Fish Passage Culvert Assessments (Mid Coast TSA)

Final Report

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International Forest Products

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Executive Summary

Fish passage failure at road crossings constitutes a major loss of habitat and is considered to be a major provincial problem. Culverted sites have been recognized as a major problem contributing to fish passage barriers. In response to this, the provincial government has undertaken a systematic, watershed-based approach to determining fisheries values on a watershed basis based on the biodiversity and socioeconomic value of watersheds in the province. These assessments were designed to prioritize watersheds in order to begin to help to determine where fish passage assessments would be the most effective. The results of the watershed prioritization process showed that several watersheds within the Mid Coast TSA were ranked as a priority 1 watershed including the Bella Coola and Owikeno watershed groups.

Forsite Consultants Ltd. was contracted to complete a fish passage assessment project within the Bella Coola and Owikeno watershed groups which focused on high value rivers, the Machmell, Kilbella, Chuckwalla, and Sheemahant rivers in the Owikeno watershed and the Saloomt, Bella Coola, Talchako, and Nusatsum rivers in the Bella Coola watershed. The intention of this work was to assess culverts located within these watersheds that may be acting as barriers to fish passage. These culverts are located on non-status, Forest Service, and pre-1995 built roads.

In total we assessed 203.0 kilometers of road, completed fish passage assessments on 90 structures, and identified the location of an additional 263 culvert locations. The results of our assessments showed that only two structures located on moderate to high quality fish streams, both located within the Bella Coola watershed, are serving as barriers to fish passage. However, our analyses showed that the cost of replacing these structures, combined with the low habitat gained (<1500 m), makes them unsuitable for replacement.

1.0 Introduction

The province of British Columbia recently brought together the Ministry of Environment, Ministry of Forests and Range, and Department of Fisheries and Oceans in order to create a Fish Passage Working Group (FPWG). The FPWG has identified th-at culverted sites on fish bearing streams may be severally limiting or stopping upstream movement of fish constituting a major loss of habitat.

In response to these concerns, the provincial government has undertaken a systematic, watershed-based approach to determining fisheries values on a provincial scale. This watershed assessment was based on a biodiversity score (endangered spp., species richness, special stocks) and socioeconomic score (recreational value, commercial value) and assigned priority rankings to each watershed. All watersheds having a priority 1 or 2 were deemed to be the highest priority for fish passage assessment. The results of this showed that several watersheds within the Mid Coast TSA were ranked as a priority 1 watershed including the Bella Coola and Owikeno watershed groups.

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1.1 Bella Coola

Noted for its spectacular scenery, the Bella Coola watershed is a magnificent and valuable watershed located on the west central coast of British Columbia. The Bella Coola River is formed where the Atnarko River meets the heavily glaciated Talchako River, to then flow through the Coast Range Mountains. This watershed has been shown to have exceptional fisheries values including both spawning and rearing for salmonids such as sockeye, pink, chum, chinook, and coho, as well as steelhead, cutthroat, Dolly Varden, and rainbow trout.

1.2 Owikeno East and West

In the late 19th century and during much of the 20th century, the Owikeno Lake area produced the second largest catch of sockeye salmon *Oncorhynchus nerka* in British Columbia. In fact, during the height of production, the Owikeno Lake area supported several canneries and was a major producer of salmon. However, overfishing and run collapses has resulted in a catastrophic decrease in fish returns in the area (McKinnell et al. 2001). However, the area still supports runs of several salmon species and supports local fish populations. As such, it is important to identify any areas which may be limiting habitat use by fish in the area.

2.0 Methods

2.1 Planning Phase

In order to identify potential data collection sites we conducted a GIS analysis where known fish presence information, as documented in the provincial Fisheries Information Summary System (FISS) and other databases, was overlaid upon the network of Forest Service, non-tenured, and pre-1995 roads within each of the four target watersheds. We also include suspected fish streams where no known information is available (using slope threshold values which are species specific 20-30%). We also included TRIM data for creeks, rivers and lakes within these watersheds. These maps also included topographic features outlined so that it was possible for field crews to measure the Habitat Gained Index (HGI) in the field where appropriate. We also used maps provided through Interfor which outlined priority road networks. Using all of this information, we generated field maps of data collection sites.

