

Slocan Wetlands Monitoring and Assessment Project

Slocan Rare Species Project



Prepared by:
Ryan Durand, RPBio. and Tyson Ehlers, RPBio.

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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, Selkirk College, Central Kootenay Invasive Species Society, National Wetlands Conservation Fund, 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.

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1.0 Introduction

During the 2014 and 2015 Slocan Wetlands Assessment and Monitoring Project (SWAMP) field program, project biologists Ryan Durand, RPBio., Tyson Ehlers, RPBio. and Rhia MacKenzie identified and mapped numerous species-at-risk in the Slocan Watershed while surveying wetlands. This report contains a summary of those findings, as well as recommendations as to a future species-at-risk inventory project.

The SWAMP study area 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).



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

2.0 Background

The type and extent of species-at-risk in the Slocan Watershed is currently understudied. Current data (October, 2015) in the BC Conservation Data Centre (CDC) lists 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. Eight of the 20 records are over 30 years old and their current condition and viability is unknown. No ecosystems-at-risk have been identified in the watershed.

Table 1. CDC Element Occurrences for the Slocan Watershed

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

3.0 2014-2015 Results

During the 2014 and 2015 SWAMP field seasons biologists identified 8 species-at-risk (Table 2) in 56 locations in the Slocan Watershed, as well as 5 locations outside of the watershed (Fig. 2). Some of these locations would constitute groups of individuals or sub-populations that would be combined by the CDC into single Element Occurrences (EO). Some were targeted surveys while completing wetland inventory plots and others were incidental sightings while traveling to and from wetlands. In addition to species-at-risk tracked by the CDC, we identified multiple locations of fungal species that are either new to BC, or have very few known records (pers. comm. Kroeger, 2015). As fungi have yet to receive official conservation status designations, the species we identified are assessed in terms of relative frequency of occurrence based on expert knowledge. Voucher specimens were collected for all fungal species and submitted to the UBC herbarium to add to the provincial data base. This work will support future initiatives to assign conservation status to fungal species. We also identified multiple wetland ecosystems that are considered to be ecosystems-at-risk in other biogeoclimatic subzones. Recent discussions with CDC staff indicate that they are interested in these data and our submission may lead to having them ranked as listed ecosystems in the Slocan (pers. comm. Stacy, 2015).

Table 2. Species-at-Risk Identified During 2014-2015 SWAMP Field Studies

Common Name	Scientific Name	Status	Habitat
Vascular Plants			
giant helleborine	<i>Epipactis gigantea</i>	Blue	Fen in Bonanza Marsh
beaked spike-rush	<i>Eleocharis rostellata</i>	Blue	Fen in Bonanza Marsh
whitebark pine	<i>Pinus albicaulis</i>	Blue (Endangered)	Multiple high elevation locations on Slocan Ridge, Pedro Creek and Goose Creek.
two-edged water-starwort	<i>Callitriche heterophylla</i> ssp <i>heterophylla</i>	Blue	Swamp and marshes in the Hwy 6 Wetlands and wetlands near Appledale
Amphibians			
western toad	<i>Anaxyrus boreas</i>	Blue (Special Concern)	Multiple locations throughout study area.
Birds			
great blue heron, herodias subspecies	<i>Ardea herodias herodias</i>	Blue	Little Slocan Lakes
Molluscs			
banded tigersnail	<i>Anguispira kochi</i>	Blue	Mixed forests in Crescent Valley, Appledale. Currently being assessed (2017) by COSWIC as potential Special Concern species.
Coeur D'Alene Oregonian	<i>Cryptomastix mullani</i>	Blue	Conifer forests near Bonanza Marsh, Hwy 6 wetlands, Summit Lake, Little Slocan Lakes, and Crescent Valley
Fungi			
Cat-tail mushroom	<i>Psathyrella typhae</i>	Rare	Bonanza Marsh
chaga	<i>Inonotus obliquus</i>	Rare	birch saprobe

swamp beacon	<i>Mitrula elegans</i>	Rare	Aquatic ascomycete
aquatic earth-tongue	<i>Vibrissea truncorum</i>	Rare	Aquatic ascomycete
	<i>Galerina tibiicystis</i>	Infrequent	Moss
	<i>Gymnopus peronatus</i>	Infrequent	Moss
	<i>Hygrocybe turunda</i> var. <i>sphagnophila</i>	Infrequent	Sphagnum moss
	<i>Hypholoma elongatum</i>	Infrequent	Moss

