Species-at-Risk in the Slocan Watershed

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SWAMP
Slocan Wetland Assessment & Monitoring Project

Executive Summary

The BC Conservation Data Centre (CDC) currently tracks only 20 occurrences of species-at-risk in the Slocan Watershed. One of the occurrences, crested woodfern (*Dryopteris cristata*), was observed and submitted during the 2014 SWAMP field program. Eight of the 20 records are over 30 years old and their current condition and viability is unknown.

Through this project, which was largely a desktop exercise, we have confirmed 47 species-at-risk in the Slocan Watershed in 154 locations, and have identified an additional 11 species that have a high potential to occur. The species include vertebrates, invertebrates, reptiles, amphibians, vascular plants and non-vascular plants. This represents a considerable increase in the number of species-at-risk known to exist in the watershed, although several species on the list are well documented, but are not tracked, or do not show up on, CDC data.

The results of this project make it apparent that there is still much to be discovered regarding the species-at-risk that inhabit the Slocan Watershed. With every additional field check more species are found, and the range of existing species is expanded. We hope to secure funding to move beyond this desktop exercise and complete additional inventories. We recommend that a series of specific surveys be carried out in the watershed to complement previous studies. These studies would be completed by experts in their field and focus on under-inventoried areas, namely vascular and non-vascular plants, amphibians and invertebrates.

Acknowledgments

Many people assisted in this project by sharing reports, general knowledge, locational data, or assisting with identification of species, including: Peter Corbett, Denise Default, Irene Manley, Marlene Machmer, Verena Shaw, Marcy Mahr, Tyson Ehlers, Gregoire Lamoreux, Richard Johnson, Dr. Kristina Ovaska, Robert Forsyth, Dr. Terry McIntosh, Jakob Dulisse, Wayne McCrory, Curtis Bjork, Dr. Toby Spirille, Jo-Anne Stacy, Dr. Dwyane Lepitzki, Judy Lauret, Peter McIver, Janice Arndt, Doris Hausleitner, and many others.

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Slocan Wetlands Assessment and Monitoring Project (SWAMP)

The Slocan Wetlands Assessment and Monitoring Project (SWAMP) is a collaboration of three societies, Slocan Solutions, Slocan River Streamkeepers and Slocan Lake Stewardship, working with the BC Wildlife Federation, Fish and Wildlife Compensation Program, BC Ministry of Forests Lands and Natural Resource Operations, Columbia Basin Trust, Selkirk College, Central Kootenay Invasive Species Society, and Regional District of Central Kootenay, to provide an integrated watershed approach to wetland understanding and management. Slocan Solutions Society is the fiscal manager of the program.

SWAMP is a multi-year initiative to establish a community based monitoring program to assess the abundance, distribution, and ecological integrity/function of wetlands and riparian habitat throughout the Slocan watershed. The long-term goal of SWAMP is to utilize existing mapping and inventory data as base layers and to develop a detailed and comprehensive habitat assessment of flora and fauna of the watershed.

Funding for this project was provided by the Columbia Basin Trust.

1.0 Introduction

The purpose of this project was to create a comprehensive list of the Species-at-Risk (SAR) in the Slocan Watershed, along with species accounts and mapping. During previous SWAMP mapping and inventory work in the watershed over the last number of years, it became apparent that while many independent studies have been done, there lacked an overview of both the SAR present in the watershed and their extent.

This project was primarily a desktop exercise that involved the collection of published and unpublished reports of any SAR species within the watershed, as well as species that have a high potential to occur. Data was also obtained by local specialists and includes unformed anecdotal reports. We do not consider this list to be exhaustive; rather it is a first attempt at collecting existing data with the hope that data collection will continue.

2.0 Species Conservation Status and Ranks

This report refers to a variety of provincial, federal and global conservation ranks and status assessments of species. The following section has been taken directly from the British Columbia Conservation Data Centre (BC CDC 2016a) to aid in readers understanding of the terminology.

BC Species at Risk Status:

Species are assigned to provincial lists depending on their Provincial Conservation Status (see table below). The lists are as follows:

- **Extinct**: Species that no longer exist. This status is only assigned if the Global Conservation Status rank is GX.

- **Red**: Includes any indigenous species or subspecies that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.

- **Blue:** Includes any indigenous species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.

- **Yellow:** Includes species that are apparently secure and not at risk of extinction. Yellow-listed species may have red- or blue-listed subspecies.

- **Exotic:** Species that have been moved beyond their natural range as a result of human activity. Exotic species are also known as alien species, foreign species, introduced species, non-indigenous species and non-native species. Exotic species are excluded from the Red, Blue and Yellow Lists as a Provincial Conservation Status Rank is not applicable (i.e. SNA)

- **Accidental**: Species occurring infrequently and unpredictably, outside their usual range. Accidental species are excluded from the Red, Blue and Yellow Lists as a Provincial Conservation Status Rank is not applicable (i.e., SNA)

- **Unknown**: Includes species or subspecies for which the Provincial Conservation Status is unknown due to extreme uncertainty (e.g., S1S4). It will also be 'Unknown' if it is uncertain whether the entity is native (Red, Blue or Yellow), introduced (Exotic) or accidental in B.C. This designation highlights species where more inventory and/or data gathering is needed.

- **No Status:** Includes species that have not been ranked (i.e., Provincial Conservation Status Rank is SNR). No Status is also assigned to an animal when all subspecies or populations of a species are assigned to either the Red List or the Blue List. For example, there are two populations of Western Painted Turtle in B.C.; one population is on the Red List, the other is on the Blue List. The species record for Western Painted Turtle is therefore not assigned to a list.

COSEWIC and SARA status:

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the *Species at Risk Act* (SARA) use the same ranking system for all species assessed at the federal level. Ranks have the following meanings:

- XX = EXTINCT: A species that no longer exists.
- XT = EXTIRPATED: A species that no longer exists in the wild in Canada, but occurring elsewhere.
- E = ENDANGERED: A species facing imminent extirpation or extinction.
- T = THREATENED: A species that is likely to become endangered if limiting factors are not reversed.
- SC = SPECIAL CONCERN: A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events.
- NAR = NOT AT RISK: A species that has been evaluated and found to be not at risk.
- C = CANDIDATE: A species that is on the short-list for upcoming assessment.
- DD = DATA DEFICIENT: A species for which there is insufficient scientific information to support status designation.

Global Heritage Status IUNC:

A Global Rank applies to a species/ecological community across its entire range. The number in parenthesis is the year the rank was last reviewed. The ranks have the following meaning:

- X = presumed extinct (species)/eliminated (community)
- H = possibly extinct (species)/presumed eliminated (comm.)
- 1 = critically imperiled
- 2 = imperiled
- 3 = vulnerable to extirpation or extinction
- 4 = apparently secure
- 5 = demonstrably widespread, abundant, and secure.
- NA = not applicable
- NR = unranked - Global Rank not yet assessed.
- U = unrankable

Element Occurrence

Once a SAR has been identified and submitted the BC CDC, it is assessed by experts and an Element Occurrence (EO) is created. An EO goes beyond a simple point on a map, and includes the completion of a detailed record that assesses such things as the confidence in the species identification and location, the viability of the population (or subpopulation), connections to adjacent individuals or subpopulations, and much more. If multiple species are observed in close proximity (generally within one kilometer) and

there are not significant barriers (such as a river or urban area), they are combined into a single EO to reflect that the observations are likely part of the same population.
The BC CDC (2016) defines an EO as follows:

> "An area of land and/or water in which a species or ecological community is, or was present. An Element Occurrence (EO) should have practical conservation value for the Element as evidenced by potential continued (or historic) presence and/or regular recurrence at a given location. For species Elements, the EO often corresponds with the local population, but when appropriate may be a portion of a population (e.g., long distance dispersers) or a group of nearby populations (e.g., metapopulation). For ecological community Elements, the EO may represent a stand or patch of an ecological community, or a cluster of stands or patches of an ecological community."

3.0 Study Area

The study area for this project includes the full Slocan River Watershed, from the Kootenay River at the south, to the watershed divide north of Summit Lake, including the villages of Slocan, New Denver, Winlaw and Silverton, and the numerous unincorporated communities in between such as Passmore, Slocan Park and Krestova (Fig. 1).

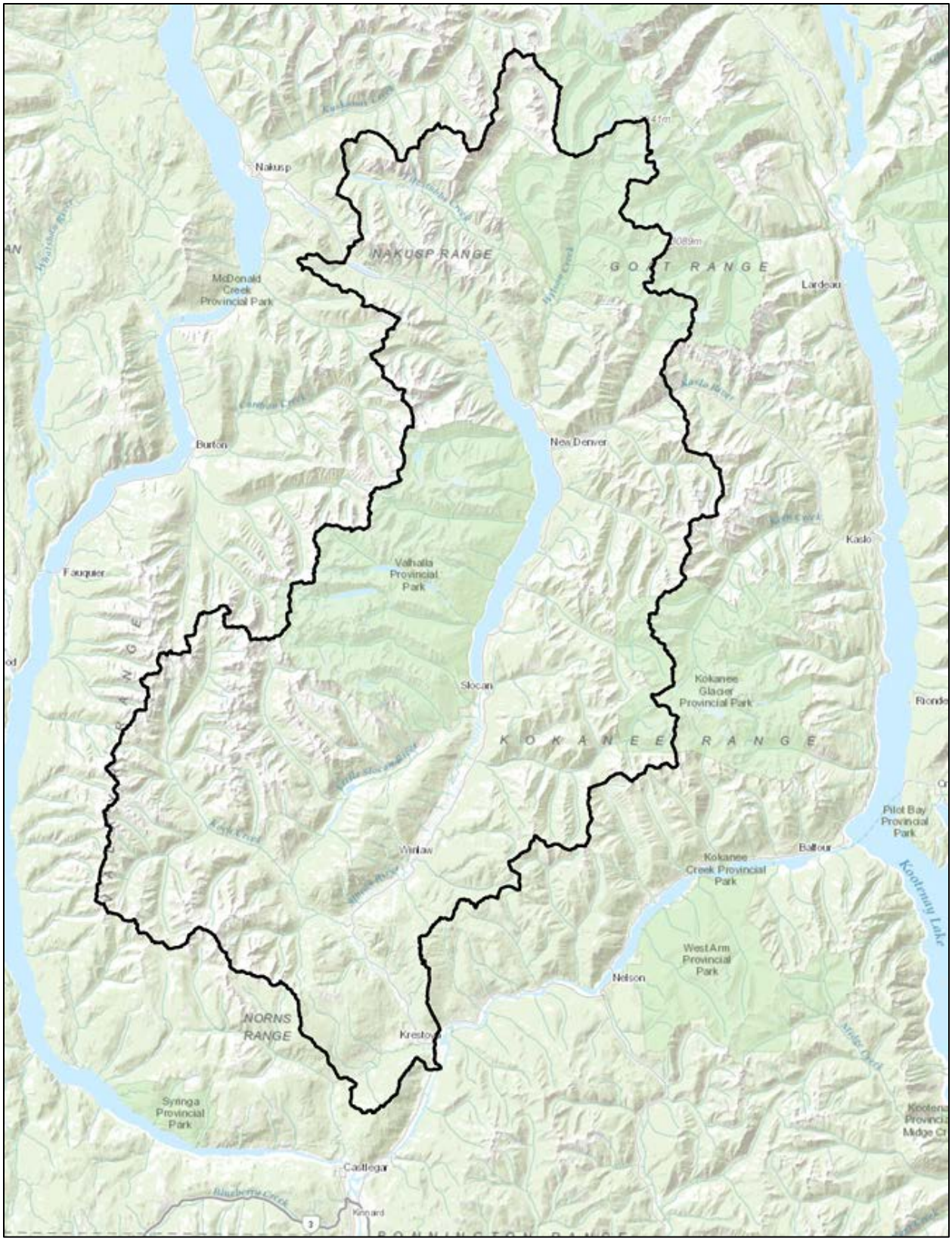

Figure 1. SWAMP Study Area (ESRI Base Maps).