2.2 Assessment Phase

During the assessment phase, field crews conducted fish passage assessments for each targeted structure within the prioritized watersheds. Field data collection followed the standards given in '*Field Assessment for Fish Passage Determination of Closed Bottom Structures'*, Ministry of Environment, 2nd Edition, May 2008 Standards) using the field protocol outlined in Sections 2 and 3.

Information collected in this phase fell into three categories:

1. Location and survey data
2. Fish passage criteria
3. Site information which was used to assist in identifying potential remedies and assist in prioritization

1. Location and Survey Data included:

- Date
- Crossing ID No.
- Crew names
- UTM/GPS
- Stream name
- Road name and location
- MFR District
- Crossing type

2. Fish Passage Criteria required the following determinations and measurements:

- depth and effectiveness of embedding (depth, % length, roughness)
- culvert dimensions (diameter, length)
- culvert slope (level/clinometer)
- downstream channel width
- outlet drop

3. Site Information collected to assist in determination of remedies and prioritization included:

• outlet residual pool depth • downstream stream slope • habitat value (high, moderate, low) • culvert slope (level/clinometer) • downstream channel width • depth of fill • valley fill (DF, SF, BR) • beaver activity • inlet drop	• backwatered • fish sighted • culvert fix (RM, OBS, SS, EM, BW, combination) • photo documentation (culvert and site) • relevant comments (see additional data collection)

For each site that was identified as being on a moderate to high value stream and had a culvert that was determined to be a potential barrier to fish passage, we conducted downstream assessments to determine if there were any naturally occurring downstream barriers which would have made the fish passage issue at the site irrelevant. Our project team also conducted an overview assessment for any resident fish which may have occurred on these streams – below the culvert. In addition, we also conducted quality control assessments on 15 sites to ensure that our protocol and results were consistent between our two data collection teams.

2.2.1 Determination of a Barrier

Table 2 in the field protocol standards provides the assessment tool for determining whether a culvert is a barrier to fish passage. Using this tool, each culvert was evaluated and provided a rating according to the scores derived for depth and degree of embedment, outlet drop, slope, stream width ratio, and length. Where other site factors negatively affect fish passage, such as channel orientation, these were duly assessed and factored into the recommendation for repair.

2.3 Analysis Phase

Once the planning and assessment phases were completed, we began analysis to identify a prioritized list of sites for restoration, using the following steps:

1. Determine fish presence based on known information
2. Analyze risk
3. Determine habitat value gained
4. Identify remediation options

These steps were sequential, and are designed to focus on sites where restoration will yield the most benefits.

2.3.1 Determining Fish Presence Based on Known Information

Using the following criteria, we determined the likelihood of fish presence:

1. Fish known downstream or within one stream order of the steam crossing (1:50,000 scale).

2. No downstream barriers and stream gradients less than 20% (30% for bull trout systems).

2.3.2 Analyze Risk

During the data collection phase we collected data on outlet drop, culvert slope, culvert diameter vs. channel width – in addition to the previously mentioned morphologically related data. These measurements helped to determine the risk associated with the culvert as it pertains to fish passage barriers.

This risk analysis step looked at the results of the overview assessment from a cumulative score standpoint and established an overall threshold based on the results for the data noted above. Exceeding this threshold served to increase confidence that an individual crossing is indeed a barrier to fish passage. These measurements were then used to generate a risk assessment score.

Although not an explicit data value, the combined experience of the team allowed for an excellent determination of both the value of the stream for fish as well as to the possibility of each structure being a barrier to fish passage. This experience served as a quality control measure for the risk analysis portion of this project.

