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Ministry of Environment
1011 4th Ave
Prince George, BC V2L 3H9

Re: Fish Permit Application

This permit application can also be viewed online [at this link](#). A summary of sites to be potentially assessed is included as Table [1](#) and [2](#), details of fish species potentially encountered is presented in Table [3](#) and an overview map displaying potential sample locations is included as Figure 1. A kml file of the sites is included as an attachment to the application and can also be downloaded [from here at this link](#)

Rationale for sampling is to inform fish presence/absence, species composition/density, abundance estimates, movement, growth, and survival as part of habitat confirmations and monitoring related to fish passage restoration at barrier culverts as per the [Fish Passage Technical Working Group Phase 2 protocol](#). Presence/absence of fish, species composition/density, distribution limits and fish movement can be useful for prioritizing which crossings are a best fit for fish passage restoration and inform follow up monitoring.

Sampling is proposed at 2 - 6 sites included in Tables [1](#) and [2](#) where we will be performing habitat confirmations and follow up site visits to past habitat confirmation sites. Sample locations may occur well upstream or downstream of the crossing locations. The current list of candidate streams will be narrowed down through the results of field assessments, modeling, ongoing communications with McLeod Lake; Land, Water and Resource Stewardship; Ministry of Environment and other stakeholders. Sampling methodologies will be dependent on the site, fish species suspected, type of habitat encountered, risks to aquatic organisms potentially present and ongoing communications. Sampling methods may include minnowtrapping, electrofishing, and dipnetting upstream and downstream of barrier culvert locations.

For tagging, our study plan is to electrofish long open sites (200 - 300m) upstream and downstream of priority culvert “barrier” sites and insert biotag APT12 PIT tags into the body cavity of all fish captured over 65mm, as well as collecting fish location (UTM), length and weight. We will return to the sites a minimum of 24hrs later to resample to inform an analysis of our capture efficiency.

In addition to providing information on abundance upstream and downstream of potential culvert restoration sites, the study will also provide baseline information for a monitoring program to document fish movement, growth and survival at these sites over multi-year timeframes (ie. to evaluate if 1. fish are moving into restored areas, 2. through “barrier” sites without remediation and to 3. evaluate if productivity of the systems are increasing following bridge installation or if fish are just moving from one place to the next). As we wish to tag all fish over 65mm in each site sampled (up to 6 sites) we would like to apply for a maximum of 450 fish (75 fish/site).

Please note that the sampling will be completed before October 31 (likely early August) however the period is listed as Dec 31 on the application to allow time outside of the busy field season for the data to be processed, QA'd and organized so that required reporting can be as informative as possible when submitted. An example of how we have been presenting results and methodologies from past assessments can be referenced [here at this link](#).

Please do not hesitate to contact me if you need more information or have any questions or concerns.



