

ROUTINE EFFECTIVENESS EVALUATIONS

ON

SELECTED SITES IN THE BULKLEY TSA

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1.0 INTRODUCTION

Silvicon Services Inc. was retained in 2006 by Pacific Inland Resources (a Division of West Fraser Mills Ltd.) to conduct Routine Effectiveness Evaluations on eleven sites spread throughout the Bulkley TSA. The effectiveness evaluations were “low intensity level” or “routine” evaluations. The purpose of the Routine Effectiveness Evaluations was to assess the condition of works at selected sites within the Bulkley TSA that were treated under the Watershed Restoration Program or the Forest Investment Account since 1998, primarily with the intent to improve or maintain fish passage upstream. The sites are all within watersheds that were identified in previous watershed restoration plans as targeted, high priority watershed sub-basins. All sites except the Toboggan Creek site were also identified in Fish Passage Culvert Inspection reports as high priority sites for fish passage improvement. The Toboggan Creek site located on the Silvern Lakes Road was originally identified by the Ministry of Environment, Lands and Parks as a stream crossing that would benefit from stream rehabilitation procedures.

Since the sites evaluated were targeted at either improving or maintaining fish passage upstream at road crossings (except for Site 306A which was primarily a deactivation of a decaying structure), most of the physical and biological performance objective fields on the *In-stream REE Field Form* were not applicable. The sites were assessed for structure function, structure condition, structure stability and maintenance recommendations. As we only evaluated eleven sites and only scored a very limited set of objectives for each structure, summary graphs and statistics were not included in the report, however; fairly extensive comments were included for each site on the *In-stream REE Field Form*.

2.0 LOCATIONS

The eleven sites visited for Routine Effectiveness Evaluations are spread throughout the Bulkley TSA from the Nilkitkwa River watershed in the northeast to the Telkwa River watershed in the south. The sites are within three watersheds; namely the Babine River, the Telkwa River, and the Bulkley River and in six different sub-watersheds; Babine River, West Babine, Lower Nilkitkwa, Fulton, Lower Telkwa and Toboggan. The Babine River, West Babine, Lower Nilkitkwa and Fulton are sub-watersheds of the Babine River, the Lower Telkwa is a sub-watershed of the Telkwa River and the Toboggan is a sub-watershed of the Bulkley River. The eleven sites visited for Routine Effectiveness Evaluations are listed in Table 1 on the following page.

Table 1. LOCATION SUMMARY OF ROUTINE EFFECTIVENESS EVALUATION SITES

Site Number/Name	Location	Watershed Sub-basin	Watershed Code	TRIM Map #	UTM Location
3006-1	306 Road	Fulton	WSC 480-697200-49300	093L.097	E: 647555 N: 6091249
3006-2	306 Road	Fulton	Cox Creek WSC 480-697200-49700	093L.097	E: 647515 N: 6091826
3006-3	306 Road	Fulton	Hagarty Creek WSC 480-697200-52800	093L.097	E: 647338 N: 6093826
306A Road	306A Road	Fulton	Fulton River WSC 480-697200	093L.097	E: 647826 N: 6093253
413-123	413 Road ~9km	West Babine	WSC 480-518400	093M.017	E: 652612 N: 6108637
4000-Feature 17/678	Nilkitkwa FSR ~34.5km	West Babine	Williams Creek WSC 480-452300	093M.027	E: 649932 N: 6124018
4000-Feature 23/696	Nilkitkwa FSR ~40.5km	West Babine	Heal Creek WSC 480-430700	093M.027	E: 649768 N: 6123028
473-1	473 Road ~0.5km	Lower Nilkitkwa	WSC 480-360200-20500-21300	093M.058	E: 651845 N: 6157234
487-34	487 Road ~3.5km	Babine River	WSC 480-296400	093M.056	E: 638575 N: 6163047
19.3km Telkwa	Telkwa FSR ~19.3km	Lower Telkwa	WSC 460-422700-37700	093L.064	E: 604391 N: 6052258
Toboggan Creek	Silvern Lakes Road ~3.3km	Toboggan	Toboggan Creek WSC 460-242900	093L.084	E: 610995 N: 6079411

