1. Okanogan Highlands Section

(v. 2015-12-29)

Section Description

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

Parker Ridge, Selkirk Mountains © 2012 Scott Rulander

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

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

Numerous glacial lakes, rivers, and streams populate the Okanogan Highlands. Alpine lakes and ponds are abundant along the Selkirk Crest and provide breeding habitat for amphibians such as Western Toad (*Anaxyrus boreas*). Steep drainages deliver water into the Kootenai, Upper Pack, Upper Priest, and Priest rivers. Although most of the land in the Kootenai River Valley has been converted to agricultural or rangelands; remnant wetlands, riparian habitats, and dry-conifer forests provide important wildlife corridors between the Selkirk, Purcell, and Cabinet mountain ranges. River and stream valleys provide important breeding habitat for fish, amphibians, Neotropical migratory birds and several bat species.

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

Outwash from the Clark Fork and Pack rivers into Lake Pend Oreille produce large deltas that support waterfowl, fish, amphibians, bats, and upland wildlife. The deltas also provide nutrients and sediments to the lake and purify the water. However, the Pack River Delta and the Clark Fork Delta have both undergone severe losses and degradation through the construction of several hydroelectric dams within the Pend Oreille drainage. While producing power for the Inland Northwest, dams such as the Albeni Falls dam on the Pend Oreille River cause shoreline and island erosion by raising and lowering water levels within the lake. Dams upstream of the Clark Fork River (Cabinet Gorge dams) reduce the amount of sediment and large wood necessary in the formation of the delta. However restoration efforts on both deltas (Pack River, 2008–2009 and Clark Fork River 2014–2015) have improved the deltas' functionality by stabilizing shorelines and re-constructing delta islands while removing nonnative species such as purple loosestrife (*Lythrum salicaria*) and planting native species.

Conservation efforts in this section should strive to maximize the collaborative opportunities made available by the geographic proximity of Washington, British Columbia, and Montana.

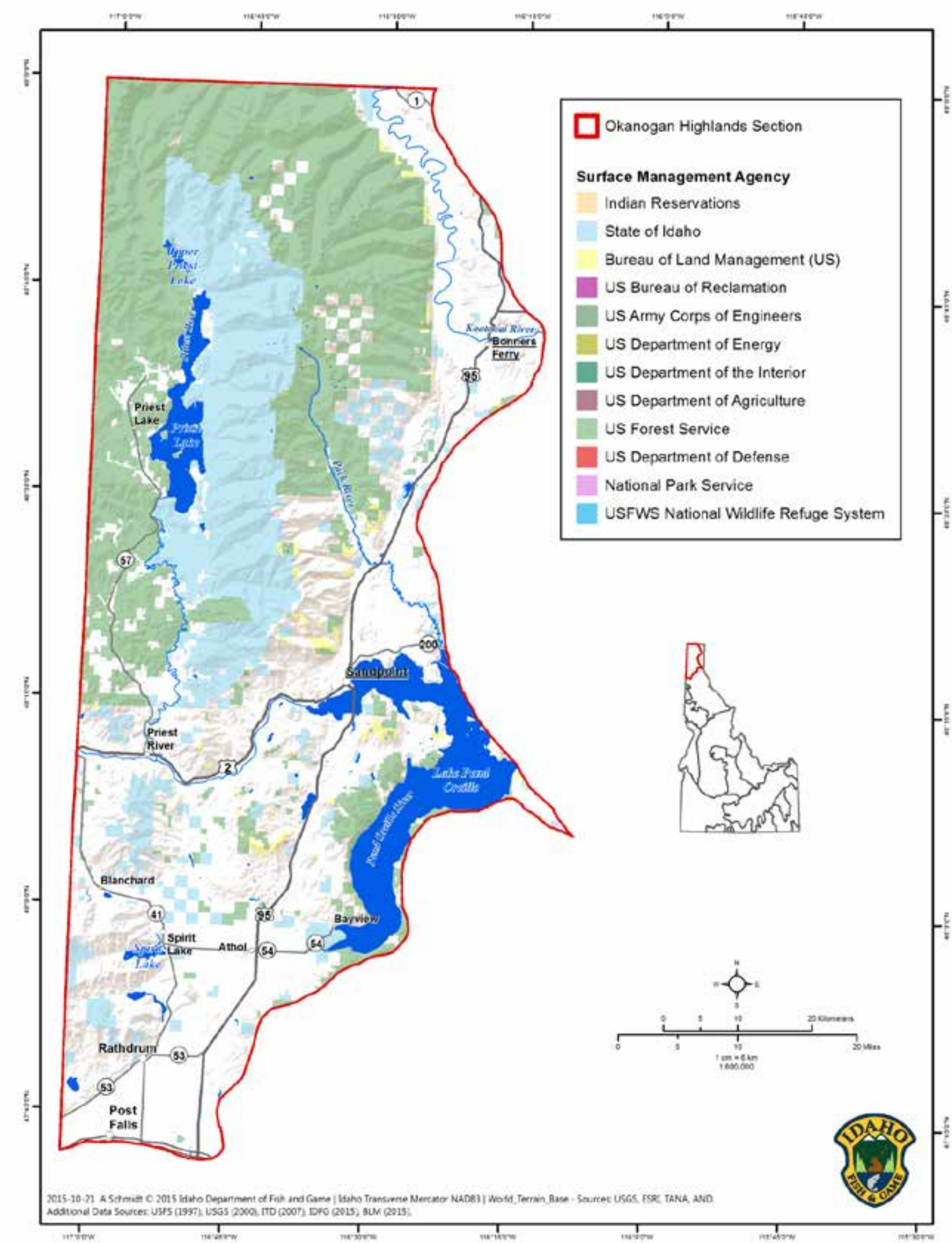


Fig. 1.1 Map of Okanogan Highlands surface management

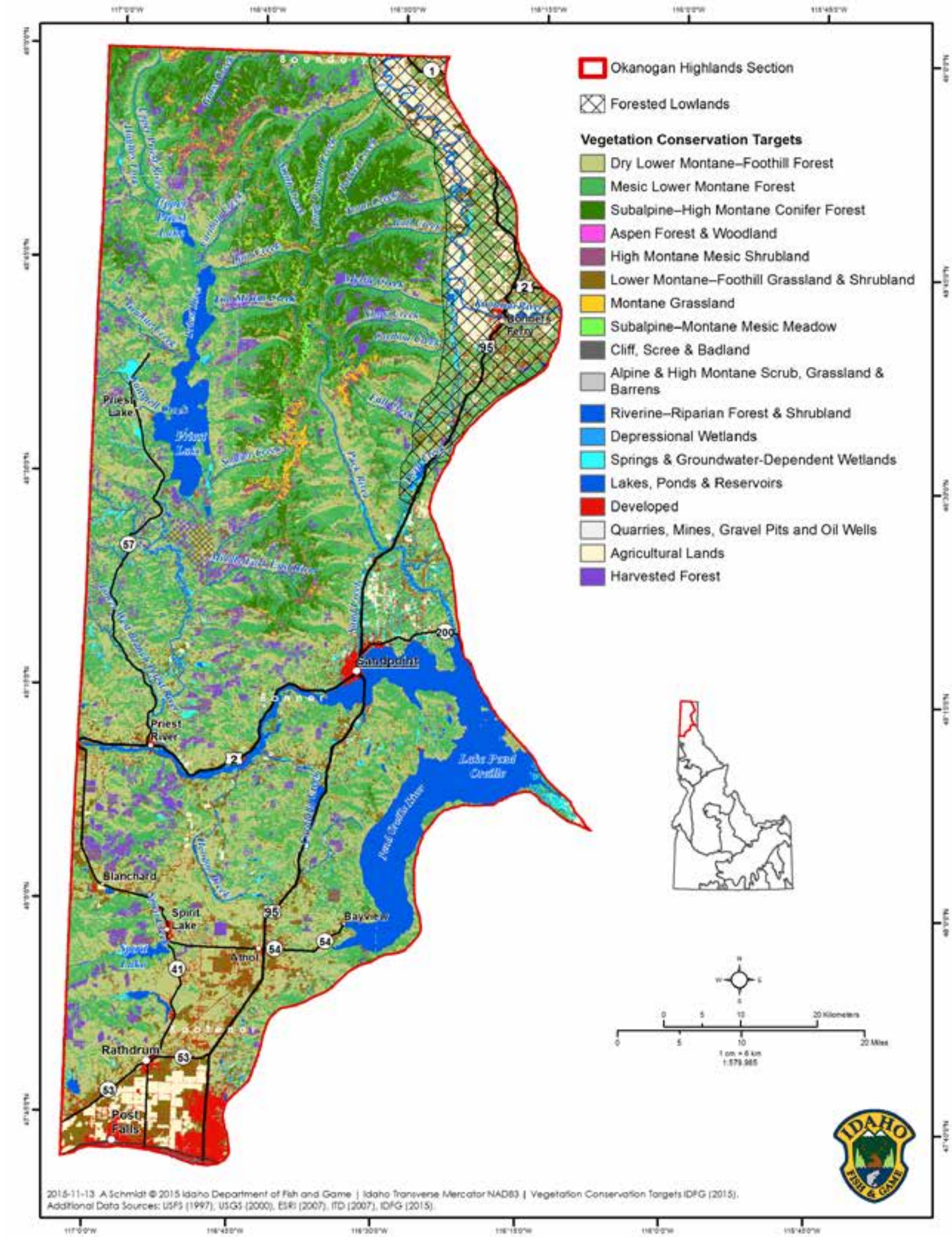


Fig. 1.2 Map of Okanogan Highlands vegetation conservation targets

Conservation Targets in the Okanogan Highlands

We selected 8 habitat targets (5 upland, 3 aquatic) that represent the major ecosystems in the Okanogan Highlands as shown in Table 1.1. Each of these systems provides habitat for key Species of Greatest Conservation Need (SGCN), i.e., "nested targets" (Table 1.2) associated with each target. All SGCN management programs in the Okanogan Highlands have a nexus with habitat management programs. Conservation of the habitat targets listed below should conserve most of the nested species within them. However, we determined that at least 6 taxonomic groups (Lake-nesting birds, Ground-dwelling invertebrates, Grizzly Bear, Pond-breeding Amphibians, Low Density Forest Carnivores and Pollinators) face special conservation needs and thus are presented as explicit species targets as shown in Table 1.1.

