



HIGHWAY 3A: SLOCAN OVERHEAD
ENVIRONMENTAL INVENTORY AND IMPACT ASSESSMENT



Prepared for:
Ministry of Transportation
Southern Interior Region
West Kootenay District
310 Ward Street
Nelson, BC
V1L 5S4

Prepared by:
Masse & Miller Consulting Ltd.
513 Victoria St.
Nelson, BC
V1L 4K7

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Table of Contents

Table of Contents.....	ii
List of Figures.....	iii
List of Tables.....	iii
1 Introduction.....	1
2 Site Description.....	1
3 Proposed Works.....	1
4 Methods.....	1
4.1 Information Sources.....	1
4.2 General survey procedures.....	2
4.3 Species at Risk (Vegetation/Wildlife).....	3
5 Results.....	4
5.1 Vegetation.....	5
5.2 Wildlife.....	9
5.2.1 High Value Plants.....	9
5.2.2 Wildlife Trees.....	9
5.2.3 Wetland Habitat.....	10
5.2.4 Reptiles.....	10
5.2.5 Birds.....	10
5.2.6 Snow-track surveys.....	14
5.3 Species at Risk (Vegetation/Wildlife).....	14
5.3.1 Vegetation.....	14
5.3.2 Wildlife.....	15
6 Impact Assessment and Recommendations.....	16
6.1 Wildlife.....	16
6.2 Vegetation.....	17
6.2.1 Revegetation Plan.....	17
6.3 Water Quality.....	18
6.4 Spills and Accidents.....	18
7 Closure.....	19
8 References.....	20

List of Figures

Figure 1. Map showing four ecological polygons within Slocan Overhead study area and ephemeral drainage location (blue).....	4
Figure 2. Project site showing wetland, western skink habitat and reptile observations (Map provided by Jakob Dulisse).	13

List of Tables

Table 1. General site attributes within the Slocan Overhead project area.....	8
Table 2. Forest and vegetation attributes within the Slocan Overhead project area.	9
Table 3. Wildlife species observed during general surveys within South Slocan Overhead Project area.*	11
Table 4. Wildlife tracks encountered within the study area during snow-track surveys in February 2009.	14
Table 5. Terrestrial plant species at risk potentially occurring in the Interior Cedar-Hemlock Dry Warm (ICHdw1) biogeoclimatic subzone within the Arrow Lake Forest District, and their potential occurrence or concern within the project area.	22
Table 6. Terrestrial vertebrate species at risk potentially occurring in the Interior Cedar-Hemlock biogeoclimatic subzone within Arrow Boundary Forest District, and their potential occurrence or concern within the project area.	32

Appendices

- Appendix 1 – Potential Plant Species at Risk
- Appendix 2 – Potential Wildlife Species at Risk

1 Introduction

Masse & Miller Consulting Ltd. conducted an environmental impact assessment of the Slocan Overhead study area. The objective of this assessment was to identify vegetation and wildlife resources that could be impacted by proposed construction activities at the project location. The study area boundaries were provided by the Ministry of Transportation and Infrastructure (MoTI) prior to completing field assessments. Mr. Jakob Dulisse, R.P.Bio., and Dr. Robert D'Eon, R.P.Bio., were sub-contracted by Masse & Miller to complete the wildlife assessments for the study area.

2 Site Description

The Slocan Overhead is located approximately 1 km on Highway 3A east of the intersection with Highway 6 (Slocan Junction). The bridge overhead crosses the decommissioned Canadian Pacific Railway that used to operate to Slocan City. The tracks were removed in the late 1990's and now the corridor is used principally by the public as a recreation trail. The study area is located within the South Slocan rural community, and is located on both sides of Highway 3A (Figure 1).

Fisheries were not a part of this assessment, as the study area does not contain any fish bearing streams or wetlands, and the existing water flows into ephemeral drainages (Figure 1).

3 Proposed Works

The South Slocan Overhead Project (Project No. 22822) will involve replacing an aging two-lane bridge, constructed in 1962, on Highway 3A. The existing structure is narrow with substandard railings and has no provision for cyclists or pedestrians to cross. A number of options for bridge repair were examined by Ryan Oakley P.Eng., Highway Designer and presented in a June 4th, 2009 memo to MOTI. The preferred option would replace the Overhead with road fill on its existing alignment and will involve the construction of a temporary detour running parallel and the south of the existing highway surface.

4 Methods

4.1 Information Sources

Background information was collected on the study area prior to completing the field assessment. The data was collected mostly from the municipal and government agencies including:

1. Ministry of Transportation and Infrastructure;
2. Ministry of Environment;
3. B.C. Conservation Data Centre;
4. Committee on the Status of Endangered Wildlife in Canada.

4.2 General survey procedures

A background review was conducted and the study area was divided into four polygons based on dominant vegetation communities (Figure 1). Masse & Miller was provided with an air photo utilized to stratify the study area into distinct ecological polygons prior to the completion of field studies. Field verification of the habitats present was conducted during site visits on August 1, September 23 and October 15, 2008 to assess the general ecological conditions within the project area. Field surveys were designed so that each polygon was visited on foot resulting in survey coverage of the entire study area. Within each polygon, general ecological conditions including vegetation cover, site disturbance, invasive weeds, significant wildlife habitat features, potential red and blue-listed wildlife concerns, and any other significant ecological features were recorded.

Mr. Jakob Dulisse, R.P.Bio assessed wildlife use and wildlife habitat along all survey routes. All snags (wildlife trees), downed wood (coarse woody debris) and significant habitat values in the project areas were recorded. All incidental wildlife sign observations were recorded as encountered on surveys. Relevant photographs were taken at each site.

On the 5th, 13th, 20th and 27th of February, the study area was surveyed for wildlife tracks in the snow by Dr. Robert D'Eon, R.P.Bio. On the initial visit, a systematic 2-hr walk-through that covered the entire study was established so that it could be repeated in the same fashion on subsequent visits. Site visits were spaced approximately 1 week apart to allow sufficient snowfall and wildlife activity in between visits. During surveys, all wildlife tracks encountered were identified to species and recorded.

In addition to the general surveys conducted in 2008 amphibian and reptile surveys were conducted on June 24th, 2009 by Mr. Jakob Dulisse, R.P.Bio. The wetland (Figure 1) was surveyed for the presence of amphibian breeding through 79 dipnet sweeps conducted along a 345m transect around the perimeter (Polygon 4, Figure 1). Two hundred twenty-two cover objects (mainly rocks and wood) were checked along an 833m transect within the dry, rocky habitat within Polygon 2 (Figure 1) of the project area for the presence of reptiles, especially the federally and provincially listed western skink (*Eumeces skiltonianus*), which is known to occur in the area. The amphibian and reptile survey date was timed to fall within the peak local amphibian (June & July) and western skink (May & June) survey periods. Significant wildlife habitat features and potential management concerns for other species of concern were also noted.

A follow-up plant species-at-risk survey was conducted on 8 July 2009, for the project area. The timing of the survey coincided with the timing the potential plant species would have been present and flowering to aid in identification. The entire study area was ground-surveyed with particular attention paid to the proposed disturbance locations. A list of all potentially occurring plant species-at-risk was used during the survey to aid in plant identification.

4.3 Species at Risk (Vegetation/Wildlife)

Plant and wildlife species in Canada are evaluated and ranked provincially by the B.C. Conservation Data Centre (CDC) and nationally by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The CDC maintains a dynamic 'tracking list' with observation and ecological information regarding species of conservation concern, commonly referred to as 'Red- and Blue-listed' species (CDC 2009). Taxa that are of 'Special Concern' (Blue-listed) are particularly sensitive or vulnerable to human activities or natural events. Taxa that are 'Threatened,' 'Endangered' or 'Extirpated' (Red-listed) are likely to become endangered (if limiting factors are not reversed) or are facing imminent extirpation or extinction. 'Extirpated' taxa no longer exist in the wild in British Columbia, but may occur elsewhere.

COSEWIC also maintains a regularly updated list of Canadian species at risk at the national level (COSEWIC 2009) which are designated 'Special Concern,' 'Threatened,' 'Endangered,' 'Extirpated,' or 'Extinct' according to the level of threat facing the species.

For both lists, ranking is applied to taxa at the species, subspecies, populations, and ecotype level. Recent legislation in Canada protects endangered species on the COSEWIC list through the Species at Risk Act. In general, the federal policy regarding species at risk is to defer to provincial management agencies so SARA only applies to species and habitat that occur on federal land, excluding provincially legislated land. For this project, both provincially and federally listed species were reviewed.

