Reconnaissance 1:20,000 Fish and Fish Habitat Inventory of the Telkwa River Watershed

WSC 400-422700

Prepared for:

Pacific Inland Resources Ltd.
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PROJECT REFERENCE INFORMATION

FDIS Project Number:	3776
MELP Project Number:	PIR_C172_010_2001
FRBC Project Number:	00FRBC18
FRBC Region:	Skeena-Bulkley Region
MELP Region:	06
MELP District:	Skeena
FW Management Unit:	6-9
Fisheries Planning Unit:	North Coast
DFO Sub-district:	4D Smithers
Forest Region:	Prince Rupert
Forest District:	Bulkley
Forest Licensee and Tenure #:	Pacific Inland Resources Ltd.
First Nation Traditional Area:	Wet'suwet'en Nation

WATERSHED INFORMATION

Watershed Group:	Bulkley
Watershed Code:	460-422700-00000-00000-0000
UTM at Mouth:	9 625429 6062653
Watershed Area:	1200 km^2
Total of All Stream Lengths:	3226.7 km
Stream Order:	7
BGC Zones:	CWH, AT, ESSF, SBS

NTS Maps:	93L/05	93L/06
	93L/11	93L/12
	93L/13	93L/14
TRIM Maps:	93L.042	93L.052
	93L.056	93L.065
	93L.043	93L.053
	93L.062	93L.073
	93L.044	93L.054
	93L.063	93L.074
	93L.045	93L.055
	93L.064	
Air Photos:	SRS30C9960 #1-19, 25-32, 34, 35, 38-62, 65-76, 78, 80-90, 92-94, 114-123,125-149, 152-185, 224-258,	

Air Photos cont.:

260-288, 318-345, 388-396, 400, 401, 404-409, 412, 415-418, 435-437, 442-455, 463, 464

SAMPLE DESIGN SUMMARY

Total number of Reaches:	3150
Random Sampling Sites:	20
Biased Sampling Sites:	57
Fish Sampling Only Sites:	9
Total Sampling Sites:	86
Field Sampling Dates:	September 7 – 15, 2000
Fish Species Captured:	BT, DV, RB

CONTRACTOR INFORMATION

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DISCLAIMER

"The Province has not accepted the contents of this product* for the purposes of the Forest Practices Code, and reserves the right to dispute the validity of summarized results. The province does not necessarily agree with the classification assigned to any individual stream reach, for use in logging plans, silviculture prescriptions or any other application."

* Product refers to the information detailed in the following pages of this report.

ACKNOWLEDGMENTS

Triton would like to thank Alan Baxter of Pacific Inland Resources Ltd and Jay Baker of Silvicon Services for their assistance throughout the planning and field phases of this project. James Cuell, Forest Ecosystem Specialist for the Bulkley Forest District for his feedback and approval of the Non Fish Bearing Status Report and Stream Classifications associated with this project. Chris Schell for his Quality Assurance participation and support in meeting Reconnaissance (1:20,000) Fish and Fish Habitat Inventory Standards for British Columbia. Paul Giroux, Fisheries Inventory Specialist for the Skeena Region was the principal contract monitor.

Forest Renewal BC – a partnership of forest companies, workers, environmental groups, First Nations, communities and government, provided funding for this inventory. Forest Renewal BC funding – from stumpage fees and royalties that forest companies pay for the right to harvest timber on Crown lands – is reinvested in the forest, forest workers and forest companies.

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1.0 INTRODUCTION

Triton Environmental Consultants Ltd. (Triton, Terrace) was retained by Pacific Inland Resources Ltd. (PIR) to conduct a Reconnaissance (1:20,000 scale) Fish and Fish Habitat Inventory in PIR's Telkwa Planning Area, which is located within the Bulkley Forest District.

This project commenced as a result of BC Fisheries and Ministry of Environment, Lands and Parks (MELP) initiatives to gather information about fish distribution, population status, and the condition and capability of stream habitats (Resource Inventory Committee, 1998). Forest Renewal of British Columbia (FRBC) funding and MELP supervision facilitated the commencement of this sample-based survey of the sub-basins outlined within the study area. The inventory provides information regarding the characteristics, the distribution and the relative abundance of fish species, as well as information on biophysical lake and stream data. This information can be used for the interpretation of habitat sensitivity and fish production capability (Resource Inventory Committee, 1998). The results of the inventory may be applied to initial Riparian Management Area (RMA) and lake classification under the Forest Practices Code for forest development planning, watershed restoration, and for the establishment of some landscape-level biodiversity objectives (Anonymous 1998).

1.1 Project Scope/Objectives

Fish and fish habitat values were the primary components of the inventory:

- Fish
  - identify and map fish-bearing stream reaches and lakes using existing information and new field information (field inventory).
- Fish Habitat
  - identification and coding of all waterbodies.
  - identification and characterization of stream reaches utilizing topographic maps and aerial photographs, with confirmation via field sampling.

The results of the inventory are presented on 1:20,000 scale TRIM based maps, MELP Field Data Information Summary (FDIS) data forms, and in the body of this report.

1.2 Location

The Telkwa study area is comprised of all the sub basins that drain into the Telkwa River (WSC 400-422700). The study area is outlined in Figure 1, and is located west of the town of Telkwa, B.C. The study area lies within the southern portion of the Hazelton Mountains and is situated in the Central Interior Ecoprovince within the Fraser Plateau Ecoregion (Demarchi, 1996). The study area is approximately 1200 km^2 and covers 15 TRIM map sheets (Figure 1).

The biogeoclimatic zonation for the study area is a mixture of Coastal Western Hemlock (CWH), Engelmann Spruce - Subalpine Fir (ESSF), Alpine Tundra (AT), and Sub Boreal Spruce (SBS). The CWH portion occurs at the west end of the study area adjacent to the Telkwa River. The ESSF portion of the study area occurs along the middle to upper elevation slopes of the study area, the AT portion occurs in the upper elevation areas within the study area, and the SBS occurs in the middle to lower elevation areas (Meidinger and Pojar, 1991).

1.2.1 Access

Telkwa is situated at the confluence of the Telkwa River and the Bulkley River. Directions from Telkwa to the sample locations within the study area are as follows:

- From the traffic lights in Telkwa turn west,
- Drive west across the one way bridge,
- Continue west on the Telkwa Forest Service Road (FSR) into the study area,
- Various spur roads along the Telkwa FSR access sample site locations.

Sample sites were accessed by both road and air. Helicopter access was the most efficient method of transport due to the distribution of sample sites within the watershed. Helicopters were used extensively to recce streams and reference barriers.

2.0 RESOURCE INFORMATION

Resource values within the study area are primarily forestry based. PIR is currently logging throughout the area. Most of the study area has low capability for agriculture due to adverse climate, topography, bedrock, or poor drainage. Outdoor recreation such as hiking, hunting, fishing, camping, snowmobiling, cross-country skiing and alpine skiing are prevalent within the study area.

