

11. Northwestern Basin and Range Section (v. 2015-12-24)

Section Description

The Northwestern Basin and Range Section lies within the Intermountain Semi-Desert Province and covers portions of northern Nevada, south-central Oregon, southeastern Idaho, and northern Utah. In Idaho, the section is represented by 2 distinct segments, which cover 14,770 km², or 6.8% of the land area in the state (Fig. 11.1, Fig. 11.2). The larger segment extends from the southern Bruneau Canyon east to the crest of the Bannock Range near Pocatello, then south to the Malad Valley. The sinuous northern boundary represents the margins of the Snake River Plain to the north; the southern boundary is the state border, which separates Idaho from the adjacent Nevada and Utah. The smaller segment encompasses Basin and Range topography from the mouth of the Snake River Canyon north of Idaho Falls, south through Soda Springs to approximately the Gentile Valley, north and west through the Portneuf Range, and north along the Snake River Plain.



Albion Mountains, City of Rocks National Reserve, Idaho © 2014 Jessica Irwin

The Basin and Range is dominated by 2 landforms: the series of north-south trending, nearly parallel mountain ranges, and the interposing broad, flat basins that together provide the region's descriptive name. The characteristic wedge-shaped mountains result from uplifting along fault zones, often forming steep-fronted escarpments on the upthrown aspects, as in the Jim Sage and Cotterel mountains bordering the Raft River Valley. The deep, sediment-filled basins are products of episodic glaciation, volcanism, inundation, and the persistent weathering of exposed mineral surfaces. Alluvial fans are common at the mouths of canyons and are major contributors of sediment. Rolling hills and deeply-dissected plateaus are other common landforms. In Idaho, elevation ranges from approximately 1,300 m (4,265 ft) in basin locations to >3,150 m (10,335 ft) at Cache Peak, the highest mountain south of the Snake River.

The Northwestern Basin and Range climate is described as semiarid with cold, wet winters, wet springs, and hot summers. Maritime weather systems dominate during winter and spring; summer weather is influenced by continental air masses. Most precipitation occurs from fall through spring and summers are typically dry. Annual precipitation ranges from approximately 20 cm (8 in) in the lowest basins to >50 cm (20 in) in the higher mountains. Most precipitation falls as snow during the winter. Monsoonal moisture and associated thunderstorms provide intermittent and often heavy rainfall during summer. The growing season is elevation-dependent, ranging from 30 to 140 days (Ross and Savage 1967).

The Northwestern Basin and Range is rugged and geographically isolated, particularly the canyon and desert locations in Owyhee County, and the mountain ranges in Twin Falls and Cassia counties. Mountains contain a mixture of state and federal ownership and little private property. Livestock grazing, mining, and outdoor recreation are the principal land uses. Most private property is located in productive agricultural areas, notably the Arbon and Gem valleys and in the disjunct eastern segment. Agriculture is by far the principal economic activity and clustered rural development has followed the road and rail corridors needed to support commerce. Towns in the section are small, originating as stage stops or resting locations for emigrants traveling west. The advent of industrial-scale irrigation at the beginning of the 20th century allowed these settlements to become major agricultural producers. Mining occurs in isolated locations throughout the section, but the scale and economic contributions from this industry are overshadowed by agriculture. Phosphate mining however, is the most important economic activity in southeast Idaho, which is centered around Soda Springs, the largest city in the section with just over 3,000 residents (2010 census).

Most surface water in the Northwestern Basin and Range occurs in small mountain streams. Discharge from mountain basins is highly variable and most surface water seeps into mountain-front alluvial fans before reaching the basin floors (Chambers et al. 2011). Where flows are sufficient to overcome infiltration losses, surface water is appropriated for agriculture. Groundwater pumping is used to supplement agriculture where surface water is limiting. Many springs have been developed exclusively for livestock use. Notable river systems include the Bruneau and Jarbidge in Owyhee County and the Blackfoot, Bear, and Portneuf rivers in Bingham and Caribou Counties. The Idaho portion of the Jarbidge River was designated as "Wild" in 2009, and as critical habitat for Bull Trout (*Salvelinus confluentus*) in 2010. Independence Lakes, in the upper Green Creek drainage, is the only system of natural lakes in the entire Southern Division of the Sawtooth National Forest (Sawtooth NF; USFS 2012). Blackfoot Reservoir is the only large reservoir in the section, supplying the Fort Hall Indian Reservation with irrigation water. Most surface waters drain to the Snake River; a few streams, including the Bear and Malad rivers, drain to interior basins in Nevada and Utah. Most streams on the Sawtooth NF are rated as "functioning at risk" or "not functioning appropriately" (USFS 2012). Despite the intermittent nature of many of these streams, strong populations of Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*) still occur where suitable habitat exists. The highest concentration of impaired waters, as defined by Section 303(d) of the Clean Water Act, occurs in the Arbon Valley.

Several habitat types have been selected as conservation targets for their value to wildlife and human populations. Riverine-riparian forest and shrubland supports a disproportionate fraction

of the total biodiversity in the Northwestern Basin and Range. Although essential for aquatic organisms, these systems also support diverse avian, bat, terrestrial mammal, and invertebrate communities as well as livestock. Stream corridors serve as migration routes for ungulates that move between summer and winter ranges. The character of riparian areas varies widely, influenced by topography, aspect, and elevation. Vegetation may consist of deciduous trees and shrubs such as willow (*Salix* L.), quaking aspen (*Populus tremuloides* Michx.), and/or cottonwood (*Populus* L.) or herbaceous growth characterized by grasses, emergent macrophytes, and shrubs (SAIC 2013). Assessment of riparian areas on the Sawtooth NF indicates that many are considered to be functioning at risk (USFS 2012). Primary threats include invasive species, improper livestock grazing management, dispersed recreation, fire exclusion, and water diversions.

The Northwestern Basin and Range in Idaho is dominated by big sagebrush (*Artemisia tridentata* Nutt.) shrubland and steppe habitat in basin, foothill, and arid mountain locations, except where displaced by agriculture or seeded perennial grasslands. It is a primary conservation target and supports a broad variety of game, nongame, and species of greatest conservation need (SGCN), many of which are considered sagebrush obligates. Key species include Greater Sage-Grouse (hereafter Sage-Grouse, *Centrocercus urophasianus*), Bighorn Sheep (*Ovis canadensis*), Pygmy Rabbit

(*Brachylagus idahoensis*), and Grasshopper Sparrow (*Ammodramus savannarum*). Most of the sagebrush steppe in the Section lies within the Idaho Southern Greater Sage-Grouse Conservation Area; the small segment west of the Jarbidge River lies within the Idaho West Owyhee Conservation Area (see Attachment 1, Fig. 2-14, Idaho and Southwestern Montana Greater Sage-Grouse Approved RMP Amendment, hereafter



Pinyon–Juniper Woodland in the City of Rocks National Reserve, Idaho © 2011 Lynn Kinter

Idaho and Southwestern Montana GRSG ARMPA; BLM 2015). The entire area includes a mix of designated Priority (PHMA), Important (IHMA), and General (GHMA) Greater Sage-Grouse Habitat Management Areas (Fig. 11.3), as defined by the Idaho and Southwestern Montana GRSG ARMPA (see Attachment 1, Fig. 2-1; BLM 2015). The principal conservation issues affecting sagebrush are generally disturbance related and include altered fire regimes, an increasing prevalence of invasive species, and fragmentation. The extent and magnitude of these problems make restoration measures costly and difficult to implement.

High-elevation forest and woodland habitats occur mainly on north aspects above 2,000 m, where precipitation is sufficient to support tree growth. Forests are characterized by a mixture of conifers including Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco), lodgepole pine (*Pinus contorta* Douglas ex Loudon), limber pine (*Pinus flexilis* James), and subalpine fir (*Abies lasiocarpa* [Hook.] Nutt.). Quaking aspen (*Populus tremuloides* Michx.), an important and declining habitat type, is also present. Mountain shrub communities comprised of mountain big sagebrush (*A. t.* subsp. *vaseyana* [Rydb.] Beetle), chokecherry (*Prunus virginiana* L.), Saskatoon serviceberry (*Amelanchier alnifolia* [Nutt.] Nutt. ex M. Roem.), and common snowberry (*Symphoricarpos albus* [L.] S.F. Blake) are common and open grasslands occur on wide ridgetops. These habitats are important to many endemic, at-risk, and SGCN species including the endemic South Hills population of Red Crossbill (*Loxia curvirostra*). Primary conservation issues include habitat loss, shifting precipitation patterns, altered fire regimes, and fragmentation resulting from a variety of human activities.

Pinyon–juniper–mountain mahogany woodland & savanna is a prominent woodland habitat complex and conservation target in the Northwestern Basin and Range. Woodlands transitionally occur between xeric, low-elevation shrub-steppe habitats and more mesic coniferous forests. They exhibit lower tree heights and more open canopies than forested areas. Rocky Mountain juniper (*Juniperus scopulorum* Sarg.) and Utah juniper (*Juniperus osteosperma* [Torr.]), although native, have been managed as invasive species on public and private lands for >60 years and large areas have been eradicated to promote grasslands and shrublands, primarily for livestock forage. Juniper encroachment is frequently implicated in the loss of sagebrush and other mountain shrub communities as well as population declines of sagebrush-dependent species. Pinyon–juniper woodlands also support a diverse assemblage of birds, particularly in winter, when berries and seeds provide an important source of food. Future management will require balancing the habitat needs of SGCN from both pinyon–juniper and sagebrush in a climate predicted to favor further expansion of juniper.

Curl-leaf mountain mahogany (*Cercocarpus ledifolius* Nutt.) is exceptionally long-lived, but stands may be seral to conifers under favorable precipitation cycles. The species is not fire-tolerant and expanded its range during the 20th century as a result of fire suppression. Curl-leaf mountain mahogany is palatable to Mule Deer (*Odocoileus hemionus*) and Elk (*Cervus canadensis*) and is also consumed by livestock. It provides important year-round cover for ungulates and nesting and foraging habitat for a variety of birds. Prolonged drought, shifting fire regimes, and invasive species compose the primary conservation issues affecting the extent and quality of this conservation target.

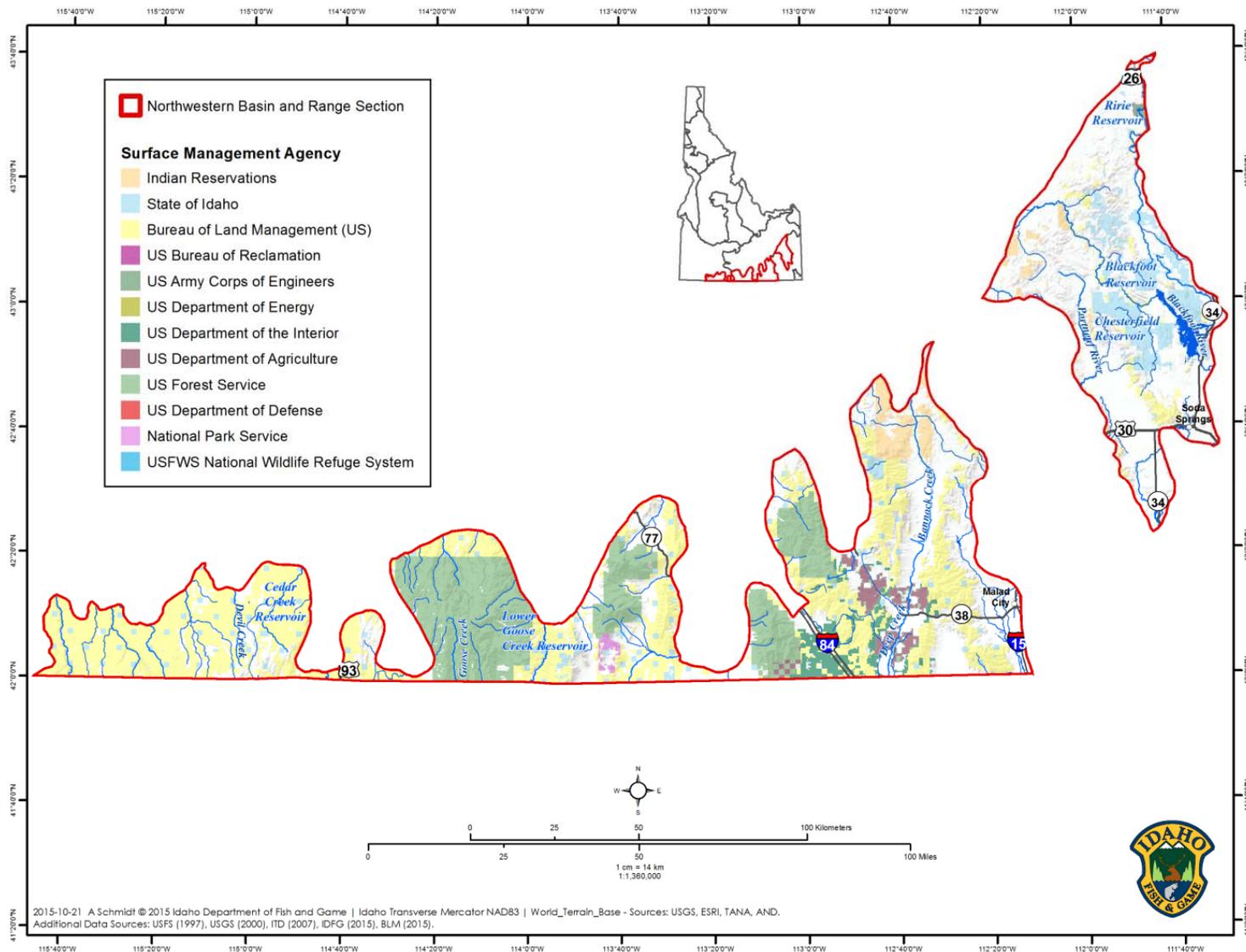


Fig. 11.1 Map of Northwestern Basin and Range surface management

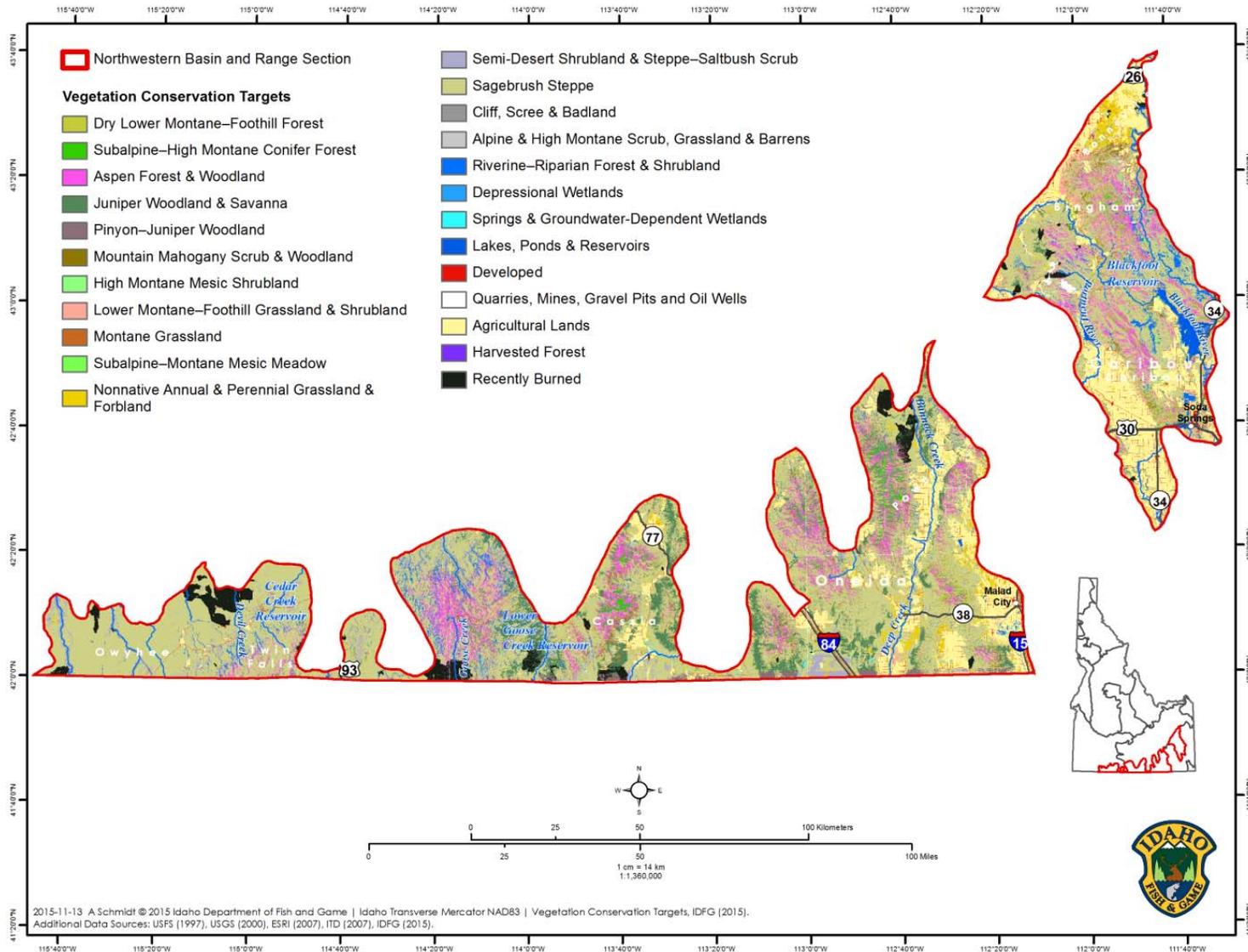


Fig. 11.2 Map of Northwestern Basin and Range vegetation conservation targets

Conservation Targets in the Northwestern Basin and Range

Successful conservation of wildlife requires that we implement measures to protect, preserve, improve, or restore habitat at a meaningful scale. The landscape is frequently the most efficient scale for maximizing conservation effort as multiple species usually realize some benefit. We identified 5 habitat targets (4 terrestrial, 1 aquatic) that represent much of the biological diversity in Idaho's Northwestern Basin and Range (Table 11.1). These habitats support unique assemblages of SGCN, identified here as nested targets, in addition to a variety of game and nongame wildlife (Table 11.2). We assess viability for each target by evaluating current condition and factors that impact habitat quality, then establish management objectives, strategies and actions for guiding landscape-scale conservation measures. We acknowledge the limited role that IDFG has in implementing those measures, as our agency manages only a small amount of land, but it is our imperative to communicate priorities for wildlife and wildlife habitat to those agencies for which conservation is mandated.