A comprehensive list of all plant and terrestrial vertebrate species provincially or federally listed as 'at risk' within the Interior Cedar Hemlock biogeoclimatic zone (ICH) of the Kootenay Lake Forest District was compiled from the CDC and COSEWIC databases. Each species was then analyzed for potential range overlap and rated on the likelihood of presence within the study area. This data was used as a comparative tool to aid in the identification of listed species during vegetation and wildlife inventories.

5 Results

Four distinct ecological polygons were identified within the Slocan Overhead study area. A map indicating the location of these four polygons is provided as Figure 1. The polygons are described as:

- Polygon 1: Urban/Residential – paved roadways and Highway 3A;
- Polygon 2a-b: Railway/Fields – recovering disturbance areas consisting predominantly of herbs and shrubs adjacent to roadways (including Highway 3A) and including railway;
- Polygon 3a-c: Shrub/Forest – three forested areas in study area; and
- Polygon 4: Wetland – small wetland adjacent to Highway 3A.

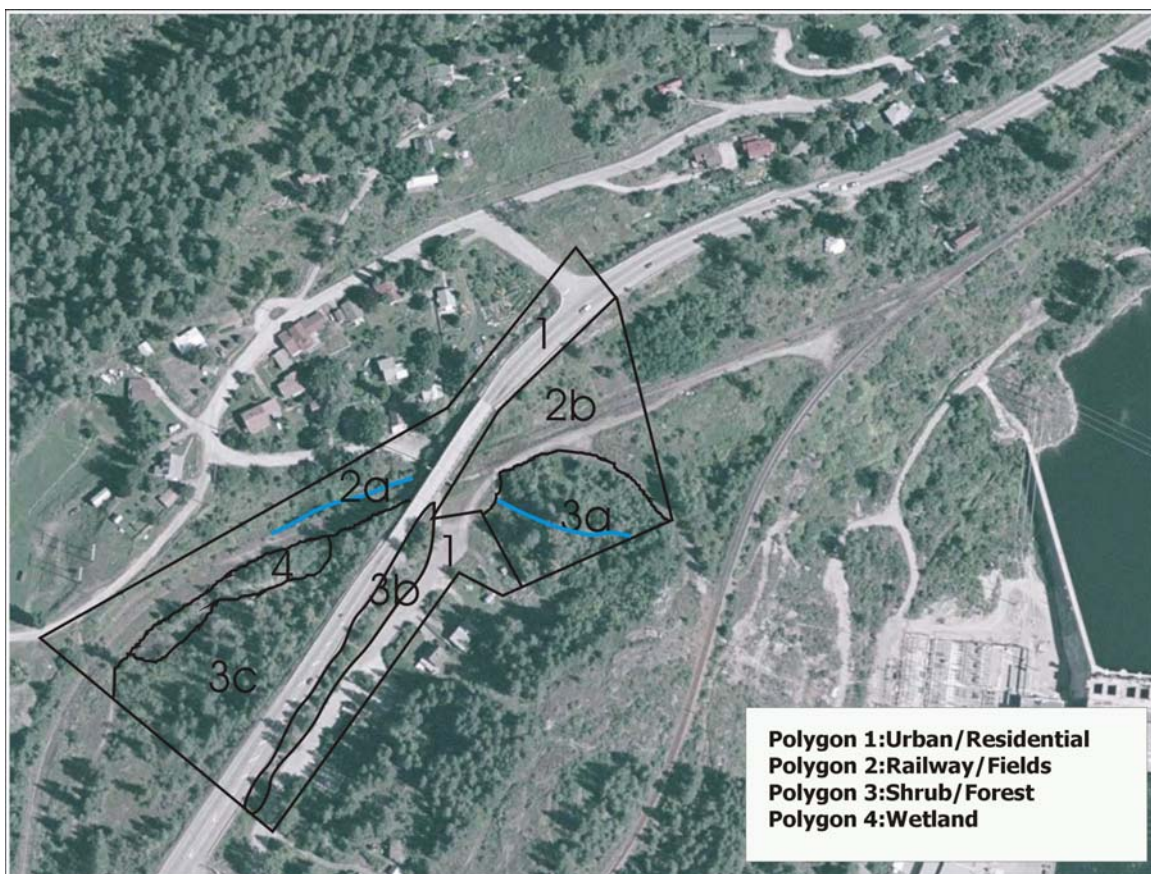


Figure 1. Map showing four ecological polygons within Slocan Overhead study area and ephemeral drainage location (blue).

5.1 Vegetation

Polygon 1 is composed of a permanently disturbed area containing existing paved and dirt roads, urban development and Highway 3A. This polygon contains very little vegetation consisting of manicured lawns and disturbed areas covered by grasses and invasive weed species.

Polygon 2 consists of the northeast and west portions of the study area adjacent to the roadways and including the railway corridor as indicated on Figure 1. These areas are heavily disturbed and are characterized by a well developed herb layer containing a variety of native and non-native plants with shrubs intermixed throughout (Photo 1 and Photo 2). The herb layer includes a mix of agronomic grasses such as orchard grass (*Dactylis glomerata*) quackgrass (*Agropyron repens*), redtop (*Agrostis gigantea*) and timothy (*Phleum pratense*) with common plantain (*Plantago major*), yarrow (*Achillea millefolium*) and spreading dogbane (*Apocynum androsaemifolium*) throughout. Invasive weeds including spotted knapweed (*Centaurea maculosa*), sheep sorrel (*Rumex acetosella*), chicory (*Cichorium intybus*) and common tansy (*Tanacetum vulgare*) are abundant throughout. The shrub layer is composed primarily of common snowberry (*Symphoricarpos albus*), sitka alder (*Alnus crispa*), and saskatoon (*Amelanchier alnifolia*) with some regenerating (1 - 3 m) Douglas-fir (*Psuedotsuga menziesii*), ponderosa pine (*Pinus ponderosa*) and black cottonwood (*Populus balsamifera*) interspersed throughout. The north side of Polygon 2a is a wet area characterized by predominantly cattail (*Typha latifolia*), growing in the old ditchline of the railway (Photo 3).



Photo 1. Polygon 2 typical vegetation (view east).



Photo 2. Polygon 2 typical vegetation (view west).



Photo 3. Wet area on north side of Polygon 2a.

Polygon 3 consists of coniferous and mixed forest types (Photo 4). It is divided into three subunits located along the southeast and southwest sides of Highway 3A, and in the east portion of the study area (Figure 1). Douglas-fir, western larch (*Larix occidentalis*) and black cottonwood dominate the upper layers of these young forest areas, which are typically 60 to 80 years in age. Polygon 3a is a densely vegetated moisture receiving area that has some standing water. The dominant shrubs in this area include Douglas maple (*Acer glabrum*), lady fern (*Athyrium filix-femina*), bracken fern (*Pteridium aquilinum*), common snowberry, thimbleberry (*Rubus parviflorus*) and abundant invasive vines such as nightshade (*Solanum* spp.) (Photo 5). Polygons 3b and 3c are drier subunits with chokecherry (*Prunus virginiana*), common snowberry, ocean spray (*Holodiscus discolor*), wildrose (*Rosa* spp.) and mountain ash (*Sorbus sitchensis*) dominating the shrub layer (Photo 6).



Photo 4. View of Polygon 3c typical vegetation (picture taken from Unit 4).



Photo 5. Polygon 3a, moisture receiving area.



Photo 6. Polygon 3b typical vegetation.

Polygon 4 consists of a wetland area within a depression located to the west of the Highway 3A south approach to the Slocan Overhead. Water collects here where the highway was built on fill material that restricts the natural flow of water. A small area of standing water was present within Polygon 4 during the field investigations. An outflow from the wetland (ephemeral drainage) flows east toward the bridge, possibly contributing to the standing water in Polygon 3a, however no culvert or channel was identified under the bridge. It is possible that the water moves underground or under the old railway between these two areas. This is an ephemeral drainage that becomes defined at the west side of the study area within Polygon 3a. Vegetation within the Polygon 4 wetland is dominated by sedges (*Carex spp.*) with marsh cudweed (*Gnaphalium uliginosum*) and small leaved bedstraw (*Galium trifidum*) dominating the understory. Hardstem bulrush (*Scirpus acutus*), common spikerush (*Eleocharis palustris*) and lady's thumb (*Polygonum persicaria*) are present around the edges of the wetland complex.