Al Irvine, R.P.Bio

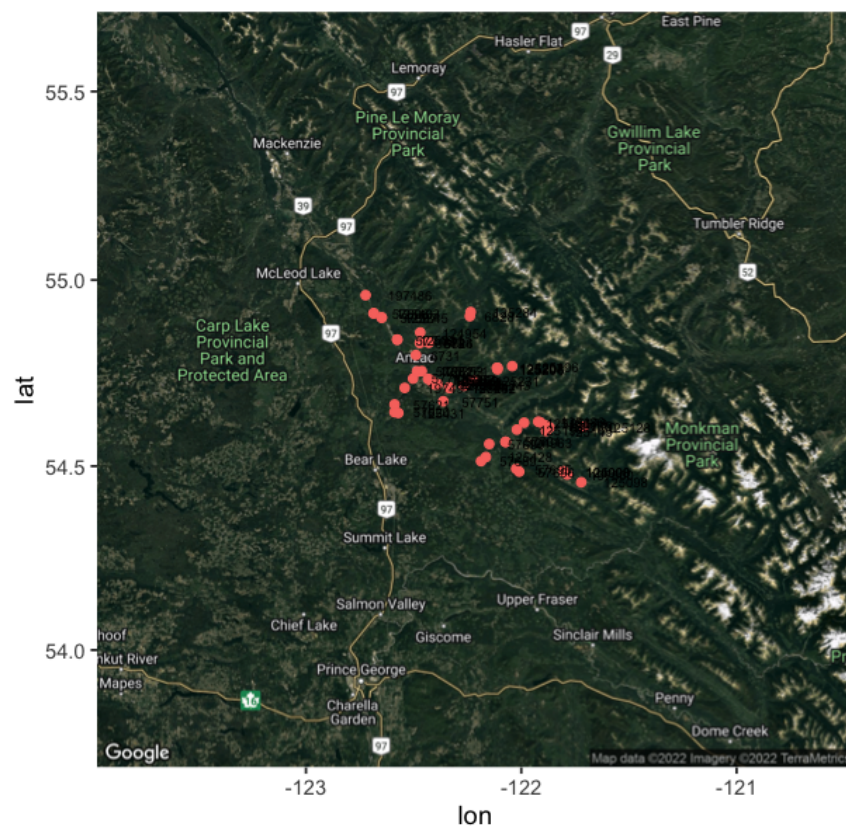


Figure 1. Location of potential sample sites.

Table 1: Potential sample locations.

id	stream_name	wsc_code	lat	long
id	stream_name	wsc_code	lat	long
6731	UNN trib of Anzac R.	236-313100-05300-00000-0000-000-000-000-000-000	54.79899	-122.4894
6745	UNN trib of Anzac R.	236-313100-13400-00000-0000-000-000-000-000-000	54.83146	-122.4708
6746	UNN trib of Anzac R.	236-313100-22400-22700-0000-0000-000-000-000-000	54.83307	-122.4291
6824	–	236-313100-22400-22700-0000-0000-000-000-000-000	54.83289	-122.4292
6828	Crocker Creek	236-313100-42700-00000-0000-000-000-000-000-000	54.90334	-122.2388
57606	Tributary to Parsnip River	–	54.91086	-122.6857
57620	Tributary to Tacheeda Lake	236-352800-58200-00000-0000-000-000-000-000-000	54.64568	-122.5887
57621	Creek from Fishhook Lake to Tacheeda Lakes	236-352800-00000-00000-0000-000-000-000-000-000	54.66643	-122.5884
57681	tributary to Parsnip River	236-349500-00000-00000-0000-000-000-000-000-000	54.75466	-122.4837
57687	tributary to Parsnip River	236-238900-00000-00000-0000-000-000-000-000-000	54.89958	-122.6480
57689	Tributary to main creek in 13045 watershed	236-615600-24700-57200-0000-0000-000-000-000-000	54.51347	-122.1868
57690	tributary to Wichcika Creek	236-615600-21000-00000-0000-000-000-000-000-000	54.55988	-122.1489
57695	tributary to Wichcika Creek	236-615600-59500-00000-0000-000-000-000-000-000	54.49289	-122.0235
57696	Unnamed tributary to Wichcika Creek	236-615600-61000-00000-0000-000-000-000-000-000	54.48505	-122.0095
57701	Tributary to Parsnip River	236-625100-00000-00000-0000-000-000-000-000-000	54.56553	-122.0728
57718	Tacheeda Creek	236-352800-00000-00000-0000-000-000-000-000-000	54.73583	-122.5027
57746	Tributary to Parsnip River	236-283700-38400-00000-0000-000-000-000-000-000	54.84049	-122.5760
57751	Tributary to 13013 Creek	236-402500-21700-17900-0000-0000-000-000-000-000	54.67491	-122.3624
124954	Tributary to Destilida Creek	–	54.85970	-122.4695
124963	Tributary to Parsnip River	236-625100-00000-00000-0000-000-000-000-000-000	54.56540	-122.0730
124998	Tributary to Parsnip River	236-738000-00000-00000-0000-000-000-000-000-000	54.48586	-121.8037
125000	tributary to Parsnip River	236-738000-00000-00000-0000-000-000-000-000-000	54.48563	-121.8031
125098	tributary to Parsnip River	–	54.45661	-121.7212
125128	tributary to Missinka River	236-614900-53900-00000-0000-000-000-000-000-000	54.60694	-121.7079
125149	Tributary to the Missinka River	236-614900-28800-00000-0000-000-000-000-000-000	54.59510	-121.8849
125170	Tributary to the Missinka River	–	54.60471	-121.8685
125175	Unnamed tributary to Missinka River	236-614900-25300-00000-0000-000-000-000-000-000	54.61028	-121.8884
125179	Unnamed tributary to Missinka River	236-614900-20900-03300-0000-0000-000-000-000-000	54.61806	-121.9112
125180	tributary to Missinka River	236-614900-20900-00000-0000-000-000-000-000-000	54.62006	-121.9211
125186	tributary to Missinka River	236-614900-10700-00000-0000-000-000-000-000-000	54.61730	-121.9868
125194	Tributary to the Missinka River	236-614900-05300-00000-0000-000-000-000-000-000	54.59871	-122.0203

