Environment and Climate Change Canada

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Kootenay Connect: Bonanza Corridor and Slocan River Valley Focal Areas

Species at Risk

Years 1 to 7 (2019–2026)

Kootenay Connect Priority Places is a project facilitated by the Kootenay Conservation Program

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KOOTENAY CONNECT

SLOCAN LAKE STEWARDSHIP SOCIETY

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TABLE OF CONTENTS

List of Tables

List of Appendices

1. INTRODUCTION

This guide provides an introduction to most of the species at risk (SAR) that are known to occur in the Slocan Watershed, with a focus on the more obscure and understudied species. It is based on the collective knowledge of local biologists who have been studying the watershed for decades, and a concentrated effort over the last seven years of this Canadian Nature Fund project to collect and summarize all the known SAR records. This initial guide is intended to be a living document to build upon, share and provide guidance to all communities, residents, tenure holders and stewardship groups. Key components (when available for a given species) of this initial guide include how to locate and identify, description of habitat, and how impacts from development, and other disturbances can be potentially mitigated.

A species at risk in Canada "means an extirpated, endangered or threatened species or a species of special concern" (*Species at Risk Act*, 2002[1]). Legal protection for species and their habitats in Canada is enacted through the *Species at Risk Act* (SARA) based on research and recommendations from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), which assigns status rankings according to the following criteria:

- Extinct (X) = A species that no longer exists.
- Extirpated (XT) = A species that no longer exists in the wild in Canada but occurs elsewhere.
- Endangered (E) = A species facing imminent extirpation or extinction.
- Threatened (T) = A species that is likely to become endangered if limiting factors are not reversed.
- Special Concern (SC) = A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events.
- Not at Risk (NAR) = A species that has been evaluated and found to be not at risk.
- Data Deficient (DD) = A species for which there is insufficient scientific information to support status designation.

In British Columbia, the BC Conservation Data Centre (CDC) designates conservation status rankings for species and ecosystems in BC according to NatureServe[2] criteria at the subnational (S) level based on the following criteria:

- X = Extirpated or extinct
- H = Historical
- S1 = Critically imperiled

[1] Species at Risk Act (2002). https://laws.justice.gc.ca/eng/acts/S-15.3/
[2] NatureServe (2022). https://explorer.natureserve.org/AboutTheData/DataTypes/ConservationStatusCategories

- S2 = Imperiled
- S3 = Vulnerable
- S4 = Apparently secure
- S5 = Secure
- ? = Unranked
- U = Unrankable

Conservation ranks are assed on a continual basis using a combination of expert reviews and occurrence data (including incorporation of citizen science such as iNaturalist and eBird) to determine if populations are changing, if new threats to individuals or habitat are known, and any taxonomic changes. Each year, normally in the spring, the CDC releases updates to the BC list of flora and fauna, as well as any changes to conservation ranks.

Legal protection for SAR in BC is enacted through the BC *Wildlife Act* (1996[3]) and the BC *Forest and Range Practices Act* (FRPA; 2002[4]). Various forms of protection are given to species or ecosystems that are designated as Red- or Blue-listed:

- Red: any native species or ecological communities that are candidates for Extirpated, Endangered, or Threatened status in British Columbia. Extirpated species no longer exist in the wild in British Columbia but do occur elsewhere. Endangered species and ecological communities are those facing imminent extirpation or extinction. Threatened species and ecological communities are those likely to become endangered if limiting factors are not reversed.
- Blue: any native species or ecological community considered to be of Special Concern in British Columbia. Species or ecological communities of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events.
- Yellow: species or ecological communities that are apparently secure and not at risk of extinction. Yellow listed species may have Red- or Blue-listed subspecies.

Identified Wildlife are species at risk and regionally important wildlife that are designated as needing special protection under the *Forest and Range Practices Act*. Species at risk includes endangered, threatened, or vulnerable species of vertebrates, invertebrates, plants, and plant communities. Regionally important wildlife include species that are considered important to a region of BC, rely on habitats that are not otherwise protected under the *Forest and Range Practices Act*, and are vulnerable to forest and range impacts. Identified Wildlife are managed through wildlife habitat areas, objectives for wildlife habitat areas, and implementation of general wildlife measures, or through other management practices described in strategic or landscape level plans. Wildlife habitat areas are mapped areas that require

[3] Wildlife Act (1996). https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/96488_01
[4] Forest and Range Practices Act (2002). https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/00_02069_01

special management. General wildlife measures describe management practices that must be implemented within approved wildlife habitat areas or other spatially defined areas.

In the Kootenay Boundary region, a Wildlife Habitat Features Order was created under the *Forest and Range Practices Act* in 2016 that prohibits physical damage or alterations that result in the loss of biological or ecological function for specific species and features. The list of Wildlife Habitat Features covered by this order includes:

- a nest of a Bald Eagle, Osprey, Flammulated Owl, Western Screech-Owl *macfarlanei* subspecies, Great Blue Heron, Lewis's Woodpecker, and Williamson's Sapsucker
- an American Badger burrow
- a Grizzly Bear den
- a significant mineral lick
- a significant wallow
- a bat hibernaculum or bat nursery roost
- a hot spring or thermal spring

Additional information can be found in the Wildlife Habitat Features Field Guide (Kootenay Boundary Region) at: https://www2.A.bc.ca/assets/gov/environment/natural-resource-policy-legislation/legislation-regulation/frpa-pac/wildlife-habitat-features/whf_field_guide_kootenay_boundary.pdf

2. BIODIVERSITY OF THE SLOCAN WATERSHED

The Slocan Watershed encompasses 343,099 hectares (ha) including Slocan River, Slocan Lake, and numerous large drainages such as Little Slocan River, Lemon Creek, Wilson Creek, Bonanza Creek, Enterprise Creek, and Silverton Creek, as well as Little Slocan Lakes, Summit Lake and Wilson Lake. The Slocan Watershed is located within the territories of the Sinixt, Syilx Okanagan, Ktunaxa and Secwépemc. The southern boundary starts at the Kootenay River at the community of Shoreacres in and extends to the north end of Summit Lake and includes numerous incorporated and small communities including Crescent Valley, Passmore, Winlaw, Slocan, Silverton, New Denver and Roseberry.

Private land covers 16,410 ha and is largely limited to the valley bottom areas along Slocan River and Slocan Lake, with minimal mid to elevation lots. Forestry (current and historical) occurs throughout the watershed, with large tenure holders including Interfor, Kalesnikoff, and BC Timber Sales, as well as community forests and private woodlots. Commercial recreation is another significant land use, with several heliskiing and cat skiing operations as well as back country lodges.

The Slocan Watershed contains 19 biogeoclimatic (BGC) units, with 12 in the Engelmann Spruce -- Subalpine Fir (ESSF) zone, six in the Interior Cedar – Hemlock (ICH) zone, and one in the Interior Mountain-heather Alpine (IMA) zone. The lower slope and valley bottoms are occupied by the ICH zone which transitions into the ESSF zone at higher elevations, normally around 1,300 m, and then gradually transitions through parkland forests into the IMA above 2,200 m. The diversity of BGC units in this landscape is reflective of the variable topography and its location within the broad regional transition between the moist climate subregion associated with the South and Central Selkirk Mountains and the Wet climate subregion of the Northern Monashee and Selkirk Mountains. The varied terrain and climate results in a high diversity of ecosystem types that are present, including alpine environments, avalanche paths, dry rocky outcrops, floodplains, old-growth forests, and wetlands.

The ICH is a transitional zone between coastal and interior climate conditions. The dominant tree species are western redcedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*), but a variety of coniferous and deciduous trees species are present including Douglas-fir (*Pseudotsuga menziesii*) and western larch (*Larix occidentalis*). Early seral stands and sites in drier areas can contain trembling aspen (*Populus tremuloides*), lodgepole pine (*Pinus contorta*), and paper birch (*Betula papyrifera*). Valley bottoms, especially along the Slocan and Little Slocan Rivers where there is no development, are dominated by black cottonwood (*Populus trichocarpa*) floodplain systems.

At higher elevations, approximately 1,300 m, where winters are longer and snowpacks are deeper than the ICH, the ESSF is represented by tree species tolerant of heavy snowfall such as Engelmann spruce (*Picea engelmanni*) and subalpine fir (*Abies lasiocarpa*). The IMA occupies the alpine zone (above the treeline at approximately 2,200 to 2,300 m) where site conditions restrict all but the hardiest of plant species tolerant of extreme weather conditions and very short growing season, low-growing dwarf plants, herbs, and lichens dominant the landscape interspersed with exposed weathered bedrock and patches of year-round snow.

The large variability of terrain, climate and topography within the watershed, especially from south to north, results in diverse habitat and therefore species diversity. Since 2016 local biologists have actively worked to inventory the biodiversity of the watershed, with a focus on SAR. To date, over 4,000 taxa from over 50,000 records have been recorded, with 145 SAR (Table 2-1; Appendix A), and numerous species that are first records for BC, Canada or North America. Data was collected for the project through extensive field surveys, reviews of existing reports from other projects, and data mining citizen science and global databases including iNaturalist and the Global Biodiversity Information Facility (GBIF). Additional taxa were included in the list from data collected by the principal investigators over the years for various projects, and from their personal herbarium voucher records. Other datasets that were sourced included the SWAMP project (Durand 2016), Slocan Lake Stewardship Society Fennell Creek BioBlitz (Slocan Lake Stewardship Society 2023), benthic macroinvertebrate data provided by Darcie Quamme for sites sampled in the Slocan Valley (Quamme et al., 2021), the BC CDC database, and HabitatWizard (Province of British Columbia 2023).

The datasets were combined in a spreadsheet and filtered to produce a list of all unique taxa identified to the level of genus documented in the watershed, however the list is not exhaustive as new species are regularly found, and documented species identification and taxonomy changes. Observations were linked to the data source with geospatial and temporal information where available and grouped by taxonomic category. Nomenclature was revised in some cases where different taxonomies were followed to be consistent with the BC CDC (BC CDC 2026).

Table 2-1. Summary of Species at Risk in the Slocan Watershed

Species Group	Number
Amphibian	2
Arachnid	1
Bird	34
Bryophyte	9
Fish	6
Fungus	36
Insect	28
Lichen	1
Mammal	8
Mollusc	7
Protozan	3
Reptile	3
Vascular Plant	8
Total	**145**

3. HOW TO USE THIS RESOURCE

This initial guide covers a range of SAR that are known to occur in the Slocan Watershed; however, fish and most birds are not included. For fungi, insects and slime moulds, the species descriptions are limited or absent, as there are limited data on these species in the watershed, or the current BC CDC conservation ranks are considered to be preliminary and likely to change in the near future.

Inventory and assessment methods are important to maintain the integrity of SAR data and information. For projects that involve the identification of SAR, impact assessments, and specific management recommendations, the work should be completed by a Registered Professional Biologist as per the BC *Professional Governance Act*. For some species or groups in this guide, specific field surveys have been included. In general, surveys for the majority of the SAR in the watershed are most appropriate during the spring to fall season. Field surveys during the late fall to early spring (November to March) are unlikely to detect many of the SAR. In order to properly survey a given area for the presence of SAR, it is essential that proper research is completed as to the appropriate time and way to survey for the species, and the surveyor has the correct experience.

Most of the species that are covered by this guide have limited information available regarding management options, including protection and conservation. Protection of a species' habitat (or reproductive structure or area) is required for most species that either do not move (plants, fungi, etc.) or have very small home ranges (molluscs, reptile, etc.), including adjacent habitat that ensure habitat conditions remain stable. For most species, moisture, shade, and exposure are critical to their survival, as well as intact physical structures such as snags, woody debris, soil, and underground mycorrhizal connections. Hydrological connections are critically important to ensure moist and wet habitat types remain stable, with changes to drainage and adjacent tree cover potentially altering downstream habitat. In general, we recommend a minimum 50 m buffer be placed around any SAR to ensure that habitat remains intact and viable for a given species, with the actual distance dependent on the species' habitat requirements and site conditions.

4. SPECIES DESCRIPTIONS

4.1 AMPHIBIANS

The Slocan Watershed contains five species of amphibians, including two SAR. Aside from the Coeur d'Alene Salamander (*Plethodon idahoensis*), amphibians are generally abundant throughout the watershed including Western Toad (*Anaxyrus boreas*), Long-toed Salamander (*Ambystoma macrodactylum*), Pacific Treefrogs (*Pseudacris regilla*) also known as the Pacific Chorus Frog, and Columbia Spotted Frog (*Rana luteiventris*).

Left: Pacific Chorus Frog. Right: Columbia Spotted Frog. Photos: Ryan Durand.

Pacific Chorus Frog eggs (left) Columbia Spotted Frog eggs (right). Photos: Ryan Durand.

Coeur d'Alene Salamander (*Plethodon idahoensis*)

Conservation Status: Blue (S3?), COSEWIC/SARA Special Concern, FRPA Identified Wildlife

Coeur d'Alene Salamander (Plethodon idahoensis). Photos: Amber Peters.

Long-toed Salamander eggs (left), tadpole (middle), and adult (right). Photos: Ryan Durand.

Cour d'Alene Salamanders are small amphibians that are only known from the Snk'mip (Bonanza) Marsh at the north end of Slocan Lake. Adults have distinctive long slender dark bodies with long yellow to red dorsal stripes that have uneven edges, a yellow throat patch, and have fairly short legs with slightly webbed toes. Long-toed Salamanders are easy to tell apart from the Cour d'Alene, based their occurrence in a wide variety of habitat, including wetlands, moist to dry forests, and rocky shores, often patchy yellow dorsal stripe, and a long forth toe on each back foot.

They occur near seepages, wet talus (normally beside streams or waterfall spay zones), and stream edges and less often in wet leaf litter and under bark or logs (BC CDC 1996). While few studies have been completed, they typically move less than 50-100 meters in a growing season.

Adults are most often observed in the spring and fall, or during wet periods, and as a largely nocturnal species, are rarely observed during day unless their habitat is disturbed. They hibernate underground, from about November to March, emerging in the during moist periods in the spring and fall, and are known to spend up to seven months underground. Reproduction occurs above ground, and eggs are assumed to be laid underground in the spring, with their young emerging in the fall.

Western Toad (*Anaxyrus boreas*)

Conservation Status: Yellow (S4), COSEWIC/SARA Special Concern

Western toad (Anaxyrus boreas). Photos: Ryan Durand.

Western Toad eggs. Photo: Jesse Victor.[5]

Western Toad tadpoles. Photos: Ryan Durand.

[5] iNaturalist observation by Jesse Victor. https://inaturalist.ca/observations/11994362

Western Toads are the only toad that occurs in the Slocan Watershed. They are frequently seen in or near wetlands, lakes and ponds, and adjacent forests. Wester Toads grow up to 15 cm long, with females larger than males. They range in colour from green to brown, have prominent large warts, and have a light stripe running down their back.

Western Toads use both aquatic and terrestrial environments, with reproduction occurring communally in aquatic areas, ranging from permanent water bodies (such as Summit Lake), wetlands, and even ephemeral wet areas such as ditches. Eggs are laid in long strings in the water, with tadpoles hatching in 3-14 days, and juvenile toads developing within 4-12 weeks depending on water temperature[6]. Juvenile toads often migrate in mass from water to adjacent terrestrial areas. Adults spend most of their time foraging in forests and other terrestrial sites, often ranging several kilometers from breeding sites, then returning to the same location to breed again. They shelter to maintain moisture in small cavities or burrows and often dig burrows over one meter deep to hibernate.

[6] https://bcreptilesandamphibians.ca/western-toad/

4.2 BIRDS

Over 230 species of birds have been documented in the Slocan Watershed, including 34 SAR. The focus of the seven species selected in this guide are those that are strongly associated with low elevation cottonwood floodplains, rivers and wetlands, as those habitats are sensitive to disturbance, and as they are largely privately owned, there is a higher chance they may be inevitably modified without the formal surveys that are done on most larger development projects.


Left: Tundra Swan (Cygnus columbianus), Right: Trumpeter Swan (Cygnus buccinator). Photos: Ryan Durand


Left: Goshawk (Astur atricapillus ssp. atricapillus), Right: Evening Grosbeak (Coccothraustes vespertinus). Photos: Ryan Durand.

Bank Swallow (*Riparia riparia*)

Conservation Status: Yellow (S4?B), COSEWIC/SARA Threatened

Bank Swallow (Riparia riparia). Photo: Alan Burger[7].

Bank Swallow are migrants that are found throughout BC during their breeding season, from April (arrival) to mid-August (Davidson et al., 2015; Rousseu and Drolet 2015). This species is closely associated with lowland riparian habitat, where colonies of bank swallow will establish closely clustered nests in eroding banks that are found along large rivers, streams, and lakes (Garrison and Turner 2020).

Using their conical beak, feet, and wings, bank swallows excavate burrows in the upper third of these vertical riparian embankments where the soil is sufficiently soft for digging but still contains enough cohesive material to avoid immediate collapse. Burrows are visually apparent and are, on average, 90 cm deep, 6 cm high, and 7 cm wide (Garrison and Turner 2020). Colonial nest sites also tend to be near favourable forage sites for aerial insects, such as lakes, pond, streams, meadows, fields, pastures, and bogs. Bank Swallow will reuse colonial nesting sites in consecutive years unless a significant nest mortality event occurs, or the embankment disappears from natural erosion (Garrison and Turner 2020). Bank Swallow will also opportunistically use human-constructed features for nesting, such as sand and gravel quarries and road cut banks.

Bank Swallow are active during the day and are best identified by sight or sound during the peak breeding period (May – early August). Excavated burrow entrances can be easy to observe due to their location along large, open riparian embankments and due to the aggregation of swallows that occur at these sites during breeding. Automated recording units can be unobtrusive methods for detecting Bank Swallow that are moving through an area due to their unique songs and calls.

[7] iNaturalist observation by Alan Burger. https://inaturalist.ca/observations/169857264

Bank Swallow is Yellow-listed in BC but is designated as Threatened under Schedule 1 of SARA (BC CDC 2026) due to consistent population declines. The primary threats to Bank Swallow are currently unclear but may be associated with declines in aerial insect prey populations influenced by anthropogenic ecosystem modifications and climate change (ECCC 2022). Bank Swallows tend to demonstrate a higher tolerance for human activity; however, colonial nest sites can be at risk of destruction and degradation when these sites overlap with industrial activities (e.g., sand and gravel quarries).

Under SARA, the residence of Bank Swallow is protected from damage and destruction on all lands (i.e., provincial, federal, private) and is defined as the occupied burrow (i.e, nest). The occupied borrow "is considered a residence from the date when adults are first seen entering or leaving the burrow to the date when a bird is last seen at the burrow" (Government of Canada 2019a).

Identification and mapping of SARA Critical Habitat for Bank Swallow is actively ongoing and includes locations that support colony nest sites and surrounding forage habitat (ECCC 2022). Anthropogenic features (e.g., sand and gravel quarries) are currently excluded as Critical Habitat features (ECCC 2022); however, burrows in anthropogenic features are still protected from disturbance and destruction under the MBCA and SARA when actively occupied by a bird or egg. To prevent Bank Swallow nesting where industrial activities are actively occurring, material piles should be contoured to a slope of less than 70 degrees before any swallows arrive on site in April (Government of Canada 2021). Installation of scaring devices (e.g., auditory deterrents) can be a contravention of the MBCA and should be completely avoided, unless done in consultation with Professional Biologists and regulators.

Bank Swallow nests. Photo: Ryan Durand.

Barn Swallow (*Hirundo rustica*)

Conservation Status: Yellow (S4B), COSEWIC Special Concern, SARA Threatened

Adult Barn Swallow and Barn Swallow nest. Photos: Ryan Durand.

