COLUMBIA BASIN FISH PASSAGE DATA ANALYSIS

Prepared for:

Fish and Wildlife Compensation Program

601-18th Street

Castlegar, BC, V1L 4K3

Prepared by:

Masse Environmental Consultants Ltd

812 Vernon Street

Nelson, BC, V1L 4G4

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Cover Photo: View of outlet of crossing barrier CAVE418 located on Caven Creek.

EXECUTIVE SUMMARY

The health and viability of freshwater fish populations depends on access to suitable spawning, high water refuge, rearing and overwintering habitat. Additionally, watershed connectivity is important to accommodate population abundance fluctuations and the flow of genes that provides resilience to environmental stressors such as floods, landslides and temperature fluctuations. Closed bottom road crossing structures (culverts) can present barriers to fish migration due to increased water velocity, turbulence, a vertical drop at the culvert outlet and/or maintenance issues. Rehabilitation and replacement of crossing structure barriers can provide access to currently isolated high value habitats.

We screened available fish passage assessment and habitat confirmation reports and the provincial fish passage database (PSCIS) for barrier crossings to summarize the crossings in the Fish and Wildlife Compensation Program operational area of the Columbia Basin with the greatest potential for remediation. We identified 116 fish passage restoration opportunities for follow up. Of these, 31 have completed the habitat confirmation stage and through the process were rated as high or moderate priorities for remediation. These projects are ideal candidates for funding from a variety of programs as they are near shovel ready requiring only the design and remediation stages. Eighty-five of the crossings we identified have completed the fish passage assessment stage. These 85 crossings could be considered for the next phase in the remediation process which involves confirmation of high value habitat and in many cases also the confirmation of fish presence.

Currently, on non-forestry related roads in British Columbia, Land Based Investment Strategy funding administered through British Columbia Timber Sales is available only for the assessment and habitat confirmation phases of the remediation process and not for the design and installation of replacement structures. This highlights a need to identify other stakeholders and alternative sources of funding to facilitate these remediation steps on local, highway and other non-forestry related roads. We identified local stakeholder groups in the basin that could potentially collaborate with regulators, government agencies and local professionals to remediate some of these sites. Also, we detailed potential funding programs that could provide support for the work required to assess, plan and remediate the crossings.

It is hoped that the information in this document will be useful to some of the identified stakeholder groups as well as local professionals, government agencies and regulators to help restore connectivity to valuable fish habitats in the basin.

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This report was prepared by:

Allan Irvine, B.Sc., R.P.Bio.

Masse Environmental Consultants Ltd

812 Vernon St, Nelson, BC, V1L 4G4

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1 INTRODUCTION

The health and viability of freshwater fish populations depends on access suitable spawning, high water refuge, rearing and overwintering habitat. Additionally, watershed connectivity is important to accommodate population abundance fluctuations and the flow of genes that provides resilience to environmental stressors such as floods, landslides and temperature fluctuations. This connectivity can be particularly important for species at risk such as bull trout (*Salvelinus confluentus*) and westslope cutthroat trout (*Oncorhynchus clarki lewisi*).

Fish passage impediments created by road crossing structures in British Columbia are a significant challenge that can have a substantial cumulative impact on local fish populations by reducing access to critical habitat and fragmenting populations. Closed bottom road crossing structures (culverts) can present barriers to fish migration due to increased water velocity, turbulence, a vertical drop at the culvert outlet and/or maintenance issues. Rehabilitation and replacement of crossing structure barriers can provide access to currently isolated high value habitats.

The Fish and Wildlife Compensation Program (FWCP) has developed strategic Basin and Action Plans to reflect conservation priorities for fish and wildlife in the Columbia Region. Their Streams Action Plan has prioritized research and information acquisition that will support the future reconnection of inaccessible habitats such as those upstream of culvert barriers.

2 BACKGROUND

As a result of high-level direction from the provincial government, a Fish Passage Strategic Approach protocol has been developed for British Columbia to ensure that the greatest opportunities for restoration of fish passage are pursued. A Fish Passage Technical Working Group has been formed to coordinate the protocol and data is continuously amalgamated within the Provincial Stream Crossing Information System (PSCIS). Currently, British Columbia Timber Sales (BCTS) administers most of the assessment, design and remediation contracts with the majority of funding typically provided by the Land Based Investment Strategy (LBIS). The strategic approach protocol involves a four phase process as described in (FPTWG 2011):

- Phase 1: Fish Passage Assessment – Fish stream crossings within watersheds with high fish values are assessed to determine barrier status of structures and document a general assessment of adjacent habitat quality and quantity.
- Phase 2: Habitat Confirmation – Assessments of crossings prioritized for follow up in Phase 1 studies are conducted to confirm quality and quantity of habitat upstream and

down as well as to scope for other potential nearby barriers that could affect the practicality of remediation.

- Phase 3: Design – Site plans and designs are drawn for priority crossings where high value fish habitat has been confirmed.
- Phase 4: Remediation – Implementation of reconnection of isolated habitats through replacement, rehabilitation or removal of prioritized crossing structure barriers.

A large number of fish passage assessments (Phase 1) and habitat confirmation assessments (Phase 2) have been completed to date in the FWCP portion of Columbia Basin using standardized protocols (MoE 2009, MoE 2011, FPTWG 2011). To date, within the region, over 3000 crossing structures have been assessed for fish passage (Phase 1) with the results loaded into the PSCIS database. Over 2000 of these crossings were round culverts with the majority assessed technically as barriers to fish passage. It should be noted however, that a significant number of these "barriers" are not on fish bearing streams. Habitat confirmations (Phase 2) have been completed on a number of the structures prioritized for follow up in assessment reports and numerous high priority crossings have been remediated to date. Currently LBIS funding is limited to only the first two stages of the strategic approach protocol on non-forestry related roads emphasizing a need to identify other sources of funding for design and remediation of local, highway and other non-forestry related roads.

We screened available fish passage assessment and habitat confirmation reports and the provincial fish passage database (PSCIS) for barrier crossings to summarize the crossings with the greatest potential for remediation in the basin. Additionally, we have highlighted local stakeholder groups that could potentially collaborate with regulators, government agencies and local professionals to remediate some of these sites. Finally, we have amalgamated a list of potential funding programs that could provide support for the work required to assess, plan and remediate the highest priority crossings.

3 OBJECTIVES

Objectives of this project include:

1. Amalgamation of prioritized subset of currently available fish passage information to serve as a resource for the future planning and implementation of fish passage remediation projects in the FWCP portion of the Columbia Basin.
2. Identification of local stakeholder groups which could be interested in fish passage remediation in the watersheds where the identified crossings occur.

3. Provide details of funding programs that could potentially support further assessment, planning and rehabilitation work at prioritized road crossing barriers.

4 STUDY AREA

The study area includes watersheds that flow into the Columbia and Kootenay Rivers within Canada (Figure 1). This is the FWCP operating area and does not include rivers or streams that enter the greater Columbia River watershed south of the Canadian border such as the Flathead, Kettle and Okanagan/Similkameen River systems. Regional districts for the area include the Regional District of the Kootenay Boundary (RDKB), Regional District of Central Kootenay (RDCK), the Regional District of the East Kootenay (RDEK), the Columbia Shuswap Regional District (CSRD) and the Regional Cistrict of Fraser-Fort George. The major watershed groups located with these regions are detailed in Table 1.

Table 1. Watershed Groups in the FWCP operating area of the Columbia Basin.

