McElhanney

CANADA BEST MANAGED COMPANIES

Aquatic and Terrestrial Assessment: Shallow Bay Road and Guest Road Intersection Improvements

September 2021 | Revision 0

Submitted to: Ministry of Transportation & Infrastructure
Prepared by McElhanney

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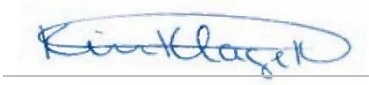
Our file: 2341-02745-09

Your Challenge.
Our Passion.

Aquatic and Terrestrial Assessment
For
Shallow Bay Road and Guest Road Intersection Improvements

Prepared by:



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Legal Disclaimer

Limitations of Report

This Aquatic and Terrestrial Assessment was prepared for the exclusive use of the MoTI, its assignees and representatives. It is intended to outline performance-based environmental requirements, standard protocols and mitigation measures implemented during works occurring in 2022 for the Shallow Bay Road and Guest Road Intersection Improvements project. In developing this report, McElhanney has relied in good faith on information provided by the MoTI.

McElhanney accepts no responsibility for any deficiency or inaccuracy contained in this report as a result of our reliance on the aforementioned information. The guidance and findings documented in this report have been prepared for the specific application to this project. This report has been developed in a manner consistent with the level of care normally exercised by environmental professionals currently practicing under similar conditions in BC. This report may be revised, at the request of the MoTI, should new information discovered in future work from other investigations, require amendments prior to any reliance upon the information presented herein.

Contents

Appendices

1. Background

The British Columbia Ministry of Transportation and Infrastructure (MOTI) has initiated planning for the improvement of both the Shallow Bay Road and Guest Road intersections along Highway 16. Improvement works include widening the highway for the construction of turning lanes. The intersections are located north of Cluculz Lake and are situated approximately 590 m apart (with Guest Road furthest west). *Figure 1* below shows the geographic location of the study area, approximately 60 km west of Prince George, BC.

Figure 1. The geographic location of the study area (approximate boundary in red).

2. Aquatic Resources

Both an office and a field review were conducted for this site and are summarized below.

2.1. OFFICE-BASED REVIEW

Information was collected by reviewing past reports and web-based municipal, provincial and federal databases and interactive mapping. Online searches were conducted at the following sites:

- Habitat Wizard Online Mapping Tool http://maps.gov.bc.ca/ess/hm/habwiz/
- Fisheries Inventory Data Queries https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/fish/fish-and-fish-habitat-data-information/search-fish-fish-habitat-data-information/fisheries-inventory-data-queries
- BC Species and Ecosystems Explorer http://a100.gov.bc.ca/pub/eswp/
- Omineca Water Tool https://www.bcwatertool.ca/owt/

The nearest waterbody is an unnamed tributary (Watershed code 180-191300-27600) to Cluculz Lake located approximately 150 m east of Guest Road between the two intersections. Cluculz Lake is approximately 415 m south of the Guest Road intersection and 430 m south of the Shallow Bay Road intersection. No existing fish information is available for the unnamed tributary.

Recorded fish species present in Cluculz Lake include Burbot (*Lota lota*), Dolly Varden (*Salvelinus malma*), Kokanee (*Oncorhynchus nerka*), Lake Chub (*Couesius plumbeus*), Lake Trout (*Salvelinus namaycush*), Lake Whitefish, Largescale Sucker (*Catostomus macrocheilus*), Longnose sucker (*Catostomus Catostomus*), Mountain Whitefish (*Prosopium williamsoni*) , Northern pikeminnow (*Ptychocheilus oregonensis*), Peamouth Chub (*Mylocheilus caurinus*), Pygmy Whitefish (*Prosopium coulterii*), Rainbow Trout (*Oncorhynchus mykiss*), Redside Shiner (*Richardsonius balteatus*), and White Sucker (*Catostomus commersonii*). As shown in *Table 1*, the least-risk timing window for Cluculz Lake is from July 15th to August 31st.

Table 1 Instream work window for Cluculz Lake.

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Rainbow trout							15							15										
Dolly Varden														15		31								
Mountain Whitefish											1					31								
Kokanee											1						15							

NOTE: White (non-shaded) areas indicate when instream work may occur

The watershed in which the unnamed stream is located is 8.90 km^2. This stream typically sees freshet flows in April and May, and then water levels decrease and remain relatively low from August to February *(Figure 2*).

