
**Reconnaissance (1:20,000)
Fish and Fish Habitat Inventory
of Selected Tributaries
to the Morice River and the
Bulkley River Watersheds**

**WSC 460 to WSC 460-600600
(Morice North Planning Area)**

Volume 1 of 5

Prepared for:

Canadian Forest Products Ltd.
PO Box 158; 1397 Morice River Road
Houston, BC
V0J 1Z0

Prepared by:

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ENVIRONMENTAL CONSULTANTS LTD.

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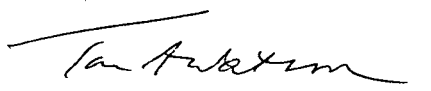
March 2003

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Report Reviewed by:



Tom Watson, Ph.D., R.P.Bio.

PROJECT REFERENCE INFORMATION

FDIS Project Number:	5270
MWLAP Project Number:	CNF_C172_010_2003
FIA Project Number:	FIA 2002-8
FIA Region:	Skeena-Bulkley Region
MWLAP Region:	06
MWLAP District:	Skeena
FW Management Unit:	6-9
Fisheries Planning Unit:	North Coast
FOC Sub-district:	4D
Forest Region:	Prince Rupert
Forest District:	Morice
Forest Licensee and Tenure #:	Canadian Forest Products Ltd. TSA 20
First Nation Traditional Areas:	Wet'suwet'en First Nation, Broman Lake, Lake Babine, Skin Tyee, Cheslatta, Sekanni-Carrier, and Nee- Tahi-Buhn

WATERSHED INFORMATION

Watershed Group:	Morice River
Watershed Code:	460-600600-00000-00000-0000
UTM at Mouth:	09 646250 6031600
Watershed Area:	850.3 km ²
Total of All Stream Lengths:	1557.6 km
Stream Order:	5 th (largest)
NTS Maps:	93L/10, 93K/02, 93L/11, 93L/06, 93L/03, 93L/04, 93L/07
TRIM Maps:	93L.055, 93L.056, 93L.045, 93L.046, 93L.047, 93L.034, 93L.035, 93L.036, 93L.037, 93L.024, 93L.025, 93L.026, 93L.013, 93L.014, 93L.015, 93L.016, 93L.003
BGC Zones:	SBS, ESSF, AT

SAMPLE DESIGN SUMMARY

Total Number of Reaches:	2211
Random Sampling Sites:	36
Biased Sampling Sites:	184
Fish Sampling Only Sites:	45
Total Sampling Sites:	265
Total Historical Sampling Sites:	89
Field Sampling Dates:	September 2 - October 2, 2002
Fish Species Captured During Survey:	RB, CT, BT, DV, CO, LKC

CONTRACTOR INFORMATION

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Report Prepared by:	S. Hartman
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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 John Brockley and Colin Johnston of Canadian Forest Products Ltd. and Todd Mahon of WildFor Consulting Ltd. for their assistance throughout the planning and field phases of this project. Paul Giroux (Ministry of Water, Land and Air Protection) for his guidance throughout the project.

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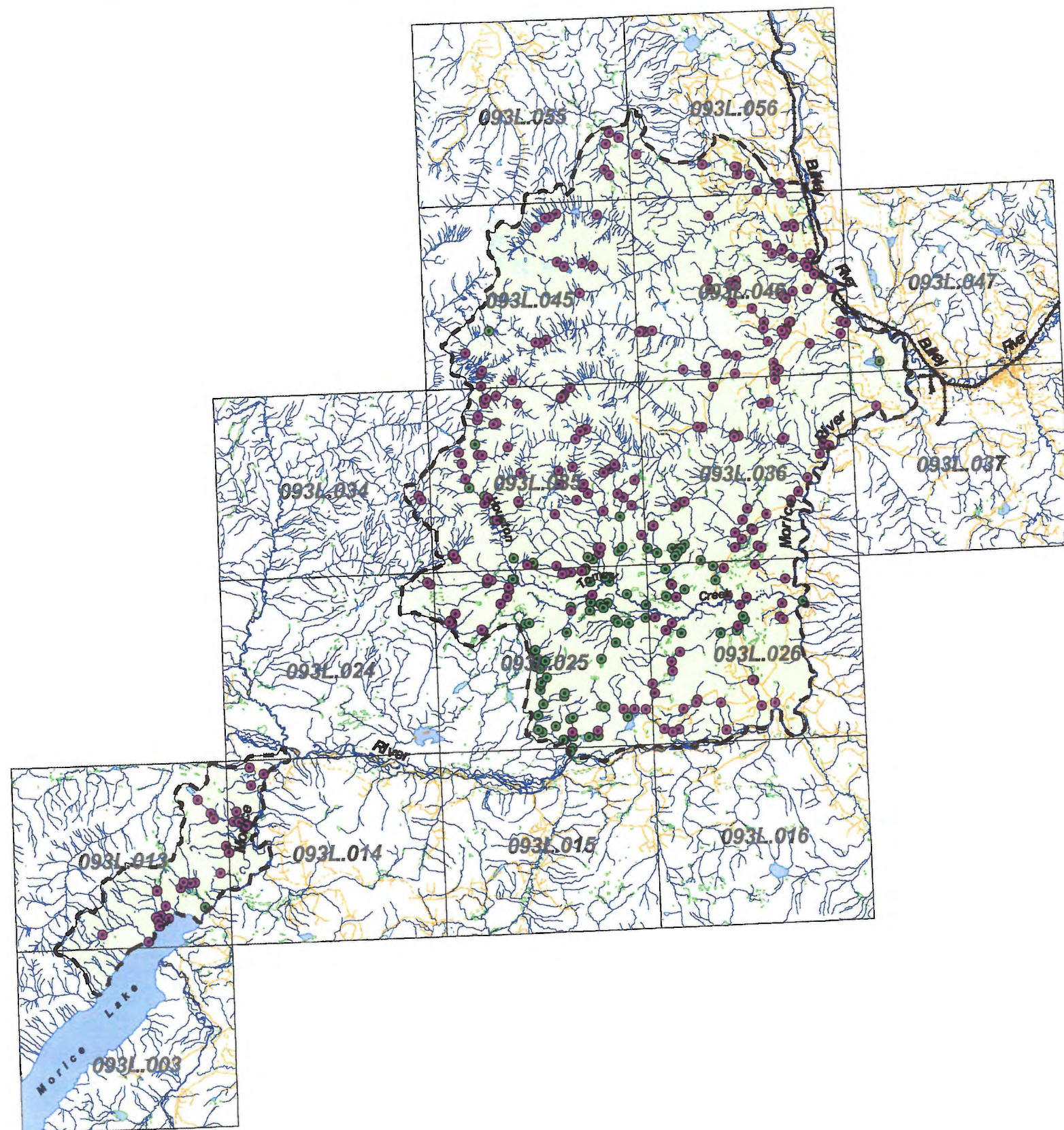
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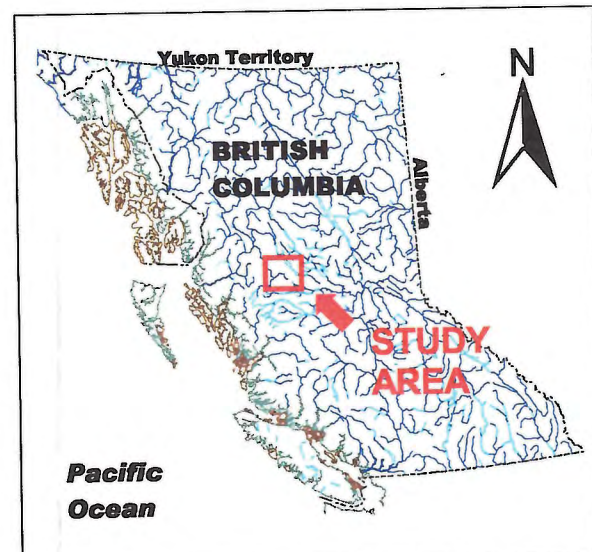
Appendix I	Reach Cards/Site Cards/Fish Collection Forms and Photographs
Appendix II	Phase Completion Reports
Appendix III	Quality Assurance Forms and Correspondence
Appendix IV	Phase I-III Project Plan (with attachments)
Appendix V	Project/Interpretive Maps

LIST OF ATTACHMENTS AVAILABLE AT MWLAP REGIONAL OFFICE

Attachment I	Planning Document Triton Environmental Consultants Ltd., 2002. Phase I-III Pre-field Project Planning Report Reconnaissance (1:20,000) Fish and Fish Habitat Inventory in selected tributaries within the Tochcha and Morice Planning Areas. Prepared for Canadian Forest Products Ltd.
Attachment II	Field Notes Site Cards/Fish Collection Forms
Attachment III	Fish Ageing Structures
Attachment IV	Photo Documentation Photo Summary Report Photo CD Prints in Plastic Sleeves Negatives in Plastic Sleeves
Attachment V	Digital Data Watershed Report Files FDIS Files Mapping Files
Attachment VI	FISS Update Data FISS Update Forms FISS Update Maps



Reconnaissance (1:20,000)
Fish and Fish Habitat Inventory
Morice North Planning Area
Overview Map
Figure 1



Legend

- Sample Site
- Historical Sample Site
- Gravel
- Rough
- Paved
- River/Stream
- Marsh
- Swamp
- Glacier/Icefield
- Lake
- Project Boundary

1: 300,000

5 0 5 Kilometers

Source: 1:20,000 TRIM Projection: UTM

Date: January 15, 2003
Created by: KJS

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1.0 INTRODUCTION

Triton Environmental Consultants Ltd. (Triton, Terrace) was retained by Canadian Forest Products Ltd. (Canfor) to conduct a Reconnaissance (1:20,000 scale) Fish and Fish Habitat Inventory in Canfor's Morice North planning area, which is located within the Morice Timber Supply Area (T.S.A. 20).

This project commenced as a result of Ministry of Water, Land and Air Protection (MWALP) initiatives to gather information about fish distribution, population status, and the condition and capability of stream habitats (Resource Inventory Committee, 2001). Forest Investment Account (FIA) funding and MWALP 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, 2001). 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 (Resource Inventory Committee, 2001).

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 Terrain Resource Information Management (TRIM) based maps, Field Data Information Summary (FDIS) data forms, and in the body of this report.

1.2 Location

Canfor's Morice North planning area is located north and west of Houston, BC and is comprised of two main 5th order drainages and many other tributaries entering the north side of the Morice River from the confluence with the Bulkley River (WSC 460-000000) to "unnamed" stream (WSC 460-600600-66900) entering the north side of Morice Lake. The study area also includes tributaries entering the west side of the Bulkley River

between the confluence with the Morice River (WSC 460-600600) to Edwards Creek (WSC 460-545700).

The study area is situated in the Central Interior Ecoprovince. The watershed lies in the broad rolling plateau that comprises the Fraser Plateau Ecoregion, in the Bulkley Ranges, and Nechako Plateau Ecosections (Demarchi, 1996). The study area is approximately 850.3 km² and covers 17 TRIM map sheets (Figure 1).

Demarchi (1996) describes the climate within the Central Interior Ecoprovince:

The area has a typically continental climate: cold winters, warm summers, and a precipitation maximum in late spring or early summer. The area lies in a rainshadow, leeward of the Coast Mountains. There is intense surface heating and convective showers in summer and in winter there are frequent outbreaks of Arctic air.

The biogeoclimatic zonation for the study area is Sub-Boreal Spruce (SBS), Engelmann Spruce Subalpine Fir (ESSF), and Alpine Tundra (AT) (Meidinger & Pojar, 1991).

1.2.1 Access

Houston is the largest community located near the study area (Figure 1). Sampling sites within the watershed were accessed by both road and air. In watersheds where road access was unavailable transportation was provided out of Houston by Westland Helicopters' Bell Jet Ranger helicopters.

Directions from Houston to the sample locations within the study area are as follows:

Emerson Creek, Dockrill Creek and unnamed tributaries to the Bulkley River

- From Houston drive 4 km west and turn left onto Morice River Road.
- Turn right at 4 km (on the Morice River Road) onto the Bymac Road.
- Follow Bymac Road onto the Morice River Bridge and cross the bridge onto the Walcott Road.
- Travel the Walcott Road for approximately 7 km where several spur roads (on the left) can be used to access the Emerson Creek watershed. Three kilometers further down the Walcott road from this point, the Dockrill Creek watershed can be accessed. Unnamed tributaries to the Bulkley River can be accessed at different locations along the Walcott Road.

Houston Tommy Creek

- From Houston drive 4 km west and turn left onto Morice River Road.
- Turn right at 4 km (on the the Morice River Road) onto the Bimac Road.
- Follow the Bimac Road onto the Morice River Bridge and cross the bridge onto the Walcott Road.

- Follow the Walcott Road for approximately 2 km and turn left on the Gold Road.
- Travel on the Gold Road for approximately 9 km where several spur roads (on the right) can be used to access the Houston Tommy watershed.

Unnamed Tributaries to Morice River and Morice Lake

- From Houston drive 4 km west and turn left onto Morice River Road.
- Follow the Morice River Road onto the Morice West Forest Service Road (27 km).
- Follow the Morice West Forest Service Road to the junction with Thautil Forest Service Road. Turn left at this junction and continue on the Morice West Forest Service Road to access unnamed tributaries to Morice Lake. Unnamed tributaries to Morice River can be accessed at various locations along the Morice River Road and the Morice West Forest Service Road.

2.0 RESOURCE INFORMATION

Resource values within the SBS, ESSF, and AT biogeoclimatic zones include forest harvesting, agriculture, outdoor recreation, tourism and mining. Canfor has current logging operations within the study area. Most of the SBS, ESSF, and AT has low capability for agriculture due to adverse climate, topography, bedrock, stoniness or poor drainage (Meidinger & Pojar, 1991). Fur harvest from this zone is among the highest in the province (Meidinger & Pojar 1991).

First Nation traditional fishing grounds of the Wet'suwet'en First Nation, Burns Lake Band, Lake Babine, Broman Lake, Skin Tyee, Cheslatta, Sekanni-Carrier and Nee-Tah-Buhn, lie in and adjacent to the study area (Government of British Columbia, Treaty Negotiations, 2002).

No active, closed or prospective mines are reported in the study area (EMCBC, 2002). No water quality data specific to the study area was identified.

Canfor's chart area (TSA 20) lies within the study area. Road maintenance, active log hauling, and logging was being conducted within the study area during the inventory. Canfor is actively participating in Forest Development Planning and Land Use planning of the forest lands in and adjacent to the study area.

The Morice River offers world class steelhead fishing, as well as providing excellent habitat for other anadromous resident sport fish species. The Morice River is also part of the Skeena drainage which has the second largest sockeye run in British Columbia (Groot & Margolis, 1991). In addition, the surrounding forested areas are used for hunting, hiking, snowmobiling, camping, and cross-country skiing (Meidinger & Pojar, 1991).

The study area, located within the Central Interior Ecoprovince 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 (*C. lupis*), fisher (*Martes pennanti*), and lynx (*Lynx canadensis*) are widely distributed throughout the ecoprovince. Common herptiles and amphibians include the western garter snake (*Thamnophis elegans*), the spotted frog (*Rana pretiosa*) and the western toad (*Bufo boreas*) (Campbell *et al.*, 1990).