Fig.1

The study area lies within the Wet'suwet'en traditional territory.

No active mines were observed in the study area. Background research found that a historic coal mining operation existed in the Goathorn Creek area. The mining took place on the north and south sides of the Telkwa River starting in the early 1920's and ending in 1986. Manalta Coal Ltd. (MCL) now holds the rights to the coal reserves in the area (Remington, 1995). MCL initiated studies (Bustard, 1985 & MacLaren Plansearch Services Ltd, 1985) of the potential impacts to the aquatic resources and water quality if the coal resources were to be developed.

The study area, supports moose *(Alces alces)*, caribou (*Rangifer tarandus*), mule deer (*Odocoileus hemionus hemionus*), whitetail deer (*O. virginianus*) and mountain goat (*Oreamnos americanus*) habitats. In addition, black bear (*Ursus americanus*), wolf (*Canis lupus*), fisher (*Martes pennanti*), and lynx (*Lynx canadensis*) are widely distributed throughout the region. The BC Conservation Data Center has blue listed the Telkwa caribou herd, considering it vulnerable and 'at risk', but not yet endangered or threatened. The Telkwa caribou is a species of special concern due to their sensitivity to human activity. Special management practices have been implemented to protect and rebuild this herd.

Remington (1995) summarizes the Telkwa River water quality information for the period of 1983-1987. The Telkwa River was found to have several characteristic differences than its parent watershed the Bulkley River. The Telkwa River has harder water (mean=38.8 mg/L), more alkaline pH (mean=7.5), higher alkalinity (mean=42mg $CaCO_3$/L), higher conductance (mean=91.3 umhos/cm), higher TSS (mean= 23.9 mg/L) and higher dissolved solids (filterable residue mean=61 mg/L) than the Bulkley River at Quick.

2.1 Existing Fisheries Information

Fisheries Information Summary System (FISS) (1995) and Stream Summary Catalogue (FHIIP, 1991) records indicate that chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), pink salmon (*O. gorbuscha*), steelhead (*O. mykiss*), rainbow trout (*O. mykiss*), Dolly Varden char (*Salvelinus malma*), mountain whitefish (*Prosopium williamsoni*), and cutthroat trout (*O. clarkii*) occur within the study area. Numerous consultant reports were reviewed and found to support FISS and FHIIP information. The reports also identified the presence bull trout (*S. confluentus*), longnose dace (*Rhinichthys cataractae*), and peamouth chub (*Mylocheilus caurinus*). The species identified from existing sources were placed in the FDIS database and mapped according to RIC standards for historical information. Several barriers and obstructions were also identified from the FHIIP and FISS information. The barrier and obstruction information was incorporated into the FDIS database and placed on the maps as historical features.

MELP (Smithers) stream and lake files were reviewed and found to support the FHIIP and FISS information.

Triton (1999) and Silvicon Services Inc. (1999-2000) have conducted 1:5,000 Fish and Fish Habitat Inventories within the watershed. In 1998 Triton completed a 1:20,000 Fish and Fish Habitat Inventory of the Telkwa Watershed. Dave Bustard and Associates Ltd. (1985, 1994, & 1998) have also completed several fisheries projects within the watershed. The results of these projects and inventories has been incorporated into the FDIS database and mapping product.

3.0 METHODS

The 1:20,000 Scale Fish Stream Identification inventory was completed in six phases:

- Phase 1: Existing Data Review
- Phase 2: Map and Air Photo Analysis
- Phase 3: Sampling Design and Project Plan
- Phase 4: Field Data Collection
- Phase 5: Data Compilation
- Phase 6: Report and Map preparation.

The methods employed for each phase of the project followed those outlined in the *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures, April 1998* (Resource Inventory Committee, 1998). Alterations were made to the project plan in Phase 4 and are outlined in the sections below.

3.1 Field Data Collection

The following sections describe the methods and approaches taken to complete field sampling and data collection.

3.1.1 Pre-field Preparations

The stream reaches inventoried were identified by two methods: random sites generated by the FDIS planning tool and biased sites identified by PIR and Triton. Biased sites were selected to address gaps within the randomly generated sampling plan. The final sampling sites incorporated into the contract were reviewed by Alan Baxter (PIR), Jay Baker (FRBC Coordinator), Paul Giroux (FIS, MELP Skeena Region), and Triton to ensure that sample sites met the requirements of PIR, MELP and the FDIS planning model.

Required fish collection permits were obtained from MELP and DFO prior to the commencement of field activities.

3.1.2 Field Procedures

All sampling procedures followed those outlined in the *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures, April 1998* (Resource Inventory Committee, 1998) and the *Forest Practices Code Fish Stream Identification Guidebook,* (BC Forest Practices Code, 1998).

Fieldwork was conducted by two field crews each consisting of two people each. Crews accessed sites by both road and air. Helicopter transportation was provided by Highland Helicopters (Smithers).

Field data was collected on RIC field site and fish collection cards. In addition, the following information was collected at each site and recorded in the comments section of the site card:

- stream classification (as per the BC Forest Practices Code),
- comments supporting stream classification,
- comments regarding fish access (i.e. downstream barriers), and
- general comments regarding rearing, spawning and overwintering habitats were also included in the Habitat Quality section of the site card.

Each crew was equipped with the following field gear:

- Smith-Root Model 12A backpack electrofisher
- electrofisher safety gear (leak proof waders, wading belts, linesman's gloves, hat with a brim, polarized sunglasses)
- minnow traps and bait
- clinometer
- compass
- hip chain
- 50 m tape
- meter stick
- VHF radio
- first aid kit
- water quality kit (hand held pH and conductivity meters)
- thermometer
- Canon waterproof camera and print film
- voucher specimen container
- MELP Site cards
- MELP Fish collection forms
- MELP Individual fish data cards

- field maps

Fish sampling within stream reaches was conducted using three primary sampling techniques: electrofishing, minnow trapping, and visual observation. Electrofishing is the most efficient method of sampling in shallow stream habitats and was the preferred sampling method for all habitat types. In habitats where using an additional sampling method would not provide additional information (i.e. species, relative abundance), electrofishing was the only fish sampling technique employed. In a few cases, minnow traps baited with salmon roe were employed in streams of greater depth and in ponded habitats. Visual observations were also used when other methods failed to catch fish. A combination of techniques were employed where the use of only one method would not have effectively sampled all habitats and in areas not suited to electroshocking (deep pools, wetlands, etc.). Where appropriate and where return visits were practical, minnow traps baited with salmon roe were set and allowed to soak for a 24-hour period.

3.2 Field Data Compilation

Following each field day, field crews met to compile field notes, review field data and summarize the field findings onto hardcopy maps. This system ensured that all information was thoroughly documented, allowing for preliminary stream classifications and changes to the sampling plan. Field crews were in constant contact with Paul Giroux (Fisheries Inventory Specialist) and Alan Baxter (PIR) when the originally proposed plan needed modifications. In most cases sites downstream of known fish bearing reaches were moved to reduce sampling redundancy. These sites were placed in other locations to address potential barriers, identify species composition, establish fish distribution and provide additional sampling data.