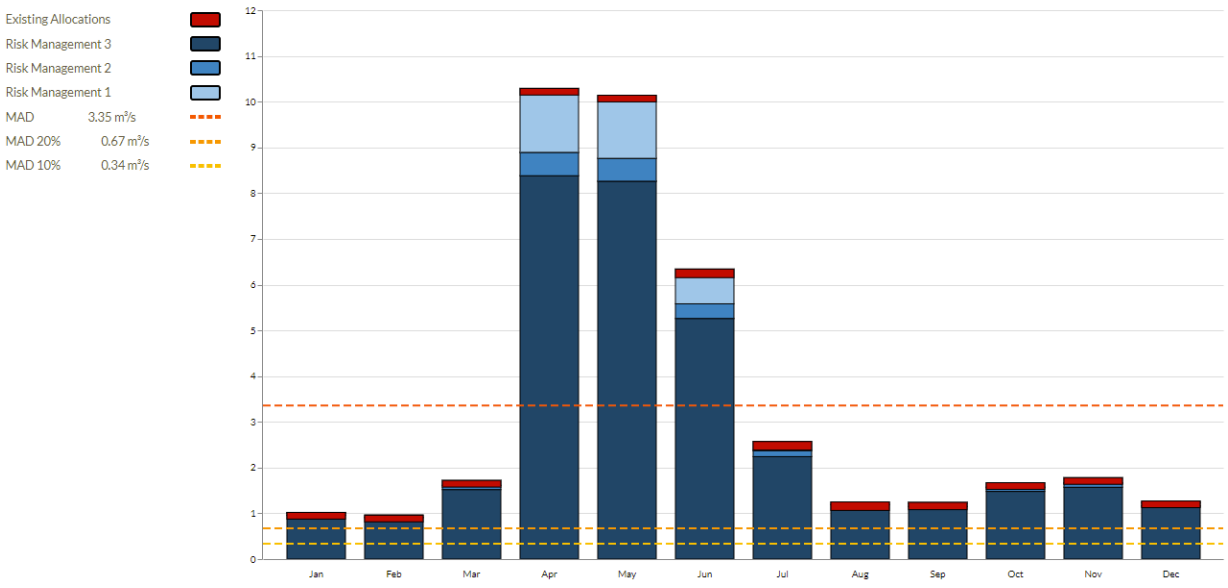

Figure 2. Monthly hydrology for the unnamed stream.

2.2. FIELD ASSESSMENT

A site visit was conducted on July 6, 2021, site photos are shown in *Appendix B*.

The unnamed stream crosses the highway towards Clucluz Lake through a 2400 mm steel culvert (70.2 m in length and dropping approximately 1 m in elevation). North of the highway, the channel is split, and both streams flow into a small pond (approximately 500 m^2) directly upstream of the culvert. The culvert contains baffles, which in high flows would reduce the velocities to enable fish passage.

At time of assessment, water from the pond downstream was restricted by low flow conditions, potentially due to beaver activity upstream of the pond. Small pools of water were present behind each baffle within the culvert, but downstream of the culvert, the channel was dry. Fish sampling was not conducted; however, four Rainbow Trout (100 to 140 mm in length) were observed from the outlet in the pools of water within the culvert. The channel downstream from the culvert contained cobble and gravel substrate and had abundant overhanging vegetation.

3. Terrestrial Resources

3.1. OFFICE-BASED REVIEW

Information was collected by reviewing previous reports in addition to web-based provincial and federal databases and interactive mapping.

- BC Species and Ecosystems Explorer http://www.env.gov.bc.ca/atrisk/toolintro.html
- Species at Risk (federal) https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html
- Data BC Catalogue http://www.data.gov.bc.ca/dbc/catalogue/

- E-Flora http://www.geog.ubc.ca/biodiversity/eflora/
- E-Fauna http://www.geog.ubc.ca/biodiversity/efauna/
- Ecocat (provincial database of records and reports) http://www.env.gov.bc.ca/ecocat/
- Invasive Alien Plant Program (IAPP) (Ministry of Forests, Land and Natural Resource Operations (http://www.for.gov.bc.ca/hra/plants/application.htm)
- BC Frogwatch Atlas https://maps.gov.bc.ca/ess/hm/bcfa/

A search was conducted using the BC Species and Ecosystem Explorer database for plant and animal species (designated as threatened or endangered) and found within the Prince George Forest District. Search results of the plants or animals being found within or near the project are described in *Section 4.0*.

3.1.1. Plants and Plant Communities

The project site occurs within the dry warm subzone of the Sub-Boreal Spruce (SBSdw3) biogeoclimatic zone. The SBSdw3 is found occurring between 750 and 1100 m elevation. Climate in this zone is relatively warm for this region and the forests are some of the most diverse. Growth can be limited by drought on drier sites and frost on frost-prone sites. *Table 2* lists the vegetation and species generally found within the SBSdw3 subzone. The project area is outside of Agricultural Land Reserve (ALR).

Table 2 Characteristic vegetation by type and species within the SBSdw3 subzone (Delong et al 1993).