2.1 Existing Fisheries Information

Fisheries Information Summary System (FISS) records indicate that chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), pink salmon (*O. gorbuscha*), kokanee/sockeye salmon (*O. nerka*), chum salmon (*O. keta*), steelhead (*O. mykiss*), rainbow trout (*O. mykiss*), cutthroat trout (*O. clarki*), lake trout (*Salvelinus namaycush*), Dolly Varden (*S. malma*), bull trout (*S. confluentus*), brook trout (*S. fontinalis*), largescale sucker (*Catostomus macrocheilus*), longnose sucker (*C. catostomus*), lake chub (*Couesius plumbeus*), lake whitefish (*C. clupeaformis*), northern pikeminnow (*Ptychocheilus oregonensis*), peamouth chub (*Mylocheilus caurinus*), redbreast shiner (*Richardsonius balteatus*), longnose dace (*Rhinichthys cataractae*), mountain whitefish (*Prosopium williamsoni*), pygmy whitefish (*P. coulteri*), prickly sculpin (*Cottus asper*), slimy sculpin (*C. cognatus*), threespine stickleback (*Gasterosteus aculeatus*), lamprey (*Lampetra sp.*) and burbot (*Lota lota*) are present in the Morice River and Bulkley River watersheds (BC Ministry of Environment, Lands and Parks, and Department of Fisheries and Oceans, 1995).

FISS identified brook trout present within Klinger Lake, which is located on a small 2nd order tributary to the Morice River. Brook trout within Klinger lake were stocked by the Prince George Trout Facility and the Clearwater Trout Hatchery from 1998 to 2002 (Ministry of Sustainable Resource Management (MSRM), 2002). The fish species identified from existing sources were placed in the Field Data Information System (FDIS) database for this project and mapped according to RIC standards for historical information.

MWLAP (Region 6) stream and lake files located in the Smithers regional office were reviewed during Phase 1 and found to support the FISS information for the study area.

3.0 METHODS

The Reconnaissance (1:20,000 Scale) Fish and Fish Habitat Inventory was completed in the following 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 2001* (Resource Inventory Committee, 2001). 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 Canfor and Triton. Biased sites were selected to address gaps in the random sampling plan. Todd Mahon (FIA Coordinator) and Triton (Terrace) reviewed the final sample sites that were incorporated into the contract to ensure the sample sites met the requirements of Canfor, MWLAP and the FDIS planning model. Required fish collection permits were obtained from MWLAP and Fisheries and Oceans Canada (FOC) 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 2001* (Resource Inventory Committee, 2001) and the *Forest Practices Code Fish Stream Identification Guidebook*, (BC Forest Practices Code, 1998).

Two person field crews conducted the fieldwork. In watersheds where road access was available, the crews used 4X4 pick-up trucks. In watersheds where road access was unavailable transportation was provided out of Houston by Westland Helicopters' Bell Jet Ranger helicopters.

Field data were recorded on RIC field site cards and fish collection forms. Fish sample sites were used to collect additional information about fish species composition and to

confirm fish distribution within the study area. Fish sample sites only recorded the information listed on the RIC fish collection forms. In addition, the following information was collected at each random or bias sample site and was recorded in the comments section of the site card:

- Stream classification,
- 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.

Prior to the commencement of field activities each crew was equipped with the following:

- 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
- Backpacks
- Clinometer
- Compass
- Hip chain
- 50 m tape
- Meter stick
- VHF radio
- Garmin handheld GPS unit
- 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 shallow stream habitats and was the preferred sampling method for all habitat types in small streams. In these habitats and where using an additional sampling method would not provide additional information (i.e. species, relative abundance), it 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 observation was also used when other methods failed to catch fish or fish sampling was not practical (spawning fish). A combination of techniques was employed where the use of only one method would not have effectively sampled all

habitats and in areas that were 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. Standard multi panel gill nets were also used to sample lake habitats.

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 hard copy maps. This system ensured that all information was thoroughly documented, allowing for preliminary stream classifications and changes to the sampling plan. In most cases sites downstream of known fish bearing reaches were moved to reduce sampling redundancy, 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 MWLAP'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 MWLAP'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 variable over the field sampling dates. A total of 47 out of 265 sampled sites during the 2002 sampling season were classified as dry/intermittent. The lack of a developed road network in some areas combined with a lack of drivable roads throughout the project area were the biggest obstacles for using vehicle access to reach sample sites. Approximately half of the sample sites were accessed by helicopter. No sites were dropped from the sample plan due to lack of access.

4.2 Survey Information

Table 1 provides an overview of the survey information compiled for the Morice North planning area.

Table 1. Summary survey information for the planning area.

Major Watershed Code:	460-000000-00000-00000
Watershed Name:	Morice River Watershed and selected tributaries to the Bulkley River.
Major sub-basins within project area:	Dockrill Creek Edwards Creek Emerson Creek Gold Creek Houston Tommy Creek
Drainage:	Morice Lake → Morice River → Bulkley River → Skeena River → Chatham Sound
NTS Maps:	93L/10, 93L/02, 93L/11, 93L/06, 93L/03, 93L/04, 93L/07
TRIM Maps:	93L.055, 93L.056, 93L.045, 93L.046, 93L.047, 93L.034, 93L.035, 93L.036, 93L.037, 93L.024, 93L.025, 93L.026, 93L.013, 93L.014, 93L.015, 93L.016, 93L.003
Total Number of Lakes:	33
Total Number of Reaches:	2211
Stream Field Sampling Dates:	September 2 - October 2, 2001
Number of Random Sites Sampled:	36
Number of Bias Sites Sampled:	184
Number of Fish Sampling Sites:	45
Total Number of Sampling Sites:	265
Total Number of Historical Sampling Sites:	89

4.3 Summary of Sub-Basin Biophysical Information

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

Table 2. Sub-basin biophysical information.

Gazetted Name	ILP	UTM at Mouth	Watershed Area (ha)	Stream Length (km)	Stream Order	NTS Maps	BGC Zones
Dockrill Creek	2941	9.640669 6037090	4,603.9	26.6	4	93L/06 93L/07	SBS ESSF AT
Edwards Creek	2445	9.640021 6041784	8,787.7	22.2	3	93L/06 93L/07 93L/10 93L/11	SBS ESSF
Emerson Creek	2868	9.641822 6035904	6,765.3	26.9	4	93L/06 93L/07	SBS ESSF AT
Gold Creek	3406	9.641202 6024771	9,893.2	22.5	5	93L/06 93L/07	SBS ESSF AT
Houston Tommy Creek	3678	9.639818 6016408	24,827.6	53.5	5	93L/06 93L/07 93L/03	SBS ESSF AT

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

AT = Alpine Tundra ESSF = Engelmann Spruce-Subalpine Fir SBS = Sub-Boreal Spruce

Following is a brief description of each of the major sub basins within the Morice North planning area.

Dockrill Creek (ILP 2941)

Dockrill Creek is a 4th order stream that is 26.6 km long and drains into the Bulkley River. A total of 14 sample sites have been completed in the Dockrill Creek drainage.

No barriers to fish migration were observed on the mapped mainstem of Dockrill Creek, but several barriers were observed within major tributaries to Dockrill Creek. A 40 m falls and cascade (100 m x 400 m) in Reach 2 of ILP 2593 (tributary flowing into Reach 5 of Dockrill Creek) was identified as being a barrier to upstream fish migration. No resident fish populations were identified upstream of the 40 m falls and cascade. A 10 m and 25 m falls in Reach 5 of ILP 2981 (tributary flowing into Reach 4 of Dockrill Creek) are barriers to upstream fish migration. It is unknown if a resident fish population exists above these falls as two lakes above the falls have not been sampled (suspected non fish bearing). A 2 m and 5 m falls in Reach 1 of ILP 2942 to Reach 3 of Dockrill Creek are barriers to upstream fish migration. No resident fish population was identified upstream of the falls.

Coho salmon, Dolly Varden and rainbow trout were captured in Reach 1 of Dockrill Creek. Dolly Varden were captured in Reach 6 of Dockrill Creek as well as in tributary ILP 2981 Reach 4 to Dockrill Creek.

Edwards Creek (ILP 2445)

Edwards Creek is a small 3rd order stream that is 22.2 km long and drains into the Bulkley River. A total of 14 sample sites have been completed in the Edwards Creek drainage.

A 5 m falls in Reach 4 of Edwards creek was identified as being a barrier to upstream fish migration. No resident fish populations were identified upstream of the 5 m falls. A cascade in Reach 3 of ILP 2450 (tributary flowing into Reach 3 of Edwards Creek) is a barrier to upstream fish migration. No resident fish populations were identified upstream of the cascade.

Coho salmon, Dolly Varden and rainbow trout were captured in Reach 2 of Edwards Creek. Rainbow trout were also captured in Reach 2 of tributary ILP 2450.

Emerson Creek (ILP 2868)

Emerson Creek is a large 4th order stream that is 26.9 km long and drains into the Bulkley River. A total of 26 sample sites have been completed in the Emerson Creek drainage. A 5 m falls in Reach 7 of Emerson Creek is a barrier to upstream fish migration. No resident fish populations were identified upstream of the 5 m falls.

Coho salmon, Dolly Varden and rainbow trout were captured in Reach 1 of Emerson Creek. Rainbow trout were captured in Reach 6 of Emerson Creek. No fish were captured in sampled tributaries to Emerson Creek.

Gold Creek (ILP 3406)

Gold Creek is a large 5th order stream that is 22.5 km long and drains into the Morice River. A total of 26 sample sites have been completed in the Gold Creek drainage. A 6.5 m falls located at the top of Reach 6 of Gold Creek blocks upstream fish access. A resident bull trout population is present above the 6.5 m falls. A high gradient section (22% for 50 m and >20% for 20 m) in Reach 10 of Gold Creek blocks upstream fish access and marks the 'end of fish use' within Gold Creek. No resident populations were identified upstream of the high gradient section. A 25 m falls in Reach 4 of tributary ILP 3477 flowing into Reach 7 of Gold Creek is a barrier to upstream fish migration. No resident populations were identified upstream of the 6 m falls.

Bull trout, Dolly Varden and rainbow trout were captured throughout the Gold Creek drainage. Bull trout were captured to the headwaters of Gold Creek (Reach 9) with resident bull trout identified upstream of the 6.5 m falls in Reach 6 of Gold Creek. Cutthroat trout were also captured just upstream of a lake in tributary ILP 3412 Reach 4 to Reach 3 of Gold Creek

Houston Tommy Creek (ILP 3678)

Houston Tommy Creek is a large 5th order stream that is 53.5 km long and drains into the Morice River. A total of 147 sample sites have been completed in the Houston Tommy Creek drainage. A 5 m falls located in Reach 7 of Houston Tommy Creek is a barrier to upstream fish migration. No resident fish populations were identified upstream of the falls. A 5 m falls in Reach 1 of ILP 3357 (tributary flowing into Reach 7 of Houston Tommy Creek) is a barrier to upstream fish migration. A cascade (30 m x 30 m) in Reach 1 of ILP 3607 (tributary flowing into Reach 2 of Houston Tommy Creek) was identified as a barrier to upstream fish migration.

Historical records indicate the presence of coho salmon, pink salmon, bull trout, Dolly Varden and rainbow trout within Houston Tommy Creek. Rainbow trout were captured throughout the Houston Tommy Creek to the 5 m falls barrier in Reach 7. Rainbow trout and Dolly Varden were captured throughout the Houston Tommy Creek drainage within tributary streams.

4.4 Fish Age, Size and Life History

Fish were captured in 74 of 354 sampling locations (current and historical data, historical data is shown in green in Tables and on maps) within the planning area. Sampling during the 2002 field season captured fish at 58 of 265 sample site locations. Table 3 provides a summary of the reaches in which fish were captured for all sampling periods (current and historical). Coho salmon, rainbow trout, cutthroat trout, Dolly Varden, bull trout and lake chub were captured in the study area.

Table 3. Fish capture locations within the study area.

Site	ILP	Reach	Order	Species	Stage	Number	Minimum Length (mm)	Maximum Length (mm)
E1065	3678	6	5	RB	A	1	210	210
E10090	3136	1	2	DV	A	1	110	110
E11063	3695	2	3	DV	J	3	64	97
E11063	3695	2	3	DV	A	1	128	128
E11063	3695	2	3	RB	F	1	52	52
E11079	3601	1	4	RB	J	3	97	113
E11079	3601	1	4	RB	F	1	52	52
E11079	3601	1	4	DV	J	5	85	111
E12065	3637	2	2	DV	A	1	135	135
E12065	3637	2	2	RB	F	3	50	60
E12065	3637	2	2	RB	J	3	100	130
E12066	3697	2	3	RB	A	2	108	138
E12066	3697	2	3	DV	A	7	94	113
E12066	3697	2	3	DV	J	1	59	59
E12068	3678	4	5	RB	J	4	150	195
E12069	3357	1	4	RB	J	3	107	153
E12070	3678	7	4	RB	F	1	60	60
E12070	3678	7	4	RB	J	3	150	190
E12078	3603	2	1	RB	J	2	85	130
E12078	3603	2	1	RB	A	1	185	185
E12080	3695	4	2	DV	J	1	60	60
E12081	3560	1	1	DV	F	1	36	36
E12081	3560	1	1	DV	J	7	60	90
E12081	3560	1	1	DV	A	1	85	85
E12091	3599	1	4	RB	A	1	150	150
E12091	3599	1	4	DV	F	7	40	60
E12091	3599	1	4	DV	A	7	80	110
E13051	3247	1	3	RB	F	1	70	70
F12	3692	2	1	RB	A	1	133	133
F14	3802	2	3	RB	F	4	29	41
F14	3802	2	3	RB	J	2	72	86
44	3742	2	3	DV	A	2	125	175
44	3742	2	2	DV	J	6	65	105
250	2445	2	3	CO	J	5	70	87
250	2445	2	3	DV	J	6	85	105
250	2445	2	3	RB	J	4	70	95
253	2941	1	4	DV	J	1	70	70
253	2941	1	4	CO	J	10	60	72
253	2941	1	4	DV	F	1	40	40
253	2941	1	4	RB	J	12	65	110
255	2912	1	4	RB	J	4	85	110
255	2912	1	4	RB	F	5	35	45
255	2912	1	4	CO	J	6	75	87
257	2868	1	4	RB	J	7	70	95
257	2868	1	4	CO	J	5	65	85
257	2868	1	4	DV	F	1	50	50
259	3028	2	3	CO	J	3	105	115
259	3028	2	3	RB	J	4	80	95
275	2450	2	2	RB	F	4	30	35

Table 3. Fish capture locations within the study area.