3.2.1 Site Cards

Site Cards and Reach Forms were entered into MELP's FDIS database following the completion of the Phase 4 field inventory. Hard copy versions of the Reach/Site Cards are presented in Appendix I.

3.2.2 Fish Collection Cards

The Fish Collection Cards were entered into MELP's FDIS database following the completion of the Phase 4 field inventory. Hard copies of the Fish Collection Forms are presented in Appendix I following the Reach/Site cards.

4.0 RESULTS AND DISCUSSION

4.1 Logistics

Weather conditions were highly variable over the field sampling dates. Rain caused turbid and high water conditions at several sample sites. Field crews often made the decision to sample selected streams, which were not affected by the high runoff. The turbid streams were then revisited when sampling conditions were favorable. The timing of the field sampling helped reduce the number of dry/intermittent streams. The number of dry intermittent streams was low (11 of 86 sample sites). Several sites were moved in the field due to lack of helicopter access (no landing available).

4.2 Survey Information

Table 1 provides an overview of the survey information compiled for the study area.

Table 1. Summary information for the study area.

Major Watershed Code:	460-422700-00000-00000-0000-0000-000-000-000-000-
Watershed Name:	Telkwa River
Drainage:	Telkwa River → Bulkley River → Skeena River → Chatham Sound
NTS Maps:	93L/05 93L/06 93L/11 93L/12 93L/13 93L/14
TRIM Maps:	093L.042 093L.043 093L.044 093L.045 093L.052 093L.053 093L.054 093L.055 093L.056 093L.062 093L.063 093L.064 093L.065 093L.073 093L.074
Total Number of Lakes:	19
Total Number of Reaches:	3150
Stream Field Sampling Dates:	September 7 - 15, 2000
Number of Random Sites Sampled:	20
Number of Bias Sites Sampled:	57
Number of Fish Sampling Only Sites	9
Total Number of Sampling Sites:	86

Previous sampling has been conducted in all sub-basins within the Telkwa watershed. Various consultants as well as Federal and Provincial sources were researched for information pertaining to the Telkwa watershed and it's sub-basins. The project planning report completed prior to field sampling activities includes a list of references and contacts that have completed various projects throughout the watershed. See Appendix IV (Phase I-III Project Plan) and Section 2.1 for these information sources.

4.3 Summary of Sub-Basin Biophysical Information

Table 2 provides a summary of sub-basin biophysical information for the study area.

Table 2. Sub-Basin Biophysical Information

Gazetted Name	WSC/ILP	UTM at Mouth	Watershed Area (ha)	Stream Length (km)	Stream Order	NTS Maps	BGC Zones
Goathorn Creek	460-422700-09600	9.620490 6058952	18658.6	369.6	5	93L/06 93L/11	SBS, ESSF, AT
Tenas Creek	13403	9.620692 6058030	6393.5	148.1	4	93L/11	SBS, ESSF, AT
Four Creek	13409	9.620240 6054198	768.1	14.76	3	93L/11	SBS, ESSF
Cabinet Creek	460-422700-09600-48500	9.622463 6050278	2354.5	43.7	4	93L/11	SBS, ESSF, AT
Webster Creek	460-422700-09600-48500-3460	9.620854 6047570	3041.6	57.25	3	93L/06 93L/11	SBS, ESSF, AT
Pine Creek	460-422700-19400	9.614832 6057206	13567.6	256.4	4	93L/11 93L/12 93L/13 93L/14	SBS, ESSF, AT
Cumming Creek	460-422700-28300	9.609609 6054263	2744.9	66.45	4	93L/11	SBS, ESSF
Howson Creek	460-422700-35700	9.605680 6052420	23019.3	351.2	6	93L/05 93L/06 93L/11	SBS, ESSF, AT
Sunsets Creek	460-422700-54900	9.606691 6041118	10683.8	224.8	5	93L/06 93L/11	SBS, ESSF, AT
Glacis Creek	12370	9.606966 6040536	3230.9	68.9	4	93L/06 93L/11	SBS, ESSF, AT
Mooseskin Creek	12006	9.606804 6038823	2983.4	57.6	4	93L/06	SBS, ESSF, AT
Jonas Creek	11687	9.602237 6051951	1325.8	29.8	4	93L/11	SBS, ESSF
Winfield Creek	460-422700-48300	9.598138 6052056	4110.6	86.5	5	93L/11 93L/12	SBS, ESSF, AT
Sinclair Creek	460-422700-51100	9.596360 6052097	6099.5	118.9	4	93L/11 93L/12	SBS, ESSF, AT
Tsai Creek	460-422700-54400	9.594508 6051312	2930.7	64.8	4	93L/12	CWH, SBS, ESSF, AT
Elliot Creek	460-422700-59600	9.590394 6048248	4712.4	108.7	4	93L/05 93L/12	CWH, SBS, ESSF, AT
Milk Creek	460-422700-66700	9.591218 6048475	5539.1	116.6	4	93L/12	CWH, SBS, ESSF, AT

Information was collected by Triton, using GIS software and digital TRIM maps.

4.4 Habitat and Fish Distribution

The following is a brief description of each of the major sub basins within the Telkwa Watershed.

Goathorn Creek (WSC 460-422700-09600)

Goathorn Creek is a large 5th order stream that is 20.7 km long and is fed by 27 tributaries. The largest tributary is Tenas Creek (ILP 13403), a 4th order stream which flows into Goathorn Creek approximately 1.2 km upstream of the mouth. Other notable tributaries are Four Creek (ILP 13409) and Cabinet Creek (WSC 460-422700-09600-48500). A 3.5 m cascade in Reach 6 was identified as being a barrier to upstream fish migration. No resident fish populations were identified upstream of the cascade. A total of 123 sample sites have been completed in the Goathorn drainage. Triton, 1998 identified two side channels, located in Reach 5 as fisheries sensitive zones (FSZ, as defined by the BC Forest Practices Code).

Pink, coho, and rainbow trout are present within Reach 1 of Goathorn Creek. Mountain whitefish are present within Tenas Creek and are most likely present in Reach 1 of Goathorn Creek as well. Bull trout, steelhead, and Dolly Varden are present up to Reach 5. Upstream of Reach 5 only Dolly Varden were captured with the exception of Cabinet Creek, which contains bull trout and Dolly Varden.

Tenas Creek (ILP 13403)

Tenas Creek is a 4th order stream that is 20.7 km long and is fed by 38 tributaries. Two 8 m falls are located in Reach 8 and Reach 9 of Tenas Creek. The lower 8 m falls is likely the end of fish use in this system. Further sampling above the falls is required to confirm fish absence from the reaches upstream of the falls. A total of 34 sample sites have been completed in the Tenas Creek drainage. No fisheries sensitive zones were identified in this drainage. It was noted that Tenas Creek is very confined and steep side slopes would be sensitive to future development adjacent to the stream (Triton, 1998).