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

Target	Target description	Target viability	Nested targets (SGCN)	
Forested Lowlands	Forested habitats below 3,000 feet (914 m) which historically experienced frequent flood disturbance cycles.	*Fair to Poor.* Majority converted to agriculture and natural flood cycles eliminated.	Tier 1 Tier 2	Wolverine Grizzly Bear Northern Leopard Frog Fisher
Dry-Lower Montane Foothill Forest	Northern Rocky Mts. Dry-Mesic Conifer and Ponderosa Pine Woodland and Savannah systems lower elevation forests in the Selkirk Mountains.	*Fair.* Substantial encroachment by other habitat types due to lack of natural fire cycle	Tier 2 Tier 3	Olive-sided Flycatcher Common Nighthawk Townsend's Big-eared Bat Little Brown Myotis
Mesic Lower Montane Conifer Forest	Commonly referred to as a "cedar–hemlock" forest but also includes Lodgepole Pine and Aspen-Mixed conifer forest at lower elevations of the Selkirk Mountains.	*Fair.* Substantial encroachment by other habitat types due to lack of natural fires cycle and loss of western white pine.	Tier 2 Tier 3	Olive-sided Flycatcher Silver-haired Bat Townsend's Big-eared Bat Little Brown Myotis
Subalpine High Montane Conifer Forest	Dry–mesic spruce-fir forest and whitebark pine woodlands at higher elevations of Selkirk Mountains.	*Fair to Poor.* Subject to altered fire regimes, forest insects, disease, and climate change; reduction in whitebark pine woodlands.	Tier 1 Tier 3	Wolverine Clark's Nutcracker Mountain Goat Hoary Marmot
Cool Air Refugia	Micro-sites and larger areas with lower air temperature regimes compared to adjacent habitat.	*Fair.* Climate change expected to reduce habitat.	Tier 1 Tier 2 Tier 3	Wolverine Grizzly Bear Magnum Mantleslug *Hemphillia* sp1 Pale Jumping Slug Shiny Tightcoil Hoary Marmot Northern Bog Lemming
Riverine-Riparian Forest and	Rivers and streams, including aquatic	*Fair.* Riverine systems in the lower valleys	Tier 1	White Sturgeon Burbot

Target	Target description	Target viability	Nested targets (SGCN)	
Shrubland	habitats and their associated terrestrial riparian habitats. Includes Kootenai, Upper Pack, Priest and Pend Oreille Rivers and their tributaries.	impacted by hydroelectric operations and invasive species. Higher elevation headwaters threatened by climate change.	Tier 2 Tier 3	Harlequin Duck Black Swift Western Pearlshell *Ephemerella alleni* California Floater Western Ridged Mussel
Depressional Wetlands	Rain-fed systems ranging from infrequent to semi-permanent or permanently flooded. Typically pond sized or smaller. Includes playas, vernal pools, shallow marshes and meadows, and deep water marshes.	*Fair.* Lower elevations experiencing altered hydrological regimes and invasive species/disease. Higher elevations threatened by climate change.	Tier 2 Tier 3	Western Toad Northern Leopard Frog American Bittern Black Tern Silver-haired Bat Townsend's Big-eared Bat Little Brown Myotis
Springs and Ground-water Dependent Wetlands	Includes a subset of groundwater-dependent ecosystems which contain sphagnum moss component within the vegetation. Also includes headwater springs.	*Good.*	Tier 2 Tier 3	Western Toad Northern Bog Lemming
Lake-nesting Birds	Western Grebe and Common Loon are listed as an Intermountain West Waterbird Conservation Plan priority species due to habitat concerns and impacts from recreational boating.	*Poor.* One western grebe colony in the Okanogan Highlands with no reproduction. No successfully nesting Common Loons detected in region.	Tier 2	Common Loon Western Grebe
Ground-dwelling Invertebrates	Assemblages of terrestrial invertebrates found on forest and other habitat floors.	*Good.* Habitat and threat data deficient. Many species taxonomically and distributionally data deficient.	Tier 1 Tier 2 Tier 3	Magnum Mantleslug *Hemphillia* sp1 Salmon Coil Coeur d'Alene Oregonian Shiny Tightcoil Pale Jumping Slug Western Flat-whorl Spur-throated Grasshopper group
Grizzly Bear	Grizzly bear are listed as Federally threatened. Population within the Selkirks is thought to be 50–60 bears.	*Fair.* Population appears to be expanding in both size and distribution.	Tier 1	Grizzly bear
Pond Breeding Amphibians	Amphibians which primarily breed in lentic	*Poor.* Northern Leopard Frogs	Tier 2	Northern Leopard Frog Western Toad

Target	Target description	Target viability	Nested targets (SGCN)	
	wetlands.	extirpated from section and face invasive species/disease threats.		
Low Density Forest Carnivores	Wide ranging mammalian mesocarnivores.	*Poor*. Only a few individuals known to occur in section.	Tier 1 Tier 2	Wolverine Fisher
Pollinators	Species delivering pollination ecosystem service.	*Fair*. Many pollinators declining range wide.	Tier 1 Tier 3	Western Bumble Bee Suckley Cuckoo Bumble Bee Monarch Gillette's Checkerspot

Table 1.2 Species of Greatest Conservation Need (SGCN) and associated conservation targets in the Okanogan Highlands

	Conservation targets													
Taxon	Forested Lowlands	Dry-Lower Montane Foothill Forest	Mesic Lower Montane Conifer Forest	Subalpine High Montane Conifer Forest	Cool Air Refugia	Riverine-Riparian Forest and Shrubland	Depressional Wetlands	Springs and Groundwater–Dependent Wetlands	Lake-nesting Birds	Ground-dwelling Invertebrates	Grizzly Bear	Pond Breeding Amphibians	Low Density Forest Carnivores	Pollinators
FISH														
White Sturgeon [Kootenai River DPS]						X								
Burbot						X								
AMPHIBIANS														
Western Toad	X						X	X				X		
Northern Leopard Frog	X						X					X		
BIRDS														
Harlequin Duck						X								
Common Loon									X					
Western Grebe									X					
American Bittern							X							
Black Tern							X							
Common Nighthawk		X												
Black Swift						X								
Olive-sided Flycatcher		X	X											
Clark's Nutcracker				X										
MAMMALS														
Townsend's Big-eared Bat		X	X				X							
Silver-haired Bat			X				X							
Little Brown Myotis		X	X				X							
Wolverine	X			X	X								X	
Fisher	X												X	
Grizzly Bear	X				X						X			
Mountain Goat				X										
Northern Bog Lemming					X			X						
Hoary Marmot				X	X									
BIVALVES														
Western Pearlshell						X								
California Floater						X								
Western Ridged Mussel						X								

Taxon	Conservation targets													
	Forested Lowlands	Dry-Lower Montane Foothill Forest	Mesic Lower Montane Conifer Forest	Subalpine High Montane Conifer Forest	Cool Air Refugia	Riverine-Riparian Forest and Shrubland	Depressional Wetlands	Springs and Groundwater–Dependent Wetlands	Lake-nesting Birds	Ground-dwelling Invertebrates	Grizzly Bear	Pond Breeding Amphibians	Low Density Forest Carnivores	Pollinators
TERRESTRIAL GASTROPODS														
Pale Jumping slug					X					X				
A roundback slug (*Hemphillia* sp. 1)					X					X				
Magnum Mantleslug					X					X				
Salmon Coil										X				
Striate Mountainsnail										X				
Coeur d'Alene Oregonian										X				
Western Flat-whorl										X				
Shiny Tightcoil					X					X				
INSECTS														
A mayfly (*Ephemerella alleni*)						X								
Western Bumble Bee														X
Suckley Cuckoo Bumble Bee														X
Monarch														X
Gillette's Checkerspot														X
Spur-throated Grasshoppers										X				

Target: Forested Lowlands

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

Kootenai River Valley © 2015 Michael Lucid

Target Viability

Fair to Poor. Historically, the valley between the Selkirk, Purcell and Cabinet mountain ranges was a large and diverse riparian and wetland complex. Since the late 1800's, most of the land has been converted to agriculture with very little forest and wetland remaining. The installation of Libby Dam has changed the natural flooding cycles in the Kootenai River Valley.