Site	ILP	Reach	Order	Species	Stage	Number	Minimum Length (mm)	Maximum Length (mm)
275	2450	2	2	RB	J	5	70	85
296	3406	3	5	RB	F	1	35	35
296	3406	3	5	RB	A	2	175	210
296	3406	3	5	RB	J	2	72	80
296	3406	3	5	BT	J	1	53	53
296	3406	3	5	BT	A	1	450	450
297	3412	1	3	RB	A	1	295	295
297	3412	1	3	RB	F	3	33	42
298	3406	6	5	BT	A	1	280	280
298	3406	6	5	BT	J	1	130	130
299	3477	1	4	BT	J	1	110	110
301	3776	1	2	DV	J	1	112	112
331	3599	4	2	DV	J	1	105	105
348	3332	1	2	RB	A	2	130	180
350	3601	4	3	DV	J	5	60	150
450	3753	1	3	RB	J	5	45	50
452	3749	1	2	RB	J	1	50	50
456	3471	3	2	DV	J	10	80	100
457	3532	3	2	CT	F	5	30	35
457	3532	3	2	CT	J	5	90	100
460	3471	5	2	DV	J	1	80	80
505	3520	1	2	RB	F	10	30	40
508	3528	2	3	RB	J	5	60	90
508	3528	2	3	RB	F	5	30	40
509	3532	1	2	RB	J	6	130	150
511	3526	3	1	CT	J	5	60	80
511	3526	3	1	DV	J	5	70	90
512	3549	2	1	CT	J	5	70	80
524	3715	4	2	DV	J	5	45	55
527	3633	2	2	CT	J	3	90	100
527	3633	2	2	CT	F	3	35	40
531	3638	1	2	RB	A	1	120	120
532	3633	2	2	CT	J	5	70	90
533	3633	6	2	CT	F	5	40	45
540	2941	6	3	DV	A	8	100	200
545	2868	6	4	RB	A	1	140	140
546	3406	4	5	DV	J	5	60	80
546	3406	4	5	BT	J	5	60	80
547	3439	1	4	BT	A	6	450	550
547	3439	1	4	BT	J	5	60	80
547	3439	1	4	DV	J	5	60	80
548	3406	5	5	DV	J	10	80	100
548	3406	5	5	BT	J	10	80	100
549	3439	2	3	DV	J	5	80	160
549	3439	2	3	DV	A	1	140	140
551	3406	9	3	BT	A	10	140	160
556	3412	4	3	CT	J	5	50	70
562	3682	1	3	DV	J	5	90	100
569	3602	2	3	RB	J	5	90	110

Table 3. Fish capture locations within the study area.

Site	ILP	Reach	Order	Species	Stage	Number	Minimum Length (mm)	Maximum Length (mm)
569	3602	2	3	DV	A	2	120	130
570	3602	2	3	RB	J	5	100	120
573	3164	1	2	DV	J	5	100	110
574	3164	2	2	DV	J	5	100	120
575	3601	3	4	RB	J	5	100	110
575	3601	3	4	DV	J	5	100	120
581	3617	2	2	RB	J	10	80	120
583	3628	1	3	RB	J	5	100	120
584	3617	3	2	RB	J	5	80	90
591	3259	1	3	RB	J	4	100	120
592	3275	1	3	RB	J	4	110	120
593	3678	3	3	RB	A	10	110	130
600	3599	2	4	DV	J	8	90	120
601	3146	1	2	DV	J	2	100	100
615	3601	5	3	DV	J	6	100	120
624	3697	2	3	DV	J	10	100	110
902	3667	2	1	LKC	J	10	57	83
902	3667	2	1	LKC	J	50	72	108
902	3667	2	1	LKC	J	1	73	73
902	3667	2	1	LKC	J	3	73	80
902	3667	2	1	LKC	J	37	71	92
909	3633	4	2	LKC	J	7	75	115
909	3633	4	2	LKC	J	4	96	110
909	3633	4	2	LKC	J	20	100	108
909	3633	4	2	LKC	J	19	69	108
982	2941	3	4	DV	F	2	45	45
982	2941	3	4	RB	J	1	70	70
982	2941	3	4	RB	F	3	30	30
986	2981	4	3	DV	F	6	33	45
986	2981	4	3	DV	J	5	85	115

BT = bull trout
 DV = Dolly Varden
 CO = coho
 CT = cutthroat trout
 LKC = lake chub
 RB = rainbow trout
 A = adult
 F = fry
 J = juvenile

Ageing structures (fin rays or scale samples) were taken for 1 rainbow trout captured in Knapper Creek (ILP 3526) and 5 bull trout captured in Gold Creek (ILP 3406). A scale sample was taken from the rainbow trout and fin ray samples were taken from bull trout. Length at age information for bull trout and rainbow trout is located in the following appropriate life history sections. Quantitative abundance figures were not generated for this study, as sampling methods to determine abundance were not utilized.

As requested in the project plan, a complete life history of each salmonid fish species captured within the study area along with capture locations, age information and length frequency distributions are provided in the sections below. For other fish species captured a brief life history description as well as a length-frequency distribution histogram is included where appropriate.

4.4.1 Rainbow Trout



Illustration by C. Groot from Pollard, W.R., G.F. Hartman, C. Groot, and Phil Edgell. 1997. Field Identification of Coastal Juvenile Salmonids. Harbour Publishing, PO Box 219, Madeira Park, BC, Canada, V0N 2H0.

Life History

There are two forms of rainbow trout, the anadromous form (moving from salt water to fresh water spawn), commonly referred to as steelhead and the non-anadromous form (remain in freshwater), commonly referred to as rainbow trout (Ford *et al.*, 1995).

Rainbow trout can be a stream dwelling or lake-resident population. Sexual maturity for rainbow trout is reached in 3-5 years (Scott and Crossman, 1973). Rainbow trout spawn from mid-April to late June in tributary streams (or inlets/outlets of their lakes) with fine gravel substrates and riffle/pool morphology (Lindsey *et al.*, 1959; Hartman *et al.*, 1962). Spawning temperature for rainbow trout has been reported to range from 7.2 to 13.3 °C, with the optimal temperature being 11°C (Hooper, 1973; Walburg *et al.*, 1981).

The young emerge from the gravel in the summer and usually migrate into rearing areas of streams or lakes in the first year (Ford *et al.*, 1995). Adequate instream and overstream cover is important for rainbow trout production as it provides resting areas and refuge places from predators (Ford *et al.*, 1995). The diet for rainbow trout generally consists of invertebrates (plankton and crustaceans), insects, snails, leeches, salmon eggs and once mature, rainbow trout may prey on other fish as part of their feeding behaviour (Scott and Crossman, 1973).

Life stage, activity, timing and specific habitat requirements for stream dwelling and lake-resident rainbow trout are presented in Table 4.

Table 4. Rainbow Trout Life Stages and Requirements.

Stage	Activity	J	F	M	A	M	J	J	A	S	O	N	D	Habitat Requirements
Egg / Fry	incubation of the eggs (~28 to 40 days)													Gravel substrate with minimal fines, typically in pool tail-outs.
	hatching of the eggs													Remain in gravel/cobble substrate until yolk sac is absorbed.
	emergence of the fry from the gravel after yolk sac is absorbed (~7 to 14 days)													Fry will often hold in schools along stream margins.
Juvenile / Immature	young rear in natal stream													Juveniles will often occupy margins of riffle and boulder areas.
	outmigration of juveniles to lake or mainstem													
	Rearing (growth and maturation) of immature fish (1 to 3 years)													Rearing habitat (during summer months) consists of undercut banks, instream and overstream vegetation. Overwintering habitat (during winter months) consists of large deep pools, wetlands and lakes.
Adult / Mature	Migration to spawning sites													Tributary streams, larger mainstems, inlets/outlets of lakes.
	Spawning													Spawn in pool tail-outs with gravel substrates and moderate flows.

Information for this table was collected from Ford *et al.*, 1995, page 42.

	Months for initial development
	Months for juvenile development
	Months for general growth and maturation
	Months for spawning activity

Locations within the Study Area

Rainbow trout captured during this survey were found to utilize small (1-5 m) to moderately large streams (5-18 m), which have moderate flows (0.08-0.30 m/s), gravel substrates, and riffle pool morphology. The high occurrence (~84%) of fry and juveniles (29-149 mm) captured and a low occurrence (~9%) of adults (>150 mm) captured, suggests that rainbow trout adults utilize these moderate size streams for spawning then return to lakes or large systems (5th order or larger) for rearing. The juveniles are left to

rear in these moderately sized streams until they are large enough to make a downstream migration to a larger stream or lake. Figure 2 provides a length-frequency distribution for rainbow trout captured in the study area.

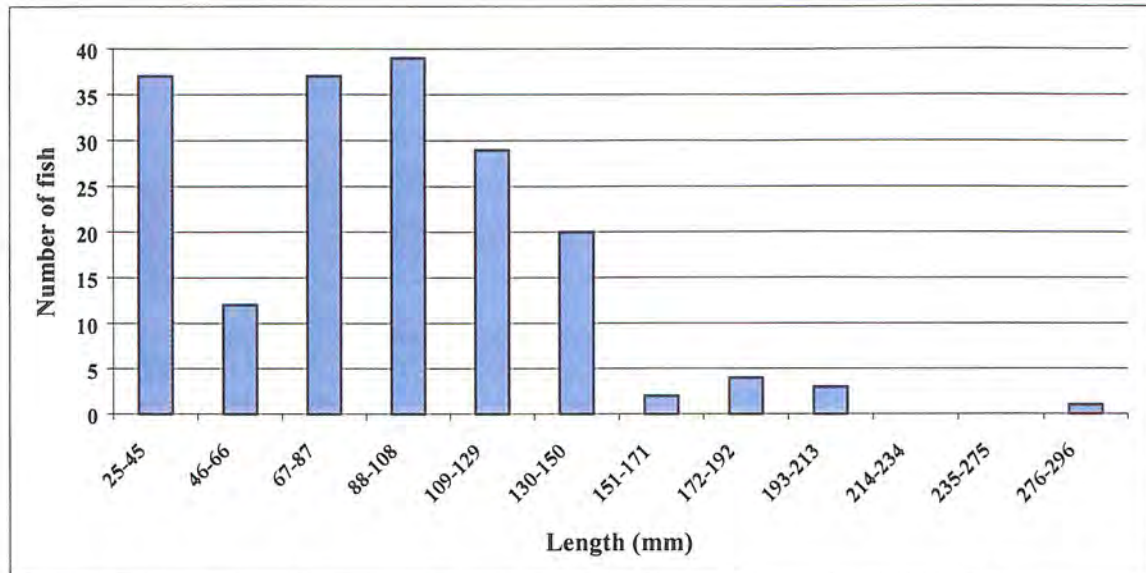


Figure 2. Length-frequency distribution for rainbow trout captured in the study area (n=184).

Although only one ageing sample was collected for a 180 mm rainbow trout (age 2) captured in Knapper Creek (ILP 3526), we can extrapolate from known ageing data collected elsewhere within the region. Triton (1999b, 2000, 2001a and 2001b) rainbow trout ageing data for the region is summarized below:

- 0+, range 40-50 mm, mean 46 mm
- 1+, range 72-150 mm, mean 88 mm
- 2+, range 110-203 mm, mean 140 mm
- 3+, range 110-221 mm, mean 184 mm

According to David Bustard and Associates (1999), steelhead fry (0+) captured within the Gosnell watershed ranged from 31-57 mm and 1+ steelhead ranged from 59-99 mm. This data is similar to the ages of rainbow trout mentioned above.

The majority (68%) of rainbow trout captured in the study area were in the 0+ (<50 mm) and 1+ (51-109 mm) age range. The high occurrence of juveniles suggests that few adults are found in small to moderately sized streams. Figure 2 provides a length-frequency distribution for rainbow trout captured in the study area.

4.4.2 Cutthroat Trout



Illustration by C. Groot from Pollard, W.R., G.F. Hartman, C. Groot, and Phil Edgell. 1997. Field Identification of Coastal Juvenile Salmonids. Harbour Publishing, PO Box 219, Madeira Park, BC, Canada, V0N 2H0.

Life History

There are two forms of cutthroat trout commonly found within British Columbia, the coastal cutthroat trout and the westslope cutthroat trout (Ford *et al.*, 1995). Coastal cutthroat species were captured within the Morice River planning area and may have 4 different 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.
- Adfluvial: The lake type, which spends its adult life in a lake habitat and uses the tributary streams for rearing and spawning.
- Anadromous: Move from fresh water to salt water within the second or third year and then migrate back to their natal freshwater stream to spawn.

The anadromous life history form of cutthroat trout has not been observed in the Morice River planning area.

Sexual maturity for cutthroat trout is reached in 3-4 years with males maturing in as early as 2 years and females spawning for the first time as late as 5-6 years (Scott and Crossman, 1973). Cutthroat trout spawn in tributary streams (or inlets/outlets of their lakes) with gravelly substrates. Spawning time for cutthroat trout varies and ranges between February and August. Scott and Crossman (1973) reported spawning in the period February to May, Shepard *et al.* (1984) in May and June, and Northcote and Hartman (1988) in July and August. Based on observations by Bustard (1998), ripe spawners were captured in an adjacent watershed in the end of May and kelts were captured from mid-June to early July (David Bustard and Associates, 1999).

Spawning times of cutthroat trout are dependent on stream temperature. Spawning temperature for cutthroat trout varies; according to Scott and Crossman (1973), cutthroat trout spawn when water temperatures approach 10°C, while Reiser and Bjornn (1979)

indicated a range of 6.1 to 17.2 °C. Water temperatures within tributaries to the Morice River were found to be 4 to 9°C (and increasing) between May 11 and June 10, 1979 (Lough, 1980). These water temperatures indicate that cutthroat trout may spawn between mid May to end of June within the Morice North planning area.

A period of 6-7 weeks of incubation is required for egg development and the alevins may remain in the gravel for an additional 1-2 weeks (Scott and Crossman, 1973). With variable spawning times, emergence of young cutthroat trout from the gravel can occur anytime between April and August (Scott and Crossman, 1973). Within the Morice North planning area, David Bustard and Associates (1999) suggests that cutthroat emergence occurs during July and early August.

Emergent fry spend variable lengths of time in natal streams. Migratory populations may spend as little as a few months to as long as 4 years in their original streams (Liknes and Graham, 1988). After emergence, cutthroat trout seek rearing habitat in areas of streams or lakes (Ford *et al.*, 1995). Once in rearing areas, cutthroat trout may migrate to access food sources and overwintering habitats (Gottesfeld *et al.*, 2002). The diet for cutthroat trout generally consists of insects (aquatic and terrestrial), invertebrates, salmon eggs, and once more mature, prey on other fishes (Scott and Crossman, 1973).

Life stage, activity, timing and specific habitat requirements for cutthroat trout are presented in Table 5.

Table 5. Cutthroat Trout Life Stages and Requirements.

Stage	Activity	J	F	M	A	M	J	J	A	S	O	N	D	Habitat Requirements
Egg / Fry	incubation of the eggs (~28 to 40 days)													Gravel substrate with minimal fines, typically in pool tail-outs.
	hatching of the eggs													Remain in gravel/cobble substrate until yolk sac is absorbed.
	emergence of the fry from the gravel after yolk sac is absorbed (~14 to 21 days)													Fry will often hold in schools along stream margins.
Juvenile / Immature	young rear in natal stream. From a few months to as long as 4 years (Liknes and Graham, 1988).													Juveniles will often occupy margins of riffle and boulder areas.
	outmigration of juveniles to lake or mainstem													If cutthroat trout are 0+ they migrate in the late fall, if they are 1+ or 2+ they migrate in the spring.
	Rearing (growth and maturation) of immature fish (1 to 4 years)													Migrate between rearing and overwintering areas. Rearing habitat (during summer months) consists of undercut banks, instream and overstream vegetation. Overwintering habitat (during winter months) consists of large deep pools, wetlands and lakes.
Adult / Mature	Migration to spawning sites													Tributary streams, inlets/outlets of lakes.
	Spawning													Spawn in pool tail-outs with gravel substrates when water temperature nears 10°C.