Pink salmon are present in Reach 1 of Tenas Creek. Mountain whitefish are present in Reach 3. Steelhead, bull trout, and Dolly Varden are present throughout Tenas Creek to Reach 6. Above Reach 6 only bull trout and Dolly Varden are present. No sampling was conducted in Reach 7 to the base of the lower 8 m falls.

Four Creek (ILP 13409)

Four Creek is a 3rd order stream that is 7.3 km long and is fed by 4 tributaries. No barriers to upstream fish migration were identified. A total of 15 sample sites have been completed in the Four Creek drainage. No fisheries sensitive zones were identified in the drainage.

Steelhead are present in Reach 1 of Four Creek. Dolly Varden were identified throughout the drainage up to the lower portion of Reach 5. No obstructions to upstream fish migration were identified and gradients are less than 20% (map interpretation); therefore Four Creek has been classified as inferred fish bearing to the headwaters.

Cabinet Creek (WSC 460-422700-09600-48500)

Cabinet Creek is a 4th order stream that is 9.8 km long and is fed by 17 tributaries. The largest tributary is Webster Creek (WSC 460-422700-09600-48500-3460), which is a 3rd order stream the flows into Cabinet Creek approximately 3.2 km upstream of the mouth. A 30 m cascade was identified in Cabinet Creek at the top of Reach 5. This cascade was found to be a barrier to upstream fish migration and no resident fish populations were captured upstream of the cascade. A total of 26 sample sites have been completed in the Cabinet Creek drainage. No FSZs were identified in Cabinet Creek.

Dolly Varden are present within the drainage up to the end of fish use in Reach 5, and in 4 of the tributaries to Cabinet Creek. Bull trout have been identified as being present in Cabinet Creek up to the confluence with Webster Creek, which is known to contain bull trout for a considerable distance upstream of the confluence.

Webster Creek (WSC 460-422700-09600-48500-3460)

Webster Creek is a 3rd order stream that is 9.7 km long and is fed by 18 tributaries. A large (magnitude 23) second order stream (ILP 13068) flows into Webster Creek approximately 2.0 km upstream of the mouth. No barriers to upstream fish migration were identified in Webster Creek. A cascade was identified in Reach 3 of ILP 13068. No sampling was conducted above the cascade therefore the portion of stream above the cascade cannot be classified as non fish bearing. A total of 9 sample sites have been completed in the Webster Creek drainage. No fisheries sensitive zones were identified in the Webster Creek drainage.

Dolly Varden are present within the Webster Creek drainage up to Reach 3. No fish were captured above that point although no barriers to upstream fish migration were identified (Triton, 1998). Bull trout have been identified as being present in Webster Creek up to the confluence with ILP 13068, which is known to have bull trout and Dolly Varden well upstream of the confluence.

Pine Creek (460-422700-19400)

Pine Creek is a 4th order stream that is 29.7 km long and is fed by 79 tributaries. Historical information indicates a 3 m falls in Reach 2. Multiple fish species have been captured above the falls indicating that it most likely is not a barrier to upstream fish migration or that resident populations exist upstream of the falls. No other potential barriers to upstream fish migration were identified. A total of 55 sample sites have been completed in the Pine Creek drainage. No fisheries sensitive zones were identified within the drainage.

Historical information indicates the presence of cutthroat, Dolly Varden, mountain whitefish, coho, and pink in Reach 1. Cutthroat and mountain whitefish are present in Pine Creek up to Reach 3. Dolly Varden are present up to the headwaters (Reach 9).

Cumming Creek (460-422700-28300)

Cumming Creek is a 4th order stream that is 9.3 km in length and is fed by 21 tributaries. No potential barriers to upstream fish migration were identified. A total of 21 sample sites have been completed in the Cumming Creek drainage. No fisheries sensitive zones were identified within the Cumming Creek drainage.

Historical information indicates the presence of rainbow trout in Reach 1. Rainbow trout were also identified in Reach 3 of a large tributary (ILP 12424) to Reach 2. Dolly Varden are present up to Reach 3. No barriers were identified in Cumming Creek and no fish were captured above Reach 3.

Howson Creek (WSC 460-422700-35700)

Howson Creek is a large 6th order drainage that is 25.2 km in length and is fed by 57 tributaries. Two of the larger tributaries are Sunsets Creek (WSC 460-422700-35700-54900) and Scallon Creek (460-422700-35700-59900). An 8 m falls in Reach 8 of Howson Creek prevents upstream fish migration and adequate sampling upstream of the falls indicates there are no resident fish populations present. Two side channels were identified in Reach 1 of Howson Creek and were identified as fisheries sensitive zones as they may provide refuge during high water events (Triton, 1998). A total of 57 sample sites have been completed in the Howson Creek drainage.

Historical information indicates that coho, pink, cutthroat, Dolly Varden, and steelhead are present in Reach 1 of Howson Creek. Steelhead have been identified as far upstream as Reach 2. Rainbow trout were captured in Reach 5. Cutthroat and Dolly Varden are present from the barrier in Reach 8 downstream. No resident fish were identified upstream of the falls in Reach 8. Cutthroat and Dolly Varden are present upstream of Reach 7 in the Sunsets Creek drainage.

Sunsets Creek (WSC 460-422700-54900)

Sunsets Creek is a 5th order drainage that is 18.7 km in length and is fed by 58 tributaries. Two of the larger tributaries are Glacis Creek (ILP 12370) and Mooseskin Creek (ILP 12006). A 4 m falls in Reach 5 of Sunsets Creek prevents upstream fish migration and sampling above the falls indicates there is no resident fish population upstream of the barrier. A side channel in Reach 4 was identified as a fisheries sensitive zone (Triton, 1998). A total of 30 sample sites have been completed in the Sunsets Creek drainage.

Historical information indicates that cutthroat are present in Sunsets Creek from Reach 4 downstream. Dolly Varden are present in Sunsets Creek from the barrier in Reach 5

downstream to the mouth. No resident fish were identified upstream of the barrier in Reach 5 (Triton, 1998).

Glacis Creek (ILP 12370)

Glacis Creek is a 4th order drainage that is 13.1 km in length and is fed by 21 tributaries. A 3 m falls is located approximately 200 m upstream of the mouth. The falls are a barrier to upstream fish migration and no resident fish were captured upstream of the falls (Triton, 1998). No fisheries sensitive zones were identified within the drainage. A total of 7 sample sites have been completed in the Glacis Creek drainage.

No fish are present above the falls in Reach 1 of Glacis Creek. The portion of stream below the falls most likely contains Dolly Varden and cutthroat from the adjacent drainage.