Regional District	***Watershed Groups**
Kootenay Boundary	LARL
Central Kootenay	KOTL, LARL, SLOC, DUNC, UARL
East Kootenay	BULL, ELKR, KOTR, COLR, KOTL
Columbia Shushwap	UARL, KHOR, DUNC, CLRH, CANO
Fraser Fort-George	CANO

* BULL = Bull River, CANO = Canoe, CLRH = Columbia Reach, COLR = Columbia River, DUNC = Duncan Lake, ELKR = Elk River, KOTL = Kootenay Lake, KOTR = Kootenay River, LARL = Lower Arrow Lake, SMAR = St. Mary River, SLOC = Slocan River, UARL = Upper Arrow Lake

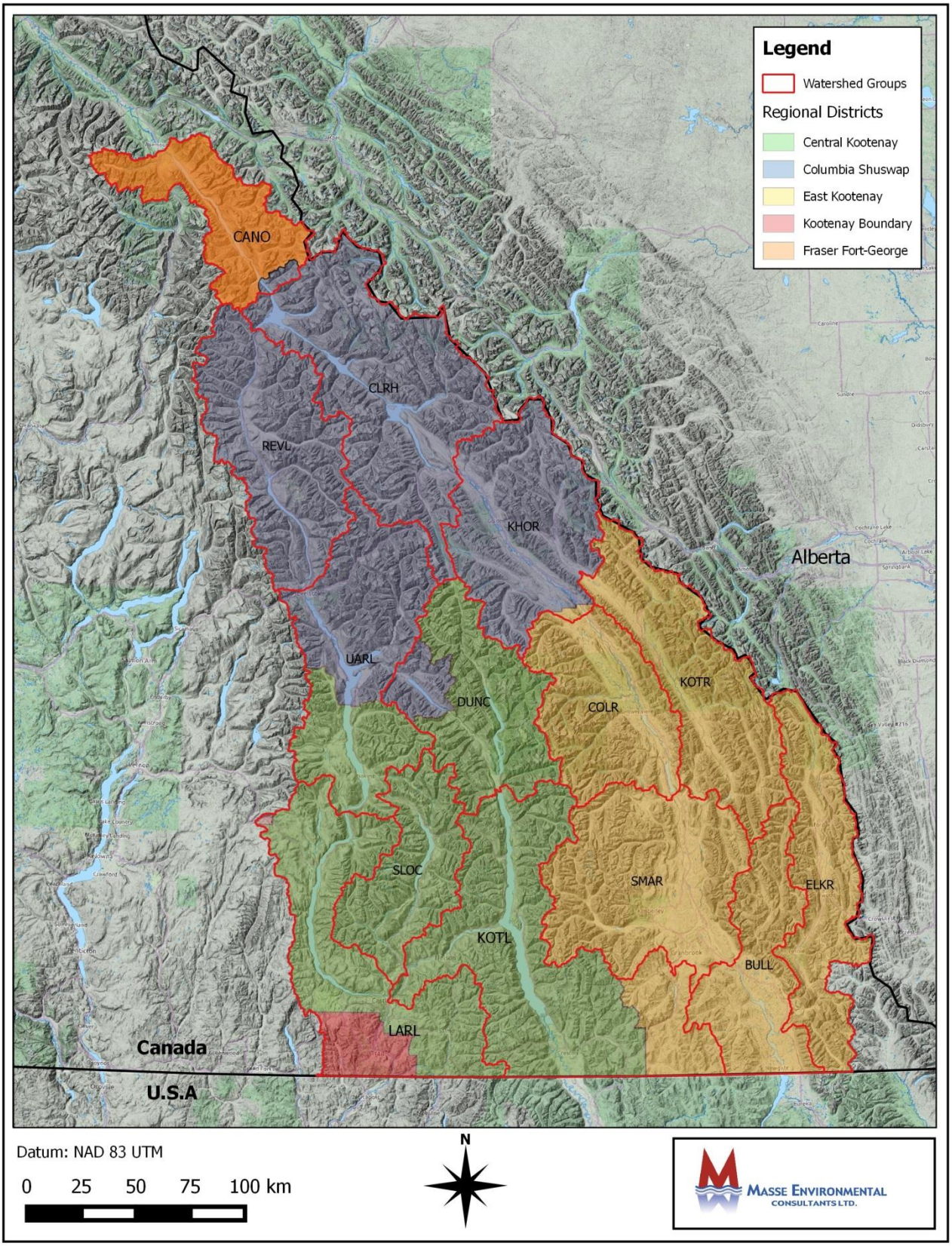

Figure 1. Map of study area.

5 METHODS

Information for this project was obtained through background literature and database review as well as through telephone and email communications with representatives of regulatory agencies and stakeholder groups in the region. Geographical information systems (GIS) were used to query road tenure information and delineate prioritized crossings into watershed groups.

To focus the results of this project on fish passage obstructions located on streams with the largest amounts of high value fish habitat, the streams with barrier crossings chosen for prioritization had a minimum downstream bankfull width of 2.0 m, contained an estimated minimum available upstream habitat (potentially gained through crossing remediation) of 400 m and met one or more of the following conditions:

- Rated as high or moderate priority for replacement in fish confirmation reports (Phase 2).
- Rated as high priority for restoration in fish passage assessment reports (Phase 1) and have not yet had habitat confirmation assessment conducted.
- Located on high value known fish-bearing habitat but were not prioritized for remediation during fish passage assessment because they were not located on forestry roads (i.e. not eligible for funding by Land Based Investment Strategy) or for other unknown reasons.
- Rated as high value habitat according to MoE (2009) protocols (Table 2) but require fish inventory to determine fish presence and species composition.

Table 2. Habitat Value Criteria.

Habitat Value	Fish Habitat Criteria
High	• The presence of high value spawning or rearing habitat (e.g., locations with abundance of suitably sized gravels, deep pools, undercut banks, or stable debris), which are critical to the fish population. • Important migration corridor.
Medium	• Presence of suitable spawning habitat. • Habitat with moderate rearing potential for the fish species present.
Low	• The absence of suitable spawning habitat, and habitat with low rearing potential (e.g., locations without deep pools, undercut banks, or stable debris, and with little or no suitably sized spawning gravels for the fish species present).

Adapted from: MoE 2011

It should be noted that our methodology for prioritizing crossings for remediation is one of many possible approaches. Other systems of screening assessment data such as those taking into consideration the gradient of upstream habitat as well as fish species composition in the watersheds could also be utilized. Additionally, many stream crossings in the FWCP portion of the Columbia Basin have not yet been inventoried and ongoing work to assess and prioritize these crossings will result in more opportunities for substantial high value habitat gains.

Many crossings located on streams rated as "medium" habitat value during fish passage assessment (Phase 1) field surveys were screened out in this study. This was done in an attempt to prioritize crossings on the highest value habitat. Crossings on habitat rated as "medium" may require remediation, as many could lie within important migration corridors and would provide access to important habitat.

Stakeholder groups were identified through internet searches as well as through collaboration with the Columbia Basin Watershed Network (CBWN). The Columbia Basin Watershed Network is a networking group for organizations working on watershed stewardship. It was formed in 2005 with the support of the Columbia Basin trust and is intended to facilitate the sharing of resources as well as the building of knowledge and expertise. For this project, the CBWN provided a list of member stewardship groups that could be interested in facilitating the remediation of fish passage barriers in their local areas.

A list of potential funding programs was amalgamated through queries of the Grant Connect database offered online through Imagine Canada. Additionally, the Columbia Basin Trust

provided a summary of available funding programs which was reviewed and refined for this paper.

6 RESULTS

A summary of crossings prioritized through this study is provided in Table 3. Crossings have been listed in order of descending habitat gain index (HGI) in Tables 4 - 7. The HGI is an estimate of the linear length of fish habitat located upstream of the crossing. HGI was most often obtained from background reports. In instances when HGI information was not available mainstem habitat length upstream of crossings with suitable gradients (<25%) and without documented barriers was estimated through a mapping exercise. Links to photos stored in the PSCIS database are provided in the "Stream" column of Tables 4 – 7 and links to background project reports are provided in the "Reference" column.

Fifty-five stakeholder groups were identified in the FWCP Columbia Basin region. Groups are sorted by regional district and local area with adjacent watershed groups identified in Appendix 1.

Twenty-two funding programs were identified that could potentially support fish habitat restoration projects and are summarized in Appendix 2.

Table 3. Summary of crossings prioritized for follow up in this paper.