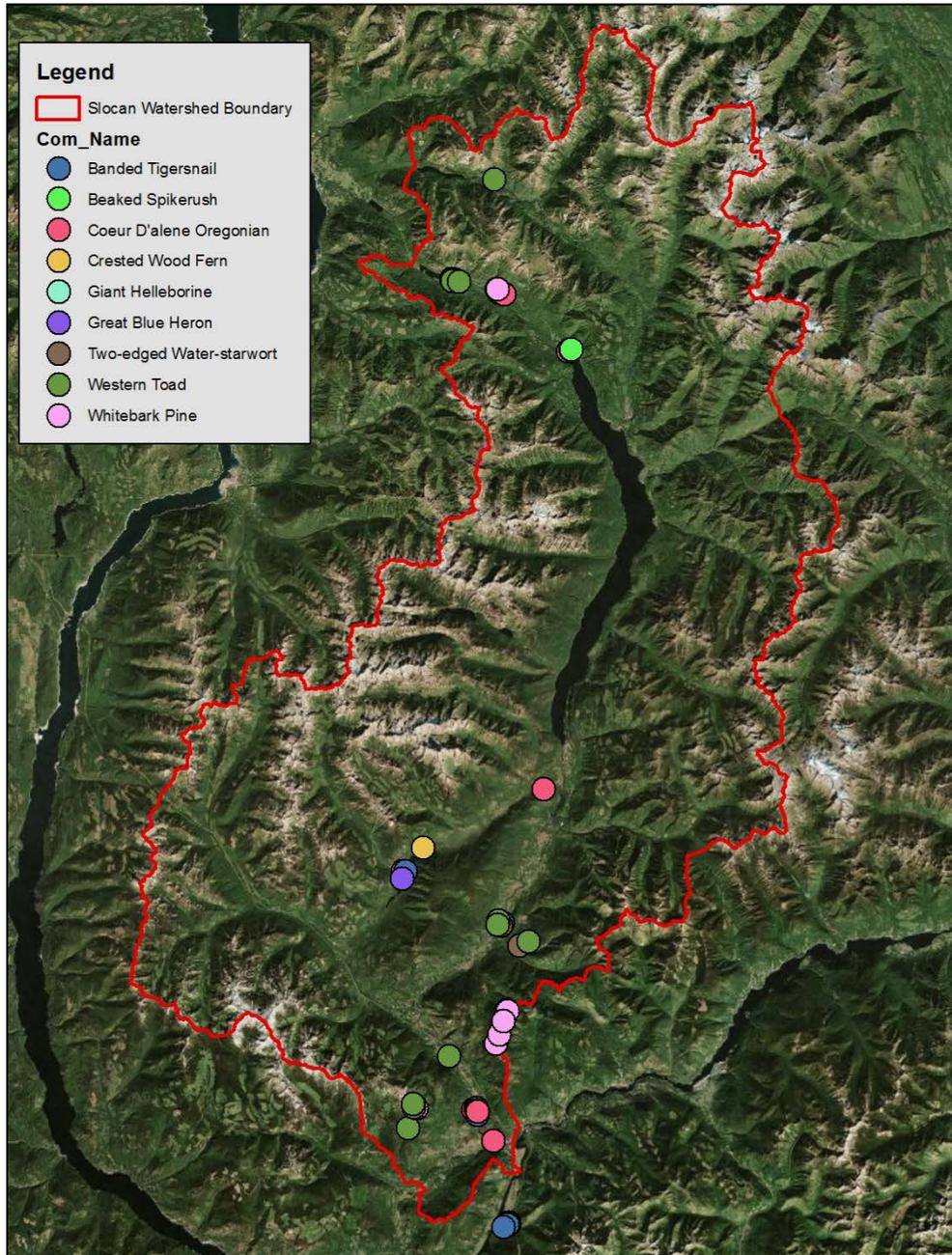


Fig. 2. Location of species-at-risk identified in the Slocan Watershed (imagery from ESRI Base Maps).

4.0 Identified Species at Risk

The following section provides additional details on the species-at-risk identified in the Slocan Watershed during SWAMP field work. Where possible, it provides a summary of the number and location they were found, as well as general habitat and representative photos.

4.1 Vascular Plants

Four at-risk vascular plants have been identified in the Slocan Watershed. All are new species for the watershed, and all but one was not previously mapped in the West Kootenays. There is a very high potential for additional occurrences of two of these species, and a high potential for many other at-risk species to be identified in the watershed.

