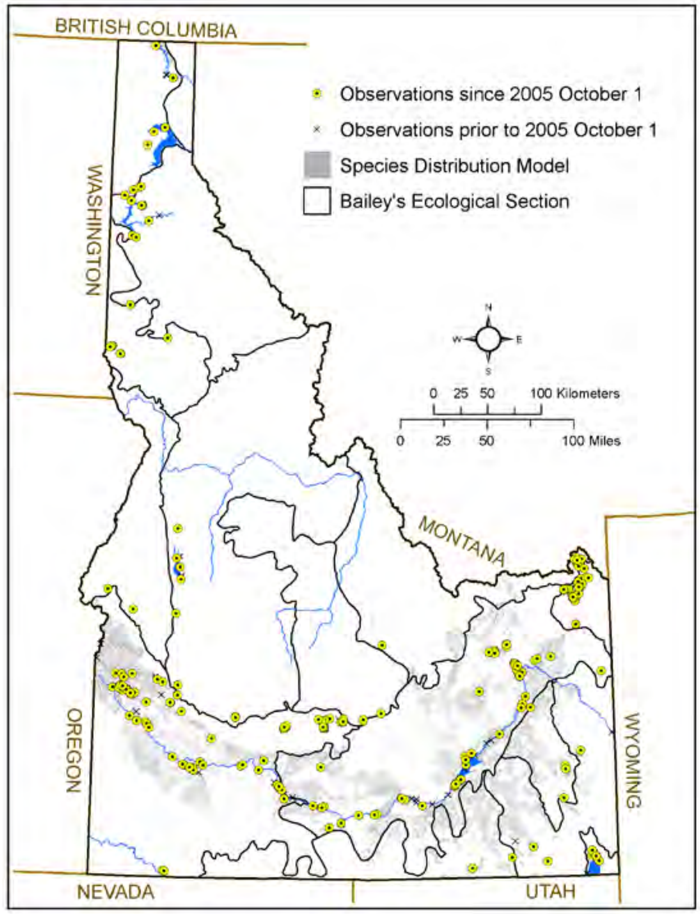
CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, they include working with water managers to develop and implement water level management guidelines during the breeding season that balance irrigation and wildlife needs, working with land managers to restore or create new nesting locations that will not be subject to low water level concerns in the foreseeable future, minimizing human disturbance of nesting colonies to the extent possible, and exploring potential for fencing access routes for land-bridged islands.

ADDITIONAL COMMENTS
None.

Information Sources: Cavitt JF, Jones SL, Wilson NM, Dieni JS, Zimmerman TS, Doster RH, Howe WH. 2014. Atlas of breeding colonial waterbirds in the interior western United States. Denver (CO): US Fish and Wildlife Service; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; IDFG unpublished data.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model modified by IDFG biologists).

Caspian Tern

Hydroprogne caspia



Class: Aves
Order: Charadriiformes
Family: Laridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
 Region1: No status
 Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S1B

SGCN TIER: 2
Rationale: Breeding population only, low population size, population declines, high-impact threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 82,800 km² (~32,000 mi²)
Key Ecological Sections: Bear Lake, Northwestern Basin and Range, Owyhee Uplands, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: 50–250
Description: Caspian Terns breed in widely scattered locations along the Pacific Coast, central Canada, the Intermountain West, the Great Lakes, the Gulf Coast, and along the Atlantic Coast. There are an estimated 68,000 adults breeding in North America. In the interior western US, there are approximately 280 breeding pairs. Of these, approximately 75 pairs currently breed at Island Park Reservoir in Idaho—this is now the only nesting location in the state. As recently as 2007, this species also nested at Blackfoot, Magic, and Mormon Reservoirs, and Bear Lake and Minidoka NWRs—in 2015, however, none of these locations were known to support nesting populations of Caspian Terns.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: In the western interior, Caspian Terns generally nest on open, fairly flat islands or islets of lakes, reservoirs, and rivers. In Idaho, this species appears to always nest in mixed-species colonies, particularly colonies with California Gulls. Nests are placed on either bare ground or in shallow scrapes, and lined with pebbles, grasses, mosses, and other vegetation. This species forages over lakes, reservoirs, rivers, and sloughs and preys almost exclusively on fish.

POPULATION TREND

Short-term Trend: Decline 70–80%
Long-term Trend: Unknown
Description: Patchy distribution of colony sites in the US likely obscures any potential geographically large-scale trends. North American Breeding Bird Survey data indicate no statistically significant changes in the US, or western BBS survey region during the period 1966-2013. BBS data do suggest a decline in Idaho during the period 1966-2013 and 2003-2013 of 6.9% and 6.2% per year, respectively. However, because of small sample sizes, this decline is not statistically significant. Colony surveys conducted in Idaho indicate that the population of breeding adults has declined by 30% in the past 10 years, and the breeding distribution has contracted to a single colony at Island Park Reservoir.

THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Low water levels, particularly in the IDFG Magic Valley Region, are the most significant threat to Caspian Terns in Idaho. Low water levels in nesting reservoirs has resulted in land-bridging at two historic nesting locations. This species appears to have low tolerance to land-bridging and has abandoned these two nesting islands. One alternative in a current Bureau of Reclamation water storage study in the Henrys Fork Basin is to raise the level of the Island Park Reservoir. This action, if implemented, would likely flood out this colony, as well as many other colonial nesting birds. Caspian Terns are also impacted by human disturbance to nesting colonies and are typically at a competitive disadvantage when nesting with other colonial species, such as California Gulls and American White Pelicans. They initiate nesting later than these other colonial species, and may be unable to initiate nesting because of lack of space, or they are subject to high predation pressure from the gulls who are often already feeding chicks.

CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, they include working with water managers to develop and implement water level management guidelines during the breeding season that balance irrigation and wildlife needs, working with land managers to restore or create new nesting locations that will not be subject to low water level concerns in the foreseeable future, minimizing human disturbance of nesting colonies to the extent possible, and creating areas on nesting islands for late breeding initiation.

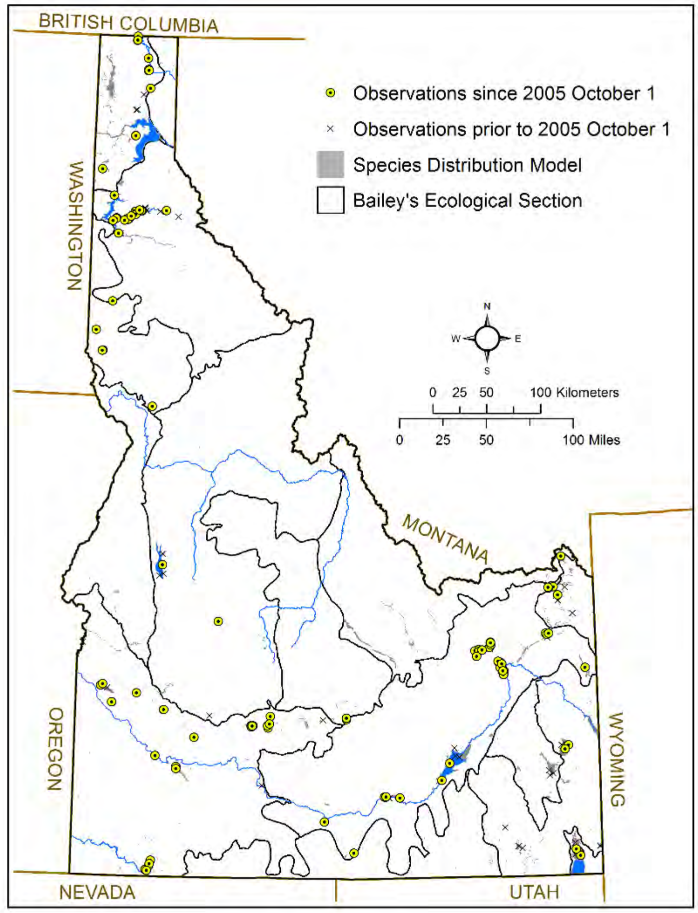
ADDITIONAL COMMENTS
None.

Information Sources: Cavitt JF, Jones SL, Wilson NM, Dieni JS, Zimmerman TS, Doster RH, Howe WH. 2014. Atlas of breeding colonial waterbirds in the interior western United States. Denver (CO): US Fish and Wildlife Service; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; IDFG unpublished data.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model modified by IDFG biologists).

Black Tern

Chlidonias niger

Class: Aves
Order: Charadriiformes
Family: Laridae



CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S2B

SGCN TIER: 2
Rationale: Population declines, threats to habitat

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 68,100 km^2 (~26,300 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Okanogan Highlands, Overthrust Mountains, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: 150-250
Description: Black Terns are localized breeders in the northern US through central Canada. Population size of this species in North America is unknown, although the US breeding population is estimated to be in the low hundreds of thousands. In the early 2000s, there were approximately 200 individuals breeding at 5-10 locations in Idaho. Most of the population is located in the northern and southeastern portions of the state. In northern Idaho, Kootenai National Wildlife Refuge and Westmond Lake appear to be consistent nesting locations for 30 and 15 pairs, respectively. Of the known breeding locations, most (>90%) are within National Wildlife Refuge or IDFG Wildlife Management Area boundaries. There may be additional nesting sites in Idaho yet to be discovered.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Black Terns generally breed semicolonially (clusters of 11–50 nests) in shallow freshwater marshes with emergent vegetation (e.g., margins of lakes, ponds, rivers, islands, or sloughs). As they have low site fidelity, nesting locations can vary widely each year, depending on marsh habitat conditions. Black Terns do not breed prior to their second summer, and some may delay breeding beyond age 2. Reproductive success is relatively low, with less than 1 chick

raised per nest on average. Unlike other North American terns, Black Terns feed predominantly on insects during the breeding season, as well as freshwater fish when available.

POPULATION TREND
Short-term Trend: Decline 50–70%
Long-term Trend: Unknown
Description: Black Terns experienced a 61% decline during the 30-year period between 1966 and 1996, followed by more recent stabilization or slight increases. This is also reflected in BBS data, which indicate sharp declines during the period 1966–1979 in the US (-10.1% per year) and a short-term increase of 3.4% per year during the period 2003-2013. In contrast, BBS data indicate significant, continued declines of -3.5% per year in the western BBS region during the period 2003-2013. No trend information is available for Idaho because of low detections for this species on BBS routes.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threat to Black Terns in Idaho is loss of marsh habitat resulting from over-extraction of ground water. Drought conditions also have a significant impact on habitat availability and suitability. Disturbance is a potential threat in some locations, although Black Terns appear to be tolerant of nearby human activity provided the colony itself is not entered.

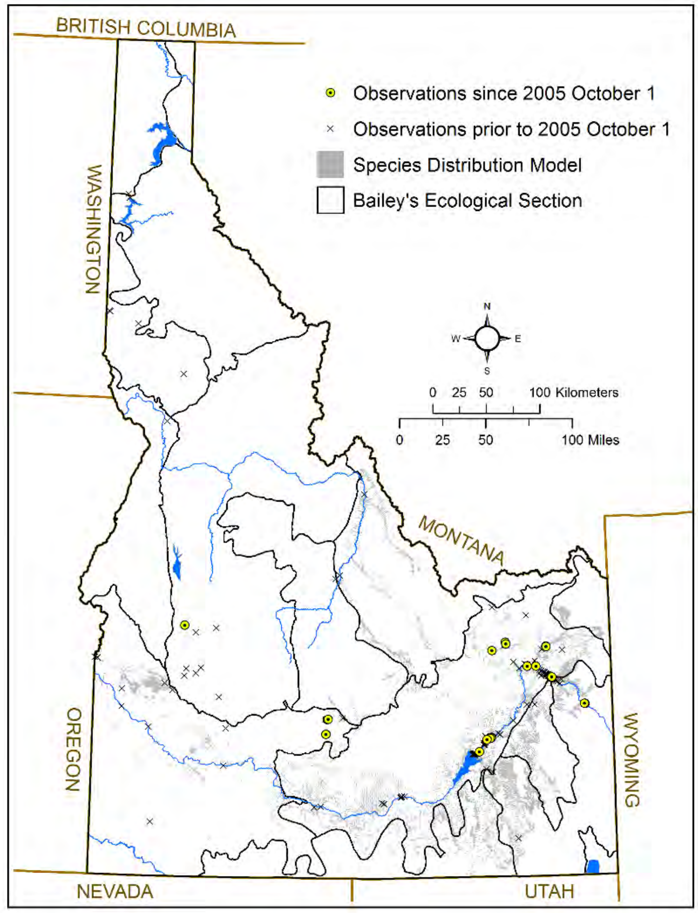
CONSERVATION ACTIONS
Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended strategies include working with the Pacific Flyway Council's Nongame Technical Committee on a wetland connectivity assessment, restoring and protecting key marsh habitats, and determining current distribution and abundance.

ADDITIONAL COMMENTS
None.

Information Sources: Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Scott JM, Peterson CR, Karl JW, Strand E, Svancara LK, Wright NW. 2002. A Gap Analysis of Idaho: Final Report. Moscow (ID): Idaho Cooperative Fish and Wildlife Research Unit.

Yellow-billed Cuckoo

Coccyzus americanus



Class: Aves
Order: Cuculiformes
Family: Cuculidae

CONSERVATION STATUS & CLASSIFICATION
ESA: Threatened
USFS:
Region1: No status
Region 4: Sensitive
BLM: Type 1
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S1B

SGCN TIER: 1
Rationale: Western US Distinct Population Segment listed as Threatened under ESA, rangewide declines, low population size, multiple threats to habitat

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 21,900 km^2 (~8,500 mi^2)
Key Ecological Sections: Overthrust Mountains, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: 1–50
Description: The Yellow-billed Cuckoo is a neotropical migrant that breeds in increasingly disjunct fragments of riparian habitat from California, Idaho, and Montana south to northwestern Mexico and winters in South America east of the Andes. The most important breeding habitat in Idaho is relatively pristine cottonwood forest found on the South Fork of the Snake River between Palisades Dam and the confluence with the Henrys Fork River, the lower Henrys Fork River from St. Anthony to the Highway 33 bridge, Deer Parks Wildlife Mitigation Unit along the main stem Snake River between Menan and Roberts, and the main stem of the Snake River between Blackfoot and American Falls Reservoir. The species is extremely rare; surveys in eastern Idaho from 2010-2012 and 2015 documented only 18 observations at 10 sites during the breeding season.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This species nests in low-elevation multistoried cottonwood riparian forest with a densely layered high canopy and a moderately dense and heterogeneous understory. The presence of point bars and low woody vegetation are important features of nesting habitat, indicating healthy river hydraulics and active habitat succession. Occupancy increases with patch size (> 40 hectares) and when surrounded by native habitats. Pairs are nonterritorial, arrive in late May, and share nest construction, incubation, and brood rearing duties. Breeding is correlated with insect abundance, which peaks from mid-June to early August. Nests consist of

a loose, flat platform of twigs lined with leaves constructed in trees or large shrubs. The nesting cycle is extremely short, lasting 17 days from the start of incubation to fledging. The species is an occasional brood parasite, laying eggs in other Yellow-billed Cuckoo nests. Its diet consists of large insects including caterpillars, katydids, cicadas, grasshoppers, and crickets.

POPULATION TREND

Short-term Trend: Decline 10–30%

Long-term Trend: Unknown

Description: No population trend data are available for Idaho because the population is too low to make valid statistical conclusions. That said, populations have probably declined and become more restricted based on habitat loss such that this species is now extremely rare.

THREATS

Overall Threat Impact: Very High

Intrinsic Vulnerability: Not intrinsically vulnerable

Description: The primary threat to Yellow-billed Cuckoo is the loss and degradation of riparian habitat associated with synthetic features that alter watercourse hydrology (e.g., dams, water diversions, stream flow management that differs from natural hydrologic patterns, channelization, flood control levees, and other forms of bank stabilization). These modifications restrict the natural floodplain dynamics from meandering stream channels to narrow riparian corridors that lack periodic flooding needed for cottonwood reproduction and establishment. Climate changes, particularly drought conditions, can affect river flow, snow packs, and temperature, favoring species better adapted to nondisturbance and the invasion of nonnative vegetation. Residential, recreational, and agricultural developments fragment suitable habitat and further constrain water flow management. In agricultural areas, pesticides can directly poison cuckoos and reduce the insect prey base. Improper livestock grazing management can remove important vegetation structure, compact soils, degrade streambanks, and introduce invasive plants, all decreasing riparian habitat value for nesting. Mortality occurs as a result of collisions with communication towers, wind turbines, and transmission lines during migration.

CONSERVATION ACTIONS

Work with the Bureau of Reclamation and Idaho water users to implement ecologically-based systems management (e.g., allowing periodic large-volume water releases from dams to mimic natural spring flooding events and maintaining appropriate base flows) to minimize impacts to aquatic systems and restore native riparian habitat. Participate in planning efforts to improve recharge to rivers to benefit fish and wildlife resources. Seek partnerships and funding to acquire (fee title or easement), protect, restore, and manage cottonwood forests. Introduce buffer zones, exclusion fencing, and manage grazing to protect riparian habitat. Participate in coordinated monitoring and evaluate causes of population decline to make informed land management decisions. Reduce the use of neonicotinoids and assess the level of impacts on insectivorous birds at a watershed scale.

ADDITIONAL COMMENTS

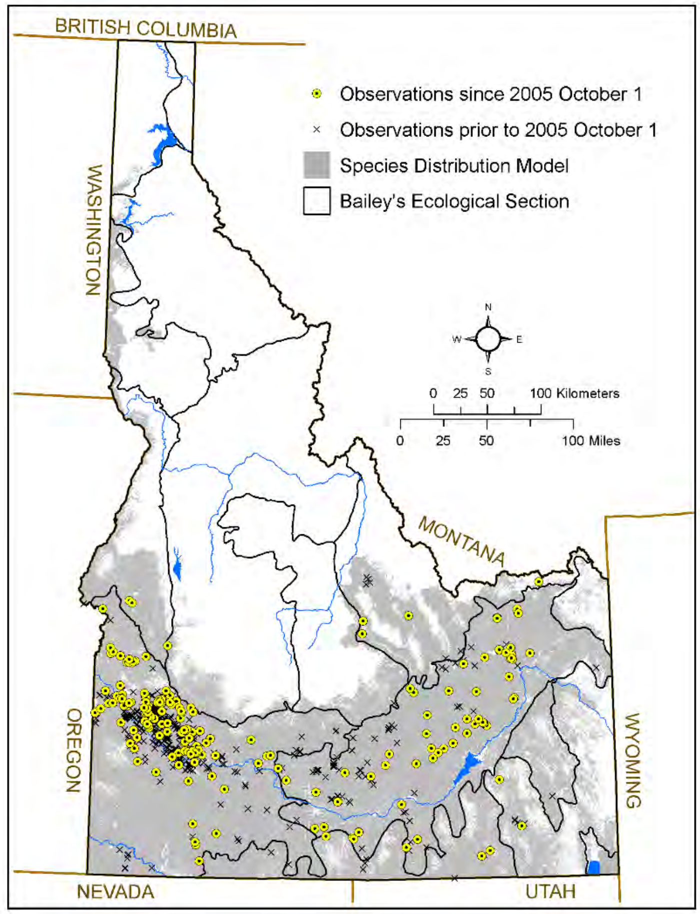
The western population of this species was listed as a Threatened species under the ESA in 2014.

Information Sources: Hughes JM. 2015. Yellow-billed Cuckoo (*Coccyzus americanus*), The Birds of North America Online (A. Poole, Ed.). Ithaca(NY): Cornell Lab of Ornithology; Poff B, Koestner KA, Neary DG, Henderson V. 2011. Threats to riparian ecosystems in western North America: an analysis of existing literature. Journal of the American Water Resources Assocication 1–14.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; IDFG Upper Snake and Southeast Region surveys; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model modified by IDFG biologists).

Burrowing Owl

Athene cunicularia



Class: Aves
Order: Strigiformes
Family: Strigidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S2B

SGCN TIER: 2
Rationale: Multiple threats to habitat

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 125,400 km^2 (~48,400 mi^2)
Key Ecological Sections: Blue Mountains, Northwestern Basin and Range, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: 2,500–10,000
Description: The western population of Burrowing Owls breeds throughout the western half of North America and Canada from as far north as British Columbia east to south-central Manitoba, and as far south as central Mexico. Although assessments of population sizes at small scales have been conducted, the size of the US population is unknown. In Idaho, Burrowing Owls are patchily distributed throughout the southern half of the state, but the population size is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This species breeds in open, well-drained grasslands, farmlands, steppes, and airfields. Burrowing Owls typically use natural burrows excavated by American Badgers, and tend to be associated with irrigated agriculture. Burrowing Owls also are responsive to artificial nesting burrows placed in their natural nesting habitats. This species forages in short-grass, mowed or overgrazed pastures, golf courses, airfields, and irrigated agricultural fields. As an opportunist, Burrowing Owls will prey on a wide variety of invertebrates and vertebrates, although most prey items are invertebrates.

POPULATION TREND

Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: Western Burrowing Owls have declined significantly throughout much of their North American range, particularly in Canada. Although local researchers suspect populations are declining in Idaho, BBS data do not indicate statistically significant changes in Idaho or the western BBS region from 1966-2013 or 2003-2013. The lack of a significant trend may be influenced by low detection rates.

THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: This species is subject to multiple threats. Frequent fires in the sagebrush steppe ecosystem have resulted in substantial habitat degradation, particularly conversion to cheatgrass that concurrently affects prey distribution and may also reduce nest site availability (e.g., with low populations of ground squirrels, low incidence of American Badger burrowing activity). One aspect of this degradation is an increase in Common Ravens, which are becoming a significant nest predator. For example, researchers in the Owyhee Uplands documented visitation by ravens to scavenge prey items deposited by the owls and/or take Burrowing Owl chicks at 66% of studied nests. Idling of agricultural fields tends to remove a significant prey resource for Burrowing Owls. This species uses these fields extensively for both insect and small mammal prey. In addition, shooting or control of American Badger on the landscape removes potential nesting sites for this species. There have been reports of mortality of individual birds due to illegal shooting but there is insufficient information to assess the mortality from a population or productivity context.

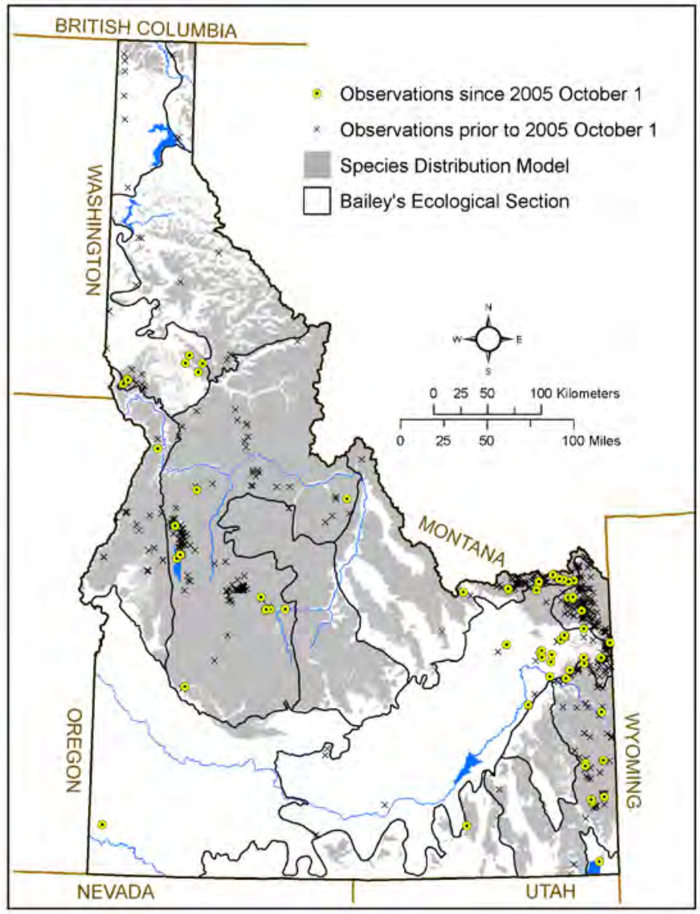
CONSERVATION ACTIONS
Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended strategies are to work with land managers to restore shrubsteppe habitats in concert with Greater Sage-Grouse conservation activities, work with researchers to assess impact level of Common Raven and develop nonlethal raven predation reduction strategies, and conduct public outreach and hunter education emphasizing native birds are protected species.

ADDITIONAL COMMENTS
None.

Information Sources: Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; Belthoff J, Boise State University, pers. comm.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

Great Gray Owl

Strix nebulosa



Class: Aves
Order: Strigiformes
Family: Strigidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: Sensitive
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S3

SGCN TIER: 3
Rationale: Data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 168,700 km² (~65,100 mi²)
Key Ecological Sections: Beaverhead Mountains, Challis Volcanics, Idaho Batholith, Overthrust Mountains, Palouse Prairie, Yellowstone Highlands
Population Size in Idaho: Unknown
Description: Great Gray Owls are unevenly distributed throughout a large circumboreal range that extends south along the Northern Rocky Mountains of Idaho, Montana, and Wyoming, the Cascade Mountains in Washington and Oregon, and the Sierra Nevada Mountains in California. In Idaho, Great Gray Owls are known to breed in the northern Panhandle, along the Montana-Wyoming border of eastern Idaho, in west-central Idaho, and in the Frank Church-River of No Returen Wilderness. Although they are year-round residents and have been recorded in almost all mountainous areas in the state, they are relatively uncommon. Population size both continentally and in Idaho is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: In the southern portions of the range, these birds are almost always found associated with mountain meadows in multilayered pine or spruce forests. In Idaho, over 90% of sightings of this species are in the lodgepole pine/Douglas-fir/aspen zone. A rodent specialist (voles in particular), this owl favors areas near bogs, forest edges, montane meadows, and other openings. It is a nocturnal and crepuscular (dawn and dusk) hunter. In some winters, when its prey are scarce, individuals will wander into areas beyond its typical range extent, often in considerable numbers, and always to the delight of birdwatchers. The breeding density of Great

Gray Owls seems limited by both prey and nest site availability. It prefers abandoned nests of other birds of prey, but will nest on the tops of broken trees or on artificial platforms as well. They produce one brood per year.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: Population estimates and trends are challenging for this species due to its variable distribution, low density, and detectability. Because of this and the lack of BBS routes in their primary habitats, there are no BBS trend data for this species. Although Christmas Bird Count data indicate relatively stable populations in the last 10 years, declines have been documented in some areas of Idaho (e.g., Long Valley, near McCall).

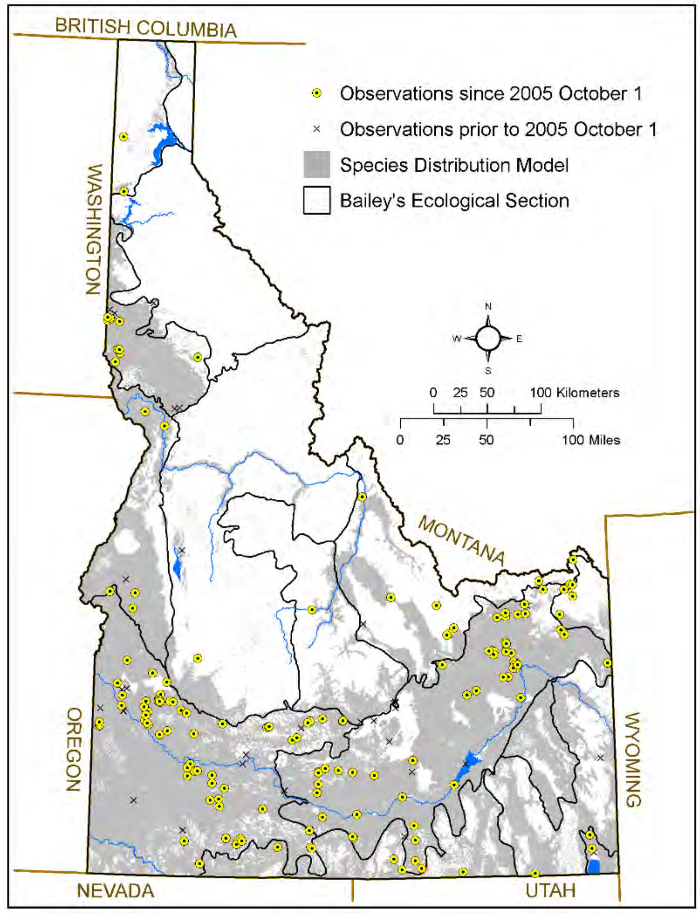
THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Although the primary threats to this species in Idaho have not been fully documented, the greatest potential impact on owl populations appears to be from some timber management practices (e.g., removal of large-diameter trees used for nesting, logging close to meadows) and fire suppression, which may change the landscape habitat mosaic (dense older forest for nesting with scattered meadows for hunting) needed. In addition, as a boreal species at the southern limits of its range in Idaho, Great Gray Owls are projected to be affected by changing climates, particularly increased summer temperatures and changes in preferred habitat. However, some areas of the state may act as refugia for the species. Recreational disturbance, particularly from birders and photographers, is a concern in some locations.

CONSERVATION ACTIONS
Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended strategies include restoring meadow habitat adjacent to nesting habitat where conifer encroachment is reducing meadow size, restoring disturbance regimes, increasing nest site availability, and educating birders and photographers about sensitivity of nesting owls.

ADDITIONAL COMMENTS
Great Gray Owls can accurately detect rodent prey under snow by ear, plunging through the surface to grab the unsuspecting vole beneath. It has been reported to break through snow crust thick enough to support the weight of a 175-pound person.

Information Sources: Bull EL, Duncan JR. 1993. Great Gray Owl (*Strix nebulosa*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/041. doi:10.2173/bna.41; National Audubon Society (2010). The Christmas Bird Count Historical Results [Online]. Available http://www.christmasbirdcount.org [Accessed: 12/14/2015]; Lankford–Bingle AJ, Svancara LK, Vierling K. 2015. A new framework for spatio–temporal climate change impact assessment for terrestrial wildlife. Environmental Management 56(6):1514–1527.; Munts M, Powers LR. 1991. Observations on the occurrence and nesting of the great gray owl (*Strix nebulosa*) in Valley County, Idaho. Journal of Idaho Academy of Science 27:37–44.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Short-eared Owl
Asio flammeus



Class: Aves
Order: Strigiformes
Family: Strigidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S3

SGCN TIER: 3
Rationale: Multiple threats to habitat

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Blue Mountains, Northwestern Basin and Range, Owyhee Uplands, Palouse Prairie, Snake River Basalts
Population Size in Idaho: 2,615
Description: The Short-eared Owl is a confirmed breeder across nearly all of Idaho, and there are winter records in the northern and southern portions of the state. Because Short-eared Owl reproduction and population dynamics are closely associated with the density of its primary prey, small mammals, there is often considerable local variation in abundance. In addition, the species is often nomadic because of this association. Miller et al. (In Press) estimated 2,615 adults in Idaho during the breeding season in 2015. This was the first standardized survey of Short-eared Owls in Idaho.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: Short-eared Owls are associated with open landscapes such as marshes, grasslands, shrubsteppe, and agricultural lands (e.g., pastures, stubble fields, and hayfields). They may also use wooded environments during winter. Breeding habitats typically support sufficient vegetation (primarily grasses and forbs) to provide ground nesting and roosting cover and are in close proximity to productive and open hunting areas with abundant supplies of small mammals. This species can be solitary or communal during the nonbreeding season, but often forms loose colonies during the breeding season. Short-eared Owls can initiate breeding in their first year, and typically have just one brood per year. They may lay replacement clutches if the

initial clutch is lost. Short-eared Owls feed almost exclusively on small mammals with voles making up the bulk of their diet.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: This species' nomadic lifestyle makes assessing population status of the Short-eared Owl difficult. However, the North American Bird Conservation Initiative identified this species as one of 33 common bird species in steep decline, and all available data suggest significant declines throughout its range. North American Breeding Bird Survey data in particular suggest a decline in the western BBS region and Idaho from 1966–2013 (-1.8% and -2.7% per year, respectively) and 2003-2013 (-1.4% and -3%, respectively). There are deficiencies in the data sets used to calculate these estimates (primarily low sample size and extremely low relative abundance for this species since they are only sporadically detected using standard BBS protocols), so any lack of statistical significance in these trend estimates should be interpreted with caution.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Because it relies on large expanses of grasslands and specializes on unpredictable small mammal prey that can dramatically fluctuate in abundance across space and time, this species is vulnerable to habitat degradation. Its nesting habits (ground nesting, often in loose colonies), also make it vulnerable to human disturbance. As a result of the difficulty in studying such a nomadic species, the degree of decline and causal factors are currently unknown.

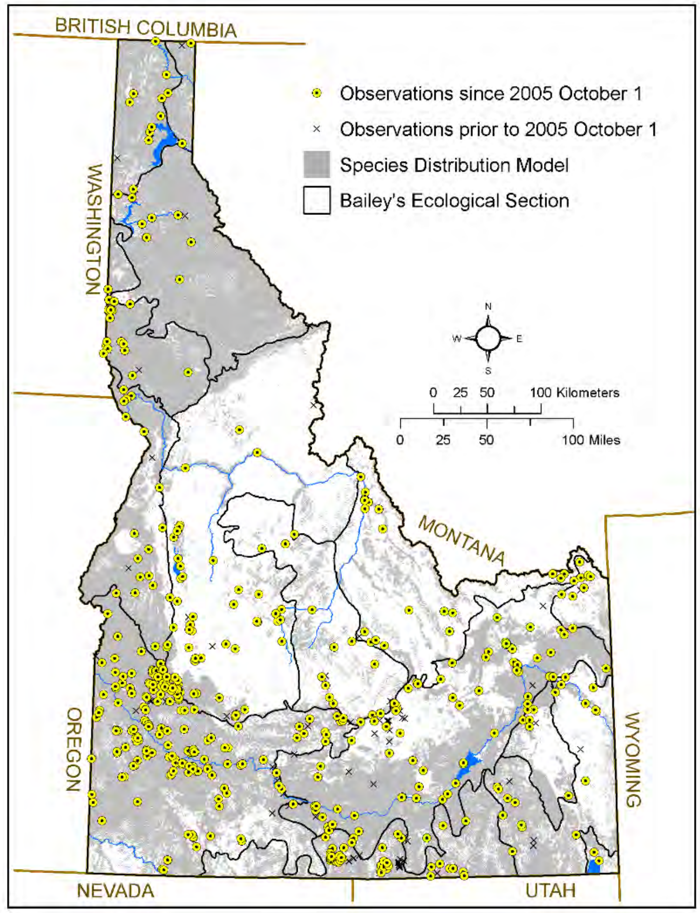
CONSERVATION ACTIONS
Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended strategies are to work with land managers to restore shrubsteppe habitats in concert with Greater Sage-Grouse conservation activities and to work with the Pacific Flyway Council's Nongame Technical Committee and partners to develop a coordinated monitoring project that will be used to target habitat conservation efforts for this species.

ADDITIONAL COMMENTS
None.

Information Sources: Booms TL, Holroyd GL, Gahbauer MA, Trefry HE, Wiggins DA, Holt DW, Johnson JA, Lewis SB, Laron MD, Keyes KL, Swengel S. 2014. Assessing the status and conservation priorities of the Short–Eared Owl in North America. Journal of Wildlife Management 78:772–778; North American Bird Conservation Initiative, US Committee. 2014. The state of the birds 2014 report. Washington (DC): US Department of Interior; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; Miller RA, Paprocki N, Stuber M, Moulton CE, Carlisle JD. In Press. Short–eared Owl (*Asio flammeus*) surveys in the North American Intermountain West: utilizing citizen scientists to conduct long–term monitoring. Avian Conservation and Ecology.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Common Nighthawk

Chordeiles minor



Class: Aves
Order: Caprimulgiformes
Family: Caprimulgidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S4B

SGCN TIER: 3
Rationale: Data deficient, population declines

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Northwestern Basin and Range, Okanogan Highlands, Overthrust Mountains, Owyhee Uplands, Palouse Prairie, Snake River Basalts
Population Size in Idaho: 150,000–250,000
Description: Common Nighthawks breed throughout North America and winter in South America. They are found throughout most of Idaho. There are an estimated 15 million individuals in North America. Approximately 200,000 of them occur in Idaho during the breeding season.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: Although considered the most studied nightjar species, there is still a lot unknown about Common Nighthawks. They typically nest in sagebrush and grassland habitat, open forests, logged or slashburned areas of forest, woodland clearings, and rock outcrops. Prior to changes in how roofs of buildings are typically constructed, this species was well known for its tendency to nest on flat gravel roofs, especially in cities. Whether nesting on roofs or natural sites, it makes no nest per se, usually laying its eggs directly on the ground. The Common Nighthawk is a crepuscular (dawn and dusk) forager that feeds on flying insects such as moths, beetles, and caddisflies. This species may forage in large groups.

POPULATION TREND

Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Decline 50-70%
Description: Common Nighthawks continue to experience significant declines throughout their range. In Canada, this species has declined by 50% since 1996 and was listed as Threatened in Canada in 2007. North American Breeding Bird Survey data reveal statistically significant long-term (1966-2013) and short-term (2003-2013) declines in the western BBS Region (-2.3% and -1.7% per year, respectively), Great Basin (-1.2% and -1.1% per year, respectively), and numerous individual states, including Idaho (-1.8% and -0.9% per year, respectively). These declines contributed to the North American Bird Conservation Initiative's decision to designate the Common Nighthawk as a Common Birds in Steep Decline.

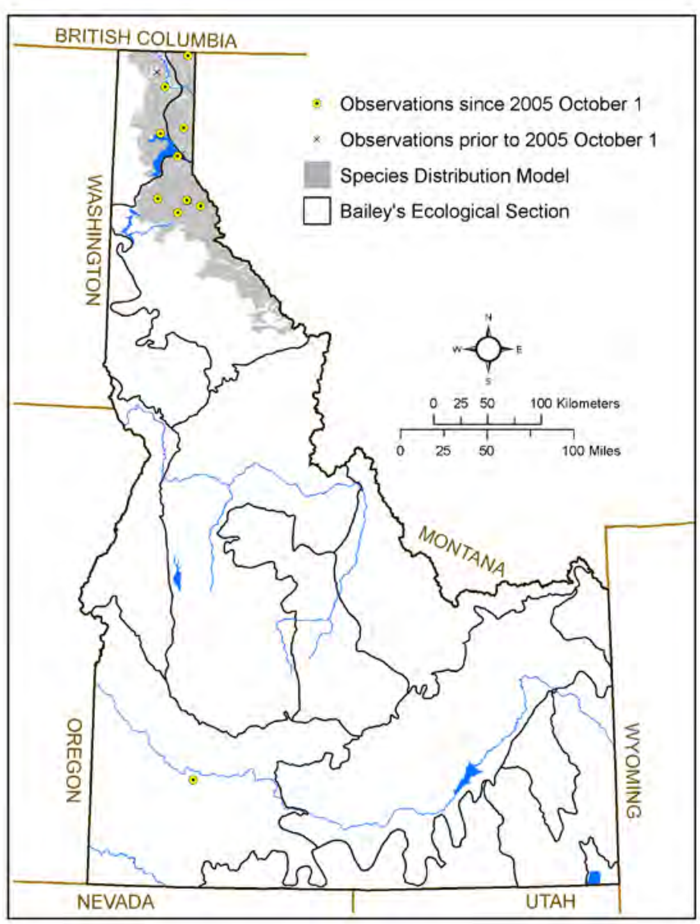
THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Reasons for decline are currently unknown. Population declines appear to coincide with nonselective pesticide spraying programs for mosquito control. As such, there is increasing concern that Common Nighthawks, along with other aerial insectivores, may be impacted by chemical control of insect populations. Developed in the 1990s, neonicotinoids are the most widely used insecticide on earth. They are used on crops, pet collars, home and garden products, and as seed coatings, to name a few. They are often used pre-emptively, as in the case of seed coatings. Although they are much less acutely toxic to farm workers, they are highly toxic to wildlife. This genre of insecticides is suspected to play a part in the significant decline of insectivorous birds, but more research is needed. Declines in some areas may also be due to reforestation.

CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, recommended strategies include reducing use of neonicotinoids on the landscape and promoting cooperation and collaboration with the Western Working Group of Partners in Flight and the Pacific Flyway Council's Nongame Technical Committee to assess causes of decline.

ADDITIONAL COMMENTS
None.

Information Sources: Brigham RM, Ng J, Poulin RG, Grindal SD. 2011. Common Nighthawk (*Chordeiles minor*). The Birds of North America Online (A Pool, Ed). Ithaca (NY): Cornell Lab of Ornithology; Mineau P, Palmer C. 2013. The impact of the nation's most widely used insecticides on birds. American Bird Conservancy report; Partners in Flight Science Committee 2013. Population Estimates Database, version 2013. Available at http://rmbo.org/pifpopestimates. Accessed 10 Dec 2015; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

Black Swift
Cypseloides niger



Class: Aves
Order: Apodiformes
Family: Apodidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: Sensitive
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S1B

SGCN TIER: 2
Rationale: Restricted distribution, low population size, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 15,000 km^2 (~5,800 mi^2)
Key Ecological Sections: Bitterroot Mountains, Flathead Valley, Okanogan Highlands
Population Size in Idaho: 1,000
Description: The Black Swift breeding range extends from British Columbia south to Mexico, from the coast eastward to Colorado, but its distribution is scattered and nowhere is it considered abundant. Winter range is poorly known, but presumed to include portions of Central and South America. Based on recent Black Swift surveys in the Idaho Panhandle National Forest (12 locations and 16 waterfalls in 2013), there are 6 confirmed nesting sites (Shadow Falls, Fern Falls, Char Falls, Wellington Creek Falls, Johnson Falls, and Copper Falls) and two suspected breeding areas (Myrtle Falls and Granite Falls, Washington, just west of the state line). Many waterfalls have not been surveyed, and thus, knowledge of distribution and abundance is incomplete.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: In Idaho, Black Swifts are closely associated with mountain waterfalls. They nest in cool, dark, and damp sites with flowing surface water, cliffs that are inaccessible from ground predators, rock faces with ledges or pockets, and unobstructed flyways. Where adequate space allows, nesting is often colonial. Nests are made of mud and moss and are placed on rock ledges or in shallow caves, usually near or behind waterfalls with abundant spray. Nests are commonly reused in subsequent years. Black swifts lay a single egg and raise not more than one brood per season. If nesting failure occurs early in the season, a replacement clutch may be laid. Nestling growth is slow with young leaving the nest 47-50 days after hatching. Black swifts

are aerial insectivores and forage widely in forests and open areas (winged ants are an important food source). Swifts make 2 foraging trips a day, once briefly in the early morning and a longer foray from early to late afternoon. Black Swifts are long-lived; maximum longevity records are >15 years.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: The population trend in Idaho is not known. Statistically significant declines are reported for the western BBS region from 1966-2013 (-6.7% per year), but due to limited coverage, BBS trends are unreliable in many areas. Surveys in the Southern Rocky Mountains of Colorado and New Mexico from 1997-2005 suggest populations have been relatively stable since the 1950s.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: Given a lack of information on distribution, survival, and reproduction, it is difficult to assess relevant threats. Colony and nest site availability and abundant food resource are thought to be the most important factors affecting reproduction. Sustained water flow during mid and late summer correlates with insect abundance and is important for maintaining moist conditions at the nest. Therefore, factors that affect water availability in the summer (e.g., water diversion, forest management, drought, and shifts in precipitation patterns from climate change) have the potential to impact populations. Broad-scale reductions in aerial insect abundance due to habitat loss and use of pesticides on the breeding and wintering grounds are also a concern. Waterfalls are popular destinations for hikers, cave explorers, rock climbers, and waterfall enthusiasts and may disturb nesting birds at relatively accessible sites (e.g., Shadow Falls).

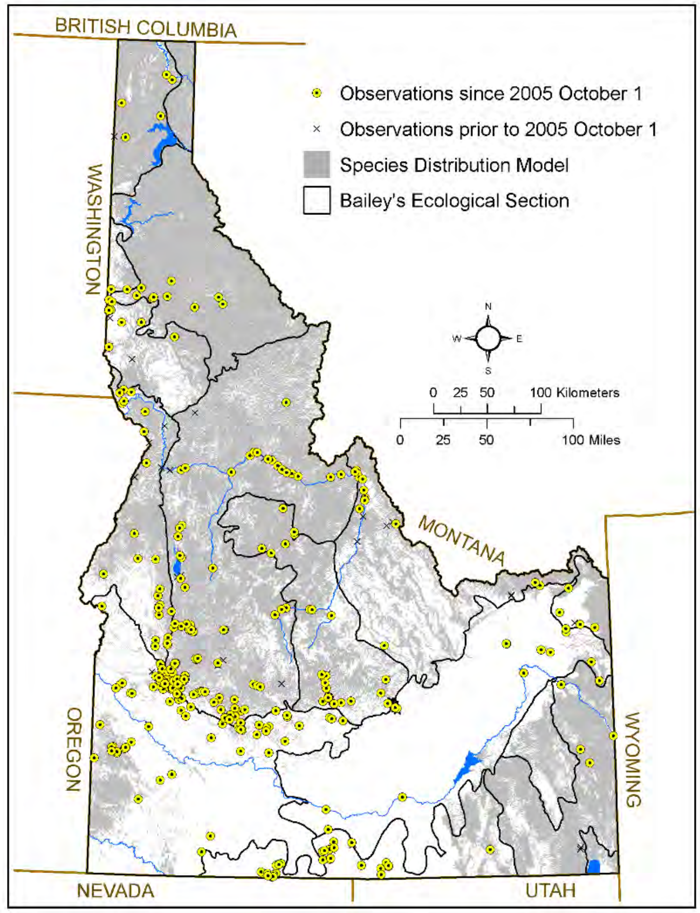
CONSERVATION ACTIONS
Conservation actions are discussed in the relevant section plans. In summary, strategies include developing and implementing a systematic survey to determine the current distribution, abundance, and status of nesting Black Swifts and increasing knowledge of factors that limit populations.

ADDITIONAL COMMENTS
Surveys timed during the final 2 hours of daylight are useful for counting local residents and discovering nest locations, as food delivery rates to young increase and adults return to the colony to roost. Daytime assessments are useful for gathering site-specific information (e.g., precise nest locations and habitat features) relevant to land management decisions.

Information Sources: Lowther PE, Collins CT. 2002. Black Swift (*Cypseloides niger*), The Birds of North America Online (A. Poole, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Miller RA, deKramer KE, Carlisle JD. 2013. Black Swift Surveys Within and Around the Idaho Panhandle National Forest 2013. Boise (ID): Idaho Bird Observatory; Levad RG, Potter KM, Schultz CW, Gunn C, Doerr JG. 2008. Distribution, abundance, and nest–site characteristics of Black Swifts in the southern Rocky Mountains of Colorado and New Mexico. The Wilson Journal of Ornithology 120(2):331–338; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ Jr, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

Lewis's Woodpecker

Melanerpes lewis



Class: Aves
Order: Piciformes
Family: Picidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S3B

SGCN TIER: 2
Rationale: Multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Idaho Batholith, Palouse Prairie
Population Size in Idaho: 2,500 – 5,500
Description: Lewis's Woodpeckers primarily occur in the western US and closely follow the distribution of ponderosa pine. This species breeds as far north as southern British Columbia and south through Washington state into California. From the west coast, the breeding range extends as far east as Colorado and the Black Hills, South Dakota. Lewis's Woodpeckers breed throughout Idaho except in the southeastern portion of the state. There are an estimated 4,000 individuals in Idaho.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Lewis's Woodpecker is a somewhat atypical woodpecker in that it flycatches during the breeding season and stores mast (e.g., acorns and corn) during the winter. Breeding sites generally occur in burned ponderosa pine forests, cottonwood riparian forests, and aspen groves. This species appears to prefer nesting in large diameter, well-decayed snags in relatively open forests with a well-developed understory. Nests are sited in natural cavities or abandoned nest hold of primary excavators. This species exploits superabundant food sources and is generally considered to be nomadic.

POPULATION TREND

Short-term Trend: Increase 10–25%
Long-term Trend: Unknown
Description: North American Breeding Bird Survey data indicate statistically significant declines during the period 1966-2013 in the US and western BBS region of -3.2% and -2.7% per year, respectively. Declines in Idaho (0.8% per year) during that time period were not statistically significant. In contrast, more recent data (2003-2013) suggest an increasing trend of 1.7% per year. However, these trends are also not statistically significant.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Habitat loss and degradation are the 2 major issues of concern for this species. Declines of up to 90% of the historic pine forests and deciduous riparian habitats in western states have been documented, and these are two of the major breeding habitats for Lewis's Woodpecker. Fire suppression and timber harvest have changed conditions in many forest stands, particularly those outside wilderness areas. Forest understories have become overgrown with dense thickets of smaller-diameter trees, canopy cover is higher, and large-diameter trees and snags are less abundant. The resulting habitats are typically unsuitable for Lewis's Woodpecker, as they primarily rely upon large snags in relatively open habitats.

CONSERVATION ACTIONS

Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended strategies include using prescribed fires to maintain desired conditions, designing and implementing silvicultural prescriptions that simulate natural disturbance regimes, and implementing Best Management Practices for riparian systems.

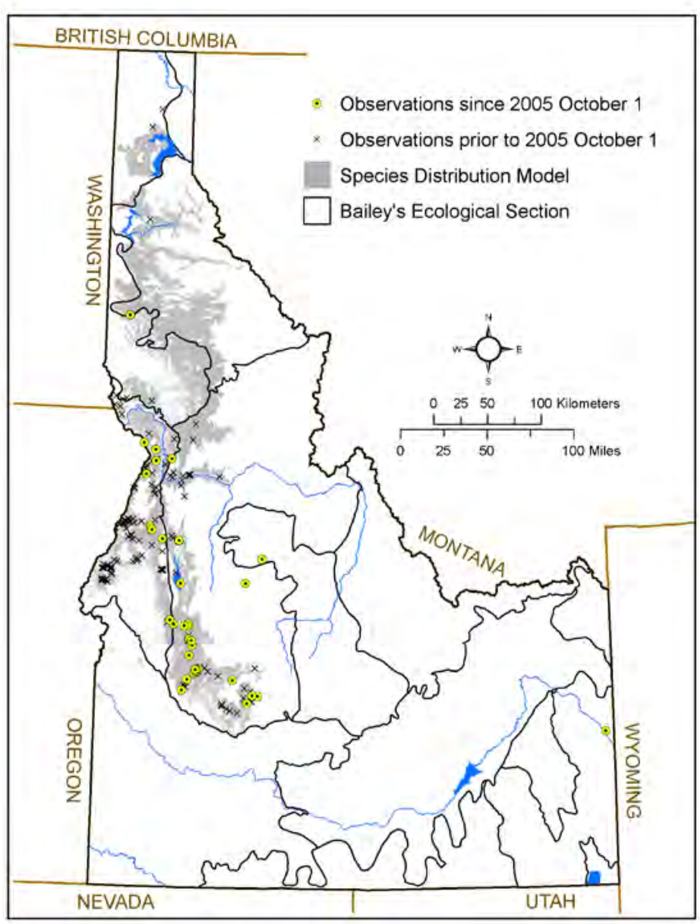
ADDITIONAL COMMENTS

None.

Information Sources: Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model modified by IDFG biologists).

White-headed Woodpecker

Picoides albolarvatus



Class: Aves
Order: Piciformes
Family: Picidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: Sensitive
Region 4: Sensitive
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S2

SGCN TIER: 3
Rationale: Population decline, low population size, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 48,500 km^2 (~18,700 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith, Palouse Prairie
Population Size in Idaho: 250-500
Description: The White-headed Woodpecker occurs throughout montane coniferous forests of the West—chiefly east of the Cascade summit in the Pacific Northwest—and is resident from south-central British Columbia, eastern Washington, western Idaho, eastern Oregon, and west-central Nevada, south through the Sierra Nevada, Coast Ranges, and highest mountains of southern California. Some individuals may migrate to lower elevations during winter months. Because of complex topography and localized suitable coniferous forest habitat, populations are considerably more fragmented than mapped. Population size for this species in Idaho is estimated at approximately 320 individuals.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The White-headed Woodpecker is endemic to pine-dominated (Pinus spp.) forests in the mountainous regions of the West. In its northernmost range, this species typically inhabits dry coniferous forests dominated by ponderosa pine. Stands are typically multistoried and open-canopied mature and old-growth ponderosa pine. This species' status is an indicator of the quality of large-diameter ponderosa pine habitats, which are used for breeding, roosting, and foraging. Throughout its range, the dominant requisite habitat components are the abundance of large-diameter pines (with large cones and abundant seed production), relatively open canopy (50–70%), and availability of snags and stumps (mostly high-cut) for nest cavities. These

birds opportunistically use recently burned or cut areas provided that large standing trees remain.

POPULATION TREND

Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Decline 30–50%
Description: No Idaho-specific trend data exist for this species. Like other woodpeckers, White-headed Woodpecker is not well-suited for population trend monitoring by BBS because its breeding season (when birds are most vocal) occurs in the spring before BBS surveys commence and its habitat is underrepresented by existing routes. However, analysis during the Interior Columbia Basin Ecosystem Management Project indicated that White-headed Woodpecker was one of 97 species analyzed associated with severe loss of habitat (>60% decline from historical conditions), indicating the likelihood of significant long-term population declines. More recent work on the Payette National Forest indicates low, but stable, occupancy rates.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: Habitat loss, specifically the reduction of large-diameter (≥53 cm) live and dead ponderosa pine, and habitat degradation through changes in historical fire regimes, pose the greatest threat to White-headed Woodpecker in its northern range. Much once suitable habitat has been rendered unsuitable either through silvicultural practices or stand conversions (as a result of fire suppression) to Douglas-fir and true fir. Old-growth ponderosa pine forests in the northern Rocky Mountains, Intermountain West, and eastside Cascades represent some of the most imperiled major forest types (85–98% decline) in US.

CONSERVATION ACTIONS

Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended strategies include using prescribed fire to maintain desired conditions, promoting retention and maintenance of large tree size classes and open canopy stands of ponderosa pine, working with partners to incorporate snag retention guidelines and legacy tree guidelines into timber projects, and designing and implementing silvicultural prescriptions that simulate natural disturbance regimes.

ADDITIONAL COMMENTS

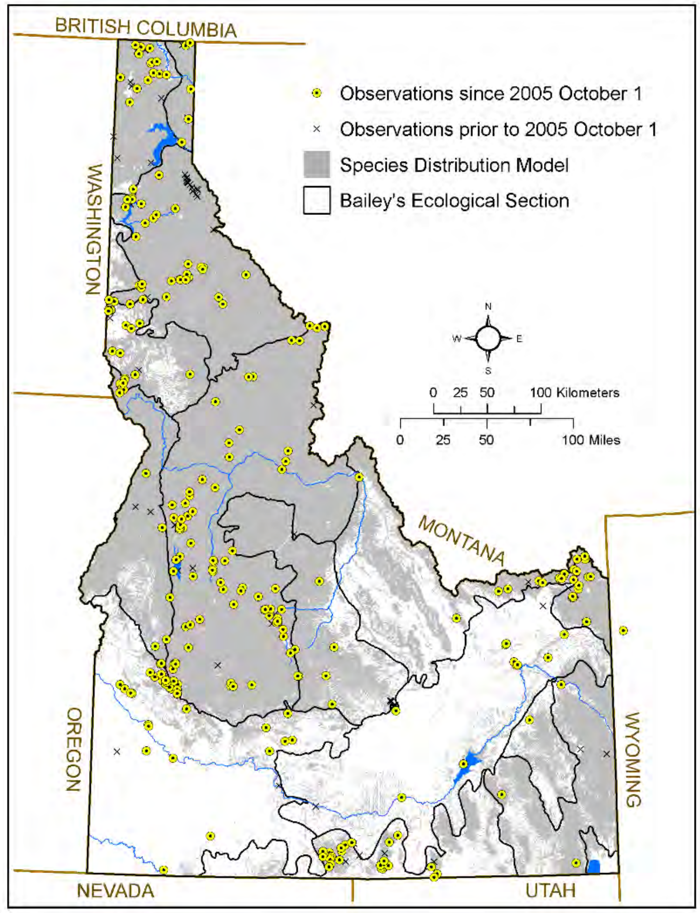
None.

Information Sources: Oliver WW, Ryker RA. 1990. *Pinus ponderosa* Dougl. ex Laws. Ponderosa Pine, p. 413–424. In Burns RM, Honkala BH [eds.], Silvics of North America: vol. 1. Conifers. Agric. Handb. 654. Washington (DC): USDA Forest Service; Langston N. 1995. Forest dreams, forest nightmares: the paradox of old growth in the Inland West. Seattle (WA): University of Washington Press; Noss RF, LaRoe ET, Scott JM. 1995. Endangered ecosystems of the United States: a preliminary assessment of loss and degradation. Biological Report 28. Washington (DC): US Department of the Interior, National Biological Service; Wisdom MJ, Holthausen RS, Wales BC, Hargis CD, Saab VA, Lee DC, Hann WJ, Rich RD, Rowland MM, Murphy WJ, Earnes MR. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad–scale trends and management implications. Portland (OR): US Forest Service, Pacific Northwest Research Station. [accessed 2015 Jun 01]. 3 vol. PNW–GTR–485. http://www.fs.fed.us/pnw/pubs/gtr485/; Dixon RD. 2010. Status and conservation of White–headed Woodpecker (*Picoides albolarvatus*) in the Interior West, USA: a metapopulation approach. Dissertation. Moscow (ID): University of Idaho; Saab V, US Forest Service, pers. comm.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Olive-sided Flycatcher

Contopus cooperi



Class: Aves
Order: Passeriformes
Family: Tyrannidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S3B

SGCN TIER: 3
Rationale: Rangewide declines, threats related to insecticides, IUCN Near Threatened

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 198,200 km^2 (~76,500 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Okanogan Highlands, Palouse Prairie, Yellowstone Highlands
Population Size in Idaho: 30,000-50,000
Description: Olive-sided Flycatchers breed throughout Canada south through western US along the Cascades and Rocky Mountains from sea level to 3,350 m (11,000 ft). This flycatcher undergoes one of the longest migrations of all northern-breeding migrants, wintering primarily in Panama and the Andes Mountains of South America. In Idaho, Olive-sided Flycatchers breed throughout the northern half of the state. There are an estimated 840,000 individuals in the US. Approximately 40,000 of them are in Idaho during the breeding season.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Olive-sided Flycatchers typically breed in mid- to high-elevation mixed conifer forests along forest edges and openings, including burns and clear-cuts. They require tall, prominent trees and snags, which serve as singing and foraging perches, and unobstructed air space for hunting. Nesting territories are relatively large for a passerine bird—1 pair may defend up to 40–45 ha (100–110 acres). The Olive-sided Flycatcher is monogamous and produces 1 brood per year. It will renest if it experiences early nest failure. This species preys almost exclusively on flying insects, especially bees. Olive-sided Flycatcher abundance is often higher in

forest recently burned by stand-replacing wildfire, and is considered by some to be a burn specialist.

POPULATION TREND
Short-term Trend: Decline 10–30%
Long-term Trend: Unknown
Description: Olive-sided Flycatcher has experienced significant declines throughout its range. North American Breeding Bird Survey data reveal statistically significant long-term (1966-2013) and short-term (2003-2013) declines in the US (-2.8% and -2.1% per year, respectively), Northern Rockies (-3.2% and -2.6% per year, respectively), and numerous individual states, including Idaho (-3.4% and 3.9% per year, respectively). These declines contributed to the North American Bird Conservation Initiative's decision to designate this species as a Yellow Watch List species.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Reasons for decline are currently unknown. Fire suppression and timber harvest have changed conditions in many forest stands, particularly those outside wilderness areas. Forest understories have become overgrown with dense thickets of smaller-diameter trees, canopy cover is higher, and large-diameter trees and snags are less abundant. The resulting habitats are unsuitable for Olive-sided Flycatchers, as they primarily rely upon relatively open habitats. There is increasing concern that this species, along with other aerial insectivores, may be impacted by chemical control of insect populations. Developed in the 1990s, neonicotinoids are the most widely used insecticide on earth. They are used on crops, pet collars, home and garden products, and as seed coatings, to name a few. They are often used pre-emptively, as in the case of seed coatings, and are highly toxic to wildlife. This genre of insecticides is suspected to play a part in the significant decline of insectivorous birds, but more research is needed.

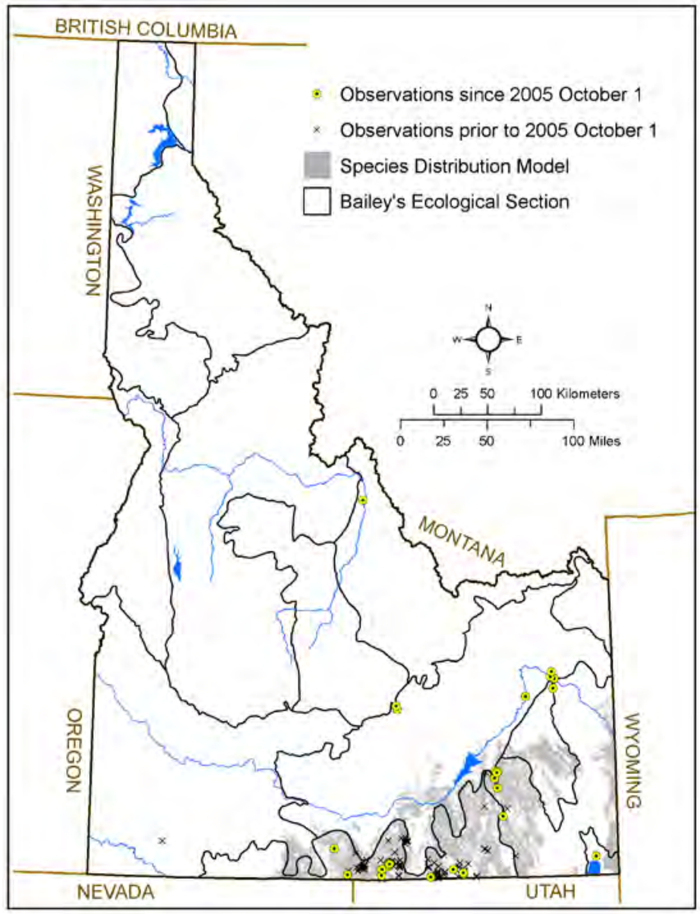
CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, recommended strategies include using prescribed and natural fires to maintain desired conditions, designing and implementing silvicultural prescriptions that simulate natural disturbance regimes, reducing use of neonicotinoids on the landscape, and promoting cooperation and collaboration with the Western Working Group of Partners in Flight to fill knowledge gaps and mitigate threats.

ADDITIONAL COMMENTS
Often diving for insects from high, prominent perches at the tops of snags or dead tips or uppermost branches of live trees, the Olive-sided Flycatcher has been described as "the Peregrine of flycatchers". This behavior, along with its distinctive loud and resounding song—quick, THREE BEERS!—makes this SGCN one of our more recognizable forest migrants.

Information Sources: Altman B, Sallabanks R. 2012. Olive–sided Flycatcher (*Contopus cooperi*), The Birds of North America Online (A. Poole, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Partners in Flight Science Committee 2013. Population Estimates Database, version 2013. Available at http://rmbo.org/pifpopestimates. Accessed 9 Dec 2015; Mineau P, Palmer C. 2013. The impact of the nation's most widely used insecticides on birds. American Bird Conservancy report; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

Pinyon Jay

Gymnorhinus cyanocephalus



Class: Aves
Order: Passeriformes
Family: Corvidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S3

SGCN TIER: 2
Rationale: Rangewide declines, multiple threats, IUCN Vulnerable

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 24,600 km^2 (~9,500 mi^2)
Key Ecological Sections: Northwestern Basin and Range
Population Size in Idaho: 1,000–2,500
Description: The Pinyon Jay is found in the western and southwestern US. It is a resident in southeastern Idaho. Generally winters in the breeding range, but when pine-cone crop fails, may irrupt into northern Idaho. The Pinyon Jay is locally common in southeastern Idaho where the population size is estimated to be about 1,700 individuals. It is found almost exclusively in the Northwestern Basin and Range Ecological Section.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: The Pinyon Jay is a highly social, seed-caching, cooperative-breeder that is closely tied to pinyon-juniper woodlands. It may also breed in sagebrush and ponderosa pine forests. This species prefers more mature stands of pinyon as older trees tend to produce more seeds. The Pinyon Jay has a complex social organization, with permanent flocks that may contain more than 500 individuals. Many birds spend their entire lives in their natal flocks. They nest colonially and young from multiple nests will gather in crèches, which may contain hundreds of individuals. Individuals that do disperse—mostly females before they are one year of age—generally travel short distances. Pinyon Jays may live 16 years. If habitat conditions are good, a flock may occupy the same home range for decades. In years when cone crops fail, individuals may disperse far from their normal range, making them one of the truly "irruptive" bird species of North America.

POPULATION TREND

Short-term Trend: Decline 10–30%

Long-term Trend: Unknown

Description: The Pinyon Jay has experienced significant declines throughout its range. North American Breeding Bird Survey data reveal statistically significant long-term (1966-2013) and short-term (2003-2013) declines in the US (-4.4% and -3.6% per year, respectively), western BBS region (-4.3% and -3.6% per year, respectively), Great Basin (-4.7% and -3.6% per year, respectively), and numerous individual states. These declines contributed to the North American Bird Conservation Initiative's decision to designate the Pinyon Jay as a Yellow Watch List species. No trend data are available for Idaho due to low detection rates.

THREATS

Overall Threat Impact: Medium

Intrinsic Vulnerability: Not intrinsically vulnerable

Description: The primary threat to Pinyon Jay is land management policy to eradicate pinyon-juniper woodlands because of concern about encroachment into sagebrush communities. Juniper has been managed as an invasive species on public and private lands for more than 60 years and large areas have been eradicated to promote grasslands and shrublands. Increasing fire frequency and severity in pinyon-juniper habitats is also a concern, which is exacerbated by drought and climate change. Nesting colonies are also sensitive to human disturbance.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the Northwestern Basin and Range Section plan. In short, recommended strategies include retaining patches of mature pinyon or pinyon-juniper, retaining large trees (which are the most prolific cone-producers), protecting old growth pinyon-juniper stands from fire, and developing appropriate fire suppression plans.

ADDITIONAL COMMENTS

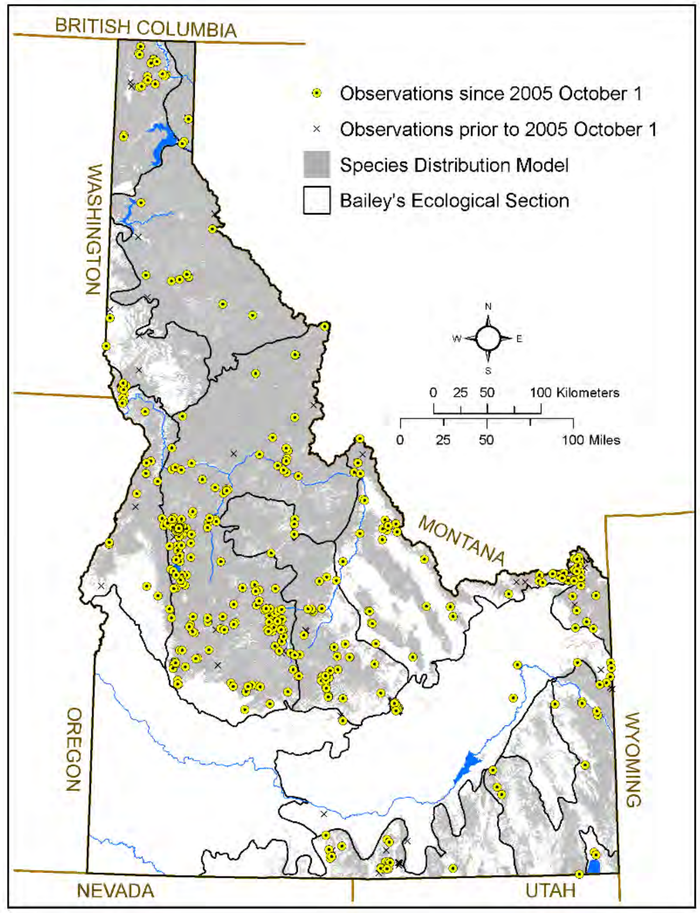
Pinyon Jays have excellent spatial memories that enable them to accurately recover hidden food stores months after caching, even beneath snow.

Information Sources: Partners in Flight Science Committee 2013. Population Estimates Database, version 2013. Available at http://rmbo.org/pifpopestimates. Accessed 9 Dec 2015; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Clark's Nutcracker

Nucifraga columbiana



Class: Aves
Order: Passeriformes
Family: Corvidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S2

SGCN TIER: 3
Rationale: Multiple threats to habitat and food source

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 158,600 km^2 (~61,200 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Okanogan Highlands, Yellowstone Highlands
Population Size in Idaho: 12,000
Description: The Clark's Nutcracker inhabits montane regions of the western US and Canada. In Idaho, observations are broadly distributed in northern, central and southeastern portions of the state. Idaho's breeding population is estimated at 12,000 birds, or about 5% of the US population.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: The Clark's Nutcracker breeds in open coniferous forests from montane to subalpine zones. It generally nests at lower elevations and moves upslope to subalpine forests later in summer, particularly where whitebark and/or limber pine occurs. It specializes on seeds of masting conifer species and relies on cached seeds for overwintering and breeding. Nesting begins in January and February. Pairs construct platform nests on outer, horizontal branches, sheltered from wind and close to food stores. Females lay a clutch of 2-5 eggs in March or April, and young typically fledge in April or May. In late spring, family groups and nonbreeding individuals migrate to higher elevations to retrieve seed stores made available by snowmelt. Their diet shifts to fresh seeds once the new seed crop is ripe, at which time most juveniles become independent and forage for themselves. The Clark's Nutcracker is a keystone species in North America because it plays an important role in forest regeneration and seed dispersal for

many conifer species. Whitebark pine, in particular, germinates almost exclusively from Clark's Nutcracker seed caches that are not retrieved before snowmelt and summer rains. Seed caching begins in late summer and continues through fall. In the event of simultaneous cone crop failures, large numbers of birds will leave their home region and irrupt into areas where they are not typically found. This species is known to live up to 17 years.

POPULATION TREND
Short-term Trend: Decline 30–50%
Long-term Trend: Unknown
Description: Populations fluctuate from year to year, primarily based on food availability. North American Breeding Bird Survey data in Idaho suggest both a long-term decline (-0.4% per year from 1966-2013) and an even steeper short-term decline (-5.1% per year from 2003-2013). However, neither trend was statistically significant, likely because of a limited number of BBS routes in suitable habitat.

THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: High-elevation whitebark pine forests are declining because of a rapid expansion of an nonnative pathogen that causes white pine blister rust, native Mountain Pine Beetle outbreaks, and altered fire regimes. Decades of fire suppression has advanced the development of late successional stands that are generally more shade-tolerant, fire-intolerant, and structurally more dense and homogenous. Warming temperatures and broad-scale changes in precipitation patterns are likely to increase the extent and severity of stand-replacing wildfires, disease outbreaks, and insect infestations. From 2009-2013, the Greater Yellowstone Ecosystem Clark's Nutcracker population failed to breed in 2 of 5 years following fall seasons with low whitebark pine cone crops and high snowpack in early spring. Although this breeding strategy may maximize long-term survival and allow birds to exploit unpredictable environments, it can also expedite population-level impacts if pine seed crop failures are prolonged.

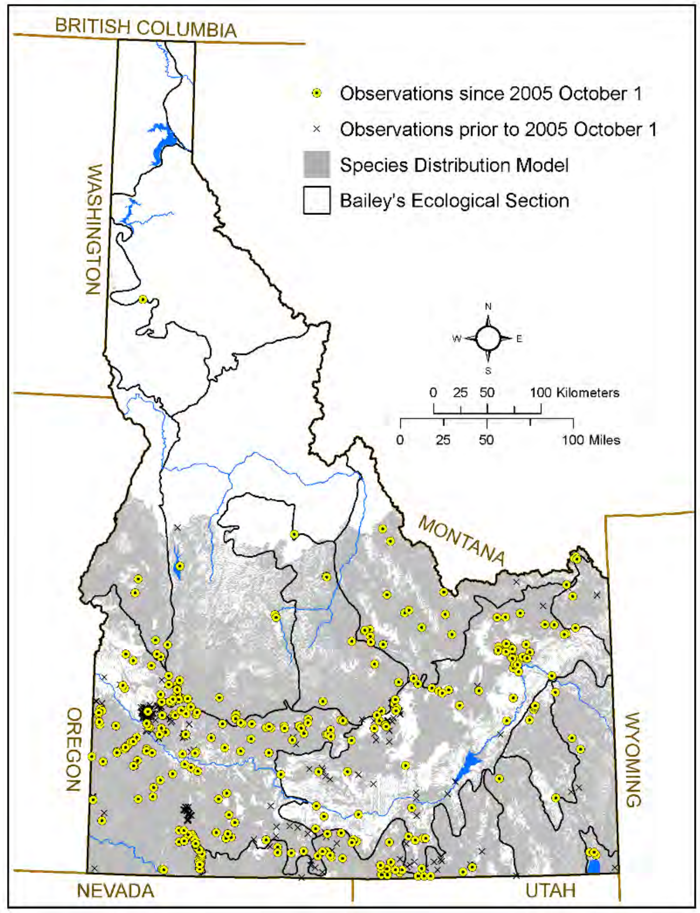
CONSERVATION ACTIONS
Conservation actions are described in the appropriate section plans. In summary, strategies include actively managing high-elevation forests to increase resiliency to disturbance and climate change, increasing the diversity of stand age, size classes, and tree species, retaining and restoring rust-resistant whitebark pine communities, and engaging forest collaboratives to develop and implement forest restoration projects.

ADDITIONAL COMMENTS
None.

Information Sources: Tomback DF. 1998. Clark's Nutcracker (*Nucifraga columbiana*), The Birds of North America Online (A. Poole, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Schaming TD. 2015. Population–wide failure to breed in the Clark's Nutcracker (*Nucifraga columbiana*). PLoS ONE 10(5): e0123917. Doi:10.1371/journal.pone.0123917; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ Jr, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; Partners in Flight Science Committee 2013. Population Estimates Database, version 2013. Available at http://rmbo.org/pifpopestimates. Accessed 16 Dec 2015; Barringer LE, Tomback DF, Wunder MB, McKinney ST. 2012. Whitebark pine stand condition, tree abundance, and cone production as predictors of visitation by Clark's Nutcracker. PLoS ONE 7(5): e37663. doi:10.1371/journal.pone.0037663.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Sage Thrasher

Oreoscoptes montanus



Class: Aves
Order: Passeriformes
Family: Mimidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S3B

SGCN TIER: 2
Rationale: Declining populations, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 150,000 km^2 (~57,900 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Challis Volcanics, Northwestern Basin and Range, Overthrust Mountains, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: 300,000–600,000
Description: Sage Thrashers breed from valleys to above 2,000m (6,500 ft) throughout the Intermountain West. In Idaho they can be found in the southern half of the state, tightly associated with sagebrush-steppe habitats. This species typically winters in the southwestern US and Mexico, but can stray towards the Atlantic Coast. Rangewide, there are an estimated 5.9 million individuals. Approximately 400,000 of them are in Idaho during the breeding season.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: The Sage Thrasher is a sagebrush-obligate species dependent on large patches of sagebrush steppe for successful breeding. Throughout the main portion of the breeding range, this species nests most commonly in big sagebrush and three-tip sagebrush, and occasionally uses other species, such as low sagebrush and rabbitbrush. For nesting, it shows a strong preference for tall (>70 cm [28 in]) shrubs. Sage Thrashers breed as second-year birds (first year after hatching), and annually thereafter. Typical of thrashers, this species is elusive when disturbed, frequently running on the ground rather than taking flight. It is known to reject cowbird eggs. Sage Thrashers feed mostly on insects on the ground, but they will also take berries. This species tends to wander during migration, with individuals occasionally showing up as far East as the Atlantic seaboard.

POPULATION TREND
Short-term Trend: Decline 10–30%
Long-term Trend: Decline 50-70%
Description: The Sage Thrasher has experienced declines throughout its range. North American Breeding Bird Survey data reveal statistically significant long-term (1966-2013) and short-term (2003-2013) declines in the US (-1.4% and -1.2% per year, respectively), Great Basin (-1.6% and -1.0% per year, respectively), and Idaho (-1.6% and -1.4% per year, respectively). Populations are mostly stable where suitable shrubsteppe habitat remains intact in large patches. However, some populations have been dramatically reduced in size, and even locally extirpated, where there has been conversion of sagebrush to grassland.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Currently, the loss of shrub steppe habitat resulting primarily from post-wildfire invasion of cheatgrass is the main concern for Sage Thrasher. In the past, broadscale mechanical, chemical, and burning methods to remove big sagebrush and increase grasses and forbs for livestock grazing probably had significant impact on the species' distribution, productivity, and long-term population trends.

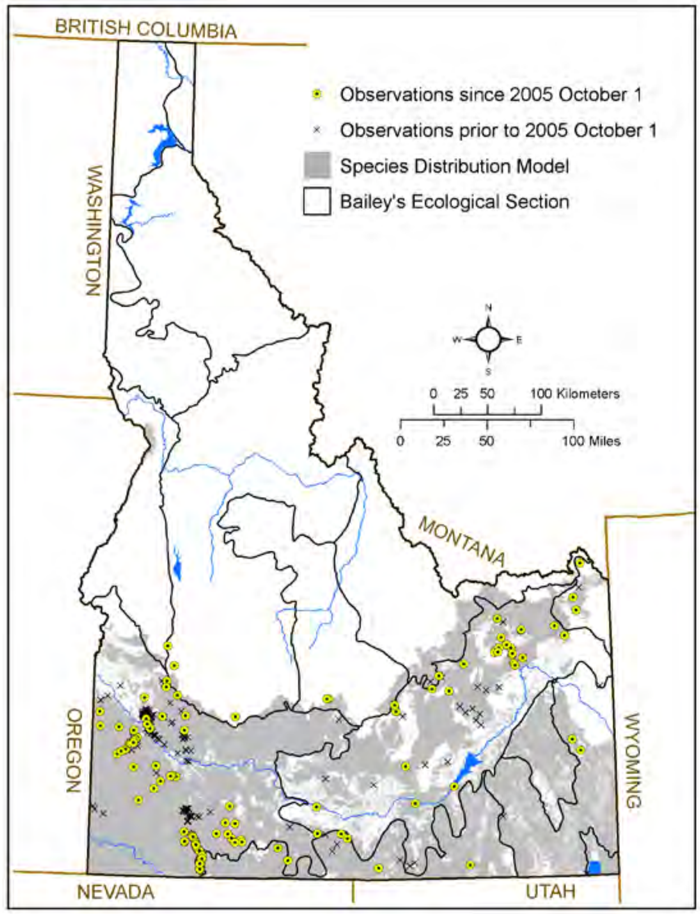
CONSERVATION ACTIONS
Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended strategies include supporting long-term strategies for the restoration of sagebrush-steppe ecosystems, protecting Wyoming big-sagebrush from destruction by wildfire, implementing actions to reduce spread of invasive plants, and implementing large-scale experimental activities to remove cheatgrass and other invasive annual grasses.

ADDITIONAL COMMENTS
None.

Information Sources: Reynolds TD, Rich TD, Stephens DA. 1999. Sage Thrasher (*Oreoscoptes montanus*), The Birds of North America Online (A. Poole, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Partners in Flight Science Committee 2013. Population Estimates Database, version 2013. Available at http://rmbo.org/pifpopestimates. Accessed 14 Dec 2015; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

Sagebrush Sparrow

Artemisiospiza nevadensis



Class: Aves
Order: Passeriformes
Family: Emberizidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S3B

SGCN TIER: 2
Rationale: Declining populations, threats to habitat

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 96,200 km^2 (~37,100 mi^2)
Key Ecological Sections: Beaverhead Mountains, Blue Mountains, Northwestern Basin and Range, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: 40,000–60,000
Description: The Sagebrush Sparrow is a widespread breeder in shrubsteppe habitats throughout much of the Great Basin east of the Cascades and Sierra Nevadas and west of the Rockies. It has a scattered distribution throughout southern Idaho. Due to a recent taxonomic split (Sage Sparrow [*Artemisiospiza belli*] was split into 2 species: Sagebrush Sparrow and Bell's Sparrow [*A. belli*]), the current population for this species is unknown. Approximately 50,000 individuals are in Idaho during the breeding season.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Sagebrush Sparrows prefer semiopen habitats with evenly spaced shrubs 1–2 m (3-6 ft) high. Vertical structure, habitat patchiness, and vegetation density may be more important in habitat selection than specific shrub species, but this sparrow is closely associated with big sagebrush throughout most of its range. In Idaho, it prefers big sagebrush, in either pure stands or interspersed with bitterbrush, rabbitbrush, or greasewood. It is rarely found in mixed sagebrush-juniper, except in ecotones adjacent to shrubsteppe habitat. It usually breeds below 1,700 m (5,500 ft), but has been found above 2,400 m (7,800 ft). This species is often missing from what appears to be suitable habitat, so other unknown habitat characteristics may be important. Most nests are found within or under shrubs, and the nest shrub is generally higher than the

average height of surrounding vegetation. The Sagebrush Sparrow is categorized as a ground-foraging omnivore during the breeding season, and as a ground-gleaning granivore during nonbreeding periods. Foods taken during the breeding season include adult and larval insects, spiders, seeds, small fruits, and succulent vegetation.

POPULATION TREND
Short-term Trend: Decline 30–50%
Long-term Trend: Decline >90%
Description: North American Breeding Bird Survey data indicate significant long-term (1966-2013) and short-term (2003-2013) declines in Idaho (-5.1% and -4.8%, respectively). These are the largest declines for this species anywhere within its range.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Loss of shrubsteppe habitat, primarily resulting from post-fire invasion of cheatgrass, is the main concern for this species. Habitat loss throughout the Great Basin and other shrub-dominated ecosystems by mechanical, chemical, and burning methods to remove big sagebrush and increase grasses and forbs for livestock grazing has probably had an impact on Sagebrush Sparrow distribution, productivity, and long-term population trends.

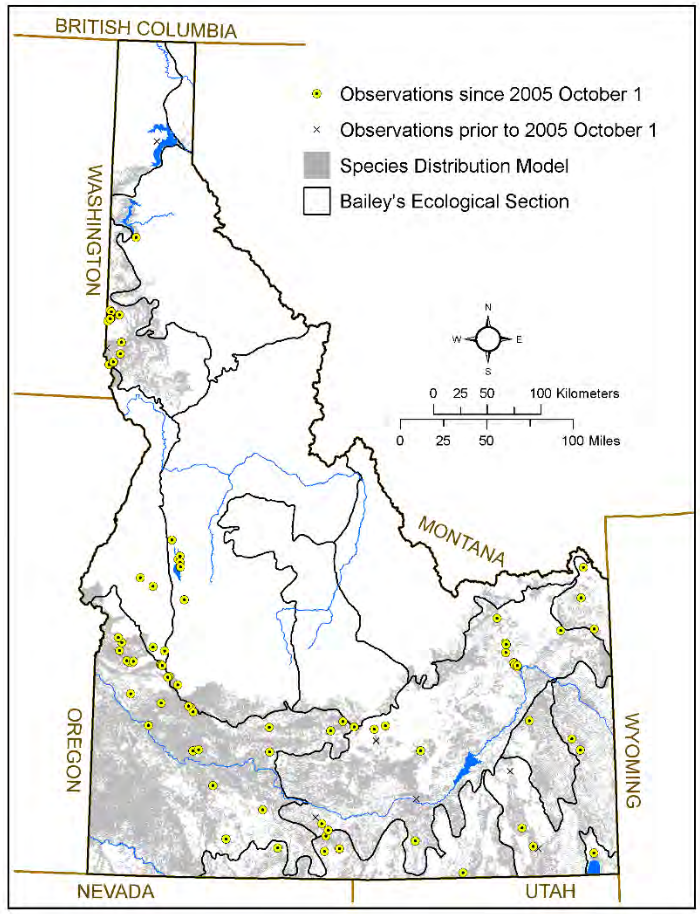
CONSERVATION ACTIONS
Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended actions include supporting long-term strategies for the restoration of sagebrush-steppe ecosystems, protecting Wyoming big-sagebrush from destruction by wildfire, implementing best management practices to reduce spread of invasive plants, and implementing large-scale experimental activities to remove cheatgrass and other invasive annual grasses.

ADDITIONAL COMMENTS
None.

Information Sources: Martin JW, Carlson BA. 1998. Sage Sparrow (*Artemisiospiza belli*). The Birds of North America Online (A. Poole, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/326. doi:10.2173/bna.326; Partners in Flight Science Committee 2013. Population Estimates Database, version 2013.Available at http://rmbo.org/pifpopestimates. Accessed on 12/14/2015; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

Grasshopper Sparrow

Ammodramus savannarum



Class: Aves
Order: Passeriformes
Family: Emberizidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S3B

SGCN TIER: 3
Rationale: Limited distribution, rangewide population declines

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 113,300 km^2 (~43,700 mi^2)
Key Ecological Sections: Blue Mountains, Northwestern Basin and Range, Owyhee Uplands, Palouse Prairie, Snake River Basalts
Population Size in Idaho: 130,000
Description: The Grasshopper Sparrow breeds in temperate grassland habitats throughout much of the US, southern and southeastern Canada, and northern Mexico. Despite this wide extent, it is locally distributed and even uncommon and rare in parts of its range. In Idaho, the species is locally abundant in suitable habitat in the Palouse Prairie and the Snake River Plain. Winter range includes the southern US, Mexico, Central America, and the Caribbean.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce
Description: The Grasshopper Sparrow is a small, inconspicuous grassland bird that breeds in a broad array of open grasslands of intermediate stature and age, including native prairie, pastures, hayfields, planted grasslands (e.g., crested wheatgrass), recently burned sites, and open sagebrush steppe. In the West, this species prefers drier sites with intermediate grass height, patchy bare ground for foraging, and sparse shrub cover, and is more likely to occupy large tracts of habitat than small fragments. In the Columbia Basin, Grasshopper Sparrows were most abundant in perennial bunchgrass grasslands, and to a lesser extent in sagebrush-bunchgrass habitat, and least abundant in degraded sagebrush with an annual understory dominated by cheatgrass. Nests are hidden at the base of clumps of grass or other vegetation and consist of a grass cup nest with a domed-shape overhang and side entrance. If conditions allow, pairs may

raise 2 broods per season. Average clutch size is 4-5 eggs. Its diet consists primarily of insects (mostly grasshoppers) as well as seeds. Its song is weak and insect-like, making this species difficult to detect during the breeding season.

POPULATION TREND

Short-term Trend: Decline 10–30%

Long-term Trend: Unknown

Description: According to BBS, Grasshopper Sparrow populations have declined over 70% in the US (-2.8% per year) and 67% in the western BBS region (-2.3% per year) from 1966-2013. In Idaho, populations declined 68% (-2.4% per year) from 1966-2013 and 22% (-2.5% per year) from 2003-2013; however, neither trend was statistically significant, likely because of a limited number of BBS routes within Grasshopper Sparrow habitat.

THREATS

Overall Threat Impact: High

Intrinsic Vulnerability: Not intrinsically vulnerable

Description: Habitat loss, fragmentation, and degradation are primary reasons for Grasshopper Sparrow declines rangewide. Threats include the conversion of native grasslands to agricultural land (e.g., on the Palouse Prairie), conversion of hayfields and pastures to intensive agriculture (facilitated by center-pivot irrigation), and residential development. Energy development can lead to direct mortality from collisions and indirect impacts from infrastructure, such as increasing edge habitat, predators and nest parasites, human disturbance, and the spread of noxious weeds. Improperly managed grazing can reduce floristic and structural diversity, ground nest cover, and interrupt fire cycles, while some prescriptive grazing can have site-specific benefits. The invasion of cheatgrass and other nonnative annual grasses has fundamentally altered fire regimes, resulting in the loss and degradation of preferred habitat. Elsewhere, fire suppression and reduced fuel loads from grazing has decreased fire frequency and led to the encroachment of native shrubs and trees. Early season mowing of hayfields and agricultural grasslands can cause direct mortality, nest failure, and reduced site fidelity. Drought and changes in precipitation patterns due to climate change can negatively impact insect abundance, productivity, and exacerbate threats. Pesticide use can directly poison birds and reduce food resources.

CONSERVATION ACTIONS

Conservation actions are described in the appropriate section plans. Recommended strategies include maintaining intermediate grasslands in various stages of succession by supporting proper livestock grazing (manage timing and intensity), fire management (including prescribed burning without significantly reducing shrub cover), mowing practices compatible with Grasshopper Sparrow nesting phenology, and promoting grassland protection and restoration on private lands using federal Farm Bill programs.