4.0 Species at Risk in the Slocan Watershed

When this project originated, the BC Conservation Data Centre (CDC) tracked 20 occurrences of species-at-risk in the Slocan Watershed (Table 1). One of the occurrences, crested woodfern (*Dryopteris cristata*), was observed and submitted during the 2014 SWAMP field program (Durand 2015). Eight of the 20 records are over 30 years old and their current condition and viability is unknown. The spring 2016 CDC update resulted in the down-listing of several species that were previously blue-listed and tracked in the watershed (Table 1).

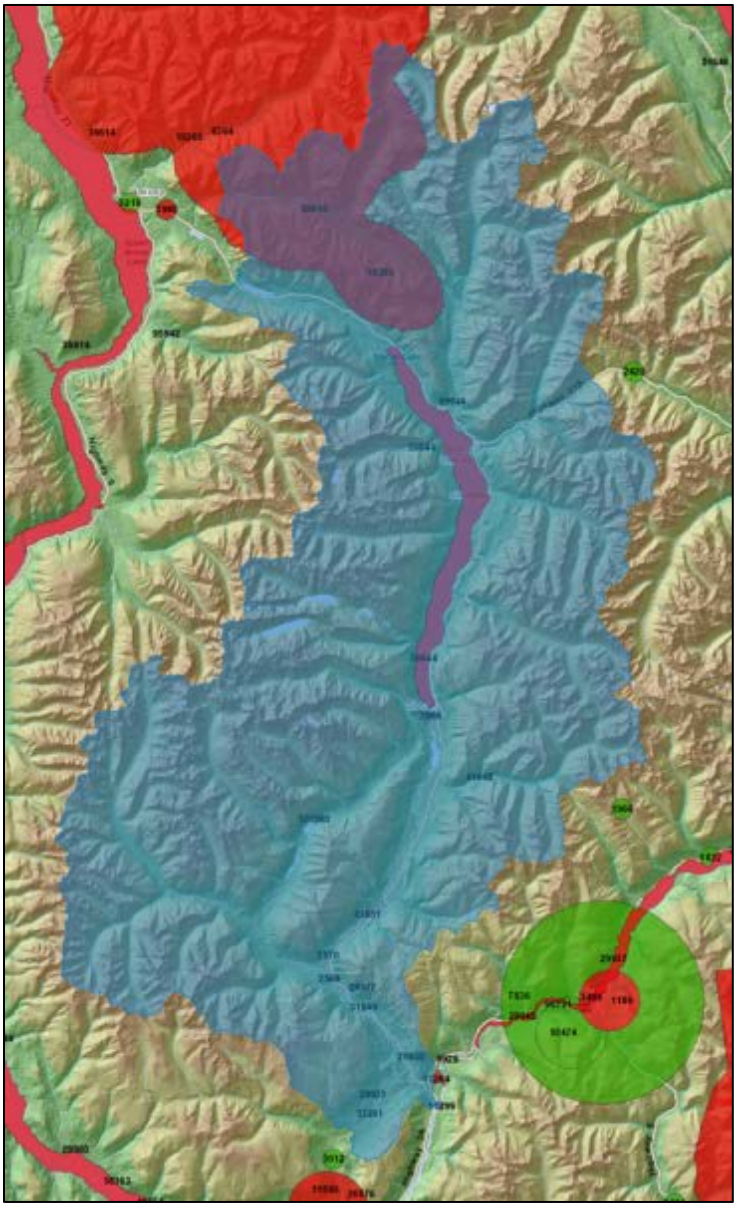

Figure 2. Element Occurrences in the Slocan Watershed as of December 2016 (BC CDC 2016b).

Table 1. Original CDC Element Occurrences for the Slocan Watershed (BC CDC 2015)

Scientific Name	Common Name	Rank	Last Obs. Date
Vascular Plant			
Epilobium glaberrimum ssp. fastigiatum	Smooth Willowherb*	Blue	1975-07-12
Leptosiphon septentrionalis	Northern Linanthus*	Blue	1975-07-11
Dryopteris cristata	Crested Wood Fern	Blue	2014-08-09
Invertebrate Animal			
Kootenaia burkei	Pygmy Slug	Red	2008-09-03
Kootenaia burkei	Pygmy Slug	Red	2013-09-22
Argia vivida	Vivid Dancer	Blue	2001-10-13
Vertebrate Animal			
Rhinichthys umatilla	Umatilla Dace	Red (Threatened)	1988-10-04
Cottus confusus	Shorthead Sculpin	Blue (Special Concern)	1985-03-19
Rhinichthys umatilla	Umatilla Dace	Red (Threatened)	1988-10-04
Cottus confusus	Shorthead Sculpin	Blue (Special Concern)	1986-02-05
Rangifer tarandus pop. 1	Caribou (Southern Mountain Population)	Red (Endangered)	2004
Cottus confusus	Shorthead Sculpin	Blue (Special Concern)	1987-10-10
Cottus confusus	Shorthead Sculpin	Blue (Special Concern)	1988-10-04
Megascops kennicottii macfarlanei	Western Screech-owl, Macfarlanei Subspecies	Red (Threatened)	2006-07-23
Plestiodon skiltonianus	Western Skink	Blue (Special Concern)	2005-06-30
Ardea herodias herodias	Great Blue Heron, Herodias Subspecies	S3B,S4N	2006-08-24
Plestiodon skiltonianus	Western Skink	Blue (Special Concern)	2004-06-10
Plestiodon skiltonianus	Western Skink	Blue (Special Concern)	2004-05-18
Acipenser transmontanus pop. 2	White Sturgeon (Columbia River Population)	Red (Endangered)	2002
Megascops kennicottii macfarlanei	Western Screech-owl, Macfarlanei Subspecies	Red (Threatened)	1998-05-11

* The CDC changed the status of these species to yellow (secure) in the spring of 2016.

5.0 Results

To date we have confirmed 47 SAR in the Slocan Watershed. This represents a considerable increase in the number of SAR known to exist in the watershed, although several species on the list are well documented, but for various reasons, are not tracked or do not show up on, CDC data. The species include vertebrates, invertebrates, reptiles, amphibians, vascular plants and non-vascular plants. Table 2 contains a summary of the number of species and provincial and federal ranks. Since this project began, three previously blue-listed species of vascular plants (*Epilobium glaberrimum* ssp. *Fastigiatum,*

Leptosiphon septentrionalis, and *Epipactis gigantean*) that were known to occur in the watershed were removed from CDC tracking lists due to additional information regarding the extent and size of their population in the province. Table 3 contains all of the SAR confirmed in the Slocan Watershed. The list of species was derived from published and unpublished reports. In addition, 11 species were considered to have a high potential to occur (Table 4). The list of potential species is based on Element Occurrences of species that occur in the vicinity of the watershed, as well as additional species from unpublished reports that are considered likely to occur.

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

Status	Vertebrate Animals	Reptiles	Amphibians	Invertebrates	Vascular Plants	Non-Vascular Plants
Blue	15	2	1	5	6	1
Red	6				4	
Special Concern	4	2	1	1	1	
Threatened	8					
Endangered	2					
Under Assessment				2		
Data Deficient	1					
Not Ranked						3
Total Number of Species	***24***	***3***	***1***	***5***	***10***	***4***

Table 3. Confirmed Species at Risk in the Slocan Watershed

Common Name	Scientific Name	Status (BC/Federal)
Vertebrate Animal (fish)		
Bull trout*	*Salvelinus confluentus*	Blue
Burbot (Lower Kootenay Population)*	*Lota lota pop. 1*	Red
Columbia Sculpin*	*Cottus hubbsi*	Blue/Special Concern
Shorthead Sculpin	*Cottus confusus*	Blue/Special Concern
Umatilla Dace	*Rhinichthys umatilla*	Red/Threatened
Westslope Cutthroat trout*	*Oncorhynchus clarki lewisi*	Blue
White Sturgeon (Columbia River Population)	*Acipenser transmontanus pop. 2*	Red
Vertebrate Animal (mammal)		
Woodland Caribou (Southern Mountain Population)	*Rangifer tarandus pop. 1*	Red/Endangered
Grizzly Bear*	*Ursus arctos*	Blue/Special Concern
Mountain Goat*	*Oreamnos americanus*	Blue
Wolverine*	*Gulo gulo*	Special Concern
Vertebrate Animal (bird, bat)		
Fringed Myotis*	*Myotis thysanodes*	Blue/Data Deficient
Lewis' Woodpecker*	*Melanerpes lewis*	Red/Threatened
California Gull*	*Larus californicus*	Blue
Great Blue Heron, *herodias* subspecies	*Ardea herodias herodias*	Blue

Tundra Swan*	*Cygnus columbianus*	Blue
Olive-sided Flycatcher*	*Contopus cooperi*	Blue/Threatened
Barn Swallow*	*Hirundo rustica*	Blue/Threatened
Black Swift*	*Cypseloides niger*	Blue/Endangered
Western Screech Owl (Mcfarlanei subspecies)	*Megascops kennicottii macfarlanei*	Red/Threatened
Bobolink*	*Dolichonyx oryzivorus*	Blue/Threatened
Common Nighthawk*	*Chordeiles minor*	Yellow/Threatened
Bank Swallow*	*Riparia riparia*	Yellow/Threatened
White-throated Swift*	*Aeronautes saxatalis*	Blue
Reptiles & Amphibians		
Western Painted Turtle (intermountain - Rocky Mountain population)*	*Chrysemys picta pop. 2*	Blue
Northern Rubber Boa*	*Chairna bottae*	Yellow/ Special Concern
Western Skink	*Plestiodon skiltonianus*	Blue/Special Concern
Western Toad*	*Anaxyrus boreas*	Blue/Special Concern
Invertebrate Animal		
Banded Tigersnail	*Anguispira kochi*	Blue /Under Assessment
Coeur D'Alene Oregonian*	*Cryptomastix mullani*	Blue
Pale Jumping Slug*	*Hemphillia camelus*	Blue
Pygmy Slug	*Kootenaia burkei*	Blue /Under Assessment
Vivid Dancer	*Argia vivida*	Blue/Special Concern
Vascular Plants		
Beaked Spike-rush*	*Eleocharis rostellata*	Blue
Crested Wood Fern	*Dryopteris cristata*	Blue
Cup Clover*×	*Trifolium cyathiferum*	Red
Harkness' Linanthus*×	*Linanthus harknessii*	Red
Heterocodon*×	*Heterocodon rariflorum*	Blue
Mountain Moonwort*	*Botrychium montanum*	Red
Small-headed Tarweed*×	*Hemizonella minima (*syn *Madia minima)*	Red
Sutherland's Larkspur*	*Delphinium sutherlandii*	Blue
Two-edged Water-starwort *	*Callitriche heterophylla ssp heterophylla*	Blue
Whitebark Pine*	*Pinus albicaulis*	Blue/Special Concern
Non-Vascular Plants		
Flaming Specklebelly*	*Pseudocyphellaria crocata*	Blue
Unnamed*	*Gyalectaria diluta*	Not Ranked (S1 Montana) - Newly described
Unnamed*	*Loxosporopsis corallifera*	Not Ranked (G3)
Unnamed*	*Pycnora xanthococca*	Not Ranked

*indicate species not tracked by the CDC in the Slocan Watershed.

