4. Idaho Batholith Section (v. 2015-12-21)

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 3400 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 ~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 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 SGCNs have the greatest extent of their statewide range in these mid- and high-elevation habitats of the Batholith, including Fisher, Wolverine, Mountain Goat, Bighorn Sheep, Harlequin Duck, Olive-sided Flycatcher, and Clark's Nutcracker.

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 ecological section adorn the mountains like aquatic jewels. High mountain lakes are a stronghold of amphibian populations, such as Western Toad, 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 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.

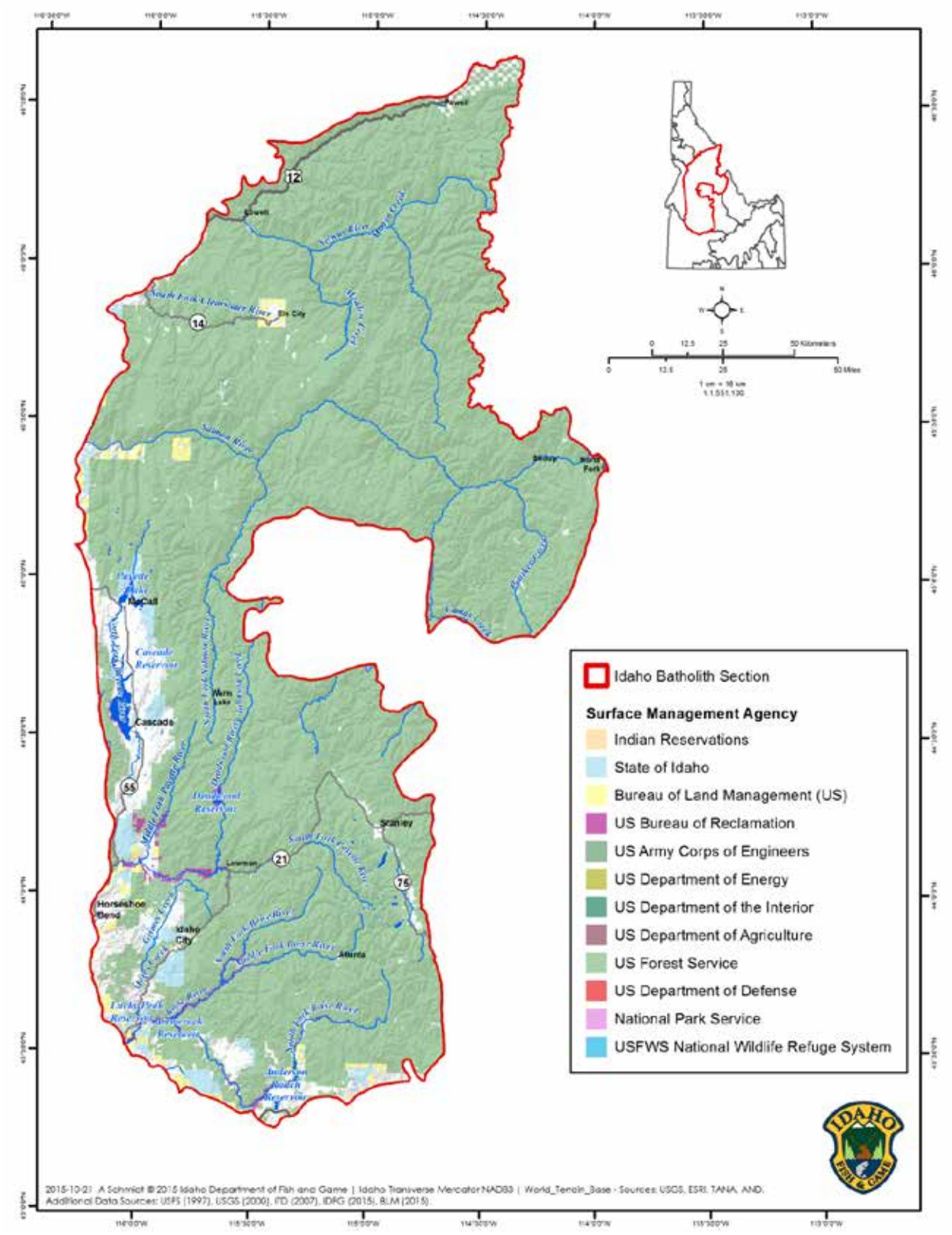

Fig. 4.1 Map of Idaho Batholith surface management

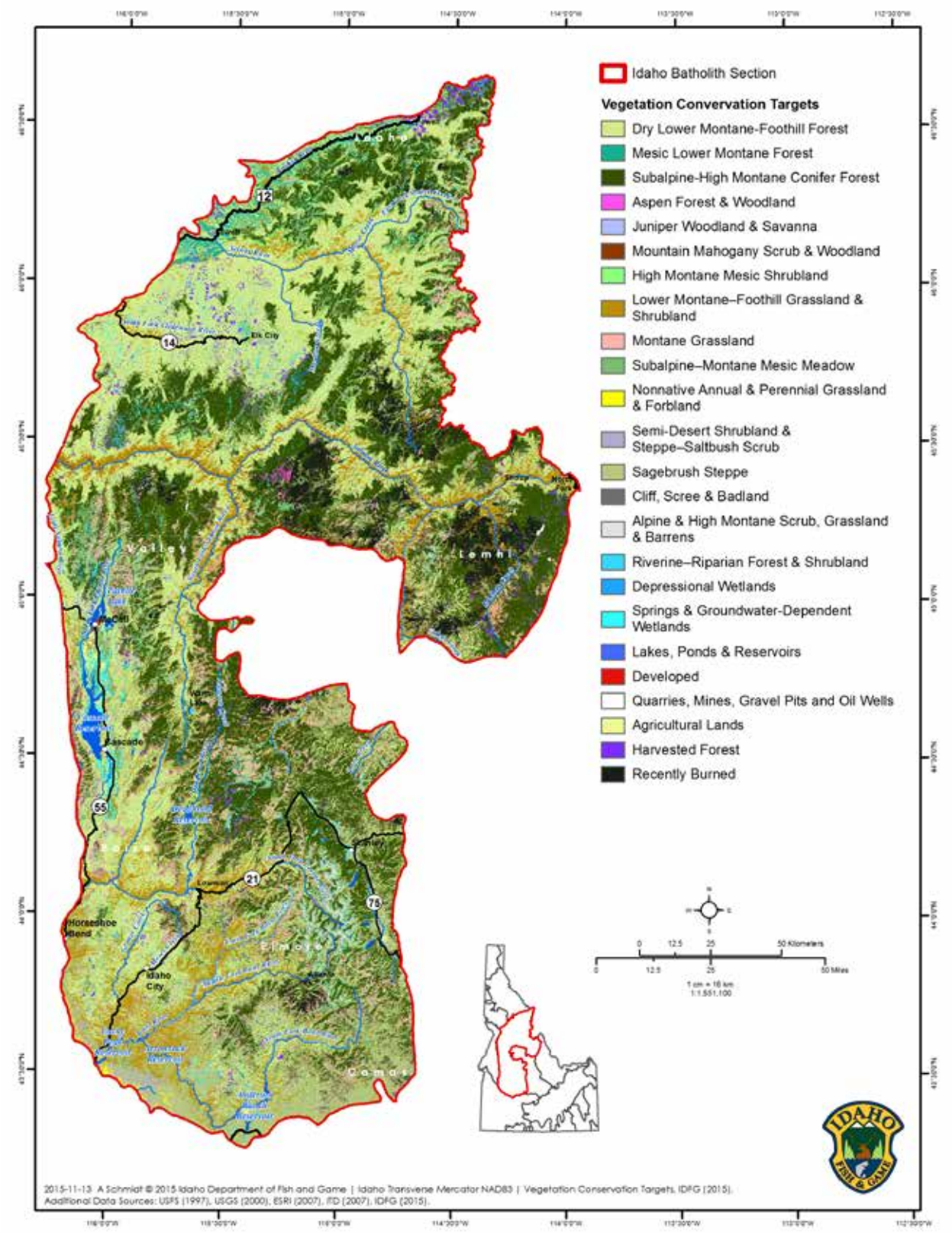

Fig. 4.2 Map of Idaho Batholith vegetation conservation targets

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 Species of Greatest Conservation Need (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 (*Gulo gulo*) and Bighorn Sheep (*Ovis canadensis*), 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 Western Bumble Bee Suckley Cuckoo Bumble Bee Marbled Jumping-Slug Marbled Disc
			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 A Mason Bee Nimapuna Disc Salmon Coil Boulder Pile Mountainsnail Coeur d'Alene Oregonian Shiny Tight Coil
Subalpine–High Montane Conifer Forest	This habitat includes the wetter end of the grand fir mixed-conifer habitat as well as higher	*Fair*. Amount and distribution remains extensive within the Idaho Batholith. Habitat condition has declined due to altered fire regimes and a	*Tier 1*	Wolverine Western Bumble Bee Suckley Cuckoo Bumble Bee
			Tier 2	Fisher