We determined that at least 2 taxa—colonial waterbirds and Bighorn Sheep (also addressed in separate management plan at <http://fishandgame.idaho.gov/public/wildlife/planBighorn.pdf>)—warrant additional conservation measures beyond those focused solely on habitat. These species are afforded conservation target status and discussed separately. We summarize current management direction, priorities, and conservation actions outlined in IDFG management and/or other applicable plans.

Table 11.1 At-a-glance table of conservation targets in the Northwestern Basin and Range

Target	Target description	Target viability	Nested targets (SGCN)	
Subalpine–High Montane Conifer Forest	These are the matrix forests of the upper montane and subalpine zone, occurring from 900 m (2,950 ft) up to the subalpine–alpine transition. They are comprised of evergreen conifers, broad-leaved cold-deciduous trees, and isolated cold-deciduous conifer stands. Characteristic trees include subalpine fir, lodgepole pine, limber pine (<i>Pinus flexilis</i>) and quaking aspen (<i>Populus tremuloides</i>).	<i>Fair</i> . Extent of this habitat is reduced from historical levels. Remaining habitat is fragmented and has been altered to some degree by a legacy of fire suppression and other human activities. Stands are more susceptible to disease and insect outbreaks and are at an increased risk from wildfire due to changing climate patterns. Climate modeling predicts these trends will continue in the future.	<i>Tier 2</i>	Western Toad Red Crossbill (South Hills popn.) Silver-haired Bat Hoary Bat
			<i>Tier 3</i>	Common Nighthawk Little Brown Myotis Kriemhild Fritillary
Pinyon–Juniper–Mountain Mahogany Woodland & Savanna	Includes Utah juniper, Rocky Mountain juniper and/or singleleaf pinyon. Singleleaf pinyon is restricted to extreme	<i>Good</i> (Pinyon–Juniper). Abundance has been increasing rangewide. Climate modeling suggests	<i>Tier 1</i>	Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee

Target	Target description	Target viability	Nested targets (SGCN)	
	southern Idaho. Elsewhere juniper occurs singly or in mixed stands. All species generally occur between 1,200 and 2,300 m (3,900 and 7,500 ft) and are often associated with a major shrub component. Curl-leaf mountain mahogany habitats occur on the dry and rocky soils of mountain slopes, plateaus, and ridges at elevations ranging from 1,200 to 2,600 m (3,937 to 8,530 ft).	further expansion of this community type as the region warms and precipitation patterns shift. Prolonged drought, altered fire regimes, and invasive nonnative species are changing the dynamics of this system. Juniper is frequently implicated in reducing the extent and quality of sagebrush and other mountain shrub communities and management activities favoring shrub habitat may reduce the extent of these woodlands.	<i>Tier 2</i>	Golden Eagle Pinyon Jay Bighorn Sheep
			<i>Tier 3</i>	Short-eared Owl Common Nighthawk Hunt's Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch
Managed Perennial Grasslands	Managed perennial grasslands and NRCS-enrolled properties, e.g., Conservation Reserve Program (CRP) and State Acres for Wildlife Enhancement (SAFE) lands.	Good. Acreages enrolled in CRP and SAFE programs in most of the section are at the maximum acreage allowed by law or reasonably expected to be enrolled. An increased focus on native plant species seed mixes in SAFE (and to some extent CRP) has improved stand quality. Finally, this system supports desired indicator species (i.e., Sharp-tailed Grouse).	<i>Tier 1</i>	Greater Sage-Grouse Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee
			<i>Tier 2</i>	Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl
			<i>Tier 3</i>	Sandhill Crane Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Hunt's Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch
Sagebrush Steppe	All big sagebrush habitat types with an emphasis on areas identified as priority sagebrush habitat for the Greater Sage-Grouse. Shrub steppe is typically dominated by perennial grasses (>25% cover) with open to moderately dense basin big sagebrush, Wyoming big sagebrush, threetip	<i>Fair</i> . Sagebrush steppe is reduced from its historical extent. Much of the remaining habitat is fragmented, impacted by a variety of human activities and degraded by invasive weeds. Fire regimes have been altered by invasive annual	<i>Tier 1</i>	Greater Sage-Grouse Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee
			<i>Tier 2</i>	Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Long-billed Curlew Burrowing Owl Sage Thrasher Sagebrush Sparrow

Target	Target description	Target viability	Nested targets (SGCN)	
	sagebrush, or antelope bitterbrush in the overstory.	grasses, producing uncharacteristically large range fires. In some areas, juniper encroachment is negatively impacting sagebrush habitat.		Pygmy Rabbit Bighorn Sheep Wyoming Ground Squirrel
			<i>Tier 3</i>	Sandhill Crane Short-eared Owl Common Nighthawk Grasshopper Sparrow Townsend's Big-eared Bat Hunt's Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch
Riverine– Riparian Forest & Shrubland	Rivers and streams, including all associated riparian habitats. Includes the Jarbidge, Blackfoot, and Bear River systems and their tributaries and all other 1st- through 4th-order streams in the section.	<i>Fair.</i> Many streams in the section are classified as 303(d) (impaired waters) by the Idaho Department of Environmental Quality. Riverine habitats face substantial threats from improper livestock grazing; altered fire regimes; dams, diversions and channel degradation; poor water quality; altered precipitation and temperature regimes; and loss of riparian habitat. Land use practices suggest current trends will continue.	<i>Tier 1</i>	Bear Lake Springsnail
			<i>Tier 2</i>	Western Toad Northern Leopard Frog American White Pelican Rocky Mountain Dusksnail
			<i>Tier 3</i>	Townsend's Big-eared Bat Little Brown Myotis A Miner Bee (<i>Hesperapis kayella</i>) A Caddisfly (<i>Eocosmoecus schmidti</i>) Snake River Pilose Crayfish
Colonial Waterbirds	Colonial waterbirds nest at Blackfoot Reservoir on 2–3 islands and within emergent vegetation along the shoreline. Threats include water level fluctuations, competition with other species, and disturbance from management and recreational activities.	<i>Fair.</i> Viability of the colonial waterbird population at Blackfoot Reservoir is fair because of a downward trend for some species (e.g., pelican and tern), lack of data for others (grebes), and ongoing management activities on the nesting island that may negatively impact nontarget SGCN.	<i>Tier 2</i>	Western Grebe Clark's Grebe American White Pelican California Gull Caspian Tern
			<i>Tier 3</i>	Ring-billed Gull
Bighorn Sheep	Small populations occupy the Bruneau–Jarbidge canyons and the Jim Sage Mountains.	<i>Good.</i> Jim Sage PMU contains an estimated 80–100 individuals. Based on	<i>Tier 2</i>	Bighorn Sheep

Target	Target description	Target viability	Nested targets (SGCN)
	<p>In addition to habitat threats, Bighorn Sheep also face threats from disease transmission from domestic sheep and goats, and disturbance from human activities during critical life cycle stages.</p>	<p>habitat models, the population is estimated to be at or near carrying capacity. The South Hills PMU contains <15 individuals and viability is poor due to low populations, conflicts with domestic livestock, and habitat concerns.</p>	

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Table 11.2 Species of Greatest Conservation Need (SGCN) and associated conservation targets in the Northwestern Basin and Range

Taxon	Conservation targets						
	Subalpine-High Montane Conifer Forest	Pinyon-Juniper-Mountain Mahogany Woodland & Savanna	Managed Perennial Grasslands	Sagebrush Steppe	Riverine-Riparian Forest & Shrubland	Colonial Waterbirds	Bighorn Sheep
AMPHIBIANS							
Western Toad ²	X				X		
Northern Leopard Frog ²					X		
BIRDS							
Greater Sage-Grouse ¹			X	X			
Sharp-tailed Grouse ²			X	X			
Western Grebe ²						X	
Clark's Grebe ²						X	
American White Pelican ²					X	X	
Ferruginous Hawk ²			X	X			
Golden Eagle ²		X	X	X			
Sandhill Crane ³			X	X			
Long-billed Curlew ²			X	X			
Ring-billed Gull ³						X	
California Gull ²						X	
Caspian Tern ²						X	
Burrowing Owl ²			X	X			
Short-eared Owl ³		X	X	X			
Common Nighthawk ³		X	X	X			
Pinyon Jay ²		X					
Sage Thrasher ²				X			
Sagebrush Sparrow ²				X			
Grasshopper Sparrow ³			X	X			
Red Crossbill (South Hills popn.) ²	X						
MAMMALS							
Pygmy Rabbit ²				X			
Townsend's Big-eared Bat ³	X			X	X		
Silver-haired Bat ²	X						
Hoary Bat ²	X						
Little Brown Myotis ³	X				X		
Bighorn Sheep ²		X		X			X
Wyoming Ground Squirrel ²				X			
GASTROPODS							

Taxon	Conservation targets						
	Subalpine-High Montane Conifer Forest	Pinyon-Juniper-Mountain Mahogany Woodland & Savanna	Managed Perennial Grasslands	Sagebrush Steppe	Riverine-Riparian Forest & Shrubland	Colonial Waterbirds	Bighorn Sheep
Rocky Mountain Dusksnail ²					X		
Bear Lake Springsnail ¹					X		
INSECTS							
Hunt's Bumble Bee ³		X	X	X			
Morrison Bumble Bee ¹		X	X	X			
Western Bumble Bee ¹		X	X	X			
Suckley Cuckoo Bumble Bee ¹		X	X	X			
A Mason Bee (<i>Hoplitis producta</i>) ³		X	X	X			
A Miner Bee (<i>Hesperapis kayella</i>) ³					X		
Kriemhild Fritillary ³	X						
Monarch ³			X	X			
A Caddisfly (<i>Eocosmoecus schmid</i>) ³					X		
CRAYFISH							
Snake River Pilose Crayfish ³					X		

Target: Sagebrush Steppe

Sagebrush steppe is the dominant habitat in the Northwestern Basin and Range and is a priority conservation concern as it contains much of the section's biological diversity. It is distinguished by an overstory of sagebrush (*Artemisia* L.) and an understory of perennial grasses and forbs. It occurs between the salt desert communities in the lowest basins and alpine meadows and forests in mountainous areas

(Miller and Eddleman 2001). Sagebrush steppe is structurally and compositionally diverse and occurs over a wide range of climatic and physiographic gradients. Large swaths of sagebrush steppe in the Northwestern Basin and Range have been disturbed and/or fragmented, reducing its value for wildlife. Although current resource management is driven by concerns over declining Sage-Grouse populations, numerous other sagebrush-dependent species show evidence of decline.



South Hills, Idaho, 2004 IDFG

Factors that may be contributing to these declines include improper livestock grazing, energy development, and invasive plants. Grazing is the predominant land use on both public and private lands throughout the section. Intact stands of sagebrush also provide winter range for Mule Deer and Elk, year-round habitat for Pronghorn (*Antilocapra americana*), and support a variety of SGCN such as Pygmy Rabbit (*Brachylagus idahoensis*) and Sagebrush Sparrow (*Artemisiospiza nevadensis*).

Target Viability

The target viability rating for sagebrush steppe is "Fair." Much of the Wyoming big sagebrush (*Artemisia tridentata* Nutt. subsp. *wyomingensis* Beetle & Young) and basin big sagebrush (*Artemisia tridentata* Nutt. subsp. *tridentata*) habitat in the valleys of southeastern Idaho has been converted to agriculture. At higher elevations, mountain big sagebrush (*Artemisia tridentata* Nutt. subsp. *vaseyana* [Rydb.] Beetle) communities are diminishing due to conifer encroachment from juniper woodlands in arid locations and Douglas-fir or subalpine fir in more mesic sites. Condition of remaining sagebrush habitats is variable, ranging from very poor in sites experiencing high-magnitude disturbances to good or excellent in undisturbed sagebrush steppe and mountain big sagebrush communities. Large fires have affected sagebrush in Owyhee and Twin Falls counties and although rehabilitation efforts are ongoing, the results of these efforts will not be known for some time. Unburned sagebrush in Owyhee and Twin Falls counties is subject to livestock grazing and other impacts, but is generally regarded as intact.

Both short- and long-term trends for sagebrush habitat are downward. Intensive agriculture in Idaho began in the early 20th century and contributed to a significant loss of sagebrush on arable land, the introduction of invasive species, and the fragmentation of remaining stands. These losses continued as range improvements, efforts to increase forage grasses and reduce sagebrush cover continued through the latter half of the century. More recently, large fires and conifer encroachment have resulted in additional losses to sagebrush habitat. Fires, exacerbated by climate change are predicted to increase in frequency and magnitude, threatening remaining sagebrush communities. Other anthropogenic impacts such as those associated with transportation, energy development, and recreation are not expected to subside and in some instances may increase. Restoration projects at a scale necessary to reverse these trends are both difficult and expensive to implement.

Spotlight Species of Greatest Conservation Need: Greater Sage-Grouse

Greater Sage-Grouse is the only "tier 1" vertebrate SGCN that inhabits the Northwestern Basin and Range. Populations are discontinuous, separated by mountain ranges or large tracts of agricultural land in some of the eastern basins. In general, abundance increases from east to west, as does the proportion of priority (I) and important (II) Sage-Grouse Habitat Management Areas (Fig. 11.3). The largest concentrations of Sage-Grouse occur in the Browns Bench and Shoshone Basin areas. Telemetry data indicate these birds are part of a larger population that extends south into Nevada. Connectivity between eastern Idaho populations and Utah populations has not been investigated. Population declines in southern Idaho have been reliably reported since about 1996, culminating with a sharp drop following the Murphy Complex Fire of 2007; they have been slowly recovering since.

The October 2, 2015 announcement by the US Fish and Wildlife Service that listing the Greater Sage-Grouse was not warranted has placed the onus for conservation on cooperative management between state and federal agencies. Conservation issues and management actions are provided in the *2006 Conservation Plan for the Greater Sage-grouse in Idaho* (Idaho Sage-grouse Advisory Committee 2006). Higher-level direction for habitat management priorities is provided in the *Federal Alternative of Governor C.L. "Butch" Otter for Greater Sage-Grouse Management in Idaho* (hereafter Governor's Alternative; Otter 2012) and included in the Idaho and Southwestern Montana GRSG ARMPA (BLM 2015). Conservation actions on state endowment lands are identified in the *Idaho State Board of Land Commissioners Greater Sage-Grouse Conservation Plan* (Idaho State Board of Land Commissioners 2015). Private landowners with permits on state endowment land may also agree to voluntary best management practice on their private lands. Landowners may also be eligible for technical and financial assistance to implement voluntary conservation practices through the Natural Resources Conservation Service's Sage-Grouse Initiative. Sage-Grouse habitat in the Northwestern Basin and Range is a mix of Priority (PHMA), Important (IHMA), and General (GHMA) (see Fig. 11.3), as developed by the State and federal land management agencies and found in the *Idaho and Southwestern Montana GRSG ARMPA* (see Attachment 1, Fig. 2-1; BLM 2015).