× indicate species identified as occurring in the Slocan Watershed at the end of the project; species accounts were not created.

Table 4. Potential Species at Risk in the Slocan Watershed

Common Name	Scientific Name	Status (BC/Federal)
Vertebrate Animal (mammal)		
Fisher	*Pekania pennanti*	Blue
Least Chipmunk, selkirki subspecies	*Neotamias minimus selkirki*	Red
Red-tailed Chipmunk, Simulans Subspecies	*Neotamias ruficaudus simulans*	Blue
Vertebrate Animal (bat)		
Townsend's Big-eared Bat	*Corynorhinus townsendii*	Blue
Western Small-footed Myotis	*Myotis ciliolabrum*	Blue
Little Brown Myotis	*Myotis lucifugus*	Yellow/Endangered
Invertebrate Animal		
Magnum Mantleslug	*Magnipelta mycophaga*	Blue/Special Concern
Subalpine Mountainsnail	*Oreohelix subrudis*	Blue
Non-Vascular Plants		
Rain bone	*Hypogymnia oceanica*	Yellow (non-coastal occurrence very limited)
Cryptic paw	*Nephroma occultum*	Blue/Special Concern
Delicate Arctomia	*Arctomia delicatula*	Not Ranked (S1 Montana; S1S3 Yukon)

6.0 Species accounts

The following sections contain brief descriptions of each SAR that has been confirmed or has a high potential to occur in the Slocan Watershed. When possible, general locations have been included in the description, along with one or more photos of each species.

6.1 Vertebrate Animals (Fish)

Bull Trout (*Salvelinus confluentus*)

BC Species at risk status: Blue (S3S4)
COSEWIC status: Special concern
Global Heritage Status IUNC: G4
SARA status: No status

Bull trout belong to the Salmonidae family and are a part of the char subgroup. They are a large char with a long body and prominent head and vary in size based on life strategies (Fig. 3). There are four types of life history strategies used by bull trout, including: 1) resident; 2) fluvial; 3) adfluvial; and 4) anadromous. Bull trout are opportunistic feeders and become piscivorous fish when older. They require

cold water habitats and spawning occurs in the fall, bull trout construct and utilize redds (COSEWIC 2012a.

Bull trout are distributed throughout western North America and in Canada; throughout British Columbia, western Alberta, southern Yukon and central North West Territories (COSEWIC 2012a). Bull trout are found throughout the Slocan watershed including: Slocan River and its tributaries Lemon Creek and Little Slocan River, Slocan Lake and its tributaries Wilson, Springer, Dennis, Carpenter, Silverton, Bonanza, Fitzstubbs Creeks (Baxter and Irvine 2013, 2014, 2015, Mirkwood Ecological Consultants Ltd. 1996).

Figure 3. Bull Trout (*Salvelinus confluentus*) (J. Sartore - Public Domain).

Burbot (Lower Kootenay Population) (*Lota lota* pop. 1)

BC Species at risk status:	Red (S1)
COSEWIC status:	No status
Global Heritage Status IUNC:	G5T1Q
SARA status:	No status

Burbot belong to the Gadidae family and are the only freshwater cod in North America. Burbot are a large slow growing fusiform fish with mottled skin, small scales and a chin barbell (Fig. 4). They often become piscivorous fish when older and do not reach sexual maturity until five, six or seven years of age. Burbot prefer cold water and spend a portion of their life history in lakes. They broadcast spawn and spawning occurs in the late winter generally under ice (BC CDC 2016c).

Burbot are distributed in freshwaters throughout North America. The lower Kootenay population is

found south from Montana to north in Canada in Kootenay Lake and tributaries (Ahrens and Korman 2002) and Paquin (2011) observed burbot in Slocan Lake.

Figure 4. Burbot, Lower Kootenay Population (*Lota lota* pop. 1) (A. Schloeffel - Creative Commons).

Columbia Sculpin (*Cottus hubbsi*)

BC Species at risk status:	Blue (S3)
COSEWIC status:	Special concern
Global Heritage Status IUNC:	G4Q
SARA status:	Special concern

Columbia sculpin are a small sculpin species that can reach a maximum of 11cm in length. They have dark mottling on the body and fins (Fig. 5) and are bottom dwellers that feed on aquatic insects and predominately inhabit riffles and rocky areas in rivers. Columbia sculpin reach sexual maturity around two years of age, when the females will lay egg clusters in nests generally under rocks. Spawning occurs in the spring and both males and females stay near the nests well after swim up to ensure proper aeration through the use of pectoral fin fanning (COSEWIC 2010a).

Columbia sculpin are found in the Similkameen, Kettle, Columbia and Flathead rivers and their various tributaries (COSEWIC 2010a). While the Columbia sculpin have not been identified in the Slocan

watershed, they have been found in the Kootenay River directly below the Slocan River (BC CDC 2016d, Mirkwood Ecological Consultants Ltd. 1996).

Figure 5. Columbia Sculpin (*Cottus hubbsi*) (M. Patterson - Public Domain).

Shorthead Sculpin (*Cottus confusus*)

BC Species at risk status:	Blue (S2S3)
COSEWIC status:	Special concern
Global Heritage Status IUNC:	G5
SARA status:	Threatened

Shorthead sculpin are a small sculpin species that can reach a maximum of 10cm in length. They are a dull mottled yellow brown colour (Fig. 6) and are bottom dwellers that feed on aquatic insect larvae and predominately inhabit riffles and rocky areas in small rivers of mountainous areas. Shorthead sculpin and Columbia Sculpin look very similar and are challenging to distinguish apart. Shorthead sculpin reach sexual maturity around two years of age, when the females will lay egg clusters in nests generally under rocks. Spawning occurs in the spring (COSEWIC 2010b).

These fish occur throughout the Columbia River basin and have been reported in the B.C. Conservation Data Centre (2016e) in various areas throughout the Slocan River. Recently, in the summer of 2016, Biologists and educators located and identified shorthead sculpin in Springer Creek, upslope of Highway 6 (D. Default, pers. comm. 2016)

Figure 6. Shorthead Sculpin (Cottus confusus) (R. Tabor - Public Domain).

Umatilla Dace (*Rhinichthys umatilla*)

BC Species at risk status:	Red (S2)
COSEWIC status:	Threatened
Global Heritage Status IUNC:	G4
SARA Status:	Special Concern

Umatilla dace are a part of the *Cyprinidae* family, commonly known as the 'minnow' or 'carp' family. They are a small fish, creamy white with dark spots, heads and backs, distinguished by the two barbels at each side of the mouth (Fig. 7). Umatilla dace reach sexual maturity between two and three years of age and spawn in the spring and summer (COSEWIC 2010c). According to Porto and Lawrence (2012) Umatilla dace in the Slocan River spawn mid-July. They utilize fast flowing stone and cobble river habitat, which provides them silt free cover.

They are found in Canada in the Similkameen, Kettle, Columbia, Slocan and Kootenay River drainages. And in the Columbia, Kettle, Similkameen and Okanagan drainages in the United States (COSEWIC 2010c). They have been identified throughout the Slocan River and some of its tributaries (BC CDC 2016f, Porto and Lawrence 2012).

Figure 7. Umatilla Dace (*Rhinichthys umatilla*) (G. Hanke, Royal BC Museum).

Westslope Cutthroat trout (*Oncorhynchus clarki lewisi*)

BC Species at risk status:	Blue (S3)
COSEWIC status:	Special Concern
Global Heritage Status IUNC:	G4T4
SARA status:	Special Concern

Westslope cutthroat trout are a salmonid that varies in size and appearances based on surrounding habitat and life strategy. They are distinguished by the red-orange slash under their jaw (Fig. 8). There are three life strategies: stream resident, fluvial and adfluvial. They require colder water and are often associated with cover, like undercut banks and large woody debris. Westslope cutthroat trout spawn in the spring whereby females will dig redds (COSEWIC 2006a).

Westslope cutthroat trout are found throughout B.C. and are found east and west of the Rocky Mountain divide in various waterbodies. They are native to many systems and are under threat for various reasons, mainly hybridization with non-native Rainbow trout (*Oncorhynchus mykiss)* (COSEWIC 2006a). They have been found in the Slocan River during annual snorkel fish counts by biologist Peter Corbett (pers. comm. 2016).

Figure 8. Westslope Cutthroat trout (*Oncorhynchus clarki lewisi*) (P. Corbett photo).

White Sturgeon (Columbia River pop) (*Acipenser transmontanus* pop. 2)

BC Species at risk status:	Red (S1)
COSEWIC status:	Endangered
Global Heritage Status IUNC:	Critically Endangered
SARA status:	Endangered

White sturgeon belong to the *Acipenseridae* family and are a long lived large fish composed mostly of cartilage except for boney plates (scutes) on their scale-less body. White sturgeon are the largest fresh water fish in Canada. They can grow to six meters in length and live for over 100 years, reaching sexual maturity slowly by the age of 11 to 27. Spawning occurs in June and July and not all adults will spawn every year. They are piscivorous fish and historically foraged on different salmon species (COSEWIC 2012b).

According to the BC CCDC (2016g) White sturgeon populations are in severe decline and modeling has predicted extinction of the species within the next two generations for several reasons, most notably habitat fragmentation caused by the construction of hydroelectric dams. There are four populations of White Sturgeon found in the upper and lower Fraser River, upper Columbia and upper Kootenay rivers (R.L.L. Environmental Services Ltd. 1996).

Figure 9. White Sturgeon , Columbia River pop (*Acipenser transmontanus* pop. 2) (B. Klinkenberg photo – eFauna).

6.2 Vertebrate Animals (Mammal)

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

BC Species at risk status:	Red (S1)
COSEWIC status:	Endangered
Global Heritage Status IUNC:	G5T2Q
SARA status:	Threatened

Woodland Caribou are a subspecies of caribou and there are three ecotypes of this subspecies in British Columbia: boreal, northern and mountain. There are three mountain caribou populations based on geographic distribution: northern, central and southern (Fig. 10). Southern mountain caribou are a member of the deer family (*Cervidae*) Adults are dark brown and white and both sexes have antlers for a segment of the year. They forage primarily on arboreal lichens in the winter and other food sources like forbs, fungi and shrubs in other seasons. Southern mountain caribou give birth in May and early June after a gestation period of roughly 230 days. Southern mountain caribou are characterized by their seasonal migration up and down in elevation and require mature and old growth forests. (Environment Canada 2014).

Southern mountain caribou occur in the southern parts of British Columbia, Alberta and in the United States of Idaho and Washington. They have been reported in the southern Selkirks (BC CDC 2016h).

Figure 10. Woodland Caribou, Southern Mountain Population (*Rangifer tarandus* pop. 1) (Kolaczan).