Target	Target description	Target viability	Nested targets (SGCN)	
	elevation forest.	keystone tree species, whitebark pine, has declined dramatically.	*Tier 3*	Great Gray Owl Olive-sided Flycatcher Clark's Nutcracker Johnson's Hairstreak Gillette's Checkerspot Harvestman species group Pale Jumping-slug Shiny Tightcoil
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*	Western Bumble Bee Suckley Cuckoo Bumble Bee Lava Rock Mountainsnail
			Tier 2	Mountain Quail Silver-haired Bat Hoary Bat Bighorn Sheep Deep Slide Mountainsnail
			Tier 3	Common Nighthawk Townsend's Big-eared Bat Little Brown Myotis Monarch Salmon Coil Coeur d'Alene Oregonian
Alpine & High Montane Scrub, Grassland & Barrens	Open grass, forb, and rock habitat above tree line.	*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 Grasshoppers (3 species) Spur-throated Grasshopper 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 improve conditions.	*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
			Tier 2	Harlequin Duck

Target	Target description	Target viability	Nested targets (SGCN)	
				Mountain Quail Lewis's Woodpecker Silver-haired Bat Hoary Bat Western Pearlshell Lolo Mayfly A Riffle Beetle Striate Mountainsnail
			Tier 3	Sandhill Crane Common Nighthawk Townsend's Big-eared Bat Little Brown Myotis Rotund Physa Lolo Sawfly Idaho Forestfly Caddisflies (11 species) Boulder Pile Mountainsnail Coeur d'Alene Oregonian
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 A Skiff Beetle
			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 Cascades Needlefly Idaho Forestfly Caddisflies (11 species) Idaho Amphipod Monarch Gillette's Checkerspot
Lakes, Ponds, & Reservoirs	Includes all natural lakes, high mountain lakes, deep ponds, dam-altered naturally formed lakes, and created water bodies 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 Miner Bee (2 species)

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.	
Bighorn Sheep	3 Bighorn Sheep Population Management Units (PMUs) occur primarily in the Idaho Batholith (see IDFG Bighorn Sheep Management Plan).	*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.	

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	Alpine & High Montane Scrub, Grassland & Barrens	Lower Montane–Foothill Grassland & Shrubland	Lakes, Ponds, & Reservoirs	Riverine–Riparian Forest & Shrubland	Springs & Groundwater-Dependent Wetlands	Bighorn Sheep	Wolverine
FISH									
Pacific Lamprey[1]						X			
Steelhead (Snake River Basin DPS)[1]						X			
Sockeye Salmon (Snake River ESU)[1]						X			
Chinook Salmon (Snake River fall-run ESU)[1]						X			
Chinook Salmon (Snake River spring/summer-run ESU)[1]						X			
AMPHIBIANS									
Western Toad[2]					X		X		
BIRDS									
Harlequin Duck[2]						X			
Mountain Quail[2]	X			X		X	X		
Western Grebe[2]					X				
Clark's Grebe[2]					X				
Golden Eagle[2]	X			X					
Sandhill Crane[3]					X	X	X		
Great Gray Owl[3]		X							
Common Nighthawk[3]	X			X		X			
Lewis's Woodpecker[2]	X					X			
White-headed Woodpecker[3]	X								
Olive-sided Flycatcher[3]	X	X							
Clark's Nutcracker[3]		X	X						
Black Rosy-Finch[3]			X						
MAMMALS									
Townsend's Big-eared Bat[3]	X			X	X	X	X		
Silver-haired Bat[2]	X	X		X	X	X	X		
Hoary Bat[2]	X	X		X	X	X	X		
Little Brown Myotis[3]	X			X	X	X	X		
Wolverine[1]		X	X						
Fisher[2]	X	X							