Category	**Number of Crossings**	**Table**	**Comments**
High and moderate priority crossings identified through habitat confirmation assessments	31	Table 4	Near shovel ready projects with only design and remediation phases required. Crossings sorted by HGI as well as priority. Could be priorities through other methodology (i.e. gradient analysis, species composition, stream productivity, etc.)
High priority crossings for restoration identified in fish passage assessment reports	27	Table 5	Habitat confirmation required before design and remediation phases.
Crossings rated as high priority for follow up through this study.	5	Table 6	Habitat confirmation recommended. Not previously prioritized in fish passage assessment reports due to LBIS funding ineligibility and other unknown reasons.
High value habitat in fish passage assessment reports but requires fish inventory to determine fish presence and species composition.	53	Table 7	Fish inventory and habitat confirmation required. Inventory and habitat confirmation could be conducted concurrently.
Total	**116**		

Table 4. Summary of crossings rated as high and moderate priority through habitat confirmation studies.

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Fish Species	[4]Road Tenure	Priority	Reference	Notes
BULL	CAVE418 (61286)	Caven Ck	Bloom (0068 01)	612562	5448057	129	5.5	MW, RB, WCT, LNC, CRH	DRM	High	Masse 2015	Habitat considered to be excellent with abundant rearing and overwintering habitat and cover.
BULL	CAVE003 (61240)	Whickman Creek	Whickman Creek FSR (R06123 2)	617344	5441277	18.8	2	WCT, (BT), (RB)	Canadian Forest Products Ltd.	High	Masse 2015	Spawning and rearing habitat available.
BULL	BLOO045 (60525)	Bloom Ck Trib	Bloom FSR (0068 01)	610161	5435537	18.5	4	BT, WCT	DRM	High	Masse 2015	Abundant pools for rearing and some limited gravel for spawning. May be beneficial for adfluvial BT found in Bloom Creek.
ELKR	GRAV009 (62562)	Grave Ck	Grave Creek FSR	659277	5523718	16.4	5.2	RB, WCT, BT	Non-status	High	Masse 2015	Deep pools present for rearing and overwintering, spawning gravel present and abundant cover.
SLOC	213084 (102172)	Winlaw Ck	Hwy 6	459276	5495478	13.5	7	CC,RB	MoTI	High	Silvatech 2014a	Excellent habitat. Recommend baffle instillation and construction of two downstream weirs.
KOTL	529927 (63224)	Sproule Ck	Sproule Creek	470981	5484015	11.4	7.1	RB	MoTI	High	Silvatech 2014a	Due to the downstream barrier falls, this enhancement is of benefit only to resident rainbow trout population.
KOTR	EFork22 (50557)	Barr Ck	East Fork White River (4603 01)	625761	5560258	8.5	4.3	WCT, BT	DRM	High	Vast 2013	Important/critical habitat.
KOTR	EFork13 (50548)	East White River	East Fork White River (4603 18)	635530	5555837	8	3.8	WCT, BTMW, CC, SU	DRM	High	Vast 2013	Critical spawning habitat for BT. Highly productive stream.
KOTR	EFork25 (50560)	East White River	Bull River (4603 01)	635522	5556288	8	3.3	WCT, BT	DRM	High	Vast 2013	Critical spawning habitat for BT. Highly productive stream.

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Fish Species	[4]Road Tenure	Priority	Reference	Notes
ELKR	ELKR000 (62385)	Tobermory Ck	Elk River FSR (0103 01)	640770	5598669	5.6	3.1	WCT, (BT), (MW)	DRM	High	Masse 2015	No fish upstream of barrier. Excellent habitat throughout with abundant pools for rearing and overwintering, gravels present for spawning.
BULL	BULL039 (61210)	Trib to Bull River	Bull River FSR (0089 01)	633036	5509670	4.1	3	WCT	DRM	High	Masse 2015	WCT caught upstream, directly connected to the Bull River. Excellent habitat.
KOTL	NEGR001	Negro Ck	(0246 12)	574865	5476742	3.8	5.1	WCT	DRM	High	Masse 2015	Excellent habitat with abundant cover and deep pools for rearing and overwintering.
COLR	Dunbar01 (50590)	Outlet Ck	Cartwright (0001 02)	544555	5626078	2	5.9	WCT, RB, EB	DRM	High	Vast 2013	Restoring fish access to Big Fish Lake would represent a significant gain of foraging, rearing, and overwintering habitat for the Dunbar Creek Watershed fish community.
SMAR	JOSP003A	Joseph Ck	Mission Rd	589767	5492634	1	3.5	BT, EB, KO, RB, WCT, LMB, CCG	MoTI	High	Masse 2015	Upstream habitat excellent with some deep pools and gravels for spawning
SMAR	WILD011 (112444)	Trib to Wildhorse Ck	Wildhorse FSR (0072 01)	604377	5508165	1	2.5	BT, WCT	DRM	High	Masse 2015	Abundant cover in the form of deep pools for rearing and overwintering. Spawning gravel present at margins of pools.
ELKR	GRAC015 (62556)	Grace Ck	Line Road	653796	5539818	0.9	2.5	WCT, (BT), (MW)	Non-status	High	Masse 2015	GRAC022 was not located during habitat confirmation due to time constraints. Must be located, have habitat assessment and fixed concomitantly. Excellent habitat with abundant cover and deep pools present for rearing and overwintering. Abundant spawning gravel present.

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Fish Species	[4]Road Tenure	Priority	Reference	Notes
SLOC	213127 (102173)	Pedro Ck	Hwy 6	458074	5493494	0.5	7	RB	MoT	High	Silvatech 2014a	Large stream. Crossing had been remediated with baffles, but was unsuccessful. Due to its Location on Hwy 6, remediation of the crossing would be of high visibility to public.
SLOC	212842 (102195)	S. Lemon Ck	Lemon Creek	466677	5505133	0.4	7	CC,RB, (BT)	DSE	High	Silvatech 2014a	Large stream. Adfluvial bull trout in Lemon Creek. Existing culverts too small to pass high flows.
BULL	SAND012 (103270)	Sand Ck	Baynes Lake Highway	623539	5468378	72	8	See notes	MoTI	Mod	Masse 2015	Crossing was passable to spawning kokanee at time of survey. Fish species present include EB, RB, BT, WCT, KO, LMB, LNC, LSU, NSC, RSC
BULL	SAND011 (103269)	Sand Ck	Baynes Lake Highway	623461	5469841	69.9	5	See notes	MoTI	Mod	Masse 2015	Crossing was passable to spawning kokanee at time of survey. Fish species present include EB, RB, BT, WCT, KO, LMB, LNC, LSU, NSC, RSC
KOTR	Cedrus01 (50453)	Cedrus Ck	Palliser (0105 01)	598618	5582200	13	3.6	WCT, BT	DRM	Mod	Vast 2013	Habitat confirmation completed. Rated as moderate priority for replacement. The upstream section offers important habitat to WCT but is not critical.
ELKR	MICH016 (103168)	Fir Ck	Unknown	658686	5503994	10.2	3.8	WCT, EB, (BT), (MW)	Non-status	Mod	Masse 2015	Good rearing habitat with abundant pools present.
KOTR	EFork23 (50558)	Stork Ck	East Fork White River (4603 01)	630240	5559087	9.2	5.5	WCT, BT	DRM	Mod	Vast 2013	In close proximity to an important BT migration corridor and may be used by this species.
KOTR	MWHT055 (62753)	Kotsats Ck	Kotsats Creek Road (R05914 R)	628439	5571939	7.7	3	BT	Canadian Forest Products Ltd.	Mod	Masse 2015	Habitat upstream excellent, however logjams downstream may prevent passage of resident fish species.