3.0 OBJECTIVES

3.1 FULTON SUB-BASIN

Fish Passage Culvert Assessments in the Upper Fulton River and Harold Price Creek Watersheds ranked sites 3006-1, 3006-2 and 3006-3 on the 306 Road as high priority sites for fish passage improvement from the FPCI sites assessed in the 2003 and 2004 field seasons. The 306A Road site is a collapsing wood stringer bridge spanning the Fulton River a short distance upstream of Chapman Lake. This site was assessed a high priority for removal of the bridge and deactivation of the road as a public safety issue. The bridge had been used regularly by ATVers to cross the Fulton River; however, it was in imminent danger of collapsing completely. The decaying bridge was slowly settling into the Fulton River and ultimately had the potential to adversely impact fish habitat and/or fish migration.

Site Level Objectives for the in-stream works on the 306 Roads in the Fulton sub-basin are:

- deactivate the 306 Road network
- restore natural drainage patterns
- improve/restore safe fish passage for all life stages and species of fish present
- reconstruct the stream channels

3.2 WEST BABINE SUB-BASIN

The West Babine watershed was identified in the Torkelson Watershed Restoration Plan (Sept. 2001) and the documents which preceded it; Interim Interior Watershed Restoration Plans (October 2000) and Integrated Watershed Restoration Plan-West Babine Watershed (December 2000), as a targeted, high-priority, watershed sub-basin. Fish Passage Culvert Assessments in the West Babine Watershed ranked sites 413-123, 4000-Feature 17/678 and 4000-Feature 23/696 as high priority sites for fish passage improvement from the FPCI sites assessed in the 2001 field season.

Site Level Objectives for the in-stream works in the West Babine sub-basin are:

- improve/restore safe fish passage for all life stages and species of fish present
- reconstruct the stream channels where culverts are being removed

3.3 LOWER NILKITKWA SUB-BASIN

Fish Passage Culvert Assessments in the Babine River and Nilkitkwa River Watersheds ranked site 473-1 on the 473 Road as a high priority site for fish passage improvement. Site 473-1 scored 44 points and ranked as the second highest priority site within the Nilkitkwa River watershed from the FPCI sites assessed in the 2003 field season. A review of forest development plans had determined that access to the back end of the 473 road for resource management purposes was no longer required but maintaining public access to a popular hunting campsite beyond the stream crossing was desirable. Constructing a ford at the site was prescribed as a means of meeting all the site level objectives.

Site Level Objectives for the in-stream works at site 473-1 in the Lower Nilkitkwa sub-basin are:

- deactivate the 473-1 site but maintain public access to a popular hunting campsite beyond the stream crossing
- improve/restore safe fish passage for all life stages and species of fish present
- reconstruct the stream channel
- provide fish access to ~4100m of habitat upstream of the culvert

3.4 BABINE RIVER SUB-BASIN

Fish Passage Culvert Assessments in the Babine River and Nilkitkwa River Watersheds ranked site 487-34 on the 487 Road as a high priority site to replace the existing culvert with a structure which provides safe fish passage. Site 487-34 scored 41 points and ranked as the highest priority site within the Babine River watershed from the FPCI sites assessed in the 2003 field season.

Site Level Objectives for the in-stream works at the 487-34 site in the Babine River sub-basin are:

- improve/restore safe fish passage for all life stages and species of fish present
- reconstruct the stream channel
- provide access to ~4800m of habitat upstream of the culvert

3.5 LOWER TELKWA SUB-BASIN

Fish Passage Culvert Assessments on the Telkwa FSR ranked the site at 19.3km as the highest priority site to replace the existing culvert with a structure which provides safe fish passage. Although there were two other high priority sites identified, the site at 19.3km was deemed to be the most cost effective of the three high priority sites.

Site Level Objectives for the in-stream works in the Lower Telkwa sub-basin are:

- improve/restore safe fish passage for all life stages and species of fish present
- reconstruct the stream channel
- provide access to high quality rearing and spawning habitat upstream of the culvert

3.6 TOBOGGAN SUB-BASIN

The Trout Creek/Moricietown Watershed Assessment Project which included the Toboggan sub-basin identified the following watershed restoration goals:

- to reduce stream turbidity and maintain water quality
- to hasten the ecological succession of vegetation on slides
- to maintain the integrity of transportation structures
- to provide balanced employment opportunities
- to protect the integrity of fish bearing streams
- to monitor the effectiveness of work done
- to encourage watershed related research activities which will assist in restoration work