Tree Layer	
lodgepole pine (dominating drier sites)	*Pinus contorta*
Douglas-fir (dominating drier sites)	*Pseudotsuga menziesii*
hybrid white spruce (dominating wetter sites)	*Picea glauca x engelmannii*
black spruce	*Picea mariana*
trembling aspen (usually dominating deciduous forests)	*Populus tremuloides*
black cottonwood (common along rivers/streams)	*Populus trichocarpa*
paper birch	*Betula papyrifera*
Shrub Layer	
prickly rose	*Rosa acicularis*
birch-leaved spirea	*Spiraea betulifolia*
Sitka alder	*Alnus crispa ssp. sinuata*
black twinberry	*Lonicera involucrata*
pink spirea	*Spiraea douglassi ssp. menziesii*
Herb and Dwarf Shrub Layer	
bunchberry	*Cornus canadensis*
twinflower	*Linnaea borealis*
queen's cup	*Clintonia uniflora*
oak fern	*Petasites frigidus var. palmatus*
kinnikinnick	*Arctostaphylos uva-ursi*
rough-leaved ricegrass	*Oryzopsis asperifolia*
prince's pine	*Chimaphila umbellata*
dwarf blueberry	*Vaccinium caespitosum*
Moss and Lichen Layer	
grey reindeer lichen	*Cladina rangiferina*
grey reindeer lichen	*Sphagnum spp.*

3.1.2. Invasive Plants

A review of known invasive plant species was also conducted for the project area. The Invasive Alien Plant Program (IAPP) Map Display was searched; there were five documented occurrences of invasive plants within an approximate 500 m buffer of the project footprint. *Table 3* lists the species that were identified.

Table 3. Invasive plant species documented in project corridor.

Common Name	Scientific Name
Common tansy	*Tanacetum vulgare*
Oxeye daisy	*Leucanthemum vulgare*
Sowthistle species	*Sonchus spp.*
Yellow hawkweed species	*Hieracium spp.*
Orange hawkweed	*Hieracium aurantiacum*
Meadow hawkweed	*Hieracium caespitosum*
Mullein	*Verbascum thapsus*

3.2. FIELD ASSESSMENT

A site visit was conducted on July 6, 2021, to assess the terrestrial habitat at the same time as the aquatic assessments noted above. The project footprint is located within the highly disturbed highway right-of-way (RoW) and area along Guest Frontage Road. The land surrounding the highway RoW is predominately coniferous forested with riparian and residential homes chiefly around Cluculz Lake. There has been substantial logging activity in the area north of the highway above Shallow Bay Road.

The topography is relatively flat with the ground elevation at the highway measuring approximately 780 m. The herb and shrub layer observed within the project footprint was typical for roadsides found within this region and included species such as fireweed, clover, prickly rose, dandelion, vetch, horsetail, yarrow, wild strawberry, willow, alder, paintbrush, spirea, and grasses. Tree species, observed mainly along the edges of the RoW, were typical of species found within the lower elevations of the SBSdw3 subzone. Invasive species of note included white sweet-clover (*Melilotus albus*), orange hawkweed, yellow hawkweed species, and oxeye daisy.

Frogs were not observed during the site visit, however, there is a potential for the area to be used by Western Toads (*Bufo boreas*), Wood Frog (*Rana sylvatica*), Columbia Spotted Frog (*Rana luteiventris*), or other amphibians. Wildlife tracks or nests were also not noted during the site visit. It is likely, however, that species such as deer or black bear would be found in the area.

4. Species at Risk

A desktop review of species at risk within the study area was conducted, followed by field visits to determine if any species at risk were present.

4.1. OFFICE-BASED REVIEW

Table 4 outlines the Species at Risk that could be found in the Cluculz Lake area. Only those species that are likely to occur in the study area, and those listed as endangered or threatened have been included. A full list of potential species and their designation can be found in *Appendix A*. CDC iMap does not show any known occurrences of species at risk within or adjacent to the project area.

Table 4. Species listed as endangered (E) or threatened (T) under the Species at Risk Act with potential to occur in the Cluculz Lake area (CDC 2021).