Photo 7. View of Polygon 4 typical vegetation.

Table 1. General site attributes within the Slocan Overhead project area.

Polygon	Site Type	BEC	Elev (m)	Slope (%)	Aspect (°)	Moisture ¹	Nutrient ¹	Recent Disturbance
1	Urban/ Residential	ICHdw1	560 - 590	0 – 30	variable	N/A	N/A	Y
2	Railway/Fields	ICHdw1	545 - 570	variable	variable	3	B - C	Y
3	Shrub/ Forest	ICHdw1	545 - 590	variable	variable	2	B - C	N
4	Wetland	ICHdw1	550 - 560	0 – 10	flat	5	C	N

¹Moisture and nutrient classes described by Province of British Columbia (1998). Moisture classes: 0 = very xeric, 1 = xeric, 2 = subxeric, 3 = submesic, 4 = mesic, 5 = subhygric, 6 = hygric, 7 = subhydric, 8 = hydric. Nutrient classes: a = very poor, b = poor, c = medium, d = rich, e = very rich.

Table 2. Forest and vegetation attributes within the Slocan Overhead project area.

Polygon	Forest comp ¹	Structural Stage ²	Stand age (yrs) ³	Stand height (m) ³	DBH (cm) ³	Trees per ha	% cover by layer ⁴			
							Tree	Shrub	Herb (grass)	Moss/lichen
1	Urban/ Residential	-	-	-	-	-	-	-	-	-
2	Act ₅ Fd ₃ Py ₂	H/SH	10-20	2-12	5-30	50	5	20	70	5
3	Fd ₆ Act ₃ (SxEpCwHw)	YF	60-80	12-30	20-45	500	40	35	40(25)	5
4	Wetland	H	-	-	-	-	10	30	90(40)	<1

¹Forest composition. Subscript indicates % composition by tree species (×10). Py = Ponderosa pine, Cw = Western red cedar, Act = Black cottonwood, Ep = Paper birch, Fd = Douglas-fir.

²Structural stage following Province of British Columbia (1998). I = Initiation, H = Herb, SH = Shrub, PS = pole/sapling, YF = young forest, MF = mature forest.

³Stand age, height, and diameter at breast height (DBH) determined by measuring at least one representative tree per dominant species.

⁴Percent ground cover by vegetation layer. Percent cover of grass in brackets beside herbs, for example: 90(60) indicates 90% total herb cover including grass; 60% cover grass only; no brackets indicates % grass cover = 0.

5.2 Wildlife

The following values and concerns were identified during the wildlife assessment field visits. A list of wildlife species encountered during general field surveys is provided in Table 3 and a list of wildlife encountered during snow track surveys is provided in Table 4.

5.2.1 High Value Plants

Several abandoned fruit trees located throughout the project area provide wildlife forage. There were signs that these trees are used heavily by black bears (*Ursus americanus*), especially within Polygons 2a and 3a (Figure 1).

Numerous berry-producing shrubs such as Saskatoon (*Amelanchier alnifolia*), choke cherry (*Prunus virginiana*) and blue elderberry (*Sambucus cerulea*) were noted on site within Polygons 2 and 3 (Figure 1), these species provide important wildlife forage for birds and mammals.

5.2.2 Wildlife Trees

Several large, high-value black cottonwood (*Populus balsamifera*) and paper birch (*Betula papyrifera*) wildlife trees are located within Polygon 3a (Figures 1 & 2). These trees provide important habitat for cavity nesting birds including woodpeckers and owls. This polygon is not likely to be impacted by this project.

5.2.3 Wetland Habitat

Two amphibian species were confirmed breeding within the wetland during the June 24th field visit (Figures 1 & 2). Forty-seven Pacific chorus-frog and eight long-toed salamander larvae were found. No adults were observed. Construction activities could potentially impact amphibian movement patterns to and from the wetland area. Mitigation measures should be designed and implemented to minimize potential impacts.

In addition, the riparian vegetation surrounding the wetland (Figure 2) provides excellent songbird habitat.

5.2.4 Reptiles

Six common garter snakes (*Thamnophis elegans*) were observed at three locations within the project area (Figure 2). Eleven western terrestrial garter snakes (*Thamnophis sirtalis*) were found at seven sites within the project area (Figure 2). Two adult western skinks were also found and are provincially blue-listed (Figure 2). One was located under a piece of plywood near the highway and the other (an adult female) was found under a discarded railroad tie within the historic railroad right-of-way (Figure 2).

Two species of garter snakes also occur in this area and rubber boas (*Charina bottae*) and northern alligator lizards (*Elgaria coerulea*) likely occur here too but were not observed during field investigations. The soils within this polygon are sandy and there is suitable cover in the form of rocks, historic metal debris (very old car body parts), railroad ties and native shrubs. There are some exposed boulders under the road bed that may provide winter hibernacula to local reptile species, including the western skink. Fissures between these rocks may allow reptiles to spend the winter below the frost line. Portions of this habitat will be impacted when the detour road is constructed through Polygon 2b.

5.2.5 Birds

The provincially blue-listed barn swallow (*Hirundo rustica*) was observed foraging over the project area. No nesting habitat occurs on site.

Four active cliff swallow (*Petrochelidon pyrrhonota*) nests were observed on the underside of the South Slocan bridge structure.

Table 3. Wildlife species observed during general surveys within South Slocan Overhead Project area.*

Common Name	Scientific Name	Provincial Status	Federal Status	Comments/Recommendations
Amphibians				
Pacific chorus-frog	<i>Pseudacris regilla</i>			Breeds within wetland. Adults and juveniles likely migrate across highway before and after breeding. Some individuals may migrate under bridge. Project footprint not likely to impact wetland but migration patterns may be altered if passageway under bridge is changed.
Long-toed Salamander	<i>Ambystoma macrodactylum</i>			Breeds within wetland. Adults and juveniles likely migrate across highway before and after breeding. Some individuals may migrate under bridge. Project footprint not likely to impact wetland but migration patterns may be altered if passageway under bridge is changed or removed.
Reptiles				
Common Garter Snake	<i>Thamnophis sirtalis</i>			Polygon 2 (Figure 1) contains some high value reptile habitat and this area supports high densities of garter snakes (Figure 2). Some habitat east of the bridge will be lost through this project. Snake movement patterns may also be altered if passageway under bridge is changed or removed. Re-creation and enhancement of existing habitat is recommended following construction completion.
Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>			Polygon 2 (Figure 1) contains some high value reptile habitat and this area supports high densities of garter snakes (Figure 2). Some habitat east of the bridge will be lost through this project. Snake movement patterns may also be altered if passageway under bridge is changed or removed. Re-creation and enhancement of existing habitat is recommended following construction completion.
Western Skink	<i>Eumeces skiltonianus</i>	Blue-listed	Special Concern	Some habitat (Figure 2b) and individuals will be impacted by the project. Trapping and relocation prior to project initiation is recommended. Re-creation and enhancement of existing habitat is recommended following construction completion.
Birds				

Common Name	Scientific Name	Provincial Status	Federal Status	Comments/Recommendations
Mallard	<i>Anas platyrhynchos</i>			Uses wetland habitat.
Downy Woodpecker	<i>Picoides pubescens</i>			Cavity nester, observed near wildlife trees in Polygon 3a.
Pileated Woodpecker	<i>Dryocopus pileatus</i>			Cavity nester, observed near wildlife trees in Polygon 3a.
Barn Swallow	<i>Hirundo rustica</i>	Blue-listed		Foraging over project area; no existing nesting sites within project area. Not likely to be impacted by project.
Mammals				
Black Bear	<i>Ursus americanus</i>			Sign throughout project area. Feeds on abandoned fruit trees within project area. Movement patterns may be altered if passageway under bridge is changed or removed. If underpass is removed, some bears may be forced to cross on highway which would increase their mortality risk and increase safety hazard to drivers.

*Wildlife list is not comprehensive.