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Fish Species	[4]Road Tenure	Priority	Reference	Notes
KOTL	530154 (63226)	Cottonwood Ck	Ymir Rd	479497	5478965	6.3	5.5	RB, EB, KO	MoTI	Mod	Silvatech 2014a	Remediate with 530130. Falls downstream prevents access from Kootenay Lake fish species.
BULL	Linklater 16 (124745)	Linklater Ck	branch off Linklater (R08663 13)	619606	5430077	6	3.6	See notes	Canadian Forest Products Ltd.	Mod	Masse 2015	Habitat upstream important to the local WCT population. Fish species present include EB, DV, MW, BT, RB, WCT, RSC, LNC, PMB
COLR	Frances03 (50604)	Leadqueen Ck	Frances Creek (0276 01)	544186	5623066	5	5.7	WCT, RB, EB	DRM	Mod	Masse 2015	Provides important (not critical) rearing habitat for Frances Creek fish.
SLOC	213571 (63223)	Goose Ck	Sorokin Rd	454989	5474459	2	11	CC,DC, EB,RB, BT	MoTI	Mod	Silvatech 2014a	Large amount of confirmed rainbow trout presence upstream. Install baffles and some downstream remedial work.
SMAR	SMAR-R03 (772)	Pudding Ck	River Rd.	563689	5495757	0.6	2.9	WCT	Non-status		Interior 2009e	HGI to SMAR-R05. Stream diverted below culvert for camping use. Highly productive habitat. 155 m high quality and 500 m moderate.
KOTL	530130 (63225)	Cottonwood Crk	Kline Rd	479344	5479483	0.56	6	RB, EB, KO	MoTI	Mod	Silvatech 2014a	Remediate with 530154. Falls downstream prevents access from Kootenay Lake fish species.
SMAR	SMAR-A05 (746)	Angus Cr. Trib.	Angus Cr. (R06052 15)	563885	5487503	0.55	2.8	WCT	Canadian Forest Products Ltd.		Interior 2009a	Downstream crossing on Angus FSR has been remediated. Priority not specified. High habitat quality high for 175 m and medium for 370 m.

[1]BULL = Bull River, CLRH = Columbia Reach, COLR = Columbia River, DUNC = Duncan Lake, ELKR = Elk River, KOTL = Kootenay Lake, KOTR = Kootenay River, LARL = Lower Arrow Lake, SMAR = St. Mary River, SLOC = Slocan River, UARL = Upper Arrow Lake [2]HGI = Habitat gained index = an estimate of the linear distance of fish habitat located upstream of the crossing. [3]BT = bull trout, CC = sculpin (general), CCG = slimy sculpin, DC = dace (general), EB = eastern brook trout, LMB = large mouth bass, KO = kokanee, RB = rainbow trout, WCT = westslope cutthroat trout. Fish species in brackets are suspected but unconfirmed. [4]DRM = Rocky Mountain Forest District Manager (FLNRO), MoTI – Ministry of Transportation and Infrastructure, DSE = Selkirk Forest District Manager (FLNRO), Non-status = No agency responsible.

Table 5. Summary of crossings rated as high priority through fish passage assessments. Require habitat confirmation.

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Fish Species	[4]Road Tenure	Habitat Value	Reference	Notes
LARL	JOH_01 (895)	Johnston Ck	Worthington (0095 01)	409449	5510271	21.1	5.8	RB	DSE	High	Ingersol and Masse 2009	RB and BT present above culvert (IME 2001). Boulder stuck in the middle of culvert backwatering the top half.
LARL	WOR_06 (1081)	Worthington Ck	Worthington (0095 01)	413370	5512036	7.6	4.7	RB	DSE	High	Ingersol and Masse 2009	Culvert seems to be too small and gradient too high for baffles and backwater.
LARL	WOR_05 (1080)	Worthington Ck	Branch 14 (0095 14)	411967	5512099	6.22	3	RB	DSE	High	Ingersol and Masse 2009	Remove culvert and replace with 3m arch culvert or bridge. Barrier to fish. Second culvert placed on top of primary culvert.
LARL		Murphy Ck	Hwy 22	446400	5445126	6.0		RB	MoTI	High	Arndt and Klassen 2004	At Murphy Creek, it may not be possible to construct weirs high enough to backwater the culvert because the intake for a licensed water withdrawal and side channel is located immediately downstream of the culvert. Baffles may be necessary to allow upstream passage in these culverts.
LARL	TIL-06	Tillicum Ck	Archibald (0006 01)	471592	5438755	4.6	3.7	RB	DSE	High	Ingersol and Masse 2009	Upstream habitat good. Gravels present. Abundant LWD, some pools.
LARL	MUR-6 (348)	Murphy Ck	Murphy Ck Rd (R06515 1A)	436823	5448983	2.04	3.2	RB	Atco Wood Products Ltd.	High	Masse & Miller 2009	If velocities at high water flow are not too high to restrict access may consider backwatering. Could partially infill; place some baffles.
LARL	334	Priest Ck	Maryland Creek FSR (3392 01)	505625	5432168	1.8	7.4	WCT	DSE	High	Masse 2010	Low gradient stream. Culvert 335 located upstream. Restoration would increase long term viability of populations.
LARL	335	Priest Ck	Maryland Creek FSR (3392 01)	505491	5432312	1.6	5.4	WCT	DSE	High	Masse 2010	Low gradient stream. Culvert 334 200 m downstream. Restoration would increase long term viability of populations.
LARL		China Ck	Hwy 22	449777	5452527	2.1		RB	MoTI	High	Arndt and Klassen 2004	At China Creek, weirs should be constructed to backwater the culvert as far as possible. Wooden weir located approximately 1 km upstream of Hwy crossing

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Fish Species	[4]Road Tenure	Habitat Value	Reference	Notes
LARL	WOR_01 (1078)	Worthington Ck	Worthington (0095 01)	411053	5511525	1.4	4.1	RB	DSE	High	Ingersol and Masse 2009	Remove culvert and replace with bridge. Visual of RB in outlet pool.
LARL	WHR_53 B (1058)	Trib. to Whatshan River	Branch 69 (R05907 1)	421322	5558143	0.81	3.9	RB, BT	Interfor Corperation	High	Ingersol and Masse 2009	Replace with bridge or backwater and install baffles.
LARL	CAR-30 (305)	Rod Ck	Caribou (0181 01)	441423	5541274	0.43	5.7	EB, RB	DSE	High	Masse & Miller 2009	Outlet falls onto boulders with no outlet pool. Replace with bridge.
UARL	423126 (125019)	Nacillewaet Ck		437697	5605211	14.8	7.25	KO, RB	Non-status	High	Sivatech 2014b	Upstream habitat is of high habitat value
UARL	423127 (124969)	Nacillewaet Ck	Hwy 23	437941	5604865	13.9	3.91	KO, RB	MoT	High	Sivatech 2014b	Confirmed fish presence u/s and d/s.
UARL	423100 (125017)	Payne Ck	Hwy 23	438852	5607989	13.6	12.2	BT, SP	MoT	High	Sivatech 2014b	Due to the large rapids at outlet and difficult site access, remediation would require a large effort.
UARL	423023 (125002)	Hill Ck	Hwy 23	445429	5615255	10.9	6.55	BT, KO, RB	MoT	Med	Sivatech 2014b	Map analysis shows grade 10- 20% grade d/s to confirmed fish presence.
UARL	423063 (125013)	MacKenzie Ck	Hwy 31	441579	5611736	8.9	3.2	BT,RB	MoT	High	Sivatech 2014b	Fish presence confirmed upstream and downstream. Barrier is attributed to long span and slope of culvert - install baffles o provide rest pools for fish.
ELKR	GRAC022 (62558)	Grace Crk	Line Road	656177	5539092	6.5	3.5	WCT, (BT), (MW)	Non-status	High	Masse 2015	GRAC015 should be done concomitantly. Habitat quality is high with potential BT spawning occurring in the stream.
UARL	423723 (124972)	Wensley Ck	Hwy 6	448286	5563057	4.5	4.86	BB, KO, RB	MoT	Med	Sivatech 2014b	Good habitat due to high flows and instream pools formed by boulders, undercut banks and overhanging veg.
UARL	MOS_01 (949)	Trib. to Mosquito Ck	Stevens (9567 01)	431777	5553884	1.5	2.5	RB	DSE	High	Ingersol and Masse 2009	Kokanee may also use this stream below culvert.
UARL	MOS-13	Turnbull Ck	East Mosquito (R08790 55)	431778	5564139	0.52	3.8	RB	Interfor Corperation	High	Ingersol and Masse 2009	
KOTL	G031_0109 (5190)	Rabbit Foot Ck	Lamb Creek FSR	578548	5462427	5.1	3.83	WCT	Non-status	High	KNRC 2011	Stream has high fish habitat quality with frequent deep pools LWD/SWD and available gravels.
KOTL	F040_0033 (5099)	North Moyie Ck	North Moyie (0246 07)	562139	5470387	2.8	3.34	WCT	DRM	High	KNRC 2011	High fish habitat quality with frequent deep pools LWD/SWD and available gravels.