Taxon	Conservation targets								
	Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Alpine & High Montane Scrub, Grassland & Barrens	Lower Montane–Foothill Grassland & Shrubland	Lakes, Ponds, & Reservoirs	Riverine–Riparian Forest & Shrubland	Springs & Groundwater-Dependent Wetlands	Bighorn Sheep	Wolverine
Mountain Goat[3]			X						
Bighorn Sheep[2]				X					
Hoary Marmot[3]			X						
Northern Idaho Ground Squirrel[1]	X								
AQUATIC INVERTEBRATES									
Western Pearlshell[2]						X			
Rotund Physa[3]						X			
Pristine Pyrg[2]							X		
Lolo Mayfly[2]						X	X		
Lolo Sawfly[3]						X			
Cascades Needlefly[3]							X		
Idaho Forestfly[3]						X	X		
Caddisflies (11 species)[3]						X	X		
Idaho Amphipod[3]							X		
INSECTS & ARACHNIDS									
A Click Beetle (*Beckerus barri*)[1]							X		
A Riffle Beetle (*Bryelmis idahoensis*)[2]						X			
A Skiff Beetle (*Hydroscapha redfordi*)[1]							X		
A Miner Bee (*Perdita salicis euxantha*)[3]					X				
A Miner Bee (*Perdita wyomingensis sculleni*)[3]					X				
Western Bumble Bee[1]	X	X		X					
Suckley Cuckoo Bumble Bee[1]	X	X		X					
A Mason Bee (*Hoplitis orthognathus*)[3]	X								
Johnson's Hairstreak[3]		X							
Monarch[3]				X		X	X		
Gillette's Checkerspot[3]		X					X		
Grasshoppers (3 species)[3]			X						
Spur-throated Grasshopper species group[3]			X						
Harvestman species group[3]		X							
TERRESTRIAL SNAILS & SLUGS									
Pale Jumping-slug[3]		X							

Taxon	Conservation targets								
	Dry Lower Montane–Foothill Forest	Subalpine–High Montane Conifer Forest	Alpine & High Montane Scrub, Grassland & Barrens	Lower Montane–Foothill Grassland & Shrubland	Lakes, Ponds, & Reservoirs	Riverine–Riparian Forest & Shrubland	Springs & Groundwater-Dependent Wetlands	Bighorn Sheep	Wolverine
Marbled Jumping-slug[1]	X					X			
Nimapuna Disc[3]	X								
Marbled Disc[1]	X					X			
Salmon Coil[3]	X			X					
Lyrate Mountainsnail[2]	X								
Deep Slide Mountainsnail[2]	X			X					
Boulder Pile Mountainsnail[3]	X					X			
Striate Mountainsnail[2]	X					X			
Lava Rock Mountainsnail[1]				X					
Selway Forestsnail[1]						X			
Coeur d'Alene Oregonian[3]	X			X		X			
Western Flat-whorl[3]	X			X					
Shiny Tightcoil[3]	X	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 ecological 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.

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, Forest Service 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 (US Forest Service 2003, 2010).

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

Target Viability

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 and White-headed Woodpecker.

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 and increased intensity and 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 (Keene 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 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, Suckley Cuckoo Bumble Bee, 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 Western Bumble Bee Suckley Cuckoo Bumble Bee
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 habitats.	Promote cooperation and collaboration with Western Working Group Partners in Flight to fill knowledge gaps and to mitigate threats (see Canada's recovery plan, Appendix B; Environment Canada 2015b). Investigate factors affecting reproductive output, survival, and fidelity to breeding sites.	Olive-sided Flycatcher
Identify 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 (NTC) 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 NTC to identify opportunities for research on contaminant impacts.	Common Nighthawk

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 ecological 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 tree line 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 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–High Montane Conifer Forest, Patrick Butte, Idaho © 2006 IDFG

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

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 (Keene 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, Keene 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).