ADDITIONAL COMMENTS

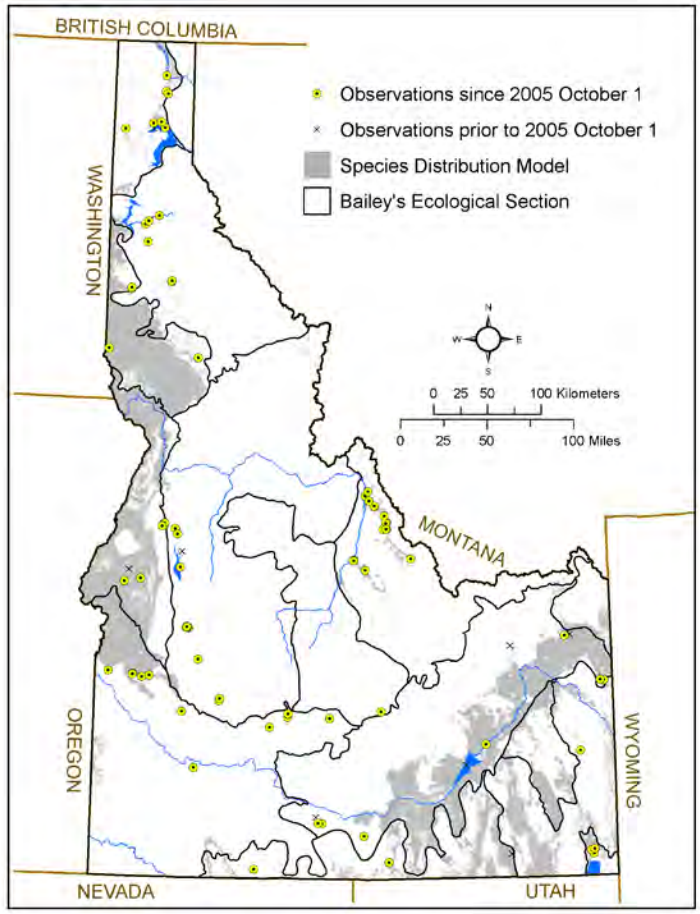
None.

Information Sources: Vickery PD. 1996. Grasshopper Sparrow (*Ammodramus savannarum*), The Birds of North America Online (A. Poole, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ Jr, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; Ruth JM. 2015. Status Assessment and Conservation Plan for the Grasshopper Sparrow (*Ammodramus savannarum*). Version 1.0 U.S. Lakewood (CO): US Fish and Wildlife Service.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

Bobolink

Dolichonyx oryzivorus



Class: Aves
Order: Passeriformes
Family: Icteridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S2B

SGCN TIER: 2
Rationale: Population declines, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 107,000 km^2 (~41,300 mi^2)
Key Ecological Sections: Beaverhead Mountains, Yellowstone Highlands
Population Size in Idaho: 12,000
Description: The Bobolink is a neotropical migrant that breeds in grasslands of the US and Canada (generally between 39° and 50° latitude) and winters in the southern interior of South America. Idaho is on the western edge of its breeding range, where populations are generally patchily distributed. Bobolinks are known to occur in relatively small aggregations in suitable habitat. There is uncertainty regarding the Idaho population size due to low relative abundance and limited coverage of the species in BBS.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Bobolinks are ground-nesting birds that breed in native prairie, wet meadows, and surrogate grasslands in nonforested landscapes. Private agricultural lands, including irrigated forage crops and pastures, compose a high proportion of nesting habitat in Idaho. Bobolinks prefer moist grasslands with forbs for nest concealment, thermal cover, and abundant prey items (especially caterpillars). Bobolinks are area sensitive; both occupancy and abundance increases with habitat patch size. Territorial males are known for elaborate songs and ritualized displays, and may pair with multiple females. Adults typically raise one brood per season. If conditions allow, pairs may renest if a nesting attempt fails. Bobolinks feed on invertebrates (exclusive nestling food source), weed seeds, and grains. Adults of both sexes show high fidelity to breeding sites, influenced by previous reproductive success.

POPULATION TREND

Short-term Trend: Decline 30-50%
Long-term Trend: Unknown
Description: Historically, Bobolinks nested in tall-grass and mixed-grass prairie habitats of the Midwest, but expanded both east and westward because of surrogate grassland habitats created by low-intensity agriculture. However, populations have declined significantly through much of the breeding range since the 1960s. Based on BBS data, there were statistically significant long-term declines from 1966–2013 in the US (−1% per year), the western BBS region (−2.9% per year), and in Idaho (−6.9% per year). Since 2003, the Idaho trend was −6.6% per year, although not statistically significant. There is some uncertainty regarding the Idaho trends due to a small sample size.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Bobolinks are susceptible to direct mortality and nest failure from hay cutting. Successful breeding on working lands, therefore, depends on hay cutting regimes that are compatible with the Bobolink's nesting phenology. Suitable nesting habitat is lost to more intensely-farmed crops (facilitated by center-pivot irrigation), subdivision, and development. Bobolinks are susceptible to pesticides and intentionally poisoned in rice fields on the wintering grounds to control seed predation. Because of potential toxicity to pollinators and birds, neonicotinoid-based products are a concern on both the breeding and wintering grounds. Climate change has the potential to exacerbate these threats. Warming temperatures may accelerate plant growth and lead to earlier and more frequent cutting. Warming temperatures and increasing water demands may also lead to a conversion of irrigated hayfields to more drought-resistant croplands unsuitable for nesting.

CONSERVATION ACTIONS

Conservation issues and management actions for the species are detailed in the Beaverhead Mountains Section plan. Recommended strategies include working with Natural Resources Conservation Service, other relevant agencies, and hay producers to develop incentives to keep working lands in hay and pasture production (hay growers producing for beef-cattle tend to cut at later dates largely compatible with nesting), and studying population-level impacts of pesticide use.

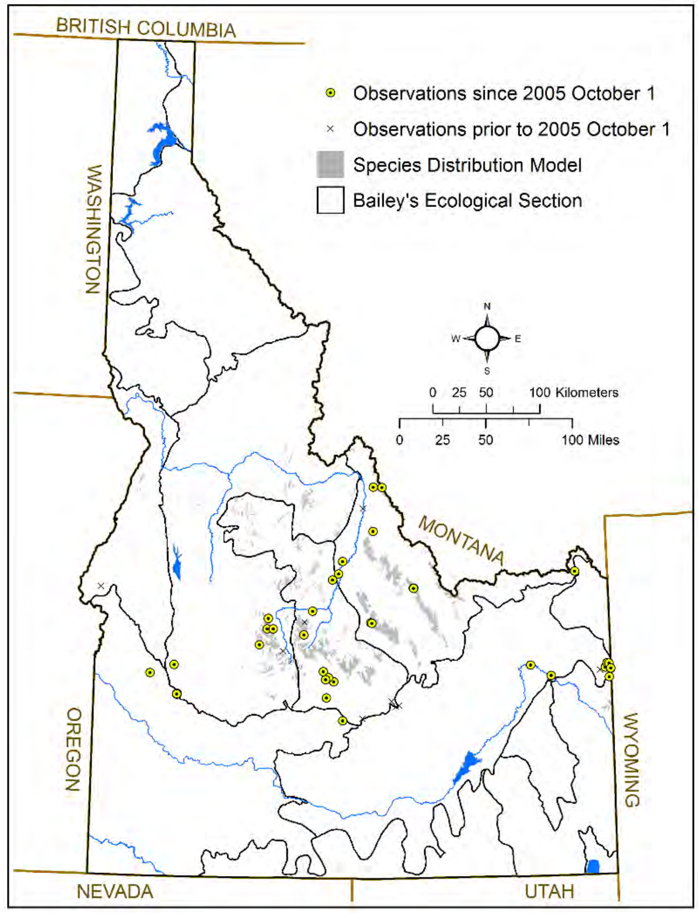
ADDITIONAL COMMENTS

Bobolinks travel about 12,500 miles round-trip every year – one of the longest migrations of any songbird in the New World.

Information Sources: Renfrew R, Strong AM, Perlut NG, Martin SG, Gavin TA. 2015. Bobolink (*Dolichonyx oryzivorus*), The Birds of North America Online (A. Poole, Ed.). Ithaca (NY): Cornell Lab of Ornithology; Wittenberger JF. 1978. The breeding biology of an isolated bobolink population in Oregon. Condor 80:355–371; Bollinger EK. 1995. Successional changes and habitat selection in hayfield bird communities. The Auk 112:720–730; Sauer JR, Hines JE, Fallon JE, Pardieck KL, Ziolkowski DJ Jr, Link WA. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015. Laurel (MD): USGS Patuxent Wildlife Research Center; Partners in Flight Science Committee 2013. Population Estimates Database, version 2013. Available at http://rmbo.org/pifpopestimates. Accessed 2015 Dec 8.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

Black Rosy-Finch

Leucosticte atrata



Class: Aves
Order: Passeriformes
Family: Fringillidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S2

SGCN TIER: 3
Rationale: Restricted distribution, low population size

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 168,800 km^2 (~65,200 mi^2)
Key Ecological Sections: Beaverhead Mountains, Challis Volcanics, Idaho Batholith
Population Size in Idaho: 250–1,000
Description: The Black Rosy-Finch is found breeding above treeline in suitable habitat in central Idaho, including within the Beaverhead, Lemhi, Lost River, Salmon River, and Sawtooth ranges, and Boulder and White Cloud mountains. Winter range for this species includes its breeding range, either on alpine tundra and open slopes just below treeline when snow levels are high, or lower in intermountain valleys when snow levels are lower and upper slopes are snowbound. In Idaho, this includes the intermountain valleys of east-central Idaho, where Black Rosy-Finch are observed in large mixed flocks with more abundant Gray-crowned Rosy-Finch during local Christmas Bird Counts. Winter range also extends southward throughout southern Idaho with records existing for both Boise and Pocatello. No population estimates exist for the Black Rosy-Finch, primarily because of the lack of BBS data for this species.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Nests above timberline throughout its range, wherever cliffs and rock slides provide nest sites with protection from falling rocks and hail, and where there are adequate feeding grounds on tundra, fellfields, rock slides, snowfields, and glaciers within flying distance of nests. In Idaho, nests have been found at 2,620 m (8,600 ft) in the Seven Devils Mountains, typically on north-facing cliffs overlooking snowfields. During migration and in winter, also found in open habitats, fields, cultivated lands, brushy areas, lower montane conifer forests, and around

human habitation. The Black Rosy-Finch eats seeds in winter and seeds and insects on breeding grounds. Is one of only three species known to nest exclusively in alpine habitats in Idaho; the others are the Gray-crowned Rosy-Finch and American Pipit.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: There are no BBS trend data available for the Black Rosy-Finch because of the remoteness (high elevation) of breeding sites for this species. Winter population estimates also are lacking due to the nomadic behavior of winter flocks in response to changing weather and snow depth. As a result, there is currently no information on population trend for this species, either throughout its range in general or in Idaho specifically.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Alpine habitat is limited in Idaho, and is expected to become scarcer in light of climate change. Long–term changes in habitat, including snow depth and snowline as a result of a warming climate, may be the largest threat to Black Rosy-Finch. Work is needed to determine what impacts these changes may have on this species and what could be done to mitigate for them. There is also a need to identify other potential stressors, which may exacerbate any effects of climate change. For example, research in the Sierras indicates that stocking fish in high alpine lakes results in a trophic cascade (loss of mayfly prey) that negatively impact Gray-crowned Rosy-Finches. Whether Black Rosy-Finches are similarly impacted by fish stocking is unknown.

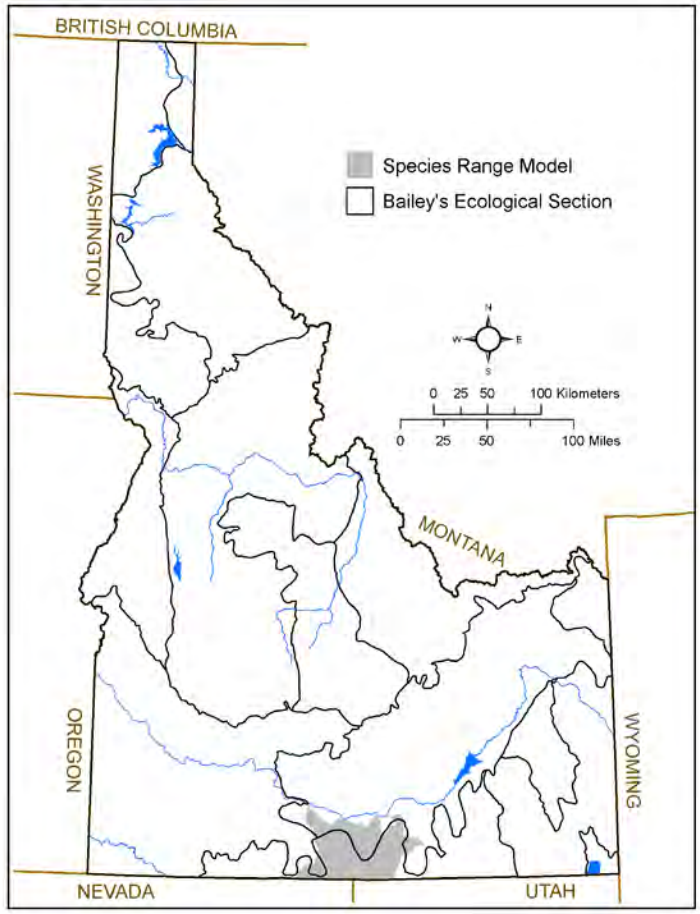
CONSERVATION ACTIONS
Conservation issues and management actions are detailed in the appropriate section plans. In short, recommended strategies are to determine current distribution and abundance, work with partners to identify temperature associations and limits, assess tundra phenology and how it relates to occupancy, and assess potential impacts of fish stocking in high mountain lakes.

ADDITIONAL COMMENTS
None.

Information Sources: Epanchin PN, Knapp RA, Lawler SP. 2010. Nonnative trout impact on alpine–nesting bird by altering aquatic–insect subsidies. Ecology 91(8):2406–2415.; Johnson RE. 2002. Black Rosy-finch (*Leucosticte atrata*). In The Birds of North America, No. 678 (A. Poole and F. Gill, eds.). Philadelphia (PA): The Birds of North America, Inc.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer, winter, and year-round distribution models).

Red Crossbill (South Hills popn.)

Loxia curvirostra



Class: Aves
Order: Passeriformes
Family: Fringillidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: GNR
S-rank: S1

SGCN TIER: 2
Rationale: Disjunct population, endemic

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 4,900 km^2 (~1,900 mi^2)
Key Ecological Sections: Northwestern Basin and Range
Population Size in Idaho: 500-2,500
Description: Red Crossbills are found in parts of North America, Europe, Asia and northern Africa. In North America, they inhabit conifer forests from Alaska to Newfoundland south through much of the western US, portions of the eastern US, and portions of Mexico and Central America. There are 9 distinct types of Red Crossbills. The South Hills form of Red Crossbill, hereafter referred to as the South Hills Crossbill, is found only in the South Hills and Albion Mountains, an isolated mountain range in south-central Idaho. This subtype of Red Crossbill has been proposed as a separate species, but thus far has not been recognized as such by the American Ornithologists' Union. There are currently approximately 1,800 individuals.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: South Hills Crossbills are medium-sized finches with crossed mandibles that allow them to pry open conifer cone scales to access the seeds within. In the South Hills and Albion mountains, lodgepole pine have evolved in the absence of red squirrels, often a primary predispersal predator of their seeds, for 10,000–12,000 years and instead, crossbills fill this role. As a result of coevolution, cone structure of the lodgepole pines and bill morphology (and other traits) of Red Crossbills in this region differ from that of other populations of lodgepoles and crossbills elsewhere. This coevolution and the resultant specialized diet and morphology of the South Hills Crossbill intimately links these birds to lodgepole pine-dominated stands within the

South Hills and Albion Mountains. In fact, because their bills are specialized for foraging on the seeds of lodgepole pines in these ranges, South Hills Crossbills are year-round residents (nonmigratory) and would be at a competitive disadvantage in most other lodgepole pine forests (and in stands of other types of conifers). Crossbills have responded to the extreme variability in conifer seed crops (their preferred food) in a number of ways, including variable age of first breeding and multiple broods per year. This species is apparently monogamous and there is little evidence of territoriality within populations. Females construct bulky, loosely-built cup nests of twigs, grasses, and other materials, typically within conifers and built on horizontal branches away from the trunk. Only females incubate eggs and brood chicks, while both parents feed nestlings.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Because of their restricted distribution, there are no BBS trend data available for the South Hills Crossbill. After remaining relatively stable between 1998-2003, C. Benkman reports that this species declined by 80% between 2003 and 2011, to a low of approximately 370 individuals. This collapse appears to have been associated with hot summer days and low seed crops. Since 2011, the population has rebounded and is approaching pre-decline levels.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threat to South Hills Crossbills may be the loss of lodgepole pine forage availability due to increasing temperatures. Population change in this species appears to be linked to the number of hot summer days in the four years immediately preceding the change. Hot summer days cause the serotinous cones to open early, releasing seeds prematurely in late summer and making fewer seeds available the rest of the year. This resulted in declines in adult survival. In addition, climate change projections suggest that there will be little new recruitment in lodgepole pine forests within 160 km (100 mi) of the South Hills and Albion Mountains. Given the close relationship between South Hills Crossbill and the form of lodgepole pine in the South Hills and Albion Mountains, a lack of lodgepole recruitment would likely adversely affect the South Hills Crossbill population. The potential for wildfire is also a concern as catastrophic wildfire could reduce the already limited amount of lodgepole pine in these mountain ranges, which could rapidly precipitate subsequent declines in crossbill numbers.

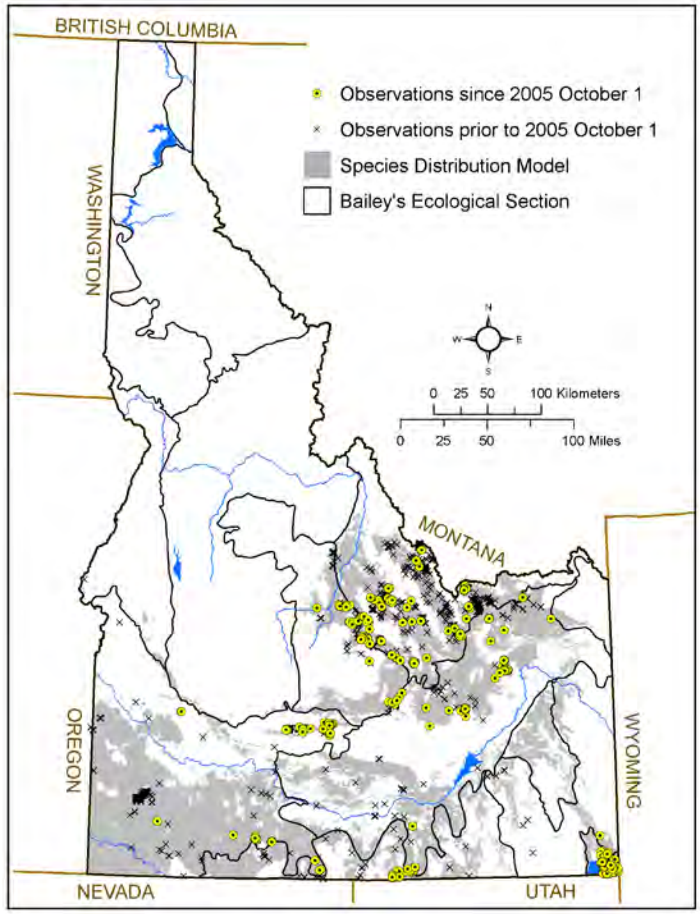
CONSERVATION ACTIONS
Conservation issues and management actions are detailed in the Northwestern Basin and Range Section plan. In short, recommended strategies include preserving remaining stands of late-seral forest that are in excellent ecological condition and ensuring that management actions intended to mitigate forest losses from severe wildfire are consistent with existing fire regimes.

ADDITIONAL COMMENTS
None.

Information Sources: Benkman C, Smith JW, Keenan PC, Parchman TL. 2009. A new species of the Red Crossbill (Fringillidae: Loxia) from Idaho. Condor 111:169–176.
Map Sources: Developed by IDFG biologists based on description in Benkman et al. (2009) following Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program predicted distribution model methodology.

Pygmy Rabbit

Brachylagus idahoensis



Class: Mammalia
Order: Lagomorpha
Family: Leporidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: Sensitive
BLM: Type 2
IDAPA: Upland Game Animals
G-rank: G4
S-rank: S3

SGCN TIER: 2
Rationale: Threats to habitat

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 117,100 km^2 (~45,200 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Challis Volcanics, Northwestern Basin and Range, Overthrust Mountains, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: 100,000–1,000,000
Description: This species occurs in the Great Basin and adjoining intermountain regions, including the southern half of Idaho. Populations are widely scattered across the landscape in appropriate habitat. Recent surveys have documented relatively abundant populations in localized areas.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: The Pygmy Rabbit is a sagebrush obligate occuping sites that typically have the densest and tallest shrubs and deepest soils relative to the surrounding landscape. In the Lost River drainages, Mima mounds (low, flattened, circular to oval, domelike natural mounds composed of loose, unstratified, often gravelly sediment) provide a key resource. Big sagebrush is the primary food item and may represent up to 99% of the winter diet and 50% of the summer diet. In spring and summer, native forbs and grasses make up a larger proportion of the diet. The species is believed to be one of only two rabbit species in North America that digs burrows.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown

Description: Population trends have not been documented.

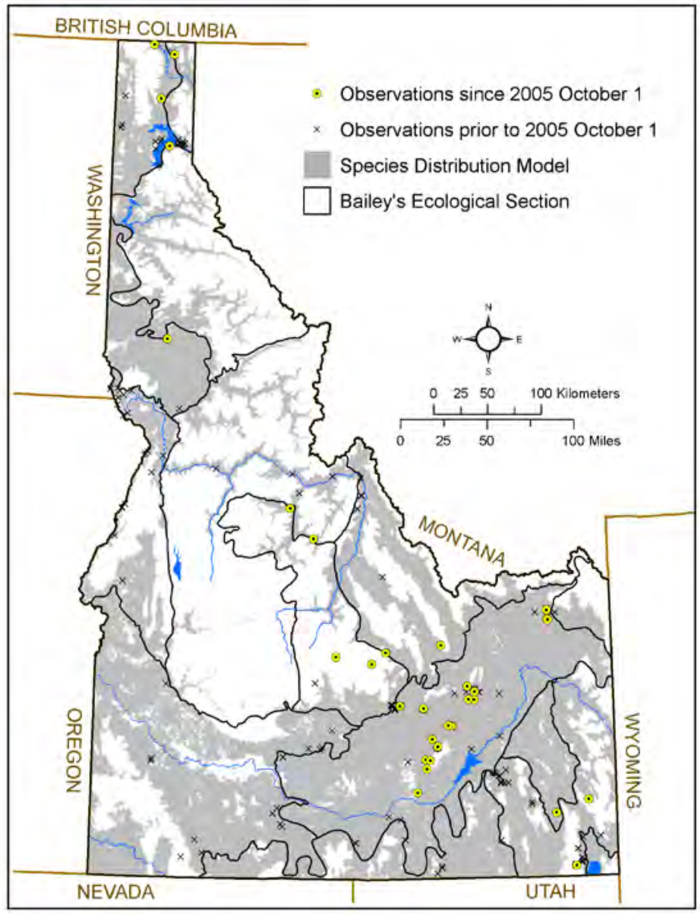
THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: The primary threat to Pygmy Rabbit is the loss and degradation of habitat due to fire and encroachment by woody plants (e.g., juniper) and nonnative grasses (e.g., cheatgrass). Changing climates are exacerbating these issues.

CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, management priorities include maintaining sagebrush cover and ecological function in sagebrush systems, managing invasive plants that outcompete native plants and serve as fine fuels for range fires, and minimizing habitat distruction from fire.

ADDITIONAL COMMENTS
In 2010, the FWS determined the Pygmy Rabbit did not warrant protection under the ESA.

Information Sources: Larrucea ES, Brussard PF. 2008. Shift in location of pygmy rabbit (*Brachylagus idahoensis*) habitat in response to changing environments. Journal of Arid Environments 72:1636–1643; Price AJ, Rachlow JL. 2011. Development of an index of abundance for pygmy rabbit populations. Journal of Wildlife Management 75:929–937; Shipley LA, Davila TB, Thines NJ, Elias BA. 2006. Nutritional requirements and diet choices of the pygmy rabbit (*Brachylagus idahoensis*): A sagebrush specialist. Journal of Chemical Ecology 32:2455–2474.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Townsend's Big-eared Bat
Corynorhinus townsendii



Class: Mammalia
Order: Chiroptera
Family: Vespertilionidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: Sensitive
Region 4: Sensitive
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G3G4
S-rank: S3

SGCN TIER: 3
Rationale: Significant concentration of bats in hibernacula, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Northwestern Basin and Range, Okanogan Highlands, Overthrust Mountains, Owyhee Uplands, Palouse Prairie, Snake River Basalts
Population Size in Idaho: 2,500-10,000
Description: Populations are distributed throughout Idaho but are concentrated on the Snake River Plain in conjunction with a high number of caves in lava formations. The largest reported hibernating colony in the western US occurs in this area. An estimate of the minimum population size in south-central and southeast Idaho is approximately 6,300 bats based on 259 hibernacula surveys and the maximum counts at 57 caves between 1984 and 2014.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: The Townsend's Big-eared Bat occurs in a variety of cover types, including desert scrub, sagebrush steppe, woodlands, and forests. This species is primarily a cave-dwelling bat, but it also roosts in synthetic structures, especially in abandoned mines, as well as buildings and bridges. The largest known populations are associated with lava flows. Individuals typically use exposed roost sites on open surfaces within the roost, making roosting bats vulnerable to vandalism or disturbance. The largest aggregations and most critical roost sites are winter hibernacula and summer maternity roosts comprising aggregations of adult females and their young. Summer day time and night roosts are used to rest and digest food during the night.

Stable, cold temperature is critical to winter hibernacula. Roost temperature, roost dimensions, light quality, and air flow are important factors influencing maternity roost selection. This species is generally recognized for its site fidelity and lack of long-distance migrations. The Townsend's Big-eared Bat is a long-lived species (longevity record of >21 years on the Idaho National Laboratory) with low reproductive potential, giving birth to not more than one pup per year. It is a moth specialist (>90% of its diet).

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: Trends documented in caves on the Snake River Plain in south-central and southeast Idaho from 1984 to 2014 appear to be stable.

THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Highly vulnerable
Description: The primary issues facing this species are disturbance and loss of roost sites through mine closures, renewed mining, recreational caving, and other roost-disturbing activities. Managing human disturbance of maternity colonies is a priority since disturbance may cause roost abandonment and have implications for reproductive success. Bats subjected to excessive disturbance during the winter months can cause them to prematurely expend energy reserves, possibly relocate, and negatively affect productivity. In agricultural production areas, particularly in southern Idaho, the insect prey base may be reduced by pesticides. Insect productivity may be degraded by the conversion to habitat dominated by invasive annual grasses (e.g., cheatgrass). Mortality from wind turbines is a potential concern if developments expand into high-use areas, such as summer foraging areas, near maternity sites, or roost concentrations, but is currently not a documented problem. The fungal pathogen responsible for white-nose syndrome (WNS), *Pseudogymnoascus* (formerly *Geomyces*) *destructans* (*Pd*), has been detected on the species' eastern counterpart, Virginia Big-eared Bat, without diagnostic symptoms of the disease.

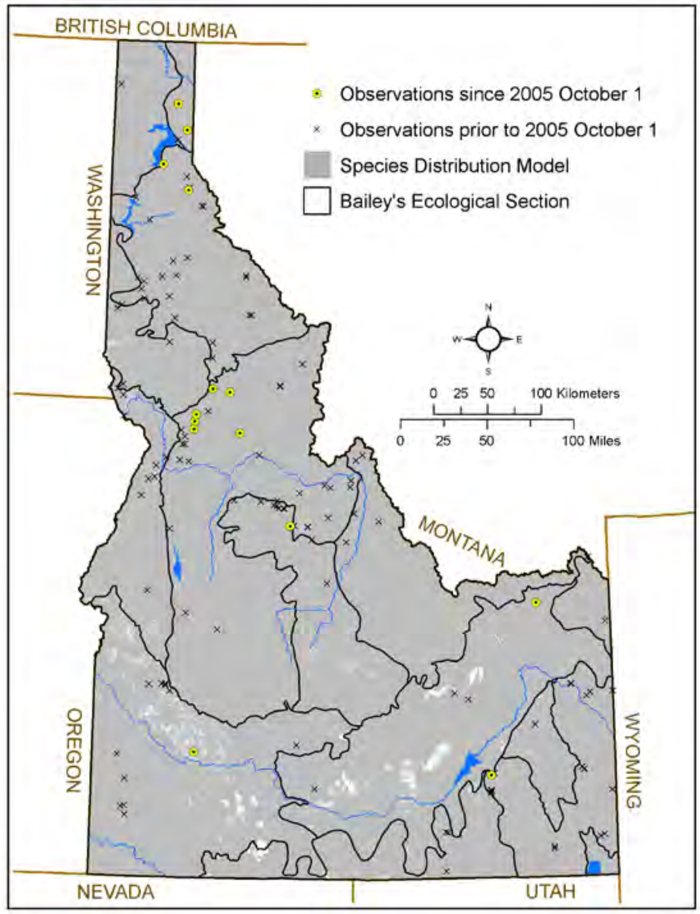
CONSERVATION ACTIONS
Conservation issues and management actions are identified in the appropriate section plans. In short, the recommended conservation strategies are to work with land managers to manage abandoned mine closures, work with local cave groups to survey caves, encourage installation of bat gates at mines and caves when appropriate, evaluate habitat restoration needs near important populations, including areas where historical populations occurred, and evaluate cave and mine use patterns by bats to support human access management decisions.

ADDITIONAL COMMENTS
None.

Information Sources: Pierson ED, Wackenhut MC, Altenbach JS, Bradley P, Call P, Genter DL, Harris CE, Keller BL, Lengus B, Lewis L, Luce B, Navo KW, Perkins JM, Smith S, Welch L. 1999. Species conservation assessment and strategy for Townsend's big–eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Idaho Conservation Effort. Boise(ID): Idaho Department of Fish and Game; INL (SM Stoller), IDFG, and BLM unpublished data.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Silver-haired Bat

Lasionycteris noctivagans



Class: Mammalia
Order: Chiroptera
Family: Vespertilionidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
 Region1: No status
 Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S3

SGCN TIER: 2
Rationale: Multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Northwestern Basin and Range, Okanogan Highlands, Overthrust Mountains, Owyhee Uplands, Palouse Prairie, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: Unknown
Description: Silver-haired Bats occur from south-eastern Alaska and the southern half of Canada throughout much of the contiguous US and into northeastern Mexico. In Idaho, it is one of the most common bat species and has been detected across much of the state, including all 6 of the NWRs.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: Silver-haired Bats are primarily associated with coniferous forests and mixed conifer/hardwood forests with adequate large-diameter trees at a wide range of elevations. Nonreproductive Silver-haired Bats typically roost alone, but they will occasionally form groups of 3-6. Females form small maternity colonies of up to 70 individuals almost exclusively in trees, including inside natural hollows, bird-excavated cavities, and under loose bark of large snags. Individuals change roosts frequently, and use multiple roosts within a limited area throughout the summer; therefore, clusters of large trees are a necessary habitat component. Emerging late in the evening (3-8 hours after sunset), this bat forages primarily for moths, but will eat a wide variety of insects found along water courses, impoundments, ponds, above the forest canopy,

and over open meadows. In northern Idaho, hibernating single individuals have been found in mine adits. Silver-haired Bats may congregate in large numbers and migrate several hundred miles to warmer climates for the winter. During the migration seasons, Silver-haired Bats are routinely observed roosting in unusual locations in Idaho, including lava-tube caves, on the outside of buildings, and telephone poles. Silver-haired Bats hibernate in hollow trees, under sloughing bark, in rock crevices, and occasionally under wood piles, in leaf litter, under foundations, and in buildings, mines, and caves.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threat for this species is direct mortality at wind energy facilities. Fatality monitoring studies indicate large numbers of Silver-haired Bats are killed at wind-energy facilities across Idaho, especially during fall migration. Additional threats include loss of roosting habitat (e.g., clusters of snags) due to timber management and persecution by humans. The fungal pathogen responsible for white-nose syndrome (WNS), *Pseudogymnoascus* (formerly *Geomyces*) *destructans* (*Pd*), has been detected on this species in eastern states and in Washington state, however no mortality has been documented. It is unknown whether Silver-haired Bats could facilitate the spread of *Pd*.

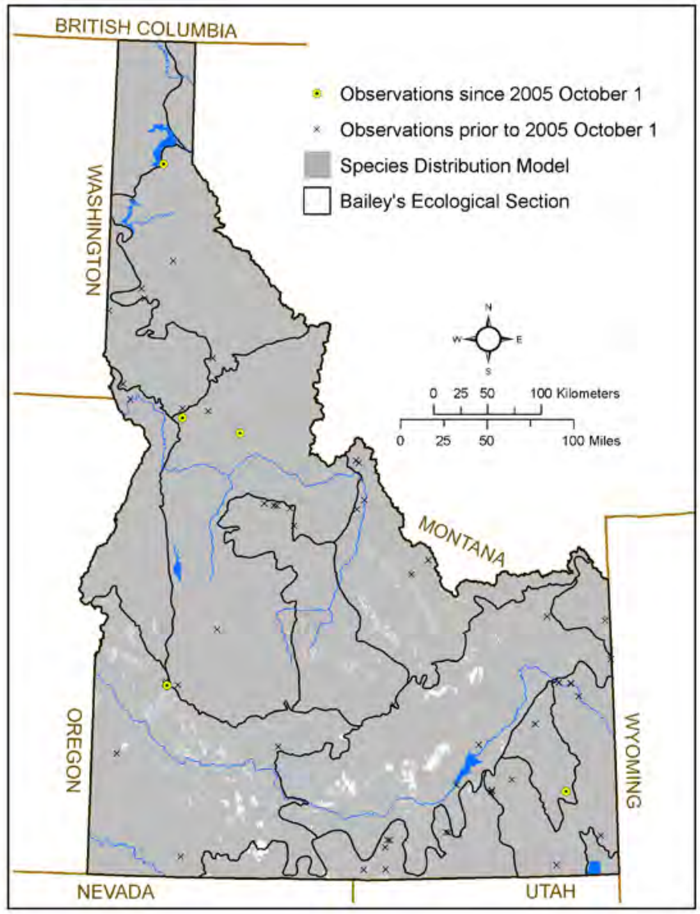
CONSERVATION ACTIONS
Conservation issues and management actions are identified in the appropriate section plans. In short, the recommended conservation strategies are to establish a wind energy working group in Idaho consisting of agencies, wind energy companies, and other stakeholders, develop and disseminate educational materials on bats to partners, stakeholders, media, and interested public, and participate in educational presentations on bats and wind energy.

ADDITIONAL COMMENTS
None.

Information Sources: Barnett JK. 2014. Region 1 acoustic bat inventory: National Wildlife Refuges in Eastern Oregon, Eastern Washington, and Idaho. Portland (OR): US Fish and Wildlife Service; Western Bat Working Group. 2015. Western Species Accounts: *Lasionycteris noctivagans*. Accessed at: http://wbwg.org/western–bat–species/. 9 December 2015; IDFG unpublished data
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer and year-round distribution model).

Hoary Bat

Lasiurus cinereus



Class: Mammalia
Order: Chiroptera
Family: Vespertilionidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S3

SGCN TIER: 2
Rationale: Multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Idaho Batholith, Northwestern Basin and Range, Overthrust Mountains, Owyhee Uplands, Palouse Prairie, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: Unknown
Description: Hoary Bats are found throughout the US to northern Canada and south through Mexico to Guatemala. In Idaho, it is one of the most common bat species and has been detected across much of the state, including all 6 of the NWRs.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: Hoary Bats are distinguished from all other Idaho bat species by their relatively large size, frosted fur with a "hoary" appearance, golden coloration around the face, rounded ears, and furred interfemoral membrane. Hoary Bats roost solitarily in foliage of coniferous and deciduous trees, near the ends of branches, 3-12 m above the ground, and usually at the edge of a clearing. The swift, direct flight of this species makes it easy to distinguish on the wing from most US bats. This bat usually emerges well after dark to forage around clearings or lights in rural areas for large moths and other insects. Hoary Bats may also roost in rock crevices and, rarely, in lava-tube caves in southern Idaho. Females usually give birth to twins, but may produce as many as 4 pups annually. Pups are born between May and June and able to fly at 4 weeks of age. Hoary Bats are migratory and some individuals migrate >2,000 km (1,243 mi).

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threat for this species is direct mortality at wind energy facilities. Fatality monitoring studies indicate large numbers of Hoary Bats are killed at wind-energy facilities across Idaho, especially during fall migration. Additional threats include loss of roosting habitat due to timber harvest and pesticide use.

CONSERVATION ACTIONS
Conservation issues and management actions are identified in the appropriate section plans. In short, the recommended conservation strategies are to establish a wind energy working group in Idaho consisting of agencies, wind energy companies, and other stakeholders, develop and disseminate educational materials on bats to partners, stakeholders, media, and interested public, and participate in educational presentations on bats and wind energy.

ADDITIONAL COMMENTS
None.

Information Sources: Barnett JK. 2014. Region 1 acoustic bat inventory: National Wildlife Refuges in Eastern Oregon, Eastern Washington, and Idaho. Portland (OR): US Fish and Wildlife Service; Western Bat Working Group. 2015. Western Species Accounts: *Lasiurus cinereus*. Available at: http://wbwg.org/western-bat-species/. Accessed 9 December 2015;Cryan PM, Bogan MA, Rye RO, Landis GP, Kester CL. 2004. Stable hydrogen isotope analysis of bat hair as evidence for seasonal molt and long-distance migration. Journal of Mammalogy 85:995–1001.; IDFG, INL, unpublished data.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted summer distribution model).

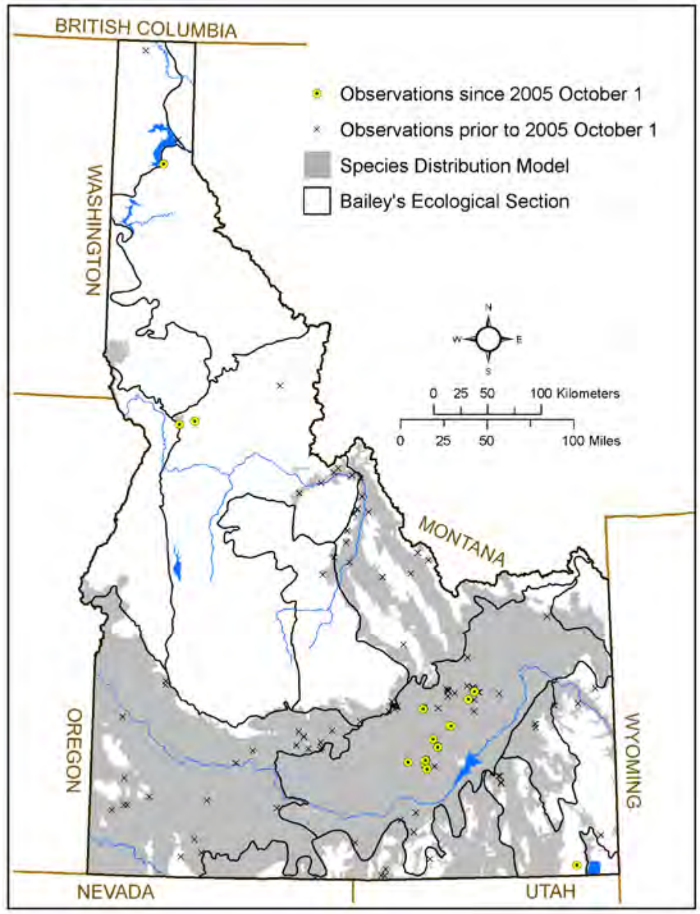
Western Small-footed Myotis

Myotis ciliolabrum

Class: Mammalia
Order: Chiroptera
Family: Vespertilionidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4G5
S-rank: S3

SGCN TIER: 3
Rationale: Important wintering area, multiple threats



DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 144,000 km^2 (~55,600 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Blue Mountains, Challis Volcanics, Overthrust Mountains, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: Unknown
Description: Western Small-footed Myotis ranges from southwestern Canada through the western US into Mexico, but does not occur along the Pacific coast of Washington, Oregon, or northern California. It is widely distributed in southern Idaho and a lava-tube cave in south Idaho is the largest known hibernacula for this species in the western US.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: The Western Small-footed Myotis is a small bat with black ears, a black mask across the eyes and nose, and fur that varies from brown to pale yellow. In summer, both reproductive and nonreproductive bats roost singly or in small groups in semiarid habitats and coniferous forests, primarily in cliff and rock crevices, caves, and mines. Western Small-footed Myotis emerge early after sunset, fly slowly, and forage on small insects found in riparian areas, along cliffs, and rocky slopes. This species is one of the last to begin hibernation, wintering in small numbers inside lava-tube caves. In hibernacula, Western Small-footed Myotis wedge their bodies into small cracks and crevices in the ceiling, and are often found hibernating near Townsend's Big-eared Bats and Big Brown Bats, if present.

POPULATION TREND

Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Highly vulnerable
Description: The primary threat for this species is white-nose syndrome (WNS) caused by the fungus *Pseudogymnoascus* (formerly *Geomyces*) *destructans* (*Pd*). Although WNS has not been documented in this species, concern is high due to WNS-caused mortality in populations of Eastern Small-footed Myotis (*Myotis leibii*), its eastern counterpart. Although WNS has not yet been detected in Idaho, the potential impact of the disease demands monitoring and surveillance. Additional threats to this species include disturbance and loss of roost sites through mine closures, renewed mining, recreational caving, and other roost-disturbing activities.

CONSERVATION ACTIONS
Conservation issues and management actions are identified in the appropriate section plans. In short, the recommended conservation strategies are work with partners and stakeholders to develop a statewide strategic plan for WNS, including protocols for surveillance and response to the introduction of WNS in Idaho, assess distribution, monitor population trends through standardized surveys of hibernacula and maternity colonies, develop and disseminate educational materials, and engage local caving grottos in conservation actions.

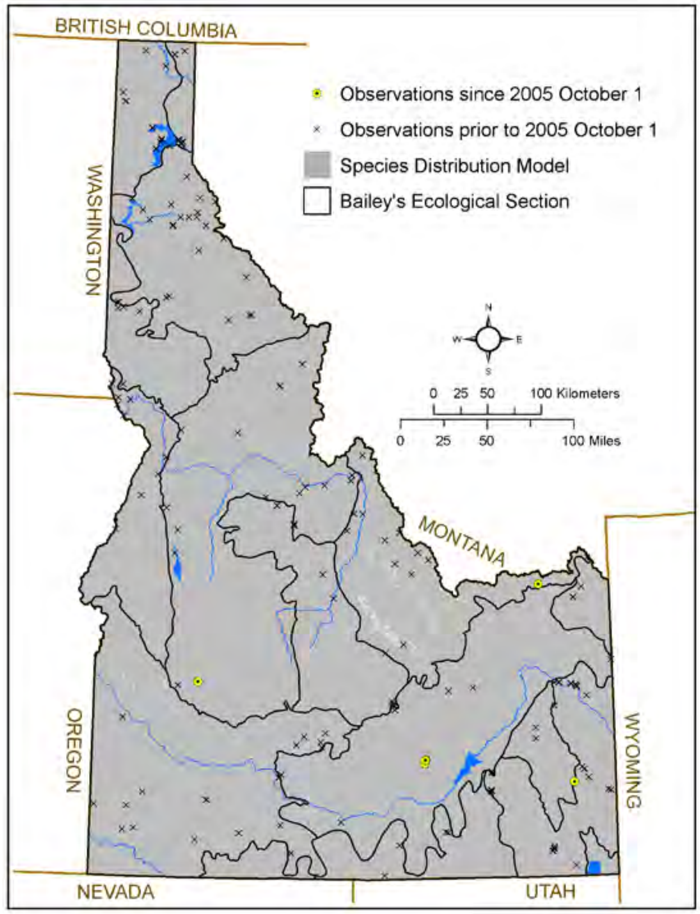
ADDITIONAL COMMENTS
None.

Information Sources: Holloway GL, Barclay RMR. 2001. *Myotis ciliolabrum*. Mammalian Species 670, *Myotis ciliolabrum*: 1–5; Western Bat Working Group. 2015. Western Species Accounts: *Myotis ciliolabrum*. Accessed at: http://wbwg.org/western–bat–species/. Accessed 9 December 2015; IDFG, INL unpublished data
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Little Brown Myotis

Myotis lucifugus

Class: Mammalia
Order: Chiroptera
Family: Vespertilionidae



CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G3
S-rank: S3

SGCN TIER: 3
Rationale: Multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,400 km^2 (~83,600 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Northwestern Basin and Range, Okanogan Highlands, Overthrust Mountains, Owyhee Uplands, Palouse Prairie, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: Unknown
Description: Little Brown Myotis is the most studied bat in North America. It is widespread, occurring from Alaska south to central Mexico, including all of the conterminous US except for the southern Great Plains. Its distribution is limited by the availability of suitable caves and mines for hibernation, temperatures inside hibernacula, and by the length of the hibernation season. In Idaho, it is one of the most common bat species and has been detected across much of the state, including all 6 of the NWRs.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: Little Brown Myotis is a small bat with glossy fur that ranges from dark, sooty brown to olive or golden brown. This species is considered catholic in its roosting and foraging habits, allowing it to occupy a variety of habitats and eat a variety of prey. Little Brown Myotis emerge from their day roosts early after sunset to forage near water, preying primarily on mosquitoes and midges. This bat uses human structures, hollow trees, rocky crevices, and occasionally caves for day roosting. Females form maternity colonies in roosts that are consistently warmer than ambient temperatures. In Idaho, known maternity colonies are usually located in human

structures. Evidence suggests this species can travel several hundreds of kilometers between summer habitat and hibernacula. Few Little Brown Myotis hibernacula have been located in Idaho.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends in Idaho have not been documented. However, the species is experiencing rangewide declines, particularly in the eastern US due to white-nose syndrome (WNS).

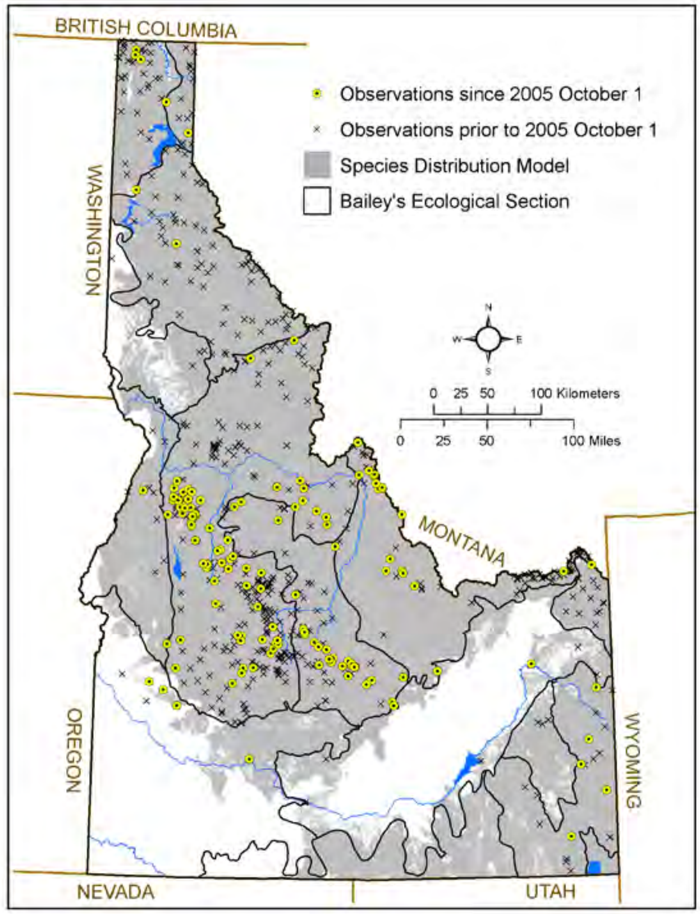
THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Highly vulnerable
Description: The primary threat for this species is WNS, a disease caused by the fungus *Pseudogymnoascus* (formerly *Geomyces*) *destructans* (*Pd*). Since it was first discovered in New York in 2006–2007, WNS has been documented in 29 states and 5 Canadian provinces. *Pd* has been detected in 4 additional states without diagnostic evidence of WNS. Little Brown Myotis was one of the first species to be diagnosed with WNS, with mortality rates >90%. The species is predicted to be extirpated from the northeastern US by 2026. Although WNS has not yet been detected in Idaho, the potential impact of the disease demands monitoring and surveillance. Recent genetic analyses indicate lower levels of population connectivity in the western US, which may reduce the rate of disease spread. In addition, Little Brown Myotis in Idaho are subjected to intensive pest control in some areas.

CONSERVATION ACTIONS
Conservation issues and management actions are identified in the appropriate section plans. In short, the recommended conservation strategies are work with partners and stakeholders to develop a statewide strategic plan for WNS, including protocols for surveillance and response to the introduction of WNS in Idaho, assess distribution, monitor population trends through standardized surveys of hibernacula and maternity colonies, develop and disseminate educational materials, and engage local caving grottos in conservation actions.

ADDITIONAL COMMENTS
None.

Information Sources: Fenton MB, Barclay RMR. 1980. *Myotis Lucifugus*. Mammalian Species 142, *Myotis* lucifugus: 1–8; Barnett, J. K. 2014. Region 1 acoustic bat inventory: National Wildlife Refuges in Eastern Oregon, Eastern Washington, and Idaho. Portland (OR): US Fish and Wildlife Service; Vonhof MJ, Russell AL, Miller–Butterworth CM. 2015. Range-wide genetic analysis of Little Brown Bat (*Myotis lucifugus*) populations: Estimating the risk of spread of white-nose syndrome. PloS ONE DOI:10.1371/journal.pone.0128713.; Frick WF, Pollock JF, Hicks A, Langwig K, Reynolds DS, Turner GG, Butchowski C, Kunz TH. 2010. A once common bat faces rapid extinction in the northeastern United States from a fungal pathogen. Science 329:679–682.; Kunz TH, Richard JD. 2010. Status review of the Little Brown Myotis (*Myotis lucifugus*) and determination that immediate listing under the Endangered Species Act is scientifically and legally warranted. Boston (MA): Boston Univeristy.; IDFG unpublished data.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Wolverine
Gulo gulo



Class: Mammalia
Order: Carnivora
Family: Mustelidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: Sensitive
  Region 4: Proposed
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S1

SGCN TIER: 1
Rationale: Idaho significant proportion of species range in lower 48, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 166,100 km^2 (~64,100 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Okanogan Highlands, Overthrust Mountains, Yellowstone Highlands
Population Size in Idaho: 50–250
Description: The Wolverine is circumboreal in distribution, occurring in Europe, Asia, and North America. The southern-most extant population in North America occupies the Rocky Mountains of Idaho, Montana and Wyoming, and the North Cascade Range of Washington. Wolverines naturally occur at low densities and current western US population estimates range from 250-318 individuals. In Idaho, Wolverines presently occur in most, if not all, historically occupied habitat in the state. Important subpopulations occur in the Salmon River Mountains north and east of McCall and the Sawtooth Mountains near Stanley, based on research encompassing these areas. Observations in the Selway-Bitterroot Wilderness Area suggest a subpopulation in that area, although recent studies have not been conducted.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Wolverines inhabit remote, mountainous environments where cold, snowy conditions exist for much of the year. They require extensive tracts of land to accommodate large home ranges and long-distance movements. Wolverine habitat selection is strongly influenced by seasonal food supply, shifting from scavenging carrion in mid-elevation conifer

forests in winter to preying on small mammals and birds in higher elevation subalpine and alpine habitats in summer.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: Current population estimates for the western US reflect the estimated population prior to European settlement, suggesting that Wolverines have reclaimed large expanses of their historical range in the contiguous US after historical lows and local extirpations in the early 1900s. Although the current distribution in the state is considered similar in extent to historical levels, data on population density and productivity trends in Idaho are lacking.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Highly vulnerable
Description: Given that Wolverine populations are not subject to hunting or trapping seasons in Idaho, the primary drivers for Wolverine populations are threats affecting habitat suitability, breeding success, mortality, and food resources. Even with significant new information on Wolverine ecology and population dynamics in the last decade, there remain critical information gaps that limit our ability to draw conclusions about the effects of various threats to the population and its habitat, including climate change, connectivity, and human interactions such as snow-sports recreation, infrastructure, and incidental trapping.

CONSERVATION ACTIONS
Conservation issues and management actions are described in the 2014 Management Plan for the Conservation of Wolverines in Idaho 2014–2019 and the appropriate section plans. In short, recommended strategies include producing finer-scale climate projections, researching wolverine-snow relationships, characterizing wolverine response to recreation, predicting potential overlap of wolverine and high levels of snow-sports recreation, and educating trappers about techniques to minimize incidental trapping of nontarget species, including Wolverine.

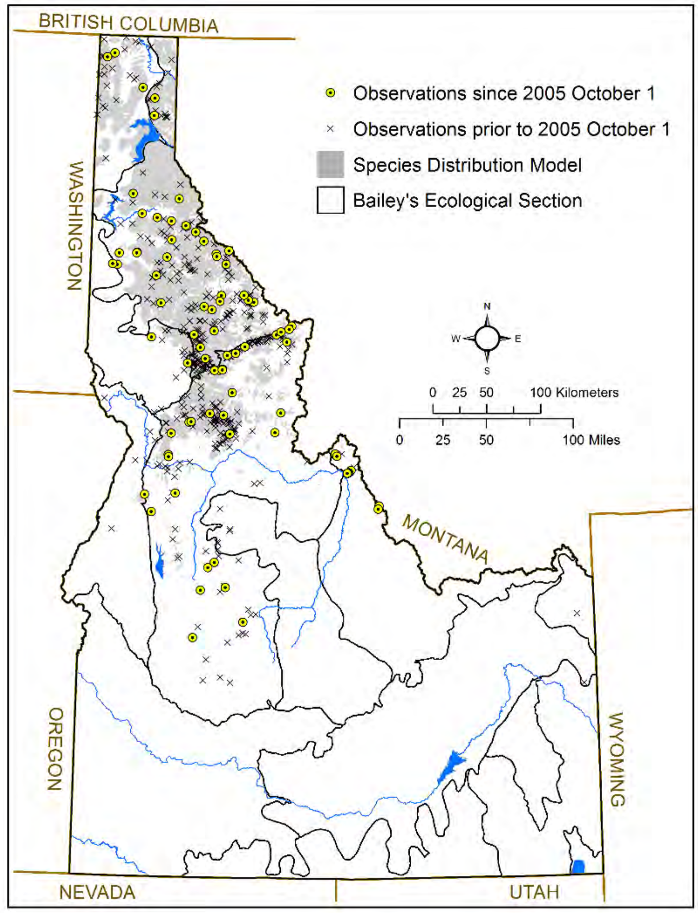
ADDITIONAL COMMENTS
Although previously a candidate for listing as Endangered or Threatened under the ESA, the FWS issued a decsion in 2014 that listing the Wolverine was not warranted. However, the Wolverine and its habitat remain a management priority in Idaho.

Information Sources: IDFG. 2014. Management plan for the conservation of wolverines in Idaho. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Fisher

Pekania pennanti

Class: Mammalia
Order: Carnivora
Family: Mustelidae



CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: Sensitive
Region 4: Sensitive
BLM: Type 2
IDAPA: Furbearing Animals
G-rank: G5
S-rank: S2

SGCN TIER: 2
Rationale: Limited population, multiple stressors

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 65,600 km^2 (~25,300 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Okanogan Highlands, Palouse Prairie
Population Size in Idaho: Unknown
Description: Fisher naturally occur at low densities throughout much of Canada and the northern US, including the northern and central parts of Idaho. In Idaho, the species is currently known to be distributed from the Idaho-Canada border south at least 483 km (300 mi) to the area around Cascade. However, the Nez Perce–Clearwater and St Joe National Forests compose the core of quality Fisher habitat in the state. There is no formal estimate of the number of Fishers in Idaho.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: In Idaho, the species occurs across a range of habitat types, including mesic conifer, dry conifer, and subalpine forests. Fishers are naturally found at low densities, with males and females maintaining intrasexually exclusive home ranges that average approximately 103 km^2 (40 mi^2) and 51 km^2 (20 mi^2), respectively. Throughout their range, Fishers are associated with forested habitats with high canopy closure, complex vertical and horizontal structure, plentiful snags, and an abundant prey base. An opportunistic predator, prey for this species includes rabbits, squirrels, and porcupines.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)

Long-term Trend: Unknown
Description: The current distribution of Fisher in Idaho is likely less than that of pre-Euro-American settlement (pre-1805), but distinctly more than it was in the 1920s to 1960s when the species was thought to be extirpated. IDFG attempted translocation of Fishers from Canada in the 1960s. Current population trends have not been documented.

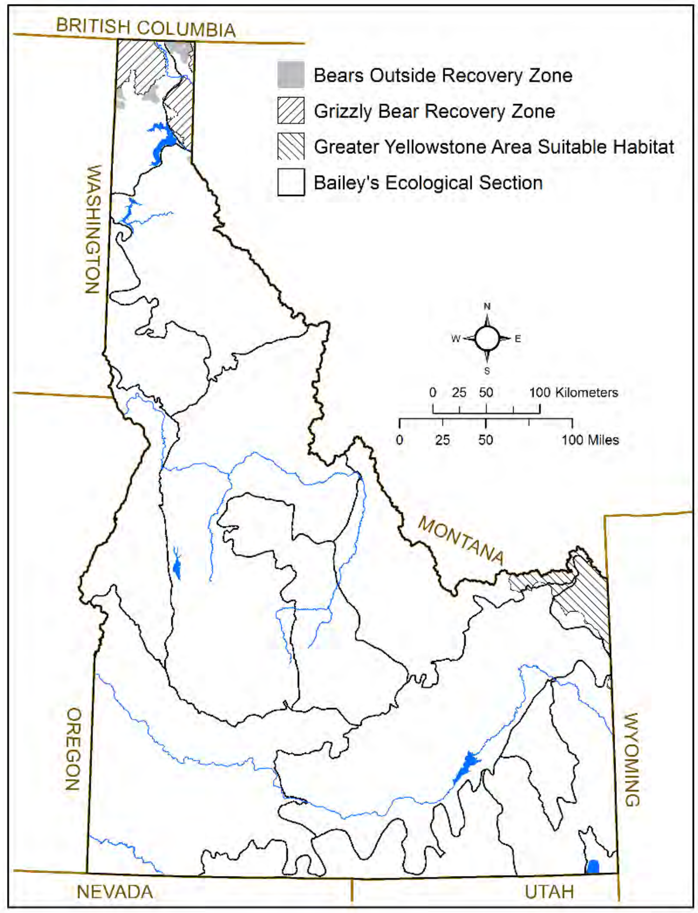
THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: Because Fishers are associated with mature forest characteristics, timber management and timber harvest activities may affect the species' abundance and distribution. Trapping seasons for Fishers were closed in the 1930s, but Fishers are incidentally trapped during regulated seasons for other furbearers. Information gaps about Fisher ecology and population dynamics limit our ability to draw conclusions about the population effects of potential threats. Due to interactions among rising temperatures, drought, water stress, insect and disease occurrence, and fire, indirect effects of climate change in forest habitat may exacerbate other threats to Fisher.

CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, recommended strategies for this species include promoting compatible timber management and timber harvest strategies, expanding the current knowledge of the species distribution, abundance, and habitat requirements and educating trappers about techniques to minimize incidental trapping of nontarget species, including Fishers.

ADDITIONAL COMMENTS
Fishers were petitioned for listing under the ESA in 2000, determined by the FWS to be warranted but precluded, and placed on a candidate list in 2004. In 2011, the FWS completed a status review of the Fisher in the Northern Rocky Mountains and concluded the species does not warrant protection under the ESA in Idaho, Montana, or Wyoming. The species was petitioned for listing again in 2013 and is currently under review.

Information Sources: Williams RM. 1962. Completion report for trapping and transplanting project, W 75-D-9, fisher transplant segment, Federal Aid in Wildlife Restoration.; Schwartz MK, DeCesare NJ, Jimenez BS, Copeland JP, Melquist WE. 2013. Stand– and landscape–scale selection of large trees by fishers in the Rocky Mountains of Montana and Idaho. Forest Ecology and Management 305:103–111; Sauder JD, Rachlow JL. 2014. Both forest composition and configuration influence landscape–scale habitat selection by fishers (*Pekania pennanti*) in mixed coniferous forests of the Northern Rocky Mountains. Forest Ecology and Management 314:75–84; Olson LE, Sauder JD, Albrecht NM, Vinkey RS, Cushman SA, Schwartz MK. 2014. Modeling the effects of dispersal and patch size on predicted fisher (*Pekania* [*Martes*] *pennanti*) distribution in the US Rocky Mountains. Biological Conservation 169:89–98; Sauder JD, Rachlow JL. 2015. Forest heterogeneity influences habitat selection by fishers (*Pekania pennanti*) within home ranges. Forest Ecology and Management 347:49–56.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Sauder JS. 2014. Chapter 4: Integrating habitat selection information across scales: mapping habitat for fishers (*Pekania pennanti*) across the Rocky Mountains of Idaho and Montana. In Landscape Ecology of Fisher (*Pekania pennanti*) in North-Central Idaho. Dissertation. Moscow (ID): University of Idaho. The modeling extent of Sauder (2014) was based on the minimum hydrologic boundaries that contained all the fisher occurrences collected by hair snaring in Idaho and Montana between 2007 and 2011, plus harvest data from Montana (n=47) from 1980 to 2010.

Grizzly Bear
Ursus arctos



Class: Mammalia
Order: Carnivora
Family: Ursidae

CONSERVATION STATUS & CLASSIFICATION
ESA: Threatened
USFS:
  Region1: No status
  Region 4: Threatened
BLM: Type 1
IDAPA: Big Game Animals
G-rank: G4
S-rank: S2

SGCN TIER: 1
Rationale: Listed Threatened

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 6,900 km^2 (~2,700 mi^2)
Key Ecological Sections: Beaverhead Mountains, Flathead Valley, Okanogan Highlands, Overthrust Mountains, Yellowstone Highlands
Population Size in Idaho: Selkirk (25–30), Cabinet–Yaak (<15), Yellowstone (40–50)
Description: Grizzly Bears occur from Alaska through western Canada south to Idaho, Montana, Wyoming and extreme northern Washington. Grizzly Bears are present in 3 recovery zones in Idaho: the Selkirk and Cabinet–Yaak recovery zones in the north and the Yellowstone recovery zone in the southeast. The Selkirk recovery zone includes portions of northwestern Idaho, northeastern Washington, and southern British Columbia. The Cabinet–Yaak recovery zone includes portions of northeastern Idaho, northwestern Montana, and southern British Columbia. The Yellowstone recovery zone is centered in the Greater Yellowstone Ecosystem and includes portions of northeastern Wyoming, southern Montana, and eastern Idaho.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: This species occurs in a variety of habitats. After emergence from higher elevation dens in late April or May, individuals seek green forage, such as emergent vegetation, corms, and bulbs in low-elevation meadows, riparian areas, and south-facing avalanche chutes. In some areas, ungulate carrion is also an important food source during the spring. Throughout late spring and early summer, individuals follow plant availability, primarily berries and nuts, to higher elevations. Both huckleberries and whitebark pine nuts are important foods where they are available.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: Grizzly Bears in the Selkirk and Yellowstone recovery zones are stable to increasing both in size and distribution. The Cabinet–Yaak recovery zone appears to be stable at this time.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Highly vulnerable
Description: Primary threats to Grizzly Bear populations include habitat loss, habitat and population fragmentation, human-bear conflicts and direct mortality.

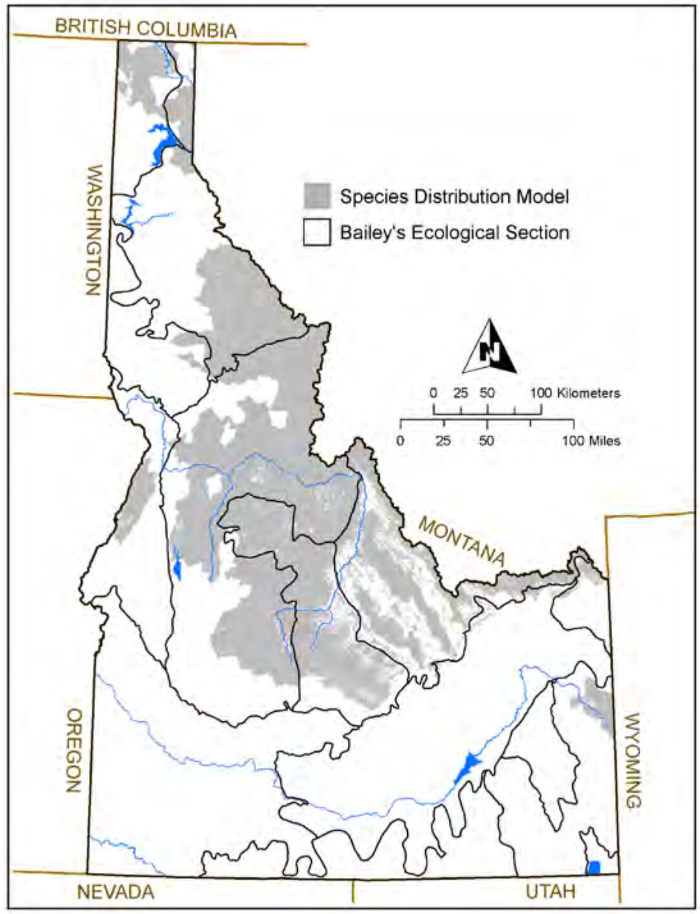
CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. In short, recommended strategies for this species include continuing conservation partnerships, reducing/preventing illegal and accidental mortalities, reducing anthropogenic attractants and other potential for human/bear conflicts, and managing access to limit conflict and disturbance.

ADDITIONAL COMMENTS
The Idaho Fish and Game Commission fully supports the State of Idaho Yellowstone Grizzly Bear Management Plan and the delisting of the Yellowstone Grizzly Bear population. Yellowstone Grizzly Bears are a recovered population and have thrived under responsive cooperative management. For the northern population, including the Cabinet–Yaak and Selkirk ecosystems, along with the North Continental Divide (located entirely in Montana), the Idaho Fish and Game Commission also believes the Grizzly Bear qualifies for delisting. These "ecosystems" are extremities of a larger, connected population in Canada, and there is documented movement of bears between these areas and areas outside the core habitats as the population has grown. Future Grizzly Bear conservation in Idaho is best served with a return to state management and the local, state, tribal, and federal partnerships that fostered recovery.

Information Sources: Wakkinen WL, WF Kasworm. 2004. Demographics and population trends of grizzly bears in the Cabinet–Yaak and Selkirk Ecosystems of British Columbia, Idaho, Montana, and Wyoming. Ursus 15:65–75; FWS Grizzly Bear Recovery page; FWS. 2011. Grizzly Bear (*Ursus arctos horribilis*) 5-Year Review: Summary and Evaluation. FWS, Missoula, Mt; Schwartz CC, Gude PH, Landenburger L, Haroldson MA, Podruzny S. 2012. Impacts of rural development on Yellowstone wildlife: linking grizzly bear Ursus arctos demographics with projected residential growth. Wildlife Biology 18: 246–257.; Kendall KC, Macleod AC, Boyd KL, Boulanger J, Royle JA, Kasworm WF, Paetkau D, Proctor MF, Annis K, Graves TA. 2016. Density, distribution, and genetic structure of grizzly bears in the Cabinet–Yaak Ecosystem. Journal of Wildlife Management 80:314-331.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Idaho Panhandle National Forest. 2013. Grizzly Bear Recovery Zone. http://www.fs.usda.gov/main/ipnf/landmanagement/gis#wild [Accessed February 17, 2016]; Idaho Panhandle National Forest. 2013. Bears Outside Recovery Zone. http://www.fs.usda.gov/main/ipnf/landmanagement/gis#wild [Accessed February 17, 2016]; FWS. 2005. Suitable Grizzly Bear Habitat in the Yellowstone Ecosystem. https://www.sciencebase.gov/catalog/item/554ceb27e4b082ec54129da3 [Accessed February 18, 2016].

Mountain Goat

Oreamnos americanus



Class: Mammalia
Order: Artiodactyla
Family: Bovidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Big Game Animals
G-rank: G5
S-rank: S3

SGCN TIER: 3
Rationale: Small and fragmented populations, low intrinsic productivity, declines in some areas

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 71,800 km^2 (~27,700 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Okanogan Highlands
Population Size in Idaho: 2500
Description: Mountain Goats occur in the rugged mountain ranges of northwestern North America, from southeastern Alaska south to Washington and Idaho. Populations have been widely introduced outside the historical range into Utah, Colorado, Oregon, South Dakota, and the Olympic Peninsula of Washington. In Idaho, populations are small and fragmented, with animals scattered throughout the central Idaho Wilderness as well as in the Panhandle, Hells Canyon, and the Snake River Range. Several reintroductions have occurred into previously occupied habitat across the state and the current Mountain Goat population is estimated at 2500 individuals.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Mountain Goats inhabit rugged landscapes characterized by steep, rocky cliffs, talus slopes, grassy ledges, and alpine meadows. They are generalists with a diet that includes grasses, sedges, rushes, forbs, low growing shrubs, woody shrubs, conifers, mosses, and lichens depending on the season. Winter ranges are typically at lower elevation cliff complexes with south and west aspects where snow is less abundant and persistent. Migration to these wintering areas occurs along well-traveled corridors with the first heavy snowfall. Other populations may

winter in alpine habitats where wind and steep southern exposures create areas of reduced snow depth. This species has relatively low reproductive potential.

POPULATION TREND

Short-term Trend: Decline 10–30%
Long-term Trend: Unknown
Description: Statewide, populations appear to be declining slightly, although data are limited. Survey data indicate that while some populations are stable (e.g., Palisades), others are extremely low or have been lost from previously occupied range (e.g., Selway, southern Lemhi mountain range, southern Beaverhead mountain range).

THREATS

Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable
Description: Human encroachment into Mountain Goat habitat is a threat, particularly from road development, backcountry recreation, and aircraft. It is possible that disease could also be impacting populations. In addition, the effects of climate change on alpine and subalpine habitats will likely affect the conservation of this species.

CONSERVATION ACTIONS

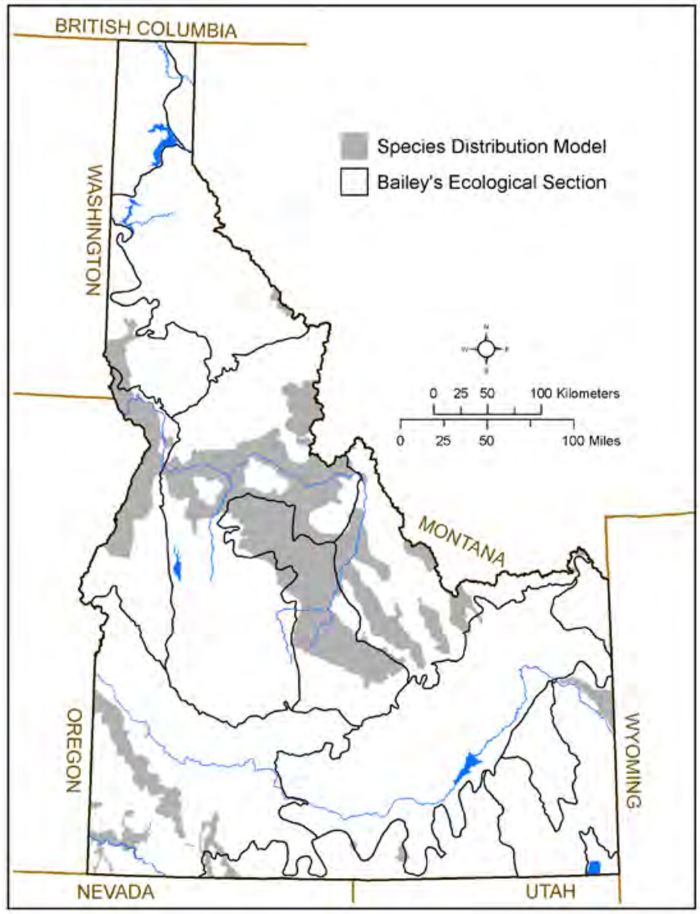
The statewide management policy is to introduce Mountain Goats into all suitable ranges, maintain or increase all herds, and harvest under a conservative management framework. Harvest of ≤5% of the non-kid segment of a herd is allowed if the total herd population is at least 50 individuals. Protection of the inaccessible, isolated nature of Mountain Goat habitat is recommended to minimize disturbance impacts to this species.

ADDITIONAL COMMENTS

Mountain Goats are an iconic watchable wildlife species in Idaho with some of the best viewing opportunities located in central Idaho and the Panhandle.

Information Sources: IDFG. 2013. Mountain Goat Statewide Report. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Bighorn Sheep
Ovis canadensis



Class: Mammalia
Order: Artiodactyla
Family: Bovidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: Sensitive
Region 4: Sensitive
BLM: Type 2
IDAPA: Big Game Animals
G-rank: G4
S-rank: S2

SGCN TIER: 2
Rationale: Widespread declines historically and over the past 25 years.

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 34,000 km^2 (~13,100 mi^2)
Key Ecological Sections: Beaverhead Mountains, Blue Mountains, Challis Volcanics, Idaho Batholith, Northwestern Basin and Range, Owyhee Uplands
Population Size in Idaho: 2900
Description: Bighorn Sheep occur in scattered localities in mountainous terrain from southwestern Canada through the western US and into northwestern Mexico, including scattered locations from north-central Idaho south to the state boundary. Translocations have successfully expanded the distribution of Bighorn Sheep (e.g., in south-central and southwestern Idaho), but the largest populations are still native Rocky Mountain Bighorn Sheep that were never extirpated in the Salmon River drainage. Current populations statewide are estimated to be 2,900 individuals (1,000 individuals south of Interstate 84 and 1,900 individuals in the rest of the state).

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Populations occupy rugged canyons, foothills, and mountainous areas with key habitat features including steep, rugged "escape" terrain, grasses and forbs for forage, and a limited amount of tall vegetation. Populations in dry areas require perennial water sources, such as streams and springs, during the summer. Native bunchgrasses and forbs are important components of forage. Ewes with lambs are particularly dependent on the availability of "escape" terrain to avoid predators.

POPULATION TREND

Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Decline 80–90%
Description: Bighorn Sheep were widely distributed and one of the most abundant game animals in Idaho until the late 1800s. Populations declined dramatically in the late 1800s and early 1900s due to a combination of unregulated hunting, competiton with livestock for forage, and disease introduced by domestic sheep and goats. By 1940, all sheep south of Interstate 84 had been extirpated. As a result of restoration efforts, numbers increased in Idaho from an estimated 1,000 individuals in 1920 to about 5,000 in 1990. However, starting in the late 1980s and continuing through the 1990s, population declines occurred, primarily associated with disease. Bighorn Sheep in much of Idaho exist as a metapopulation and although individual populations exhibit varied trends, current statewide estimates are relatively stable.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary limiting factor for Bighorn Sheep in Idaho is disease. Bighorn Sheep are vulnerable to organisms carried by healthy domestic sheep and goats and once these organisms are transmitted there is no effective treatment in Bighorn Sheep. Other factors including predation and habitat degradation can also be important. Invasive annual grasses and noxious weeds occur throughout lower elevations of occupied habitat, which may be impacting late summer forage value. Warming temperatures and changing precipitation patterns are likely effecting Bighorn Sheep habitat indirectly, particularly through fire and invasive annual grasses.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the 2010 IDFG Bighorn Sheep Management Plan and the appropriate section plans. In short, recommended strategies include maintaining spatial and temporal separation between Bighorn Sheep and domestic sheep and goats, and collaborating with partners to develop education and outreach strategies.

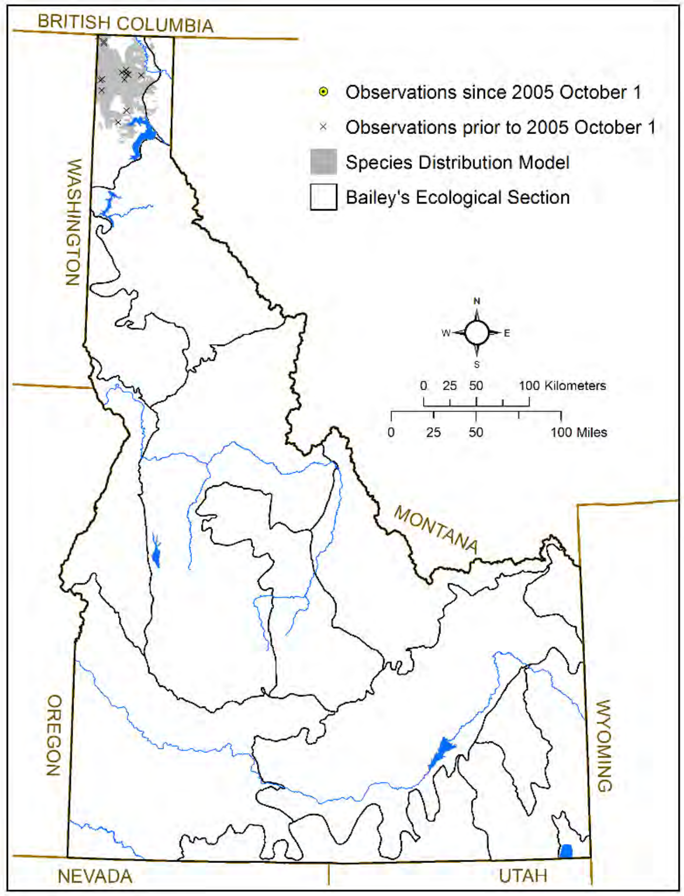
ADDITIONAL COMMENTS

Regulated hunting is the cornerstone of the North American Model of Wildlife Conservation, a system that keeps wildlife a public and sustainable resource, scientifically managed by professionals. Hunter harvest for Bighorn Sheep in Idaho is restricted to <20% of Class 3-4 Rams (3/4 curl or larger) within a population management area. A conservative harvest strategy, such as this, is unlikely to have an important influence on local population dynamics.

Information Sources: IDFG. 2010. Bighorn Sheep management plan 2010. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. 2010. Bighorn Sheep management plan 2010. Boise (ID): Idaho Department of Fish and Game.

Caribou

Rangifer tarandus



Class: Mammalia
Order: Artiodactyla
Family: Cervidae

CONSERVATION STATUS & CLASSIFICATION
ESA: Endangered
USFS:
Region1: No status
Region 4: No status
BLM: Type 1
IDAPA: Endangered Species
G-rank: G5T4
S-rank: S1

SGCN TIER: 1
Rationale: ESA listed, low population size, population declines, range restricted, culturally significant

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 3,000 km^2 (~1,200 mi^2)
Key Ecological Sections: Okanogan Highlands
Population Size in Idaho: <14
Description: Caribou are circumboreal in distribution, occuring in the tundra and boreal zones of Europe, Asia, and North America. The only Caribou that exist in the contiguous US use the Selkirk Mountains in southeastern British Columbia, northern Washington, and northern Idaho. These Caribou are a subpopulation of the South Mountain Caribou Designatable Unit as defined by the Committee on the Status of Endangered Species in Canada (COSEWIC). The FWS designated recovery zone for the South Selkirk subpopulation includes an area of approximately 5,700 km^2 (2,200 mi^2), of which 53% lies in the US.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The South Selkirk subpopulation inhabits mature forests dominated by subalpine fir and Engelmann spruce in areas that experience deep snowfall. Individuals migrate to lower elevations (~1,500 m [4,900 ft]) in December and January and return to higher elevations (~1,900 m [6,200 ft]) after the snow has consolidated in late January. During the summer, individuals forage on small wood browse and forbs. During the winter, individuals rely almost entirely on arboreal lichens, a trait that distinguishes them from other Caribou Designatable Units. The Caribou breeds during September or early October and females move to high elevation ridges to calve in late April to May. Females generally have their first calf at 3 years of ageand usually produce single calves although twins do occur rarely.

POPULATION TREND
Short-term Trend: Decline 50%
Long-term Trend: Decline 60–70%
Description: Historically, the South Moutain Caribou were relatively widespread and occurred in large subpopulations. By 2000, about 30% of the early 1900s range was no longer occupied. The South Selkirk subpopulation, in particular, declined >70% from 1995 to 2015. Augmentation efforts occurred in 1987-1990 and again in 1996-1998 and from 2002-2011 the population appeared to be relatively stable at 35-45 individuals. However, census counts since 2012 have documented < 30 individuals, with only 14 individuals counted in 2015.

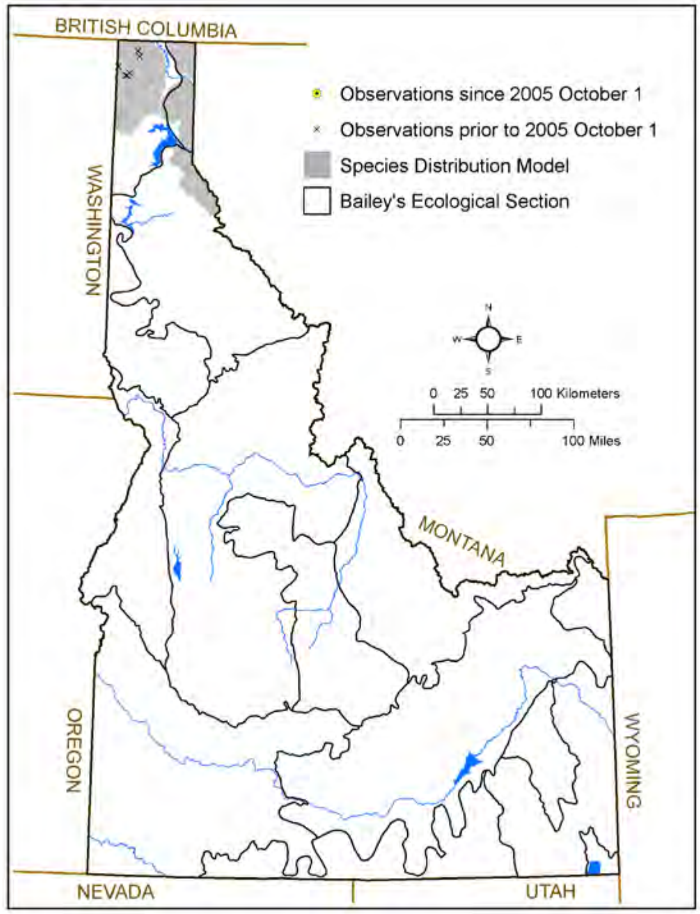
THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Highly vulnerable
Description: The primary threats for this population of Caribou include predation by Mountain Lions, Bears and Wolves, highway mortalities, synthetic and natural habitat changes, and increasing levels of human recreation.

CONSERVATION ACTIONS
Conservation issues and management actions are being detailed by the Southern Caribou International Technical Working Group (SCITWG). SCITWG is currently evaluating threats from avalanches, climate change, fire and fire suppression, forest insects and diseases, hunting, timber harvest, parasites, predation, recreational activities, and roads and other linear features. Historically, predation, highway mortalities, and large-scale habitat alterations have impacted Caribou. These three issues are currently being addressed through predation management, coordination with B.C. Ministry of Transportation, and land management plans in Canada and the US.

ADDITIONAL COMMENTS
The Selkirk Mountain population was listed as Endangered under the ESA in 1983, a recovery plan was published in 1994, and critical habitat was designated in 2012. In 2014, the population was proposed for downlisting from Endangered to Threatened.

Information Sources: Ray JC, Cichowski DB, St-Laurent MH, Johnson CJ, Petersen SD, Thompson ID. 2015. Conservation status of caribou in the western mountains of Canada: Protections under the Species At Risk Act, 2002-2014. Rangifer 35:49-80.; Kinley TA, Apps CD. 2007. Caribou habitat modeling for the South Selkirk Mountains Ecosystem including habitat assessments for the Priest Lake endowment lands.; Wakkinen WL, Slone JB. 2010. Selkirk Ecosystem Woodland Caribou Movement Analysis. Idaho Department of Fish and Game, Boise, ID.; COSEWIC. 2011. Designatable Units for Caribou (*Rangifer tarandus*) in Canada. Ottawa (Ontario): Committee on the Status of Endangered Wildlife in Canada.; DeGroot, L. 2015. 2015 Caribou Census. South Selkirk Mountains. Nelson (British Columbia): Ministry of Forest, Lands, and Natural Resource Operations.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Northern Bog Lemming
Synaptomys borealis



Class: Mammalia
Order: Rodentia
Family: Cricetidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: Sensitive
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G5
S-rank: S3

SGCN TIER: 3
Rationale: Data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 7,100 km^2 (~2,700 mi^2)
Key Ecological Sections: Okanogan Highlands
Population Size in Idaho: Unknown
Description: The Northern Bog Lemming is generally boreal in distribution, occurring from Alaska south to Washington, Idaho, Montana, Minnesota, and the New England states. In Idaho, the species occurs in scattered localities in the extreme northwestern part of the state. Population size is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Most populations in the Northwest have been found in peatlands, particularly sphagnum moss bogs, but also wet meadows, coniferous forests with dense mossy understory, and mossy streamsides. In Idaho, this species has been found in sphagnum bogs near stands of Engelmann spruce, lodgepole pine, and subalpine fir, and occurs most frequently in second-growth stands and sometimes in old-growth forest. Northern Bog Lemmings are herbivorous, feeding on grasses and other herbaceous vegetation. Individuals are active throughout the year.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: High

Intrinsic Vulnerability: Moderately vulnerable

Description: Specific threats have not been determined. The loss of sphagnum or other bog mats and corridors for inter-patch movement due to habitat disturbances (e.g., timber harvest, grazing, roads, recreation) and climate change are thought to affect populations.

CONSERVATION ACTIONS

Conservation issues and management actions for the species are detailed in the Okanogan Highlands Section plan. The primary recommended strategy is to establish methods for assessing distribution and monitoring populations.

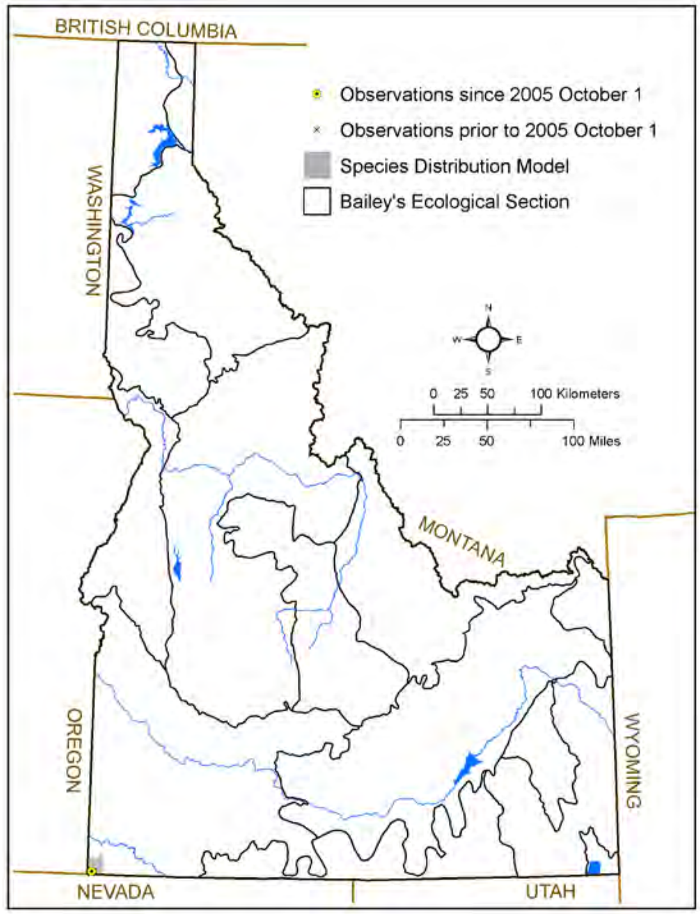
ADDITIONAL COMMENTS

The species was petitioned for listing under the ESA in 2014. In September 2015, the FWS issued a "substantial finding" meaning that the petition provided enough information to substantiate that listing the species may be warranted. A thorough status review to determine whether to propose listing was initiated.

Information Sources: Groves C, Yensen E. 1989. Rediscovery of the northern bog lemming (*Synaptomys borealis*) in Idaho. Northwest Naturalist 70:14–15; Groves CR. 1994. Effects of timber harvest on small mammals and amphibians in old–growth coniferous forests on the Priest Lake Ranger District, Idaho Panhandle National Forests. Unpublished report to the Priest Lake Ranger District. 188p. The Nature Conservancy, Boulder, CO; Groves CR, Butterfield B, Lippincott A, Csuti B, Scott JM. 1997. Atlas of Idaho's Wildlife: Integrating Gap Analysis and Natural Heritage Information. Boise (ID): Idaho Department of Fish and Game.; Boggs JR, Woods S. 2004. Northern bog lemmings and rare plants in the Panhandle of Idaho. Boise (ID): Idaho Department of Fish and Game.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Dark Kangaroo Mouse
Microdipodops megacephalus



Class: Mammalia
Order: Rodentia
Family: Heteromyidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G4
S-rank: S1

SGCN TIER: 2
Rationale: Range restricted, habitat specialist, threats to habitat

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: <100 km^2 (<~40 mi^2)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Unknown
Description: The Dark Kangaroo Mouse occurs in Nevada, Utah, California, and Idaho. Populations are discontinuous and irregularly distributed across its range. The Idaho population occurs in a portion of the Little Owyhee River drainage in the extreme southwest corner of Owyhee County.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This species is an edaphic specialist inhabiting xeric shrub communities, including low dryland shrubland dominated by saltbush, associated with sandy substrates. Most habitat in the occupied range comprises sagebrush-dominated mixed shrub habitat having a sparse understory of bunchgrasses, annual forbs, and perennial forbs. A distinctive feature in this habitat is the presence of Mima mounds, small patches of relatively loose soil on the order of 100 square meters in area.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Very High
Intrinsic Vulnerability: Highly vulnerable
Description: The very restricted distribution makes this population vulnerable to extirpation if habitat is lost. Range fires are the greatest threat and have the potential to destroy all habitat in a single event. Currently, the habitat is largely intact within the Idaho distribution with much of it unaffected by invasive weeds. Nevertheless, cheatgrass is somewhat established and has the potential to expand.