Barn swallow are migrants that found throughout BC during their breeding season from April (arrival) to late August (Davidson et al. 2015; Rousseu and Drolet 2015), with some actively breeding birds having been observed as late as early September in BC. Barn Swallow are often found in open areas foraging on aerial insects, such as fields, meadows, and wetlands (Brown and Brown 2020) but can be highly versatile in where they select nest sites if suitable structures can be found. Historically, Barn Swallow nested in rock caves, crevices, and hollow trees (Brown and Brown 2020); however, this species now exclusively relies on anthropogenic features to build their nests. Barn Swallow construct mud nests on vertical walls that are sheltered underneath a horizontal overhang, such as rafters and beams of buildings, under eaves, vertical walls, and under bridges. Nests can be solitary or as part of larger colonies, especially at favourable sites capable of supporting many birds (e.g., bridges), and near riparian shorelines where mud can be collected for nest construction. Old, intact nests may be reused in consecutive years and can serve as visual indicators of territory quality by Barn Swallow investigating new sites for breeding (Brown and Brown 2020).

Barn Swallows are active during the day and are best identified by sight or sound during the peak breeding period (May – late August). Nests and breeding activity can be easy to observe due to their preference for nesting on anthropogenic structures that often occur in close proximity to human activity. Automated recording units can be an unobtrusive method of detecting Barn Swallow that are moving through an area due to their unique songs and calls.

Barn Swallow is Yellow-listed in BC but is designated as Threatened under Schedule 1 of SARA (BC CDC 2026) due to significant population declines since the 1980's (COSEWIC 2021). Like the Bank Swallow, threats to Barn Swallow are not well understood but are suspected to be linked to declining insect prey from external anthropogenic pressures and climate change (COSEWIC 2021).

Under SARA, the residence of a Barn Swallow is protected from damage and destruction on all lands (i.e., provincial, federal, private) and is defined as the nest from "May 1st or the date when adults are first seen building or occupying the nest, whichever is earlier, to August 31st or the date when a bird is last seen at the nest, whichever is later" (Government of Canada 2019b). This definition protects newly constructed

nests, but also preserves old, intact nests during the breeding period so that these nests can be opportunistically reused by Barn Swallow returning to the region. Due to their reliance on anthropogenic buildings and structures, Barn Swallows have been shown to benefit from enhancement projects that involve the installation of artificial nesting structures.

Barn swallow nests are often at risk from disturbances where they occur in locations that are perceived to be inconvenient, or where industrial activities occur (e.g., on bridge sites during construction initiatives). Disturbance and removal of nests should only occur outside of the window where the nest is legally defined as a residence. Installation of scaring devices (e.g., auditory deterrents) can be a contravention of the MBCA and should be completely avoided, unless done in consultation with Professional Biologists and regulators.

Common Nighthawk (*Chordeiles minor*)

Conservation Status: Blue (S3S5B), COSEWIC/SARA Special Concern

Common Nighthawk. Photo: Braden Judson[8]

Common Nighthawk chicks. Photo: Ryan Durand.

[8] iNaturalist observation by Braden Judson. https://inaturalist.ca/observations/309632641

Common Nighthawk occur in low densities throughout BC during their breeding period from May to August (Davidson et al., 2015; Rousseu and Drolet 2015). This species will nest in rural and urban areas which historically included flat gravel roofs back when this was a more common method of construction (Brigham et al., 2020). Natural nest sites are located on the ground in open areas such as coastal sand dunes, beaches, logged or slashburned forests, cleared transmission right-of-way clearings, sagebrush and grassland habitat, open forests, and rock outcrops (Brigham et al. 2020). Female nighthawks and young rely on their cryptic plumage to blend into their surroundings during the active nest period, while male nighthawks will roost in trees of open forest stands or on roads (Brigham et al., 2020). Common Nighthawk feed primarily on flying insects found over open water, wetlands, fields, and forest canopies (Brigham et al., 2020).

Common Nighthawks are most active at dawn and dusk during the peak breeding period (May – August), when they can be heard vocalizing (referred to as a “peent” call) during aerial foraging and travel. The males will also produce sounds, referred to as booms, when conducting territorial displays that involve diving through the air. For those reasons, acoustic recording units can be an effective and unobtrusive method for detecting nighthawks in an area.

Common Nighthawk is Blue-listed in BC and designated as Special Concern under Schedule 1 of SARA (BC CDC 2026) due to declines in the population since the 1970’s (COSEWIC 2018). However, tracking population trends in this species has been challenging to their low-density occurrences and cryptic behaviour. There are concerns that the rate of recovery for this species might be limited by their strong reliance on declining aerial insect populations, low annual productivity (two young maximum), and a limited breeding window coupled with a long migration (COSEWIC 2018). Mortalities from vehicle collisions have also been documented due to the Common Nighthawk’s attraction to gravel roads for nesting and roosting (COSEWIC 2018; Brigham et al., 2020).

Great Blue Heron, *herodias* subspecies (*Ardea herodias herodias*)

Conservation Status: Blue (S3?), Identified Wildlife under FRPA

Gret Blue Heron. Photo: Ryan Durand.

Great Blue Heron (*Herodias* subspecies) widely occurs in the southern interior regions of BC and includes both migratory and non-migratory populations; although migratory behaviour is more common for this interior subspecies (Davidson et al., 2015; Vennesland and Butler 2020). The breeding period for Great Blue Heron occurs from March until late August (Rousseu and Drolet 2015), during which time adults will commonly occupy wetlands, water courses of all sizes, pastures, and cultivated fields for foraging (Vennesland and Butler 2020). Nest sites can occur in trees, bushes, on the ground, and on artificial structures; however, nests are more commonly found in trees up to 30 m or more above the ground. Nests are primarily built from sticks and are frequently maintained and reused in consecutive years unless disturbed (Vennesland and Butler 2020). Single pairs will periodically raise young in a solitary nest; however, Great Blue Heron are more likely to nest in colonies (Vennesland and Butler 2020).

Great Blue Heron are more likely to be detected in the region during the peak breeding period between March and August when migrants return. Nest colonies can be visually apparent due to the number and size (0.5 – 1.2 m wide) of stick nests that can occur in a single, or small cluster of, trees, at a location (Vennesland and Butler 2020). Great Blue Heron can be over a meter in size and easy to observe when they are patiently standing in wait for prey at the edge of shallow riparian areas.

Great Blue Heron nests. Photo: saintaardvark[9] (left) and Derek Armstrong[10] (right).

Great Blue Heron (*Herodias* subspecies) is Blue-listed in BC and is designated as Identified Wildlife that requires management during forest and range activities authorized under FRPA (BC CDC 2026). A Great Blue Heron nest is also protected as a Wildlife Habitat Feature under FRPA for the Kootenay Boundary Region, which is associated with specific management provisions for forest licensees and agreement holders (MECCS 2018). Threats to Great Blue Heron in BC include the loss of breeding and foraging habitat from urban development, forestry, and hydroelectric power development (MWLAP 2004a).

Great Blue Heron nests are protected year-round regardless of occupancy under Section 34 of the BC *Wildlife Act* and under Schedule 1 of the Migratory Bird Regulations (MBR), in accordance with the MBCA. As per the MBR, Great Blue Heron nests are protected year-round unless they can be confirmed as abandoned for a period of 24 months (ECCC 2023). The waiting period begins after the suspected abandoned nest has been reported through the Abandoned Nest Registry and is only formally designated as abandoned if a Great Blue Heron, or any other bird protected under the MBCA, does not use the nest for the entire duration of the 24-month period (ECCC 2023).

[9] iNaturalist observation by saintaardvark. https://inaturalist.ca/observations/265604833
[10] iNaturalist observation by Derek Armstrong. https://inaturalist.ca/observations/118766816

Killdeer (*Charadrius vociferus*)

Conservation Status: Blue (S3S5B)

Left: Killdeer. Photo: Ryan Durand. Right: Killdeer nest and eggs. Photo: Tim Pirk[11].

Killdeer are considered medium-distance, partial migrants that are primarily found throughout BC during the breeding season from late March to late July (Davidson et al., 2015; Rousseu and Drolet 2015). Killdeer prefer open areas for breeding, such as sandbars, mudflats, heavily grazed pastures, and human modified areas including golf courses, gravel pads, broken-asphalt parking lots, graveled road shoulders, and cultivated fields (Jackson and Jackson 2020). Nest sites are comprised of shallow scrapes on the ground and are often challenging to see due to the cryptic colouration of eggs and nestlings.

Killdeer are active during the day and best identified through sight and sound during the peak breeding period (March – July). During the nesting period, Killdeer parents will perform antipredator displays to perceived predators that are too close to the nest or young. These displays can include approaching the perceived predator (e.g., human) and feigning a broken wing, pretending to brood or incubate at a site where there are no eggs or nestlings, or performing an ungulate display that involves rushing towards the predator while loudly screaming (Jackson and Jackson 2020).

Killdeer are currently Blue-listed in BC due to recent population declines (BC CDC 2026; Burger 2015). Due to this species' attraction to human-modified environments for nesting, Killdeer are also vulnerable to anthropogenic disturbance, such as road mortality, habitat modification during industrial activities, and environmental contaminants (Jackson and Jackson 2020).

[11] iNaturalist observation by Tim Pirk. https://inaturalist.ca/observations/59417989

Lewis's Woodpecker (*Melanerpes lewis*)

Conservation Status: Blue (S2S3B), COSEWIC/SARA Threatened, Identified Wildlife under FRPA

Lewis Woodpecker. Photos: Michael Caparas[12] (left) Ryan Durand (Right).

In BC, Lewis's Woodpecker is a migrant with a breeding range that is limited to the low-elevation habitats of south-central and southern interior portions of the province and is considered a rare occurrence in the west Kootenay region (ECCC 2017). Breeding distribution is closely associated with Ponderosa pine forests that can provide large trees at advanced decay stages suitable for cavity excavation (ECCC 2017; Vierling et al. 2020). Lewis's Woodpecker nests in tree cavities and typically rely on existing excavated nest holes or natural cavities (ECCC 2017; Vierling et al., 2020). Although Lewis's Woodpecker can excavate its own cavities in highly decayed wood, it lacks the skull structure typical of other primary cavity excavators to proficiently execute excavation (Goodge 1972 in ECCC 2017). Lewis's Woodpecker will often reuse the same nest cavities in consecutive years, likely due to the limited availability of these features on the landscape. Nest distributions can be close together and nest sites are sometimes considered semi-colonial (Vierling et al., 2013 in ECCC 2017). A complex understory layer comprised of berry-producing shrubs, grass, or herbaceous cover that supports prey abundance has been determined as important forage habitat characteristics for this species (ECCC 2017; Vierling et al., 2020).

[12] iNaturalist observation by Michael Caparas. https://inaturalist.ca/observations/283676504

The breeding period offers the highest potential for detecting this species, which occurs from May to late August; however, pre-migratory flocks may remain in BC until late September (ECCC 2026). Acoustic recording units that are selectively installed in preferred habitat can be an unobtrusive method of detecting Lewis's Woodpecker calls during the breeding season.

Lewis's Woodpecker is Blue-listed in BC and is designated as Identified Wildlife that requires management during forest and range activities authorized under FRPA (BC CDC 2026). A Lewis's Woodpecker nest is also protected as a Wildlife Habitat Feature under FRPA for the Kootenay Boundary Region, which is associated with specific management provisions for forest licensees and agreement holders (MECCS 2018).

This species is also designated as Threatened under SARA due to ongoing population declines (ECCC 2017). The primary threats to this species are attributed to habitat loss and degradation from timber harvest, urban development, fire suppression, and riparian flooding due to hydroelectric development (ECCC 2017; ECCC 2026). Critical Habitat as defined under SARA has been identified for the Lewis's Woodpecker and includes known nest trees that have been recently or historically used, potential nest sites based on tree attributes, and foraging areas within 400 m of a known or potential nest tree (ECCC 2017).

Western Screech-owl, *macfarlanei* subspecies (*Megascops kennicottii macfarlanei*)

Conservation Status: Blue (S3), COSEWIC/SARA Threatened, Identified Wildlife under FRPA

Western Screech-owl, macfarlanei subspecies. Photo: Andrew Thomas[13].

The Western Screech-Owl (*Macfarlanei* subspecies) occupies a limited range in south-central BC year-round, where it is associated with low elevation riparian habitat, deciduous forests, and in some cases wooded urban areas (MOE 2008). The Western Screech-Owl uses existing tree cavities for nesting in habitat characterized by black cottonwood (*Populus trichocarpa*), water birch (*Betula occidentalis*), trembling aspen (*Populus tremuloides*), and a moderate to dense understory of shrubs (MOE 2008; Cannings et al., 2020). Trees that support nesting generally have a diameter at breast height (dbh) that is larger than 25 cm with cavity openings greater than 7.5 cm in diameter (Cannings et al., 2020; MECCS 2018).

Western Screech-Owl is most active at night during the breeding season, which typically occurs between March – late August in the region (MECCS 2018). Acoustic recording units are an unobtrusive method of detecting owls by recording their unique calls. Although Western Screech-Owl species will respond to call playback surveys, which were historically conducted for population inventories, call playback surveys can be disruptive and should be avoided unless working in consultation with a professional biologist and regulators.

[13] iNaturalist observation by Andrew Thomas. https://inaturalist.ca/observations/220743464

Western Screech-Owl (*Macfarlanei subspecies*) is Blue-listed in BC and is designated as Identified Wildlife that requires management during forest and range activities authorized under FRPA (BC CDC 2026). A Western Screech-Owl nest is also protected as a Wildlife Habitat Feature under FRPA for the Kootenay Boundary Region, which is associated with specific management provisions for forest licensees and agreement holders (MECCS 2018).

Western Screech-Owl is also designated as Threatened under Schedule 1 of SARA (BC CDC 2026) due to its small population size and the ongoing risk of loss of habitat for this species, particularly the loss of large diameter trees required for nesting and roosting (MOE 2008).

4.3 FUNGI

Fungi are one of the most diverse kingdoms of life on earth with an estimated 2-3 million species globally, more than 90% of which remain unknown to science[14]. They occupy every conceivable habitat, yet for the most part remain unseen except for those that produce often ephemeral spore-bearing structures such as the mushrooms, conks, and truffles we are familiar with. This makes them difficult to survey and most species cannot be positively identified without the aid of microscopes and specialized knowledge, and even then, genetic sampling is now increasingly challenging our former species concepts.

Unsurprisingly, the diverse landscape of the Slocan Valley is rich in fungal diversity. Fungi account for about 20% of the total number of species documented to date, and about one quarter of the total number of SAR. Given the challenges with making proper identifications and the rate of taxonomic revisions, we expect these numbers and status rankings to change. Without robust survey data, the best approach for conservation is to protect all known locations where fungal SAR occur from any form of human-caused disturbance, particularly those dependent on intact ecosystems that are themselves at risk. Managing for rare and at-risk fungi is fundamentally about protecting their habitats and understanding their life requisites and nutritional modes, which can be broadly categorized as saprobic (decomposers), mycorrhizal (tree symbionts), or parasitic (dependent on a living host).

The conservation ranks of many of the fungi listed below are preliminary and expected to change during future CDC assessments. Several of the species listed as SAR are commonly found in the Slocan Watershed, including species such as white chanterelle (*Cantharellus subalbidus*) which is a locally abundant and a highly sought edible species.

[14] Niskanen, T., et al. (2023). Pushing the frontiers of biodiversity research: Unveiling the global diversity, distribution and conservation of fungi. Annual Review of Environment and Resources. DOI: https://doi.org//10.1146/annurev-environ-112621-090937

Saprobic Species

Arrhenia epichysium

Conservation Status: Blue (S2S3)

Arrhenia epichysium. Photos: Elora Adamson[15].

Arrhenia lobata

Conservation Status: Blue (S2S3)

Arrhenia lobata. Photo: Tyson Ehlers.

[15] iNaturalist observation by Elora Adamson. https://www.inaturalist.ca/observations/100644355

Baeospora myriadophylla

Conservation status: Blue (S2S4)

Baeospora myriadophylla. Photo: Tyson Ehlers.

Bjerkandera adusta

Conservation status: Blue (S2S4)

Bjerkandera adusta growing on Populus. Photo: Tyson Ehlers.

Mycorrhizal Species

Boletopsis grisea

Conservation Status: Blue (S3)

Boletopsis grisea . Photo: Tyson Ehlers.

Cantharellus roseocanus

Conservation Status: Blue (S2S3)

Cantharellus roseocanus. Photo: Tyson Ehlers.

Cantharellus subalbidus

Conservation Status: Blue (S3)

Cantharellus subalbidus. Photo: Tyson Ehlers.

Turbinellus floccosus

Conservation Status: Blue (S3)

Turbinellus floccosus. Photo: Ryan Durand.

Turbinellus kauffmanii

Conservation Status: Blue (S2S3)

Turbinellus kauffmanii (Tentative ID). Photo: Leann Stacy.[16]

[16] iNaturalist observation by Leann Stacy https://www.inaturalist.ca/observations/319485174

Parasitic Species

Armillaria nabsnona

Conservation Status: Blue (S2S4)

Armillaria nabsnona. Photo: Alan Rockefeller[17].

Armillaria nabsnona was first confirmed in the Kootenays in 2020 from two collections, including one made near the village of Slocan. The specimens were confirmed through DNA analysis and considerably extended the previous distribution range of this species to the eastern part of the province. Both records from the Kootenays stem from basidiocarps growing in soil, and they were not associated with damage to living plants which is in accordance with previous knowledge (Morrison 2004; Volk et al., 1996).

[17] iNaturalist observation by Alan Rockefeller. https://www.inaturalist.ca/observations/67416356

Asterophora lycoperdoides

Conservation Status: Blue (S3)

Asterophora lycoperdoides growing on decaying Russula sp. Photos: Tyson Ehlers.

Cerioporus varius

Conservation Status: Blue (S3)

Cerioporus varius. Photo: Tyson Ehlers.

Cheilymenia fimicola

Conservation Status: Blue (S2S4)


Cheilymenia fimicola. Photos: Tyson Ehlers.

Chlorociboria aeruginosa

Conservation Status: Blue (S3)

Chlorociboria aeruginosa (tentative ID). Photo: Tyson Ehlers.

Chrysomphalina chrysophylla

Conservation Status: Blue (S3)

Chrysomphalina chrysophylla. Photo: Tyson Ehlers.

Ciboria rufofusca

Conservation Status: Blue (S2S4)

Ciboria rufofusca. Photo: Tyson Ehlers.

Climacocystis borealis

Conservation Status: Blue (S2S4)

Climacocystis borealis. Photo: Tyson Ehlers.

Clitocybe albirhiza

Conservation status: Blue (S3)

Clitocybe albirhiza. Photo: Tyson Ehlers.

Deconica angustispora

Conservation status: Blue (S2S4)

Deconica angustispora. Photo: Tyson Ehlers.

Geastrum quadrifidum

Conservation status: Blue (S2S4)

Geastrum quadrifidum. Photo: Tyson Ehlers.

Geastrum saccatum

Conservation status: Blue (S3)

Geastrum saccatum. Photo: Tyson Ehlers.

Geopyxis carbonaria

Conservation status: Blue (S3)

Geopyxis carbonaria. Photo: Adrian Leslie[18]*.*

[18] iNaturalist observation by Adrian Leslie. https://www.inaturalist.ca/observations/280419749

Gliophorus psittacinus

Conservation status: Blue (S3)

Gliophorus psittacinus. Photo: Tyson Ehlers.

Gomphus clavatus

Conservation status: Blue (S3)

Gomphus clavatus. Photo: Tyson Ehlers.

Neolentinus lepideus

Conservation status: Blue (S3)

Neolentinus lepideus. Photo: Tyson Ehlers.

Neournula pouchetii

Conservation status: Blue (S2S3)

Neournula pouchetii. Photo: Tyson Ehlers

Peziza varia

Conservation status: Blue (S3)

Peziza varia (tentative ID). Photo: Tyson Ehlers.

Phaeotremella foliacea

Conservation status: Blue (S2S4)

Phaeotremella foliacea. Photo: Elora Adamson[19].