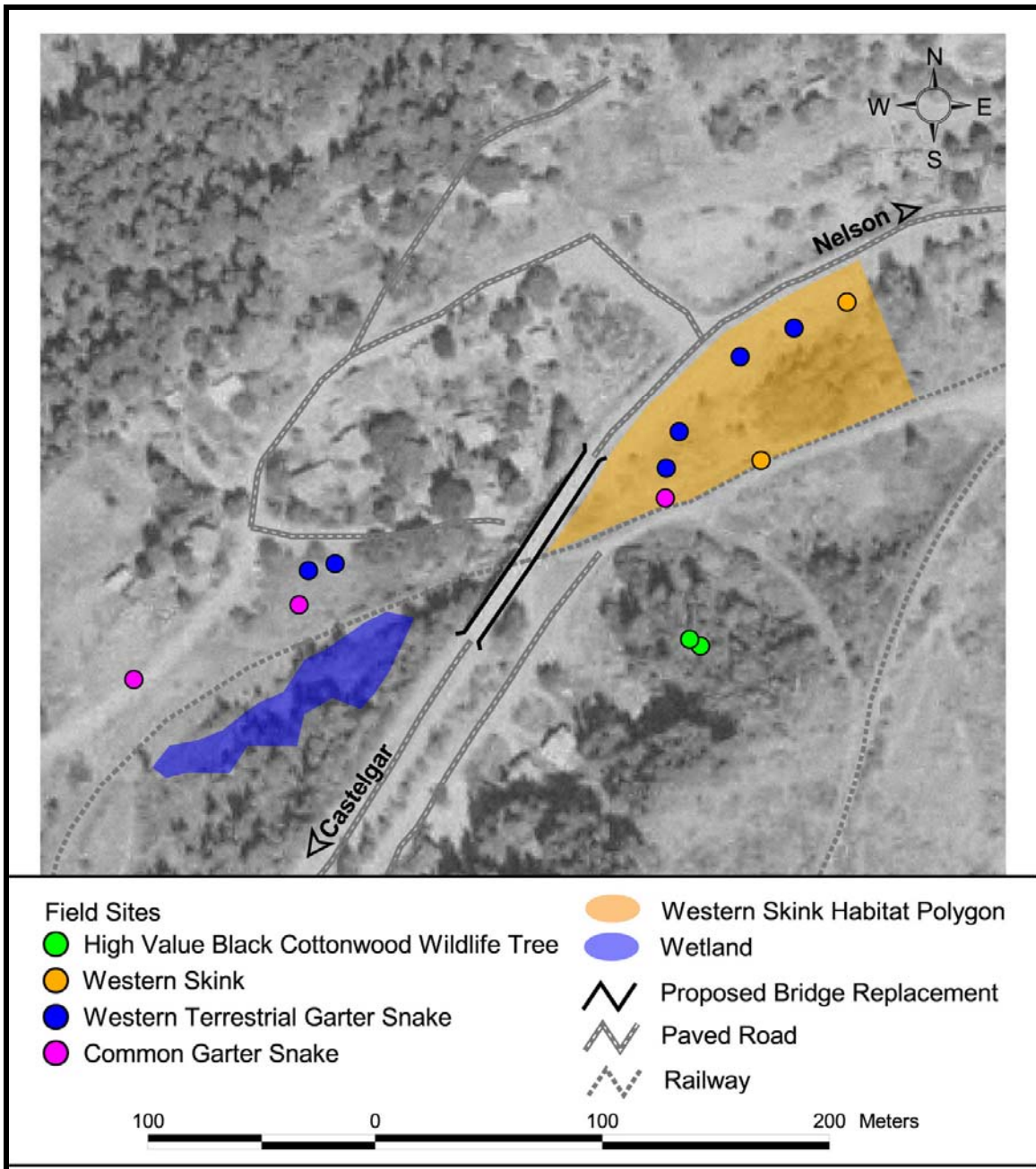


Figure 2. Project site showing wetland, western skink habitat and reptile observations (Map provided by Jakob Dulisse).

5.2.6 Snow-track surveys

Wildlife tracks observed during snow-track surveys consisted primarily of wildlife species expected within a rural human-dominated landscape (Table 4). Species detected were deer (evidence of browse on shrubs, as well as tracks), elk, squirrel, coyote, snowshoe hare, and raccoon. A confounding problem in this study was the occurrence of many dog tracks. Given the proximity of the study area to houses, the area is heavily used for walking dogs. As a result, dog tracks accounted for the vast majority of tracks encountered and sometimes obscured other tracks or otherwise made track identification difficult. As well, the heavy presence of dogs likely reduces the value of the area to wildlife since most wildlife species would avoid an area dominated by dogs, and no doubt accounts for the relatively small number of wildlife tracks encountered.

Table 4. Wildlife tracks encountered within the study area during snow-track surveys in February 2009.

Date	Time since last snowfall	Polygon (from Figure 1)			
		1	2	3	4
5 Feb	3 days		2 deer 1 hare	1 squirrel 1 elk	
13 Feb	2 days		1 raccoon 1 squirrel	1 squirrel	
20 Feb	7 days		1 squirrel 1 deer deer browse	1 coyote* deer browse	
27 Feb	2 days	1 elk	4 deer		1 raccoon 1 squirrel

*likely coyote, but positive identification was difficult given the large number of dog tracks throughout the study area.

5.3 Species at Risk (Vegetation/Wildlife)

5.3.1 Vegetation

Sixty-five plant species are provincially or federally listed as 'at risk' within the Interior Cedar Hemlock biogeoclimatic zone (ICH) of the Arrow Lake Forest District. An analysis of potential range overlap in combination with habitat preferences revealed 32 plant species at risk were considered *possible* to occur within the project area. A total of 31 species were considered *unlikely* and two species were considered *extremely unlikely* to occur in the study area due to a lack of suitable habitat. A list of all the listed vascular and non-vascular plant species and their potential to occur in the study area is located in Appendix 1.

No plant species at risk were found within the study area during the rare plant survey conducted on July 8th, 2009.

5.3.2 Wildlife

Twenty-four terrestrial vertebrate taxa at risk are known to occur in the ICH within the Arrow Forest District. Of these, two species (western toad, and western skink) were considered *likely* to occur on site and two species (American bittern and the Barn swallow) were considered *possible* to occur on site. Field investigations confirmed the presence of two blue listed species utilizing the site as described in Section 5.2, the western skink and barn swallow.

In addition, nine invertebrates at risk are known to occur in the ICH within the Arrow Forest District. Of these two were considered *possible* to occur within the project area including the Monarch butterfly and Checkered Skipper. The two species had such little information gathered to this date on habitat preferences and distribution that they were given an *unknown* rating. All listed vertebrate and invertebrate species and their potential to occur in the study area are located in Appendix 2.

6 Impact Assessment and Recommendations

The most significant impact this project will have on the environment is to wildlife resources from infilling the corridor underneath the bridge and disturbance to western skink habitat from construction of the detour route. The trail under the overpass is used by both humans and wildlife to avoid crossing the highway. Infilling may result in increased wildlife and human activity on the highway, both of which could present safety concerns.

6.1 Wildlife

Terrestrial wildlife within the study area has the highest value habitat located within Polygon 2b, 3a and 4. Polygon 2b provides medium-high quality habitat for the western skink along the south-facing fillslope of Highway 3A and the old railway corridor. The western skink is provincially blue-listed and federally listed as Special Concern (COSEWIC 2008). Western skinks are habitat specialists, occurring in warm, open areas with little tree cover and abundant shrub, grass and rock cover. The South Slocan area is a “hotspot” for the species and they can be locally abundant. Much of the existing western skink habitat will be lost as the planned detour road will be constructed here.

Polygon 3a contains high value cottonwood trees that provide cavity nesters with potential nesting sites and Polygon 4, the wetland area, supports amphibian species.

The removal of the existing bridge will result in the loss of nesting sites for cliff swallows. In addition, several wildlife species (e.g. snakes, ungulates and black bears) use the area under the existing bridge as a movement corridor. The loss of this corridor may alter movement patterns, forcing some individuals to move across the paved road surface instead—this may increase local wildlife mortality and may pose an increased safety risk to motorists. The following recommendations are provided to mitigate impacts to terrestrial wildlife within the Slocan Overhead study area.

- It is recommended that the project consider retaining the corridor under the bridge. A large culvert could be installed to maintain passage. At a minimum small culverts should be installed to aid in reptile and amphibian passage from the wetland to other habitats.
- Trapping and hand collecting of western skinks and any other reptiles should be attempted in Unit 2 prior to construction. Captured individuals could either be relocated to suitable habitat nearby or kept in captivity until the project is complete and then reintroduced. The reptile habitat in this area should be recreated and enhanced after the project is complete using the appropriate soils, rocks, cover objects and planting native species.
- Bridge demolition should be conducted outside the swallow nesting season (May through July).