	Months for initial development
	Months for juvenile development
	Months for general growth and maturation
	Months for spawning activity

Information for this table was collected from Ford *et al.*, 1995 page 68, David Bustard and Associates, 1999 and Scott and Crossman, 1973.

Locations within the Study Area

Cutthroat trout were captured in or adjacent to the larger streams that provided overwintering habitat and FISS recorded cutthroat in two unnamed lakes within the watershed. The cutthroat trout captured in 2002 were fry and juveniles, which indicates

they are utilizing the small (0.68-2.43 m) stream, low (2.5-5.0%) gradient habitat for rearing and refuge. Adult cutthroat likely utilize these tributary streams for spawning during the spring.

Age data was not collected for cutthroat trout captured within the study area. Age data collected from adjacent watersheds is presented below (Triton, 2000, 2001b and 2001c).

Triton (2000, 2001b and 2001c) cutthroat ageing data for adjacent watersheds within the region is summarized below:

- 1+, range 69-155 mm, mean 95 mm
- 2+, range 110-160 mm, mean 140 mm

No adult cutthroat trout were captured within the study area, which suggests that these streams are only used for spawning and juvenile rearing. Figure 3 provides a length-frequency distribution for cutthroat captured in the study area.

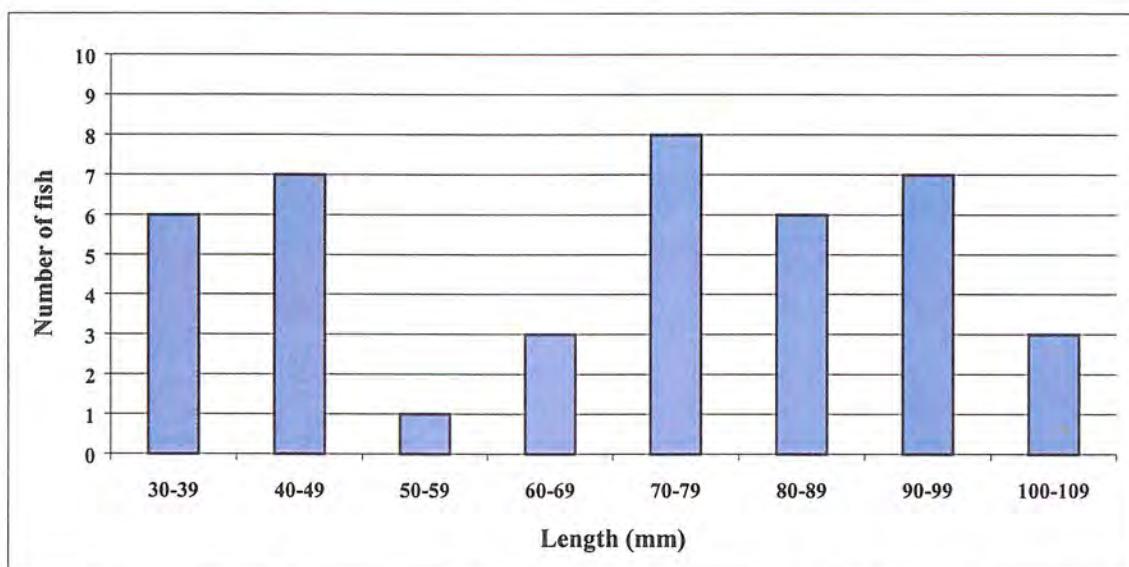


Figure 3. Length-frequency distribution for cutthroat trout captured in the study area (n=41).

Based on age data previously conducted in adjacent watersheds, we can conclude that 59% of the cutthroat trout captured within the study area were 1+ (69-155mm) and 41% were 0+ (<69 mm) as seen in Figure 3. Cutthroat trout within the study area were captured between September 4th and October 2nd, 2002.

4.4.3 Dolly Varden



Illustration by C. Groot from Pollard, W.R., G.F. Hartman, C. Groot, and Phil Edgell. 1997. Field Identification of Coastal Juvenile Salmonids. Harbour Publishing, PO Box 219, Madeira Park, BC, Canada, V0N 2H0.

Life History

In the past, Dolly Varden and bull trout were thought to be same species simply because they have similar life histories and occupy the same habitats. It has been found that Dolly Varden are primarily a coastal species being anadromous over much of their range (moving from salt to fresh water to spawn) and bull trout are primarily an interior species (anadromy is uncertain) (McPhail and Baxter, 1996; Ford *et al.*, 1995).

Dolly Varden are known to occupy a wide spectrum of habitat types, often occupying unproductive habitats where rainbow and cutthroat do not thrive. Resident Dolly Varden are often found above physical barriers and within step-pool cascade habitat.

Dolly Varden may have 4 different 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.
- Anadromous: Move from fresh water to salt water (spend 2 to 3 years in the ocean) then migrate back to their natal freshwater stream to spawn.

Dolly Varden reach sexual maturity in 3-6 years and spawn in streams with cobble/gravel substrates and moderate flows. Spawning takes place in the fall from September to November (usually October) at water temperatures near 8.0°C (Scott and Crossman, 1973). Observations made by Bustard (1999) suggest that Dolly Varden spawning occurs from mid-September into October within the Gosnell watershed.

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. Anadromous Dolly Varden may only rear in freshwater for 2 years before they migrate to the ocean. Migration occurs during May to June and Dolly Varden may spend 2 to 3 years at sea.

The diet of juveniles generally consists of insects, snails, leeches, salmon eggs and once mature they can prey on juvenile salmon (Scott and Crossman, 1973). Life stage, activity, timing and specific habitat requirements for Dolly Varden is presented in Table 6.

Table 6. Dolly Varden Life Stages and Requirements.

Stage	Activity	J	F	M	A	M	J	J	A	S	O	N	D	Habitat Requirements
Egg / Fry	incubation of the eggs (16 weeks)													Small gravel substrate with minimal fines, typically in riffle areas.
	hatching of the eggs													Remain in gravel substrate until yolk sac is absorbed.
	emergence of the fry from the gravel after yolk sac is absorbed (~60 to 70 days)													Fry often found in low velocity side channels and back-channels with undercut banks and quiet shallow areas.
Juvenile / Immature	young rear in natal stream (a couple months to 4 years)													Rearing habitat consists of well oxygenated water with large woody debris, undercut banks, instream and overstream vegetation for cover. Overwintering habitat consists of large deep pools, wetlands and lakes.
	Anadromous form migrates to ocean and remains there for 2 to 3 years													Migrate out to the ocean in late May to early June
	Growth and maturation of resident fish													Migrate to and from rearing and overwintering habitats, migrate in and out of rivers, lakes and tributaries.
Adult / Mature	Migration to spawning sites													Move from the ocean and/or rivers and migrate to natal streams.
	Spawning													Spawn in cobble/gravel substrates with moderate flows.

	Months for initial development
	Months for juvenile development
	Months for general growth and maturation
	Months for spawning activity

Information for this table was collected from Scott and Crossman, 1973.

Locations within the Study Area

Dolly Varden captured within the study area were found in 1st to 5th order streams in habitats that ranged from small (0.63-1.9 m), high gradient (11 to 22%) streams to larger (2.0 to 17.2 m), low gradient (0.8-10%) streams. Fry and juveniles were found to inhabit the smaller secondary streams (1-5 m) adjacent to overwintering habitat (larger mainstems and lakes) and the mature fish were found in mainstems or larger tributary streams. A length-frequency distribution graph for Dolly Varden captured in the study area is presented in Figure 4.

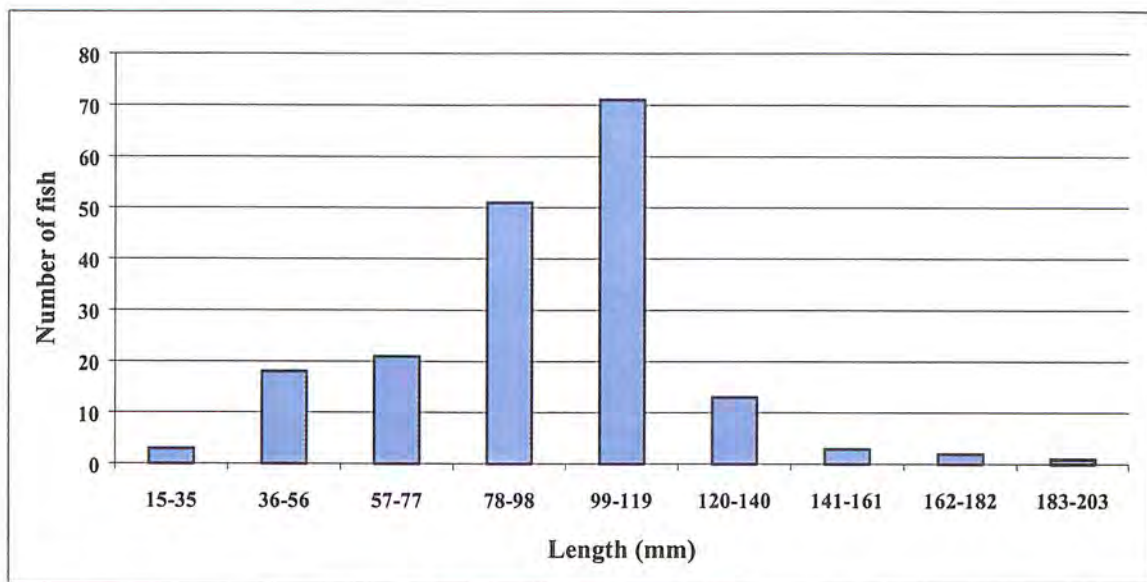


Figure 4. Length-frequency distribution for Dolly Varden captured in the study area (n=183).

Age data was not collected for Dolly Varden captured in the study area. Age data collected from adjacent watersheds within the region is presented below (Triton 2000, 2001a, 2001b and 2002).

Triton (2000, 2001a, 2001b and 2002) Dolly Varden ageing data for the region is summarized below:

- 1+, range 110-120 mm, mean 116 mm
- 2+, range 80-150 mm, mean 111 mm
- 3+, range 115-180 mm, mean 144 mm
- 4+, range 139-200 mm, mean 169 mm
- 5+, range 157-177 mm, mean 167 mm

Based on ageing data previously conducted in adjacent watersheds, we can conclude that 96% of the Dolly Varden captured within the study area were fry or juveniles (age less than or equal to 2+) that were 30-140 mm in length and 4% were adults (age 3+ or greater) that were >140 mm in length.

A male Dolly Varden (140mm) was captured in ILP 3439 Reach 2 (a tributary flowing into Reach 5 of Gold Creek) on September 9, 2002. The male extruded milt when slightly pressed and it was estimated to be ~3 to 5 days pre-spawn.

4.4.4 Bull Trout



Illustration by C. Groot from Pollard, W.R., G.F. Hartman, C. Groot, and Phil Edgell. 1997. Field Identification of Coastal Juvenile Salmonids. Harbour Publishing, PO Box 219, Madeira Park, BC, Canada, V0N 2H0.

Life History

Bull trout are known to occupy a wide spectrum of habitat types, often occupying unproductive habitats where rainbow and cutthroat trout do not thrive. Resident bull trout are often found above physical barriers and within step-pool cascade habitat.

Bull trout within the study area may have 3 different 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.

Sexual maturity for bull trout is reached in 5-7 years (Post and Johnston, 2002) and they spawn in streams with cobble/gravel substrates and moderate flows. Spawning takes place in the fall from September to November (usually October) (Scott and Crossman, 1973). It has been suggested that the threshold temperature below which spawning activity begins is 9°C (McPhail and Murray, 1979; Weaver and White, 1985). According to Bahr (2002), bull trout spawning takes place between August 23rd and September 15th based on observations made in 2001 within the Gosnell and Denys Creeks within the Morice Forest District.

The fry hatch in the spring and reside (1-4 years) in their natal stream until reaching a size large enough to move downstream into larger bodies of water (lakes or rivers) (Ford *et*

al., 1995). The diet for juveniles generally consists of insects, snails, leeches, salmon eggs and once mature, bull trout prey on juvenile salmon (Scott and Crossman, 1973).

Life stage, activity, timing and specific habitat requirements for bull trout are presented in Table 7.

Table 7. Bull Trout Life Stages and Requirements.

Stage	Activity	J	F	M	A	M	J	J	A	S	O	N	D	Habitat Requirements
Egg / Fry	incubation of the eggs (~34 to 120 days)													Small gravel substrate with minimal fines, typically in riffle areas.
	hatching of the eggs													Remain in gravel substrate until yolk sac is absorbed.
	emergence of the fry from the gravel after yolk sac is absorbed (~65 to 90 days)													Fry often found in low velocity side channels and back-channels.
Juvenile / Immature	young rear in natal stream													Rearing habitat consists of well oxygenated water with boulder and cobble substrate, as well as areas with small and large woody debris for cover.
	move into pools and runs (1 to 4 years)													Typically found in pools during summer months and runs during the winter months.
	Growth and maturation (after maturity and up to age 13)													Move into large rivers and lakes.
Adult / Mature	Mature at age 5 and are iteroparous (repeated reproduction)													Occupy lakes at stream mouths.
	Migration to spawning sites													Move from lakes through large rivers to tributaries.
	Spawning													Spawn in cobble/gravel substrates with moderate flows.

	Months for initial development
	Months for juvenile development
	Months for general growth and maturation
	Months for spawning activity

Information for this table was collected from Ford *et al.*, 1995 page 116, Bahr, 2002 and Post and Johnson, 2002.

Locations within the Study Area

Bull trout captured within the study area are thought to be resident and fluvial life history types due to the size of the captured fish and the locations where they were captured.

Bull trout were captured in Gold Creek (ILP 3406) or within tributaries to Gold Creek. A resident bull trout population was captured above a 6.5 m falls (blocking all salmonid access) on the Gold Creek mainstem. The bull trout captured were both juvenile and adults. They were utilizing large (4.84-12.93 m) stream, moderate (2.6-8%) gradient habitat for rearing and refuge.

Resident bull trout captured above the 6.5 m falls in Gold Creek were small (110-160 mm) given that McPhail and Baxter (1996) noted the average size of stream resident bull trout is 200 mm (sizes are rarely >300 mm).

Resident and fluvial bull trout were captured below the 6.5 m falls within Gold Creek. Fluvial bull trout were large (280-550 mm) and according to bull trout ageing data collected by Bahr (2002), these fish were >3+ years in age.

Six (6) spawning bull trout (450-550 mm) were observed in ILP 3439 Reach 1 (a tributary flowing into Reach 5 of Gold Creek) on September 9, 2002. A female bull trout sampled extruded eggs when slightly pressed. The adult bull trout observed were estimated to be ~3 to 5 days pre-spawn.

Ageing data was collected from 5 bull trout ranging from 160-190 mm in size captured within the study area Table 8. Sex and maturity was determined for bull trout specimens taken for ageing by Triton staff.

Table 8. Bull Trout Ageing, Sex and Maturity Data within Gold Creek.

Length (mm)	Weight (g)	Age	Sex	Maturity
160	38.9	Unable to determine age	Indeterminate	Immature (no gonad development)
168	39.9	Unable to determine age	Indeterminate	Immature (no gonad development)
185	54.6	4	Indeterminate	Immature (no gonad development)
188	75	3	Female	Maturing (156 eggs)
190	60.5	3	Indeterminate	Immature (no gonad development)

The maturing resident 188 mm female bull trout (Table 8) captured within Gold Creek was found to have 156 eggs (each ~4 mm in size). Ageing data collected for this specimen concluded that this female was 3 years in age. According to McPhail and Baxter (1996), stream resident bull trout may mature 1-2 years earlier than migratory populations in the same region.