Grizzly Bear (*Ursus arctos*)

BC Species at risk status:	Blue (S3?)
COSEWIC status:	Special concern
Global Heritage Status IUNC:	G4
SARA status:	No status

Grizzly bears belong to the *Ursidae* family and are distinguished from other bear species by a large shoulder hump and longer front claws. They are a large mammal reaching up to 8 feet and they breed in late spring and early summer (Fig. 11). Delayed implantation occurs with gestation period lasting approximately180 – 190 days. Grizzly bears can live for up to 25 years and they are slow to reach sexual maturity, as late as 6 or 7 years, and do not breed every year (BC CDC 2016i). According to COSEWIC (2002a) grizzly bear diet varies seasonally and different plants, tubers and berries are important food sources and they have been described as 'opportunistic omnivores.' Grizzly bear populations occur throughout the globe and throughout western Canada and the United States. They occur throughout the Slocan watershed including the Valhalla Mountain range (Mowat 2007).

Figure 11. Grizzly Bear (*Ursus arctos*) (Public Domain).

Mountain Goat (*Oreamnos americanus*)

BC Species at risk status:	Blue (S3)
COSEWIC status:	No status
Global Heritage Status IUNC:	G5
SARA status:	No status

Mountain goats are ungulates belonging to the *Bovidae* family. Mountain goats have a long white coat, both sexes have horns (Fig. 12). They inhabit mountainous landscapes, specializing in steep terrain climbing. Breeding occurs in November and December with females isolating themselves in May and June to give birth and rejoining predominately female groups after birth. Generally the first reproduction occurs between the age of four and six, but can occur as early three year old. They are herbivores and require utilizing mineral licks to supplement their diet.

Mountain goats are distributed throughout western North America, with 50% of the population occurring in British Columbia (Mountain Goat Management Team 2010). They have been seen within the Slocan watershed, namely in the Slocan Park bluffs and in Valhalla Provincial Park (V. Shaw, J. Lauret, G. Lamoreux, R. Mackenzie pers. com. 2106)

Figure 12. Mountain Goat (*Oreamnos americanus*) (Vickimiller6 – Creative Commons).

Wolverine (*Gulo gulo* and *Gulo gulo luscus*)

BC Species at risk status:	No status (*luscus* subspecies – Blue S3)
COSEWIC status:	Special concern
Global Heritage Status IUNC:	G4
SARA status:	No status

Part of the *Mustelidae* family, Wolverines look like little bears with long tails and a brown fur coat (Fig. 13). They can grow up to one meter in length and possess strong jaws and sharp claws on large feet. As omnivores that eat roots, berries, fresh and scavenged meat. They inhabit large home ranges and often travel great distances to remote areas. Wolverines reach sexual maturity at two to three years old and do not necessarily give birth every year. Breeding occurs between April and September where females have delayed implantation and give birth in dens around March/April (COSEWIC 2003). Wolverines occur throughout the globe, predominately in the north, including Canada. There exists an eastern and western population of wolverines in Canada (COSEWIC 2003). They are found in the Slocan watershed, in the Valhalla and Selkirk mountain ranges (Kortello and Hausleitner 2015).

Figure 13. Wolverine (*Gulo gulo* and *Gulo gulo luscus*) (Creative Commons).

6.3 Vertebrate Animals (Bird, Bat)

Fringed Myotis (*Myotis thysanodes*)

BC Species at risk status:	Blue (S3)
COSEWIC status:	Data Deficient
Global Heritage Status IUNC:	G4
SARA status:	Special Concern

The fringed myotis is the largest of the myotis species in Canada and belong to the *Vespertilionidae* Family (Fig. 14). Fringed myotis have brown fur and long black ears and they utilize a variety of sites for diurnal and nocturnal roosting including cliff and tree crevices. They are insectivores feeding mostly on moths and flies. Fringed myotis mate in late summer. They are colonial, after mating, females travel to the maternity colony in early April and ovulation and fertilization happens a month later. They reach sexual maturity in their first year and birth only one young each year (COSEWIC 2004a).

They are found throughout western North America and recently Hill, Clarke and Stent (2007) recorded a roosting site in the Slocan watershed.

Figure 14. Fringed Myotis (*Myotis thysanodes*) (Jared Hobbs photo).

Lewis' Woodpecker (*Melanerpes lewis*)

BC Species at risk status:	Blue (S2S3B)
COSEWIC status:	Threatened
Global Heritage Status IUNC:	G4
SARA status:	Threatened

Lewis's Woodpecker has green and black body colouration and a red belly and face patch and grows to approximately 28cm (Fig. 15). Lewis's Woodpecker eats insects, fruits and nuts. They require dead standing trees for nesting cavities and open areas for feeding. They are associated with mature ponderosa pine and black cottonwood stands. Lewis's Woodpeckers form long-term mating pairs and mostly breed as solitary pairs with have high fidelity to their nesting sites returning each year. They produce a relatively large clutch of 5-9 eggs (COSEWIC 2010d).

Lewis's Woodpecker occurs throughout western North America and have been reported in the Slocan valley (I. Manley, pers. com. 2016, P. McIver pers. com. 2016, South West Kootenay Bird Survey)

Figure 15. Lewis' Woodpecker (*Melanerpes lewis*) (Ianmaton).

California Gull (*Larus californicus*)

BC Species at risk status:	Blue (S2S3B)
COSEWIC status:	No Status
Global Heritage Status IUNC:	G5
SARA status:	No Status

The California gull is a medium sized white gull belonging to the family *Laridae*. They have yellow legs, a small yellow bill with a black ring, and can have a wing span of up to 137 cm (Fig. 16). The California gull is a migratory bird that breeds between April and June and inhabits a wide diversity of ecosystems. In the interior they breed in marshes and lakes, and are ground nesters. They feed predominately on insects and mice (BC CDC 2016j). They are found across western and central North America, and have been recorded in the Slocan valley, observed on the river (P. McIver pers. com. 2016, South West Kootenay Bird Survey).

Figure 16. California Gull (*Larus californicus*) (S. Byland photo).

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

BC Species at risk status:	Blue (S3B,S4N)
COSEWIC status:	No Status
Global Heritage Status IUNC:	G5T5
SARA status:	No Status

The Great Blue Heron belongs to the *Ardeidae* family and is a large wading bird measuring up to 140 cm in height with a wing span of up to 200cm. They have distinct grey and blue flight feathers with long grey to reddish legs and yellow bill (Fig. 17). They inhabit riparian and wetland ecosystems and are primarily piscivours, they are also opportunistic and will feed on small mammals, insects, reptiles and amphibians. Breeding in the spring, one brood is laid yearly with a typical clutch size of 3 to 5 eggs. Great blue herons predominately breed in trees in colonies close to riparian and wetland ecosystems, however, they may also nest on platforms and dirt mounds (Gebauer and Moul 2001).

Great blue heron are found throughout North and Central America, the Caribbean and Galapagos islands. One of the four subspecies in North America and one of two found in British Columbia, the Great blue heron herodias subspecies occurs east of the coastal mountains and breeds and lives year round throughout the interior of southern British Columbia (Gebauer and Moul 2001; BC CDC 2016k).

They have been observed in the Little Slocan Lakes, the Slocan River and the north end of Slocan Lake (Durand and Ehlers 2015; M. Machmer pers. com. 2016).

Figure 17. Great Blue Heron, herodias subspecies (*Ardea herodias herodias*) (R.Burton - Public Domain).

Tundra Swan (*Cygnus columbianus*)

BC Species at risk status:	Blue (S3N)
COSEWIC status:	No Status
Global Heritage Status IUNC:	G5
SARA status:	No Status

Tundra Swans are part of the *Anitdae* family and one of three species of swans found in Canada. Smaller than both other species, tundra swans are all white with a black bill and feet (Fig. 18). Tundra Swans breed in May and June and nest until late June or July producing an average clutch size of 3 to 7 eggs. They are ground nesters and often pair up and mate for life or extensive lengths of time. They are found on rivers, lakes, wetlands and near shorelines. Tundra Swans are herbivores mainly feeding on aquatic vegetation, however they will also eat mollusks and invertebrates (BC CDC 2016l). Tundra Swans are found throughout British Columbia and have been observed on the Slocan River often in large numbers during the winter between Lemon Creek and Slocan City (P. McIver pers. com. 2016 South West Kootenay Bird Survey).

Figure 18. Tundra Swan (*Cygnus columbianus*) (R. Runtsch photo).

Olive-sided Flycatcher (*Contopus cooperi*)

BC Species at risk status:	Blue (S3S4B)
COSEWIC status:	Threatened
Global Heritage Status IUNC:	G4
SARA status:	Threatened

The olive-sided flycatcher belongs to the *Tyrannidae* family and is a relatively large flycatcher with a short tail and olive coloured plumage above and white to yellow below on the belly and chest (Fig. 19). They are insectivorous and feed while flying and are found in various diverse forested and riparian ecosystems displaying a high fidelity to breeding and wintering grounds (BC Conservation Data Center 2016). Olive-sided flycatchers breed and nest usually in coniferous forests between May and July and commonly will re-nest if the first clutch is lost. General clutch size is 3 eggs laid in an open cup sized nest and re-nesting clutch size is generally the same and occasionally only 2 eggs are laid (BC CDC 2016m).

Olive-sided flycatchers occur throughout North America and migrate and over winter in Central, South and southern North Americas. They are found throughout British Columbia and have been recorded north of Lemon Creek on the riparian forests of the Slocan River (South West Kootenay Bird Survey, P. McIver pers. com.).

Figure 19. Olive-sided Flycatcher (*Contopus cooperi*) (P. Reeves photo).

Barn swallow (*Hirundo rustica*)

BC Species at risk status:	Blue
COSEWIC status:	Threatened
Global Heritage Status IUNC:	Least Concern
SARA status:	No Status

Barn swallows are one of many swallow species found in North America and are distinguished by the bright blue back feathers and rusty red face and throat (Fig. 20). They are found in open habitats often near water and are insectivores that forage mainly on flying insects while in flight. Occasionally they will eat berries and insects from the ground. They breed in the early spring and often produce two broods laying an average of 4 to 5 eggs. They will often mate with the same individuals for years and return to reuse their nests. When not breeding they may be found in flocks of thousands (BC CDC Center 2017a).

Barn swallows are found throughout British Columbia as a seasonal resident and breeder and they have been observed nesting in the gazebo and old mill site of Slocan City (V. Shaw pers. com. 2016).

Figure 20. Barn swallow (*Hirundo rustica*) (J. Riley Photo).

Black Swift (*Cypseloides niger*)

BC Species at risk status:	Blue (S2S3B)
COSEWIC status:	Endangered
Global Heritage Status IUNC:	G4
SARA status:	No Status

The Black Swift belongs to the *Apodidaeis* family and is characterized as the largest of the swifts with all black plumage (Fig. 21). Black swifts are insectivores that feed only on flying insects and forage aerially at high elevations above mountainous terrain. These swifts are long lived and breed in June and July producing one clutch with a single egg. They nest in remote areas behind waterfalls in high elevation canyons or cliffs and often in colonies (COSEWIC 2015: BC CDC 2017b).

Black swifts are found throughout British Columbia and have been observed in the Slocan Valley near Perry's siding and south of Lemon Creek (South West Kootenay Bird Survey, P. McIver pers. com. 2016)

Figure 21. Black Swift (*Cypseloides niger*) (Terry Gray photo).

Western Screech Owl (Mcfarlanei subspecies) (*Megascops kennicottii macfarlanei*)

BC Species at risk status:	Red (S2)
COSEWIC status:	Threatened
Global Heritage Status IUNC:	G5T4
SARA status:	Endangered

The *Macfarlanei* subspecies of the Western Screech-owl is one of two subspecies found in Canada. They are small greyish brown owls with short tails and prominent ear tuffs (Fig. 22). Western screech-owls are associated with forested lower elevation areas and riparian habitats. They are cavity nesters, occupying either natural cavities or secondary cavities created by woodpeckers, where they produce one brood with an average of 2 to 7 eggs. Wester screech-owls are nocturnal birds, roosting during the day and foraging during crepuscular and night hours. They are opportunistic hunters and will eat a wide variety of insects, mammals and fish (COSEWIC 2002b).