An old bridge located at this site had collapsed into Toboggan Creek and diverted the main stream channel off it's course so that the new channel location regularly overflowed it's banks at high flows and ran down the road surface on the empty side approach. It was felt that this could lead to excessive siltation and debris accumulations which could potentially have adverse affects on important salmon spawning grounds downstream of the crossing. The final prescription for this site following all consultation prescribed a ford and berm at this site as a means of meeting the site level objectives. Because of concerns over impacts to downstream salmon habitat, no instream work was prescribed for this site. Consequently, a berm and ford was only constructed on the empty side approach.

Site Level Objectives for the in-stream works at the Toboggan Creek site in the Toboggan sub-basin are:

- to maintain recreation access for the public on the Silvern Lakes Road which is used as a 4WD/hiking recreation trail
- mitigate potential adverse impacts to important salmon spawning habitat downstream of the crossing

3.7 PROJECT SCOPE

Routine Effectiveness Evaluations were conducted at 11 stream crossing sites in 6 sub-basins scattered throughout the Bulkley TSA. The sites evaluated fell into four general categories or types of fish passage restoration works. All the works were intended to improve or maintain safe passage except for the 306A site on the Fulton River which, while technically a deactivation project, also had a preventative component to it in removing a potential future source of fish habitat degradation and/or a potential fish migration barrier.

1. Fish Passage Restoration / Improvement (Backwatering)
 - Site 4000-Feature 17/678 (Williams Creek)
 - Site 4000-Feature 23/696 (Heal Creek)
2. Fish Passage Restoration / Deactivation (Culvert or bridge removal, channel restoration)
 - Site 3006-1
 - Site 3006-2 (Cox Creek)
 - Site 3006-3 (Hagarty Creek)
 - Site 306A (Fulton River)
 - Site 413-123
3. Fish Passage Restoration / Bridges (Culvert removal, channel restoration, bridge installation)
 - 19.3km Telkwa Site
 - Site 487-34
4. Fish Passage Restoration / Fords (Culvert removal, ford construction)
 - Site 473-1
 - Toboggan Creek Site

4.0 PERFORMANCE SUMMARY

Eleven in-stream work sites were evaluated for structural, physical and biological performance. For all in-stream works the mean physical performance objective was 3.27 and the mean biological performance objective was 3.18. For all sites except Site 306A, the mean structural condition score was 3.90 and the mean structural stability score was 3.70. Site 306A was excluded from the structural score averages because there was really no structure to evaluate at this site. Based on the scores, the works at each of the sites are meeting the expectations and objectives of the site prescriptions. There are some minor concerns with scour and erosion at the downstream loaded side of the reconstructed stream channel at Site 3006-1 on the 306 Road.

5.0 CONCLUSIONS

Overall the works evaluated at the eleven sites visited are functioning well and appear to be structurally stable and in good structural condition. The reconstructed stream channel at Site 3006-1 in the Fulton sub-basin should be re-visited for a REE again next year after the spring freshet is complete. As well the fords at Site 473-1 on the 473 Road in the Lower Nilkitkwa sub-basin and the ford at Toboggan Creek on the Silvern Lakes Road should be visited annually to monitor their performance and structural stability and condition. Due to the high energy flows in Toboggan Creek, the site should be a priority for routine monitoring. The backwater weirs on Williams Creek and Heal Creek appear to be holding up well and are functioning as intended in the site prescriptions. The site at Williams Creek should also be monitored on a routine basis, either every year or at least every other year as it is also a high energy system. Heal Creek seems to have much more benign flows than Williams Creek therefore it should be monitored on a longer interval basis, either 3 or 5 years. The reconstructed channels under the bridges at Site 487-34 and at the 19.3km Telkwa Site should not require any further monitoring as they are stable and should not require any routine maintenance.