Scientific Name	Common Name	SARA Status[1]	COSEWIC[2] Status	BC Status[3]	Key Habitat Features	Potential to be found at site
Amphibians						
Anaxyrus boreas	Western Toad	1-SC (2018)	SC	Yellow	Shallow (<0.5m) wetlands with submergent vegetation & non-polluted waters	Possible
Birds						
Hirundo rustica	Barn Swallow	1-T (2017)	SC	Blue	Open areas, including agricultural land, lowland foreshores, floodplains and alpine meadows. Nest on barns, bridges, cliffs, steep embankments and caves.	Possible but unlikely
Icteria virens	Yellow-breasted Chat	1-E (2003)	E	Red	Low-lying riparian habitats, dense riparian thickets and usually nests in wild rose bushes.	Possible but unlikely
Melanerpes lewis	Lewis's Woodpecker	1-T (2012)	T	Blue	Open forest or grassland with scattered trees, riparian forests adjacent to open areas, and burns.	Possible but unlikely
Contopus cooperi	Olive-sided Flycatcher	1-T (2010)	SC	Blue	Open areas, such as coniferous or mixed forest clearings.	Possible but unlikely
Cypseloides niger	Black Swift	1-E (2019)	E	Blue	Open country and forests in mountainous areas and lowlands. They nest near or behind waterfalls and in caves, located in canyons and sometimes on sea cliffs.	Possible but unlikely
Dolichonyx oryzivorus	Bobolink	1-T (2017)	T	Blue	Nest in tall-grass prairie, forage crops and various grassland habitats.	Possible but unlikely
Chordeiles minor	Common Nighthawk	1-T (2010)	SC	Yellow	Open habitat where the ground is devoid of vegetation, such as sand dunes, beaches, logged areas, burned-over areas, forest clearings, rocky outcrops, pastures etc.	Possible but unlikely
Mammals						
Myotis lucifugus	Little Brown Myotis	1-E (2014)	E	Yellow	Hibernate in caves or abandoned mines, and are chosen for their high humidity and stable, above-freezing temperatures.	Unlikely
Myotis septentrionalis	Northern Myotis	1-E (2014)	E	Blue	Prefer cool, moist hibernating sites where the air is still, often associated with boreal forests	Unlikely

1. Species at Risk Act: Extinct, extirpated, endangered, threatened (T), special concern (SC), not at risk (NAR, assessed and deemed not at risk of extinction) or no status (not rated)
2. Committee on the Status of Endangered Wildlife in Canada: the same status names as SARA
3. Provincial ranking (Includes any indigenous species or subspecies): Red (candidates for, extirpated, endangered, or threatened status in BC), Blue (Special Concern (formerly Vulnerable) in BC), and Yellow (apparently secure and not at risk of extinction)

4.2. FIELD ASSESSMENT

There was no observation of any Species at Risk noted during the July 2021 site visit. It is possible that some of the bird species listed in *Appendix A* could be present near the site, however, none were noted.

5. Summary and Recommendations

Overall, there are few environmental concerns noted during the field and desktop assessment that need to be considered during the design phase of the project. The notable areas as well as general measures and applicable legislation are discussed in the following sections.

5.1. REGULATORY ENVIRONMENT

Depending on the engineered design, it is anticipated a provincial *Water Act* Notification and a Fisheries and Oceans Canada Project Review could be required for work occurring near the unnamed fish-bearing stream. The Notification process typically takes 45 days, and Project Reviews have no legislated timelines, but can take up to 140 days.

5.2. AQUATIC RESOURCES

The nearest waterbody is an unnamed tributary to Cluculz Lake located approximately 150 m east of Guest Road between the two intersections. Project timing should be scheduled when water levels are low (August to February) and there is the least risk to fish. The least-risk timing window for Cluculz Lake is from July 15th to August 31st.

5.3. TERRESTRIAL RESOURCES

5.3.1. Invasive Plants

Several invasive plant species were identified within the immediate project area. A plan should be developed that addresses any soil movement in these areas to reduce the potential for spreading the plants. The construction contractor hired to conduct the construction should be made aware of this plant and ensure their equipment is free of plant parts prior to starting work and clean equipment prior to leaving the site to reduce the spread of invasive plants.

5.3.2. Birds

Any clearing activities should avoid the bird nesting window of May 1 to July 31, unless a nest survey is conducted by a qualified professional.

5.3.3. Amphibians

There is potential for amphibians to be found throughout the project area, in particular the area surrounding the pond upstream of the unnamed tributary. It is recommended a general sweep of the area be conducted well in advance of any construction works. If any are found, a salvage permit from the province is required prior to moving any amphibians. Permits may take 60 to 90 days to obtain.

5.4. OTHER CONSIDERATIONS

As the project moves from design through to construction, it is recommended, and construction environmental management plan (CEMP) be prepared and overseen by a qualified professional during construction. The plan should detail site specific erosion and sediment control measures, timing and access considerations, and general best management practices. It should meet the requirements of Section 165 of the 2020 Standard Specifications for Highway Construction (MOTI 2020).

6. References

BC Conservation Data Centre: CDC iMap [web application]. 2021. Victoria, British Columbia, Canada. Accessed: http://maps.gov.bc.ca/ess/sv/cdc/ September 2021.