The Western Screech-owl (*Macfarlanei* subspecies) is found only in the southern interior of British Columbia. D. Hausleitner (2013) has conducted telemetry research in the Slocan Valley confirming Wester screech-owl residents near Slocan City and on the Little Slocan River.

Figure 22. Western Screech Owl, Mcfarlanei subspecies (*Megascops kennicottii macfarlanei*) (S. Cannings – photo).

Bobolink (*Dolichonyx oryzivorus*)

BC Species at risk status:	Blue (S3B)
COSEWIC status:	Threatened
Global Heritage Status IUNC:	G5
SARA status:	No Status

The Bobolink is a small black and white song bird related to blackbirds and orioles (Fig. 23). These birds are associated open grasslands, fields and pastures with tall vegetation. They breed in early spring and are ground nesters producing one or two broods with an average of clutch size of three to seven eggs. They construct their nests on the ground sheltered by vegetation and often on partially saturated soil. Bobolinks eat invertebrates, seeds, spiders, insects and larvae. They will also eat seeds of agricultural grain crops (BC CDC 2016n).

Bobolinks are found throughout North America and were observed along the Slocan River near cow pastures south of Lemon Creek (Verena Shaw, per. com).

Figure 23. Bobolink (*Dolichonyx oryzivorus*) (P. Reeves).

Common nighthawk (*Chordeiles minor*)

BC Species at risk status:	Yellow (S4B)
COSEWIC status:	Threatened
Global Heritage Status IUNC:	G5
SARA status:	Threatened

Common nighthawk belongs to the nightjar family and is a medium sized brown, black and white mottled bird, with seven subspecies across North America (Fig. 24). They are insectivores that mainly forage on flying insects during crepuscular hours and the evening. Common nighthawks are found in a variety of habitat types and are found throughout Canada. They require open areas void of lots of vegetation for nesting as they are ground nesters. They have been known to nest on bare rock, sand, and gravel, and even gravel roofs of houses. They lay one brood a year of two eggs between May and August (BC CDC 2016o).

Common nighthawks are found throughout Canada and North America and have been observed in the Slocan Valley in a large pasture south of Lemon Creek and in Crescent Valley (P. McIver per. com. 2016, South West Kootenay Bird Survey; R. Durand pers. com. 2016).

Figure 24. Common nighthawk (*Chordeiles minor*) (V. Hawkes Photo).

Bank swallow (*Riparia riparia*)

BC Species at risk status:	Yellow (S4B)
COSEWIC status:	Threatened
Global Heritage Status IUNC:	G5
SARA status:	No Status

A small brown and white song bird (Fig. 25), bank swallows are aerial foraging insectivores. Habitat varies and includes open areas near water. Banks are required and often are found near water, in gravel pits or off the side of the road. These swallows nest in colonies within the banks by creating burrows and a burrow chamber where nests are constructed in the side if the banks. They generally have one brood with average clutch size of four to five eggs. Colony sizes vary and can reach high numbers of paired birds. Bank swallows are also known to huddle together for warmth and will form large flocks prior to migration. They are found throughout North America and the globe, and at least three active bank swallow colonies were recorded within the Slocan Valley, including two in Crescent Valley (P. McIver per. Comm. 2016, South West Kootenay Bird Survey; R. Durand pers. comm. 2016). (BC CDC 2016p)

Figure 25. Bank swallow (*Riparia riparia*) (P. Reeves photo).

White-throated swift (*Aeronautes saxatalis*)

BC Species at risk status:	Blue (S3S4B)
COSEWIC status:	No Status
Global Heritage Status IUNC:	G5
SARA status:	No Status

The white throated swift is a small black and white bird and one of the fastest flying birds in North America. They are insectivores feeding primarily on flying insects while flying. Often seen in mountainous areas and above canyons these birds nest in rock crevices and cavities along the side of cliffs. They nest in large groups with an average of clutch size of four to five eggs and they create small cup like nests with a variety of materials held together by their saliva. They begin breeding in early spring and are found throughout British Columbia only in breeding season. They were observed in a flock in the southern Slocan Valley near Crescent Valley beach (Verena Shaw, pers. com. 2016). (CDC 2016q)

Figure 26. White-throated swift (*Aeronautes saxatalis*) (M.Woodruff photo).

6.4 Reptiles and Amphibians

Northern Rubber Boa (*Charina bottae*)

BC Species at risk status:	Yellow (S4)
COSEWIC status:	Special Concern
Global Heritage Status IUNC:	G5
SARA status:	Special Concern

The northern rubber boa occurs from central California to southern BC, with disjunct populations occurring in some states. It is considered to have a patchy distribution, but that may be due to a lack of sightings of a species that is most active during dusk and the night. The northern rubber boa is a medium-sized snake, with adult lengths ranging from 35 to 83 cm. It has a general rubber-like appearance and feel, with a short tail and blunt head (Fig. 27). Colours range from plain brown to olive green, with young appearing tan to pinkish above and yellow to pink below. Northern rubber boas inhabit open forests, meadows and grassy areas, often close to water and with an abundance of rocks and woody debris that is used for cover. It feeds on a variety of animals, including other snakes, birds, mice, lizards and shrews. (BC CDC 2017c)

The northern rubber boa was not previously mapped by the BC CDC in the Slocan Valley, although previous studies (such as Dulisse 2006) reported multiple observations. New observations reported through this project include Winlaw, Crescent Valley and South Slocan (R. Durand pers. com.).

Figure 27. Northern Rubber Boa (*Charina bottae*) (J. Riley Photo - eFauna).

Western Painted Turtle (intermountain - Rocky Mountain population) (*Chrysemys picta pop. 2)*

BC Species at risk status:	Blue (S2S3)
COSEWIC status:	Special Concern
Global Heritage Status IUNC:	G5T2T3
SARA status:	Special Concern

Western painted turtles are small freshwater turtles that have distinct red and yellow patterns on its shell and limbs (Fig. 28). They occur in low elevation wetlands, ponds and slow moving water, typically in areas with abundant emergent vegetation and basking sites. Exposed soil, particularly well drained sand, is essential for nesting sites, with adults known to travel over 150 metres from water to find suitable locations. Populations are considered to be at risk due to declining wetland habitat, nesting sites, and road kill. (COSEWIC 2006)

The western painted turtle is widely spread throughout North America, and contains four recognized subspecies. In BC there are two distinct populations; Pacific Coast Population (red-listed and endangered) and Intermountain - Rocky Mountain Population (blue-listed and special concern). Western painted turtles, Intermountain - Rocky Mountain population, have been previously found throughout the West Kootenays, but no observations have previously been recorded in the Slocan Watershed. They are known from wetlands, ponds and rivers between Cranbrook in the east, to the south Okanagan, and as far north as Williams Lake. In the Slocan Watershed, they have been confirmed in multiple locations along the Slocan River south of Winlaw, and one unconfirmed observation in a wetland in Slocan Park (Durand pers. com. 2016). (CDC 2017d; COSEWIC 2006b)

Figure 28. Western Painted Turtle (intermountain - Rocky Mountain population) (*Chrysemys picta* pop. 2*)* (V. Hawkes Photo - eFauna).

Western Skink (*Plestiodon skiltonianus*)

BC Species at risk status:	Blue (S3)
COSEWIC status:	Special Concern
Global Heritage Status IUNC:	G5
SARA status:	Special Concern

The Western Skink occurs throughout western North America, from Baja California to south-central BC. It is a small lizard that grows to about 10 cm in length, with bright blue tails that often exceed 12 cm long (Fig. 29). They are brown in colour, with two pale stripes that run the length of the body, and males have bright orange chins during spring breeding seasons. (CDC 2017e; COSEWIC 2014)

In BC, the Western Skink inhabits dry open areas, often round on warm south facing rock outcrops, talus, grasslands, conifer woodlands, and open conifer forests. It is strongly associated with rocks, under which it takes shelter and digs burrows. Western Skinks feed on a diverse assortment of insects, spiders and worms. 39 occurrences mapped in the province, including three from the southern portion of the Slocan Watershed, including Passmore, South Slocan and Gander Creek. During this project, we received anecdotal reports of Western Skinks in Crescent Valley, and confirmed a sighting in the New Settlement, Krestova (Durand pers. comm. 2016). (CDC 2017e; Dulisse 2006)

Figure 29. Western Skink (*Plestiodon skiltonianus*) (J. Riley Photo).

Western Toad (*Anaxyrus boreas*)

BC Species at risk status: Blue (S3S4)
COSEWIC status: Special Concern

Global Heritage Status IUNC: G4
SARA status: Special Concern

Western toads may appear with a range of colouring, from green, tan, grey or green, with prominent stipes along the back and a typically warty toad appearance. Adult females are large, typically reaching up to 13cm in length, while adult males grow to 10cm in length. Breeding ranges considerably, starting as early as January in warm regions, and late summer in colder areas. Large hatches of eggs hatch quickly and metamorphose in one to three months (based on water temperature). Toads reach sexual maturity in two to six years, with females reproducing every one to three years. They are active throughout the growing season, with adults travelling long distances to reach breeding sites. Toads live in a variety of habitats, often ranging several kilometers from breeding areas. (Hammerson, 1989; Wind and Dupuis, 2002; Olsen, 1988; BC CDC 2016r)

Western toads have been mapped in multiple locations in the Slocan Watershed. Observations ranged from single juvenile or adults, to masses of thousands of tadpoles (Fig. 30 and 31). Known locations range from well-known toad breeding areas (such us Summit Lake and Beaver Lake), to breeding locations in unnamed waterbodies and temporally flooded fields, along with numerous observations of individual toads. Observation shave been made in almost all regions of the watershed, from Slocan Park to Summit Lake (Durand & Ehlers 2015; Mahr 2016 pers. comm.).

Figure 30. Large mass of western toad tadpoles (R. Durand photo).

Figure 31. Adult female western toad (R. Durand photo).

6.5 Invertebrates

Banded Tigersnail (*Anguispira kochi*)

BC Species at risk status:	Blue (S3 2015)
COSEWIC status:	Under Review (Nov 2016)
Global Heritage Status IUNC:	G4 (2009)
SARA status:	No Status

The Banded Tigersnail is fairly widespread in the U.S., with populations in portions of Montana, Idaho, Washington State, and a small portion of southeastern Oregon. In Canada it is restricted to southeast B.C., with records extending from Trail to the St. Mary River near Kimberly, and as far north as Trout Lake (BC CDC 2016s; Ovaska and Sopuck 2015) with no records to date on the west side of the Columbia River. A separate population occurs in southern Ontario (and several northeastern states). There is debate regarding the classification of the species, with Canada generally considering it to be a single species, while U.S. guide books (Bourke 2013) classify the eastern population as the typical *Anguispira*

kochi and the western population (including B.C.) considered to be the subspecies *A. kochi occidentalis* (and further refined to include a second subspecies *A. kochi eyerdami* in Oregon).