CONSERVATION ACTIONS

Conservation issues and management actions for the species are detailed in the Owyhee Uplands Section plan. The primary recommended strategy for habitat management is to reduce invasive weeds and minimize fire risk. In addition, ecological data needed to guide habitat management prescriptions is minimal. Additional information regarding natural history, ecology, and population status would provide stronger support for habitat management decisions.

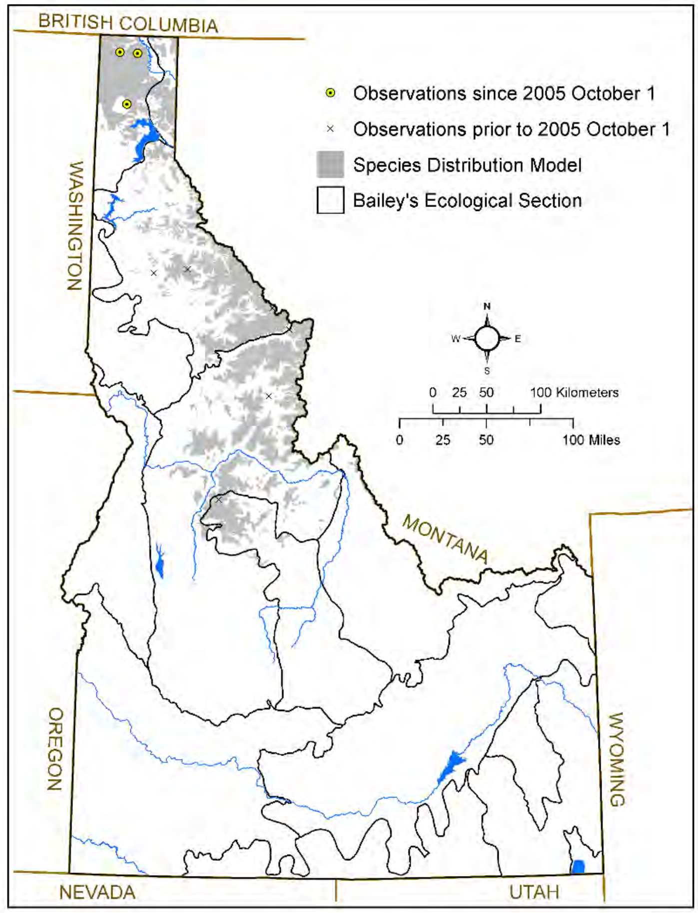
ADDITIONAL COMMENTS

Currently the Idaho population is taxonomically identified as a subspecies, but preliminary analysis of molecular data has suggested that it and a population in north-central Nevada represent a distinct species.

Information Sources: Hafner JC, Upham NS, Reddington E, Torres CW. 2008. Phylogeography of the pallid kangaroo mouse, *Microdipodops pallidus*: a sand–obligate endemic of the Great Basin, western North America. Journal of Biogeography 35:2102–2118; Hafner JC, Upham NS. 2011. Phylogeography of the dark kangaroo mouse, *Microdipodops megacephalus*: cryptic lineages and dispersal routes in North America's Great Basin. Journal of Biogeography 38:1077–1097; Anderson JJ, Portnoy DS, Hafner JC, Light JE. 2013. Populations at risk: conservation genetics of kangaroo mice (*Microdipodops*) of the Great Basin Desert. Ecology and Evolution 3:2497–2513.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Hoary Marmot

Marmota caligata



Class: Mammalia
Order: Rodentia
Family: Sciuridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G5
S-rank: S4

SGCN TIER: 3
Rationale: Threats to habitat, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 48,700 km^2 (~18,800 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Challis Volcanics, Idaho Batholith, Okanogan Highlands
Population Size in Idaho: Unknown
Description: The Hoary Marmot is a large ground squirrel distributed in western North America from Alaska south to Washington, Idaho, and Montana. Central Idaho is the southern extent of the species range. Few occurrences have been documented in north-central Idaho, and these sightings are all from before 1955. Some records are from vouchered specimen, but some sites of occurrence documented in literature references are difficult to interpret because they are not from typical habitat and may represent misidentifications. Recent surveys in the Panhandle documented three occurrences in the Selkirk Mountains.

HABITAT & ECOLOGY
Environmental Specificity:
Description: Hoary Marmots occur at or above timberline on alpine and subalpine rockslides, boulder piles, and talus slopes surrounded by meadows. They are highly social and form relatively isolated colonies. The species is slow to mature (reproductive maturity at 3 years) and reproductive effort is low with females typically breeding in alternate years. Litters are spaced 2 to 4 years apart. Hibernation extends 8 months from September to mid-May.

POPULATION TREND
Short-term Trend: Unknown

Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Medium
Intrinsic Vulnerability: Highly vulnerable
Description: The primary threat to this species is believed to be changing temperature and precipitation patterns. Limited to high elevation areas, Hoary Marmots are directly affected by temperature, snowpack, and timing of snow melt. In Canada, survival was negatively correlated with winter severity, especially for juveniles. Winters with low snowpack and early spring snowmelt negatively impacted survival while heavy snow cover correlated with low mortality for all age groups. In the summer, foraging is reduced at air temperatures >20 °C (68 °F).

CONSERVATION ACTIONS

Conservation issues and management actions are described in the appropriate section plans. Additional information is needed to confirm the status of Idaho populations and evaluate distribution in the context of habitat requirements, availability, future climate projections, and vulnerability. Habitat priorities include maintaining natural fire disturbance in subalpine and alpine forest systems.

ADDITIONAL COMMENTS

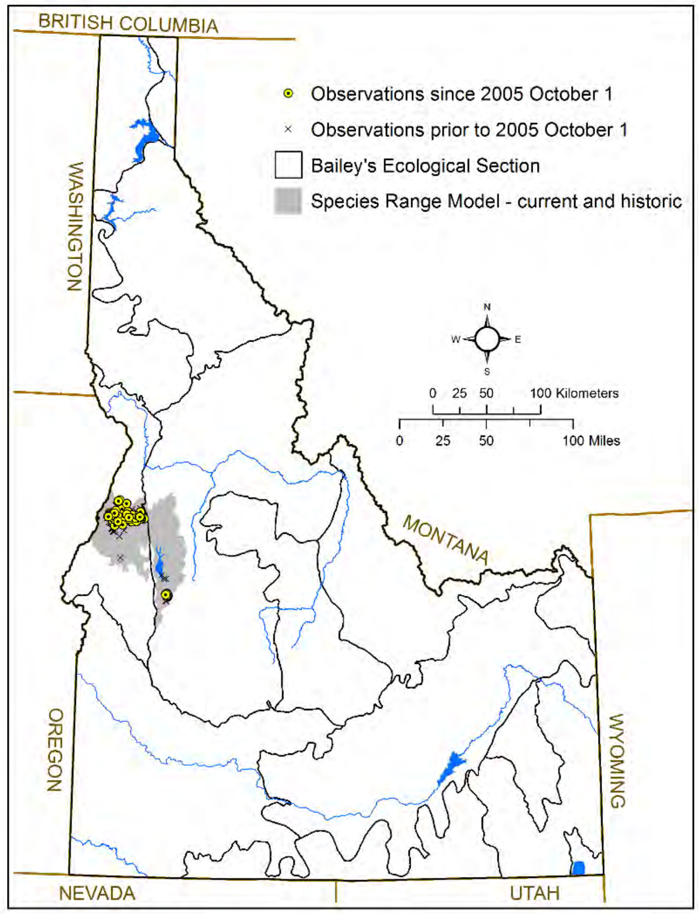
None.

Information Sources: Linzey AV, Hammerson G. 2008. Marmota caligata. The IUCN Red List of Threatened Species. Version 2014.2. www.iucnredlist.org. Downloaded on 14 October 2014; Braun JK, Eaton TS Jr., Mares MA. 2011. *Marmota caligata* (Rodentia: Sciuridae). Mammalian Species 43:155–171; Patil VP. 2010. The interactive effects of climate, social structure, and life history on the population dynamics of hoary marmots (*Marmota caligata*). MS Thesis. Edmonton (Alberta): University of Alberta.; Patil VP, Morrison SF, Karels TJ, Hik DS. 2013. Winter weather versus group thermoregulation: what determines survival in hibernating mammals? Oecologia 173:139–149.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

Northern Idaho Ground Squirrel

Urocitellus brunneus



Class: Mammalia
Order: Rodentia
Family: Sciuridae

CONSERVATION STATUS & CLASSIFICATION
ESA: Threatened
USFS:
  Region1: No status
  Region 4: Threatened
BLM: Type 1
IDAPA: Threatened Species
G-rank: G2
S-rank: S2

SGCN TIER: 1
Rationale: Low population size, endemic, range restricted, multiple threats, IUCN Endangered

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 4,600 km^2 (~1,800 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith
Population Size in Idaho: 2,757
Description: The Northern Idaho Ground Squirrel is a rare endemic mammal that occurs at ~60 sites in Adams and Valley Counties in west-central Idaho. Patchily distributed, the species occupies only ~2,300 ha (5,683 acres) of the mapped range extent and currently all but 1 extant colonies occur in the Blue Mountains Section. Colonies are distributed in the Bear Creek, Lick Creek, Lost Creek, Weiser River, and Mud Creek drainages. A disjunct population occurs in Round Valley in Valley County. Using a new long-term monitoring sampling design, the baseline estimated population size in 2015 was 1,461-2,007 individuals with an adjusted index to abundance of 2,757 individuals.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This species inhabits dry montane meadows surrounded by ponderosa pine or Douglas-fir forest. Most sites have a mixture of shallow and deeper soils to accommodate nest burrows. Individuals consume a wide variety of forbs and grasses, foraging on green vegetation after emergence and increasing seed intake prior to hibernation.

POPULATION TREND
Short-term Trend: Increase 10–25%
Long-term Trend: Decline 50–70%

Description: Over the long term, the species has declined from the 1980s estimate of 5,000 to <1,000 when it was listed in 2000. However, recent population trends are improving. Standardized survey methods from 2005-2012 increased the number of known occupied sites and estimates of overall population size. A new long-term population monitoring strategy, first implemented in 2014, indicated an increase from 2014 to 2015 and an estimated abundance in 2015 of 2,757 individuals.

THREATS

Overall Threat Impact: Very High

Intrinsic Vulnerability: Highly vulnerable

Description: Primary threats for this species include fire suppression, private land development, and proposed reservoir enlargement. There is also evidence that bubonic plague may be adversely affecting populations; research is ongoing to confirm or disprove this hypothsis. In addition, several disturbances occur throughout the species range, including roads and human recreation including occasional illegal or misidentified shooting, but the population effects are largely unknown.

CONSERVATION ACTIONS

Conservation issues and management actions for this species are detailed in the FWS Recovery Plan and address population size, spatial distribution, security, and habitat restoration needed to sustain and expand populations.

ADDITIONAL COMMENTS

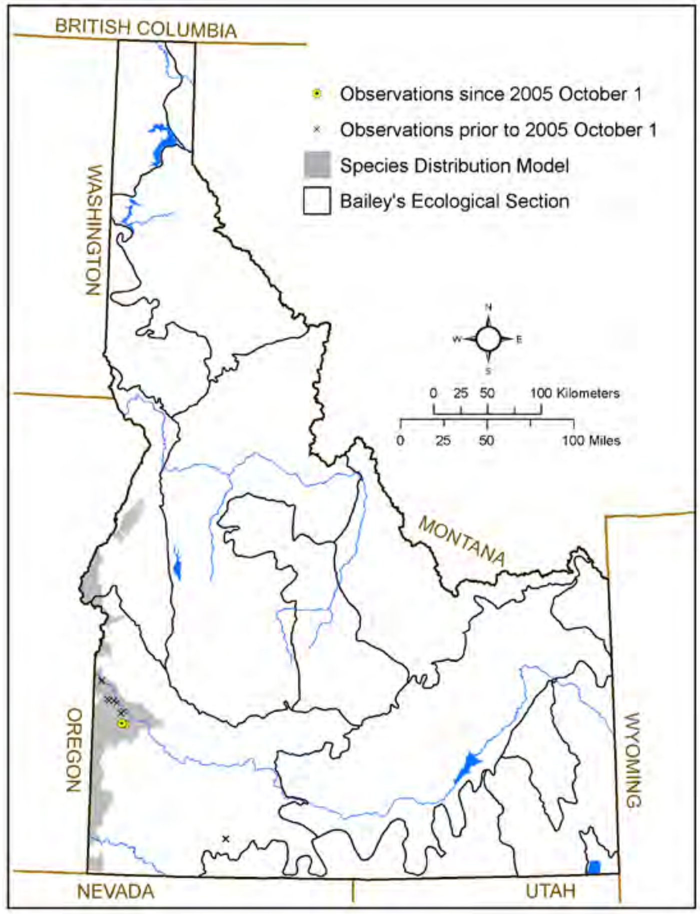
The Northern Idaho Ground Squirrel was listed as Threatened under the ESA in 2000, with a Recovery Plan published in 2003.

Information Sources: Yensen E. 1985. Taxonomy, distribution, and population status of the Idaho ground squirrel, *Spermophilus brunneus*. Caldwell (ID): Albertson College of Idaho; Yensen E. 1991. Taxonomy and distribution of the Idaho Ground Squirrel, *Spermophilus brunneus*. Journal of Mammalogy 72:583–600; US Fish and Wildlife Service. 2003. Recovery Plan for the Northern Idaho Ground Squirrel (*Spermophilus brunneus brunneus*). Portland (OR): US Fish and Wildlife Service.; Evans Mack D, Baker C. 2015. Long-term population monitoring of Northern Idaho Ground Squirrel: 2015 implementation and population estimates. Boise (ID): Idaho Department of Fish and Game.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].;Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).; FWS. 2003. Recovery Plan for the Northern Idaho Ground Squirrel (*Spermophilus brunneus brunneus*). Portland (OR): US Fish and Wildlife Service (probable historic distribution model).

Columbia Plateau (syn. Merriam's) Ground Squirrel

Urocitellus canus



Class: Mammalia
Order: Rodentia
Family: Sciuridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G4
S-rank: S1

SGCN TIER: 2
Rationale: Range restricted, low population size in decline, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,500 km^2 (~1,000 mi^2)
Key Ecological Sections: Northwestern Basin and Range, Owyhee Uplands
Population Size in Idaho: 250-500
Description: The Columbia Plateau (syn. Merriam's) Ground Squirrel occurs south of the Snake River and west of Reynolds Creek, but the current status of Idaho populations is uncertain. Range limits where the ranges of the Columbia Plateau and Great Basin Ground Squirrels abut are not well demonstrated, and thus hybridization could occur in contact zones. As of January 2014, extirpation from Idaho remains a possibility, but extant colonies have been reported in the Owyhee foothills in the Reynolds Creek vicinity.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Habitat characteristics in Idaho have not been described but many historically occupied sites have been converted to agricultural fields. Native habitat comprises sagebrush-dominated shrublands and grassland systems.

POPULATION TREND
Short-term Trend: Decline 30–50%
Long-term Trend: Decline 80–90%
Description: Populations appear to have been extirpated from lower-elevation sites in areas converted to tilled agriculture. Records of occurrence in the northern foothills of the Owyhee Mountains are of unverified identification. Recent sightings are uncommon.

THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: The primary threat for this species is thought to be habitat loss and degradation due to conversion of natural habitat to agriculture, invasive plants, and wildfire. In addition, mortality of individuals may occur from illegal or misidentified shooting but population and productivity effects are unknown. Populations may face competition with Belding's Ground Squirrel where these species are sympatric. The effects of diease, especially plague, has not been investigated. Plague appeared in Idaho ca. 1940 and may have important consequences for population dynamics of colonial ground squirrels.

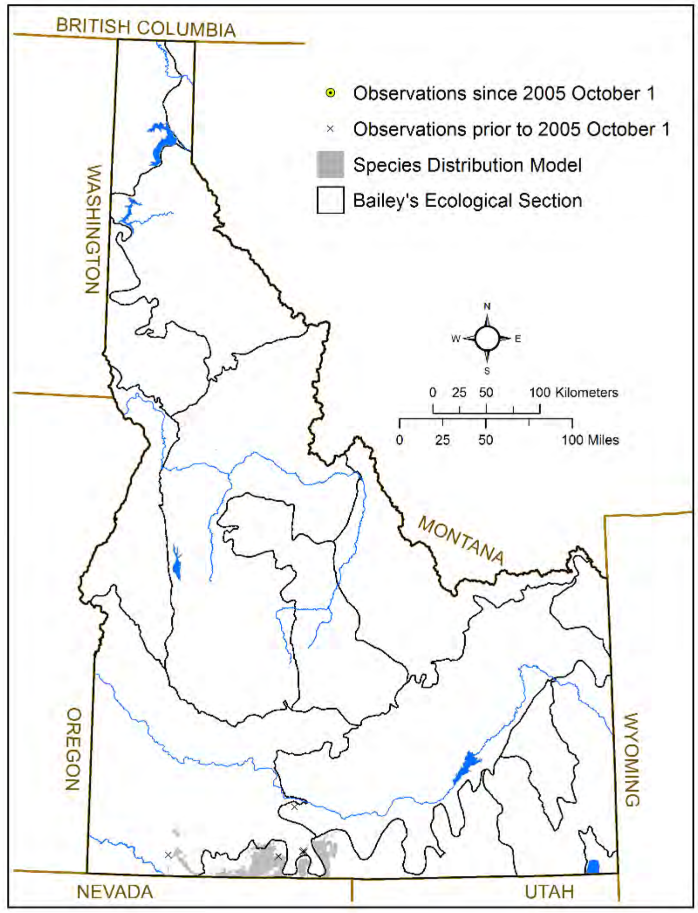
CONSERVATION ACTIONS
Conservation issues and management actions for the species are detailed in the appropriate section plans. In short, recommended strategies include determining the identity and status of ground squirrel populations in northwest Owyhee County, which will help with public and hunter education regarding identification of this protected native species. Long-term efforts toward rangeland restoration and management intended to reduce nonnative grasses and restore ecological function of shrub habitats would benefit this species.

ADDITIONAL COMMENTS
None.

Information Sources: Cole FR, Wilson DE. 2009. *Urocitellus canus* (Rodentia: Sciuridae). Mammalian Species 834:1–8; Yensen E, Sherman PW. 2003. Ground–dwelling squirrels of the Pacific Northwest. Caldwell (ID): Albertson College of Idaho.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model modified by IDFG biologists).

Wyoming Ground Squirrel (Southwest Idaho popn.)

Urocitellus elegans nevadensis



Class: Mammalia
Order: Rodentia
Family: Sciuridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Protected Nongame Species
G-rank: G5T4
S-rank: S3

SGCN TIER: 2
Rationale: Range restricted, isolated and disjunct

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 38,300 km^2 (~14,800 mi^2)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Unknown
Description: This subspecies of Wyoming Ground Squirrel is restricted to southwest Idaho and northern Nevada. Although its distribution is poorly documented in Idaho, it is widely disjunct from other subspecies in the mountains of central Idaho. Population size is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: The Wyoming Ground Squirrel occupies shrubland and grassland habitats across its range, often in relatively mesic or productive sites, including mid- to high-elevation montane meadows and valley bottoms. The southwestern Idaho subspecies occurs primarily in sagebrush steppe.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable

Description: Populations are likely affected by widespread degradation of sagebrush habitat from invasive weeds and altered fire cycles.

CONSERVATION ACTIONS

The primary recommended conservation action for this species is to develop and implement surveys intended to characterize its distribution and status in Idaho.

ADDITIONAL COMMENTS

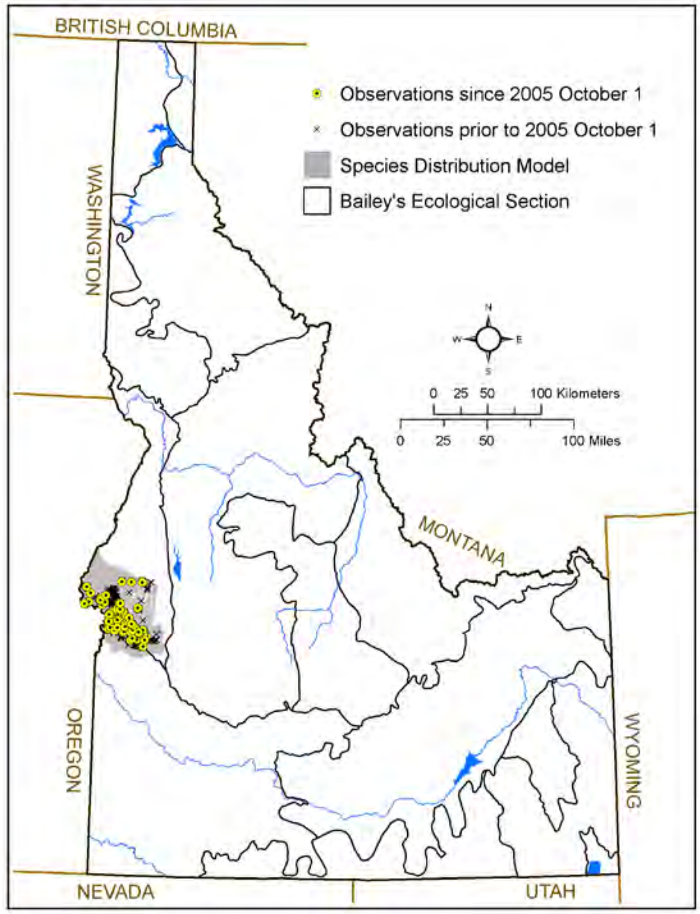
None.

Information Sources: Yensen E. 1998. *Spermophilus elegans* Kennicott 1863, Wyoming ground squirrel. Pp. 45–46 in Hafner DJ, Yensen E, Kirkland GL Jr. (compilers and eds.). North American rodents: Status survey and conservation action plan. IUCN/SSC Rodent Specialist Group. Gland (Switzerland): International Union for the Conservation of Nature, Gland, Switzerland.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database, accessed December 14, 2015; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model modified by IDFG biologists to reflect only the southwest population).

Southern Idaho Ground Squirrel

Urocitellus endemicus



Class: Mammalia
Order: Rodentia
Family: Sciuridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: Sensitive
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G2T2
S-rank: S2

SGCN TIER: 1
Rationale: Low population size, endemic, range restricted, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,900 km² (~1,100 mi²)
Key Ecological Sections: Blue Mountains, Owyhee Uplands
Population Size in Idaho: 2,500-10,000
Description: The Southern Idaho Ground Squirrel is endemic to approximately 291,500 ha (720,300 acres) in Gem, Payette, Washington, and Adams counties. The Snake and Payette rivers are range boundaries to the west and south, respectively, and geologic and edaphic conditions may limit habitat suitability at the northern and eastern extent of the range. Distribution is most extensive and population density greatest in the foothills north of the Payette River from Weiser east to Squaw Butte. Populations in the northeastern portion of the range tend to be widely distributed at relatively low densities.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This species occurs in a mosaic of shrubland and grassland habitats. Nonnative annual grasses have invaded most ground squirrel habitat and the extent of shrub cover has been reduced from historical levels. Nonnative grasses have displaced native plants and reduced plant diversity, which has implications for forage availablility and quality. Habitat conditions in late winter and through spring are most important because individuals hibernate for 7-8 months, having a relatively short active season from mid- to late February through June. The short active period is focused on breeding and acucmulation of energy reserves for the dormant period. Nonnative grasses tend to senesce in late spring (e.g., late May through early

June), a period when ground squirrels are completing the accumulation of energy reserves prior to entering estivation in June.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Decline 10–30%
Description: Investigations into the status of this species began in the 1980s when populations were suspected to be declining, but not necessarily imperiled. During the late 1990s, however, resurveys indicated a dramatic decline with population estimates going from 40,000 to 4,000 individuals between 1984 and 2000. Populations have made an apparent recovery from the 1999-2000 population low and now occur throughout their range, often being locally abundant.

THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Highly vulnerable
Description: The primary threats to Southern Idaho Ground Squirrel habitat include invasive plants and changes in plant composition. Changes in plant composition may reduce forage value and the propensity of nonnative grasses to senesce during the period when squirrels accumulate fat reserves may affect survival through their dormant period. Ground squirrels are susceptibe to plague, a disease caused by an introduced pathogen. The effects of plague on small mammal communities is an emerging topic of investigation. Plague has the potential to reduce survival rates, perhaps dramatically in the event of an epizootic disease outbreak, and may also mediate competitive interactions that affect distribution and abundance. Individual squirrel mortality may occur from illegal or misidentified shooting and incidental mortality may occur through control measures for other species; population effects have not been detected.

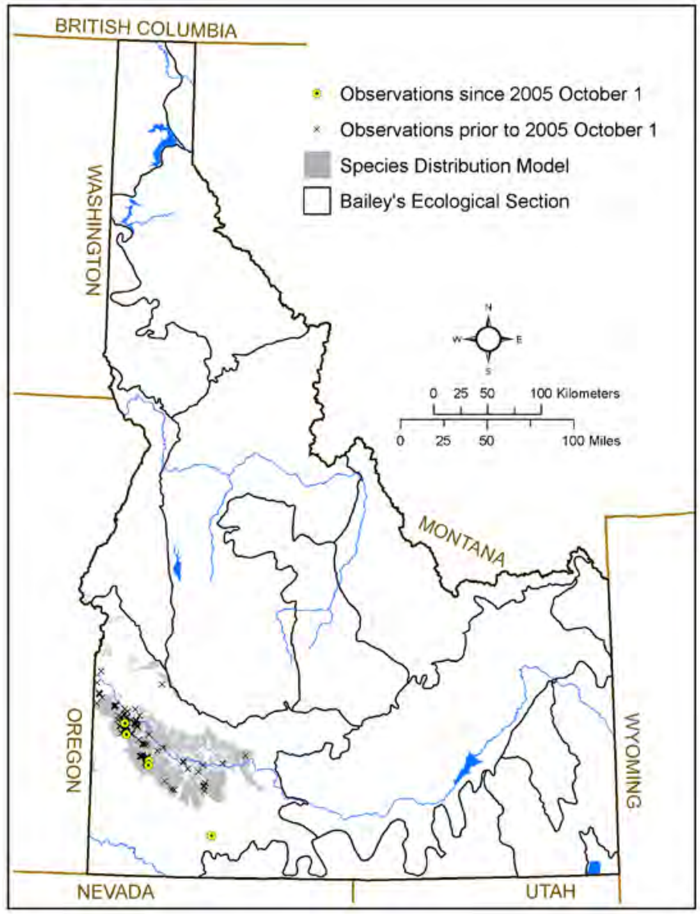
CONSERVATION ACTIONS
Conservation issues and management actions for the species are detailed in the appropriate section plans. Recommended strategies include determining the effects of evaluating and managing disease, implementing rangeland management and restoration programs to benefit ground squirrel populations, and continuing landowner, public, and hunter education emphasizing proper identification and protected status of these native squirrels.

ADDITIONAL COMMENTS
The Southern Idaho Ground Squirrel was designated a candidate for listing under the ESA in 2001 and was determined to be not warranted for listing in October 2015.

Information Sources: Yensen E. 1999. Population survey of the southern Idaho ground squirrel, *Spermophilus brunneus endemicus*. A report for US Fish and Wildlife Service, Snake River Basin Office. Boise (ID): Albertson College of Idaho; Yensen E. 2000. Additional surveys for southern Idaho ground squirrels, *Spermophilus brunneus endemicus*. A report for US Fish and Wildlife Service, Snake River Basin Office. Boise (ID): Albertson College of Idaho; Yensen E. 2001. Population estimate for the southern Idaho ground squirrel (*Spermophilus brunneus endemicus*). A report for the US Fish and Wildlife Service, Snake River Basin Office. Boise (ID): Albertson College of Idaho; Lohr K, Yensen E, Munger JC, Novak SJ. 2013. Relationships between habitat characteristics and densities of southern Idaho ground squirrels. Journal of Wildlife Management 77:983–993; Barrett J. 2005. Population viability of the southern Idaho ground squirrel: effects of an altered landscape. MS Thesis. Boise (ID): Boise State University; FWS. 2014. Review of Native Species That Are Candidates for Listing as Endangered or Threatened. Federal Register 79(234):72450.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model); IDFG unpublished data.

Great Basin Collared Lizard

Crotaphytus bicinctores



Class: Reptilia
Order: Squamata
Family: Crotaphytidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Protected Nongame Species
G-rank: G5
S-rank: S2

SGCN TIER: 3
Rationale: Critical conservation needs, multiple threats to habitat

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 11,600 km^2 (~4,500 mi^2)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Unknown
Description: The Great Basin Collared Lizard occurs from southwest Idaho and eastern Oregon south across the Great Basin to northern Arizona and southeastern California. Idaho populations occur at lower elevations along the Snake River, primarily in Owyhee County south of the Snake River. Individuals are typically sparsely distributed within occupied habitat. Density from 0.27 to 4.47 individuals per hectare has been estimated at four sample sites south of Nampa, Idaho.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This lizard occurs in rocky, sparsely-vegetated habitat with sagebrush, saltbush and bunchgrasses as dominant cover types. Scattered rocks are a characteristic habitat component. Collared lizard population density increases with rock cover, and rock sizes in occupied habitat are typically 0.25-1.00m in diameter. Prey consists of large arthropods and lizards.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: The primary threats to this species include loss or alteration of suitable habitat by nonnative plants. Habitat changes may affect physical structure of the habitat (such as availability of open, unvegetated patches) and prey availability. Mortality and displacement by off-road vehicles and commercial and noncommercial collecting for the pet trade are sources of mortality (or removal from the population in the case of collection) that have unknown implications for population viability. Similarly, rock quarrying may affect habitat in some localized areas but has unknown effects on habitat suitability or occupancy.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the Owyhee Uplands Section Plan. The management priority for Great Basin Collared Lizard habitat is management of cheatgrass and other invasive plants and noxious weeds. These plants reduce habitat quality because collared lizards are adapted to sparsely-vegetated habitat, but cheatgrass and other invasive annuals tend to grow in dense stands. Invasive annuals may also have negative consequences for prey abundance and affect fire cycles, which has implications for vegetation composition and structure in post-fire regenerated habitat.

ADDITIONAL COMMENTS

None.

Information Sources: Cossel J Jr, Oelrich K, Thoren K, Butler–Dawson J. 2004. Habitat use, home range size and relative abundance of the Great Basin Collared Lizard (*Crotaphytus bicinctores*) in southwestern Idaho. Final Report, WCRP Program, Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed August 14, 2015].; Aycrigg J, Andersen M, Beauvais G, Croft M, Davidson A, Duarte L, Kagan J, Keinath D, Lennartz S, Lonneker J, Miewald T, Ohmann J, eds. 2013. Ecoregional Gap Analysis of the Northwestern United States: Northwest Gap Analysis Project Draft Report. Moscow (ID): USGS, Gap Analysis Program (predicted year-round distribution model).

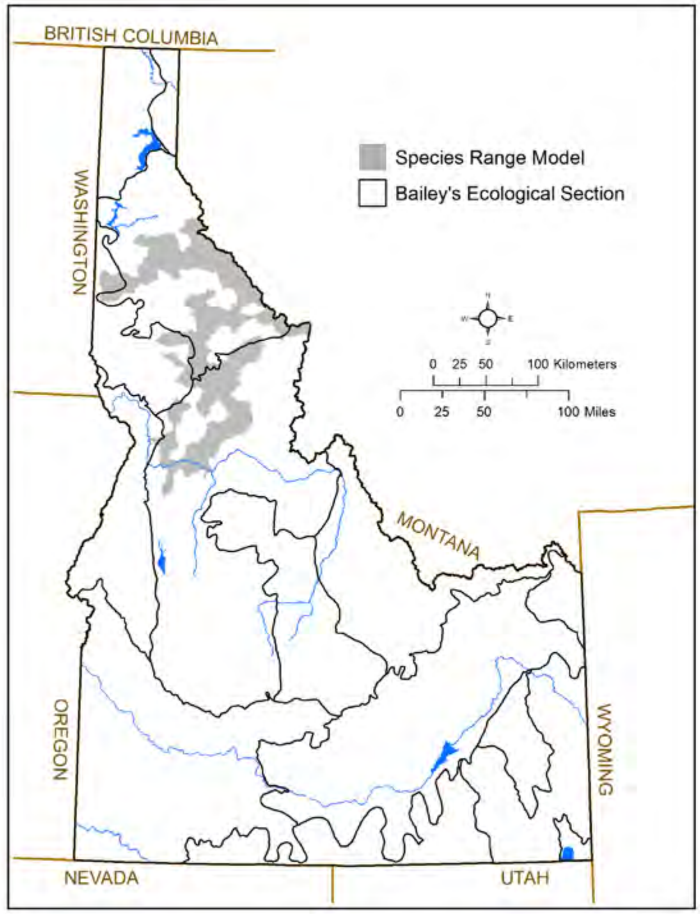
Harvestman Species Group

Acuclavella Species Group

Class: Arachnida
Order: Opiliones
Family: Ceratolasmatidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S3Q

SGCN TIER: 3
Rationale: Idaho endemics, data deficient, restricted range



DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 16,700 km^2 (~6,400 mi^2)
Key Ecological Sections: Bitterroot Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: At least 5 Acuclavella species, including 4 Idaho endemics (*A. sheari*, *A. quattuor*, *A. merickeli*, *A. shoshone*) and 1 regional endemic (*A. cosmetoides*) occur in the Clearwater region of Idaho. *Acuclavella sheari* is currently known only from an area just south of the Salmon River in Idaho County. *A. quattuor* occurs between the South Fork of the Clearwater River and the Salmon River, but may also occur between the Selway and Lochsa rivers. Known *A. merickeli* populations are all on the Nez Perce National Forest between the Selway River and the South Fork of the Clearwater River. *A. shoshone* is known only from its type locality at Hobo Cedar Grove, Shoshone County. Conversely, *A. cosmetoides* is more widespread ranging from the Clearwater River north to the Coeur d'Alene River with 1 known location in Montana.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: These species are riparian obligate forest–dwellers, typically found in litter, moss, or moist woody debris adjacent to small perennial seeps and headwater streams. Coniferous canopy cover generally includes grand fir, Douglas-fir, Engelmann spruce, western hemlock and/or western redcedar.

POPULATION TREND
Short-term Trend: Unknown

Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Threats to these populations have not been specifically identified but could include any changes to the riparian forest found at known sites.

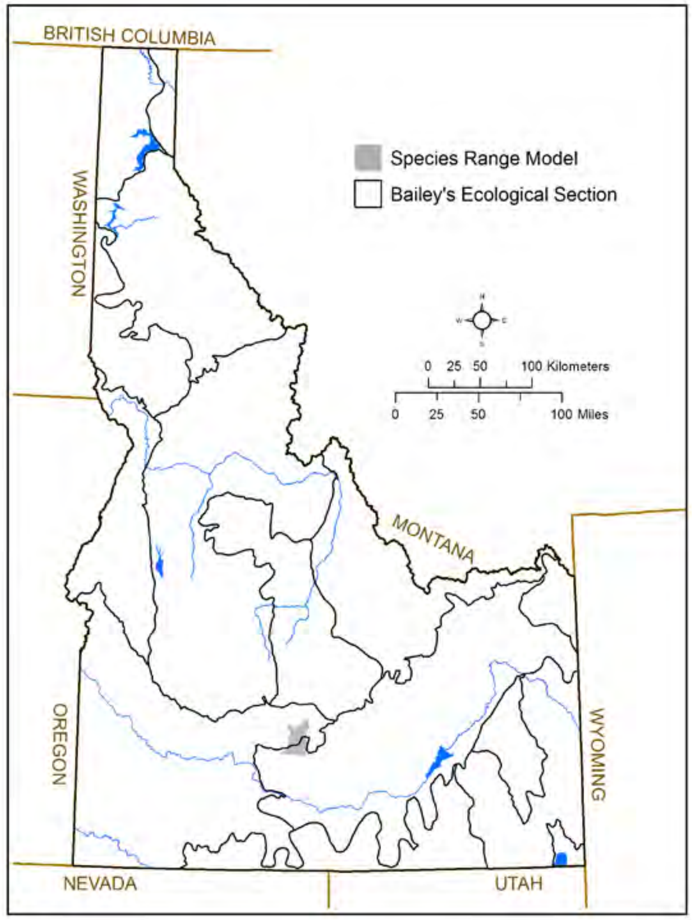
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for these species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate. In addition, further taxonomic work is needed for this genus to support the separation of *A. shoshone* and *A. cosmetoides* as well as the possiblity of 2 species in the *A. quattuor* lineage.

ADDITIONAL COMMENTS
None.

Information Sources: Richart CH, Hedin M. 2013. Three new species in the harvestmen genus *Acuclavella* (Opiliones, Dyspnoi, Ischyropsalidoidea), including description of male *Acuclavella quattuor* Shear, 1986. ZooKeys 311:19–68; Shear, W. A. 1986. A cladistic analysis of the Opilionid superfamily Ischyropsalidoidea, with descriptions of the new family Ceratolasmatidae, the new genus *Acuclavella*, and four new species. American Museum Novitates 2844:1-29.
Map Sources: Richart CH, Hedin M. 2013. Three new species in the harvestmen genus *Acuclavella* (Opiliones, Dyspnoi, Ischyropsalidoidea), including description of male *Acuclavella quattuor* Shear, 1986. ZooKeys 311:19–68; Integrated digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.

A Cave Obligate Harvestman

Speleomaster lexi



Class: Arachnida
Order: Opiliones
Family: Cladonychiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S1

SGCN TIER: 2
Rationale: Idaho endemic, data deficient, restricted range, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 600 km^2 (~200 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This cave obligate species is an Idaho endemic known from a single lava-tube cave complex in Lincoln County. The distribtion of populations within the complex is not known, but the species may be restricted to a limited area of suitable habitat. Individuals are rarely encounterd.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Although specific habitat requirements have not been documented, specimens have all been found in various locations within a single lava-tube cave.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented. The species appears to be reclusive and population estimates are difficult.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: Threats are unknown, but any activity that might negatively disrupt the cave environment would be considered a threat.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

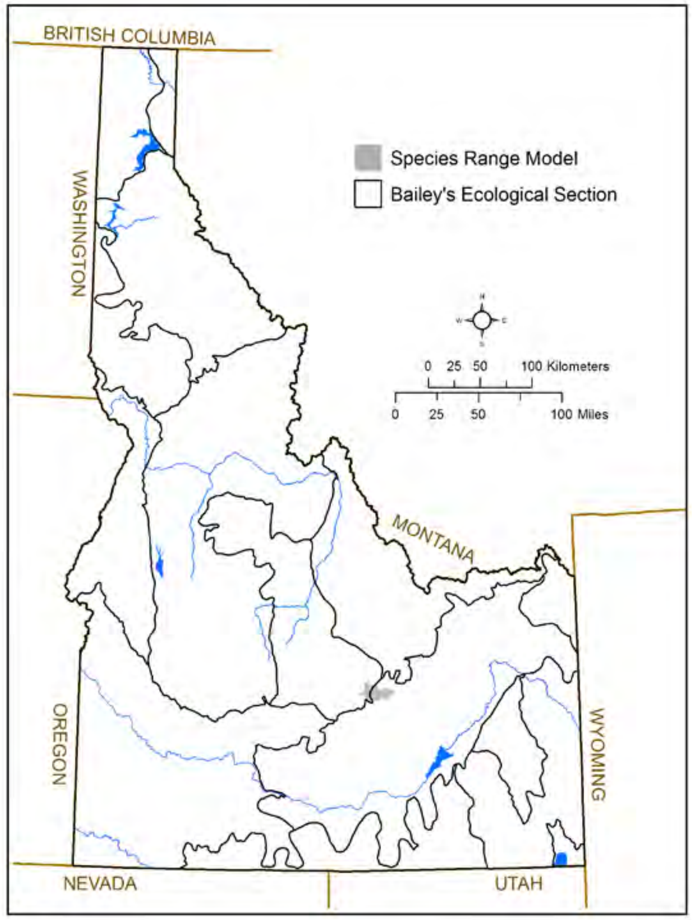
ADDITIONAL COMMENTS

None.

Information Sources: Briggs TS. 1974. Troglobitic harvestmen recently discovered in North American lava tubes (Travuniidae, Eremobastridae, Triaenonychidae: Opiliones). Journal of Arachnology 1:205-214.; Riggs J. 1994. Phalangids in the T–maze cave system, Shoshone, Idaho. Gem State Grotto, Boise (ID): Boise State University.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

A Cave Obligate Harvestman

Speleomaster pecki



Class: Arachnida
Order: Opiliones
Family: Cladonychiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S1

SGCN TIER: 2
Rationale: Idaho endemic, data deficient, restricted range, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 400 km^2 (~200 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This cave obligate species is an Idaho endemic known only from a single cave in Craters of the Moon National Monument and Preserve, Butte County.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This harvestman is restricted to habitat found only in a lava-tube cave, and has only been collected near a permanent ice flow.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Threats are unknown, but any activity that might negatively disrupt the cave environment would be considered a threat.

CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Briggs TS. 1974. Troglobitic harvestmen recently discovered in North American lava tubes (Travuniidae, Eremobastridae, Triaenonychidae: Opiliones). Journal of Arachnology 1:205-214.; Riggs J. 1994. Phalangids in the T–maze cave system, Shoshone, Idaho. Gem State Grotto, Boise (ID): Boise State University.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

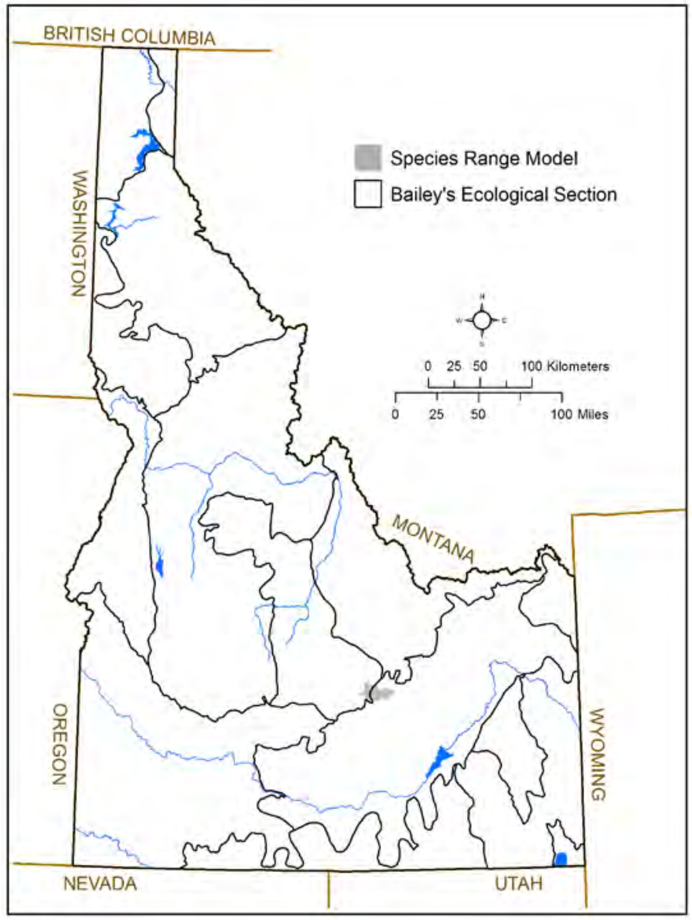
A Cave Obligate Mite

Flabellorhagidia pecki

Class: Arachnida
Order: Trombidiformes
Family: Rhagidiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S1

SGCN TIER: 2
Rationale: Idaho endemic, data deficient, restricted range, habitat specialist



DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 400 km^2 (~200 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This cave obligate species is an Idaho endemic, known only from a single cave at Craters of the Moon National Monument and Preserve.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species is an obligate cave inhabitant, but specific habitat requirements have not been published.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Threats are unknown, but any activity that might negatively disrupt the cave environment would be considered a threat.

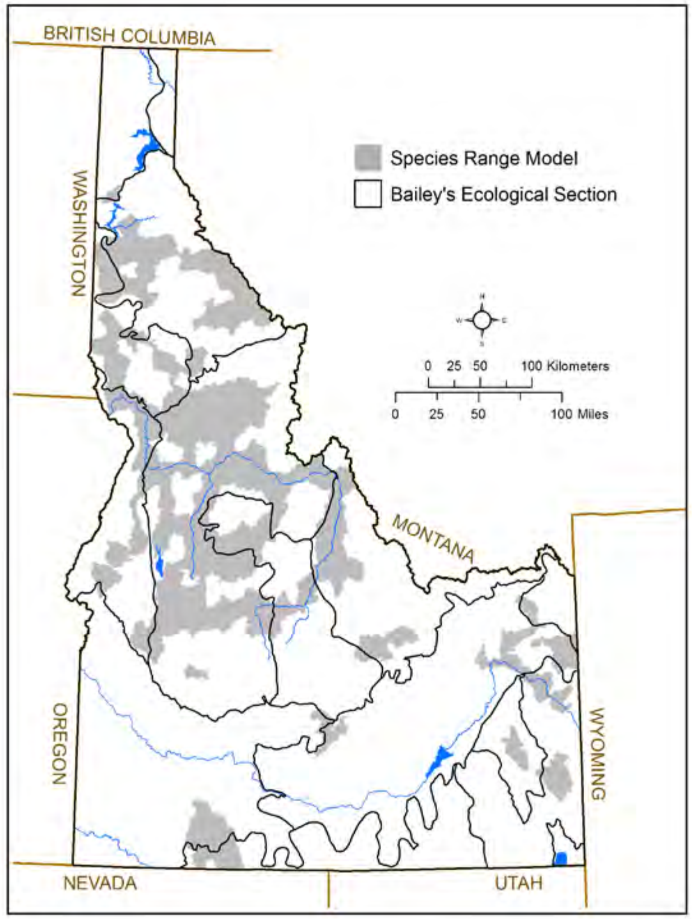
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Elliott WR. 1976. New cavernicolous Rhagidiidae from Idaho, Washington, and Utah (Prostigmata: Acari: Arachnida). Occasional Papers, Museum of Texas Tech University 43:1–15.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Western Pearlshell

Margaritifera falcata



Class: Bivalvia
Order: Unionoida
Family: Margaritiferidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4G5
S-rank: S2

SGCN TIER: 2
Rationale: Significant rangewide declines, multiple threats

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 30,328 stream km (~18,845 stream mi)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Idaho Batholith, Palouse Prairie, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: Historically, the Western Pearlshell was widespread across western North America, including most of Idaho. Once the most common mussel in the Pacific Northwest, it is now increasingly rare. Although the species continues to persist in most forested streams across the state, it has been lost from large stretches of the Snake, Big Wood, Big Lost, Little Lost, Malad, Raft, Payette, Portneuf, Boise, Clearwater, and Bruneau rivers. Recent surveys in the Buffalo, Upper Teton, and Lower Henrys Fork have identified potentially viable populations, but distribution data from these locations was not available at the time of this report. Viability of populations in the Northern Rocky Mountains is questionable and lack of recruitment correlates with loss of the host fish.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This species inhabits cold, clear streams and rivers often in reaches with fast current and coarse substrates. It is long–lived (average 60–70 years, but some as long as 100 years), is slow to reproduce, and relies on fish hosts, predominantly native salmonids.

POPULATION TREND
Short-term Trend: Decline 30–50%

Long-term Trend: Unknown
Description: Western Pearlshell have declined across much of the historical range. In Idaho, the species has declined between 37% and 57% when compared to estimates of historical distribution. These declines have been attributed to changes in water quality and the loss of riparian zones. Habitats once more appropriate for Western Pearlshell no longer support populations and may instead be inhabited by the native Western Ridged Mussel that are better adapted to lower quality stream habitats.

THREATS

Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable
Description: This species is sensitive to changes in water quality and is particularly intolerant of heavy nutrient loads and siltation. Thus, threats to the species include impoundments, channel modification, dredging/mining, contamination, sedimentation, nutrient enrichment, water withdrawal and diversion, thermal pollution, and improper livestock grazing management in riparian areas. In addition, loss of host fish populations and introduction of non–native fish and invertebrate species are also threats. The species is also known to be recreationally harvested in certain portions of its range, the scale and effect of this harvest is not fully understood.

CONSERVATION ACTIONS

Priority conservation strategies include conducting surveys to determine the current abundance and trends of this species in Idaho and maintaining water quality and quantity at both known and potential sites.

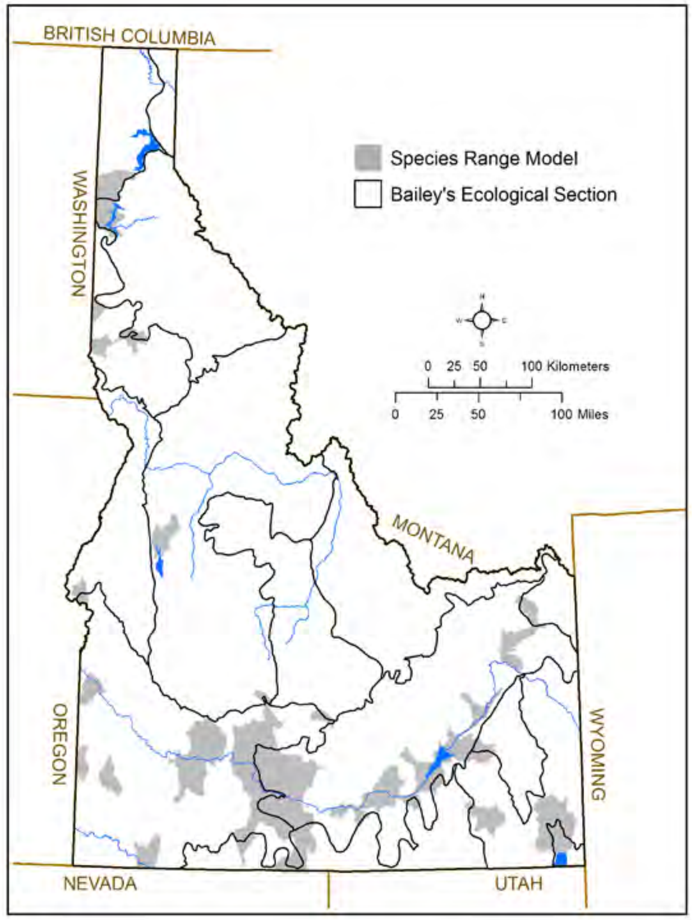
ADDITIONAL COMMENTS

None.

Information Sources: Lysne S. 2009. A Guide to Southern Idaho's Freshwater Mollusks. Boise (ID): US Fish and Wildlife Service; Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Xerces Society. 2012. Status Review of *Margaritifera falcata* (Gould, 1850) Western Pearlshell (Bivalvia: Margaritiferidae). www.xerces.org [Accessed Jan 6, 2015]; Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51; Hovingh P. 2004. Intermountain freshwater mollusks, USA (Margaritifera, Anodonta, Gonidea, Valvata, Ferrissia): Geography, conservation and fish management implications. Western North American Naturalist 2:109–135; Lysne SJ, Krouse BR. 2011. *Margaritifera falcata* in Idaho: using museum collections and GIS to demonstrate a declining trend in regional distribution. Journal of the Idaho Academy of Science, 47(2):33–39; Vannote RL, Minshall GW. 1982. Fluvial processes and local lithology controlling abundance, structure, and composition of mussel beds. Proceedings of the National Academy of Science, 79:4103–4107.
Map Sources: Range extent is based on the current stream occupancy in Idaho (30,328 stream km); Idaho Department of Environmental Quality. BUGS database. [Accessed February 13, 2015].; Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; The Xerces Society for Invertebrate Conservation and the Confederated Tribes of the Umatilla Indian Reservation Mussel Project. 2015. Western Freshwater Mussel Database. Database available by request; Holderman C, Shafii B, Anders P, Lester G. 2009. Characterization of the Kootenai River aquatic macroinvertebrate community before and after experimental nutrient addition, 2003-2006. Chap 3 in Kootenai River Macroinvertebrate Characterization, 2009 KTOI Report [Accessed Feb 20, 2015] https://pisces.bpa.gov/release/documents/documentviewer.aspx?doc=P110393; Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Lysne SJ, Garcia G, Krouse BR. 2011. Molluscan community composition and richness in four high-elevation Idaho streams includes an exotic taxon. American Malacological Bulletin 29:127–133; Lysne SJ, Krouse BR. 2011. *Margaritifera falcata* in Idaho: using museum collections and GIS to demonstrate a declining trend in regional distribution. Journal of the Idaho Academy of Sciences 47:33–39.

California Floater

Anodonta californiensis



Class: Bivalvia
Order: Unionoida
Family: Unionidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G3Q
S-rank: S3Q

SGCN TIER: 3
Rationale: Significant rangewide declines

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 23,300 km^2 (~9,000 mi^2)
Key Ecological Sections: Bear Lake, Northwestern Basin and Range, Overthrust Mountains, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: The Caliornia Floater is widespread across the western US, but scarce. In Idaho, populations primarily occur in the Snake River Plain and it can still be locally common in some reaches.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This species occurs in large, cold, slow–moving streams and lakes at lower elevations. It is typically found on soft substrates, is relatively sedentary and is thought to be a fast–growing species that reaches sexual maturity in 4–5 years with a lifespan of 10–15 years. Host fish in Idaho are unknown.

POPULATION TREND
Short-term Trend: Decline 10–30%
Long-term Trend: Unknown
Description: This species is declining both in terms of the area occupied and the number of sites and individuals across much of its range, but predominantly in the southern extent. Recent analyses by the Xerces Society indicates that a major range contraction has not yet taken place in Idaho.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Sensitive to changes in water quality and quantity, the primarly threats to this species include impoundments, channel modification, dredging/mining, contamination, sedimentation, nutrient enrichment, water withdrawal and diversion, thermal pollution, and improper livestock grazing management in riparian areas. In addition, loss of host fish populations and introduction of nonnative fish and invertebrate species are also threats.

CONSERVATION ACTIONS

Priority conservation strategies for this species include conducting surveys to determine the current abundance and trends in Idaho and genetic work to determine the possible synonymy with Anodonta nuttalliana.

ADDITIONAL COMMENTS

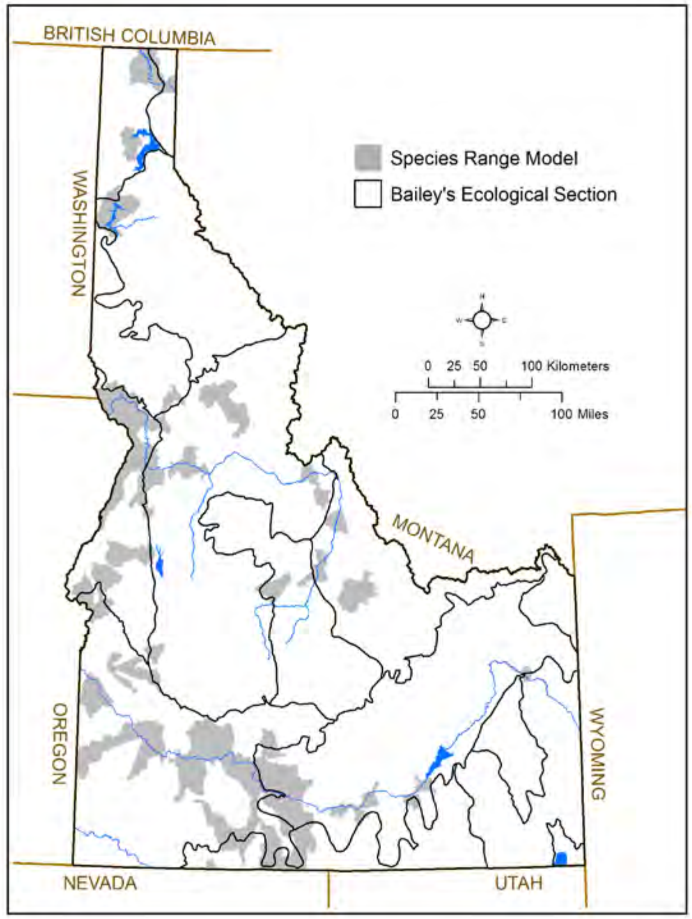
The taxonomy of the California Floater is uncertain and it is considered likely synonymous with *Anodonta nuttalliana* by the Xerces Society and Chong et al. (2008).

Information Sources: Xerces Society. 2009. Freshwater mussels of the Pacific Northwest, Second edition. Portland (OR): The Xerces Society for Invertebrate Conservation; Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51; Hovingh P. 2004. Intermountain freshwater mollusks, USA (*Margaritifera*, *Anodonta*, *Gonidea*, *Valvata*, *Ferrissia*): Geography, conservation and fish management implications. Western North American Naturalist 2:109–135.; Chong JP, Brim Box JC, Howard JK, Wolf D, Myers TL, Mock KE. 2008. Three deeply divided lineages of the freshwater mussel genus *Anodonta* in western North America. Conservation Genetics 9:1303–1309.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; The Xerces Society for Invertebrate Conservation and the Confederated Tribes of the Umatilla Indian Reservation Mussel Project. 2015. Western Freshwater Mussel Database. Database available by request; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.; Lysne SJ, Clark WH. 2009. Mollusc survey of the lower Bruneau River, Owyhee County, Idaho, USA. American Malacological Bulletin 27:167–172

Western Ridged Mussel

Gonidea angulata



Class: Bivalvia
Order: Unionoida
Family: Unionidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S3

SGCN TIER: 3
Rationale: Rangewide declines

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 30,500 km² (~11,800 mi²)
Key Ecological Sections: Blue Mountains, Idaho Batholith, Okanogan Highlands, Flathead Valley, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: The Western Ridged Mussel is widespread across the western US, but with declining populations in many areas of its range. Historically, populations existed in much of the Snake, Clearwater, Salmon, and Little Salmon rivers in Idaho. Recent analyses by the Xerces Society suggests that the species has been lost from about a third of its range in Idaho. The Snake River is considered a stronghold for this species and it can still be locally common in some areas.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This species is found in cold creeks and streams, mainly in low to mid–elevations. Adults are sedentary with an estimated lifespan of 20–30 years. Host fish in Idaho are unknown.

POPULATION TREND
Short-term Trend: Decline 10–30%
Long-term Trend: Unknown
Description: This species is declining both in terms of the area occupied and the number of sites and individuals across much of its range, though a population on the Humboldt River in Nevada appears to be stable. In Idaho, the species is estimated to have declined by about 30% of its historic range but current trend estimates are unknown.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: This mussel is a cold–water filter feeder and is fairly sensitive to nutrient enhancement, pollution, and temperature changes. Thus, the primary threat to this species is the degradation of water quality and quantity through impoundments, channel modification, reduced stream flow, contamination, sedimentation, nutrient enrichment, and thermal pollution. In addition, the loss of host fish and introduction of nonnative fish and invertebrates are threats.

CONSERVATION ACTIONS

Priority conservation strategies include conducting surveys to determine the current abundance and trends of this species in Idaho and maintaining water quality and quantity at both known and potential sites.

ADDITIONAL COMMENTS

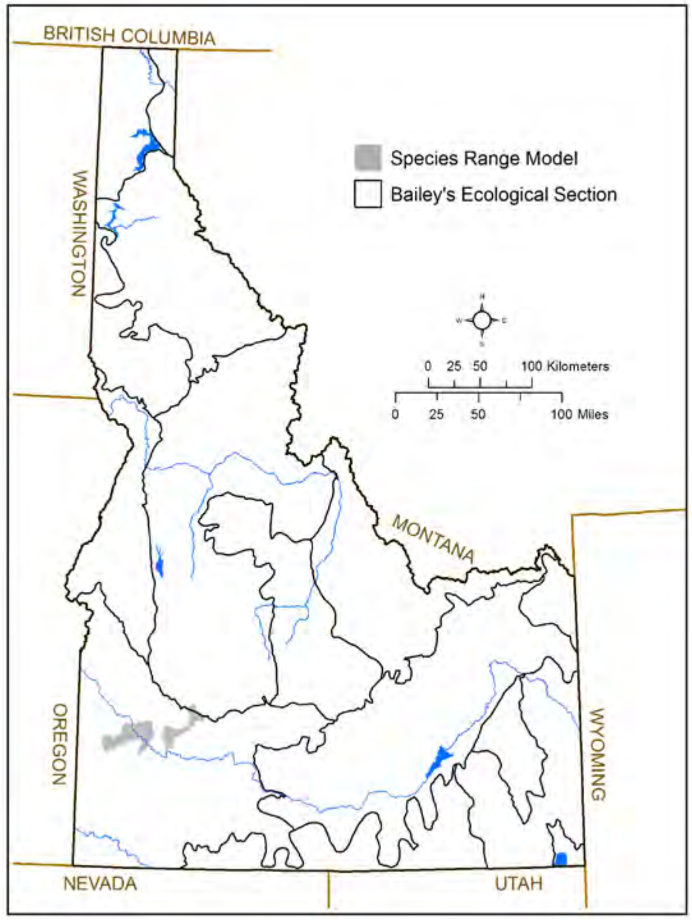
None.

Information Sources: Xerces Society. 2009. Freshwater mussels of the Pacific Northwest, Second edition. Portland (OR): The Xerces Society for Invertebrate Conservation; Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51; Hovingh P. 2004. Intermountain freshwater mollusks, USA (*Margaritifera*, *Anodonta*, *Gonidea*, *Valvata*, *Ferrissia*): Geography, conservation and fish management implications. Western North American Naturalist 2:109–135.

Map Sources: Idaho Department of Environmental Quality. BUGS database. [Accessed February 13, 2015].; Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; The Xerces Society for Invertebrate Conservation and the Confederated Tribes of the Umatilla Indian Reservation Mussel Project. 2015. Western Freshwater Mussel Database. Database available by request; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.; Holderman C, Shafii B, Anders P, Lester G. 2009. Characterization of the Kootenai River aquatic macroinvertebrate community before and after experimental nutrient addition, 2003-2006. Chap 3 in Kootenai River Macroinvertebrate Characterization, 2009 KTOI Report https://pisces.bpa.gov/release/documents/documentviewer.aspx?doc=P110393 [Accessed Feb 20, 2015]; Lysne SJ, Clark WH. 2009. Mollusc survey of the lower Bruneau River, Owyhee County, Idaho, USA. American Malacological Bulletin 27:167–172

Raptor Fairy Shrimp

Branchinecta raptor



Class: Branchiopoda
Order: Anostraca
Family: Branchinectidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S1

SGCN TIER: 3
Rationale: Idaho endemic, data deficient, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,400 km² (~500 mi²)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Not applicable for invertebrates.
Description: To date, Raptor Fairy Shrimp are known from only two playas in southwestern Idaho – Tadpole Lake in the Idaho Army National Guard Orchard Training Area and Armadillo Lake in the Snake River Birds of Prey National Conservation Area.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The two localities for this species are playas less than 5 ha (12 acres) in size and 10–30 cm (4–12 in) in depth with turbid water, pH of 10 or higher, and temperatures ranging between 4° and 25° C (39°–77° F). Spring rainfall is variable and combined April – June rainfall ranges from 2.5 to 10 cm (1–4 in). This species is a predatory shrimp preying primarily on the Alkali Fairy Shrimp (*Branchinecta mackini*).

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Highly vulnerable
Description: Threats to the population are not specifically identified but primarily include any changes to water quality and quantity including pollution, pH level, and temperature. Climate change will likely exacerbate these threats given current and projected changes in temperature and precipitation patterns.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

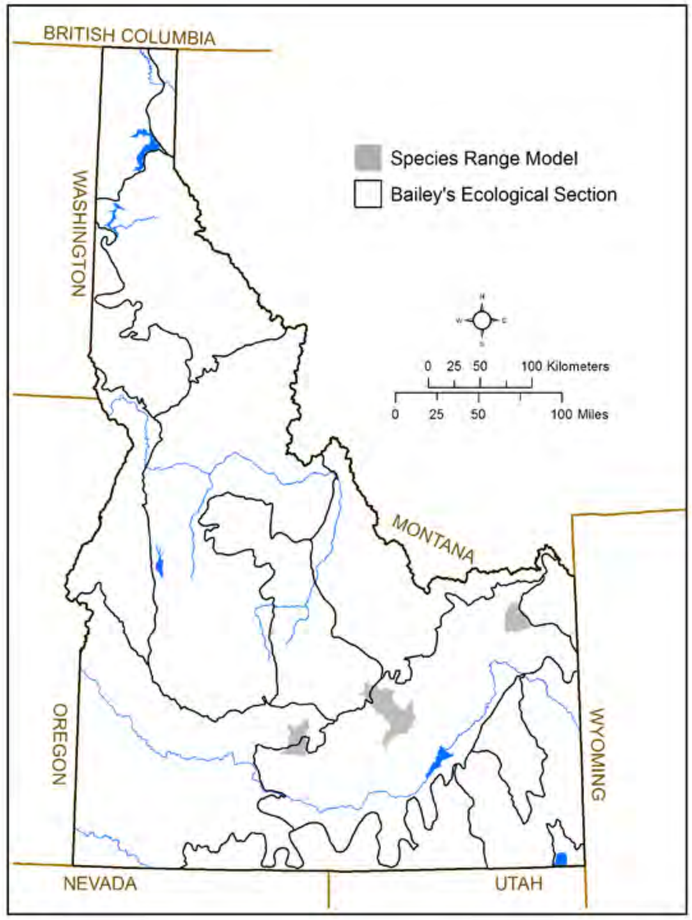
ADDITIONAL COMMENTS

None.

Information Sources: Rogers CD, Quinney DL, Weaver J, Olesen J. 2006. A new giant species of predatory fairy shrimp from Idaho, USA (Branchiopoda: Anostraca). Journal of Crustacean Biology 26:1–12.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Idaho Lava Tube Millipede

Idagona westcotti



Class: Diplopoda
Order: Chordeumatida
Family: Conotylidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S1

SGCN TIER: 2
Rationale: Idaho endemic, data deficient, restricted range, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,400 km^2 (~900 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: The Idaho Lava Tube Millipede is an Idaho endemic known from four clusters of lava-tube caves in southern Idaho, it may however be more widespread across the Snake River plain in similar cave systems.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The species is a cave obligate but little else is known about its specific habitat requirements. The lava tubes where it is found generally have permanent ice and constant temperatures around 4 °C (39 °F).

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: The primary threat to this species is alteration of cave habitat, which may include climate change, human activities, nutrient loads, and insecticides.

CONSERVATION ACTIONS

Priority conservation strategies for this species include surveys to determine the current abundance and trends of this species in Idaho, maintaining suitable habitat at both known and potential sites, and managing human uses of caves to prevent unintentional damage.

ADDITIONAL COMMENTS

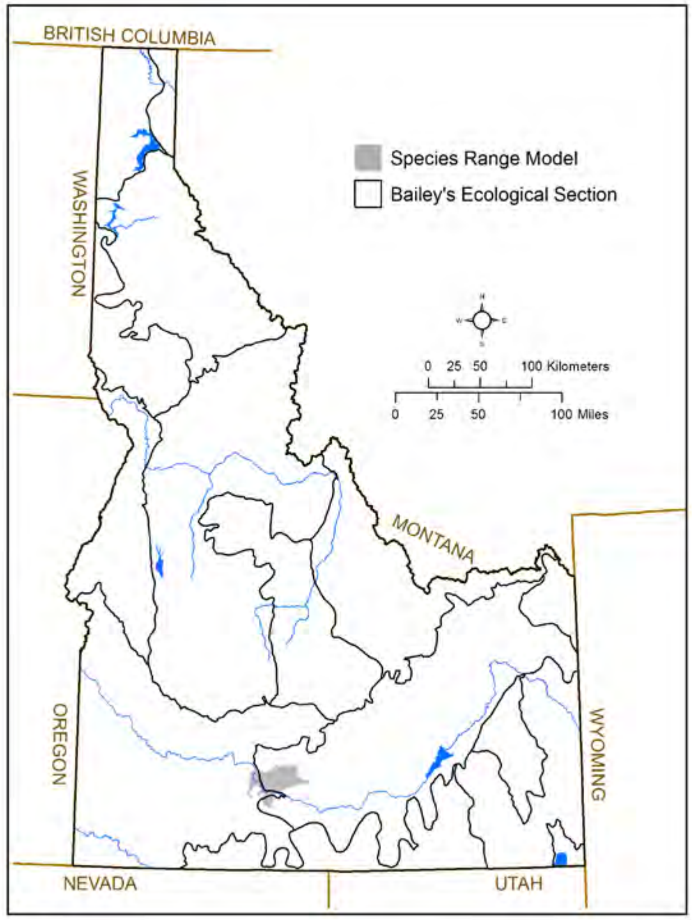
None.

Information Sources: Buckett JS, Garner MR. 1967. A new family of cavernicolous millipedes with description of a new genus and species from Idaho (Diplopoda: Chordeumida: Chordeumidea). The Michigan Entomologist, 1, 117–126.; Shear WA. 2007. Cave millipeds of the United States. V. The genus *Idagona* Buckett & Gardner (Chordeumatida, Conotylidae, Idagoninae). Zootaxa 1463:1–12.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Shear WA. 2007. Cave millipeds of the United States. V. The genus *Idagona* Buckett & Gardner (Chordeumatida, Conotylidae, Idagoninae). Zootaxa 1463:1–12.

Banbury Springs Limpet

Lanx sp. 1

Class: Gastropoda
Order: Basommatophora
Family: Lymnaeidae



CONSERVATION STATUS & CLASSIFICATION
ESA: Endangered
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 1
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, ESA Listed, significant declines, high vulnerability

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,200 km² (~500 mi²)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Banbury Springs Limpet is an Idaho endemic currently known to occur in only 4 coldwater springs along the Snake River – Briggs Springs, Banbury Springs, Box Canyon Springs, and Thousand Springs. The status of the 4 separate populations is uncertain, but experts estimate approximately 2,500 individuals.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The species appears to prefer deep, cold, high quality water and stable substrates.

POPULATION TREND
Short-term Trend: Decline 30–50%
Long-term Trend: Unknown
Description: Although the 4 populations have persisted, the decline reported here represents the average decline in estimated density (individuals/m²) among the 4 populations.

THREATS
Overall Threat Impact: Very High
Intrinsic Vulnerability: Highly vulnerable

Description: This species is sensitive to small changes in water quality (e.g., temperature, dissolved oxygen, sediment, pollution) and quantity. Thus, the primary threats include habitat modification, water diversion, spring flow reduction, and groundwater contamination from agriculture. The invasive New Zealand mudsnail is also a threat.

CONSERVATION ACTIONS

Although first discovered in 1988 by Terrence Frest, this species has never been formally described or named in the scientific literature. The priority conservation need for this species is that it be described in the scientific literature within the next ten years. In addition, water quality and quantity should be maintained at both occupied and potential sites.

ADDITIONAL COMMENTS

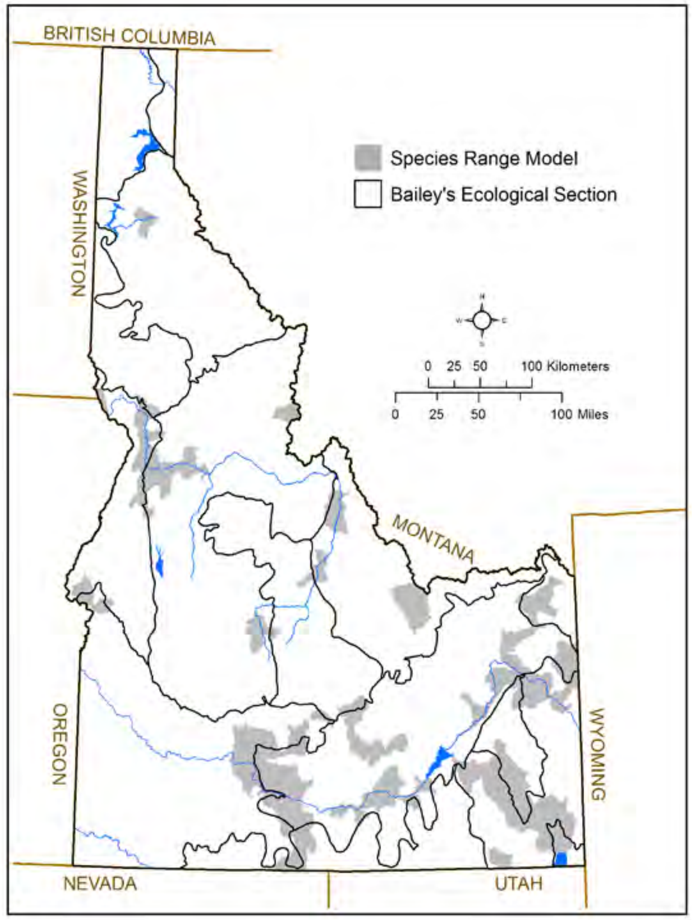
A petition to designate critical habitat for this species was submitted in 2010 but FWS has not yet published its findings.

Information Sources: Lucid M, Idaho Department of Fish and Game, pers. comm.; Hopper D, US Fish and Wildlife Service, pers. comm.; Lysne S. 2009. A Guide to Southern Idaho's Freshwater Mollusks. Boise (ID): US Fish and Wildlife Service; Burak G, Hopper D. 2014. 2014 Banbury Springs lanx monitoring report for Banbury, Box Canyon, Thousand, and Briggs springs, Idaho. FWS Internal Status Report. Boise (ID): US Fish and Wildlife Service.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Hopper D, US Fish and Wildlife Service, pers.comm.

Pondsnail Species Group

Stagnicola Species Group



Class: Gastropoda
Order: Basommatophora
Family: Lymnaeidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: SNR

SGCN TIER: 3
Rationale: State and regional endemics, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 39,500 km^2 (~15,300 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Blue Mountains, Overthrust Mountains, Owyhee Uplands, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: This species group consists of 9 species (*Stagnicola apicina*, *S. caperata*, *S. elodes*, *S. emarginata*, *S. hinkleyi*, *S. idahoensis*, *S. montanensis*, *S. traski*, and *S. utahensis*) found in various parts of the Salmon and Snake River drainages. Four of these species (*hinkleyi*, *idahoensis*, *montanensis*, and *traski*) are currently considered to be rare or uncommon and 1 (*S. utahensis*) is thought to be extinct in Idaho. Current population status for all species is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: All of these Pondsnails are cold water stenotherms, found in cold streams often with coarse substrates.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Unknown
Description: Threats to the populations have not been documented however changes in water quality though agricultural pollution, road consturction and mining, as well as habitat loss through the conversion of springs and streams for stock and domestic use and grazing have been identified as primary issues for some of the species.

CONSERVATION ACTIONS

Uncertainties in the taxonomy of *Stagnicola* have been raised (Stagliano et al. 2007) and some of these species may be synonyms of more common species (e.g., *S. catascopium*) and may be actually be in the *Lymnaea* genus. Priority conservation strategies include genetic work to determine taxonomic uniqueness of these species and surveys to determine the current abundance and trends in Idaho.

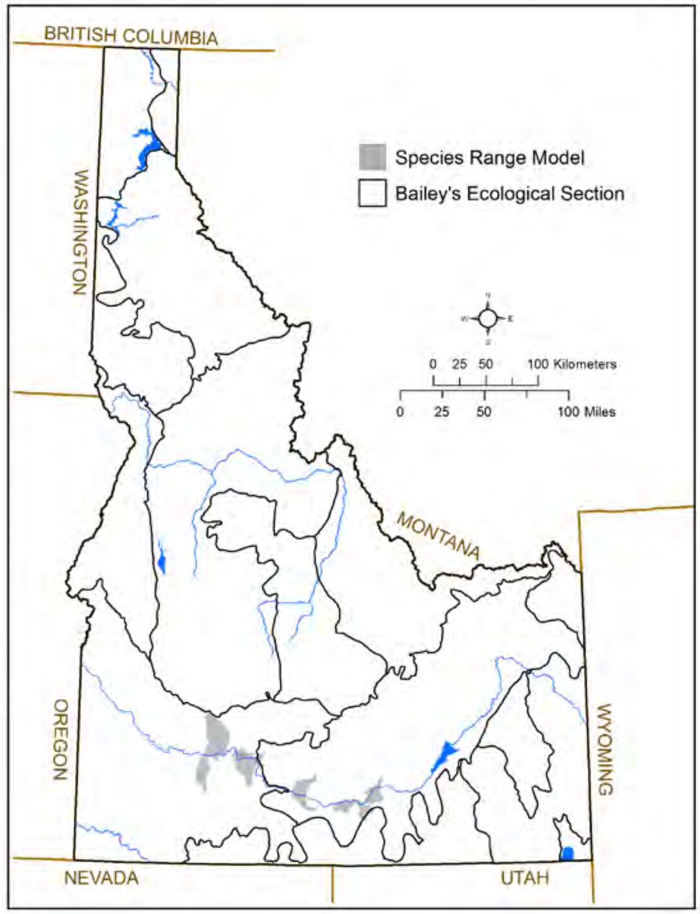
ADDITIONAL COMMENTS

None.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.
Map Sources: Extent includes all *Stagnicola* species in Idaho.; Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Minshall GW, Andrews DA. 1973. An ecological investigation of the Portneuf River, Idaho: a semiarid–land stream subjected to pollution. Freshwater Biology 3:1–30.; Lysne SJ, Garcia G, Krouse BR. 2011. Molluscan community composition and richness in four high–elevation Idaho streams includes an exotic taxon. American Malacological Bulletin 29:127–133.

Snake River Physa

Physa natricina



Class: Gastropoda
Order: Basommatophora
Family: Physidae

CONSERVATION STATUS & CLASSIFICATION
ESA: Endangered
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 1
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, ESA listed, restricted range

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,600 km^2 (~1,000 mi^2)
Key Ecological Sections: Owyhee Uplands, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: The Snake River Physa is endemic to Idaho and occurs predominantly in the middle Snake River. Until recently, this snail was thought to only occur from Hagerman downstream to Grandview. Current research indicates the range is much larger. Several museum specimens were collected from 1998-2002 along the Snake River as far downstream as Ontario, Oregon, and a persistent population is known to occur farther upstream below the Minidoka Dam. The species is considered rare, is not easily detected throughout most of its range, and has never been found in high densities.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: The habitat requirements of this species are not well understood. Based on limited occurrence data, it is thought to require clean gravel and pebble substrates (i.e., free of fine sediments and macrophyte growth), moderate water velocity, and good water quality. It is rarely collected in shallow water and has been found in greatest numbers at depths greater than 1.5 m (4.9 ft). Diet preferences are unknown.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown

Description: Population trends rangewide have not been documented. However, survey data from 2006-2012 indicates the population within the Minidoka reach is relatively stable.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Highly vulnerable
Description: The primary threat for this species is the degradation of water quality and quantity. All waters occupied by this species are heavily managed for flood control and agricultural use. Low flows, pollutants, and excess nutrients impair water quality. Changes in water management for additional consumptive use and storage (e.g., as a result of drought and climate change) are likely to adversely affect this species. In addition, introductions of nonnative species (e.g., Quagga mussel) could be highly detrimental.

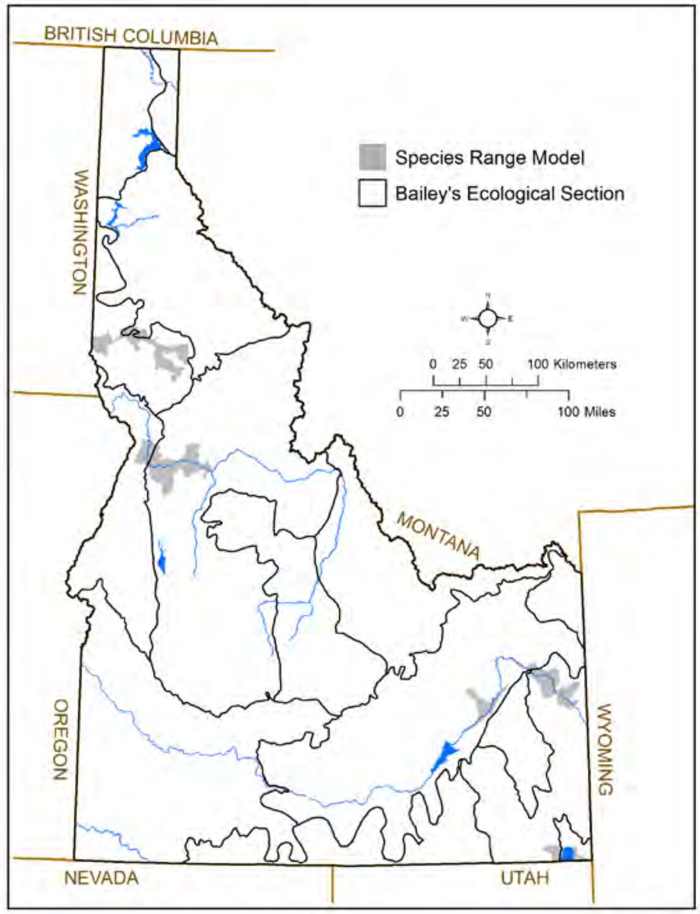
CONSERVATION ACTIONS
Conservation issues and management actions are described in the FWS Snake River Aquatic Species Recovery Plan and 2014 5–Year Status Review, and appropriate section plans. In short, recommended actions are to continue monitoring populations, gather additional biological information on distribution, habitat, and ecology, revise the Species Recovery Plan, and address water quality issues.

ADDITIONAL COMMENTS
This species was listed as Endangered under the ESA in 1992. In the recent 5–year Status Review, the FWS recommended that recovery criteria be revised and the status be downlisted to Threatened.

Information Sources: Hopper D, US Fish and Wildlife Service, pers. comm.; FWS 1995. Snake River Aquatic Species Recovery Plan. Boise (ID): US Fish and Wildlife Service; FWS. 2014. 5–year status review for Snake River physa (*Physa* (*Haitia*) *natricina*). Boise (ID): US Fish and Wildlife Service.; Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51; Gates KK, Kerans BL. 2014. Habitat use of an endemic mollusc assemblage in a hydrologically altered reach of the Snake River, Idaho, USA. River Research and Applications 30:976–986.; Gates KK, Kerans BL, Keebaugh JL, Kalinowski S, Vu N. 2013. Taxonomic identity of the endangered Snake river physa, *Physa natricina* (Pulmonata: Physidae) combining traditional and molecular techniques. Conservation Genetics 14:159–169.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Rotund Physa

Physella columbiana



Class: Gastropoda
Order: Basommatophora
Family: Physidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 6,900 km^2 (~2,700 mi^2)
Key Ecological Sections: Bear Lake, Bitterroot Mountains, Blue Mountains, Idaho Batholith, Overthrust Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Rotund Physa is endemic to the Columbia River basin. Historically, it was widespread across the basin, but is now possibly extirpated from Oregon and British Columbia. The current extent of its range is unknown. In Idaho, the species was recorded in the early 1980s from scattered locations along the lower Clearwater River, the lower Salmon River, and the upper Snake River. The only recent observations are known from the Coeur d'Alene drainage, where certain populations appear to have uniquely adapted to lakes contaminated with heavy metals (i.e., arsenic, cadmium, lead, and zinc). Populations are robust in polluted lakes, but rare at nearby reference (non–contaminated) lakes. Part of the species' success in these polluted sites comes from decreased parasite loads that are caused by the parasite's lower tolerance for heavy metals.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Habitat requirements for this species are not well understood. It is generally found in shallow water rivers and lakes and is thought to be a cold water stenotherm (capable of surviving in only a narrow range of cold temperatures).

POPULATION TREND

Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented. However, the population in the Coeur d'Alene drainage has been studied for the past several years and appears to be stable.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Threats to this species have not been identified.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

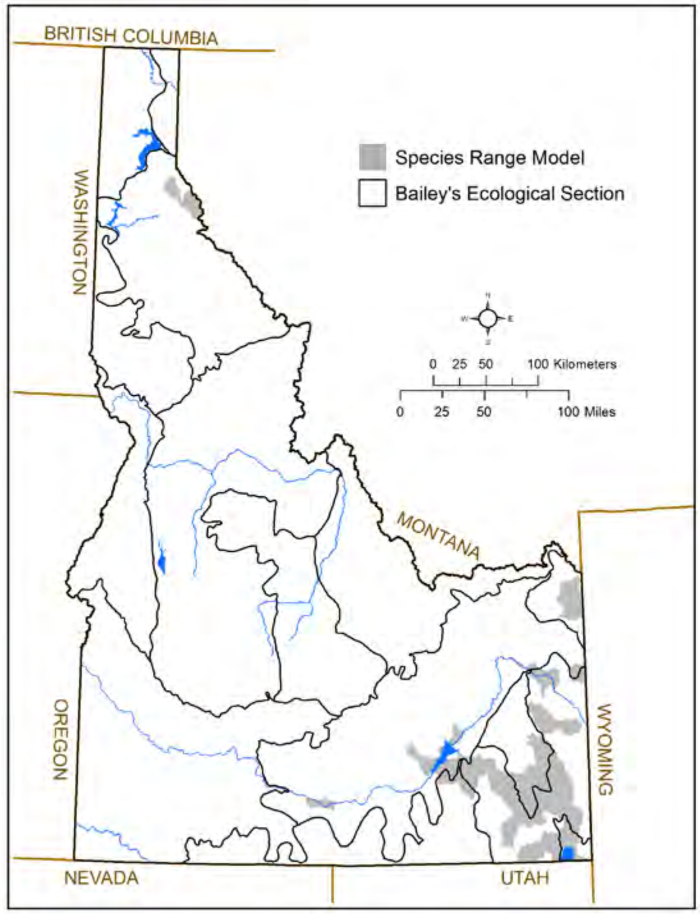
ADDITIONAL COMMENTS

None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.; Lefort H, Wehner EA, Cocco PL. 2013. Pre–exposure to heavy metal pollution and the odor of predation decrease the ability of snails to avoid stressors. Archives of Environmental Contamination and Toxicology 64:273-280.; Lefcort H, Freedman Z, House S, Pendleton M. 2008. Hormetic effects of heavy metals in aquatic snails: is a little bit of pollution good? EcoHealth 5:10–17.; Lefcort H, Abbott DP, Cleary DP, Howell E, Keller NC, Smith MM. 2004. Aquatic snails from mining sites have evolved to detect and avoid heavy metals. Archives of Environmental Contamination and Toxicology 46:478–484.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Rocky Mountain Duskysnail

Colligyrus greggi



Class: Gastropoda
Order: Neotaenioglossa
Family: Hydrobiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4
S-rank: S3Q

SGCN TIER: 2
Rationale: Regional endemic, data deficient, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 11,200 km^2 (~4,300 mi^2)
Key Ecological Sections: Bear Lake, Bitterroot Mountains, Northwestern Basin and Range, Overthrust Mountains, Yellowstone Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Rocky Mountain Duskysnail is known to occur in Idaho, Montana, Wyoming and Utah. Recent genetic research also indicates that populations in the area of Mount Hood, Oregon, formerly known as Columbia Ducksynail, are conspecific though somewhat differentiated. In Idaho, the species is predominantly recorded from the southeast portion of the state with a few scattered observations elsewhere (2 in Shoshone County, 1 in Twin Falls County). It can be locally common.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This snail is found in cold to very cold springs, streams, and rivers.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Moderately vulnerable
Description: Threats to this species have not been identified but likely include the loss or degradation of habitat.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

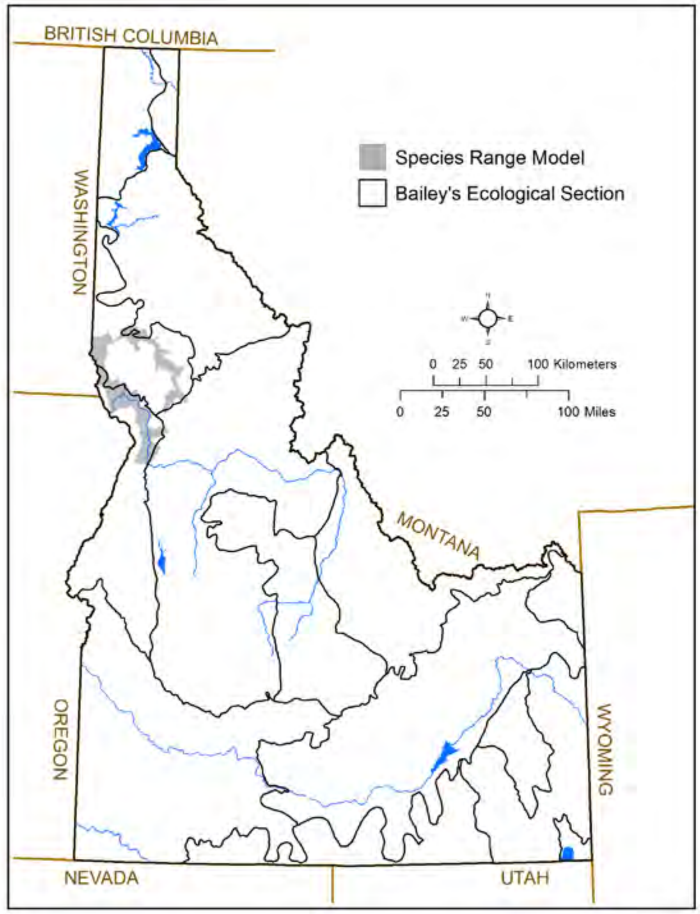
ADDITIONAL COMMENTS

The full range and conservation status of this species is uncertain pending resolution of the taxonomic status.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.; Liu H, Hershler R, Rossel CS. 2015. Taxonomic status of the Columbia duskysnail (Truncatelloidea, Amnicolidae, Colligyrus). Zookeys 514:1–13.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Nez Perce Pebblesnail

Fluminicola gustafsoni



Class: Gastropoda
Order: Neotaenioglossa
Family: Hydrobiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2G3
S-rank: SNR

SGCN TIER: 3
Rationale: Idaho endemic, data deficient, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 3,300 km² (~1,300 mi²)
Key Ecological Sections: Blue Mountains, Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: The Nez Perce Pebblesnail is restricted to the Clearwater River and the lower Salmon River, as well as the reach of the Snake River in between these two rivers.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: The species has been found in shallow water on rocks and cobbles, but additional habitat requirements are unknown.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

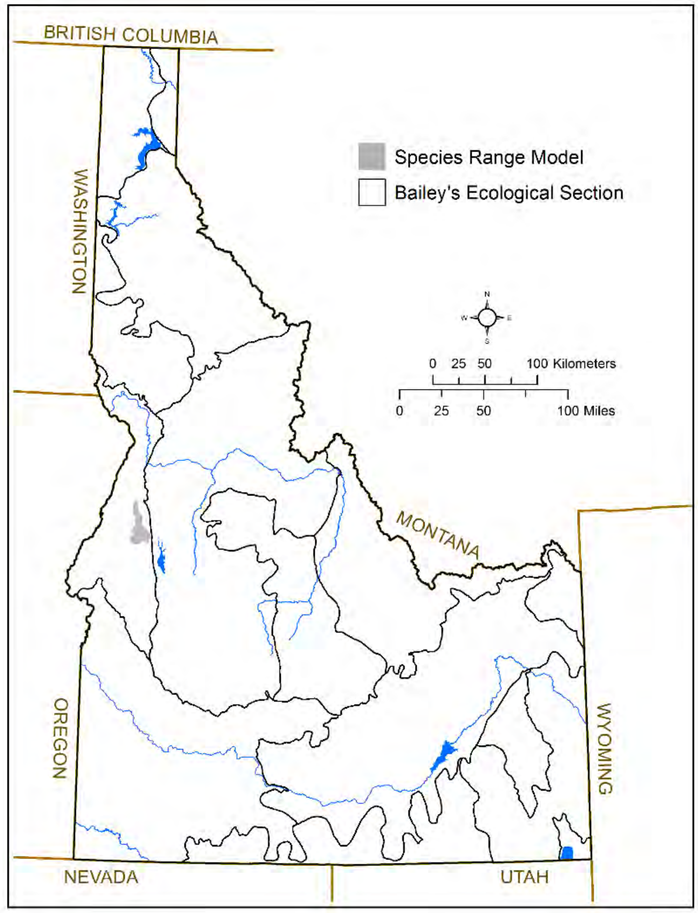
THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: This species is newly described and its status in Idaho is uncertain and threats are unknown.

CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Hershler R, Liu HP. 2012. Molecular phylogeny of the western North American pebblesnails, genus *Fluminicola* (Rissooidea: Lithoglyphidae), with description of a new species. Journal of Molluscan Studies 78:321–329.
Map Sources: Hershler R, Liu HP. 2012. Molecular phylogeny of the western North American pebblesnails, genus *Fluminicola* (Rissooidea: Lithoglyphidae), with description of a new species. Journal of Molluscan Studies 78:321–329.

Pixie Pebblesnail
Fluminicola minutissimus



Class: Gastropoda
Order: Neotaenioglossa
Family: Hydrobiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GH
S-rank: SH

SGCN TIER: 1
Rationale: Idaho endemic, data deficient, may be extinct

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 400 km^2 (~200 mi^2)
Key Ecological Sections: Blue Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Pixie Pebblesnail is an Idaho endemic, known only from the Weiser River drainage. Populations have not been relocated since the first collections were made in the early 1900s. The species might be extinct.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Habitat requirements for this species are not well understood. The type locality is a small spring within ponderosa pine and Douglas-fir forests at moderate elevations.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

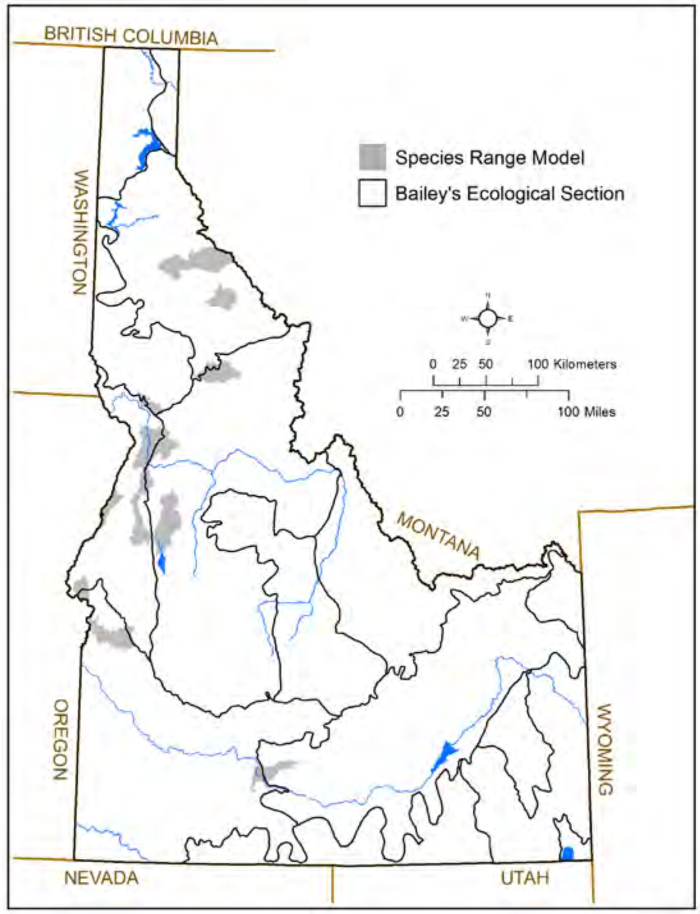
THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Threats to this species have not been identified.

CONSERVATION ACTIONS
Surveys are needed to determine if the species is extant in Idaho.

ADDITIONAL COMMENTS
None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.; Hershler R, Frest TJ. 1996. A review of the North American freshwater snail genus *Fluminicola* (Hydrobiidae). Smithsonian Contributions to Zoology 583:1–41.; Hershler R, Liu HP. 2012. Molecular phylogeny of the western North American pebblesnails, genus *Fluminicola* (Rissooidea: Lithoglyphidae), with description of a new species. Journal of Molluscan Studies 78:321–329.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Pristine Pyrg
Pristinicola hemphilli



Class: Gastropoda
Order: Neotaenioglossa
Family: Hydrobiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S3

SGCN TIER: 2
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 7,700 km^2 (~3,000 mi^2)
Key Ecological Sections: Bitterroot Mountains, Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Pristine Pyrg occurs in Washington, Oregon, California, and Idaho, but is known only from scattered locations. In Idaho, the species has been recorded in Shoshone, Clearwater, Idaho, Adams, and Valley counties. Although observations in Idaho typically consist of a small number of individuals, other areas within its range have reported colonies with hundreds of individuals. Such colonies can vary considerably from year to year depending on environmental factors.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This snail is found in cold, undisturbed springs, seeps, and small creeks. It is completely aquatic, semelparous (reproduces a single time before dying), and generally lives 1-2 years.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Threats to this species in Idaho have not been identified but likely include the loss or degradation of cold water habitats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

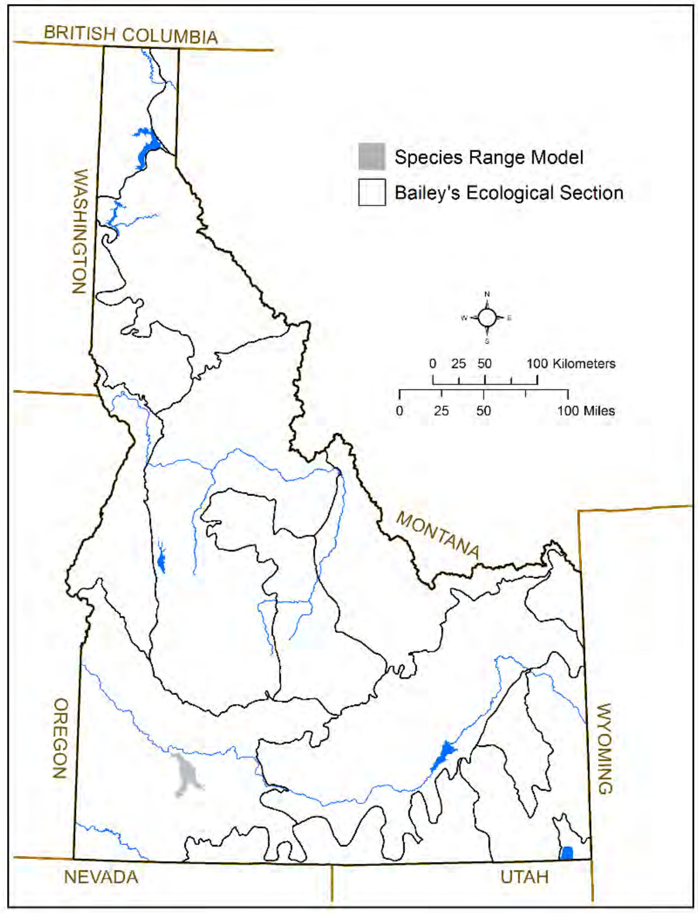
ADDITIONAL COMMENTS

None.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.
Map Sources: Idaho Department of Environmental Quality. BUGS database. [Accessed February 13, 2015].; Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Bruneau Hot Springsnail

Pyrgulopsis bruneauensis



Class: Gastropoda
Order: Neotaenioglossa
Family: Hydrobiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: Endangered
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 1
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, ESA listed, IUCN Critically Endangered, significant declines

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,000 km^2 (~800 mi^2)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Bruneau Hot Springsnail is an Idaho endemic restricted to thermal springs and seeps along approximately 8 km (5 mi) of the Bruneau River and Hot Creek, the major tributary. Its range extent and distribution are determined primarily by water temperature.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This tiny, gill–breathing gastropod is completely aquatic and only found in small hotsprings or areas of river habitat wih geothermal influences. It resides in waters ranging from 11° C to 35 °C (52 °F to 95 °F).

POPULATION TREND
Short-term Trend: Decline 10–30%
Long-term Trend: Decline 30–50%
Description: A comparison of population estimates suggests that the overall population size declined by 50% between 1982 and 1991, yet Hot Creek, a major hotspring tributary, still contained a large robust population of springsnails. Upstream of Hot Creek, the total number of hotsprings (both occupied and unoccupied) declined at a rate of ~5 springs per year from 1991-2004. From 1991 to 2013, the number of springs in the entire system declined by 69%. During this same period, Hot Creek lost significant amounts of flow and spring emergence increasingly

migrated downstream. Recent rangewide surveys indicate continued gradual declines in populations and springs.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Highly vulnerable
Description: The primary threat to this species is habitat loss from groundwater depletion. Although seasonal high flows in the Bruneau River largely control the population size within the river, the gradual loss of springs and reduced geothermal groundwater has had a chronic adverse effect on the spring–dwelling component of the population. In addition, introduced aquarium-trade fish species (Tilapia, guppies, and other tropical and semitropical fish) feed on springsnails in this system. These non–native fish may expand their range through portions of the Bruneau River during late summer, but are restricted to Hot Creek and other large hotspring systems during the winter. Lastly, modification of hot spring habitats to create soaking pools have eradicated snails in some areas.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the 2002 Recovery Plan for the Bruneau Hot Springsnail and the Owyhee Uplands Section plan. In short, recommended actions are to continue monitoring populations and springs and work wih partners and private landowners to stabilize and increase groundwater levels.

ADDITIONAL COMMENTS

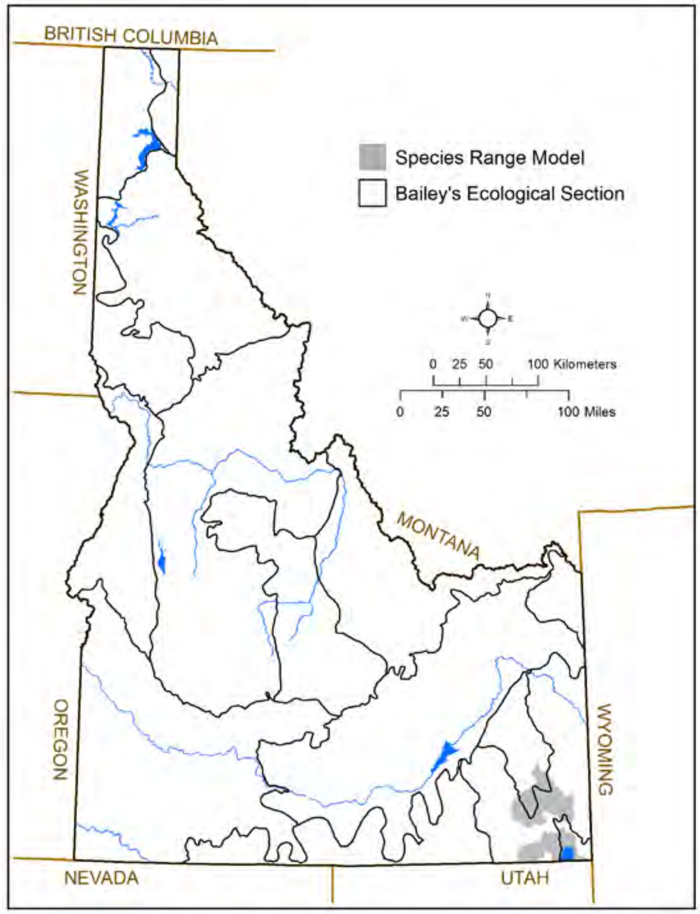
This species was listed as Endangered under the ESA in 1993. The FWS 5-year Status Review in 2007 concluded that the original listing classification was still valid.

Information Sources: Hopper D, US Fish and Wildlife Service, pers. comm.; Myler CD, Mladenka GC, Minshall GW. 2007. Trend analysis shows decline of an endangered thermophilic springsnail (*Pyrgulopsis bruneauensis*) in southwestern Idaho. Western North American Naturalist 67:199-205; Lysne S. 2009. A Guide to Southern Idaho's Freshwater Mollusks. Boise (ID): US Fish and Wildlife Service; Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.; Hershler R, Liu HP, Howard J. 2014. Springsnails: A new conservation focus in western North America. BioScience 64:693–700; Hopper D, Burak G, Hardy N. 2014. Bruneau hot springsnail (*Pyrgulopsis bruneauensis*) 2013 range-wide surveys. FWS Internal Status Report. Boise (ID): US Fish and Wildlife Service.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Lysne SJ, Clark WH. 2009. Mollusc survey of the lower Bruneau River, Owyhee County, Idaho, USA. American Malacological Bulletin 27:167–172

Bear Lake Springsnail

Pyrgulopsis pilsbryana



Class: Gastropoda
Order: Neotaenioglossa
Family: Hydrobiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: S1

SGCN TIER: 1
Rationale: Regional endemic, data deficient, restricted range, IUCN Near Threatened

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 3,300 km^2 (~1,300 mi^2)
Key Ecological Sections: Bear Lake, Northwestern Basin and Range, Overthrust Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Bear Lake Springsnail is restricted to the Bear River basin in northeast Utah, southwest Wyoming and southeast Idaho. Most of the range is within Idaho where the species occurs at about 10 sites in close proximity to one another. All known occurrences predate 1995.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Habitat requirements for this species are not well understood, but members of this genus typically occur in small, usually fishless, spring-fed waterbodies. The Bear Lake Springsnail, in particular, has been found in cold to slightly warm springs.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: The primary threat to this species is the loss or degradation of cold spring habitats.

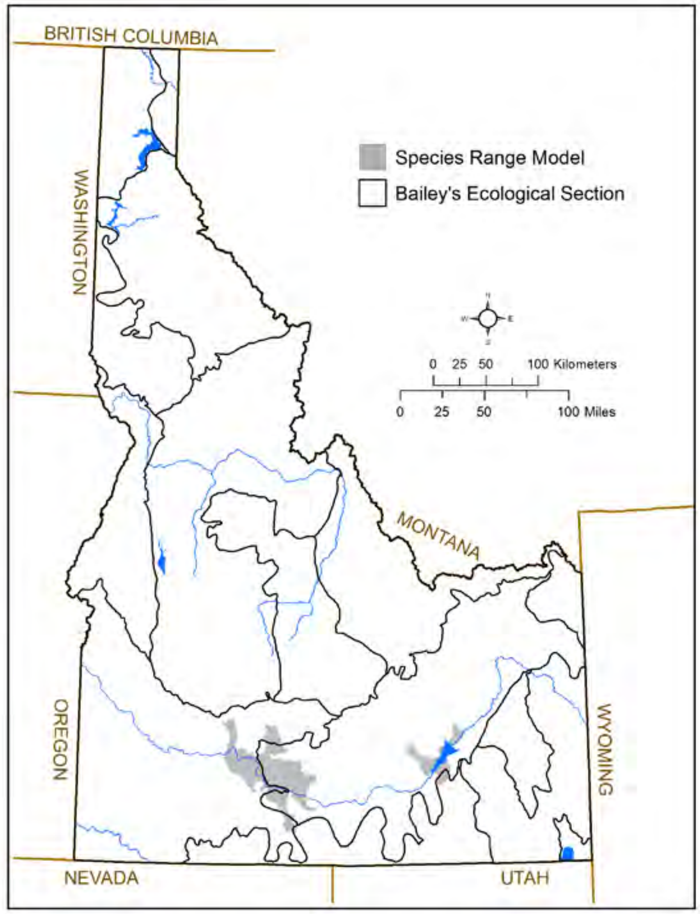
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.; Hershler R, Liu HP, Howard J. 2014. Springsnails: A new conservation focus in western North America. BioScience 64:693–700.; Hershler R. 1998. A systematic review of the Hydrobiid snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus *Pyrgulopsis*. The Veliger 41:1–132.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Bliss Rapids Snail

Taylorconcha serpenticola



Class: Gastropoda
Order: Neotaenioglossa
Family: Hydrobiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: Threatened
USFS:
Region1: No status
Region 4: No status
BLM: Type 1
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, ESA listed, IUCN Vulnerable

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 5,600 km^2 (~2,200 mi^2)
Key Ecological Sections: Owyhee Uplands, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: The Bliss Rapids Snail is a rare Idaho endemic that historically occurred in the Snake River from Indian Cove Bridge near Hammett to Twin Falls. Currently, it is patchily distributed over 22 miles of the middle Snake River, from approximately King Hill to Bliss Dam (River Mile 547–560), Shoestring Bridge to Lower Salmon Falls Dam (River Mile 566–573), and at Doleman Rapids (River Mile 580). It also occurs in 14 springs and tributaries of the Snake River, including a small section of the Malad River. Colonies that occur in springs are consistently larger (higher relative abundance and density) than river colonies. Recent research suggests this species may be more abundant and widely distributed than previously known.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This tiny snail is limited to cold water springs, seeps, and spring–influenced streams. It is known to occur on stable, cobble substrates in unimpounded sections of the Snake and Malad Rivers and on various substrates in the spring complexes. It is generally found in water temperatures between 15–16 °C (59–60.8 °F). This species is typically absent from areas with impoundments and major depth fluctuations, warm–water environments, whitewater, and sites with predominantly aquatic macrophytes. It has a 1–year life cycle.

POPULATION TREND

Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: The past destruction and alteration of springs and spring tributaries, primarily from agriculture, has had some impact on this species. However, because the pre–development distribution of this species is uncertain and its status on private lands is not currently known, declines cannot be preciesly estimated. Current populations are thought to be relatively stable.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threats to this species include ground water depletion, impaired water quality, and invasive species (predominantly New Zealand mudsnails).

CONSERVATION ACTIONS

Conservation issues and management actions are described in the FWS Snake River Aquatic Species Recovery Plan and appropriate section plans. In short, recommended strategies are to continue monitoring populations, protect remaining cold water spring habitats, stabilize water levels, improve water quality, and control nonnative species.

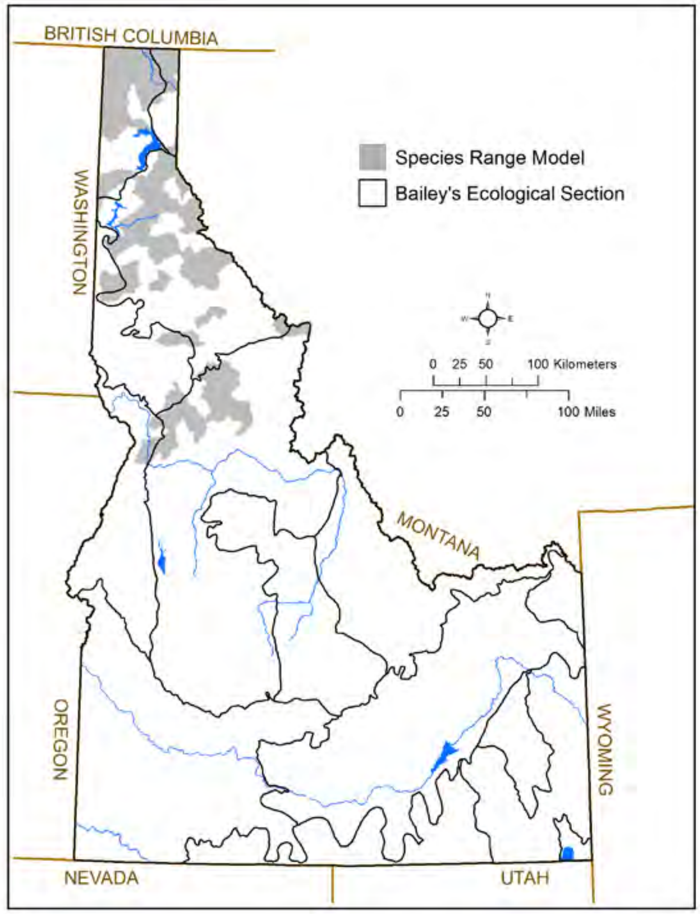
ADDITIONAL COMMENTS

The species was listed under the ESA in 1992 and a Recovery Plan was published in 1995. In 2006, a petition to remove the species from ESA status was submitted. In 2009, the FWS found that the species still warranted protection at that time. Critical habitat has not been designated.

Information Sources: Lucid M, Idaho Department of Fish and Game, pers. comm.; Hopper D, US Fish and Wildlife Service, pers. comm.; Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.; FWS. 2009. 12-month finding on a petition to remove the Bliss Rapids Snail (*Taylorconcha serpenticola*) from the list of Endangered and Threatened wildlife. Federal Register 74(178):47536. 50 CFR Part 17.; Richards DC, Arrington TD. 2008. Threatened Bliss Rapids snail's susceptibility to desiccation: Potential impact from hydroelectric facilities. American Malacological Bulletin 24:91–96.; Bean BM. 2011. Spatial distribution and habitat use of the Bliss Rapids snail [master's thesis]. Boise (ID): Boise State University.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Pale Jumping-slug

Hemphillia camelus



Class: Gastropoda
Order: Stylommatophora
Family: Arionidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 20,900 km^2 (~8,100 mi^2)
Key Ecological Sections: Bitterroot Mountains, Flathead Valley, Idaho Batholith, Okanogan Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: Originally thought to be in Idaho endemic, the Pale Jumping-slug is now known to also occur in adjacent parts of surrounding states and provinces. In recent surveys across north Idaho, the species was found to be widespread. Its range overlaps, but is mostly disjunct from a new, undescribed, species of *Hemphillia* (see *Hemphillia* sp.1).

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Slugs in this genus inhabit moist, coniferous forests with abundant large, woody debris and extensive litter and duff layers. This species in particular is associated with a narrow cold air temperature envelope below the mean annual air temperature in the Idaho Panhandle. It is one of the 4 most cold-associated gastropods studied during the recent Multispecies Baseline Initiative.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown

Description: According to Frest and Johannes (1997), the number of occupied sites and population size are declining. However, more current population trends have not been documented and the number of documented locations is increasing.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Threats to the population are not specifically identified but could include any changes to the moist, forested habitat at known sites. Little is known about this species, including its sensitivity to disturbance.

CONSERVATION ACTIONS

Priority conservation strategies for this species include surveys to determine the current abundance and trends in Idaho, managing habitat to maintain cool microclimate at known sites, and taxonomic research to describe characteristics that differentiate this species from the new undescribed *Hemphillia*, which also occurs in the Panhandle.

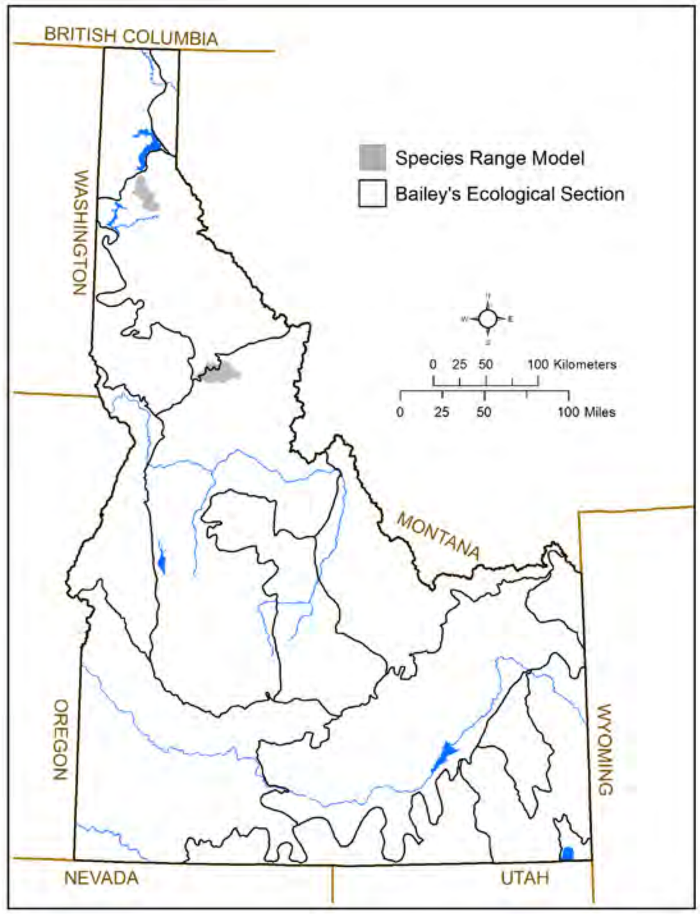
ADDITIONAL COMMENTS

None.

Information Sources: Lucid M, Idaho Department of Fish and Game, pers. comm.; Hendricks P, Maxell BA, Lenard S, Currier C. 2007. Land mollusk surveys on USFS Northern Region lands: 2006. Report to the USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.
Map Sources: Burke T. 2013. Land snails and slugs of the Pacific Northwest. Oregon State University Press, Corvallis, OR; Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Idaho Department of Fish and Game. Multi-species Baseline Initiative, unpublished data. [Accessed November 14, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.

Marbled Jumping-slug

Hemphillia danielsi



Class: Gastropoda
Order: Stylommatophora
Family: Arionidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2G3
S-rank: SNR

SGCN TIER: 1
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,000 km^2 (~400 mi^2)
Key Ecological Sections: Bitterroot Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Marbled Jumping-slug appears to be restricted to the Northern Rocky Mountain Refugium in northern Idaho and Montana, with most current observations occurring in Montana. Only 2 locations are recorded in Idaho, one along the Lochsa River in 1960 and the other along the Coeur d'Alene River in 2007.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Slugs in this genus inhabit moist, coniferous forests with abundant large, woody debris and extensive litter and duff layers.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Threats to the population are not specifically identified but could include any changes to the moist, forested habitat at known sites. Little is known about this species, including its sensitivity to disturbance.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

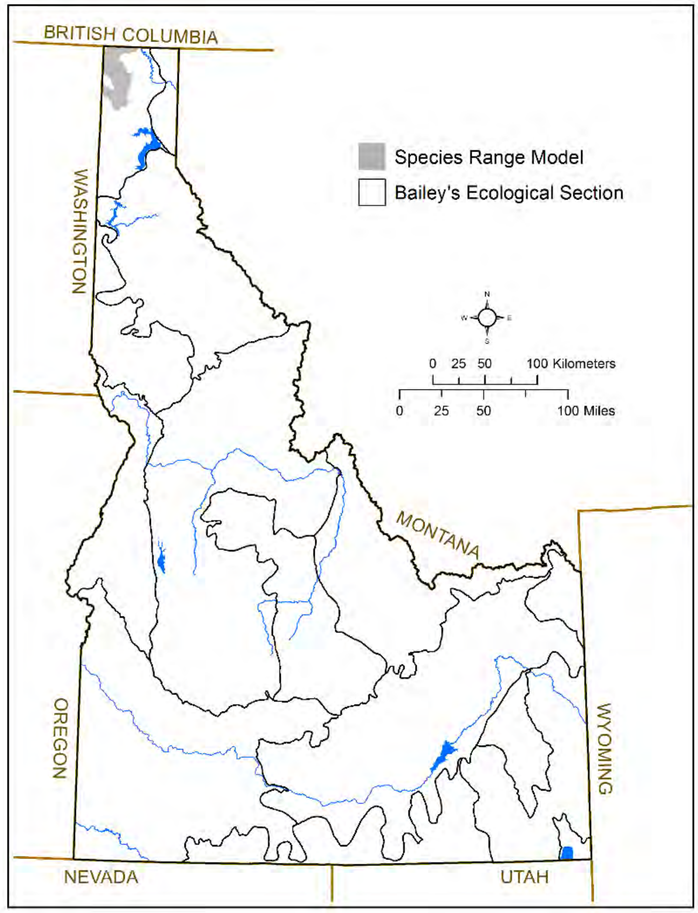
ADDITIONAL COMMENTS

None.

Information Sources: Hendricks P, Maxell BA, Lenard S, Currier C. 2007. Land mollusk surveys on USFS Northern Region lands: 2006. Report to the USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

A Roundback Slug

Hemphillia sp. 1



Class: Gastropoda
Order: Stylommatophora
Family: Arionidae

CONSERVATION STATUS & CLASSIFICATION

ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S2Q

SGCN TIER: 2
Rationale: Possible Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE

Range Extent in Idaho: 1,300 km^2 (~500 mi^2)
Key Ecological Sections: Okanogan Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: This newly discovered species is apparently restricted to northern Idaho and adjoining states.

HABITAT & ECOLOGY

Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Slugs in this genus inhabit moist, coniferous forests with abundant large, woody debris and extensive litter and duff layers. This species in particular is associated with cold air temperatures (<2 °C [1.8 °F] below mean annual air temperature) in the Idaho Panhandle. It is one of the 4 most cold-associated gastropods studied during the recent Multispecies Baseline Initiative.

POPULATION TREND

Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable

Description: Threats to the population are not specifically identified but could include any changes to the cool, moist, forested habitat at known sites. Little is known about this species, including its sensitivity to disturbance.

CONSERVATION ACTIONS

Priority conservation strategies for this species include surveys to determine the current distribution and abundance in Idaho, managing habitat to maintain cool microclimate at known sites, and taxonomic research to describe characteristics that differentiate this species from the Pale Jumping-slug.

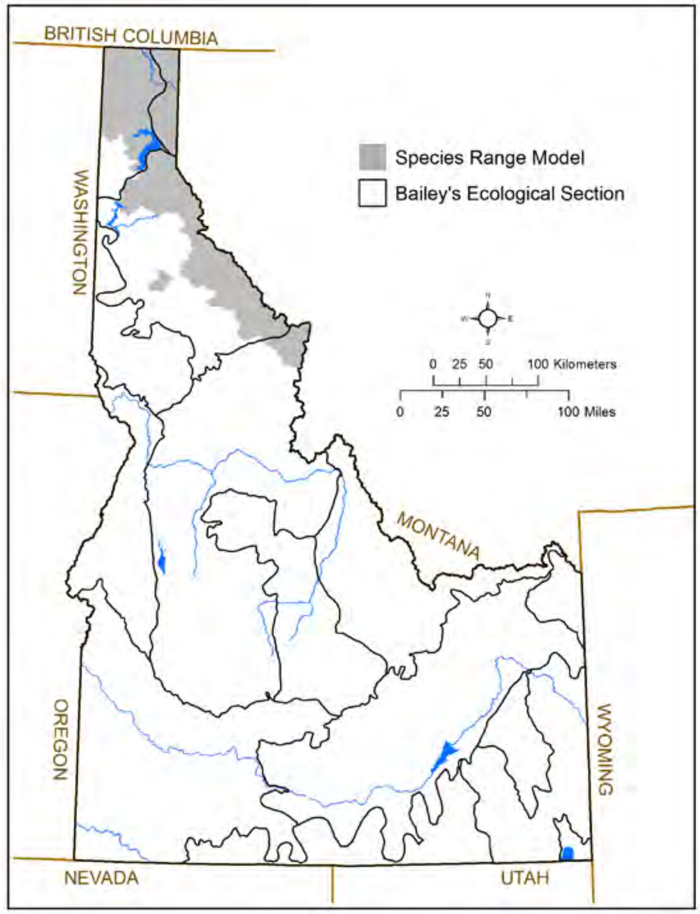
ADDITIONAL COMMENTS

This is a newly discovered species in north Idaho collected as part of the Multispecies Baseline Initiative. Taxonomic research needed to describe characteristics that differentiate this species from the Pale Jumping-slug.

Information Sources: Lucid M, Idaho Department of Fish and Game, pers. comm.
Map Sources: Idaho Department of Fish and Game. Multi-species Baseline Initiative, unpublished data. [Accessed November 14, 2014].

Magnum Mantleslug

Magnipelta mycophaga



Class: Gastropoda
Order: Stylommatophora
Family: Arionidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S2

SGCN TIER: 1
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 16,800 km^2 (~6,500 mi^2)
Key Ecological Sections: Bitterroot Mountains, Flathead Valley, Okanogan Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Magnum Mantleslug is a large slug that is found throughout the Pacific Northwest in British Columbia, Washington, Montana, and Idaho, but appears to occur irregularly. In Idaho, this species was most recently recorded in 2010-2014 as part of the Multi-species Baseline Initiative; the first such detection in 68 years. It is known to occur in Bonner, Boundary, and Idaho counties.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species is primarily found in mesic mixed conifer forest and riparian woodlands, sometimes with talus. It is also found at higher elevation, drier sites with ground cover that maintains soil moisture. It is usually found under rocks and woody debris, though sometimes in decomposing logs. Recent surveys indicate that this terrestrial gastropod is the most closely-associated with cool air temperatures in the Idaho Panhandle.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats have not been identified, however habitat loss and degradation are thought to be the primary issues.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

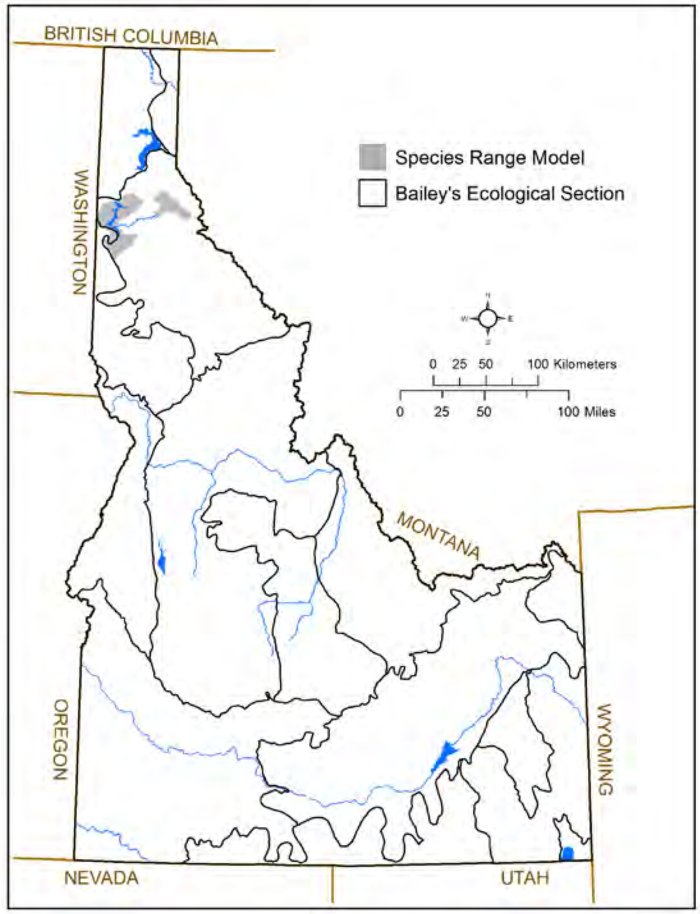
ADDITIONAL COMMENTS

None.

Information Sources: Lucid M, Idaho Department of Fish and Game, pers. comm.; Burke TE. 2013. Land Snails and Slugs of the Pacific Northwest. Corvallis (OR): OSU Press.; Bosworth W. 2012. Terrestrial gastropods of USFS Northern Region: Materials developed for Idaho Field Guide. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Idaho Department of Fish and Game. Multi-species Baseline Initiative, unpublished data. [Accessed November 14, 2014].; Burke, T. E. 2013. Land Snails and Slugs of the Pacific Northwest. Corvallis (OR): OSU Press.

Blue-gray Taildropper

Prophysaon coeruleum



Class: Gastropoda
Order: Stylommatophora
Family: Arionidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3G4
S-rank: S1Q

SGCN TIER: 1
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,900 km^2 (~700 mi^2)
Key Ecological Sections: Bitterroot Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Blue-gray Taildropper is known to occur from southern British Columbia south to northern California, and eastward to northern Idaho. Although common in western Oregon and Washington, this species is apparently rare in Idaho. Only 4 known occurrences are documented: Benewah County (2002), Kootenai County (2 locations, 2013), and Shoshone County (2013).

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This species is typically found in late-successional conifer forests with moist plant associations, abundant coarse woody debris, and heavy accumulation of organic litter. It primarily eats fungus.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Highly vulnerable
Description: Primary threats to this species include habitat loss and degradation from development, timber harvest, and fire, predation, and competition with nonnative mollusks. Populations are also isolated and at risk to stochastic events and loss of genetic diversity given the species' limited dispersal capability.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

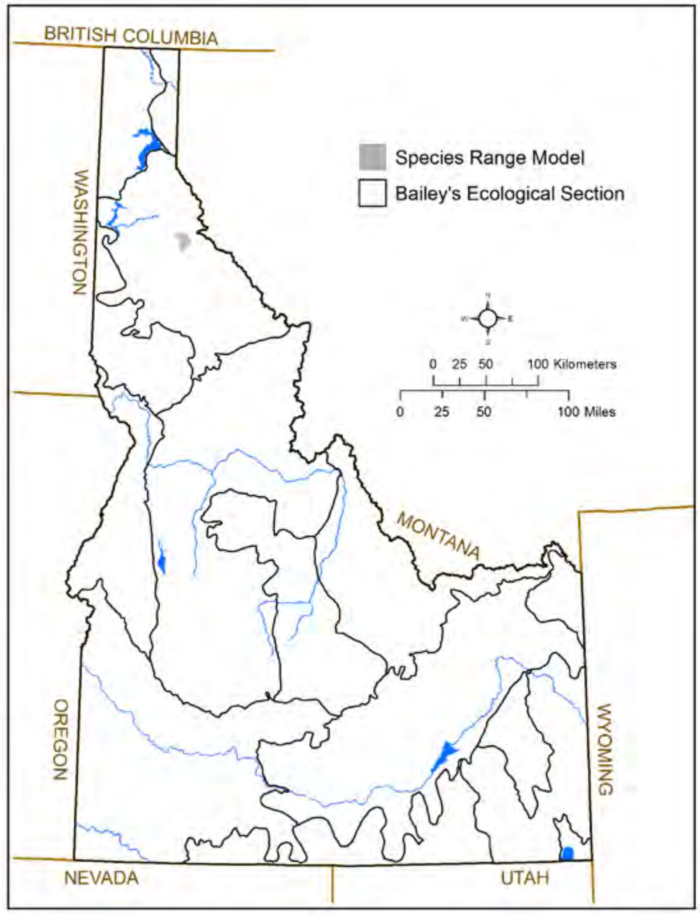
Genetic work is needed to determine if populations in Idaho are taxonomically unique from those on the west coast.

Information Sources: Lucid M, Idaho Department of Fish and Game, pers. comm.; Burke TE. 1999. Management Recommendations for terrestrial mollusk species *Prophysaon coeruleum*, Blue–Gray Taildropper, and *Prophysaon dubium*, Papillose Taildropper. V. 2.0. http://www.blm.gov/or/plans/surveyandmanage/files/mr–terrestrial–ig–4sp–1999–11–att3.pdf; Bosworth W. 2012. Terrestrial gastropods of USFS Northern Region: Materials developed for Idaho Field Guide. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Idaho Department of Fish and Game. Multi-species Baseline Initiative, unpublished data. [Accessed November 14, 2014].

Papillose Taildropper

Prophysaon dubium

Class: Gastropoda
Order: Stylommatophora
Family: Arionidae



CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4
S-rank: S2Q

SGCN TIER: 1
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 200 km^2 (~100 mi^2)
Key Ecological Sections: Bitterroot Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Papillose Taildropper is known from California, Oregon, Washington, and Idaho. In Idaho, populations are known to occur in Benewah, Kootenai, and Shoshone counties and are disjunct from the rest of the species range. This species is apparently rare in Idaho and was found in only 1 of 880 cells surveyed as part of the 2010-2014 Multi-species Baseline Initiative.

HABITAT & ECOLOGY
Environmental Specificity: B = Narrow; Specialist key requirements common
Description: This species is typically found in late–successional forests with and hardwood component, moist plant associations, abundant coarse woody debris, and an accumulation of organic litter. It appears to eat both fungus and plant litter.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: Primary threats to this species include habitat loss and degradation from development, timber harvest, and fire, as well as predation and competition with nonnative mollusks. Populations are also isolated and at risk to stochastic environmental events and loss of genetic diversity, given the species' limited dispersal capability.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

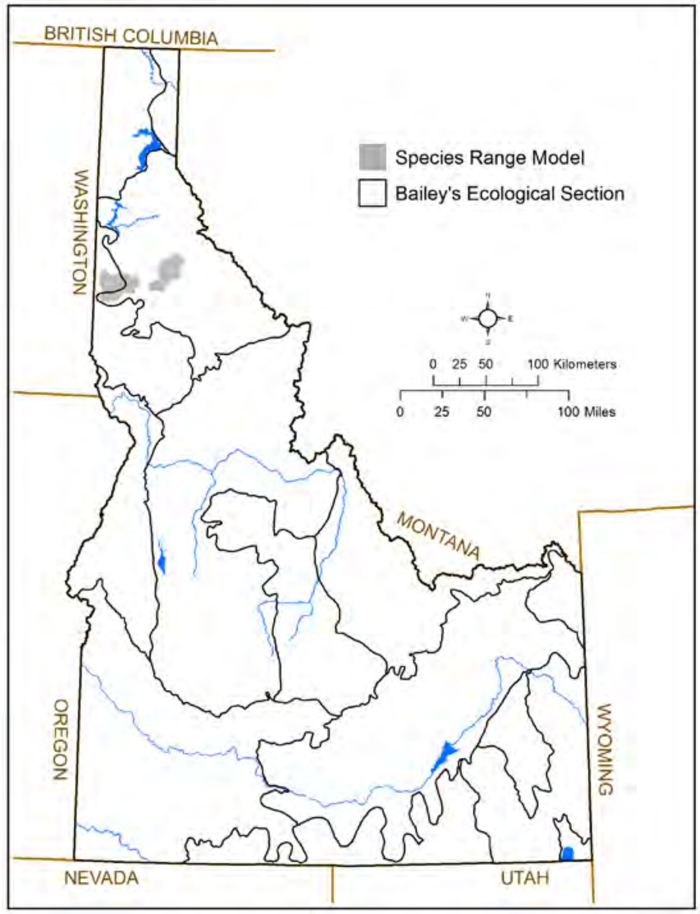
Genetic work is needed to determine if populations in Idaho are taxonomically unique from those on the west coast.

Information Sources: Lucid M, Idaho Department of Fish and Game, pers. comm.; Bosworth W. 2012. Terrestrial gastropods of USFS Northern Region: Materials developed for Idaho Field Guide. Boise (ID): Idaho Department of Fish and Game.; Burke TE. 1999. Management Recommendations for terrestrial mollusk species *Prophysaon coeruleum*, Blue–Gray Taildropper, and *Prophysaon dubium*, Papillose Taildropper. V. 2.0. http://www.blm.gov/or/plans/surveyandmanage/files/mr–terrestrial–ig–4sp–1999–11–att3.pdf

Map Sources: Burke T. 2013. Land snails and slugs of the Pacific Northwest. Oregon State University Press, Corvallis, OR; Idaho Department of Fish and Game. Multi-species Baseline Initiative, unpublished data. [Accessed November 14, 2014].; Leonard WP, Chichester L, Ovaska K. 2003. *Prophysaon dubium* Cockerell, 1890, the papillose taildropper (Gastropoda: Arionidae): distribution and anatomy. The Nautilus 117:62–67.

Rocky Mountain Axetail

Securicauda hermani



Class: Gastropoda
Order: Stylommatophora
Family: Arionidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,500 km^2 (~600 mi^2)
Key Ecological Sections: Bitterroot Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Rocky Mountain Axetail is a newly described species (2011) that has been recorded from 4 areas in northern Idaho: Hobo, Merry, and Cornwall creeks in Shoshone County and Mannering Creek in Benewah County. It appears to be extremely rare.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Little is known of the habitat requirements for this small slug. However, it is apparently limited to areas of high winter snowfall where western redcedar dominates. It has been found either on the underside of woody debris or in moss, often buried in the needle–duff layer.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Species–specific threats have not been identified.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

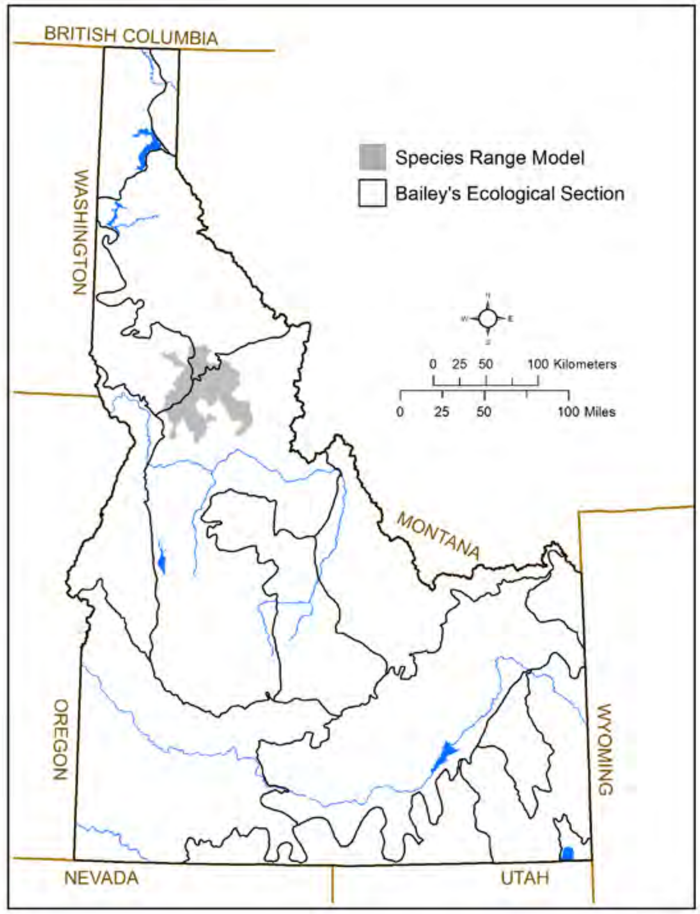
ADDITIONAL COMMENTS

None.

Information Sources: Leonard WP, Chichester L, Richart CH, Young TA. 2011. *Securicauda hermani* and *Carinacauda stormi*, two new genera and species of slug from the Pacific Northwest of the United States (Gastropoda: Stylommatophora: Arionidae), with notes on Gliabates oregonius Webb 1959. Zootaxa 2746:43–56.; Bosworth W. 2012. Terrestrial gastropods of USFS Northern Region: Materials developed for Idaho Field Guide. Boise (ID): Idaho Department of Fish and Game.

Map Sources: Idaho Department of Fish and Game. Multi-species Baseline Initiative, unpublished data. [Accessed November 14, 2014].; Leonard WP, Chichester L, Richart CH, Young TA. 2011. *Securicauda hermani* and *Carinacauda stormi*, two new genera and species of slug from the Pacific Northwest of the United States (Gastropoda: Stylommatophora: Arionidae), with notes on Gliabates oregonius Webb 1959. Zootaxa 2746:43–56.

Nimapuna Disc
Anguispira nimapuna



Class: Gastropoda
Order: Stylommatophora
Family: Discidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S3

SGCN TIER: 3
Rationale: Idaho endemic, data deficient, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 5,100 km² (~2,000 mi²)
Key Ecological Sections: Bitterroot Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Nimapuna Disc (or Nimapuna Tigersnail) is endemic to a limited area in the Clearwater and Selway river canyons in Idaho County. This species may have a wider distribution as surveys have generally occurred along roads and rivers, thus creating a biased distribution.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Specific habitat requirements are not known, but the species has been found in dry to mesic mixed conifer forest often under debris, especially rocks and talus.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Not intrinsically vulnerable

Description: Specific threats have not been identified. However, habitat loss and degradation due to improper livestock grazing management, logging, mining, and road construction are likely the primary threats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

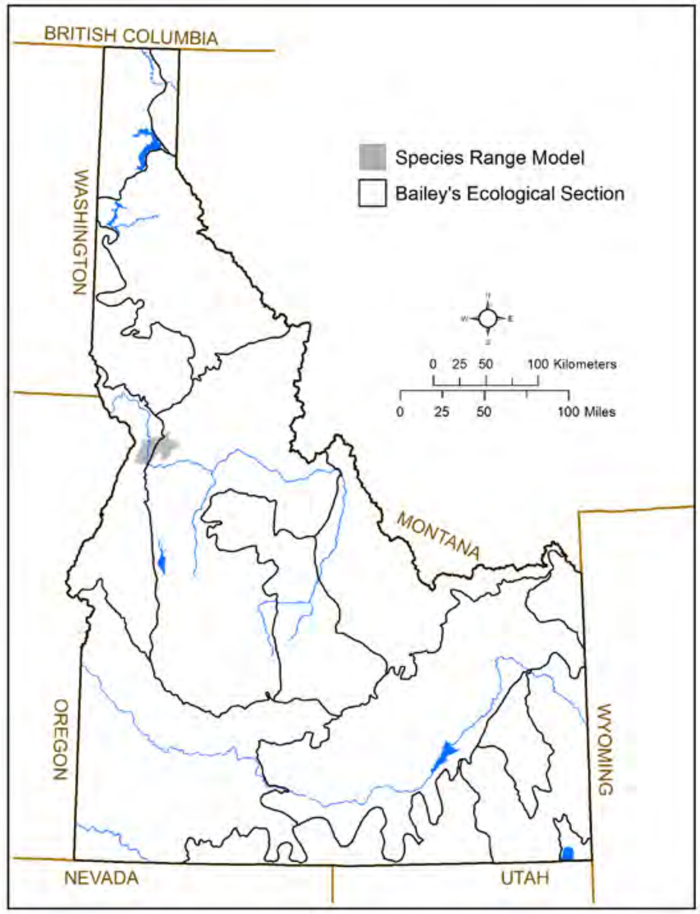
ADDITIONAL COMMENTS

None.

Information Sources: Sauder J, Idaho Department of Fish and Game, pers. comm.; Baumgardt JA, Sauder J. 2012. Occupancy modeling of the Nimapuna tigersnail, a terrestrial gastropod endemic to Idaho. Idaho Fish and Game, Lewiston, ID.; Bosworth W. 2012. Terrestrial gastropods of USFS Northern Region: Materials developed for Idaho Field Guide. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Sauder J, Idaho Department of Fish and Game, unpublished data.

Marbled Disc

Discus marmorensis



Class: Gastropoda
Order: Stylommatophora
Family: Discidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S2

SGCN TIER: 1
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 700 km^2 (~300 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Marbled Disc is an Idaho endemic, found only in the lower Salmon River drainage in western Idaho County. The distribution of this snail is coincident with a geologic region known as the Martin Bridge Formation, characterized by a predominance of calcareous rock types. Documented occurrences all predate 1993.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Habitat at many sites is dense riparian conifer forest. Snails occur under rocks and woody debris partially buried in decomposing leaf and conifer–needle litter or decomposing downed tree limbs. This species also inhabits well–shaded, moist ponderosa pine forests with diverse deciduous and forb understories. Within occupied habitat, colonies usually occur near stream edges and at the bases of steep slopes, often in association with limestone.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: In 1999, both the number of sites and the number of individuals was thought to have declined. Current population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threat for this species is habitat loss and degradation due to logging and improper livestock grazing management. In particular, habitat management or resource development projects that reduce the availability and complexity of understory vegetation, coarse woody debris, leaf and needle litter, and rock and talus cover could negatively affect this species.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.; Bosworth W. 2012. Terrestrial gastropods of USFS Northern Region: Materials developed for Idaho Field Guide. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

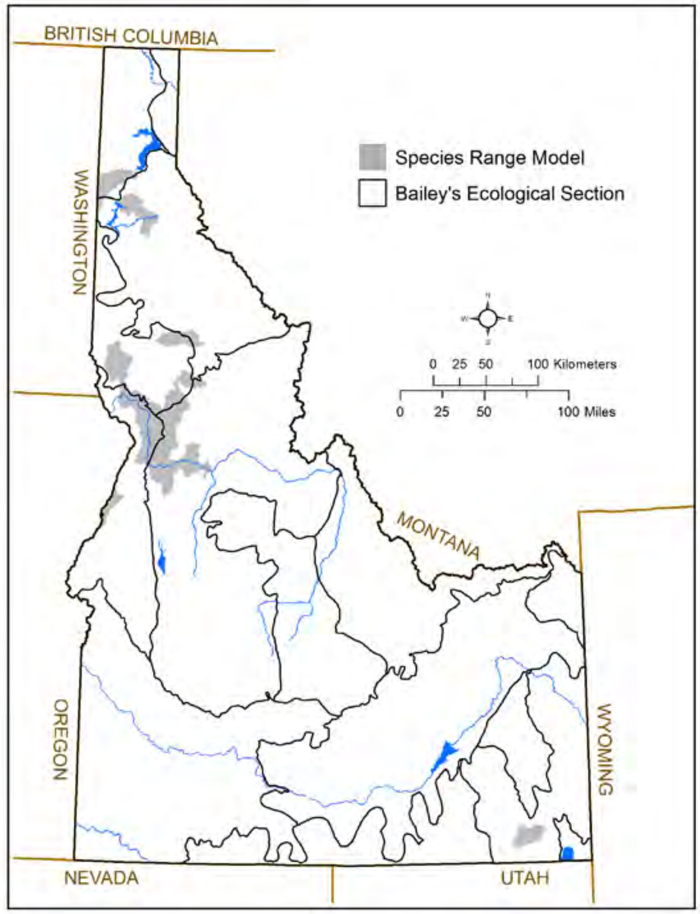
Salmon Coil

Helicodiscus salmonaceus

Class: Gastropoda
Order: Stylommatophora
Family: Helicodiscidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient



DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 8,300 km^2 (~3,200 mi^2)
Key Ecological Sections: Bitterroot Mountains, Blue Mountains, Idaho Batholith, Okanogan Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Salmon Coil is a small snail that occurs in Idaho, Washington, and Oregon. In Idaho, records are from Adams, Idaho, Lewis, Nez Perce, Clearwater, and Kootenai counties. The species appears to be relatively rare in northern Idaho, but more common further South along the Lower Salmon River.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This species is found in xeric to mesic sites within moderatley closed- to open-canopied mixed conifer forest, though sometimes it can be found in shrub-dominated habitats as well. It is often found under bryophyte mats over calcareous talus or under rocks with predominant canopy species including ponderosa pine, Douglas-fir, grand fir and western hackberry. It is thought to be limited by the occurrence of its rocky habitat (Burke, pers. comm).

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Specific threats have not been identified, however road building and other activities that disturb the terrain are thought to be the primary threat.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

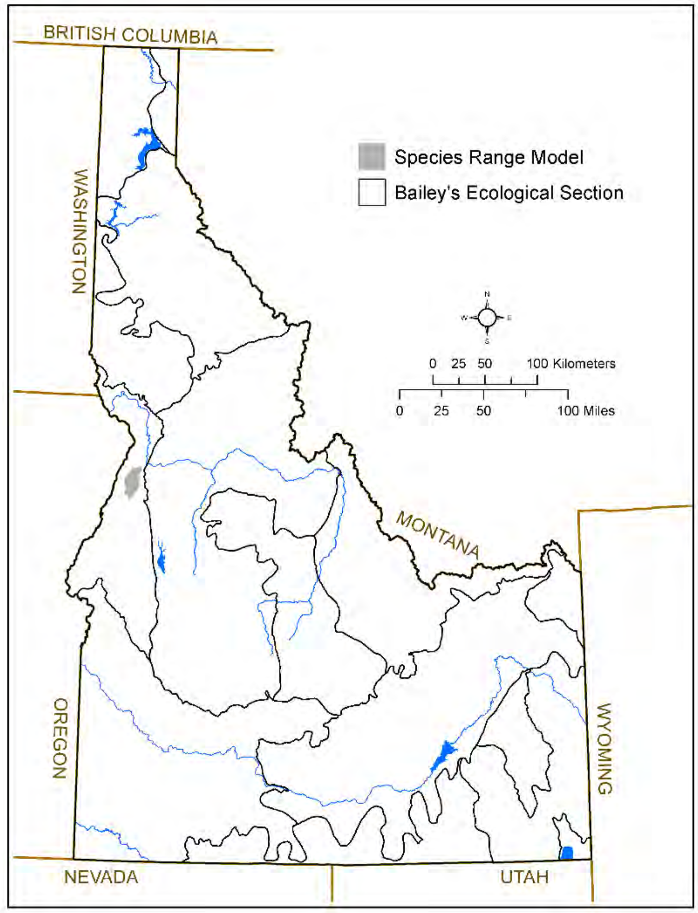
ADDITIONAL COMMENTS

None.

Information Sources: Lucid M, Idaho Department of Fish and Game, pers. comm.
Map Sources: Burke T. 2013. Land snails and slugs of the Pacific Northwest. Oregon State University Press, Corvallis, OR; Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Idaho Department of Fish and Game. Multi-species Baseline Initiative, unpublished data. [Accessed November 14, 2014].

Seven Devils Mountainsnail

Oreohelix hammeri



Class: Gastropoda
Order: Stylommatophora
Family: Oreohelicidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, data deficient, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,800 km^2 (~1,100 mi^2)
Key Ecological Sections: Blue Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Seven Devils Mountainsnail is an Idaho endemic known only from a single site (Mt. Sampson) in the Seven Devils Mountains discovered in 1982. Although the population had been thought to have been affected by a wildfire during the 1990s, the population was determend to be extant during 2010.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species occurs on a steeply descending ridge crested with an outcrop of limestone blocks and plates of rock standing on edge. The habitat is vegetated with grasses, assorted forbs (including balsamroot and paintbrush), and mountain mahogany. The east-facing slope immediately below the ridge is heavily timbered with Douglas-fir, while the west-facing slope is predominantly vegetated with grasses and perennial forbs.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Specific threats have not been identified for this species.

CONSERVATION ACTIONS

Surveys are needed to better delineate the species distribution and vulnerability to stochastic events.

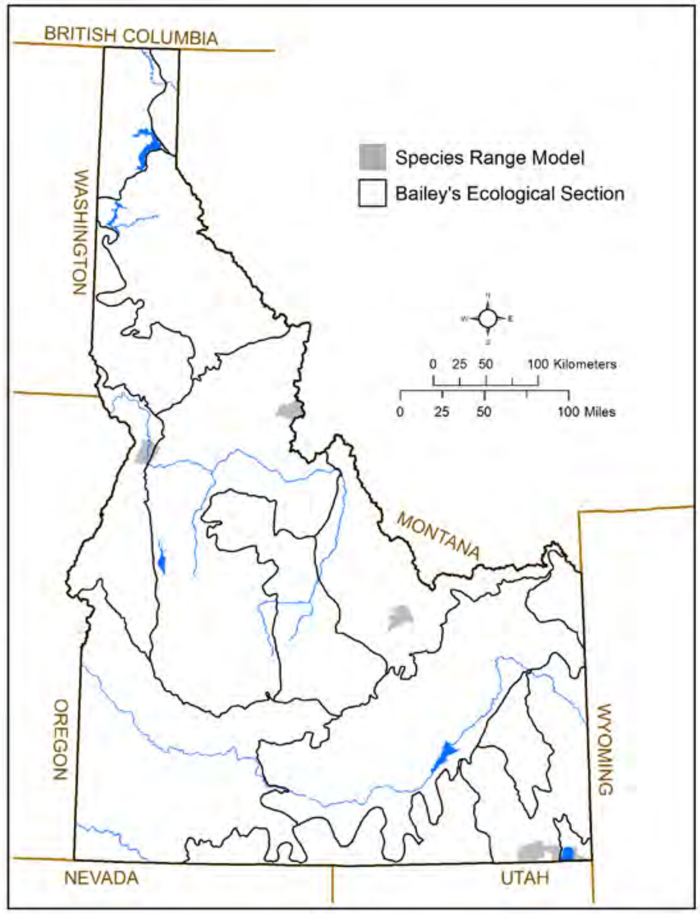
ADDITIONAL COMMENTS

None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51; Fairbanks HL. 1984. A new species of *Oreohelix* (Gastropoda: Pulmonata: Oreohelicidae) from the Seven Devils Mountains, Idaho. Proceedings of the Biological Society of Washington 97:179–185.; Bosworth W. 2012. Terrestrial gastropods of USFS Northern Region: Materials developed for Idaho Field Guide. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Lyrate Mountainsnail

Oreohelix haydeni



Class: Gastropoda
Order: Stylommatophora
Family: Oreohelicidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2G3
S-rank: S1

SGCN TIER: 2
Rationale: Endemic subspecies, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,600 km^2 (~1,000 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith, Bear Lake, Beaverhead Mountains, Overthrust Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Lyrate Mountainsnail is irregularly distributed across the Rocky Mountain states, including scattered locations in Idaho. Two subspecies (*O. h. hesperia* and *O. h. perplexa*) are endemic to the state.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: This species is found in xeric habitats with exposed limestone outcrops. The subspecies *hesperia* occurs in open ponderosa pine forests while *perplexa* occurs in areas dominated by sagebrush, serviceberry, and grasses.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: In 1999, the two subspecies were believed to occupy <10% and <30% of their historical range, respectively. Current population trends for both the species and subspecies are unknown.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: The primary threat to this species is thought to be habitat loss from timber harvest, improper livestock grazing management, and agricultural development.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

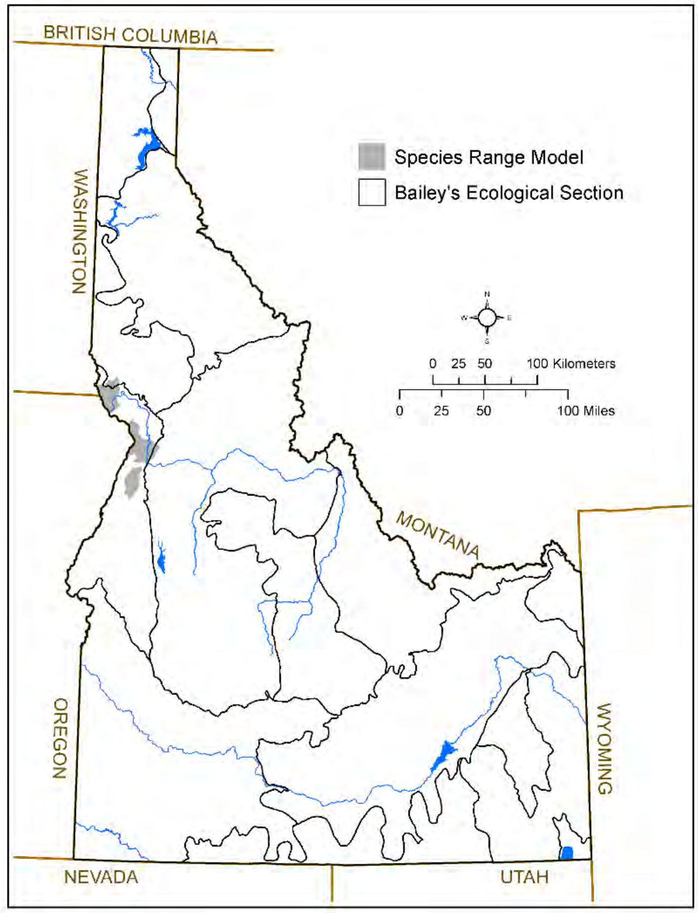
ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Costate Mountainsnail

Oreohelix idahoensis



Class: Gastropoda
Order: Stylommatophora
Family: Oreohelicidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S2

SGCN TIER: 2
Rationale: Idaho endemic, data deficient, restricted range

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 4,700 km^2 (~1,800 mi^2)
Key Ecological Sections: Blue Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Costate Mountainsnail is an Idaho endemic, known only from a short reach along the Salmon River in Idaho County. Two subspecies (*O. i. idahoensis* and *O. i. baileyi*) are recognized, but little known regarding current status of either one.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species occurs in dry, open limestone or calcareous schist. The dominant vegetation includes sagebrush, netleaf hackberry, and prickly pear.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: In 1999 this species was considered to be declining both in occupied area and in the number of individuals. Current population trends are unknown.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: This species is vulnerable to habitat loss and fragmentation resulting from surface distrubance, grazing, housing development, and mining or quarrying.

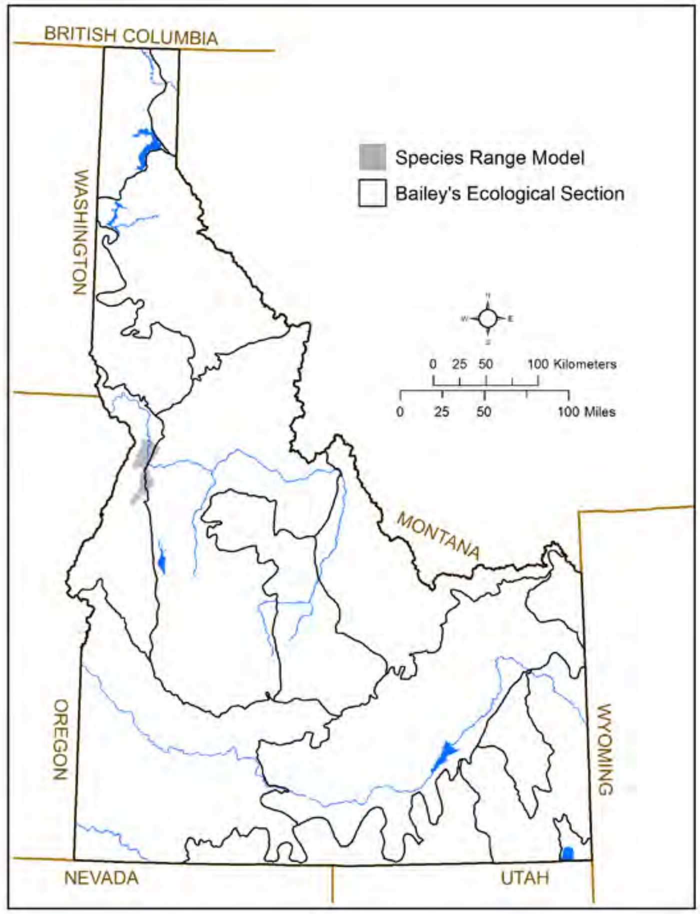
CONSERVATION ACTIONS
Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS
Taxonomy may need to be examined for the two subspecies (*O. i. idahoensis* and *O. i. baileyi*). The Costate Mountainsnail is Red listed with IUCN due to lack of information. Similarly, the subspecies *O. i. idahoensis* was a candidate for ESA listing, but was determined to be lacking information (1994, FR2729).

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Frest TJ, Johannes EJ. 1997. Land snails of the Lucile Caves ACEC. Idaho Bureau of Land Management Technical Bulletin 97–16.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Deep Slide Mountainsnail

Oreohelix intersum



Class: Gastropoda
Order: Stylommatophora
Family: Oreohelicidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S1

SGCN TIER: 2
Rationale: Idaho endemic, data deficient, restricted range

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 800 km^2 (~300 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Deep Slide Mountainsnail is an Idaho endemic known from only few sites along the Little Salmon River.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The species occurs primarily in association with basalt talus in dry habitat. Dominant vegetation in the area includes poison ivy, netleaf hackberry, prickly pear, sagebrush, and balsamroot.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: In 1999 this species was considered to be declining both in occupied area and in the number of individuals. Current population trends are unknown.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: The primary threat to this species is thought to be habitat loss resulting from road construction, quarrying, and herbicide application.

CONSERVATION ACTIONS

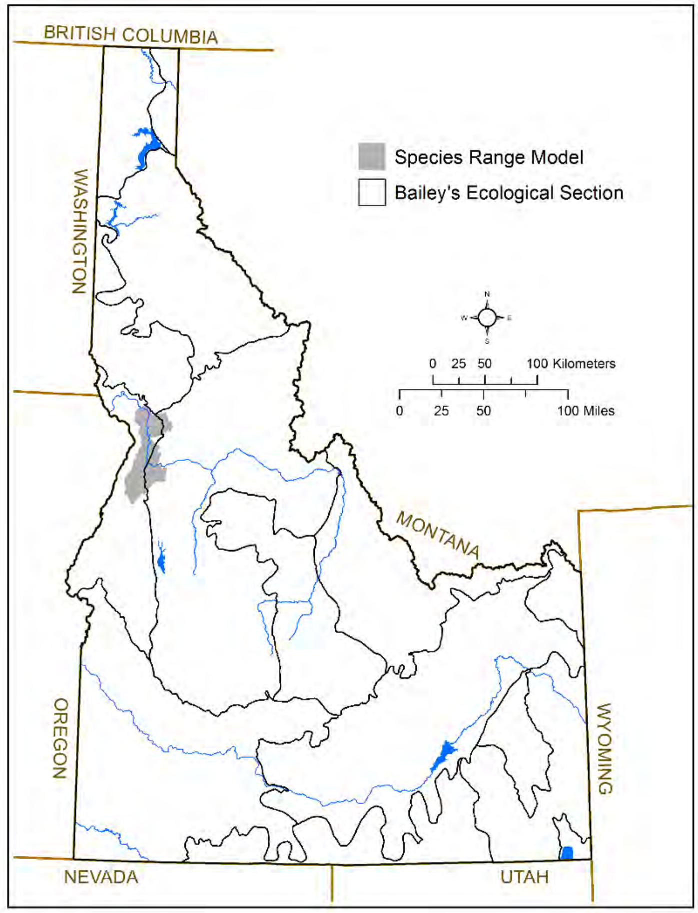
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Boulder Pile Mountainsnail
Oreohelix jugalis



Class: Gastropoda
Order: Stylommatophora
Family: Oreohelicidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S1

SGCN TIER: 3
Rationale: Idaho endemic, data deficient, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 5,000 km^2 (~1,900 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Boulder Pile Mountainsnail is an Idaho endemic known from the Salmon River between Hells Gate Creek and Allison Creek. In 1999, snails were reported as common at 9 of 34 sites. Current abundance is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species is found in varied habitats, but generally is associated with talus or boulder fields in mesic to somewhat xeric conditions. Dominant vegetation at known locations includes netleaf hackberry, willow, and various forbs and grasses.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: In 1999 this species was considered to be declining. Current population trends are unknown.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: Threats have not been documented.

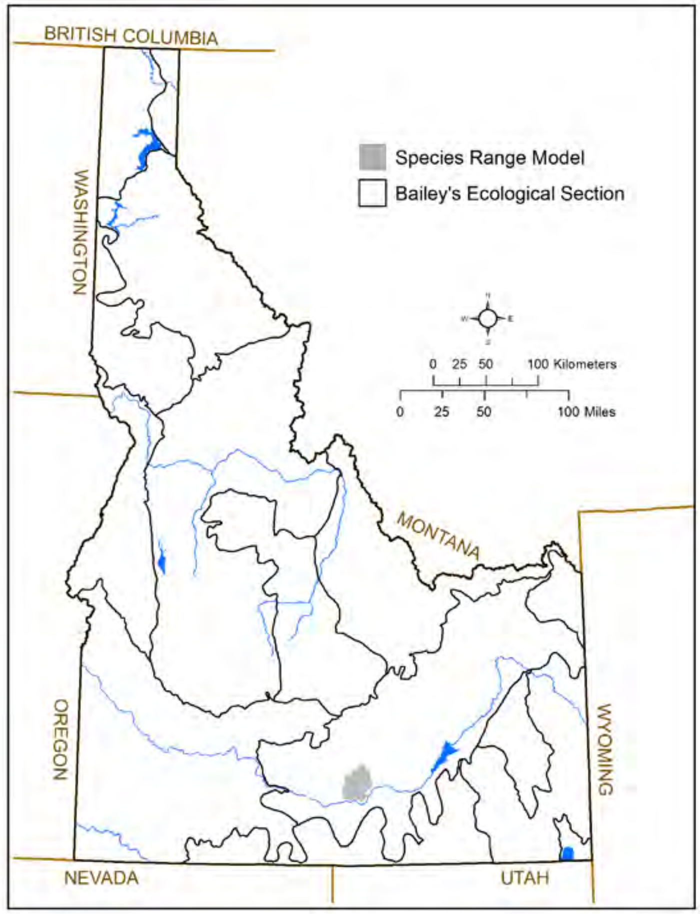
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Deseret Mountainsnail

Oreohelix peripherica



Class: Gastropoda
Order: Stylommatophora
Family: Oreohelicidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: SNR

SGCN TIER: 2
Rationale: Regional endemic, data deficient, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,400 km^2 (~500 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: The Deseret Mountainsnail is known to occur in Idaho, Oregon, and Utah in fragmented populations. In Idaho, one museum specimen was colleced near Rupert, Minidoka County. Current population status is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Habitat requirements for this species have not been documented. Other species in this genus seem to prefer limestone rock outcrops.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: Specific threats have not been identified for this species.

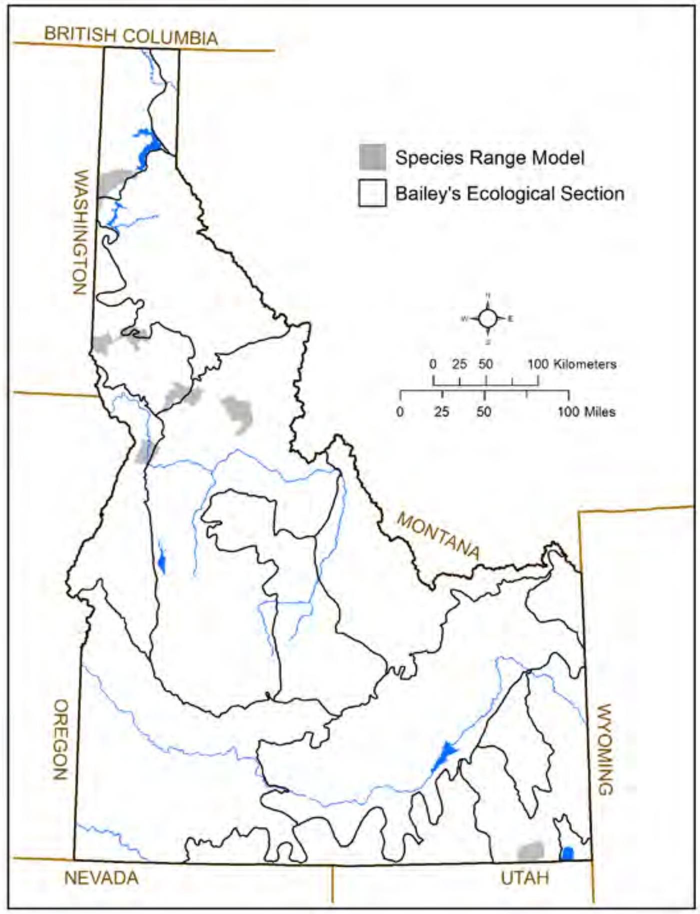
CONSERVATION ACTIONS
Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS
The taxonomic status of this species is uncertain.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Striate Mountainsnail

Oreohelix strigosa goniogyra



Class: Gastropoda
Order: Stylommatophora
Family: Oreohelicidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G5T1Q
S-rank: S1

SGCN TIER: 2
Rationale: Idaho endemic, data deficient, restricted range

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 3,300 km^2 (~1,300 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Striate Mountainsnail is endemic to Idaho and occurs in a limited area along the lower Salmon River drainage near Riggins, Idaho. Older records, however, indicate the species may also occur in the Selway River drainage, and even in scattered locations on the Palouse and Rathdrum prairies, but these specimens have not been confirmed and may be a different subspecies. Current status of the species is not known.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The species is found on schist and limestone outcrops in forested, often moist, areas. Sites are often in closed or partially closed–canopy ponderosa pine forests with well–developed and diverse understory vegetation.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Frest (1999) indicated both the abundance and the number of occupied sites of this species were declining. Current trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Timber harvest and fire have eliminated some habitat, and snails now occur on small remnant patches of relatively intact habitat. Other threats include improper livestock grazing management and road construction and maintenance.

CONSERVATION ACTIONS

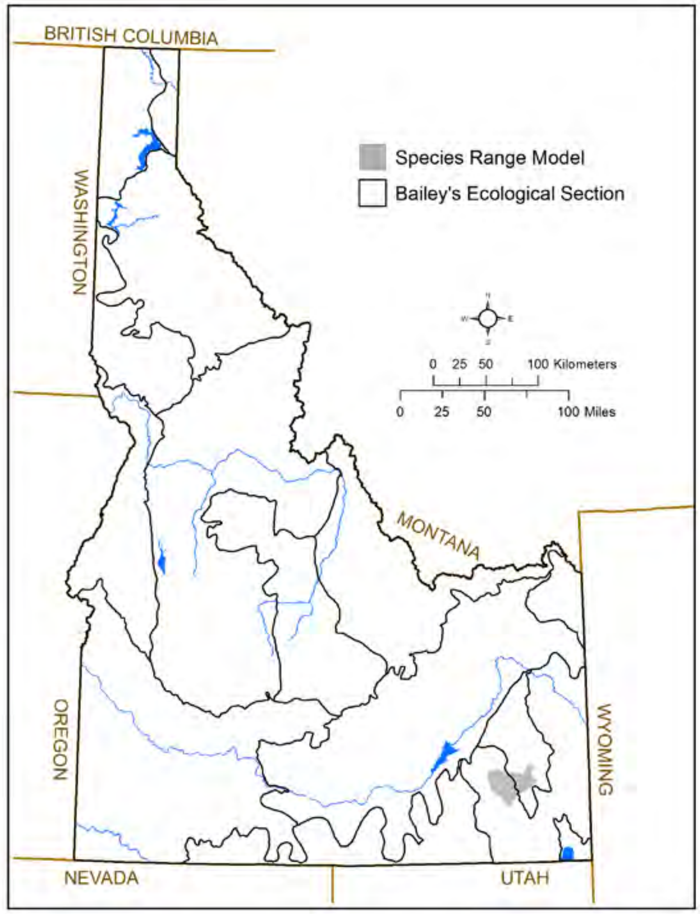
Priority conservation strategies for this species include surveys to determine the current abundance and trends and genetic work to determine status of the subspecies in Idaho.

ADDITIONAL COMMENTS

The taxonomic status of the subspecies is currently uncertain.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Thin–ribbed Mountainsnail
Oreohelix tenuistriata



Class: Gastropoda
Order: Stylommatophora
Family: Oreohelicidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GH
S-rank: SH

SGCN TIER: 1
Rationale: Idaho endemic, data deficient, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,100 km^2 (~800 mi^2)
Key Ecological Sections: Overthrust Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Thin–ribbed Mountainsnail is known from only 8 occurrences between Lava Hot Springs and McCammon in Bannock County, and has not been relocated since 1947. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The population was found in an area dominated by mountain mahogany, in openings among the shrubs where balsamroot grew in association with limestone.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Threats have not been documented.

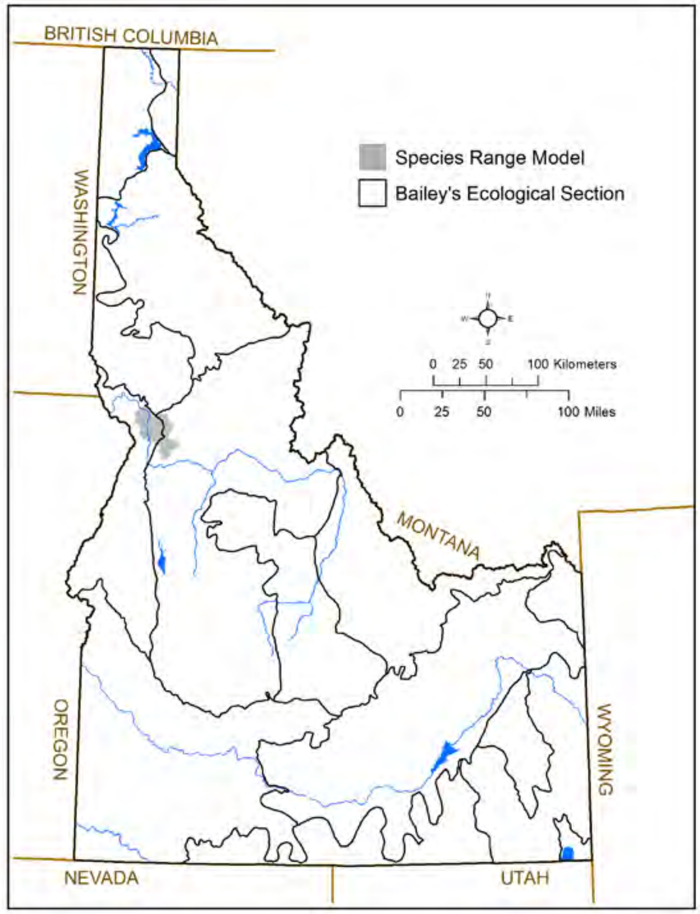
CONSERVATION ACTIONS
Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS
None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Whorled Mountainsnail

Oreohelix vortex



Class: Gastropoda
Order: Stylommatophora
Family: Oreohelicidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, data deficient, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,100 km^2 (~400 mi^2)
Key Ecological Sections: Blue Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Whorled Mountainsnail is endemic to a limited stretch of the lower Salmon River and tributaries just above and below the town of Whitebird, Idaho. It was last recorded in 1994 and its current status is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species occurs in association with basalt boulder fields and talus in xeric habitat. Grasses and occasionally shrubs or forbs are the most common plant associates.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Frest (1999) considered this species to be declining, noting both a decrease in the extent of occupied habitat and population extirpations. Current trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: The primary threat to this species is thought to be habitat loss resulting from quarrying, road construction and maintenance, and improper livestock grazing management.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

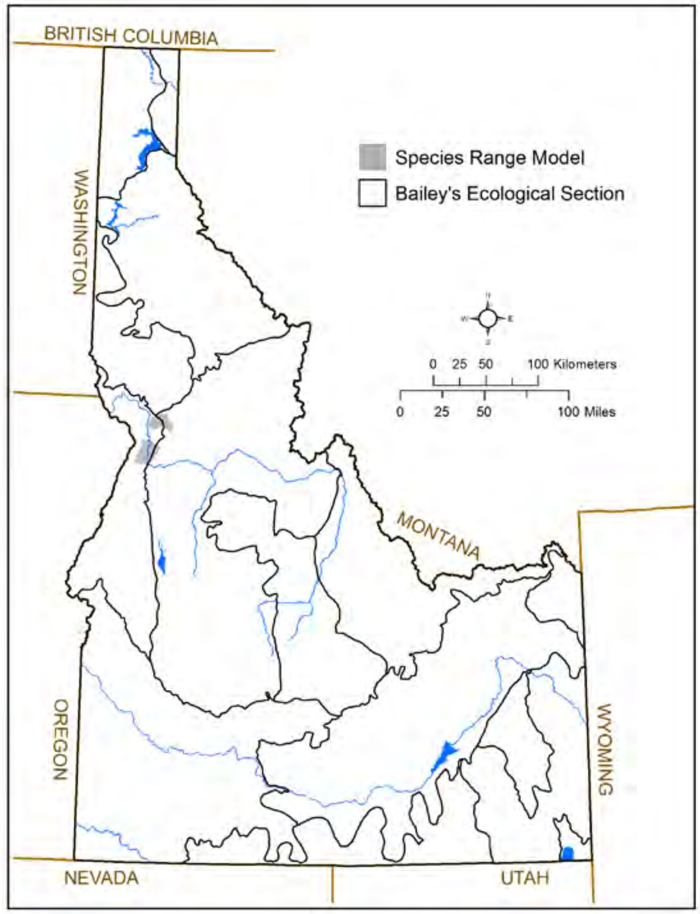
ADDITIONAL COMMENTS

None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Lava Rock Mountainsnail

Oreohelix waltoni



Class: Gastropoda
Order: Stylommatophora
Family: Oreohelicidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, data deficient, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 600 km^2 (~200 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Lava Rock Mountainsnail is an Idaho endemic restricted to a few sites in the lower Salmon River Canyon. Current abundance information is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The species occurs in xeric habitat in basalt talus and mixed schist/alluvium. Dominant plants in the areas include sagebrush, netleaf hackberry, and grasses.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: In 1999 this species was considered to be declining both in occupied area and in the number of individuals. Current population trends are unknown.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: The primary threat to this species is thought to be habitat loss and degradation resulting from improper livestock grazing management, rocky quarrying, and road construction and maintenance.

CONSERVATION ACTIONS

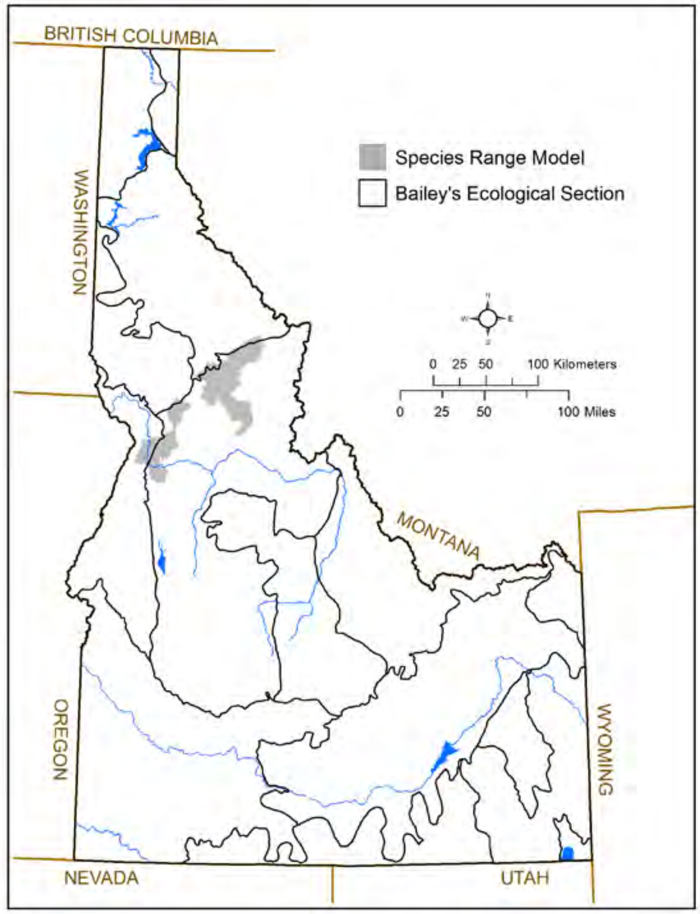
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Selway Forestsnail
Allogona lombardii



Class: Gastropoda
Order: Stylommatophora
Family: Polygyridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S3

SGCN TIER: 1
Rationale: Idaho endemic, data deficient, restricted range

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 6,300 km^2 (~2,400 mi^2)
Key Ecological Sections: Bitterroot Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Selway Forestsnail is an Idaho endemic that occurs in Idaho County, mostly in isolated colonies along the lower Lochsa River, the Selway River, the Souh Fork of the Clearwater River, and the lower Salmon River. The most recent records (2006, 2010) have all been along the Lochsa and Selway Rivers.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This species is found in intact mixed coniferous forest, usually in low elevation, well–shaded, moist areas along medium to large streams. Sites usually have a diverse understory and a substantial duff layer.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable

Description: Specific threats have not been identified for this species, however habitat loss and degradation are thought to be the primary threats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

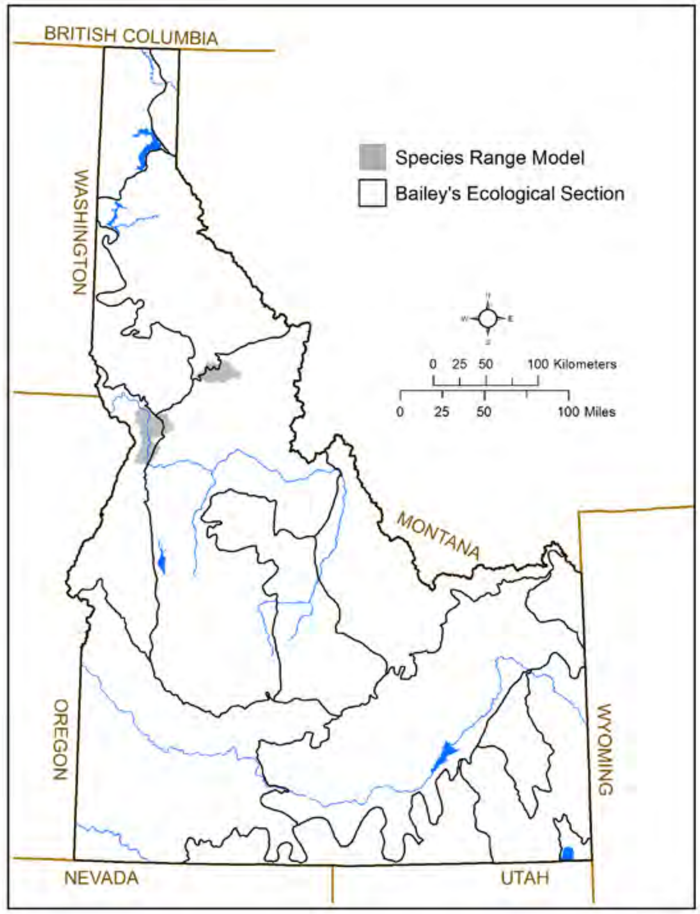
ADDITIONAL COMMENTS

None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.; Frest TJ, Johannes EJ. 1997. Land snail survey of the lower Salmon River drainage, Idaho. Idaho Bureau of Land Management Technical Bulletin 97–18.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.