Ageing data for bull trout was collected from the Morice River watershed by Bahr (2002) and is presented below. Juvenile scale samples are often the most difficult to age due to

the difficulty in identifying the first winter annuli. Fin rays of adult bull trout were taken and are easier to determine age.

Bull trout ageing data collected by Bahr (2002) for the Morice River watershed¹ is summarized below:

- 0+, range 44-85 mm, mean 57 mm
- 1+, two fish at 117 and 124 mm, mean 121 mm
- 2+, range 120-300 mm, mean 205 mm
- 3+, range 260-410 mm, mean 323 mm
- 4+, range 365-470 mm, mean 413 mm
- 5+, range 385-540 mm, mean 458 mm
- 6+, range 410-560 mm, mean 482 mm
- 7+, range 415-655 mm, mean 525 mm
- 8+, range 460-640 mm, mean 539 mm
- 9+, range 460-625 mm, mean 522 mm
- 10+, range 535-580 mm, mean 561 mm
- 11+, range 525-655 mm, mean 570 mm
- 12+, two fish at 650 and 755 mm, mean 703 mm
- 13+, one fish at 530 mm
- 14+, one fish at 640 mm

Figure 5 provides a length-frequency distribution for bull trout captured in the study area.

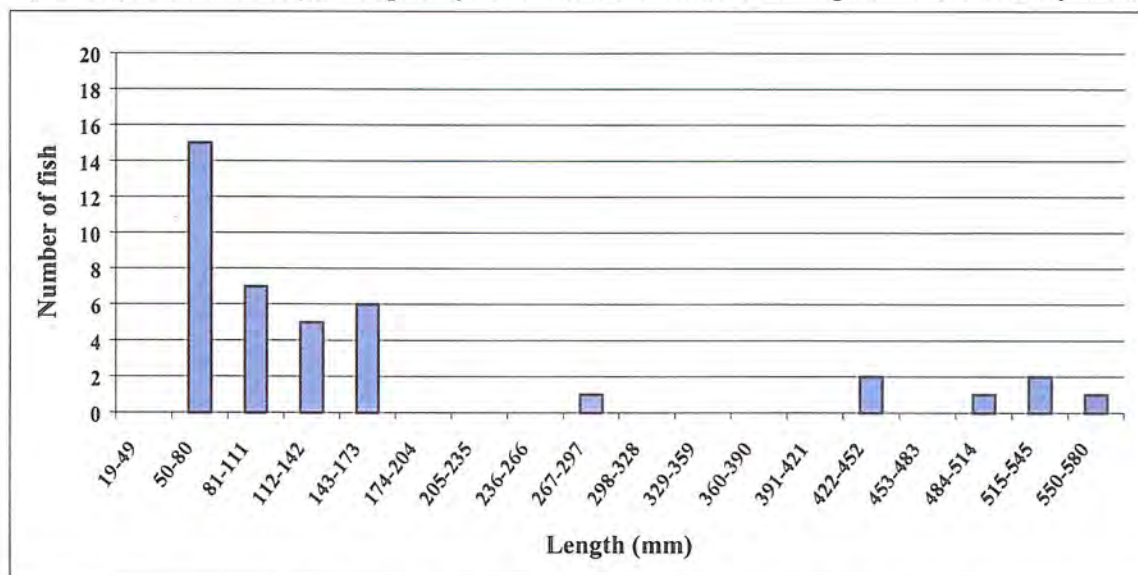


Figure 5. Length-frequency distribution for bull trout captured in the study area (n=41).

Based on ageing data previously conducted within the Morice River watershed (Bahr, 2002 and Triton 2003), we can conclude that 55% of the bull trout captured within the study area were 0+ and 1+ (53-120 mm). Bull trout within the study area were captured on September 9th, 2002.

¹Includes ageing data collected from the Upper Morice, Middle Morice, Lower Morice, Gold Creek, Gosnell Creek, Thautil River and the Thautil/Gosnell only. Ageing data from the Nanika River and Crystal Creek was not used.

4.4.5 Coho Salmon



Illustration by C. Groot from Pollard, W.R., G.F. Hartman, C. Groot, and Phil Edgell. 1997. Field Identification of Coastal Juvenile Salmonids. Harbour Publishing, PO Box 219, Madeira Park, BC, Canada, V0N 2H0.

Life History

Coho salmon captured within the Morice North planning area are anadromous (moving from salt to fresh water to spawn). Most coho salmon spawn at age 3 or 4, but in the north this increases to 4 to 5 year old fish (Scott and Crossman, 1973). Some jacks (early maturing male that is coincidentally small) return to their natal stream to spawn only after a short period of time in the ocean. Coho spawn in swift water with shallow gravelly areas of river tributaries usually from October to November (Scott and Crossman, 1973). Based on observations by Envirocon Ltd. (1984), coho salmon first arrive in the upper Morice in mid-August and David Bustard and Associates (1999) observed more than 200 coho salmon at the confluence of the Morice River with Gosnell Creek at the beginning of September. According to Hancock *et al.* (1983), the peak spawning for coho salmon within the Gosnell Creek is during late October and is finished in the beginning of November.

The eggs remain in the gravel over the winter and after hatching in the spring, the alevins may remain in the gravel for an additional 2-3 weeks until their yolk sac is absorbed (Scott and Crossman, 1973). In Gosnell Creek within the Morice North planning area, Envirocon Ltd. (1984) found that coho fry emergence begins in mid-May and continues into early July.

Emergent fry will spend between 1 and 2 years in natal streams and once smolting begins they will migrate downstream to the ocean where they reside for a subsequent 1 to 3 years. Smith and Berezay (1983) found that outmigration for coho smolts within tributaries to the Morice River occurs during late May through mid-June (Smith and Berezay, 1983).

The diet for young coho salmon in fresh water generally consists of insects (aquatic and terrestrial), invertebrates, sockeye fry and other small fish, and once in the ocean, they prey on chum and pink fry, herring, sand lance and other fishes (Scott and Crossman,

1973). Adult coho salmon feed on wide variety of fishes and invertebrates during the ocean phase of their life cycle.

Life stage, activity, timing and specific habitat requirements for anadromous coho salmon are presented in Table 9.

Table 9. Coho Salmon Life Stages and Requirements.

Stage	Activity	J	F	M	A	M	J	J	A	S	O	N	D	Habitat Requirements
Egg / Fry	incubation of the eggs (35 to 50 days)													Shallow gravelly areas with minimal fines, near ground water upwellings.
	hatching of the eggs (depends on when the nest was made)													Remain in gravel substrate until yolk sac is absorbed.
	emergence of the fry from the gravel after yolk sac is absorbed (observed by Envirocon Ltd. 1984).													Fry often found in low velocity side channels, back-channels, ponds and lakes.
Juvenile / Immature	young rear in natal stream (usually 1 or 2 years before migrating to the ocean).													Rearing habitat consists of side-channels, back-channels, ponds, lakes, as well as areas with small and large woody debris for cover and undercut banks. Overwintering habitat consists of deeper waters (pools, ponds, wetlands, lakes).
	Smolting													Outmigration of coho smolts to the ocean. Within the Gosnell Creek begins in late May to mid June (Smith and Berezay, 1983).
	Growth and maturation within the ocean.													Coho will spend from 1 to 3 years in the ocean.
Adult / Mature	Migration to spawning sites													Move from the ocean back to natal freshwater streams.
	Spawning													Spawn in swift water of shallow gravelly areas. Die after spawning.

	Months for initial development
	Months for juvenile development
	Months for general growth and maturation
	Months for spawning activity

Information for this table was collected from Scott and Crossman, David Bustard and Associates, 1999, Smith and Berezay, 1983, Envirocon Ltd., 1984.

Locations within the Study Area

Coho salmon were captured in larger (2.38 to 17.2 m), low gradient (2.4 to 4%) streams that provided overwintering habitat. Coho salmon capture locations were all located less than 14 km away from the Bulkley River mainstem, which suggests that the coho were using these streams for rearing and refuge. Adult coho salmon likely utilize these tributary streams for spawning during the fall. Ageing data was not collected for coho salmon captured within the study area. Figure 6 provides a length-frequency distribution for coho captured in the study area.

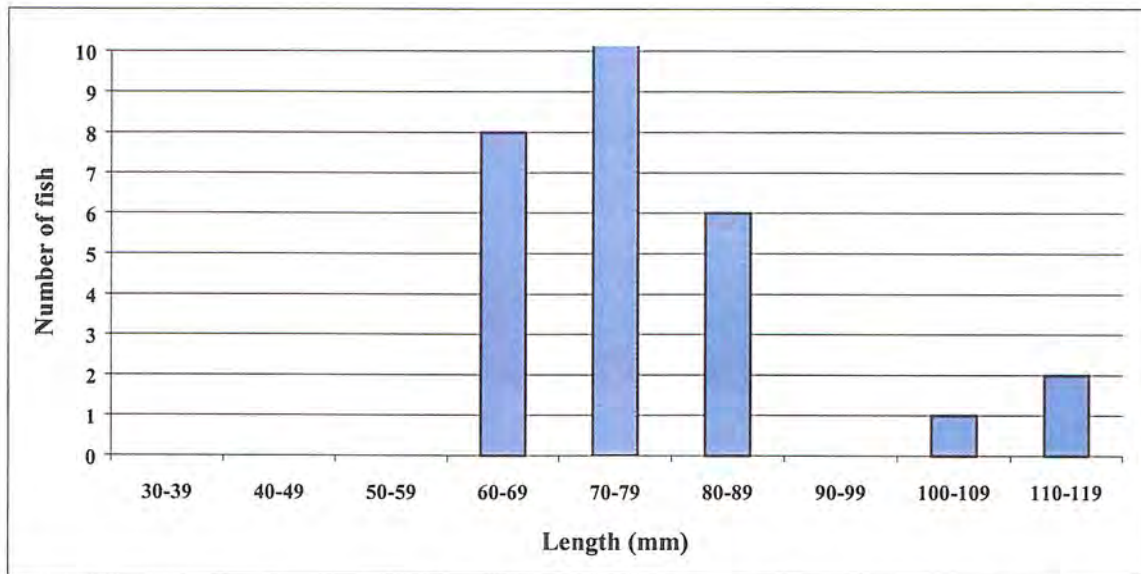


Figure 6. Length-frequency distribution for coho salmon captured in the study area (n=29).

No adult coho salmon were captured within the study area, which supports the theory that these streams are only used for spawning and juvenile rearing. Based on the life history of coho salmon we can conclude that all the coho captured within the study area were <2+ in age. Coho salmon within the study area were all captured on September 3rd, 2002.

4.4.6 Brook Trout

Life History

Brook trout spawn within tributary streams or within the shallow gravelly areas of a lake. Males mature at 2-3 years with females maturing a year later (Ford *et al.*, 1995). Spawning usually takes place in from late September through to November (Scott and Crossman, 1973). Emergence of young likely occurs from late January to late May depending on when the eggs were laid. The young move to shallow areas of their natal stream or move to lake margins for rearing.

Locations within the Study Area

FISS identified brook trout present within Klinger Lake (ILP 3570), which is located on a small 2nd order tributary to the Morice River. Brook trout within Klinger lake were stocked by the Prince George Trout Facility and the Clearwater Trout Hatchery from 1998 to 2002 (Ministry of Sustainable Resource Management, 2002). As the population of brook trout is stocked, they are most likely introduced as juveniles and therefore rearing mainly within the lake. During RFFHI, no other populations of brook trout were captured within the Morice North planning area.

4.4.7 Lake Chub

Life History

Lake chub is a large minnow that can be found in lake, wetland and stream type habitats. Studies indicate that the fish mature in their third or fourth year and probably seldom survived beyond 5 years, female lake chub are known to grow faster and live longer than the males (Scott and Crossman, 1973). Lake chub usually undergo a spawning migration from lakes to tributary streams early in the spring. In British Columbia, the lake chub range extends from the Columbia and Fraser to the Skeena, Peace and Liard (Scott & Crossman 1973).

Locations within the Study Area

Numerous lake chub were captured in two lakes (ILP 3363 Reach 4 and ILP 3667 Reach 2) that were minnow trapped within the Morice North planning area. The lake chub captured ranged in size from 57-120 mm (average 87 mm). The lake chub within the study area most likely utilize the lake and wetland habitat along with the connecting stream habitat between these two habitat types. Figure 7 provides a length-frequency distribution for lake chub captured in the study area.

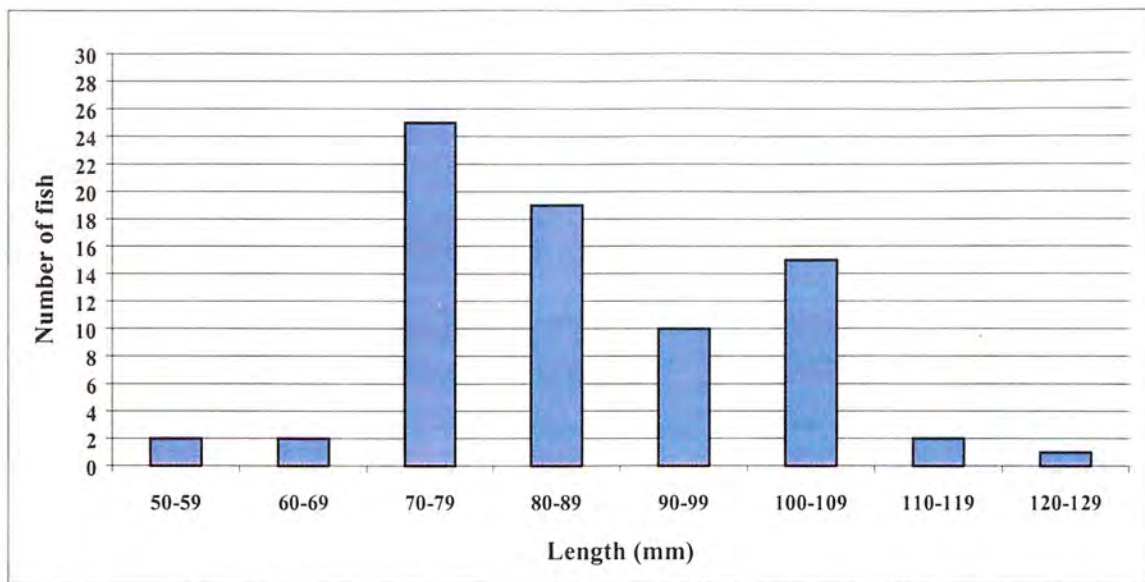


Figure 7. Length-frequency distribution for lake chub captured in the study area (n=76).

4.4.8 In-Stream Work Windows

In-stream work windows are periods of time when there is a lower risk from work activities to aquatic resources, fish and their habitats (The Fisheries Committee, June 1999). Work windows for fish species are produced by the Ministry of Water Land and Air Protection and the Department of Fisheries and Oceans to protect fish during the more sensitive stages of their life history (egg, alevins and spawning). The following table outlines the work windows for the species captured and identified within the study area.

Table 10. In-stream work windows for species captured within the Morice North planning area (Morice Forest District).