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Fish Species	[4]Road Tenure	Habitat Value	Reference	Notes
KOTL	G031_0121 (5194)	Barkshanty Ck	R08445 SEC.01 SEG.1A (R08445 1)	586980	5462539	2		WCT, EB, RB	Canadian Forest Products Ltd.	Med/High	KNRC 2011	Crossing under HWY 3 at 2.2 km downstream not assessed. No width info.
KOTL	326	North Star Ck	(3392 01)	508629	5428988	1.9	2.7	RB	DSE	High	Masse 2010	Confirmed fish presence above culvert. Frequent deep pools, LWD and gravels available. 500 m upstream of culvert assessed. Restoration would increase long term viability of populations.
ELKR	FORD213 (62321)	Dry Ck	Fording Highway	656363	5544727	7.5	2.2	WCT	MoT	High	Vast 2013	Culvert is passable but not properly embedded. Good candidate for restoration due to high habitat value.
KOTR	White18 (50417)	Ptarmigan Lake Ck	Ptarmigan (4603 25)	608391	5562508	5	3.3	WCT	DRM	High	Grainger 2012	Needs to be remediated with BULL001 located 100 m upstream.

[1]BULL = Bull River, CLRH = Columbia Reach, COLR = Columbia River, DUNC = Duncan Lake, ELKR = Elk River, KOTL = Kootenay Lake, KOTR = Kootenay River, LARL = Lower Arrow Lake, SMAR = St. Mary River, SLOC = Slocan River, UARL = Upper Arrow Lake [2]HGI = Habitat gained index = an estimate of the linear distance of fish habitat located upstream of the crossing. [3]BT = bull trout, CC = sculpin (general), CCG = slimy sculpin, DC = dace (general), EB = eastern brook trout, LMB = large mouth bass, KO = kokanee, RB = rainbow trout, WCT = westslope cutthroat trout. Fish species in brackets are suspected but unconfirmed. [4]DRM = Rocky Mountain Forest District Manager (FLNRO), MoTI – Ministry of Transportation and Infrastructure, DSE = Selkirk Forest District Manager (FLNRO), Non-status = No agency responsible.

Table 6. Crossings rated as high priority for follow up through background literature review (i.e. this study).

[1]Watershed	ID (PSCIS)	Stream	Road (Tenure ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Fish Species	[4] Road Tenure	Habitat Value	Reference	Notes
BULL	Linklater01 (124730)	Linklater Ck	Newgate	631229	5432017	16.1	5.5	EB, DV, MW, BT, RB, WCT, RSC, LNC, PMB	MoT	High	Grainger 2012	Potential spawning at site. HGI to Linklater02 is 0.5 km. Likely not prioritized for habitat confirmation due to ineligibility for LBIS funding.
BULL	Linklater02 (124731)	Linklater Ck	Newgate	630729	5432139	15.6	9	EB, DV, MW, BT, RB, WCT, RSC, LNC, PMB	MoT	High	Grainger 2012	Upstream of Linklater01. Likely not prioritized for habitat confirmation due to ineligibility for LBIS funding.
BULL	UPGD011 (112424)	Trib to Gold Ck	Shed FSR (5326 01)	595806	5464677	3	2.5	WCT	DRM	High	Vast 2013	Potentially unassessed crossings 1.2 km upstream and 200 m downstream. Good spawning and rearing habitat. Not discussed in report.
BULL	BLOO028 (60530)	Trib to Bloom Ck	Ward FSR (0068 01)	609311	5432259	2	2.5	WCT	DRM	High	Vast 2013	Good spawning and rearing habitat above culvert. Not discussed in report.
KOTR	White03 (50402)	Ptarmigan Lake Ck	Moscow (4603 08)	609052	5562403	0.7	3.9	WCT	DRM	High	Grainger 2012	HGI to upstream crossing barrier (White18)

[1]BULL = Bull River, CLRH = Columbia Reach, COLR = Columbia River, DUNC = Duncan Lake, ELKR = Elk River, KOTL = Kootenay Lake, KOTR = Kootenay River, LARL = Lower Arrow Lake, SMAR = St. Mary River, SLOC = Slocan River, UARL = Upper Arrow Lake [2]HGI = Habitat gained index = an estimate of the linear distance of fish habitat located upstream of the crossing. [3]BT = bull trout, CC = sculpin (general), CCG = slimy sculpin, DC = dace (general), EB = eastern brook trout, LMB = large mouth bass, KO = kokanee, RB = rainbow trout, WCT = westslope cutthroat trout. Fish species in brackets are suspected but unconfirmed. [4]DRM = Rocky Mountain Forest District Manager (FLNRO), MoTI – Ministry of Transportation and Infrastructure, DSE = Selkirk Forest District Manager (FLNRO), Non-status = No agency responsible.

Table 7. Crossings on potentially high value fish habitat that require fisheries information.

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Road Tenure	Reference	Notes
BULL	Chipka01 (124701)	Chipka Ck	Chipka (5325 01)	612287	5470849	5	2.2	DRM	Grainger 2012	Chipka09 1.6 km downstream (PSCIS 124726)
KOTR	White32 (50441)	Trib to White River	Rock	604273	5575553	5	3.3	Non-status	Grainger 2012	Appears confined upstream. May have barriers.
ELKR	Michel24 (50246)	Fir Ck	branch off Fir-Roberts	658672	5503975	4.6	3.6	Non-status	Grainger 2012	WCT and EB are known downstream, high habitat value and good potential
ELKR	Michel27 (50249)	Trib to Michel Ck	Spruce	657517	5505182	3.8	3.6	Non-status	Grainger 2012	Michel51 (PSCIS 50273) is downstream at 1.2 km at Hwy 3
KOTL	UDU-11 (496)	Duncan	Duncan (0243 09)	581408	5430613	3.56	6.5	DSE	Masse 2013	No road access for 8km to replace with bridge. Culvert is bent 2.5 m from inlet. This creates a high gradient inside culvert which is a possible fish barrier. Culvert seems to be undersized. Suspect fish.
KOTL	529900 (63238)	Rixen Ck	Sproule Creek	470725	5484426	3.5	3.9	MoT	Masse 2013, Sivatech 2014b	Although habitat confirmation was conducted (Silvatech 2014) fish presence was not confirmed and is required for next steps.
KOTL	HAW-08 (425)	Trib. to Hawkins South	Hawkins South (0243 10)	576729	5431157	3.4	2.8	DSE	Masse 2013	Good habitat all around.
ELKR	Morrisey06 (50185)	Trib to Morrisey Ck	River Road (5466 02)	645669	5469023	3	3.8	DRM	Grainger 2012	HGI to Morrisey02.
ELKR	LZRD021 (62661)	Lizard Ck Trib	Mt. Fernie	638000	5483390	3	2.35	MoT	Vast 2013	Great potential for replacement.
KOTR	White33 (50442)	Trib to White River	Rock (4603 09)	604756	5574750	2.9	4.4	DRM	Grainger 2012	Appears confined upstream. May have barriers.
ELKR	MORR019 (103216)	Morrissey Ck	Lodgepole Rd (5466 02)	645674	5469026	2.8	2.5	DRM	Vast 2013	High value habitat located upstream at Morrisey02 (Grainger 2012). This crossing from VAST 2012 (PSCIS 50185)
KOTR	White41 (50450)	Trib to White River	Rock (4603 09)	610167	5562501	2.8	3.8	DRM	Grainger 2012	