4.1.1 Crested wood fern

Crested wood fern (*Dryopteris cristata*) was located in an alder swamp at Upper Little Slocan Lakes (UTM 453150 5503685) in August, 2014 (Fig. 3 and 4). It is 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 in the area as potential habitat is common in the area. The population is considered to be viable and stable with no immediate threats. This record was submitted to the CDC in 2014 and is now a mapped EO (EO ID 12471). (CDC, 2015)



Fig. 3. Crested wood fern (R. Durand photo).



Fig. 4. Close up of crested wood fern sori (R. Durand photo).

4.1.2 Giant Helleborine

A sizeable population (several hundred individuals) of giant helleborine (*Epipactis gigantea*) was found in the Bonanza Wetland Complex in July, 2015 (Fig. 5). The population covered an area of roughly 0.25 hectares with regularly spaced flowering individuals. The population is considered to be viable and stable with no immediate threats. It is restricted to a fen in the southeast corner of the complex. No other similar habitat is known in the complex, or in the larger watershed, therefore it is expected that this is the only element occurrence of this species. This species is known from several EOs on Kootenay Lake, the closest of which is over 60km away. There are 34 known occurrences of the species in the province, including many historic records that are likely extirpated (BC CDC, 2015).



Fig. 5. Giant Helleborine (R. Durand photo).

4.1.3 Beaked Spike-Rush

A sizeable population of beaked spike-rush (*Eleocharis rostellata*) was found in the Bonanza Wetland Complex in July, 2015 (Fig. 6 and 7). The population covered an area of roughly 0.25 hectares with roughly 50% cover of the species. The population is considered to be viable and stable with no immediate threats. It is 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 is the 10th known element occurrence of this species in the province, and the first in the West Kootenays (BC CDC, 2015).



Fig. 6. Beaked Spike-Rush (R. Durand photo).



Fig. 7. Close up of beaked spike-rush flower (T. Ehlers photo).

4.1.4 Whitebark pine

Whitebark pine (*Pinus albicaulis*) has been recorded in 47 locations in the province, with no mapped occurrences in the West Kootenay (CDC, 2015). Seven incidental observations of this species were made by the SWAMP team while traveling to wetlands, and numerous more were seen (but not recorded) while driving higher elevation roads (Table 3). The majority of the observations were young saplings, and only two appears to be lacking blister rust (Fig. 8 and 9). Local biologists indicate that whitebark pine are frequently found in high elevation areas throughout the Slocan Watershed.

Table 3. Whitebark pine observations.

Number	Habitat	Condition
3 saplings	Subalpine near road	No blister rust
1 young	Subalpine near road	Blister rust
2 mature, multiple saplings	Near road and in forest	Some rust
1 sapling	Approximate location along road	Not assessed
2 saplings	Subalpine near old road	Blister rust
1 sapling	Subalpine near old road	No rust
1 sapling	Subalpine forest	Not assessed



Fig. 8 Apparently healthy whitebark pine on Slocan Ridge (left) and Fig. 9 whitebark pine with blister rust above Pass Creek (Right) (R. Durand photos).

4.1.5 Two-edged water-starwort

Two-edged water-starwort (*Callitriche heterophylla* var. *heterophylla*) was observed in three locations in the Slocan Watershed (Table 4), and 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 (CDC, 2015). It occurs in shallow ponds or shallow open water wetlands with still or slow moving waters. It is a difficult species to properly identify, so photographs of key parts were sent to botanist Curtis Bjork for confirmation (Fig. 10). 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.

Table 4. Two-edged water-starwort observations.

Number	Habitat
Approx. 5m x 5m (??)	Shallow open water wetland. ID not confirmed.
Approx. 10m x 5m in OW	Fen and OW along small stream
10m x 5m in OW	Shallow open water wetland in subalpine fen
10m ²	Modified pond on edge of old railway



Fig. 10. Close-up of a two-edged water-starwort seed and leaves (R. Durand photo).

4.2 Amphibians

One at-risk amphibian was observed in the Slocan Watershed.

4.2.1 Western toad

Western toads (*Anaxyrus boreas*) were observed in 12 locations in the Slocan Watershed (Table 5). Observations ranged from single juvenile or adults, to masses of thousands of tadpoles (Fig. 11 and 12). While some observations were made in well-known toad breeding areas (such as Summit Lake), 4 significant breeding areas were located, along with incidental observations of individuals. Western toads are studied in many areas of the Slocan Watershed, and are known to occur throughout the area.

Table 5. Western toad observations.