- Retain trees where possible, especially those greater than 30 cm diameter as these provide increased wildlife values (e.g. bird and mammal nesting, food and shelter).
- Retain broadleaf trees and fruit trees where possible as these trees also provide wildlife values.
- Avoid disturbance in Units 3a and 4 as these areas provide valuable habitat.
- Minimize disturbing rocky forest openings and slopes whenever possible, especially areas with abundant cover such as downed wood, bark, flat rocks and talus.
- Minimize soil compaction wherever possible so burrowing reptiles and regenerating vegetation are not impacted.
- The proliferation of invasive plant species following ground disturbance may impact native plants and wildlife. Careful and prompt restoration measures will be necessary to mitigate this impact.
- Salvage shrubs before construction for replanting at project completion.
- Replant native shrubs as soon as possible upon project completion using pre-project species composition.

6.2 Vegetation

The most sensitive areas within the study area are Polygons 3a and 4, where young/mature forest and a wetland are present respectively. These areas will likely not be impacted from the infilling of the Slocan Overhead, as they are outside the area where infilling would occur. Overall, vegetation within the project area consists of highly disturbed sites, with 3 patches (Polygon 3) of recovering forest. The open areas (Polygon 2) consist of a large amount of invasive weed species, and introduced plants, however Polygon 2a provides high value wildlife habitat for the western skink. Providing that the forested areas in Unit 3a and the wetland complex (Unit 4) are avoided, impacts to vegetation will be minimal. The following recommendations are provided to mitigate impacts to vegetation within the Slocan Overhead study area.

- The disturbance area boundaries should be flagged in the field prior to any construction work commencing to prevent unnecessary disturbance to existing vegetation.
- As many large trees as possible should be retained around the site.
- Existing native trees and shrubs should be retained wherever possible.
- Control spread of invasive plants by re-vegetating disturbed areas as soon as possible.
- Immediately after works are completed, re-vegetate all exposed soils with a rapid growing erosion control seed mix to minimize potential for sediment transport to the ephemeral drainages and wetland areas and invasive plant establishment.
- Revegetation should follow the plan provided in Section 6.2.1.

6.2.1 Revegetation Plan

Revegetation of exposed slopes from construction activities should be carried out as soon as possible to control erosion and the soils should be rehabilitated to a pre-disturbed state. Infilling

of the Slocan Overhead site may result in moderate gradient slopes. Any newly exposed mineral soil, including roadbeds and disturbed areas, should be seeded with an erosion control mix to limit the amount of sedimentation and erosion. Any slopes over 30 % should have erosion mats placed on the exposed soil surface once an erosion control herb mix has been planted. This will limit potential sediment delivery into the ephemeral drainages that are present in the study area. During excavation of soils, the topsoil should be kept and stored in a separate location so it can be placed back on top of areas that were disturbed and undergoing rehabilitation.

Native shrubs such as common snowberry, sitka alder, saskatoon, choke cherry, wild rose and oceanspray should be replanted throughout the disturbed area, particularly within Polygon 2b to rehabilitate disturbed habitat. Plants should consist of 1 gallon potted nursery stock and be spaced every 2 m.

6.3 Water Quality

To minimize the effects of potential impacts on water quality during construction of the wetland and the ephemeral drainages the following mitigative measures are recommended.

- Natural drainage patterns should be maintained.
- The construction area should be isolated from any actively flowing ephemeral drainage using erosion and sediment control best management practices and site isolation methods.
- Any seepage areas should be contained and prevented from entering the construction site.
- Clearing, grubbing and excavating should be minimized during wet periods.
- Clearing of riparian vegetation should be prevented.
- All excavated soils should be stockpiled in a manner to ensure there is no risk of sediment delivery to the drainages.
- Re-vegetate exposed soils immediately after works are complete.
- Spills must be dealt with as per the spill emergency plan as described in Section 6.4.

6.4 Spills and Accidents

A spill is an unauthorized release or discharge of a deleterious substance into the environment equal to or greater than specified amounts by the Provincial Emergency Program (PEP) or the uncontrolled release of substances deleterious to the environment. To mitigate impacts to land, water or air resources the Contractor must prepare and familiarize all workers on site with a spill control and response plan. The plan should include detailed information on control and response procedures. The following information must be included:

- Stop the spill source.
- Contain the spill. A spill containment kit must be readily accessible.

- Report the spill. The Construction Supervisor and Environmental Monitor must be contacted immediately. If necessary, they will contact PEP and the local Ministry of Environment Representative. Refer to Table 4 for contact information.
- Protect the area.
- Remove material to an approved location for storage and/or disposal.
- Reclaim the area.
- Prepare spill report.

Table 4. Spill Response Contact Information.

Name	Company	Position	Contact Number
Provincial Emergency Program	24 hour Spill Reporting		1 800 663 3456
Ed Stockerl	Ministry of Environment Environmental Protection Division	Toxic Management/ Emergency Response Officer	250 354 6358

7 Closure

Overall, the greatest impact of this project will be to wildlife resources including the loss of the corridor under the bridge and to western skink habitat. These impacts, however can be mitigated for by following the recommendations provided above. No significant concerns, with regards to vegetation, were identified during the field surveys.

Sincerely,

Eric Miller, R.P.Bio., R.P.F.
Masse & Miller Consultants Ltd.
Project Biologist

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Appendix 1
Plant Species at Risk Potentially Occurring in Study Area

Table 5. Terrestrial plant species at risk potentially occurring in the Interior Cedar-Hemlock Dry Warm (ICHdw1) biogeoclimatic subzone within the Arrow Lake Forest District, and their potential occurrence or concern within the project area.

Plant Species	BC Status¹	Federal Status²	Potential occurrence or concern within project area³	Rationale³
Nettle-leaved giant-hyssop <i>Agastache urticifolia</i>	Blue	Not listed	Unlikely	Dry to mesic grasslands, meadows and forest openings in the steppe and montane zones. Observed in the ICHdw zone. Closest occurrence near Rossland.
Pink agoseris <i>Agoseris lackshewitzii</i>	Blue	Not listed	Unlikely	Habitat restricted to moist to mesic meadows in the sub-alpine to lower alpine zones. Not known to occur in the ICHdw. Closest occurrence over 100 km northwest of Castlegar.
Western dogbane <i>Apocynum x floribundum</i>	Blue	Not listed	Unlikely	Prefers mesic to dry roadsides, fields, shrublands and open forests in the lowland, steppe and montane zones. Has not been recorded in the ICHdw.
Seep-spring arnica <i>Arnica longifolia</i>	Blue	Not listed	Unlikely	Moist to wet meadows and seepage slopes in the montane to alpine zones. Observed in the ICHvk only.
Long-leaved aster <i>Aster ascendens</i>	Red	Not listed	Possible	Habitat consists of dry slopes and forest openings in the steppe and lower montane zones. Known to occur in the ICHdw zone. Closest occurrence near Rossland.
Least bladderly milk-vetch <i>Astragalus microcystis</i>	Red	Not listed	Possible	Dry grassy slopes to open forests in the steppe and lower montane zones. Observed only in the ICHdw zone. Closest recorded observation 8 km north of Castlegar at Pass Creek.
Bent-flowered milk-vetch <i>Astragalus vexilliflexus</i> var. <i>vexilliflexus</i>	Blue	Not listed	Unlikely	Prefers mesic to dry scree slopes, gravelly banks and grassy knolls in the montane, subalpine and alpine zones. Has not been recorded in the ICHdw. Closest recorded observation over 100 km northwest of Castlegar.
Tall beggarticks <i>Bidens vulgata</i>	Red	Not listed	Unlikely	Prefers moist to wet ditches, streambanks and lakeshores in the steppe and montane zones. Has not been recorded in the ICHdw zone. Nearest recording is near Creston.