BC Ministry of Environment (MoE). 2021. Habitat Wizard – accessed from http://maps.gov.bc.ca/ess/sv/habwiz/ September 2021.

Ministry of Forests, Lands and Natural Resource Operations. 2020. Omineca Water Tool. Accessed September 2021. Available at: https://www.bcwatertool.ca/owt/#13/54.1289/-122.2936.

BC Ministry of Forests, Lands and Natural Resource Operations. 2014 Invasive Alien Plant Program IAAP Map Display, searched September 2021.

Ministry of Forests, Lands and Natural Resource Operations. 2012. Fish-stream Crossing Guidebook, revised edition. Province of BC and Fisheries and Oceans Canada.

Ministry of Transportation and Infrastructure. 2020. 2020 Standard Specifications for Highway Construction, vol 1 of 2. Province of BC.

APPENDIX A – SUMMARY OF BC SPECIES & ECOSYSTEMS EXPLORER RESULTS

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA
Accipiter gentilis atricapillus	Northern Goshawk, *atricapillus* subspecies	BWBS; PP; SBS; MS; SBPS; ESSF; ICH; SWB; IDF	S3S4 (2017)	Blue	G5T5 (2016)	NAR	
Acipenser transmontanus	White Sturgeon	PP; SBS; IDF; ICH; CWH; CDF; MS; BG	S2 (2018)	No Status	G4 (2002)	E/T	1-E
Acipenser transmontanus pop. 5	White Sturgeon (Upper Fraser River Population)	ICH; SBS	S2 (2018)	Red	G4T1 (2001)	E	1-E (2003)
Acroloxus coloradensis	Rocky Mountain Capshell	SBS; ESSF	S3S4 (2015)	Blue	G3G4 (2014)	NAR	
Aechmophorus occidentalis	Western Grebe	ICH; MS; PP; BWBS; BG; SBS; CWH; IDF; SBPS; CDF	S1B,S2N (2015)	Red	G5 (2016)	SC	1-SC (2017)
Anaxyrus boreas	Western Toad	BG; BWBS; PP; ICH; IDF; ESSF; CWH; CDF; SBS; SWB	S4 (2016)	Yellow	G4 (2008)	SC	1-SC (2018)
Ardea herodias herodias	Great Blue Heron, *herodias*	BG; PP; IDF; ICH; MS; SBS	S3? (2017)	Blue	G5T5 (2016)		
Asio flammeus	Short-eared Owl	BG; SWB; ICH; CWH; PP; SBS; IDF; MS; SBPS; BWBS; CDF	S3B,S2N (2015)	Blue	G5 (2016)	T	1-SC (2012)
Bartramia longicauda	Upland Sandpiper	ICH; BWBS; CWH; SWB; CDF; BG; IDF; SBPS; SBS	S2B (2015)	Red	G5 (2016)		
Boloria epithore sigridae	Western Meadow Fritillary, *sigridae* subspecies	SBS; BWBS; ESSF; BAFA; SWB	S3 (2021)	Blue	G5T2T4 (2018)		
Botaurus lentiginosus	American Bittern	CDF; MS; CWH; IDF; SBPS; PP; ICH; SBS; BWBS; BG	S3B, SNRN (2015)	Blue	G5 (2016)		
Buteo lagopus	Rough-legged Hawk	BWBS; CDF; SBPS; PP; ICH; IMA; BAFA; CWH; ESSF; IDF; SBS; SWB; BG; MS	S3N (2015)	Blue	G5 (2016)	NAR	
Buteo platypterus	Broad-winged Hawk	IDF; ICH; BWBS; SBS	S3?B (2015)	Blue	G5 (2016)		
Buteo swainsoni	Swainson's Hawk	BWBS; ICH; MS; BG; PP; CDF; IDF; SBS	S2B (2015)	Red	G5 (2016)		
Calcarius pictus	Smith's Longspur	CDF; CWH; SWB; BWBS; BAFA; BG; CMA; PP; SBS; MS; IDF	S3S5B (2015)	Blue	G4G5 (2016)		
Chondestes grammacus	Lark Sparrow	BG; CDF; CWH; ICH; IDF; SBPS; BWBS; MS; PP; SBS	S3S4B (2015)	Blue	G5 (2016)		
Chordeiles minor	Common Nighthawk	BWBS; SBS; CDF; CWH; ESSF; ICH; SBPS; BG; IDF; MH; MS; PP; SWB	S4B (2015)	Yellow	G5 (2016)	SC	1-T (2010)