Number	Habitat
1 adult female	Forested swamp near Little Wilson Lake
1 toadlet	Swamp
1,000-2,500 tadpoles	Cottongrass sedge fen. Slow moving stream and OW
5,000 - 10,000 tadpoles	Shallow flooded field. Marginal viability
5,000 - 10,000 tadpoles	Shallow flooded field. Marginal viability
1 adult	Shrubby area on edge of highway. 2012 first obs.
250-500 tadpoles	Swamp and OW
1 juvenile	Fen and OW
2,500 - 5,000 toadlets	Migrating from Summit Lake across rail trail
2,500 - 5,000 toadlets	Migrating from Summit Lake across rail trail
50-100 toadlets	Edge of Summit Lake
1,000+ toadlets	Migrating from Summit Lake across rail trail



Fig. 11. Large mass of western toad tadpoles (R. Durand photo).



Fig. 12. Adult female western toad (R. Durand photo).

4.3 Birds

One observation of an at-risk bird was made during the 2015 SWAMP field season.

4.3.1 Great blue heron

A single observation of 2 adult great blue herons (*Ardea herodias herodias*) was made in a marsh on the edge of Little Slocan Lakes (UTM 451225 5500851). The observation was made from distance across the lake. It was assumed that the birds were using the lake margin for feeding and it is unknown if they were permanent residents in the area.

4.4 Molluscs

Numerous observations of at-risk molluscs were made during the 2015 SWAMP field season. In addition to the two blue-listed species, multiple terrestrial and aquatic species were identified with the assistance of Dr. Kristiina Ovaska and Robert Forsyth (research associate, Royal BC Museum).

4.4.1 Banded tigersnail

The banded tigersnail (*Anguispira kochi*) is known from the Kootenay and Columbia Watersheds in BC, as well as Washington State, Oregon, Idaho and Montana (NatureServe, 2015). Populations also occur in eastern Canada and the eastern US. It is a species-at-risk in most of its range and is currently being assessed by COSWIC for potential listing under SARA (pers, comm. Forsyth, 2015). Thirteen occurrences are currently mapped by the CDC, mainly in the West Kootenays, including: Syringa Creek (Lower Arrow Lake), Kootenay Lake, Nelson, S of Gray Bay (Hwy 3A), Six Mile Lakes and Schroeder Creek (N of Kaslo) (CDC, 2015 from Forsyth 2003a).

2015 SWAMP field work identified 8 new Element Occurrences (EO) of this species, 1 of which was located outside of the Slocan Watershed (Table 6). Twenty five observations were combined into 8 EOs when a standard 1km separation distance (observations greater than 1km apart are considered to be separate populations, while those within 1km of each other are considered sub-populations that are combined into a single EO) was applied. A total of 25 live adults and 14 dead shells were observed (Fig. 13 and 14). It is expected that there are many more occurrences of this species in the Slocan Watershed based on the relative abundance of potential habitat (while undefined, the snails appear to be affiliated with broadleaf forests that contains a moderate to high cover of thimbleberry). Fig. 15 is an example of one area in Crescent Valley where the species was observed in 16 locations and both confirmed and potential habitat could be easily delineated.

Table 6. Banded tigersnail observations.

Number	Habitat	Live/Dead
2 adults	Sub pop 1 - see FS882	Shell
3 adults	Sub pop 1 - see FS882	Live
1 adult	Sub pop 1 - see FS882	Shell
1 adult	Sub pop 1 - see FS882	Shell
3 adults	Sub pop 1 - see FS882	2 live 1 shell
4 adults	Sub pop 1 - see FS882	2 live 2 shell
2 adults	Sub pop 1 - see FS882	live
1 adult	Sub pop 1 - see FS882	Live
1 adult	Sub pop 1 - see FS882	shell
1 adult	Sub pop 1 - see FS882	shell
1 adult	Sub pop 1 - see FS882	live
1 adult	Sub pop 1 - see FS882	shell
1 adult	Sub pop 1 - see FS882	1 live
1 adult	Sub pop 1 - see FS882	shell
1 adult	Sub pop 1 - see FS882	live
1 adult	Disturbed mixed forest at regional park	1 live
2 adults	Young conifer to mixed forest	live
1 adult	Young conifer to mixed forest	shell
3 adults	Young conifer to mixed forest	live
1 adult	Young conifer to mixed forest	live
1 adult	Young conifer to mixed forest	shell
1 adult	Thimbleberry edge of driveway	1 live
1 adult	Young mixed forest	1 live
3 adults	Young broadleaf forest	live
1 adult	Moist conifer forest	1 dead shell



Fig. 13. Live banded tigersnail (R. Durand photo).