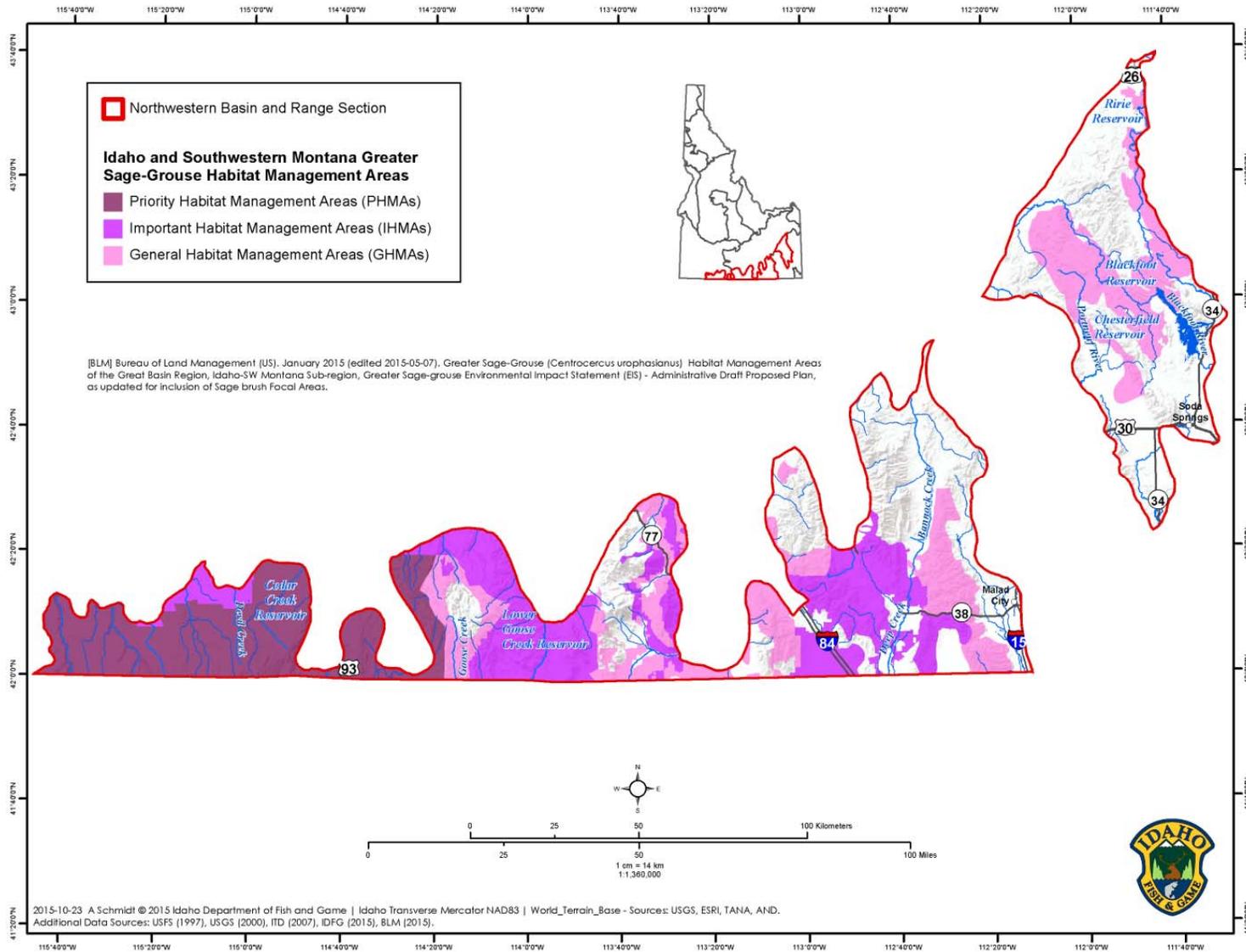


Fig. 11.3 Map of Idaho and Southwestern Montana Greater Sage-Grouse Habitat Management Areas

Prioritized Threats and Strategies for Sagebrush Steppe

Very High rated threats to Sagebrush Steppe in the Northwestern Basin and Range

Increased frequency & severity of wildfire

The increased frequency and intensity of wildfire is considered a primary threat to the sagebrush-steppe ecosystem and to the many sagebrush-steppe species that depend on it, including Sage-Grouse (Otter 2012, US Fish and Wildlife Service 2014). The accelerated invasion of nonnative annual grasses, the spread of juniper, and the effects of intensified drought and climate change have created conditions leading to larger, more intense rangeland fires across the Great Basin. This contributes to the ongoing fragmentation and loss of shrub-steppe habitats. Almost the entire extent of the Northwestern Basin and Range is rated as "very high" for burn probability (DOI 2015; also see Fig. 11.4).

That portion of the Northwestern Basin and Range occurring in Owyhee, Twin Falls, and Cassia counties is especially vulnerable to lightning-caused wildfire, as continental weather systems drive convective thunderstorm activity here during the driest part of the year. Protection of this key system and restoration of degraded areas is a priority. Habitat management within the Greater Sage-Grouse Priority Habitat Management Area (PHMA) (BLM 2015) should be conservative and focused on preserving large tracts of intact sagebrush, developing habitat resiliency, and improving sustainability.

Objective	Strategy	Action(s)	Target SGCNs
Manage wildfires to minimize loss of sagebrush habitat.	Improve fire suppression protocols and resource allocations to limit habitat losses to wildfire.	<p>Support development and implementation of Rangeland Fire Protection Associations (RFPAs) (e.g., Idaho Code § 38-104B and Governor's Executive Order 2015-04) (Otter 2015).</p> <p>During high fire danger conditions, stage initial attack and secure additional resources closer to priority areas, with particular consideration of the Southern and Desert Conservation Areas to ensure quicker response times in or near Sage-Grouse habitat (BLM 2015).</p> <p>Create and maintain effective fuel breaks in areas dominated by cheatgrass and medusahead to modify fire behavior and increase fire suppression effectiveness based on criteria outlined in the Governor's Alternative (Otter 2012).</p>	<p>Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Wyoming Ground Squirrel Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch</p>
Increase the	Expand the use of	Reallocate use of native seed from ESR	Greater Sage-Grouse

Objective	Strategy	Action(s)	Target SGCNs
likelihood of post-fire vegetation restoration success (DOI 2015).	native seeds and seedlings to restore post-fire rangeland vegetation (DOI 2015).	<p>projects outside of PHMA or IHMA (or ESA-listed species habitat) to those inside it in years when preferred native seed is in short supply (BLM 2015).</p> <p>Collect native seed from across the entirety of a species range to conserve germ plasm for research and restoration and enhance vegetation resilience in uncertain future environments.</p> <p>Develop and use interagency climate data to tailor site-specific vegetation restoration plans.</p> <p>Sagebrush-steppe restoration should incorporate an appropriate mix of native vegetation to support all habitat needs of Sage-Grouse and other sagebrush-dependent species.</p> <p>To the extent possible, limit the use of nonnative species for emergency site stabilization and the creation of fire breaks.</p>	<p>Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Wyoming Ground Squirrel Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch</p>
Restore degraded habitat.	Support long-term strategies for sagebrush-steppe restoration including consistent long-term monitoring protocols and adaptive management for restored areas (DOI 2015).	<p>Assess current restoration activities to identify successful techniques, improve efficiency, and to help leverage funding for future restoration needs.</p> <p>Materially support cross-jurisdictional revegetation, monitoring, and adaptive management efforts for landscape-level sagebrush steppe restoration.</p>	<p>Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Wyoming Ground Squirrel Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee</p>
Maintain intact sagebrush stands to limit fragmentation and minimize direct habitat loss.	Protect Wyoming big sagebrush from destruction by wildfire.	<p>Suppress wildfires in Sage-Grouse habitat, commensurate with threatened and endangered species habitat or other critical habitats to be protected (BLM 2015).</p> <p>Develop fuel breaks in areas dominated by invasive annual grasses adjacent to Wyoming big sagebrush stands.</p>	<p>Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk</p>

Objective	Strategy	Action(s)	Target SGCNs
			Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Wyoming Ground Squirrel Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch

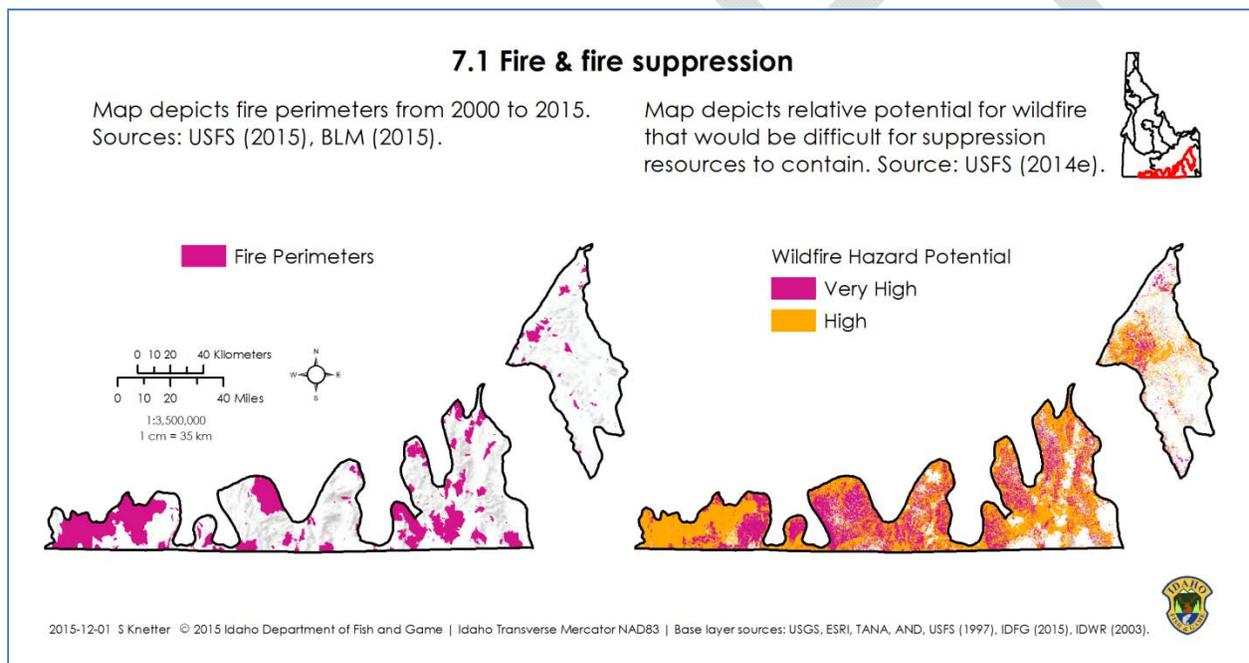


Fig. 11.4 Map of fire perimeters and relative potential for wildfire in the Northwestern Basin and Range

High rated threats to Sagebrush Steppe in the Northwestern Basin and Range

Noxious weeds & invasive annual grasses

Invasive species are considered a primary threat to Sage-Grouse in Idaho in the Governor's Alternative (Otter 2012) and likewise cited as a primary threat to shrub-steppe habitats by the US Fish and Wildlife Service (2014). In addition, the accelerated invasion of nonnative annual grasses, in particular cheatgrass and medusahead, is one of the primary drivers of larger, more intense rangeland fires across the Great Basin and directly threatens the habitat of Sage-Grouse

and other sagebrush-steppe dependent wildlife (DOI 2015). In the Northwestern Basin and Range, noxious weeds and invasive annual grasses (e.g., cheatgrass) crowd out native grasses and most forbs and have colonized many of the sagebrush habitat types, particularly in lower-elevation sites and in ecologically degraded areas (Fig. 11.5). Heavily infested areas have already become or will likely convert to monocultures of annual grasses.

Objective	Strategy	Action(s)	Target SGCNs
Limit introduction of new weeds into areas where they do not occur.	<p>Improve weed management tools and techniques.</p> <p>Aggressively manage nonnative undesirable plant species.</p>	<p>Implement <i>The Idaho Invasive Species Strategic Plan 2012–2016</i> ([ISDA] Idaho State Department of Agriculture 2012).</p> <p>Develop integrated weed management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015).</p> <p>Develop large-scale application of integrated weed management programs that include chemical, mechanical, biological, newly registered biocides, and subsequent restoration practices (DOI 2015).</p> <p>Support the use of Plateau® herbicide in controlling cheatgrass.</p> <p>Promote certified weed-free seeds/forage (Idaho Sage-grouse Advisory Committee 2006).</p> <p>Target areas that contain cheatgrass and other invasive or noxious species to minimize competition and favor establishment of desired species (BLM 2015).</p> <p>Support the development of a framework for a national invasive species Early Detection and Rapid Response (EDRR) program (DOI 2015).</p>	<p>Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Wyoming Ground Squirrel Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch</p>

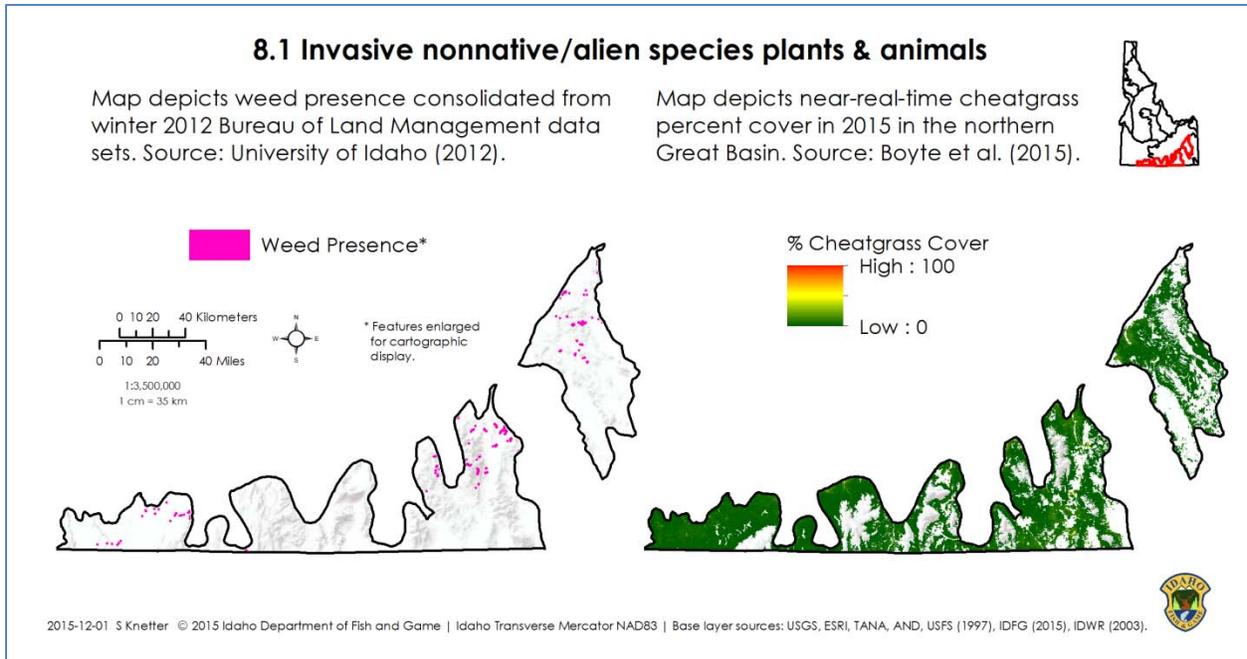


Fig. 11.5 Map of weed presence and cheatgrass percent cover in the Northwestern Basin and Range

Juniper encroachment

The expansion of native junipers (*Juniperus occidentalis* Hook. and *J. osteosperma* [Torr.]) into sagebrush-steppe habitats has degraded this ecosystem, reducing habitat suitability for sagebrush obligates. A study in eastern Oregon by the Nature Conservancy and the Natural Resources Conservation Service showed that Sage-Grouse abandoned sagebrush habitat once conifer cover reached 4%. Juniper encroachment has been cited as a growing problem across portions of southeast Idaho and locally in south-central Idaho. Altered fire regimes have allowed juniper to expand into long-established sagebrush-steppe ecosystems, increasing fire intensity when rangeland wildfires become crown fires in juniper. From a climate change perspective, southern Idaho is predicted to have less sagebrush and more woodland cover types (e.g., juniper) in the future.

Objective	Strategy	Action(s)	Target SGCNs
Reduce juniper encroachment into sagebrush-steppe.	Remove phase 1 and phase 2 juniper stands to reduce juniper expansion into sagebrush steppe.	<p>Prioritize treatments near occupied Sage-Grouse leks and other seasonal Sage-Grouse habitats.</p> <p>Use site-specific analysis to refine the location for specific areas to be treated.</p>	<p>Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep</p>

Objective	Strategy	Action(s)	Target SGCNs
			Wyoming Ground Squirrel Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch

Improper livestock grazing management

We define "improper" grazing as grazing beyond the capacity of the resource (e.g., overuse as often occurs along riparian areas) or occasionally as underuse where lack of grazing contributes to increased fuel loads. This differs from commonly accepted rangeland definitions where improper is simply synonymous with forage overuse.

The effects of improper livestock grazing on sagebrush steppe are pervasive and well documented (e.g., Kauffman and Krueger 1984, Fleischner 1994, Belsky et al. 1999). For example, livestock grazing can change habitat features that directly influence birds by reducing plant species diversity and biomass (Reynolds and Trost 1981, Bock and Webb 1984, Saab et al. 1995). Changes in water and nutrient cycling caused by grazing can also promote the spread of invasive species, which then degrade native bird habitats by altering fire and disturbance regimes (Rotenberry 1998, Knick et al. 2003). Sagebrush systems west of the Rocky Mountains are particularly sensitive to grazing disturbance because they evolved in the absence of large herds of herbivorous mammals such as American Bison (*Bos bison*) (Mack and Thompson 1982).

In the Northwestern Basin and Range, factors that contribute to this problem include insufficient funds for federal land management agency oversight and insufficient monitoring (i.e., lack of appropriate rangeland monitoring data to support trend analysis) to adequately inform rangeland management decisions.