2.3.3 Determine Habitat Gained Index

The third step of the analysis phase determined the value of the habitat gained as a result of restoring or establishing fish passage upstream of a specific crossing. This was arrived at by combining a subjective assessment of habitat quality at the crossing site, determined at the time of the overview assessment, with the area of upstream habitat as determined through a GIS analysis and/or map-based estimate of the length of habitat available upstream of the structure.

2.3.4 Identify Remediation Options

The fourth step in the analysis phase was to identify proposed solutions for restoring fish passage for each of the identified structures. Cost estimates were generated for completing works that will work to restore fish passage (using professional engineers), i.e. bridge and streambed simulation, using measurements taken during the overview assessment. This analysis was combined with the habitat-gained index to calculate a cost benefit for establishing fish passage at a given location.

3.0 Implementation Phase

We developed a Draft Implementation Plan based on all known information gathered for review and comment by the Contract Administrator. We also sent this implementation plan out to a variety of stakeholders in the project area (see Appendix A for the referral list).

4.0 Fish Passage Results

In total we assessed 203.0 kilometers of road and 90 open and closed-bottom structures for fish passage barrier potential within the Bella Coola and Owikeno watershed. It is important to note that the majority of identified culvert sites were actually open-bottom log culvert sites which are currently not barriers to fish passage. We completed assessments on all of these structures noting the potential for these structures to eventually serve as barriers to fish passage. This assessment was particularly important within the Owikeno watershed as the road systems that were assessed are currently not active and are unmaintained. In addition, the Kilbella and Chuckwalla road systems have been primarily deactivated. However, there are a few structures that have been left in place on these road systems which have begun to show signs of stress and are likely to fail in the near future – these structure failures may serve to block fish passage in the future (see Appendix B for an overview of this assessment). Although these structures are not closed bottom structures the potential for future barriers to fish passage to be created by these structures is high and is important to note. No culverted sites within the Owikeno watershed that were on moderate to high value streams were barriers to fish passage – all culverts were located on low value streams.

The one issue with the Sheemahant river road system is that the road itself often works to serve as a barrier between the Sheemahant and potential overwintering sites. The road is serving as a levee between wetland sites and the river.

The Machmell river road system has very few culverted sites that were located on areas where slopes were ≤30%. The one culverted site that was assessed was passing fish and was located on the flood plain where the Machmell meets Owikeno Lake. The Machmell river is mostly contained within sharply incised canyons and the value of this river into upper reaches is negligible (Figure 1). We also completed an overview flight of the Machmell river and confirmed the low fish habitat values outside of the main river.

Figure 1. Photo of typical incised canyons within the Machmell River.

4.1 Priority Structures

The results of our assessments showed that only two structures, both located within the Bella Coola watershed, are serving as barriers to fish passage (see Table 1 as well as included maps and photos). However, our analyses showed that the cost of replacing these structures, combined with the low habitat gained (<1500 m), makes them unsuitable for replacement. See Appendix C for photos and further information related to these sites. Also see Appendix D for overview of assessments completed.

Table 1. Priority Structures

Site No.	Barrier Score	HGI	Proposed Solution 1	Span (m)	Cost Estimate ($K)	Proposed Solution 2	Cost Estimate ($K)	Cost Benefit 1	Cost Benefit 2
NUS01	26	15	CB	6	40	3200x10 SS	36	0.38	0.42
BEL62	21	2.5	CB	6	40	2000x10 SS	45	0.06	0.05

CB – Concrete Slab Bridge
SS – Streambed Simulation

4.2 Culvert Inventory and Overview Flight

We completed an inventory of all culverts located on roads surveyed in the Bella Coola watershed in order to provide information as to the location of these structures on these roads. This inventory also helped to identify eleven (11) fish passage assessment sites which were not identified in the original planning phase. This inventory included

identifying the location of 195 round culverts, 5 bridges, 5 ford crossings, and 3 washouts. The location of these sites is identified in the final maps as well as via digital data.