Burke (2013) describes the Banded Tigersnail as "*Shell with 6 to 6.5 whorls, 19 to 29mm wide by 14-22 mm high. Peripheral bands of narrow, dark brown, or reddish-brown, with a lighter band between. Dorsal and basal colours distinctly or slightly lighter, so the dark bands are apparent.*" Forsyth (2004) adds "*Apertural lip not flared and only rarely slightly thickened in older snails. The animal is pale brown or creamy brown with a tinge of ochre, and has darker, greyish brown tentacles*." While the bands are not always apparent on live snails (Fig. 32) they are generally obvious on old shells (Fig. 33) and the thin apertural lip is always present. The Banded Tigersnail is one of the larger snail species that occurs in the study area and the Kootenays in general. It can be confused with Mountainsnails (*Oreohelix* spp.) which also have distinct bands, but closer inspection reveals a shell that is less rounded and more angular. Idaho Forestsnail (*Allogona ptygophora)* is also of a similar size, but it lacks the distinct bands, older shells have a shredded appearance, and it has a distinctly thickened apertural lip.

Banded Tigersnail occurs in forested areas, generally dominated by trembling aspen or paper birch, with a lesser or absent component of conifers such as western redcedar, Douglas fir and western hemlock. Shrub species are diverse, with thimbleberry, beaked hazelnut and Douglas maple commonly occurring. Herbs are also varied, although false Solomon's seal, queen's cup and prince's pine are common. Moss and lichens are generally absent or only comprise a small percent cover. The snails appear to exclusively occur in areas with deep, continuous leaf litter; typically with soft, silty loam soils underneath. They are more abundant in lower elevations, often near watercourses or waterbodies; although that may be more related to the typical location of deciduous forest stands, than a specific affinity to riparian areas. (Durand 2017)

Banded tigersnail's are relatively common in the Slocan Watershed, with many occurrences mapped to date. They are expected to be more widespread than is currently known, with the abundance of low elevation suitable habitat that occurs along the Slocan and Little Slocan Rivers in particular (Durand 2016; Durand 2017; Ovaska pers. comm. 2017; Lepitzki pers. comm. 2017).

Figure 32. Live banded tigersnail (R. Durand photo).

Figure 33. Dead banded tigersnail shell (R. Durand photo).

Coeur D'Alene Oregonian (*Cryptomastix mullani*)

BC Species at risk status:	Blue (S3 2015)
COSEWIC status:	No Status
Global Heritage Status IUNC:	G4 (2005)
SARA status:	No Status

The Coeur D'Alene Oregonian falls within a complex genus that contains numerous species and subspecies that frequently change as new information becomes available. While there are three recognized species in B.C., *Cryptomastix devia* is only known from historic records on Vancouver Island and is considered to be extirpated from the Province and *C. germana* occurs west of the Coast Mountains. *C. mullani* occurs in the Southern Interior of B.C., but it is expected that further research will result in multiple regional subspecies, and potentially separate species (Forsyth 2016). In the U.S., there are at least eight distinct species occurring in Washington State, Idaho, Oregon and Montana, and eight subspecies of *C. mullani.* Burke (2013) considers the subspecies that occurs in southern B.C. to be *C. mullani olneyae*, while Provincially it is recognized as being broadly called *C. mullani* with *C. mullani olneyae* the only subspecies at this time (Forsyth 2003; CDC 2015a). The Coeur D'Alene Oregonian is fairly widespread in the Southern Interior of B.C., ranging from Christina Lake in the west to Cranbrook in the east, and as far north as Revelstoke (B.C. CDC 2015a; Ovaska and Sopuck 2015).

Forsyth (2004) describes the Coeur D'Alene Oregonian as "*Shell 12-17mm wide, heliciform to depressed-heliciform, brown and nearly smooth, sometimes with fine incremental and weak spiral striae. Periostrachum no hair in adults. About 6 whorls. Parietal denticle low to strongly developed, but peg-like and not long and curved when in basal view. Apertural lip thickened, strongly recurved and with obscurely denticle-like thickenings."* The Coeur D'Alene Oregonian is a medium sized snail that is not easily confused with other species in the study area due to the distinct apertural lip and denticles (Fig. 34 and 35).

The Coeur D'Alene Oregonian occurs in a wide variety of forested habitat; inhabiting conifer, deciduous and mixed forests, and occasionally can be found in shrubby or grass dominated areas and even wetland margins. It appears to be most commonly associated with mixed forest stands that have a moderate to thick leaf or needle litter and low moss cover. During surveys more individuals were observed in moist deciduous forests and moist conifer forests than any other habitat; however due to its small size it is uncommon to find more than a few individuals in any location. It is widespread throughout the Slocan Watershed, with the majority of gastropod survey sites locating the species. (Durand 2017)

Figure 34. Coeur D'Alene Oregonian shell (R. Durand photo).

Figure 35. Adult Coeur D'Alene Oregonian on the left and juvenile on the right (R. Durand photo).

Pale Jumping Slug (*Hemphillia camelus*)

BC Species at risk status:	Blue (S3 2015)
COSEWIC status:	No Status
Global Heritage Status IUNC:	G4 (2006)
SARA status:	No Status

The Pale Jumping Slug is part of the Binneyidae family which is characterized by a shell that is not completely covered by the mantle and a vicera that is elevated into a hump. The *Hemphilla* genus is split into two groups, with the *H. glandulosa* group composed of smaller slugs (generally under 20mm and more compressed) and the *H. camelus* group comprising larger slugs (30 – 50mm or longer) that often have longer tails (Burke 2013). Collectively they are called the jumping slugs, as when disturbed or attacked they often writhe and flop (Burke 2013). There are three species of *Hemphilla* in B.C., with *H. camelus* the only known species found so far in the Kootenays. Based on the abundance of species and subspecies in adjacent U.S. states, it is likely that additional species or subspecies will be found in B.C. and the Pend Oreille area specifically (Ovaska 2016). *H. camelus* is found throughout southern interior B.C., with numerous records from the Alberta border to Trail, and well documented in the Columbia region near Revelstoke and Golden (CDC 2015).

Burke (2013) describes *H. camelus* as "*A medium-sized slug, 30 to 50mm long or more. Its base colour is light tan to buff, and it is clouded with gray. There is a light tan or buff-coloured mid-dorsal stripe the length of the trail. The mantle is mottled or speckled with gray and has a blackish lateral band most prominent on the posterior half to three-quarters, or sometimes faint. The sides below the mantle are light coloured, with little or no speckling. The pneumostome is in the third quarter of the right side of the mantle. The genital opening is behind the right tentacle."* A small exposed portion of the internal shell is always visible near the back of the mantle (Fig 36).

In the Kootenay region, Pale Jumping Slug is typically found in cool, moist deciduous to mixed forests that have abundant and deep leaf litter. They are often found in riparian areas that have a component of black cottonwood, while other tree and shrub species are highly variable. Moss is always absent. This species is relatively widespread throughout the Kootenays, with recent surveys identifying new locations every year. There are many occurrences in the Slocan Watershed, with the potential for many more due to the abundance of suitable and relatively intact habitat. (EcoLogic 2017; Ovaska & Sopuck 2014; EcoLogic 2017)

Figure 36. Pale Jumping Slug (*Hemphillia camelus*) (R. Durand Photo).

Pygmy Slug (*Kootenaia burkei*)

BC Species at risk status:	Blue (S3 2015)
COSEWIC status:	Special Concern (2016)
Global Heritage Status IUNC:	G2 (2010)
SARA status:	No Status

The Pygmy slug is a newly described (2003) species that is currently the only one within the *Kootenaia* genus. It is a small slug that is found in the East and West Kootenays extending roughly from the Trail area to Cranbrook and north of Nakusp, and in the northern panhandle of Idaho and small portions of northwestern Montana (Burke 2013: CDC 2016b). There are currently around 40 known occurrences of the species in B.C., including three in the Slocan Watershed (CDC 2016b; Ovaska & Sopuck 2014; EcoLogic 2017).

Burke (2013) describes the Pygmy slug as *"a small slug, 10.2 mm long when extended. The roundly elliptic mantle measures about two-fifths of the body length. It is nearly uniformly blue-gray or dark gray to nearly black with tiny bluish-white flecks in the integument. The head and neck are lighter, as are the medial half of the ocular tentacles. The lower tentacles are black medially with a transparent tip….The*

lower sides become increasingly lighter as a result of the increasing density of the light flecks…The pneumostome is slightly posterior to the middle of the right side of the mantle. There are about 10 flat, rather broad ridges running parallel on the tail, so that the spread on the tail narrows. Posteriorly, a line crosses these ridges, forming a scalloped junction in a daisy-petal pattern, and leaving a second set of very short ridges or polygons at the end of the tail." K. burkei can be reliably differentiated from the Blue-grey Taildropper (*Prophysaon coeruleum*); one of the few other species that it could be confused with, by the polygon-like tail end ridges (Fig. 37).

The Pygmy slug typically occurs in mature to old conifer stands (and less often mixed forests) that have a deep, moist litter and abundant woody debris. To date, most occurrences have been located near running water. It occurs from low to almost subalpine elevations. Observations rarely indicate more than one or two individuals found at any given site, although the low numbers are more likely due to the small size of the slug. The pygmy slug has been identified in multiple located in and adjacent to the Slocan Watershed and is likely to be widespread in the area. (EcoLogic 2017)

Figure 37. Pygmy Slug (*Kootenaia burkei*) (R. Durand photo).

Vivid Dancer (*Argia vivida*)

BC Species at risk status:	Blue (S2S3)
COSEWIC status:	Special Concern
Global Heritage Status IUNC:	G5
SARA status:	No Status

The vivid dancer is a bright blue damselfly that that is associated with hot springs and warm springs. It occurs in western North America from the Coast range to the Rocky Mountains. There are a high number of occurrences of this species in the Kootenays, with one known occurrence near Little Wilson Lake, and a total of 22 mapped in the province. Vivid dancers have variable colouring, with males normally being blue marked with black, but may be mainly green, yellow, orange, red or purple (Fig. 38). Females are typically blue, and a limited to two colour forms. The thorax has a black stipe at least as wide as adjacent pale stripes on the top. They are always found associated with vegetation near warm or hot pools, with females laying eggs on aquatic vegetation. (Cannings 2002; CDC 2017f; Klinkenberg 2014)

Figure 38. Vivid Dancer (*Argia vivida*) (J. Riley).

6.6 Vascular Plants

Beaked Spike-rush (*Eleocharis rostellata*)

BC Species at risk status:	Blue (S3)
COSEWIC status:	No Status
Global Heritage Status IUNC:	G5
SARA status:	No Status

Beaked spikerush is a grass-like perennial with leaves occurring on the lower stems as sheathed scales. It grows with a combination of 40 to 100cm long stems, with longer ones bending over and the tips rooting. Beaked spikerush inhabits saline marshes and fens, typically in warm lowland areas. (CDC 2016t)

A sizeable population of beaked spike-rush was found in the Bonanza Wetland Complex in 2015 (Fig. 39 and 40). The population covered an area of roughly 0.25 hectares with roughly 50% cover of the species. The population was considered to be viable and stable with no immediate threats. It was restricted to a fen in the southeast corner of the complex. No other similar habitat (it requires water with elevated salinity and/or calcium) is known in the complex, or in the larger watershed, therefore it is expected that this is the only element occurrence of this species. The Bonanza occurrence was the 10th known element occurrence of this species in the province, and the first in the West Kootenays (Durand & Ehlers 2015; McIntosh pers. comm. 2015; CDC, 2016t).

Figure 39. Beaked spike-rush (*Eleocharis rostellata*) (R. Durand photo).