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 subalpine–high montane conifer forests 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, Englemann 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	Manage for diverse, healthy	Work with other agencies, organizations and user groups across the Idaho Batholith to refine	Olive-sided Flycatcher

Objective	Strategy	Action(s)	Target SGCNs
resilience.	plant communities able to resist stresses including drought and drought-mediated impacts such as invasion by nonnative plants and wildfire.	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.	Clark's Nutcracker Wolverine Mountain Goat Hoary Marmot

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 (Keene 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 (Keene 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 Forest Service partners to implement experimental mechanical and prescribe fire treatments in whitebark pine stands encroached upon by subalpine fir.	Olive-sided Flycatcher Clark's Nutcracker Mountain Goat Hoary Marmot
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 Wolverine Mountain Goat Hoary Marmot

Insects and disease

Subalpine fir 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.). Mortality caused by blister rust on exposed, steep, dry locations likely will transition these 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). 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 subalpine-high montane conifer forests in the Idaho Batholith.	Slow the spread of mountain pine beetle and white pine blister rust.	Work with partner forest management agencies to incorporate wildlife considerations in their response to disease. 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 • promoting healthy forests in areas that have not yet been affected.	Olive-sided Flycatcher Clark's Nutcracker Wolverine Mountain Goat Hoary Marmot
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 Cuckoo Bumble Bee, Johnson's Hairstreak, Gillette's Checkerspot, 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
Determine the distribution of little-known insects 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.	Western Bumble Bee Suckley Cuckoo Bumble Bee Johnson's Hairstreak Gillette's Checkerspot Harvestman species group

Objective	Strategy	Action(s)	Target SGCNs
Understand causes of decline in Olive-sided Flycatcher populations.	Determine relative importance of known and suspected threats to Olive-sided Flycatcher, its prey, and its habitats.	Promote cooperation and collaboration with Western Working Group Partners in Flight to fill knowledge gaps and to mitigate threats (see Canada's recovery plan, Appendix B; Environment Canada 2015b). Investigate factors that affect reproductive output, survival, and fidelity to breeding sites.	Olive-sided Flycatcher
Provide suitable nesting and foraging habitat for Great Gray Owls.	Incorporate recommended buffer zones and protected activity centers (PACs) in timber management projects.	Work with state, private, and federal forest management partners to establish a 300-m buffer around meadows adjacent to nest stands to maintain nesting, roosting, and fledgling habitat adjacent to foraging habitat. 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).	Great Gray Owl

Target: Lower Montane–Foothill Grassland & Shrubland

Lower montane–foothill grassland and 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 (USFS and BLM), and privately-managed lands in the Batholith.

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

Lower montane–foothill grassland and 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

The condition of lower montane–foothill grassland and 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
Conserve habitat for native pollinators during fuels management activities.	Promote pollinator-friendly prescribed fire techniques.	Develop and incorporate measures to safeguard native pollinators during prescribed fire.	Western Bumble Bee Suckley Cuckoo 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 NF 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 USFS, 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 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 Western Bumble Bee Suckley 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 Cuckoo Bumble Bee, Monarch, and virtually all of the SGCN terrestrial gastropods associated with lower montane–foothill grassland and 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 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.	Western Bumble Bee Suckley Cuckoo Bumble Bee Monarch Terrestrial gastropods
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
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 (NTC) 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 NTC to identify opportunities for research on contaminant impacts.	Common Nighthawk

Objective	Strategy	Action(s)	Target SGCNs
Determine current distribution and abundance of Mountain Quail.	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
Reduce native pollinator exposure to contaminants (pesticides and neonicotinoid insecticides).	Promote Best Management Practices 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 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 Cuckoo Bumble Bee Monarch Monarch

Target: Alpine & High Montane Scrub, Grassland & Barrens

Alpine and high montane scrub, grassland and shrubland 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 tree line 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

Condition of alpine and high montane scrub, grassland and shrubland 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, 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.).

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

High rated threats to Alpine & High Montane Scrub, Grasslands & 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 and high montane scrub, grassland and 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 on alpine habitats in central Idaho.	Produce finer-scale projections of temperature and precipitation patterns for central Idaho and assess potential effects on SGCN habitat. Assess potential changes in tundra habitat phenology and its relationship to migratory SGCN.	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. Partner with researchers to investigate the relationship of Black Rosy-Finch seasonal occurrence with alpine habitat phenology.	Black Rosy-Finch Wolverine Mountain Goat Hoary Marmot Grasshopper species
Increase understanding of species-specific relationships with temperature.	Investigate relationship of SGCN occurrence with temperature regimes.	Work with partners, including universities, USFWS and Western Working Group of Partners in Flight 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 and high montane scrub, grassland and barrens. We identify needs and appropriate actions in the section below.