[19] iNaturalist observation by Elora Adamson. https://www.inaturalist.ca/observations/193227525

Phellodon melaleucus

Conservation status: Blue (S3)

Phellodon melaleucus. Photos: Tyson Ehlers.

Phellodon tomentosus

Conservation status: Blue (S3)

Phellodon tomentosus. Photos: Tyson Ehlers.

Ramaria marrii

Conservation status: Blue (S3)

Ramaria marrii (tentative ID). Photo: Tyson Ehlers.

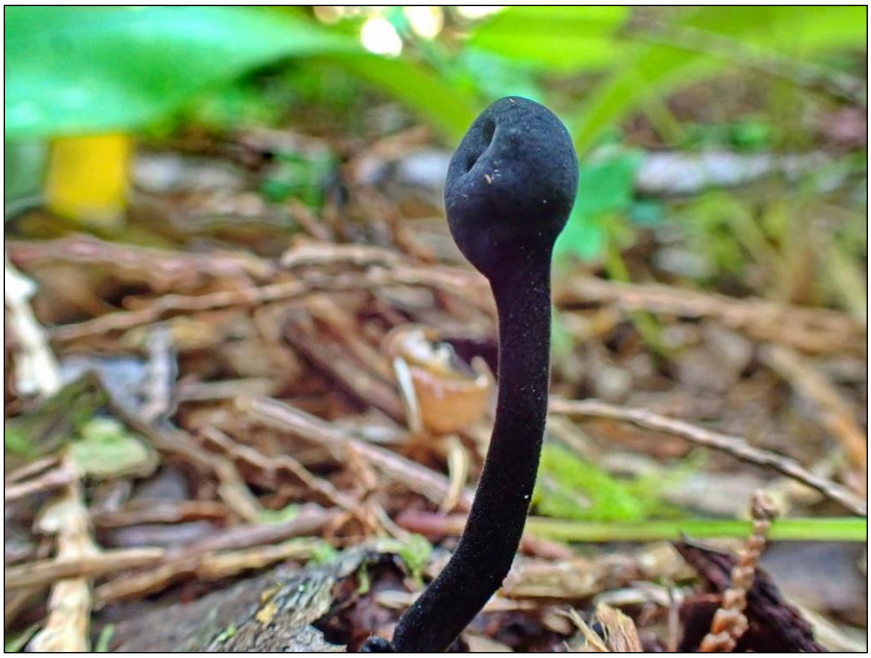
Trametes hirsuta

Conservation status: Blue (S2S4)

Trametes hirsute. Photos: Tyson Ehlers.

Trichoglossum hirsutum

Conservation status: Blue (S2S3)



Trichoglossum hirsutum. Photo: Tyson Ehlers.

Tricholomopsis decora

Conservation status: Blue (S2S4)

Tricholomopsis decora. Photo: Tyson Ehlers.

4.4 Insects – Bees and Wasps

Fernald's Cuckoo Bumblebee (*Bombus flavidus*)

Conservation Status: Blue (S3S4)

Fernald's Cuckoo Bumblebee. Photos: John Reynolds[20].

Fernald's Cuckoo Bumblebee is a social parasite (BC CDC 2013). They have lost the ability to collect pollen and to rear their brood, so they enter the nests of other bumble bee species, kill or subdue the queen of that colony, and forces the workers to rear their offspring through aggression and pheromones. Known hosts include species of the subgenus *Pyrobombus,* as well as *B. rufocinctus*, *B. occidentalis*, and *B. appositus*, which mostly all nest underground. Fernald's Cuckoo Bumblebee can be found in subalpine and low alpine habitats.

[20] iNaturalist observations by John Reynolds. https://inaturalist.ca/observations/316222915 and https://inaturalist.ca/observations/308436439

Horn-faced Leaf-cutter Bee (*Megachile fidelis*)

Conservation Status. Not Reviewed (S3)

Horn-faced Leaf-cutter Bee. Photos: Jakob Dulisse[21].

Little information is available on this species. It is able to persist in semi-natural habitats surrounded by intensely modified landscapes (BC CDC n.d-b).

[21] iNaturalist observation by Jakob Dulisse. https://www.inaturalist.ca/observations/308092111 and https://www.inaturalist.ca/observations/311119713

Megachile angelarum

Conservation Status. Not Reviewed (S3)

Megachile angelarum. Photo: Jakob Dulisse[22]*.*

Megachile angelarum is a species of solitary leaf cutter bee. Females are 10-11 mm in length and can be recognized by the combination of the parallel sided metasoma, mandibles which lack cutting edges, and the complete apical white fasciae on their first to fifth abdominal segments (Sheffield et al., 2011). Males are 9-10 mm in length and be recognized by the combination of three visible metasomal sterna, having 9-10 punctures between lateral ocelli and edge of vertex, the conspicuous front coxal spine, and having very short and erect dark hairs on their 4th and 5th abdominal segments (Sheffield et al., 2011). They nest in cavities, stems, twigs, and wood. They are able to persist in semi-natural habitats surrounded by intensely modified landscapes (BC CDC n.d-a).

[22] iNaturalist observation by Jakob Dulisse. https://inaturalist.ca/observations/303855674

Nomada edwardsii

Conservation Status. Not Reviewed (S3)

Nomada edwardsii. Photo: Jakob Dulisse[23]*.*

Little information is available on this species. The *Nomada* genus is a known cleptoparasite of bees in the *Andrena* genus (BC CDC n.d-c).

[23] iNaturalist observation by Jakob Dulisse. https://inaturalist.ca/observations/217185658

A Potter Wasp (*Eumenes verticalis*)

Conservation Status. Not Reviewed (S3)

Eumenes verticalis. Photos: Tyson Ehlers.

A Potter Wasp (*Symmorphus canadensis*)

Conservation Status. Not Reviewed (S3)

Symmorphus canadensis. Photo: Jakob Dulisse[24].

[24] iNaturalist observation by Jakob Dulisse. https://inaturalist.ca/observations/229774971

Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)

Conservation Status: Blue (S3S4), COSEWIC Threatened

Suckley's Cuckoo Bumble Bee. Photo: coryss[25].

Like other cuckoo bumblebees, this species has lost the ability to collect pollen and to rear their brood. They enter the nests of other bumble bee species, kill or subdue the queen of that colony, and forces the workers to rear their offspring. Its known breeding host is the Western Bumblebee (*Bombus occidentalis occidentalis)*, but it has also been recorded in colonies of other *Bombus* species (BC CDC n.d-d). Females measure 15–25 mm in length (COSEWIC 2019). The outer surface of the hind tibia (i.e. flattened segment of hind leg) is convex, with dense hair covering the surface. They lack corbicula, the shiny and hairless pollen basket of nest-building species. The hair on the face and top of the head is typically all black, occasionally with some yellow hairs at the posterior top of the head. The hairs on the sides of the thorax are yellow. The hair on the anterior surface of thorax is yellow and varies from yellow to black on the remaining dorsal surface. The first two abdominal segments have black hair, the 3rd to 5th abdominal segments are laterally variable yellowish white, but usually white at least posteriorly in the middle of the 4th segment.

Males measure 15–22 mm in length (COSEWIC 2019). The hair of the hind basitarsus posterior fringe is predominantly black. The first abdominal segments are largely yellow, sometimes black hair intermixed laterally, especially on the 2nd segment. The 3rd, 5th, and 6th segments are primarily yellow with black

[25] iNaturalist observation by coryss. https://inaturalist.ca/observations/265501165

hairs present medially. The 4th segment is primarily yellow. The 7th segment is entirely black. Proper identification of males may require examination of genitalia structures.

These bees live in the same habitat as their host species. The adult food plants of this species include asters, *Chrysothamnus, Cirsium*, and *Solidago* (BC CDC n.d-d). Specific overwintering habitat requirements for Suckley's Cuckoo Bumble Bee are unknown, but like other bumble bees, mated females overwinter in the ground, in mulch or other decomposing vegetation, and in rotting logs near nesting sites (COSEWIC 2019).

Their range has declined by an estimated 16%. The decline of Suckley's Cuckoo Bumble Bee is linked to the declines of its host species, including the Western Bumblebee.

Western Bumble Bee (*Bombus occidentalis*)

Conservation Status: Yellow (S4), COSEWIC/SARA Threatened

Western Bumble Bee. Photo: Leanne Cleaveley[26]

Queens and workers differ in size (queen length 1.6-1.9 cm, worker length 1.1-1.3 cm; COSEWIC 2014a). The head is entirely black, and the malar space is short. All individuals have a transverse band of yellow hair anterior to the wing bases. Their abdominal colouration is variable, ranging from all black on the first four segments to individuals having the third and sometimes part of the second segment with yellow. Most individuals have white or rarely yellowish hairs on the apical terga. Males are similar in appearance to females, with variability in colour pattern. They have an intermediate body size of 1-2 cm in length (COSEWIC 2014a). Male-specific colouring includes the pale-yellow hairs intermixed with black hairs on the face.

The Western Bumblebee is found in Southern BC a range of habitats, including mixed woodlands, farmlands, urban areas, montane meadows (BC CDC n.d-e). They feed on plants from the *Ceanothus, Centaurea, Chrysothamnus, Cirsium, Geranium, Grindellia, Lupinus, Melilotu, Monardella, Rubus, Solidago*, and *Trifolium* genera (BC CDC n.d-e). They nest in abandoned rodent burrows, grassy hummocks, rotted logs or openings in dead wood (COSEWIC 2014a). Queens typically emerge from April to May (COSEWIC 2014a).

[26] iNaturalist observation by Leanne Cleaveley. https://inaturalist.ca/observations/305947245

The Western Bumble Bee was formerly one of the most common bumble bees in western North America, but their range has declined by an estimated 14% (BC CDC n.d-e). Large-scale urban development and agriculture have led to cumulative habitat quality decline. Minimal surveys or bumble bee collection events have occurred in central BC. There are no federal or provincial laws that protect Western Bumble Bee, mitigate threats, or protect the species' nest sites or habitat (COSEWIC 2014a). They have several natural predators and parasites, including Fernald's Cuckoo Bumblebee and Suckley's Cuckoo Bumble Bee.

4.5 Insects - Dragonflies and Damselflies

Dragonflies differ from damselflies in that their eyes are closer together and the base of their hindwings are broader than their forewings. In addition, their wings are held wide open (flat or angled downwards). Dragonflies are larger and heavier bodied than the generally smaller, and more slender damselflies. Damselflies can also be identified by their wide heads and separated eyes. Their wings are often held together over their abdomens (Cannings 2002).

There are four listed dragonfly species and one listed damselfly species documented in the Slocan Valley.

Common Green Darner (*Anax junius*)

Conservation Status: Blue (S3)

Common Green Darner. Photo: Steve Ansell[27].

The common green darner is one of the few North American dragonflies that migrates (B.C. CDC 2009) and is therefore most common in the spring and fall. It is one of BC's largest dragonflies with a wingspan of almost 12 cm and an average body length of 75 mm (Cannings 2002). Mature males tend to have a dark dorsal stripe with blue lateral stripes, and mature females tend to have rusty brown to purple abdomens (B.C.CDC 2009).

This species tends to occupy warm low elevation marshes and ponds (Cannings 2002). It is observed during much of the growing season, with its flight period in BC ranging between late April to early October (Cannings 2002). Drought, draining, and pollution are common threats to their habitat (BC CDC 2023b).

[27] iNaturalist observation by Steve Ansell. https://inaturalist.ca/observations/148661449

Lance-tipped Darner (*Aeshna constricta*)

Conservation Status: Blue (S3)

Lance-tipped Darner. Photo: Janice Arndt[28].

Members of the genus *Aeshna* are large dragonflies that can often be distinguished by the shape of the stripes on their thorax. Facial colour and markings can also be telling of species. In males, the shapes of their appendages at the tip of the abdomen (used to clasp females while mating) are also important identifying features. Abdominal spots on males are often blue, and the abdominal spots on females can vary between yellow, green, and blue (Cannings 2002).

The lance-tipped darner has an average body length of 71 mm (for males) and 69 mm (for females). Thorax stripes are often yellow-green gradating to blue and may be all yellow in some females. Females also have unusually large ovipositors and appendages. The male's appendages are flattened (Cannings 2002). This species tends to occupy small ponds and open marshes that are warm, nutrient-rich, and dominated by cattails and bulrushes (Cannings 2002). Flight period in BC ranges from early July to mid-October (Cannings 2002).

Their preferred habitat tends to dry up in the summer and are susceptible to drought and climate warming. The ephemeral nature of these wetlands makes them particularly vulnerable to their destruction for development and their vulnerability may be exacerbated due to drier summers. However, the adaptation to temporary ponds may assist in their resilience as climate warms (Cannings pers. comm. 2015 in BC CDC 2023a).

[28] iNaturalist observation by Janie Arndt. https://inaturalist.ca/observations/142970495

Sinuous Snaketail (*Ophiogomphus occidentis*)

Conservation Status: Blue (S3)

Sinuous Snaketail. Photo: Tyson Ehlers

Snaketails in the family of Clubtails (Family Gomphidae) are identified by widely separated eyes (compare with darners). The tip of the abdomen in males is enlarged. Mature adults have a green thorax, and their abdomens have yellow spots on top and white or yellow markings on the sides. The sinuous snaketail has a yellow-green face with a noticeable brown stripe in front of the forewing base. The brown stripe is divided by a wavy pale line. The pale snaketail (*Ophiogomphus severus*) is also found in the kootenays, however, the front of the forewing base has a prominent oval spot (Cannings 2002).

This species tends to occupy low elevation sandy lake shores and sunny stream banks (Cannings 2002). Their flight period in BC ranges between early June to early October (Cannings 2002).

Due to this species' preference for sandy lake shores, they are threatened by developments associated with recreation. Potential threats also include drought, flooding, sedimentation as a result of logging and road building, and damming of waterways (BC CDC 2023d).

Twelve-spotted Skimmer (*Libellula pulchella*)

Conservation Status: Blue (S3)

Twelve-spotted Skimmer. Photo: Jakob Dulisse[29].

Twelve-spotted skimmers have dark patches at the tip, middle, and base of each wing. Mature males have white patches in between each of the dark patches and a white patch in the basal area of the hind wing. This species can be confused with the eight-spotted skimmer which lacks dark wing tips. Females have no white patches on their wings and can be confused with female common whitetail (*Libellula lydia*). However, the female twelve-spotted skimmer is larger with narrower, and more continuous yellow abdominal stripes. The average body length is 51 mm for males and 48 mm for females (Cannings 2002).

This species occupies exposed, nutrient rich marshy ponds and lakeshores, particularly on alkaline soils (Cannings 2002). The flight period in BC ranges from late May to mid-September (Cannings 2002).

The habitat of this species is susceptible to droughts, pesticide contamination, salts and sedimentation due to developments, logging, and fires, introduced species and drainage. Most of their habitat has been drained and filled within the last century (BC CDC 2023c; Cannings 2002).

[29] iNaturalist observation by Jakob Dulisse. https://inaturalist.ca/observations/315925462

Vivid Dancer (*Argia vivida*)

Conservation Status: Blue (S3) COSEWIC/SARA Special Concern

Vivid Dancer. Photo: Tyson Ehlers.

Vivid Dancer. Photo: Jakob Dulisse[30].

Damselflies in the genus *Argia* are the largest pond damselflies in BC. *Argia* look similar to bluets (genus *Coenagrion* or *Enallagma*) but can be distinguished by a short black stripe on the side of the thorax as well as isolated black marks along the abdomen. The top of the thorax of the vivid dancer has a black stripe that is as wide (at least) compared to its adjacent pale stripes. Their average body length is 34 mm (for

[30] iNaturalist observation by Jakob Dulisse. https://inaturalist.ca/observations/170851921

males) and 35 mm (for females). Males are bright blue in coloration and females tend to be brown or blue (Cannings 2002).

This species is associated with cool or hot springs (Cannings 2002) and flight periods in BC ranges between early May to mid-October (Cannings 2002).

The habitat of this species is prone to loss and degradation. Hot springs draw in development and their scattered habitats such as spring-fed streamlets are vulnerable to pollution and trampling by cattle. Thermal springs are also used commercially and noncommercially (by recreationalists) thereby altering habitat characteristics such as temperature and discharge which can also be affected by road construction, droughts, landslides, and seismic activities. Introduced fish are also considered a threat to this species (COSEWIC 2015).

4.6 Insects - Butterflies and Moths

Evergestis subterminalis

Conservation Status: Blue (S3S4)

Evergestis subterminalis[31]*. Photo: Dick Cannings.*

Evergestis subterminalis has dark grey forewings that are crossed by narrow black angled antemedian and postmedian lines (Anweiler 2007). The median area bordering the lower part of the postmedian line is bordered with white scales. The area between the postmedian and subterminal lines is mostly filled with rust-red. The terminal area and fringe are grey. The hindwings are pale pink ochre, crossed by a narrow dark postmedian line and with a broader terminal band (Anweiler 2007).

Evergestis subterminalis is seen most often in the southern interior. It is found in montane meadows (Anweiler 2007). In BC, observations on iNaturalist have occurred from June – September (iNaturalist n.d-a).

[31] iNaturalist observation by Dick Cannings. https://inaturalist.ca/observations/300867503

Monarch (*Danaus Plexippus*)

Conservation Status: Red (S1?B), COSEWIC/SARA Endangered

Adult Monarch (left). Photo: Sue Elwell[32]. Monarch larva on milkweed flower (right). Photo: Jasmine[33].

Monarchs are large, distinct butterflies that are not easily mistaken for other species. The adult Monarch has a of wingspan 93 – 105 mm (COSEWIC 2016a). They have predominantly orange wings outlined by a broad black border and two rows of circular white spots. Males have a black sex patch on each hindwing; females do not. The larvae are white, yellow, and black-banded, with a pair of black filaments at its head and tail. The larvae's prolegs are black and there is a large white spot at the base of each one. The chrysalis is green with gold spots. The eggs are approximately 1 mm long, and conical in shape.

The overall native range of the Monarch occurs from Central America northward through the continental United States to southern Canada, and from the Atlantic Coast westward to the Pacific Coast (COSEWIC 2016a). The Canadian range of occurrence is Canadian breeding > 2000 km² and includes portions of all ten provinces and the Northwest Territories (COSEWIC 2016a). The summer range includes low elevation areas in the southern interior of BC. Monarchs in the Kootenays may be the eastern North American population; those in the rest of the province are part of the western North American population (BC CDC 2025a). The eastern North American population hibernate in Mexico. At least one generation matures successfully each summer in BC. The number of adult Monarchs in BC varies from year to year, but the species is generally uncommon.

[32] iNaturalist observation by Sue Elwell. https://inaturalist.ca/observations/182265360
[33] iNaturalist observation by Jasmine. https://inaturalist.ca/observations/124949555

Adults roost in trees near water. Monarchs feed and lay their eggs on showy milkweed (*Asclepias speciosa*), the only native milkweed in BC (BC CDC 2025a). They use other plant species when milkweed is not in bloom including goldenrods (*Solidago* spp.), asters (*Doellingeria* spp., *Eurybia* spp., *Oclemena* spp., *Symphyotrichum* spp. and *Virgulus* spp.), the non-native Purple Loosestrife (*Lythrum salicaria*), and clovers (*Trifolium* spp. and *Melilotus* spp.; COSEWIC 2016a).

The adults begin flying from their wintering range in Late February or early March. Observations on iNaturalist from the Kootenays are from June and July (iNaturalist n.d-b). These observations include eggs, larvae, and adults. Southward migration typically begins in early August.

Population size estimates are not available for Monarchs in Canada, but monitoring hibernation sites in Mexico suggests their populations are in decline (COSEWIC 2016a). Their summer habitats are threatened by fragmentation because of urban/rural land development. In BC, breeding habitat trends are not well studied, and the most important breeding areas have not been identified. Milkweed is widely distributed throughout the southern interior but is considered a noxious weed by the agricultural industry.