id	stream_name	wsc_code	lat	long
125196	Tributary to Table River	236-450800-43100-00000-0000-0000-000-000-000-000-000	54.76940	-122.0420
125206	Tributary to Table River	—	54.76051	-122.1105
125207	Tributary to Table River	—	54.76461	-122.1135
125208	Tributary to Table River	—	54.76480	-122.1099
125231	tributary to Table River	236-450800-15400-00000-0000-0000-000-000-000-000-000	54.73106	-122.2241
125243	Tributary to Table River	236-450800-07200-00000-0000-0000-000-000-000-000-000	54.71689	-122.2667
125247	tributary to Parsnip River	236-426000-00000-00000-0000-0000-000-000-000-000-000	54.71071	-122.3338
125251	Tributary to Parsnip River	236-393300-00000-00000-0000-0000-000-000-000-000-000	54.72040	-122.3899
125252	Tributary to Parsnip River	236-393300-00000-00000-0000-0000-000-000-000-000-000	54.72060	-122.4025
125253	tributary to Parsnip River	236-380900-00000-00000-0000-0000-000-000-000-000-000	54.72843	-122.4140
125254	Tributary to Parsnip River	236-379700-00000-00000-0000-0000-000-000-000-000-000	54.73225	-122.4219
125257	Tributary to Parsnip River	236-375200-00000-00000-0000-0000-000-000-000-000-000	54.73503	-122.4328
125261	Fern Creek	236-358400-00000-00000-0000-0000-000-000-000-000-000	54.75598	-122.4624
125284	Tributary to Anzac River	—	54.91445	-122.2349
125341	Tributary to Parsnip River	236-283700-38400-00000-0000-0000-000-000-000-000-000	54.84041	-122.5762
125345	tributary to Parsnip River	236-238900-00000-00000-0000-0000-000-000-000-000-000	54.89949	-122.6483
125353	Tributary to Parsnip River	236-349500-00000-00000-0000-0000-000-000-000-000-000	54.75481	-122.4835
125403	tributary to Parsnip River	—	54.91081	-122.6859
125428	Tributary to Wichcika Creek	236-615600-24700-00000-0000-0000-000-000-000-000-000	54.52474	-122.1642
125431	Tributary to Fishhook Lake	236-352800-00000-00000-0000-0000-000-000-000-000-000	54.64341	-122.5709
197482	Unnamed tributary to Parsnip River	236-426000-00000-00000-0000-0000-000-000-000-000-000	54.71233	-122.3345
197486	Tributary to Parsnip River	—	54.95935	-122.7229
197492	Tributary to Parsnip River	236-380900-00000-00000-0000-0000-000-000-000-000-000	54.72817	-122.4147
197496	Tributary to Parsnip River	236-393300-00000-00000-0000-0000-000-000-000-000-000	54.72085	-122.3898
197497	Trib to Tacheeda Lk	236-352800-27400-00000-0000-0000-000-000-000-000-000	54.71089	-122.5414
197500	Tributary to Parsnip River	236-738000-49900-00000-0000-0000-000-000-000-000-000	54.47783	-121.7858