Salmon Oregonian

Cryptomastix harfordiana



Class: Gastropoda
Order: Stylommatophora
Family: Polygyridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3G4
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, data deficient, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,700 km^2 (~700 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Salmon Oregonian is an Idaho endemic, restricted to a limited reach in the lower Salmon River Canyon. Current abundance is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This species is found in moderately xeric to somewhat mesic habitats, and is associated with talus or boulder fields often at the base of slopes or in riparian areas. Dominant plants include netleaf hackberry, grasses, willow, and dogwood.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: In 1999 this species was considered to be declining both in occupied area and in the number of individuals. Current population trends are unknown.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable

Description: The primary threat to this species is thought to be habitat loss resulting from housing development, road construction and maintenance, mining and quarrying, and improper livestock grazing management.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

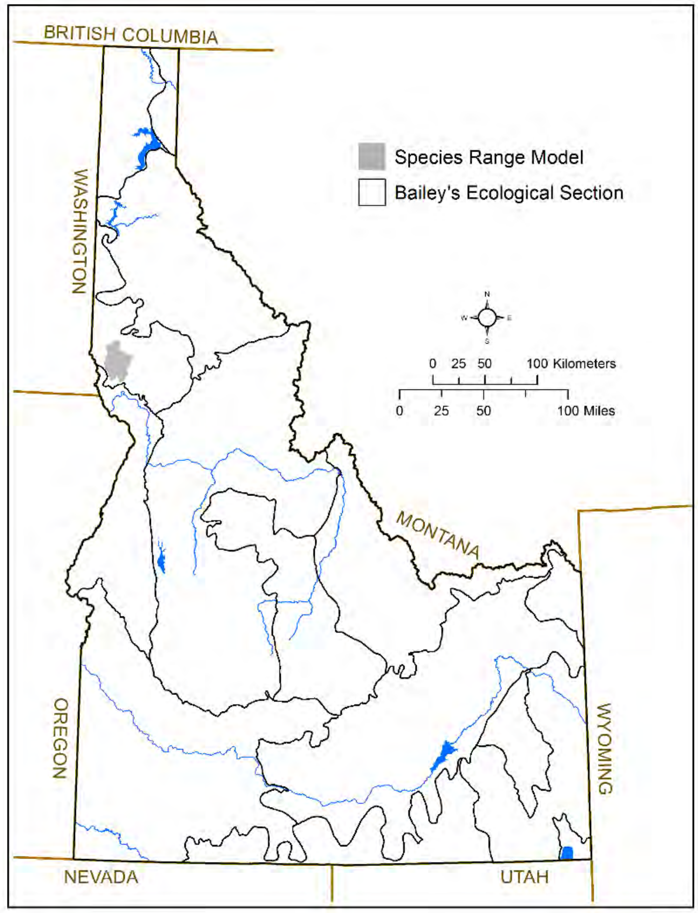
None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.; Frest TJ. 1999. A review of the land and freshwater mollusks of Idaho. Boise (ID): Idaho Department of Fish and Game.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Mission Creek Oregonian

Cryptomastix magnidentata



Class: Gastropoda
Order: Stylommatophora
Family: Polygyridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 700 km^2 (~300 mi^2)
Key Ecological Sections: Bitterroot Mountains, Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: The Mission Creek Oregonian is believed to be endemic to a site in Nez Perce County, but the species has also been reported from additional sites in Idaho County, Oregon, and Washington. Observations reported outside of the type locality are currently believed to represent other 3–toothed oregonian species such as the Salmon Oregonian or a subspecies of the Coeur d'Alene Oregonian. Taxonomic uncertainty and difficulties of distinguishing similar species makes interpretation of these records difficult.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Populations are found on limestone and basalt talus in pine forest that is moist, rocky, and well–shaded.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented, however, in 1999 the species was believed to be declining both in the area occupied and in the number of individuals.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats have not been identified for this species, however habitat loss and degradation are thought to be the primary threats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on verifying the taxonomic status and identification of recorded specimens, improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

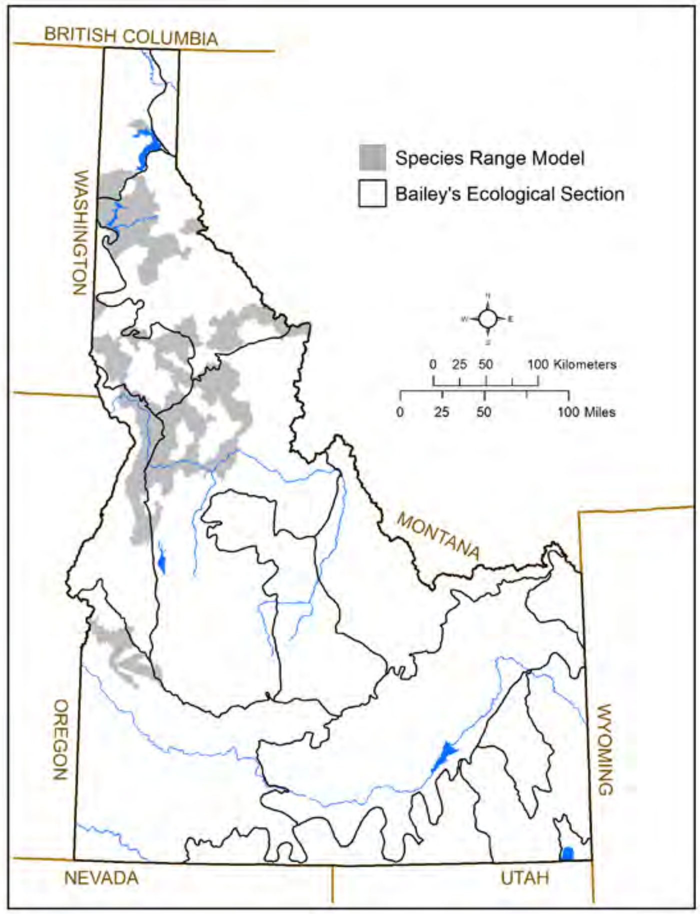
ADDITIONAL COMMENTS

None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.; Frest TJ. 1999. A review of the land and freshwater mollusks of Idaho. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Coeur d'Alene Oregonian

Cryptomastix mullani



Class: Gastropoda
Order: Stylommatophora
Family: Polygyridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4
S-rank: S4Q

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 23,400 km^2 (~9,000 mi^2)
Key Ecological Sections: Bitterroot Mountains, Blue Mountains, Flathead Valley, Idaho Batholith, Okanogan Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Coeur d'Alene Oregonian is a fairly common and widespread species known to occur in British Columbia, Washington, Oregon, Idaho, and Montana. In idaho, It occurs predominantly in the northern portion of the state. Several rare subspecies endemic to Idaho have been identified, but uncertainty exists in the taxonomic status of those subspecies.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: This species is found on rock outcrops in ponderosa pine forests with well–developed, moist, shaded understories.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Not intrinsically vulnerable

Description: Specific threats have not been identified for this species, however habitat loss and degradation are thought to be the primary threats.

CONSERVATION ACTIONS

Genetic analysis of this species complex is needed to address sub–specific taxonomic designations.

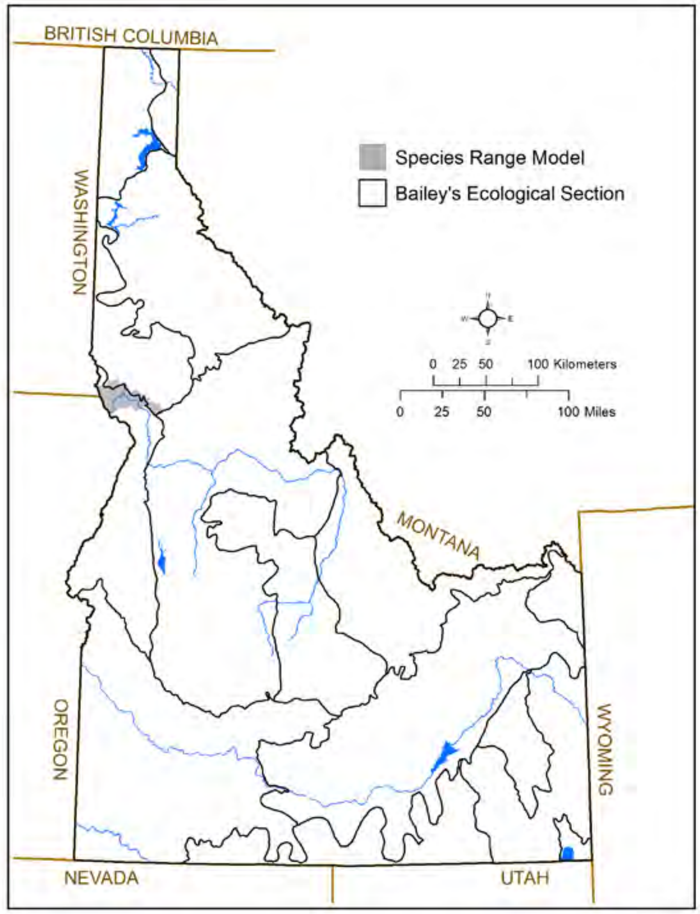
ADDITIONAL COMMENTS

None.

Information Sources: Lucid M, Idaho Department of Fish and Game, pers. comm.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Idaho Department of Fish and Game. Multi-species Baseline Initiative, unpublished data. [Accessed November 14, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Cottonwood Oregonian

Cryptomastix populi



Class: Gastropoda
Order: Stylommatophora
Family: Polygyridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: S1

SGCN TIER: 1
Rationale: Regional endemic, data deficient, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,100 km^2 (~400 mi^2)
Key Ecological Sections: Blue Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Cottonwood Oregonian is a regional endemic found in Idaho, Oregon, and Washington. In Idaho, it has been documented along the Snake River, lower Salmon River, and lower Clearwater River. By the mid-1990s, sites along the Clearwater River were believed to be extirpated and the species was only known to exist in isolated colonies in undisturbed areas along the lower Salmon River and Snake River. The current status of the species is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Little is known of the species biology. However, populations typically occur in basalt talus in xeric, sparsely-vegetated habitats with netleaf hackberry, sagebrush, and a variety of forbs and grasses.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented, but the species is believed to be declining both in number of individuals and number of sites.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats have not been identified for this species, however habitat loss and degradation are thought to be the primary threats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

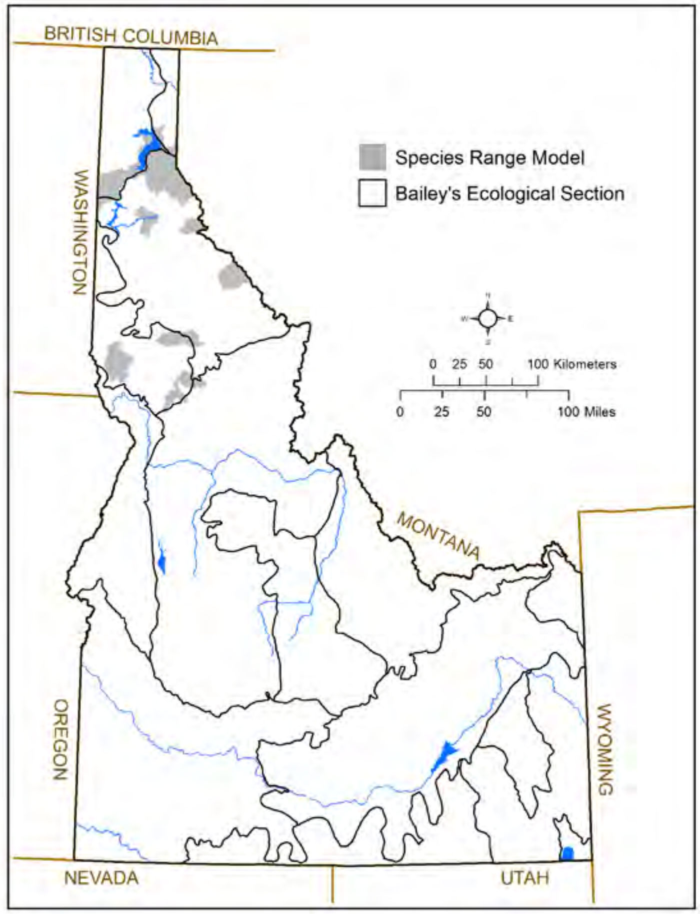
ADDITIONAL COMMENTS

None.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.; Frest TJ. 1999. A review of the land and freshwater mollusks of Idaho. Boise (ID): Idaho Department of Fish and Game
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Kingston Oregonian

Cryptomastix sanburni



Class: Gastropoda
Order: Stylommatophora
Family: Polygyridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S3

SGCN TIER: 1
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 6,300 km² (~2,400 mi²)
Key Ecological Sections: Bitterroot Mountains , Flathead Valley
Population Size in Idaho: Not applicable for invertebrates.
Description: The Kingston Oregonian is a regional endemic, with historical occurrences in Oregon, Montana, and Idaho. In Idaho, it was only known from a few locations until recent (2010-2014) survey efforts documented it at several sites across north Idaho. It now appears to be most abundant in the Couer d'Alene Mountains.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Specific habitat requirements have not been identified, however the species has typically been found along streams or springs in areas dominated by mesic ponderosa pine forests.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable

Description: Specific threats have not been identified for this species, however habitat loss and degradation are thought to be the primary threats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

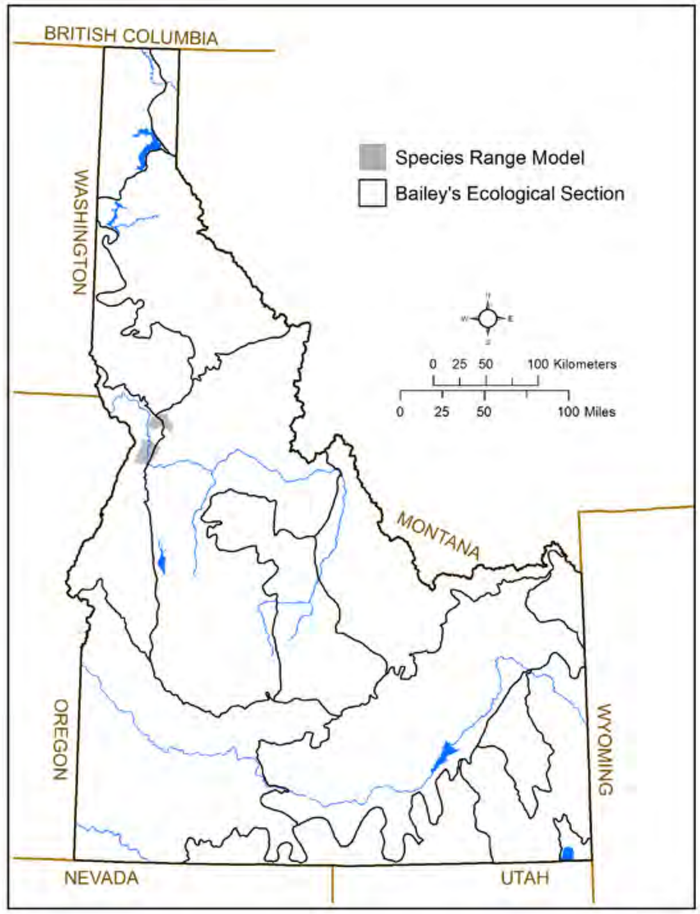
ADDITIONAL COMMENTS

This species was 1 of 206 petitioned for listing under the ESA in 2007. Listing was determined to be not warranted in 2009 due to a lack of information.

Information Sources: Lucid M, Idaho Department of Fish and Game, pers. comm.
Map Sources: Burke T. 2013. Land snails and slugs of the Pacific Northwest. Oregon State University Press, Corvallis, OR, Idaho Department of Fish and Game, Multi-species Baseline Initiative, unpublished data; Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Idaho Department of Fish and Game. Multi-species Baseline Initiative, unpublished data. [Accessed November 14, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Western Flat-whorl

Planogyra clappi



Class: Gastropoda
Order: Stylommatophora
Family: Valloniidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4G5
S-rank: S1

SGCN TIER: 3
Rationale: Data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,300 km^2 (~500 mi^2)
Key Ecological Sections: Blue Mountains, Flathead Valley, Idaho Batholith, Okanogan Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Western Flat-whorl occurs in Alaska, British Columbia, Washington, Oregon, California, and Idaho. In Idaho, it is considered rare and is known from only 3 locations along the lower Salmon River, collected in 1993 and 2010. It has not been detected in the Idaho Panhandle, despite recent, extensive surveys.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Habitat associations for this species in Idaho have not been described. Elsewhere, the species is generally associated with mesic forests at a wide range of elevations. Populations are also occasionally encountered in partly forested rock taluses or outcrops, marshes, meadows, or riparian areas. Individuals are usually found under leaf litter.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Specific threats have not been identified for this species, however habitat loss and degradation are thought to be the primary threats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

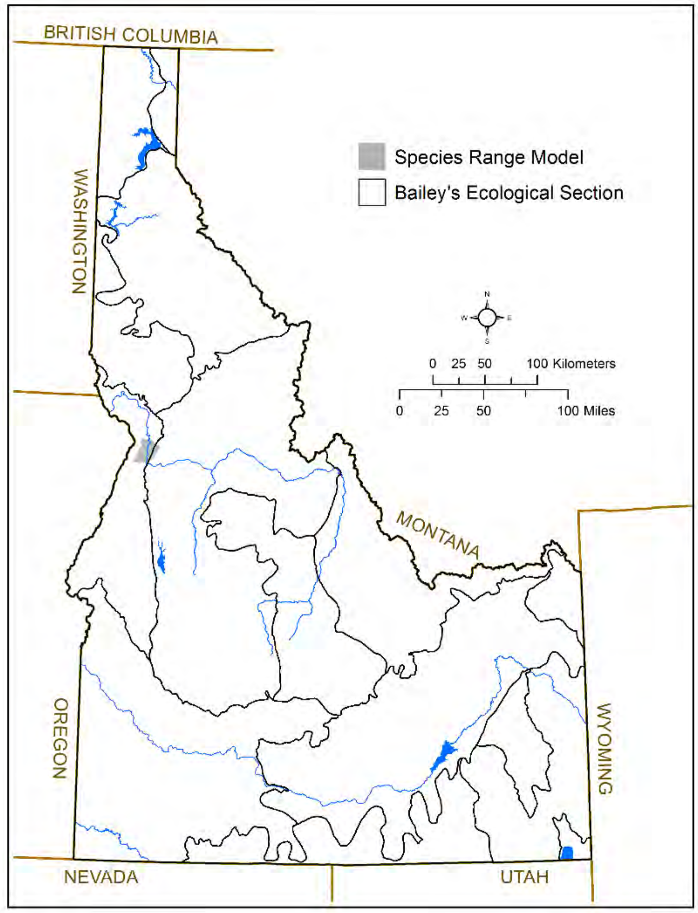
ADDITIONAL COMMENTS

None.

Information Sources: Lucid M, Idaho Department of Fish and Game, pers. comm.; NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org
Map Sources: Burke T. 2013. Land snails and slugs of the Pacific Northwest. Oregon State University Press, Corvallis, OR, Idaho Department of Fish and Game, Multi-species Baseline Initiative, unpublished data; Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

Southern Tightcoil

Ogaridiscus subrupicola



Class: Gastropoda
Order: Stylommatophora
Family: Zonitidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 400 km^2 (~200 mi^2)
Key Ecological Sections: Blue Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Southern Tightcoil has been recorded from Oregon (where it is nearly extirpated), Utah (extirpated in 1929), and Idaho (unknown). In Idaho, it is known from only 2 observations (1941 and 1993) both along John Day Creek in Idaho County.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Specific habitat requirements are not known. However, the species has typically been found in open rocky areas, talus, and caves.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

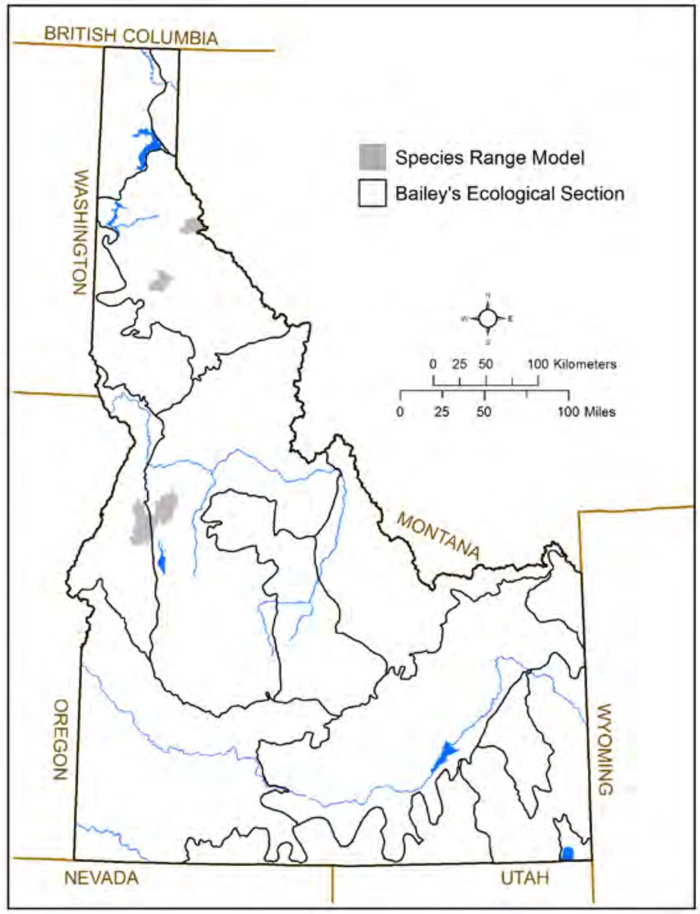
THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats have not been identified for this species.

CONSERVATION ACTIONS
Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS
This species was 1 of 206 petitioned for listing under the ESA in 2007. Listing was determined to be not warranted in 2009 due to a lack of information.

Information Sources: Frest TJ, Johannes EJ. 2000. An annotated checklist of Idaho land and freshwater mollusks. Journal of the Idaho Academy of Science 36:1–51.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Shiny Tightcoil
Pristiloma wascoense



Class: Gastropoda
Order: Stylommatophora
Family: Zonitidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,700 km^2 (~700 mi^2)
Key Ecological Sections: Bitterroot Mountains, Blue Mountains, Flathead Valley, Idaho Batholith, Okanogan Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Shiny Tightcoil has been documented in Washington, Oregon, Idaho, and Montana. In Idaho, it was known from only 4 historical occurrences in Adams, Valley, and Shoshone counties until recently when it was documented in 2 locations (1 in Idaho near Clarkia, 1 in Washington) during 2013 surveys.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Specific habitat requirements for this species are not well known. Most sites are in ponderosa pine and Douglas-fir at moderate to high elevations, but some have been found at more moist locations. The species does appear to be assoicated with cool air temperatures, at least in the Panhandle Region.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats have not been identified for this species.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

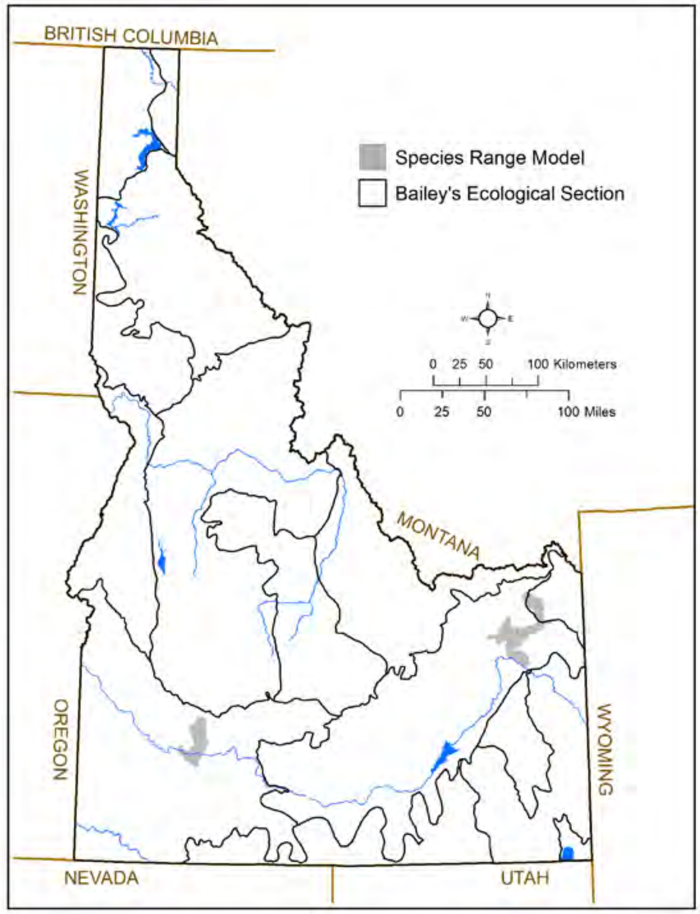
ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Lucid M, Idaho Department of Fish and Game, pers. comm.
Map Sources: Burke T. 2013. Land snails and slugs of the Pacific Northwest. Oregon State University Press, Corvallis, OR, Idaho Department of Fish and Game, Multi-species Baseline Initiative, unpublished data; Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Idaho Department of Fish and Game. Multi-species Baseline Initiative, unpublished data. [Accessed November 14, 2014].

An Ant-like Flower Beetle

Amblyderus owyhee



Class: Insecta
Order: Coleoptera
Family: Anthicidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S2

SGCN TIER: 2
Rationale: Regional endemic, data deficient, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,000 km^2 (~800 mi^2)
Key Ecological Sections: Owyhee Uplands, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This ant-like flower beetle was described in 1999 and is found in the Snake River and Columbia River Basins in Idaho, British Columbia, and Alberta. In Idaho, the only known locations are at Bruneau Dunes State Park and St Anthony Dunes. It has not been recorded since the late 1980s.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species is a sand habitat specialist. Adults are burried in dune slip-faces during the day; at night they run about investigating the debris that has accumulated at the bottom of the dune slip-faces. Most specimens were taken in May and June, and a smaller number were taken as late as November.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats have not been identified for this species, however a significant threat to dune habitats in the core of its Idaho range is the loss of habitat as a result of dune stabilization. Dune stabilization occurs primarily as a result of invasive weed encroachment.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate. Reducing the spread of invasive weeds in sand dominated habitats would also benefit this and other sand obligate species.

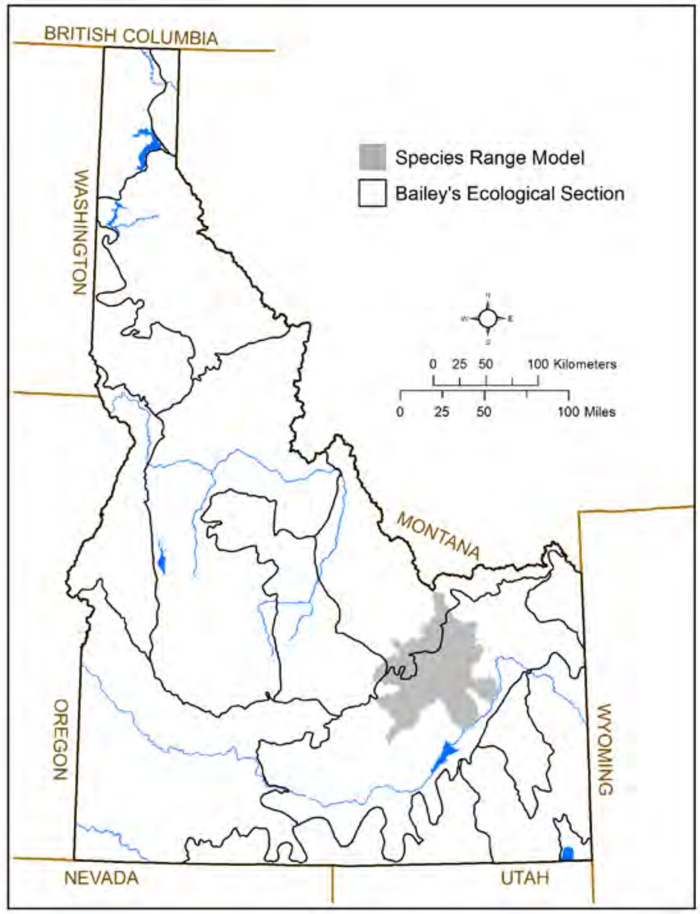
ADDITIONAL COMMENTS

None.

Information Sources: Chandler DS. 1999. Revision of the North American species of *Amblyderus* with a checklist of the world species (Coleoptera: Anthicidae). Transactions of the American Entomological Society 125:269-293.
Map Sources: Chandler DS. 1999. Revision of the North American species of *Amblyderus* with a checklist of the world species (Coleoptera: Anthicidae). Transactions of the American Entomological Society 125:269-293.

A Metallic Wood-boring Beetle

Agrilus pubifrons



Class: Insecta
Order: Coleoptera
Family: Buprestidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S3

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 8,300 km^2 (~3,200 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This metallic wood-boring beetle is known from only a handful of specimens. It was originally collected near Pocatello, Idaho, and is now known to also occur in Utah.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Little is known of the species biology but, green rabbitbrush is its only known host plant. The species and related species have generally been described as also feeding on plants in the Amaranth and Aster families, but no specifics on a particular preference. Larvae bore into the plant roots and adults feed in the flowers. Adults have also been collected on Parry's rabbitbrush and spiny hopsage.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Not intrinsically vulnerable

Description: Specific threats have not been identified for this species.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

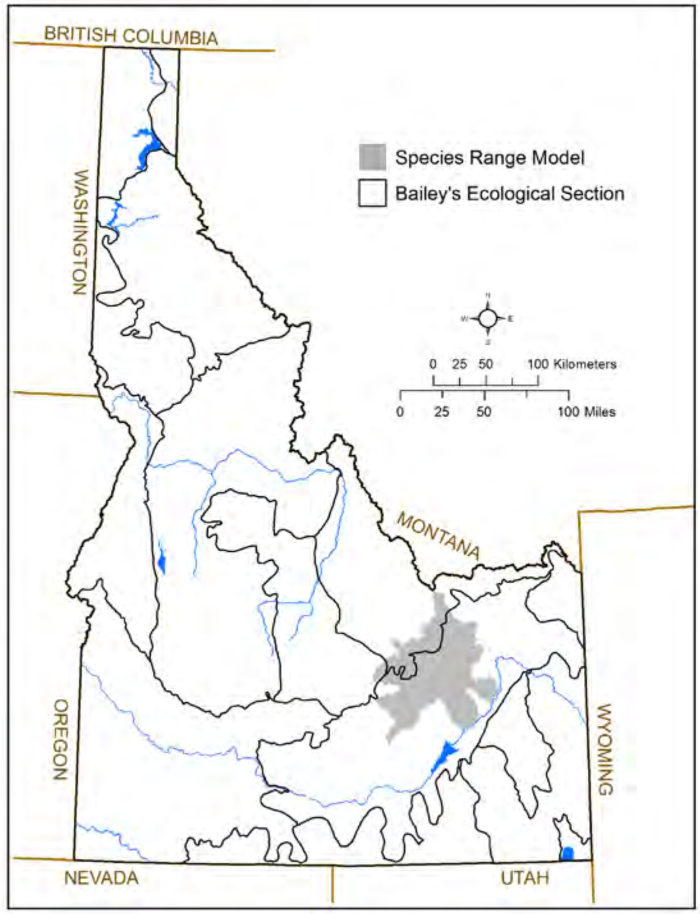
ADDITIONAL COMMENTS

None.

Information Sources: Nelson GH, Walters GC Jr, Haines RD, Bellamy CL. 2008. A catalog and bibliography of the Buprestoidea of America north of Mexico. The Coleopterists Society, Special Publication 4:1-274.; Jendek E, Polakova J. 2014. Host Plants of World *Agrilus* (Coleoptera, Buprestidae): A critical review. New York (NY): Springer.; Fisher WS. 1928. A revision of the North American species of buprestid beetles belonging to the genus *Agrilus*. US National Museum Bulletin 145:1-347.

Map Sources: Hampton N. 2005. Insects of the Idaho National Laboratory: A compilation and review. In: Shaw NL, Pellant M, Monsen SB, comps. Sage-grouse habitat restoration symposium proceedings, USDA Forest Service, RMRS-P38.

A Metallic Wood-boring Beetle
Chrysobothris horningi



Class: Insecta
Order: Coleoptera
Family: Buprestidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
 Region1: No status
 Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S3

SGCN TIER: 2
Rationale: Idaho endemic, data deficient, restricted range

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 8,300 km^2 (~3,200 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This metallic wood-boring beetle has only been collected at Craters of the Moon National Monument and Preserve and the neighboring Idaho National Engineering Laboratory in Butte County. It has not been recorded since the early 1980s.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Little is known of the species biology but, it appears to be restricted to cushion buckwheat (*Eriogonum depressum*), which commonly grows on cinder cones in the area. Larvae have been found to bore into the roots of the plant. Adults are known as fast-flying, elusive, and uncommon.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Not intrinsically vulnerable

Description: Specific threats have not been identified for this species.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

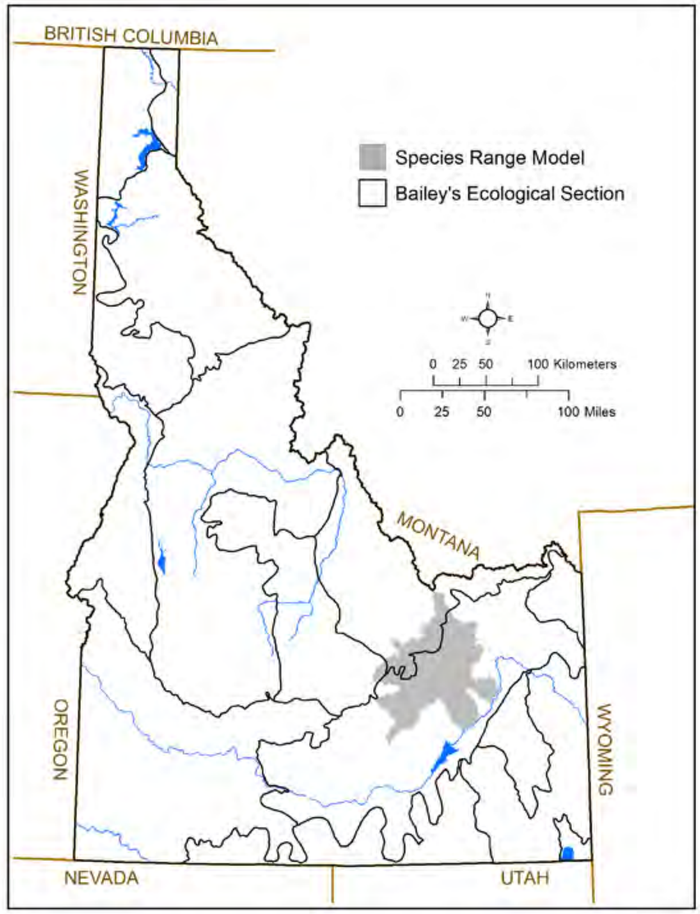
None.

Information Sources: Barr WF. 1969. New species of *Chrysobothris* from the Pacific Northwest (Coleoptera: Buprestidae). Proceedings of the Entomological Society of Washington 71:117–132.; Stafford MP, Barr WF, Johnson JB. 1986. Coleoptera of the Idaho National Engineering Laboratory: An annotated checklist. Great Basin Naturalist 46:287-293.

Map Sources: Barr WF. 1969. New species of *Chrysobothris* from the Pacific Northwest (Coleoptera_Buprestidae). Proceedings of the Entomological Society of Washington 71:117–132; Hampton N. 2005. Insects of the Idaho National Laboratory: A compilation and review. In: Shaw NL, Pellant M, Monsen SB, comps. Sage-grouse habitat restoration symposium proceedings, USDA Forest Service, RMRS-P38.

A Metallic Wood-boring Beetle

Chrysobothris idahoensis



Class: Insecta
Order: Coleoptera
Family: Buprestidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S3

SGCN TIER: 2
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 8,300 km^2 (~3,200 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This metallic wood-boring beetle is known to occur in Idaho and Nevada. In Idaho, it has only been collected in Butte, Blaine and Washington counties. It may be relatively common locally when conditions are suitable, but is not often collected. The species has not been recorded since the early 1980s.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Little is known of the species biology but, it has been collected from wild buckwheat (Eriogonum) species and larvae have been found to bore into the roots of the plant.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Specific threats have not been identified for this species.

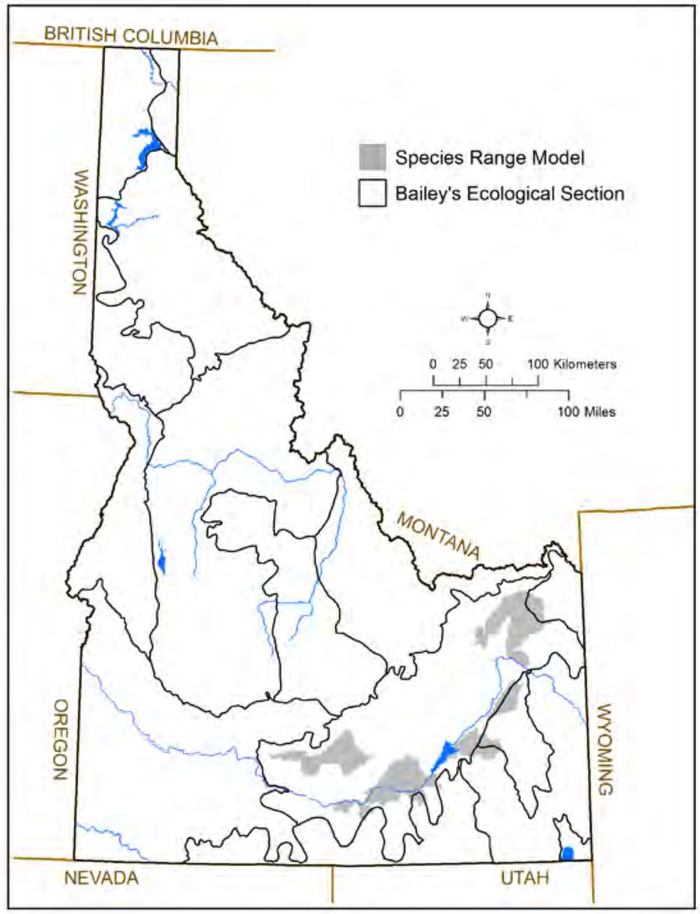
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Barr WF. 1969. New species of *Chrysobothris* from the Pacific Northwest (Coleoptera: Buprestidae). Proceedings of the Entomological Society of Washington 71:117–132; Westcott RL. 1990. Notes on taxonomy, ecology and distribution for some species of *Chrysobothris* Eschscholtz (Coleoptera: Buprestidae) occurring in the United States (including Hawaii) and Canada. The Colopterists Bulletin 44:323–343.; Stafford MP, Barr WF, Johnson JB. 1986. Coleoptera of the Idaho National Engineering Laboratory: An annotated checklist. Great Basin Naturalist 46:287-293.
Map Sources: Hampton N. 2005. Insects of the Idaho National Laboratory: A compilation and review. In: Shaw NL, Pellant M, Monsen SB, comps. Sage-grouse habitat restoration symposium proceedings, USDA Forest Service, RMRS-P38.

Idaho Dunes Tiger Beetle

Cicindela arenicola



Class: Insecta
Order: Coleoptera
Family: Carabidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S2

SGCN TIER: 2
Rationale: Regional endemic, habitat specialist, population declines

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 9,900 km^2 (~3,800 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: The Idaho Dunes Tiger Beetle is predominantly in eastern and south-central Idaho, but was recently found to also occur in southwestern Montana. The most extensive populations are in the St. Anthony Dunes in Fremont County.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: In general, tiger beetles show preferences for small patches of dynamic habitats. The Idaho Dunes Tiger Beetle is a sand dunes specialist. Larvae live in burrows located in flat, grassy areas where the sand is at least a meter thick, often on the windward side of sand dunes. Although adult beetles that disperse are reported to move up to 1km (0.6 mi) within 6 weeks of emergence, most adults remain in the immediate area of the dune system on which they developed. Adults are active from mid–April to late June and again from late August to late October. In low rainfall years, the life cycle from egg to adult may take up to 4 years.

POPULATION TREND
Short-term Trend: Decline 10–30%
Long-term Trend: Unknown
Description: Population trends are thought to be declining slightly.

THREATS

Overall Threat Impact: High
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threat to this species is the loss or degradation of habitat due to OHV use, agriculture expansion, and invasive grass species.

CONSERVATION ACTIONS

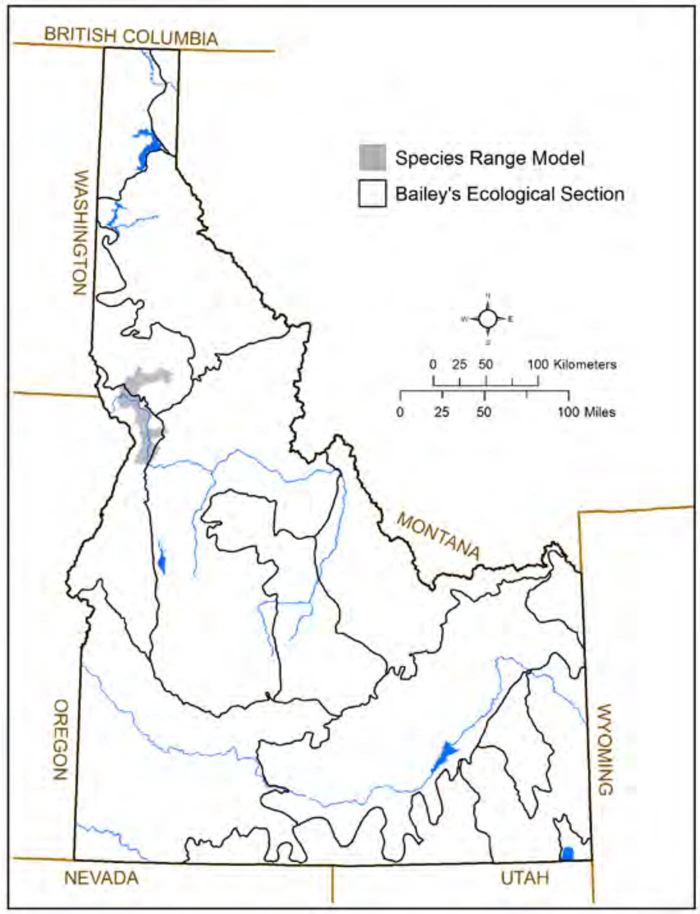
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Knisley CB, Kippenhan M, Brzoska D. 2014. Conservation status of United States tiger beetles. Terrestrial Arthropod Reviews 7:93–145; Pearson D, Knisley CB, Duran DP, Kazilek CJ. 2015. A field guide to the tiger beetles of the United States and Canada. 2nd Edition. New York (NY): Oxford University Press.; Winton RC, Kippenhan MG, Ivie MA. 2010. New state record for *Cicindela arenicola* Rumpp (Coleoptera: Carabidae: Cicindelinae) in Southwestern Montana. The Coleopterists Bulletin 64:43–44.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.

Columbia River Tiger Beetle
Cicindela columbica



Class: Insecta
Order: Coleoptera
Family: Carabidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, range restricted, population declines, IUCN Vulnerable

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,800 km^2 (~700 mi^2)
Key Ecological Sections: Blue Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Columbia River Tiger Beetle was historically known to occur along the Columbia, Snake, and Salmon Rivers in Oregon, Washington, and Idaho. It is now thought to have been extirpated from Oregon and Washington and, in Idaho, only occurs along the lower Salmon River in Idaho County.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: In general, tiger beetles show preferences for small patches of dynamic habitats. This species, in particular, is found exclusively on sandbars and sand dunes in riparian areas of large lowland rivers. Surveys on the lower Salmon River found it in greatest abundance on older, extensive, well-established sandbars that are not affected by spring floods. Adults are found from mid-April to early August. The life cycle is thought to be 3-years in length, and larvae are present in their burrows in any season. Adults and larvae are voracious predators on other insects.

POPULATION TREND
Short-term Trend: Decline 10–30%
Long-term Trend: Unknown
Description: Population trends are thought to be declining slightly.

THREATS

Overall Threat Impact: Moderate
Intrinsic Vulnerability: Highly vulnerable
Description: The primary threat to this species is the loss or degradation of habitat due to dams and water level changes.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

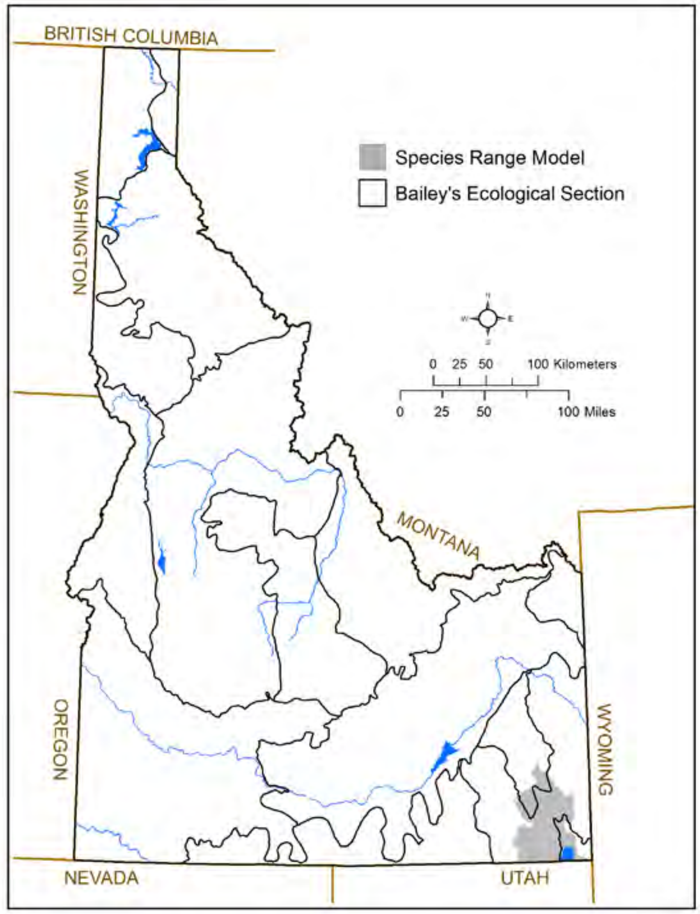
ADDITIONAL COMMENTS

The species was petitioned for listing under the ESA in 1979 based on the threat of a proposed dam on the lower Salmon River. In 1988, the FWS deemed that listing was unwarranted because the dam was no longer proposed.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Knisley CB, Kippenhan M, Brzoska D. 2014. Conservation status of United States tiger beetles. Terrestrial Arthropod Reviews 7:93–145; Pearson D, Knisley CB, Duran DP, Kazilek CJ. 2015. A field guide to the tiger beetles of the United States and Canada. 2nd Edition. New York (NY): Oxford University Press.; Shook G. 1981. The status of the Columbia tiger beetle (*Cicindela columbica* Hatch) in Idaho (Coleoptera: Cicindelidae). The Pan-Pacific Entomologist 57:359–363.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.

A Tiger Beetle

Cicindela decemnotata montevolans



Class: Insecta
Order: Coleoptera
Family: Carabidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S2

SGCN TIER: 2
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 3,800 km^2 (~1,500 mi^2)
Key Ecological Sections: Bear Lake, Overthrust Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: This recently described (2012) subspecies is only known from the Bear River Mountain Range in southeastern Idaho and northeastern Utah, with most popuatlions found in the area of Bear Lake Summit. Adults may sometimes be found in abundance.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: In general, tiger beetles show preferences for small patches of dynamic habitats. This tiger beetle in particular is found in patchy colonies at high elevations (>2,000 m [6,500 ft]) in a variety of habitats including sparsely-vegetated grasslands, open pine forests, and sagebrush. Adults are typically found from late June through late August. Larvae take 2–3 years to develop depending on elevation.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: Population trends have not been documented, but are thought to be relatively stable.

THREATS

Overall Threat Impact: Low
Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats have not been identified for this subspecies.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

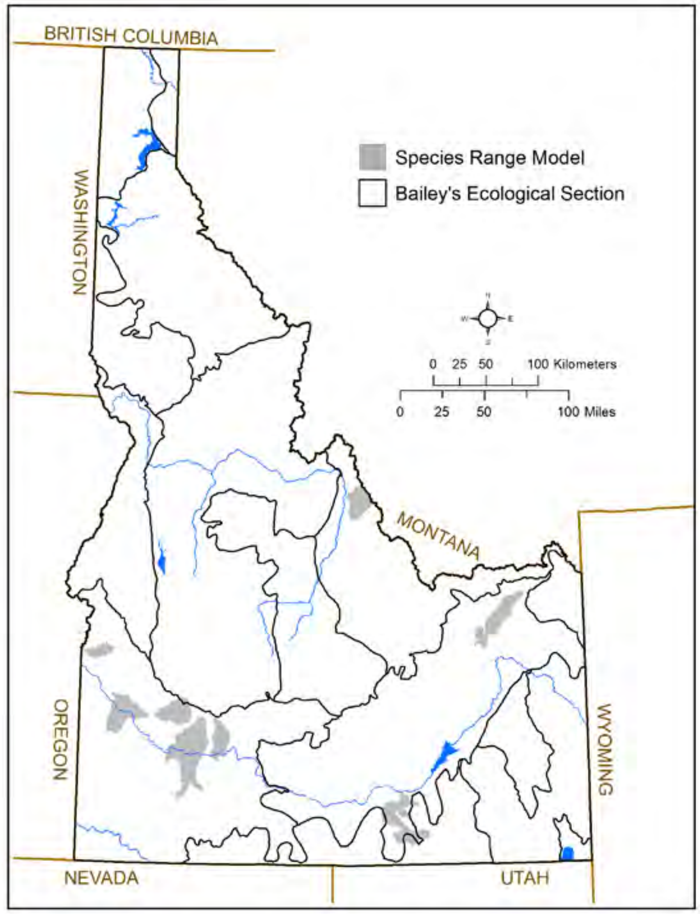
ADDITIONAL COMMENTS

None.

Information Sources: Knisley CB, Kippenhan M, Brzoska D. 2014. Conservation status of United States tiger beetles. Terrestrial Arthropod Reviews 7:93–145.; Knisley CB, Woodcock MR, Kippenhan MG. 2012. A morphological and mtDNA analysis of the badlands tiger beetle, *Cicindela* (s. str.) *decemnotata* Say, 1817 (coleoptera: Carabidae: Cicindelinae) with the description of three new subspecies. Insecta Mundi 0214:1–49.
Map Sources: Knisley CB, Kippenhan M, Brzoska D. 2014. Conservation status of United States tiger beetles. Terrestrial Arthropod Reviews 7:93–145

Alpine Tiger Beetle

Cicindela plutonica



Class: Insecta
Order: Coleoptera
Family: Carabidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S2

SGCN TIER: 2
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 6,100 km^2 (~2,400 mi^2)
Key Ecological Sections: Beaverhead Mountains, Owyhee Uplands
Population Size in Idaho: Not applicable for invertebrates.
Description: Limited to the Great Basin, the Alpine Tiger Beetle occurs intermittently across its range including scattered locations in Ada, Canyon, Cassia, Elmore, Jefferson, Lemhi, and Owyhee counties. The Idaho population makes up approximately 45% of its known overall range.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: In general, tiger beetles show preferences for small patches of dynamic habitats. The Alpine Tiger Beetle, in particular, is typically found in high-elevation, mountainous areas in alpine habitat over 2,700m (8,858 ft) elevation. Despite its general association with alpine habitats, however, it is known to occur in much lower elelvation sagebrush as well.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: Population trends have not been documented, but are thought to be relatively stable.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Specific threats have not been identified for this species.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

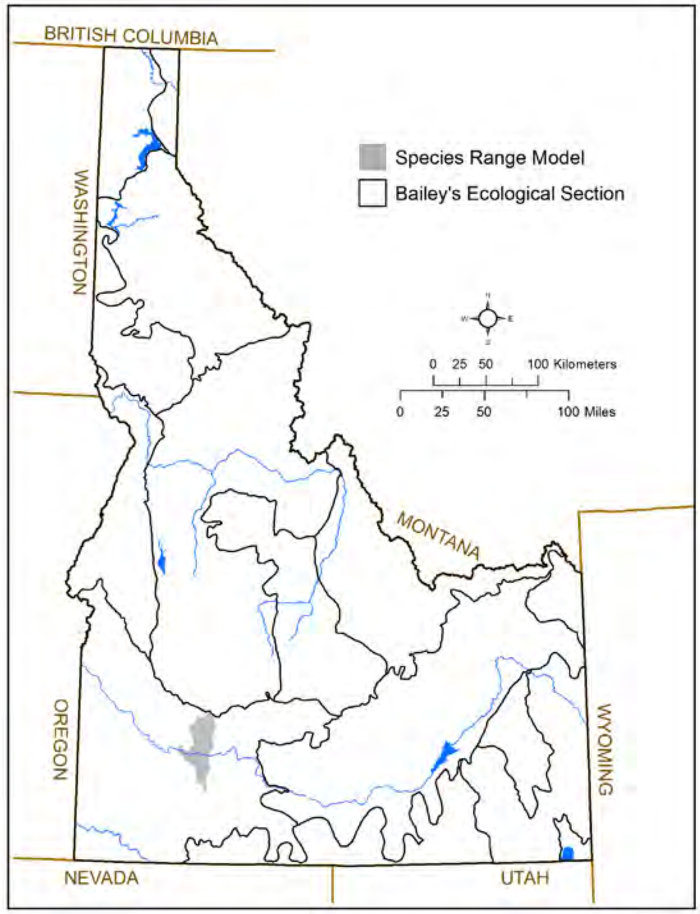
ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Pearson D, Knisley CB, Duran DP, Kazilek CJ. 2015. A field guide to the tiger beetles of the United States and Canada. 2nd Edition. New York (NY): Oxford University Press.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Bruneau Dune Tiger Beetle

Cicindela waynei



Class: Insecta
Order: Coleoptera
Family: Carabidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, range restricted, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,300 km^2 (~500 mi^2)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Bruneau Dune Tiger Beetle is found only within Bruneau Dunes State Park and a few adjacent sand-dominated blowouts.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species of ground beetle is a sand–obligate that requires healthy early-seral dune habitats with a mosaic of cobble and open sand. Cobble is required for larval survival and open dunes for breeding and the pursuit of prey.

POPULATION TREND
Short-term Trend: Relatively Stable (<=10% change)
Long-term Trend: Unknown
Description: Although population trend data are unavailable, the proportion of occupied habitat has declined and approximately 75% of previously occupied habitat is now unoccupied.

THREATS
Overall Threat Impact: High
Intrinsic Vulnerability: Highly vulnerable

Description: The primary threats for this species are sand stabilization as a result of nonnative vegetation encroachment and changing precipitation patterns crucial to spring emergence and reproduction. Additonal threats include human recreational activities, improper livestock grazing management, and collectors. Threat mitigation is challenging.

CONSERVATION ACTIONS

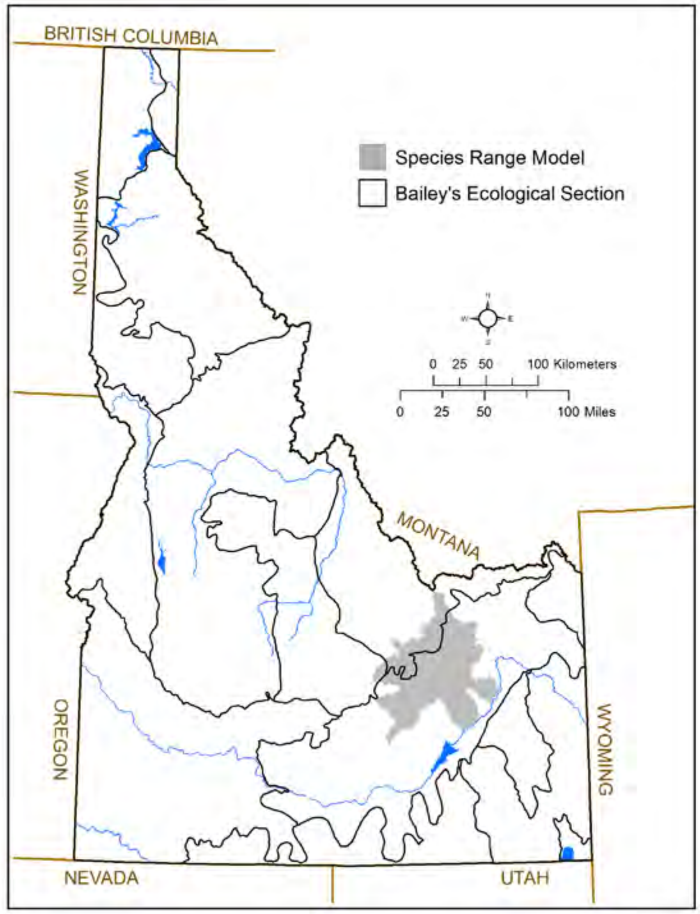
Conservation issues and management actions are described in the appropriate section plans. In short, recommended strategies for this species include maintenance of core habitat, potential expansion into restored areas, and assessing the exposure and potential effects of herbicides.

ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Knisley CB, Kippenhan M, Brzoska D. 2014. Conservation status of United States tiger beetles. Terrestrial Arthropod Reviews 7:93–145; Pearson D, Knisley CB, Duran DP, Kazilek CJ. 2015. A field guide to the tiger beetles of the United States and Canada. 2nd Edition. New York (NY): Oxford University Press.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Integrated digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.

A Long-horned Beetle
Judolia gaurotoides



Class: Insecta
Order: Coleoptera
Family: Cerambycidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S3Q

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 8,300 km^2 (~3,200 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This long-horned beetle is distributed from the Rockies west to the Sierra Nevada Mountains. There are two distinct subspecies, one is from the west coast area and the other is endemic to the Rocky Mountains. In Idaho, most records of the species are in the southwest. However, recent specimens collected as part of the northern Idaho MBI project need to be checked to determine subspecies status. Due to the habitats where these specimens were collected, they may represent a new species. In general, the species is relatively uncommon, but not rare in the western US.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Little is known of the species biology but, it appears to be associated with sagebrush, wild buckwheat, and sandworts.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats for this species have not been identified.

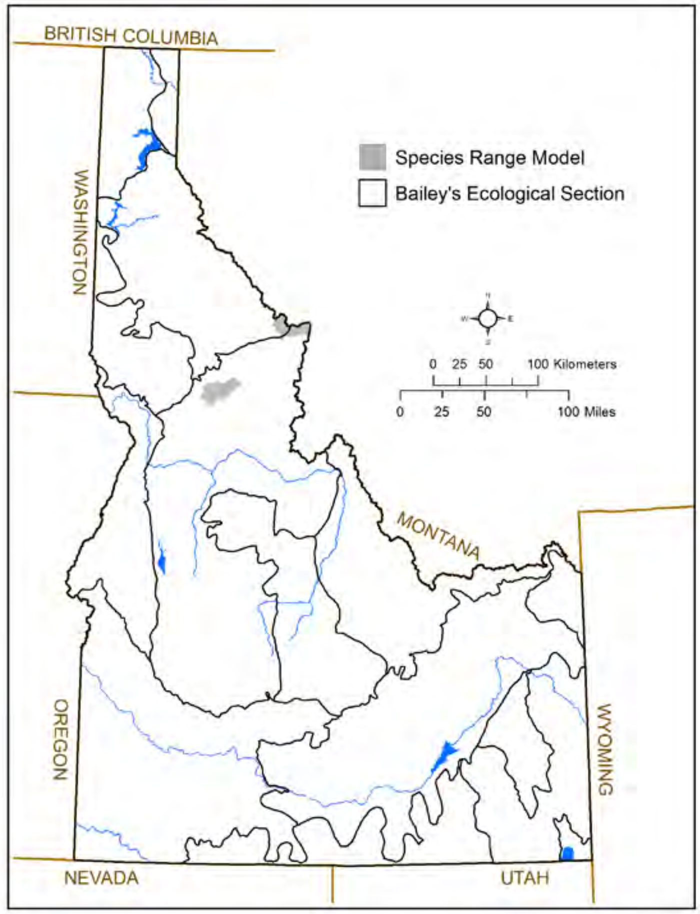
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on taxonomic work to clarify subspecies status, improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Linsley EG, Chemsak JA. 1976. Cerambycidae of North America. Part VI, No.2: Taxonomy and Classification of the subfamily Lepturinae. Berkeley (CA): University of California Press.
Map Sources: Hampton N. 2005. Insects of the Idaho National Laboratory: A compilation and review. In: Shaw NL, Pellant M, Monsen SB, comps. Sage-grouse habitat restoration symposium proceedings, USDA Forest Service, RMRS-P38.

A Click Beetle

Beckerus barri



Class: Insecta
Order: Coleoptera
Family: Elateridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, data deficient, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,000 km^2 (~400 mi^2)
Key Ecological Sections: Bitterroot Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This click beetle is an Idaho endemic, known from only 2 localities in Idaho County (O'Hara Campground and the Lolo Pass Visitor Center).

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Little is known about this species biology, however it appears to be a habitat specialist and has only been found in montane bogs.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented. However, as of 1995, the species was assumed to be declining due to habitat loss and degradation.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: As of 1995, the known populations were at risk of habitat loss and/or degradation. At that time, the bog at O'Hara Campground was entirely enclosed by the campground road

and at risk due to road improvements. At Lolo Pass, one bog (the type locality) had lost at least half of its original size due to roadbuilding and construction of the visitor center, and the remaining habitat was degraded by hydrologic and vegetation changes. The other bog had also been degraded by roadbuilding, but was in better condition than the type locality. No current information is available on the status of these populations.

CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: LaBonte JR. 1995. Possible Threatened or Endangered Terrestrial Predaceous Coleoptera of the Columbia River Basin. A report prepared for the BLM/USFS Eastside Ecosystem Management Project.
Map Sources: Winton R, Idaho Department of Fish and Game, pers. comm.

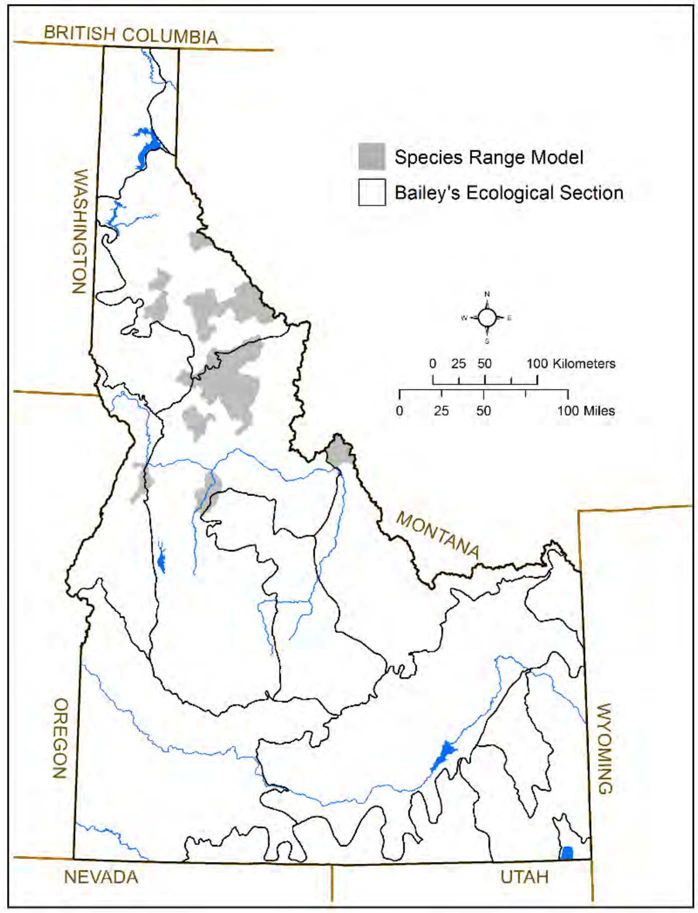
A Riffle Beetle

Bryelmis idahoensis

Class: Insecta
Order: Coleoptera
Family: Elmidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S3

SGCN TIER: 2
Rationale: Idaho endemic, data deficient, restricted range



DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 9,000 km^2 (~3,500 mi^2)
Key Ecological Sections: Bitterroot Mountains, Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This riffle beetle is a newly described species (2011) that ranges from the St. Joe River in Shoshone County, southeast to the Salmon River in Lemhi County. It is currently considered to be endemic to Idaho, but may be endemic to the Northern Rockies Refugium and also occur in western Montana. When found, specimens were often in large numbers.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Specimens have been collected in low-order, coniferous closed-canopy streams with clear, cool to cold water and most sites were cold, high-gradient 1st-order rivulets completely concealed by plant cover. It is almost exclusively collected in association with aquatic bryophytes (particularly liverworts) attached to rocks. It has been suggested as one of the more sensitive species dependent on water quality.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats for this species have not been identified, however the primary threat is likely the loss or degradation of clear, cold stream habitats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

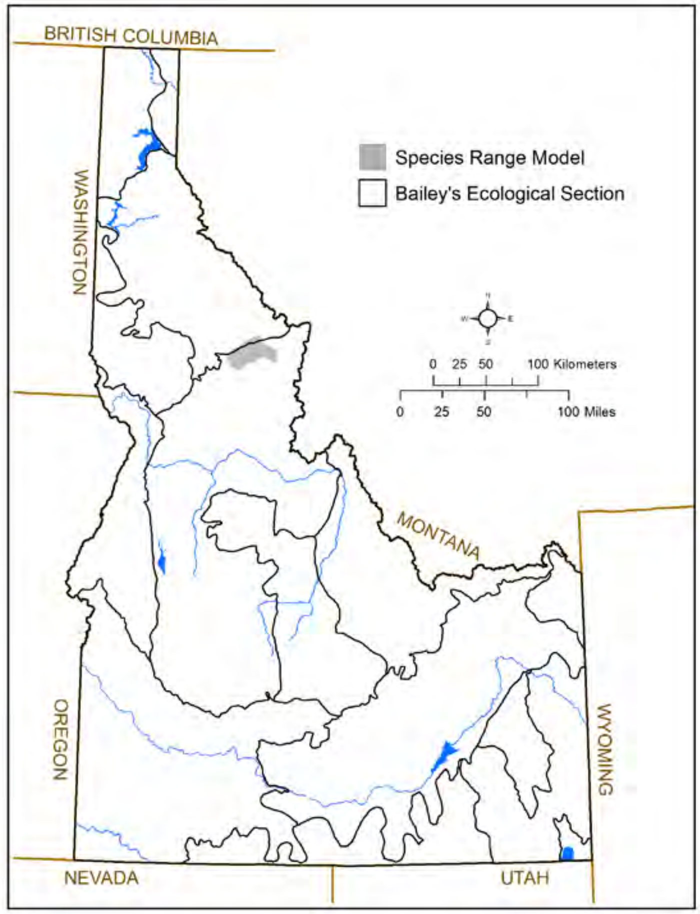
ADDITIONAL COMMENTS

None.

Information Sources: Barr CB. 2011. *Breyelmis* Barr (Coleoptera: Elmidae: Elminae), a new genus of riffle beetle with three new species fromo the Pacific Northwest, USA. The Coleopterists Bulletin 65:197-212.
Map Sources: Essig Museum Online Database. University of California, Berkeley, accessed December 18, 2014; Barr CB. 2011. Breyelmis Barr (Coleoptera: Elmidae: Elminae), a new genus of riffle beetle with three new species from the Pacific Northwest, USA. The Coleopterists Bulletin 65:197-212.

A Skiff Beetle

Hydroscapha redfordi



Class: Insecta
Order: Coleoptera
Family: Hydroscaphidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S1

SGCN TIER: 1
Rationale: Idaho endemic, data deficient, range restricted, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 900 km^2 (~300 mi^2)
Key Ecological Sections: Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This recently described (2010) skiff beetle is known from two disjunct hot springs (Jerry Johnson Hot Springs and Weir Hot Springs) in Idaho County.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This tiny, uncommon species is limited to hot springs and adjacent aquatic habitats where it lives in hygropetric environments on near vertical rock faces in mats of filamentous green algae. Its population density appears to be correlated with algal density.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Species–specific threats have not been identified. However, any loss or degradation of the hotspring habitats will adversely affect the species. For example, piping of hotspring water

away from its source to create pools for recreational activity removes the cascading effect of the water, which allows for the perpetuation of algal communities. Diminishing ground water sources have also been demonstrated to negatively effect hotsprings and, in some instances, has completely and permanently dried up localities of the sister species (*Hydroscapha natans*) in the Bruneau River Valley.

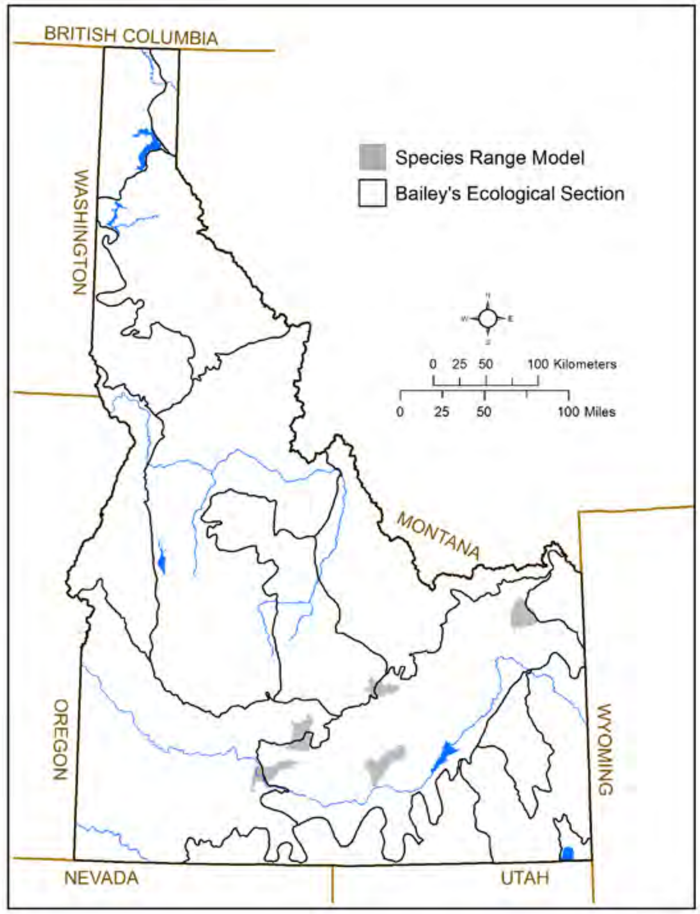
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Maier CA, Ivie MA, Johnson JB, Maddison DR. 2010. A New Northern–Most Record for the Family Hydroscaphidae (Coleoptera: Myxophaga), with Description of a New Nearctic Species. The Coleopterists Bulletin 64:289–302.
Map Sources: Maier CA, Ivie MA, Johnson JB, Maddison DR. 2010. A New Northern–Most Record for the Family Hydroscaphidae (Coleoptera: Myxophaga), with Description of a New Nearctic Species. The Coleopterists Bulletin 64:289–302.

Blind Cave Leiodid Beetle

Glacicavicola bathyscioides



Class: Insecta
Order: Coleoptera
Family: Leiodidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G1G3
S-rank: S1

SGCN TIER: 1
Rationale: Regional endemic, data deficient, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,500 km^2 (~1,000 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: The Blind Cave Leiodid Beetle is known only from Idaho and Wyoming. In Idaho, it occurs in widely spearated lava-tube caves on the eastern Snake River Plain in Fremont, Butte, Power, and Lincoln counties. Occurrences in Idaho are primarily from pre-1975, with 3 new records added in 2007 and 1 in 2013. Most lava-tube caves, however, have not been surveyed for invertebrates.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This beetle is an obligate inhabitant of cave habitats. It is found in caves with year–round cold temperatures and moisture, and many of the caves contain perennial ice formations.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Highly vulnerable
Description: The primary threat to this species is the alteration of cave habitat through climate change (affecting temperature and humidity) and human activities.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

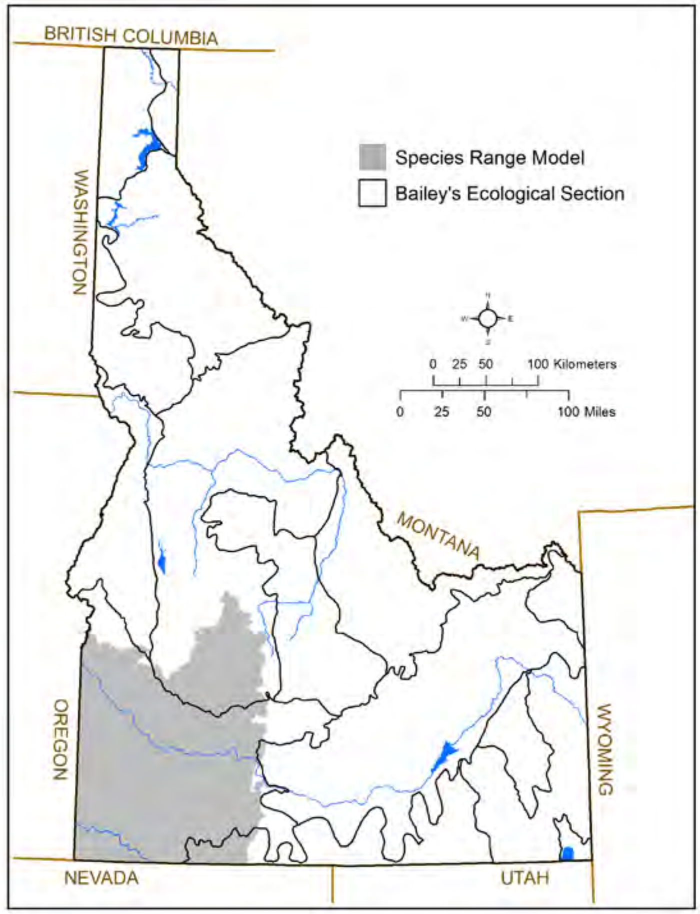
ADDITIONAL COMMENTS

None.

Information Sources: Westcott RL. 1968. A new subfamily of blind beetle from Idaho ice caves with notes on its bionomics and evolution (Coleoptera: Leiodidae). Los Angeles County Museum Contributions in Science 141:1–14.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Lined June Beetle

Polyphylla devestiva



Class: Insecta
Order: Coleoptera
Family: Scarabaeidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S2

SGCN TIER: 2
Rationale: Idaho endemic, data deficient, restricted range, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 37,100 km^2 (~14,300 mi^2)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Lined June Beetle is endemic to southwest Idaho. When originally described in 1966, it was associated with sand systems along the Snake River from Homedale to Bruneau. Due to habitat succession resulting from invasive species encroachment however, it is now only observed at Celebration Park and Bruneau dunes. No formal surveys have been conducted on this species and as a result, its presence at historical sites as well as its population status are unknown.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The Lined June Beetle life cycle is closely tied to healthy early-seral dune habitats with the presence of sand-associated native perennial forbs and grasses. It is rhizophagous, feeding on the roots of a variety of sand-associate plants (primarily grasses) and, like many sand-associate scarabs, is physiologically and behaviorally adapted to sand-dominated habitats and is often unable to survive under surrounding desert conditions.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

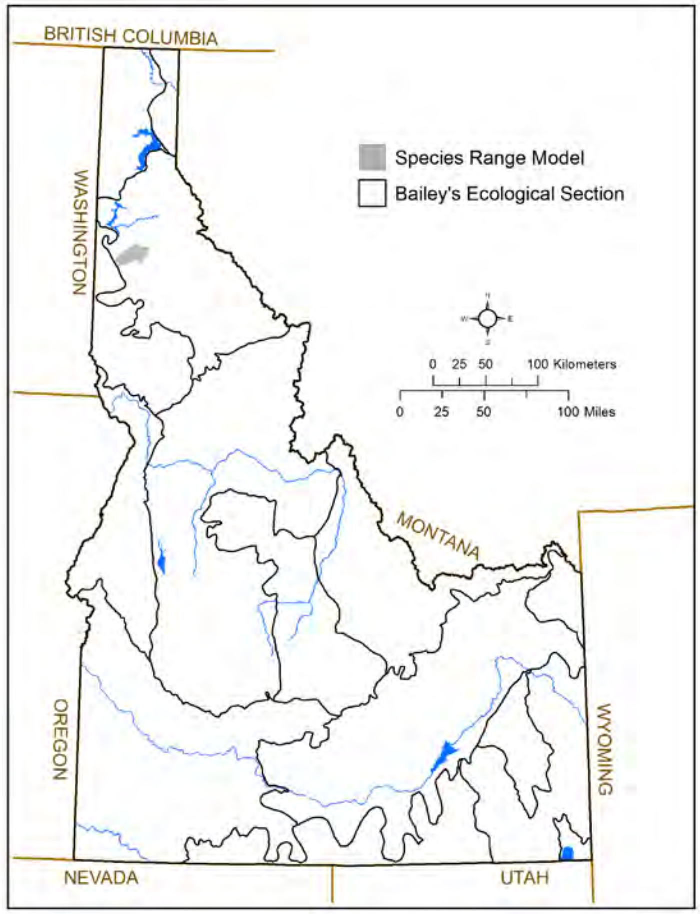
THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threat to this species is the loss of healthy dune habitats due primarily to nonnative vegetation encroachment.

CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Young RM. 1966. A New Species of *Polyphylla* and a Designation of Two Lectotypes (Coleoptera: Scarabaeidae,Melolonthinae). Journal of the Kansas Entomological Society 39:233-236.
Map Sources: Young RM. 1966. A New Species of *Polyphylla* and a Designation of Two Lectotypes (Coleoptera: Scarabaeidae,Melolonthinae). Journal of the Kansas Entomological Society 39:233-236.

A Mayfly
Ameletus tolae



Class: Insecta
Order: Ephemeroptera
Family: Ameletidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 400 km^2 (~200 mi^2)
Key Ecological Sections: Bitterroot Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: This mayfly is only known to occur in northeastern Oregon and Idaho. In Idaho, it was collected once in 1966 in Benewah County. Whether it is extant in the state is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Specific habitat requirements of this species have not been documented. In general, mayflies in this genus inhabit running waters in mountainous areas, from headwater springs to large rivers.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable

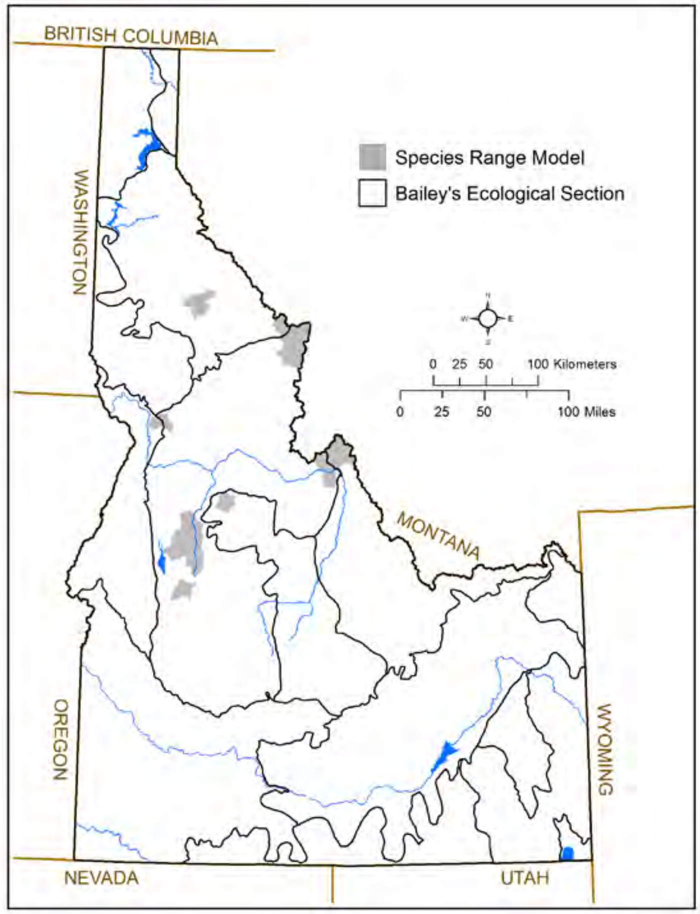
Description: Specific threats to this species have not been identified. In general, mayfly populations are affected by changes in aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS
Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS
None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Zloty J. 1996. A revision of the Nearctic *Ameletus* mayflies based on adult males, with descriptions of seven new species (Ephemeroptera: Ameletidae). The Canadian Entomologist 128:293–346.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Lolo Mayfly
Caurinella idahoensis



Class: Insecta
Order: Ephemeroptera
Family: Ephemerellidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S2

SGCN TIER: 2
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 7,900 km^2 (~3,100 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Lolo Mayfly is believed to be endemic to the Northern Rocky Mountain Refugium in Idaho and Montana. In Idaho, it has been documented in less than 20 scattered locations across Clearwater, Idaho, Valley, and Lemhi counties between 1978 and 2005. When found, it is typically in low numbers.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species occurs only in small, fast-flowing, high elevation streams with cobble and gravel substrates and is considered a cold water stenotherm. Larvae have typically been found clinging to rocks at the bases of blue–green algae colonies. The adult flight period is thought to be mid-July to early August.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threat to this species is thought to be the loss or degradation of source headwater habitats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

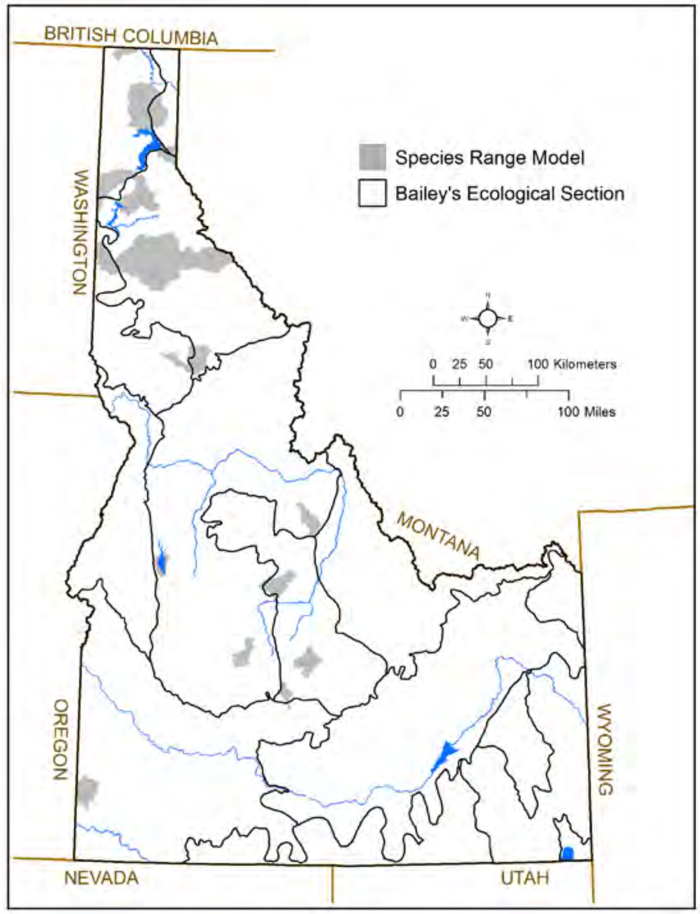
ADDITIONAL COMMENTS

None.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Stagliano DM, Stephens GM, Bosworth WR. 2007. Aquatic invertebrate species of concern on USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program and Boise (ID): Idaho Conservation Data Center.
Map Sources: Idaho Department of Environmental Quality. BUGS database. [Accessed February 13, 2015].; Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

A Mayfly

Ephemerella alleni



Class: Insecta
Order: Ephemeroptera
Family: Ephemerellidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4
S-rank: S2

SGCN TIER: 2
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 19,300 km^2 (~7,500 mi^2)
Key Ecological Sections: Bitterroot Mountains, Challis Volcanics, Flathead Valley, Okanogan Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: This mayfly occurs in the mountainous areas of Idaho, Montana, Oregon, Washington, and Wyoming. In Idaho, occurrences are primarily in the Panhandle, with a few scattered locations in southern Idaho, and mainly from the mid–1990s. The species likely occurs in more areas of central Idaho, but survey data are lacking.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This species is found in small, headwater streams with cobble and gravel substrates.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable

Description: The primary threat to this species is thought to be the loss or degradation of source headwater habitats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

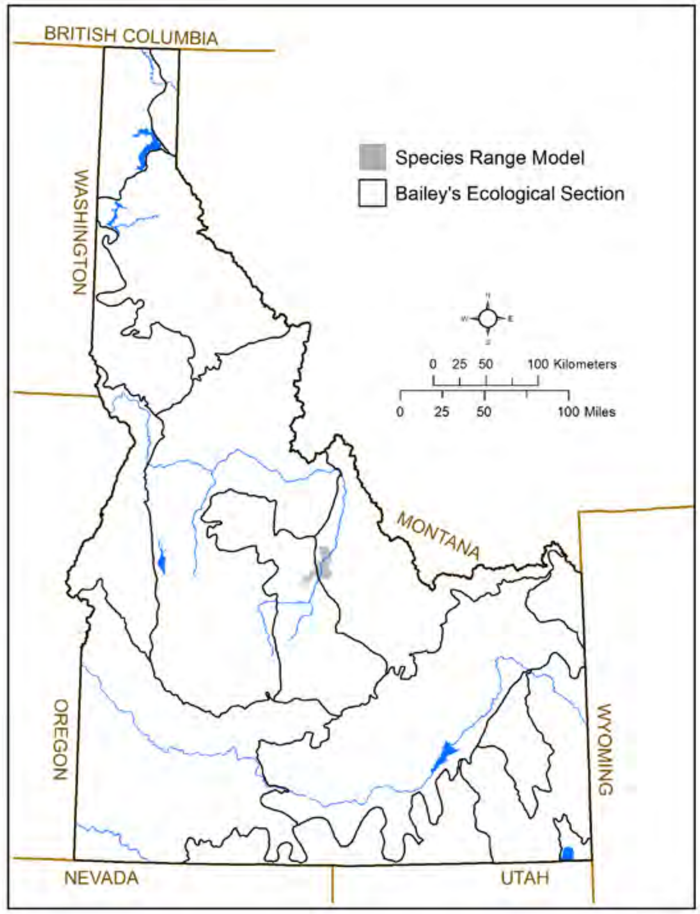
None.

Information Sources: Jacobus LM, Kondratieff BC, Meyer MD, McCafferty WP. 2003. Contribution to the biology and systematics of *Ephemerella alleni* (Ephemeroptera: Ephemerellidae). Pan-Pacific Entomologist 79:207-211.

Map Sources: Idaho Department of Environmental Quality. BUGS database. [Accessed February 13, 2015].; Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Jacobis LM, Kondratieff BC, Meyer MD, McCafferty WP. 2003. Contribution to the biology and systematics of *Ephemerella alleni* (Ephemeroptera: Ephemerellidae). Pan-Pacific Entomologist 79:207-211.