6.0 IN-STREAM REE FIELD FORMS

Appendix A-1. Field Form for In-Stream REE

Form 1. Routine Effectiveness Evaluation Restoration Works Summary – In-Stream Component

Name of Sponsor PIR-West Fraser Watershed Babine River Survey Crew REK / Silvicon Services REE Interval 2 years
 Forest District Skeena-Stikine Sub-Watershed Fulton River Weather/Flow Overcast / Low Flow Other Components _____
 Date October 19, 2006 Project Name 306 Road & 306A Road, Road Deactivation and Fish Passage Restoration Project

SITE DESCRIPTION					PERFORMANCE OBJECTIVES														OVERALL						
Stream	Distance	Site ID #	Structure Type	Site Objective	Pool	Riffle	Gravel Bar	Stream bank	Stream Cover	Restored Channel	Overall Rating	Species	Life Stage	Over-winter	Rearing	Holding	Spawning	Fish Passage	Overall Rating	Structural Condition	Structural Stability	High Flow Function	Low Flow Function	Maintenance Recommendation	Photo Numbers
Unnamed Creek WSC 480-697200-49300	300m	3006-1	Restoration of 1 ^o channel	Remove culvert, re-establish channel	-	-	-	-	-	3	3	RB, CT	All	-	-	-	-	3	3	3	3	3	4	3	REK-12 #21-25
Comments: 3006-1	The site has seen some scour (and erosion) at the stream crossing. Lots of gravel has been transported and deposited in the reconstructed channel (REK-12 #21). Some boulders and cobbles from rip-rap in re-constructed channel have been carried up to 10m downstream from old outlet pool. This is possibly from very high flows during an extreme rain event last spring. Erosion has only occurred on downstream half of loaded side bank. Grass very well established on approach slopes, possibly due to straw mulch laid down over seeded areas. Suspect that channel will stabilize now that channel is widened and has down-cut. Revisit in 1-2 years to see if channel stabilizes and scour stops on downstream loaded side bank.																								
Cox Creek WSC 480 – 697200-49700	200m	3006-2	Restoration of 1 ^o channel	Remove culvert, re-establish channel	-	-	-	-	-	3	3	RB, CT, DV	All	-	-	-	-	3	3	4	4	4	4	4	REK-12 #18-20
Comments: 3006-2	There is no evidence of erosion or scour at this site. The reconstructed channel is holding up well and the site appears to be stable. There is no sign of large amounts of sediment transport and/or deposition. The gradient of the reconstructed stream channel is 7-8% with no apparent obstacles to upstream fish passage for any life stage of fish. Grass seeding of the site was successful as grass is very well established at the site helping to stabilize the approaches, thereby minimizing the risk of erosion at the site.																								
Hagarty Creek WSC 480-697200-52800	350m	3006-3	Restoration of 1 ^o channel	Remove culvert, re-establish channel	-	-	-	-	-	4	4	DV	All	-	-	-	-	4	4	4	4	4	4	4	REK-12 #13-17
Comments: 3006-3	Reconstructed channel is holding up well, no erosion or scour of reconstructed channel evident. There is no evidence of significant amounts of sediment transport or deposition at the site. Overall the site appears to be quite stable. The stream flow is predominantly through the empty side channel but still flows through the secondary channel on the loaded side of the stream crossing at higher flows. Fish passage is greatly improved at the site, it is passable now even at relatively low flows. The crossing does not present an obstacle to upstream fish passage for any life stage of fish.																								
Fulton River WSC 480-697200	2200m	306A	N/A	Remove decaying log bridge	-	-	-	-	-	-	4	DV, RB, CT	All	-	-	-	-	-	4	-	-	-	-	-	REK-12 #11-12
Comments: 306A	There is no evidence of scour or erosion of the banks at the site of the bridge deactivation. The deactivated bridge crossing is holding up very well and there are no concerns with the deactivation prescription or deactivation works at this time. Due to the slow meanders of the Fulton River in this reach, erosion and scour are not a high risk. This site is on an active floodplain and wetland so the river channel could move at any time or location in this reach under flood or peak flow conditions. There also appears to be ongoing beaver activity throughout this reach which could cause flooding or the movement of the main channel at any time. Possibly revisit in 2 years for a very quick overview assessment.																								