Table 2: Potential sample locations.

id	stream_name	sp_upstr	fish_tags	pscis_assessment_comment
6731	UNN trib of Anzac R.	—	150	Failed - drop is too high - Beaver blockage in culvert - water flowing over the road
6745	UNN trib of			

id	stream_name	sp_upstr	fish_tags	pscis_assessment_comment
	Anzac R.	—		<p>Fails due to slope, embedment,</p> <p>however width is okay, don't think</p> <p>this is a high priority for fixing —</p> <p>downstream too bushy to</p> <p>150 photograph, lots of overhanging</p> <p>osier. Upstream has high banks</p> <p>(60cm to water surface). Culvert</p> <p>has scattered rocks and some silt</p> <p>in it.</p>
6746	UNN trib of Anzac R.	—	150	<p>Failed - on constriction - baffled culvert - Fish at culvert - inlet pool</p> <p>depth 8cm - some introduced materials downstream natural weir</p>
6824	—	—	150	<p>Fail due to stream constriction, slope, embedment — downstream</p> <p>has lots of blockages (trees down) upstream very thick/ deep</p> <p>silt/muck</p>
6828	Crocker Creek	{BT,CAS,RB,SP}	150	<p>Fail, SCW — think these culverts are only here to prevent the road</p> <p>from washing out when river is high, appears to be a side channel</p> <p>from the river. Completely dry at the moment but looks like high flows</p> <p>come through. Is it really necessary to establish fish passage here??</p> <p>20 m upstream creek comes in and flows opposite direction back to</p> <p>river.</p>
57606	Tributary to Parsnip River	—	150	<p>Road slumping at inlet, and outlet is a barrier</p>
57620	Tributary to Tacheeda Lake	—	150	<p>Fry observed upstream, may be resident population. Fish sampling</p> <p>recommended to confirm barrier status</p>
57621	Creek from Fishhook Lake to Tacheeda Lakes	{DV,LNC,LSU,LW,MW,NSC,RB,RSC,SP,SU,WF}	150	<p>3 culverts.</p>
57681	tributary to Parsnip River	{BB,CC,LKC,MW,RB,RSC,SU}	150	<p>Drains Goose Lake. Surveyed upstream for 550 m. Culvert is</p> <p>continous under the CN railway (PSCIS crossing 57681) and Anzac</p> <p>FSR (PSCIS crossing 125353) and empties into margins of Parsnip</p> <p>River. No downstream site recorded. Numerous unidentified</p> <p>salmonids present upstream. Small woody debris and undercut banks</p> <p>abundant. Overhanging vegetation. Minnowtrapping conducted</p> <p>upsteam and downstream. Rainbow trout captured upstream and</p> <p>burbot and rainbow trout captured downstream.</p>
57687	tributary to Parsnip River	—	150	<p>Good habitat. Surveyed upstream for 680 m. Culvert is under CN</p> <p>railway but Chuchinka-Colbourne FSR located 10 m downstream also</p> <p>has barrier crossing (PSCIS 125345). Abundant gravels throughout</p>