Mooseskin Creek (ILP 12006)

Mooseskin Creek is a 4th order stream that is 10.8 km in length and is fed by 19 tributaries. Mooseskin Creek flows out of Mooseskin Johnny Lake, which is approximately 95 ha. No barriers to upstream fish migration were identified. No fisheries sensitive zones were identified within the drainage. A total of 6 sample sites have been completed in the Mooseskin Creek drainage.

Historical information indicates that cutthroat trout and peamouth chub are present in Mooseskin Johnny Lake. Cutthroat trout were captured into Reach 3. No fish were captured in the tributary streams or upstream of Reach 3 (Triton, 1998).

Jonas Creek (ILP 11687)

Jonas Creek is a 4th order stream that is 7.4 km in length and is fed by 11 tributaries. A 30 m cascade was identified in Reach 2. The cascade is a barrier to upstream fish migration and no resident fish populations were captured upstream of the barrier. A total of 13 sample sites have been completed in the Jonas Creek drainage.

Dolly Varden were captured in Reach 2 of Jonas Creek and in Reach 2 of a tributary stream (ILP 11505). Historical information indicates that rainbow trout are also present in Reach 1.

Winfield Creek (WSC 460-422700-48300)

Winfield Creek is a 5th order stream that is 13.4 km in length and is fed by 24 tributaries. A 4 m falls in Reach 2 was identified as a barrier to upstream fish migration and no fish were captured upstream of the barrier (Triton, 1998). No fisheries sensitive zones were identified within the drainage. A total of 12 sample sites have been completed in the Winfield Creek drainage.

Historical fisheries information indicates that Dolly Varden are present in Winfield Creek below the 4 m falls. The remainder of Winfield Creek above the falls in Reach 2 is non fish bearing.

Sinclair Creek (WSC 460-422700-51100)

Sinclair Creek is a 4th order stream that is 16.4 km in length and is fed by 25 tributaries. No barriers to upstream fish migration were identified within Sinclair Creek. No fisheries sensitive zones were identified within the drainage. A total of 25 sample sites have been completed in the Sinclair Creek drainage.

Bull trout are present up to Reach 7 and are also present in tributary streams; ILP 11651, ILP 11641 and ILP 11657. Dolly Varden were also identified in several tributary streams and are present in Sinclair Creek up to Reach 4. Sinclair Creek is fish bearing from Reach 7 down to the confluence with the Telkwa River. The portion of Sinclair Creek upstream of Reach 7 is inferred fish bearing until further sampling can identify the end of fish use.

Tsai Creek (WSC 460-422700-54400)

Tsai Creek is a 4th order drainage that is 12.7 km in length and is fed by 33 tributaries. A 12 m falls is located approximately 2 km upstream of the mouth. The falls are a barrier to upstream fish migration and no resident fish were captured upstream of the falls. No fisheries sensitive zones were identified within the drainage. A total of 8 sample sites have been completed in the Tsai Creek drainage.

No fish are present above the falls in Reach 2 of Tsai Creek. The portion of stream below the falls contains Dolly Varden.

Elliot Creek (WSC 460-422700-59600)

Elliot Creek is a 4th order stream that is 14.4 km in length and is fed by 46 tributaries. An 8 m falls in Reach 2 was identified as a barrier to upstream fish migration. Historical information indicates that Reach 1 is used by spawning coho and was identified by Triton (1998) as a fisheries sensitive zone. A total of 7 sample sites have been completed in the Elliot Creek drainage.

Historical fisheries information indicates the presence of coho spawning habitat in reach 1. No other fisheries information exists for this stream and no fish were captured in any of the sample sites on the system.

Milk Creek (WSC 460-422700-66700)

Milk Creek is a 4th order drainage that is 12.7 km in length and is fed by 33 tributaries. No potential barriers were noted on this system, however high gradients in the upper

reaches and tributaries are likely barriers to fish. A total of 11 sample sites have been completed in the Milk Creek drainage.

Historical information indicates the presence of Dolly Varden, coho, and mountain whitefish within the drainage. It is likely that coho use the lower reach for spawning and juvenile rearing. Historical information also indicates that Dolly Varden are present in several of the tributaries to Milk Creek.

4.4.1 Patterns of Fish Distribution

Bedrock cascades or falls were identified as the primary barriers to fish access within the study area. Naturally occurring obstructions such as debris jams and landslides as well as anthropogenic obstructions such as culverts were also identified. The barriers and obstructions identified during the 2000 sampling program are found in Table 3.

Fish were captured in 1st to 4th order streams and fish distribution was generally associated with perennial fish habitat and reaches contiguous to other fish bearing streams. Perennial habitat includes the presence of overwintering, spawning, and rearing habitat. Instream overwintering habitat was identified as containing residual pool depths greater than 0.5 m. Other overwintering habitat included wetlands and lakes with depths greater than 0.5 m. Spawning habitat was characterized by the presence of suitable spawning substrates and adequate flows. Rearing habitat was characterized as containing water where fish can live and grow.

Fish bearing 1st order streams were not located far from perennial fish habitat. Habitat quality within 1st order streams was generally poor with smaller average channel widths and low water flows. Field observations indicated that the small channel widths and ephemeral nature of these streams likely limit or prevent their ability to sustain fish populations throughout the year.

During the 2000 sampling program no fish were captured in reaches with an average channel width of less than 1.24 m, or with an average gradient greater than 14.3%. An analysis of results from the 2000 inventory as well as previous surveys in the study area by Bustard (1985-1998), Silvicon (1999-2000) and Triton (1998-1999) was completed. By compiling and presenting summaries of inventory sampling results, Figure 2 (below) describes the gradient vs. width relationship for sampled streams (in the study area) with channel widths <7 m. Gradient and channel measurements were taken directly from the field data gathered for each survey. The measurements used in Figure 2 are averages for each survey site and may contain measurements that are greater or less than the surveyed average. This figure shows that no fish have been captured in channel widths less than 75

Table 3

cm or in streams with gradients greater than 23%.

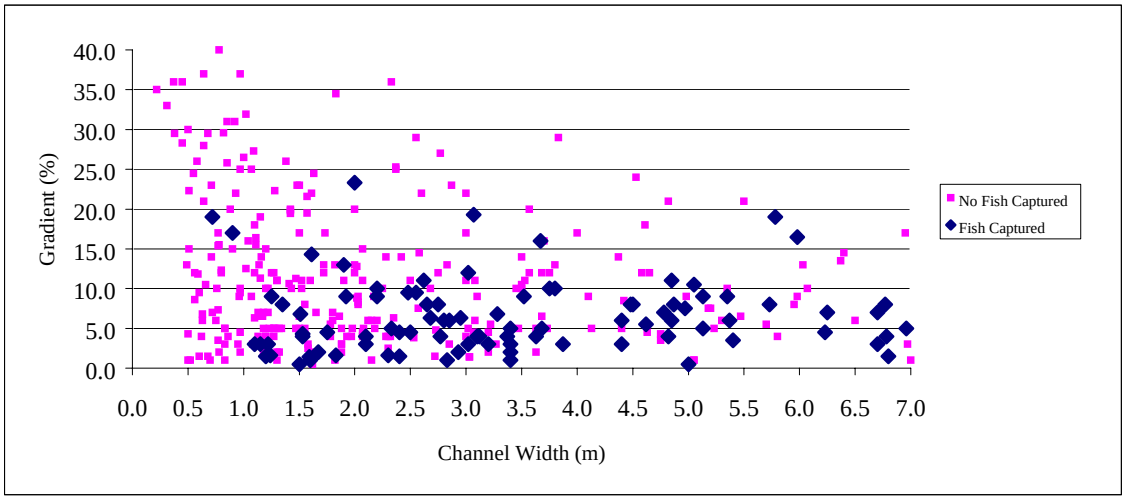

Figure 2. Gradient vs width relationship for sampled streams in the study area with channel widths <7 m (n=365). Includes Bustard (1985-1998), Silvicon (1999-2000) and Triton (1998-2000) sampling results.