Appendix A-1. Field Form for In-Stream REE

Form 1. Routine Effectiveness Evaluation Restoration Works Summary – In-Stream Component

Name of Sponsor PIR-West Fraser Watershed Babine River Survey Crew REK / Silvicon Services REE Interval 3 years
 Forest District Skeena-Stikine Sub-Watershed West Babine Weather/Flow ----- / Low Flow Other Components Fish Access
 Date October 17, 2006 Project Name West Babine Fish Passage Restoration Project – Culvert Removal at ~9km on the 413 Road

SITE DESCRIPTION					PERFORMANCE OBJECTIVES													OVERALL							
Stream	Distance	Site ID #	Structure Type	Site Objective	Physical							Biological						Structural Condition	Structural Stability	High Flow Function	Low Flow Function	Maintenance Recommendation	Photo Numbers		
					Pool	Riffle	Gravel Bar	Stream bank	Stream Cover	Restored Channel	Overall Rating	Species	Life Stage	Over-winter	Rearing	Holding	Spawning							Fish Passage	Overall Rating
Unnamed Creek WSC 480-518400	2100m	413-123	Restoration of 1 ^o channel	Remove culvert, restore channel and restore safe fish passage	-	-	-	-	-	3	3	DV, RB	All	-	-	-	-	3	3	4	4	4	3	4	REK-12 #4-10
Comments:	No evidence of erosion at banks or on approaches. Grass seeding well established. Upstream fish migration much better than old culverts, no drop as with old culverts. A series of small steps was created through the use of rock lines in the reconstructed channel. Bed material predominantly gravel in reconstructed channel, possible spawning habitat but no cover yet, some deciduous stems appearing on approaches to channel. Appears to be good rearing habitat but more cover especially from O.V. is needed to really improve habitat quality. Channel appears to be stable, no erosion or scour of banks evident. Some coarse woody debris and boulders in reconstructed channel for cover but still very open. Site basically just needs more cover on the reconstructed channel to be really good habitat. Should fill in naturally in next few years, some deciduous trees and shrubs becoming established on approach slopes.																								

Appendix A-1. Field Form for In-Stream REE

Form 1. Routine Effectiveness Evaluation Restoration Works Summary – In-Stream Component

Name of Sponsor PIR-West Fraser Watershed Babine River Survey Crew REK, HZ / Silvicon Services REE Interval 3 years
 Forest District Skeena-Stikine Sub-Watershed West Babine Weather/Flow ----- / Low Flow Other Components -----
 Date September 29, 2006 Project Name West Babine Fish Passage Restoration Project – Williams Creek 34.5km Nilkitkwa FSR

SITE DESCRIPTION					PERFORMANCE OBJECTIVES												OVERALL								
Stream	Distance	Site ID #	Structure Type	Site Objective	Physical							Biological							Structural Condition	Structural Stability	High Flow Function	Low Flow Function	Maintenance Recommendation	Photo Numbers	
					Pool	Riffle	Gravel Bar	Stream bank	Stream Cover	Outlet Backwater Weir	Overall Rating	Species	Life Stage	Over-winter	Rearing	Holding	Spawning	Fish Passage							Overall Rating
Williams Creek WSC 480-452300	4000m	4000-Feature 17/678	RipRap Weir (backwater weir)	To backwater the site to facilitate fish passage upstream	-	-	-	-	-	3	3	DV/BT, CO, RB	All	-	-	-	-	3	3	4	3	4	3	4	REK-10 #23-25-2006 REK-11 #1-3-2006
Comments:	Structure (backwater weir) is functioning well, culvert is still backwatered through 50% of downstream length despite very low flow conditions this year. Sampled same length as upstream baseline sample we did just prior to weir construction in 2003. No CO or CH captured upstream in baseline sample area during September 29, 2006 sampling. Only captured RB and DV/BT. The 2003 fish salvage captured RB, CO and DV/BT and the 2003 baseline sample captured 2 RB, 4 CO and 4 DV/BT. The 2006 baseline sample captured 11 RB, 5 DV/BT and no CO. Backwater weir has resulted in outlet pool infilling and raising the water level so the outlet fall from the culvert apron has been completely eliminated. Apron is now submersed approximately 30 cm. Water velocity in the culvert has also definitely reduced in the backwatered section of the culvert. This is evidenced by the lack of scour at outflow pool and the infilling of the outlet pool with sediments since the backwater outlet control weir constructed at outlet. The excessive scour that was undermining the outlet apron prior to the construction of the backwater weir has been stopped and much of the scour pool has filled in with sediments.																								