id	stream_name	sp_upstr	fish_tags	pscis_assessment_comment
with deep pools suitable for overwintering. No barriers. Small beaver dam located 180 m upstream of crossing.				
57689	Tributary to main creek in 13045 watershed	—	150	—
57690	tributary to Wichcika Creek	—	150	Moderate priority for rehabilitation. Surveyed upstream for 650 m. Large stream with many deep pools suitable for overwintering and rearing. Multiple rock chutes up to 1 m high in surveyed area with 1.4 m falls at top end of site. Rainbow trout (120 mm) observed approximately 60 m upstream of culvert. Some gravels present suitable for spawning . Falls only potentially passable for adfluvial bull trout and migration to this area seems unlikely given plateau topography and wetland character present upstream (based on google earth review). Downstream surveyed to Wichcika Creek.
57695	tributary to Wichcika Creek	—	150	Moderate priority for rehabilitation. Surveyed upstream for 920 m. Larger stream with pockets of gravels, some shallow pools and some widely spaced large woody devris. No barriers observed besides debris jams of 50 - 100cm. These obstructions are non-permanent and likely navigable at different flows and by large fish. Surveyed downstream for 520 m to beyond historic observation of bull trout.
57696	Unnamed tributary to Wichcika Creek	—	150	Moderate priority for rehabilitation. Some occasional pools. Frequent steps 30 - 50 cm due to large woody debris jams. Mature spruce forest. Cascade at top end of site not passable by any species or life stage. Good sized stream with some intermittent small patches of gravel suitable for spawning. Overall nice stream but unlikely overly important to adfluvial bull trout populations due to limited spawning habitat. Too steep for rainbow access due to rock drop below the crossing.

id	stream_name	sp_upstr	fish_tags	pscis_assessment_comment
57701	Tributary to Parsnip River	—	150	Channel is mainly fines, with lots of pools and debris for shelter
57718	Tacheeda Creek	{CAS,DV,KO,LNC,LSU,LT,LW,MW,NSC,OS,PCC,PW,RB,RSC,SP,SU,WF,WSU}	150	Wide creek upstream and downstream. Fry spotted at outlet. Beaved damn inside left pipe should be removed. Backwatering and/or baffle placement recommended.
57746	Tributary to Parsnip River	—	150	Culvert is damaged, and should be replaced with OBS
57751	Tributary to 13013 Creek	—	150	Embed culvert if proven a barrier and fish present
124954	Tributary to Destilida Creek	—	150	Beaver guards. Photos 79-83.
124963	Tributary to Parsnip River	—	150	—
124998	Tributary to Parsnip River	—	150	Two culverts.
125000	tributary to Parsnip River	—	150	High priority candidate for restoration. Good habitat. Surveyed upstream continuously for 350 m to beaver influenced wetland area where walking became difficult. Then stream was visited again upstream at 1.6 km upstream from crossing then again at approximately 2.5 km upstream of crossing. Undercut banks provide areas of deep cover ad Large woody debris is scattered throughout. Overhanging vegetationalso provides cover throughout. Pools observed were somewhat shallow but were preseetevery 20 - 30 m or so. Minnowtrapping conducted upstream and downstream of crossing. Electrofishing conducted downstream of the crossing. No fish captured upstream of the culvert. First beaver dam located approximately 330m upstream of the culvert.
125098	tributary to Parsnip River	{RB}	150	Small stream with low flows. Fish records indicate fish observed upstream.
125128	tributary to Missinka River	—	150	Beaver influenced extensive wetland area located upstream for as far as visible from 50 m upstream of culvert. 5 m high cascade (10 m long at 50% gradient) is located approximately 5 m below the culvert. Below this is a rock chute for 12 m (30%). Culvert is potentially accessible only to adult adfluvial bull trout however it is unlikely that they would utilize this stream due to the wetland type habitat present upstream of the culvert.