Fig. 14. Dead banded tigersnail shell (R. Durand photo).

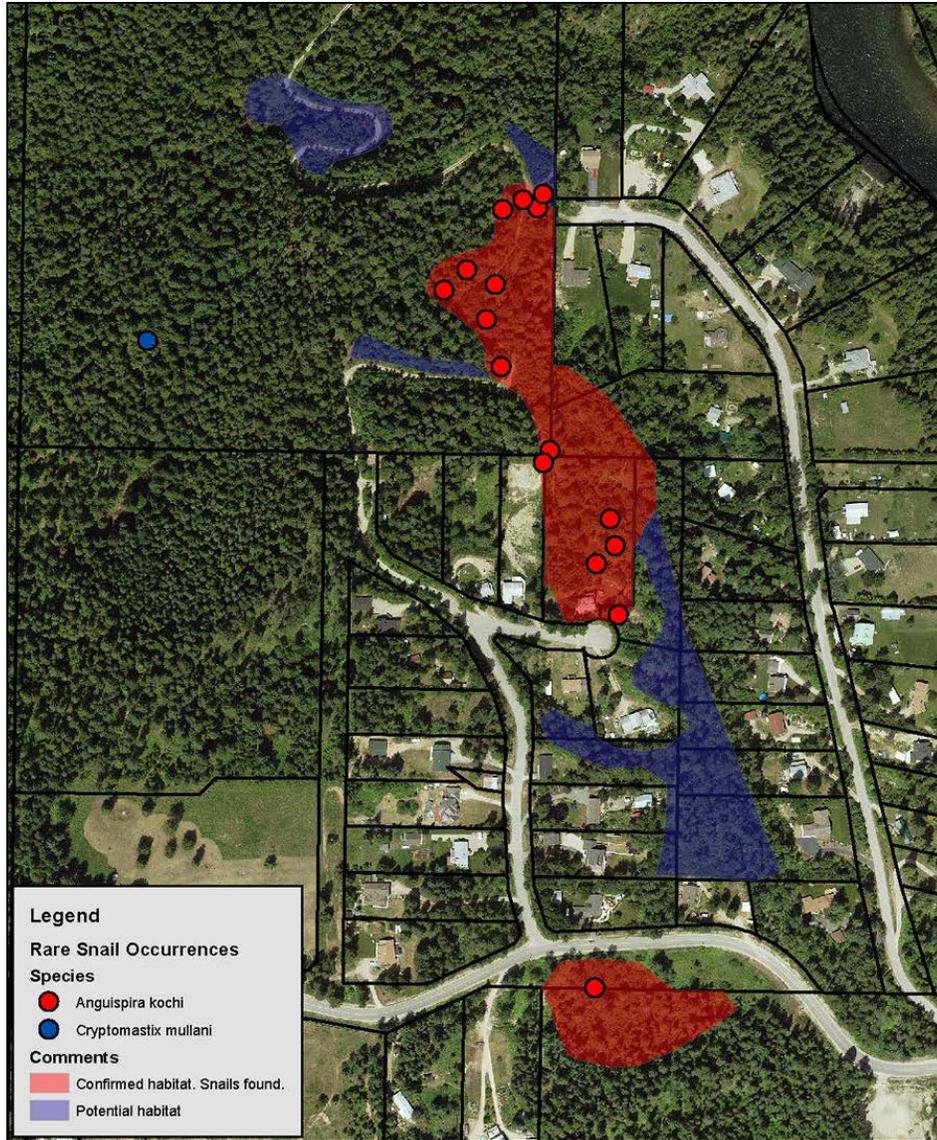


Fig. 15. Map of confirmed and potential snail habitat in Crescent Valley (R. Durand photo).

4.4.2 Coeur D'Alene Oregonian

The Coeur D'Alene Oregonian (*Cryptomastix mullani*) was found in 9 locations in the Slocan Watershed (Table 7). This small terrestrial snail is typically found in moist conifer forests (and less often in mixed or broadleaf stands) that have a thick leaf or needle litter layer (Fig. 16 and 17). The Coeur D'Alene Oregonian has only been found in the Kootenay and Columbia watersheds in all of Canada, with few known records. The BC CDC does not contain any mapped EOs for this species, but states that it occurs in the East and West Kootenays, and is thought to be widespread in the Pacific Northwest of the US

(CDC, 2015a). It is likely more widespread than current records indicate, as 9 new locations were found in 2015 during SWAMP field work with limited time spent searching.