Appendix A-1. Field Form for In-Stream REE

Form 1. Routine Effectiveness Evaluation Restoration Works Summary – In-Stream Component

Name of Sponsor PIR-West Fraser Watershed Babine River Survey Crew REK, HZ / Silicon Services REE Interval 3 years
 Forest District Skeena-Stikine Sub-Watershed West Babine Weather/Flow ----- / Low Flow Other Components _____
 Date September 29, 2006 Project Name West Babine Fish Passage Restoration Project – Heal Creek 40.5km Nilkitkwa FSR

SITE DESCRIPTION					PERFORMANCE OBJECTIVES												OVERALL								
Stream	Distance	Site ID #	Structure Type	Site Objective	Physical						Biological						Structural Condition	Structural Stability	High Flow Function	Low Flow Function	Maintenance Recommendation	Photo Numbers			
					Pool	Riffle	Gravel Bar	Stream bank	Stream Cover	Outlet Backwater Weir	Overall Rating	Species	Life Stage	Over-winter	Rearing	Holding							Spawning	Fish Passage	Overall Rating
Heal Creek WSC 480-430700	750m	4000-Feature 23/696	RipRap Weir (backwater weir)	To backwater the site to facilitate fish passage upstream	-	-	-	-	-	3	3	DV/BT, RB, CO, CH, KO	All	-	-	-	-	3	3	4	4	4	3	4	REK-11 #4-9-2006
Comments:	Structure (backwater weir) is functioning well, culvert is backwatered almost entire length except for approx. 5m at upstream end despite extremely low flows this fall. Outlet pool has in-filled level with concrete apron 3 years after construction of backwater (outlet control) weir. Weir has nice steep pools for upstream passage, only 10-15cm between steps. Weir appears to be holding up very well. Should have no problems remaining as a permanent structure especially after unusually high flows during rain events last spring (spring 2006). 2003 upstream baseline sampling captured 21 fish, 19 CO and 2 DV/BT. Baseline sampling 3 years later in 2006 saw the capture of 1 CH, 9 RB, 3 DV/BT and 1 unidentified salmonid 70mm in length. No sediment transfer or transfer of rip-rap used to construct the weir was evident. Backwater weir has resulted in the outlet pool in-filling and raising the water level so the outlet fall has been completely eliminated. Apron is now submersed by approximately 40 cm of water. Culvert water velocity has definitely been reduced in the backwatered section. This is evidenced by the lack of scour at outflow pool and the infilling of the outlet pool with sediments since the backwater outlet control weir was constructed at the outlet.																								

Appendix A-1. Field Form for In-Stream REE

Form 1. Routine Effectiveness Evaluation Restoration Works Summary – In-Stream Component

Name of Sponsor PIR-West Fraser Watershed Babine River Survey Crew REK / Silvicon Services REE Interval 2 years
 Forest District Skeena-Stikine Sub-Watershed Lower Nilkitkwa Weather/Flow Overcast / Low-Mod. Flow Other Components _____
 Date October 17, 2006 Project Name Fish Passage Restoration Project, 473 Road/Site 473-1 Culvert Pull – Ford Construction

SITE DESCRIPTION					PERFORMANCE OBJECTIVES													OVERALL							
Stream	Distance	Site ID #	Structure Type	Site Objective	Physical							Biological						Structural Condition	Structural Stability	High Flow Function	Low Flow Function	Maintenance Recommendation	Photo Numbers		
					Pool	Riffle	Gravel Bar	Stream bank	Stream Cover	Ford	Overall Rating	Species	Life Stage	Over-winter	Rearing	Holding	Spawning							Fish Passage	Overall Rating
Unnamed Creek WSC 480-360200-20500-21300	270m	473-1	Ford	Road deactivation, fish passage restoration	-	-	-	-	-	3	3	DV	All	-	-	-	-	3	3	4	4	4	4	4	HZ-7 #22-25
Comments:	This stream crossing culvert location was deactivated in the fall of 2004; however, since the gravel pit at the end of the 473 Road was commonly used as a camping area by hunters, fording the site was recommended rather than complete deactivation. No erosion was visible at the ford during our field visit. Both approaches are holding up very well. The gravel that was spread on the empty and loaded approaches during the ford construction remains clean and is working well in preventing the approaches from becoming muddied by 4WD vehicles spinning on the approach slopes. The grass seed that was spread on all the mineral soil exposed during the ford construction has taken very well and is assisting in stabilizing and minimizing erosion of exposed soil surfaces. Upstream fish migration conditions are much more favourable than the culvert conditions, especially for juvenile fish. The stream velocity is much slower in the ford than it was through the culvert. Based on the appearance and condition of the ford during the REE, no maintenance of the ford is required at this time. This site should possibly be re-evaluated on a bi-annual basis (every 2 nd year) to briefly ensure the function of the ford is maintained and no deterioration or erosion of the ford is occurring.																								