id	stream_name	sp_upstr	fish_tags	pscis_assessment_comment
the				
Missinka {BT,RB} 150 –				
River				
125170	Tributary to the Missinka River	–	150	Km Markers are from split to the South Missinka as no road markers present. Fry observed in outlet pool. Twin culverts.
125175	Unnamed tributary to Missinka River	{RB}	150	Moderate priority for rehabilitation. Surveyed upstream for 565 m. At approximately 300m upstream of culvert stream splits into three tributaries. Western most tributary has the most flow. Abundant gravels. Very overwintering habitat available if fish passage was restored at the crossing due to lack of large woody debris and deep pools.
125179	Unnamed tributary to Missinka River	{BT,RB}	150	High priority candidate for restoration with habitat for rearing and overwintering upstream. Surveyed upstream for 520 m with no barriers to fish passage present. Bull trout and rainbow recorded upstream. Some deep pools for overwintering and rearing. Large woody debris and undercut banks throughout. Sections of gravel suitable for spawning. Good flow. Surveyed downstream for 360 m. No barriers observed and none likely downstream of surveyed section due to gradients. Abundant large woody debris and gravels suitable for spawning.
125180	tributary to Missinka River	{RB}	150	High priority candidate for restoration. Good habitat. Surveyed upstream of PSCIS crossing 125186 for a distance of 515 m. Good flow and abundant cover. Large woody debris and pools throughout. Frequet pockets of gravel suitable for spawning. Good candidate.
125186	tributary to Missinka River	{RB}	150	High priority candidate for restoration. Good habitat. Surveyed upstream of PSCIS crossing 125186 for a distance of 515 m. Good flow and abundant cover. Large woody debris and pools throughout. Frequet pockets of gravel suitable for spawning. Good candidate.
125194	Tributary to the Missinka River	–	150	High rearing habitat, moderate spawning.
125196	Tributary to Table River	–	150	Dry Bed. 2 Culverts
125206	Tributary to Table River	–	150	Dry bed.
125207	Tributary to Table River	{LKC}	150	–
125208	Tributary to Table River	–	150	2 culverts w/ one flowing.
125231	tributary to Table River	{RB}	150	High priority candidate for restoration. Good habitat. Surveyed for 600m to new bridge (modelled crossing 16603641). Some deep pools and boulders, undercut banks, gravels throughout. Abundant large wody debris throughout. Some debris steps from 30 - 70 cms high. No barriers. Rainbow trout known upstream (FIDQ 2020). Good candidate for rehabilitation.
125243	Tributary to Table River	{RB}	150	–
125247	tributary to Parsnip River	{RB}	150	High priority candidate for restoration. Surveyed to 700 m upstream. Good habitat to where beaver dammed area begins at 700m. Abundant undercut banks, overhanging vegetation, large woody debris and gravels. Gradients

	id	stream_name	sp_upstr	fish_tags	pscis_assessment_comment
decreasing at top end of the site due to historic beaver dam. Railway culvert (modelled crossing 16603287) is located approximately 200 m upstream and is barrier (very long, unembedded and 3%).					
	125251	Tributary to Parsnip River	—	150	Culvert completely blocked and submerged.
	125252	Tributary to Parsnip River	{NSC}	150	Dry bed. Erosion above culvert.
	125253	tributary to Parsnip River	{RB}	150	High priority for restoration. Surveyed upstream for 800 m. Stable channel with large woody debris throughout. Railway crossing culvert (modelled ID 16603267) is located 60 m downstream of the crossing and is a barrier. Overhanging vegetation and undercut banks present for cover. Historic beaver impounded area at top of site.
	125254	Tributary to Parsnip River	{WSU}	150	Culvert completely submerged.
	125257	Tributary to Parsnip River	—	150	Dry bed.
	125261	Fern Creek	{BB,C,CBC,DC,DV,LSU,RB,RSC,SU}	150	Two additional culverts at 0.9m diameter.
	125284	Tributary to Anzac River	—	150	Dry bed.
	125341	Tributary to Parsnip River	—	150	Outlet and inlet damaged.
	125345	tributary to Parsnip River	—	150	High priority candidate for restoration. Good habitat. Surveyed upstream for 680 m. Culvert is under the Chuchinka-Colbourne FSR but CN railway located 10 m upstream also has barrier crossing (PSCIS 57687). Abundant gravels throughout with deep pools suitable for overwintering. No barriers. Small beaver dam located 180 m upstream of crossing.
	125353	Tributary to Parsnip River	{BB,CC,LKC,MW,RB,RSC,SU}	150	2 culverts.
	125403	tributary to Parsnip River	—	150	Low priority for rehabilitation. Surveyed upstream for approximately 350 m. Beaver influenced wetland for first 50 m then small stream with deep pools and undercut banks, overhanging vegetation. Large wetland upstream of beaver