A Mayfly

Cinygma dimicki



Class: Insecta
Order: Ephemeroptera
Family: Heptageniidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 500 km^2 (~200 mi^2)
Key Ecological Sections: Beaverhead Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: This species of mayfly is known to occur in Idaho, Montana, Oregon, and Washington. However, the only Idaho collection was in 1963 in Custer County and whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Little is known of the species habitat. In general, mayflies in this genus are found in lotic-erosional habitats on wood substrate.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Species-specific threats have not be identified. In general, mayfly populations are affected by changes to aquatic habitat including alteration of flow patterns, streambed substrates, thermal characteristics, and water quality.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

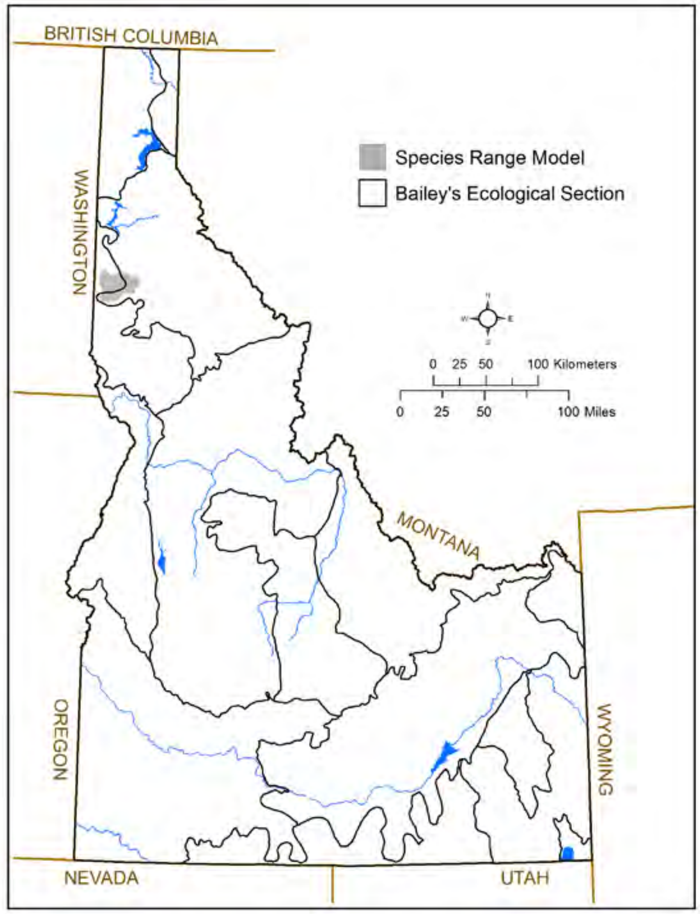
ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

A Mayfly

Paraleptophlebia falcula



Class: Insecta
Order: Ephemeroptera
Family: Leptophlebiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: SNR

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 800 km^2 (~300 mi^2)
Key Ecological Sections: Bitterroot Mountains, Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: This species is known from limited occurrences in Idaho, Oregon, and Washington. In Idaho, two museum records provide locality of Laird Park (assumed to be in Latah County), but no other location documentation. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Habitat requirements for this species have not been documented. Other species in this genus seem to prefer riffles and slower moving waters or pools.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Species-specific threats have not be identified. In general, mayfly populations are affected by changes to aquatic habitat including alteration of flow patterns, streambed substrates, thermal characteristics, and water quality.

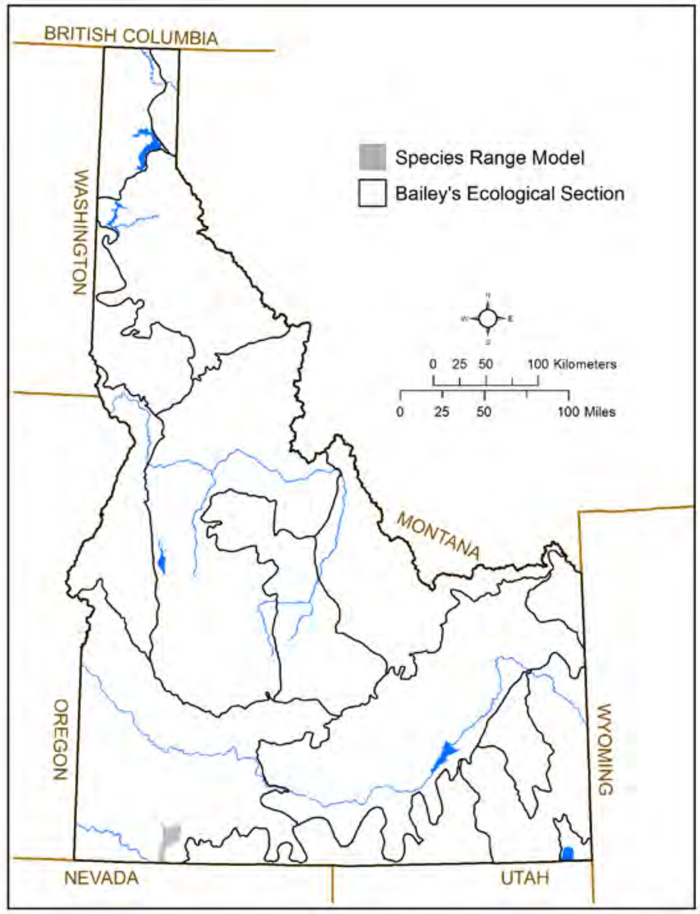
CONSERVATION ACTIONS
Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS
None.

Information Sources: Harper F, Harper PP. 1986. An annotated key to the adult males of the northwestern Nearctic species of *Paraleptophlebia* Lestage (Ephemeroptera: Leptophlebiidae) with the description of a new species. Canadian Journal of Zoology 64:1460–1468.
Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

A Mayfly

Paraleptophlebia jenseni



Class: Insecta
Order: Ephemeroptera
Family: Leptophlebiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2G4
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 400 km² (~200 mi²)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Not applicable for invertebrates.
Description: This species is known to occur in Idaho and Washington. In Idaho, it has only been collected in Owyhee County in 1965. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Habitat requirements for this species have not been documented. Other species in this genus seem to prefer riffles and slower moving waters or pools.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: Species-specific threats have not be identified. In general, mayfly populations are affected by changes to aquatic habitat including alteration of flow patterns, streambed substrates, thermal characteristics, and water quality.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

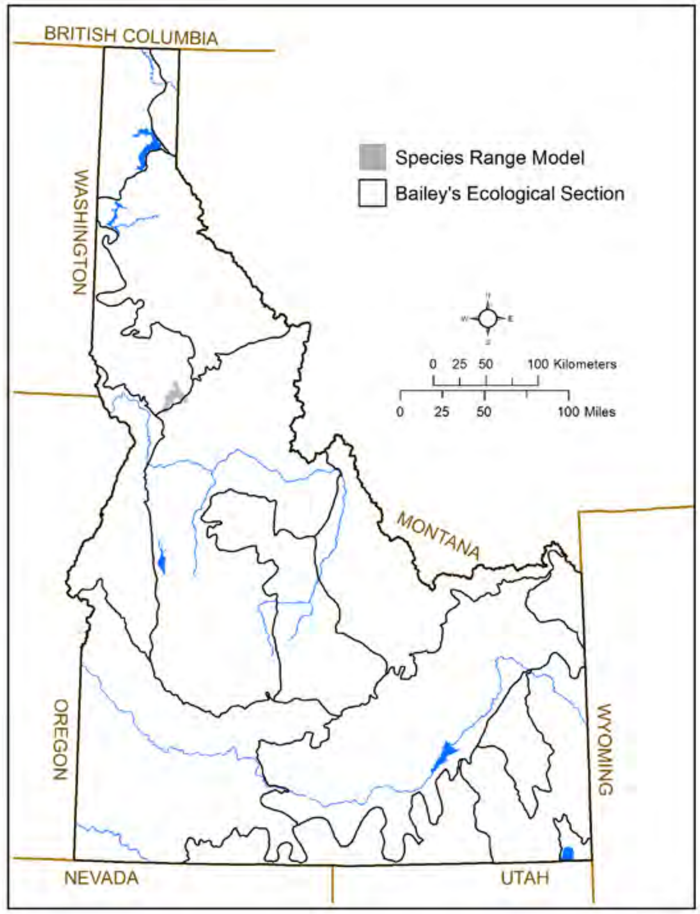
ADDITIONAL COMMENTS

None.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.

Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

A Mayfly
Paraleptophlebia traverae



Class: Insecta
Order: Ephemeroptera
Family: Leptophlebiidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GH
S-rank: S1

SGCN TIER: 3
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 300 km^2 (~100 mi^2)
Key Ecological Sections: Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: This endemic species is known from only one specimen collected near Grangeville, ID in 1907. No recent collections of this species have been documented and whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Habitat requirements for this species have not been documented. Other species in this genus seem to prefer riffles and slower moving waters or pools.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

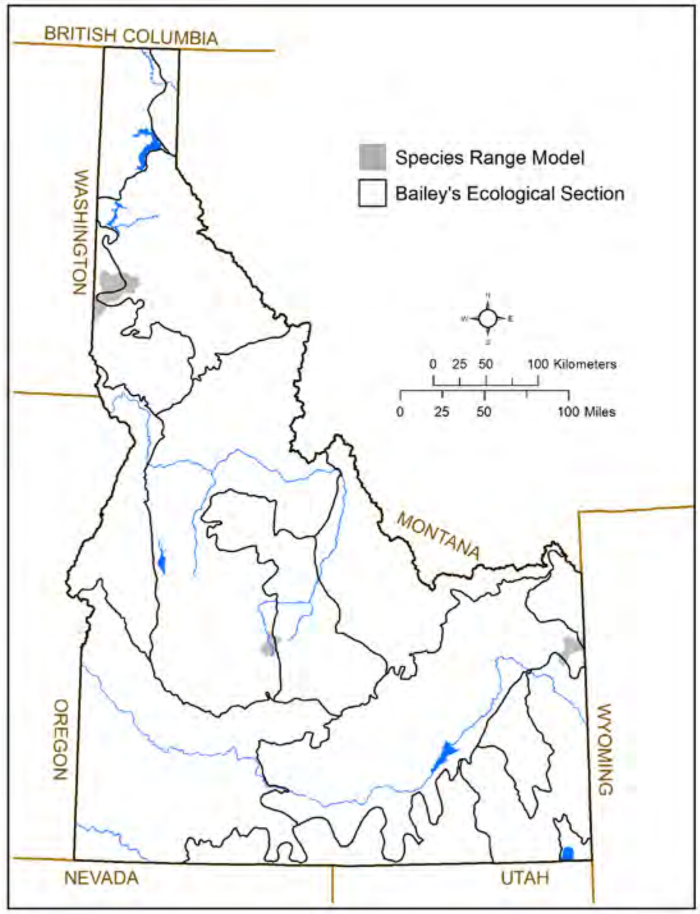
Description: Species-specific threats have not be identified. In general, mayfly populations are affected by changes to aquatic habitat including alteration of flow patterns, streambed substrates, thermal characteristics, and water quality.

CONSERVATION ACTIONS
Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS
None.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

A Mayfly
Parameletus columbiae



Class: Insecta
Order: Ephemeroptera
Family: Siphlonuridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,700 km^2 (~700 mi^2)
Key Ecological Sections: Bitterroot Mountains, Challis Volcanics, Idaho Batholith, Palouse Prairie, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This mayfly is known from Idaho, Montana, Utah, Wyoming and BC, but no longer occurs at several well documented sites in Utah and has not been collected in Idaho since 1965. The Idaho locations include 4 sites in Latah, Blaine, and Teton counties. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: This species is found in shallow, cold water ponds, or at the edges of moderately flowing rivers and streams. Eggs are laid in mid-June, remain dorman during the summer and winter, and hatch within 1 day after the snow melts (typically May).

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Unknown
Description: Species-specific threats have not be identified. In general, mayfly populations are affected by changes to aquatic habitat including alteration of flow patterns, streambed substrates, thermal characteristics, and water quality.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

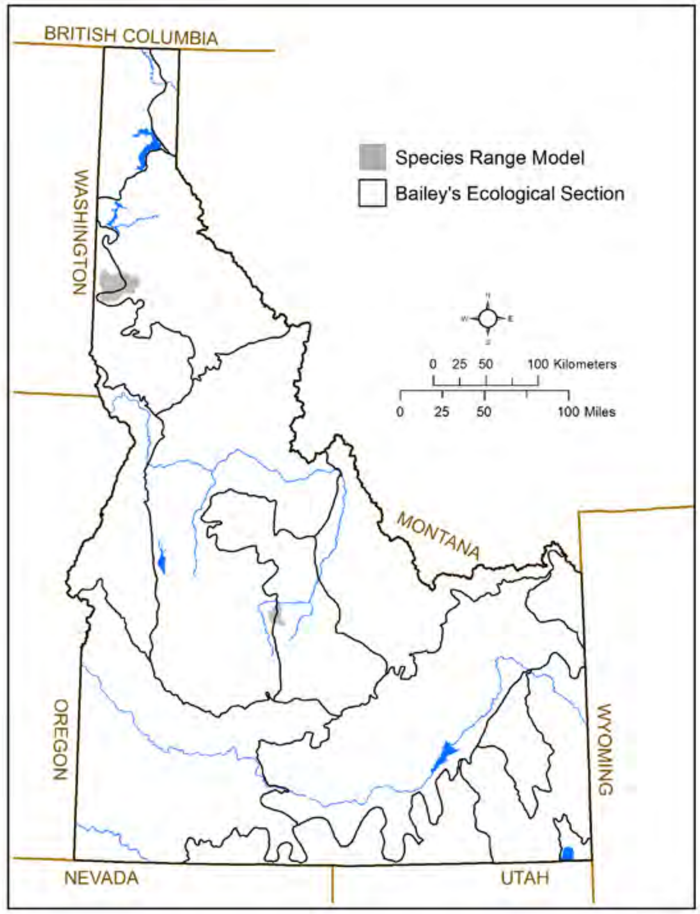
ADDITIONAL COMMENTS

None.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

A Miner Bee

Andrena aculeata



Class: Insecta
Order: Hymenoptera
Family: Andrenidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S3

SGCN TIER: 3
Rationale: Regional endemic, data deficient, important pollinator

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,000 km^2 (~400 mi^2)
Key Ecological Sections: Bitterroot Mountains, Challis Volcanics, Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: This miner bee is endemic to the Columbia Basin. Although not many records of this species exist, it is thought to be fairly widespread in the region.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: All *Andrena* species nest in the ground, typically in sandy soil and often near or under shrubs. This species has been recorded in two habitat types in the region, Engelmann spruce–subalpine fir and agricultural lands. It has a long flight period (May to August) and is found at a wide range of elevations. Flower preferences are unknown, but are assumed to be varied.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable

Description: Species–specific threats have not be identified.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

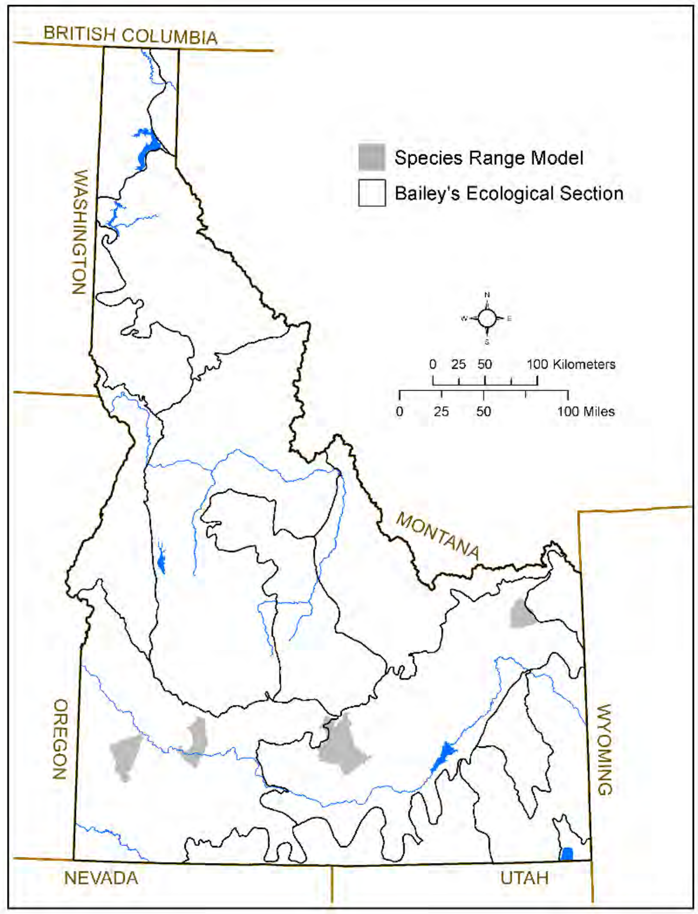
ADDITIONAL COMMENTS

None.

Information Sources: Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council. Washington (DC): National Academies Press.; Shepherd MD, Vaughan DM, Black SH (eds.). Red List of Pollinator Insects of North America, CD–ROM Vers 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.

Map Sources: Shepherd MD. 2005. Species Profile: Andrena aculeata. In Shepherd MD, Vaughan DM, Black SH (Eds). Red List of Pollinator Insects of North America. CD-ROM Version 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.

A Miner Bee
Calliopsis barri



Class: Insecta
Order: Hymenoptera
Family: Andrenidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S1

SGCN TIER: 2
Rationale: Regional endemic, data deficient, important pollinator, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 3,600 km^2 (~1,400 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This miner bee is a rare regional endemic known only from sand dunes in Rexburg, Idaho and Sisters, Oregon.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species is known to nest in sand dunes and has been recorded on small–flowered legumes, including picabo milkvetch a narrowly endemic plant in the upper Snake River Plain. Its has a short flight season (July). Little else is known of its biology.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

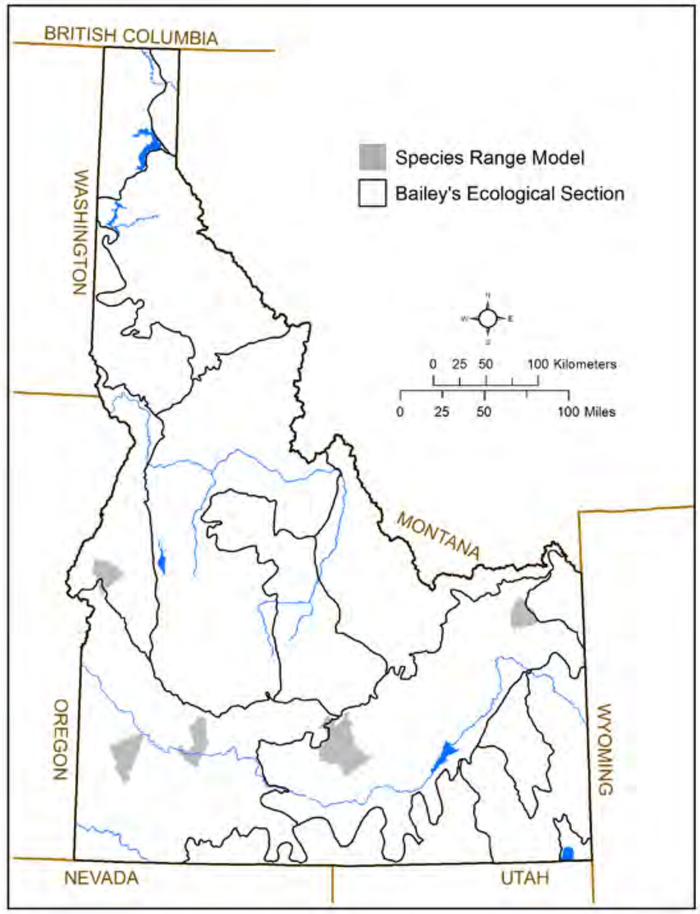
THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Species–specific threats have not be identified.

CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council, Washington (DC): National Academies Press.; Tepedino, VJ and TL Griswold. 1995. The bees of the Columbia Basin. Final report. Portland (OR): USDA Forest Service.; Shepherd MD, Vaughan DM, Black SH (eds.) Red List of Pollinator Insects of North America, CD–ROM Vers 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.
Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

A Miner Bee
Perdita barri



Class: Insecta
Order: Hymenoptera
Family: Andrenidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S1

SGCN TIER: 3
Rationale: Idaho endemic, data deficient, restricted range, important pollinator

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 600 km^2 (~200 mi^2)
Key Ecological Sections: Blue Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: This miner bee is a rare Idaho endemic that has been collected only once, near the town of Midvale. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: The flight period of this species is thought to be June to July and, like all members of the genus, it nests in the ground. Other members of the genus are specialist foragers, thus this species may be dependent on Phacelia flowers. Little else is known of the species biology, ecology, or status.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Species–specific threats have not be identified.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS

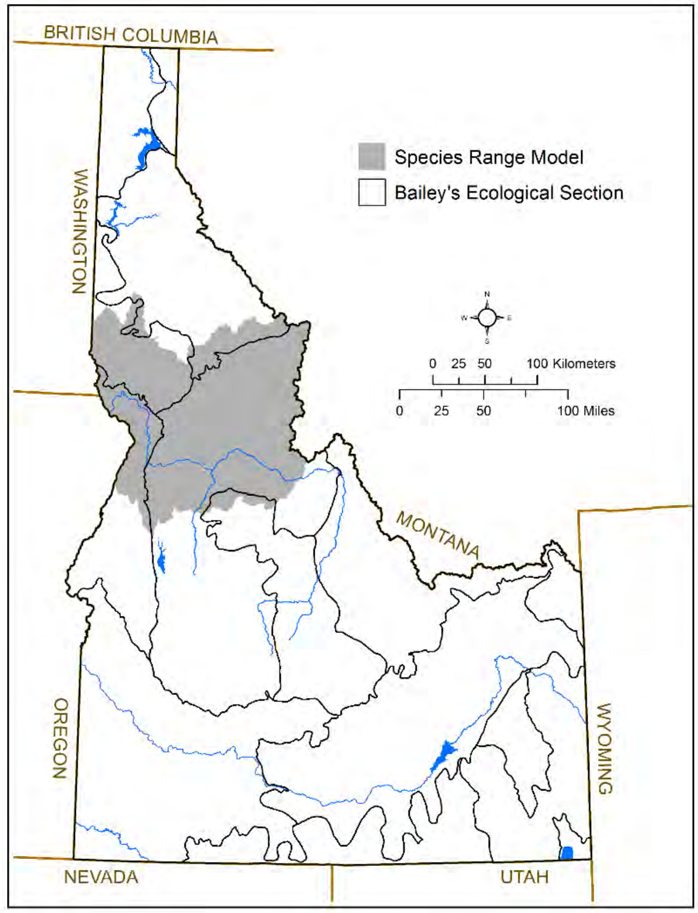
None.

Information Sources: Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council, Washington (DC): National Academies Press.; Tepedino, VJ and TL Griswold. 1995. The bees of the Columbia Basin. Final report. Portland (OR): USDA Forest Service.; Shepherd MD, Vaughan DM, Black SH (eds.) Red List of Pollinator Insects of North America, CD–ROM Vers 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.

Map Sources: Shepherd MD. 2005. Species Profile: Perdita barri. In Shepherd MD, Vaughan DM, Black SH (Eds). Red List of Pollinator Insects of North America. CD-ROM Version 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.

A Miner Bee

Perdita salicis euxantha



Class: Insecta
Order: Hymenoptera
Family: Andrenidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G5TNR
S-rank: S3

SGCN TIER: 3
Rationale: Regional endemic, data deficient, important pollinator

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 31,400 km^2 (~12,100 mi^2)
Key Ecological Sections: Bitterroot Mountains, Blue Mountains, Idaho Batholith, Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: This miner bee is a rare endemic to the Columbia River Basin and has been collected only from Kiger Island, Oregon and 2 sites in Idaho (in Idaho and Nez Perce counties).

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: The flight period of this species is thought to be June to July and, like all members of the genus, it nests in the ground. Other members of the genus are specialist foragers, and this species is assumed to be dependent on willow flowers. Little else is known of the species biology, ecology, or status.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Species–specific threats have not be identified.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS

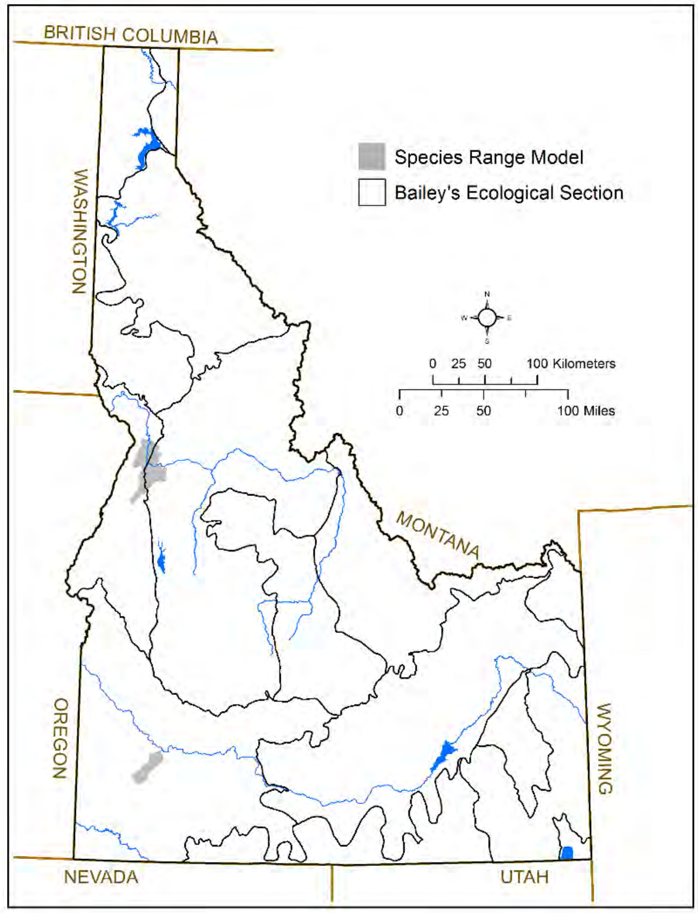
None.

Information Sources: Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council, Washington (DC): National Academies Press.; Tepedino, VJ and TL Griswold. 1995. The bees of the Columbia Basin. Final report. Portland (OR): USDA Forest Service.; Shepherd MD, Vaughan DM, Black SH (eds.) Red List of Pollinator Insects of North America, CD–ROM Vers 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.

Map Sources: Shepherd MD. 2005. Species Profile: Perdita salicis euxantha. In Shepherd MD, Vaughan DM, Black SH (Eds). Red List of Pollinator Insects of North America. CD-ROM Version 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.

A Miner Bee

Perdita wyomingensis sculleni



Class: Insecta
Order: Hymenoptera
Family: Andrenidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient, important pollinator

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,200 km^2 (~800 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This miner bee is endemic to the Columbia River Basin, but is fairly widespread in the region and appears to be relatively common.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: The flight period of this species is thought to be June to July and, like all members of the genus, it nests in the ground. Other members of the genus are specialist foragers, and although it is not known which plant this species forages at, it is thought to be mariposa lily. Little else is known of the species biology, ecology, or status.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Species-specific threats have not be identified.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

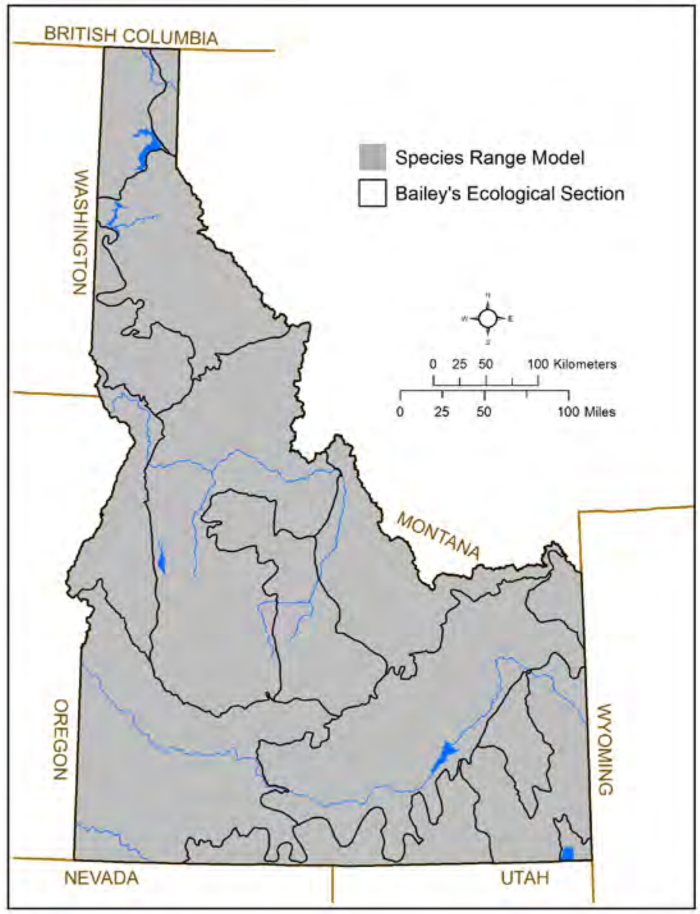
ADDITIONAL COMMENTS

None.

Information Sources: Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council, Washington (DC): National Academies Press.; Tepedino, VJ and TL Griswold. 1995. The bees of the Columbia Basin. Final report. Portland (OR): USDA Forest Service.; Shepherd MD, Vaughan DM, Black SH (eds.) Red List of Pollinator Insects of North America, CD–ROM Vers 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.

Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.; Shepherd MD. 2005. Species Profile: Perdita wyomingensis sculleni. In Shepherd MD, Vaughan DM, Black SH (Eds). Red List of Pollinator Insects of North America. CD-ROM Version 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.

Yellow Bumble Bee
Bombus fervidus



Class: Insecta
Order: Hymenoptera
Family: Apidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4?
S-rank: S5

SGCN TIER: 3
Rationale: Rangewide declines, IUCN Vulnerable, primary pollinator of an ESA-listed plant (*Silene spaldingii*)

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 223,200 km^2 (~86,200 mi^2)
Key Ecological Sections: Blue Mountains, Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: The Yellow Bumble Bee is widespread across the US and southern Canada, but is experiencing declines in several parts of its range. Although information is generally lacking in Idaho, this species has been detected in low numbers in Palouse Prairie surveys in 2002 and 2003 (Hatten et al. 2013) and in moderate numbers in two southern Idaho sagebrush steppe communities in Bear Lake and Blaine counties from 2006-2009 (Cook et al. 2011).

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: Like most bumble bees, the Yellow Bumble Bee is found in a variety of grasslands and shrublands where an abundance of diverse, native flowers occur. They are generalist foragers, feeding on a large variety of pollen and nectar resources. The Yellow Bumble Bee is known as a pollinator of many flowering plants, including being the only significant pollinator for Silene spaldingii, a rare plant currently listed as Threatened under the ESA. At Zumwalt Prairie in northeast Oregon, 90% of pollinators to *S. spaldingii* were Yellow Bumble Bee and 10% were the Mountain Bumble Bee (Bombus appositus) (Tubbesing et al. 2014). In contrast to honey bees, bumble bees are annual with only the queens living through the winter. The queens emerge from hibernation in the spring, start foraging, and begin a new nest, typically underground. New queens produced from the colony mate then leave the nest for an overwintering site. The remainder of the colony, including the original queen, die off at the end of the year.

POPULATION TREND
Short-term Trend: Decline 10–30%
Long-term Trend: Unknown
Description: Population trends in Idaho have not been documented. However, long–term rangewide declines are evident and, since 2000, more significant declines in portions of the range have been documented.

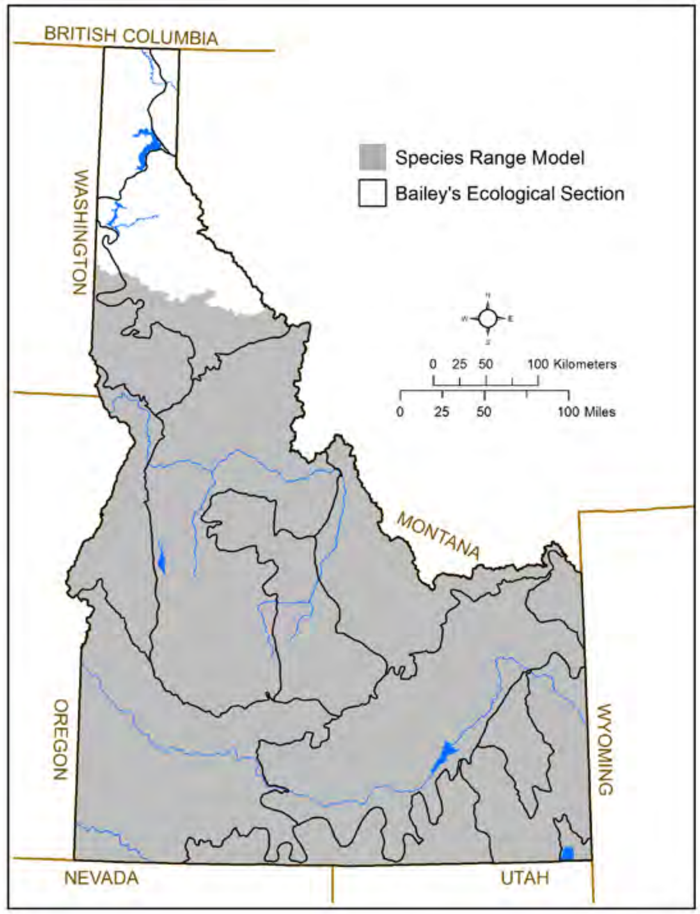
THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Not intrinsically vulnerable
Description: Species–specific threats in Idaho have not be identified. However, primary threats are thought to include habitat loss and fragmentation, pesticide use, nonnative pathogens, competition with honey bees, and climate change.

CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Hatfield R, Colla S, Jepsen S, Richardson L, Thorp R, Jordan SF. 2015. IUCN Assessments for North American Bombus spp. Technical Report for the North American IUCN Bumble Bee Specialist Group. Portland (OR): The Xerces Society for Invertebrate Conservation.; Koch J, Strange J, Williams P. 2012. Bumble Bees of the Western United States. Washington (DC): US Forest Service and the Pollinator Partnership, USDA.; Hatten TD, Looney C, Strange JP, Bosque–Perez NA. 2013. Bumble bee fauna of Palouse Prairie: Survey of native bee pollinators in a fragmented ecosystem. Journal of Insect Science 13:1-26; Cook SP, Birch SM, Merickel FW, Lowe CC, Page–Dumroese D. 2011. Bumble bee (Hymenoptera: Apidae) community structure on two sagebrush steppe sites in southern Idaho. The Pan-Pacific Entomologist 87:161–171.; Kerr JT, Pindar A, Galpern P, Packer L, Potts SG, Roberts SM, Rasmont P, Schweiger O, Colla SR, Richardson LL, Wagner DL, Gall LF, Sikes DS, Pantoja A. 2015. Climate change impacts on bumblebees converge across continents. Science 349:177–180.; Hatfield R, Jepsen S, Mader E, Black SH, Shepherd M. 2012. Conserving Bumble Bees: Guidelines for creating and managing habitat for America's declining pollinators. Portland (OR): The Xerces Society for Invertebrate Conservation.
Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.; Hampton N. 2005. Insects of the Idaho National Laboratory: A compilation and review. In: Shaw NL, Pellant M, Monsen SB, comps. Sage-grouse habitat restoration symposium proceedings, USDA Forest Service, RMRS-P38; Koch J, Strange J, Williams P. 2012. Bumble Bees of the Western United States. Washington (DC): US Forest Service and the Pollinator Partnership, USDA; Hatten TD, Looney C, Strange JP, Bosque–Perez NA. 2013. Bumble bee fauna of Palouse Prairie: Survey of native bee pollinators in a fragmented ecosystem. Journal of Insect Science 13:1-26; Bohart GE, Knowlton GF. 1973. The bees of Curlew Valley (Utah and Idaho). All PIRU Publications, Paper 790. http://digitalcommons.usu.edu/piru_pubs/

Hunt's Bumble Bee
Bombus huntii



Class: Insecta
Order: Hymenoptera
Family: Apidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G5
S-rank: S5

SGCN TIER: 3
Rationale: Data deficient, important pollinator

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 204,000 km^2 (~78,800 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Northwestern Basin and Range, Overthrust Mountains, Owyhee Uplands, Palouse Prairie, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: Hunt's Bumble Bee is widespread across the western US and Canada. Althougth Idaho–specific information are generally lacking, it has been detected in low numbers on Palouse Prairie remnants in 2003 (Hatten et al. 2013), and on Red Mountain in Bear Lake County in 2006-2009 (Cook et al. 2011). It was not detected in the Cook et al. (2011) targeted survey in Blaine County in 2006-2009.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: Like most bumble bees, Hunt's Bumble Bee is found in a variety of grasslands and shrublands where an abundance of diverse, native flowers occur. They are generalist foragers, feeding on a large variety of pollen and nectar resources. In contrast to honey bees, bumble bees are annual with only the queens living through the winter. The queens emerge from hibernation in the spring, start foraging, and begin a new nest, typically underground. New queens produced from the colony mate then leave the nest for an overwintering site. The remainder of the colony, including the original queen, die off at the end of the year.

POPULATION TREND

Short-term Trend: Decline 10–30%
Long-term Trend: Unknown
Description: Population trends in Idaho have not been documented. However, long–term rangewide declines appear to be stable to slightly decreasing.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Species–specific threats in Idaho have not be identified. However, primary threats are thought to include commercial collection of queens from the wild, habitat loss and fragmentation, pesticide use, nonnative pathogens, competition with honey bees, and climate change. A recent long–term study of 67 bumblebees in Europe and North America suggests that the southern range limits are shifting northward, in some cases up to 300km (186 mi) and more southern species are shifting to higher elevations in response to climate change.

CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

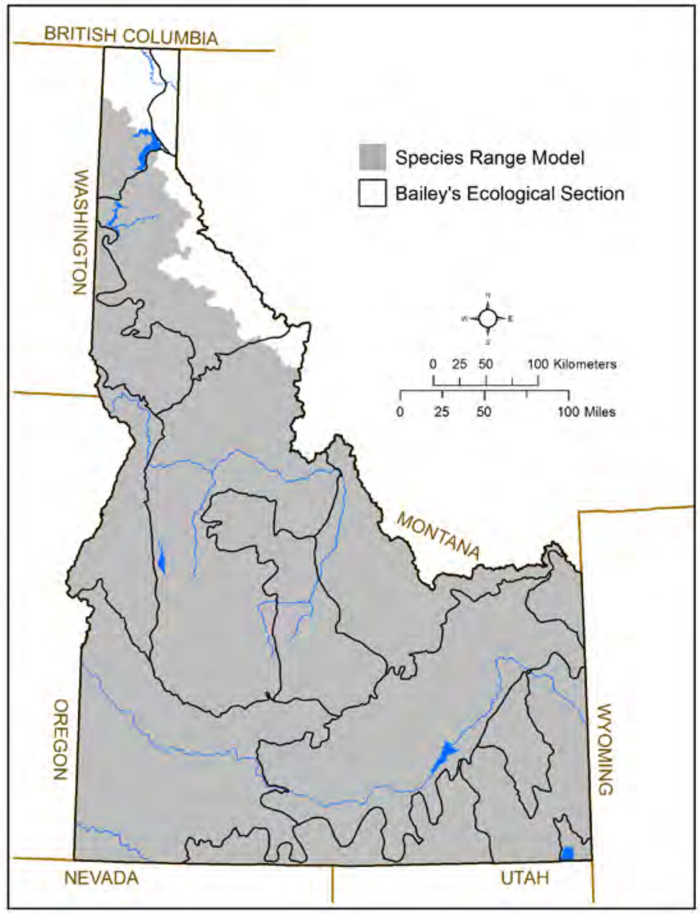
ADDITIONAL COMMENTS
None.

Information Sources: Hatfield R, Colla S, Jepsen S, Richardson L, Thorp R, Jordan SF. 2015. IUCN Assessments for North American *Bombus* spp. Technical Report for the North American IUCN Bumble Bee Specialist Group. Portland (OR): The Xerces Society for Invertebrate Conservation.; Koch J, Strange J, Williams P. 2012. Bumble Bees of the Western United States. Washington (DC): US Forest Service and the Pollinator Partnership, USDA; Hatten TD, Looney C, Strange JP, Bosque–Perez NA. 2013. Bumble bee fauna of Palouse Prairie: Survey of native bee pollinators in a fragmented ecosystem. Journal of Insect Science 13:1-26.; Hatfield R, Jepsen S, Mader E, Black SH, Shepherd M. 2012. Conserving Bumble Bees: Guidelines for creating and managing habitat for America's declining pollinators. Portland (OR): The Xerces Society for Invertebrate Conservation.; Cook SP, Birch SM, Merickel FW, Lowe CC, Page–Dumroese D. 2011. Bumble bee (Hymenoptera: Apidae) community structure on two sagebrush steppe sites in southern Idaho. The Pan-Pacific Entomologist 87:161–171

Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.; Hampton N. 2005. Insects of the Idaho National Laboratory: A compilation and review. In: Shaw NL, Pellant M, Monsen SB, comps. Sage-grouse habitat restoration symposium proceedings, USDA Forest Service, RMRS-P38; Koch J, Strange J, Williams P. 2012. Bumble Bees of the Western United States. Washington (DC): US Forest Service and the Pollinator Partnership, USDA; Hatten TD, Looney C, Strange JP, Bosque–Perez NA. 2013. Bumble bee fauna of Palouse Prairie: Survey of native bee pollinators in a fragmented ecosystem. Journal of Insect Science 13:1-26; Bohart GE, Knowlton GF. 1973. The bees of Curlew Valley (Utah and Idaho). All PIRU Publications, Paper 790. http://digitalcommons.usu.edu/piru_pubs/

Morrison's Bumble Bee

Bombus morrisoni



Class: Insecta
Order: Hymenoptera
Family: Apidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4G5
S-rank: S4

SGCN TIER: 1
Rationale: Significant rangewide declines, data deficient, important pollinator, IUCN Vulnerable

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 205,400 km^2 (~79,300 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Northwestern Basin and Range, Overthrust Mountains, Owyhee Uplands, Palouse Prairie, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: Morrison's Bumble Bee is widespread across the western US and British Columbia. Although it used to be rather common in southern Idaho, it was not detected in 2006-2009 surveys of 2 sagebrush steppe areas in Bear Lake and Blaine counties (Cook et al. 2011) and is now considered uncommon.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: This species is generally associated with arid environments, predominantly open dry shrub and scrub. Like most bumble bees, they are generalist foragers, feeding on a large variety of pollen and nectar resources. It typically nests underground, but will also use structures. In contrast to honey bees, bumble bees are annual with only the queens living through the winter. The queens emerge from hibernation in the spring, start foraging, and begin a new nest, typically underground. New queens produced from the colony mate then leave the nest for an overwintering site. The remainder of the colony, including the original queen, die off at the end of the year.

POPULATION TREND

Short-term Trend: Decline 50–70%
Long-term Trend: Unknown
Description: Population trends in Idaho have not been documented and few surveys have been conducted for the species in the state. Rangewide, this species has declined in relative abundance over the past 10 years. Although most declines appear to have been in the interior of the species range (e.g., western Nevada, Four Corners area) other areas seem to be maintaining numbers (e.g., Utah).

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Species–specific threats in Idaho have not be identified. However, primary threats are thought to include habitat loss and fragmentation, pesticide use, nonnative pathogens, competition with honey bees, and climate change. A recent long–term study of 67 bumblebees in Europe and North America suggests that the southern range limits are shifting northward, in some cases up to 300km (186 mi) and more southern species are shifting to higher elevations in response to climate change.

CONSERVATION ACTIONS

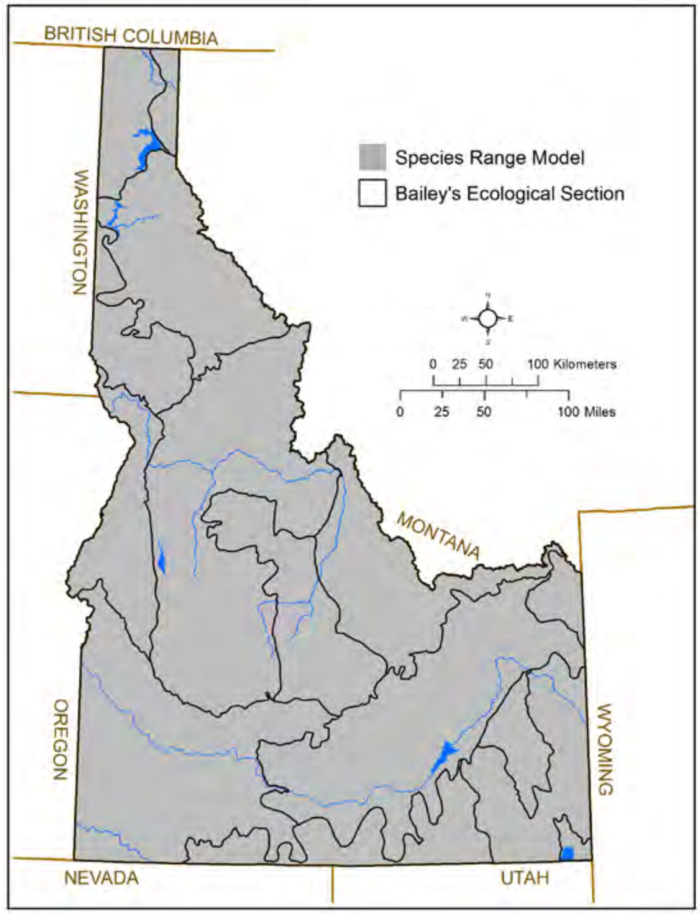
We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Hatfield R, Colla S, Jepsen S, Richardson L, Thorp R, Jordan SF. 2015. IUCN Assessments for North American Bombus spp. Technical Report for the North American IUCN Bumble Bee Specialist Group. Portland (OR): The Xerces Society for Invertebrate Conservation.; Koch J, Strange J, Williams P. 2012. Bumble Bees of the Western United States. Washington (DC): US Forest Service and the Pollinator Partnership, USDA.; Hatfield R, Jepsen S, Mader E, Black SH, Shepherd M. 2012. Conserving Bumble Bees: Guidelines for creating and managing habitat for America's declining pollinators. Portland (OR): The Xerces Society for Invertebrate Conservation.; Cook SP, Birch SM, Merickel FW, Lowe CC, Page–Dumroese D. 2011. Bumble bee (Hymenoptera: Apidae) community structure on two sagebrush steppe sites in southern Idaho. The Pan-Pacific Entomologist 87:161–171
Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.; Koch J, Strange J, Williams P. 2012. Bumble Bees of the Western United States. Washington (DC): US Forest Service and the Pollinator Partnership, USDA.

Western Bumble Bee
Bombus occidentalis



Class: Insecta
Order: Hymenoptera
Family: Apidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4
S-rank: S3

SGCN TIER: 1
Rationale: Significant rangewide declines, data deficient, important pollinator, IUCN Vulnerable

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 216,900 km^2 (~83,700 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Northwestern Basin and Range, Okanogan Highlands, Overthrust Mountains, Palouse Prairie, Yellowstone Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Western Bumble Bee was once widespread across the western US and Canada. It is now, however, rarely recorded in habitats where it was formerly common, particularly on the western edge of its range from southern British Columbia to central California. In Idaho, Western Bumble Bees were historically documented in many areas of the state. Surveys on the Palouse Prairie in north–central Idaho in 2002-2003 however failed to detect the species as did 2006-2009 surveys in Blaine County. Only 7 were collected in 2006-2009 surveys in Bear Lake County and 3 were documented in the Idaho Panhandle in 2014.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: Like most bumble bees, the Western Bumble Bee is found in a variety of grasslands and shrublands where an abundance of diverse, native flowers occur. They are generalist foragers, feeding on a large variety of pollen and nectar resources and are an important pollinator of agricultural plants (e.g., alfalfa, apples, cherries). In contrast to honey bees, bumble bees are annual with only the queens living through the winter. The queens emerge from hibernation in the spring, start foraging, and begin a new nest, typically underground. New

queens produced from the colony mate then leave the nest for an overwintering site. The remainder of the colony, including the original queen, die off at the end of the year.

POPULATION TREND
Short-term Trend: Decline 30–50%
Long-term Trend: Unknown
Description: Prior to 1998, the Western Bumble Bee was common and widespread across its range. Since that time, this species has undergone a drastic decline, particularly in southern British Columbia, Oregon, Washington, and central California. Once common populations in these areas have largely disappeared. Viable populations appear to still persist east of the Cascade Mountains and in the Rocky Mountains. Population trends in Idaho have not been documented.

THREATS
Overall Threat Impact: Very High–High
Intrinsic Vulnerability: Highly vulnerable
Description: Species–specific threats in Idaho have not be identified. However, primary threats are thought to include habitat loss and fragmentation, pesticide use, nonnative pathogens, competition with honey bees, and climate change. A recent long–term study of 67 bumblebees in Europe and North America suggests that the southern range limits are shifting northward, in some cases up to 300 km (186 mi) and more southern species are shifting to higher elevations in response to climate change.

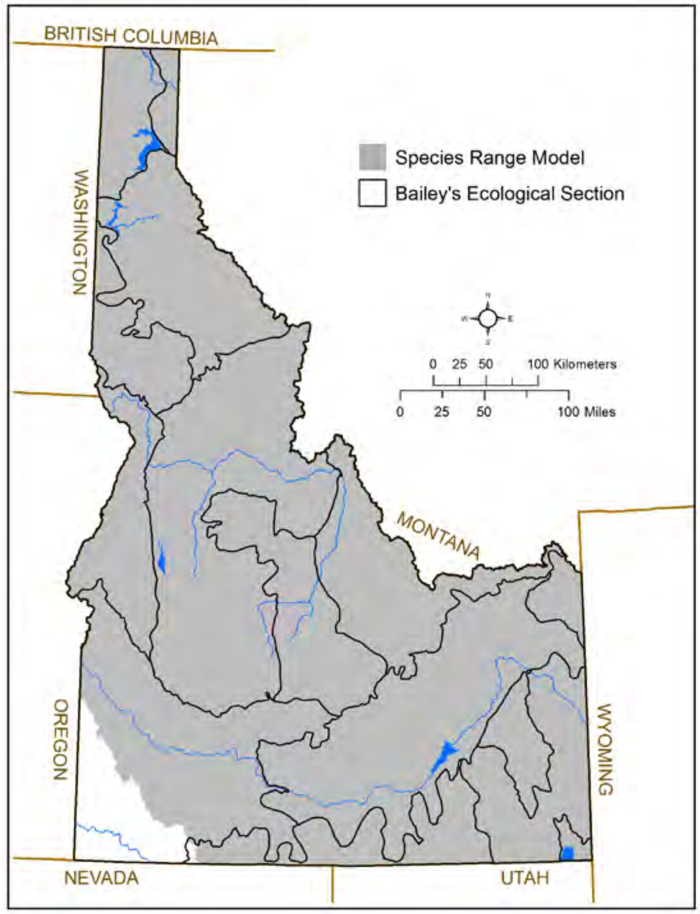
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
Several subspecies of Western Bumble Bee have been suggested and sometimes this species is considered a subspecies of the Yellow–banded Bumble Bee (Bombus terricola) and vice–versa. The species was petitioned for listing under the ESA in September, 2015, and is currently under review by FWS.

Information Sources: Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council, Washington (DC): National Academies Press.; NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe; Hatfield R, Colla S, Jepsen S, Richardson L, Thorp R, Jordan SF. 2015. IUCN Assessments for North American *Bombus* spp. Technical Report for the North American IUCN Bumble Bee Specialist Group. The Xerces Society; Koch J, Strange J, Williams P. 2012. Bumble Bees of the Western United States. Washington (DC): US Forest Service and the Pollinator Partnership, USDA; Cameron SA, Lozier JD, Strange JP, Koch JB, Cordes N, Solter LF, Griswold TL. 2011. Patterns of widespread decline in North American bumble bees. PNAS 108:662–667; Evans, E., R. Thorp, S. Jepsen, S. H. Black. 2008. Status review of three formerly common species of bumble bee in the subgenus Bombus. Portland (OR): The Xerces Society for Invertebrate Conservation.; Hatten TD, Looney C, Strange JP, Bosque–Perez NA. 2013. Bumble bee fauna of Palouse Prairie: Survey of native bee pollinators in a fragmented ecosystem. Journal of Insect Science 13:1-26.; Hatfield R, Jepsen S, Mader E, Black SH, Shepherd M. 2012. Conserving Bumble Bees: Guidelines for creating and managing habitat for America's declining pollinators. Portland (OR): The Xerces Society for Invertebrate Conservation.; Koch JB. 2011. The decline and conservation status of North American bumble bees. Master's Thesis. Logan (UT): Utah State University.
Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.; Koch J, Strange J, Williams P. 2012. Bumble Bees of the Western United States. Washington (DC): US Forest Service and the Pollinator Partnership, USDA; Bohart GE, Knowlton GF. 1973. The bees of Curlew Valley (Utah and Idaho). All PIRU Publications, Paper 790. http://digitalcommons.usu.edu/piru_pubs/

Suckley's Cuckoo Bumble Bee

Bombus suckleyi



Class: Insecta
Order: Hymenoptera
Family: Apidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GU
S-rank: S2

SGCN TIER: 1
Rationale: IUCN Critically Endangered, significant rangewide declines, data deficient, important pollinator

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 210,500 km^2 (~81,300 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Northwestern Basin and Range, Okanogan Highlands, Overthrust Mountains, Palouse Prairie, Yellowstone Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: Suckley's Cuckoo Bumble Bee is, or recently was, widespread in the western US and Canada. Few records document its distribution in Idaho.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species is a cuckoo bee, a term used for a specialized group of bumble bees that have lost the ability to collect pollen and to rear their brood. Thus, these species do not build their own nests, but instead usurp the colonies of other bumble bees. To do this, a mated female enters the nest of another bumble bee, kills or subdues the queen of the colony, and forcibly enslaves (using pheromones and/or physical attacks) the worker bees to feed her and her young. Although Suckley's Cuckoo Bumble Bees have been recorded in the nests of several different bumble bees, the only successful host (i.e., produced adults) is the Western Bumble Bee.

POPULATION TREND
Short-term Trend: Decline 70–80%
Long-term Trend: Unknown

Description: Population trends in Idaho have not been documented. However, in many parts of its range, a gradual decline in relative abundance in the 1940s has become a much steeper, and significant, decline since the 1970s. These declines are presumably linked to declines of its hosts.

THREATS

Overall Threat Impact: Very High–High
Intrinsic Vulnerability: Highly vulnerable
Description: Given its dependence on Western Bumble Bees, the primary threats for this species are likely due to indirect threats (e.g., disease, habitat loss) resulting in the loss of its hosts.

CONSERVATION ACTIONS

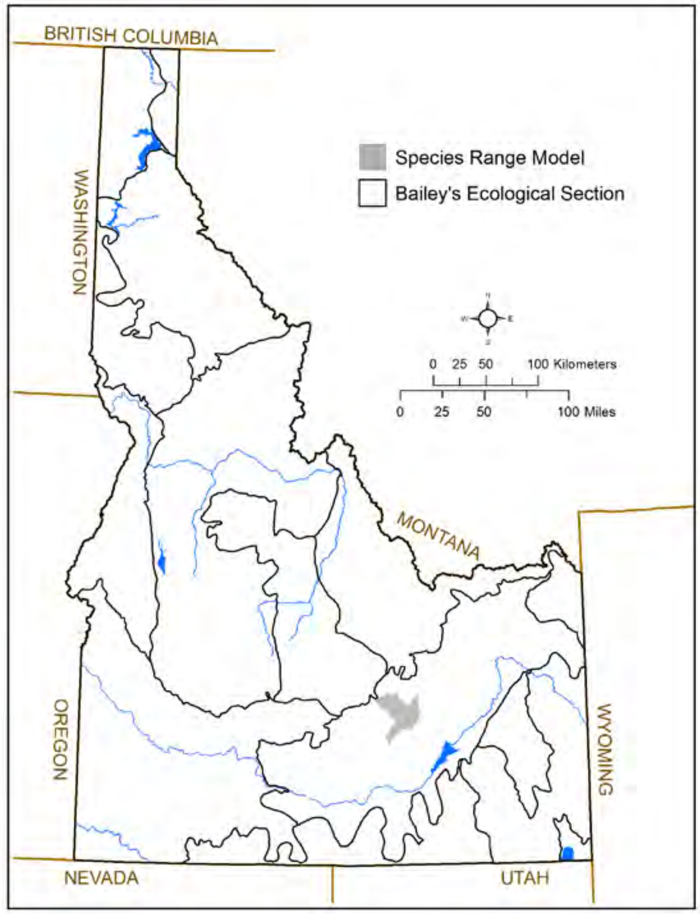
We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Hatfield R, Colla S, Jepsen S, Richardson L, Thorp R, Jordan SF. 2015. IUCN Assessments for North American Bombus spp. Technical Report for the North American IUCN Bumble Bee Specialist Group. Portland (OR): The Xerces Society for Invertebrate Conservation.; Koch J, Strange J, Williams P. 2012. Bumble Bees of the Western United States. Washington (DC): US Forest Service and the Pollinator Partnership, USDA.; Hatfield R, Jepsen S, Mader E, Black SH, Shepherd M. 2012. Conserving Bumble Bees: Guidelines for creating and managing habitat for America's declining pollinators. Portland (OR): The Xerces Society for Invertebrate Conservation.
Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.; Koch J, Strange J, Williams P. 2012. Bumble Bees of the Western United States. Washington (DC): US Forest Service and the Pollinator Partnership, USDA.

A Yellow-masked Bee
Hylaeus lunicraterius



Class: Insecta
Order: Hymenoptera
Family: Colletidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S3

SGCN TIER: 3
Rationale: Idaho endemic, data deficient, important pollinator

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,000 km^2 (~400 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This Yellow-masked Bee is only known from the Craters of the Moon National Monument and Preserve.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: Little is known of this species biology, but it appears to be a generalist forager and may nest in snags or rock crevices.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Species–specific threats have not been identified.

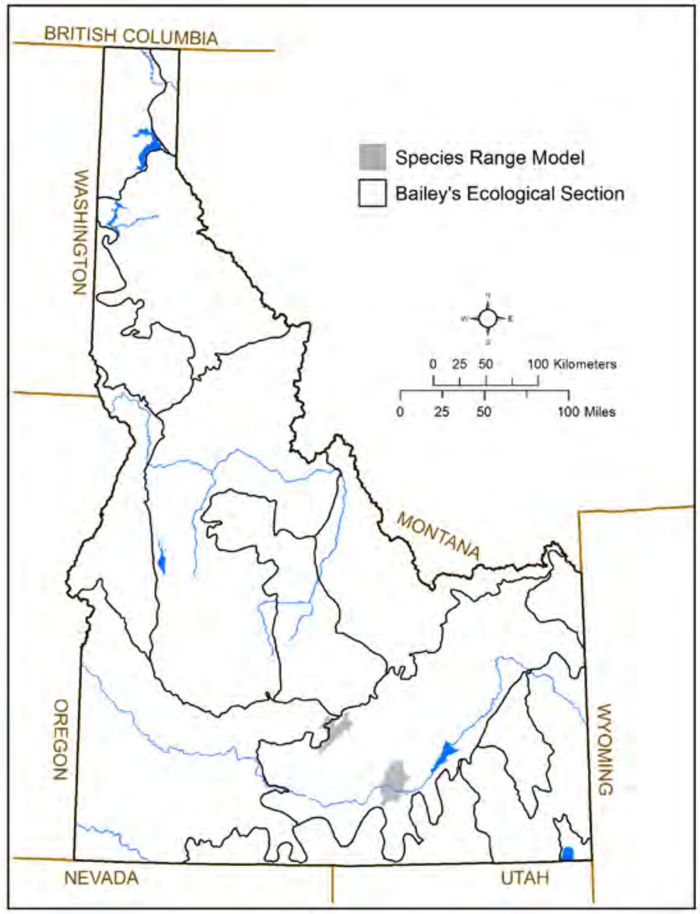
CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council, Washington (DC): National Academies Press.; Shepherd MD, Vaughan DM, Black SH (Eds). 2005. Red List of Pollinator Insects of North America, Portland, OR. The Xerces Society for Invertebrate Conservation.
Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

A Leafcutting Bee
Ashmeadiella sculleni



Class: Insecta
Order: Hymenoptera
Family: Megachilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient, important pollinator

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,300 km^2 (~500 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This leafcutting bee is known from only a few locations in Oregon, Nevada, and Idaho (2 observations in Lincoln and Blaine counties). Given the distance between occurrences, it is possible that this bee is more widely distributed.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Little is known of this species biology but, bees in this genus tend to prefer dry desert environments and this species appears to be a specialist forager on flowers in the genus Penstemon. Nesting is thought to occur in snags and stumps.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Species–specific threats have not been identified.

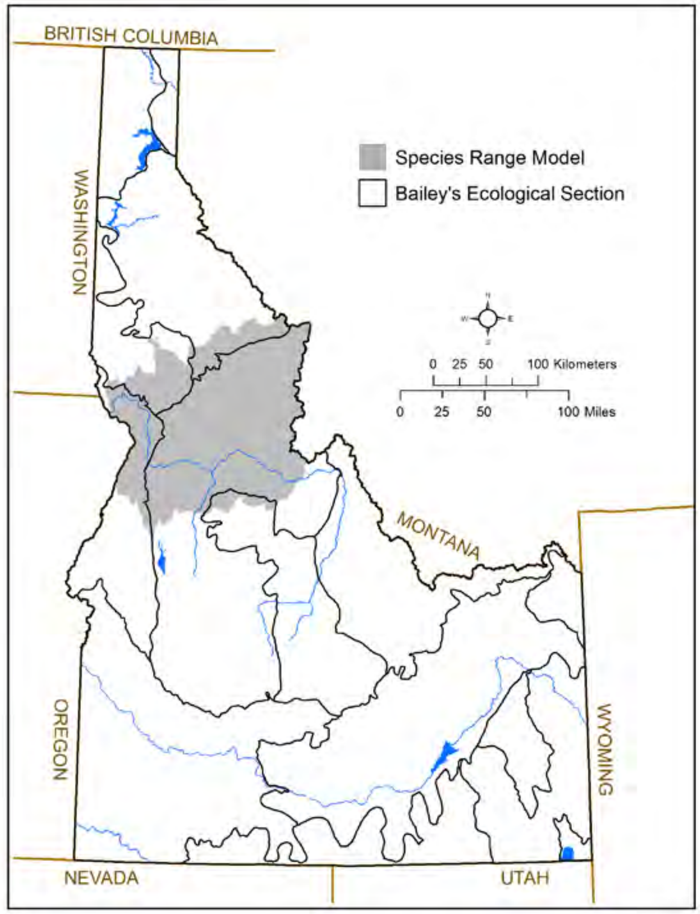
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council, Washington (DC): National Academies Press.; Shepherd MD, Vaughan DM, Black SH (eds.) Red List of Pollinator Insects of North America, CD-ROM Vers 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.
Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.

A Mason Bee

Hoplitis orthognathus



Class: Insecta
Order: Hymenoptera
Family: Megachilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S4

SGCN TIER: 3
Rationale: Regional endemic, data deficient, important pollinator

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 27,700 km^2 (~10,700 mi^2)
Key Ecological Sections: Bitterroot Mountains, Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This Mason bee is endemic to the Columbia River Basin and has been found in only 3 locations (Baker County, Oregon, Asotin County, Washington, and Idaho County, Idaho).

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: This species has been found in ponderosa pine and Idaho fescue grasslands. Although little is known of its nesting and foraging needs, other members of this genus are generalists and it is likely that this species forages on a range of plants. Records indicate its flight period is June–July.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Species–specific threats have not been identified.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

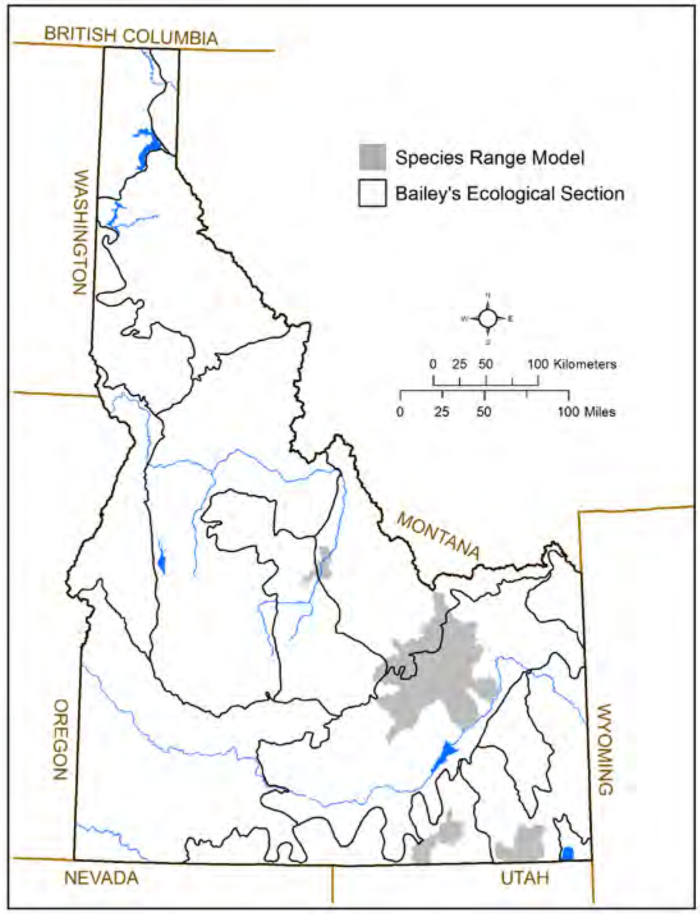
ADDITIONAL COMMENTS

None.

Information Sources: Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council, Washington (DC): National Academies Press.; Shepherd MD, Vaughan DM, Black SH (Eds). 2005. Red List of Pollinator Insects of North America, Portland, OR. The Xerces Society for Invertebrate Conservation.
Map Sources: Shepherd MD. 2005. Species Profile: *Hoplitis orthognathus*. In Shepherd MD, Vaughan DM, Black SH (Eds). Red List of Pollinator Insects of North America. CD-ROM Version 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.

A Mason Bee

Hoplitis producta subgracilis



Class: Insecta
Order: Hymenoptera
Family: Megachilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S4

SGCN TIER: 3
Rationale: Regional endemic, data deficient, important pollinator

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 11,000 km^2 (~4,200 mi^2)
Key Ecological Sections: Beaverhead Mountains, Challis Volcanics, Northwestern Basin and Range, Overthrust Mountains, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This subspecies is a solitary bee endemic to the Columbia Basin. It appears to be fairly widespread in the region but the limits of its distribution are uncertain.

HABITAT & ECOLOGY
Environmental Specificity: Broad: Generalist—all key requirements are common.
Description: This subspecies has been found in a range of habitats including ponderosa pine, Engelmann spruce, Idaho fescue, and agriculture. Although little is known of its nesting and foraging needs, other members of this genus are generalists and it is likely that this subspecies forages on a range of plants. Based on records, it appears the flight season is July to August.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented. Based on the number of sites and range of habitats this species has been documented in, it is probably more secure than many of the other endemic bees in the region.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Species–specific threats have not been identified.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

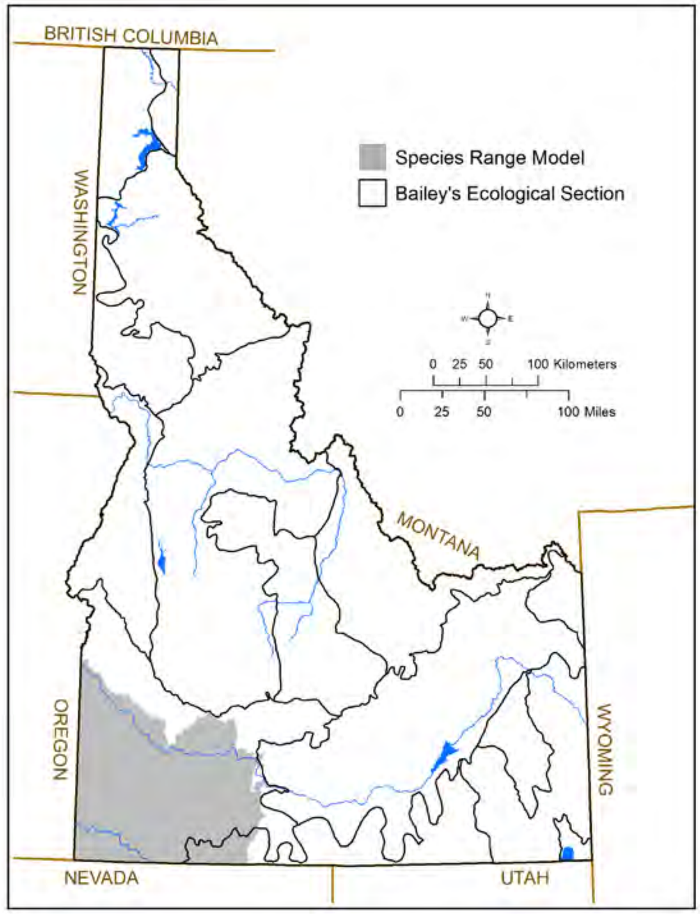
ADDITIONAL COMMENTS

None.

Information Sources: Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council, Washington (DC): National Academies Press.; Shepherd MD, Vaughan DM, Black SH (Eds). 2005. Red List of Pollinator Insects of North America, Portland, OR. The Xerces Society for Invertebrate Conservation.; Michener CD. 1947. A revision of the American species of *Hoplitis* (Hymenoptera, Megachilidae). Bulletin of the American Museum of Natural History 89:257-318.
Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Hampton N. 2005. Insects of the Idaho National Laboratory: A compilation and review. In: Shaw NL, Pellant M, Monsen SB, comps. Sage-grouse habitat restoration symposium proceedings, USDA Forest Service, RMRS-P38.

A Miner Bee

Hesperapis kayella



Class: Insecta
Order: Hymenoptera
Family: Melittidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient, important pollinator, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 24,700 km^2 (~9,500 mi^2)
Key Ecological Sections: Northwestern Basin and Range, Owyhee Uplands
Population Size in Idaho: Not applicable for invertebrates.
Description: This Miner bee is endemic to the Columbia River Basin and is known from only 4 locations (1 in Owyhee County, Idaho, and 3 in Washoe County, Nevada).

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Little is known of this species biology, however it appears to be a foodplant specialist on plants in the genus Tiquilia, is thought to nest in the ground in sandy river–bottom soils, and has a short flight season (June).

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Species–specific threats have not been identified.

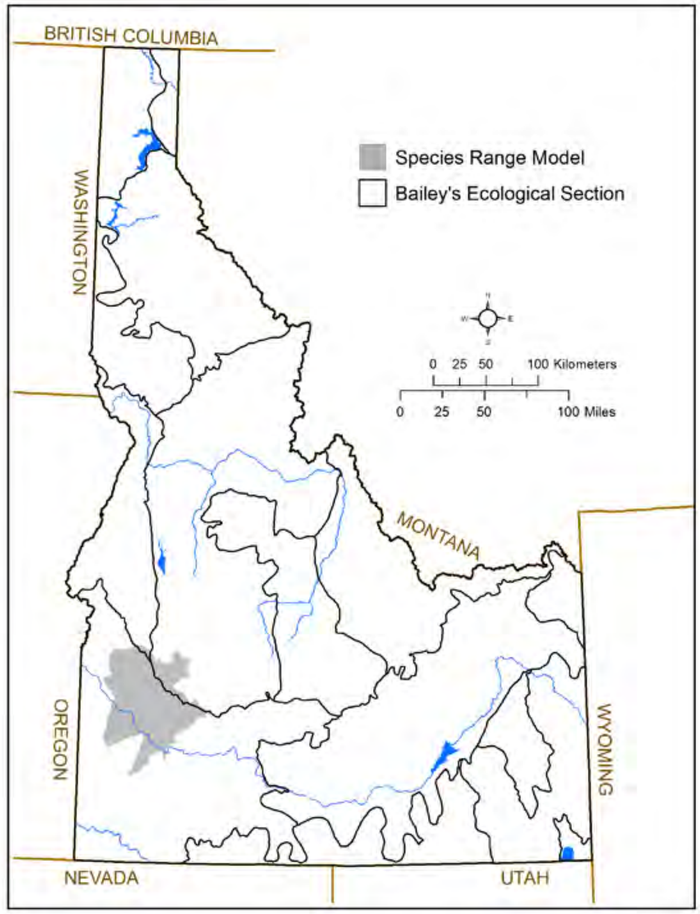
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council, Washington (DC): National Academies Press.; Shepherd MD, Vaughan DM, Black SH (Eds). 2005. Red List of Pollinator Insects of North America, Portland, OR. The Xerces Society for Invertebrate Conservation.
Map Sources: Shepherd MD. 2005. Species Profile: *Hesperapis kayella*. In Shepherd MD, Vaughan DM, Black SH (Eds). Red List of Pollinator Insects of North America. CD-ROM Version 1 (May 2005). Portland (OR): The Xerces Society for Invertebrate Conservation.

A Grammid Moth

Grammia eureka



Class: Insecta
Order: Lepidoptera
Family: Erebidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: SNR

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 7,000 km^2 (~2,700 mi^2)
Key Ecological Sections: Blue Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: This recently described (2007) moth is known only from two historical locations, one in central Utah and one in southwestern Idaho (Ada County). No occurrences of the species have been recorded since the type material was collected in the early 1900s and the Idaho location is somewhat uncertain. Whether the species is extant in the state is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Little is known of this species biology. Collection dates indicate it has an early flight period (April – May) and may be diurnal. Habitat is unknown.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: Species–specific threats have not been identified.

CONSERVATION ACTIONS
Surveys are needed to determine if this species is extant in Idaho.

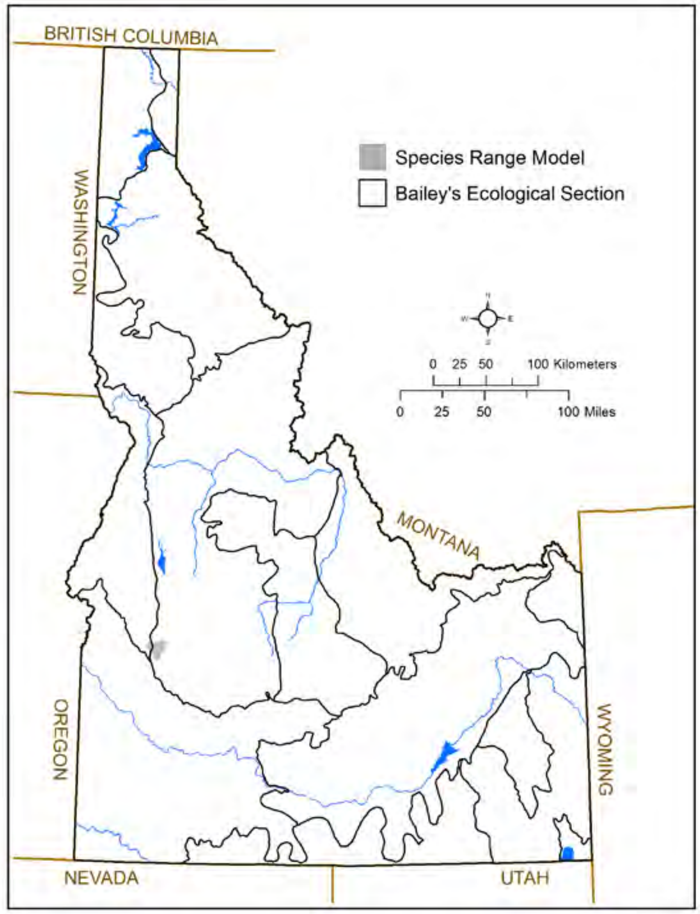
ADDITIONAL COMMENTS
None.

Information Sources: Pacific Northwest Moth Database. 2014. [Accessed Oct–Dec, 2014] pnwmoths.biol.wwu.edu; Schmidt BC. 2009. Taxonomic revision of the genus Grammia Rambur (Lepidoptera: Noctuidae: Arctiinae). Zoological Journal of the Linnean Society 156:507–597.

Map Sources: Schmidt BC. 2009. Taxonomic revision of the genus *Grammia* Rambur (Lepidoptera: Noctuidae: Arctiinae). Zoological Journal of the Linnean Society 156:507–597; Pacific Northwest Moth Database. 2014. [Accessed Oct–Dec, 2014] pnwmoths.biol.wwu.edu

Johnson's Hairstreak

Callophrys johnsoni



Class: Insecta
Order: Lepidoptera
Family: Lycaenidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3G4
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient, rangewide declines, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 500 km^2 (~200 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The historic range of Johnson's Hairstreak included much of the western US, from southern British Columbia to central California. It's current range however, is uncertain and is thought to be localized and scarce. In Idaho, there is one known disjunct population along Hells Canyon in eastern Oregon and Adams County, Idaho, and another population near the town of Horseshoe Bend, Boise County. Another population in Whitman County, Washington is thought to extend north and east into Idaho, but no observations in this area of Idaho have yet been recorded. Abundances tend to be highly variable between years with few adults recorded most years.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This species depends on coniferous forests that contain dwarf mistletoes (genus Arceuthobium), typically old–growth and late successional second growth western hemlock and firs (but the eastern Washington population has been found in ponderosa pine). It spends much of its time in the forest canopy, thus likely contributing to the rarity of sightings.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown

Description: Although population trends have not been documented, the range of the species appears be declining. Prior to 1900, this butterfly was thought to occur throughout much of the old–growth coniferous forests in the Pacific Northwest. Most records of the species are from before the 1970s and 1980s.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Although species–specific threats in Idaho have not been identified, the primary threats to this species are thought to include logging of old growth forests, hybridization with the Thicket Hairstreak, and use of insecticides, predominantly Btk, a Lepidoptera–specific pesticide used to treat defoliators (Btk).

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

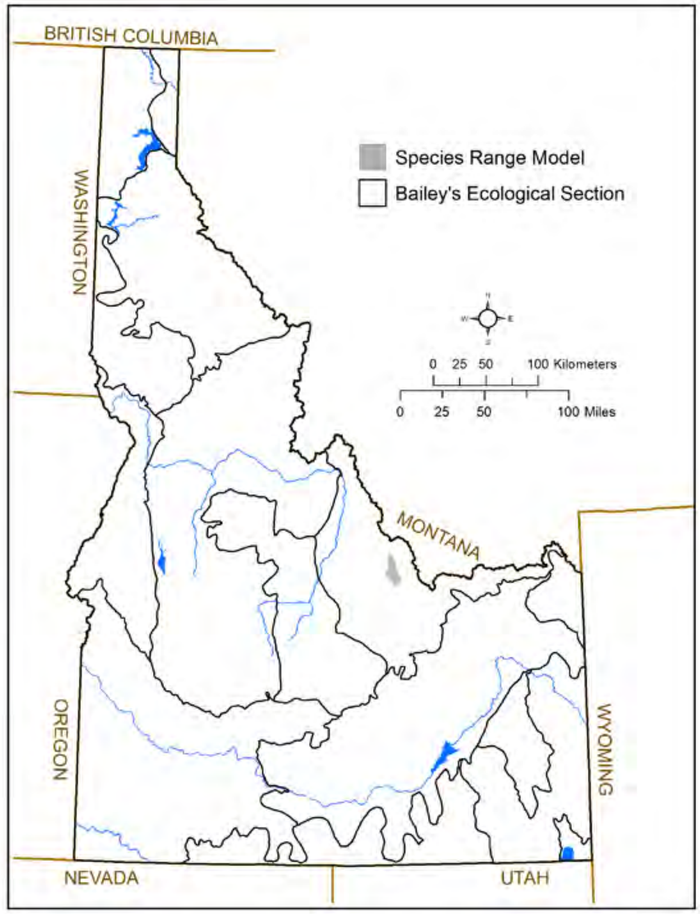
ADDITIONAL COMMENTS

None.

Information Sources: Miller JC, Hammond PC. 2007. Butterflies and Moths of Pacific Northwest Forests and Woodlands: Rare, endangered, and management sensitive species. Forest Health Technology Enterprise Team, USDA Forest Service, Washington, DC; Hammond PC. 1994. Rare butterfly assessment for the Columbia River Basin in the Pacific Northwest. Eastside Ecosystems Management Strategy Project, part of the Interior Columbia Basin Ecosystem Management Project. [Accessed Feb 13, 2015] www.icbemp.gov/science/hammond2.pdf; Xerces Society. 2005. Fact sheet for the Johnson's Hairstreak (*Callophrys johnsoni*). [Accessed Feb 19, 2015] www.xerces.org/johnsons–hairstreak; Pacific Northwest Moth Database. 2014. [Accessed Oct–Dec, 2014] pnwmoths.biol.wwu.edu
Map Sources: Lepidopterists' Society Season Summary database. [Accessed March 18, 2015].; Lotts K, Naberhaus T, coordinators. 2015. Butterflies and Moths of North America. [Accessed November 2014]. www.butterfliesandmoths.org.

Beartooth Copper

Lycaena phlaeas arctodon



Class: Insecta
Order: Lepidoptera
Family: Lycaenidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G5T3T5
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 300 km^2 (~100 mi^2)
Key Ecological Sections: Beaverhead Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Beartooth Copper is endemic to the northern Rocky Mountains and is currently known from several scattered areas in Montana, Wyoming, and Idaho. In Idaho, it has only been recorded at Meadow Creek Lake, approximately 6 km (4 mi) west of Gilmore, but it likely occurs elsewhere in contiguous areas of appropriate habitat. Generally considered rare, it can be moderately common once the correct habitat has been located.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: A high–elevation species, the Beartooth Copper is found in open alpine meadows and rocky slopes at or above treeline. It is a foodplant specialist on sorrel (*Rumex* spp.) and adults do not stray more than 4.5–9 m (15–30 ft) from the host plant. In known localities, the plant grows in depressions in open meadows where moisture remains after spring snow melt.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Species–specific threats in Idaho have not been identified. However, given its habitat preferences, the Beartooth Copper is considered to be sensitive to climate change.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

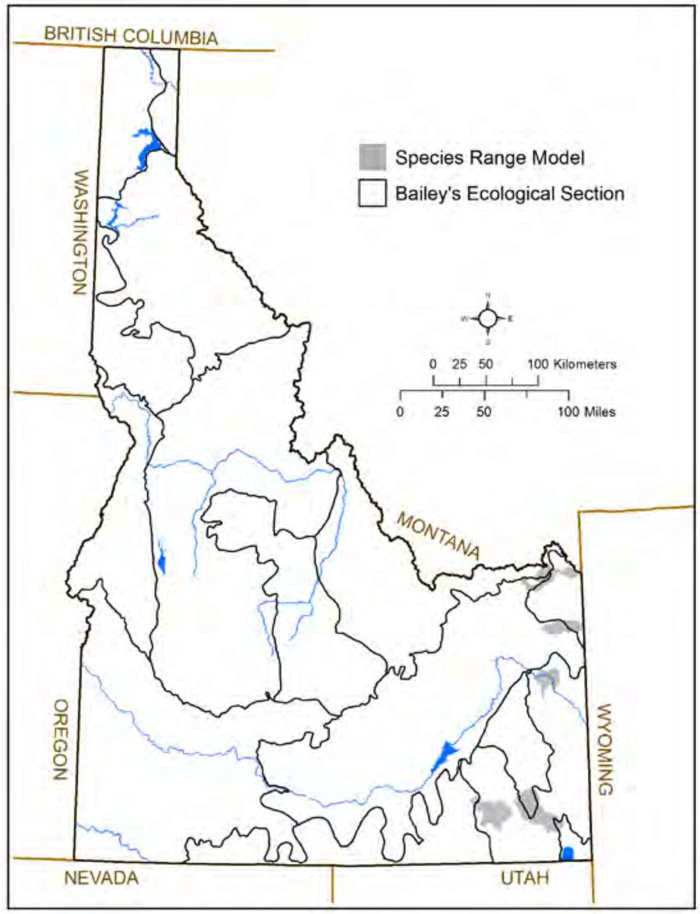
ADDITIONAL COMMENTS

None.

Information Sources: Ferris CD. 1974. Distribution of arctic–alpine *Lycaena phlaeas* L. (Lycaenidae) in North America with designation of a new subspecies. Bulletin of the Allyn Museum 18:1–14.; Miller JC, Hammond PC. 2007. Butterflies and Moths of Pacific Northwest Forests and Woodlands: Rare, endangered, and management sensitive species. Forest Health Technology Enterprise Team, USDA Forest Service, Washington, DC; Kohler S. 2007. A description of a new subspecies of *Lycaena phlaeas* (Lycaenidae: Lycaeninae) from Montana, United States, with a comparative study of Old and New World populations. The Taxonomic Report 7:1-20.
Map Sources: Ferris CD. 1974. Distribution of arctic–alpine *Lycaena phlaeas* L. (Lycaenidae) in North America with designation of a new subspecies. Bulletin of the Allyn Museum 18:1–14.

Kriemhild Fritillary

Boloria kriemhild



Class: Insecta
Order: Lepidoptera
Family: Nymphalidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3G4
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 3,000 km^2 (~1,200 mi^2)
Key Ecological Sections: Bear Lake, Northwestern Basin and Range, Overthrust Mountains, Yellowstone Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: Endemic to the northern Rocky Mountains, the Kriemhild Fritillary (also known as Relict Fritillary) occurs in Montana, Idaho, Wyoming, and Utah. In Idaho, its range is restricted to a narrow region that extends along the length of the Idaho/Wyoming border. Within this restricted range and appropriate habitats, it can be moderately common. Idaho populations are considered to be globally important.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This butterfly occurs in mountain meadows and moist forest openings and edges where its host plant (Violets) can be found. Adults fly from mid–June to early August, depending on elevation and annual variability.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Species–specific threats in Idaho have not been identified. However, it is likely affected by intensive use of national forests and is considered climate sensitive due to is preferred habitat.

CONSERVATION ACTIONS

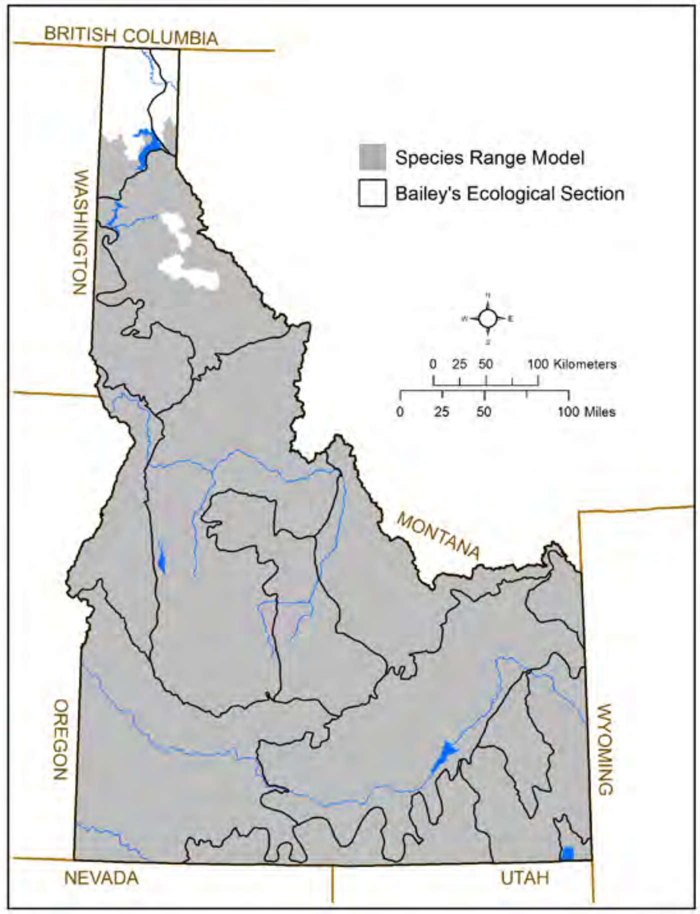
We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

None.

Information Sources: Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Montain West Environmental Services.; Lotts K, Naberhaus T, coordinators. 2015. Butterflies and Moths of North America. [Accessed November 2014]. www.butterfliesandmoths.org
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Lepidopterists' Society Season Summary database. [Accessed March 18, 2015].

Monarch
Danaus plexippus



Class: Insecta
Order: Lepidoptera
Family: Nymphalidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4
S-rank: S2

SGCN TIER: 3
Rationale: Data deficient, significant rangewide declines

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 224,500 km^2 (~86,700 mi^2)
Key Ecological Sections: Bear Lake, Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Northwestern Basin and Range, Okanogan Highlands, Overthrust Mountains, Palouse Prairie, Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: Monarch butterflies are widespread in North America, but appear to be experiencing large rangewide declines. In Idaho, the species is assumed to be migratory or non–resident, breeding here during the summer with the resulting adults heading south to coastal California and Mexico for winter. Breeding records in Idaho are few in number and scattered in distribution (Kootenai, Canyon, Jerome, and Bonneville counties). A recent survey by IDFG also documented breeding populations in Lemhi County. However, other targeted surveys over the last 10 years in southern Idaho have not detected the species (Leavitt, pers. comm.).