Prioritized Threats and Strategies for Forested Lowlands

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

Dams and water management

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

Objective	Strategy	Action(s)	Target SGCNs
Develop habitat modifications that are compatible within the current hydrologic regime. (KTOI 2009) Determine feasibility of restoring historic hydrological regime. Restore populations of flood associated organisms.	Increase floodplain areas with suitable substrate and elevation relative to the water table that can support riparian vegetation recruitment and establishment (KTOI 2009) Determine if all or a portion of historic hydrological regime could be restored. Determine which organisms historically altered flood regimes and implement population restoration programs.	Implement strategies outlined in the Kootenai Tribe's Kootenai River Habitat Restoration Project Master Plan (KTOI 2009). Conduct review study to determine obstacles and solution to hydrological regime recovery. Conduct review study to determine best mechanisms to restore natural flood associated species and implement actions developed in plan. Conduct re-introduction programs for organisms which directly influence natural flooding cycles.	Northern Leopard Frog, Wolverine, Fisher, Grizzly Bear

Genetic connectivity

The forested lowlands of this ecological section are well recognized as being of major importance to gene flow between the Selkirk, Cabinet, and Purcell Mountains (Schwartz et al. 2009, Cushman et al. 2014). Research is necessary to assess historic and current levels of gene flow across the Kootenai Valley within the context of the Flathead, Bitterroot, and Okanogan Highlands ecological sections to identify priority land parcels for conservation or habitat restoration actions that are most appropriate for conservation or restoration of multiple species genetic connectivity.

Objective	Strategy	Action(s)	Target SGCNs
Assess genetic connectivity between mountain ranges Restore genetic connectivity.	Assess genetic connectivity for SGCN with varying vagility levels to assess current–historic areas of gene flow in order to prioritize land parcels for habitat conservation, acquisition, and/or restoration. Work toward long term restoration and conservation of parcels identified as	Assemble genetic samples from current collections. When necessary, conduct field work to collect necessary genetic samples. Conduct genetic studies to determine valley locations which have been or currently are of importance for multiple species gene flow. Conserve, acquire, and/or restore land parcels identified as important for genetic connectivity.	Grizzly Bear, Fisher, Wolverine, Magnum Mantleslug, Pale Jumping Slug, *Hemphillia* sp1, Shiny Tightcoil, Coeur d'Alene Oregonian, Spur Throated Grasshopper Group, Western Toad, Western Bumble Bee, Suckley Cuckoo Bumble Bee, Gillette's Checkerspot, Hoary Marmot, Bog Lemming, Common Nighthawk, Clark's Nutcracker, Silver-haired Bat

Objective	Strategy	Action(s)	Target SGCNs
	important for genetic connectivity.		
Monitor genetic connectivity between mountain ranges.	Monitor genetic connectivity over time.	Develop and implement long-term multi-taxa monitoring program.	

Loss of farm field diversity

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

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

High rated threats in the Forested Lowlands in the Okanogan Highlands

Transportation corridors

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

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk along roadways	Highway signage at areas of high wildlife use Construction of over- and under-passes	Determine high risk areas for wildlife crossings Construct over- and under- passes Construct noise buffers at crossing areas	Northern Leopard Frog, Wolverine, Fisher, Grizzly Bear, Western Toad, Coeur d'Alene Oregonian

Invasive and noxious weeds

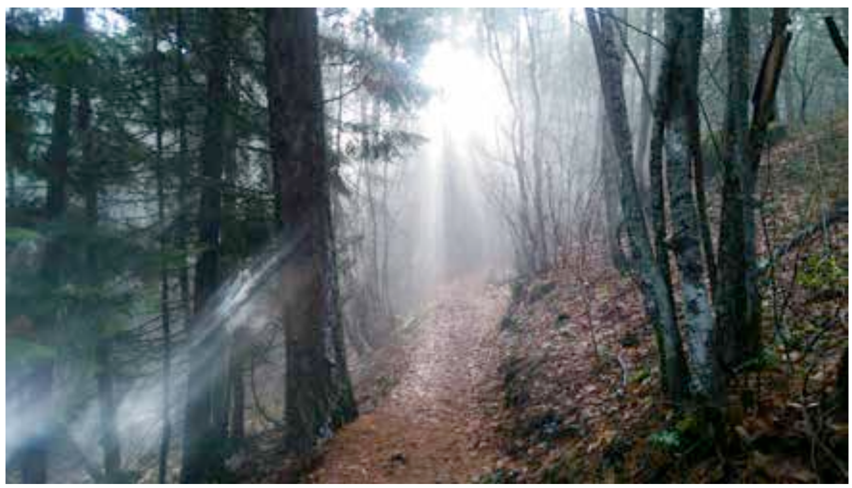
One of the limiting factors impacting the restoration of riparian areas in the Kootenai River Valley is the prevalence of invasive and noxious weeds in disturbed or developed areas (KTOI 2009). Invasive species often prevent the establishment of native species by forming dense monocultures and in some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

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USDA Forest Service 2013).	Increased monitoring for invasive and noxious weeds. Coordinate invasive and noxious weed treatment across agencies.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Utilize existing technology such as Global Positioning Systems (GPS), remote sensing and Geographic Information Systems (GIS) to efficiently collect, store, retrieve, and analyze and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012)	Northern Leopard Frog, Wolverine, Fisher, Grizzly Bear Suckley Cuckoo Bumble Bee, Monarch
Contain and reduce widespread weeds in areas that are already infested (USDA Forest Service 2013).	Coordinate invasive and noxious weed treatment across agencies. Prevent spread of widespread weeds through the identification and treatment of dispersal	Weed treatment of high impact areas/roads. (USDA Forest Service 2013) Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USDA Forest	Northern Leopard Frog, Wolverine, Fisher, Grizzly Bear Suckley Cuckoo Bumble Bee, Monarch

Objective	Strategy	Action(s)	Target SGCNs
	vectors. Restoration of treated areas with native species.	Service 2013, IDL 2015) Revegetate and monitor restoration areas with native species (KTOI 2009) Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012)	

Target: Dry–Lower Montane Foothill Forest

In the Okanogan Highlands, nearly 28% of the land cover is classified as Dry Lower Montane–Foothill Forest. While this habitat group can be located at all aspects and slopes; it is predominately found on the warm–dry, south–southwest, moderately steep slopes within the Selkirk Mountains (Cooper et al. 1991). However, it also extends into the valleys and floodplains that surround the mountain range, including the floodplain of the Kootenai, Priest and Pend Oreille Rivers and is the predominant habitat type that surrounds Rathdrum Prairie. Elevation ranges from 529–1920 meters in the Okanogan Highlands but there are numerous occurrences above 1920 meters. In the dry lower montane–foothill forest, Douglas-fir is a co-dominate climax species with ponderosa pine (*Pinus ponderosa* Lawson & C. Lawson) in mixed or single species stands (Rocchio 2011). Species such lodgepole pine (*Pinus contorta* Douglas ex Loudon), western larch (*Larix occidentalis* Nutt.) and grand fir (*Abies grandis* [Douglas ex D. Don] Lindl.) only occasionally occur and are found in the wetter microsites within the habitat group (Cooper et al. 1991). Ponderosa pine woodlands are dominant on the driest sites and where fires are frequent and of low severity (Cooper et al. 1991). Historically fires were thought to be frequent and moderate–low severity which maintained open stands of fire–resistant species. Low fire frequency has resulted in a dominance of shrubs and tree species such as grand fir, lodgepole pine, Douglas-fir and western larch in the understory. Currently the habitat group contains a variable understory physiognomy ranging from shrub–dominated and dense with mallow ninebark [*Physocarpus malvaceus* (Greene) Kuntze] and ocean spray [*Holodiscus discolor* (Pursh) Maxim.], to bunch-grass dominated and open with Idaho fescue [*Festuca idahoensis* Elmer] and bluebunch wheatgrass [*Pseudoroegneria spicata* (Pursh) Á. Löve] to name a few species.



Coeur d'Alene Mountains © 2015 Michael Lucid

Target Viability

Fair. There has been substantial encroachment in the habitat type by more shade–tolerant overstory species due to the lack of normal fire intervals.

Prioritized Threats and Strategies for Dry–Lower Montane Foothill Forest

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

Uncharacteristic wildland fire resulting in stand-replacing fires

Historically, moderate- to low-severity fires that burned on average every 10 to 30 years maintained the open understory and predominance of shade-intolerant species, such as ponderosa pine in the overstory (Smith and Fischer 1997). However, decades of fire suppression activities aided by a cool period in the Pacific decadal oscillation were effective in preventing most moderate fires in the ecosystem while also preventing stand-replacing fires that often enable shade-intolerant species to establish (USDA Forest Service 2013[EIS_IPNF]). This resulted in the encroachment of shade-tolerant species into the habitat group as well as a decrease in fire-tolerant species, increased vertical stand structure, increased canopy closure, increased vertical fuel ladders, greater biomass, greater fire intensities and severities, and increased insect and disease epidemics (Keane et al. 2002). Fire management over the past 15 years has attempted to simulate and reestablish the vegetative composition of regular fire patterns but is hampered by the inability to allow natural fires to burn. In addition, human population increases have increased the Wildland–Urban Interface (WUI) that often prevents the use of fire as a management tool.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USDA Forest Service 2013 [monitoring and evaluation program]).	Use prescribed and natural fires to maintain desired conditions (USDA Forest Service, 2015). Encourage prescribed fire on private, corporate, & state-endowed lands. Increase markets to pay for ecological forest management activities, e.g., explore markets to thin trees so that they can ward off insect and fire threats. Increase membership and participation in Idaho Forest Stewardship Programs, American Tree Farm System, and NRCS. Remove barriers to improved	Lands within the WUI treated to reduce fuels through mechanical removal or controlled burns (USDA Forest Service 2015). Fire-killed trees are left standing, if pose no safety hazard, as wildlife habitat (USDA Forest Service 2015). Develop programs to enable private landowners to assess agency prescribed fire crews at small to no cost.	Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
	forest management (e.g., barrier for reducing fire suppression further in existing law, i.e., Idaho Forest Practices Act).		
Simulate natural fire regimes.	Design and implement silvicultural prescriptions that simulate natural disturbance regimes.	Actively remove shade-tolerant species.	Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Little Brown Myotis
	Improve federal land policy to allow for active forest management.	Increase timeliness of USFS to respond after a fire/blowdown (e.g., storm damage) and/or insect outbreak.	
	Use 2014 Farm Bill authorities to expedite preventive management activities driven by catastrophic damage, or WUI on Categorical Exclusion.		