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Road Tenure	Reference	Notes
KOTR	Cedrus02 (50454)	Cedrus Ck	Cedrus Creek (0105 11)	601159	5585009	2.6	3.6	DRM	Grainger 2012	Cedrus01 downstream.
COLR	McDonald03 (50686)	McDonald Ck	McDonald Creek (5467 04)	538781	5594958	2.5	10	DRM	Grainger 2012	Good rearing, spawning and overwintering habitat observed.
CLRH	BLA-005 (51332)	Trib. to Blackwater Ck	Branch 1 (off Bush River Rd)	474866	5718402	2.38	2.1	Non-status	Landmark 2012	Prioritized for follow up due to stream size, HGI and fish habitat value.
KOTR	White35 (50444)	Trib to White River	R05978 AA	606470	5572986	2.2	3.1	Canadian Forest Products Ltd.	Grainger 2012	White 34 located 0.5 km downstream.
ELKR	Lizard02 (51193)	Trib to Lizard Ck	Mt Fernie Park Rd	636121	5484097	2.2	3.4	Non-status	Grainger 2012	
UARL	SHEL_12 (988)	Olsen Ck	Branch 15	427529	5609028	2.2	4.5	Non-status	Ingersol and Masse 2009	Culvert bent on top side and may be a migration barrier. Culvert is undersized. Flood sign over road. Good potential spawning habitat. Recommend removal.
DUNC	UDU-06 (493)	Trib. to Duncan	Duncan (0077 01)	495269	5612960	2.1	2.2	DSE	Masse 2013	Suspect fish. Lake headed.
LARL	WHL_14 (1026)	Trib. to Whatshan Lake	Whatshan FSR (2010 01)	422444	5546907	2.1	3.4	DSE	Ingersol and Masse 2009	Needs fish inventory. Outlet flows onto rocks. Residual pool 55cm downstream. Old log stringers from box culvert left in stream creating 1.1m log jam below culvert.
BULL	BULL008 (61179)	Trib to Bull River	Bull River FSR (0089 01)	620698	5492836	2	2.3	DRM	Vast 2013	Great Potential for fix. Very close to Bull River.
KOTR	White08 (50407)	Moscow Ck	Moscow (4603 08)	607669	5566263	2	2.9	DRM	Grainger 2012	
KOTR	White15 (50414)	Trib to White River	Moscow (4603 08)	604839	5569809	2	3.2	DRM	Grainger 2012	Good probability of fish presence.
KOTR	White16 (50415)	Trib to White River	Moscow (4603 08)	603236	5571564	1.9	3.8	DRM	Grainger 2012	Good probability of fish presence.

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Road Tenure	Reference	Notes
KOTR	EFork06 (50541)	Trib to East White River	branch off East White River (R067931)	634127	5558828	1.8	2.9	Canadian Forest Products Ltd.	Grainger 2012	
ELKR	LZRD015 (62656)	Lizard Ck Trib	Mt. Fernie	636137	5484091	1.8	2.5	Non-status	Vast 2013	Might be unassessed crossing located 60 m downstream.
BULL	Chipka09 (124726)	Chipka Ck	Wardner	613071	5471920	1.6	2.2	MoT	Grainger 2012	HGI to Chipka01.
ELKR	LZRD012 (62653)	Lizard Ck Trib	Mt. Fernie	634163	5484538	1.6	2	Non-status	Vast 2013	Unassessed crossing located 0.4 km upstream.
BULL	CAVE118 (61284)	Haller Ck	Cherry (0067 03)	603584	5448421	1.5	2.5	DRM	Vast 2013	Important habitat for Cherry Lake. Spawning and rearing habitat available. Appears to have unassessed crossings located 0.24 km downstream and 0.55 km upstream.
BULL	BULL055 (61168)	Trib to Bull River	Browns Cabin (R070721)	626876	5499219	1.5	2.5	Galloway Lumber Company Ltd.	Vast 2013	Rearing and overwintering habitat potential. Unassessed crossing located 0.6 km upstream.
ELKR	MICH011 (103174)	Trib to Michel Ck	Wheeler N Rd	659211	5499658	1.5	2.1	Non-status	Vast 2013	Also Michel18 or PCSIS 50240 (Grainger 2012). HGI is to upstream crossing barriers Michel21/23 (Grainger 2012).
ELKR	Morrisey15 (50194)	Trib to Morrisey Ck	Morrisey (R083661)	651245	5475072	1.4	2.9	Canadian Forest Products Ltd.	Grainger 2012	One unassessed crossing 0.5 km upstream.
KOTL	526001 (63233)	Trib to W. Kokanee	Kokanee West (0236 04)	485927	5502085	1.4	2.8	DSE	Masse 2013	Fish inventory required. Excellent habitat. Two lakes upstream. Suspect WCT.
BULL	BULL028 (61199)	Trib to Bull River	Tanglefoot (0089 13)	616868	5502428	1.3	3.5	DRM	Vast 2013	Rearing and overwintering habitat potential. BULL025 is barrier located 1.3 km upstream. Fairly steep system (~20 %).
KOTL	SAN-12 (459)	Trib to Sanca Ck	Unnamed (R04949 B)	528695	5469469	1.3	2.8	Wynndel Box & Lumber Company Ltd.	Masse 2013	Good habitat present. Several pools present, gravels abundant. Fish presence suspected, fish absence confirmed in reach above. Fish presence should be confirmed.
ELKR	MICH018 (103158)	Roberts Ck	Spruce	657524	5505168	1.2	2.5	Non-status	Vast 2013	HGI is to MICH17

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Road Tenure	Reference	Notes
ELKR	Michel51 (51313)	Robert Ck	Crowsnest Highway	657682	5506282	1.2	2.4	MoT	Grainger 2012	HGI to Michel27.
LARL	CRA-16 (380)	Trib to Crawfor Ck	Crawford	452431	5543736	1.12	4.4	Non-status	Masse 2013	Newer culvert installed for recreational access. Suspect fish presence due to low gradient to Crawford Creek.
ELKR	Lizard01 (50152)	Trib to Lizard Ck	Mt Fernie Park Rd	637987	5483407	1.1	2.4	MoT	Grainger 2012	EB, BT and WCT known in mainstem
LARL	EDUN-01 (386)	Griz Ck	Duncan FSR (R048911)	446588	5545768	1	5.5	Interfor Corperation	Masse 2013	8% U/S slope. Few deep pools present, but nice step pool habitat. Good size creek. Need to check for fish presence and access from Duncan Reservoir.
ELKR	Lizard08 (51199)	Trib to Lizard Ck	Mt Fernie Park Rd	633304	5484606	1	3.5	Non-status	Grainger 2012	Stream is not mapped
LARL	WHR_70 (1072)	Trib. to Whatshan River	Branch 8 (R059072)	420486	5556366	0.87	2.2	Interfor Corperation	Ingersol and Masse 2009	Needs fish inventory. Fish suspected. Small stream. Low - moderate habitat upstream. Stream is not on map. Replace with bridge.
KOTL	HAW-06 (423)	Hawkins	7 Mile (0243 06)	576703	5433463	0.86	3	DSE	Masse 2013	Replace with arch culvert or bridge. Culvert too small to backwater. 860m to dam on Meadow Lake.
BULL	BULL011 (61182)	Trib to Van Ck	Van Creek FSR (008902)	620789	5493667	0.7	2.5	DRM	Vast 2013	Van Creek is a fish bearing stream. Great potential for fix. Very close to Bull River.
ELKR	Morrisey02 (51221)	Trib to Morrisey Ck	Lodgepole (5466 01)	648294	5468176	0.7	3.7	DRM	Grainger 2012	Also MORRO074 (Vast 2012). Looks like very good potential
LARL	WHL_24 (1034)	Trib. to Whatshan Lake	West Whatshan FSR (956405)	420717	5548507	0.63	3.9	DSE	Ingersol and Masse 2009	Needs fish inventory. High value stream. Replace with bridge. Stream is 200m North of location on map.
BULL	BULL001 (61172)	Burntbridge Ck	BullRiver Cut-off	616524	5484250	0.6	4	MoT	Vast 2013	BULL029 barrier 100 m downstream also requires fix.
ELKR	Morrisey19 (50198)	Trib to Morrisey Ck	Morrisey	651593	5476509	0.6	2.8	Non-status	Grainger 2012	High value step-pool habitat. One unassessed crossing upstream (200 m). Fairly steep system.
SMAR	Smar03 (124724)	Trib to Kootenay River	Campsall Rd	597621	5495845	0.6	3.4	MoT	Grainger 2012	Smar02 300 m downstream needs to be remediated at the same time. KO spawning.