Plant Species	BC Status ¹	Federal Status ²	Potential occurrence or concern within project area ³	Rationale ³
Least Moonwort <i>Botrychium simplex</i>	Blue	Not listed	Possible	Prefers moist to wet vernal pools and seepages in the lowland and montane zones. Not known to occur in the ICHdw zone. Nearest known location 8 km west of Castlegar.
Lesser brown sedge <i>Carex adusta</i>	Red	Not listed	Unlikely	Occurs on dry disturbed sites and open forests in the lowland zone. Only observed in the ICHxw zone. Nearest recording is in the Creston area.
Bigleaf sedge <i>Carex amplifolia</i>	Blue	Not listed	Possible	Habitat includes moist meadows, swamps, bogs in the lowland and montane zones. Has been recorded in the ICHdw at several locations in the southern Arrow-Boundary Forest District including Nelson, Salmo, and Lower Arrow Lake.
Lakeshore sedge <i>Carex lenticularis</i>	Red	Not listed	Unlikely	Prefers wet meadows, sandy beaches and marsh edges in the montane zone. Not recorded in the ICHdw zone. Closest recorded observation located between Salmo and Creston.
Peduncled sedge <i>Carex pedunculata</i>	Blue	Not listed	Unlikely	Prefers mesic sites in the montane zone. Rare in SE BC. Not observed in the ICHdw zone. Closest observation near Grand Forks.
Pointed broom sedge <i>Carex scoparia</i>	Blue	Not listed	Possible	Occurs on moist to wet sites in the lowland and montane zones. Observed in the ICHdw zone. Recorded near Trail.
Fox sedge <i>Carex vulpinoidea</i>	Blue	Not listed	Unlikely	Habitat includes wet meadows, swamps, marshes and stream banks in the lowland, steppe and montane zones. No recorded observations in the ICHdw zone. Closest record at Pend Oreille-Salmo River confluence.
Hairy owl-clover <i>Castilleja tenuis</i>	Red	Not listed	Possible	Habitat includes moist meadows and vernal pools in the montane zone. Only recorded in the ICHdw zone. Observed east of Trail.

Plant Species	BC Status ¹	Federal Status ²	Potential occurrence or concern within project area ³	Rationale ³
Dark lamb's-quarters <i>Chenopodium atrovirens</i>	Red	Not listed	Unlikely	Prefers dry waste spaces in the montane zone. Not known to occur in the ICHdw. Closest observation on the north end of Lower Arrow Lake.
Common clarkia <i>Clarkia rhomboidea</i>	Red	Not listed	Unlikely	Occurs in dry open areas in the lower montane zone. Has been recorded near Trail. Species is known only in the ICHxw biogeoclimatic subzone. Closest observation east of Trail at the of the Salmo- Pend Oreille River confluence.
Atkinson's coreopsis <i>Coreopsis tinctoria var atkinsoniana</i>	Red	Not listed	Unlikely	Habitat includes moist riverbanks in the steppe and montane zones. Has been recorded in the ICHdw zone. Closest observation east of Trail at the of the Salmo- Pend Oreille River confluence.
Obscure cryptantha <i>Cryptantha ambigua</i>	Blue	Not listed	Unlikely	Occurs in dry grasslands and shrublands in the steppe and montane zones. Not recorded in the ICHdw. Closest recorded observation near Midway.
Steer's head <i>Dicentra uniflora</i>	Blue	Not listed	Possible	Habitat includes mesic to dry meadows and scree slopes in the montane and subalpine zones. Observed in the ICHdw zone and has been recorded near Rossland.
Crested Wood Fern <i>Dryopteris cristata</i>	Blue	Not listed	Possible	Habitat includes swamps and wet meadows in the montane zone. Found in the ICHdw zone. Closest recorded observation south of Nelson.
Slender spikerush <i>Eleocharis elliptica</i>	Blue	Not listed	Extremely Unlikely	Occurs on dry to moist calcareous openings, often in barren or only seasonably moist conditions. Known to occur in the Beaver Valley near Golden. Not observed in the ICHdw.
Smooth willowherb <i>Epilobium glaberrimum</i> ssp. <i>fastigiatum</i>	Blue	Not listed	Possible	Habitat includes streambanks and moist open forests in the montane and alpine zones. Known to occur in the ICHdw and has been recorded south of Rossland near the US border.

Plant Species	BC Status ¹	Federal Status ²	Potential occurrence or concern within project area ³	Rationale ³
Small-fruited willowherb <i>Epilobium leptocarpum</i>	Blue	Not listed	Unlikely	Prefers moist meadows and streambanks in the montane to alpine zones. Not recorded in the ICHdw. Has been recorded near New Denver.
Giant helleborine <i>Epipactis gigantea</i>	Blue	Special Concern	Unlikely	Habitat includes moist streambanks, fens, marshes and swamps and around hot springs in the lowland and montane zones. Has been recorded in the ICHdw zone. Closest observations on north end of Lower Arrow Lake and 8 km north of Balfour.
Priarie Rocket <i>Erysimum aspernum</i>	Red	Not listed	Possible	Found on dry roadsides, Douglas-fir forests and rocky slopes in the montane zone. Recorded only in the ICHdw. Closest observation 2.5 km north of the Pend Oreille-Columbia River confluence.
False-mermaid <i>Floerkea proserpinacoides</i>	Blue	Not at risk	Possible	Occurs in seepage areas in the montane zone. This species has been observed in the ICHdw zone. Closest recorded observation made 15 km west of Salmo on Highway 3.
Wild licorice <i>Glycyrrhiza lepidota</i>	Red	Not listed	Possible	Habitat includes moist to wet fields, streambanks and open forests in the montane zone. Known to occur in the ICHdw zone. Closest occurrence recorded near Balfour.
Dwarf hesperochiron <i>Hesperochiron pumilus</i>	Red	Not listed	Unlikely	Habitat includes moist meadows and seepage sites in the montane zone. Rarely occurs in SE BC. Known only to exist in the ICHdw zone between Salmo and Trail.
Porcupinegrass <i>Hesperostipa spartea</i>	Red	Not listed	Possible	Generally located on dry to mesic grassy slopes and open forests in the steppe and montane zones. Has been recorded in the ICHdw zone. Closest observation made east of Highway 3 near Castlegar.

Plant Species	BC Status ¹	Federal Status ²	Potential occurrence or concern within project area ³	Rationale ³
Heterocodon <i>Heterocodon rariflorum</i>	Blue	Not listed	Possible	Found on moist sites in the lowland and lower montane zones. Has been recorded in the ICHdw zone near Nelson, Grand Forks, Christina Lake, and between Salmo and Castlegar along Highway 3.
Western St. John's wort <i>Hypericum scouleri</i> ssp. <i>nortoniae</i>	Blue	Not listed	Possible	Habitat includes moist sites in the lowland, montane and subalpine zones. Has been found in the ICHdw. Closest observation made 7 km west of Nelson.
Scalepod <i>Idahoia scapigera</i>	Red	Not listed	Unlikely	Habitat includes moist seepages to dry rocky slopes in the lowland, steppe and montane zones. Not known in the ICHdw. Closest recorded observation near Christina Lake.
Spurless Touch-Me-Not <i>Impatiens ecalcarata</i>	Blue	Not listed	Possible	Generally prefers moist forests in the montane zone and has been recorded in the ICHdw zone. Closest recorded observations near Nelson and on the Slokan River north of Crescent Valley.
Midget quillwort <i>Isoetes minima</i>	Red	Not listed	Possible	Found in seasonally saturated areas that dry by mid-summer. Only recorded observations have been in the ICHdw. Closest observation near Castlegar.
Colorado rush <i>Juncus confusus</i>	Red	Not-listed	Possible	Habitat consists of moist meadows and forest openings in the steppe and montane zones. Observed in the ICHdw near Nelson.
Western stickseed <i>Lappula occidentalis</i> var. <i>cupulata</i>	Red	Not listed	Unlikely	Occurs on xeric to mesic sites in the steppe and montane zones. Not observed in the ICHdw zone. Nearest occurrence 20 km southwest of Rosslund on the US Border.
Three-leaved lewisia <i>Lewisia triphylla</i>	Blue	Not listed	Possible	Occurs on moist gravelly slopes, meadows, open forests and sandy snowbed sites from the montane to alpine zones. Observed in the ICHdw zone near Nelson.