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: During the breeding season, Monarchs rely on native milkweeds as their larval host plant. Thus, they can be found in any open habitats such as grasslands, meadows, fields, and along roads where milkweed is present. This species has a complex life cycle that results in two different generations; the summer (or breeding) generation that lives 2–5 weeks and the migratory (or wintering) generation that lives 5–9 months. Immature Monarchs produced in late summer and early fall react to environmental triggers (e.g., shorter day length, declining

temperatures) to emerge as longer–lived migratory butterflies. Wintering Monarchs begin mating in mid–January then disperse to breeding grounds where females lay their eggs on emerging milkweed. These are the first of several summer generations.

POPULATION TREND
Short-term Trend: Decline 50–70%
Long-term Trend: Unknown
Description: Although monitoring of the western population began in the 1980s, large–scale yearly assessments did not begin until 1997. In 1997, there were more than 1.2 million Monarchs overwintering in California, but by 2014 only about 234,000 were counted. Assessment of 15 overwintering locations monitored during the Western Monarch Thanksgiving Count every year since 1997 indicate that the steepest decline occurred prior to 2002 and numbers have remained low, but steady, since 2010. Population trends in Idaho have not been documented.

THREATS
Overall Threat Impact: Medium
Intrinsic Vulnerability: Moderately vulnerable
Description: The primary threat to this species is the loss and degradation of native milkweed habitat due to several factors including urban development, broad–scale use of post–emergent herbicides, and intensive management of roadside vegetation (e.g., herbicide application, mowing). In addition, changing temperature and precipitation patterns will also likely affect Monarch reproduction, larval development, and migration.

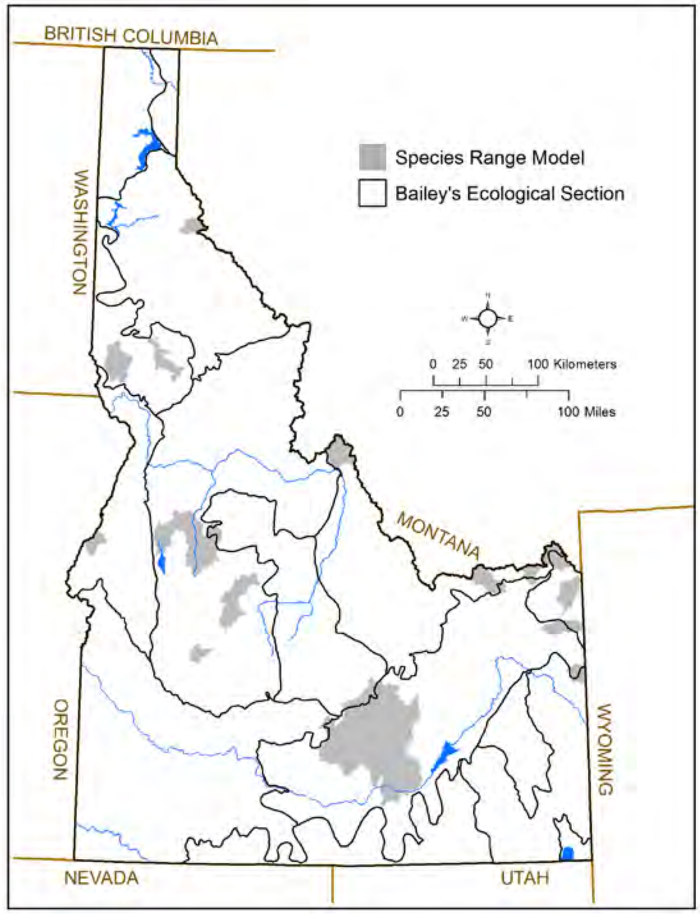
CONSERVATION ACTIONS
Conservation issues and management actions are described in the appropriate section plans. Recommended strategies for this species include working with partners to protect, create, and enhance milkweed habitats, increasing public awareness of Monarchs and their host plants, and continuing to document and monitor breeding populations.

ADDITIONAL COMMENTS
In 2014, the Monarch was petitioned for listing under the ESA. The FWS is currently conducting a 12–month status review to determine if listing is warranted.

Information Sources: Leavitt H, College of Western Idaho, pers. comm.; Lotts K, Naberhaus T, coordinators. 2015. Butterflies and Moths of North America. [Accessed November 2014]. www.butterfliesandmoths.org.; Stevens SR, Frey DF. 2010. Host plant pattern and variation in climate predict the location of natal grounds for migratory monarch butterflies in western North America. Journal of Insect Conservation 14:731–744; Jepsen S, Schweitzer DF, Young B, Sears N, Ormes M, Black SH. 2015. Conservation status and ecology of the monarch butterfly in the United States. Arlington (VA): NatureServe and Portland (OR): The Xerces Society for Invertebrate Conservation.; Commission for Environmental Cooperation. 2008. North American Monarch Conservation Plan. Montreal, Quebec, Canada; Monroe M, Fallon C, Frey D, Stevens S. 2015. Western Monarch Thanksgiving Count Data from 1997-2014. [Accessed December 2015] http://www.xerces.org/western–monarch–thanksgiving–count/; Waterbury B, Ruth T. 2015. A survey for milkweed (*Asclepias* spp.) and monarch butterflies (*Danaus plexippus*) in Lemhi County, Idaho. Boise (ID): Idaho Department of Fish and Game.
Map Sources: Lepidopterists' Society Season Summary database. [Accessed March 18, 2015].; USGS. 2002. Butterfly Occurrence Database. National Atlas of the United States, Reston, VA. http://nationalatlas.gov/atlasftp.html?openChapters=chpbio#chpbio [Accessed 9/29/2014]; Stephens GM, Ferris CD. 2002. Butterflies (Lepidoptera: Rhopalocera) of Cecil D. Andrus Wildlife Management Area, Washington C, Idaho. Journal of the Idaho Academy of Science 38:7–11; Stephens GM, Ferris CD. 2002. Butterflies (Lepidoptera: Rhopalocera) of the Mud Flat Road, Owyhee C, Idaho, with comments on the discovery of *Thessalia leanira* (C. & R. felder) (Lepidoptera: Nymphalidae) in Idaho. Journal of the Idaho Academy of Science 38:1–5; Digital Atlas of Idaho, http://imnh.isu.edu/digitalatlas/bio/insects/butrfly/btrfrm.htm [Accessed 12/09/2014]; Stefanic T. 2014. Butterflies and moths (Lepidoptera) of CRMO. Craters of the Moon National Monument and Preserve, National Park Service, US Dept of Interior

Gillette's Checkerspot

Euphydryas gillettii



Class: Insecta
Order: Lepidoptera
Family: Nymphalidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient, important pollinator, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 14,700 km^2 (~5,700 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Idaho Batholith, Yellowstone Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: Gillette's Checkerspot is endemic to the northern Rocky Mountains, ranging from northwestern Wyoming to southern Alberta, in widely separated and isolated colonies. Although rare and restricted, it can be abundant once a colony has been located (C. Ferris, expert opinion). Idaho populations are globally important, but information on the current status is lacking.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This butterfly is restricted to moist, open, sunny, mostly montane meadows that support the primary larval host, twinberry. Caterpillars can only complete their development on host plants that are growing in direct sunlight. This species is extremely sedentary and is an important pollinator for several montane flowering plant species.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown

Description: In 1988, Williams (1988) noted several populations in the Greater Yellowstone Ecosystem and along the Idaho–Montana border that had not been recorded since 1960. However, current population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Relying on sufficient habitats in appropriate successional condition, Gillette's Checkerspot is sensitive to forest management and can benefit from infrequent, controlled ground fires and prescribed forest thinning to maintain open meadow habitats. Conversely, fire suppression can be detrimental. Given its local and sedentary nature, it is highly vulnerable to herbicide and pesticide spraying.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

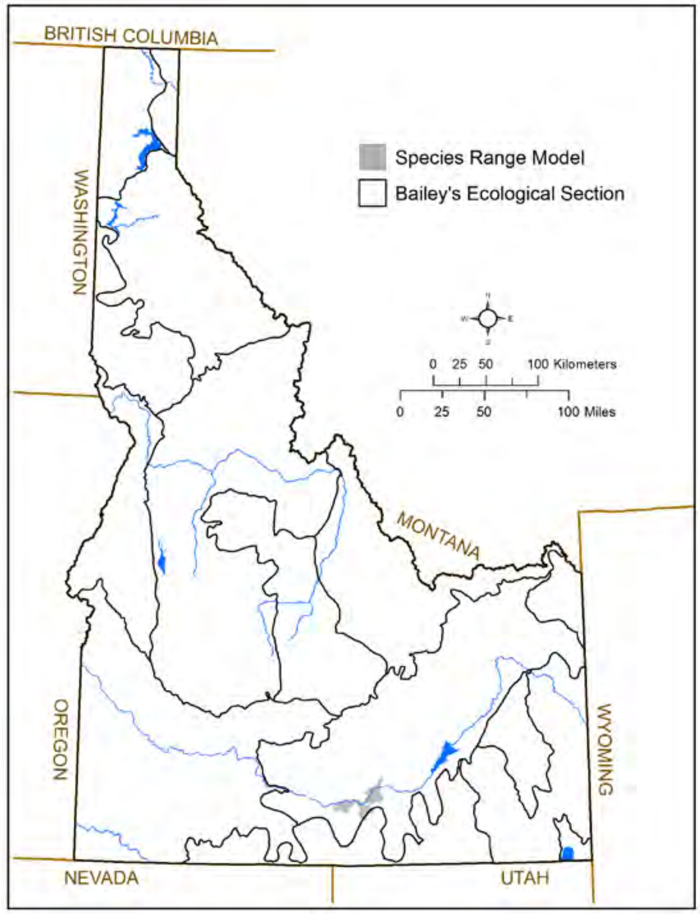
ADDITIONAL COMMENTS

None.

Information Sources: Miller JC, Hammond PC. 2007. Butterflies and Moths of Pacific Northwest Forests and Woodlands: Rare, endangered, and management sensitive species. Forest Health Technology Enterprise Team. Washington (DC): USDA Forest Service.; Committee on the Status of Pollinators in North America. 2007. Status of Pollinators in North America. Natural Research Council, Washington (DC): National Academies Press.; Clark TW, Harvey AH, Dorn RD, Genter DL, Groves C, eds. 1989. Rare, sensitive and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Montain West Environmental Services. 153 pp.; Williams EH. 1988. Habitat and range of Euphydryas gillettii (Nymphalidae). Journal of the Lepidopterists' Society 42:37–45.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Lepidopterists' Society Season Summary database. [Accessed March 18, 2015].; Stefanic T. 2014. Butterflies and moths (Lepidoptera) of CRMO. Craters of the Moon National Monument and Preserve, National Park Service, US Dept of Interior.

Wiest's Primrose Sphinx

Euproserpinus wiesti



Class: Insecta
Order: Lepidoptera
Family: Sphingidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3G4
S-rank: S1

SGCN TIER: 3
Rationale: IUCN Critically Endangered, data deficient, habitat specialist

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 600 km^2 (~200 mi^2)
Key Ecological Sections: Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: Wiest's Primrose Sphinx has been recorded from less than about 20 localities across the western US. In Idaho, it is known from a single site near Rupert. Although it is rarely collected, it may be more common than records indicate.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: A sand dunes specialist, this moth is restricted to sandy wash areas where its larval host plant (Evening primrose) grows. Adults are diurnal and fly in sunshine. Records suggest the flight period is April-May.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable

Description: Species–specific threats in Idaho have not been documented. However, the most likely threats are loss of sand dune habitat and larval host plants.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species in Idaho. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

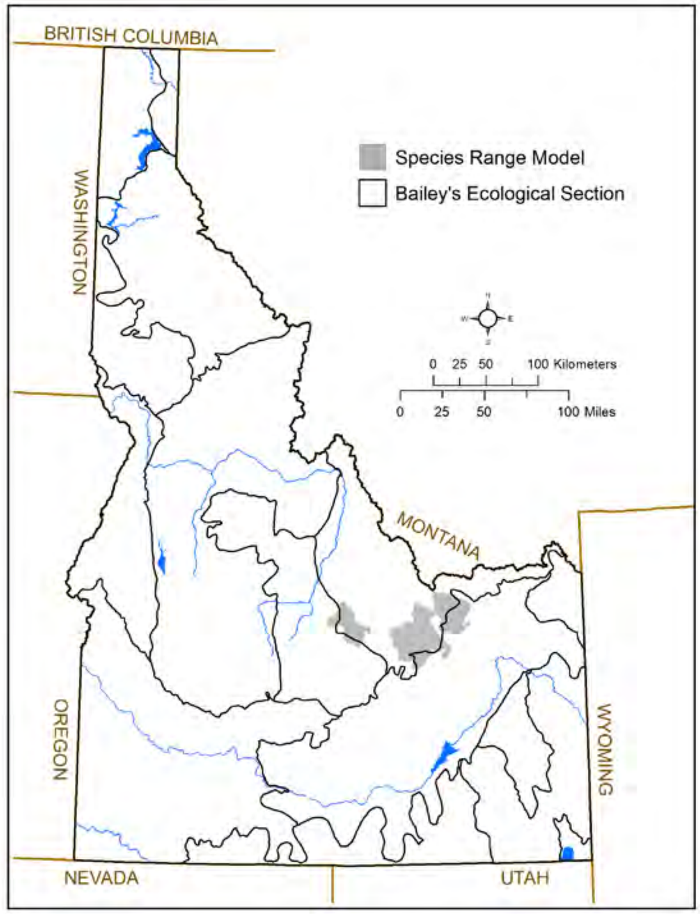
ADDITIONAL COMMENTS

None.

Information Sources: Pacific Northwest Moth Database. 2014. [Accessed Oct–Dec, 2014] pnwmoths.biol.wwu.edu
Map Sources: Pacific Northwest Moth Database. 2014. [Accessed Oct–Dec, 2014] pnwmoths.biol.wwu.edu

Idaho Point-headed Grasshopper

Acrolophitus pulchellus



Class: Insecta
Order: Orthoptera
Family: Acrididae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: Type 2
IDAPA: Unprotected Wildlife
G-rank: G1G3
S-rank: S2

SGCN TIER: 2
Rationale: Idaho endemic, restricted range, IUCN Vulnerable

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 3,800 km^2 (~1,500 mi^2)
Key Ecological Sections: Beaverhead Mountains, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: The Idaho Point-headed Grasshopper is a rare Idaho endemic found in the Birch Creek and Big Lost River drainages. Prior to 2010, the species was known from only 17 records dating from 1883 to 1993. Surveys in 2010 confirmed its persistence at historical localities.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: This grasshopper is found in dwarf-shrubland and steppe habitats on alluvial fan and stream terrace landforms characterized by sparse vegetation, surface gravels, vagrant lichens, and intact biological soil crusts. The species is thought to be ground-dwelling and a specialist feeder on stemless mock goldenweed, a cushion–form forb common to the area.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: Threats to these populations are widespread, but low in magnitude, and include invasive plants, OHV use, conversion to agriculture, and improper livestock grazing management. The species is also thought to be negatively influenced by drought.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the Beaverhead Mountains Section plan. In short, recommended strategies for this species include continuing to investigate the ecology of the species and encouraging land management that promotes proper livestock grazing management, restricts OHV travel to designated routes, controls noxious weeds, and uses native species for range restoration.

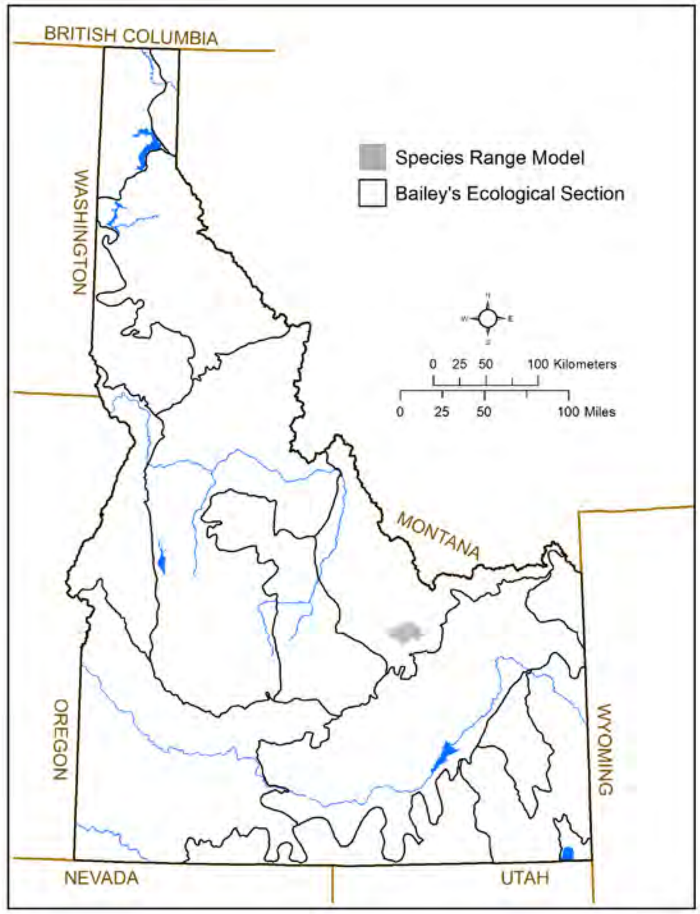
ADDITIONAL COMMENTS

None.

Information Sources: Waterbury BA. 2014. Rediscovered populations of the Idaho Point–Headed Grasshopper, *Acrolophitus pulchellus* (Bruner), 1890 (Orthoptera: Acrididae). Western North American Naturalist 74:349–355.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Waterbury BA. 2014. Rediscovered populations of the Idaho Point–Headed Grasshopper, *Acrolophitus pulchellus* (Bruner), 1890 (Orthoptera: Acrididae). Western North American Naturalist 74:349–355.

A Grasshopper

Argiacris amissuli



Class: Insecta
Order: Orthoptera
Family: Acrididae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G3
S-rank: S1

SGCN TIER: 3
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 400 km^2 (~200 mi^2)
Key Ecological Sections: Beaverhead Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: An Idaho endemic, this grasshopper has not been collected since 1965 when the type specimen was found at a single location in Butte County. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Species–specific habitat requirements have not been documented. However, the specimen was collected at about 1500m elevation in xeric habitat sparsely vegetated with sagebrush.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Species–specific threats have not been documented. However, in general, threats to grasshoppers include pesticides, habitat modification, and drought.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS

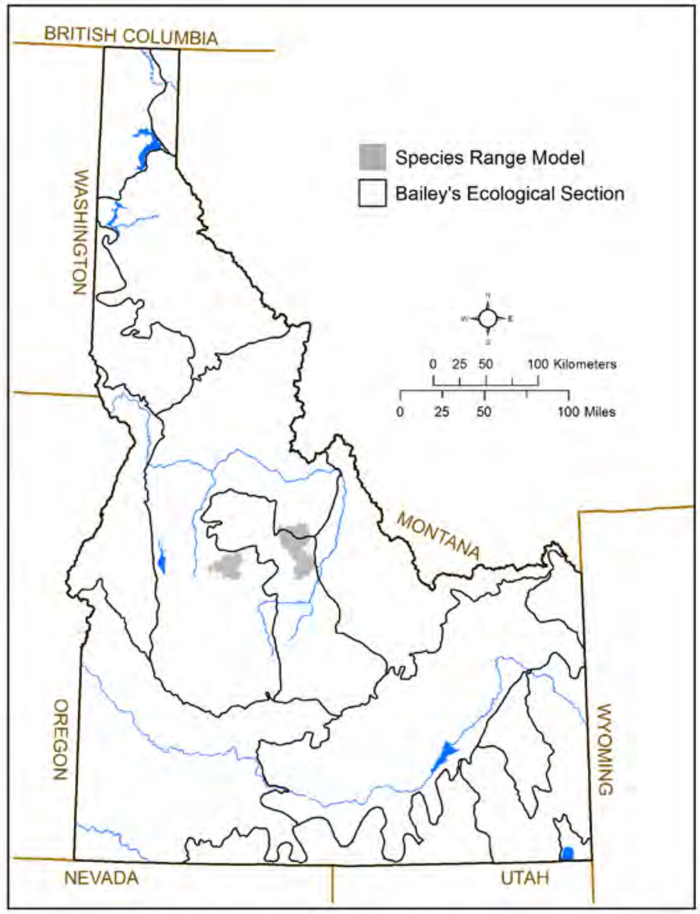
None.

Information Sources: Gurney AB. 1971. North American grasshoppers of the genus *Argiacris*, including two new species from Idaho (Orthoptera: Acrididae: Catantopinae). Proceedings of the Entomological Society of Washington 73:292–303.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

A Grasshopper

Argiacris keithi

Class: Insecta
Order: Orthoptera
Family: Acrididae



CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G3
S-rank: S1

SGCN TIER: 3
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,700 km^2 (~700 mi^2)
Key Ecological Sections: Challis Volcanics, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: An Idaho endemic, this grasshopper has not been collected since 1970 in Custer and Lemhi Counties. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: This species has been found in rugged, mountainous terrain at approximately 2500–3000m elevation. Little is known of species current status, ecology, or conservation needs.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: Species–specific threats have not been documented. However, in general, threats to grasshoppers include pesticides, habitat modification, and drought.

CONSERVATION ACTIONS

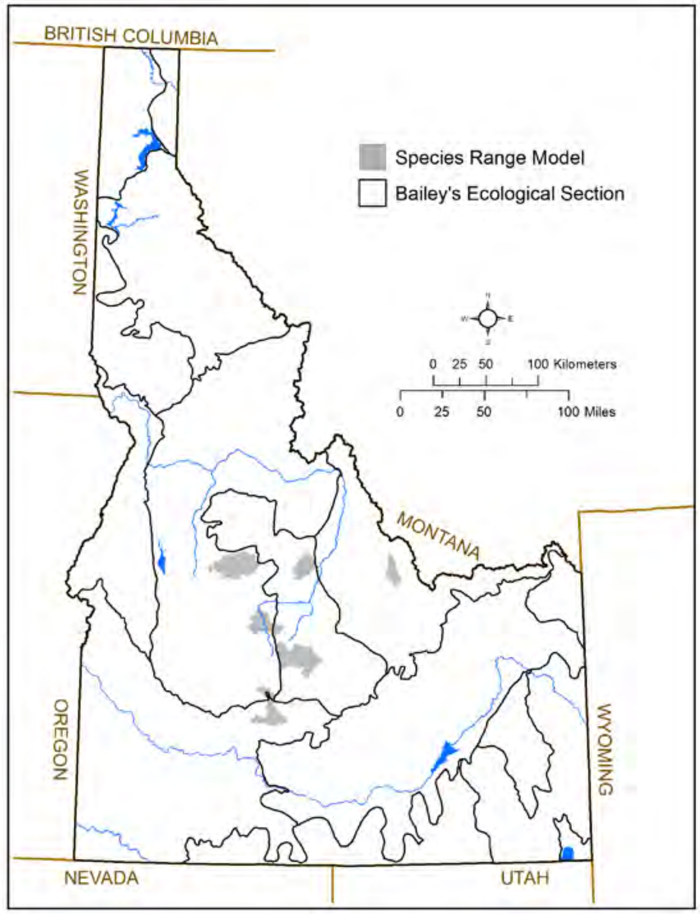
Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS

None.

Information Sources: Gurney AB. 1971. North American grasshoppers of the genus *Argiacris*, including two new species from Idaho (Orthoptera: Acrididae: Catantopinae). Proceedings of the Entomological Society of Washington 73:292–303.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

A Grasshopper
Argiacris militaris



Class: Insecta
Order: Orthoptera
Family: Acrididae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3G4
S-rank: S2

SGCN TIER: 3
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 3,800 km^2 (~1,500 mi^2)
Key Ecological Sections: Beaverhead Mountains, Challis Volcanics, Idaho Batholith, Owyhee Uplands
Population Size in Idaho: Not applicable for invertebrates.
Description: This grasshopper is an Idaho endemic occurring in Camas, Blaine, Lemhi, and Custer counties but has not been collected since 1970. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: This species has typically been found in rocky, sparsely-vegetated areas between 2500 and 2800m elevation. Little is known of species current status, ecology, or conservation needs.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Species–specific threats have not been documented. However, in general, threats to grasshoppers include pesticides, habitat modification, and drought.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

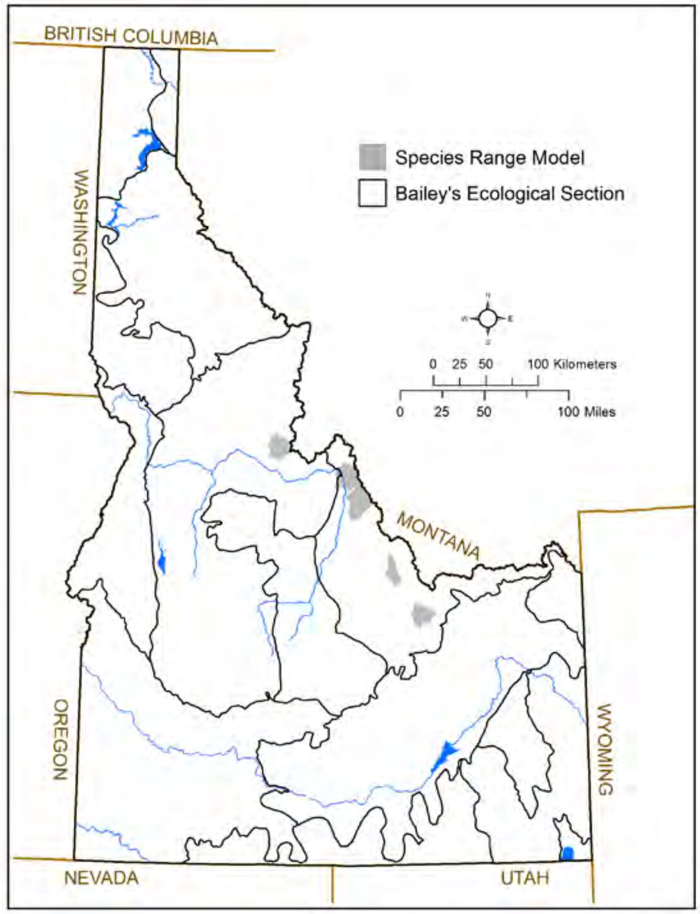
ADDITIONAL COMMENTS

None.

Information Sources: Gurney AB. 1971. North American grasshoppers of the genus *Argiacris*, including two new species from Idaho (Orthoptera: Acrididae: Catantopinae). Proceedings of the Entomological Society of Washington 73:292–303.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.

A Grasshopper

Barracris petraea



Class: Insecta
Order: Orthoptera
Family: Acrididae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3?
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,000 km^2 (~800 mi^2)
Key Ecological Sections: Beaverhead Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This grasshopper occurs in Idaho and Montana. In Idaho, it has been found in Lemhi County, Clark County, and southeast Idaho County. Current status of the species is unknown.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: The species has been found above timberline in bare rock, talus, and scree. However specific habitat requirements have not been documented.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: Specific threats to this species are not known. However, given the association with alpine habitats, changes in climatic conditions is a potential threat.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

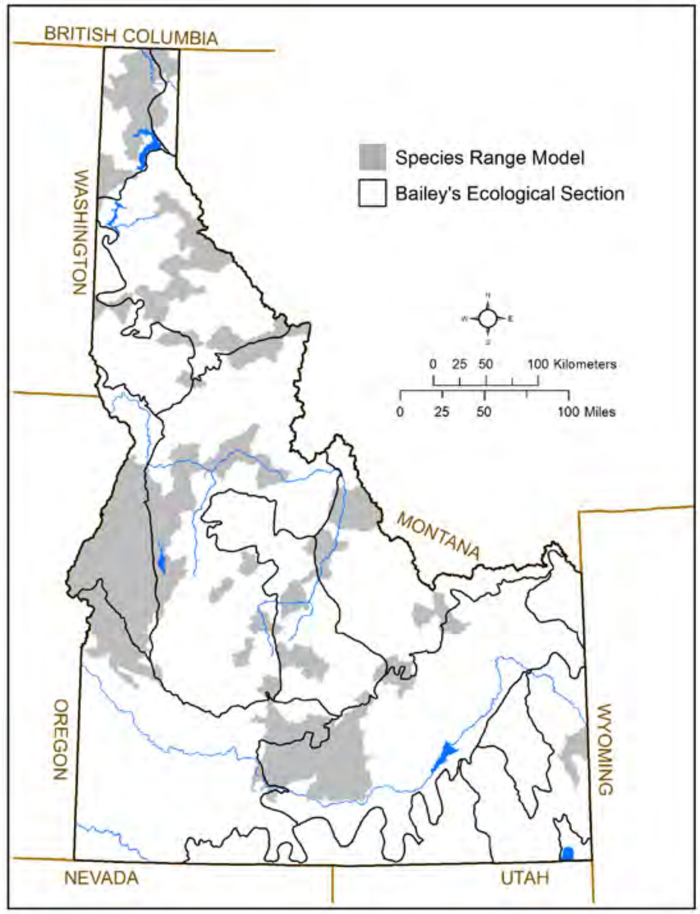
ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Spur-throated Grasshopper Species Group

Melanoplus Species Group



Class: Insecta
Order: Orthoptera
Family: Acrididae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GNR
S-rank: S2Q

SGCN TIER: 3
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 83,800 km^2 (~32,400 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Flathead Valley, Idaho Batholith, Okanogan Highlands, Overthrust Mountains, Owyhee Uplands, Palouse Prairie, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: This species group consists of 32 Spur–throated Grasshoppers in the genus *Melanoplus*. All of these species are currently thought to be either Idaho or regional endemics. Many of the species are known from few localities and have not been observed for decades. Nothing is known of these species current status, ecology, or conservation needs. The species include: *M. aix*, *M. alector*, *M. artemesiae*, *M. baldi*, *M. daemon*, *M. digitifer*, *M. idaho*, *M. illash*, *M. indigens*, *M. ixalus*, *M. latah*, *M. lemhiensis*, *M. lemurus*, *M. lolo*, *M. militaris*, *M. obex*, *M. ohadi*, *M. papoosense*, *M. papyraedus*, *M. payettei*, *M. phobetico*, *M. pyro*, *M. salmonis*, *M. shoshoni*, *M. sol*, *M. stipes*, *M. tendoyense*, *M. tincupense*, *M. trigeminus*, *M. washingtonius*, *M. xenus*, and *M. zeus*.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Most grasshoppers are generalists, but some have narrow habitat requirements. Although many of the species in this group have limited ranges, it cannot be assumed that they are specialists.

POPULATION TREND

Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Species–specific threats have not been documented. However, in general, threats to grasshoppers include pesticides, habitat modification, and drought.

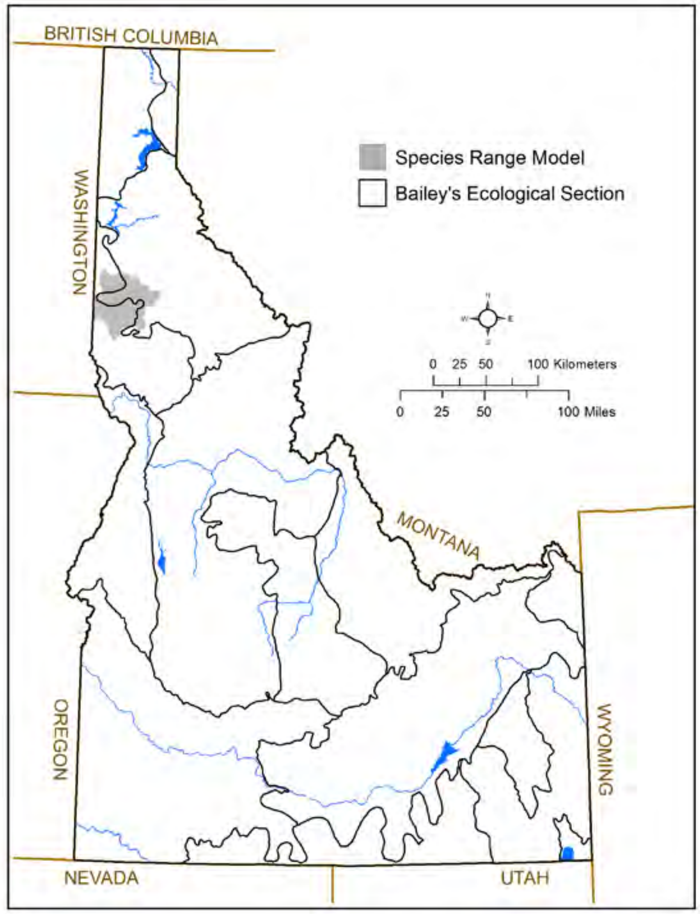
CONSERVATION ACTIONS
Priority conservation strategies for this genus includes surveys to determine if many of these species are extant in Idaho and genetic work needed to determine taxonomic uniqueness of these species.

ADDITIONAL COMMENTS
Although the taxonomy of this genus has been recently revised with several new species added (Otte 2012), it is incredibly difficult to understand and distinction among species is often based on locality and male genitalia. Extensive examination of the group and collaboration with Dan Otte is needed to determine the status.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe.; Otte D. 2012. Eighty New *Melanoplus* Species from the United States (Acrididae: Melanoplinae). Transactions of the American Entomological Society 138:73–167.; Strohecker HF. 1963. New Acrididae from western North America (Orthoptera). Pan–Pacific Entomologist 39(3): 157–174.; Hebard M. 1937. New genera and species of the *Melanopli* found within the United States and Canada (Orthoptera: Acrididae): Parts X to XIV. Transactions of the American Entomological Society 63: 147–173.; Hebard M. 1936. New genera and species of the *Melanopli* found within the United States and Canada (Orthoptera: Acrididae): Parts VII, VIII and IX). Transactions of the American Entomological Society 62:167-222.; Hebard M. 1935. New genera and species of the *Melanopli* found within the United States and Canada (Orthoptera, Acrididae): Parts V and VI. Transactions of the American Entomological Society 60:337–390.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Integrated digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.; Otte D. 2012. Eighty new Melanoplus species from the United States (Acrididae: Melanoplinae). Transactions of the American Entomological Society 138:73–167.

Straight Snowfly

Capnia lineata



Class: Insecta
Order: Plecoptera
Family: Capniidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: S1

SGCN TIER: 3
Rationale: Idaho endemic, data deficient, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 3,400 km^2 (~1,300 mi^2)
Key Ecological Sections: Bitterroot Mountains, Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: The Straight Snowfly is endemic to Idaho (Latah County), a previous report of a specimen in California was shown to be erroneous. It has been collected from several creeks near the small towns of Troy and Deary and was last recorded in 1989. Current status of the population is not known, however it has been described as "rare" in the past.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Life history and ecology requirements for many *Capnia* species, including this species, are poorly known. It is known that *Capnia* nymphs require cool water temperatures for development. After hatching in early spring, the nymphs move into the hyporheic zone and undergo diapause, remaining inactive until the water cools in late fall and winter, at which time they feed (probably by shredding detritus) and rapidly grow to maturity. Adults emerge in late February to June and are usually univoltine.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Threats to this species have not been specifically identified, but could include any changes to the water quality and quantity of occupied creeks primarily sedimentation and increasing water temperatures.

CONSERVATION ACTIONS

Surveys are needed to determine the true distribution of this species, status and size of existing populations, and potential presence of additional populations. Known locations in Latah County overlap with areas surveyed by Potlatch watershed fish crews, therefore Multispecies survey collaborations may be possible.

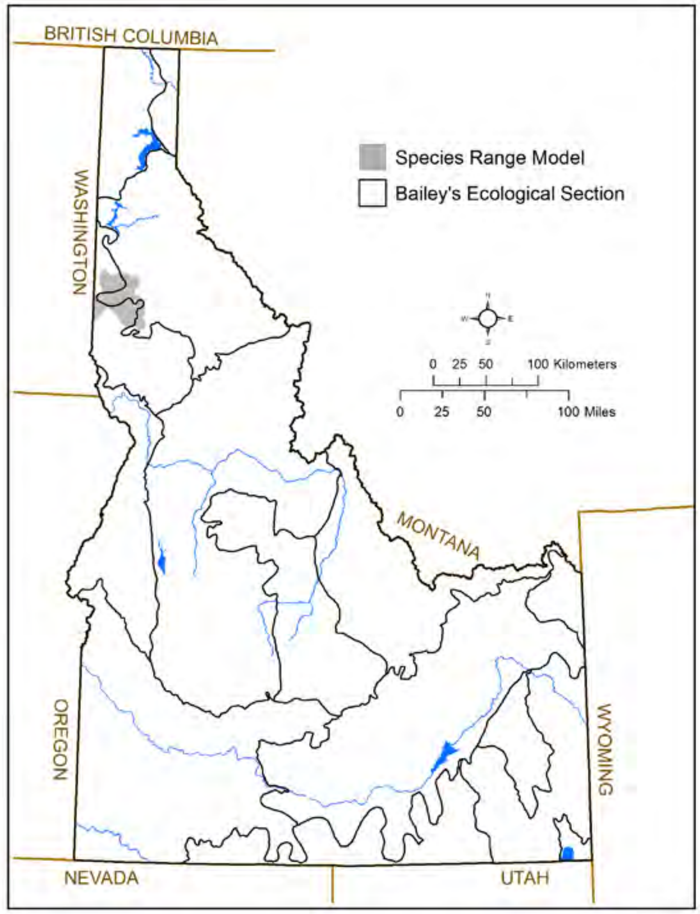
ADDITIONAL COMMENTS

The Straight Snowfly was petitioned for listing under the ESA in 2010, but was declined due to a lack of information.

Information Sources: Mazzacano C. 2009. *Capnia lineaata* (Hanson 1943) Straight stonefly Plecoptera: Capniidae. The Xerces Society for Invertebrate Conservation. Available http://www.xerces.org/wp–content/uploads/2009/12/capnia_lineata_profile_v2.pdf; Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Jordan SF, Mazzacano C, Jepsen S, Black SH. 2010. Petition to list the Straight Snowfly (*Capnia lineata* Hanson, 1943) and the Idaho Snowfly (*Capnia zukeli* Hanson, 1943) as endangered species under the US Endangered Species Act.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.

Idaho Snowfly

Capnia zukeli



Class: Insecta
Order: Plecoptera
Family: Capniidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: S1

SGCN TIER: 3
Rationale: Idaho endemic, data deficient, range restricted

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,900 km^2 (~700 mi^2)
Key Ecological Sections: Bitterroot Mountains, Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: The Idaho Snowfly is endemic to Idaho (Latah county). It has been collected from several creeks near the small town of Troy and was last recorded in 1986. Current status of the population is not known, however it has been described as "rare" in the past.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Life history and ecology requirements for many *Capnia* species, including this species are poorly known. It is known that *Capnia* nymphs require cool water temperatures for development. After hatching in early spring, the nymphs move into the hyporheic zone and undergo diapause, remaining inactive until the water cools in late fall and winter, at which time they feed (probably by shredding detritus) and rapidly grow to maturity. Adults emerge in late February to June and are usually univoltine.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Threats to this species have not been specifically identified, but could include any changes to the water quality and quantity of occupied creeks primarily sedimentation and increasing water temperatures.

CONSERVATION ACTIONS

Surveys are needed to determine the true distribution of this species, status and size of existing populations, and potential presence of additional populations. Known locations in Latah County overlap with areas surveyed by Potlatch watershed fish crews, therefore multispecies survey collaborations may be possible.

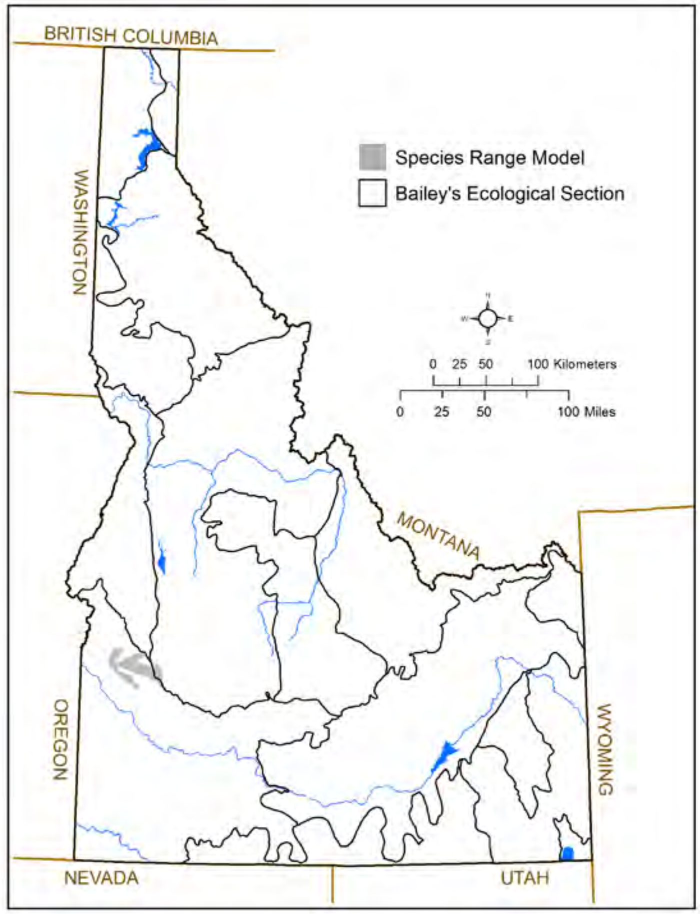
ADDITIONAL COMMENTS

The Idaho Snowfly was petitioned for listing under the ESA in 2010, but was declined due to a lack of information.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Jordan SF, Mazzacano C, Jepsen S, Black SH. 2010. Petition to list the Straight Snowfly (*Capnia lineata* Hanson, 1943) and the Idaho Snowfly (*Capnia zukeli* Hanson, 1943) as endangered species under the US Endangered Species Act; Mazzacano, C. 2008. *Capnia zukeli* (Hanson 1943). The Xerces Society for Invertebrates Conservation. http://www.xerces.org/wp–content/uploads/2008/09/capnia_zukeli.pdf
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Duckhead Snowfly

Capnura anas



Class: Insecta
Order: Plecoptera
Family: Capniidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: SNR

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 900 km^2 (~300 mi^2)
Key Ecological Sections: Owyhee Uplands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Duckhead Snowfly is known from only a few locations in Oregon and Idaho. The Idaho locality is recent (2004) and near Boise.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Specific habitat requirements have not been documented, however, the species is generally found in small intermittent streams, some of apparent low water quality.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: Specific threats to this species are not known. However, stonefly populations are generally affected by changes to aquatic habitat such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

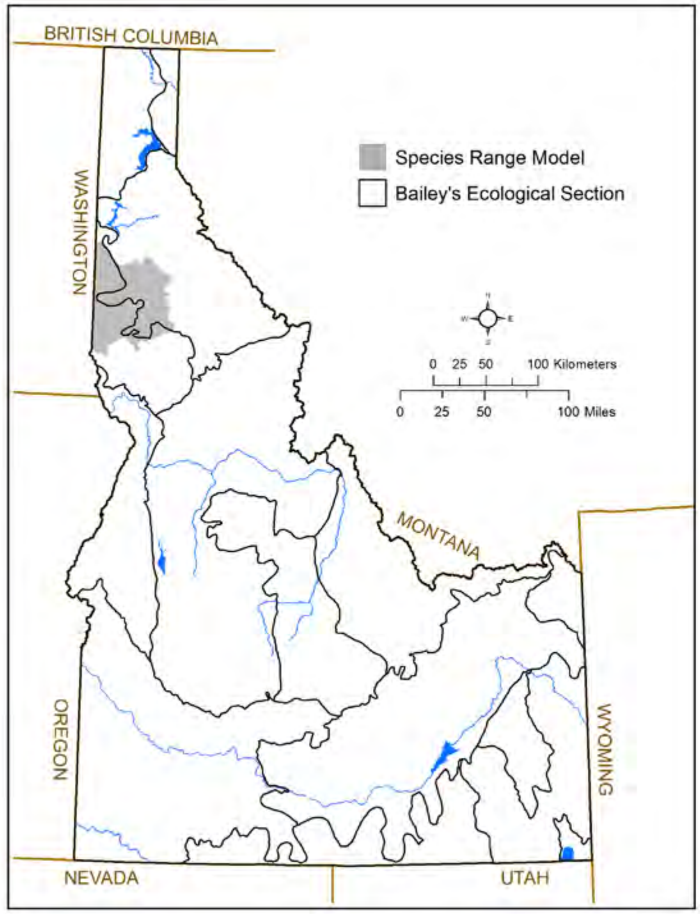
ADDITIONAL COMMENTS
None.

Information Sources: Nelson CR, Baumann RW. 1987. The winter stonefly genus *Capnura* (Plecoptera: Capniida) in North America: Systematics, phylogeny, and zoogeography. Transactions of the American Entomological Society 113:1-28.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Palouse Snowfly

Isocapnia palousa

Class: Insecta
Order: Plecoptera
Family: Capniidae



CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S3

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 5,800 km² (~2,200 mi²)
Key Ecological Sections: Bitterroot Mountains, Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: The Palouse Snowfly is a newly described species of stonefly that is restricted to southeast Washington, northeast Oregon, and northwest Idaho. In Idaho, the species has been found in several tributaries of the Potlatch River in the southern portion of Latah County. Althougth described in 2004, collections of this species in Idaho are from 1969 and 1984.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Species–specific habitat requirements have not been documented. However, this genus is generally associated with relatively pristine, gravel–based streams and rivers.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable

Description: Specific threats to this species are not known. However, stonefly populations are generally affected by changes to aquatic habitat such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

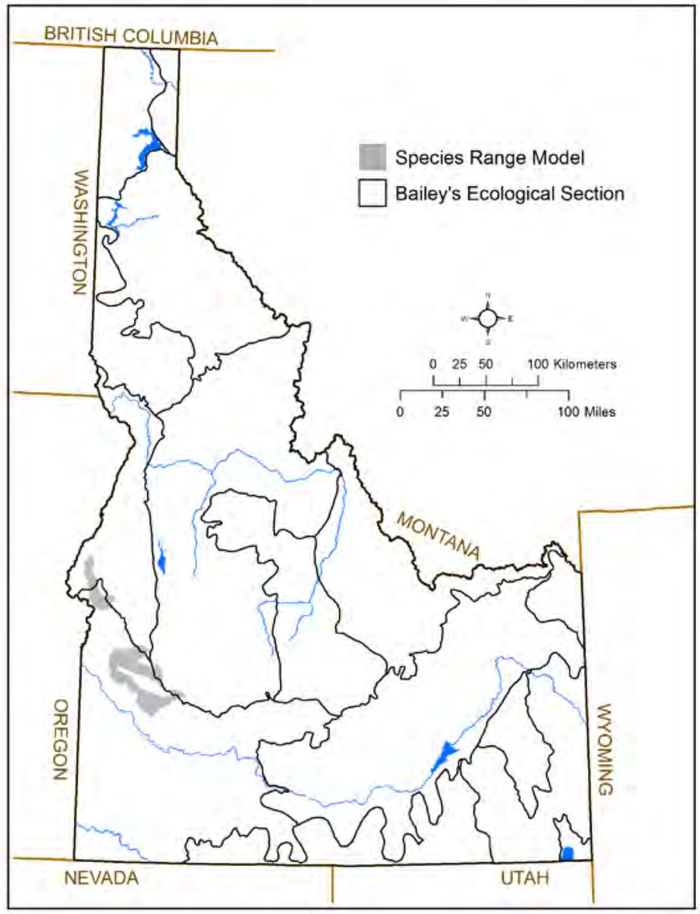
None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Zenger JT, Baumann RW. 2004. The Holarctic winter stonefly genus *Isocapnia*, with an emphasis on the North American fauna (Plecoptera: Capniidae). Monographs of the Western North American Naturalist 2:65–95.

Map Sources: Zenger JT, Baumann RW. 2004. The Holarctic winter stonefly genus *Isocapnia*, with an emphasis on the North American fauna (Plecoptera: Capniidae). Monographs of the Western North American Naturalist 2:65–95.

Boise Snowfly

Utacapnia nedia



Class: Insecta
Order: Plecoptera
Family: Capniidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,500 km^2 (~1,000 mi^2)
Key Ecological Sections: Blue Mountains, Owyhee Uplands
Population Size in Idaho: Not applicable for invertebrates.
Description: The Boise Snowfly occurs in southeast Oregon and southwest Idaho, with the Idaho distribution including Ada and Washington counties. Current status of the population is unknown, but it is considered to be "rare".

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: This stonefly has been found in small mountain streams, but details of habitat requirements have not been documented.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Specific threats to this species are not known. However, stonefly populations are generally affected by changes to aquatic habitat such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

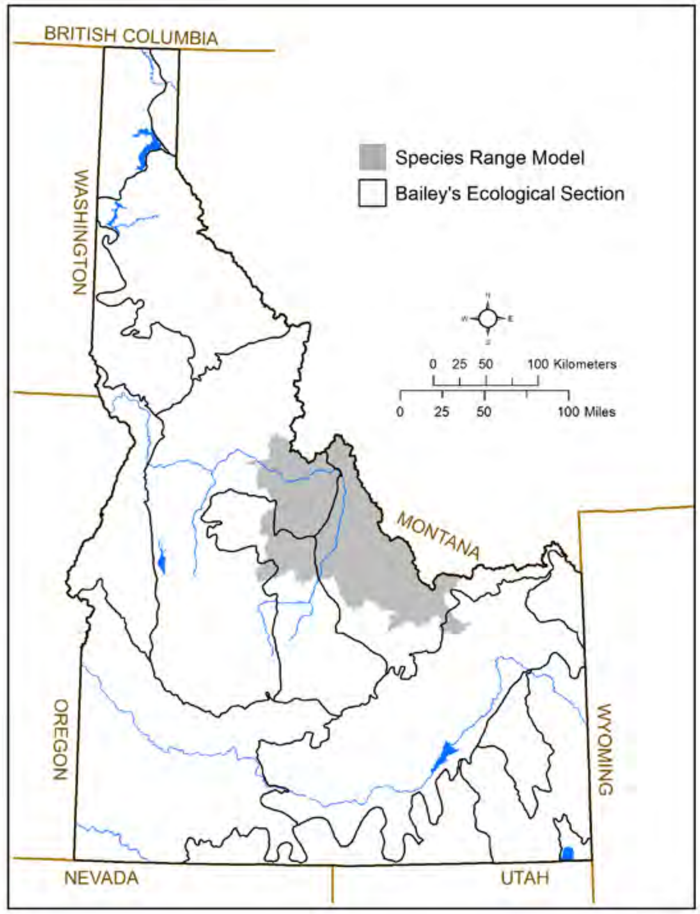
ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Lolo Sawfly

Sweltsa durfeei



Class: Insecta
Order: Plecoptera
Family: Chloroperlidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: SNR

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 18,200 km^2 (~7,000 mi^2)
Key Ecological Sections: Beaverhead Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Lolo Sawfly is a recently described species known only from Idaho (Lemhi County) and Montana (Mineral and Ravalli counties) and is likely endemic to the Northern Rocky Mountain Refugium. Although described in 2009, the Montana collections are dated from 1995–2008 and the Idaho collection is from 1979.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: This stonefly has been found in small mountain streams, but details of habitat requirements have not been documented.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Specific threats to this species are not known. However, stonefly populations are generally affected by changes to aquatic habitat such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

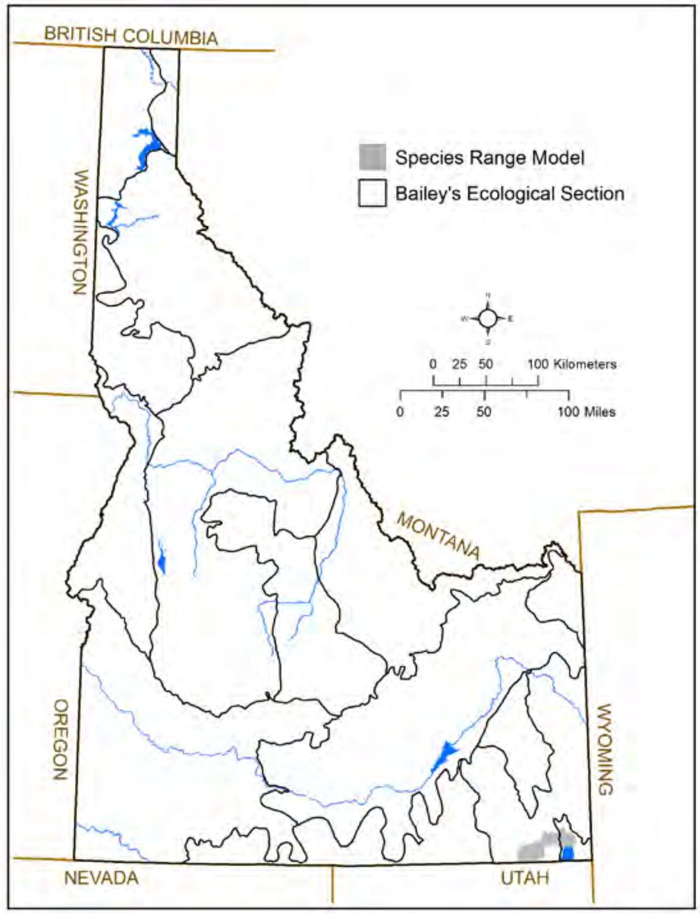
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Kondratieff BC, Baumann RW. 2009. A contribution to the knowledge of *Sweltsa exquisita* (Frison) and S. *occidens* (Frison) and description of a new species of *Sweltsa* from the northern Rocky Mountains, USA (Plecoptera: Chloroperlidae). Illiesia 5:20-29.
Map Sources: Kondratieff BC, Baumann RW. 2009. A contribution to the knowledge of *Sweltsa exquisita* (Frison) and S. *occidens* (Frison) and description of a new species of *Sweltsa* from the northern Rocky Mountains, USA (Plecoptera: Chloroperlidae). Illiesia 5:20-29.

Utah Sallfly
Sweltsa gaufini



Class: Insecta
Order: Plecoptera
Family: Chloroperlidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 900 km^2 (~300 mi^2)
Key Ecological Sections: Bear Lake, Overthrust Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Utah Sallfly is restricted to the Bear River area of southeast Idaho and northern Utah. In Idaho, it can be locally abundant, but is possibly extirpated from Utah.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: This stonefly has been found in small mountain streams, but details of habitat requirements have not been documented.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: Specific threats to this species are not known. However, stonefly populations are generally affected by changes to aquatic habitat such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

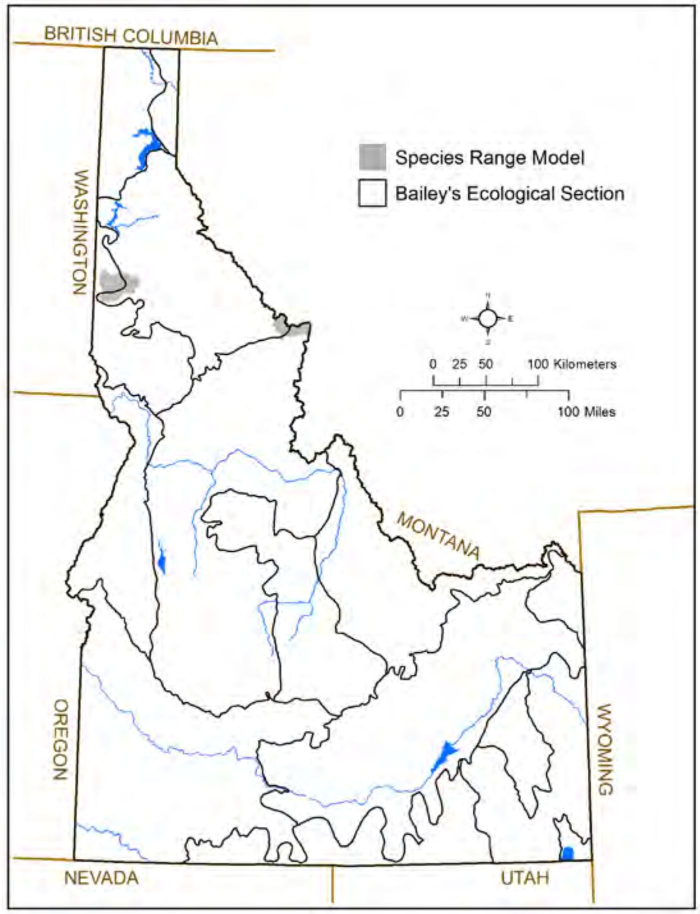
ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Cascades Needlefly

Megaleuctra kincaidi



Class: Insecta
Order: Plecoptera
Family: Leuctridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,300 km^2 (~500 mi^2)
Key Ecological Sections: Bitterroot Mountains, Idaho Batholith, Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: The Cascades Needlefly is known from a small number of locations in Idaho (Clearwater and Latah counties), Oregon, Washington, and Montana. Occurrences in Idaho and Montana are likely due to the area being a Pacific Coast refugium. It is known to co-occur with the Giant Needlefly (*M. stigmata*) in Idaho and Montana and, although species-specific abundances are unknown, Megaleuctra is considered to be one of the rarest of stonefly genera (Baumann and Stark 2013).

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This stonefly is generally associated with seeps and springs with cold, clean water.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: Specific threats to this species are not known. However, stonefly populations are generally affected by changes to aquatic habitat such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

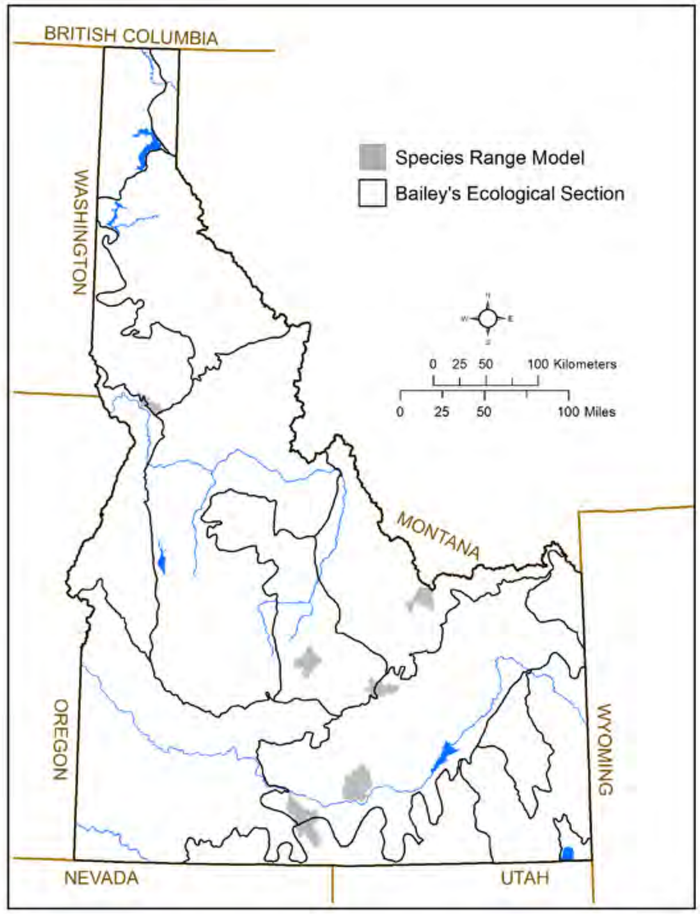
ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Stagliano DM, Stephens GM, Bosworth WR. 2007. Aquatic invertebrate species of concern on USFS Northern Region lands. Report prepared for USDA Forest Service, Northern Region, Missoula, Montana. Helena (MT): Montana Natural Heritage Program and Boise (ID): Idaho Conservation Data Center; Baumann RW, Stark BP. 2013. The genus *Megaleuctra* Neave (Plecoptera: Leuctridae) in North America. Illiesia 9:65–93.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Baumann RW, Stark BP. 2013. The genus *Megaleuctra* Neave (Plecoptera: Leuctridae) in North America. Illiesia 9:65–93.

Tiny Forestfly

Malenka tina



Class: Insecta
Order: Plecoptera
Family: Nemouridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,900 km^2 (~1,100 mi^2)
Key Ecological Sections: Beaverhead Mountains, Challis Volcanics
Population Size in Idaho: Not applicable for invertebrates.
Description: The Tiny Forestfly is widespread, but rare, with occurrences from Washington, Idaho, Oregon, Utah, Montana, and Nevada. In Idaho, the species has been recorded from Blaine, Butte, Custer, Idaho, Lemhi, Minidoka, and Twin Falls counties, but all are from pre-1970s. Current information on the species status are lacking.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: This stonefly has been found in small mountain streams, but details of habitat requirements have not been documented.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Specific threats to Idaho populations have not been identified. In general, stonefly populatins are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

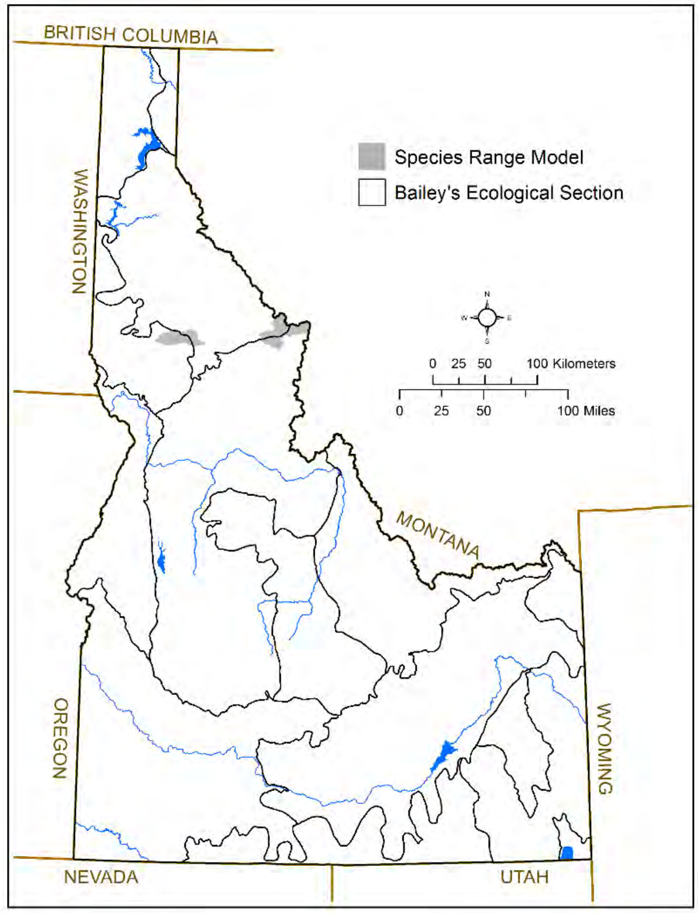
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Newell RL, Minshall GW. 1976. An annotated list of the aquatic insects of Southeastern Idaho. Part I. Plecoptera. Great Basin Naturalist. 36:501–504.

Idaho Forestfly

Soyedina potteri



Class: Insecta
Order: Plecoptera
Family: Nemouridae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,200 km^2 (~500 mi^2)
Key Ecological Sections: Bitterroot Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Idaho Forestfly is known from few locations in Idaho (Clearwater and Idaho counties), Montana, and Alberta. It is always reported in low abundance.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This stonefly is generally associated with headwater springs and seeps. The adults emerge from April to July.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: The primary threats to this species are the loss of source headwater habitats and degradation of aquatic habitats.

CONSERVATION ACTIONS

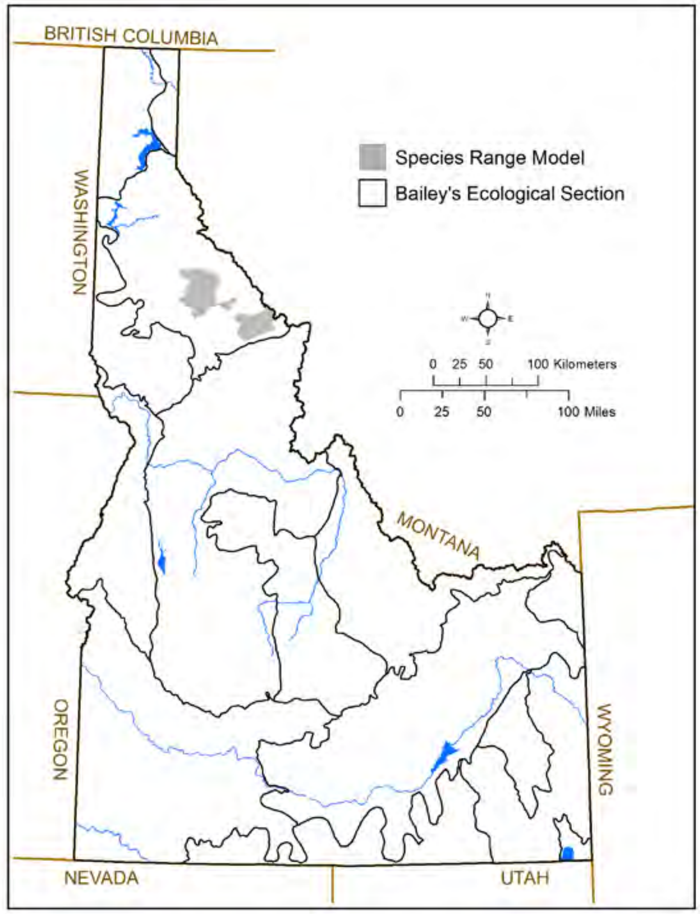
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Clearwater Roachfly
Soliperla salish



Class: Insecta
Order: Plecoptera
Family: Peltoperlidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,200 km^2 (~800 mi^2)
Key Ecological Sections: Bitterroot Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: The Clearwater Roachfly is a recently described species endemic to the Northern Rocky Mountains Refugium in north-central Idaho and western Montana. It appears to be narrowly distributed in the headwaters of the North Fork Clearwater River in Idaho (Shoshone and Clearwater counties) and adjacent areas of the Clark Fork River in Montana (Mineral County). Collections are from 2002–2003.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: This stonefly occurs in seeps and splash zones of small, high elevation streams near their headwater sources. It is probably cold–water adapted. Forest conditions vary at the collection sites but western red cedar and dense deciduous brush were consistently present. Collection of full-grown and half-grown nymphs together at several sites suggests that more than one year is needed to complete the life cycle.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Primary threats to this species are loss of source headwater habitats and stream sedimentation (both suspended and bedload) due to forest practices, mining, roads, and other human disturbances.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

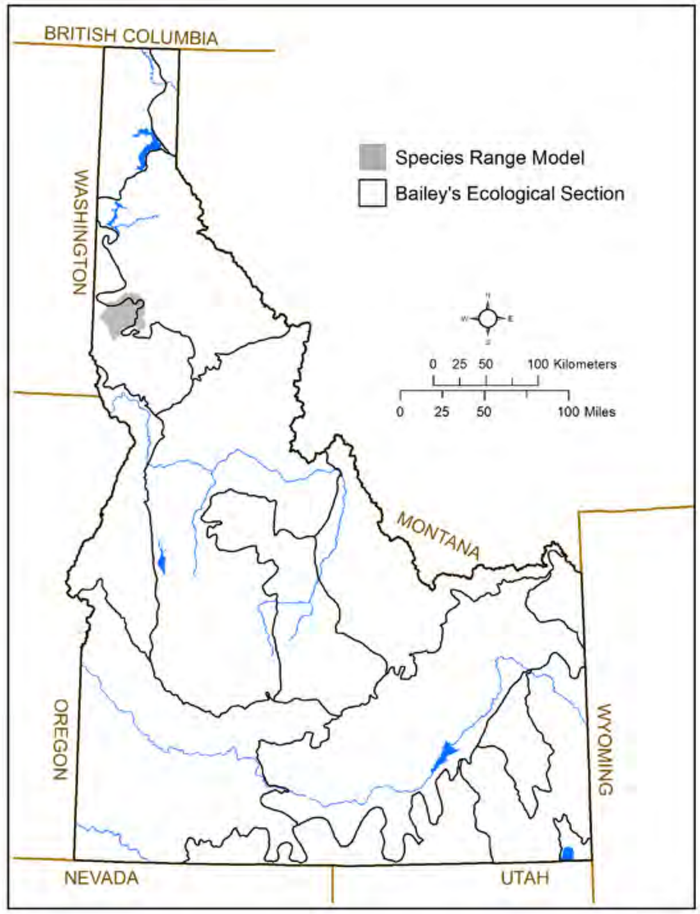
ADDITIONAL COMMENTS

None.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Stark BP, Gustafson DL. 2004. New species and records of *Soliperla* Ricker, 1952 from western North America (Insecta, Plecoptera, Peltoperlidae). Spixiana 27:97–105.
Map Sources: Stagliano DM, Stephens GM, Bosworth WR. 2007. Aquatic invertebrate species of concern on USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program. and Idaho Conservation Data Center, Boise, ID; Stark BP, Gustafson DL. 2004. New species and records of *Soliperla* Ricker, 1952 from western North America (Insecta, Plecoptera, Peltoperlidae). Spixiana 27:97–105

Umatilla Willowfly

Taenionema umatilla



Class: Insecta
Order: Plecoptera
Family: Taeniopterygidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,200 km^2 (~500 mi^2)
Key Ecological Sections: Bitterroot Mountains, Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: The Umatilla Willowfly is known only from Idaho (Latah County) and eastern Oregon. It is a rarely collected species that has not been recorded in Idaho since 1986. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: The species is known to occur in creeks and small rivers. Adults tend to emerge in spring and early summer (April–May) and are often found on willows along stream banks when the willow buds begin to open. It is considered an important food source for trout and other fish.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

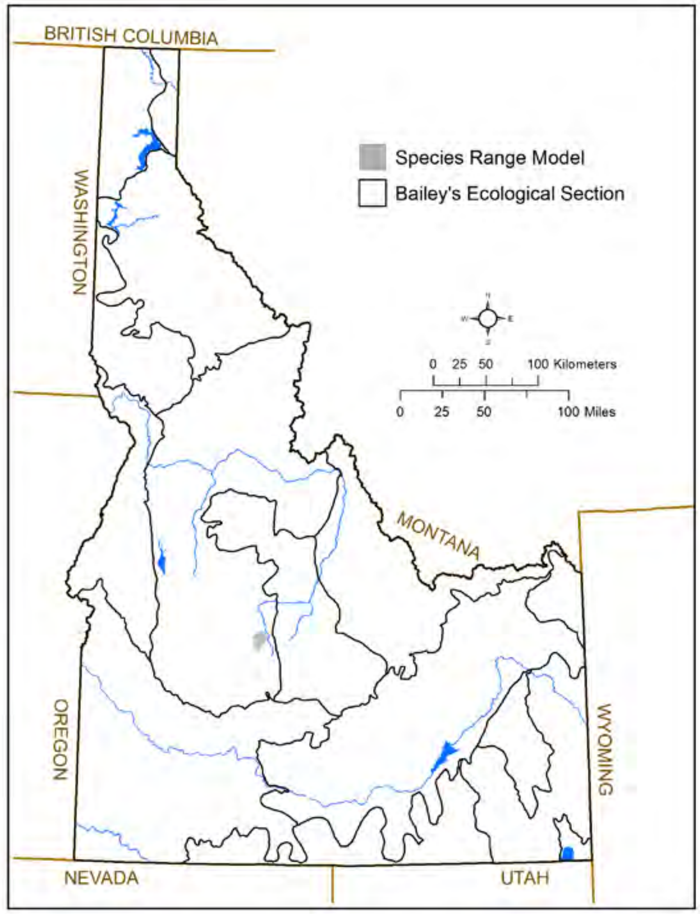
Description: Species-specific threats have not been identified. In general, stonefly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS
Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS
None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Furniss RL, Carolin VM. 1977. Western Forest Insects. Miscellaneous Publication No. 1339. Washington (DC): USDA Forest Service; Stanger JA, Baumann RW. 1993. A revision of the stonefly genus *Taenionema* (Plecoptera: Taeniopterygidae). Transactions of the American Entomolgical Society 119:171-229.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].; Stanger JA, Baumann RW. 1993. A revision of the stonefly genus *Taenionema* (Plecoptera: Taeniopterygidae). Transactions of the American Entomolgical Society 119:171-229.

A Caddisfly
Apatania barri



Class: Insecta
Order: Trichoptera
Family: Apataniidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: GU
S-rank: SNR

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 200 km^2 (~100 mi^2)
Key Ecological Sections: Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is known to occur in Idaho (Alturas Lake, Blaine County) and Montana. In Idaho, it was last collected in 1965 and whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Details of habitat requirements have not been documented.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: Species–specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS

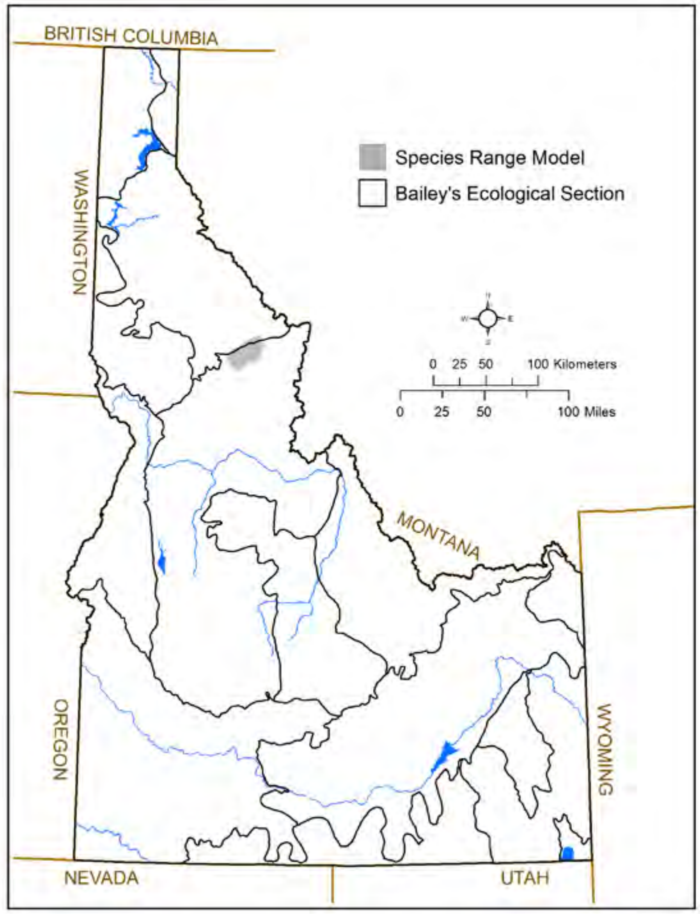
None.

Information Sources: Smith SD. 1969. Two new species of Idaho Trichoptera with distributional and taxonomic notes on other species. Journal of Kansas Entomological Society 42:46–53.

Map Sources: Smith SD. 1969. Two new species of Idaho Trichoptera with distributional and taxonomic notes on other species. Journal of the Kansas Entomological Society 42:46–53.

A Caddisfly

Manophylax annulatus



Class: Insecta
Order: Trichoptera
Family: Apataniidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G3
S-rank: S1

SGCN TIER: 3
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 700 km^2 (~300 mi^2)
Key Ecological Sections: Bitterroot Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is an Idaho endemic, incredibly localized and rare (thus, the genus name "mano"). It is only known from one location in Idaho County, northeast of Lowell, and was collected in 1968. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Details of habitat requirements have not been documented. However, the species was collected in a small, fast-flowing, high-elevation stream. The larvae were found on flat rocks in a thin film of flowing water.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable

Description: Species–specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

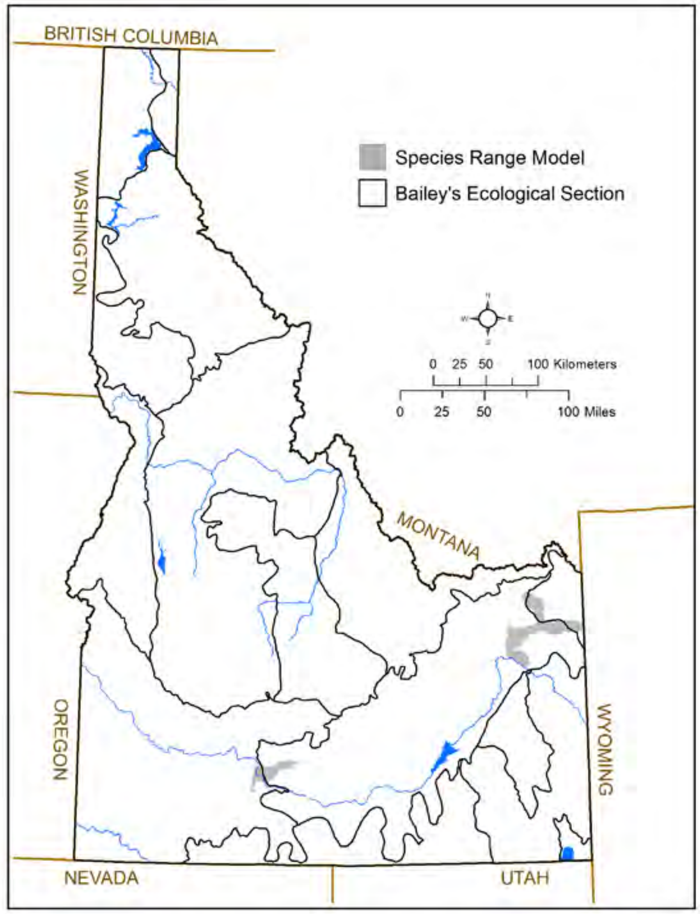
ADDITIONAL COMMENTS

None.

Information Sources: Wiggins GB. 1973. Contributions to the systematics of the caddisfly family Limnephilidae (Trichoptera). I. Life Sciences Contributions, Royal Ontario Museum, Number 94.; Wiggins GB. 2015. Larvae of the North American caddisfly genera (trichoptera) second edition. Toronto (Canada): University of Toronto Press; Chuluunbat S, Morse JC, Lessard JL, Benbow ME, Wesener MD, Hudson J. 2010. Evolution of terrestrial habitat in *Manophylax* species (Trichoptera: Apataniidae), with a new species from Alaska. Journal of the North American Benthological Society 29:413–430.
Map Sources: Wiggins GB. 1973. Contributions to the systematics of the caddisfly family Limnephilidae (Trichoptera). I. Life Sciences contribution Royal Ontario Museum 94, Toronto, Canada.

A Caddisfly

Glossosoma idaho



Class: Insecta
Order: Trichoptera
Family: Glossosomatidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2G3
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 2,500 km^2 (~1,000 mi^2)
Key Ecological Sections: Snake River Basalts, Yellowstone Highlands
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly occurs in Idaho and Montana. In Idaho, it has been recorded from Niagara Springs (Gooding County) and Falls River (Fremont County). It is reported as rare and infrequently collected. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: Details of this species habitat requirements have not been documented however, it appears to occur mainly in larger, open canopied mountain streams.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Species-specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS

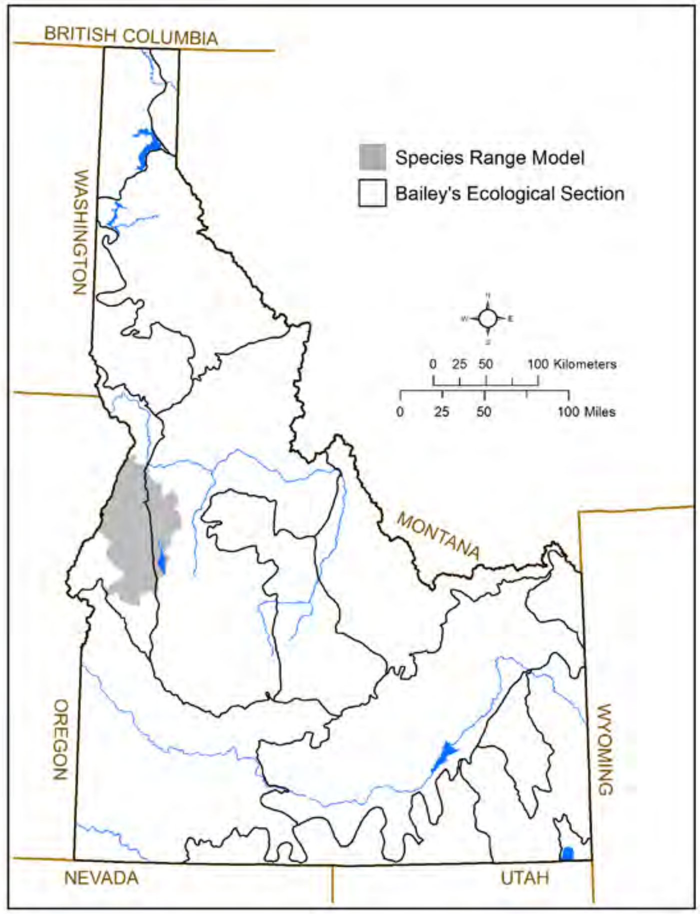
None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Newell RL, Minshall GW. 1979. Aquatic invertebrates of southeastern Idaho II. Trichoptera (Caddisflies). Journal of the Idaho Academy of Science 15:33–51; Roemhild G. 1982. The Trichoptera of Montana with distributional and ecology notes. Northwest Science 56: 8–13.

Map Sources: Global Biodiversity Information Facility. [Accessed November 20, 2014] www.gbif.org.; Integrated Digitized Biocollections (iDigBio) Specimen Portal, [accessed December 10, 2014] www.idigbio.org.; Newell RL, Minshall GW. 1977. An annotated list of the aquatic insects of Southeastern Idaho, Part II: Trichoptera. Great Basin Naturalist 37:253-257

A Caddisfly

Cheumatopsyche logani



Class: Insecta
Order: Trichoptera
Family: Hydropsychidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3G5
S-rank: SNR

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 7,000 km^2 (~2,700 mi^2)
Key Ecological Sections: Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is known only from Washington, Montana, and Idaho. In Idaho, the type specimen was collected in 1965 on the Little Salmon River in Adams County. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Details of this species habitat requirements have not been documented.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: Specie-–specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

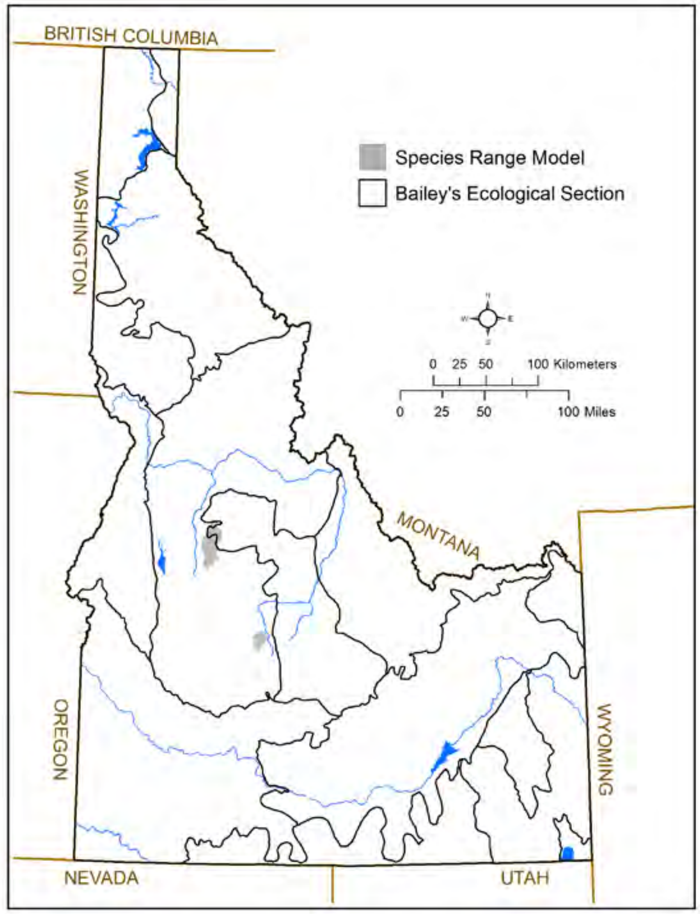
CONSERVATION ACTIONS
Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS
None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Nimmo AP. 1987. The adult Arctopsychidae and Hydropsychidae (Trichoptera) of Canada and adjacent United States. Quaestiones Entomologicae 23:1–189; Roemhild G. 1982. The Trichoptera of Montana with distributional and ecology notes. Northwest Science 56: 8–13.
Map Sources: Gordon, A. E. and S. D. Smith. 1974. A new species of *Cheumatopsyche* (Trichoptera, Hydropsychidae) from the northwestern United States. Notulae Naturae 450:1-2.

A Caddisfly

Arctopora salmon



Class: Insecta
Order: Trichoptera
Family: Limnephilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G3
S-rank: S3Q

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 700 km^2 (~300 mi^2)
Key Ecological Sections: Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: Originally thought to be endemic to Idaho, this caddisfly is now known to occur in northwest Montana as well. In Idaho, the species is known from the type specimen collected in 1965 near Landmark in Valley County as well as a 1985 collection in Alturas Lake (Blaine county). Surveys in 2010 in Glacier County, Montana, identified two additional collections. The lack of collections suggests low densities, but also highlights the need for additional sampling.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Details of this species habitat requirements have not been documented however, the species has been collected in wet meadows and small wetlands.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable

Description: Species-specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

Given the recent sampling, expert D. Ruiter suspects that this species is a synonym but additional work comparing all *Arctopora* types needs to be done to be sure how many species there really are.

Information Sources: Hossack BR, Newell RL, Ruiter DE. 2011. New collection records and range extension for the caddisfly *Arctopora salmon* (Smith, 1969) (Trichoptera: Limnephilidae). Pan-Pacific Entemologist 87:206-208.
Map Sources: Hossack BR, Newell RL, Ruiter DE. 2011. New collection records and range extension for the caddisfly *Arctopora salmon* (Smith, 1969) (Trichoptera: Limnephilidae). Pan–Pacific Entemologist 87:206-208;Smith SD. 1969. Two new species of Idaho Trichoptera with distributional and taxonomic notes on other species. Journal of the Kansas Entomological Society 42:46–53.

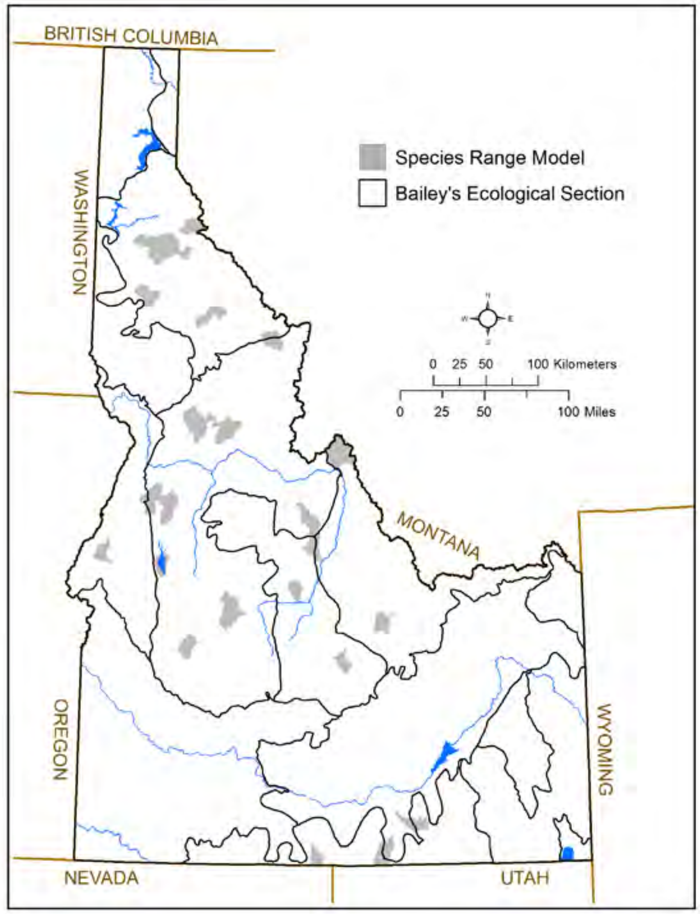
A Caddisfly

Eocosmoecus schmidi

Class: Insecta
Order: Trichoptera
Family: Limnephilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G4
S-rank: S2

SGCN TIER: 3
Rationale: Regional endemic, data deficient



DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 7,600 km^2 (~2,900 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics, Idaho Batholith, Northwestern Basin and Range
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly occurs in British Columbia, Washington, Idaho, and Montana. In Idaho, it has been recorded in several areas of the state, mainly in the mid-1990s. The most recent observation (2008) was in Lemhi County. It appears to be relatively uncommon and infrequently collected, but may be more common and simply under–collected.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: The species is found in small, cold streams in subalpine habitat. It feeds on plant detritus and is thought to require two years to complete its life cycle. This species is considered a good surrogate indicator for other species of subalpine small, cold streams.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats to populations have not been documented, however the primary threat is thought to be the loss and/or degradation of source headwater habitats. In addition, the species may be vulnerable to climate change due to its habitat preferences.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

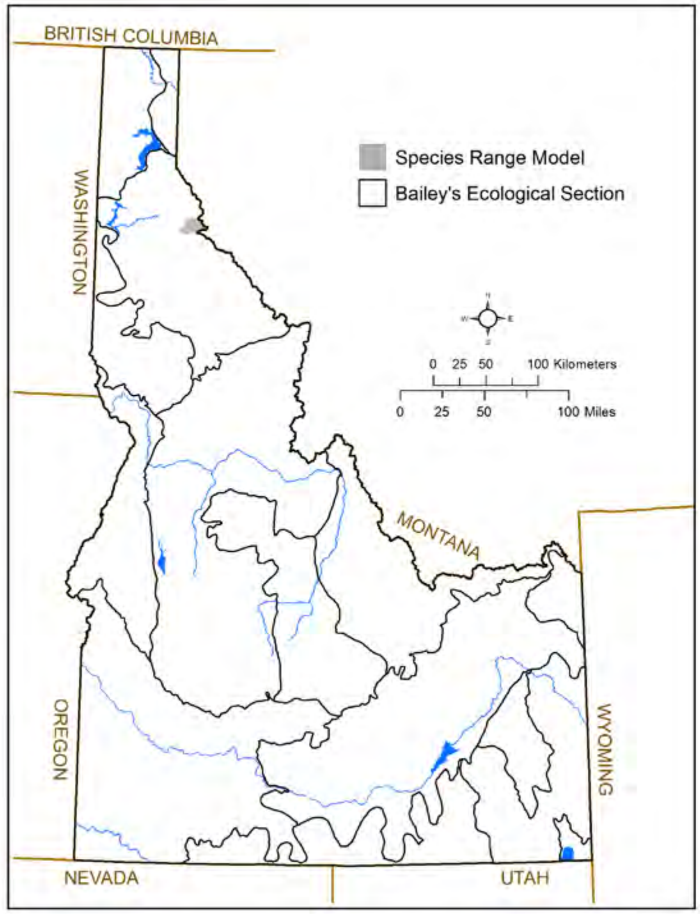
ADDITIONAL COMMENTS

None.