[1]Watershed	ID (PSCIS)	Stream	Road (Segment ID)	Easting	Northing	[2]HGI (km)	Stream Width	[3]Road Tenure	Reference	Notes
ELKR	Morrisey16 (51235)	Trib to Morrisey Creek	Morrisey (R083661)	651669	5475526	0.5	3.4	Canadian Forest Products Ltd.	Grainger 2012	Fairly steep system
KOTR	White34 (50443)	Trib to White River	Rock (4603 09)	606333	5572537	0.5	3.3	DRM	Grainger 2012	HGI is to White35
CLRH	BLA-011 (51338)	Trib to Blackwater Ck	Bush River FSR (752101)	474939	5716026	0.49	11.6	BCTS (Okanagan)	Landmark 2012	Prioritized for follow up in 2016 due to stream size, HGI and fish habitat value. Dry due to beaver damn
ELKR	Morrisey21 (50200)	Trib to Morrisey Ck	Morrisey spur	651913	5477123	0.4	2.7	Non-status	Grainger 2012	HGI to crossing barrier (Morrisey23) upstream. Fairly steep system.

[1]BULL = Bull River, CLRH = Columbia Reach, COLR = Columbia River, DUNC = Duncan Lake, ELKR = Elk River, KOTL = Kootenay Lake, KOTR = Kootenay River, LARL = Lower Arrow Lake, SMAR = St. Mary River, SLOC = Slocan River, UARL = Upper Arrow Lake [2]HGI = Habitat gained index = an estimate of the linear distance of fish habitat located upstream of the crossing. [3]DRM = Rocky Mountain Forest District Manager (FLNRO), MoTI – Ministry of Transportation and Infrastructure, DSE = Selkirk Forest District Manager (FLNRO), Non-status = No agency responsible.

7 DISCUSSION

Before the design and remediation phases of the Fish Passage Strategic Approach protocol are implemented for individual crossing structures, local fisheries regulators and professionals knowledgeable of current local fisheries issues should be consulted. Incorporating their input will be important for aligning projects with regional priorities for the protection and enhancement of individual fish species and will ensure precaution for works affecting species at risk such as bull trout and westslope cutthroat trout. Additionally, as per the protocol, the evaluation of cost benefit will need to be explored for priorities before the final and most expensive stages are undertaken to ensure the efficient use of resources.

We identified 116 fish passage restoration opportunities for follow up in the FWCP portion of the Columbia Basin. Of these, 31 have completed the habitat confirmation stage (Phase 2) of the Fish Passage Strategic Approach protocol and were rated as high or moderate priorities for remediation. These projects are ideal candidates for funding from a variety of programs as they are near shovel ready requiring only the design (Phase 3) and remediation (Phase 4) stages.

We identified an additional 85 crossings that have completed the fish passage assessment stage (Phase 1) and should be considered for the habitat confirmation phase. Of these, 27 crossings on known fish bearing streams were rated as high priorities for fish habitat confirmation studies in background reports and our research highlighted an additional five. Fifty-three of the 85 crossing barriers are located on potentially high value fish habitat but require fisheries information to inform further prioritization.

Currently, on non-forestry related roads in BC, LBIS funding administered through BCTS is available only to the first 2 phases of the Fish Passage Strategic Approach protocol. This highlights a need to identify other stakeholders to facilitate coordination of priority crossing remediation as well as to source alternative sources of funding for the design and remediation of local, highway and other non-forestry related roads.

A list of stakeholder groups that could have an interest in the remediation of the 31 near shovel ready projects in local watersheds is included in Appendix 1. Additionally, numerous funding programs that could support efforts towards remediation works is included in Appendix 2. It is hoped that this document will be of utility to some of the identified stakeholder groups as well as local professionals, government agencies and regulators to restore connectivity to valuable fish habitats in the basin.

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Appendix 1

Summary of Local Stakeholder Groups

[1]Regional District	Group	Local Area	Website	[2]CBWN Member	[3]Watersheds
CSRD	Wildsight Upper Columbia	Golden	http://www.wildsight.ca/	Y	DUNC, UARL, CLRH
CSRD	North Columbia Environmental Society	Revelstoke	https://www.facebook.com/North-Columbia-Environmental-Society-241234592607076/	Y	DUNC, UARL, CLRH
CSRD	Okanagan Nation Alliance -(Syilx)		http://www.syilx.org/	n/a	DUNC, UARL, CLRH, LARL
RDCK	Blewett Conservation Society	Blewett	http://bcs.kics.bc.ca/Homepage.htm	Y	KOTL, DUNC, UARL, SLOC,
RDCK	Blewett Watershed Committee	Blewett	n/a	Y	KOTL, DUNC, UARL, SLOC
RDCK	Arrow Lakes Environmental Stewardship Society	Burton	n/a	Y	KOTL, DUNC, UARL, SLOC, LARL
RDCK	East Shore Freshwater Habitat Society	Crawford Bay	http://www.eastshorefreshwaterhabitatsociety.org/	Y	KOTL, DUNC, UARL, SLOC
RDCK	Wildsight Creston Valley	Creston	http://www.wildsight.ca/branches/creston-valley/	Y	KOTL, DUNC, UARL, SLOC
RDCK	Fletcher Creek Improvement District	Fletcher Creek	http://www.fletchercreekwater.com/who-we-are/	Y	KOTL, DUNC, UARL, SLOC
RDCK	Friends of Kootenay Lake	Kootenay Lake	http://www.friendsofkootenaylake.ca/	Y	KOTL, DUNC, UARL, SLOC
RDCK	Friends of the Lardeau River	Meadow Creek	n/a	Y	KOTL, DUNC, UARL, SLOC
RDCK	Nakusp and Area Watershed Stewardship	Nakusp/Kelowna	n/a	Y	KOTL, DUNC, UARL, SLOC
RDCK	Kootenay Lake Partnership	Nelson	http://kootenaylakepartnership.com/	Y	KOTL, DUNC, UARL, SLOC

[1]Regional District	Group	Local Area	Website	[2]CBWN Member	[3]Watersheds
RDCK	Living Lakes Canada	Nelson	http://www.livinglakes.ca/	Y	KOTL, DUNC, UARL, SLOC
RDCK	West Kootenay EcoSociety	Nelson	http://www.ecosociety.ca/	Y	KOTL, DUNC, UARL, SLOC
RDCK	Nelson and District Rod & Gun Club	Nelson	http://nrgcbc.ca/	n/a	KOTL, DUNC, UARL, SLOC
RDCK	Slocan Lake Research Centre	New Denver	https://slocanresearch.wordpress.com/	Y	KOTL, DUNC, UARL, SLOC
RDCK	Slocan Lake Stewardship Society	New Denver	http://slocanlakess.com/	Y	KOTL, DUNC, UARL, SLOC
RDCK	Slocan River Streamkeepers	New Denver	http://www.slocanriverstreamkeepers.com/	Y	KOTL, DUNC, UARL, SLOC
RDCK	Duhamel Watershed Society	North Shore Nelson	http://www.duhamelwatershedsociety.com/	Y	KOTL, DUNC, UARL, SLOC
RDCK	Rosebery Parklands Development Society	Roseberry	n/a	Y	KOTL, DUNC, UARL, SLOC
RDCK	Salmo Watershed Streamkeepers Society	Salmo	http://www.streamkeepers.bc.ca/	Y	KOTL, DUNC, UARL, SLOC
RDCK	Springer Creek Restoration and Protection Society	Slocan	https://springercreekrestoration.wordpress.com/	Y	KOTL, DUNC, UARL, SLOC
RDCK	Wolverton Creek Water Users	Slocan	n/a	Y	KOTL, DUNC, UARL, SLOC
RDCK	Hawkins Creek Stewardship Committee	Yahk	n/a	Y	KOTL, DUNC, UARL, SLOC
RDCK	West Kootenay Fly fishing club	Castlegar	http://flyfishingclub.org/	n/a	KOTL, DUNC, UARL, SLOC, LARL
RDCK	Creston Valley Rod and Gun Club	Creston	http://www.crestonvalleyrodandgunclub.org/	n/a	KOTL, DUNC, UARL, SLOC