Species	J	F	M	A	M	J	J	A	S	O	N	D	Dates
Chinook													June 15 to July 31
Coho													July 1 to August 31
Pink													May 15 to August 15
Chum													May 15 to August 31
Sockeye													June 15 to July 15
Kokanee													June 15 to July 15
Steelhead													September 1 to December 31
Rainbow Trout													September 1 to January 31
Cutthroat Trout													September 1 to December 31
Dolly Varden													June 15 to August 31
White Fish													June 1 to September 15
Bull Trout													June 15 to August 31

Information for Table came from The Fisheries Committee, 1999, page 12.

4.5 Habitat and Fish Distribution

Fish were captured in 1st to 5th order streams and fish distribution was generally associated with perennial fish habitat. Perennial habitat includes the presence of available 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, perennial flows, and adequate water velocity. The quality of spawning habitat was based on a field observation and judgment on how close the observed habitat met the following parameters:

- Low or poor quality spawning habitat was characterized by a lack of significant accumulations of spawning substrates, turbulent flows, low average water velocity (<1% gradient), or high average water velocity (>1 m/s).
- Medium or Moderate quality spawning habitat was characterized by occasional accumulations of spawning substrates (<10% of total habitat area) but limited by one or several of the following parameters: turbulent flows, high proportion of fines, low average water velocity (<1% gradient), or high average water velocity (>1 m/s).
- High quality spawning habitat was characterized by abundant accumulations of suitable spawning substrates (>10% of total habitat area) perennial flows, and moderate gradient (1 to 5% gradient).

Rearing habitat was characterized as habitat with adequate water (seasonal) to sustain growth. The quality of rearing habitat was based on a field observation and judgment on how close the observed habitat met the following parameters:

- Low or poor quality rearing habitat was characterized by a lack of channel development and limited by ephemeral flows, shallow average water depths (<10 cm), lack of significant pools (>10 cm), and a predominance of fine or organic substrates.
- Medium or moderate quality rearing habitat was characterized by the presence of perennial flows and limited by one or several of the following parameters: low gradient (<2%), high gradient (>10%), lack of cover, lack of significant pools (>20 cm), lack of coarse substrates, or large average substrate size (boulders).
- High quality rearing habitat was characterized by perennial flows, abundant cover, moderate gradient (1-5%), frequent riffles and pools.

Fish were captured in five 1st order streams and one lake. Most of the first order streams had a channel width of 0.68-2.0 m and/or contained a headwater wetland or lake. Habitat quality within 1st order reaches was generally poor with smaller average (<1.3 m) channel widths and ephemeral 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, particularly throughout the year. It is unlikely that fish use these reaches, due to the short duration of water flows and lack of suitable fish habitat, unless they flow into a major system (i.e. 3rd to 5th order) or contain pockets of perennial fish habitat.

Fish were captured in twenty-five 2nd order streams within the Morice North planning area (current and historical information). These fish bearing 2nd order streams had a mean channel width of 2.52 m. Fish were captured in twenty-five 3rd order streams that had a mean channel width of 4.78 m. Fish were captured in thirteen 4th order streams that had a mean channel width of 8.38 m. Fish were captured in five 5th order streams that had a mean channel width of 13.8 m.

Fisheries values within the project area are largely associated with the limited occurrence of spawning and rearing habitats. The prevalence of shallow stream habitat and low overall habitat complexity, appear to be the primary limiting factors for spawning and rearing habitats. The general lack of deep pool habitats and perennial flow in tributary streams limits the occurrence of suitable rearing and overwintering habitats for resident trout. Figure 8 shows the relationship between fish capture locations and gradient vs. channel width.

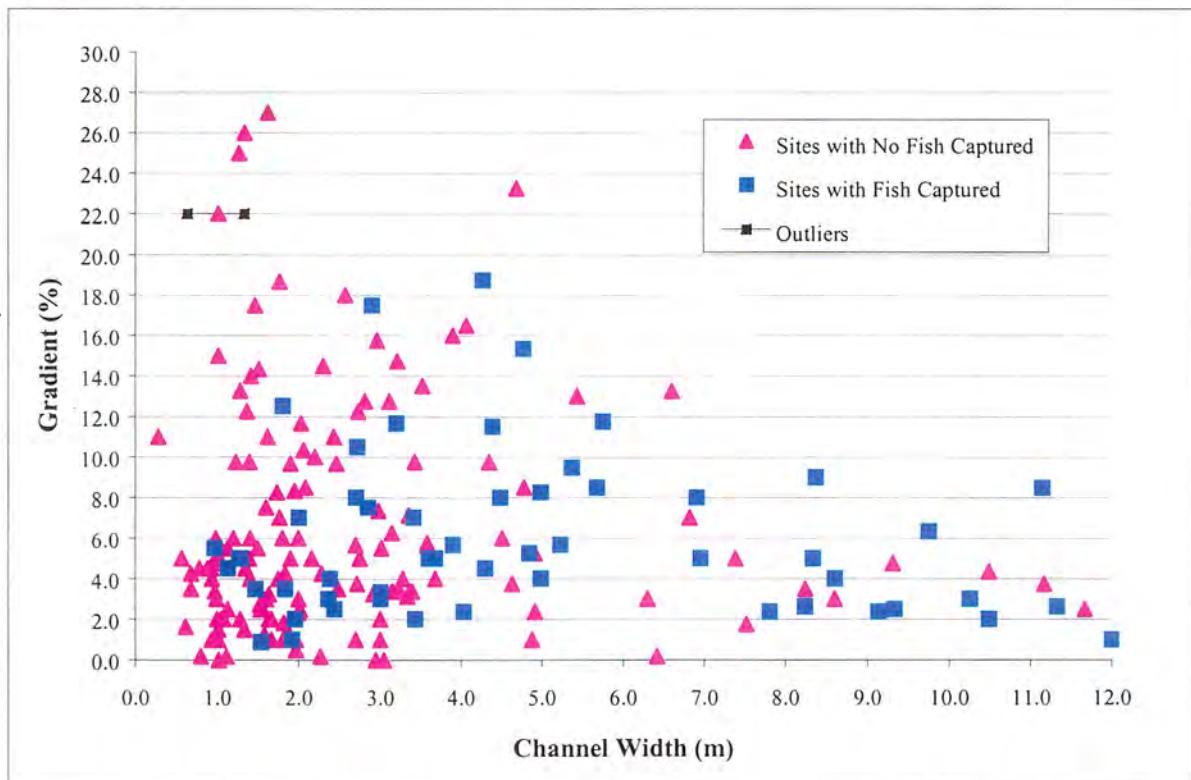


Figure 8. Gradient vs width relationship for sampled streams in the study area (current and historical data) (n=197).

No fish were captured in streams with an average channel width of less than 0.97 m or with an average gradient of greater than 19% after excluding two outlying sample sites. The two outliers within the graph are of two sites in which fish were captured in the

lower portion of the reach just prior to the point where the stream gradient increased to 22%. A moderate percentage (10%) of Non Visible Channels (NVCs) are found within the study area (current and historical data) and it appears that channel widths must be at least 30 cm or greater to develop a continuous channel bed at lower gradients. Fish were not found in streams <0.97 m average channel width during the late summer early fall period in spite of considerable sampling effort. These results are generally consistent with other data found throughout the region where fish are absent (smaller channel width, high gradient streams).

4.5.1 Barriers to Fish Distribution

Permanent barriers prevent all fish species in all age classes from gaining access to the portion of stream above the barrier under all flows and stage. Falls and cascades were the dominant types of permanent barriers to upstream fish migration in the study area. Temporary barriers such as culverts and beaver dams may prevent species from gaining access to the portion of stream above the barrier but they are not permanent features with the drainage as they can change from year to year.

Several significant barriers that define fish distribution were noted:

- 6 m falls in Reach 6 of “unnamed” stream (ILP 3406). Resident bull trout species are present above the falls.
- 5 m falls in Reach 7 of Houston Tommy Creek (ILP 3678). The falls mark the “end of fish use” in this large 5th order drainage.
- 5 m falls in Reach 7 of Emerson Creek (ILP 2868). The falls mark the “end of fish use” in this large 4th order drainage.
- 8 m falls in Reach 2 of “unnamed” stream (ILP 3439). The falls mark the “end of fish use” in this 4th order drainage.
- 40 m falls and a 100 m x 400 m cascade in Reach 2 of “unnamed” stream (ILP 2593). These barriers mark the “end of fish use” in this large 3rd order drainage.
- 25 m falls in Reach 4 of “unnamed” stream (ILP 3477). The falls mark the “end of fish use” in this large 4th order drainage.
- 5 m falls in Reach 2 of “unnamed” stream (ILP 3753). The falls mark the “end of fish use” in this large 3rd order drainage.

Other barriers to fish migration are presented in Table 11 along with other features affecting fish habitat in the study area.

Table 11. Features within the study area.

Site	ILP	Reach	Feature Type	Feature Height (m)	Feature Length (m)	Comments
E11054	3602	2	C	0.85	-	Historical Feature. Cascade. Dolly Varden and rainbow trout captured upstream of cascade.
E11058	3586	1	CV	-	-	Historical Feature. Culvert, not a barrier to fish migration.
E11059	3699	1	CV	-	-	Historical Feature. Culvert, not a barrier to fish migration, no drop.
E11060	3698	3	CV	-	-	Historical Feature. Culvert, not a barrier to fish migration.
E11064	3727	1	CV	-	-	Historical Feature. Culvert, not a barrier to fish migration.
E11067	3802	7	BD	0.85	-	Historical Feature. Beaver Dam, obstruction to fish migration.
E11076	3594	1	CV	-	-	Historical Feature. Culvert, not an obstruction to fish migration.
E11077	3725	6	BD	0.5	-	Historical Feature. Beaver dam.
E11087	3802	4	BD	-	-	Historical Feature. Numerous beaver dams throughout reach.
E12066	3697	2	CV	1.6	20	Historical Feature. Culvert, obstruction to upstream fish migration.
E12075	3630	1	F	0.8	1	Historical Feature. Falls, obstruction to fish migration.
E12078	3603	2	FLD	-	-	Historical Feature. Subsurface flow.
E12080	3695	4	FLD	1	-	Historical Feature. Subsurface flow.
E13051	3247	1	X	1.1	1	Historical Feature. Debris Jam, non permanent obstruction to upstream fish migration.
F12	3692	2	F	1.9	1	Historical Feature. Falls located 35 m below 1.8 m Falls are a barrier to upstream fish migration.
F12	3692	2	F	1.8	1	Historical Feature. Falls are a barrier to upstream fish migration.
F113	3802	5	BD	3	10	Historical Feature. Beaver dam.
F114	3652	1	CV	-	8	Historical Feature. Culvert, does not effect fish passage.
F1215	3802	3	C	1	10	Historical Feature. Bedrock chute at bottom of reach 3 (NID 60064), bedrock chute is a barrier to upstream fish passage.
F1215	3802	3	F	3	10	Historical Feature. Falls (NID 60065) are a barrier to fish passage.
45	3740	2	CV	1.7	20	Naturally embedded culvert.
46	3737	2	CV	1.6	20	Naturally embedded culvert.
48	3787	3	CV	1.2	20	Culvert is a partial barrier to upstream fish migration.
49	3783	3	CV	1.2	25	Three culverts, two (1 m x 25m) and one (1.2 m x 25 m).
50	3783	4	CV	1	20	Culvert.

Table 11. Features within the study area.

Site	ILP	Reach	Feature Type	Feature Height (m)	Feature Length (m)	Comments
250	2445	2	X	1.2	0.1	Log falls located ~50 m upstream of the bridge is a non-permanent obstruction to upstream fish migration.
251	3007	4	CV	0.5	12	Culvert perched 0.2 m, partial barrier to fish migration.
252	2999	3	CV	0.6	-	Culvert is partial barrier due to shallow water depths, perched 0.2 m.
254	2937	1	CV	0.4	12	Newly installed culvert.
256	2910	1	CV	0.4	12	Newly installed culvert with.
258	2857	1	CV	0.4	12	Culvert.
259	3028	2	CV	1.2	20	Culvert is perched 0.25 m, partial barrier, coho and rainbow trout captured in culvert outlet. Dewatered stream.
261	2910	3	CV	0.8	10	Culvert.
262	2913	1	CV	0.5	12	Culvert.
265	2934	1	CV	0.6	12	Culvert is passable under higher flows, perched 10 cm with ~7% slope, potential velocity barrier.
266	2912	5	CV	0.9	13	Culvert is passable.
268	2885	2	CV	0.9	15	Culvert is perched 0.5 m with no plunge pool, culvert is a full barrier to fish migration.
269	2874	1	CV	0.6	11	Culvert is passable.
272	2873	2	CV	0.6	10	Culvert is perched 0.2 m, passable under high flows.
273	2450	3	CV	0.9	20	Culvert perched 25 cm, partial barrier to fish migration, 45 cm deep pool at culvert outlet.
273	2450	3	C	1.5	2.1	Cascade over bedrock is a barrier to upstream fish migration.
276	2450	6	CV	0.5	10	Culvert is perched 2 m at outlet. Inlet of culvert was perched as well. Stream is non fish bearing.
277	2448	2	CV	0.3	10	Culvert perched 0.2 m.
278	2877	1	XW	1	-	Wedge observed ~50 m upstream of confluence with Emerson Creek.
279	2873	1	X	0.9	-	Debris jam is partial obstruction.
282	2868	4	F	2.7	1	Bedrock falls with 1.5 m plunge pool.
284	2879	1	CV	0.6	8	Culvert perched 0.8 m and is a full barrier to fish migration.
287	2593	2	C	100	400	Cascade section combined with falls are barriers to upstream fish migration.
287	2593	2	F	40	10	Falls combined with long cascade section are barriers to upstream fish migration.
289	2593	4	C	80	125	Cascade at lake outlet is a barrier to upstream fish migration.
294	2912	3	F	4	1	Bedrock falls are a barrier to upstream fish migration.

Table 11. Features within the study area.

Site	ILP	Reach	Feature Type	Feature Height (m)	Feature Length (m)	Comments
298	3406	6	F	6.5	5	Resident bull trout captured upstream of falls.
301	3776	1	CV	1.4	24	Culvert, not a barrier to fish migration.
303	3777	1	CV	1	14	Culvert, not a barrier to fish migration.
306	3783	3	F	3	1.5	Bedrock falls are a barrier to upstream fish migration.
306	3783	2	C	10	50	Cascade is a barrier to upstream fish migration.
308	3791	1	CV	1.2	10	Culvert is a partial barrier to upstream fish migration, perched 10 cm.
309	3736	3	CV	1.2	10	Passable culvert, not a barrier to upstream fish migration.
310	3739	2	CV	1.2	10	Culvert perched 10 cm.
329	3477	2	F	6	2	Falls are a potential barrier to upstream fish migration.
329	3477	4	F	25	25	Falls are a barrier to upstream fish migration.
329	3477	5	F	12	12	Falls are a barrier to upstream fish migration.
331	3599	4	BD	0.7	16	Beaver dam.
339	3678	7	F	5	-	Falls are a barrier to upstream fish migration.
349	3247	1	X	1.1	-	Historical Log falls (Triton, 1998).
351	3182	1	C	20	35	Cascade is a barrier to upstream fish migration.
353	3174	1	F	2	0.1	Falls are a barrier to upstream fish migration.
353	3174	1	C	5	12	Cascade is a barrier to upstream fish migration.
450	3753	2	F	5	-	Falls are barrier to upstream fish migration.
450	3753	2	F	5	-	Falls are barrier to upstream fish migration.
455	3742	2	C	5	1	Cascade (5 m x 1 m) located on mainstem ILP 3742, Reach 2 is a barrier to upstream fish migration.
456	3471	3	CV	1.2	20	Culvert perched 40 cm at outlet. U-shaped and partially squashed in center, High priority.
460	3471	5	C	20	40	Cascade (20 m x 40 m) with a 1 m and 1.5 m falls within are a barrier to upstream fish migration.
500	3571	1	C	1.5	0.3	Cascade over cobble gravel is a semi permanent barrier (located 30 m downstream of road crossing).
500	3571	1	CV	1	10	Culvert is perched 30 cm with no plunge pool. Low priority, downstream semi-permanent barrier limits upstream access.
501	3402	1	CV	0.9	10	Culvert is perched 1 m at outlet.