We also completed an overview flight of the project area in order to (1) determine if we would need to gain helicopter access to a road section that was inaccessible to vehicular traffic (southern section of the Talchako) in order to complete fish passage assessments and (2) to examine other priority 1 and 2 watersheds in the project area for the potential to expand fish passage assessments into these watersheds. The results of this overview flight revealed that there were very little fish values below the road washout section on the Talchako; as such, it was deemed to be inappropriate to complete assessments on potential structures on this road section. In addition, this overview assessment also showed that the other priority 1 and 2 watersheds within the project area also had low fish values and assessments would not have been appropriate given the low probability of identifying structures in need of repair.

5.0 Implementation Phase

Task 1. We developed a Draft Implementation Plan based on all known information gathered during previous activities for review and comment by Contract Administrator.

Task 2. We then referred our implementation plan, incorporating feedback, to all appropriate stakeholders including Ministry of Forests and Range, Ministry of Environment, licensees, and First Nations. We used comments received by these stakeholders to improve upon our implementation plan.

Task 3. Incorporate comments and finalize implementation plan.
This task will include developing a final report which will detail our methodology, works completed, and results from analysis phase. This report will also include appropriate maps and photos. This report will also include a determination of limiting factors which would otherwise reduce the feasibility or cost-effectiveness of proposed works. These limiting factors would include unreasonable costs for replacement, potentially negative environmental impacts that would supplant those of replacement, current and foreseeable future access needs, etc.

After having our implementation plan reviewed by Warren Wartiig, Interfor, and Ian Robertson (Contract Administrator) it was agreed that the low cost benefit analyses associated with each of these sites makes them a low priority for fix. This low cost-benefit analysis was driven by the low habitat gained for each of these sites (250m for BEL62 and 1500m for NUS01). The low number of sites was primarily a function of the type of structures which are predominantly used as well as the habitat type and previous attempts to improve upon fish passage within these watersheds. This implementation plan is included as a separate document.

6.0 Conclusion

Both the Bella Coola and Owikeno watersheds groups have extremely high fisheries values for both salmonid species as well as resident species. These high values make it important to ensure that access to all upstream habitats for reproduction, overwintering, and refugia is maintained. As fish passage on culverted sites is one of the greatest threats to accessing upstream habitat, identifying sites that are blocking this access is very important. The majority of crossings located for assessment within the Bella Coola and Owikeno watersheds were actually log culverts which were not impacting upon fish passage.

7.0 Literature Cited

McKinnell, S.M., C.C. Wood, D.T. Rutherford, K.D. Hyatt., and D.W. Welch. 2001. The demise of Owikeno Lake sockeye salmon. North American Journal of Fisheries Management. 21:774–791.

Appendix A. Implementation Plan Referral List

Organization	Contact	Address
Nuxalk Nation	Abel Hood	Box 65 Bella Coola, BC V0T 1C0
Heiltsuk Tribal Council	Jack Larsen	PO Box 880 Waglisla, BC V0T 1Z0
Ministry of Environment	John Youds	640 Borland Street Williams Lake, BC V2G 4T1
Ministry of Environment	Volkler Michelfelder	1650 Airport Road Hagensborg, BC V0T 1H0
Wuikinuxv First Nation	Paul Willie	Treaty Manager Bag 300 Port Hardy, BC V0N 2B0

Appendix B. Owikeno West - Chuckwalla and Kilbella Rivers Fish Passage

October 7, 2008

Chuckwall River:
A field review of fish passage was completed for the Chuckwalla River on September 30, 2008 by Dave Brown of Forsite and Roger Jackson Jr. from the Owikeno Indian Band. The point of commencement was at approximately 12.2km mark on the Chuckwalla mainline and is marked on the accompanying map. Above this point the river enters a canyon, fish passage is unlikely and was beyond the scope of this project. The objective of the field review was to identify outstanding fish passage issues and was completed as a course filter approach noting major crossings and creeks.