A trend that stands out from the above figure is that no streams were sampled with channel widths less than 45 cm. With such a high percentage of Non Visible Channels (NVCs) found within the data set for this study area; it is possible that channel widths must be at least 45 cm or greater to develop a continuous definable channel at lower gradients.

By combining various inventories and results from the area it gives the viewer a better understanding of the types of streams that Forest Practices Code species (within the area) tend to inhabit. Even with considerable sampling effort in streams with less than 1 m channel widths, fish were not found to utilize these streams during the late summer early fall period. The analyzed results from this figure are fairly consistent with other results found throughout the province (non fish presence) in smaller channel width, high gradient streams.

4.5 Fish Age, Size and Life History

Fish were captured in 30 of 86 sample locations. Table 4 provides a summary of the reaches in which fish were captured.

Dolly Varden char, bull trout, and rainbow trout were captured within the study area. Length frequency distributions are provided in the figures below for sport species captured. Bull trout were not found in significant numbers (4), so a length frequency distribution was not created. Quantitative abundance figures were not generated for this project, as sampling methods to determine abundance were not utilized.

Table 4

Dolly Varden

Dolly Varden were found in habitats that ranged from high energy glacial streams to low gradient stagnant pools. Fry and juvenile Dolly Varden were found to inhabit the smaller secondary streams adjacent to overwintering habitat (larger mainstems and lakes) and the larger (mature) Dolly Varden were found in mainstems/larger tributary streams. Dolly Varden reach sexual maturity in 3-6 years and spawn in streams with cobble/gravel substrates and moderate flows. The fry hatch in the spring and reside (3-4 years) in their natal stream until reaching a size large enough to move downstream into larger bodies of water. Northern and high elevation populations are often stunted and rarely exceed 30 cm. Dolly Varden are a relatively long-lived species reaching ages of 10-12 years (Scott & Crossman 1985). A length frequency distribution graph for Dolly Varden captured in the study area is presented in Figure 3. A length vs age graph for Dolly Varden captured in the study area is presented in Figure 4.

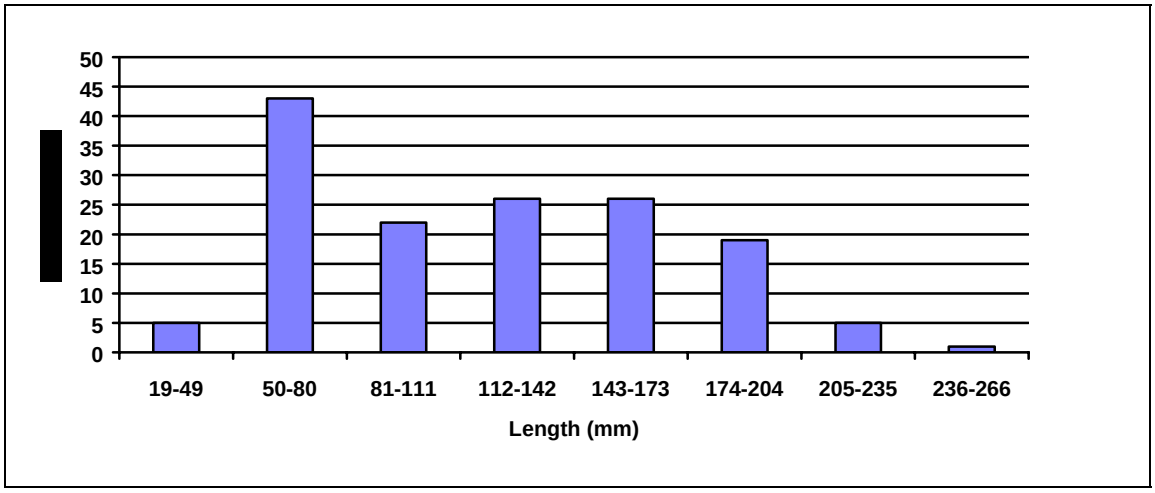

Figure 3. Length frequency distribution for Dolly Varden char captured in the study area (n=147).

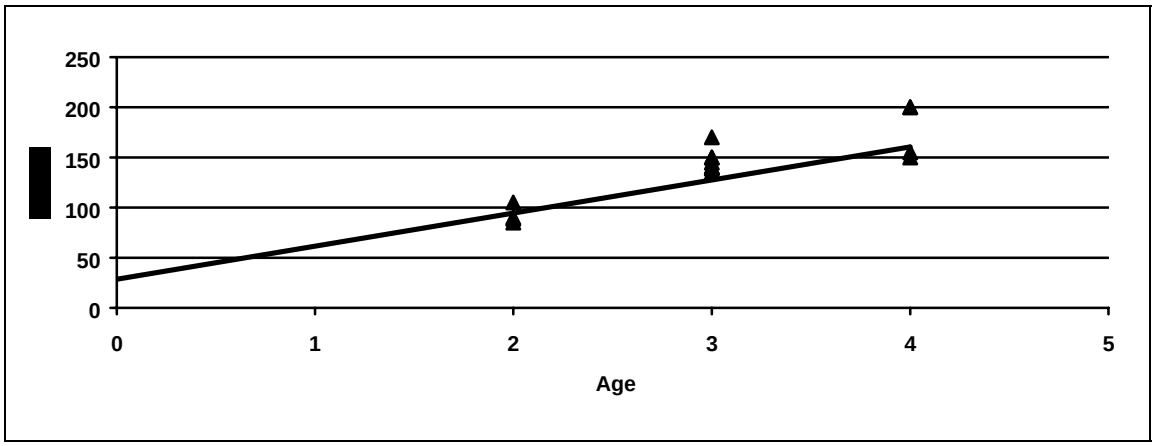

Figure 4. Length vs age for Dolly Varden char captured in the study area (n=7).