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

Invasive and noxious weeds

In the drier habitat types, such as the Dry Lower Montane Foothill Forests, invasive/noxious weeds have migrated from disturbed areas such as roads, railroads and utility right-of-ways to undisturbed habitats. Across the Idaho Panhandle National Forest (IPNF), nearly 82% of the warm/dry habitat type is at high risk for invasion by nonnative weeds (USDA Forest Service, 2013). Additionally surveys done in the Okanogan Highlands, found 14% of sites in the Dry Lower Montane Foothill Forest type (n=115) had spotted knapweed or tansy present (Lucid et al. 2015). Species such as spotted knapweed, diffuse knapweed, yellow star thistle, leafy spurge, dyer's woad are particularly invasive within the IPNF and have dispersed into undisturbed areas and displaced native species over large areas (USDA Forest Service, 2013).

Objective	Strategy	Action(s)	Target SGCNs
Identify and eradicate any potential invasive species prior to establishment (USDA Forest Service 2013).	Increased monitoring for invasive and noxious weeds. Coordinate invasive and noxious weed treatment across agencies. Implement the Idaho Invasive Species Council Strategic Plan.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Use existing technology such as Global Positioning Systems (GPS), remote sensing and Geographic Information Systems (GIS) to efficiently collect, store, retrieve, and analyze and display noxious weed information (ISDA 1999).	Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
		Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012)	
Contain and reduce widespread weeds in areas that are already infested (USDA Forest Service 2013).	Coordinate invasive and noxious weed treatment across agencies. Prevent spread of widespread weeds through the identification and treatment of dispersal vectors. Restoration of treated areas with native species.	Weed treatment of high impact areas/roads. (USDA Forest Service 2013) Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USDA Forest Service 2013, IDL 2015) Revegetate and monitor restoration areas with native species (KTOI 2009) Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012)	Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Little Brown Myotis
Monitor threat.	Monitor changes in range and distribution of noxious weeds.	Incorporate noxious weeds into a multitaxa monitoring program.	Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Little Brown Myotis

Unknown status or causes of decline

Multiple species identified as SGCN are declning as as result of unknown causes. The priority for many of these species in the coming years is to identify what is/are the root cause(s) of their apparent decline, and develop a strategy for addressing it.

Objective	Strategy	Action(s)	Target SGCNs
Determine causes of decline in Olive-sided Flycatchers	Determine relative importance of known and suspected threats to Olive-sided Flycatchers, its prey, and their habitats (see Canada's recovery plan, Appendix B; Environment Canada 2015b) Investigate factors affecting reproductive output, survival, and fidelity to breeding sites	Promote cooperation and collaboration with Western Working Group Partners in Flight to fill knowledge gaps and to mitigate threats	Olive-sided Flycatcher
Determine	Work with Western	Assist WWG PIF with adjusting current	Common

Objective	Strategy	Action(s)	Target SGCNs
cause(s) of decline for nightjar species in Idaho.	Working Group Partners in Flight (WWG PIF) and the Pacific Flyway Nongame Technical Committee (NTC) to assess causes(s) of decline.	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.	Nighthawk
Assess future changes to species status.	Monitor population status.	Incorporate species into multitaxa monitoring program.	Olive-sided Flycatcher Common Nighthawk

Target: Mesic Lower Montane Conifer Forest

Selkirk Mountains © 2013 Michael Lucid

In the Okanogan Highlands, 30% of the land cover is classified as Mesic Lower Montane Forest. Within the Selkirk Mountains, this habitat group is located on the slopes, valley bottoms, ravines, canyons and benches with high soil moisture and cool summer temperatures. Elevation ranges from 532–1800 meters, with the lodgepole pine (Pinus contorta Douglas ex Loudon) woodlands found generally above 1800 meters and reaching elevations of 2255 meters. Commonly referred to as a cedar/hemlock forest, western hemlock (Tsuga heterophylla [Raf.] Sarg.) and western redcedar (*Thuja plicata* Donn ex D. Don) are common in the overstory with grand fir (*Abies grandis* [Douglas ex D. Don] Lindl.), Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco), Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), western white pine (*Pinus monticola* Douglas ex D. Don) and western larch (*Larix occidentalis* Nutt.) as frequent associates within the canopy (Cooper et al. 1991). Lodgepole pine also forms woodlands within this habitat group at the upper montane to subalpine areas that are drier and cooler (Crawford 2011). The understory is composed of short and tall shrubs, perennial graminoids, forbs, ferns and mosses, often at levels of in-stand diversity approaching or equal to the diversity found in some eastern deciduous forests (Reid 2013). In depressional areas with a high water table, Devil's club (*Oplopanax horridus* (Sm.) Miq.) is regularly encountered. Forests within this habitat group are often centuries old with fire only passing through every 500 years. The fire interval is long with stand replacing fires occurring 150–500 years and moderate fires 50–

100 years (Crawford 2011). Fire suppression has created mixed aged stands that form fuel ladders which make the forest more susceptible to high intensity and stand replacing fires. Disturbance in the form of insect, disease, windfall and ice generally produce canopy openings for the regeneration of forest types. Western white pine was once a predominant canopy species within this habitat group; however logging, fire and the introduction of the white pine blister rust (*Cronartium ribicola*) has decimated this species to below 90% of its historical prevalence (Cooper et al. 1991).

Target Viability

Fair. Substantial encroachment by other habitat types due to lack of natural fires cycle and loss of western white pine.

Prioritized Threats and Strategies for Mesic Lower Montane Conifer Forest

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

Altered fire regimes (fire suppression and stand replacing wildfires)

Historically, fires were as variable as the tree species in the forest stand, with an average mean interval of 200–250 years but some stands burning with a mean of 18 years (Smith and Fischer 1997). Stands with fire intervals shorter than 140 years were often dominated by western white pine, western larch, Douglas-fir and grand fir (Smith and Fischer 1997). However, decades of fire suppression activities aided by a cool period in the Pacific decadal oscillation were effective in preventing most moderate fires in the ecosystem while also preventing stand-replacing fires that often enable shade and fire-intolerant species to establish and heavy fuel loads to build (USDA Forest Service 2013[EIS_IPNF]). This resulted in the encroachment of shade-tolerant species into the habitat group as well as a decrease in fire-tolerant species, increased vertical stand structure, increased canopy closure, increased vertical fuel ladders, greater biomass, greater fire intensities and severities, and increased insect and disease epidemics (Keane et al. 2002). Fire management over the past 15 years has attempted to simulate and re-establish the vegetative composition of regular fire patterns but is hampered by the inability to allow natural fires to burn. Additionally, population increases in neighboring towns has increased the Wildland–Urban Interface (WUI) that often prevents the use of fire as a management tool.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USDA Forest Service 2013 [monitoring and evaluation program])	Use prescribed and natural fires to maintain desired conditions (USDA Forest Service, 2015) Encourage the use of prescribed fire on state, corporate and private lands	Lands within the WUI treated to reduce fuels through mechanical removal or controlled burns (USDA Forest Service 2015) Fire-killed trees are left standing, if pose no safety hazard, as wildlife habitat (USDA Forest Service 2015)	Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Silver-haired Bat, Little Brown Myotis
Simulate natural fire regimes	Design and implement silvicultural prescriptions that	Actively remove shade-tolerant species	Olive-sided Flycatcher,

Objective	Strategy	Action(s)	Target SGCNs
	simulate natural disturbance regimes		Common Nighthawk, Townsend's Big-eared Bat, Little Brown Myotis
Assess species response to changes in fire regimes.	Monitor species occurrence prior to and after fire events.	Incorporate species into multitaxa monitoring program.	Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Silver-haired Bat, Little Brown Myotis

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

Forest insects and disease epidemics

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

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk of stand-replacing pine beetle or root fungus infestations	Use integrative pest management strategies Increase diversity of stand ages, size classes and tree species (KPNZ Climate, 2010) Promote responsible firewood harvest/transport	Use pheromones to protect stands (beetle whispering) (Kegley and Gibson 2004) Thin stands to <= 60 basal area Remove debris that attracts pine beetles Cut out infected trees (mistletoe)(IDL 2015)	Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Silver-haired Bat, Little Brown Myotis

Objective	Strategy	Action(s)	Target SGCNs
Increase number of rust-resistant western white pine in the ecosystem (USDA Forest Service 2013)	Continue developing genetics of disease resistant trees Planting rust –resistant western white pine during restoration efforts.	Conserve and protect any old-growth western white pine on the landscape. Determine if rust-resistant. (Neuenschwander et al. 1999) Planting rust-resistant trees in openings that are also *Ribes*-free (Neuenschwander et al. 1999) Monitor and remove any signs of the rust on planted trees (USDA Forest Service 2013).	Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Little Brown Myotis
Assess changes in insect numbers over time.	Monitor insect populations and disease.	Incorporate insect and disease threats into a multitaxa monitoring program.	Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Silver-haired Bat, Little Brown Myotis

Unknown status or causes of decline

Multiple species identified as SGCN are declning as as result of unknown causes. The priority for many of these species in the coming years is to identify what is/are the root cause(s) of their apparent decline, and develop a strategy to address it.