Generally, the Chuckwalla mainline road is moderately to heavily overgrown with alder and salmon berry and is accessible only by foot. The road has previously been deactivated and no outstanding issues remain. Due to the proximity of the Chuckwalla River the road has been washed out in three locations and is no longer passage without complete re-routing and reconstruction.

Table 1: Summary notes for the Chuckwalla Mainline

Map reference	UTM Zone 9	Stream class at crossing	Structure type	Comments
1	624809 5736846	S3	No structure	Secondary crossing 20m away
2	624528 5736796	S2	No structure	Stable channel. Camp side of crossing (+200m) with multiple cutslope failures. Photo C2
3	623647 5736718	S2	No structure	Stable channel on larger alluvial fan. Photo C3
4	623328 5736527	S4	No structure	Channel on backside of fan
Chuck 1	622726 5736203	S3	LC	Assessment completed. S6 above (26%)
5	622256 5736272	S6	LC	Road on slope break no habitat above. Washout with 2m drop on outlet caused by excessive ditchline water.
6	622194 5736236	S5	No structure	Large active fan with recent movement and multiple channels. No defined channel. No fish habitat. Photo C6 us and C6 ds
7	621564 5735932	S4	No structure	Incised creek
8	621164 5735525	S4	No structure	Small fan secondary channel in 50m
9	620985 5735379	S5	No structure	Active fan with recent movement and multiple channels. No defined channel. No fish habitat.

10	620199 5735337	S4	No structure	From map refernce 9 to 15 road low and adjacent to river and acts as levi isolating existing backchannels. Slide and washout down stream.
11	619583 5735389	S2	No structure	Good habitat. Secondary channel with less flow 40m down the road.
12	618263 5735221	S2	No structure	Olds sills in place.
13	618127 5734958	S2	No structure	Creek now runs on the road. Fish sighted little structure on road bed. Approx 150-200m long. Photos C13 us and C13 ds.
14		S2	No structure	Mouth at river is good and protected by large sand bar. Old 40 gallon drums are foundation of old ATV bridge. Photo C14
15	617343 5733161	S3	No structure	Road washout by river
16	617096 5732765	S3	No structure	Gradient to S5 above
17	616010 5732326	S4	No structure	Old CMP blown out. Fish sighted in pond created behind plugged LC. Leave as is fish passage provided in ditchline and blown out structure.
18	615683 5732319			Road washout by river

Recommendations: No action required at this time as machine access is not feasible. Where deactivation was insufficient the road has naturally stabilized and provided sufficient drainage and resulting fish passage.

Kilbella River:

A field review of fish passage was completed for the Kilbella River on October 1st and 2nd, 2008 by Dave Brown and Oliver Windsor of Forsite and Roger Jackson Jr., Craig Johnson and Steve VanBursken from the Owikeno Indian Band. The point of commencement was at approximately 32km north of the Chuckwalla River bridge at a prominent fork in the river. The accompanying maps and table commence at House Creek. All road sections North of House Creek the road is fully deactivated and no outstanding issues remain in regards to fish passage. However, we noted several large avalanche tracks and active alluvial fans. The objective of the review was to identify outstanding fish passage issues and was completed as a course filter approach noting major crossings and creeks.

Generally, the Kilbella mainline road is moderately to heavily overgrown with alder, willow and salmon berry and is accessible only by foot. The road has previously been deactivated beyond the hatchery (marked in the map) and no outstanding issues remain. Road access remains and may be suitable for machine and pick-up access upon clearing and minor maintenance to address the issues noted below .