Information Sources: Wisseman R, Aquatic Biology Associates, pers. comm.; Wiggins GB, Richardson JS. 1989. Biosystematics of *Eocosmoecus*, a new Nearctic caddisfly genus (Trichoptera: Limnephilidae, Dicosmoecinae). Journal of the North American Benthological Society 8:355–369; Wiggins GB. 1975. Contributions to the systematics of the caddisfly family Limnephilidae (Trichoptera). II. Canadian Entomologist 107:325–336.
Map Sources: Idaho Department of Environmental Quality. BUGS database. [Accessed February 13, 2015].; Wiggins GB, Richardson JS. 1989. Biosystematics of *Eocosmoecus*, a new Nearctic caddisfly genus (Trichoptera: Limnephilidae, Dicosmoecinae). Journal of the North American Benthological Society 8:355–369; Wisseman R, Ruiter D, Aquatic Biology Associates, unpublished data.

A Caddisfly

Homophylax acutus



Class: Insecta
Order: Trichoptera
Family: Limnephilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3G5
S-rank: SNR

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 300 km^2 (~100 mi^2)
Key Ecological Sections: Bitterroot Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is known to occur in Idaho, Montana, Alberta, and British Columbia. The only known location in Idaho is from Wallace. Most known species in this genus are localized in distribution and rarely collected. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Details of this species habitat requirements have not been documented however, it appears to be a subalpine–alpine species and has been found in small high-elevation creeks and pools.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Species-specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS

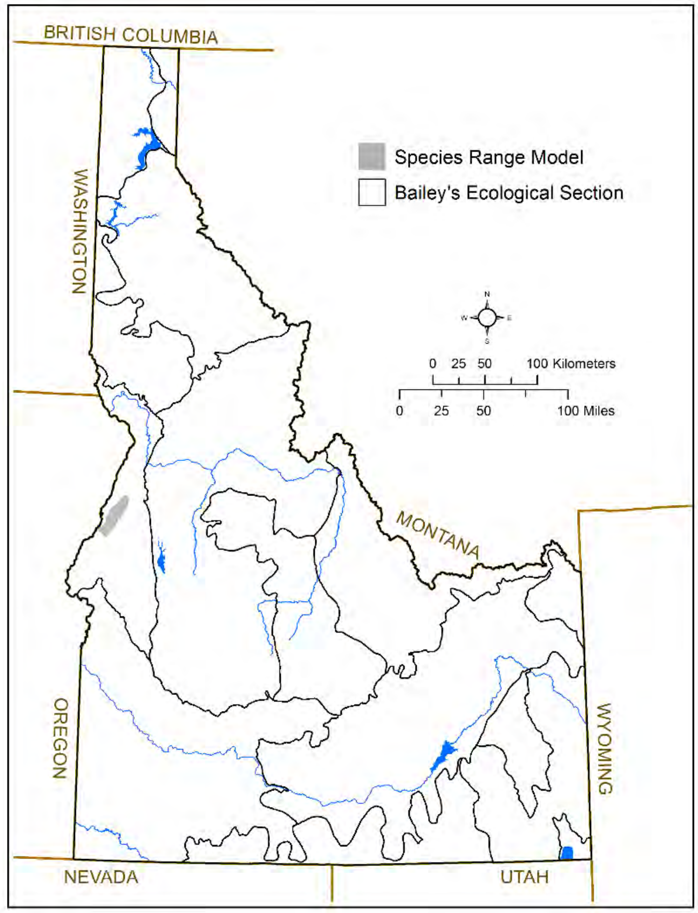
None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Ruiter D, pers.comm.; Wisseman R, Aquatic Biology Associates, pers. comm.; Denning DG. 1964. The genus *Homophylax* (Trichoptera: Limnephilidae). Annals of the Entomological Society of America 57: 253-260; Roemhild G. 1982. The Trichoptera of Montana with distributional and ecology notes. Northwest Science 56: 8–13.
Map Sources: Denning DG. 1964. The genus *Homophylax* (Trichoptera: Limnephilidae). Annals of the Entomological Society of America 57: 253-260.

A Caddisfly

Homophylax auricularis

Class: Insecta
Order: Trichoptera
Family: Limnephilidae



CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G3
S-rank: SNR

SGCN TIER: 3
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 500 km^2 (~200 mi^2)
Key Ecological Sections: Blue Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is an Idaho endemic that was described from specimens collected near the town of Bear in Adams County in 1951. Most known species in this genus are localized in distribution and rarely collected. Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Details of this species habitat requirements have not been documented however, it has been found in mountain streams and lakes.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Species-specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

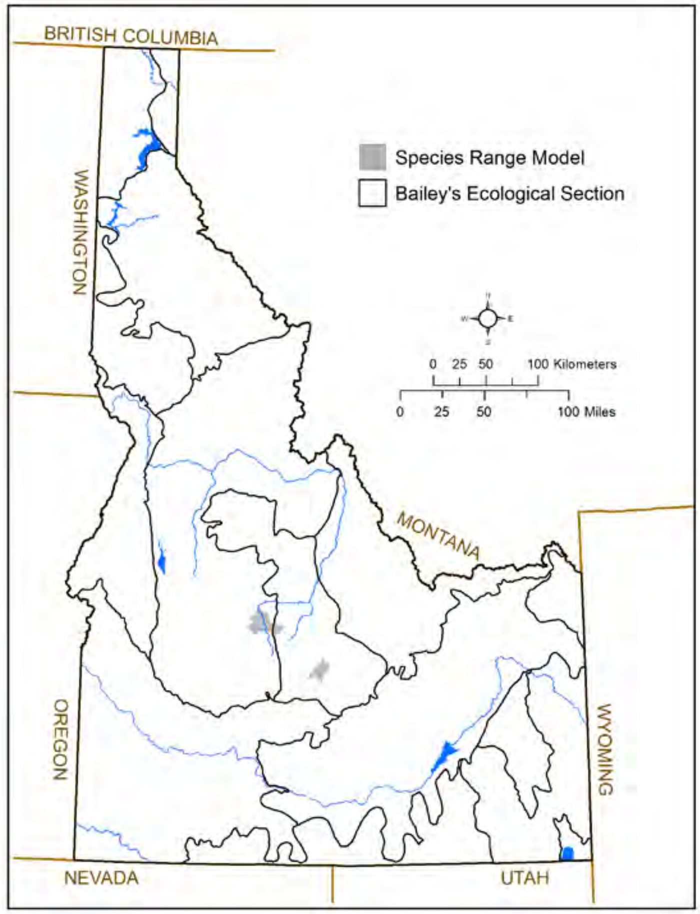
ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Denning DG. 1964. The genus *Homophylax* (Trichoptera: Limnephilidae). Annals of the Entomological Society of America 57: 253-260; Smith SD. 1971. Notes and new species of Limnephilid caddisflies from Idaho (Trichoptera: Limnephilidae). The Pan–Pacific Entomologist 47:184–188.
Map Sources: Denning DG. 1964. The genus *Homophylax* (Trichoptera: Limnephilidae). Annals of the Entomological Society of America 57: 253-260.

A Caddisfly

Limnephilus challisa



Class: Insecta
Order: Trichoptera
Family: Limnephilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: SNR

SGCN TIER: 3
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 700 km^2 (~300 mi^2)
Key Ecological Sections: Challis Volcanics, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is an Idaho endemic, known only from Hyndman Creek (Blaine County, 1952) and the Salmon River near Stanley (Custer County, 1965). Whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Details of this species habitat requirements have not been documented.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: Species-specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

Surveys are needed to determine if this species is extant in Idaho.

ADDITIONAL COMMENTS

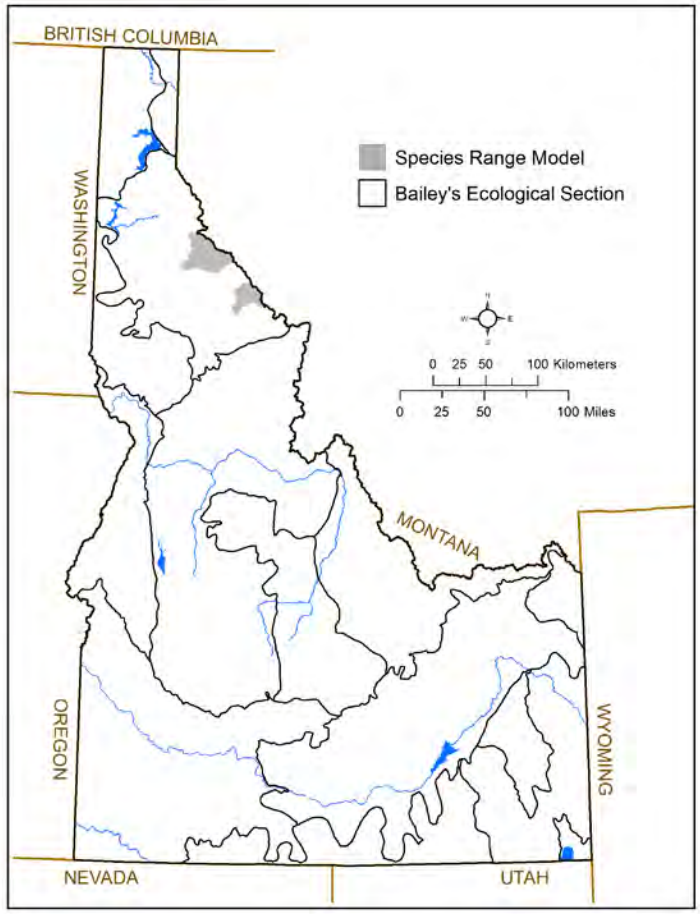
None.

Information Sources: Ruiter DE. 1995. The adult *Limnephilus* Leach (Trichoptera: Limnephilidae) of the New World. Ohio Biological Survey Bulletin Vol 11, No 1, 206 pp; Newell RL, Minshall GW. 1979. Aquatic invertebrates of southeastern Idaho II. Trichoptera (Caddisflies). Journal of the Idaho Academy of Science 15:33–51.

Map Sources: Ruiter DE, unpublished data; Ruiter DE. 1995. The adult *Limnephilus* Leach (Trichoptera: Limnephilidae) of the New World. Ohio Biological Survey Bulletin Vol 11, No 1, 206pp.; Smith SD. 1969. Two new species of Idaho Trichoptera with distributional and taxonomic notes on other species. Journal of the Kansas Entomological Society 42:46–53.

A Caddisfly

Philocasca antennata



Class: Insecta
Order: Trichoptera
Family: Limnephilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G3
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,600 km^2 (~600 mi^2)
Key Ecological Sections: Bitterroot Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is known to occur in Idaho, Montana, and Washington. In Idaho, it is known from only 1 collection near Wallace. It appears to be rare and is infrequently collected.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Details of this species habitat requirements have not been documented however, it appears to be more highly habitat specific than other species in the region. Adults have been collected from small, cold, low–gradient, conifer–forested streams with loose gravel in the stream bed. Larvae of this species have not been described. Larvae of other species in the genus have been known to spend part of their life cycle terrestrially, leaving the stream channel during cool, wet seasons and returning to the stream when the forest floor dries out.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Unknown
Description: Specific threats to populations have not been documented, however the primary threat is thought to be the loss and/or degradation of source headwater habitats.

CONSERVATION ACTIONS

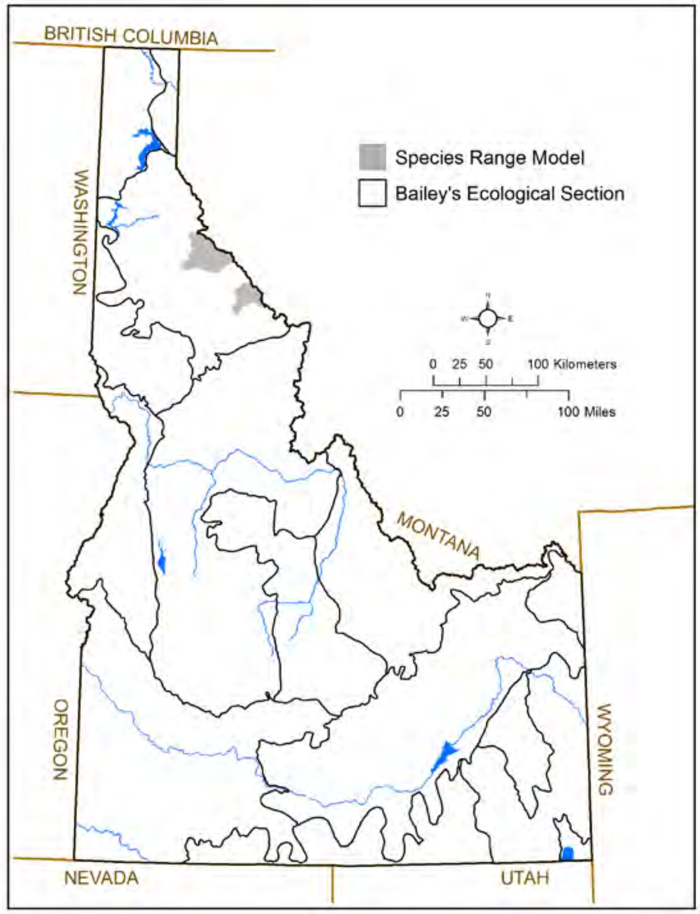
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

None.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.
Map Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Wiggins GB, Anderson NH. 1968. Contributions to the systematics of the caddisfly genera *Pseudostenophylax* and *Philocasca* with special reference to the immature stages (Trichoptera: Limnephilidae). Canadian Journal of Zoology 46:61–75.

A Caddisfly
Philocasca banksi



Class: Insecta
Order: Trichoptera
Family: Limnephilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G3
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,600 km^2 (~600 mi^2)
Key Ecological Sections: Bitterroot Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly occurs in Idaho and Montana and is endemic to the Northern Rocky Mountain Refugium. It appears to be rare and is infrequently collected with only a few known localities. The holotype was collected near Wallace in 1941.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Details of this species habitat requirements have not been documented however, it appears to be more highly habitat specific than other species in the region. Adults have been collected from small, cold, low–gradient, conifer–forested streams with loose gravel in the stream bed. Larvae of this species have not been described. Larvae of other species in the genus have been known to spend part of their life cycle terrestrially, leaving the stream channel during cool, wet seasons and returning to the stream when the forest floor dries out.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown
Description: Specific threats to populations have not been documented, however the primary threat is thought to be the loss and/or degradation of source headwater habitats.

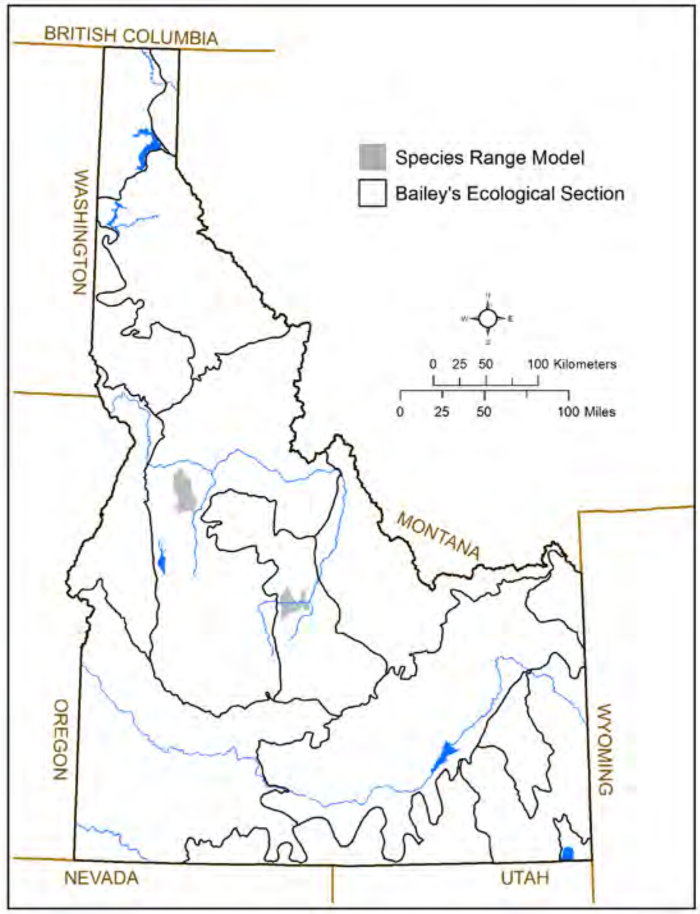
CONSERVATION ACTIONS
We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS
None.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.
Map Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Wiggins GB, Anderson NH. 1968. Contributions to the systematics of the caddisfly genera *Pseudostenophylax* and *Philocasca* with special reference to the immature stages (Trichoptera: Limnephilidae). Canadian Journal of Zoology 46:61–75.

A Caddisfly

Psychoglypha smithi



Class: Insecta
Order: Trichoptera
Family: Limnephilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G3
S-rank: S2

SGCN TIER: 3
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 1,100 km^2 (~400 mi^2)
Key Ecological Sections: Challis Volcanics, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is an Idaho endemic, known from only 2 locations in Custer and Idaho counties. It is one of the smallest species in the genus.

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Details of this species habitat requirements have not been documented however, it has been found in small, fast–flowing, cold streams. Most species in this genus are cold–adapted and are frequently found in the late fall, winter or early spring, often on snow.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: Species–specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

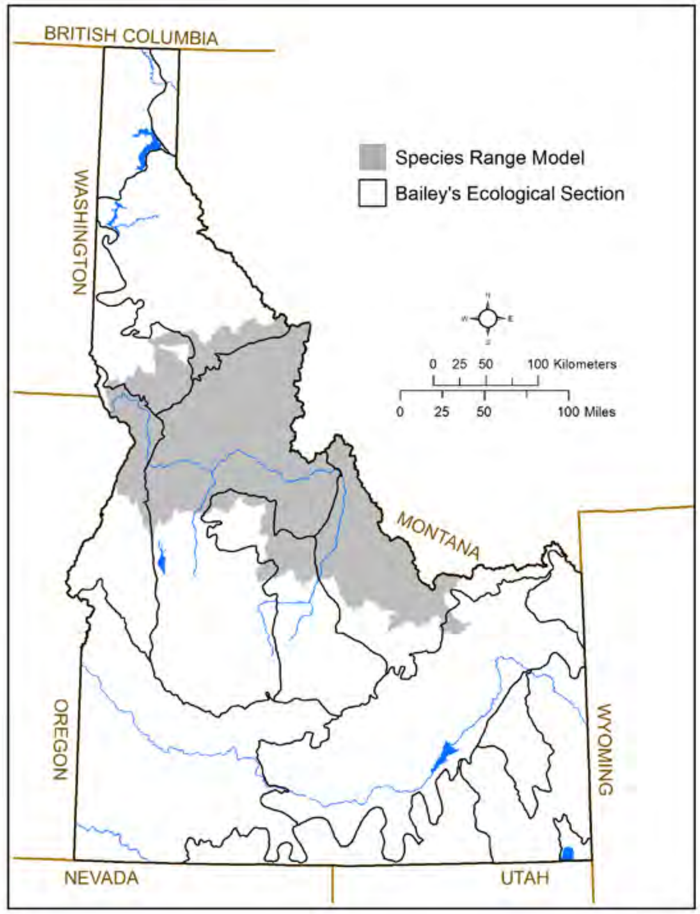
ADDITIONAL COMMENTS

None.

Information Sources: D Ruiter, unpublished data; Denning DG. 1970. The genus *Psychoglypha* (Trichoptera: Limnephildae). The Canadian Entomologist 102:15–30.
Map Sources: Ruiter DE, unpublished data; Denning DG. 1970. The genus *Psychoglypha* (Trichoptera: Limnephilidae). The Canadian Entomologist 102:15–30

A Caddisfly

Rhyacophila oreia



Class: Insecta
Order: Trichoptera
Family: Rhyacophilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G3
S-rank: SNR

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 44,500 km^2 (~17,200 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is known to occur in Montana, Wyoming, and Idaho. In Idaho, it has been recorded in the South Fork area of the Salmon River drainage in Valley County, near Gibbonsville in Lemhi County and at Lolo Pass in Idaho County. All collections are from before 1970. It is a small, uncommon species.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Details of this species habitat requirements have not been documented. However, it tends to be found in small, fast–flowing, cold streams typically in forested habitats. Most species in this genus are predators feeding on aquatic insects, especially midges and blackflies.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown

Intrinsic Vulnerability: Unknown
Description: Species–specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

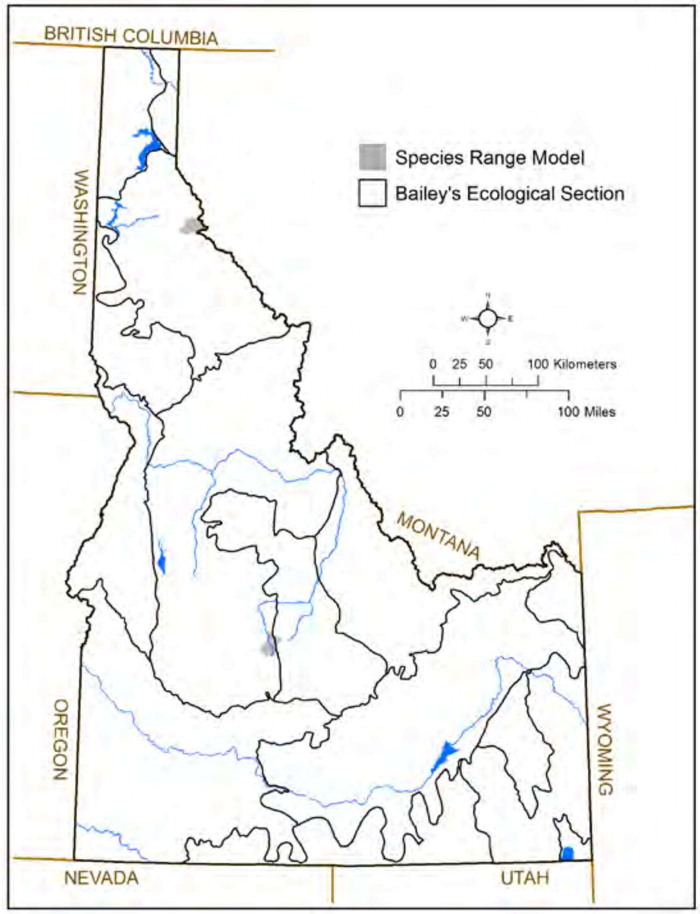
ADDITIONAL COMMENTS

None.

Information Sources: Wold JL. 1974. Systematics of the Genus *Rhyacophila* (Trichoptera: Rhyacophilidae) in Western North America with special reference to the immature stages. Master's Thesis. Corvallis (OR): Oregon State University; Smith SD. 1968. The *Rhyacophila* of the Salmon River drainage of Idaho with special reference to larvae. Annals of the Entomological Society of America 61:655–674.
Map Sources: Wold JL. 1974. Systematics of the Genus *Rhyacophila* (Trichoptera: Rhyacophilidae) in Western North America with special reference to the immature stages. Master's Thesis. Corvallis (OR): Oregon State University.

A Caddisfly

Rhyacophila robusta



Class: Insecta
Order: Trichoptera
Family: Rhyacophilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2G3
S-rank: SNR

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 500 km^2 (~200 mi^2)
Key Ecological Sections: Bitterroot Mountains, Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is known from Montana, Idaho, British Columbia, and Alberta. In Idaho, it was documented in Shoshone and Blaine counties in 1996.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Details of this species habitat requirements have not been documented. However, it tends to be found in small, fast–flowing, cold streams typically in forested habitats. Most species in this genus are predators feeding on aquatic insects, especially midges and blackflies.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Species–specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

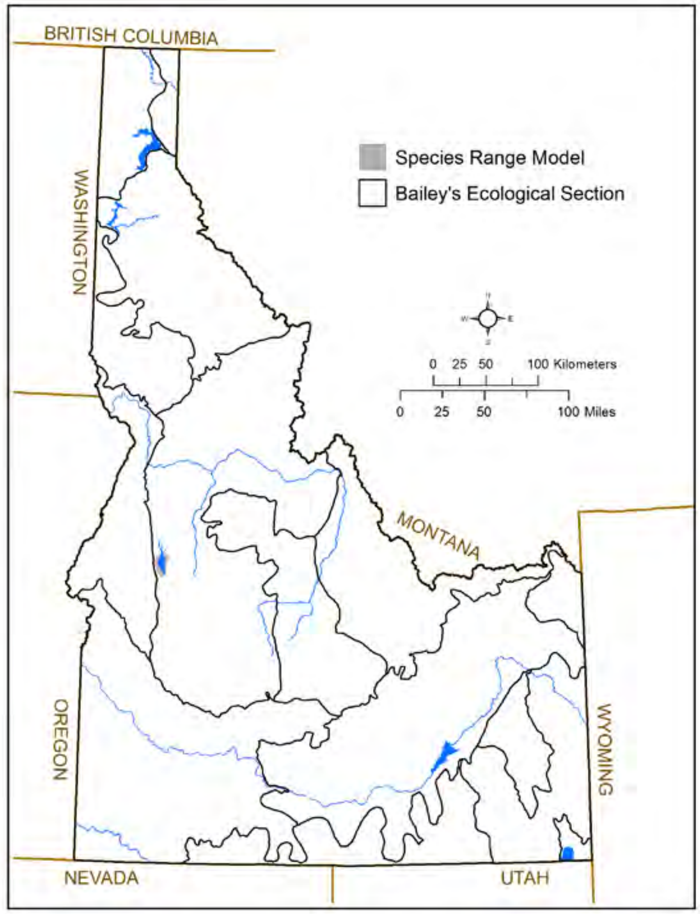
ADDITIONAL COMMENTS

None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Roemhild G. 1982. The Trichoptera of Montana with distributional and ecology notes. Northwest Science 56: 8–13.
Map Sources: Idaho Department of Environmental Quality. BUGS database. [Accessed February 13, 2015].

A Caddisfly

Rhyacophila velora



Class: Insecta
Order: Trichoptera
Family: Rhyacophilidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: SNR

SGCN TIER: 3
Rationale: Data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 200 km^2 (~100 mi^2)
Key Ecological Sections: Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly was previously known from only a few sites in California and Oregon, but has been collected by the Idaho Department of Environmental Quality at Campbell Creek, Valley County, in 1995.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: Details of this species habitat requirements have not been documented. However, it tends to be found in small, fast–flowing, cold streams typically in forested habitats. Most species in this genus are predators feeding on aquatic insects, especially midges and blackflies.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Species–specific threats have not been identified. In general, caddisfly populations are affected by changes to aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

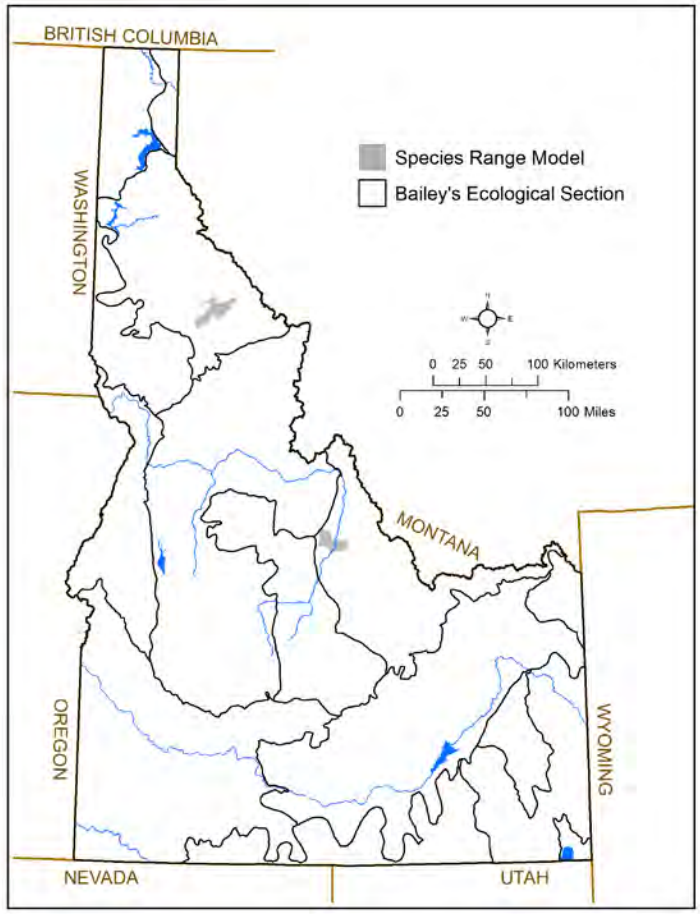
None.

Information Sources: NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington (VA): NatureServe. http://explorer.natureserve.org; Wold JL. 1974. Systematics of the Genus *Rhyacophila* (Trichoptera: Rhyacophilidae) in Western North America with special reference to the immature stages. Master's Thesis. Corvallis (OR): Oregon State University.
Map Sources: Idaho Department of Environmental Quality. BUGS database. [Accessed February 13, 2015].

A Caddisfly

Goereilla baumanni

Class: Insecta
Order: Trichoptera
Family: Rossianidae



CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G2
S-rank: S1

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 800 km^2 (~300 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is endemic to the Northern Rocky Mountain Refugium in north–central Idaho and western Montana. In 2007, it was known from only 6 occurrences, 5 in Montana and 1 in Idaho (Clearwater County). When found, it is always reported in low abundance.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Little is known of this species' biology and ecology, however it has been found in headwater springs and seeps.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats to populations have not been documented, however the primary threat is thought to be the loss and/or degradation of source headwater habitats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

ADDITIONAL COMMENTS

None.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.

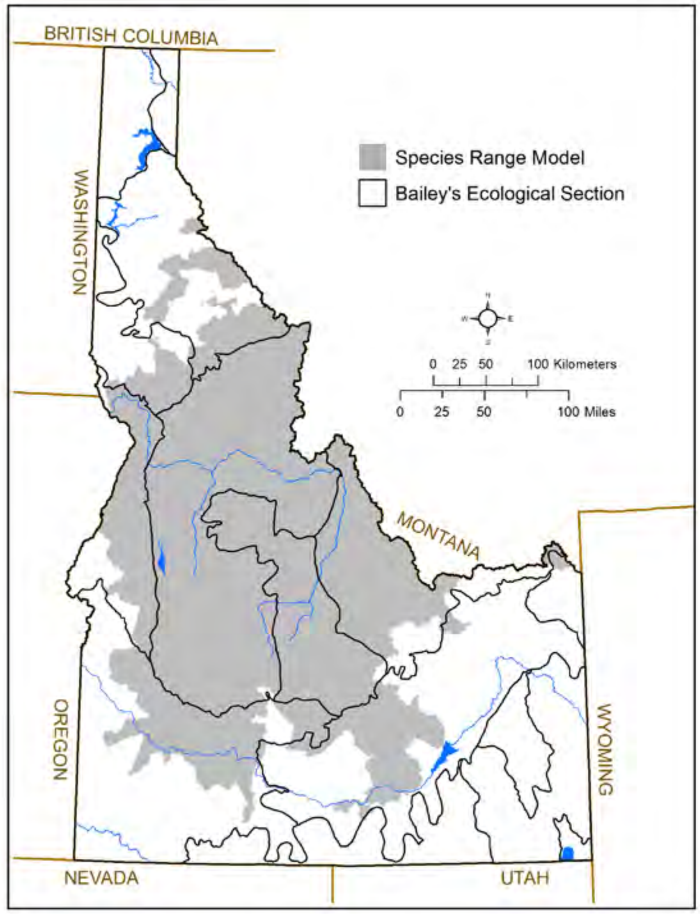
Map Sources: Wisseman R, Ruiter DE, Aquatic Biology Associates, unpublished data; Northern Rocky Mountain Refugium Caddisfly – *Goereilla baumanni*. Montana Field Guide. Montana natural Heritage Program http://FieldGuide.mt.gov [Accessed Jan 12, 2015]; Stagliano DM, Stephens GM, Bosworth WR. 2007. Aquatic Invertebrate Species of Concern on USFS Northern Region Lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program and Boise (ID): Idaho Conservation Data Center.

A Caddisfly
Sericostriata surdickae

Class: Insecta
Order: Trichoptera
Family: Uenoidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
  Region1: No status
  Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G3
S-rank: S3

SGCN TIER: 3
Rationale: Regional endemic, data deficient



DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 121,600 km^2 (~47,000 mi^2)
Key Ecological Sections: Beaverhead Mountains, Bitterroot Mountains, Blue Mountains, Challis Volcanics
Population Size in Idaho: Not applicable for invertebrates.
Description: This caddisfly is endemic to northern and central Idaho and western Montana, but is patchily distributed across this area. It has been documented in several Idaho counties. Recent sampling efforts have found new locations in Montana and modeling suggests a high likelihood of finding occurrences in previously undocumented sites.

HABITAT & ECOLOGY
Environmental Specificity: Narrow: Specialist—key requirements are common.
Description: This species is found in cold, fast–flowing streams, typically in mid-elevation and subalpine forested habitats. The larvae occur on the upper surfaces of rocks, especially in the splash zones, and are often found in aggregates. They are distinctive and diagnostic making them hard to miss or misidentify. Adults emerge mid–July to mid–August. The species is thought to require at least 2 years to complete its life cycle.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Moderately vulnerable
Description: Specific threats to populations have not been documented, however the primary threat is thought to be the loss and/or degradation of source headwater habitats.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

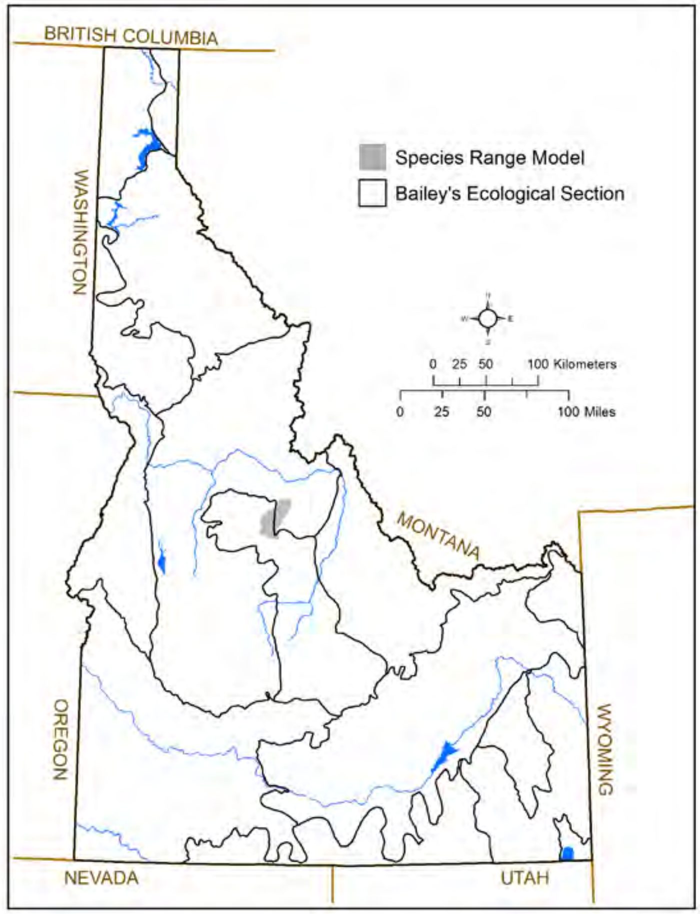
ADDITIONAL COMMENTS

None.

Information Sources: Stagliano DM, Maxell BA. 2010. Aquatic invertebrate species of concern: updated distributions, vital watersheds, and predicted sites within USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Helena (MT): Montana Natural Heritage Program.; Mazzacano C. 2008. *Sericostriata surdickae* (Wiggins, Weaver and Unzicker 1995) A northern Rocky Mountain Refugium caddisfly Trichoptera: Uenoidae. The Xerces Society for Invertebrate Species Conservation. [Accessed Jan 12, 2015] www.xerces.org/wp–content/uploads/2008/09/sericostriata_surdickae.pdf; Wiggins GB, Weaver JS III, Unzicker JD. 1985. Revision of the caddisfly family Uenoidae (Trichoptera). The Canadian Entomologist 117:763–800.
Map Sources: Wisseman R, Ruiter DE, Aquatic Biology Associates, unpublished data; Idaho Department of Environmental Quality. BUGS database. [Accessed February 13, 2015].; Mazzacano C. 2008. *Sericostriata surdickae* (Wiggins, Weaver and Unzicker 1995) A northern Rocky Mountain Refugium caddisfly Trichoptera: Uenoidae. Portland (OR): The Xerces Society for Invertebrate Conservation. [Accessed Jan 12, 2015] www.xerces.org/wp–content/uploads/2008/09/sericostriata_surdickae.pdf

Idaho Amphipod

Stygobromus idahoensis



Class: Malacostraca
Order: Amphipoda
Family: Crangonyctidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1G2
S-rank: S1

SGCN TIER: 3
Rationale: Idaho endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 600 km^2 (~200 mi^2)
Key Ecological Sections: Idaho Batholith
Population Size in Idaho: Not applicable for invertebrates.
Description: The Idaho Amphipod is an Idaho endemic, known only from the mouth of a tributary to the Middle Fork Salmon River, Lemhi County. It was last collected in 1986 and whether the species is extant is not known.

HABITAT & ECOLOGY
Environmental Specificity: Very narrow: Specialist—key requirements are scarce.
Description: Little is known of this species' biology and ecology, however it has been found in shallow water habitat.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented for this species.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable

Description: Species–specific threats have not been identified but likely include any changes to its aquatic habitat, such as alteration of flow patterns, streambed substrate, thermal characteristics, and water quality.

CONSERVATION ACTIONS

We have an inadequate understanding of the current population status for this species. Conservation actions should therefore focus on improving our knowledge of distribution and abundance, and clarifying the nature and extent of threats where appropriate.

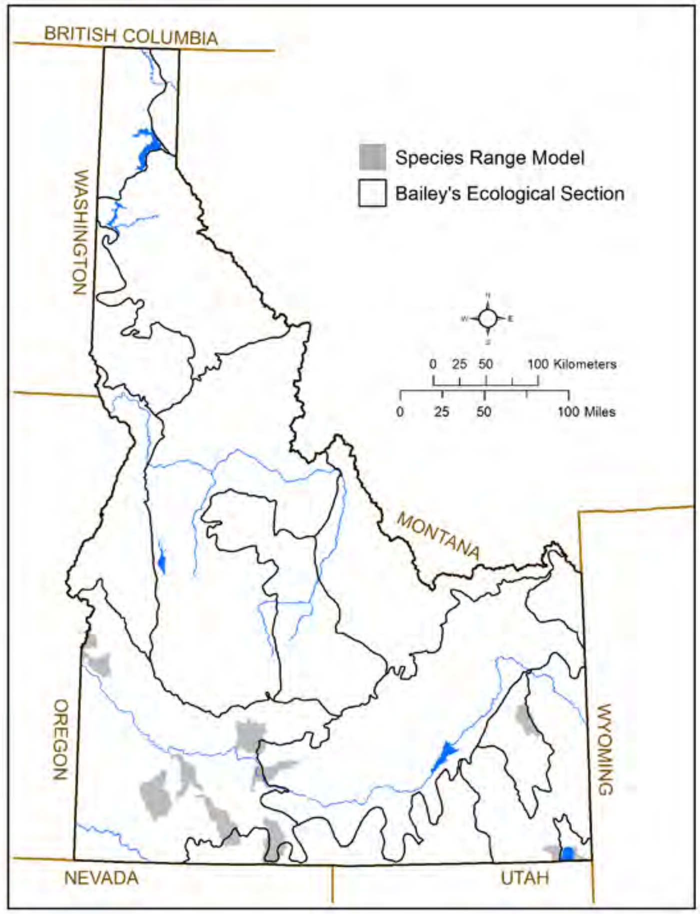
ADDITIONAL COMMENTS

None.

Information Sources: Wang D, Holsinger JR. 2001. Systematics of the subterranean amphipod genus *Stygobromus* (Crangonyctidae) in Western North America, with emphasis on species of the *hubbsi* group. Amphipacifica 3(2):39–147; JR Holsinger, Old Dominion University, pers. comm.
Map Sources: Idaho Department of Fish and Game. Idaho Fish and Wildlife Information System, Species Diversity Database. [Accessed July 1, 2014].

Snake River Pilose Crayfish

Pacifastacus connectens



Class: Malacostraca
Order: Decapoda
Family: Astacidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Game Fish
G-rank: G3G4
S-rank: SNR

SGCN TIER: 3
Rationale: Regional endemic, data deficient

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 5,400 km^2 (~2,100 mi^2)
Key Ecological Sections: Northwestern Basin and Range, Owyhee Uplands, Snake River Basalts
Population Size in Idaho: Not applicable for invertebrates.
Description: Historically, the range of the Snake River Pilose Crayfish extended from southeastern Oregon, across the Snake River plain of southern Idaho and into northern Nevada. Little is known of its contemporary distribution or conservation status.

HABITAT & ECOLOGY
Environmental Specificity: Unknown
Description: This species is found in lotic habitats and is sensitive to water quality, however, little else is known of the ecology and life history of the species.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS
Overall Threat Impact: Unknown
Intrinsic Vulnerability: Unknown

Description: Threats to the population are not specifically identified but could include land use change and/or habitat loss or degradation affecting water quality. The introduction of invasive crayfish species in southern Idaho have also likely affected the species.

CONSERVATION ACTIONS

Recent studies indicate that the Snake River Pilose Crayfish and Pilose Crayfish (*P. gambelii*) might be the same species. Additional genetic research is needed to determine the taxonomic uniqueness of this species.

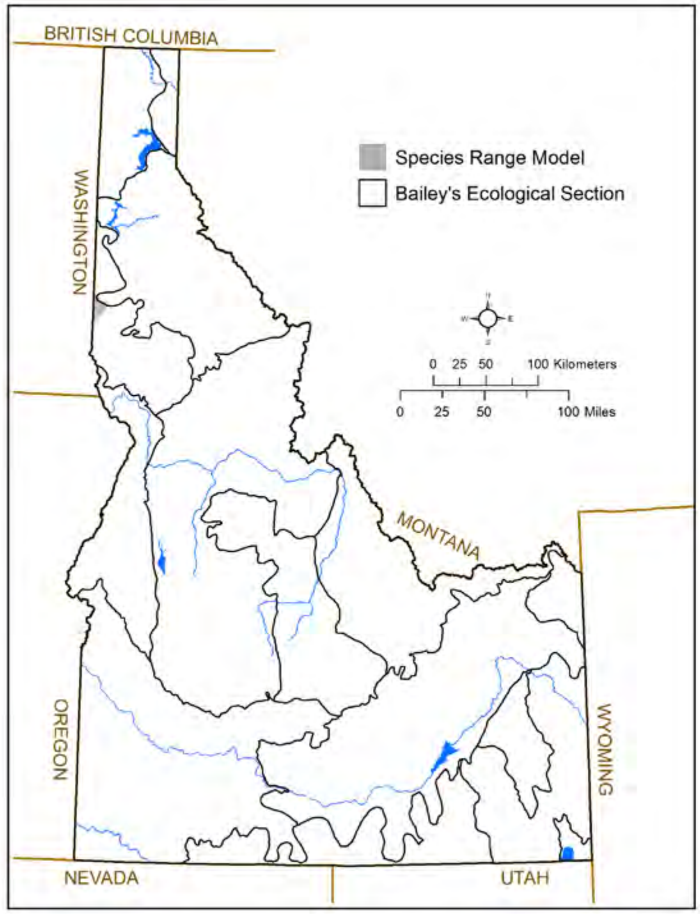
ADDITIONAL COMMENTS

None.

Information Sources: Larson ER, Olden JD. 2011. The state of crayfish in the Pacific Northwest. Fisheries 36:60–73.
Map Sources: Idaho Department of Environmental Quality. BUGS database. [Accessed February 13, 2015].; Larson ER, Olden JD. 2011. The state of crayfish in the Pacific Northwest. Fisheries 36:60–73.

Giant Palouse Earthworm

Driloleirus americanus



Class: Oligochaeta
Order: Haplotaxida
Family: Megascolecidae

CONSERVATION STATUS & CLASSIFICATION
ESA: No status
USFS:
Region1: No status
Region 4: No status
BLM: No status
IDAPA: Unprotected Wildlife
G-rank: G1
S-rank: S2

SGCN TIER: 2
Rationale: Regional endemic, data deficient, IUCN Vulnerable

DISTRIBUTION & ABUNDANCE
Range Extent in Idaho: 200 km^2 (~100 mi^2)
Key Ecological Sections: Palouse Prairie
Population Size in Idaho: Not applicable for invertebrates.
Description: The Giant Palouse Earthworm, once thought to be endemic to the Palouse grasslands in Washington and northern Idaho, has recently been documented to occur across a broader area of Washington (Whitman, Kittitas, and Chelan counties), but in Idaho, is still only known from Latah County. Althougth reported as "very abundant" in 1897, few records of the species existed until the last 10 years. Recent Idaho records include specimens from Moscow Mountain (1988), Paradise Ridge (2008, 2010, 2012), and East of Moscow (2010).

HABITAT & ECOLOGY
Environmental Specificity: Moderate: Generalist—some key requirements are scarce.
Description: Habitat requirements for this species are not well understood. Generally it is associated with Palouse Prairie vegetation, but it has also been found in relatively open canopy forested systems. It is thought to be capable of burrowing up to 15 ft deep, making it difficult to detect in surveys.

POPULATION TREND
Short-term Trend: Unknown
Long-term Trend: Unknown
Description: Population trends have not been documented.

THREATS

Overall Threat Impact: Unknown
Intrinsic Vulnerability: Highly vulnerable
Description: Direct threats to this species are unknown, but are thought to include land–use change, habitat fragmentation, and competition with nonnative earthworms.

CONSERVATION ACTIONS

Conservation issues and management actions are described in the Palouse Prairie Section plan. In short, recommended strategies for the Giant Palouse Earthworm include preservation of native grassland remnants, minimizing conversion of grazing pastures to crop fields, early detection and response to invasive plants, using integrated pest management strategies, and minimizing impacts of rural development.

ADDITIONAL COMMENTS

The species was proposed for listing under the ESA in 2006 and 2009, but deemed not warranted by FWS in 2011 due to recent collections over a broader geographical and ecological range and the lack of data about known direct threats.

Information Sources: Xu S, Johnson–Maynard JL, Prather TS. 2013. Earthworm density and biomass in relation to plant diversity and soil properties in a Plaouse Prairie remnant. Applied Soil Ecology 72:119–127.; Johnson–Maynard J. 2012. Giant Palouse Earthworm Survey Protocol Final Performance Report; Sanchez–de Leon Y, Johnson–Maynard J. 2009. Dominance of an invasive earthworm in native and non–native grassland ecosystems. Biological Invasions 11:1393–1401.; FWS. 2011. 12-month finding on a petition to List the giant Palouse earthworm (*Drilolerius americanus*) as threatened or endangered. Federal Register 76:44547-44564.

Map Sources: Xu S, Johnson–Maynard JL, Prather TS. 2013. Earthworm density and biomass in relation to plant diversity and soil properties in a Palouse Prairie remnant. Applied Soil Ecology 72:119–127.; Johnson–Maynard J. 2012. Giant Palouse Earthworm Survey Protocol Final Performance Report; Sanchez–de Leon Y, Johnson–Maynard J. 2009. Dominance of an invasive earthworm in native and non–native grassland ecosystems. Biological Invasions 11:1393–1401.

Appendix G: Species Monitoring Summary

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
Bear Lake	Bear Lake Whitefish[2]		x			x
Bear Lake	Bonneville Cisco[2]		x			x
Bear Lake	Bonneville Whitefish[2]		x			x
Bear Lake	Bear Lake Sculpin[2]		x			x
Bear Lake	Western Toad[2]	x		x	x	x
Bear Lake	Northern Leopard Frog[2]		x	x	x	x
Bear Lake	Trumpeter Swan[2]		x		x	x
Bear Lake	Greater Sage-Grouse[1]		x	x	x	
Bear Lake	Sharp-tailed Grouse[2]		x	x	x	
Bear Lake	Western Grebe[2]	x				x
Bear Lake	Clark's Grebe[2]	x				x
Bear Lake	American Bittern[2]		x			x
Bear Lake	White-faced Ibis[2]		x	x	x	x
Bear Lake	Ferruginous Hawk[2]		x	x	x	
Bear Lake	Golden Eagle[2]		x	x	x	
Bear Lake	Sandhill Crane3			x	x	x
Bear Lake	Long-billed Curlew[2]	x		x		
Bear Lake	Franklin's Gull[3]		x			x
Bear Lake	California Gull[2]		x			x
Bear Lake	Caspian Tern[2]		x			x
Bear Lake	Black Tern[2]	x				x
Bear Lake	Short-eared Owl[3]	x		x	x	
Bear Lake	Common Nighthawk[3]	x		x		
Bear Lake	Sage Thrasher[2]			x		
Bear Lake	Sagebrush Sparrow	x				
Bear Lake	Grasshopper Sparrow[3]	x				
Bear Lake	Pygmy Rabbit[2]		x	x		
Bear Lake	Townsend's Big-eared Bat[3]			x		
Bear Lake	Silver-haired Bat[2]			x		
Bear Lake	Hoary Bat[2]			x		
Bear Lake	Western Small-footed Myotis[3]			x		
Bear Lake	Little Brown Myotis[3]			x		
Bear Lake	California Floater[3]	x		x		
Bear Lake	Pondsnail (*Stagnicola*) Species Group[3]	x		x		
Bear Lake	Rotund Physa[3]	x		x		
Bear Lake	Rocky Mountain Duskysnail[2]	x		x		
Bear Lake	Bear Lake Springsnail[1]	x		x		
Bear Lake	Lyrate Mountainsnail[2]	x		x		
Bear Lake	A Tiger Beetle (*Cicindela decomnotata montevolans*)	x		x		
Bear Lake	Hunt's Bumble Bee[3]	x				
Bear Lake	Morrison's Bumble Bee[1]	x				
Bear Lake	Western Bumble Bee[1]	x				
Bear Lake	Suckley's Cuckoo Bumble Bee[1]	x				
Bear Lake	Kriemhild Fritillary[3]	x				
Bear Lake	Monarch[3]	x				
Bear Lake	Utah Sallfly[3]	x		x		

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
Snake River Basalts	Northern Leopard Frog[2]					
Snake River Basalts	Western Toad[2]					
Snake River Basalts	Trumpeter Swan[2]					
Snake River Basalts	Greater Sage-Grouse[1]			x		
Snake River Basalts	Sharp-tailed Grouse[2]					
Snake River Basalts	Clark's Grebe[2]					
Snake River Basalts	Western Grebe[2]					
Snake River Basalts	American White Pelican[2]					
Snake River Basalts	American Bittern[2]					
Snake River Basalts	White-faced Ibis[2]					
Snake River Basalts	Ferruginous Hawk[2]					
Snake River Basalts	Golden Eagle[2]					
Snake River Basalts	Sandhill Crane[3]					
Snake River Basalts	Long-billed Curlew[2]			x		
Snake River Basalts	Franklin's Gull[3]					
Snake River Basalts	Ring-billed Gull[3]					
Snake River Basalts	California Gull[2]					
Snake River Basalts	Caspian Tern[2]					
Snake River Basalts	Black Tern[2]					
Snake River Basalts	Yellow-billed Cuckoo[1]					
Snake River Basalts	Burrowing Owl[2]			x		
Snake River Basalts	Short-eared Owl[3]			x		
Snake River Basalts	Common Nighthawk[3]			x		
Snake River Basalts	Sage Thrasher[2]			x		
Snake River Basalts	Sagebrush Sparrow[2]			x		
Snake River Basalts	Grasshopper Sparrow[3]			x		
Snake River Basalts	Hoary Bat[2]	x				
Snake River Basalts	Little Brown Myotis[3]	x	x			
Snake River Basalts	Pygmy Rabbit[2]					
Snake River Basalts	Silver-haired Bat[2]					
Snake River Basalts	Townsend's Big-eared Bat[3]	x	x			
Snake River Basalts	Western Small-footed Myotis[3]	x	x			
Snake River Basalts	California Floater[3]					
Snake River Basalts	Western Pearlshell[2]					
Snake River Basalts	Western Ridged Mussel[3]					
Snake River Basalts	Snake River Physa[1]					
Snake River Basalts	Bliss Rapids Snail[1]					
Snake River Basalts	Pondsnail (*Stagnicola*) Species Group[3]		x			
Snake River Basalts	Deseret Mountainsnail[2]					
Snake River Basalts	A Cave Obligate Millipede (*Idagona westcotti*)[2]		x			
Snake River Basalts	Snake River Pilose Crayfish[3]					
Snake River Basalts	A Cave Obligate Mite (*Flabellorhagidia pecki*)[2]		x			
Snake River Basalts	A Cave Obligate Harvestman (*Speleomaster lexi*)[2]		x			
Snake River Basalts	A Cave Obligate Harvestman (*Speleomaster pecki*)[2]		x			
Snake River Basalts	Idaho Point-headed Grasshopper[2]	x				
Snake River Basalts	Spur-throated Grasshoppers (*Melanoplus*) Species Group[3]	x				
Snake River Basalts	A Metallic Wood-boring Beetle (*Agrilus pubifrons*)[3]	x				
Snake River Basalts	A Metallic Wood-boring Beetle	x				

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
	(*Chrysobothris horningi*)[2]					
Snake River Basalts	A Metallic Wood-boring Beetle (*Chrysobothris idahoensis*)[2]	x				
Snake River Basalts	Idaho Dunes Tiger Beetle[2]		x			
Snake River Basalts	Blind Cave Leiodid Beetle[1]		x			
Snake River Basalts	An Ant-like Flower Beetle (*Amblyderus owyhee*)[2]	x				
Snake River Basalts	A Long-horned Beetle (*Judolia gaurotoides*)[3]	x				
Snake River Basalts	A Leafcutting Bee (*Ashmeadiella sculleni*)[3]	x				
Snake River Basalts	Hunt's Bumble Bee[3]	x				
Snake River Basalts	Morrison's Bumble Bee[1]	x				
Snake River Basalts	A Miner Bee (*Calliopsis barri*)[2]	x				
Snake River Basalts	A Mason Bee (*Hoplitis producta subgracilis*)[3]	x				
Snake River Basalts	A Yellow-masked Bee (*Hylaeus lunicraterius*)[3]	x				
Snake River Basalts	Monarch[3]	x		x		
Snake River Basalts	Wiest's Primrose Sphinx[3]	x				
Snake River Basalts	A Caddisfly (*Glossosoma idaho*)[3]					
Snake River Basalts	A Mayfly (*Parameletus columbiae*)[3]					
NWBasinRange	Western Toad[2]		x	x		x
NWBasinRange	Northern Leopard Frog[2]			x		x
NWBasinRange	Greater Sage-Grouse[1]			x		
NWBasinRange	Sharp-tailed Grouse[2]			x		
NWBasinRange	Western Grebe[2]		x	x		x
NWBasinRange	Clark's Grebe[2]		x	x		x
NWBasinRange	American White Pelican[2]			x		
NWBasinRange	Ferruginous Hawk[2]			x		
NWBasinRange	Golden Eagle[2]			x		
NWBasinRange	Sandhill Crane[3]			x		x
NWBasinRange	Long-billed Curlew[2]		x	x		
NWBasinRange	Ring-billed Gull[3]		x	x		
NWBasinRange	California Gull[2]		x	x		
NWBasinRange	Caspian Tern[2]		x	x		
NWBasinRange	Burrowing Owl[2]		x	x		
NWBasinRange	Short-eared Owl[3]		x	x		
NWBasinRange	Common Nighthawk[3]		x	x		
NWBasinRange	Pinyon Jay[2]			x		
NWBasinRange	Sage Thrasher[2]			x		
NWBasinRange	Sagebrush Sparrow[2]			x		
NWBasinRange	Grasshopper Sparrow[3]			x		
NWBasinRange	Red Crossbill (South Hills popn)[2]					
NWBasinRange	Pygmy Rabbit[2]			x		
NWBasinRange	Townsend's Big-eared Bat[3]			x		x
NWBasinRange	Silver-haired Bat[2]					
NWBasinRange	Hoary Bat[2]					
NWBasinRange	Little Brown Myotis[3]			x		x
NWBasinRange	Bighorn Sheep[2]			x	x	
NWBasinRange	California Floater[3]			x		
NWBasinRange	Rocky Mountain Duskysnail[2]	x				
NWBasinRange	Bear Lake Springsnail[1]	x	x	x		x
NWBasinRange	Hunt's Bumble Bee[3]			x		

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
NWBasinRange	Morrison's Bumble Bee[1]			x		
NWBasinRange	Western Bumble Bee[1]			x		
NWBasinRange	Suckley's Cuckoo Bumble Bee[1]			x		
NWBasinRange	A Mason Bee (*Hoplitis producta subgracilis*)[3]			x		
NWBasinRange	A Miner Bee (*Hesperapis kayella*)[3]			x		x
NWBasinRange	Kriemhild Fritillary[3]					
NWBasinRange	Monarch[3]			x		
NWBasinRange	A Caddisfly (*Eocosmoecus schmidi*)[3]			x		x
NWBasinRange	Snake River Pilose Crayfish[3]	x	x	x		x
Yellowstone	Western Toad[2]			x		
Yellowstone	Northern Leopard Frog[2]			x		
Yellowstone	Trumpeter Swan[2]			x		
Yellowstone	Greater Sage-Grouse[1]			x		
Yellowstone	Sharp-tailed Grouse[2]			x		
Yellowstone	Common Loon[2]					
Yellowstone	Western Grebe[2]					
Yellowstone	American White Pelican[2]			x		
Yellowstone	White-faced Ibis[2]			x		
Yellowstone	Sandhill Crane[3]			x		
Yellowstone	Long-billed Curlew[2]			x		
Yellowstone	Franklin's Gull[3]					
Yellowstone	Ring-billed Gull[3]					
Yellowstone	California Gull[2]					
Yellowstone	Caspian Tern[2]					
Yellowstone	Great Gray Owl[3]					
Yellowstone	Short-eared Owl[3]			x		
Yellowstone	Olive-sided Flycatcher[3]					
Yellowstone	Clark's Nutcracker[3]					
Yellowstone	Bobolink[2]			x		
Yellowstone	Silver-haired Bat[2]			x		
Yellowstone	Hoary Bat[2]			x		
Yellowstone	Little Brown Myotis[3]			x		
Yellowstone	Wolverine[1]					
Yellowstone	Grizzly Bear[1]			x	x	
Yellowstone	Western Pearlshell [2]			x		
Yellowstone	Pondsnail species group (*Stagnicola* spp.)[3]			x		
Yellowstone	Rocky Mountain Duskysnail[2]					
Yellowstone	Western Bumble Bee[1]			x		
Yellowstone	Suckley's Cuckoo Bumble Bee[1]			x		
Yellowstone	Kriemhild Fritillary[3]			x		
Yellowstone	Monarch[3]			x		
Yellowstone	Gillette's Checkerspot[3]			x		
Yellowstone	A Caddisfly (*Glossosoma idaho*)[3]			x		

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
Beaverhead	Pacific Lamprey					
Beaverhead	Steelhead (Snake River Basin DPS)					
Beaverhead	Sockeye Salmon (Snake River ESU)					
Beaverhead	Chinook Salmon (spring/summer-run ESU)					
Beaverhead	Western Toad			x		
Beaverhead	Harlequin Duck		x			
Beaverhead	Greater Sage-Grouse			x		
Beaverhead	Ferruginous Hawk			x		
Beaverhead	Golden Eagle			x		
Beaverhead	Sandhill Crane			x		
Beaverhead	Long-billed Curlew			x		
Beaverhead	Burrowing Owl			x		
Beaverhead	Short-eared Owl			x		
Beaverhead	Great Gray Owl			x		
Beaverhead	Common Nighthawk			x		
Beaverhead	Lewis's Woodpecker			x		
Beaverhead	Olive-sided Flycatcher			x		
Beaverhead	Clark's Nutcracker			x		
Beaverhead	Sage Thrasher			x		
Beaverhead	Sagebrush Sparrow			x		
Beaverhead	Bobolink					
Beaverhead	Black Rosy-Finch	x	x	x		
Beaverhead	Pygmy Rabbit			x		
Beaverhead	Townsend's Big-eared Bat			x		
Beaverhead	Silver-haired Bat			x		
Beaverhead	Hoary Bat			x		
Beaverhead	Western Small-footed Myotis			x		
Beaverhead	Little Brown Myotis			x		
Beaverhead	Wolverine		x	x	x	
Beaverhead	Fisher		x	x		
Beaverhead	Grizzly Bear			x		
Beaverhead	Mountain Goat			x		
Beaverhead	Bighorn Sheep			x	x	
Beaverhead	Hoary Marmot	x	x			
Beaverhead	Western Pearlshell	x	x			
Beaverhead	Pondsnail (*Stagnicola*) Species Group	x	x			
Beaverhead	Lyrate Mountainsnail	x	x			
Beaverhead	Alpine Tiger Beetle	x	x			
Beaverhead	Lolo Mayfly	x	x			
Beaverhead	A Mayfly (*Cinygma dimicki*)	x	x			
Beaverhead	Hunt's Bumble Bee	x	x	x		
Beaverhead	Morrison's Bumble Bee	x	x			

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
Beaverhead	Western Bumble Bee	x	x	x		
Beaverhead	Suckley's Cuckoo Bumble Bee	x	x	x		
Beaverhead	A Mason Bee (*Hoplitis producta*)	x	x			
Beaverhead	Beartooth Copper	x	x			
Beaverhead	Monarch	x	x	x		
Beaverhead	Gillette's Checkerspot	x	x	x		
Beaverhead	Idaho Point-headed Grasshopper	x	x			
Beaverhead	A Grasshopper (*Argiacris amissuli)*	x	x			
Beaverhead	A Grasshopper (*Argiacris militaris*)	x	x			
Beaverhead	A Grasshopper (*Barracris petraea*)	x	x			
Beaverhead	Spur-throated Grasshopper (*Melanoplus*) Species Group	x	x			
Beaverhead	Lolo Sawfly	x	x			
Beaverhead	Tiny Forestfly	x	x			
Beaverhead	A Caddisfly (*Eocosmoecus schmidi*)	x	x			
Beaverhead	A Caddisfly (*Rhyacophila oreia*)	x	x			
Beaverhead	A Caddisfly (*Goereilla baumanni*)	x	x			
Beaverhead	A Caddisfly (*Sericostriata surdickae*)	x	x			
Challis	Pacific Lamprey[1]					
Challis	Steelhead (Snake River Basin DPS)[1]					
Challis	Sockeye Salmon (Snake River ESU)[1]					
Challis	Chinook Salmon (Snake River spring/summer-run ESU)[1]					
Challis	Western Toad[2]			x		x
Challis	Harlequin Duck[2]					
Challis	Greater Sage-Grouse[1]			x		x
Challis	Ferruginous Hawk[2]			x		x
Challis	Golden Eagle[2]			x		x
Challis	Sandhill Crane[3]			x		
Challis	Long-billed Curlew[2]			x		x
Challis	Yellow-billed Cuckoo[1]					
Challis	Burrowing Owl[2]			x		x
Challis	Great Gray Owl[3]			x		x
Challis	Short-eared Owl[3]			x		x
Challis	Common Nighthawk[3]			x		x
Challis	Lewis's Woodpecker[2]			x		x
Challis	Olive-sided Flycatcher[3]			x		x
Challis	Clark's Nutcracker[3]					x
Challis	Sage Thrasher[2]			x		x
Challis	Sagebrush Sparrow[2]			x		x
Challis	Black-Rosy Finch[3]	x	x	x		x
Challis	Pygmy Rabbit[2]			x		x

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
Challis	Townsend's Big-eared Bat[3]		x	x	x	x
Challis	Silver-haired Bat[2]		x	x	x	x
Challis	Hoary Bat[2]		x	x	x	x
Challis	Western Small-footed Myotis[3]		x	x	x	x
Challis	Little Brown Myotis[3]		x	x	x	x
Challis	Wolverine[1]	x	x	x	x	x
Challis	Mountain Goat[3]			x		
Challis	Bighorn Sheep[2]			x	x	x
Challis	Hoary Marmot[3]	x	x			
Challis	Western Pearlshell[2]	x	x			
Challis	A Mayfly (*Ephemerella alleni*)[2]	x	x			
Challis	A Mayfly (*Parameletus columbiae*)[3]	x	x			
Challis	A Mason Bee (*Hoplitus producta*)[3]	x		x		x
Challis	A Miner Bee (*Andrena aculeata*)[3]	x				
Challis	Hunt's Bumble Bee[3]	x	x	x		x
Challis	Morrison's Bumble Bee[1]	x				x
Challis	Western Bumble Bee[1]	x	x	x		x
Challis	Suckley's Cuckoo Bumble Bee[1]	x	x	x		x
Challis	Monarch[3]	x		x		x
Challis	A Grasshopper (*Argiacris keithi*)[3]	x	x			
Challis	A Grasshopper (*Argiacris militaris*)[3]	x	x			
Challis	Spur-throated Grasshopper (*Melanoplus*) Species Group[3]	x	x			x
Challis	Tiny Forestfly[3]	x	x			
Challis	A Caddisfly (*Eocosmoecus schmidi*)[3]	x	x			
Challis	A Caddisfly (*Limnephilus challisa*)[3]	x	x			
Challis	A Caddisfly (*Psychoglypha smithi*)[3]	x	x			
Challis	A Caddisfly (*Sericostriata surdickae*)[3]	x	x			
Overthrust	Northern Leopard Frog			x		
Overthrust	Western Toad			x		
Overthrust	Trumpeter Swan		x	x		
Overthrust	Harlequin Duck			x		
Overthrust	Greater Sage-Grouse			x		
Overthrust	Sharp-tailed Grouse			x		
Overthrust	American Bittern		x	x		
Overthrust	White-faced Ibis			x		
Overthrust	Golden Eagle			x		
Overthrust	Sandhill Crane			x		
Overthrust	Long-billed Curlew			x		
Overthrust	Franklin's Gull			x		
Overthrust	Black Tern			x		
Overthrust	Yellow-billed Cuckoo		x	x		

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
Overthrust	Great Gray Owl			x		x
Overthrust	Common Nighthawk			x		
Overthrust	Sage Thrasher		x	x		
Overthrust	Grizzly Bear			x	x	x
Overthrust	Hoary Bat		x	x	x	x
Overthrust	Little Brown Myotis		x	x		x
Overthrust	Pygmy Rabbit			x		
Overthrust	Silver-haired Bat		x	x	x	x
Overthrust	Townsend's Big-eared Bat		x	x		x
Overthrust	Western Small-footed Myotis		x	x		x
Overthrust	Wolverine					
Overthrust	California Floater[3]			x		
Overthrust	Pondsnail (*Stagnicola*) Species Group[3]			x		
Overthrust	Rotund Physa[3]					
Overthrust	Rocky Mountain Duskysnail[2]			x		
Overthrust	Bear Lake Springsnail[1]			x		
Overthrust	Lyrate Mountainsnail[2]					x
Overthrust	Thin-ribbed Mountainsnail[1]					x
Overthrust	A Tiger Beetle (*Cicindela decemnotata montevolans*)[2]			x		
Overthrust	Hunt's Bumble Bee[3]	x	x			
Overthrust	Morrison's Bumble Bee[1]	x	x			
Overthrust	Western Bumble Bee[1]	x	x			
Overthrust	Suckley's Cuckoo Bumble Bee[1]	x	x			
Overthrust	A Mason Bee (*Hoplitis producta subgracilis*)[3]	x	x			
Overthrust	Kriemhild Fritillary[3]			x		
Overthrust	Monarch[3]			x		x
Overthrust	Spur-throated Grasshopper (*Melanoplus*) Species Group[3]					
Overthrust	Utah Sallfly[3]			x		
Idaho Batholith	Pacific Lamprey[1]					
Idaho Batholith	Steelhead (Snake River Basin DPS)[1]					
Idaho Batholith	Sockeye Salmon (Snake River ESU)[1]					
Idaho Batholith	Chinook Salmon (Snake River fall-run ESU)[1]					
Idaho Batholith	Chinook Salmon (Snake River spring/summer-run ESU)[1]					
Idaho Batholith	Western Toad[2]			x		x
Idaho Batholith	Harlequin Duck[2]	x	x			
Idaho Batholith	Mountain Quail[2]	x		x		x
Idaho Batholith	Western Grebe[2]					
Idaho Batholith	Clark's Grebe[2]					
Idaho Batholith	Golden Eagle[2]					
Idaho Batholith	Sandhill Crane[3]			x		x

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
Idaho Batholith	Great Gray Owl[3]					
Idaho Batholith	Common Nighthawk[3]					
Idaho Batholith	Lewis's Woodpecker[2]					
Idaho Batholith	White-headed Woodpecker[3]					
Idaho Batholith	Olive-sided Flycatcher[3]			x		
Idaho Batholith	Clark's Nutcracker[3]			x		
Idaho Batholith	Black Rosy-Finch[3]		x			
Idaho Batholith	Townsend's Big-eared Bat[3]			x		x
Idaho Batholith	Silver-haired Bat[2]			x		x
Idaho Batholith	Hoary Bat[2]			x		x
Idaho Batholith	Little Brown Myotis[3]			x		x
Idaho Batholith	Wolverine[1]			x		
Idaho Batholith	Fisher[2]		x	x		
Idaho Batholith	Mountain Goat[3]		x			
Idaho Batholith	Bighorn Sheep[2]					
Idaho Batholith	Hoary Marmot[3]		x			
Idaho Batholith	Northern Idaho Ground Squirrel[1]					
Idaho Batholith	Western Pearlshell[2]	x	x			
Idaho Batholith	Western Ridged Mussel[3]	x	x			
Idaho Batholith	Rotund Physa[3]	x	x			
Idaho Batholith	Pristine Pyrg[2]		x	x		x
Idaho Batholith	Salmon Oregonian [1]					
Idaho Batholith	Lolo Mayfly[2]	x	x	x		x
Idaho Batholith	Lolo Sawfly[3]	x	x			
Idaho Batholith	Cascades Needlefly[3]			x		x
Idaho Batholith	Idaho Forestfly[3]					x
Idaho Batholith	A Caddisfly (*Apatania barri*)[3]	x	x	x		x
Idaho Batholith	A Caddisfly (*Arctopora salmon*)[3]	x	x	x		x
Idaho Batholith	A Caddisfly (*Cheumatopsyche logani*)[3]	x	x	x		x
Idaho Batholith	A Caddisfly (*Eocosmoecus schmidi*)[3]	x	x	x		x
Idaho Batholith	A Caddisfly (*Limnephilus challis*)[3]	x	x	x		x
Idaho Batholith	A Caddisfly (*Manophylax annulatus*)[3]	x	x	x		x
Idaho Batholith	A Caddisfly (*Psychoglypha smithi*)[3]	x	x	x		x
Idaho Batholith	A Caddisfly (*Rhyacophila oreia*)[3]	x	x	x		x
Idaho Batholith	A Caddisfly (*Rhyacophila robusta*)[3]	x	x	x		x
Idaho Batholith	A Caddisfly (*Rhyacophila velora*)[3]	x	x	x		x
Idaho Batholith	A Mayfly (*Parameletus columbiae*)[3]	x	x	x		x
Idaho Batholith	Idaho Amphipod[3]			x		x
Idaho Batholith	A Click Beetle (*Beckerus barri*)[1]			x		x
Idaho Batholith	A Riffle Beetle (*Bryelmis idahoensis*)[2]	x	x			
Idaho Batholith	A Skiff Beetle (*Hydroscapha*			x		x

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
	redfordi)[1]					
Idaho Batholith	A Miner Bee (*Perdita salicis euxantha*)[3]		x			
Idaho Batholith	A Miner Bee (*Perdita wyomingensis sculleni*)[3]		x			
Idaho Batholith	Western Bumble Bee[1]	x	x			
Idaho Batholith	Suckley's Cuckoo Bumble Bee[1]	x	x			
Idaho Batholith	A Mason Bee (*Hoplitis orthognathus*)[3]	x				
Idaho Batholith	Johnson's Hairstreak[3]		x			
Idaho Batholith	Monarch[3]	x	x	x		x
Idaho Batholith	Gillette's Checkerspot[3]		x	x		x
Idaho Batholith	A Grasshopper (*Argiacris keithi*)[3]		x			
Idaho Batholith	A Grasshopper (*Argiacris militaris*)[3]		x			
Idaho Batholith	A Grasshopper (*Barracris petraea*)[3]		x			
Idaho Batholith	Spur-throated Grasshopper (*Melanoplus*) Species Group[3]		x			
Idaho Batholith	Harvestmen (*Acuclavella*) Species Group[3]		x			
Idaho Batholith	Pale Jumping-slug[3]	x	x			
Idaho Batholith	Marbled Jumping-slug[1]	x	x			
Idaho Batholith	Nimapuna Disc[3]	x	x			
Idaho Batholith	Marbled Disc[1]	x	x			
Idaho Batholith	Salmon Coil[3]	x	x			
Idaho Batholith	Lyrate Mountainsnail[2]	x	x			
Idaho Batholith	Deep Slide Mountainsnail[2]	x	x			
Idaho Batholith	Boulder Pile Mountainsnail[3]	x	x			
Idaho Batholith	Striate Mountainsnail[2]	x	x			
Idaho Batholith	Lava Rock Mountainsnail[1]	x	x			
Idaho Batholith	Selway Forestsnail[1]	x	x			
Idaho Batholith	Coeur d'Alene Oregonian[3]	x	x			
Idaho Batholith	Western Flat-whorl[3]	x	x			
Idaho Batholith	Shiny Tightcoil[3]	x	x			
Idaho Batholith	Salmon Oregonian[1]	x	x			
Blue Mountains	Mountain Quail		x	x		x
Blue Mountains	Greater Sage-Grouse			x		x
Blue Mountains	Sharp-tailed Grouse			x		x
Blue Mountains	Sandhill Crane			x		
Blue Mountains	Long-billed Curlew			x		x
Blue Mountains	Burrowing Owl			x		x
Blue Mountains	Short-eared Owl			x		x
Blue Mountains	Common Nighthawk			x		x
Blue Mountains	Lewis's Woodpecker			x		
Blue Mountains	White-headed Woodpecker			x		
Blue Mountains	Olive-sided Flycatcher			x		
Blue Mountains	Clark's Nutcracker			x		

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
Blue Mountains	Sagebrush Sparrow			x		
Blue Mountains	Grasshopper Sparrow			x		x
Blue Mountains	Bighorn Sheep			x		x
Blue Mountains	Northern Idaho Ground Squirrel			x		
Blue Mountains	Southern Idaho Ground Squirrel			x		x
Blue Mountains	Mountain Goat			x		
Blue Mountains	Townsend's Big-eared Bat			x		x
Blue Mountains	Silver-haired Bat			x		x
Blue Mountains	Hoary Bat			x		x
Blue Mountains	Western Small-footed Myotis			x		x
Blue Mountains	Little Brown Myotis			x		x
Blue Mountains	Steelhead (Snake River Basin DPS)			x		
Blue Mountains	Sockeye Salmon (Snake River ESU)			x		
Blue Mountains	Chinook Salmon (Snake River fall-run ESU)			x		
Blue Mountains	Chinook Salmon (Snake River spring-run ESU)			x		
Blue Mountains	Western Ridged Mussel[3]			x		x
Blue Mountains	Western Pearlshell[2]			x		x
Blue Mountains	Salmon Oregonian[1]			x		x
Blue Mountains	Coeur d'Alene Oregonian[3]			x		x
Blue Mountains	Cottonwood Oregonian[1]			x		x
Blue Mountains	Marbled Disc[1]			x		
Blue Mountains	Nez Perce Pebblesnail[3]			x		
Blue Mountains	Pixie Pebblesnail[1]	x				
Blue Mountains	Salmon Coil[3]			x		x
Blue Mountains	Southern Tightcoil[3]			x		x
Blue Mountains	Lyrate Mountainsnail[2]			x		x
Blue Mountains	Costate Mountainsnail[2]			x		x
Blue Mountains	Deep Slide Mountainsnail[2]			x		x
Blue Mountains	Boulder Pile Mountainsnail[3]			x		x
Blue Mountains	Striate Mountainsnail[2]			x		x
Blue Mountains	Whorled Mountainsnail[1]			x		x
Blue Mountains	Lava Rock Mountainsnail[1]			x		x
Blue Mountains	Rotund Physa[3]			x		
Blue Mountains	Western Flat-whorl[3]			x		
Blue Mountains	Shiny Tightcoil[3]			x		
Blue Mountains	Pristine Pyrg[2]			x		
Blue Mountains	Pondsnail (*Stagnicola*) Species Group[3]			x		
Blue Mountains	Seven Devils Mountain Snail[1]			x		x
Blue Mountains	Yellow Bumble Bee[3]	x		x		
Blue Mountains	Hunt's Bumble Bee[3]	x		x		
Blue Mountains	Morrison's Bumble Bee[1]	x		x		
Blue Mountains	Western Bumble[1]	x		x		

Appendix G. Species Monitoring Summary. Continued.

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
Blue Mountains	Suckley's Cuckoo Bumble Bee[1]	x		x		
Blue Mountains	A Miner Bee (*Perdita barri*)[3]	x		x		
Blue Mountains	A Miner Bee (*Perdita salicis euxantha*)[3]	x		x		
Blue Mountains	A Miner Bee (*Perdita wyomingensis sculleni*)[3]	x		x		
Blue Mountains	A Mason Bee (*Hoplitis orthognathus*)[3]	x		x		
Blue Mountains	Spur-throated Grasshopper (*Melanoplus*) Species Group[3]			x		
Blue Mountains	A Riffle Beetle (*Bryelmis idahoensis*)[2]			x		
Blue Mountains	Columbia River Tiger Beetle[3]			x		
Blue Mountains	Monarch[3]	x		x		
Blue Mountains	Johnson's Hairstreak[3]	x				
Blue Mountains	Gillette's Checkerspot[3]	x				
Blue Mountains	A Moth (*Grammia eureka*)[3]	x				
Blue Mountains	A Caddisfly (*Cheumatopsyche logani*)[3]			x		
Blue Mountains	A Caddisfly (*Eocosmoecus schmidi*)[3]			x		
Blue Mountains	A Caddisfly (*Homophylax auricularis*)[3]			x		
Blue Mountains	A Caddisfly (*Rhyacophila oreia*)[3]			x		
Blue Mountains	A Caddisfly (*Sericostriata surdickae*)[3]			x		
Blue Mountains	Boise Snowfly[3]			x		
Bitterroot	Pacific Lamprey					
Bitterroot	Western Toad			x	x	x
Bitterroot	Northern Leopard Frog					
Bitterroot	Harlequin Duck		x			
Bitterroot	Western Grebe			x		
Bitterroot	American Bittern	x		x		x
Bitterroot	Black Tern			x		x
Bitterroot	Common Nighthawk		x			x
Bitterroot	Black Swift		x			
Bitterroot	Lewis's Woodpecker					x
Bitterroot	Olive-sided Flycatcher		x	x		x
Bitterroot	Clark's Nutcracker		x	x		
Bitterroot	Townsend's Big-eared Bat		x	x	x	x
Bitterroot	Silver-haired Bat		x	x	x	x
Bitterroot	Hoary Bat		x	x	x	x
Bitterroot	Little Brown Myotis		x	x	x	x
Bitterroot	Wolverine	x	x	x		
Bitterroot	Fisher	x	x			
Bitterroot	Mountain Goat		x	x		
Bitterroot	Hoary Marmot		x	x		
Bitterroot	Western Pearlshell[2]		x	x		x
Bitterroot	Rotund Physa[3]		x	x		

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
Bitterroot	Rocky Mountain Duskysnail[2]	x	x	x		
Bitterroot	Pristine Pyrg[2]	x				
Bitterroot	Pale Jumping-slug[3]	x	x	x		
Bitterroot	Marbled Jumping-slug[1]		x			
Bitterroot	Magnum Mantleslug[1]	x	x	x		
Bitterroot	Blue-gray Taildropper[1]		x			
Bitterroot	Papillose Taildropper[1]		x			
Bitterroot	Rocky Mountain Axetail[1]		x			
Bitterroot	Nimapuna Disc [3]		x			
Bitterroot	Salmon Coil[3]		x			
Bitterroot	Selway Forestsnail[1]		x			
Bitterroot	Mission Creek Oregonian[1]		x			
Bitterroot	Coeur d'Alene Oregonian[3]		x			
Bitterroot	Kingston Oregonian[1]		x			
Bitterroot	Shiny Tightcoil[3]	x	x			
Bitterroot	Harvestman (*Acuclavella*) Species Group[3]		x			
Bitterroot	A Click Beetle (*Beckerus barri*)[1]	x	x	x		
Bitterroot	A Riffle Beetle (*Bryelmis idahoensis*)[2]		x	x		
Bitterroot	A Mayfly (*Ameletus tolae*)[3]					
Bitterroot	Lolo Mayfly (*Caurinella idahoensis*)[2]		x	x		
Bitterroot	A Mayfly (*Ephemerella alleni*)[2]		x	x		
Bitterroot	A Mayfly (*Paraleptophlebia falcula*)[3]		x	x		
Bitterroot	A Mayfly(*Parameletus columbiae*)[3]		x	x		
Bitterroot	A Miner Bee(*Andrena aculeata*)[3]	x	x			
Bitterroot	A Miner Bee (*Perdita salicis euxantha*)[3]	x	x			
Bitterroot	Hunt's Bumble Bee[3]	x	x			
Bitterroot	Morrison's Bumble Bee[1]	x	x			
Bitterroot	Western Bumble[1]	x	x			
Bitterroot	Suckley's Cuckoo Bumble Bee[1]	x	x			
Bitterroot	A Mason Bee (Hoplitis orthognathus)[3]	x	x			
Bitterroot	Monarch[3]	x	x			
Bitterroot	Gillette's Checkerspot[3]	x	x			
Bitterroot	Spur-throated Grasshopper (*Melanoplus*) Species Group[3]		x			
Bitterroot	Straight Snowfly[3]		x	x		
Bitterroot	Idaho Snowfly[3]		x	x		
Bitterroot	Palouse Snowfly[3]		x	x		
Bitterroot	Cascades Needlefly[3]	x				
Bitterroot	Idaho Forestfly[3]	x				
Bitterroot	Clearwater Roachfly[3]	x	x	x		
Bitterroot	Umatilla Willowfly[3]		x	x		
Bitterroot	A Caddisfly (*Manophylax*		x	x		

Section	Species	Document presence, distribution & abundance	Monitoring population	Monitoring habitat	Monitoring direct mortality (e.g., collisions, disease)	Monitoring invasive species
	annulatus)³					
Bitterroot	A Caddisfly (*Eocosmoecus schmidi*)³		x	x		
Bitterroot	A Caddisfly (*Philocasca antennata*)³		x	x		
Bitterroot	A Caddisfly (*Philocasca banksi*)³		x	x		
Bitterroot	A Caddisfly (*Homophylax acutus*)³		x	x		
Bitterroot	A Caddisfly (*Rhyacophila oreia*)³		x	x		
Bitterroot	A Caddisfly (*Rhyacophila robusta*)³		x	x		
Bitterroot	A Caddisfly (*Goereilla baumanni*)³		x	x		
Bitterroot	A Caddisfly (*Sericostriata surdickae*)³		x	x		

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Glossary

accidental/nonregular The taxon does not persist in or regularly return to Idaho.

candidate A candidate species (C) is one for which FWS has on file sufficient information on biological vulnerability and threats to support a proposal for listing as endangered or threatened, but for which preparation and publication of a proposal is precluded by higher listing actions.

concentration areas Particular areas where species or species assemblages concentrate, e.g., shorebirds, whose populations concentrate at particular areas during migration, and species occurring in multiple species assemblages at migration "funnels" or hot spots. Other examples include waterfowl, landbird, and raptor migratory concentration areas, as well as particular areas during the breeding or nonbreeding season such as waterbird colonies and bat hibernacula).

confirmed Species has been reported and confirmed in Idaho by a reliable source.

conservation The use of methods and procedures necessary or desirable to sustain healthy populations of wildlife, including all activities associated with scientific resources management such as research, census, monitoring of populations, acquisition, improvement and management of habitat, live trapping and transplantation, wildlife damage management, and periodic or total protection of a species or population, as well as the taking of individuals within wildlife stock or population if permitted by applicable state and federal law (Federal Aid in Wildlife Restoration Act [16 U.S.C. 669a]).

Critically Endangered (CR) A taxon is Critically Endangered (CR) when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V IUCN Red List Categories Version 3.1), and it is therefore considered to be facing an extremely high risk of extinction in the wild.

currently present Species known to be currently extant in Idaho.

Data Deficient (DD) A taxon is Data Deficient (DD) when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the

	possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified. (See IUCN Red List Categories Version 3.1).
ecosystem engineers	"organisms that directly or indirectly modulate the availability of resources (other than themselves) to other species, by causing physical state changes in biotic or abiotic materials. In so doing they modify, maintain and/or create habitats" (Jones et al. 1994). Some examples include beaver, badger, rabbits, ants, earthworms, pocket gophers.
Endangered (EN)	A taxon is Endangered (EN) when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V, IUCN Red List Categories Version 3.1), and it is therefore considered to be facing a very high risk of extinction in the wild.
endangered species	Species listed as endangered (E) under the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; ESA); an endangered species is any species that is in danger of extinction throughout all or a significant portion of its range.
evolutionarily distinct	"Evolutionary distinctness" measures a species' contribution to the total evolutionary history of its clade and is expected to capture uniquely divergent genomes and functions (Jetz et al. 2014).
G1 (Critically Imperiled)	NatureServe G1 (Critically Imperiled)—a species, often referred to as G1, that is globally at very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2 (Imperiled)	NatureServe G2 (Imperiled)—at high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3 (Vulnerable)	NatureServe G3 (Vulnerable)—at moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
genetically unique	genetically unique (i.e., within Idaho species comprises an evolutionarily significant unit).
globally taxonomically distinct	taxonomic distinctness is the number of close relatives and provides a metric that is continuous and captures diversity at the species, genus,

and family level (Joseph et al. 2009).

G-rank NatureServe global conservation status rank (G-rank). These ranks reflect an assessment of the condition of the species or ecological community across its entire range.

native Introduced into Idaho by natural mechanisms.

Near Threatened (NT) A taxon is Near Threatened (NT) when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (IUCN Red List Categories Version 3.1).

population A group of organisms of the same species occupying a particular space at a particular time (e.g., Krebs 1972). For the purpose of determining practical conservation value, we interpret "group" to mean >1 individual.

proposed species Proposed species are those species for which FWS has published a proposed rule to list as endangered (PE) or threatened (PT) in the Federal Register. This category does not include species for which FWS has withdrawn or finalized the proposed rule.

regularly occurring occurrence of the taxon is consistent in Idaho (e.g., it may migrate in and out of the area, but it returns on a regular basis). For the purpose of determining practical conservation value, we interpret the term "regular" to mean that the taxon spends at least some part of its annual cycle in Idaho annually.

S1 (Critically Imperiled) Critically Imperiled—Critically imperiled in the state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2 (Imperiled) Imperiled—Imperiled in the state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state/province.

S3 (Vulnerable) Vulnerable—Vulnerable in the state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 (Apparently Secure) Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 (Secure)	Secure—Common, widespread, and abundant in the state/province.
SH (Possibly Extirpated/Historical)	Possibly Extirpated (Historical)—Species or community occurred historically in the state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20–40 y. A species or community could become SH without such a 20–40 y delay if the only known occurrences in a state/province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
threatened species	Species listed as threatened (T) under ESA; a threatened species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
unknown/undetermined	regularity of the taxon in Idaho has not been, or cannot be, determined.
Vulnerable (VU)	A taxon is Vulnerable (VU) when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V IUCN Red List Categories Version 3.1), and it is therefore considered to be facing a high risk of extinction in the wild.