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

Objective	Strategy	Action(s)	Target SGCNs
		impacts.	
Assess futures changes to species status.	Monitor population status.	Incorporate species into multitaxa monitoring program.	

Target: Subalpine–High Montane Conifer Forest

At the higher elevations within the Selkirk Mountains, the Subalpine–High Montane Conifer Forest is the prevalent habitat group. The Subalpine–High Montane Conifer Forest is predominately found at elevations between 900–2338 meters in the Selkirk Mountains. At the lower elevations within the habitat group where it is still warm enough to sustain, Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco), western larch (*Larix occidentalis* Nutt.), and western white pine (*Pinus monticola* Douglas ex D. Don) are found with Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), lodgepole pine (*Pinus contorta* Douglas ex Loudon) and subalpine fir (*Abies lasiocarpa* [Hook.] Nutt.) in the overstory. Thinleaf huckleberry (*Vaccinium membranaceum* Douglas ex Torr.) and grouse whortleberry (*Vaccinium scoparium* Leiberg ex Coville) are common species in the understory and provide important wildlife forage (Smith and Fischer 1997). Mountain hemlock (*Tsuga mertensiana* [Bong.] Carrière) is often a co-climax species in this habitat group; however like Subalpine larch, (*Larix lyallii* Parl.) it has a limited distribution in the Selkirk Mountains (Smith and Fischer 1997). Whitebark pine (*Pinus albicaulis* Engelm.) replaces lodgepole pine in higher elevations and becomes dominant as the elevation and climate severity increases. At timberline, the transition zone between continuous forest and the limited alpine, only Engelmann spruce, subalpine fir, subalpine larch and whitebark pine persist. The timberline zone is impacted by drying winds, heavy snow accumulation and subsurface rockiness that lead to stunted growth and a clustered distribution (Cooper et al. 1991, Smith and Fischer 1997). At timberline, whitebark pine is commonly the species that colonizes sites and provides habitat for less hardy species. Whitebark pine also provides food resources for numerous wildlife *species*, such as Grizzly Bear (*Ursus arctos*), Clark's Nutcracker (*Nucifraga columbiana*) and other small mammals and birds, in the form of large high caloric-value seeds (Fryer 2002). It is a long-lived and slow-growing species that is often overtopped by faster-growing, shade-tolerant species, such as subalpine fir and Engelmann spruce. Fire and other

Selkirk Mountains-Whitebark Pine © 2015 Michael Lucid

disturbances such as ice, windthrow, rockslides and landside help to maintain whitebark pine as the climax species within the upper elevations of the subalpine. However fire suppression, invasion of the white pine blister rust (*Cronartium ribicola*) and mountain pine beetle have all contributed to the recent precipitous declines of whitebark pine across its range (Smith and Fischer 1997, Fryer 2002).

Target Viability

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

Prioritized Threats and Strategies for Subalpine High Montane Conifer Forest

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

Altered fire regimes (fire suppression and stand replacing wildfires)

Historically, mixed severity fires burned between 60–300 years with nonlethal burns in the understory of whitebark pine stands at an average interval of 56 years (Smith and Fischer 1997). However tree regeneration in the upper elevation is dependent on soil moisture, temperature and whitebark pine seed cache and may be very slow in some areas. For example, the lack of whitebark pine regeneration after the Sundance Fire (a 56,000 acre wildfire that started in Sundance Mountain in Bonner County in 1967) is thought to be due to a lack of seed cache after mature trees were killed by mountain pine beetle or infected with blister rust (Smith and Fischer 1997). As with the other habitat types, decades of fire suppression activities aided by a cool period in the Pacific decadal oscillation were effective in preventing most moderate fires in the ecosystem while also preventing stand-replacing fires that often enable shade-intolerant species to establish (USDA Forest Service 2013[EIS_IPNF]). This resulted in the encroachment of shade-tolerant species into the habitat group as well as a decrease in fire-tolerant species, increased vertical stand structure, increased canopy closure, increased vertical fuel ladders, greater biomass, greater fire intensities and severities, and increased insect and disease epidemics (Keane et al. 2002). Fire management over the past 15 years has attempted to simulate and re-establish the vegetative composition of regular fire patterns but is hampered by the inability to allow natural fires to burn.

Objective	Strategy	Action(s)	Target SGCNs
Restore a natural fire interval that promotes historical forest conditions (USDA Forest Service 2013 [monitoring and evaluation program])	Use prescribed and natural fires to maintain desired conditions (USDA Forest Service, 2015) Encourage the use of prescribed fire on state, corporate and private lands	Fire-killed trees are left standing, if pose no safety hazard, as wildlife habitat (USDA Forest Service 2015)	Wolverine, Clark's Nutcracker, Mountain Goat, Hoary Marmot
Simulate natural fire regimes	Design and implement silvicultural prescriptions that simulate natural disturbance regimes	Actively remove shade-tolerant species	Wolverine, Clark's Nutcracker, Mountain Goat,

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

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

Climate planning and monitoring

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

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring	Monitor climate variables and species co-occurrence over time	Develop climate monitoring program using a variety of micro-climate variables along with co-occurrence of associated SGCN.	Wolverine, Clark's Nutcracker, Mountain Goat, Magnum Mantle Slug, Hoary Marmot
Implement other state management plans	Implement the Idaho Wolverine Conservation Plan (IDFG 2014)	Implement specific actions outlined in the climate section of the Idaho Wolverine Conservation Plan (IDFG 2014)	Wolverine, Clark's Nutcracker, Mountain Goat, Hoary Marmot

Forest insects and disease

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

Objective	Strategy	Action(s)	Target SGCNs
Reduce risk of stand-replacing pine beetle infestations	Use integrative pest management strategies Increase diversity of stand ages, size classes and tree species (KPNZ Climate, 2010) Promote responsible firewood harvest/transport	Use pheromones to protect stands (beetle whispering)(Kegley and Gibson 2004) Thin stands to <= 60 basal area Remove debris that attracts pine beetles Cut out infected trees (mistletoe) (IDL 2015)	Clark's Nutcracker, Grizzly Bear
Increase number of rust-resistant whitebark pine in the ecosystem (USDA Forest Service 2013)	Continue developing genetics of disease resistant trees Planting rust –resistant whitebark pine during restoration efforts.	Monitor rust and beetle levels in live whitebark pine. Collect rust-resistant seed for testing and restoration (Schwandt 2006) Planting rust-resistant trees in openings that are also *Ribes*-free (Neuenschwander et al. 1999) Monitor and remove any signs of the rust on planted trees (USDA Forest Service 2013).	Clark's Nutcracker, Grizzly Bear
Assess changes in insect numbers over time.	Monitor insect populations and disease.	Incorporate insect and disease threats into a multitaxa monitoring program.	Clark's Nutcracker, Grizzly Bear

Target: Terrestrial Cool Air Refugia

Global climate change is expected to have widespread effects on temperature and precipitation regimes worldwide and mean annual global air temperatures are predicted to rise within the 2 to 4.5 °C range by the end of the century (Meehl et al. 2007). Conditions in the Pacific Northwest are expected to trend toward hotter drier summers and warmer wetter winters (Karl et al. 2009). How wildlife populations will respond to these changes in localized areas is uncertain. While empirical data to evaluate even the basic climatic requirements for many species is sometimes available (Mawdsley 2009), it is generally lacking. Fortunately, the Okanogan Highlands has a substantial database on species co-occurrence with different micro-climate regimes (Lucid et al. 2015). This database provides information necessary to begin learning how to help cool air dependent species adapt to climate change. A clear understanding of local climatic landscapes and climatic requirements of wildlife species is the first step toward managing landscapes in such a way to reduce potential climatic stressors on wildlife species.

Target Viability

Fair. Climate change expected to reduce habitat.

Prioritized Threats and Strategies for Cool Air Refugia

High Threats for Cool Air Refugia in the Okanogan Highlands

Climate planning and monitoring

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

Objective	Strategy	Action(s)	Target SGCNs
Maintain cool air temperatures	Manage landscape for cool air temperatures	Conduct research to determine how to maintain cool temperatures at micro-sites. Manage timber harvest for cool current and future air temperatures.	Wolverine, Magnum Mantleslug, *Hemphillia* sp1, Pale Jumping Slug, Shiny Tightcoil, Hoary Marmot, Northern Bog Lemming, Grizzly Bear, Western Toad, Mountain Goat
Climate monitoring	Monitor climate variables and species co-occurrence over time	Develop climate monitoring program using a variety of micro-climate variables along with co-occurrence of associated SGCN.	Wolverine, Magnum Mantleslug, *Hemphillia* sp1, Pale Jumping Slug, Shiny Tightcoil, Hoary Marmot, Northern Bog Lemming, Grizzly Bear, Western Toad, Mountain Goat

Target: Riverine–Riparian Forest and Shrubland

In the Okanogan Highlands, the riverine ecosystem includes all rivers, streams, and smaller order waterways (1–3 order; Strahler stream order) and their associated floodplain and riparian vegetation. Major rivers (those designated as 4+ order in Strahler stream order) in the Okanogan Highlands includes the Kootenai, Pend Oreille and Priest Rivers. The Kootenai River is the only drainage in Idaho with a native Burbot (ling) population and is home to a genetically distinct population of White Sturgeon. Fisheries for both of these species were closed for conservation purposes in 1984 in response to major declines in these populations. Alteration of the natural flow regime, substrate, temperature, and nutrients are believed to be the primary reasons for the lack of successful reproduction of White Sturgeon and Burbot (IDFG, 2008). Other rivers and streams in the region support numerous fisheries and provide host habitat for several mussel species. High velocity mountain streams provide important nesting habitat for Harlequin Ducks. In the Okanogan Highlands there are numerous waterfalls documented for the region. Waterfalls support aquatic organisms uniquely adapted to extremely high water velocities and plants and animals that require cool, constantly moist rocky habitats. Waterfalls also provide important nesting habitat for Black Swift. While swifts are commonly detected within the Okanogan Highlands region, a nesting colony has not yet been discovered (Miller, 2013).