Propertius Duskywing (*Erynnis propertius*)

Conservation Status: Red (S2)

Propertius Duskywing. Photo: Brian Starzomski[34].

This species is usually present within Garry oak and associated ecosystem habitats throughout southern Vancouver Island and the gulf islands (BC CDC 2012a). Observations outside of this area are considered strays. Propertius Duskywing is a Red Listed species in BC. It is a mid-priority candidate for COSEWIC assessment.

[34] iNaturalist observation by Brian Starzomski. https://inaturalist.ca/observations/271593275

Raspberry Crown Borer Moth (*Pennisetia marginatum*)

Conservation Status: Blue (S3?)

Raspberry Crown Borer Moth (Pennisetia marginatum). Photo: Chris Ratzlaff[35].

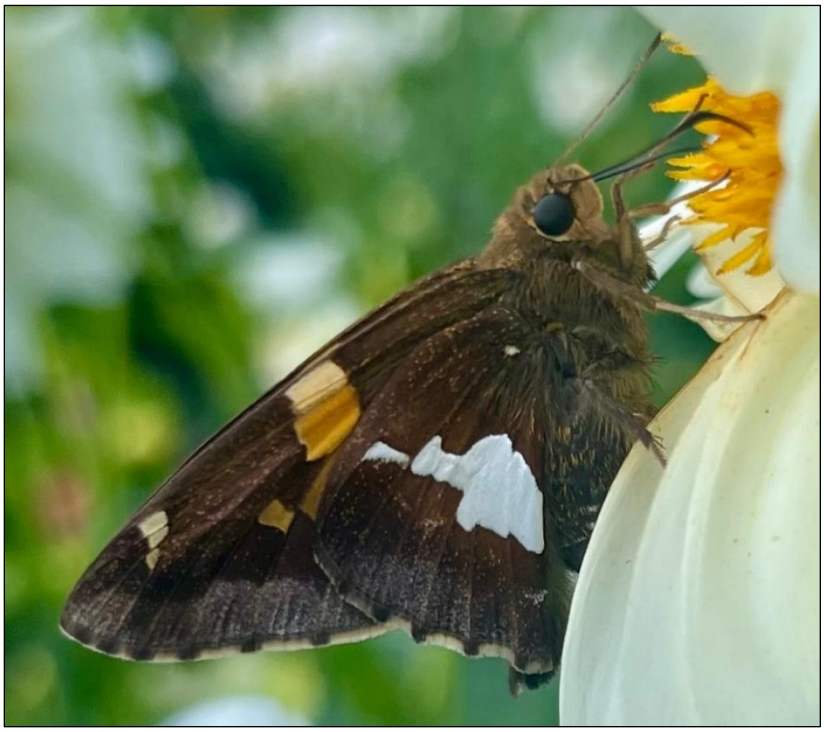
The Raspberry Crown Borer Moth is small with a 2.0- 3.5 cm wingspan (Anweiler 2004). It has a wasp-like appearance with a black body with some yellow streaking and 4 or more narrow yellow bands around the abdomen. The legs are largely dull yellow. The wings, where scaled, are dark olive and red-brown, and there is a prominent dark discal bar. Females are much larger than the males.

The larvae are borers in the rootstock and root crowns of raspberry and blackberry (*Rubus* sp.; Anweiler 2004). In BC, they are mostly observed on the southern coast and interior. They have been recorded as far north as Smithers on iNaturalist (iNaturalist, n.d-c). All the observations from the Kootenays on iNaturalist occurred in August (iNaturalist n.d-c).

[35] iNaturalist observation by Chris Ratzlaff. https://www.inaturalist.ca/observations/181856315

Silver-spotted Skipper (*Epargyreus clarus*)

Conservation Status. No Status (S3)



Silver-spotted Skipper, clarus subspecies. Photo: Robert Hedges-Goettl[36].

Silver-spotted Skipper, clarus subspecies egg (left) and larva (right). Photos: vjh[37].

The Silver-spotted Skipper has brown wings with a large white area in the center of the ventral hind wing, and a median row of yellow spots on the dorsal forewing. They are the largest skipper in BC, with the

[36] iNaturalist observation by Robert Hedges-Goettl. https://inaturalist.ca/observations/313634402
[37] iNaturalist observation by vjh. https://inaturalist.ca/observations/128144966

forewing measuring 22-27 mm (Guppy and Sheppard 2001). The egg has 16-18 ribs. Eggs from the East Kootenay are white with pink around the micropyle and a band of pink around the middle of the egg. The mature larval body is yellow green, with darker green transverse lines. The head is dark brownish red, with a bright orange spot between labrum and ocellus on each side (Guppy and Sheppard 2001).

Silver-spotted Skipper range in southeastern BC over approximately over 7,500-10,000 km^2 (BC CDC 2007). Their range includes the communities of Nelson, Castelgar, and Cranbrook. There are two known permanent breeding populations in BC - the Wasa Lake and Bummer's Flats populations (BC CDC 2007). iNaturalist observations record regular year to year sightings around Castlegar and the Pend Oreille River (iNaturalist n.d-d).

Silver-spotted Skipper feed on plants in the pea family (Fabacea) including Black Locust (*Robinia pseudoacacia*), Hog Peanut (*Amphicarpaea bracteata*), Groundnut (Apios americana), Showy-tick-trefoil (Desmodium canadense), False Indigo (*Amorpha fruticosa*) and Wild Licorice (*Glycyrrhiza lepidota*). They are mostly seen in valley bottoms (BC CDC 2007).

Adults are on the wing from late May to early August, with peak flight occurring in the first week of July (Guppy and Shepard 2001). Eggs are laid singly on the bottom leaves of foodplants. Eggs hatch within the week, develop into mature larvae by late September, and pupate before winter.

Because this species is colonial, they are potentially a good species for yearly monitoring (BC CDC 2007). They may be a candidate for management under the Identified Wildlife Management Strategy of the *Forest and Range Practices Act*.

Skinner's Pelidne Sulphur (*Colias skinneri*)

Conservation Status: Blue (S3?)

Skinner's Pelidne Sulphur. Photo: Jakob Dulisse[38].

Skinner's Pelidne Sulphur has a wingspan of 33-44 mm (BC CDC 2024). They have pale yellow wings with medium to narrow black borders and dark scales at the wing base. The females may have white or yellow wings with reduced or absent black borders, a faint spot in the center of the hindwing, and faint and pink fringes to the wings. The underside of the hindwing is dark olive-coloured with a pink-rimmed spot.

The Skinner's Pelidne Sulphur occurs in Alberta and BC (BC CDC 2024). This species is found in alpine and subalpine meadows, bogs, forest openings, and along roadsides. Larvae host plants are blueberry (*Vaccinium* spp.) and wintergreen (*Gaultheria humifusa*). Their dispersal and mobility information is unknown.

Their life history is not well documented. Flight period late June to early August in most of its range (BC CDC 2024).

More research is needed to understand this species' dispersal, mobility, and life history characteristics as well as any threats they may currently face (BC CDC 2024).

[38] iNaturalist observation by Jakob Dulisse. https://inaturalist.ca/observations/302520686

Variegated Fritillary (*Euptoieta Claudia*)

Conservation Status: Blue (S3N)


Variegated Fritillary (left). Photo: Janice Arndt[39]. Variegated Fritillary pupa (right). Photo: Rebecca Reader-Lee[40].

The Variegated Fritillary is the only fritillary in which the outer margin of the forewing is concave rather than convex (Guppy and Shepard 2001). The upper side of the wings is checkered with orange and black. Both the forewing and hindwing have a row of submarginal black spots and black median lines running across the wings. The underside of the forewing is orange with a pale orange spot rimmed in black in the forewing cell. The underside of the hindwing is mottled with browns and grays with a pale postmedian band. The wingspan measures 44–57 mm (Brock and Kaufman 2003).

The Variegated Fritillary is an uncommon migrant found at all elevations in southeastern BC, mostly within the Kootenays, although, it does not breed here (BC CDC 2012b). Detections on iNaturalist from BC occur from June – September (iNaturalist n.d-e). The Variegated Fritillary is considered a migrant and not permanently established in BC (BC CDC 2012b). Occurrence of this species should be noted, especially in parks and protected areas.

[39] iNaturalist observation by Janice Arndt. https://inaturalist.ca/observations/136526007
[40] iNaturalist observation by Rebecca Reader-Lee. https://inaturalist.ca/observations/242616440

4.7 INSECTS - OTHER

Bunchgrass Grasshopper (*Pseudopomala brachyptera*)

Conservation status: S2S3 (Not reviewed)

Bunchgrass Grasshopper (Pseudopomala brachyptera). Photo: Tyson Ehlers.

Dipalta serpentina

Conservation Status: S3 (Not Reviewed)

Dipalta serpentina. Photo: Jeremy Gatten[41].

[41] iNaturalist observation by Jeremy Gatten. https://www.inaturalist.ca/observations/131665060

Transverse Lady Beetle (*Coccinella transversoguttata*)

Conservation Status: S4 (Not Reviewed), COSEWIC/SARA Special Concern

Transverse Lady Beetle (Coccinella transversoguttata). Photos: Adrian Leslie[42].

Transverse Lady Beetles are small (5.0 to 7.8 mm), round, with orange to red wing covers with black markings, consisting of a black band and four elongate spots (COSEWIC 2016b). Transverse Lady Beetles primarily feed on aphids. They occur across a wide range of habitats including agricultural areas, suburban gardens, parks, coniferous forests, deciduous forests, prairie grasslands, meadows, riparian areas, and other natural areas (COSEWIC 2016b).

Prior to 1986, this species was widely distributed and abundant across North America, playing an important role as a biological control agent of aphids and other insect pests (COSEWIC 2016b). Currently, in many parts of its range, this species is either absent or below detection thresholds where it was once common. The specific range-wide causes of decline in the Transverse Lady Beetle are currently unknown. Possible threats to this species may include negative interactions with recently arrived non-native species, such as the Seven-spotted Lady Beetle and Multicolored Asian Lady Beetle through competition, intraguild predation or indirect effects through introduction of pathogens (COSEWIC 2016b). Other possible localized and cumulative threats include land use changes, such as direct and indirect effects of agricultural pesticide/chemical use to control their prey species, habitat loss through urban expansion, conversion of farmland to forest, and other human disturbances (COSEWIC 2016b).

[42] iNaturalist observation by Adrian Leslie. https://inaturalist.ca/observations/130775505

Tree Crickets (*Oecanthus* spp.)

Four species of Tree Crickets (*Oecanthus* spp.) have been recorded in the Slocan Watershed. None of the species have been assigned conservation ranks by the CDC, but their subnational ranks indicate three of them may be blue-listed (S3 and S2S3) and one may be red-listed (S1S2). The four species are:

- Prairie Tree Cricket (*Oecanthus argentinus*) - S3
- Western Tree Cricket (*O. californicus*) - S2
- Snowy Tree Cricket (*O. fultoni*) - S1S2
- Riley's Tree Cricket (*O. rileyi*) - S2S3

Tree crickets live in a variety of habitats, but are mostly associated with fields and low bushes, except the Snowy Tree Cricket which is known to occur in trees (Cannings and Scudder 2005). Key characteristics for identification include the presence and shape of dark marks on the first two segments of the antennae (Cannings and Scudder 2005).

Prairie Tree Cricket. Photo: Jakob Dulisse[43].

Snowy Tree Cricket. Photo: Robby Deans[44].

[43] iNaturalist observation by Jakob Dulisse. https://inaturalist.ca/observations/183048589
[44] iNaturalist observation by Robby Deans. https://inaturalist.ca/observations/28387179

Western Tree Cricket. Photo: Doug Brown[45].

Riley's Tree Cricket. Photo: Dick Cannings[46].

[45] iNaturalist observation by Doug Brown. https://inaturalist.ca/observations/244902818
[46] iNaturalist observation by Dick Cannings. https://inaturalist.ca/observations/302276531

4.8 LICHENS

Few surveys of lichens have been completed in the Slocan Watershed, with only one potential SAR recorded. Black rocklicorice (*Lichinella nigritella* syn. *Thallinocarpon nigritellum*) is a Blue-listed (S3) lichen that has tentatively been recorded in the Valhalla Mountains.

Cryptic Paw (*Nephroma occultum*) is a Blue-listed (S3) species, listed by COSEWIC as Threatened and SARA as Special Concern (Schedule 1). It likely occurs in low to mid elevation old grown forests, where it grows on the bark and wood of conifers. Cryptic Paw has been recorded in the Duncan River and along Kuskanax River (north of Nakusp) in similar habitat that occurs in the Slocan Watershed.

Left: Black rocklicorice lichen. Photo: Samuel Brinker[47]. Right: Cryptic paw lichen. Photo Toby Spribille[48].

[47] iNaturalist observation by Samuel Brinker. https://inaturalist.ca/observations/180675621
[48] iNaturalist observation by Toby Spribille. https://inaturalist.ca/observations/67561223

4.9 MAMMALS

The Slocan Watershed is home to a wide range of mammals, with at least 59 species recorded to date, including eight SAR. Most of the larger SAR are well known, with species such as Grizzly Bear regularly observed, while the species such as Wolverine are rarely seen. Four bat SAR are known to occur in the watershed as well.

Left: Northwestern Jumping Mouse (Zapus saltator). Photo: Tyson Ehlers. Right: Cougar (Puma concolor). Photo: EcoLogic wildlife camera.

Left: Beaver (Castor canadensis). Photo: Ryan Durand. Right: Moose (Alces alces). Photo: EcoLogic wildlife camera.

Caribou, Southern Mountain Population (*Rangifer tarandus caribou* pop. 1)

Conservation Status: Red (S1), COSEWIC Endangered, SARA Threatened, FRPA Identified Wildlife

Mountain Caribou. Columbia Mountain population. Photo: EcoLogic wildlife camera.

The Southern Mountain Population of Caribou are distributed across 15 extant subpopulations in the deep snowbelt regions of southeastern BC, where they have distinctly adapted to the deep snow environment and are able to subsist on arboreal lichens in winter. Caribou are brown in colour and have white manes and large, rounded hooves that are well suited for travelling and digging for food in snow (COSEWIC 2014b). Males and females both typically grow antlers, but females will sometimes lack these (COSEWIC 2014b). Breeding occurs in late September and October and pregnant females will seek out isolated areas in the mountains that are relatively safe from predators to calve between May and June (COSEWIC 2014b).

Caribou are most active during their seasonal migrations between higher and lower elevation habitat, as well as during the fall rutting season when they congregate into larger groups for sparring and mating. Strategically deployed wildlife cameras can be used to detect these species within their home range.

Caribou (Southern Mountain Population) are Red-listed in BC and is designated as Identified Wildlife that requires management during forest and range activities under FRPA (BC CDC 2026). Caribou are also assessed as Endangered by COSEWIC and are currently designated as Threatened under Schedule 1 of SARA (COSEWIC 2014b). It was determined that these populations were subject to consistently high adult mortality and low calf recruitment rates and were vulnerable to ongoing threats from predation and habitat loss (COSEWIC 2014b). Several objectives have been identified achieve population recovery for this species, including but not limited to removal of linear corridors to reduce exacerbated predator-prey dynamics, preserve existing summer and winter habitat range, reduce recreational disturbance, and continued population monitoring (Environment Canada 2014).

Grizzly Bear (*Ursus arctos*)

Conservation Status: Blue (S3?), COSEWIC/SARA Special Concern, FRPA Identified Wildlife

Grizzly Bear (Ursus arctos). Photo: Jim Lawrence[49].

Grizzly Bears are habitat generalists that are found from sea-level to high-elevation alpine throughout most of BC, except for parts of the south and south-central regions of the province and are less common around concentrated areas of human development (COSEWIC 2002). Grizzly Bears are functionally omnivorous, with many bears primarily herbivorous, and demonstrating habitat use that is driven by the availability of winter dens and seasonal food sources (COSEWIC 2002). Grizzly Bears are large bears (only second to Polar Bears) that can weigh up to 500 kg (270 – 360 kg on average) and are differentiated from Black Bears by their dish-shaped face, longer claws, and visible muscle hump on the shoulders (MWLAP 2004b). Breeding occurs between late-April to late-June and cubs are born in the den between January and March (MWLAP 2004b).

Grizzly Bear are most active during the day from spring to late fall and can be encountered where their preferred food source is found, such as carrion sites, salmon spawning areas, and locations with green vegetation (e.g., skunk cabbage, grasses, horsetails, rushes, sedges, cow parsnip), berry-producing shrubs, insects, and grubs (MWLAP 2004b). Strategically deployed wildlife cameras can be used to detect this species.

Grizzly Bear are Blue-listed in BC and are an Identified Wildlife requiring management during forest and range activities authorized under FRPA. A Grizzly Bear den is also protected as a Wildlife Habitat Feature

[49] iNaturalist observation by Jim Lawrence. https://www.inaturalist.ca/observations/149173224

under FRPA for the Kootenay Boundary Region, which is associated with specific management provisions for forest licensees and agreement holders (MECCS 2018).

Under Schedule 1 of SARA, Grizzly Bear are designated as Special Concern due to reductions in some populations, anthropogenic pressures, and habitat fragmentation and degradation (COSEWIC 2002, MWLAP 2004b). The primary risks to this species include human-caused mortality, such as hunting and vehicle collisions, as well as loss and degradation of habitat (COSEWIC 2002). Linear developments, such as roads, are particularly a constraint for this species and have been associated with avoidance and a loss of suitable habitat for foraging and rearing of young (COSEWIC 2002).

Mountain Goat (*Oreamnos americanus*)

Conservation Status: Blue (S3)

Mountain Goat. Photos: Ryan Durand.

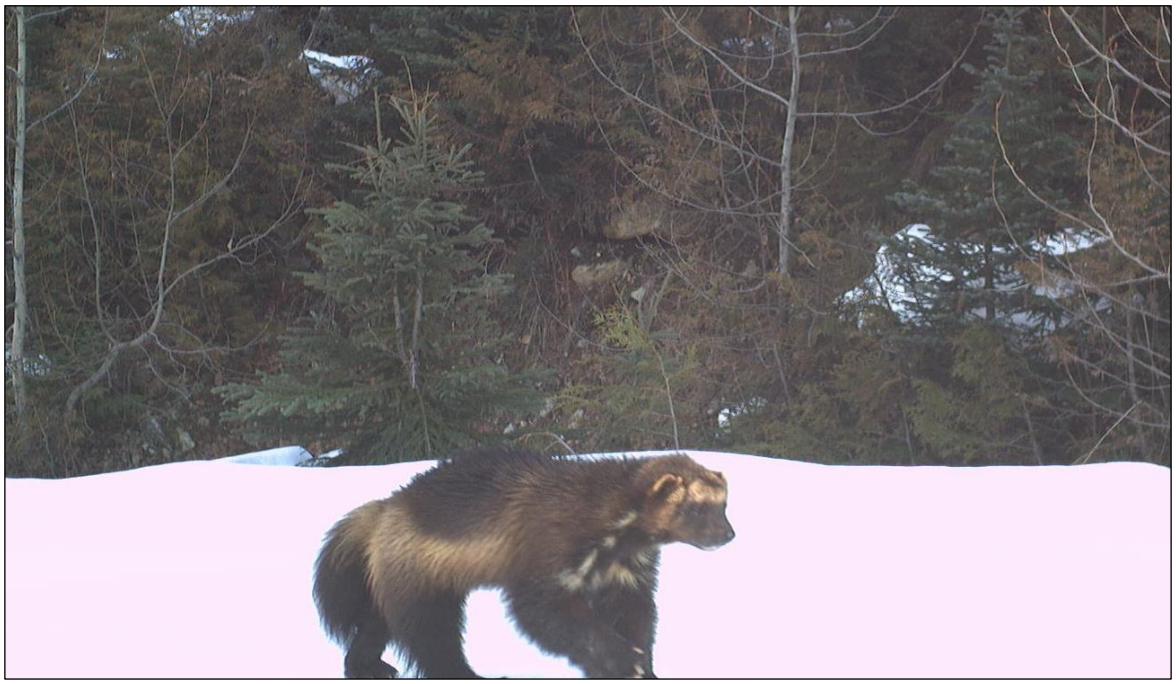
Mountain Goats occupy alpine and subalpine habitat throughout the mountainous regions of BC with differences observed in habitat use and movement between the interior and coastal populations (MGMT 2010). Males and females are both white with horns that are characteristic of a goat, and have large forequarters, a deep chest, and a laterally compressed body that is well-suited to climbing near vertical cliffs and narrow ledges.