[1]Regional District	Group	Local Area	Website	[2]CBWN Member	[3]Watersheds
RDCK	Lower Kootenay Indian Band (Yaqan nu?kiy)	Creston	http://lowerkootenay.com/	n/a	KOTL, DUNC, UARL, SLOC, LARL
RDEK	Columbia Lake Stewardship Society	Canal Flats	n/a	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Jimsmith Lake Community Association	Cranbrook	https://sites.google.com/site/jimsmithcommunity/	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Joseph Creek Streamkeepers	Cranbrook	http://www.mainstreams.ca/joseph-creek-streamkeepers-3	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	East Kootenay Integrated Lake Partnership	East Kootenay	http://www.ekilmp.com/	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Elk River Alliance	Fernie	http://www.elkriveralliance.ca/	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Columbia Wetlands Stewardship Partners	Invermere	http://www.cwsp.ca/	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Friends of the Columbia Wetlands	Invermere	n/a	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Lake Windermere Ambassadors	Invermere	http://www.lakeambassadors.ca/	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Wildsight Invermere	Invermere	http://www.wildsight.ca/branches/invermere/	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Mainstreams Environmental Society	Kimberley	n/a	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Mark Creek Recovery Program	Kimberley	n/a	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	St. Mary Lake Residents Association	Kimberley	n/a	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR

[1]Regional District	Group	Local Area	Website	[2]CBWN Member	[3]Watersheds
RDEK	Wildsight Kimberley/Cranbrook	Kimberley	http://www.wildsight.ca/branches/kimcran/	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Sheep Creek/Lussier River Concerned Citizens	Premier Lake	n/a	Y	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Cranbrook District Rod & Gun Club	Cranbrook	www.rodandgunclub.com/CanadaCranbrookDistrictR&GC.html	n/a	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Lake Windermere District Rod & Gun Club	Invermere	http://www.rodandgunclub.com/CanadaLakeWindermereDistrictR&GC.html	n/a	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Fernie Rod & Gun Club	Fernie	n/a	n/a	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Columbia-Kootenay Fisheries Renewal Partnership	Cranbrook	n/a	n/a	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Friends of Kootenay National Park Association	Invermere	http://friendsofkootenay.ca/	n/a	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Shuswap Band	Invermere	http://www.shuswapband.net/	n/a	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Columbia Lake Indian Band (?Akisq'nuk First Nation)	Invermere	http://www.akisqnuk.org	n/a	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	St. Mary's Indian Band (?Aq'am)	Cranbrook	http://www.aqam.net	n/a	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDEK	Tobacco Plains Indian Band	Cranbrook	http://www.tobaccoplains.org/	n/a	BULL, KOTL, KOTR, ELKR, COLR, SMAR
RDKB	Rossland Streamkeepers	Rossland		Y	LARL
RDKB	Rossland Society for Environmental Action	Rossland	http://www.rosslandsocietyforenvironmenta.canic.ws/	Y	LARL

[1]Regional District	Group	Local Area	Website	[2]CBWN Member	[3]Watersheds
RDKB	Friends of the Rossland Range	Rossland	http://www.rosslandrange.org/FORR/index.html	Y	LARL
RDKB	Trail Wildlife Association	Trail	http://www.trailwildlife.com/	n/a	LARL

[1]CSRD = Columbia Shushwap Regional District, RDCK – Regional District of Central Kootenay, RDEK = Regional District of East Kootenay, RDKB = Regional District of Kootenay Boundary. [2]CBWN = Columbia Basin Watershed Network member – please contact Tara Clapp at cbwn.coordinator@gmail.com for contact information.[3]BULL = Bull River, CLRH = Columbia Reach, COLR = Columbia River, DUNC = Duncan Lake, ELKR = Elk River, KOTL = Kootenay Lake, KOTR = Kootenay River, LARL = Lower Arrow Lake, SMAR = St. Mary River, SLOC = Slocan River, UARL = Upper Arrow Lake

Appendix 2

Summary of Potential Funding Programs

Program	Website	Details
Fish and Wildlife Compensation Program	http://fwcp.ca/apply-for-funding/	Projects must align with Basin plan and lower level action plans.
Columbia Basin Trust	http://www.cbt.org/Funding/	Strategic plan focuses on water, ecosystems, climate change resilience, education and stewardship, environmental capacity to strengthen communities.
Land based investment strategy (LBIS)	http://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/land-based-investment	Funds restoration of old forestry road and non-status road crossings.
Habitat Conservation Trust Fund	http://www.hctf.ca/	Projects that focus on freshwater wild fish, native wildlife species and their habitats. Have the potential to achieve a significant conservation outcome; maintain or enhance opportunities for fishing, hunting, trapping, wildlife viewing and associated outdoor recreational activities.
Fisheries and Oceans Canada Recreational Fisheries Conservation Partnerships Program	http://www.dfo-mpo.gc.ca/pnw-ppe/rfcpp-ppcpr/index-eng.html	Supports multi-partner projects at the local level aimed at restoring recreational fisheries habitat. Limited to recreational fishing/angling groups, conservation organizations (i.e., an organization that has conservation as its sole or primary mandate) and Indigenous groups.
Fisheries and Oceans Canada Environmental Damages Fund	http://www.ec.gc.ca/edf-fde/	Priority funding is given to projects that restore the natural environment and conserve wildlife.
SARA - Habitat Stewardship Program (HSP)	http://www.ec.gc.ca/hsp-pih/	Secure or protect important habitat to protect species at risk and support their recovery; mitigating threats to species at risk caused by human activities; and supporting the implementation of other priority activities in recovery strategies or action plans, where these are in place or under development.
Real Estate Foundation of British Columbia	http://www.refbc.com/grants/freshwater-sustainability	Freshwater Stability Grants- Supports community-based freshwater education and research, such as lake stewardship, citizen science, monitoring, restoration and wetland management.
Interfor	http://www.interfor.com/responsibility/community	Castlegar and Nakusp areas are eligible. Preference is given to programs where there is a clear connection to the forest industry and/or Interfor as a company.
Patagonia Environmental Grants and Support - World Trout Initiative	http://www.patagonia.com/ca/patagonia.go?assetid=2927	Supports small, grassroots, activist organizations with provocative direct-action agendas, working on multi-pronged campaigns to preserve and protect our environment.
Teck Resources Ltd.	http://www.teck.com/responsibility/	Elkford, Sparwood and Trail. Funding interests include biodiversity and water.
World Wildlife Fund and Telus Go Wild Community Grants	http://www.wwf.ca/takeaction/gowild/	Support activities directly related to restoring, rehabilitating, or recovering natural ecosystems
Aboriginal Fund for Species at Risk	http://ec.gc.ca	Recovery of species at risk on Aboriginal lands.
Eco Action Grant	http://www.ec.gc.ca/ecoaction/Default.asp?lang=En&n=FA475FEB-1	Encourages action focused projects that will protect, rehabilitate or enhance the natural environment, and build the capacity of communities to sustain these activities into the future.
TD Friends of the Environment Foundation	https://fef.td.com/funding/	Eligible projects include habitat restoration.

Program	Website	Details
Gore Mutual Insurance Company Foundation	http://www.goremutual.ca/en/about/foundation.asp	Support the communities served by Gore Mutual Insurance Company by aiding social services, education, health, cultural and environmental activities as may be in the best interest of these communities.
Husky Energy Community Investment	http://www.huskyenergy.com/socialresponsibility/communityinvestment/default.asp	Environmental initiatives supported.
Marisla Foundation	https://online.foundationsource.com/public/home/marisla	The Environment Program concentrates on activities that promote the conservation of biological diversity and advance sustainable ecosystem management.
Slocan Valley Legacy fund	http://www.slocanvalleylegacy.com/	Provides grants to charitable organizations that serve the Slocan Valley on an ongoing and sustainable basis.
Sophie Danforth Conservation Biology Fund	http://www.rwpzoo.org/142/sophie-danforth-conservation-biology-fund-grant-application-process	Supports conservation programs that protect threatened wildlife and habitats worldwide.
The Kenneth M. Molson Foundation	http://www.kennethmolsonfoundation.ca/	Will fund projects of wildlife research, conservation and habitat.
TransCanada Corporation	http://www.transcanada.com/community-investment.html	Work with national and local organizations to conserve important habitat, protect species at risk and educate individuals about the importance of the environment