Upper Priest Falls © 2013 Michael Lucid

Target Viability

Fair. Kootenai River is subjected to sometimes very high to more often very low levels of nutrients that influence aquatic invertebrate load and thus fish. Changed seasonal flooding impacts important habitat for fish and aquatic invertebrates. Other rivers are influenced by changed hydrographic regime.

Prioritized Threats and Strategies for Riverine–Riparian Forest and Shrubland

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

Aquatic invasive invertebrate and plant species

Aquatic invasive species are often the hardest to detect and eradicate. Across the nation, Zebra and Quagga Mussels have disrupted food chains, competed with native species and cost millions of dollars of damage to municipalities by choking water intake pipes and other facilities

(Pimental et al. 2004). Although zebra and quagga mussels have not yet been detected in the water bodies of the Okanogan Highlands, several boat check stations in the region have found the mussels on boats traveling through the area (ISDA 2015 Road Side Inspection Stations, accessed on Nov 2, 2015). It is a goal of the state that neither mussel is ever established in any of the Idaho water ways. Other aquatic invasive species such as Eurasian watermilfoil (*Myriophyllum spicatum* L.), flowering rush (*Butomus umbellatus* L.) and curly pondweed (*Potamogeton crispus* L.) have been detected and established in the Kootenai and Pend Oreille Rivers (T. Woolf, pers. comm.). These species easily spread through the movement of boats between the recreational lakes, rivers and streams in the region. For most of the aquatic plant species, only a fragment of the vegetated matter is necessary to establish the species in a new area. Aquatic invasive plant species, particularly water milfoil, often form dense mats that prevent the establishment of native aquatic plant species and degrade wildlife and fish habitat (ID Invasive Species Counsel and ISDA 2007).

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

Invasive and noxious weeds

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

Objective	**Strategy**	**Action(s)**	**Target SGCNs**
Identify and eradicate any potential invasive species prior to establishment (USDA Forest Service 2013).	Increased monitoring for invasive and noxious weeds. Coordinate invasive and noxious weed treatment across agencies.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Utilize existing technology such as Global Positioning Systems (GPS), remote sensing and Geographic Information Systems (GIS) to efficiently collect, store, retrieve, and analyze and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012)	White Sturgeon, Burbot, Harlequin Duck
Contain and reduce widespread weeds in areas that are already infested (USDA Forest Service 2013).	Coordinate invasive and noxious weed treatment across agencies. Prevent spread of widespread weeds through the identification and treatment of dispersal vectors. Restoration of treated areas with native species.	Weed treatment of high impact areas/roads. (USDA Forest Service 2013) Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USDA Forest Service 2013, IDL 2015) Revegetate and monitor restoration areas with native species (KTOI 2009) Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012)	White Sturgeon, Burbot, Harlequin Duck
Monitor Threat	Monitor changes in range and distribution of noxious weed.	Incorporate noxious weeds into a multi-taxa monitoring program.	Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Little Brown Myotis

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

Population declines of Harlequin Duck

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

Objective	Strategy	Action(s)	Target SGCNs
Develop priority land management and recreation actions to benefit harlequin ducks.	Design research projects that improve understanding of the factors that influence occupancy, survival, and reproduction.	Mark and track individuals on the breeding grounds using telemetry (e.g., platform transmitter terminals (PTTs) or geolocators) to better understand habitat use, survival rates, causes and timing of mortality, patterns and timing of movements, linkages between breeding, molting, and wintering areas, and return rates. Seek partnerships with coastal states and provinces to study wintering ecology and habitat use. Investigate how stream flow characteristics (severity, timing, and frequency of peak and low stream flows) affect harlequin duck productivity and survival. Assess population implications under forecasted climate models. Investigate how human disturbance and changes in forest management affect behavior, occupancy, reproductive success, and survival.	Harlequin Duck
Implement a Harlequin Duck population monitoring program.	Develop partnerships, funding and capacity to conduct breeding surveys statewide on a regular basis.	Conduct spring pair surveys and summer brood surveys following the protocol established in the Harlequin Duck Conservation Assessment and Strategy for the US Rocky Mountains (Cassirer et al. 1996). Where local declines are apparent, expand surveys upstream of historically occupied stream reaches. Coordinate surveys with MT, WY, WA, OR, BC, AB to facilitate a northwest regional	Harlequin Duck

Objective	Strategy	Action(s)	Target SGCNs
		population assessment. Incorporate harlequin duck surveys into riverine multi-taxa monitoring programs	
Provide and protect high quality breeding habitat (nesting habitat, security cover, food) for harlequin duck on breeding streams.	Maintain and protect water quality, quantity, and natural flow regimes and riparian vegetation.	Introduce buffer zones along montane riparian habitats to maintain riparian structure and function, including snags and woody debris. Avoid siting projects (e.g., water diversions, dams, and hydropower developments, mining, road construction, clear-cut logging) on breeding streams and in the adjacent uplands that might alter runoff and water quality to sustain food supply, suitable foraging conditions, and continuous habitat during the breeding season. Manage grazing (length and timing of season, stock levels, location, development of water sources) to maintain stream bank stability and riparian vegetation (especially shrubs).	Harlequin Duck

Unknown status of Black Swift

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

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

Declines in beaver populations

Beaver populations currently exist at lower than historic levels across the western United States. This results is a host of ecological consequences. Beaver restoration efforts have been shown to be an effective tool to restoring habitat and ecological function to riverine systems.

Objective	Strategy	Action(s)	Target SGCNs
Determine current status of beaver populations.	Determine past and current status of beaver populations.	Conduct analysis to determine feasibility and potential mechanisms of beaver restoration. Implement actions delineated by above analysis.	Western Pearlshell, California Floater, Western Ridged

Objective	Strategy	Action(s)	Target SGCNs
			Mussel, Ephemerella alleni Olive-sided Flycatcher, Common Nighthawk, Townsend's Big-eared Bat, Little Brown Myotis

Target: Depressional Wetlands

Depressional wetlands are any wetlands found in a topographic depression. Depressional wetlands include vernal pools, old oxbows, disconnected river meanders and constructed wetlands. In the Okanogan Highlands, this includes many of the wetlands found within the Pend Oreille, McArthur Lake, and Boundary Creek WMAs, the Kootenai National Wildlife Refuge, and within the floodplains of the Kootenai, Upper Pack, and Pack Rivers. Other depressional wetlands are found within the Selkirk Mountains wherever the elevational lines close and surface waters accumulate. Small depressional ponds (less than 2 meters deep) commonly occur within the Selkirk Mountains and provide breeding habitat for Western Toads. Depressional wetlands often support emergent marsh or shrub swamps that are composed of broad-leaf cattail (*Typha latifolia* L.), panicled bulrush (*Scirpus microcarpus* J. Presl & C. Presl), creeping bentgrass (*Agrostis stolonifera* L.), rose spirea (*Spiraea douglasii* Hook.) and grey alder (*Alnus incana* [L.] Moench). In the valley bottoms, reed canarygrass (*Phalaris arundinacea* L) often forms impenetrable monocultures that limit species diversity within the wetlands (Cousins, personal comm.). Amphibians, waterbirds, marshbirds, and waterfowl all utilize depressional wetlands for breeding and foraging habitats.

Target Viability

Fair. Lower elevations experiencing altered hydrological regimes and invasive species/disease. Higher elevations threatened by climate change.

Prioritized Threats and Strategies for Depressional Wetlands

Very High Threats for Depressional Wetlands in the Okanogan Highlands

Invasive and noxious weeds

Invasive species often prevent the establishment of native species by forming dense monocultures and in some instances even change the soil chemistry or hydrology of the invaded area (Ricciardi et al. 2013). In plant surveys conducted in Boundary Creek WMA and Pend Oreille WMA, 93% and 83% of the study sites, respectively detected noxious weeds at varying densities (Cousins and Antonelli 2008 a,b). Additionally, in the Boundary Creek WMA, reed canarygrass (*Phalaris arundinacea* L.) was the dominant species found in 5 of the 17 marsh communities and it had doubled in coverage from previous surveys conducted in meadow communities (Cousins and Antonelli 2008). Reed canarygrass is a native species in the lower 48 but is considered a noxious weed in Washington and is thought to have hybridized with a nonnative invasive reed canarygrass (Lavergne and Molofsky 2007). Reed canarygrass forms dense monocultures that decreases plant diversity and degrades wildlife habitat. Additionally surveys done in the Okanogan Highlands, found 33 of the ponds, small lakes and emergent wetlands (n=176) surveyed had spotted knapweed or tansy present (Lucid et al. 2015).