The interior population of Mountain Goats generally inhabit areas of drier and lower snowfalls at higher elevations compared to their coastal counterparts. The interior ecotype population seasonally moves between areas of higher elevations above treeline during the summer and fall and lower elevations (including forests) during the spring and early summer (MGMT 2010). Mountain Goat can occasionally be detected outside of their range at lower elevations, and these types of detections may be associated with use of mineral licks which are important for this species (MGMT 2010).

Mountain Goat is Blue-listed in BC in recognition of localized declines and ongoing risk to their habitat (BC CDC 2026). This species is most vulnerable during the winter months when severe winter conditions, lack of forage, and greater risks of predation pose a higher risk of mortality to animals (MGMT 2010). Therefore, any anthropogenic disturbances, including habitat alteration, that affect mountain goat winter range poses a risk to this species (MGMT 2010).

Wolverine (*Gulo gulo*)

Conservation Status: Blue (S3), COSEWIC/SARA Special Concern, FRPA Identified Wildlife



Wolverine. Photo: EcoLogic wildlife camera.

Wolverine are distributed at low densities throughout much of BC and utilize a variety of forested and non-forested structural stages at varying elevations that support their food supply, such as rodents, snowshoe hares, and carcasses of large ungulates (COSEWIC 2014c). They are a stocky, medium-sized weasel and carnivore with brown or black glossy coarse fur, a pale facial mask, and lateral body stripe that runs from its shoulders to its tail (COSEWIC 2014c). Females rely on snow-covered dens for rearing young (COSEWIC 2014c).

Wolverines occur in low densities over large ranges (50-400 km^2 for females, 230-1580 km^2 for males; COSEWIC 2014) and therefore, this species can be challenging to detect. Strategically deployed wildlife cameras can offer some of the best opportunities for detecting this species.

Wolverines are Blue-listed in BC and designated as Identified Wildlife that requires management during forest and range activities authorized under FRPA (BC CDC 2026). Wolverines are also designated as Special Concern under SARA due to increased habitat pressure from anthropogenic disturbance and population declines and uncertain estimates in some regions (COSEWIC 2014c). This species tends to avoid areas of anthropogenic disturbances, particularly roads and transportation corridors, which may serve as barriers to home range dispersal and access to prey (COSEWIC 2014c). Climatic reductions in snow cover over time may also negatively impact reproduction in this species due to the importance of snow cover for maternal den security and food access (COSEWIC 2014c).

Hoary Bat (*Lasiurus cinereus*)

Conservation Status: Blue (S3S4), COSEWIC Endangered

Hoary Bat. Photos: Jason Headley[50]

Hoary Bat is the largest breeding bat in BC and has distinctive, white-tipped fur, hence its name. It is widespread throughout British Columbia during migratory periods in spring and fall Due to its non-colonial nature, Hoary Bats are not considered particularly susceptible to impacts from the White-nose Syndrome fungal pathogen (*Pseudogymnoascus destructans*).

The Hoary Bat is a broad habitat specialist. This species typically roosts in trees; males are solitary in the breeding seasons and females roost in family groups with their young. Hoary Bats are not thought to hibernate in BC, apparently preferring warmer temperatures further south.

Hoary Bats are more commonly detected in southern BC during spring (northward migration) and fall (southward migration) than during the summer.

Hoary Bats are Blue-listed in BC and are considered Endangered by the federal Committee on the Status of Endangered Wildlife in Canada, largely due to the frequency that this species is detected as fatalities at operating wind energy projects. Due to their solitary nature, they are less likely to be affected in large numbers by land alteration or disturbance.

[50] iNaturalist observation by Jason Headley. https://inaturalist.ca/observations/130873657

Little Brown Myotis (*Myotis lucifugus*)

Conservation Status: Blue (S3S4), COSEWIC/SARA Endangered

Little Brown Bat. Photos: Jason Headley[51]

Little Brown Myotis is one of the most common bats in BC. This species can be difficult to differentiate from other Myotis bats without having the bat in the hand or without good acoustic recordings. This species is a broad habitat generalist, readily uses bat boxes during the summer, and has the largest known elevational range of any bat species in BC, ranging from sea level to over 2,800 m in the Rocky Mountains. It will also use bridges for maternity roosts, day roosts and night roosts (e.g., resting between foraging bouts). Like all bats, this species is vulnerable to disturbance of maternity roosts or hibernation locations. Known roosts and hibernacula should be protected with large disturbance buffers and occupancy surveys are recommended prior to any activities requiring vegetation removal or the demolition of abandoned buildings. Little Brown Myotis are active in BC from March through October.

Despite being common, this species is currently Blue-listed in BC and listed as Endangered on the federal Species at Risk Act. Its conservation status is reflective of sharp declines in eastern Canada and elsewhere in North America from the spread of WNS; although WNS is not yet known from BC, the provincial status remains a concern due to the sensitivity of this species (and other colonial bats) to the pathogen. In addition to documented sensitivity to WNS, this species, like all bats in BC, is vulnerable to disturbance of maternity roosts or hibernation locations. Known roosts and hibernacula should be protected with large disturbance buffers and occupancy surveys are recommended prior to any activities requiring vegetation removal or the demolition of abandoned buildings.

[51] iNaturalist observation by Jason Headley. https://inaturalist.ca/observations/99020832

Townsend's Big-eared Bat (*Corynorhinus townsendii*)

Conservation Status: Blue (S3)

Townsend's Big-eared Bat. Photos: Jason Headley[52]

Townsend's Big-eared Bat occurs widely but uncommonly across the southern portions of BC, particularly at lower elevations. Its large ears allow for easy identification. This species is acoustically similar to other bats in the West Kootenays but can be distinguished with high quality call recordings.

Townsend's Big-eared Bats typically eat small moths and forage in a range of open habitat types, such as pastures or open forests. During the breeding season, this species typically roosts in cooler microclimates, such as rock crevices (or under bridges), caves and in abandoned buildings, rather than in occupied structures, such as attics. This preference may reflect an intolerance of the higher temperatures of occupied buildings. The species also overwinter in BC, often in small to mid-sized groups within caves or buildings. The breeding season for this species in BC is June to August; during this active period, acoustic monitoring is likely to detect foraging individuals in the right habitats.

This species is Blue-listed in BC, largely due to its susceptibility to disturbance during roosting or hibernation. Due to this species' preference for drier microclimates for roosting and hibernating, it is hoped that it might be less susceptible to WNS than other colonial bats. Known roosts and hibernacula should be protected with large disturbance buffers and occupancy surveys are recommended prior to any activities requiring vegetation removal or the demolition of abandoned buildings.

[52] iNaturalist observation by Jason Headley. https://inaturalist.ca/observations/130879496

Yuma Myotis (*Myotis yumanensis*)

Conservation status: Blue (S3)

Yuma Myotis. Photo: Kyle Nelson[53]*.*

Yuma Myotis occurs widely, though uncommonly, across the southern half of BC and is reported further north along the coast than in the interior, particularly at lower elevations. The Yuma Myotis can be difficult to differentiate from other Myotis bats without having the bat in the hand or without good acoustic recordings.

This species occupies mature forests and arid grasslands, and primarily roosts in human-made structures (often in very large numbers) including bridges, and readily occupy specially constructed features (e.g., the bat condominium at the Creston Valley Wildlife Management Area). In the Kootenay region, the locally breeding bats are thought to overwinter in the region as well, although hibernation habitats for this species in BC are not well understood. Yuma Myotis are active in BC from March through October and are occasionally detected flying during warmer winter days.

The Yuma Myotis is Blue-listed in BC and, as with other colonial bats, this species may be susceptible to WNS if it were to spread into the province. Known roosts and hibernacula should be protected with large disturbance buffers and occupancy surveys are recommended prior to any activities requiring vegetation removal or the demolition of abandoned buildings.

[53] iNaturalist observation by Kyle Nelson. https://inaturalist.ca/observations/35381316

4.10 Moss and Liverworts

Liverworts, a non-vasular plant grouped with mosses and hornworts within the bryophytes group, are common but easily overlooked. Many are small, grow intermixed with mosses, and are not easily identified. They occur in two forms, leafy or thalloid, and can be distinguished from mosses by the arrangement of their leaves. The leaves of leafy liverworts are arranged in rows of two or three, while mosses are arranged spirally. Thalloid liverworts (like *Marchantia* sp.) have flat bodies that lack stems and leaves. Liverworts are abundant on rotten logs, but also occur in similar habitat to mosses, including dirt, rocks, live trees, and even in running water.

Mosses are abundant and diverse in all elevations of the Slocan Watershed, and grow on amost every type of natural substrate. They range from small obscure species, to common species that grow in thick mats on rocks, trees and the forest floor. As previously mentioned, they are distinguished from liverworts by leaf arrangments.

The conservation status of many liverworts is in flux, as they are rarely inventoried and frequently overlooked. Microscopes or a hand lens are generally required to confirm the identification of most species. In the Slocan Watershed, they are abundant but poorly inventoried, with six SAR known to occur. Mosses are somewhat better studied (and much more abundant), but their conservation status also frequently changes. Only three SAR mosses have been found in the Slocan Watershed, but there are likely many more.

Management options for all bryophytes are limited, with the protection of their direct and indirect habitat necessary. Physical distrubance of direct habitat should be avoided, and as most species are dependent on moisture, light, and limited exposure, alterations to the habitat within the vicinity of the SAR should be avoided. Specific information for each species is not available, so we recommend a minimum of 50 meters around each SAR occurrent to be protected.

Marchantia polymorpha ssp. *montivagans*

Conservation Status: Blue (S3)

Marchantia polymorpha ssp. montivagans Photo: Jason Headley[54]

Marchantia polymorpha ssp. *montivagans* is a large thalloid liverwort that occurs in damp areas in moist forests, swamps, and riparian areas. It grows in rich, moist soil and on rocks, and may occur on the edge of standing or moving water. There are several species of *Marchantia* that occur in the Slocan Watershed, as well as the closely related *Conocephalum*. The polygonal markings on the upper surface of the leaves are an important diagnostic feature for most species.

[54] iNaturalist observation by Jason Headley. https://inaturalist.ca/observations/99726889

Nardia geoscyphus

Conservation Status: Blue (S3)

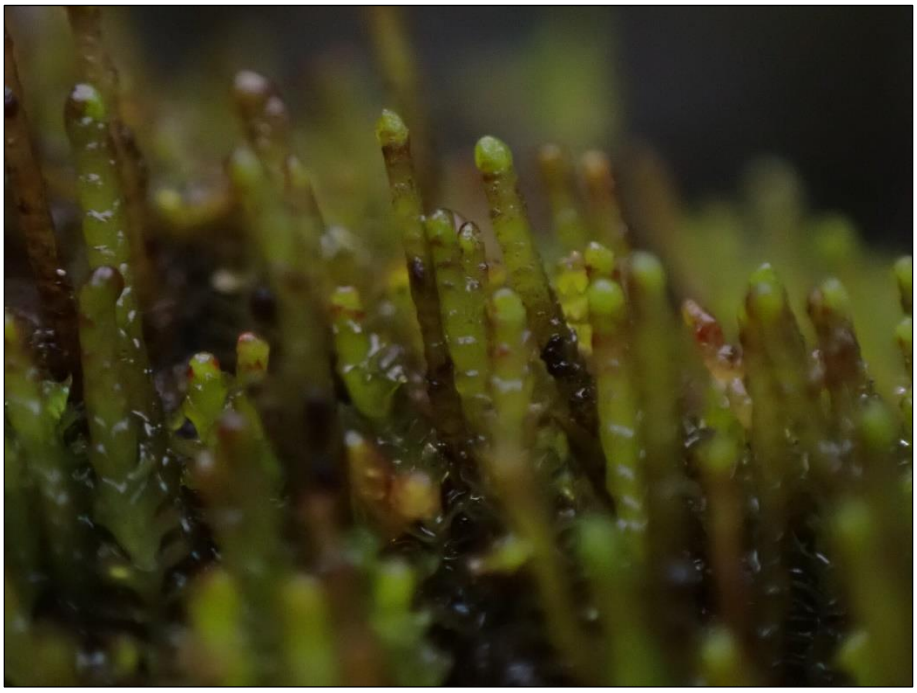
Nardia geoscyphus. Photo: Randal Mindell[55]

Nardia geoscyphus grows on the soil, often at higher elevations. Examination of the underleaves and oil bodies within the leaves are required to identify this speices. There are several other Nardia species that occur in BC, including red and blue-listed species, and multiple species may occur in the Slocan Watershed.

[55] iNaturalist observation by Randal Mindell. https://inaturalist.ca/observations/31326252

Neoorthocaulis attenuatus

Conservation Status: Blue (S2S3)



Neoorthocaulis attenuatus. Photo: Randal Mindell[56]

Neoorthocaulis attenuatus is a small leafy liverwort that grows in moist shady areas on a variety of substrates, including decaying logs, tree trunks, moist rich soil and rocks (British Bryological Society 2026). *N. floerkei* is a much more commonly observed species in the genus, including in the Slocan Watershed.

[56] iNaturalist observation by Randal Mindell. https://inaturalist.ca/observations/182975232

Scapania gymnostomophila

Conservation Status: Blue (S2S3)

Scapania gymnostomophila. Photo Randal Mindell[57]

Scapania gymnostomophila occurs in cool, moist areas such as shady cliffs and streamside rocks. It occurs at all elevations, and in conifer and broadleaf forests (BC CDC 2026). There are numerous *Scapania* species in BC, many of which are Red or Blue-listed.

[57] iNaturalist observation by Randal Mindell. https://inaturalist.ca/observations/135618169

Solenostoma hyalinum

Conservation Status: Blue (S2S3)

Solenostoma hyalinum. Photo: Tom Neily[58]

Solenostoma hyalinum grows in moist areas, often near water, on moist soil and rocks. It is one of the larger species in the *Solenorstoma* genera, and all are challenging to identify (British Bryological Society 2026). Nine species of *Solenorstoma* occur in BC, with many of them Red or Blue-listed, and at least two species occur in the Slocan Watershed.

[58] iNaturalist observation by Tom Neily. https://inaturalist.ca/observations/88974546

Solenostoma sphaerocarpum

Conservation Status: Blue (S3)

Solenostoma sphaerocarpum. Photo: Stefan Gey[59]

Solenostoma sphaerocarpum is a small leafy liverwort that grows in damp areas near streams, wetlands and cliffs. It mostly occurs on rocks, and less often in soil. It is a rarely reported species that is challenging to identify (British Bryological Society 2026).

[59] iNaturalist observation by Stefan Gey. https://inaturalist.ca/observations/145666737

Margined Streamside Moss (*Scouleria marginata*)

Conservation Status: Red (SH), COSEWIC/SARA Endangered

Margined streamside moss (Scouleria marginata). Photo: Matt Berger[60].

Margined Streamside Moss is an uncommon species that grows attached to rocks in or near streams. It is a large species, growing up to 10 cm long, and can form large mats. *Scouleria aquatica* is a similar looking, common species that grows in the same habitat, and a close examination of leaf magins and teeth with a microsope is needed to tell them apart (BC CDC 2025b).

[60] iNaturalist observation by Matt Berger. https://www.inaturalist.ca/observations/226474384

Pohlia bulbifera

Conservation Status: Blue (S3?)

Pohlia bulbifera. Photo: Randal Mindell[61].

Pohlia bulbifera is a moss that grows on damp soil, including sandy, loamy and peaty soils. It occurs in moist areas, often on stream banks and wetlands (British Bryological Society 2026). There are 26 species of Pohlia in BC, including several Blue-listed species, and multiple species have been recorded in the Slocan Watershed.

[61] iNaturalist observation by Randal Mindell. https://www.inaturalist.ca/observations/137826700

Tetrodontium repandum

Conservation Status: Blue (S3)

Tetrodontium repandum. Photo: Martina Poeltl[62]*.*

Tetrodontium repandum is a small moss (2-5 mm tall) that occurs in subalpine areas. It grows in moist crevices in rock outcrops. It is rarely observed, but may be more common as the small size and high elevation habitat are rarely surveyed.

[62] iNaturalist observation by Martina Poeltl. https://www.inaturalist.ca/observations/312524234

4.11 REPTILES

Aside from Garter Snakes (which includes multiple species and subspecies), reptiles are infrequently observed in the Slocan Watershed, including the three SAR that have been recorded. Northern Alligator Lizards (*Elgaria coerula*) are occasionally observed mostly in dry areas, along with uncommon observations of Western Skinks (*Plestiodon skilitonianus*). Painted Turtles (*Chrysemys picta*) are uncommon in the watershed but readily observed along the river and other waterbodies on their normal basking logs. Northern Rubber Boa (*Charina bottae*) are rarely seen, despite being locally abundant in the southern portion of the watershed, as they are largely nocturnal.

Left: Common Garter Snake (Thamnophis sirtalis). Photo: Ryan Durand. Right: Northern Alligator Lizard (Elgaria coerula). Photo: Gregoire Lamoureux.

Northern Rubber Boa (*Charina bottae*)

Conservation status: Yellow (S4), COSEWIC/SARA Special Concern

Rubber Boa (Charina bottae). Photo: Tyson Ehlers

Northern Rubber Boa are found in southern BC, with the northern part of their range occurring shortly south of Williams Lake and then occurring west to Nelson Island and Sechelt Peninsula on the coast, and east to Radium Hot Springs and Canal Flats in the Rocky Mountain Trench (COSEWIC 2016c). This species prefers dry lowland areas characterized by rock outcrops, rock piles, rock bluffs, and talus slopes, as well as in open forested areas near rocks and woody debris (COSEWIC 2016c). This species overwinters in communal, below ground hibernacula (COSEWIC 2016c). Northern Rubber Boa can be identified by their rounded, blunt heads, uniformly brown bodies (adults), yellow undersides, short and stout bodies, and their short blunt tails (COSEWIC 2016c).

Northern Rubber Boa are most likely to be detected during the spring and summer months when they emerge from hibernacula to breed and forage. Groups of snakes can be observed near hibernacula sites in March during first emergence.

Northern Rubber Boa are Yellow-listed in BC and are designated as Special Concern under Schedule 1 of SARA (BC CDC 2026). This species is vulnerable from external pressures, such as habitat degradation and loss, due to their low reproductive rates and site-specific requirements for overwintering and breeding (COSEWIC 2016c).

Painted Turtle - Intermountain - Rocky Mountain Population (*Chrysemys picta* pop. 2)

Conservation Status: Blue (S3?) COSEWIC/SARA Special Concern

Painted Turtle (Chrysemys picta pop. 2). Photo: Ryan Durand.

Painted Turtle occurs primarily in major valley bottoms between mountain ranges across the Southern Interior of BC, with the largest documented populations occurring in the Thompson and Okanagan valleys, southern East Kootenay Trench, and the southern Cariboo Region (COSEWIC 2016d). Painted Turtles are highly aquatic and can be found in the shallow waters of ponds, lakes, oxbows, marshes, and along the edges of slow-moving streams (COSEWIC 2016d). They are identifiable by their relatively large dorsal shell (up to 25 cm in length) and distinct bright orange ventral shell and pattern of reticulated black lines (COSEWIC 2016d). Nest sites are on land adjacent to aquatic foraging habitat (COSEWIC 2016d).

Painted Turtles are most active, and detectable, from spring to fall, which encompasses the active breeding and foraging period. This species can also be observed sunbathing on coarse woody debris and open banks near its aquatic habitat.