Table 11. Features within the study area.

Site	ILP	Reach	Feature Type	Feature Height (m)	Feature Length (m)	Comments
503	3401	2	C	1.5	0.3	Semi-permanent barrier over cobble / gravel, with no plunge pool.
503	3401	2	CV	0.9	10	Culvert perched 1 m.
505	3520	1	CV	0.9	10	Culvert is perched 90 cm.
507	3525	3	CV	0.5	10	Culvert is slightly perched.
508	3528	2	CV	1.2	20	Culvert outlet - good installation.
509	3532	1	CV	0.9	10	Culvert with extension, slightly perched 10 cm. Juvenile, fry restriction.
511	3526	3	CV	0.9	10	Culvert is perched 40 cm with a kink within.
512	3549	2	CV	0.6	10	Culvert is perched 5 cm at outlet. Cutthroat trout captured upstream of culvert.
515	3530	2	CV	0.5	10	Culvert.

Table 11. Features within the study area.

Site	ILP	Reach	Feature Type	Feature Height (m)	Feature Length (m)	Comments
517	3688	1	FLD	NA	75	Dewatered section at bottom of reach fans out into willow swale at confluence with Houston Tommy Creek.
519	3706	2	CV	1.2	10	Culvert outlet perched / expanded / slump / high velocity. Culvert is Moderate to High priority depending on fish capture. (dry/intermittent stream).
520	3711	1	CV	1.2	10	Culvert perched 30 cm.
521	3710	3	CV	0.9	10	Culvert perched 50 cm, extension at upstream end of culvert 'slightly perched'.
522	3715	8	CV	0.5	10	Culvert.
524	3715	4	CV	0.9	10	Culvert perched 20 cm at outlet.
527	3633	2	CV	1.6	20	High priority culvert. Presently blocks upstream fish access.
529	3801	4	CV	0.9	20	Culvert crushed at outlet.
531	3638	1	CV	1	20	Culvert at road crossing perched 0.2 m.
533	3633	6	CV	0.80	10.00	Culvert perched 40 cm.
535	3607	1	C	30	30	Cascade with six 2 m drops / falls within is a barrier to upstream fish migration.
539	2981	8	C	100	100	Cascade with falls is a barrier to upstream fish migration.
542	2868	10	C	5	7	Cascade found within lower portion of reach.
543	2690	1	F	3.5	-	Falls located ~50 m upstream of confluence with Emerson Creek are an obstruction to fish migration.
543	2690	1	C	10	20	Cascade located ~50 m upstream of confluence with Emerson Creek are an obstruction to fish migration.
545	2868	7	F	5	-	Falls are a barrier to upstream fish migration.
549	3439	2	F	8	4	Falls (6 m and 2 m) are a barrier to upstream fish migration. Dolly Varden captured downstream of falls.
553	3073	1	C	3	3	Bedrock cascades block upstream fish access.
558	3003	2	CV	0.5	10	Culvert outlet is perched and blocked.

Table 11. Features within the study area.

Site	ILP	Reach	Feature Type	Feature Height (m)	Feature Length (m)	Comments
558	3003	2	BD	1	20	Beaver dam has totally altered natural drainage pattern.
569	3602	2	F	5	-	Falls are a barrier to upstream fish migration. Rainbow trout and Dolly Varden captured below falls.
585	3628	1	C	50	50	Cascade with 5 m falls within is a barrier to upstream fish migration.
606	3357	1	F	5	-	Falls are a barrier to upstream fish migration.
624	3697	2	CV	1.6	20	Culvert 1 m perched.
918	3705	1	F	1.5	0	Falls over cobbles and gravels.
918	3705	1	CV	0.9	10	Culvert is not a priority.
986	2981	4	X	3	25	Log jam with multiple slides, non-permanent obstruction to upstream fish migration.
986	2981	5	F	25	5	Falls at outlet of Melissen Lake. Barrier to upstream fish migration.
986	2981	5	F	10	2	Falls ~250 m below outlet of Melissen Lake.
980	2445	4	F	5	-	Falls are a barrier to upstream fish migration.
981	2942	1	F	2	-	Falls are barrier to upstream fish migration.
981	2942	1	F	5	-	Falls are barrier to upstream fish migration.

BD = Beaver Dam
C = Cascade

CV = Culvert
F = Falls

FLD = Subsurface Flow
X = LWD jam

XW = Wedge

4.6 Significant Features and Fisheries Observations

4.6.1 Fish and Fish Habitat

A resident population of bull trout was identified upstream of a 6.5 m falls in Reach 6 of Gold Creek. Resident bull trout were also captured in Reach 1 of ILP 3477 (tributary to Reach 7 of Gold Creek). Bull trout are a blue listed species by the BC Conservation Data Center (2002).

Six (6) spawning bull trout (450-550 mm) were observed in ILP 3439 Reach 1 (a tributary flowing into Reach 5 of Gold Creek) on September 9, 2002. A female bull trout sampled extruded eggs when slightly pressed. The adult bull trout observed were estimated to be ~3 to 5 days pre-spawn.

A male Dolly Varden (140mm) was captured in ILP 3439 Reach 2 (a tributary flowing into Reach 5 of Gold Creek) on September 9, 2002. The male extruded milt when slightly pressed and it was estimated to be ~3 to 5 days pre-spawn.

FISS identified brook trout present within Klinger Lake (ILP 3570), which is located on a small 2nd order tributary to the Morice River. Brook trout within Klinger lake were stocked by the Prince George Trout Facility and the Clearwater Trout Hatchery from 1998 to 2002 (Ministry of Sustainable Resource Management, 2002).

No other special populations of rare and/or sensitive wild stocks were identified within the study area. One high value sport fishing/recreation opportunity was identified at an "unnamed" lake (Reach 3 of ILP 3412, local 'Grizzly Lake'). Cutthroat trout remains were found along the shore of this lake as well as a couple fire pits and camping spots were observed. Several other small lakes within the study area may have sport fishing potential but they were not sampled during this study. Sport fishing opportunities exist within the Morice River as described in the Resource Information section.

4.6.2 Habitat Protection Concerns

4.6.2.1 Fisheries Sensitive Zones

No fisheries sensitive zones were identified in the study area.

4.6.2.2 Fish above 20% Gradients

No fish were identified above 20% gradient.

4.6.2.3 Restoration and Rehabilitation Opportunities

A preliminary assessment of road crossing structures within surveyed reaches was conducted as an added value component to the 1:20,000 RFFHI completed within the Morice North planning area.

The objectives of road crossing assessments were as follows:

- Evaluate fish distribution upstream and downstream at each crossing,
- Evaluate to what degree each crossing blocks fish passage (either a partial or full barrier crossing),
- Identify the quality of available fish habitat for at least 100 m at each crossing,
- Identify the length of inferred and confirmed fish habitat upstream of each crossing,
- Identify maintenance issues associated with stream crossings,
- Prioritize each crossing for rehabilitation to facilitate fish access,
- Provide a preliminary prescription for rehabilitation at each crossing.

A low, medium, high or “no impact” priority rating was assigned to each of the crossing features based on the criteria below. (Please note that this evaluation is preliminary and intended to be used as a guide only).

Low

- Typically less than 2 km of inferred fish habitat upstream of the culvert, usually associated with 1st or 2nd order watersheds,
- Associated with partial barrier culverts that are barriers to fish only at low flows,
- Dry/Intermittent stream flows,
- Provide limited rearing and spawning and no overwintering habitat,
- Fish use is inferred,
- Minor maintenance issues (i.e. damaged inlet or outlet with only a minimal effect on hydrological flows).

Moderate

- Typically more than 2 km of inferred and less than 1 km of confirmed fish habitat upstream of the crossing,
- Associated with partial barrier culverts. These culverts typically block juvenile fish under most flows,
- Provide good rearing and poor spawning habitat. Overwintering habitat is present,
- Fish use is confirmed (usually associated with S4 streams).

High

- Typically more than 4 km of inferred and more than 1 km of confirmed fish habitat upstream of the crossing,
- Associated with full barrier culverts that are barriers to fish at all flow conditions,
- Provide good rearing and spawning habitat. Overwintering habitat is present,
- Fish confirmed (usually associated with S3 streams),
- Major maintenance issue resulting in sediment input directly into fish bearing stream or a diversion of a streamflows directly affecting fish habitat downstream.

No Impact

- Crossings that were not barriers to fish or did not require maintenance.

A total of 50 road crossings were featured during this assessment. Twenty-six (26) culverts (4 high, 6 moderate, and 16 low) were identified as barriers or partial barriers to upstream fish migration and/or were identified as requiring maintenance. In most cases, a culvert outlet was perched above the outlet pool creating a barrier at low flows. Culvert replacement or outflow pool modification can be used to restore fish access at all flow regimes where road access is required. Crossing deactivation and culvert removal is an option where road access is no longer required. Outflow pools can be backflooded with a water control structure. Backflooding will improve fish access through increasing the water levels and allowing for a greater pool depth when jumping the obstacle. Twenty-four crossings were identified as not requiring maintenance and were not barriers to fish migration.

Table 12 identifies crossings within the study area in order of priority and describes fish habitat, fish species captured and a description of the problems associated with the crossings. Preliminary recommendations for rehabilitation are also provided in the table.

4.6.2.4 Unstable Slopes

No unstable slopes or landslides were identified within the study area.

Table 12. Crossings within the study area and recommendations for maintenance.

Priority	Site	ILP	Reach	Map Number	Species	Stream Class	CV Specs.		Description of Problem	Barrier to fish	Potential Habitat Upstream	Habitat / Stream Channel / Fish Comments	Recommendations
							Dia (m)	Length (m)					
H	456	3471	3.0	093L.036	DV	S3	1.2	20	CV is perched 0.4 m at outlet, U-shaped and partially crushed in center.	full	4 km (1.2 km confirmed / 2.8 km inferred)	Moderate rearing, low spawning and low overwintering habitat observed within reach. DV are present upstream and downstream of the CV.	Replace and downset CV.
H	505	3520	1.0	093L.036	RB	S4	0.9	10	CV is perched 0.9 m.	full	5.3 km (0.5 km confirmed / 4.8 km inferred)	Moderate rearing, low spawning and no overwintering habitat observed within reach.	Replace and downset CV.
H	527	3633	2.0	093L.025	CT	S3	1.6	20	CV inlet is bent upward and stream flows are diverting down the ditchline.	full	10.1 km (4.1 km confirmed / 6.0 km inferred)	Good rearing, good spawning and good overwintering habitat available within this reach. CT were captured upstream of the CV.	Replace and downset CV.
H	624	3697	2.0	093L.026	DV	S3	1.6	20	CV is perched 1 m.	full	8.4 km (5.8 km confirmed / 2.6 km inferred)	Moderate rearing, low spawning and potential overwintering habitat observed within reach. DV were captured upstream of the CV.	Replace and downset CV.
M	259	3028	2.0	093L.046	CO, RB	S3	1.2	20	CV is perched 0.25 m.	partial	14.1 km (inferred)	Dewatered due to private road crossing upstream. Poor rearing, poor spawning and no overwintering habitat observed within reach. Fish captured in CV outlet pool (~0.8 m deep). Substantial damage to stream bank by cattle.	Construct weirs to backwater CV (~12 m of fill on CV).
M	268	2885	2.0	093L.046	NFC	S4*	0.9	15	CV is perched 0.5 m with no plunge pool.	full	2 km (inferred)	Dry/Intermittent. Good rearing, poor spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed.	Confirm fish use. Replace and downset CV.
M	509	3532	1.0	093L.036	RB	S3	0.9	10	CV with extension is perched 0.1 m.	partial	6.9 km (2.0 km confirmed / 4.9 km inferred)	Moderate rearing, moderate spawning and low overwintering habitat observed within reach. Stream has perennial flows. CT were captured upstream of the CV	Replace and downset or construct weirs to backwater CV.
M	511	3526	3.0	093L.036	CT, DV	S4	0.9	10	CV is perched 0.4 m with a kink.	full	1.1 km (0.4 km confirmed / 0.7 km inferred)	Moderate rearing, low spawning and no overwintering habitat observed within reach. DV were captured upstream of the CV.	Replace and downset CV.

Table 12. Crossings within the study area and recommendations for maintenance.

Priority	Site	ILP	Reach	Map Number	Species	Stream Class	CV Specs.		Description of Problem	Barrier to fish	Potential Habitat Upstream	Habitat / Stream Channel / Fish Comments	Recommendations
							Dia (m)	Length (m)					
M	520	3711	1.0	093L.026	NFC	S3*	1.2	10	CV is perched 0.3 m with no plunge pool. Higher than average gradient, (~6%) (visual estimate).	full	3.3 km (inferred)	Low spawning, low rearing and no overwintering habitat. No barriers to fish migration were observed.	Confirm fish use. Replace and downset CV.
M	533	3633	6.0	093L.026	CT	S4	0.80	10.00	CV perched 0.4 m.	full	3.2 km (0.8 km confirmed / 2.4 km inferred)	Low rearing, low spawning and no overwintering habitat observed. Perennial habitat available in downstream lake. CT were captured upstream of the CV.	Replace and downset CV.
L	48	3787	3.0	093L.013	NFC	S4*	1.2	20	CV is a perched 0.6 m.	full	2.4 km (inferred)	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. No barriers to upstream fish migration were observed.	Confirm fish use. Replace and downset CV.
L	251	3007	4.0	093L.046	NS	S4*	0.5	12	CV is perched 0.2 m.	partial	1.9 km (inferred)	Poor rearing, poor spawning and no overwintering habitat observed within reach. No permanent barriers to fish migration were observed.	Confirm fish use. Replace and downset CV.
L	252	2999	3.0	093L.046	NFC	S4*	0.6	12	CV is perched 0.2 m with shallow water depths.	partial	0.3 km (inferred)	Poor rearing, poor spawning and no overwintering habitat observed within reach. No permanent barriers to fish migration were observed.	Confirm fish use. Replace and downset CV.
L	272	2873	2.0	093L.046	NFC	S3*	0.6	10	CV is perched 0.2 m.	partial	2.1 km (inferred)	Dewatered. Poor rearing, no spawning and no overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed.	Confirm fish use. Replace and downset or backwater with weirs.
L	277	2448	2.0	093L.056	NS	S4*	0.3	10	CV is perched 0.2 m.	partial	1.1 km (inferred)	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. No barriers to upstream fish migration were observed. CO, DV and RB captured downstream in Mainstem ILP 2445, Reach 2 (250).	Confirm fish use. Replace and downset or construct weirs to backwater CV.
L	284	2879	1.0	093L.046	NFC	S4*	0.6	8	CV is perched 0.8 m.	full	1.8 km (inferred)	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach.	Confirm fish use. Replace and downset CV.