Table 2: Summary notes for the Kilbella Mainline

Map reference	UTM Zone9	Stream class at crossing	Structure type	Comments
1 - House Creek	622955 5758275	S2	No structure	Large S2 with moderate to high habitat values. The road has been washed out for >100m and is very difficult to locate. Photos 'House Creek'
2	622241 5758188	S2	No structure	Large crib in place on bushside of crossing. Access to productive backchannel. Photos 'kil backchannel us and ds'
3 – Krantz Creek	621882 5747883	S2	No Structure	Large crib on both sides. Large secondary crossing (40-50m wide) on active fan. Photos Krantz Creek
4	620616 5746879	S3	CMP 600	Naturally deactivated. Creek has bypassed culvert. No concern.
5	620078 5746477	W3	n/a	Road acts as levi and isolated adjacent wetlands.
6 – Kil 1	619773 5746220		Nursery / LC	Chainlink fence and ATCO building at old nursery location established in backchannel. Deactivated on bushside from this point. See assessment
Kil 2	619551 5745880	S3	LC	See assessment.
7	619358 5745569	W3	n/a	Road acts as levi and isolated adjacent wetlands. Beaver activity.
Kil 3	619264 5745390	S2	LC	See assessment.
8	618804 5744855	n/a	n/a	Blowout caused by accumulated ditchline water.
Kil 4	618462 5744235	S3	LC	See assessment.
9	618331 5744086	S5	Bridge 3x8	Classification by gradient and habitat. Photo K9
10 – Ellen Crk	616913 5743204	S2	Bridge 3x12	50t load rating effective 2004. Photo Ellen Crk
11	616414 5741179	S3	CMP 800	Blown out. Bypass of culvert access to ox bow lake.
Kil 5	616637 5740523	S3	CMP 800	See assessment.
Kil 6	616629 5740482	S2	LC	See assessment.
Kil 7	616538 5738432	S3	CMP 800	See assessment.
12	616556 5737690	S6	CPP 400 (plastic)	No Habitat gained
13	616309	S3	Bridge	Moderate habitat gained. Passage

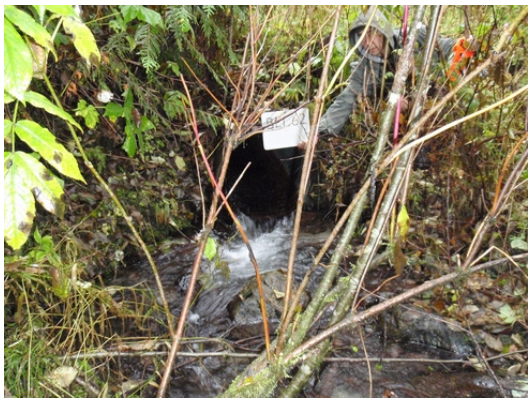
	5737388			adequate.
14	615857 5735531	n/a	CMP 400	Ditchline water only.
15	615758 5735288	S3	LC	Moderate habitat gained. Passage adequate.
16	615722 5734981	n/a		Small slide (20m wide)
17	615746 5734399	n/a	CMP 900	Ditchline water only
18	615716 5734525	S6	none	Creek present and washed out
19	615518 5734335	S6	CMP 600	No HG
20	615571 5734255	S6	CMP 600	No HG
21	615277 5733630	S6	CMP 600	No HG
22	615254 5733257	S2	Bridge	Side channel between Chuckwalla and Kilbella rivers. Good off stream habitat

Recommendations: Approximately 17km of deactivation remains to be completed up to the old nursery on the Kilbella mainline. There are several large bridge structures that are in place and failure can be expected within the next ten years. Should deactivation proceed and engineered assessment should be completed prior to machine passage on these structures. Culvert Metal Pipes (CMP) that are located at sites 11-21 and generally undersized and are washed out. A proper stable channel should be established at these sites. The Log Culverts (LC) that were identified at sites Kil 1 -4 are 100% backwater and connect former backchannels and ox bows and are presently functioning but failure is expected. In addition to these sites several connections should be established to reconnect isolated wetlands where the road continues to act as a levy limiting potential fish habitat.