Painted Turtle (Rocky Mountain Population) is Blue-listed in BC and designated as Special Concern under Schedule 1 of SARA due to habitat loss and alteration (BC CDC 2026). This species is also vulnerable to road mortality during seasonal migrations when females move from water bodies to terrestrial nest sites (COSEWIC 2016d).

Western Skink (*Plestiodon skiltonianus*)

Conservation Status: Blue (S3S4), COSEWIC/SARA Special Concern

Western Skink (Plestiodon skiltonianus). Photo: Tyson Ehlers.

The Western Skink is restricted to southcentral and southeastern BC, including the Columbia, Shuswap, Kettle, Okanagan, and Similkameen drainages (Environment Canada 2015). It is one of two extant native lizards. It can grow up to 83 mm in snout-vent length or 16 cm including tail, and has smooth shiny scales, a thick neck, small head, and short legs with a wide brown stripe down the middle of the back (Environment Canada 2015). Within its range, this species occupies desert canyons, open woodlands, grasslands, forests, and warm dry hillsides up to 2,100 m in elevation, and seeks out cover including talus, rocks, and coarse woody debris (Environment Canada 2015). Talus and rock outcrops also serve as important hibernation sites during the winter.

Western Skinks are most likely to be detected during early spring and early summer when it is actively breeding, as well as during the cooler periods of the day (dawn and dusk) during the peak of summer (Environment Canada 2015).

The Western Skink is Blue-listed in BC and designated as Special Concern under Schedule 1 of SARA due to its small occupancy range, small population size, population fluctuations, and habitat loss from agriculture and urban development (BC CDC 2026; Environment Canada 2015). Availability of suitable hibernation sites may also be a limiting factor for this species (Environment Canada 2015).

4.12 Slime Moulds

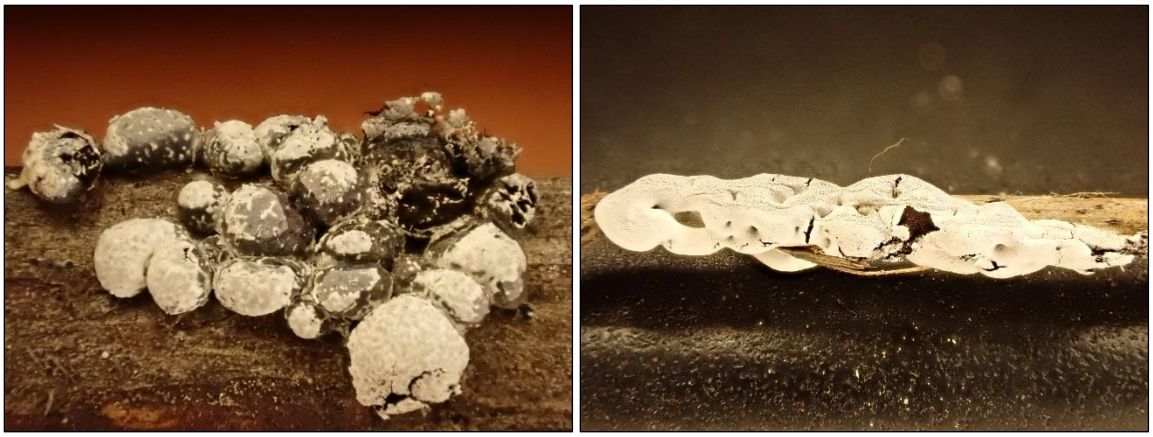
For the last five years intensive inventories of slime moulds (Myxomycetes) have been completed throughout the Slocan watershed. Slime moulds are unicellular organisms (amoeboid eukaryotes) that live much of their lives as microscopic amoeba in soil and organic material (such as old rotten logs). When conditions are right, they form a multinucleate plasmodial form that is visible to the human eye that search for food and a suitable place to reproduce. A non-mobile reproductive structure is then created, ranging from tiny fruiting bodies less than 1 mm in size, to large, bright coloured masses that can be measured in 10s of centimeters. The fruiting bodies somewhat resemble fungi, and they were placed in the fungi kingdom for many years.

Slime moulds were added to the BC CDC tracking lists in 2023; however, the conservation ranks are preliminary and will significantly change in coming years. To date, roughly 300 species are known to occur in the province, with numerous additions to the list each year. Most species are difficult to find and require careful microscopic analysis to identify to the species level.

Slime moulds can occur on almost any terrestrial substate (and one species is aquatic, but has not been found in BC), and are frequently found on dead and rotting wood, bark, leaves, and other plant matter. A group of slime moulds are nivicolous species, they are only found at the edge of the melting snow line in the spring, while most others can be found throughout the growing season, but are generally more abundant during moist, warm periods.

In addition to the three species that are Blue-listed by the BC CDC, there are several dozen species that have been found in the Slocan watershed that are the only records for BC, Canada or North America that are likely to be added to future Red and Blue-lists. While it has not been assigned a conservation rank yet the only known location in the world for *Spiromyxa slocanensis* is from the Airy Creek drainage and it is assumed it will be a Red-listed (S1) species when it is assessed. Several other uncommon or globally rare species are highlighted below.

Hemitrichia montana (left) and Nannengaella alpestris (right). Photos: Ryan Durand.



Physarum nivale (left) and Physarum vernum (right). Photos: Ryan Durand.

Reticularia lobata (left) and Stemonitis mussooriensis (right). Photos: Tyson Ehlers.

Trichia nivicola (left) and Nannengaella globulifera (right). Photos: Tyson Ehlers.

Badhamia foliicola

Conservation Status: Blue (S2S4)

Badhamia foliicola. Photo: Ryan Durand.

Badhamia foliicola is a cold-weather species that occurs in the early spring, often along the melting snow line. It is commonly found on live and dead herbaceous material (often close or on the ground), on living shrubs such as alder or willow (on branches that are pressed to the ground by snow and then rebound in the spring) and occasionally on dead wood. It is an uncommon species but is likely more widespread than recorded. It is a very small species, with fruiting bodies growing to about 0.5 mm in small, crowded clusters. The cold weather habitat of this species makes it easier to identify, however the *Badhamia* and closely related *Physarum* are both large, challenging genera with about 40 species known to occur in BC, and detailed microscopy is required to identify them.

Perichaena corticalis

Conservation Status: Blue (S3)

Perichaena corticalis. Photos: Ryan Durand.

Perichaena corticalis is an infrequently observed slime mould that is found throughout the province at any time of the year, but more often during spring and fall. It grows on dead bark and is most commonly found on Populus (cottonwood and aspen) logs. Fruiting bodies grow in large clusters, sometimes heaped, and are up to 1 mm in diameter. This is the only species in the genus Perchaena that occurs in BC. *P. corticalis* is readily identifiable by the wavy yellow line that occurs around the perimeter of the sporotheca, and at maturity a persistent cups remains, sometimes with remnants of bright yellow spores.

Prototrichia metallica

Conservation Status: Blue (S3)

Prototrichia metallica. Photo: Tyson Ehlers.

Prototrichia metallica is a cold-weather slime mould that is most often found in late fall and is occasionally found during the winter and spring. While it is currently blue-listed, there have been numerous recent observations, and it is likely to be moved to the Yellow-list in the near future. As with most slime moulds, it is small, with mature fruiting bodies up to 2.5 mm tall occurring in small clusters. It is either sessile (no stalk) or stalked and often has an iridescent peridium (the other skin) with distinctive veins. It is easily identified microscopically by the capillitium that have ragged 'broom-like' ends.

Prototrichia metallica. Photos: Ryan Durand.

Spiromyxa slocanensis

Conservation Status: Unknown (SU)

Spiromyxa slocanensis. Photos: Tyson Ehlers.

Spiromyxa slocanensis is the only endemic species that has been recorded in the Slocan Watershed. Collected by Tyson Ehlers in 2021 near the mouth of Airy Creek (Little Slocan River), it was formally described as a new genus and species in 2024 (Yatsiuk et al., 2004). There is only one single known occurrence of the species, collected twice from the same old growth cedar log in a seepage site.

Microscopic analysis is required to identify this species, and it looks superficially similar to the common *Arcyria cinerea* that occurs throughout the watershed. *S. slocanensis* occurs in large colonies, but the individual fruiting bodies are only 4 mm tall, expanding up to 12 mm when mature and the capillitium and spores start to fall out.

Arcyria cinerea. Photo: Ryan Durand.

Management Recommendations

In areas where rare or uncommon slime moulds have been located, protection of the direct habitat and ensuring that alterations do not affect shade, temperature and humidity is essential to protect the species. General recommendations for protecting habitat for slime moulds include:

- Retaining large conifer woody debris in a variety of decay classes is important. Woody debris is essential to many of the species, and some species are known to occur/fruit on the same log over multiple years.
- Woody debris from aspen and cottonwood, even though it does not last long, is also important as several species only occur on *Populus* wood.
- Old growth woody debris is critical, as it is uncommon on much of the landscape and there is limited recruitment. During clearing activities, any large old wood should be kept intact if possible, and planning should consider future recruitment of large, old wood.
- Moisture, light levels, humidity, and pH are important for most species. Activities that open up forest cover or remove shrub cover will have a negative effect on many species.
- If slime moulds are found, the identification and surveys for additional species is a specialized skill that only a few biologists in BC are experienced in doing. Species identification in general can only be accurately done by collecting an intact sample (including some of the substrate it occurs on), ensuring it remains intact during transport, fully drying it at room temperature, and analysis with a compound microscope.

4.13 Slugs and Snails

There are over 30 terrestrial and aquatic molluscs known to occur in the Slocan Watershed, including seven SAR and three exotic species. While most of the larger terrestrial snails and slugs are straight forward to identify, the smaller species and many of the aquatic species are challenging and often require microscopic analysis and even dissection. For many of the snails, mussels and clams, dead shells are sufficient for identification and confirming presence.

Three at risk snails occur in the watershed, with the potential for several other species including the Blue-listed Subalpine Mountainsnail (*Oreohelix subrudis*) as the very similar looking Rocky Mountainsnail (*Oreohelix strigosa*) has been found throughout the watershed. Other common large land snails include the Exotic Grovesnail (*Cepaea nemoralis*) and the Idaho Forestsnail (*Allogona ptychophora*), while multiple small snails occur. Little information is available on the majority of the aquatic snails and bivalves in the region, and additional details would likely result in the identification of more at risk species in the watershed.

Rocky Mountainsnail (Oreohelix strigosa). Photo: Ryan Durand.

Introduced Grovesnail (Cepaea nemoralis). Photo: Ryan Durand.

Idaho Forestsnail (Allogona ptychophora). Photo: Tyson Ehlers.

Three at risk terrestrial slugs are known to occur in the watershed, with limited occurrence and distribution data available. Near residential areas, several introduced slugs are common while native species are found less frequently in natural areas.

Exotic Ater-group of Arion slugs (Ario sp.). Photo: Ryan Durand.

Exotic Leopard Slug (Limax maximus). Photo: Ryan Durand.

The ubiquitous Reticulate Taildropper (Prophysaon andersoni). Photo: Ryan Durand.

All molluscs are dependent on microclimates that retain the moisture required for movement and respiration (Kappes 2005). They are sensitive to changes in temperature and moisture, and require

features such as woody debris, bark, leaf and needle litter, rocks, or human-made objects for shelter. Most occur in areas with high tree or shrub cover that help reduce direct sunlight, moderate temperature, and provide microhabitat features. Woody debris of all age classes, with well decomposed logs that are partially incorporated into the soil a necessity for many species, and a variety of less decomposed wood to provide future habitat. An intact forest floor (including a thick litter layer) and woody debris are also essential for many species for reproduction (many species lay eggs in and under litter and logs), and for insulation and moisture required to survive hot summers and cold winters.

Aquatic snails, clams and mussels require stable waterbodies, wetland habitats, or ephemeral wet areas. The aquatic or semiaquatic environments they live are used to regulate temperature, provide food, and for reproduction. Water permanence, temperature, quality, and physical condition (including aquatic and emergent vegetation) are important habitat features. Some species are adapted to seasonal variation, such as ephemeral water bodies, by burrowing into the substrate to remain cool and moist during the dry season and during winter months.

Marsh Ramshorn (Planorbella trivolvis). Photo Ryan Durand.

Pondsnail (Lymnaea sp.). Photo Ryan Durand.

Western/Oregon Floater (Anodonta kennerlyi/oregonensis clade). Photo Ryan Durand.

Banded Tigersnail (*Anguispira occidentalis*)

Conservation Status: Blue (S3S4)

Banded Tigersnail (Anguispira occidentalis). Photo: Ryan Durand.

Banded Tigersnail shells (Anguispira occidentalis). Photo: Ryan Durand.

The Banded Tigersnail is a large terrestrial snail up to 28 mm in diameter and 22 mm in height, with a pale to creamy shell, while older snails may have a flaky grey appearance (Montana Natural Heritage Program 2026). The shell has up to six whorls that have obvious axial riblets and is bordered by one pale and two reddish bands (that are not always visible). The aperture is round and lacks a distinctive lip, with old shells often having an irregular opening. The umbilicus is narrow and deep. It could be confused with Mountainsnails (*Oreohelix* spp.), which are slightly smaller and also have spiral bands around the shell, but Mountainsnail shells are somewhat angular on edge vs. the round Banded Tigersnail. The Idaho Forestsnail is also a similar size and dead shells have a similar white, flaky look, but it has a prominent white lip. The Banded Tigersnail was recently elevated to a species to separate it from the Eastern Banded Tigersnail (*Anguispira kochi*) which is used to be a subspecies of (*Anguispira kochi occidentalis*).

Banded Tigersnails inhabit mesic to moist conifer, mixed and deciduous forests, ranging from young to old growth stands. Less common in modified landscapes and shrub dominated ecosystems. Moisture retention is a critical part of its habitat, with canopy cover, leaf and needle litter, and woody debris and bark are all important features. While its home range is unknown, it is assumed that it is limited and less than 100 m^2. Found throughout the Kootenay region, mainly in low to mid elevations. It can be locally abundant, with several hundred snails found in a small area during some surveys. While there are numerous observations of this species throughout the Kootenay region, and sporadic observations in the Boundary and Okanagan, many occur in forested areas that will or have been logged. Pre and post logging surveys in the Liard Watershed near Nelson found that four of the five occurrences of the species that were identified and flagged for a tenure holder during a review of proposed cutblocks were subsequently logged.

Field surveys should be completed in April to October, with observations common during cooler periods from early summer to late fall. It is most often found by sifting leaf and needle litter, or after warm summer

rain as they are active on top of the litter and woody debris. During warm dry periods, live snails are often found buried in the humus layer under tree litter.

The main threats to this species are alterations that reduce forest cover, thereby increasing temperature and reducing moisture, the disturbance of the litter layer, and the loss or alteration of woody debris. Logging (including fire fuel management), road and trail building, and other development that changes forest cover or disturb soils will affect this species, along with fires and drought.

Coeur d'Alene Oregonian (*Cryptomastix mullani*)

Conservation Status: Blue (S3S4)

Coeur d'Alene Oregonian (Cryptomastix mullani). Photo: Ryan Durand

The prominent lip and tooth of a Coeur d'Alene Oregonian (Cryptomastix mullani). Photo: Ryan Durand

The Coeur d'Alene Oregonian is a medium sized species of about 12-17 mm diameter, and up to 10 mm tall. It is heliciform and mostly flat, with 5-6 whorls that have fine, weak striae (Montana Natural Heritage Program 2026). The umbilicus is small and partially covered by the thickened white lip of the aperture. The white lip and the presence of a distinctive small tooth within the aperture are key diagnostic features for this species that make it easy to identify. Immature snails may have some hairs, but they are typically smooth by adulthood. There are multiple subspecies and other species of *Cryptomastix* that occur in northern Washington, Idaho and Montana, but to date none have been found in BC.

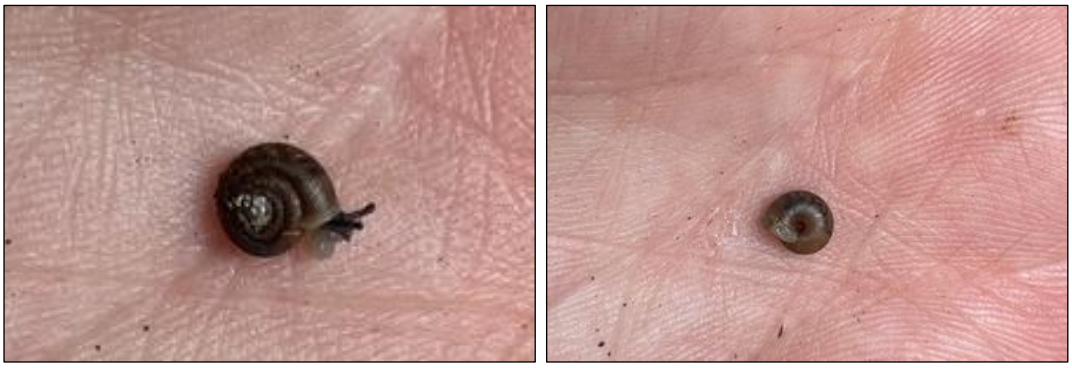
It occurs in moist to mesic conifer and mixed forests, less often in cottonwood floodplains and other deciduous stands. Normally found in and under tree litter, both conifer and deciduous, and less often in or under rotten woody debris and bark. It is found throughout the Slocan Watershed at low to mid elevations. It is locally abundant in areas.

Field surveys should be completed during April to October, with most observations found during moist cool periods in the spring and fall, however the shells are persistent and can be found throughout the snow free portion of the year. Most active in spring and fall. During warm months, live snails can be found buried in leaf litter and under decayed woody debris and bark.

The majority of observations of this species are in young to mature conifer forests at low to mid elevations. They are frequently found in areas that will or have been logged. Other threats include wildlife, fuel reduction programs, invasive species, grazing and recreation.

Fir Pinwheel (*Radiodiscus abietum*)

Conservation Status: Red (S2?)



Fir Pinwheel. Photos: mlucid[63]

Forest Disc (Discus whitneyi). Photos: Ryan Durand.

The Fir Pinwheel is small terrestrial snail that grows to about 6.5 mm in diameter and 3.5 mm tall. It is fairly flat on top and rounded below with a deep narrow umbilicus (opening), and crescent-shaped aperture (the opening where the snail body emerges from the shell). It is light brown to translucent, with up to 5.75 whorls on the shell. The outer whorls have well defined riblets, while the inner whorls are fine striae. It is similar to the very common Forest Disc (*Discus whitneyi*) snail that occurs throughout the Kootenay region. The Forest Disc is larger (up to 6.5mm diameter and 3.5mm tall), with up to 4.5 whorls (the inner 1.5 whorls are smooth), a wide umbilicus (1/3 diam of shell) (Montana Natural Heritage Program 2026).

It is only known from a few records in southeast BC, including Wilson Creek and Carpenter Creek. It is known to occur in Washington, Oregon, Montana and Idaho, so it is expected to be more widespread in the Kootenay region. It occurs in moist to mesic conifer and mixed forests, with most observations occurring during May to October, with a greater chance of detection during cool, moist fall months.

[63] iNaturalist observation by mlucid https://inaturalist.ca/observations/248212377

Magnum Mantleslug (*Magnipelta mycophaga*)

Conservation Status: Blue (S3), COSEWIC/SARA Special Concern

Magnum Mantleslug (Magnipelta mycophaga) Photo: Robert Forsyth[64].

A large terrestrial slug, up to 80 mm long, that is tan with irregular brown and black markings across the body. The mantle covers about 2/3 of the body and has an inconsistent brown to black stripe on either side. The tail is rounded, with prominent dark lines radiating down each side. The large mantle, and large overall size are key characteristics that clearly differentiate it from other species in the region (Montana Natural Heritage Program 2026).