Figure 40. Close up of beaked spike-rush (*Eleocharis rostellata*) flower (R. Durand photo).

Crested Wood Fern (*Dryopteris cristata*)

BC Species at risk status:	Blue (S3)
COSEWIC status:	No Status
Global Heritage Status IUNC:	G5
SARA status:	No Status

Crested woodfern is an herbaceous, evergreen perennial. It has clustered fronds that rise from a short rhizome (Fig. 41). Sterile leaves are typically 20 to 75 cm long and 5 to 15cm wide, 1 pinate, with deeply cut pinnae with toothed margins. Fertile deciduous fronds are shorter (30 to 60 cm) and wither after spores are shed. Sori (clusters of spores) occur along the underside of the fertile fronds on either side of the mid-vein (Fig. 42). (CDC 2016u; Douglas et al. 2000)

Crested wood fern was located in an alder swamp at Upper Little Slocan Lakes in August, 2014. It was a new species record for the Slocan Watershed, and one of only 17 recorded occurrences in the province (only two of which are in the Kootenays). Roughly 20 individual plants were observed in a 100 square metre section of the swamp, with a high potential for more sub-populations to occur as similar habitat was common in the area. Numerous other swampy areas occur in the Slocan Watershed with suitable habitat. The population was considered to be viable and stable with no immediate threats. This record was submitted to the CDC in 2014 and is now a mapped Element Occurrence (EO ID 12471). (Durand & Ehlers 2015)

Figure 41. Crested wood fern (*Dryopteris cristata*) (R. Durand photo).

Figure 42. Close up of crested wood fern (*Dryopteris cristata*)sori (R. Durand photo).

Mountain Moonwort (*Botrychium montanum*)

BC Species at risk status:	Red (S2?)
COSEWIC status:	No Status
Global Heritage Status IUNC:	G3
SARA status:	No Status

Mountain moonwort, also known as western goblin, is a small perennial species that grows to a height of 12 cm (Fig. 43). It is rarely branched, consisting of a single common stalk with an oblong to linear sterile pinnae (leaf-like structure) with 1-6 pairs of irregular lobes. The fertile segment extends above and may be branched, and contains grape-like sporangia. Mountain moonwort has a distinct gay-green colour and is one of the more easily recognized moonwort species, although frequent morphological variability between individuals may complicate identification. (CDC 2016v; Ada Hayden Herbarium 2016)

This species occurs from southern California to northern British Columbia and to northern Idaho and northwestern Montana to the east. It grown in predictable habitats, typically found in moist, shady areas under riparian (normally old growth) western redcedar where it apparently forms fungal associations in the rich, moist soils that have a high organic content. It is a late species, emerging from underground spores in the late summer to early fall. Unlike most *Botrychium* species it is often found growing in patches with hundreds of individual species. (CDC 2016v; Ada Hayden Herbarium 2016)

Mountain moonwort was found near Silverton in the fall of 2016 and is believed to be the only known occurrence in the Slocan Valley (EcoLogic 2016; Bjork pers. comm. 2016). It is red-listed in BC, with only 10 element occurrences mapped in the province. (CDC 2016v)

Figure 43. Mountain Moonwort (*Botrychium montanum*) (R. Durand Photo).

Sutherland's larkspur (*Delphinium sutherlandii*)

BC Species at risk status:	Blue (S3)
COSEWIC status:	No Status
Global Heritage Status IUNC:	GNR
SARA status:	No Status

Sutherland's larkspur is a perennial herb that grows to 70 cm tall from a tuberous to fibrous root system. Like other Delphiniums, it has both basal leaves (growing on leaf stems from base of the stalk) and smaller stem leaves (located periodically up the stalk). It has multiple (11-37) flowers arranged as a terminal raceme, with characteristically hairy bracts, yellowish to tan lower petals, and bright blue upper petals and sepals (Fig. 44). (Klinkenberg 2014)

This species is mapped by the CDC in five locations in the province, although eFlora and other sources indicate it is more frequent. It is known to occur in mesic to dry open forests and shrub lands in southeastern BC and portions of Washington, Idaho, Montana and New Mexico. In the Slocan Watershed, it is only recently (Ehlers pers. comm. 2016) known from the bank of the Slocan River near Slocan City. (CDC 2017; Klinkenberg 2014)

Figure 44. Sutherland's larkspur (*Delphinium sutherlandii*) (T. Ehlers Photo).

Two-edged Water-starwort (*Callitriche heterophylla* ssp. *heterophylla*)

BC Species at risk status:	Blue (S2S3)
COSEWIC status:	No Status
Global Heritage Status IUNC:	G5T5
SARA status:	No Status

Two-edged water-starwort is an aquatic to semi-aquatic species that grows in shallow ponds and slow moving water (Fig. 45). The *heterophylla* subspecies is blue listed and can be differentiated from the more common *bolanderi* subspecies by a round (vs egg) shaped achene that has regularly pitted lines

(opposed to irregular on *bolanderi*). It was observed in three locations in the Slocan Watershed and in a fourth un-confirmed location (the specimen lacked some characteristics to confirm the identification). This species has been recorded by the CDC in only 11 locations in the province, with no mapped observations in the Kootenays. It occurs in shallow ponds or shallow open water wetlands with still or slow moving waters. As it can be a difficult species to properly identify, additional work should be completed at the mapped locations, with proper specimens collected and submitted to the UBC Herbarium, as well as expanded surveys in suitable habitat. (CDC 2017h; Bjork pers. comm. 2015; Klinkenberg 2015)

Figure 45. Close-up of a two-edged water-starwort seed and leaves (R. Durand photo).

Whitebark Pine (*Pinus albicaulis*)

BC Species at risk status:	Blue (S2S3)
COSEWIC status:	Endangered
Global Heritage Status IUNC:	G3G4
SARA status:	Endangered

Whitebark pine is a subalpine to alpine tree that grows up to 20 m in height in the subalpine, and is frequently observed as a scraggly, dwarf 5 to 10 m tall shrubby tree in the alpine and exposed areas

where it often dominates krummholz communities. It mainly occurs on warm, dry exposures in poorly developed soils along the Rocky Mountains and Sierras, from northern Nevada and California, to northern BC and Alberta. In many areas it was considered to be a dominate tree species in high elevation forests, but populations have been sharply declining (estimated 57% decline over the last 100 years) mainly due to pine blister rust. Clark's nutcracker (*Nucifraga columbiana*), which feed almost exclusively on the whitebark pine seeds, is the primary method of seed dispersal. (CDC 2016w; Klinkenberg 2014; COSEWIC 2010e)

Whitebark pine has been recorded in 47 locations in the province, with no mapped occurrences in the West Kootenay. Seven incidental observations of this species were made by the SWAMP in 2015 team while traveling to wetlands, and numerous more were seen (but not recorded) while driving higher elevation roads. The majority of the observations were young saplings, and only two appears to be lacking blister rust (Fig. 46 and 47). Local biologists indicate that whitebark pine are frequently found in high elevation areas throughout the Slocan Watershed (Ehlers pers. comm. 2015). (Durand & Ehlers 2015; CDC 2016w)

Figure 46. Apparently healthy whitebark pine on Slocan Ridge (left); Figure 47. whitebark pine with blister rust above Pass Creek (Right) (R. Durand photos).

6.7 Non-vascular Plants

Flaming Specklebelly *(Pseudocyphellaria crocata)*

BC Species at risk status: Blue (S3)
COSEWIC status: No Status
Global Heritage Status IUNC: G4?
SARA status: No Status

Flaming specklebelly is a circumglobal species that occurs throughout North America. It is a large foliose lichen with a greyish or brownish upper surface (Fig. 48) with conspicuous spots on the lower surface. It occurs in moist, mature forests on deciduous and conifer trees, and less frequently on moss covered rocks. It was observed at Wilson Falls in 2002, and is considered to be one of the rarest inland macrolichens. (Spribille *et al.* 2009; CDC 2017i; NatureServe 2015a)

Figure 48. *Pseudocyphellaria crocata* (C. Bjork photo).

Gyalectaria diluta (formerly *Pertusaria diluta*)

BC Species at risk status: NR
COSEWIC status: No Status

Global Heritage Status IUNC: GNR
SARA status: No Status

Gyalectaria diluta is a newly described lichen species (Fig. 49) that is known from 14 locations in British Columbia, one in Idaho and one in Montana. It is found in old growth forests on the trunks and branches of western redcedar (*Thuja plicata)*, western hemlock (*Tsuga heterophylla*) and Douglas-fir (*Pseudotsuga menziesii*), and on fallen logs. Western redcedar bark appeared to be the most common substrate on which it was found. *Gyalectaria diluta* has been found north of New Denver near Bremner Creek. This species is not currently ranked by the CDC or globally by NatureServe. (Spribille *et al.* 2009; NatureServe 2015).

Figure 49. *Gyalectaria diluta* (C. Bjork photo).

Pycnora xanthococca

BC Species at risk status: NR
COSEWIC status: No Status
Global Heritage Status IUNC: GNR
SARA status: No Status

Pycnora xanthococca is a tiny lichen (Fig. 50) that is known from northern Europe, northeastern USA, and the Pacific Northwest. It was found on Perry Ridge in 2004 in what was believed to be the first occurrence in northwestern North America. The Perry Ridge population occurred on the branch of a Douglas-fir (*Pseudotsuga menziesii*). This species is not currently tracked or ranked by the CDC and also does not have a global conservations status at this time. (Spribille *et al.* 2009).

Figure 50. Pycnora xanthococca (C. Bjork photo).

Loxosporopsis corallifera

BC Species at risk status:	NR
COSEWIC status:	No Status
Global Heritage Status IUNC:	G3
SARA status:	No Status

Loxosporopsis corallifera is known from Wilson Falls and several other rivers north of the Slocan Watershed. It is an inconspicuous, small white crustose lichen (Fig. 51) that grows in variety of habitat as an epiphyte on trees and woody debris (BLM date unknown). It is not currently tracked by the CDC, but is globally vulnerable (G3). The 2002 and 2004 were (at the time of their publications) some of the only inland records of this typically coastal species. It is the only species in the *Loxosporopsis* genus in the world and occurs from British Columbia to northern California. (Spribille & Bjork 2008; NatureServe 2015; Spribille pers. comm. 2017; Bjork pers. comm. 2017)

Figure 51. *Loxosporopsis corallifera* (C. Bjork photo).

7.0 Mapping

The following section contains a series of maps depicting the locations of SAR within the watershed. The locational data is presented in a generalized format in order to protect species locations of potentially sensitive data. The data is a combination of all the sources listed in this report and BC CDC data. All data have been buffered to create generalized locations and species names are not provided. Species locations are indicated with red outlines. Not all species described in the report are presented on the map, as many species only had general locations associated with them.