Cicindela hirticollis	Hairy-necked Tiger Beetle	ESSF; ICH; CMA; IMA; MS; SBPS; SBS; MH; IDF; BG; BAFA; CWH; PP	S2S4 (2017)	Blue	G5 (2016)		
Coccothraustes vespertinus	Evening Grosbeak	CWH; ESSF; IDF; ICH; MH; SWB; PP; BWBS; CDF; MS; SBPS; SBS; BG	S5 (2015)	Yellow	G5 (2016)	SC	1-SC (2019)
Contopus cooperi	Olive-sided Flycatcher	IDF; BWBS; ICH; SBS; SWB; CDF; MH; MS; PP; CWH; ESSF; SBPS	S3S4B (2015)	Blue	G4 (2016)	SC	1-T (2010)
Cypseloides niger	Black Swift	ICH; IDF; PP; CMA; MS; MH; BG; CDF; CWH; ESSF; IMA; SWB; BAFA; SBPS; SBS	S3S4B (2021)	Blue	G4 (2016)	E	1-E (2019)
Dolichonyx oryzivorus	Bobolink	BWBS; CWH; ICH; BG; CDF; PP; SBS; IDF	S3B (2015)	Blue	G5 (2016)	T	1-T (2017)
Equisetum fluviatile - Carex utriculata	swamp horsetail - beaked sedge	MSxk3/; SBSmk2/Wm02; IDFdm2/Wm02; MSdm3w/Wm02; SBPSxc/Wm02; SBSdw3/Wm02; ICHwk4/Wm02; MSmw2/Wm02; MSxv/Wm02; PPdh2/Wm02; SBPSmk/Wm02; SBSwk1/Wm02; IDFxk/Wm02; MSdc2/Wm02; MSxk/Wm02; MSxk2/; BWBSmk/Wm02; ICHmk4/Wm02; IDFdc/Wm02; SBPSdc/Wm02; ESSFmw/Wm02; MSdk/Wm02; MSdw/Wm02; SBSdk/Wm02; BGxh2/Wm02; BWBSdk/Wm02; ICHmw3/Wm02; IDFdk5/Wm02; MSdm3/Wm02	S3 (2010)	Blue	G4	N/A	N/A
Euphagus carolinus	Rusty Blackbird	ESSF; PP; SWB; BG; SBS; BWBS; CWH; MS; CDF; SBPS	S3S4B (2015)	Blue	G4 (2016)	SC	1-SC (2009)
Falco peregrinus	Peregrine Falcon	BWBS; SWB; ICH; MS; IDF; BG; CWH; CDF; SBS; ESSF; PP	S3 (2015)	No Status	G4 (2016)	SC	1-SC
Falco peregrinus anatum	Peregrine Falcon, *anatum*	BWBS; PP; MS; IDF; BG; CDF; CWH; SBS	S2? (2011)	Red	G4T4 (2016)	NAR	1-SC (2012)
Falco rusticolus	Gyrfalcon	CDF; CWH; BAFA; IDF; SBPS; BG; ICH; SWB; BWBS; SBS	S3S4B, SNRN (2015)	Blue	G5 (2016)	NAR	
Galba obrussa	Golden Fossaria	BG; ICH; IMA; MS; PP; BAFA; SBPS; IDF; SBS; ESSF	S2S3 (2015)	Blue	G5 (2015)		
Galba parva	Pygmy Fossaria	SBS; CWH	S3S5 (2015)	Blue	G5 (2015)		
Gulo gulo	Wolverine	CMA; IDF; ICH; MH; SBPS; SBS; BAFA; CWH; ESSF; IMA; SWB; MS; BWBS	S3 (2015)	No Status	G4 (2016)	SC	1-SC (2018)
Gulo gulo luscus	Wolverine, *luscus* subspecies	BAFA; CWH; MH; CMA; SBS; ICH; SBPS; BWBS; ESSF; MS; IDF; IMA; SWB	S3 (2010)	Blue	G4T4 (2016)	SC	1-SC (2018)
Hirundo rustica	Barn Swallow	IDF; IMA; MH; CDF; CWH; MS; SBS; SWB; BG; BWBS; ESSF; SBPS; BAFA; ICH; PP	S3S4B (2015)	Blue	G5 (2016)	SC	1-T (2017)
Hydroprogne caspia	Caspian Tern	BG; CWH; ICH; BWBS; CDF; SBS; IDF; PP	S3B (2015)	Blue	G5 (2016)	NAR	
Icteria virens	Yellow-breasted Chat	CDF; IDF; CWH; PP; BG; ICH; SBS	S2B (2018)	Red	G5 (2016)	E	1-E (2003)
Larix laricina / Betula pumila / Calamagrostis canadensis - Carex spp. / *Sphagnum* spp.	tamarack / low birch / bluejoint reedgrass - sedges / peat-mosses	SBSdw2; SBSdw3	S1 (2008)	Red	GNR	N/A	N/A
Larus californicus	California Gull	CWH; ICH; MS; BG; IDF; PP; BWBS; SBS; CDF	S2S3B (2015)	Blue	G5 (2016)		
Lymnaea atkaensis	Frigid Lymnaea	CWH; ESSF; BWBS; SBS; BAFA; CMA; ICH; SWB; MH	S3S5 (2015)	Blue	G4G5 (2015)		
Melanerpes lewis	Lewis's Woodpecker	SBS; CDF; ICH; BG; IDF; PP; CWH	S2S3B (2015)	Blue	G4 (2016)	T	1-T (2012)