Appendix A-1. Field Form for In-Stream REE

Form 1. Routine Effectiveness Evaluation Restoration Works Summary – In-Stream Component

Name of Sponsor PIR-West Fraser Watershed Babine River Survey Crew REK / Silvicon Services REE Interval 2 years
 Forest District Skeena-Stikine Sub-Watershed Babine Weather/Flow Cloudy, Cold / V. Low Flow Other Components _____
 Date October 17, 2006 Project Name Fish Passage Restoration Project, 487 Road/Site #487-34 Culvert Pull - Bridge Installation

SITE DESCRIPTION					PERFORMANCE OBJECTIVES													OVERALL							
Stream	Distance	Site ID #	Structure Type	Site Objective	Physical							Biological						Structural Condition	Structural Stability	High Flow Function	Low Flow Function	Maintenance Recommendation	Photo Numbers		
					Pool	Riffle	Gravel Bar	Stream bank	Stream Cover	Bridge	Overall Rating	Species	Life Stage	Over-winter	Rearing	Holding	Spawning							Fish Passage	Overall Rating
Unnamed Stream WSC 480-217000	2050m	487-34	Bridge	Culvert replacement, fish passage restoration	-	-	-	-	-	3	3	CT	All	-	-	-	-	3	3	4	3	4	4	4	HZ-7 #16-20
Comments:	The grass seeded at this site is well established and is assisting in stabilizing the fill. Water flow at the time of the Routine Effectiveness Evaluation was very low. A small amount of rip-rap on the loaded side of the restored stream channel directly underneath the bridge has dislodged and rolled into the thalweg of the stream channel. This appears to be a relatively recent event, probably within the last few months prior to the REE. The restored channel is definitely an improvement in fish passage although the extremely low water levels at the time of the evaluation would pose difficulties for adult fish migration upstream. There were no apparent run-off or sediment issues; no visible sediments have been introduced into the stream as a result of the post construction layout of the site. A follow up visit in 2007 may be in order to ensure that no further rip-rap has fallen into the stream channel and that the rip-rap has stabilized.																								

Appendix A-1. Field Form for In-Stream REE

Form 1. Routine Effectiveness Evaluation Restoration Works Summary – In-Stream Component

Name of Sponsor PIR-West Fraser Watershed Telkwa River Survey Crew REK, HZ / Silvicon Services REE Interval 7 years
 Forest District Skeena-Stikine Sub-Watershed Lower Telkwa Weather/Flow Sunny, Clear / Low Flow Other Components _____
 Date October, 3, 2006 Project Name Telkwa FSR Road Rehabilitation Project, 19.3km Culvert Pull/Fish Passage Restoration/Bridge Installation

SITE DESCRIPTION					PERFORMANCE OBJECTIVES													OVERALL							
Stream	Distance	Site ID #	Structure Type	Site Objective	Physical							Biological						Structural Condition	Structural Stability	High Flow Function	Low Flow Function	Maintenance Recommendation	Photo Numbers		
					Pool	Riffle	Gravel Bar	Stream bank	Stream Cover	Bridge	Overall Rating	Species	Life Stage	Over-winter	Rearing	Holding	Spawning							Fish Passage	Overall Rating
Unnamed Creek WSC 460-422700-37700	35m	19.3km Telkwa FSR	Bridge	Culvert replacement, fish passage restoration	-	-	-	-	-	3	3	DV, CO	All	-	-	-	-	3	3	4	4	4	4	4	REK-11 #21-25
Comments:	Good stream channel restoration where the old culvert rested. No evidence of stream bank scour or erosion. The gradient of the reconstructed channel is 5%, no difficulties for upstream fish passage through the area of reconstructed stream channel under the bridge where the culvert used to lay. Access to this stream from the Telkwa River can be difficult or impossible during periods of low flow in the Telkwa. Fish access into the unnamed stream at kilometer 19.3 is much more likely during higher flow conditions. A single DV/BT approximately 170mm long was observed in a stream pool located approximately where the old culvert outlet used to be. Other sampling conducted on this stream reach for Fish Passage Culvert Inspection purposes about 250m upstream captured only DV/BT. Although we wished to sample further in this reach to get a better indication of fish species present and overall fish densities, the unusually low water levels prevalent in the summer and fall of 2006 made this objective impossible. Determining coho presence/absence and fish densities overall in the reach between the Telkwa River confluence and the 119 Road crossing approximately 250m upstream would still be a worthwhile objective. If funding is available in 2007/2008, the previously discussed objective should be pursued for this site with a follow-up effectiveness evaluation in 2007.																								