Table 7. Coeur D’Alene Oregonian observations.

Number	Habitat	Live/Dead
1 adult	Mature conifer forest	Live
1 adult	Mature conifer forest	Live
1 adult	Mature conifer forest by Summit Lake	Alive.
3 adults	Conifer forest. Edge of new clearcut	Alive
1 adult	Young conifer forest	Alive
2 adults	Young conifer forest	dead shells
6 adults	Young conifer forest	Alive
1 adult	Disturbed mixed forest at regional park	1 dead shell
4 adults	Young mixed forest	Live



Fig. 16. Coeur D’Alene Oregonian shell (R. Durand photo).



Fig. 17. Adult Coeur D'Alene Oregonian on the left with an adult *Discus* sp. on the right (R. Durand photo).

4.5 Fungi

Tyson Ehlers has compiled a list of over 300 fungal species found in the Slocan Valley and elsewhere in the Kootenays. He identified numerous species in Slocan wetlands in 2015, several of which are considered rare or infrequent, and one a first record in BC. It is highly likely that further directed sampling efforts will yield more occurrences of these and other rare species.

4.5.1 Cat-tail Mushroom

Cat-tail Mushroom (*Psathyrella typhae*) is a little brown mushroom found on leaves of cat-tail (*Typha latifolia*) and sedges (*Carex* spp.). It fruits in the spring at the water level (Fig. 18). It has been found in three wetlands in the Slocan Valley; Bonanza Marsh and two sites near Winlaw. This is the first record for the species in BC, and it is considered to be a very rare species (pers. comm. Kroeger, 2015).



Fig. 18. Cat-tail Mushroom (T. Ehlers photo).

4.5.2 *Vibrissea truncorum* - Aquatic earth-tongue

Vibrissea truncorum is a small aquatic ascomycete for which the only records for the province are for Vancouver Island and the lower mainland (UBC Herbarium Fungal database, 2015; Mushroom Observer, 2015). It was found in a swamp on Slocan Ridge, in a small flowing stream. This find significantly expands the known range of this species in BC.



Fig. 19. *Vibrissea truncorum* (T. Ehlers photo).

4.5.3 *Mitrula elegans* - The Swamp Beacon

Mitrula elegans is another aquatic species found in a swamp in the Little Slocan watershed. It has also only previously been recorded from coastal BC.



Fig. 20. *Mitrula elegans* (T. Ehlers photo).

4.5.4 *Inonotus obliquus* - Chaga

Chaga is a decay fungus that inhabits paper birch (*Betula papyrifera*). It occurs infrequently in BC and is a highly sought after medicinal fungus which may lead to future conservation concerns.



Fig. 21. *Inonotus obliquus* - Chaga (T. Ehlers photo).

4.5.5 Other fungal species

A number of other fungal species we found infrequently are wetland specialists with limited distributions and potential rarity according to their highly specialized habitat niches, primarily sphagnum moss-dominated wetlands. These include: *Hygrocybe turunda* var. *sphagnophila*, *Hypholoma elongatum*, *Galerina tibiicystis*, *Arrhenia onisca* (*epichysium*), and *Gymnopus peronatus*.

5.0 Recommendations

Based on both the number of species-at-risk found, and the number of new species recorded, from incidental sightings during SWAMP field work, we believe that a proper inventory and mapping project would be beneficial. We know of several other species that occur in the watershed (such as painted turtles, Lewis woodpecker, and common nighthawk) that have not been properly documented. We also assume that numerous other species-at-risk will be found with targeted surveys when areas beyond the wetlands are assessed. We suggest that a future species-at-risk inventory and mapping project begin with the following activities:

1. Compile all existing data. Conservation Data Centre (CDC) Element Occurrence Records, grey literature, discussions with local biologists and naturalists.

2. Targeted field surveys to confirm un-recorded observations (naturalists, local residents reporting painted turtles on the Slocan River, other anecdotal observations, etc.) and attempt to locate historic records.
3. Field surveys to expand known occurrences (such as single element occurrences of rare snails, etc.) to map a more comprehensive extent of their distribution.
4. Develop a longer term plan for bringing experts to the watershed to conduct inventories.
5. Submit all data to the CDC in an appropriate format.
6. Communicate findings to local biologists, government agencies, resource extraction businesses, and landowners.

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