Objective	Strategy	Action(s)	Target SGCNs
Manage livestock to maintain rangeland health and habitat quality (Otter 2012).	Manage the timing, intensity, duration, and frequency of grazing practices to manipulate vegetative condition (Otter 2012).	<p>Prioritize permit renewals and land health assessments for allotments with declining Sage-Grouse populations (Otter 2012).</p> <p>Inform affected permittees and landowners regarding Sage-Grouse habitat needs and conservation measures (Idaho Sage-grouse Advisory Committee 2006).</p> <p>Incorporate GRSG Seasonal Habitat Objectives (Table 2-2 in BLM 2015) into relevant resource management plans and projects.</p> <p>Use the Sage-Grouse Habitat Assessment Framework (Stiver et al. 2015) with an appropriate</p>	<p>Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Wyoming Ground Squirrel Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee</p>

Objective	Strategy	Action(s)	Target SGCNs
		<p>sampling design to conduct fine-scale habitat assessments to inform grazing management.</p> <p>Undertake adaptive management changes related to existing grazing permits when improper grazing is determined to be the causal factor in not meeting habitat objectives (Otter 2012).</p>	<p>A Mason Bee (<i>Hoplitis producta</i>) Monarch</p>
	Maintain MOU between ISDA and BLM as it pertains to grazing management.	Involve permittees in providing monitoring information, the interpretation of monitoring data, & providing input into grazing management adjustments to meet the goals and objectives of federal land management agencies and the permittees (Sanders 2006).	
Assess the impacts (both negative and, potentially, positive) of livestock grazing on sagebrush-steppe obligate passerines (Rotenberry 1998).	Design experiments involving a variety of alternative grazing treatments (including no grazing at all) across the spectrum of major shrub-steppe habitat (Rotenberry 1998).	<p>Implement grazing alternatives based on project outcome.</p> <p>Conduct experiments over multiple years (Rotenberry 1998).</p> <p>Work with the University of Idaho to consider adding a sagebrush-obligate passerine component to its long-term study of the impacts of spring grazing on Sage-Grouse.</p>	<p>Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Wyoming Ground Squirrel Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch</p>

Changes in precipitation & broad-scale hydrologic regimes

The modeled effects of climate change, including intensified drought and changes in precipitation timing and amounts, predict conditions leading to larger, more intense rangeland fires across the entire Great Basin. The amount and timing of water affects sagebrush growth and recruitment and may seriously hinder restoration efforts. Reduced winter snowpack and increased winter rains favor development of cheatgrass and other invasive annuals. The flammability of annual grasses and increased summer temperatures exacerbates fire intensity and shortens fire return intervals. Generally, the most reliable strategies for mitigating climate

change impacts in sagebrush steppe are those that promote ecosystem resiliency by preserving areas of high ecological integrity.

Objective	Strategy	Action(s)	Target SGCNs
Mitigate drought impacts by building resiliency into sagebrush steppe systems.	Conserve intact sagebrush steppe vegetation and soils by eliminating or reducing nonclimate stressors.	<p>Coordinate livestock and land management planning efforts to achieve rangeland vegetation standards consistent with established federal guidelines.</p> <p>Preserve institutional flexibility for reducing or removing livestock from marginal or degraded land for a time period sufficient to allow full recovery.</p> <p>Protect relict and native-dominated communities by restricting vegetation- and soil-disturbing practices.</p> <p>Protect soils by limiting chemical and biological treatments and mechanical disturbances that disrupt soil structure or processes.</p> <p>Prevent and slow the proliferation of invasive species and other nonnative vegetation.</p> <p>Suppress all fires that occur in areas of high ecological integrity.</p>	<p>Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Wyoming Ground Squirrel Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch</p>
	Restore degraded sagebrush steppe vegetation where possible.	<p>Prioritize areas of high conservation for restoration.</p> <p>Consider multiple sources to guide restoration of sagebrush habitats (e.g., WIVC 2002).</p>	
Mitigate changes in precipitation & broad-scale hydrologic regimes.	Reduce or remove human and livestock disturbance until hydrologic regimes are restored.	<p>Adjust stocking rates to accurately reflect vegetation and hydrologic conditions.</p> <p>Limit human disturbances, e.g., OHV use and other high-impact recreational activities during periods of prolonged or recurrent drought.</p>	<p>Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Sage Thrasher Sagebrush Sparrow Grasshopper Sparrow Pygmy Rabbit Townsend's Big-eared Bat Bighorn Sheep Wyoming Ground Squirrel Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo</p>

Objective	Strategy	Action(s)	Target SGCNs
			Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch

Species designation, planning & monitoring

In addition to conservation measures to address habitat threats, some SGCN require inventory and monitoring to assess their current status and distribution in Idaho. We identify information needs for 4 species in sagebrush steppe and propose strategies to determine population status and suggest interim conservation measures where declines are known or suspected.

Long-billed Curlew

Long-billed Curlew (*Numenius americanus*) is the largest North American shorebird and in the Northwestern Basin and Range, occurs in open grasslands, pasture, and disturbed agricultural areas. Idaho represents important breeding territory for this migratory species and although breeding occurs within the Northwestern Basin and Range, it is poorly studied. Currently, this species is ranked G5 (Secure) by NatureServe, S2B (Imperiled) by the Idaho Department of Fish and Game, and designated a Type 2 Sensitive Species by BLM Idaho. Rangewide, Long-billed Curlew is believed to be declining, particularly in the Great Plains. BBS data (Sauer et al. 2014) indicate a significant increasing long-term trend of 1.26% per year in the Western BBS Region during the 1966–2013 time interval and suggest a nonstatistically significant increasing short-term trend (2003–2013) of 3.81% per year in Idaho. However, these data may not adequately cover trends for this species. Status and distribution of Long-billed Curlew in the Northwestern Basin and Range have not been determined, and if completed would advance efforts to determine population status at regional and rangewide levels. Systematic surveys and productivity studies are monitoring needs for this species in the Northwestern Basin and Range. Conservation measures that benefit Long-billed Curlew include those that protect, enhance, and restore suitable breeding habitat and limit nest disturbance by humans and livestock. A prominent area to consider for restoration would be the 19,340-ha Curlew National Grassland, which currently has little suitable nesting habitat.

Burrowing Owl

Burrowing Owl (*Athene cunicularia*) occupies grasslands, open sagebrush steppe, and agricultural landscapes across southern Idaho. Currently, this species is ranked G4 (Apparently secure) by NatureServe, S2B (Imperiled) by the Idaho Department of Fish and Game, and designated a Type 2 Sensitive Species by BLM Idaho. Western Burrowing Owl (*A. c. hypugaea*) has declined significantly throughout much of its North American range, particularly in Canada. Although local researchers suspect populations are declining in Idaho, BBS data (Sauer et al. 2014) do not indicate statistically significant changes in Idaho or the Western BBS Region for either of 2 time intervals (1966–2013, 2003–2013). The lack of a significant trend may be influenced by low detection rates. As funding and time permit, systematic surveys for Burrowing Owl are recommended for agencies within the Northwestern Basin and Range to determine population status and trend. Survey results from the BLM Four Rivers Field Office in southwest Idaho indicate that 2 years of survey effort is sufficient to provide adequate baseline information for the species. Conservation measures to benefit Burrowing Owl include the protection or

expansion of open grassland habitats favored for breeding, and the preservation of native rodent and insect populations by reducing or eliminating chemical control measures near occupied sites.

Short-eared Owl

Short-eared Owl (*Asio flammeus*) is an owl of open terrain and adjacent woodland habitats. It occurs throughout Idaho where suitable habitat and prey are found. NatureServe ranks this species as G5 (Secure) due to its extensive range; IDFG ranks the species as S3 (Vulnerable); and BLM Idaho designated it as a Type 2 Sensitive Species in 2015. Based on data from the BBS, Christmas Bird Count (CBC), and regional and national conservation assessments, the species has undergone substantial rangewide declines (Booms et al. 2014). These declines have spurred interest in accurately determining population status as well as developing broad-scale habitat protection strategies. The Pacific Flyway Nongame Technical Committee (PFNTC) identified coordinated monitoring for Short-eared Owl as a priority new initiative in 2015. The Idaho Bird Conservation Partnership (IBCP) determined the need for a baseline population assessment and potential development of a long-term monitoring program for the species. In 2015, IBCP successfully piloted a volunteer-based, multistate survey effort that provided baseline population estimates for Idaho and Utah. IBCP plans to improve upon and expand the program into 2016 and beyond. Primary conservation concerns are habitat loss and degradation and human disturbance. Beneficial conservation actions for Short-eared Owl include those that protect, enhance, or restore suitable foraging and breeding habitat.

Common Nighthawk

Common Nighthawk (*Chordeiles minor*) is an aerial insectivore with a broad North American distribution. The species is cryptic and crepuscular, and many aspects of its life history are poorly understood. A long-distance migrant, Common Nighthawk breeds throughout North America and winters in South America. In southern Idaho, the species occupies sagebrush steppe where it nests on open, gravelly areas. BBS data (Sauer et al. 2014) reveal statistically significant long-term (1966–2013) and short-term (2003–2013) declines in the Western BBS Region (–2.30% and –1.73% per year, respectively), Great Basin (–1.15% and –1.13% per year, respectively), and numerous individual states, including Idaho (–1.81% and –0.86% per year, respectively), which is cause for concern. More consistent monitoring in Idaho is needed to better ascertain the magnitude and cause(s) of decline. Conservation actions that preserve or enhance populations of flying insects would benefit this species.

Target: Pinyon–Juniper–Mountain Mahogany Woodland & Savanna

Pinyon–juniper–mountain mahogany woodland and savanna habitats, a broad macrogroup, are characterized by single species or mixed species stands of Utah juniper (*Juniperus osteosperma* [Torr.]), Rocky Mountain juniper (*Juniperus scopulorum* Sarg.), singleleaf pinyon (*Pinus monophylla* Torr. & Frém.), and curl-leaf mountain mahogany (*Cercocarpus ledifolius* Nutt.) as dominant canopy species. Mountain big sagebrush (*Artemisia tridentata* Nutt. subsp. *vaseyana* [Rydb.] Beetle), black sagebrush (*Artemisia nova* A. Nelson), mountain snowberry (*Symphoricarpos oreophilus* A. Gray), and antelope bitterbrush (*Purshia tridentata* [Pursh] DC.) are common shrubs found in the understory. Bunchgrasses, such as needle and thread

(*Hesperostipa comata* [Trin. & Rupr.] Barkworth), Idaho fescue (*Festuca idahoensis* Elmer), bluebunch wheatgrass (*Pseudoroegneria spicata* [Pursh] Á. Löve), and basin wildrye (*Leymus cinereus* [Scribn. & Merr.] Á. Löve), and forbs such as arrowleaf balsamroot (*Balsamorhiza sagittata* [Pursh] Nutt.) are also common (Rust 1999).

Pinyon–juniper dominated habitats occur on dry, rocky soils at elevations ranging from 1,200 to 2,300 m (3,937 to 7,546 ft); curl-leaf mountain mahogany dominated habitats range from 1,200 to 2,600 m (3,937 to 8,530 ft). Both woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events during the growing season, such as frosts and drought, are thought to restrict the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Curl-leaf mountain mahogany woodlands may occur as small- to large-patch forested stands, but most stands occur as open woodlands, shrublands on ridges and steep rimrock slopes, or as savanna in steppe areas. Scattered juniper or pinyon may co-occur.

Pinyon–juniper–mountain mahogany woodland and savanna habitats are important for a diversity of Idaho endemic species within the Northwestern Basin and Range. In addition, big game species such as Mule Deer (*Odocoileus hemionus*), Elk (*Cervus canadensis*), and Bighorn Sheep, rely on pinyon–juniper and mountain mahogany woodlands for forage, thermal cover, and security cover throughout the year.



Jim Sage Mountains, Idaho © 2004 Jennifer Miller

The Pinyon Jay (*Gymnorhinus*

cycanocephalus) is closely tied to pinyon–juniper woodlands (Gillihan, 2006) and in Idaho, is mostly found within the Northwestern Basin and Range.

Target Viability

Pinyon–juniper–mountain mahogany woodland and savanna condition across the Northwestern Basin and Range section is considered “Good.” These areas have generally been stable to increasing in occurrence across the landscape. Much of the expansion is attributed to fire suppression (Gruell 1985, Miller and Tausch 2001). Although the current viability of this target is considered good, prolonged drought, shifting fire regimes, and invasive species are changing the dynamics of this system. In addition, although energy extraction and mining activities occur within this system, the scope is extremely limited in the Northwestern Basin and Range and therefore this threat is not currently considered high.

Spotlight Species of Greatest Conservation Need: Pinyon Jay

The following material was adapted from IDFG's 2005 Comprehensive Wildlife Conservation Strategy.

The Pinyon Jay (*Gymnorhinus cyanocephalus*) is closely tied to pinyon–juniper woodlands, preferring more mature stages of pinyon, which produce more seeds. If habitat conditions are good, a flock may occupy the same home range for decades (Ryser 1985). However, due to the unpredictable nature of the pinyon seed supply, flocks may wander in search of adequate seed sources. The Pinyon Jay has experienced significant declines throughout its range. BBS data (Sauer et al. 2014) reveal statistically significant long-term (1966–2013) and short-term (2003–2013) declines in the US (–4.36% and –3.59% per year, respectively), Western BBS Region (–4.27% and –3.59% per year, respectively), Great Basin (–4.70% and –3.57% per year, respectively), and several western states. These declines led the North American Bird Conservation Initiative to identify the Pinyon Jay as a Yellow Watch List species. No trend data exist for Idaho, likely due to low detection rates and the lack of suitable roads for conducting BBS routes. The greatest threat to Pinyon Jay in Idaho is the land management policy to eradicate pinyon–juniper woodlands because of concern about encroachment into sagebrush communities. In addition, the loss of pinyon–juniper habitat through conversion to other land cover types, including clearing for residential development, is likewise a threat (Gillihan 2006). Retaining patches of unaltered mature pinyon or pinyon–juniper at least 18 km² (7 mi²) in size, which is approximately the area of each flock's home range (Balda and Bateman 1971), is an important conservation action for Pinyon Jay. Colonies are sensitive to human disturbance, so development such as roads or picnic areas should be kept well away from known nesting sites (Gillihan 2006).

Prioritized Threats and Strategies for Pinyon–Juniper–Mountain Mahogany Woodland & Savanna

High rated threats to Pinyon–Juniper–Mountain Mahogany Woodland & Savanna in the Northwestern Basin and Range

Altered fire regimes

Fire regimes, specifically changes in the frequency and severity of wildfire, have been altered throughout the West. Climate change, invasive species expansion, and fire suppression represent examples of factors that have led to these changes. Within the pinyon–juniper–mountain mahogany woodland systems, the threat of altered fire regimes is multifaceted. The mean fire return interval prior to the European settlement was between 13 and 22 years, but since that time has significantly increased (Miller and Tausch 2001, Gucker 2006). This has allowed pinyon–juniper–mountain mahogany woodlands to expand and mature. In some instances, fire suppression has allowed juniper- and pinyon-dominated woodlands to encroach into adjacent habitats such as sagebrush steppe. Where this has occurred, pinyon–juniper removal has been implemented in an effort to maintain the integrity of sagebrush steppe habitats, often with Sage-Grouse conservation the primary focus. Conversely, decadent stands of pinyon–juniper–mountain mahogany are more susceptible to high-intensity fires, carried by the dense crown cover that can have catastrophic impacts to this important habitat type. Curl-

leaf mountain mahogany generally does not resprout after fire and these systems need protection from high-intensity fires to retain viable seedbanks for recruitment.

Because of the conflicting outcomes of altered fire regimes on pinyon–juniper–mountain mahogany woodlands, local-scale assessments and inventories should be a management priority. In some scenarios, fire might be an important management tool to improve the capacity of that habitat to support wildlife. In other scenarios, fire could be detrimental to the habitat and fire abatement would be the most appropriate management action. In general, where curl-leaf mountain mahogany is present, reducing the potential for high-intensity fire that could destroy the seedbed and recovery potential would be a priority. In contrast, where pinyon and/or juniper are the dominant species, managers will need to evaluate and prioritize management prescriptions based on species occurrence, seral stage of that particular stand, and desired conservation outcomes.

Objective	Strategy	Action(s)	Target SGCNs
Increase general knowledge on the composition and spatial arrangement of pinyon–juniper–mountain mahogany woodland and savanna patches.	Develop a detailed, high-resolution map layer that illustrates patch dynamics of pinyon–juniper–mountain mahogany woodland and savanna patches.	<p>Initiate efforts to begin development of an accurate, detailed, high-resolution habitat map that would illustrate composition, patch size, and age structure of these woodlands. This effort should include coordination with other state and federal land management agency partners.</p> <p>Ground-truth and monitor to improve map accuracy and to better allow managers to detect changes in habitat.</p> <p>Use the map layer to prioritize where management prescriptions, such as fire abatement or mechanical removal, are needed.</p>	<p>Golden Eagle Short-eared Owl Common Nighthawk Pinyon Jay Bighorn Sheep Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>)</p>
Reduce the extent of curl-leaf mountain mahogany lost to wildfire.	Develop and implement appropriate fire management plans.	<p>Identify curl-leaf mountain mahogany patches needing protection from fire.</p> <p>Work with federal and state land management agencies to coordinate wildfire response prioritization efforts.</p> <p>Where appropriate, use fuels reduction to limit the potential for catastrophic fire events in curl-leaf mountain mahogany dominated habitats.</p> <p>Implement aggressive rehabilitation using techniques such as seeding and planting in areas disturbed by fire.</p>	<p>Golden Eagle Short-eared Owl Common Nighthawk Pinyon Jay Bighorn Sheep Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>)</p>
Maintain intact old-growth stands of pinyon–juniper–mountain mahogany	Protect old growth pinyon–juniper–mountain mahogany woodland stands from fire.	Suppress all fires in identified old-growth stands of pinyon–juniper–mountain mahogany woodlands in coordination with state and federal land management agencies.	<p>Golden Eagle Short-eared Owl Common Nighthawk Pinyon Jay Bighorn Sheep</p>

Objective	Strategy	Action(s)	Target SGCNs
woodlands.		Implement aggressive rehabilitation using techniques such as seedling planting in areas disturbed by fire.	Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>)

Changes in precipitation & broad-scale hydrologic regimes

Intensified drought and climate change is a driver in creating conditions that lead to larger, more intense rangeland fires across the entire Great Basin (DOI 2015). Additionally, reduced precipitation degrades the condition of this habitat type, thereby reducing the habitat value for wildlife.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the potential for catastrophic wildfire events.	Develop appropriate fire suppression plans.	Work with state and federal land management agencies as well as private landowners to reduce vulnerability of pinyon-juniper-mountain mahogany woodlands to wildfire. Implement rehabilitation and habitat improvement efforts in desired stands that reduce potential for catastrophic wildfire, such as planting drought-tolerant species.	Golden Eagle Short-eared Owl Common Nighthawk Pinyon Jay Bighorn Sheep Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>)

Species designation, planning & monitoring

In addition to conservation measures to address habitat threats, some SGCN require inventory and monitoring to assess their current status and distribution in Idaho. We identify information needs for 2 species in pinyon-juniper-mountain mahogany woodland and savanna and propose strategies to determine population status. We also suggest interim conservation measures where appropriate.