Appendix A-1. Field Form for In-Stream REE

Form 1. Routine Effectiveness Evaluation Restoration Works Summary – In-Stream Component

Name of Sponsor PIR-West Fraser Watershed Bulkley River Survey Crew REK, HZ / Silvicon Services REE Interval 6 years
 Forest District Skeena-Stikine Sub-Watershed Toboggan Weather/Flow Sunny, Clear / Mod. Flow Other Components _____
 Date October 3, 2006 Project Name Toboggan Creek Ford ~3.3km Silvern Lakes Road

SITE DESCRIPTION					PERFORMANCE OBJECTIVES												OVERALL								
Stream	Distance	Site ID #	Structure Type	Site Objective	Physical						Biological						Structural Condition	Structural Stability	High Flow Function	Low Flow Function	Maintenance Recommendation	Photo Numbers			
					Pool	Riffle	Gravel Bar	Stream bank	Stream Cover	Ford (empty appr. only)	Overall Rating	Species	Life Stage	Over-winter	Rearing	Holding							Spawning	Fish Passage	Overall Rating
Toboggan Crk WSC 460-242900	3320m	Toboggan Creek	Ford (empty side only)	Maintain 4WD stream crossing for public access to Silvern Lake Rd	-	-	-	-	-	4	4	CO, ST	All	-	-	-	-	3	3	4	4	4	4	4	REK-11 #15-20
Comments:	The ford across Toboggan Creek was constructed in 2000, only on the empty side approach, under the Watershed Restoration Program (WRP) of Forest Renewal BC (FRBC). Concerns by DFO over downstream impacts to fish habitat prevented the completion of any in-stream works or works on the loaded side approach to the stream crossing. The ford works on the empty side approach are holding up well. Rip-rap used to construct the empty side berms and ford approach has not been displaced. The log deflector on the upstream side of the empty approach is still in place and functioning as intended. There is no evidence of rip-rap being washed downstream. The empty side works (berms and ford approach) have so far been completely effective at keeping Toboggan Creek flowing in the primary channel and preventing it from jumping onto the road on the empty side approach. There is some indication that during peak flows minor amounts of water may overtop the berm at the ford approach and run down the road on the empty side for approximately 200m before running downhill off the road. There appears to be some scour of the road surface due to this seasonal overflow. It would be prudent to re-evaluate this site on an annual basis and establish permanent photo points to record changes overtime due to the high energy characteristics of Toboggan Creek.																								

7.0 PHOTOS



Site 3006-1. Upstream view of reconstructed channel. Note bank scour at toe of loaded approach to right of ribbon.



Site 3006-2. Upstream view of completed channel.



Site 3006-3. View of reconstructed stream channel.



Site 306A. View across Fulton River with bridge removed.



Site 413-123. Downstream view of reconstructed channel.



Site 4000-Feature 17/678. Williams Creek. Upstream view of backwatered culvert outlet, in-filled outlet pool.



Site 4000-Feature 23/696. Heal Creek. Culvert outlet; apron and culvert backwatered.



Site 473-1. View across ford from loaded side. No erosion or scour evident.



Site 487-34. Upstream view of reconstructed stream channel under new bridge.



Site 19.3km Telkwa. Downstream view of reconstructed channel under bridge installed in 1999.



Site 19.3km Telkwa. 170mm BT/DV in pool under bridge.



Toboggan Creek Site. Empty side ford approach at Toboggan Creek crossing with log deflector in place.

8.0 REFERENCES

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