It occurs in higher elevation moist to mesic conifer, mixed and deciduous forests, sometimes near rocks. It is normally found underneath rotten woody debris and rocks (Montana Natural Heritage Program 2026). It is only known from the Silverton area but is expected to occur in numerous locations in the Slocan Valley. Field surveys should be completed between May to October, with many observations recorded throughout the summer and early fall. As it is a higher elevation species, seasonal weather may be a less important factor during surveys relative to lowland species.

Wildfire, drought and forestry are the primary threats to this species. As it mostly occurs in higher elevation forests, other types of development are less likely to affect it.

[64] iNaturalist observation by Robert Forysth. https://inaturalist.ca/observations/19319261

Pale Jumping-slug (*Hemphillia camelus*)

Conservation Status: Blue (S3S4)

Pale Jumping-slug (Hemphillia camelus) showing the exposed shell on the posterior of the mantle. Photo: Ryan Durand.

Pale Jumping-slug (Hemphillia camelus) showing the large, raised mantle. Photo: Ryan Durand.

The Pale Jumping Slug is a medium-sized terrestrial snail that grows up to about 50-80 mm long. It is a very distinctive species, with a large hump-like mantle that contains a partially exposed internal shell. It ranges from pale cream to golden brown or pale grey, and irregular lateral strips may be present. It is the only jumping slug known to occur in the Slocan Watershed and the large mantle makes it easy to identify.

The Pale Jumping Slug occurs in low to mid elevation moist conifer and mixed forests, alluvial fans, and seepage sites. Often found in riparian areas in leaf litter, it is mostly known from mature to old, forested stands. It only occurs in southern BC, with most observations in the West Kootenay and Boundary regions. It has been found sporadically in the Slocan Watershed but is likely widespread. Field surveys should be completed from July to October, with most observations recorded during cool fall months. It is most often found by sifting through leaf litter, and less often in or under well decayed woody debris and rocks.

Forestry, road building, grazing and land development are the primary threats to this species. As it is often associated with riparian areas, there is limited protection to important habitat through watercourse protection regulations, but it also occurs in moist, productive forests that are targeted for logging, and along small seepages that are normally considered nonclassified drainages and not protected.

Pygmy Slug (*Kootenaia burkei*)

Conservation Status: Blue (S3), COSEWIC/SARA Special Concern

Pygmy Slug (Kootenaia burkei) fully extended. Photo: Ryan Durand.

Pygmy Slug (Kootenaia burkei) contracted after disturbance Photo: Ryan Durand.

Sheathed Slug (Zacoleus idahoensis). Photo: Ryan O'Donnell[65].

The Pygmy Slug is the smallest slug in the Kootenay region, with adults up to 9-14 mm long (COSEWIC 2016e). It is readily identifiable by the dark to bright blue colour, with mottling on the mantle and groves on its tail that branch at the rounded end. When constricted, the colour and groves are less obvious. The Red-listed (SARA Special Concern) Sheathed Slug (*Zacoleus idahoensis*) is similar looking, but larger (up to 30mm long), and has a distinctive middorsal keel on its tail. It has been found in the East Kootenay and Pend d'Oreielle River in similar Bioegeoclimatic zones and potentially occurs in the Slocan Watershed.

[65] iNaturalist observation by Ryan O'Donnell. https://inaturalist.ca/observations/19725431

The Pygmy Slug occurs in mesic to moist old growth cedar forests, less commonly in mature forests and mixed forests, and often in riparian areas. It is always associated with large, old coarse woody debris. All records of this species in the Slocan Watershed are from forest stands that are intact with little to no recent human disturbance and in relatively large intact forests. In British Columba, the Pygmy Slug only occurs in the Columbia Basin, with sporadic observations throughout the Slocan Watershed. While it likely occurs more frequently that the limited observations suggest, its association with moist old western redcedar stands limit potential habitat.

Field surveys should be completed from May to October, with most observations occurring in the late fall during cool, moist periods. Surveys for this very small slug are difficult due to the species' small size, dark colour, and association with moist, dark forests. Most detections are made by scanning the surface of large woody debris from an oblique angle, and less frequently from flipping old wood and bark, then scanning the underneath. A light and hand lens are important tools.

This species mostly occurs on forested Crown Land and is threatened by the removal of tree cover, road building, wildfires, and invasive species (COSEWIC 2016e). Any activity that changes tree cover, alters or removes woody debris, litter, or soils, may affect its habitat. Habitat fragmentation (primarily from forestry activities), high severity wildfire, and potentially fuel reduction programs, have negative effects on potential habitat, refugia, and recruitment.

Herrington Fingernailclam (*Sphaerium occidentale*)

Conservation Status: Blue (S3S4)

Herrington Fingernailclam (Sphaerium occidentale). Photo: Tyson Ehlers.

Herrington Fingernailclam (Sphaerium occidentale). Photo: Ryan Durand.

Young and mature Herrington Fingernailclams (Sphaerium occidentale). Photo: Tyson Ehlers.

Relative size of Herrington Fingernailclams (Sphaerium occidentale). Photo: Tyson Ehlers.

The Herrington Fingernailclam is a small, fragile freshwater clam that is unlikely to be mistaken for other species in the Slocan watershed due to its specific habitat requirements. It grows up to 8 mm wide, and often a range of shell sizes are found. Dead shells are more commonly found than living clams. There are three other Fingernailclams in the genus *Musculium* that occur in the Slocan, but they are all associated with permanent water and have fairly prominent 'beaks' at the back of the shell where the top and bottom are attached.

It occurs in moist to wet margins of wetlands, watercourses, ponds and potentially seepage sites that seasonally dry out. It is normally found in muddy or well decomposed organic material that stays wet throughout the year. It is known to be affiliated with calcareous deposits, but in the Slocan, it is found in a variety of conditions. Herrington Fingernailclam have been infrequently observed in wetlands near Summit Lake and in backwater channels along the Slocan River. It likely occurs in many other places, but

the habitat and small size make it an easily overlooked species. Field surveys should occur during the spring to fall during seasonally low water periods.

As this species is associated with wetlands and riparian areas, it is not threatened by most developments. Normal buffers of 15-30 m used by forestry and private land development around wetlands and watercourses should be sufficient to maintain habitat requirements. Seepage sites and wet forests that are adjacent to wetlands and watercourses may contain potential habitat and are more likely to be disturbed. Alterations to local hydrology (diversions, ditches, dams, culverts, etc.) may also affect habitat quality.

Management Recommendations

- Complete surveys during cool (not cold) weather or immediately after precipitation to maximize the potential to locate active molluscs.
- Survey effort should involve searches though litter, in and under woody debris and bark, and under rocks.
- Where at risk molluscs are located, create a minimum 50 m buffer around the occurrence to provide enough habitat for the population to persist and contain enough individuals to reestablish in the adjacent modified areas.
- Retain as much coarse woody debris as possible, especially old well decayed wood (that does not increase wildfire risk if left, but is also very sensitive to disturbance) and where possible abundant fresh large woody debris to provide future habitat as forests recover.
- Limit litter, humus and soil disturbance when possible. It is assumed that winter harvest would keep potential habitat more intact, especially if combined with retention of patches and woody debris.
- Avoid alterations of hydrology, including NCD drainages.
- Ensure replanting does not introduce exotic molluscs into the area.

4.14 VASCULAR PLANTS

Over 1,000 species of vascular plants have been recorded in the Slocan Watershed, including native and introduced species. To date, eight SAR vascular plants have been recorded in the watershed, with numerous additional species likely to occur. In particular, subalpine and alpine areas have been poorly sampled. There are numerous interesting vascular plants that occur in the watershed that are non-longer listed species such as Giant Helleborine (*Epipactis gigantea*), Snow Bramble (*Rubus nivalis*) and Beaked Spike-rush (*Eleocharis rostellata*), are unexpected in the region such as White Beak-rush (*Rhynchospora alba*), or are coastal disjuncts that occur in the inland temperate rainforest but are more commonly associated with coastal regions.

Gnome Plant (Hemitomes congestum). Photo: Tyson Ehlers. Snow Bramble (Rubus nivalis). Photo: Ryan Durand.

White Beak-rush (Rhynchospora alba), Giant Helleborine (Epipactis gigantea), and Beaked Spike-rush (Eleocharis rostellata). Photos: Ryan Durand.

Columbia Quillwort (*Isoetes minima*)

Conservation Status: Red (S1S2), COSEWIC/SARA Endangered

Columbia Quillwort (Isoetes minima), left and bulb, right. Photos: Ryan Durand.

Columbia Quillwort (*Isoetes minima*) is a small, perennial plant that is comprised of 6 to 12 slender, erect leaves (3–6 cm long) surrounding a whitish, bulbous base. The bases of the leaves are flared and sheathing and contain a rounded region at the base that contains the spores within a thin membranous flap (known as the 'sporangium'). Two types of whitish to yellowish-brown spores are present within these sporangia: smaller microspores and larger megaspores. The microspores are minutely pimply or prickly on their surface, while the megaspores have an irregularly roughened to minutely pimply surface texture with several raised ridges across the surface. Assessment of spore characters requires microscopic examination.

It can be found from May to July in small, isolated, seepy openings in forested environments with thin soil over bedrock. It is currently only known from a small number of isolated populations in the Castlegar-Salmo region of the southern Selkirk Mountains, including the mountains above Goose Creek, but there are numerous potential habitats in the southern Slocan Watershed that may support additional populations.

The identification of quillworts is challenging and generally requires the presence of mature spores. Columbia Quillwort is the only terrestrial *Isoetes* species in the West Kootenays, with all other species occurring submerged in water; it is thus distinctive within the context of the flora of the West Kootenays

by virtue of its habitat alone. It is also smaller than other regional quillworts, but further confirmation requires microscopic examination of the surface texture of the spores.

Open riparian features in montane zones of this BEC unit are rare, as that ecotype typically occurs in higher elevations in the ESSF and MS zones in the regions surrounding Castlegar and Salmo, BC, in which this species has been recorded. A 30 m buffer, within which resource operations or land disturbance can be avoided, should be established around the riparian feature that hosts this species. This buffer may protect the hydrological regime of these habitats through minimized impacts on plant communities from sedimentation and light attenuation.

Common Clarkia (*Clarkia rhomboidea*)

Conservation Status: Blue (S2S3)

Common clarkia (Clarkia rhomboidea). Photos: Leanne Stacy Reitan[66].

Common Clarkia (*Clarkia rhomboidea*) is a slender, often delicate annual herb 15–100 cm tall with erect, unbranched to sparsely branched, stiffly short-hairy stems. The leaves are opposite and short-stalked; the blade is lance-shaped to oblong and usually has a rounded tip. One to several flowers are produced at the top of the stem, each comprised of four green-lance-shaped sepals alternating with four diamond-shaped to egg-shaped, short-stalked pink petals atop a slender, cylindrical, greenish ovary. The fruits are elongate, cylindrical, short-pointed, four-chambered capsules with numerous tiny seeds.

It is primarily restricted to the Pend d'Oreille River east of Trail, with scattered occurrences north to Salmo and Castlegar. Common Clarkia can be found in flower from May to July in dry, open, grassy or shrubby habitats in upland environments; sometimes in the understory of dry, open coniferous forests.

[66] iNaturalist observation by Leanne Stacy Reitan. https://inaturalist.ca/observations/162540572

This species is highly distinctive when flowering, as no other species shares its unique pink, diamond- or spoon-shaped petals. The only other *Clarkia* species occurring in the same region, Pink Fairies (*C. pulchella*), have much larger petals that are each divided into three long, slender lobes. When not in flower, Pink Fairies can be distinguished from Common Clarkia by their narrower, usually linear to lanceolate, unstalked leaves (vs. leaves broader, lanceolate to elliptic, and short-stalked in Common Clarkia).

As an annual, this species completes its entire life cycle over the course of a single year. As a result, it is highly dependent on the existing seedbank in the soil to maintain its populations over time. Seed germination is correlated with annual climate and weather conditions, and the size of a given population will vary between years as a result of these fluctuations; such populations may appear to be nearly absent during years with poor growing conditions.

Given its need for dry open areas, resource operations should allow for a 30-m buffer from known populations so as to not alter the light and temperature regime that enables the open ecosystems. As with many species that occupy open, dry habitats, Common Clarkia is threatened by the encroachment of invasive plants into its populations; development near known populations should take care to minimize the transport of invasive species propagules and eliminate any populations of these species that become established.

Cut-leaved Water-parsnip (*Berula incisa*)

Conservation Status: Blue (S3?)

Cut-leaved Water Parsnip (Berula incisa). Photos: Finn McGee.[67]

Cut-leaved Water Parsnip (*Berula incisa*) is a large semi-aquatic plant that grows in moist to wet areas including wetlands, diches and streambanks. It develops large compound basal leaves up to 12 cm long, with small upper steam leaves occurring. Stems of up to 80 cm tall produce several white umbrella-like clusters of small white flowers. The flowers could be mistaken for other members of the Apiaceae family, such as hemlock water-parsnip (*Sium suave*), but the leaves are distinctive.

This species is only known from the Snk'mip (Bonanza) Marsh area on the north end of Slocan Lake. It may occur in other areas of the watershed, as there is abundant habitat, however extensive surveys of most wetlands in the watershed have been completed and additional populations have not been detected. This species is dependent on moist to wet soils and is threatened by developments that alter local hydrology (increasing or decreasing water depth and permanence), invasive species, and direct physical disturbance.

[67] iNaturalist observations by Finn McGee. https://inaturalist.ca/observations/250838739 and https://inaturalist.ca/observations/250819669

Dark-green Hawthorn (*Crataegus atrovirens*)

Conservation Status: Blue (S3)

Dark Green Hawthorn (Crataegus atrovirens). Photo: Vincent Laurie.[68]

Dark-green Hawthorn (*Crataegus atrovirens*) is a medium sized deciduous shrub that grows up to 5 metres tall, often with multiple erect trunks. As with all species of hawthorn, it is readily recognizable by large thorns (3-5 cm long) on branches and twigs. It has abundant small flowers in the spring, that develop into burgundy to dark purple clusters of fruit in the late summer to early fall. The identification of hawthorn species is difficult, with the large thorns, small flowers and large glands on the leaf teeth being useful features (eFloras 2026).

This species is only known from the north end of Summit Lake. It potentially grows in other locations in the watershed, as it is difficult to tell apart from the common black hawthorn (*Crataegus douglasii*) and may be overlooked.

[68] iNaturalist observation by Vincent Laurie https://inaturalist.ca/observations/243895748

Heartleaf Springbeauty (*Claytonia cordifolia*)

Conservation Status: Blue (S2S3)

Heartleaf springbeauty (Claytonia cordifolia), left and western spring-beauty (C. lanceolata), right. Photos: Ryan Durand.

The smaller Western Spring-beauty (*C. lanceolata*) has narrower, broadly lanceolate or elliptic stem leaves and either lacks basal leaves or has 1-2 elliptic to broadly lanceolate basal leaves; the petals of *C. lanceolata* have a yellow spot at their base and are often finely pink-veined (vs. entirely white in *C. cordifolia*). Western Spring-beauty occurs (May to August) in a wide variety of mesic to seasonally moist habitats at all elevations, primarily in open areas, and is common at valley bottom elevations where Heart-leaved Spring-beauty is absent. It has also been found on moist road margins in higher elevation areas in the Lemon Creek drainage. Occurrences of this species are closely associated with wet soils and shady, forested overstories, particularly in montane and subalpine environments. It may be a significant component of understory vegetation in its preferred habitats, but the narrowness of its ecological amplitude limits its abundance at the landscape level.

In the Slocan Watershed, it is known from the Lemon Creek drainage from low to mid elevations, and in the Fennel Creek area. It is well represented in the Kootenay area, and there are likely additional populations in the Slocan Watershed. As a riparian plant, suitable habitat in which this species is found beside wetlands and streams should be allowed at least a 30 m buffer where no resource operations or land disturbance occurs. This 30 m buffer allows for minimal light, sediment, and nutrient fluctuations following timber harvest, which can assist in maintaining habitat conditions for this species.

Mountain Moonwort (*Botrychium montanum*)

Conservation Status: Blue (S3)

Mountain Moonwort (Botrychium montanum). Photos: Ryan Durand.

Two-spiked Moonwart (left); Michigan Moonwort (middle); and Northwestern Moonwort (right). Photos: Ryan Durand.

Mountain Moonwort is a small (2–10 cm tall), soft green, erect plant that is divided into two components: a taller, erect fertile portion ('sporophore') that bears spherical, often golden-yellow sporangia (containing the spores) and a short to elongate, pinnately lobed sterile portion ('trophophore') that

emerges part-way up the plant. The segments of the trophophore are few (usually three to five, sometimes appearing almost undivided), broad-based, and squared-off at the tips, sometimes with finely toothed margins.

This species is smaller than other moonworts in the West Kootenay, although very small individuals can occur in any of these species. The once-pinnate sterile blade with short, flat-tipped, broad-based segments is also distinctive, and some small plants may appear to have an almost undivided trophophore; other moonworts have either 2 to 3x pinnate trophophores or are once-pinnate but have the segments more narrow-based. The fertile portion of the plant is unbranched or, at most, has very short, spreading branches, unlike the often branched sporophores of other species. The typically forested habitat of mountain moonwort is distinctive, as most other *Botrychium* species are more characteristic of open, grassy habitats and few occur in closed-canopy forests. This species emerges and persists later in the season than other moonworts, most of which have senesced by late July, with the survey period ranging from July to September, sometimes as early as June.

It most commonly occurs in moist, mature or old-growth redcedar forests with a prominent understory of Devil's-club, where its tiny size and low population density can make it very challenging to locate. Occasionally it grows in more open, grassy meadows and disturbed areas (e.g., rights-of-way, weedy roadsides), where it may occur in mixed populations with other *Botrychium* species.

Other moonworts that it may be confused with include the Blue-listed Two-spiked Moonwort (*Botrychium paradoxum*), an uncommon species in the Kootenay region; while the Yellow-listed Michigan Moonwort (*Botrychium michiganense*) and Northwestern Moonwort (*Botrychium pinnatum*) occur sporadically throughout the Slocan Watershed. It occurs throughout the West Kootenay. Most frequently found in the wet, low elevation forests of the ICH zone, and rare in the drier forests of the IDF zone and the cooler, higher-elevation forests of the ESSF and MS zones.

Moonworts are perennial ferns that spend most of their lives below-ground in their gametophytic or early sporophytic phases. During this non-photosynthetic period, *Botrychium* spp. form mycorrhizal connections with subterranean fungi of the genus Glomus that enable their survival under the surface of the forest floor. Thus, like other moonwort species, *B. montanum* requires an intact soil mycorrhizal network for survival. It may occur in disturbed habitats such as weedy roadsides and grassy pastures but is more typical of mature redcedar forests where few other members of the genus occur. When it does occur with other Botrychium species in mixed-species populations, it is generally only as single plants or small groups. Buffers of at least 30 meters should be established around known *Botrychium* spp. populations due to their need for intact mycelial networks that may be affected by trampling or soil compaction. Mycorrhizal networks are expansive, and their connectivity is critical to their survival. The larger the buffer around these plants, the more likely the management strategy will be effective in protecting their habitat. Small populations growing along grassy trailsides may be subject to trampling or other forms of physical disturbance. Forestry operations have recently been documented extirpating small populations in the Kootenay Lake area.

Sweet-flowered Fairy-candelabra (*Androsace chamaejasme* ssp. *lehmanniana*)

Conservation Status: Blue (S2S3)

Sweet-flowered Fairy-candelabra (Androsace chamaejasme ssp. lehmanniana). Photo: Douglas Tate[69]

Sweet-flowered fairy-candelabra (*Androsace chamaejasme* ssp. *lehmanniana*) is a small perennial that occurs in mesic to dry supalpine and alpine areas. It forms a loose mat of small leaved (3-15 mm) basal rosettes connected by prostrate stems. Inflorescences of 2-8 white to pinkish flowers occur during June to August on 2-10 cm long, hairy scapes. Sweet-flowered fairy-candelabra is associated with calcareous soils and grows in meadows, rocky slopes, alpine tundra and heath, and gravelly areas (Klinkenberg 2020).