Melanitta perspicillata	Surf Scoter	BG; SWB; MS; BWBS; CDF; CWH; SBS; IDF; SBPS; ICH; PP	S3B,S4N (2015)	Blue	G5 (2016)		
Myotis lucifugus	Little Brown Myotis	BWBS; MS; ICH; MH; PP; SBS; BG; CDF; ESSF; SWB; CWH; IDF; SBPS	S4 (2015)	Yellow	G3 (2016)	E	1-E (2014)
Myotis septentrionalis	Northern Myotis	BWBS; SBS; ICH; MH	S3S4 (2015)	Blue	G1G2 (2016)	E	1-E (2014)
Nephroma isidiosum	pebbled paw	ESSFwv; SBSdw; ICHvk; MHmm; ICHmw; IDFdk; ESSFwc; ESSFwcp; ESSFwvp; ICHwk; SBSwk; BAFAun; BGxh; CWHwm; MSdm; ICHmc; SBSdh	S3 (2010)	Blue	G3G5 (2006)		
Numenius americanus	Long-billed Curlew	ICH; SBPS; PP; BG; CWH; SBS; CDF; IDF	S3B (2018)	Blue	G5 (2016)	SC	1-SC (2005)
Oeneis jutta chermocki	Jutta Arctic, *chermocki*	SBS; BG; ESSF; ICH; MS; IDF	S3 (2013)	Blue	G5T4Q (1999)		
Oreamnos americanus	Mountain Goat	CMA; ESSF; IDF; MS; ICH; SBS; BAFA; MH; IMA; PP; SBPS; CWH; BG; BWBS; CDF; SWB	S3 (2015)	Blue	G5 (2016)		
Patagioenas fasciata	Band-tailed Pigeon	ICH; CDF; CWH; MS; IDF; SBS	S3S4 (2015)	Blue	G4 (2016)	SC	1-SC (2011)
Pekania pennanti	Fisher	BAFA; CMA; CWH; ICH; MH; MS; CDF; SBS; ESSF; IMA; PP; BWBS; IDF; SBPS; SWB	S3 (2020)	No Status	G5 (2016)		
Pelecanus erythrorhynchos	American White Pelican	ICH; SBPS; IDF; MS; CDF; SBS; BG; CWH; PP; BWBS	S1B (2015)	Red	G4 (2016)	NAR	
Phalacrocorax auritus	Double-crested Cormorant	PP; SBS; BWBS; IDF; SBPS; CDF; ICH; CWH	S3S4 (2015)	Blue	G5 (2016)	NAR	
Phalaropus lobatus	Red-necked Phalarope	IDF; PP; CDF; SBPS; BG; ICH; CWH; SBS; BWBS; MS; SWB	S3S4B (2015)	Blue	G4G5 (2016)	SC	1-SC (2019)
Physella propinqua	Rocky Mountain Physa	CMA; IDF; IMA; MS; SBS; CDF; BAFA; CWH; ESSF; MH; SBPS	S3S4 (2015)	Blue	G5Q (2015)		
Physella virginea	Sunset Physa	IDF; SBPS; ESSF; ICH; IMA; MH; SBS; CDF; CMA; MS; BAFA; BG; CWH	S3S5 (2015)	Blue	G5 (2015)		
Picea engelmannii x glauca / Spiraea douglasii - Rosa acicularis	hybrid white spruce / hardhack - prickly rose	SBSdw3/06	S3? (2011)	Blue	GNR	N/A	N/A
Pinus contorta - Picea mariana / Pleurozium schreberi	lodgepole pine - black spruce / red-stemmed feathermoss	SBPSdc/04; SBSdw3/05; SBSdw2/07	S3 (2015)	Blue	G3	N/A	N/A
Pisidium fallax	River Peaclam	ESSF; BWBS; SBS; IDF	S3S4 (2017)	Blue	G5 (2015)		
Planorbula campestris	Meadow Rams-horn	BWBS; ICH; IMA; MH; SBS; CWH; BAFA; CMA; CDF; ESSF	S3S4 (2015)	Blue	G4G5 (2015)		
Pluvialis dominica	American Golden-Plover	ICH; MS; BWBS; IDF; PP; SBS; CDF; CWH; SWB; BG; BAFA	S3S4B (2015)	Blue	G5 (2016)		
Podiceps nigricollis	Eared Grebe	SBS; BG; BWBS; ESSF; MS; CMA; IDF; SBPS; BAFA; IMA; CWH; PP; ICH; MH	S3B (2015)	Blue	G5 (2016)		
Pseudotsuga menziesii - Pinus contorta / Cladonia spp.	Douglas-fir - lodgepole pine / clad lichens	SBSdw1/02; SBSmh/03; SBSdw2/02; SBSdw3/02; SBSmh/02	S3 (2014)	Blue	GNR	N/A	N/A