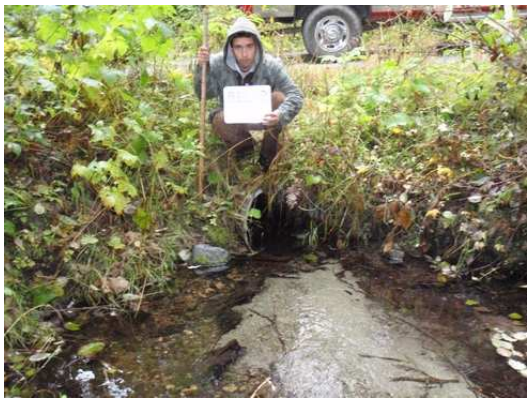
Appendix C. Priority Site Photos

Site No. BEL62
Moderate quality fish habitat stream with suitable rearing habitat. 50mm fish noted within stream.

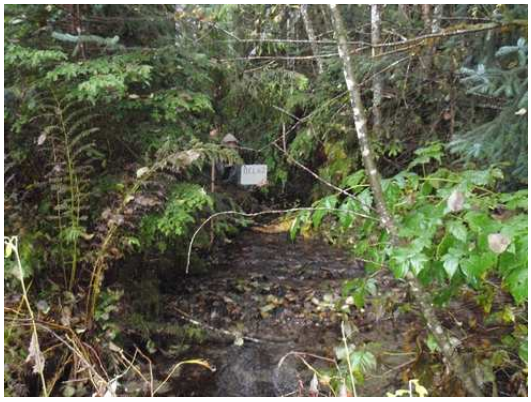
Culvert Dimensions: 600 mm x 10.0 m
Stream Width: 2.8 m
Fish Habitat Quality: Moderate



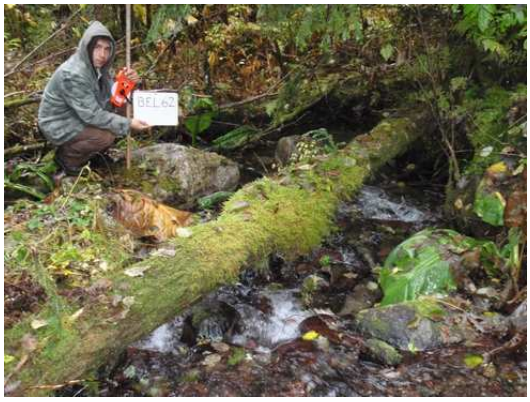
BEL62 – Outlet



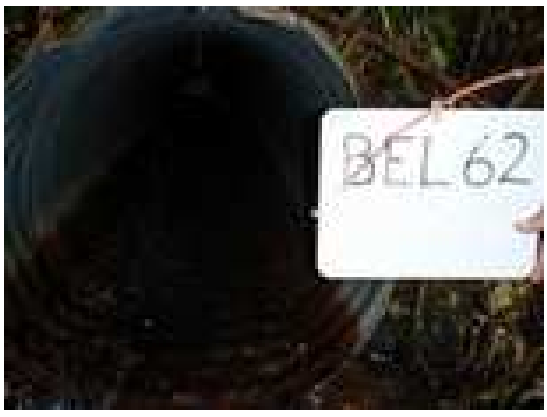
BEL62 – Inlet



BEL 62 – Upstream



BEL62 – Downstream

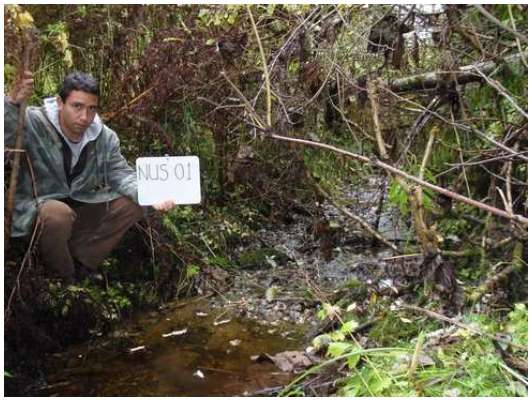


BEL62 – Barrel

Site No. NUS01

Moderate quality habitat stream with potential for rearing and over wintering upstream and downstream of culverted site. Fish seen within creek.