Common Nighthawk

Common Nighthawk (*Chordeiles minor*) is an aerial insectivore with a broad North American distribution. The species is cryptic and crepuscular, and many aspects of its life history are poorly understood. A long-distance migrant, it breeds throughout North America and winters in South America. In southern Idaho, it has been recorded in pinyon-juniper-mountain mahogany woodland and savanna, but specific habitat associations are unknown. Common Nighthawk

continues to experience significant declines throughout its range. BBS data (Sauer et al. 2014) reveal statistically significant long-term (1966-2013) and short-term (2003-2013) declines in the Western BBS Region (-2.30% and -1.73% per year, respectively), Great Basin (-1.15% and -1.13% per year, respectively), Canada, and numerous US states, including Idaho (-1.81% and -0.86% per year, respectively). The Common Nighthawk is recognized as a Common Bird in Steep Decline in the State of the Birds 2014 Report (NABCI 2014). Studies to clarify habitat associations in this habitat type would inform conservation planning. Actions that preserve or enhance populations of flying insects would be beneficial to this species.

Short-eared Owl

Short-eared Owl (*Asio flammeus*) is an owl of open terrain and adjacent woodland habitats. Recent surveys indicate higher use of open woodlands and savannas by this species than previously reported. Short-eared Owl occurs throughout Idaho where suitable habitat and prey are found. NatureServe ranks this species as G5 (Secure) due to its extensive range; IDFG ranks the species as S3 (Vulnerable); and BLM Idaho designated it as a Type 2 Sensitive Species in 2015. Based on BBS data, Christmas Bird Count (CBC), and regional and national conservation assessments, the species has undergone substantial rangewide declines (Booms et al. 2014). These declines have spurred interest in accurately determining population status as well as developing broad-scale habitat protection strategies. The Pacific Flyway Nongame Technical Committee (PFNTC) identified coordinated monitoring for Short-eared Owl as a priority new initiative in 2015. The Idaho Bird Conservation Partnership (IBCP) determined the need for a baseline population assessment and potential development of a long-term monitoring program for the species. In 2015, IBCP successfully piloted a volunteer-based, multistate survey effort that provided baseline population estimates for Idaho and Utah. IBCP plans to improve upon and expand the program into 2016 and beyond. Primary conservation concerns are habitat loss and degradation and human disturbance. Beneficial conservation actions for Short-eared Owl include those that protect, enhance, or restore suitable foraging and breeding habitat.

Objective	Strategy	Action(s)	Target SGCNs
Determine the cause(s) of population decline for nightjar species in Idaho.	Work with Western Working Group Partners in Flight (WWG PIF) and the 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

Located at elevations from approximately 900 m (2953 ft) to the higher subalpine-alpine transition zone, these are the matrix forests of the upper montane and subalpine zone of the Northwestern Basin and Range. Largely comprised of evergreen conifers, broad-leaved cold-deciduous trees also occur as do isolated cold-deciduous conifer stands. Characteristic trees include subalpine fir (*Abies lasiocarpa* [Hook.] Nutt.), Engelmann spruce (*Picea engelmannii*

Parry ex Engelm.), lodgepole pine (*Pinus contorta* Douglas ex Loudon), limber pine (*Pinus flexilis* James), and quaking aspen (*Populus tremuloides* Michx.). Patterning of which forest types occur is driven by the interaction between snow deposition, desiccating winds, soil and substrate characteristics, and the interacting effects of precipitation, temperature, latitude, elevation, and aspect. Occurrences at high elevations are restricted by cold temperatures and are found on warmer southern aspects. At lower elevations, occurrences are restricted by lack of moisture and are found on cooler northern aspects and mesic microsites. Occurrences of these forest types often originate from, and are likely maintained by, stand-replacing disturbances such as avalanches, crown fires, insect outbreaks, disease, or logging. Fire regimes are generally mixed severity or stand replacing, and of long return intervals, occurring from 150 to 500 years. Insect outbreaks are more frequent and typically occur every 30 to 50 years in some forest types, altering both the structure and composition of stands.

Target Viability

This conservation target has a viability rating of Fair. Much of the subalpine–high montane conifer forest in the Northwestern Basin and Range has been impacted to some degree by a legacy of human activities, notably logging and fire suppression. Increases in older, decadent stands dominated by shade-tolerant species are accompanied by decreases in shade-intolerant species like quaking aspen. These stands are more susceptible to disease and insect outbreaks and are at an increased risk from wildfire due to changing precipitation and temperature patterns. All management units in the Sawtooth National Forest (Sawtooth NF), Minidoka Ranger District report that subalpine–high montane conifer forest is either “functioning at risk” or “functioning at risk in some areas.” The Sawtooth NF also reports a moderate departure from the historical range of variability for fire for most forest types. Climate modeling predicts temperature increases in the Northwestern Basin and Range will likely exacerbate fire conditions in the future.

The Caribou National Forest's (Caribou NF) Sub-regional Properly Functioning Condition Assessment (1997) indicates the Engelmann spruce/subalpine fir and quaking aspen communities on the forest are at high risk due to departure from historical ranges of variation in sustainability indicators. The risks to lodgepole pine (low level of departure) and Douglas-fir (moderate level of departure) are not as severe. Quaking aspen losses across the forest have been estimated at 40% for the past 100 to 150 years. The Engelmann spruce/subalpine fir complex is at risk primarily from dominance of mature stands and potential for high-severity fires. Quaking aspen is also mature, decadent, conifer is succeeding, and early and mid-seral stages are not well represented. Overall, 70% to 80% of the coniferous forest is in a late seral stage. Some areas have become more susceptible to droughts, insect and disease outbreaks, and other effects of overcrowding. Trends show increasing human development occurring in and around the Caribou NF. These interface areas historically burned at frequent intervals. Suppression costs increase dramatically in the interface areas as does the pressure to maintain high suppression levels, even in areas that would ecologically benefit from fire.

Spotlight Species of Greatest Conservation Need: Red Crossbill (South Hills population)

Based on flight call and morphological differences, a form of Red Crossbill (*Loxia curvirostra* complex) endemic to the South Hills and Albion Mountains of south-central Idaho is believed to be genetically distinct from co-occurring Red Crossbills that inhabit the area. Three of the 9 identified crossbill call types have been recorded in the area, but call type 9, the type of the proposed South Hills Crossbill (*Loxia sinesciuris*) is the most frequently encountered in the South Hills and Albion Mountains. In addition, morphological and genetic evidence support the recognition of South Hills Crossbill as a distinct species.

Red Crossbill is a medium-sized finch found primarily in conifer forests. A foraging specialist, its unique crossed mandibles allow it to pry open conifer cone scales to access the seeds within. The Red Crossbill's primary food source in southern Idaho is lodgepole pine. The South Hills Crossbill has coevolved with local populations of lodgepole pine, producing a unique predator-prey relationship. Both species coevolved in the absence of Red Squirrel (*Tamiasciurus hudsonicus*), normally a primary consumer of lodgepole pine seeds. As a result, cone structure of lodgepole pine and bill morphology (and other traits) of South Hills Crossbill evolved differently from that of other populations of lodgepole pine and Red Crossbill, respectively (Benkman et al. 2001). Lodgepole pine cones lost features resistant to Red Squirrel predation and South Hills Crossbill developed bill morphology specific to local cone characteristics. These unique adaptations left both lodgepole pine and South Hills Crossbill highly dependent on one another and highly susceptible to the appearance of Red Squirrel, an occurrence that would place South Hills Crossbill populations at risk for extirpation (or extinction should it be recognized as a full species).

The population size for South Hills Crossbill is unknown, but because suitable habitat for the species is limited to approximately 70 km², the total population of South Hills Crossbill is estimated at <10,000 individuals (C. Benkman, University of Wyoming, pers. comm.). Population declines of 63% were reported by Santisteban et al. (2012) between 2003 and 2008, largely because of decreasing adult survival. The proposed cause of the decline was abnormally high summer temperatures (>32 °C) that reduced serotinous cone production and led to premature cone opening and subsequent loss of seeds. Since 2008, temperatures have modified and South Hills Crossbill populations have increased.

Immediate threats to the South Hills Crossbill include activities or events that reduce the extent of lodgepole pine or curtail seed production in the South Hills and Albion Mountains. High-severity wildfire and the potential introduction of Red Squirrel are believed to be the 2 biggest threats. Extensive habitat loss would force South Hills Crossbills to relocate to new areas, leaving them at a competitive disadvantage in other lodgepole pine types. An efficient seed predator, Red Squirrel would presumably reach high densities if introduced into these ranges and outcompete South Hills Crossbill for lodgepole pine seeds, possibly resulting in the extinction of the South Hills Crossbill. The principal long-term threat to the South Hills Crossbill is climate change. Climate modeling forecasts environmental conditions resulting in little recruitment in lodgepole pine in the South Hills and Albion Mountains and decreases in cone and seed production in remaining stands. Conservation actions to address immediate threats to the South Hills Crossbill should focus on maintaining the health and extent of lodgepole pine forests in both mountain ranges.

Appropriate management of wildfire and prescribed burning, livestock grazing, and timber and fuelwood harvest would likely provide the greatest benefits. The exclusion of Red Squirrel should also be a management priority for the Sawtooth NF.

Prioritized Threats and Strategies for Subalpine–High Montane Conifer Forest

Very High rated threats to Subalpine–High Montane Conifer Forest in the Northwestern Basin and Range

Fire regimes outside the historical range of variability

Fire is a primary disturbance process in western coniferous forests, influencing vegetation dynamics, composition, and structure. Infrequent high-severity fire events historically occurred in the high-elevation subalpine forests of the Rocky Mountains, recurring at long, but variable intervals. In these systems, high magnitude fire events followed prolonged droughts, which were relatively rare in the cool, subalpine environments (Kipfmüller & Baker 2000, Veblen 2000). Mid- and low-elevation stands may have evolved with a mixed-severity regime, where surface fires occurred more frequently. Climatic patterns and weather are the major determinants of fire intensity and return interval in subalpine–high montane forests. Evidence suggests that fire suppression, to a much a lesser extent, has also influenced fire regimes for this forest type, but the effects are thought to be negligible (Kipfmüller & Baker 2000).

As the Northwestern Basin and Range warms, changes to fire regimes in forested systems are expected to occur. High-intensity fire events are predicted to increase in frequency across the section and the extent of large fires may increase. Fire return interval may be shortened, affecting tree regeneration and producing undesirable stand characteristics. Shortened fire return intervals prevent the establishment of late-seral stands and alter species distribution at a landscape scale. In the Sawtooth NF, patchy distribution of forest stands and discontinuous fuels will reduce the likelihood of extensive burns and may benefit early seral species like quaking aspen. Extensive high-severity burns will affect animal distribution across the landscape, as suitable habitat for species dependent on late-seral forests is reduced.

Objective	Strategy	Action(s)	Target SGCNs
Maintain areas of late-seral subalpine–high montane forest sufficient to support current populations of species dependent on this habitat type.	Preserve remaining stands of late-seral forest that are in excellent ecological condition, particularly large tracts and those with outstanding resource value.	Through survey and assessment, identify stands with exceptional resource value to focus protection measures. Limit human disturbances that alter stand composition, structure, or ecological function in late seral forests. To preserve the discontinuous nature of fuels in the subalpine–high montane forests, avoid disturbance and the introduction or spread of nonnative annual grasses in adjacent sagebrush and mountain shrub communities.	Western Toad Red Crossbill (South Hills population) Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Kriemhild Fritillary

Objective	Strategy	Action(s)	Target SGCNs
		Institute appropriate mechanical treatments in mixed-severity forest stands if desirable outcomes will likely be realized.	
Elevate the ecological condition and resiliency of subalpine-high montane forests to better withstand the expected increase in fire occurrence and severity.	Where appropriate, restore desired forest structure, composition and mix of seral stages to degraded subalpine-high montane forests.	<p>Identify appropriate treatments to achieve restoration goals with a minimum of inputs and disturbance.</p> <p>Work with the appropriate state and federal land management agencies to identify and prioritize stands that would benefit from the application of fire.</p> <p>Work with the appropriate land management agencies to amend current fire suppression strategies to permit a broader range of conditions where beneficial fires are allowed to burn.</p>	<p>Western Toad</p> <p>Red Crossbill (South Hills population)</p> <p>Townsend's Big-eared Bat</p> <p>Silver-haired Bat</p> <p>Hoary Bat</p> <p>Little Brown Myotis</p> <p>Kriemhild Fritillary</p>

High rated threats to Subalpine-High Montane Conifer Forest in the Northwestern Basin and Range

Improper fuels management & restoration activities

In xeric, low-elevation forests where fire regimes are marked by short-interval, low-severity surface fires, fuel reduction is an important management tool for mitigating risks to life and property and reducing the financial and social costs of fighting fire. Fire suppression and a concomitant increase in available fuels are widely believed responsible for changes to fire regimes in these environments. Cooler subalpine-high montane forests typically experience infrequent, high-severity fires occurring as stand-replacing events, or mixed-severity fires with effects dependent on site and environmental characteristics. High-severity fires are driven by climatic, not structural variables and the effects of human manipulations on this fire regime are secondary (Schoennagel et al. 2004). Mechanical fuel reduction is generally ineffective in subalpine forests and imposes structural characteristics outside the natural range of variability. The relative contributions of climate and structure in a mixed-severity fire regime are variable and often difficult to discern, but mechanical fuel treatments may be acceptable for some mixed-severity fire regimes. However, wildfire originating under severe drought often overrides fire-mitigating structural characteristics in a mixed-severity fire regime. Similarly, using a prescribed burn to emulate a low-severity ground fire is not appropriate in a high-severity fire regime.

Objective	Strategy	Action(s)	Target SGCNs
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Objective	Strategy	Action(s)	Target SGCNs
Reduce or eliminate resource damage caused by improper fuels management or restoration treatments.	Ensure that management actions intended to mitigate forest losses from severe wildfire are consistent with existing fire regimes.	Clearly identify existing fire regimes in areas considered for restoration or fuel reduction treatments and prioritize areas where treatments are likely to be effective, e.g., in previously open woodlands. Define and prioritize acceptable treatment methods that improve stand conditions, minimize unintended impacts, and produce stand characteristics likely to be maintained under the current fire regime.	Western Toad Red Crossbill (South Hills population) Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Kriemhild Fritillary
	Implement actions intended to mitigate forest losses from severe wildfire in a manner designed to limit damage to soils and vegetation and minimize disturbance to wildlife.	Avoid constructing new roads or other infrastructure, e.g., skidding or landing areas in logging operations and actively decommission infrastructure where practical. Plan management activities to avoid disrupting critical life stages of forest-dwelling species such as nesting season for birds, maternity season for bats, or when migratory species are present.	

Changes in precipitation & broad-scale hydrologic regimes

The modeled effects of climate change predict changes in precipitation timing and quantity, which will likely affect the severity, frequency and magnitude of all forest disturbances. The immediate effects are predicted to create conditions conducive to larger, more intense fires across the entire Great Basin, which may result in rapid changes in forest age class distribution and landscape patterns. Decreased snowpack and summer precipitation will increase water stress in forests that normally experience annual drought conditions in summer, leaving them more susceptible to disease and parasites. These effects may be more pronounced in dense stands. The extent of subalpine–high montane forest may be reduced at the lower limits of its range, reducing habitat for forest-dependent species. Streams and riparian habitat will likely experience negative impacts as snowpack and runoff declines. Generally, the most reliable strategies for mitigating climate change impacts are those that promote ecosystem resiliency by preserving areas of high ecological integrity and adaptive management responsive to changing environmental conditions and shifting plant and animal communities.