Rangifer tarandus pop. 15	Caribou (Northern Mountain	BWBS; ESSF; SBS; MH	S2S3 (2017)	Blue	G5T4T5 (2013)	SC	1-SC (2005)
Salix drummondiana / Calamagrostis canadensis	Drummond's willow / bluejoint reedgrass	MSdk1/; MSdk2/; MSdm1/Fl05; MSdk/Fl05; MSmw2/Fl05; SBSdk/Fl05; SBPSdc/Fl05; SBSdw3/Fl05	S2S3 (2004)	Blue	G3	N/A	N/A
Salvelinus confluentus	Bull Trout	SWB; PP; ESSF; SBPS; IDF; SBS; CWH; BWBS; BG; ICH; MS	S3S4 (2018)	Blue	G5 (2017)	SC	
Scheuchzeria palustris / Sphagnum spp.	scheuchzeria / peat-mosses	SBSvk/Wb12; ICHmk3/Wb12; SBSdw3/Wb12; SBSmc2/Wb12; ICHmc2/Wb12	S3 (2004)	Blue	G3	N/A	N/A
Setophaga castanea	Bay-breasted Warbler	ICH; CWH; MS; SBS; BWBS	S2B (2015)	Red	G5 (2016)		
Setophaga tigrina	Cape May Warbler	MS; BWBS; SBS	S3S4B (2018)	Blue	G5 (2016)		
Setophaga virens	Black-throated Green Warbler	ESSF; SBS; ICH; BWBS; CDF; CWH	S3B (2015)	Blue	G5 (2016)		
Somatochlora forcipata	Forcipate Emerald	SBS; ESSF; MS; SBPS	S3? (2015)	Blue	G5 (2015)		
Somatochlora kennedyi	Kennedy's Emerald	MS; BWBS; ESSF; SBS; SWB; SBPS	S3S4 (2015)	Blue	G5 (2015)		
Sphaerium striatinum	Striated Fingernailclam	CWH; IMA; SWB; MH; MS; PP; SBS; BWBS; CMA; ESSF; ICH; BAFA; BG; CDF; IDF; SBPS	S3S4 (2015)	Blue	G5 (2015)		
Troglodytes hiemalis	Winter Wren	SBS; BWBS; BAFA; ESSF; SWB	S3S4B (2015)	Blue	G5 (2016)		
Tympanuchus phasianellus columbianus	Sharp-tailed Grouse, *columbianus* subspecies	SBPS; SBS; IDF; PP; BG	S2S3 (2005)	Blue	G5T3 (2016)		
Ursus arctos	Grizzly Bear	BWBS; SBS; SWB; CWH; MS; CMA; ESSF; ICH; SBPS; BAFA; IDF; IMA; MH	S3? (2015)	Blue	G4 (2016)	SC	1-SC (2018)
Valvata tricarinata	Threeridge Valvata	SBS; BWBS; ESSF; ICH; MS; IMA; BAFA; IDF	S1S2 (2015)	Red	G5 (2015)		

APPENDIX B -- PHOTOGRAPHS

Photo 1: View north of the Shallow Bay Road intersection with Highway 16.

Photo 2: View north of roadside vegetation at the Shallow Bay Road intersection with Highway 16.

Photo 3: View downstream of the 2400 mm steel culvert.

Photo 4: View downstream of the dry channel south of the 2400 mm steel culvert.

Photo 5: View upstream of the 2400 mm steel culvert and baffles where fish were observed.

Photo 6: Rainbow trout observed within a pool of the lowest baffle (within the culvert).

Photo 7: The channel substrate immediately downstream of the existing crossing.

Photo 8: The pond immediately upstream, of the existing crossing, looking northeast.

Photo 9: View of the 2400 mm steel culvert inlet from the pond.

Photo 10: Roadside vegetation along Highway 16.

Photo 11: View north of Guest Road intersection with Highway 16.

Photo 12: View of Guest Frontage Road from the Shallow Bay Road intersection.

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