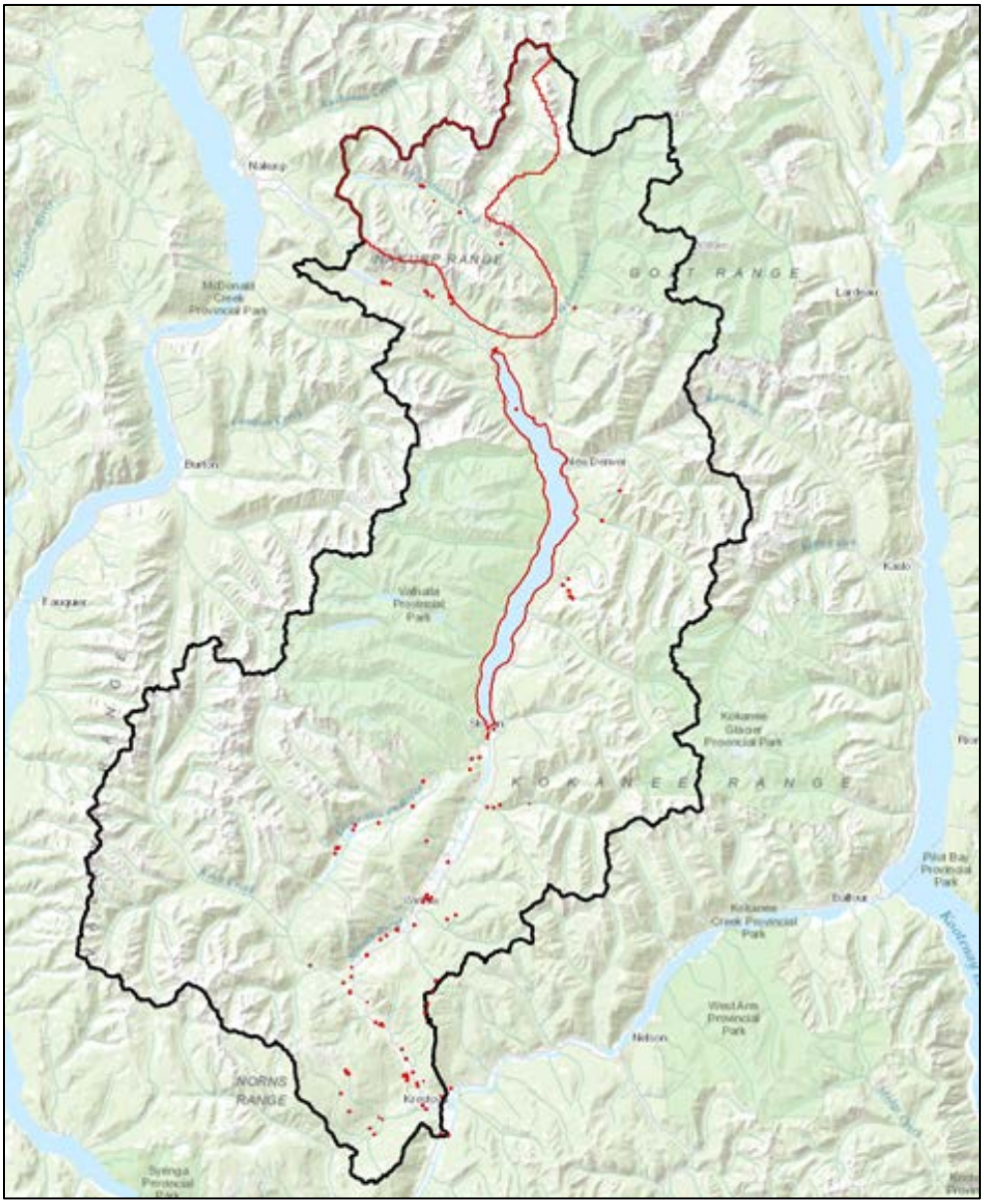

Figure 52. Overview Map of Slocan Watershed Species-at-Risk.

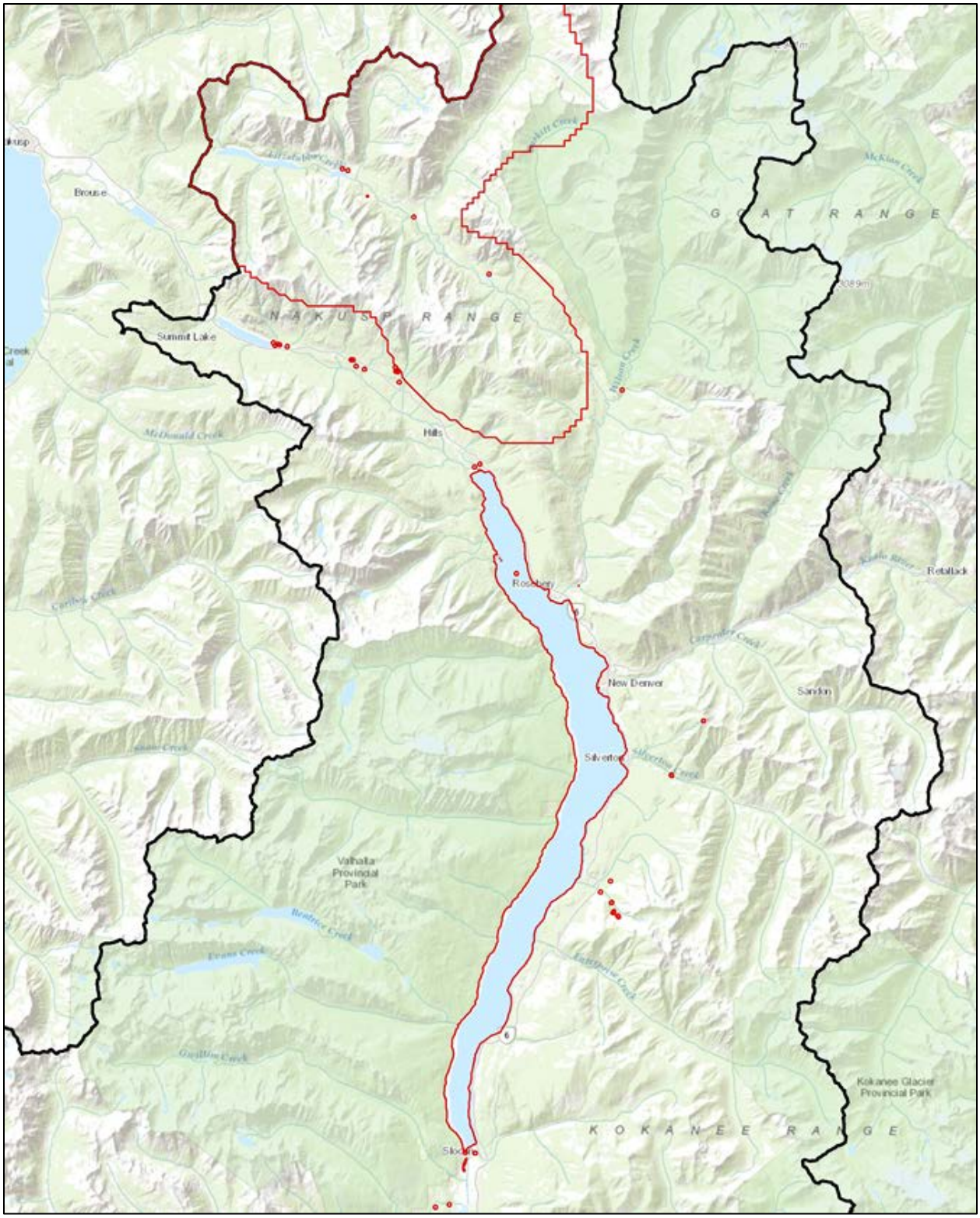

Figure 53. Map of Slocan Watershed North Species-at-Risk.

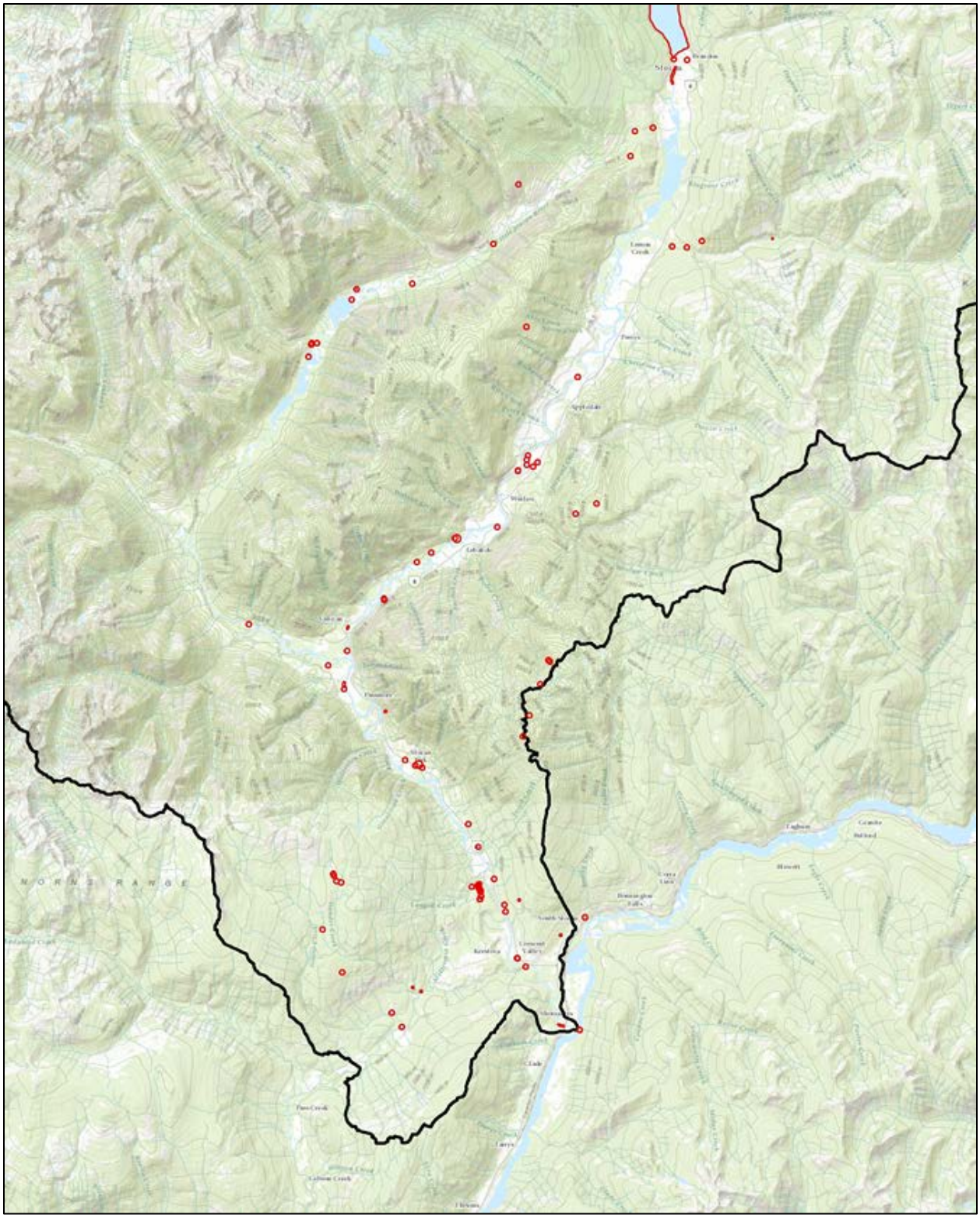

Figure 54. Overview Map of Slocan Watershed South Species-at-Risk.

8.0 Recommendations

The results of this project make it distinctly apparent that there is still much to be discovered regarding the SAR that inhabit the Slocan Watershed. With each additional field check more species are found, and the range of existing species is expanded. We hope to secure funding to move beyond this desktop exercise and complete additional inventories. We recommend that a series of specific surveys be carried out in the watershed to complement previous studies (such as those completed for the Western Skink, Lewis Woodpecker, and the extensive fish inventory work). These studies would be completed by experts in the field and focus on under-inventoried areas, namely vascular and non-vascular plants, amphibians and invertebrates.

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