Plant Species	BC Status¹	Federal Status²	Potential occurrence or concern within project area³	Rationale³
Northern linanthus <i>Linanthus septentrionalis</i>	Blue	Not listed	Possible	Located on dry slopes, meadows, and forest openings in the steppe and montane zones. Recorded in the ICHdw zone. Nearest occurrence in the Nelson area.
Water marigold <i>Megaladonta beckii</i> var. <i>beckii</i>	Blue	Not listed	Unlikely	Occurs on lakeshores in the lowland and montane zones. Present in the ICHdw zone. Closest occurrence near Christina Lake.
Purple oniongrass <i>Melica spectabilis</i>	Blue	Not listed	Possible	Habitat includes wet to dry meadows and open forests in the montane and subalpine zones. This plant species is reported to occur in the ICHdw zone. Closest recorded observation near Nelson.
Tall bluebells <i>Mertensia paniculata</i> var. <i>borealis</i>	Blue	Not listed	Possible	Habitat includes moist to mesic sites in the montane to subalpine zones. Occurs in the ICHdw zone. Distributed throughout the Rossland area and along the Salmo-Creston Pass.
Short-Flowered Monkey-Flower <i>Mimulus breviflorus</i>	Red	Not listed	Possible	Habitat includes moist to mesic open areas in the steppe and lower montane zones. Has been recorded in the ICHdw zone. Closest occurrence on Ladybird Creek northwest of Castlegar.
Brewer's Monkey-flower <i>Mimulus breweri</i>	Blue	Not listed	Possible	Habitat includes moist to dry sites in the lower montane zone. Occurs in the ICHdw zone. Closest observations recorded west of Castlegar near Highway 3.
Satinflower <i>Olsynium douglasii</i> var. <i>inflatum</i>	Red	Not listed	Possible	Found in moist vernal sites in the montane zone. Recorded in the ICHdw zone. Closest occurrence recorded west of Castlegar near the southeast shore of Lower Arrow Lake.

Plant Species	BC Status ¹	Federal Status ²	Potential occurrence or concern within project area ³	Rationale ³
Whitebark pine <i>Pinus albicualis</i>	Blue	Not listed	Unlikely	Occurs on mesic to dry slopes in the subalpine to alpine zones. This species is recorded in the ICHdw zone, however, the elevation of the study area is far too low to expect a presence.
Western Jacob's Ladder <i>Polemonium occidentale</i> spp. <i>Occidentale</i>	Blue	Not listed	Unlikely	Habitat includes wet to moist swamps, streambanks, meadows and thickets in the steppe to subalpine zones. Recorded in the ICHdw zone. Not recorded in southeastern BC.
White wintergreen <i>Pyrola elliptica</i>	Blue	Not listed	Possible	Habitat includes dry to moist forests in the montane zone. Known to occur in the ICHdw zone. Closest occurrence observed west 30 km west of Castlegar north of Highway 3.
Snow bramble <i>Rubus nivalis</i>	Red	Not listed	Unlikely	Prefers moist forests and glades in the montane zone. Documented near New Denver. Not recorded in the ICHdw zone.
Booth's willow <i>Salix boothii</i>	Blue	Not listed	Unlikely	Habitat includes moist to wet streambanks and meadows in the montane and subalpine zones. Not recorded in the ICHdw zone. Closest recorded observation 10 km west of Castlegar.
Pale bulrush <i>Scirpus pallidus</i>	Red	Not listed	Unlikely	Prefers swamps and wet meadows in the montane zone. Known to occur in the ICHdw zone. Nearest recording is on Lower Arrow Lake near Burton.
Lance-leaved figwort <i>Scrophularia lanceolata</i>	Blue	Not listed	Unlikely	Occurs in moist to mesic roadsides, clearings, thickets and forest edges in the lowland and montane zones. Not known to occur in the ICHdw zone. Closest recorded observation near Christina Lake.

Plant Species	BC Status ¹	Federal Status ²	Potential occurrence or concern within project area ³	Rationale ³
Small-flowered skullcap <i>Scutellaria angustifolia</i> ssp. <i>micrantha</i>	Blue	Not listed	Extremely Unlikely	Habitat includes dry rocky soil on barren talus slopes, sagebrush grasslands or Ponderosa Pine woodlands. No record of occurrence in the ICHdw zone. Closest occurrence near Trail.
Sweet-marsh butterweed <i>Senecio hydrophiloides</i>	Red	Not listed	Possible	Found in wet to moist meadows and forest openings in the montane and lower subalpine zones. Recorded in the ICHdw zone. Closest records south of Salmo.
Alkali-marsh butterweed <i>Senecio hydrophilus</i>	Red	Not listed	Unlikely	Occurs in wet, often alkaline swamps and meadows in the montane zone. Extremely rare in SE BC with recorded observations in the ICHdw and ICHxw zones. Closest recorded occurrence near Salmo.
Smooth goldenrod <i>Solidago gigantean</i> ssp. <i>serotina</i>	Red	Not listed	Possible	Found in moist meadows, streambanks and forest openings in the montane zone. Has been known to occur in the ICHdw zone. Closest recorded observation in Trail area.
Blunt-sepaed Starwort <i>Stellaria obtusa</i>	Blue	Not listed	Possible	Occurs in wet to moist meadows and streambanks in the montane zone. Occurs in a range of biogeoclimatic zones including the ICHdw zone. Closest recorded observation near Nelson.
Purple meadowrue <i>Thalictrum dasycarpum</i>	Blue	Not listed	Possible	Habitat includes wet meadows, streambanks, and woodlands in the montane zone. Occurs in the ICHdw zone. Closest recorded occurrence at the Salmo-Pond Oreille River confluence southeast of Trail.
Mountain Blue-Curls <i>Trichostema oblongum</i>	Red	Not listed	Unlikely	Habitat includes moist sites in forest openings. Not known to occur in the ICHdw. Lone observation 10 km west of Castlegar in a large south-facing forest opening resulting from shallow soils overlying bedrock.

Plant Species	BC Status¹	Federal Status²	Potential occurrence or concern within project area³	Rationale³
Cup Clover <i>Trifolium cyathifelum</i>	Red	Not listed	Possible	Habitat includes wet to mesic, sandy sites in the lowland, steppe and montane zones. Recorded in the ICHdw zone. Closest observations near Rossland.
Northern Violet <i>Viola septentrionalis</i>	Red	Not listed	Possible	Habitat includes moist open forests in the montane zone. Has been recorded in the ICHdw zone. Nearest recorded observation south of Rossland along the US Border.
Haller's Apple Moss <i>Bartramia halleriana</i>	Red	Threatened	Unlikely	Habitat preference includes rocky outcrops, crevices and cliffs in southern BC. No records of this species in the Kootenay area.
Margined Streamside Moss <i>Scouleria marginata</i>	Red	Endangered	Unlikely	Habitat preference includes areas along stream margins and wet rocky substrates. The only known population is a significant distance from the project area.
Banded cord-moss <i>Entosthodon fascicularis</i>	Blue	Special Concern	Unlikely	Habitat includes periodically humid or damp earth of terraces of exposed outcrop knobs in open stands of arbutus. Known to occur in the ICHdm zone/variant, but not recorded near the project area.

¹ Blue-listed=vulnerable; Red=endangered; Endangered= facing imminent extirpation or extinction; Threatened= likely to become endangered if limiting factors are not reversed; Special Concern=characteristics that make it is particularly sensitive to human activities or natural events.

² Information Sources: British Columbia Conservation Data Centre 2008; Douglas et al. 1998; Committee On the Status of Endangered Wildlife In Canada 2009.

Appendix 2
Wildlife Species at Risk Potentially Occurring in Study Area

Table 6. Terrestrial vertebrate species at risk potentially occurring in the Interior Cedar-Hemlock biogeoclimatic subzone within Arrow Boundary Forest District, and their potential occurrence or concern within the project area.

Species	BC Status ¹	Federal Status ²	Potential occurrence or concern within project area ³	Rationale ³
Amphibians				
Coeur d'Alene Salamander <i>Plethodon idahoensis</i>	Yellow	Special Concern	Extremely unlikely	Associated with small seeps, waterfall splash zones and riparian areas of streams, especially in areas with fissured bedrock. No suitable habitat within project area.
Tiger Salamander <i>Ambystoma tigrinu</i>	Red	Endangered	Unlikely	Range of species not known to extend into project area and habitat is unsuitable. Nearest records are for Christina Lake area. Requires shallow aquatic habitat for breeding.
Western Toad <i>Bufo boreas</i>	Not Listed	Special Concern	Likely	Species is known to occur in general area, and there is suitable breeding habitat within the wetland along the west side of Highway 3A.
Reptiles				
Painted Turtle <i>Chrysemys picta</i>	Blue	Special Concern	Extremely unlikely	Highly aquatic and occurs in slow-moving, shallow lakes, ponds, and streams. No suitable habitat within project area.
Western Skink <i>Eumeces skiltonianus</i>	Blue	Special Concern	Confirmed	ICH is considered fringe of range; requires complex ground structure such as rock and downed wood for cover; habitat within project area largely unsuitable except along slope of Highway 3A in the northeast area.
Birds				
Great Blue Heron <i>Ardea herodias herodias</i>	Blue	Not listed	Extremely unlikely	Typically nests in colonies in stands of large trees (prefers black cottonwood) near significant water bodies. Easily detected, but was not observed within project area.
American Bittern <i>Botaurus lentiginosus</i>	Blue	Not listed	Possible	Strictly associated with wetlands with abundant emergent vegetation such as reeds and cattails. Some suitable habitat where wetland is located.