Rainbow Trout

Rainbow trout were captured at four locations within the study area. Historical information shows the presence of both resident rainbow trout and steelhead within the study area (Bustard, 1998; British Columbia Ministry of Environment, Lands and Parks, Department of Fisheries and Oceans, 1995). We have referred to the species captured as rainbow trout with the possibility that some may be juvenile steelhead. The rainbow trout captured within the study area were utilizing small to moderately large streams adjacent to larger mainstems. All of the rainbow trout captured were adjacent to overwintering habitats. The rainbow trout within the study area are likely using these smaller tributary streams for spawning and rearing. Rainbow trout spawning occurs mainly from mid April to late June with fry emergence occurring from mid June to mid August. (Scott & Crossman 1985). A length frequency distribution graph for rainbow trout captured in the study area is presented in Figure 5. A length vs age graph for rainbow trout captured in the study area is presented in Figure 6.

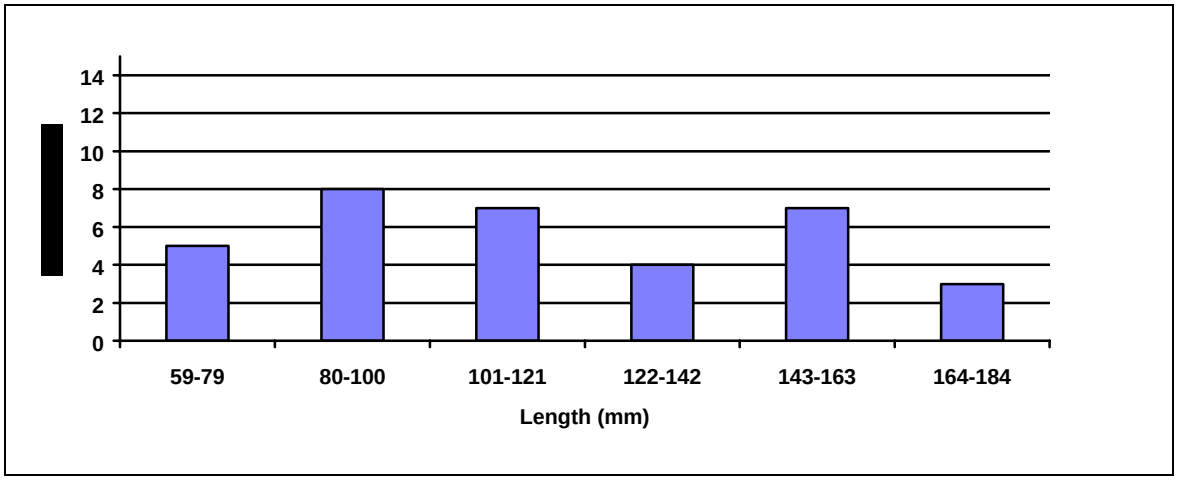

Figure 5. Length frequency distribution for rainbow trout captured in the study area (n=32).

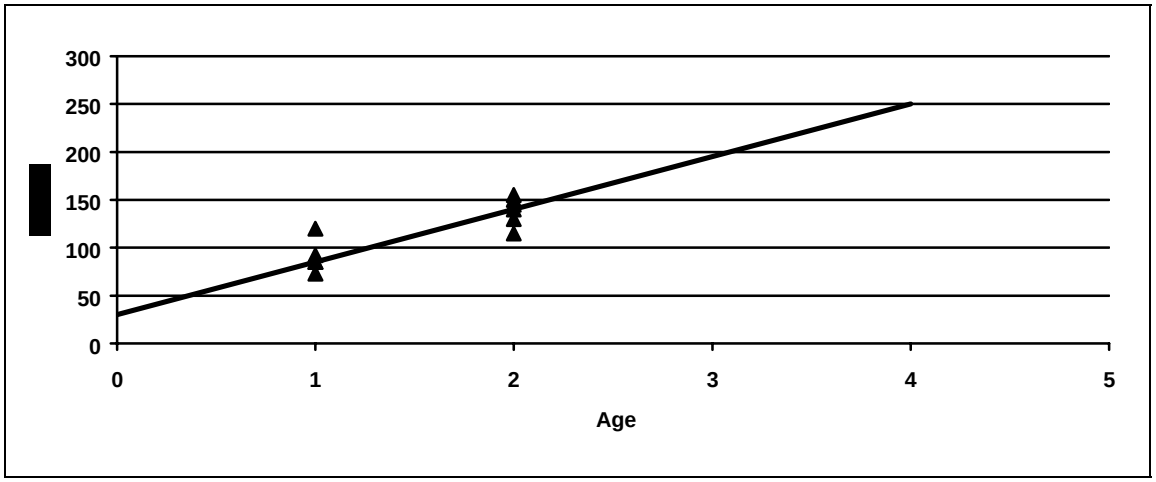

Figure 6. Length vs Age for rainbow trout captured in the Study Area (n=12).

Bull trout

Bull trout were captured in two small first and second order tributaries to Sinclair Creek (WSC 460-422700-51100). Bull trout are known to occupy a wide spectrum of habitat types, often occupying unproductive habitats where rainbow and cutthroat do not thrive. Within the study area there is the possibility of 3 different bull trout life histories:

- Resident: The stream resident that spends its entire life within small headwater streams, often above physical barriers;
- Fluvial: The large river type, which spends its adult life within large rivers and spawns in smaller tributaries. The large river offspring rear in these smaller tributaries until they grow large enough to compete within the large river habitat; and,
- Adfluvial: The lake type, which spends its adult life in a lake habitat and uses the tributary streams for rearing and spawning.

The bull trout captured during the inventory are thought to be the stream resident type due to the size of the captured fish and the location in which they were captured.

4.6 Significant Features and Fisheries Observations

4.6.1 Fish and Fish Habitat

Fisheries values within the sites sampled are largely associated with the limited occurrence of quality spawning and rearing habitats for fish species. The prevalence of high gradients and cascade pool morphology appeared to be the primary limiting factors for spawning and rearing habitats within the sampled reaches.

4.6.1.1 Critical Fish Habitats

Critical fish habitats such as staging areas or large spawning grounds were identified during the historical data review. Historical records indicate the presence of coho, pink, steelhead, Dolly Varden, bull trout and cutthroat trout spawning areas throughout the Telkwa Mainstem and in the lower reaches of the larger tributaries flowing into the Telkwa. Historical fisheries information indicates the presence of salmonid spawning habitats in the lower reaches of Clear Creek, Telkwa River, Cumming Creek, Elliot Creek, Goathorn Creek, Milk Creek, Pine Creek and Howson Creek. Bustard (1985, 1994,1998) and Triton (1998) identified critical off channel habitat adjacent to the Telkwa mainstem.

4.6.1.2 Special Populations

The BC Conservation Data Center has blue listed bull trout within the Bulkley Forest District. Blue-listed means the species is considered vulnerable and “at risk”, but not yet endangered or threatened. Populations of bull trout may not be in decline, but their habitat or other requirements are such that they are vulnerable to further disturbance. Bull trout are present throughout the Telkwa watershed. Habitat requirements and life

history strategies should be considered when encroaching on watersheds where bull trout have been identified.