Objective	**Strategy**	**Action(s)**	**Target SGCNs**
Identify and eradicate any potential invasive species prior to establishment (USDA Forest Service 2013).	Increased monitoring for invasive and noxious weeds. Coordinate invasive and noxious weed treatment across agencies.	Train agency staff to document presence/absence of noxious weeds during field/site visits. Develop a noxious weed database for all lands across Idaho. Utilize existing technology such as Global Positioning Systems (GPS), remote sensing and Geographic Information Systems (GIS) to efficiently collect, store, retrieve, and analyze and display noxious weed information (ISDA 1999). Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012)	Black Tern, American Bittern, Western Toad, Northern Leopard Frog, Silver-haired Bat, Townsend's Big-eared Bat, Little Brown Bat
Contain and reduce widespread weeds in areas that are already infested (USDA Forest Service 2013).	Coordinate invasive and noxious weed treatment across agencies. Prevent spread of widespread weeds through the identification and treatment of dispersal vectors. Restoration of treated areas with native species.	Continue annual noxious weed control program and coordinate weed management activities with Bonner County and the Selkirk Cooperative Weed Management Area. (Cousins and Antonelli 2008) Weed treatment of high impact areas/roads. (USDA Forest Service 2013) Treat equipment used during timber harvest or fire suppression activities to be "weed-free" (USDA Forest Service 2013, IDL 2015) Revegetate and monitor restoration areas with native species (KTOI 2009) Implement actions described in the 2012–2016 Idaho Invasive Species Strategic Plan (ISDA 2012)	Black Tern, American Bittern, Western Toad, Northern Leopard Frog, Silver-haired Bat, Townsend's Big-eared Bat, Little Brown Bat
Monitor Threat	Monitor changes in range and distribution of noxious	Incorporate noxious weeds into a multi-taxa monitoring	Black Tern, American

Objective	Strategy	Action(s)	Target SGCNs
	weed	program.	Bittern, Western Toad, Northern Leopard Frog, Silver-haired Bat, Townsend's Big-eared Bat, Little Brown Bat

High Threats for Depressional Wetlands in the Okanogan Highlands

Climate planning and monitoring

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

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

Unknown status or causes of decline

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

Objective	Strategy	Action(s)	Target SGCNs
Determine current distribution and abundance of American Bitterns	Participate in coordinated monitoring Identify hot spots for conservation	Conduct repeat surveys of effort initiated in early 2000s to determine where species distribution and density has changed.	American Bittern
Determine statewide breeding populations of Black Tern	Identify habitat requirements of breeding Black Tern	Conduct repeat surveys of targeted habitat for tern nesting.	Black Tern

Objective	Strategy	Action(s)	Target SGCNs
Assess futures changes to species status.	Monitor population status.	Incorporate species into multi-taxa monitoring program.	American Bittern, Black Tern, Western Toad, Northern Leopard Frog

Target: Springs and Groundwater-Dependent Wetlands

In the Okanogan Highlands, peatlands are one of the most conspicuous types of groundwater dependent wetlands with over 31 sites identified (Lichthardt, 2004) within the ecoregion. Peatlands are found on waterlogged soils with at least 30 cm peat accumulation and range from nutrient poor (poor fens) to nutrient rich (rich fens and palustrine forests) (Bursik and Mosely,). They often host a diversity of boreal plant species that are disjunct from their core range and species that are unique in their ability to persist in nutrient- and oxygen-poor soils (Lichthardt, 2004). Surveys for Northern Bog Lemming in Montana (Reichel and Corn, 1997) and Idaho (Groves, 1994) have found the species frequently in wetland habitats with a peat component. Cold-water springs and other groundwater dependent wetlands are also widespread within the Selkirk Mountains, particularly within the glaciated canyons and headwater streams. They often provide a cold-water refugium for invertebrate and vertebrate species (Issak et al. 2015).

Target Viability

Good.

Prioritized Threats and Strategies for Springs and Groundwater Dependent Wetlands

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

Invasive and noxious weeds

Invasive species often prevent the establishment of native species by forming dense monocultures and in some instances even change the soil chemistry or hydrology of the invaded area (Ricciardi et al. 2013). In plant surveys conducted in Boundary Creek WMA and Pend Oreille WMA, 52 and 54 of the 56 and 65 study sites, respectively detected noxious weeds at varying densities (Cousins and Antonelli 2008 a,b). Additionally, in the Boundary Creek WMA, reed

Smith Creek Peatland © 2014 Michael Lucid

canarygrass (*Phalaris arundinacea* L.) was the dominant species found in 5 of the 17 marsh communities and it had doubled in coverage from previous surveys conducted in meadow communities (Cousins and Antonelli 2008). Reed canarygrass is a native species in the lower 48 but is considered a noxious weed in Washington and is thought to have hybridized with a nonnative invasive reed canarygrass (Lavergne and Molofsky 2007). Reed canarygrass forms dense monocultures that decreases plant diversity and degrades wildlife habitat.

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

Objective	Strategy	Action(s)	Target SGCNs
Monitor Threat	Monitor changes in range and distribution of noxious weed	Incorporate noxious weeds into a multi-taxa monitoring program.	Western Toad, Northern Bog Lemming

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

Climate planning and monitoring

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

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

Target: Lake–nesting Birds

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

Target Viability

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

High Threats for Lake-nesting Birds in the Okanogan Highlands

Water level fluctuations in lakes

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

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

Unknown status or causes of decline

Two species identified as SGCN are declining as as result of unknown causes. The priority for these species in the coming years is to identify what is/are the root cause(s) of their apparent decline, and develop a strategy for addressing it.

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

Target: Ground-dwelling Invertebrates

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

Target Viability

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

Species designation, planning and monitoring

Basic knowledge of ecological requirements, habitat needs, systematics, and distribution is lacking for the majority of ground invertebrates. Spur throated grasshoppers are in need of basic taxonomic work. While substantial knowledge of terrestrial gastropod distribution and microclimate requirements was obtained during work conducted from 2010-2014 (Lucid et al. 2015), much work remains to be done gain an adequate understanding of basic conservation needs for these species. Four terrestrial gastropods are known to be associated with cooler than average mean annual air temperatures (Lucid et al. 2015). Managing micro-sites for these species for cool air temperatures and minimal disturbance is recommended until a better ecological understanding is developed through research and monitoring.

Objective	Strategy	Action(s)	Target SGCNs
Determine appropriate taxonomic status of species within the spur throated grasshopper group.	Investigate and validate taxonomic status.	Conduct field surveys to collect specimens. Conduct morphological and genetics work to determine species status.	Spur Throated Grasshopper Group.
Determine appropriate taxonomic status of sub-species within the Coeur d'Alene Oregonian species complex.	Investigate and validate taxonomic status.	Conduct field surveys to collect specimens. Conduct morphological and genetics work to determine species status.	Coeur d'Alene Oregonian
Confirmation and site protection	Implement actions to sites where Salmon Coil and Western Flat-whorl are known to occur.	Conduct genetics work to confirm taxonomic identity of specimens currently in possession of IDFG. Work with land owners or private landowners to minimized disturbance to sites.	Salmon Coil, Western Flat-whorl
Conduct research and habitat conservation activities for cool air temperature associated gastropods (Lucid et al. 2015).	Develop a better understanding of requirements for these species.	Conduct research to assess ecological requirements for these species. Manage forest structure near micro-sites to maintain cool air temperatures. Manage these sites for minimal disturbance. Implement long term monitoring of species and associated micro-climate and other habitat requirements. Coordinate with Washington, Montana, and British Columbia.	Magnum Mantleslug, Pale Jumping Slug, *Hemphillia* sp1, Shiny Tightcoil
Determine appropriate taxonomic status	Investigate and validate taxonomic status.	Conduct field surveys to collect specimens. Conduct morphological and genetics work to	Harvestman Species Group.

Objective	Strategy	Action(s)	Target SGCNs
of species within the harvestman species group.		determine species status.	

Target: Grizzly Bear

Grizzly Bears in this ecological section occupy the Selkirk Mountains ecosystem which is approximately 2,200 square miles in size distributed equally between the United States and Canada. The Selkirks currently contain at least 50–60 grizzly bears. Research has been conducted on the grizzly bear population since the early 1980s, primarily in the form of trapping and radiocollaring. More recently researchers have included camera trap and DNA collection to the research effort. Grizzlies typically den at high elevations in the Selkirks but move to lower elevations or south-facing slopes following den emergence, taking advantage of early spring green-up. As the season progresses bears move to higher elevations, relying on a variety of berries with the huckleberry (*Vaccinium* sp.) as the most important forage. Domestic livestock grazing is very limited in this ecological section and is not an important consideration in Grizzly Bear management. The population appears to be expanding both in size and distribution. Grizzly bears are currently listed by the US Fish and Wildlife Service as threatened but are warranted but precluded for uplisting in the Selkirks.

Target Viability

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

Prioritized Threats and Strategies for Grizzly Bears

High rated threats to Grizzly Bears in the Okanogan Highlands

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

Anthropogenic attractants

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

Objective	Strategy	Actions	Target SGCNs
Reduce human-caused mortalities to allow for population growth	Reduce anthropogenic attractants	Work with USFS on education and enforcement of food storage orders on USFS land	Grizzly Bear

Objective	Strategy	Actions	Target SGCNs
		Public education about consequences of feeding and habituating bears	

Roads

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

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

Genetic isolation

Genetic isolation of any small population is of long-term conservation concerns. Recent radio-telemetry and DNA data suggests that some interchange with adjacent grizzly bears populations is either occurring or possible; however, human populations continue to increase. Long-term conservation of grizzly bears must accommodate movement between adjacent ecosystems to insure genetic interchange.