Culvert Dimensions: 800 mm x 10.0 m
Stream Width: 1.2 m
Fish Habitat Quality: Moderate



NUS01 – Upstream

NUS01 – Downstream

NUS01 – Inlet

NUS01 – Outlet

NUS01 – Barrel

Appendix D. Overview of fish passage results.

Site No.	Barrier Score	Result	Comment
BEL 39	26	Barrier	Low Fish Value
BEL 61	Log Culvert		
BEL 63	Log Culvert		
BEL 69	16	Potential Barrier	No Fish Values
BEL 72	36	Barrier	No Fish Values
NUS 10	36	Barrier	Downstream barrier
NUS 11	31	Barrier	Downstream barrier
NUS 12	Pipe Arch	Passable	
NUS 3	21	Barrier	Low Fish Value
NUS 7	11	Passable	Low Fish Value
NUS 8	Log Culvert		
SAL 1001	18	Potential Barrier	Low Fish Value
SAL 1002	36	Barrier	Downstream barrier
SAL 1003	18	Potential Barrier	Low Fish Value
SAL 1004	Log Culvert		
SAL 1005	Log Culvert		
SAL 1006	Log Culvert		
SAL 1007	Log Culvert		
SAL 2005	Log Culvert		
TAL 2001	23	Barrier	No Fish Values
TAL 2002	16	Potential Barrier	No Fish Values
TAL 2005	16	Potential Barrier	No Fish Values
BEL 62	26	Barrier	Priority Site
NUS 01	26	Barrier	Priority Site
BEL 102	Log Culvert		
BEL 111	Log Culvert		

BEL 141	Log Culvert		
BEL 159	Log Culvert		
BEL 174	Log Culvert		
BEL 188	26	Barrier	Low Fish Value
BEL 19	Log Culvert		
BEL 195	Log Culvert		
BEL 21	36	Barrier	No Fish Values
BEL 22	26	Barrier	No Fish Values
BEL 230	Log Culvert		
BEL 234	25	Barrier	No Fish Values
BEL 237	36	Barrier	No Fish Values
BEL 25	36	Barrier	No Fish Values
BEL 28	26	Barrier	No Fish Values
CHUCK 1	Log Culvert		
KILL 01	Log Culvert		
KILL 2	Log Culvert		
KILL 3	Log Culvert		
KILL 4	Log Culvert		
KILL 5	Log Culvert		
KILL 6	Log Culvert		
KILL 7	Log Culvert		
MAC 29	15	Passable	
SHE 100	Log Culvert		
SHE 101	Log Culvert		
SHE 102	Log Culvert		
SHE 106	Log Culvert		
SHE 3	Log Culvert		
SHE 33	Log Culvert		
SHE 38	Log Culvert		
SHE 4	Log Culvert		
SHE 51	Log Culvert		
SHE 52	Log Culvert		
SHE 53	Log Culvert		
SHE 54	Log Culvert		
SHE 55	Log Culvert		
SHE 56	Log Culvert		
SHE 57	Log Culvert		
SHE 60	Log Culvert		
SHE 61	Log Culvert		
SHE 62	Log Culvert		

SHE 64	Log Culvert		
SHE 66	Log Culvert		
SHE 70	Log Culvert		
SHE 72	Log Culvert		
SHE 77	Log Culvert	Potential barrier	Low Fish Value
SHE 79	Log Culvert		
SHE 82	Log Culvert		
SHE 91	Log Culvert		
SHE 94	Log Culvert		
SHE 95	Log Culvert		
SHE 99	Log Culvert		
SHE F015	26	Barrier	Low Fish Value
SHE F021	28	Barrier	Low Fish Value
SHE F03	Log Culvert		
SHE F04	Log Culvert		
SHE F05	Log Culvert		
SHE F06	Log Culvert		
SHE F07	Log Culvert		
SHE F09	Log Culvert		
SHE F13	Log Culvert		
SHE F15	30	Low Fish Value	
SHE F17	Log Culvert		
SHE F18	Log Culvert		
SHE F50	Log Culvert		