Objective	Strategy	Action(s)	Target SGCNs
Determine	Establish methods	Work with partners, including USFWS and	Black Rosy-

Objective	Strategy	Action(s)	Target SGCNs
occurrence and distribution of little-known SGCN.	for assessing and monitoring status.	Western Working Group of Partners in Flight, to develop protocols and identify funding opportunities for surveys. Conduct surveys to determine the occurrence, abundance, and habitat associations in the Idaho Batholith.	Finch Mountain Goat Hoary Marmot Grasshoppers (3 species) Spur-throated Grasshopper 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 species group

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.

Lochsa River, Idaho © 2009 Justin Barrett

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.

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 Volcanic sections, provides more anadromous fish spawning area than any other subbasin in the Columbia River Basin (Northwest Power and Conservation Council 2014).

Target Viability

The condition of riverine–riparian forest and 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 Endangered Species Act of 1973 (ESA), as amended.

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).

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 7500-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.	Anadromous fish Harlequin Duck Mountain Quail Sandhill Crane Lewis's Woodpecker Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis A Riffle Beetle Lolo Mayfly Lolo Sawfly Idaho Forestfly Caddisflies (11 species)
Increase Harlequin Duck abundance and distribution.	Maintain and protect high-quality Harlequin Duck breeding habitat.	Investigate how stream flow characteristics (severity, timing, and frequency of peak and low stream flows) affect Harlequin Duck productivity and survival.	Harlequin Duck

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 and shrubland listed in Table 4.2. We identify needs and appropriate actions in the section below.

Objective	Strategy	Action(s)	Target SGCNs
Determine distribution of little-known insects and terrestrial gastropods in riverine–riparian forest and shrubland.	Establish methods for assessing and monitoring status.	Conduct surveys to determine occurrence, abundance, and habitat associations in the Idaho Batholith.	Western Pearlshell Rotund Physa Lolo Mayfly Lolo Sawfly Idaho Forestfly Caddisflies (11 species) A Riffle Beetle Marbled Jumping-slug Marbled Disc Boulder Pile Mountainsnail Striate Mountainsnail Selway Forestsnail Coeur d'Alene Oregonian
Increase understanding of the factors that influence Harlequin Duck distribution and abundance to develop meaningful land management and recreation actions that benefit populations.	Design studies that improve understanding of the factors that influence Harlequin Duck 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 and changes in forest management affect behavior, occupancy, reproductive success, and survival on breeding streams.	Harlequin Duck
Implement a coordinated Harlequin Duck 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 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

Target: Springs & Groundwater-Dependent Wetlands

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 groundwater-dependent 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).

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).

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

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

Overall, springs and groundwater-dependent wetland habitat 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 condition.	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 Best Management Practices 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 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.	Western Toad Mountain Quail Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Pristine Pyrg A Click Beetle A Skiff Beetle Lolo Mayfly Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (11 species) 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 (*Anaxyrus boreas*) 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 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 A Skiff Beetle Lolo Mayfly Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (11 species) Idaho Amphipod

Loss and degradation of wetland habitat due to human land uses

The cumulative effects of human land uses have resulted in degradation or loss 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), 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, 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 shade out undesirable, invasive vegetation and stabilize soil.	Western Toad Mountain Quail Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Pristine Pyrg A Click Beetle A Skiff Beetle Lolo Mayfly Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (11 species) Idaho Amphipod
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	Western Toad Mountain Quail Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Pristine Pyrg A Click Beetle A Skiff Beetle Lolo Mayfly Monarch Gillette's

		footpaths for access and restricting vehicles and equipment to existing roads (Abele 2011).	Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (11 species) Idaho Amphipod

Upland and 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 (EDRR) System for Invasive Plants approach (biological, chemical, and/or mechanical methods) to control noxious weeds and undesirable, highly invasive nonnative plant and animal species.	Work with Cooperative Weed Management Areas (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. 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,	Western Toad Mountain Quail Sandhill Crane Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Pristine Pyrg A Click Beetle A Skiff Beetle Lolo Mayfly Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (11 species) Idaho Amphipod

		seeding, and/or other treatments. Avoid chemical application within habitat occupied by sensitive species.	