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

Target: Pond-breeding Amphibians

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

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

Western toads have experienced range-wide declines in western North America. This species could be experiencing similar declines in the Okanogan Highlands but recent surveys indicate this species is more abundant in the section than other sections in the Idaho Panhandle (Lucid et al. 2015). This indicates the importance of maintaining quality conditions for this species in the Okanogan Highlands. Northern Leopard frogs are abundant across their range, but have experienced severe declines in portions of their range. Northern leopard frogs appear to be extirpated from the Okanogan Highlands (Lucid et al. 2015).

Target Viability

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

Prioritized Threats and Strategies for Pond-breeding Amphibians

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

Chytrid fungus and other disease

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

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

Extirpation of Northern Leopard Frogs

Extensive surveys indicate this species has been extirpated from the Okanogan Highlands (Lucid et al. 2015). The closest known colony of this species occurs at the Creston Wildlife Management Area in British Columbia. This population could potentially serve as a source population for human assisted reintroduction or natural re-colonization efforts. Nonnative bullfrogs occur on the U.S. side of the border but have not been detected on the British Columbia side. It is critically important to initiate immediate control and extirpation efforts on the most northern bullfrogs in Idaho to prevent their dispersal to the Creston Wildlife Management Area.

Objective	Strategy	Action(s)	Target SGCNs
Address Northern Leopard Frog Extirpation	Work with trans-boundary partners in Idaho, Washington and British Columbia	Conduct a literature review assessing potential recovery options including re-introduction and natural re-colonization for this species.	Northern Leopard Frog
Bullfrogs	Prevent bullfrog expansion to Creston Wildlife Management Area northern Leopard frog colony.	Work with partners to conduct bullfrog control and extirpation actions near the Canadian border. Coordinate efforts with British Columbia and Washington.	Northern Leopard Frog

Climate planning and monitoring

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

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring	Monitor climate variables and species and disease co-occurrence over time	Develop climate monitoring program using a variety of micro-climate variables along with co-occurrence of associated SGCN. Monitor chytrid fungus in relation to micro-climate variables.	Western Toad, Northern Leopard Frog

Target: Low Density Carnivores

Forest carnivores naturally occur at low densities and can be directly affected by human activities. This presents unique opportunities to directly affect positive conservation outcomes for these species. This group consists of mammals traditionally considered 'furbearers' including marten, weasels, and mink. Wolverine and fisher are the 2 forest carnivore SGCN which occur within the Okanogan Highlands. Extensive surveys of this section from 2010-2014 detected only one individual male of each species within this ecological section (Lucid et al. 2015). Conservation efforts in this section should focus on maintaining or improving ecosystem integrity conducive to the establishment of resident and reproductive wolverine and fisher. Research to determine reasons for recent declines in fisher numbers (Lucid et al. 2015) and developing and implementing conservation actions to address those issues should be a priority.

Target Viability

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

Prioritized Threats and Strategies for Low Density Carnivores

High rated threats to Low Density Carnivores in the Okanogan Highlands

Genetic isolation

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

Objective	Strategy	Action(s)	Target SGCNs
Monitor genetic isolation	Determine current levels of genetic isolation	Conduct genetic analyses to determine currently population sizes and levels of gene flow. Maintain trans-boundary collaborations to assess and monitor wolverine gene flow with Canadian populations.	Wolverine, Fisher
Assess and enhance gene flow	Manage connectivity habitat and assess potential to enhance gene flow.	Conduct analysis assessing apparent lack of fisher gene flow from Flathead Valley to Okanogan Highlands. Conduct analysis assessing reasons for recent declines in fisher numbers (Lucid et al 2015). Manage forested lowland habitat to maintain forested connectivity Improve additional lowland forest to increase connectivity Conduct analysis and literature review assessing potential recovery options including re-	Wolverine, Fisher

Objective	Strategy	Action(s)	Target SGCNs
		introduction and natural re-colonization.	

Winter recreation

The Idaho Wolverine Conservation plan (IDFG 2014) outlines specific actions to minimize potential disturbance of wolverine by oversnow recreation and ski area infrastructure.

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

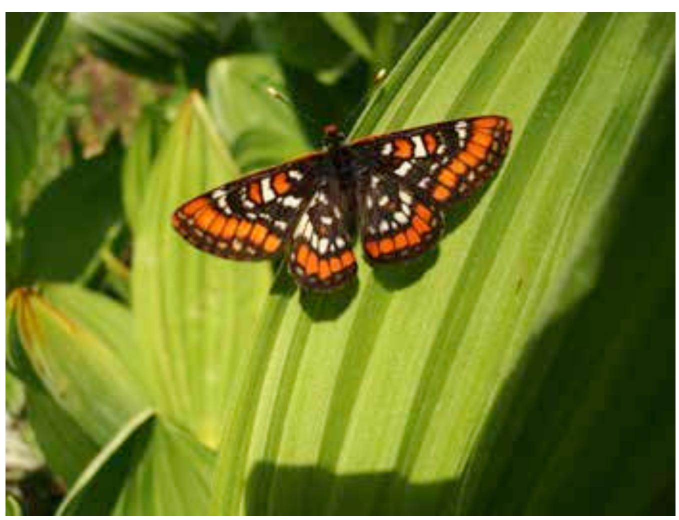
Climate planning and monitoring

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

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

Target: Pollinators

Pollinators provide an essential ecosystem service which benefits agricultural producers, agricultural consumers, and gardeners (Mader et al. 2011) in the Okanogan Highlands. A wide range of taxa includes birds, bats, and a wide array of insects provide pollination activities. Two butterflies (Gillette's Checkerspot and monarchs) and two bees (Western Bumble Bee and Suckley Cuckoo Bumble Bee) comprise the group of four SGCN pollinators which are known to occur within this ecological section.



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

Target Viability

Fair. Many pollinators declining range wide.

Prioritized Threats and Strategies for Pollinators

Very High rated threats to Pollinators in the Okanogan Highlands

Pesticides

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

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

Objective	Strategy	Action(s)	Target SGCNs
neonicotinoid insecticides (Hopwood et al. 2012).	measures on the detrimental effects of neonicotinoids on bees (Hopwood et al. 2012).	Distribute to municipalities, counties, agriculture producers, habitat managers, and other property owners (Hopwood et al. 2012). Do not employ the use of neonicotinoids on IDFG administered lands (Hopwood et al. 2012).	Bee, Suckley Cuckoo Bumble Bee

Habitat loss

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

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

Objective	Strategy	Action(s)	Target SGCNs
		Convert majority of lawn at Coeur d'Alene IDFG regional office to pollinator habitat. Work with municipalities and businesses to create urban pollinator habitat. Provide bee nest boxes for purchase at the Coeur d; Alene IDFG regional office.	

High rated threats to Pollinators in the Okanogan Highlands

Climate planning and monitoring

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

Objective	Strategy	Action(s)	Target SGCNs
Climate monitoring	Monitor climate variables and species co-occurrence over time	Develop climate monitoring program using a variety of micro-climate variables along with co-occurrence of associated SGCN.	Western Bumble Bee, Suckley Cuckoo Bumble, Gillette's Checkerspot

Species designation, planning and monitoring

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

Objective	Strategy	Action(s)	Target SGCNs
Determine pollinator population status	Conduct surveys and implement long term pollinator monitoring program.	Conduct surveys to identify colonies and breeding locations of bee SGCN. Conduct specific surveys for Gillette's Checkerspot. Protect known breeding sites.	Western Bumble Bee, Suckley Cuckoo Bumble, Gillette's Checkerspot, Monarch

Okanogan Highlands Section Team

An initial summary version of the Okanogan Highlands Ecological Section project plan was completed for the 2005 Idaho State Wildlife Action Plan. A small working group developed an initial draft of the Section Plan (Miradi v 0.13 which was then reviewed by a much wider group of stakeholders at a 2-day meeting held at the Idaho Department of Fish and Game in February 2015 (this input captured in Miradi v 0.14). This draft was then subsequently cleaned up and polished. Materials in this document are based on Miradi v. 0.19. Individuals and organizations/agencies involved in this plan are shown in Table 1.3.

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

First name	Last name	Affiliation
Rita	Dixon*	Idaho Department of Fish and Game (IDFG), HQ rita.dixon@idfg.idaho.gov / 208 287 2735
Michael	Lucid*	Idaho Department of Fish and Game, Coeur d' Alene Office michael.lucid@idfg.idaho.gov, 208 830-1451
Cristy	Garris	Foundations of Success (FOS)
Shannon	Ehlers*	Idaho Department of Fish and Game (IDFG)
Jim	Fredericks	Idaho Department of Fish and Game (IDFG)
Chris	Murphy	Idaho Department of Fish and Game (IDFG)
Wayne	Wakkinen	Idaho Department of Fish and Game (IDFG)
Laura	Wolf	Idaho Department of Fish and Game (IDFG)
Patrick E "Pat"	Seymour	Idaho Department of Lands (IDL)
Charles R. "Chuck"	Peterson	Idaho State University
Kathleen	Fulmer	US Fish and Wildlife Service (USFWS), Northern Idaho Field Office
Lydia	Allen	US Forest Service Northern Region (R1), Idaho Panhandle National Forests

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

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(IDL 2015) Based on conversations Rita Dixon had with IDL. I could find no publication in IDL's literature to back it all up.

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