Species	BC Status ¹	Federal Status ²	Potential occurrence or concern within project area ³	Rationale ³
Short-eared Owl <i>Asio flammeus</i>	Blue	Special Concern	Unlikely	Grassland, ground-nesting species. Some open fields in the project area, but mainly consists of invasive species. It is also a highly developed rural area with significant dog disturbance.
Olive-sided Flycatcher <i>Contopus cooperi</i>	Blue	Threatened	Unlikely	Habitat preference is in coniferous and mixed forest with available snags. Also like burned-over areas with standing dead trees, in taiga, subalpine coniferous forest and mixed coniferous-deciduous forest for breeding. Not suitable habitat in project area due to lack of coniferous vegetation and rural development.
Western Screech-Owl <i>Megascops kennicottii macfarlanei</i>	Red	Endangered	Extremely unlikely	Secondary cavity nester; requires riparian habitat dominated by large-diameter old (wildlife trees decay class 2 to 6) trees, preferably cottonwood and trembling aspen. No suitable habitat within project area.
Lewis's Woodpecker <i>Melanerpes lewis</i>	Red	Special Concern	Extremely unlikely	Associated with open, fire-maintained mature ponderosa pine forests. No suitable habitat within project area.
Williamson's sapsucker <i>Sphyrapicus thyroideus</i>	Red	Endangered	Extremely unlikely	Requires wildlife trees class 2 to 5 for nesting, with a strong preference for coniferous snags (Douglas-fir, western larch, ponderosa pine). No suitable habitat within project area.
Barn Swallow <i>Hirundo rustica</i>	Blue	Not listed	Confirmed	While highly associated with rural human-dominated areas, requires sheltered structures such as buildings, bridges, caves or cliff crevasses for nesting. Observed foraging during field studies.
Yellow Breasted Chat <i>Icteria virens auricollis</i>	Red	Endangered	Unlikely	Range of species not known to extend into project area. Highly associated with the south Okanagan and Similkameen Valleys.
Purple Martin <i>Progne subis</i>	Blue	Not listed	Extremely unlikely	Project area is far outside expected range for this species. Highly associated with low elevation areas of southwest-coastal BC.

Species	BC Status ¹	Federal Status ²	Potential occurrence or concern within project area ³	Rationale ³
Bobolink <i>Dolichonyx oryzivorus</i>	Blue	Not listed	Unlikely	Breeds in unmowed, tall grass fields. Some open fields in the project area, but it is a highly developed rural area with significant dog disturbance.
Mammals				
Townsend's Big-eared Bat <i>Corynorhinus townsendii</i>	Blue	Not listed	Unlikely	Range of species not known to in nearby area (Slocan Valley). Highly associated with caves and cave-like roosts, or rural buildings. No suitable habitat within project area observed.
Fringed Myotis <i>Myotis thysanodes</i>	Blue	Not listed	Unlikely	ICH is considered fringe range; requires caves, rock crevices, buildings and other such structures for roosting and hibernating. No suitable habitat structures within project area.
Wolverine <i>Gulo gulo luscus</i>	Blue	Special Concern	Unlikely	Occurs predominately in subalpine and alpine habitat; avoids human settlement and highly disturbed environments.
Fisher <i>Martes pennanti</i>	Blue	Not listed	Extremely unlikely	Believed extirpated from areas of southeast British Columbia including the project area. Prefers older forests and riparian areas; project area generally unsuitable.
Badger <i>Taxidea taxus</i>	Red	Endangered	Extremely unlikely	Does not generally occur in West Kootenays; highly associated with IDF, PP, and BG subzones.
Grizzly <i>Ursus arctos</i>	Blue	Special Concern	Unlikely	Occurs predominately in subalpine and alpine habitat; generally avoids human settlement and highly disturbed environments. Project area unsuitable.
Caribou (southern population) <i>Rangifer tarandus</i>	Red	Threatened	Extremely unlikely	Project is outside of known caribou range. Generally requires old higher-elevation coniferous forest. No suitable habitat within project area.
Bighorn Sheep <i>Ovis Canadensis</i>	Blue	Not listed	Extremely unlikely	Project is outside of known range. Highly associated with south-facing, rocky terrain systems. No suitable habitat within project area.

Species	BC Status ¹	Federal Status ²	Potential occurrence or concern within project area ³	Rationale ³
Red-tailed Chipmunk <i>Tamias ruficaudus simulans</i>	Blue	Not listed	Unlikely	Highly associated with mixed coniferous forests with complex ground structure such as rock, downed wood, and low woody vegetation for cover; habitat within project area largely unsuitable due to open ground conditions and general lack of rock and downed wood.
Invertebrates				
Monarch butterfly <i>Danaus plexippus</i>	Blue	Special Concern	Possible	Habitat preference for breeding is where milkweed is present throughout North America. Wintering occurs south in California and Mexico. Known to occur in the Kootenay Region.
Silver-spotted Skipper <i>Epargyreus clarus clarus</i>	Blue	Not listed	Unknown	Known to occur in the Kootenay Region, but little data available on this species and its preferred habitat.
Viceroy <i>Limenitis archippus</i>	Red	Not listed	Unlikely	Prefers habitat with willows or small aspens which are the main larval foodplants. Habitats include prairies and dry barrens with small willows as well as wetlands in arid areas. No suitable habitat in project area.
Lilac-bordered Copper <i>Lycaena nivalis</i>	Blue	Not listed	Extremely unlikely	Mountain meadows, forest openings, alpine fell-fields, sagebrush. Larval host is <i>Polygonum douglasii</i> . Nearest occurrence is Grand Forks.
Common Sootywing <i>Pholisora catullus</i>	Blue	Not listed	Extremely unlikely	Very seldom in any kind of natural setting in most of its range, most typically weedy backyards, vacant lots, landfills, edges of croplands. Not known to occur in the project area, as it prefers an arid climate.
Checkered Skipper <i>Pyrgus communis</i>	Blue	Not listed	Possible	A generally transient species in a great variety of dry disturbed situations and some more natural ones. Low vegetation, flowers, and patches of bare ground are probably important. Known to occur in the Arrow and Kootenay Lake Forest Districts.

Species	BC Status ¹	Federal Status ²	Potential occurrence or concern within project area ³	Rationale ³
Satyrium californicum <i>Satyrium californica</i>	Blue	Not listed	Unlikely	Known to occur in the Thompson and Okanogan areas in arid areas where its hosts comprise of principally genera Ceanothus, Cercocarpus, Quercus and a few others. Unsuitable habitat in project area.
Zerene Fritillary <i>Speyeria zerene garretti</i>	Blue	Not listed	Unknown	Known to occur in the Kootenay area in the ICH and ESSF, but little information on habitat preferences and occurrence.
Vivid Dancer <i>Argia vivida</i>	Red	Not listed	Extremely unlikely	Known to occur in the Kootenay Lake and Arrow Forest Districts, in riverine environments. Habitat preference is associated with hot springs. Unsuitable habitat in the project area.

¹Red = Candidate species for attaining extirpated, endangered, or threatened status within British Columbia. Blue = Species considered to be of special concern within British Columbia. Yellow = considered secure within British Columbia. ²Endangered = Facing imminent extirpation or extinction. Threatened = Likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction. Special concern = May become a threatened or an endangered species because of a combination of biological characteristics and identified threats. Not listed = not listed on Schedule 1 of the Canadian Species at Risk Act. ³Unlikely = project site is not within expected range, and/or habitat is generally unsuitable; Extremely unlikely = project site is far outside species range, and no required habitat features exist in or around project area. Information sources: British Columbia Conservation Data Centre, BC Species and Ecosystem Explorer, and references therein.