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 riverine–riparian forest and shrubland.	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 A Skiff Beetle Lolo Mayfly Monarch Gillette's Checkerspot Cascades Needlefly Idaho Forestfly Caddisflies (11 species) Idaho Amphipod

Target: Lakes, Ponds, & Reservoirs

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 water bodies 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 water bodies 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.

Cascade Reservoir, Idaho © 2015 IDFG

Alpine lakes, also called "high mountain lakes" are a distinct category of lakes, ponds, and 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 2014) guided through a Memorandum of Understanding with the US Forest Service.

Buckhorn Lake, Idaho © 2012 Curt Mack

Target Viability

Habitat conditions of lakes, ponds, and 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*) and Bald Eagles (*Haliaeetus leucocephalus*) and the largest nesting colony of Western and Clark's Grebes 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.

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, and Reservoirs

High rated threats to Lakes, Ponds, and 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, and 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
Assess potential impacts of drought on wetland-dependent birds.	Participate in wetland connectivity assessment in the West.	Work with Pacific Flyway Nongame Technical Committee to develop and implement a connectivity assessment.	Western Toad Western Grebe Clarks' Grebe Sandhill Crane

Invasive species

Lakes, ponds, and 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
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 Clarks' Grebe
Maintain invasive mussel-free waters.	Promote ongoing statewide surveillance efforts for dressenid mussels.	Promote boat inspection stations, boat washing stations, and plankton tow surveys. Promote ongoing education/outreach efforts, including signs at boat launches and brochures.	Clarks' Grebe Western Grebe
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

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 USFWS, 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 Best Management Practices 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, and 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
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 USFWS and Western Working Group of Partners in Flight to identify funding opportunities and implement foraging studies.	Black Rosy-Finch
Determine distribution of little-known insect species.	Establish methods for assessing and monitoring status.	Conduct surveys to determine the occurrence, abundance, and habitat associations in the Idaho Batholith.	Miner Bee (2 species)

Target: Wolverine

Although previously a candidate for listing as endangered or threatened under the Endangered Species Act of 1973, as amended, the US Fish and Wildlife Service issued a decision in 2014 that listing the Wolverine was not warranted (USFWS 2014). However, the Wolverine and its habitat remain a management priority for IDFG. Conservation issues and management actions are described in the 2014 *Management Plan for the Conservation of Wolverines in Idaho 2014–2019* (IDFG 2014). Wolverines inhabit remote, high-elevation montane habitats centered near alpine tree line 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 US Forest Service.

Wolverines captured on remote camera, Sawtooth Mountains, Idaho © 2015 Chris Klingler, Sawtooth National Recreation Area

Target Viability

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 and 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.	Black Rosy-Finch Wolverine Hoary Marmot
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 US Forest Service, 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 ecological 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

Bighorn Sheep ewe and lamb, Salmon River, Idaho © 2011 Nez Perce Tribe

summer. Most of the occupied habitat is managed by the US Forest Service 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 Bighorn Sheep Management Plan 2010). Sheep occurrence in the Batholith is defined within 3 Population Management Units (PMUs), described in detail in the Bighorn Sheep Management Plan (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

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 ecological 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.

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	Advocate and work toward maintaining spatial and	Work with willing domestic sheep permittees, USFS, and BLM to identify and implement Best Management Practices (e.g., limit estrus ewes near wild sheep populations, develop effective	Bighorn Sheep

Objective	Strategy	Action(s)	Target SGCNs
populations.	temporal separation between Bighorn Sheep and domestic sheep and goats.	grazing patterns, track and report missing livestock) to maintain separation between Bighorn Sheep and domestic sheep and goats. Work with the USFS, 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).	
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 Ecological 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

First Name	Last Name	Affiliation
Diane	Evans Mack* [b]	Idaho Department of Fish and Game
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Jay	Carlisle	Intermountain Bird Observatory
Trisha	Cracroft	Natural Resources Conservation Service
Rita	Dixon	Idaho Department of Fish and Game
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
Clay	Hickey	US Forest Service Nez Perce–Clearwater National Forests
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Chris	Murphy	Idaho Department of Fish and Game
Steve	Nadeau	Idaho Department of Fish and Game
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[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.