4.6.1.3 Sport Fishing Opportunities

Sport fishing opportunities are largely associated with mainstem reaches of the Telkwa River and larger (>20 m) perennial tributaries. Anglers were often seen fishing the Telkwa/Bulkley confluence for steelhead and coho.

4.6.2 Habitat Protection Concerns

4.6.2.1 Fisheries Sensitive Zones

Numerous FSZs were identified during the historical data review. Most of the FSZs were described as swamps, sloughs or wetlands. Most of the wetlands identified were channelized and offered access to fish during flooding. Many of the FSZs provide a link between confirmed upstream and downstream fish bearing waters. Irrespective of the official classifications of the numerous wetlands and FSZs throughout the study area, the maintenance of fish passage, access and protection of habitats is a concern.

4.6.2.2 Fish above 20% Gradients

No fish were captured during the survey in gradients above 20%. Figure 6 indicates that fish were captured in a stream with the average gradient over 20%. The fish capture location in this stream was at the toe of the slope where the gradient was substantially less than 20%.

4.6.2.3 Restoration and Rehabilitation Opportunities

Four (4) culverts (Table 3) were identified as barriers or partial barriers to upstream fish migration. In most cases the culvert outlet was perched (0.4-1.0 m) above the outlet pool creating a barrier at low flows. Restoration of the natural watercourse through culvert removal is a possible restoration option where road access is no longer needed. Culvert replacement (downsetting) or outflow pool modification can be used to restore fish access where road access is required.

4.6.2.4 Unstable Slopes

Unstable slopes (landslides) were identified at two sample locations within the study area. The two landslides identified (Site 7 and Site 143) introduced sediment directly into the stream. Both slides were initiated as a result of natural stream erosion of steep unstable banks. Bank stabilization and rehabilitation is not a feasible strategy for these landslides. Forest harvesting activities should be planned to protect riparian areas upstream and downstream of these slides in order to maintain the integrity of the natural stream course.

4.7 Fish Bearing Status

4.7.1 Fish Bearing Reaches

Fish species were captured in 29 of the 46 reaches classified as fish bearing (Table 5). Seventeen (17) reaches in the fish bearing classification table were classified as fish bearing by default. It was determined that fish can access these reaches (from downstream fish bearing waters) and further sampling is not recommended.

The fish bearing status of streams may be directly supported by sampling data or inferred based on the presence of fish habitat and available access from fish bearing waters (inferred seasonal use). For example, if the fish habitat within a given reach is suitable for rearing and/or spawning, and the reach is contiguous to a fish bearing reach, but no fish were captured and no barriers were observed, the reach would be classified as fish bearing. If the reach does not provide suitable rearing, spawning and overwintering habitat or where barriers (includes high gradient) prevent fish from accessing and utilizing the reach it would be classified as non-fish bearing.

4.7.2 Additional Sampling Recommendations

No reaches within the study area were recommended for additional sampling.

4.7.3 Non-Fish Bearing Status

Non-fish bearing status was assigned to 50 of the 86 sample sites within the study area (Table 6). A non-fish bearing classification has been assigned to all sampled reaches within the non-fish bearing table. Non-fish bearing classifications are associated with reaches that lack suitable habitat to sustain salmonids or are inaccessible to fish. Non-fish bearing status was assigned to reaches where any or all of the following criteria applied:

- The stream was labeled a non-visible channel containing no potential fish habitat;
- The stream was deemed inaccessible from fish bearing waters and did not have perennial fish habitat upstream of the barrier;
- Permanent barriers (cascades, falls, etc.) prevented upstream fish migration and the stream did not have perennial fish habitat upstream of the barrier;
- Permanent barriers (cascades, falls, etc.) prevented upstream fish migration and the stream habitat was found to be non fish bearing through sampling above the barrier;
- The stream gradient is >30% (through map interpretation); Gradients were calculated during the pre field planning phases.

Table 5

Table 5

- The stream gradient is >30% (through map interpretation) in the lower section of stream (i.e. reach 1) and all reaches upstream of that reach are >20%;

Inferred non-fish bearing status was given to non sampled reaches with the following criteria:

- Reaches above a stream section found to contain no stream channel (NVC) with no potential fish habitat;
- Reaches above a stream section with an average gradient greater than or equal to 20% (through map interpretation) with no headwater lake present.

Insufficient discharge often results in a lack of connectivity between the channelized portion of stream and downstream watercourses. Lack of connectivity can be described as the channelized portion of stream being isolated from downstream watercourses in which no surface connection or subsurface channel exists (joining the two at any time of the year). Evidence of no surface connection includes a lack of surface scour, no alluvial substrates and no evidence of surface ponding or seasonal flooding. These small streams with no connectivity to fish bearing waters were adequately sampled upstream of the loss of connectivity to verify fish presence or absence.

Reaches that are classified as NVC (NCD, non-RIC term used by the timber industry) are not streams as they do not possess a continuous channel and/or mineral alluvium, criteria necessary to be classified as a stream. The reaches classified as NVC are largely drainages where no stream exists, often an error in mapping. They may also be watercourses that lack evidence of surface scour, contain no continuous definable channel, lack alluvium deposits, and exhibit no evidence of extensive ponding. Wetlands with extensive ponding and wetlands that lack surface water are both considered NVC, as they do not possess stream channels or properties of streams. It should be recognized that a NVC classification does not necessarily mean that the reach is not fish bearing unless otherwise stated. For example, a ponded wetland reach could sustain fish but be classified NVC due to the lack of a continuous definable channel and fluvial substrates. In cases where ponded wetland reaches (NVC) are identified as fish bearing they should not be treated as streams because they do not meet the criteria of a stream. They should be managed to maintain the integrity of the fisheries resources identified within that reach. In most cases the level of concern is low with respect to protecting fish habitats sustained within NVC reaches due to the poor habitat values (for salmonids) associated with wetland habitats. However, the maintenance of fish passage is a concern.

5.0 STREAM CLASSIFICATION SUMMARY

Table 7 provides a summary of stream inventory information collected during the project and Riparian Management Area (RMA) classifications for each reach sampled.

Table 6

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6.0 REFERENCES

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APPENDIX I

Reach Cards/Site Cards/Fish Collection Forms and Photographs

(in order of ascending site number)

APPENDIX II

Phase Completion Reports

Phase I-III Completion Report
Phase IV Completion Report
Phase V-VI Completion Report

APPENDIX III

Quality Assurance Forms and Correspondence

Stage I Quality Assurance
Stage II Quality Assurance
Stage III Quality Assurance
NFBS Review/Acceptance
Misc. Correspondence

APPENDIX IV

Phase I-III Project Plan (with Attachments)

Phase I-III Completion Report
Bibliography
Contact List
FDIS Reach Sampling Summary
Sample Site Selection
Digital Data

APPENDIX V

Project/Interpretive Maps

(map tube submitted with copy of report)