	id	stream_name	sp_upstr	fish_tags	piscis_assessment_comment
dam located at approx. 200m from crossing. Fixing culvert					
provides access to plateau wetland areas and not a priority.					
	125428	Tributary to Wichcika Creek	{CC,RB}	150	NCD.
	125431	Tributary to Fishhook Lake	–	150	–
	197482	Unnamed tributary to Parsnip River	–	150	Good habitat. Surveyed downstream for 250 m to beaver dammed area on floodplain of Parsnip River.
	197486	Tributary to Parsnip River	–	150	Small stream. A few gravels present. Abundant small woody debris and overhanging vegetation for cover. Frog in outlet pool.
	197492	Tributary to Parsnip River	{RB}	150	Habitat confirmation completed for upstream PSCIS crossing 125253. See https://newgraphenvironment.github.io/Parsnip_Fish_Passage/03_Parsnip_report_125253.html
	197496	Tributary to Parsnip River	–	150	Fully backwatered due to beaver dam located downstream of the FSR. Wetland located upstream.
	197497	Trib to Tacheeda Lk	–	150	Dry stream with no visible channel.
	197500	Tributary to Parsnip River	–	150	Shallow stagnant water. Fine substrate. Length of culvert estimated.

Table 3: Fish species recorded in the Parsnip River watershed group.

Scientific Name	Species Name	Species Code	BC List	Provincial FRPA	COSEWIC	SARA
Catostomus catostomus	Longnose Sucker	LSU	Yellow	–	–	–
Catostomus commersonii	White Sucker	WSU	Yellow	–	–	–
Catostomus macrocheilus	Largescale Sucker	CSU	Yellow	–	–	–
Coregonus clupeaformis	Lake Whitefish	LW	Yellow	–	–	–
Cottus aleuticus	Coastrange Sculpin (formerly Aleutian Sculpin)	CAL	Yellow	–	–	–
Cottus asper	Prickly Sculpin	CAS	Yellow	–	–	–
Cottus cognatus	Slimy Sculpin	CCG	Yellow	–	–	–
Couesius plumbeus	Lake Chub	LKC	Yellow	–	DD	–
Lota lota	Burbot	BB	Yellow	–	–	–
Mylocheilus caurinus	Peamouth Chub	PCC	Yellow	–	–	–
Oncorhynchus mykiss	Rainbow Trout	RB	Yellow	–	–	–

Scientific Name	Species Name	Species Code	BC List	Provincial FRPA	COSEWIC	SARA
<i>Oncorhynchus nerka</i>	Kokanee	KO	Yellow	–	–	–
<i>Osmerus dentex</i>	Rainbow Smelt	RSM	Unknown	–	–	–
<i>Prosopium coulterii</i>	Pygmy Whitefish	PW	Yellow	–	NAR (Nov 2016)	–
<i>Prosopium cylindraceum</i>	Round Whitefish	RW	Yellow	–	–	–
<i>Prosopium williamsoni</i>	Mountain Whitefish	MW	Yellow	–	–	–
<i>Ptychocheilus oregonensis</i>	Northern Pikeminnow	NSC	Yellow	–	–	–
<i>Rhinichthys cataractae</i>	Longnose Dace	LNC	Yellow	–	–	–
<i>Richardsonius balteatus</i>	Redside Shiner	RSC	Yellow	–	–	–
<i>Salvelinus confluentus</i>	Bull Trout	BT	Blue	Y (Jun 2006)	SC (Nov 2012)	–
<i>Salvelinus fontinalis</i>	Brook Trout	EB	Exotic	–	–	–
<i>Salvelinus malma</i>	Dolly Varden	DV	Yellow	–	–	–
<i>Salvelinus namaycush</i>	Lake Trout	LT	Yellow	–	–	–
<i>Thymallus arcticus</i>	Arctic Grayling	GR	Yellow	–	–	–