Objective	Strategy	Action(s)	Target SGCNs
Mitigate changes in precipitation and broad-scale hydrological regimes.	Preserve intact stands of subalpine–high montane forest with high biological diversity.	Limit human disturbance, e.g., OHV use and other high-impact recreational activities to prevent disturbance of vegetation and soil. Control fires that occur in areas of high ecological integrity except where effects are expected to be beneficial. Reduce or remove livestock disturbance to accurately reflect vegetation and	Western Toad Red Crossbill (South Hills population) Townsend's Big-eared Bat Silver-haired Bat Hoary Bat Little Brown Myotis Kriemhild Fritillary

Objective	Strategy	Action(s)	Target SGCNs
		hydrologic conditions.	

Species designation, planning & monitoring

In addition to conservation measures to address habitat threats, some SGCN require inventory and monitoring to assess their current status and distribution in Idaho. We identify information needs for 1 species in subalpine–high montane conifer forest and propose strategies to determine population status and suggest interim conservation measures where appropriate.

Western Toad

The Western Toad (*Anaxyrus boreas*) occurs in a variety of habitats statewide. Population status in Idaho is unknown, as are short- and long-term trends. Significant and often dramatic declines have been reported elsewhere across the species' range. Populations south of the Snake River are isolated and small. Proposed revisions to the *Anaxyrus boreas* species group identify southern Idaho populations as the subspecies Boreal Toad (*Anaxyrus boreas boreas*) and place them in the Eastern population, which was petitioned for listing in May 2011 as an endangered or threatened distinct population segment (DPS) under the Endangered Species Act of 1973, as amended. In response to this petition, in April 2012, the US Fish and Wildlife Service announced a 90-day finding that substantial biological information exists to warrant a more in-depth examination of the status of the Eastern population of the Boreal Toad and once complete, whether to propose adding the population as a DPS to the federal lists of threatened or endangered wildlife and plants. The Eastern population includes the Southern Rocky Mountain population (southeastern Wyoming, Colorado, and New Mexico) and toad populations in southwestern Wyoming, southeastern Idaho, northeastern Nevada, and Utah (USFWS 2012) and possibly much of Nevada (A. Goebel, Florida Gulf Coast University, unpublished data). Recent surveys in southern Idaho failed to detect Western Toad in previously occupied habitat. Dramatic declines in the Eastern population imply additional surveys are warranted in Idaho. Western Toad is threatened by activities that modify, curtail, or eliminate habitat. Avoiding disturbance from timber harvest, livestock grazing, pesticide application, water management, recreation, and roads and other construction activities would be a prudent conservation strategy for the species. In addition, assistance is needed across Idaho in collecting/identifying representative toad tissue samples to support A. Goebel's work to capture the edge of the eastern clade (2015 email from A Goebel, Florida Gulf Coast University, to C Peterson, Idaho State University).

Target: Managed Perennial Grasslands

The Conservation Reserve Program (CRP) and State Acres for Wildlife Enhancement (SAFE) are working lands conservation programs administered by the US Department of Agriculture (USDA) Farm Service Agency (FSA), which convert eligible croplands to permanent vegetation. In Idaho, these programs primarily convert lands that are predominantly dryland wheat to a mixture of perennial grasses and forbs. Both programs are limited and administered on a county by county basis. Not more than 25% of the arable land in a county may be enrolled in CRP or SAFE, collectively. Currently, 42,896 ha (105,998 acres) of land are enrolled in CRP within the Northwestern Basin and Range. The Idaho SAFE program has grown to 18,615 ha (46,000 acres) within the Northwestern Basin and Range, and is limited to 47,470 ha (117,300 acres) statewide.

The Farm Bill must be reauthorized every 5 years by Congress. The 2014 Farm Bill required a 39% reduction in CRP from the 2002 limit to 9.7×10^6 ha (24×10^6 acres) nationwide by 2017.

Target Viability

Target viability was evaluated by determining and rating the current condition of key ecological attributes based on professional opinion. The managed perennial grasslands habitat target is in "Good" condition across the section based on 3 key ecological attributes: abundance and patch size of CRP and SAFE stands, vegetative condition of the stands (presence of invasive plants and native species), and presence of desired indicator species (Sharp-tailed Grouse, *Tympanuchus phasianellus*).

Acres enrolled in CRP and SAFE are predominantly dryland acres because irrigated land returns a greater income for the landowners when in production than in either of the federal programs. Given that situation, the number of acres enrolled in these programs is rated as "Good." Acreages for the CRP and SAFE programs are at the maximum allowed by the federal government in Caribou and Oneida counties, which represent a substantial portion of the section and rely mostly on dryland farming. Power County is also at the federal limit and relies on dryland farming, but is divided between the Northwestern Basin and Range and the Snake River Basalts section. A decline in managed perennial grassland acreages within the Northwestern Basin and Range in Power County may not necessarily result in a negative net impact to the target SGCN if those acres were merely moved to another part of the county. In that case, the benefits of the target habitat are still available to SGCN. Loss of acres within these counties due to program acreage reductions would negatively impact target SGCN. Bingham, Cassia, and Twin Falls counties also compose a large portion of this section, but have a much greater portion of their arable land under irrigation, so fewer acres are enrolled in CRP and SAFE in these counties.

The average block size of CRP within the section is 20 to 65 ha (49 to 161 acres), which is considered "Fair." This evaluation is based on the assumption that larger block sizes provide more suitable habitat for wildlife species.

Weed control is required as part of the CRP contract so invasive species are not a significant problem; therefore, invasive plant species are rated as in "Good" condition.

Increased emphasis on native species (grasses, forbs, and shrubs) improves the value of the stands for wildlife by increasing plant diversity and providing more appropriate food and cover plant species. During the early years of CRP, this emphasis on natives did not exist. At that time, monocultures of crested wheatgrass (*Agropyron cristatum* [L.] Gaertn.) and smooth brome (*Bromus inermis* Leyss.) were popular seed mixes. Because some of those acres are still present, this condition has been rated as "Fair." The SAFE program and different options within CRP are made by the USDA to encourage landowners to plant more native species.

Finally, an appropriate index of Sharp-tailed Grouse presence is being evaluated and will be rated when data are analyzed.

Spotlight Species of Greatest Conservation Need: Sharp-tailed Grouse

The Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*; hereafter Sharp-tailed Grouse) is one of 7 subspecies (one extinct) of Sharp-tailed Grouse in North America (Connelly et al. 1998). Of the 6 extant subspecies, Columbian Sharp-tailed Grouse has experienced the greatest decline in distribution and abundance (Hamerstrom and Hamerstrom 1961, Miller and Graul 1980). The USFWS has been petitioned twice (1995 and 2004) to list Columbian Sharp-tailed Grouse under the Endangered Species Act of 1973, as amended. Under both petitions, USFWS issued a finding that listing was not warranted (US Department of the Interior 2000, 2006). Idaho supports approximately 60% to 65% of the remaining Sharp-tailed Grouse in the US (Hoffman and Thomas 2007).



Conservation Reserve Program parcel in the Arbon Valley, Idaho ©
YYYY Jeff Knetter

Sharp-tailed Grouse appear to have benefited more from CRP than any other prairie grouse (Rodgers and Hoffman 2005) and are closely linked to the success of the CRP and SAFE programs (Mallett 2000). Since its inception in 1985, the CRP has provided thousands of acres of nesting and brood-rearing habitat on private lands in Idaho, resulting in an apparent increase in Sharp-tailed Grouse populations (excerpted from IDFG 2015). Hoffman and Thomas (2007) suggest the possible loss of CRP lands is the single most important immediate threat to Sharp-tailed Grouse in Idaho and across the subspecies' range (excerpted from IDFG 2015).

Prioritized Threats and Strategies for Managed Perennial Grasslands

High rated threats to Managed Perennial Grasslands in the Northwestern Basin and Range

Conversion of acres withdrawn from CRP and SAFE

Although recent general enrollment opportunities exist, the number of CRP acres in Idaho, and within the Northwestern Basin and Range, has declined. This is because of high commodity prices and the 2008 and 2014 congressional reductions in the number of acres that could be enrolled. SAFE acres have helped to mitigate the loss of CRP acres. Although CRP and SAFE

efforts have enhanced habitat for grouse and other SGCN, they are not permanent solutions to the decline of available habitat for these species. CRP and SAFE contracts remain active for 10 years and landowners have the option to buy out of contracts early with a penalty. Often, these acres are converted back to agricultural production or rangeland after withdrawal, which reduces the habitat value for wildlife. The Natural Resources Conservation Service (NRCS) is exploring options to use their conservation programs to preserve the benefits of CRP and SAFE after the contracts expire. This effort would strive to keep expired CRP and SAFE lands in a grass-based system. To date, success has been limited due to high agricultural commodity prices and incentives within the commodity title of the Farm Bill to put expired land back into agricultural production (excerpted from IDFG 2015).

Objective	Strategy	Action(s)	Target SGCNs
Reduce the number of acres being withdrawn from CRP and SAFE.	<p>Support legislation to renew CRP in future Farm Bill legislation.</p> <p>Support legislation that provides a financial incentive to stay in the programs.</p>	<p>Work with NRCS, FSA, and the Idaho congressional delegation to ensure renewal (and expansion) of CRP.</p> <p>Work with NRCS, FSA, and the Idaho congressional delegation to ensure that CRP and SAFE payments are high enough to incentivize landowners to keep their land in the programs.</p>	<p>Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch</p>
Influence the land use of acres removed from CRP and SAFE so that wildlife values are protected.	<p>Provide financial incentives to leave acres in perennial grasses.</p> <p>Develop alternative uses for retired CRP and SAFE acres that benefit wildlife.</p>	<p>Work with FSA and other agencies and organizations to develop cost-share programs and alternative uses for acres no longer in CRP.</p> <p>Work with FSA and NRCS to develop and promote land uses that provide income for landowners and habitat value for wildlife.</p>	<p>Greater Sage-Grouse Sharp-tailed Grouse Ferruginous Hawk Golden Eagle Sandhill Crane Long-billed Curlew Burrowing Owl Short-eared Owl Common Nighthawk Hunt's Bumble Bee Morrison Bumble Bee Western Bumble Bee Suckley Cuckoo Bumble Bee A Mason Bee (<i>Hoplitis producta</i>) Monarch</p>

Species designation, planning & monitoring

In addition to conservation measures to address habitat threats, some SGCN require inventory and monitoring to assess their current status and distribution in Idaho. We identify information needs for 4 species (Long-billed Curlew, Burrowing Owl, Short-eared Owl, Common Nighthawk; cross reference Sagebrush Steppe target) in managed perennial grasslands and propose

strategies to determine population status. We also suggest interim conservation measures where appropriate.

Target: Riverine–Riparian Forest & Shrubland

This conservation target encompasses all rivers, streams, and riparian habitats in the Northwestern Basin and Range. Higher order streams (1st through 3rd) are headwater or small montane streams. Many are ephemeral and some exist only as freshets. Spring-fed stream systems in basins or canyon bottoms occur much less frequently. Floodplains and valley bottoms tend to be narrow and aquatic substrates are boulders, cobbles, gravel, and large woody debris. There are few pools and many rapids. Aquatic communities are usually dominated by benthic invertebrates and small fish. Few large rivers traverse the section, and all except the Jarbidge River have either been impounded by dams or impacted by diversions and other human activities.

Riverine wetlands occur in river and stream channels. They include floodplains and riparian vegetation influenced by stream channel hydrology. Slope wetlands (e.g., seeps and springs) are often found at their headwaters. Riparian vegetation in the section is dominated by deciduous shrubs and trees, such as willow (*Salix* L.), thinleaf alder (*Alnus incana* [L.] Moench subsp. *tenuifolia* [Nutt.] Breitung) and redosier dogwood (*Cornus sericea* L.). Wet meadows and marshes are generally characterized by grasses and emergent macrophytes.



Lower Rock Creek Canyon, Idaho © 2006 Julie Randell, Stone Feather Studios

Riverine wetlands occur in river and stream channels. They include floodplains and riparian

vegetation influenced by stream channel hydrology. Slope wetlands (e.g., seeps and springs) are often found at their headwaters. Riparian vegetation in the section is dominated by deciduous shrubs and trees, such as willow (*Salix* L.), thinleaf alder (*Alnus incana* [L.] Moench subsp. *tenuifolia* [Nutt.] Breitung) and redosier dogwood (*Cornus sericea* L.). Wet meadows and marshes are generally characterized by grasses and emergent macrophytes.

Despite the low occurrence of riverine–riparian forest and shrubland in the Northwestern Basin and Range (~3% of the total land area), the importance of these habitats to wildlife in this arid region cannot be overstated. They support a disproportionately large fraction of the biological diversity across the section. Aquatic and semiaquatic species are dependent on water for their survival, but 70% to 80% of terrestrial species in the Northwestern Basin and Range are also known to use riverine–riparian habitats for all or part of their life cycles. Populations of native Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*) and Bonneville Cutthroat Trout (*O. c. utah*) persist where water quality is not significantly impaired. Birds, bats, and many small and

large mammals preferentially use riparian areas for foraging and reproductive habitat and stream corridors often serve as migratory routes for local deer and Elk populations.

Target Viability

This conservation target has a viability rating of “Fair.” Nearly all riverine and riparian habitats in the Northwestern Basin and Range have been impacted by one or more human activities and all are susceptible to impacts from changing precipitation and temperature patterns. Water quality in most watersheds within the section is impaired, primarily by sediment. Roads and livestock grazing are the main disturbance agents across much of the section; agriculture is the principal disturbance in basins. Severe fires may result in sediment pulses on all landscapes until revegetation can occur. Elevated water temperature is also a significant problem and many streams exceed state water quality standards. Climate modeling predicts temperature increases in the Northwestern Basin and Range that are likely to exacerbate fire and elevated water temperature conditions.

All management units in the Sawtooth NF, Minidoka Ranger District report that riparian vegetation is either “functioning at risk” or “functioning at risk in some areas.” Recent monitoring and evaluation reports (2014) and grazing allotment Annual Operating Instructions (AOI), which specify stocking rates and grazing management, suggest this trend is likely to continue. The BLM reports that most of the stream channels and floodplains in the planning area of Idaho and Southwestern Montana Greater Sage-Grouse Approved RMP Amendment (which includes the Northwestern Basin and Range) are not meeting the BLM standard of proper functioning condition (PFC) (BLM 2015).

Elevated water temperature is also a concern across the planning area. Removal of riparian vegetation by livestock is identified as the primary cause of temperature increases. Demands for water resources and competing management objectives indicate these problems will likely continue or worsen.

Prioritized Threats and Strategies for Riverine–Riparian Forest & Shrubland

High rated threats to Riverine–Riparian Forest & Shrubland in the Northwestern Basin and Range

Improper livestock grazing management

In the Northwestern Basin and Range, livestock grazing has been identified by all land management agencies as the single greatest factor influencing riparian habitat extent and quality. A legacy of improperly managed public lands grazing has resulted in riparian ecosystems that are often in poor ecological condition, but may still provide some resource value. Current management seeks to preserve extant high-value riparian ecosystems where they occur or rehabilitate degraded systems such that wildlife and consumptive human needs are served. We define improper grazing as grazing beyond the capacity of the resource (e.g., overuse as often occurs along riparian areas) or occasionally as underuse where lack of grazing contributes to increased fuel loads. This differs from commonly accepted rangeland definitions where improper is simply synonymous with forage overuse.

The effects of improper livestock grazing on riparian habitat in arid and semiarid regions are well documented (e.g., Kauffman and Krueger 1984, Fleischner 1994 or Belsky et al. 1999). Generally, improper grazing negatively affects soils, vegetation, wildlife, fish, water quality, and changes fluvial processes that regulate watershed hydrology. Livestock exhibit a strong preference for riparian habitat and use of these areas is disproportionately high, particularly in summer months when shade, water, and high-quality forage are limited or absent in the more xeric uplands.