It is a rarely observed species in the Slocan Watershed, with a single known occurrence in the Valhalla mountains. Due to its small size and high elevation habitat, there is a high potential for additional occurrences. This species is not likely to be threatened by most types of developments, with the potential for the development of recreational trails or ski runs to impact it. If found, a 30-meter buffer should be created around it to limit soil disturbance.

[69] iNaturalist observation by Douglas Tarte. https://inaturalist.ca/observations/312058635

Whitebark Pine (*Pinus albicaulis*)

Conservation Status: Blue (S2S3), COSEWIC/SARA Endangered

Whitebark Pine. Photo: Ryan Durand.

Whitebark Pine needles and cone (left) and Western White Pine needles (right). Photos: Ryan Durand.

Whitebark Pine, a small to medium-sized (to 21 m tall) coniferous tree with an often contorted trunk and wide-spreading branches that bear smooth, chalky-white to pale grey bark when young (mature bark becomes grey-brown and broken into thin plates). The yellow-green to blue-green needles are 3-7 cm long and occur in bunches along the branches, and occur in clusters of five from a papery sheath (fascicle'). The short (4-8 cm long), blackish-brown or purplish-brown cones are broadly egg-shaped to almost spherical and are comprised of numerous woody scales that lack a sharp spine at their tip. This species often adopts a low, shrubby 'krummholz' form when growing in alpine habitats.

Only two pine species in the West Kootenays bear needles in clusters of five: Western White Pine (*P. monticola*) and Whitebark Pine; however, Western White Pine is a taller (to 70 m), straight-trunked tree of low elevation, valley bottom habitats rather than the exposed subalpine environments of Whitebark Pine. Most importantly, the cones of Western White Pine are long and cylindrical, often reaching lengths of 25 cm or more (vs. cones egg-shaped, 4-8 cm long in Whitebark Pine), and the leaves are longer (5-10 cm long) and more strongly blue-tinged.

Over half of the global range of *Pinus albicaulis* is in Canada, occurring between the Coast-Cascade Mountains in the West to the Rockies on the Alberta boarder in the East. In the Slocan Watershed, Whitebark Pine occurs at subalpine and alpine elevations along most if not all of the mountains. It occurs as a component of high elevation conifer forests, especially in subalpine and lower alpine areas. Often associated with rocky substrates, ridgelines, subalpine parkland, and exposed outcrops.

This species is at risk due to four main interacting drivers: climate change, forest fires and fire suppression and management, Mountain Pine Beetle, and White Pine Blister Rust. Human disturbance is considered a compounding impact on the survival of Whitebark Pine. It is considered a 'keystone' species, as its presence has a disproportionally high impact on ecosystem function and biological diversity relative to other organisms. This species plays a vital role in the hydrology in the areas it grows; it strongly influences snow interception and snowmelt, which impacts timing, flashiness, and intensity of stream flow. Whitebark Pine is the primary nutrient source for Clark's Nutcracker (*Nucifraga columbiana*) and provides an important source of fat mammals such as Grizzly Bears (*Ursus arctos)* and Red Squirrels (*Tamiasciurus hudsonicus*).

There are many research projects assessing the most impactful conservation management tools for the protection of this species. Current in-situ best practices are to protect habitat and projected critical habitat that is within 2 km of known Whitebark Pine populations[70].

[70] See p. 30 of https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/plans/rs_whitebark_pine_e_proposed.pdf for definition of "critical habitat".

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APPENDIX A. LIST OF SPECIES AT RISK IN THE SLOCAN WATERSHED

Species Group	Scientific Name	Common Name	Global Status	Provincial Status	BC List	COSEWIC	SARA Schedule	SARA
Amphibian	*Anaxyrus boreas*	Western Toad	G4	S4	Yellow	Special Concern	1	Special Concern
Amphibian	*Plethodon idahoensis*	Coeur d'Alene Salamander	G4	S3?	Blue	Special Concern	1	Special Concern
Arachnid	*Antrodiaetus pugnax*	Great Basin Foldingdoor Spider	GNR	S2S3	Not Reviewed			
Bird	*Accipiter atricapillus atricapillus*	American Goshawk, atricapillus subspecies	G5T5	S3S4	Blue	Not at Risk		
Bird	*Aechmophorus occidentalis*	Western Grebe	G5	S1S2B,S2N	Red	Special Concern	1	Special Concern
Bird	*Aeronautes saxatalis*	White-throated Swift	G5	S3S4B	Blue			
Bird	*Ardea herodias herodias*	Great Blue Heron, herodias subspecies	G5T5	S3?	Blue			
Bird	*Asio flammeus*	Short-eared Owl	G5	S3B,S1N	Blue	Threatened	1	Special Concern
Bird	*Buteo lagopus*	Rough-legged Hawk	G5	S3N	Blue	Not at Risk		
Bird	*Buteo swainsoni*	Swainson's Hawk	G5	S2B	Red			
Bird	*Charadrius vociferus*	Killdeer	G5	S3S5B	Blue			
Bird	*Chordeiles minor*	Common Nighthawk	G5	S3S5B	Blue	Special Concern	1	Special Concern
Bird	*Coccothraustes vespertinus*	Evening Grosbeak	G5	S5	Yellow	Special Concern	1	Special Concern
Bird	*Contopus cooperi*	Olive-sided Flycatcher	G4	S4B	Yellow	Special Concern	1	Special Concern
Bird	*Cygnus columbianus*	Tundra Swan	G5	S3N	Blue			
Bird	*Cypseloides niger*	Black Swift	G4	S2S4B	Blue	Endangered	1	Endangered

Species Group	Scientific Name	Common Name	Global Status	Provincial Status	BC List	COSEWIC	SARA Schedule	SARA
Bird	*Dolichonyx oryzivorus*	Bobolink	G5	S2?B	Red	Special Concern	1	Threatened
Bird	*Empidonax wrightii*	Gray Flycatcher	G5	S2S3B	Blue	Not at Risk		
Bird	*Eremophila alpestris*	Horned Lark	G5	S3S5	Blue			
Bird	*Euphagus carolinus*	Rusty Blackbird	G4	S3S4	Blue	Special Concern	1	Special Concern
Bird	*Falco mexicanus*	Prairie Falcon	G5	S1	Red	Not at Risk		
Bird	*Falco peregrinus anatum*	Peregrine Falcon, anatum subspecies	G4T4	S2?	Red	Not at Risk		
Bird	*Gavia adamsii*	Yellow-billed Loon	G4	S2S3N	Blue	Not at Risk		
Bird	*Himantopus mexicanus*	Black-necked Stilt	G5	S1B	Red			
Bird	*Hirundo rustica*	Barn Swallow	G5	S4B	Yellow	Special Concern	1	Threatened
Bird	*Larus californicus*	California Gull	G5	S1B,SNRN	Red			
Bird	*Megascops kennicottii macfarlanei*	Western Screech-Owl, macfarlanei subspecies	G4G5T4	S3	Blue	Threatened	1	Threatened
Bird	*Melanerpes lewis*	Lewis's Woodpecker	G4	S2S3B	Blue	Threatened	1	Threatened
Bird	*Nannopterum auritum*	Double-crested Cormorant	G5	S3S4	Blue	Not at Risk		
Bird	*Pelecanus erythrorhynchos*	American White Pelican	G4	S1B	Red	Not at Risk		
Bird	*Podiceps auritus*	Horned Grebe	G5	S4B,SNRN	Yellow	Special Concern	1	Special Concern
Bird	*Podiceps nigricollis*	Eared Grebe	G5	S3B	Blue			
Bird	*Progne subis*	Purple Martin	G5	S3S4B	Blue			
Bird	*Riparia riparia*	Bank Swallow	G5	S4?B	Yellow	Threatened	1	Threatened

Species Group	Scientific Name	Common Name	Global Status	Provincial Status	BC List	COSEWIC	SARA Schedule	SARA
Bird	*Sterna forsteri*	Forster's Tern	G5	S1B	Red	Data Deficient		
Bird	*Tringa flavipes*	Lesser Yellowlegs	G5	S3S4B	Blue	Threatened		
Bird	*Zonotrichia querula*	Harris's Sparrow	G5	SUM	Unknown	Special Concern		
Bryophyte	*Marchantia polymorpha ssp. montivagans*	0	G5T3T5	S3	Blue			
Bryophyte	*Nardia geoscyphus*	0	G5	S3	Blue			
Bryophyte	*Neoorthocaulis attenuatus*	0	G5	S2S3	Blue			
Bryophyte	*Pohlia bulbifera*	0	G5	S3?	Blue			
Bryophyte	*Scapania gymnostomophila*	0	G4	S2S3	Blue			
Bryophyte	*Scouleria marginata*	margined streamside moss	G3	SH	Red	Endangered	1	Endangered
Bryophyte	*Solenostoma hyalinum*	0	G5	S2S3	Blue			
Bryophyte	*Solenostoma sphaerocarpum*	0	G5	S3	Blue			
Bryophyte	*Tetrodontium repandum*	0	G2G3	S3	Blue			
Fish	*Acipenser transmontanus pop. 2*	White Sturgeon (Upper Columbia River Population)	G3T3Q	S1	Red	Endangered	1	Endangered
Fish	*Cottus confusus*	Shorthead Sculpin	G5	S3	Blue	Special Concern	1	Special Concern
Fish	*Cottus hubbsi*	Columbia Sculpin	G4Q	S3	Blue	Special Concern	1	Special Concern

Species Group	Scientific Name	Common Name	Global Status	Provincial Status	BC List	COSEWIC	SARA Schedule	SARA
Fish	*Oncorhynchus clarkii lewisi*	Cutthroat Trout, lewisi subspecies	G4	S2S3	Blue	Special Concern	1	Special Concern
Fish	*Rhinichthys umatilla*	Umatilla Dace	G3G4	S2	Red	Threatened	3	
Fish	*Salvelinus confluentus*	Bull Trout	G5	S3S4	Blue	Special Concern		
Fungus	*Armillaria nabsnona*	0	GNR	S2S4	Blue			
Fungus	*Arrhenia epichysium*	0	GNR	S2S3	Blue			
Fungus	*Arrhenia lobata*	0	G5	S2S3	Blue			
Fungus	*Asterophora lycoperdoides*	Powder Cap	GNR	S3	Blue			
Fungus	*Baeospora myriadophylla*	0	GNR	S2S4	Blue			
Fungus	*Bjerkandera adusta*	Smoky polypore	GNR	S2S4	Blue			
Fungus	*Boletopsis grisea*	grey falsebolete	GNR	S3	Blue			
Fungus	*Cantharellus roseocanus*	rainbow chanterelle	GNR	S2S3	Blue			
Fungus	*Cantharellus subalbidus*	white chanterelle	GNR	S3	Blue			
Fungus	*Cerioporus varius*	0	G5	S3	Blue			
Fungus	*Cheilymenia fimicola*	0	GNR	S2S4	Blue			
Fungus	*Chlorociboria aeruginosa*	0	GNR	S3	Blue			
Fungus	*Chrysomphalina chrysophylla*	0	GNR	S3	Blue			
Fungus	*Ciboria rufofusca*	0	GNR	S2S4	Blue			

Species Group	Scientific Name	Common Name	Global Status	Provincial Status	BC List	COSEWIC	SARA Schedule	SARA
Fungus	*Climacocystis borealis*	0	G4	S2S4	Blue			
Fungus	*Clitocybe albirhiza*	0	GNR	S3	Blue			
Fungus	*Dacrymyces minor*	0	GNR	S2S4	Blue			
Fungus	*Deconica angustispora*	0	GNR	S2S4	Blue			
Fungus	*Fomitopsis officinalis*	0	GNR	S2S4	Blue			
Fungus	*Geastrum quadrifidum*	0	GNR	S2S4	Blue			
Fungus	*Geastrum saccatum*	rounded earthstar	GNR	S3	Blue			
Fungus	*Geopyxis carbonaria*	0	GNR	S3	Blue			
Fungus	*Gliophorus psittacinus*	0	GNR	S3	Blue			
Fungus	*Gomphus clavatus*	pig's ears	GNR	S3	Blue			
Fungus	*Neolentinus lepideus*	0	GNR	S3	Blue			
Fungus	*Neournula pouchetii*	0	GNR	S2S3	Blue			
Fungus	*Peziza varia*	0	GNR	S3	Blue			
Fungus	*Phaeotremella foliacea*	0	GNR	S2S4	Blue			
Fungus	*Phellodon melaleucus*	0	GNR	S3	Blue			
Fungus	*Phellodon tomentosus*	0	GNR	S3	Blue			
Fungus	*Ramaria marrii*	0	GNR	S3	Blue			
Fungus	*Trametes hirsuta*	0	GNR	S2S4	Blue			
Fungus	*Trichoglossum hirsutum*	Hairy Earthtongue	GNR	S2S3	Blue			
Fungus	*Tricholomopsis decora*	Decorated Mop	GNR	S2S4	Blue			

Species Group	Scientific Name	Common Name	Global Status	Provincial Status	BC List	COSEWIC	SARA Schedule	SARA
Fungus	*Turbinellus floccosus*	Scaly Chanterelle	GNR	S3	Blue			
Fungus	*Turbinellus kauffmanii*	0	G3?	S2S3	Blue			
Insect	*Aeshna constricta*	Lance-tipped Darner	G5	S3	Blue			
Insect	*Anax junius*	Common Green Darner	G5	S3	Blue			
Insect	*Argia vivida*	Vivid Dancer	G5	S3	Blue	Special Concern	1	Special Concern
Insect	*Bombus flavidus*	Fernald's Cuckoo Bumblebee	G5?	S3S4	Blue			
Insect	*Bombus occidentalis*	Western Bumble Bee	G3	S4	Yellow	Threatened	1	Threatened
Insect	*Bombus suckleyi*	Suckley's Cuckoo Bumble Bee	G2G3	S3S4	Blue	Threatened		
Insect	*Coccinella transversoguttata*	Transverse Lady Beetle	G5	S5	Not Reviewed	Special Concern	1	Special Concern
Insect	*Colias skinneri*	Skinner's Pelidne Sulphur	G4	S3?	Blue			
Insect	*Danaus plexippus*	Monarch	G4	S1?B	Red	Endangered	1	Endangered
Insect	*Dipalta serpentina*	0	GNR	S3	Not Reviewed			
Insect	*Epargyreus clarus*	Silver-spotted Skipper	G5	S3	No Status			
Insect	*Erynnis propertius*	Propertius Duskywing	G5	S2	Red			
Insect	*Eumenes verticalis*	a potter wasp	GNR	S3	Not Reviewed			
Insect	*Euptoieta claudia*	Variegated Fritillary	G5	S3N	Blue			

Species Group	Scientific Name	Common Name	Global Status	Provincial Status	BC List	COSEWIC	SARA Schedule	SARA
Insect	*Evergestis subterminalis*	0	GNR	S3S4	Blue			
Insect	*Libellula pulchella*	Twelve-spotted Skimmer	G5	S3	Blue			
Insect	*Megachile angelarum*	0	G4G5	S3	Not Reviewed			
Insect	*Megachile fidelis*	Horn-faced Leaf-cutter Bee	G5	S3	Not Reviewed			
Insect	*Nomada edwardsii*	0	GNR	S3	Not Reviewed			
Insect	*Oecanthus argentinus*	Prairie Tree Cricket	G5	S3	Not Reviewed			
Insect	*Oecanthus californicus*	Western Tree Cricket	GNR	S2	Not Reviewed			
Insect	*Oecanthus fultoni*	Snowy Tree Cricket	G5	S1S2	Not Reviewed			
Insect	*Oecanthus rileyi*	Riley's Tree Cricket	GNR	S2S3	Not Reviewed			
Insect	*Ophiogomphus occidentis*	Sinuous Snaketail	G5	S3	Blue			
Insect	*Pennisetia marginatum*	Raspberry Crown Borer Moth	GNR	S3?	Blue			
Insect	*Pseudopomala brachyptera*	Bunchgrass Grasshopper	G5	S2S3	Not Reviewed			
Insect	*Symmorphus canadensis*	a potter wasp	G5	S3	Not Reviewed			
Lichen	*Lichinella nigritella*	black rocklicorice	G4G5	S3	Blue			

Species Group	Scientific Name	Common Name	Global Status	Provincial Status	BC List	COSEWIC	SARA Schedule	SARA
Mammal	*Corynorhinus townsendii*	Townsend's Big-eared Bat	G4	S3	Blue			
Mammal	*Gulo gulo luscus*	Wolverine	G4	S3	Blue	Special Concern	1	Special Concern
Mammal	*Lasiurus cinereus*	Hoary Bat	G3G4	S3S4	Blue	Endangered		
Mammal	*Myotis lucifugus*	Little Brown Myotis	G3G4	S3S4	Blue	Endangered	1	Endangered
Mammal	*Myotis yumanensis*	Yuma Myotis	G5	S3	Blue			
Mammal	*Oreamnos americanus*	Mountain Goat	G5	S3	Blue			
Mammal	*Rangifer tarandus pop. 1*	Caribou (Southern Mountain Population)	G5TNRQ	S1	Red	Endangered	1	Threatened
Mammal	*Ursus arctos*	Grizzly Bear	G4	S3?	Blue	Special Concern	1	Special Concern
Mollusc	*Anguispira kochi*	Banded Tigersnail	G5	S3S4	Blue	Not at Risk		
Mollusc	*Cryptomastix mullani*	Coeur d'Alene Oregonian	G4	S3S4	Blue			
Mollusc	*Hemphillia camelus*	Pale Jumping-slug	G4	S3S4	Blue			
Mollusc	*Kootenaia burkei*	Pygmy Slug	G3	S3	Blue	Special Concern	1	Special Concern
Mollusc	*Magnipelta mycophaga*	Magnum Mantleslug	G3	S3	Blue	Special Concern	1	Special Concern
Mollusc	*Radiodiscus abietum*	Fir Pinwheel	G4	S2?	Red			
Mollusc	*Sphaerium occidentale*	Herrington Fingernailclam	G5	S3S4	Blue			
Protozoan	*Badhamia foliicola*	a slime mold	GNR	S2S4	Blue			
Protozoan	*Perichaena corticalis*	a slime mold	GNR	S3	Blue			

Species Group	Scientific Name	Common Name	Global Status	Provincial Status	BC List	COSEWIC	SARA Schedule	SARA
Protozoan	*Prototrichia metallica*	a slime mold	GNR	S3	Blue			
Reptile	*Charina bottae*	Northern Rubber Boa	G5	S4	Yellow	Special Concern	1	Special Concern
Reptile	*Chrysemys picta pop. 2*	Painted Turtle - Intermountain - Rocky Mountain Population	G5T2T3Q	S3?	Blue	Special Concern	1	Special Concern
Reptile	*Plestiodon skiltonianus*	Western Skink	G5	S3S4	Blue	Special Concern	1	Special Concern
Vascular Plant	*Androsace chamaejasme ssp. lehmanniana*	sweet-flowered fairy-candelabra	G5T5	S2S3	Blue			
Vascular Plant	*Berula incisa*	cut-leaved water-parsnip	G4G5	S3?	Blue			
Vascular Plant	*Botrychium montanum*	mountain moonwort	G3G4	S3	Blue			
Vascular Plant	*Clarkia rhomboidea*	common clarkia	G5	S2S3	Blue			
Vascular Plant	*Claytonia cordifolia*	heart-leaved springbeauty	G5	S2S3	Blue			
Vascular Plant	*Crataegus atrovirens*	dark-green hawthorn	G3	S3	Blue			
Vascular Plant	*Isoetes minima*	Columbia quillwort	G1G2	S1S2	Red	Endangered	1	Endangered
Vascular Plant	*Pinus albicaulis*	whitebark pine	G3G4	S2S3	Blue	Endangered	1	Endangered