Objective	Strategy	Action(s)	Target SGCNs
Protect riverine–riparian ecosystems that have high ecological value from impacts associated with improper livestock grazing.	Prioritize riparian areas for protection from livestock grazing impacts.	<p>Identify high-value riparian habitat using existing survey or field data supplemented with additional vegetation assessments where necessary.</p> <p>Increase riparian width and subsequent proper function and condition through the use of wildlife-friendly exclusion fencing and riparian pasture management for grazed riparian systems.</p>	<p>Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (<i>Hesperapis kayella</i>) A Caddisfly (<i>Eocosmoecus schmid</i>) Snake River Pilose Crayfish</p>
Support proper livestock grazing management that maintains or improves riverine–riparian vegetation sufficient for wildlife needs.	Manage the timing, intensity, duration, and frequency of grazing practices on vegetation composition and structure during seasons critical to nesting birds in riparian areas.	<p>Coordinate livestock and land management planning efforts to achieve riparian vegetation standards consistent with established federal guidelines.</p> <p>Preserve institutional flexibility for reducing or removing livestock from marginal or degraded land for a time period sufficient to allow full recovery.</p>	<p>Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (<i>Hesperapis kayella</i>) A Caddisfly (<i>Eocosmoecus schmid</i>) Snake River Pilose Crayfish</p>
Improve water and vegetation quality in riverine–riparian habitats degraded by excessive or improper livestock grazing.	Involve permittees in monitoring and data collection, and providing input into grazing management to meet the range standards of federal land management agencies.	<p>Inform affected permittees and landowners regarding riverine–riparian habitat needs and conservation measures.</p> <p>Prioritize permit renewals and land health assessments for allotments with declining riparian quality.</p> <p>Conduct fine-scale habitat assessments to inform grazing management.</p> <p>Reduce AUMs where necessary to more accurately reflect riparian conditions.</p> <p>Develop water sources for livestock away from stream and riparian habitats.</p> <p>Undertake adaptive management changes related</p>	<p>Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (<i>Hesperapis kayella</i>) A Caddisfly (<i>Eocosmoecus schmid</i>) Snake River Pilose Crayfish</p>

Objective	Strategy	Action(s)	Target SGCNs
		to existing grazing permits where improper grazing is determined to be the causal factor in declining habitat condition.	
Support the responsible use of federal lands for grazing to maintain open spaces and important habitat conditions that benefit wildlife (WGA Policy Resolution 2015-03).	Implement Western Governors' Association (WGA) policy for public lands grazing (for details, see WGA Policy Resolution 2015-03).	Use sound, science-based management decisions for federal lands and base these decisions upon flexible policies that take into account local ecological conditions and state planning decisions.	Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (<i>Hesperapis kayella</i>) A Caddisfly (<i>Eocosmoecus schmid</i>) Snake River Pilose Crayfish

Changes in precipitation & broad-scale hydrologic regimes

The modeled effects of climate change include intensified drought and changes to precipitation amounts and timing that may in turn affect stream flows, groundwater recharge, growth and phenology of wetland, riparian, and upland vegetation, and fire regimes. Reduced winter snowpack and increased winter rains alter cycles of water availability and storage. Decreased summer precipitation will impact vegetation growth and survival. Aquatic systems, in addition to changes in water availability, will also have to contend with warming temperatures, lower dissolved oxygen levels, and the possible loss of coldwater biota from lower stream reaches. Water temperature affects physiology, behavior, distribution, and survival of aquatic organisms. Timing and quantity of spring runoff is likely to be reduced and may alter plant phenology. For migratory animal species, phenological shifts may negatively affect condition, fitness, and survival. Changes in species distribution, particularly for some invasive species like tamarisk (*Tamarix* L.) are predicted to occur. Currently, the most reliable site-specific strategies for mitigating climate change impacts in riverine and riparian habitats are those that promote ecosystem resiliency by preserving areas of high ecological integrity and those that promote managing for a changed landscape where maintenance of a previous habitat is no longer feasible. The following objectives, strategies and actions have been developed for use at specific locations.

Objective	Strategy	Action(s)	Target SGCNs
Maintain or improve resiliency in riverine-riparian habitat.	Identify and protect minimally disturbed areas that exhibit high species diversity or other desired ecological characteristics.	Adopt an annual inventory strategy to maintain a current assessment of riverine-riparian habitat resources. Restrict livestock grazing, mining, logging, motorized and nonmotorized recreation, and other high-impact activities to the degree necessary to protect existing high-value conservation areas.	Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (<i>Hesperapis kayella</i>) A Caddisfly (<i>Eocosmoecus schmid</i>) Snake River Pilose Crayfish
	Maximize water	Increase water storage and	

Objective	Strategy	Action(s)	Target SGCNs
	<p>availability in riverine–riparian environments using mechanical, biological or cultural methods.</p>	<p>improve conductivity in riverine habitat where needed by improving hydrology using floodplain restoration, channel reconfiguration, flow augmentation through modification of diversions and other water developments, reintroduction of beaver, protection of coldwater springs, or groundwater recharge.</p> <p>Provide financial incentives or meaningful assistance to private landowners to encourage land stewardship that enhances and protects riverine–riparian habitat and appropriates water for wildlife uses.</p> <p>Improve interagency, regional coordination where possible to expedite restoration and explore avenues to streamline decisions involving water and wildlife resources.</p> <p>Improve capacity to provide technical assistance and incentives to increase storage capacity and to improve conservation, reuse, and water use efficiency by consumptive water users.</p>	
	<p>Improve vegetation condition and proportion of native species in degraded riparian habitat.</p>	<p>Implement vegetation restoration where necessary to accelerate riparian recovery.</p> <p>Practice aggressive weed control in degraded areas until native vegetation is established and resistant to recurring infestations.</p> <p>Broaden the genetic diversity of species used for restoration to accommodate a range of future environmental conditions so that any resultant vegetation community, regardless of specific composition, is tolerant of site conditions.</p>	
	<p>Mitigate or eliminate other threats to riparian habitat where possible.</p>	<p>Limit livestock grazing in riparian areas with fencing or by developing off-site water sources.</p> <p>Restrict mining, logging, motorized and nonmotorized recreation,</p>	

Objective	Strategy	Action(s)	Target SGCNs
		and other high-impact activities in degraded or recovering areas. Limit these threats to the degree necessary to protect existing high-value conservation areas.	
	Monitor and incorporate species response to environmental conditions.	Focus monitoring on species with low environmental tolerances to detect subtle changes in habitat characteristics and inform decisions on habitat restoration or rehabilitation efforts. Implement immediate management activities to secure populations facing extirpation or an elevated risk of unacceptable losses.	
Adopt a strategy of adaptation for systems that have lost resiliency and are unable to mitigate impacts from changing environmental conditions.	Reassess conservation goals to align with site conditions and expected environmental changes.	Encourage partnerships with federal, tribal, and local government, private landowners, and conservation organizations to create and implement culturally acceptable adaptation and management options for riverine-riparian habitat. Incorporate regional, long-term conservation perspectives when developing local management plans. Have plans in place for areas known to have lost resiliency and aggressively implement when and where opportunities present themselves, e.g., following disturbance events, or as funding and management direction align.	Western Toad Northern Leopard Frog Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (<i>Hesperapis kayella</i>) A Caddisfly (<i>Eocosmoecus schmidti</i>) Snake River Pilose Crayfish

Dams, water diversions, and other stream manipulations

Nearly all surface water that enters the basins in the Northwestern Basin and Range is intercepted by water diversions, impoundments, or other structures. Free-flowing segments are often influenced by culverts and sediment generated by roads. Groundwater pumping also affects surface flows, as stream channels lose water where groundwater levels are depleted. Any of these activities may lead to changes in hydrology that alter stream courses, increase sedimentation and nutrient enrichment, and change water temperature and chemistry. These types of alterations typically produce cascading effects, resulting in loss of habitat for invertebrate and vertebrate species. Large dams used for flood control and irrigation create additional downstream problems related to the amount and timing of releases that affect water temperatures, sediment transport, channel morphology, and riparian vegetation establishment. Upstream problems include capture of sediments and pollutants and elevated water temperatures. In the Northwestern Basin and Range, fluctuating lake levels have negatively

impacted nesting waterbird colonies. Dams also block instream movement of fish and invertebrates. Drought, livestock, and agricultural needs will increase demand for available surface water and additional withdrawals in the near and distant future.

Objective	Strategy	Action(s)	Target SGCNs
Improve hydrology and restore proper function to riverine–riparian habitats in watersheds affected by water control structures.	Eliminate or modify small impoundments, diversions, and other water control structures where practical.	<p>On public lands, remove outdated, failing or inactive dams, particularly improvised check dams installed in normally dry washes to capture stormwater runoff.</p> <p>Work with appropriate agencies to modify failing or poorly designed/installed culverts and other water conveyances to improve water quality.</p> <p>On private property, work with landowners to improve the design and efficiency of water diversions for livestock to improve water quantity and quality in degraded systems.</p>	<p>Western Toad Northern Leopard Frog Western Grebe Clark's Grebe Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (<i>Hesperapis kayella</i>) A Caddisfly (<i>Eocosmoecus schmidl</i>) Snake River Pilose Crayfish</p>
	Promote wildlife and conservation interests in the operation of large dams.	<p>Where practical, work with appropriate agencies to mimic natural stream flows in downstream reaches of impounded waterways.</p> <p>Work with appropriate agencies to provide sufficient minimum flows to downstream reaches of impounded waterways, particularly during droughts or critical life history stages of aquatic animals.</p>	

Invasive weeds

Invasive weeds are a high rated threat to riverine–riparian habitat in the Northwestern Basin and Range. Primary impacts include alterations to hydrology (water storage and release) and hydrogeomorphic processes, loss of plant and animal diversity, and reduction in forage value for livestock and wildlife. A variety of noxious weeds have colonized riverine–riparian environments, particularly low-elevation sites and ecologically degraded areas. Severely disturbed sites are at highest risk for establishment and spread of invasive plants as fluvial seed dispersal, chronic soil disturbance, and persistent soil moisture create ideal growth conditions. Tamarisk and Russian olive (*Elaeagnus angustifolia* L.) are problematic across large areas. Tamarisk is predicted to expand as the region warms. Reed canarygrass (*Phalaris arundinacea* L.), broadleaved pepperweed (*Lepidium latifolium* L.), Canada thistle (*Cirsium arvense* [L.] Scop.), and purple loosestrife (*Lythrum salicaria* L.), are widespread in the section and have compromised large areas of riparian habitat. The following objectives, strategies and actions provide a conceptual framework for addressing invasive species in riparian habitat.

Objective	Strategy	Action(s)	Target SGCNs
Reduce the incidence and impacts from invasive weeds on vegetation in riverine-riparian habitat.	Prevent the introduction of invasive species in riverine-riparian habitat that is currently weed-free.	<p>The responsible agency should: identify and manage potential pathways for invasive species introductions, including livestock, recreation, roads and other ground-disturbing activities. Seek input from all stakeholders and engage them in decision-making and implementation.</p> <p>Diligently monitor areas known to be weed-free and respond with aggressive control efforts when new infestations are located. Each year, complete at least one Watershed Assessment for a 5th level HUC watershed.</p> <p>Maintain targeted education and outreach efforts for all stakeholders and provide technical and material support where resources allow.</p> <p>Promote proven programs like the ISDA Noxious Weed Free Forage and Straw (NWFFS) Certification Program to limit the introduction and spread of noxious weeds through forage and straw onto Idaho USFS and BLM lands.</p>	<p>Western Toad Northern Leopard Frog Western Grebe Clark's Grebe Sandhill Crane Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (<i>Hesperapis kayella</i>) A Caddisfly (<i>Eocosmoecus schmid</i>) Snake River Pilose Crayfish</p>
	Limit the spread of introduced invasive species in riverine-riparian habitat.	<p>Maintain effective multijurisdictional partnerships for collaborative and coordinated control of invasive species across landscapes.</p> <p>Develop and employ an Early Detection and Rapid Response (EDRR) program to address newly discovered infestations. Implement the plan as early as possible.</p> <p>Close pathways for additional populations, or and control the spread of incipient populations into nonimpacted areas.</p> <p>Develop and employ an effective monitoring and surveillance program to follow up on treated areas.</p>	
	Mitigate the ecological and economic impacts resulting from invasive species occurrences.	<p>Use an Integrated Pest Management (IPM) approach to control established populations.</p> <p>Identify and prioritize key riparian habitats for restoration efforts.</p> <p>Focus maintenance and restoration efforts, within disturbed watersheds that have the greatest potential for restoration of hydrologic function, riparian, water quality, and aquatic values.</p> <p>Use native plant species from genetically local sources to the extent practical for riparian restoration and revegetation projects.</p>	

Mining pollution

Much of the mining pollution in southeast Idaho is generated by open-pit or contour strip mining of phosphate ore near Soda Springs. Of particular concern is the contamination of water, soils, and vegetation with selenium, a chemical leached from waste dumps and inactive or abandoned phosphate mines. Selenium is highly soluble and is easily transported by water. Weathering of exposed rock also results in airborne releases where exposure may occur via inhalation of fugitive dust. Toxic levels of selenium have been detected in soils, sediments, ground and surface water, vegetation, and wildlife near phosphate mines. Vertebrates appear to be the most susceptible taxa to selenium poisoning and more than 60 head of livestock in southeast Idaho have been fatally poisoned by selenium. Wildlife mortality has not been documented, but selenium has been detected in muscle and organ tissue in fish and wild ungulates, prompting warnings against consumption. Impacts from mining cover approximately 17,000 acres in the Southeast Idaho Phosphate Mining Resource Area (NRDA 2014). Most of the active, inactive, and proposed mines in the region do not occur within the Northwestern Basin and Range. However, nearly all are located in watersheds that drain into the Blackfoot River, one of the largest rivers in the eastern Northwestern Basin and Range.

Objective	Strategy	Action(s)	Target SGCNs
Minimize the exposure of humans, wildlife, and habitat to selenium and other toxins generated by mining activities.	Maintain IDFG's role as a Trustee in the DOI Natural Resource Damage Assessment and Restoration (NRDAR) Program Southeast Idaho Phosphate Mine Site.	Advocate for mitigation and restoration commitments from mining companies during planning for remediation and restoration activities.	Western Toad Northern Leopard Frog Western Grebe Clark's Grebe American White Pelican Sandhill Crane Caspian Tern Townsend's Big-eared Bat Little Brown Myotis Bear Lake Springsnail A Miner Bee (<i>Hesperapis kayella</i>) A Caddisfly (<i>Eocosmoecus schmidti</i>) Snake River Pilose Crayfish
	Protect human health by preventing accidental ingestion of selenium-contaminated substances.	Continue to monitor water, vegetation, and animal tissues for selenium levels in affected watersheds. Ensure adequate warnings are provided to the public where selenium levels are known to be elevated in wildlife and vegetation.	

Species designation, planning & monitoring

In addition to conservation measures to address habitat threats, some SGCN require inventory and monitoring to assess their current status and distribution in Idaho. We identify information needs for 2 species in riverine-riparian forest and shrubland and propose strategies to determine population status. We also suggest interim conservation measures where appropriate.

Bear Lake Springsnail

The Bear Lake Springsnail (*Pyrgulopsis pilsbryana*) is known from 13 sites in the Bear River drainage of Idaho, Utah and Wyoming. Most are in Bear Lake and Franklin counties in southeast Idaho where the sites are clustered in an area stretching <80 km (<50 mi). The species is ranked G2 (Imperiled) by NatureServe and S1 (Critically Imperiled) by the Idaho Department of Fish and Game. The Bear Lake Springsnail is known to inhabit large, cold springs. Little else is known of the ecology or habitat needs of the species. Population status is unknown. Frest (1999) identifies habitat alteration arising from water appropriation and livestock use as the primary threats. Research to ascertain population status, trends and habitat requirements are the most pressing needs for the Bear Lake Springsnail. Conservation measures that minimize disturbance to habitat and preserve water quantity and quality are logical for an aquatic species with such a restricted distribution.

Snake River Pilose Crayfish

The Snake River Pilose Crayfish (*Pacifastacus connectens*) is known from the Snake River drainage in south-central Idaho west to the closed desert lakes basins of eastern Oregon, specifically Harney Basin and one likely aberrant occurrence from Bear Lake in the closed Bonneville Basin of eastern Idaho and northern Utah. The holotype was collected in Upper Salmon Falls Creek in 1914. Conservation status of the species is unknown. The species is almost completely data deficient and there are no contemporary surveys of its distribution or conservation status (Larsen and Olden 2011). The American Fisheries Society recognizes its conservation status as stable, though there is no basis for the designation. NatureServe has assigned it a status of G3G4; in Idaho, Snake River Pilose Crayfish has no official status. Potential threats to Snake River Pilose Crayfish are largely generalized from literature, but include habitat loss or degradation. A more tangible threat is the introduction of invasive crayfish species to areas occupied by Snake River Pilose Crayfish. The northern or Virile Crayfish (*Orconectes virilis*) has widely replaced the Pilose Crayfish (*P. gambelii*) from stretches of the Bear River in southwestern Wyoming, and has also been reported from upper Snake River tributary streams of southern Idaho (Clark and Lester 2005). The most immediate conservation need for this species is a current status assessment and comparison to the known historic distribution to gauge the current level of displacement by introduced crayfishes.

Target: Colonial Waterbirds

Blackfoot Reservoir is a large, 18,000 acre body of water administered by the Bureau of Indian Affairs (BIA). Established in 1910 for the purpose of agricultural irrigation to the Fort Hall Indian Reservation and surrounding lands around Blackfoot, Idaho, this particular reservoir and adjacent habitat created by the reservoir provides valuable habitat for a suite of wildlife, particularly colonial waterbirds. Several SGCN rely on Blackfoot Reservoir for nesting. These species include Western Grebe (*Aechmophorus occidentalis*), Clark's Grebe (*Aechmophorus clarkii*), American White Pelican (*Pelecanus erythrorhynchos*), Ring-billed Gull (*Larus delawarensis*), California Gull (*Larus californicus*), and Caspian Tern (*Hydroprogne caspia*). Grebe species nest in the emergent vegetation surrounding the reservoir while American White Pelican and the 2 gull species nest on Gull Island within Blackfoot Reservoir.

Presumably, Blackfoot Reservoir colonies originated shortly after construction of the Blackfoot Dam. However, persecution by anglers, fluctuating water levels, predation, and other unknown

factors likely limited successful nesting (USFWS 1984, Burleigh 1972). Surveys conducted in the mid-1980s documented adult birds on Gull Island, but no evidence of nesting American White Pelican (Trost 1985). In 1991 and 1992, IDFG contracted with USDA Wildlife Services to remove native predators (American Badger, *Taxidea taxus*) from Gull Island. The following year (1993) was the first record of American White Pelican production at Blackfoot Reservoir when 80 to 100 nearly-fledged young were observed (Trost and Gerstell 1994). Beginning in 2002, American White Pelicans have been surveyed annually while gull species have been surveyed every 3 to 4 years. Survey data on grebe species are limited.

In 2002, IDFG counted 1,352 breeding American White Pelican pairs on Gull Island. The colony increased to a peak of 3,418 breeding birds in 2007. Between 2010 and 2015, the colony averaged 1,860 (range 724 to 3,034) breeding birds. A growing population of American White Pelican on the island has resulted in measured increases in predation on native Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*). Since 2010, IDFG has implemented management actions to alleviate predation pressure on important trout fisheries (IDFG Forthcoming 2016). For example, installing nest exclusion fences and flagging on Gull Island to reduce the availability of suitable nest substrates for American White Pelican.

Colonial waterbirds at Blackfoot Reservoir are a valuable conservation target despite continued management challenges between American White Pelican and trout fisheries. Future management at Blackfoot Reservoir will require careful monitoring of colonial waterbirds as well as native trout species to meet desired objectives.

Target Viability

Viability of the colonial waterbird population at Blackfoot Reservoir is fair because of a downward trend for some species (American White Pelican and Caspian Tern), lack of data for others (grebes), and ongoing management activities on the nesting island that may negatively impact nontarget SGCN. IDFG survey data specific to Blackfoot Reservoir waterbird colonies indicate a downward trend for American White Pelican and Caspian Tern, and no distinct trend for the other nesting SGCN (Ring-billed and California Gull, Western and Clark's Grebe; IDFG unpublished data). Statewide, Ring-billed and California Gull nesting populations have declined by >50% in the past 10 years (IDFG unpublished data) and nesting success and recruitment of Western and Clark's Grebe are extremely low (B. Flanders-Wanner, pers. comm.). Conversely, American White Pelican appears to be stable in Idaho and westwide (C. Moulton and M. Wackenhut, IDFG, in review).

Prioritized Threats and Strategies for Colonial Waterbirds

High rated threats to Colonial Waterbirds in the Northwestern Basin and Range

Water level fluctuations and unknown causes of decline

Fluctuating water levels are a significant issue for Western and Clark's Grebe. Most Western and Clark's Grebe colonies are located on reservoirs, or along rivers susceptible to water fluctuations that result from dam operations. Rapid increases in water levels results in nest flooding, while rapid releases of water results in nests that are no longer accessible to grebes.

Although significant declines in these 2 grebe species have been documented in Idaho and significant, if not complete, nesting failure is regularly documented at locations where surveys have been conducted, the reason for this decline and failure is currently unknown. Blackfoot Reservoir is a regularly used nesting site for these grebe species, but they have not been surveyed at this location and it is not known whether they are experiencing the same significant breeding issues as seen in the rest of the state.

Objective	Strategy	Action(s)	Target SGCNs
Determine breeding status on Blackfoot Reservoir.	Conduct breeding season surveys on the reservoir.	Work with grebe experts to develop monitoring strategy for this location.	Western Grebe Clark's Grebe
Assess potential impacts of water level fluctuations on breeding success on Blackfoot Reservoir.	Work with partners to conduct research on this colony.	Collaborate with USFWS on proposed research project.	Western Grebe Clark's Grebe

Population management activities and competition with native species

Until as recently as 2006, 8 Ring-billed and California Gull nesting colonies existed in Idaho. Six of these were also nesting locations for Caspian Tern (IDFG 2007). By 2014, only five of these historic colonies remained active, including Blackfoot Reservoir, representing 41% of the 2006 population. Since 2010, much of Gull Island at Blackfoot Reservoir has been fenced during the breeding season to limit American White Pelican nesting; nevertheless, this is the only colony that has remained relatively stable over the last 20 years with 5,000 to 7,000 pairs of nesting gulls.

Caspian Tern has mostly disappeared from Idaho and currently nests reliably in only one location—Island Park Reservoir. Until 2009, an average of 35 pairs nested regularly at Blackfoot Reservoir on Gull Island (Trost 1994, IDFG unpublished data). The last known nest attempt of this species at Blackfoot was in 2013, when one pair initiated nesting on the island (IDFG unpublished data), and it was the only nest attempt documented since 2008. This species is highly sensitive to disturbance, but it is also typically at a competitive disadvantage when nesting with other colonial species, such as gulls and American White Pelican. Caspian Tern initiates nesting later than these other colonial species, and is therefore either pushed out because of lack of space, or is subject to high predation pressure from the gulls, which are often already feeding chicks. At Blackfoot Reservoir, Caspian Terns typically attempted to nest in the low-lying areas away from the rest of the colonial waterbirds. If and when water levels rose in the spring after snowmelt, their nests would flood. Management of the island since 2010 to limit American White Pelican nesting is likely also deterring nest attempts at this location.

Objective	Strategy	Action(s)	Target SGCNs
Maintain nesting island availability.	Monitor breeding population in concert with fencing activities on Gull Island to ensure population remains	Conduct colony surveys at least once every 3 years as long as fencing activities continue.	Ring-billed Gull California Gull Caspian Tern

Objective	Strategy	Action(s)	Target SGCNs
	stable.		
Reduce impacts of competition with other nesting species on Caspian Tern.	Create areas on Gull Island for late breeding initiation.	Work with USFWS, Pacific Region, to develop protocol for creating late-breeding initiation areas. Work with land managers, such as USFWS, to test protocol on Blackfoot Reservoir.	Caspian Tern

Recreational disturbance

Human disturbance is a concern for the nesting colony of American White Pelican, Ring-billed and California Gull, and Caspian Tern on Gull Island in Blackfoot Reservoir. Persecution by local anglers took place here as late as the early 1960s, deterring successful American White Pelican nesting (USFWS 1984, Burleigh 1972). With increased management activities at this location to limit American White Pelican nesting, it is critical that additional human disturbance is minimized.

Western and Clark's Grebe are sensitive to boating activities from nest initiation through brood-rearing. Boat wake can inundate or flip nests, causing nest failure, and inattentive boat use too close to grebes carrying young can result in separation of the young from adults, and ultimately mortality of the separated young.

Objective	Strategy	Action(s)	Target SGCNs
Reduce recreational disturbance.	Educate public about nesting colony sensitivity. Enforce state and federal laws pertaining to the disturbance of nesting migratory birds.	Create and post obvious signage at colony to deter disturbance. Create boating no-wake zones around nesting colonies, and monitor their effectiveness. Create signage at boat launches informing the public of grebe colony presence and recommendations for reducing recreational impacts.	Western Grebe Clark's Grebe American White Pelican Ring-billed Gull California Gull Caspian Tern

Spotlight Species of Greatest Conservation Need: American White Pelican & Native Cutthroat Trout Management Challenges

This section is adapted from IDFG's draft "Management Plan for the Conservation of American White Pelican in Idaho: A five-year plan (2016–2020) to conserve American White Pelican populations and manage impacts to fisheries in Idaho."

The American White Pelican is a colonial-nesting, fish-eating waterbird that inhabits lakes, rivers and wetlands in the interior western US. American White Pelican populations in Idaho are part of a distinct, migratory western population that breeds in northern latitudes roughly west of the Continental Divide and winters in marine habitats along the southern Pacific Coast. American White Pelican nests predominantly on permanent islands in freshwater lakes where predators are effectively excluded. In Idaho, all 3 active nesting colonies occupy islands created by the construction of large reservoirs. One of the 3 colonies is located in the Northwestern Basin and Range, on Gull Island in Blackfoot Reservoir. Idaho currently supports approximately 16% of the western American White Pelican breeding population and is the third largest relative contributor

to this nesting population. Current threats to western populations include relatively few colonies, large fluctuations in colony size and productivity, hydrologic alterations, disease pandemics, and possibly West Nile virus. Idaho identifies the American White Pelican as a SGCN due to few occurrences (i.e., breeding colonies) in the state, a significant proportion (16%) of the western US population breeds in Idaho, and multiple threats, including climate change and disease.

American White Pelican populations in Idaho generally forage on abundant nongame fish, generating little controversy or causing few impacts to aquatic resources. The Blackfoot Reservoir colony, however, is measurably impacting native Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*) populations creating a conflict between American White Pelican conservation and fisheries management objectives. The Yellowstone Cutthroat Trout is not recognized as a SGCN.



Adult American White Pelican, Blackfoot Reservoir, Idaho © 2005 Colleen Moulton

Beginning in 2003, concentrations of 50 to 100 American White Pelicans began foraging at the mouth of the Blackfoot River. Since then, the frequency and abundance of American White Pelicans foraging on migrating fish has increased commensurate with the American White Pelican nest count trends on Gull Island. During a 4-year study of wild Yellowstone Cutthroat Trout in the Blackfoot River, predation rates by American White Pelican typically exceeded 20% and even exceeded 60% in one river segment. Low river flows augment predation by forcing migrating Yellowstone Cutthroat Trout to navigate water too shallow to provide effective escape cover. Current climate modeling suggests that low flow conditions are likely to appear more frequently in the future and may even become a regular occurrence.

Providing high-quality sport fisheries and angling opportunities and maintaining a viable American White Pelican breeding population are priorities for IDFG. Management actions are therefore necessary to protect fisheries as American White Pelican colony size and productivity fluctuates annually, while at the same time ensuring the persistence of nesting American White Pelicans on the landscape. In 2010, IDFG began using nest exclusion fencing and fladry to limit occupancy and breeding activity on Gull Island. The goal has been to maintain a 5-year average of 700 breeding American White Pelicans at Blackfoot Reservoir. Hazing activities along Blackfoot River have been implemented to minimize impacts to migrating Yellowstone Cutthroat Trout, sometimes with lethal reinforcement, as authorized by a depredation permit issued by the USFWS. Also authorized by the same permit, nest destruction occurs annually on Blackfoot Reservoir islands in an attempt to meet breeding American White Pelican population objectives. Ongoing and future management will be challenged to mitigate the impacts of American

White Pelican on native Yellowstone Cutthroat Trout and to balance the conservation and management of these 2 species.

Target: Bighorn Sheep

Bighorn Sheep populations are managed in Idaho with a separate species management plan (Bighorn Sheep Management Plan 2010; IDFG 2010). Sheep occurrence in the Northwestern Basin and Range is defined within 2 Population Management Units (PMUs), described in detail in the Bighorn Sheep Management Plan (IDFG 2010): the Jim Sage and South Hills. Bighorn sheep in the Jim Sage PMU occur between 1,500 and 2,400 m, primarily on lands administered by the BLM, but occasionally use private lands also. The landscape is characterized by moderately rugged canyons and low mountains with predominantly shrub-steppe vegetation on the lower elevations and south slopes. Bighorn Sheep in this PMU do not exhibit seasonal migration. From 1988 through 2004, the Department embarked on a program to reestablish Bighorn Sheep into historic range in several locations in Cassia County including the Jim Sage and Albion mountains. From 2000 to 2004, 93 Bighorn Sheep were released into historic habitat on the Jim Sage and Albion mountains. The Jim Sage population has increased steadily and now contains an estimated 80 to 100 individuals (IDFG 2010).

The South Hills is an isolated mountain range covering approximately 1,600 km². The dominant landform is low mountains bisected by moderately rugged canyons. Lower elevations and south- and west-facing slopes are predominantly shrub-steppe vegetation and juniper woodlands. Lodgepole pine and quaking aspen communities occur at higher elevations. Suitable habitat for Bighorn Sheep occurs in the Rock Creek, Dry Creek, and Big Cottonwood Creek drainages between 1,400 and 2,100 m. Bighorn Sheep principally use Sawtooth NF lands, but also use lands managed by the BLM, Idaho Department of Lands, and IDFG. Bighorn Sheep in this PMU do not exhibit seasonal migration. From 1986 to 1993, 50 Bighorn Sheep were released into the Big Cottonwood Creek drainage and 24 were released into the East Fork of Dry Creek. In 1989, the Bighorn Sheep in Big Cottonwood experienced a die-off and despite additional releases, numbers continued to decline. Currently, <15 Bighorn Sheep persist in the PMU. Reintroduction efforts are considered impractical due to several issues, including the proximity of domestic sheep and goats, motorized recreation, and habitat issues such as juniper encroachment (IDFG 2010).

Target Viability

Viability for Bighorn Sheep in the South Hills is poor due to low populations, conflicts with domestic livestock, and habitat concerns. Viability for the the Jim Sage population is good. The population is estimated to be near carrying capacity using habitat models.

Prioritized Threats and Strategies for Bighorn Sheep

Very High rated threats to Bighorn Sheep in the Northwestern Basin and Range

Disease transmission via domestic sheep

Disease was a significant factor in the historic decline of Bighorn Sheep and is a key factor limiting recovery throughout Idaho (IDFG 2010). Respiratory disease (pneumonia) is the most significant disease, resulting in negative effects on populations through increased adult and

lamb mortality. Effects can be serious and long-lasting, no effective vaccines exist, and once pathogens are introduced, there is currently no effective treatment. The most likely sources of pathogen introduction into Bighorn Sheep populations are domestic sheep and goats, and other Bighorn Sheep (USFS 2006, WAFWA 2007, CAST 2008, Schommer and Woolever 2008; excerpted from IDFG 2010).

Objective	Strategy	Action(s)	Target SGCNs
Work to reduce the effects of disease on Bighorn Sheep populations.	Advocate and work toward maintaining spatial and temporal separation between Bighorn Sheep and domestic sheep and goats.	Work with livestock permittees to develop and implement "Best Management Policies" to assist in ensuring physical separation of livestock, consistent with Idaho Code (IDFG 2010). Collaborate with ISDA and the Idaho Wool Growers Association to develop education and outreach efforts to inform owners of domestic sheep and goats of the risks associated with comingling and provide recommendations to avoid contact (IDFG 2010). Increase knowledge of movement patterns, habitat use, survival, etc. using radio-marked Bighorn Sheep.	Bighorn sheep
	Monitor populations for presence of disease.	Conduct investigations of known disease events and their impacts on individual herds (IDFG 2010). Obtain biological samples from all Bighorn Sheep handled, to determine exposure to pathogens, and to develop individual herd health histories of Bighorn Sheep in Idaho (IDFG 2010).	

High rated threats to Bighorn Sheep in the Northwestern Basin and Range

Altered fire regimes

Fire suppression has altered habitats by allowing encroachment of conifer species into mountain shrub communities, reducing forage. Conversely, wildfire in shrub-steppe habitats results in loss of forage.

Objective	Strategy	Action(s)	Target SGCNs
Reduce conifer encroachment into mountain shrub habitat.	Where succession and conifer encroachment are limiting Bighorn Sheep habitat, work closely with appropriate agencies to maintain or restore mountain shrub habitat.	Use mechanical methods or controlled fire to reduce or remove conifers from mountain shrub habitat.	Bighorn Sheep
Reduce impacts of wildfire in mountain shrub habitats.	Develop fire plans that prioritize suppression in important habitats.	Provide land management agencies with maps detailing important shrub-steppe habitat within Bighorn Sheep range.	Bighorn Sheep

Changes in precipitation & broad-scale hydrologic regimes

The modeled effects of climate change suggest changes in precipitation timing and quantity is likely to impact the severity, frequency, and magnitude of all forest disturbances. The immediate effects are predicted to create conditions conducive to larger, more intense fires across the entire Great Basin, which may result in rapid changes in forest age class distribution and landscape patterns. The amount and timing of precipitation affects vegetation growth and recruitment and may seriously hinder restoration efforts on degraded sites.

DRAFT

Northwestern Basin and Range Section

An initial version of the Northwestern Basin and Range Section project plan was completed for the 2005 Idaho State Wildlife Action Plan (formerly Comprehensive Wildlife Conservation Strategy). In 2014, a small working group developed an initial draft of the section plan (Miradi v. 0.39), which was then reviewed by a wider group of partners and stakeholders during a 2-day workshop held at the Idaho Department of Fish and Game, Southeast Regional Office, Pocatello in January 2015 (this input captured in Miradi v. 0.41). This draft was then subsequently distributed for additional internal review within the Idaho Department of Fish and Game in June 2015. Since then, we have continued to work with key internal and external stakeholders and subject matter experts to improve upon the plan. Materials in this document are based on Miradi v. 0.53. Individuals and organizations/agencies involved in this plan are shown in Table 11.3.

Table 11.3 Individuals, agencies, and organizations involved in developing this plan ^a

First name	Last name	Affiliation
Zach	Lockyer*	Idaho Department of Fish and Game, Southeast Region
Dean	Rose*	Idaho Department of Fish and Game, Southeast Region
Tim	Weekley	Idaho Department of Fish and Game, Headquarters
Arnie	Brimmer	Idaho Department of Fish and Game, Southeast Region
Rita D	Dixon	Idaho Department of Fish and Game, Headquarters
Brett	Gullett	Idaho Department of Fish and Game, Southeast Region
Deborah	Koziol	Natural Resources Conservation Service
James	Kumm	Bureau of Land Management (US), Idaho Falls District, Pocatello Field Office
Paul	Makela	Bureau of Land Management (US)
Colleen	Moulton	Idaho Department of Fish and Game, Headquarters
Charles R	Peterson	Idaho State University
Quinn	Shurtliff	Gonzales–Stoller Surveillance, LLC
Travis	Stone	Shoshone–Bannock Tribes
Martha	Wackenhut	Idaho Department of Fish and Game, Southeast Region

^a Apologies for any inadvertent omissions.

^b An asterisk “*” denotes team leader(s) and contact point if you would like to become involved in this work.