Table 12. Crossings within the study area and recommendations for maintenance.

Priority	Site	ILP	Reach	Map Number	Species	Stream Class	CV Specs.		Description of Problem	Barrier to fish	Potential Habitat Upstream	Habitat / Stream Channel /Fish Comments	Recommendations
							Dia (m)	Length (m)					
L	308	3791	1.0	093L.013	NS	S4*	1.2	10	CV is perched 0.1m.	partial	0.9 km (inferred)	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. No permanent barriers observed.	Confirm fish use. Replace and downset or construct weirs to backwater CV.
L	310	3739	2.0	093L.013	NS	S4*/S6	1.2	10	CV is perched 0.1 m with shallow water depths.	partial	0.2 km (inferred)	Dry/Intermittent. High gradient (20%) increasing to 25% in upper portion of reach blocks upstream fish access. Poor rearing, no spawning and no overwintering habitat observed within reach. CO and ST captured downstream in mainstem ILP 3736, Reach 1 (FISS-02).	Confirm fish use. Replace and downset or construct weirs to backwater CV.
L	500	3571	1.0	093L.037	NS	S4*	1	10	CV is perched 0.3 m with no plunge pool.	full	10.5 km (inferred)	Dry/Intermittent. Low rearing, low spawning and no overwintering habitat observed within reach. Inferred fish bearing as this stream has direct connection with Morice River. Cascade (1.5 m x 0.3 m) over cobble gravel is a semi permanent barrier located 30 m downstream of road crossing.	Confirm fish use. Replace and downset CV.
L	501	3402	1.0	093L.036	NS	S4*/S6	0.9	10	CV is perched 1 m at outlet.	full	0.05 km (inferred)	Dry/Intermittent. Inferred fish bearing downstream of road, S6 upstream of road (high gradient of 20% upstream of road). No fish habitat observed within reach.	Confirm fish use. Replace and downset CV.
L	512	3549	2.0	093L.036	CT	S4	0.6	10	CV is perched 0.05 m at outlet.	partial	0.8 km (0.5 km confirmed / 0.3 km inferred)	Potential rearing, no spawning and no overwintering habitat observed within reach.	Confirm fish use. Construct weirs to backwater CV.
L	519	3706	2.0	093L.026	NS	S3*	1.2	10	CV is perched 0.15 m and flows are high velocity.	partial	1.4 km (inferred)	Dry/Intermittent. Low spawning, low rearing and no overwintering habitat observed within reach. No barriers to fish migration were observed.	Confirm fish use. Replace and downset or construct weirs to backwater CV.
L	521	3710	3.0	093L.026	NS	S4*	0.9	10	CV is perched 0.5 m, extension at inlet is slightly perched.	partial	0.4 km (inferred)	Dry/Intermittent. Potential spawning and rearing with no overwintering habitat observed within reach. No barriers to fish migration were observed.	Confirm fish use. Replace and downset CV.

Table 12. Crossings within the study area and recommendations for maintenance.

Priority	Site	ILP	Reach	Map Number	Species	Stream Class	CV Specs.		Description of Problem	Barrier to fish	Potential Habitat Upstream	Habitat / Stream Channel /Fish Comments	Recommendations
							Dia (m)	Length (m)					
L	524	3715	4.0	093L.026	DV	S4	0.9	10	CV is perched 0.2 m at outlet.	partial	4.1 km (0.2 km of confirmed and 3.9 km of inferred fish habitat upstream)	Low rearing, low spawning and no overwintering habitat observed.	Confirm fish use. Replace and downset or construct weirs to backwater CV.
L	531	3638	1.0	093L.025	RB	S4	1	20	CV is perched 0.2 m.	partial	4.6 km (1.8 km confirmed / 2.6 km inferred)	Moderate rearing, moderate spawning and questionable overwintering habitat.	Confirm fish use. Replace and downset or construct weirs to backwater CV.
L	529	3801	4	093L.025	NS	S4*	0.9	20	CV crushed at outlet.	none	na	CV is well placed.	Replace.
NI	46	3737	2.0	093L.013	NS	S4*	1.6	20	None. Naturally embedded CV.	no	na	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach.	None.
NI	49	3783	3.0	093L.014	NFC	S6	1.2	25	None.	no fish	na	Cascades (10 m x 50 m) downstream in Reach 2, along with falls (3 m) in this reach block upstream fish access.	None.
NI	50	3783	4.0	093L.013	NFC	S6	1	20	None.	no fish	na	Cascades (10 m x 50 m) downstream in Reach 2, along with falls (3 m) in this reach block upstream fish access.	None.
NI	254	2937	1.0	093L.046	NS	NVC	0.4	12	None. Newly installed CV	no	na	No visible channel.	None.
NI	256	2910	1.0	093L.046	NS	NVC	0.4	12	None. Newly installed CV.	no	na	No visible channel.	None.
NI	258	2857	1.0	093L.046	NS	NVC	0.4	12	None.	no	na	No visible channel.	None.
NI	261	2910	3.0	093L.046	NS	S6	0.8	10	None.	no fish	na	Dry/Intermittent. Non fish bearing due to Non Classified Drainage downstream in Reach 1 (256).	None.
NI	262	2913	1.0	093L.046	NFC	NVC	0.5	12	None.	no	na	No visible channel.	None.
NI	265	2934	1.0	093L.046	NFC	S6	0.6	12	CV is perched 10 cm with ~7% slope.	no fish	na	Bedrock falls (4 m) located downstream in mainstem ILP 2912, Reach 3 are a barrier to upstream fish migration.	None.
NI	266	2912	5.0	093L.046	NFC	S6	0.9	13	None.	no fish	na	Bedrock falls (4 m) located downstream in Reach 3 are a barrier to upstream fish migration.	None.

Table 12. Crossings within the study area and recommendations for maintenance.

Priority	Site	ILP	Reach	Map Number	Species	Stream Class	CV Specs.		Description of Problem	Barrier to fish	Potential Habitat Upstream	Habitat / Stream Channel /Fish Comments	Recommendations
							Dia (m)	Length (m)					
NI	269	2874	1.0	093L.046	NS	S4*	0.6	11	None. CV is well placed.	no	na	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach.	None.
NI	273	2450	3.0	093L.056	NFC	S6	0.9	20	CV perched 25 cm,	no fish	na	Cascade (1.5 m x 2.1 m) located ~335 m downstream of road crossing within this reach is a barrier to upstream fish migration.	None.
NI	276	2450	6.0	093L.056	NFC	S6	0.5	10	CV is perched 2 m at outlet.	no fish	na	Dry/Intermittent. Cascade (1.5 m x 2.1 m) located at the bottom of Reach 3 is a barrier to upstream fish migration.	None.
NI	301	3776	1.0	093L.014	DV	S3	1.4	24	None. CV is well placed.	no	na	Good rearing, good spawning and no overwintering habitat observed within reach.	None.
NI	303	3777	1.0	093L.014	NFC	S3*	1	14	None. CV is well placed.	no	na	Good rearing, moderate spawning and no overwintering habitat observed within reach. Dolly Varden captured downstream in Reach 1.	None.
NI	309	3736	3.0	093L.013	NS	S3*/S6	1.2	10	None. CV is well placed.	no	na	Dry/Intermittent. High gradient (27%) in upper portion of reach blocks upstream fish access. Poor rearing, poor spawning and no overwintering habitat observed within reach.	None.
NI	501	3402	1.0	093L.036	NS	S4*/S6	0.9	10	CV is perched 1 m at outlet.	no fish	0 km	Dry/Intermittent. Inferred fish bearing downstream of road, S6 upstream of road (high gradient of 20% upstream of road). No fish habitat observed within reach.	None.
NI	503	3401	2.0	093L.036	NS	S6	0.9	10	CV perched 1 m.	no fish	na	Dry/Intermittent. Stream is S6 upstream of road crossing. Cascade (1.5 m x .30 m) over cobble located ~50 m downstream of road and interstitial flows block upstream fish access.	None.
NI	507	3525	3.0	093L.036	NS	S6	0.5	10	CV is slightly perched	no fish	na	Dry/Intermittent. High gradient (20%) ~150 m downstream of site prevents upstream fish migration. No fish habitat.	None.
NI	508	3528	2	093L.036	RB	NS	NS	NS	None. CV is well placed.	none	na	CV is passable to all fish.	None.
NI	515	3530	2.0	093L.036	NS	NVC	0.5	10	None.	no	na	CV provides adequate drainage. No visible channel.	None.

Table 12. Crossings within the study area and recommendations for maintenance.

Priority	Site	ILP	Reach	Map Number	Species	Stream Class	GV Specs.		Description of Problem	Barrier to fish	Potential Habitat Upstream	Habitat / Stream Channel / Fish Comments	Recommendations
							Dia (m)	Length (m)					
NI	522	3715	8	093L.026	NS	NVC	0.5	10	None.	no	na	CV provides adequate drainage. No visible channel.	None.
NI	558	3003	2.0	093L.046	NS	NVC	0.5	10	CV outlet is perched and blocked.	no	na	No visible channel.	None.
NI	918	3705	1	093L.026	NS	S6	0.9	10	None.	no fish	na	Dry/Intermittent. Cascades (0.9 m x 10 m) and falls (1.5 m) combined with gradient (13.5 %) and sections of discontinuity in upper portion block fish access.	None.

BT = bull trout

DV = Dolly Varden

CO = coho

CT = cutthroat trout

RB = rainbow trout

NFC = no fish captured

NVC = no visible channel

H = high

M = moderate

L = low

NI = No Impact

na = not applicable

4.7 Fish Bearing Status

4.7.1 Fish Bearing Reaches

Fish species were captured in 74 of 185 reaches classified as fish bearing (current and historical data) within the Morice North planning area (Table 13). For sampling during the 2002 field season, 58 of 146 reaches were classified as fish bearing. Fifty eight (58) reaches in the fish bearing classification table were classified as fish bearing by default.

The fish bearing status of streams may be directly supported by sampling data or indirectly inferred based on fish captures in associated reaches, or habitat quality and the occurrence or lack of barriers to fish passage. For example, if the habitats within a given reach are suitable for rearing and/or spawning but no fish were captured and no barriers were observed, the reach would be classified as fish bearing. If the habitats were inadequate to provide suitable rearing habitat, or where barriers prevent fish from accessing and utilizing the reach, it would be classified as non-fish bearing.

Inferred fish bearing status was given to reaches not sampled with the following criteria:

- The average stream gradient was less than 20% (through map interpretation) and access to fish bearing water is present.
- Stream sections below a headwater lake.

4.7.2 Additional Sampling Recommendations

Seven (7) reaches were recommended for additional sampling (Table 14). Additional sampling will clarify fish presence/absence and establish if any barriers exist in downstream reaches. No sport fish or regionally significant fish were captured in reaches recommended for additional sampling and these reaches are considered fish bearing until further sampling is conducted. Reaches identified for additional sampling are included in Table 13 (fish bearing).

The timing of additional sampling efforts is critical to ensuring optimal conditions and maximizing the potential for fish to occur. In particular, additional sampling should be conducted in the spring immediately following peak runoff, which usually occurs in the early part of May. Reaches classified as fish bearing and selected for additional sampling could also be deferred by accepting this default classification, however the reaches selected for additional sampling would contribute valuable information to aid in determining fish presence and distribution for future stream classification work.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
E1065	3678	6	24.2	2	RB	S1	n	Historical Site. Good rearing, good spawning and good overwintering habitat observed within reach. Rainbow trout captured.
E10090	3136	1	1.3	22	DV	S4	n	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within site. Dolly Varden captured in lower section approximately 50 m upstream of confluence.
E11054	3602	2	1.9	5	NFC	S3	n	Historical Site. Good rearing, fair spawning and poor overwintering habitat observed within site. Rainbow trout and Dolly Varden captured within this reach (Site 569 and Site 570).
E11055	3604	1	1.4	6	NFC	S4	n	Historical Site. Good rearing, fair spawning and poor overwintering habitat observed within site. Rainbow trout and Dolly Varden captured downstream in mainstem ILP 3602, Reach 2.
E11057	3725	1	2.8	3	NS	S3	n	Historical Site. No barriers to fish migration were observed. Potential perennial habitat available in upstream wetland and small upstream lake.
E11058	3586	1	1.9	3	NS	S3	n	Historical Site. Dewatered, highly ephemeral. No barriers to fish migration were observed.
E11061	3682	1	0.5	7	NS	S4	n	Historical Site. Dry / Intermittent. Poor rearing, poor spawning and poor overwintering habitat. Dolly Varden captured downstream within this reach (Site 562).
E11063	3695	2	2.4	3	DV, RB	S3	n	Historical Site. Good rearing, fair spawning and poor overwintering habitat observed within site. Dolly Varden and rainbow trout captured.
E11064	3727	1	1.8	1	NFC	S3	n	Historical Site. Poor rearing, poor spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Dolly Varden and rainbow trout were captured in mainstem ILP 3697, Reach 2 (Site E12066).
E11068	3802	2	4.5	6	NFC	S3	n	Historical Site. Good spawning, good rearing and fair overwintering habitat. Rainbow trout captured upstream (Site F14).
E11069	3637	5	2.0	4	NS	S3	n	Historical Site. Good rearing, good spawning and poor overwintering habitat. No barriers to fish migration were observed. Not enough water to electrofish.
E11076	3594	1	1.0	5	NS	S4	n	Historical Site. Fair rearing, good spawning and poor overwintering habitat observed within reach. No barriers to fish migration were observed. Potential perennial habitat available in small lake on mainstem ILP 3725, Reach 7.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
E11077	3725	6	1.9	3	NS	S3	n	Historical Site. Poor rearing, poor spawning and poor overwintering habitat. Beaver dam at lake controls stream flow. Potential perennial habitat available in small upstream lake.
E11078	3164	1	1.4	11	NS	S4	n	Historical Site. Fair rearing, fair spawning and poor overwintering habitat observed within reach. Dolly Varden captured within reach (Site 573).
E11079	3601	1	8.6	4	RB, DV	S3	n	Historical Site. Rainbow trout and Dolly Varden captured.
E11080	3630	1	0.5	3	NS	S4	n	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within reach. Fish presence in upstream lake is unknown.
E11083	3802	1	6.2	3	NS	S2	n	Historical Site. Good rearing, good spawning and fair overwintering habitat observed within reach. Dolly Varden and rainbow trout captured upstream.
E11087	3802	4	NS	NS	NS	NVC	n	Historical Site. Good rearing, fair spawning and fair overwintering habitat. Potential Fisheries Sensitive Zone.
E12058	3590	1	1.1	5	NS	S4	n	Historical Site. Dry/Intermittent. Poor rearing, poor spawning and poor overwintering habitat. No barriers to fish migration were observed. Potential perennial habitat in downstream wetland/lake on mainstem (ILP 3725, Reach 7).
E12059	3725	4	2.2	5	NFC	S3	n	Historical Site. Moderate rearing, moderate spawning and poor overwintering habitat observed within site. No barriers to fish migration observed. Potential perennial habitat available in downstream wetland/lake.
E12060	3686	1	1.6	3	NFC	S3	n	Historical Site. Moderate rearing, poor spawning and poor overwintering habitat. No barriers observed within site. Dolly Varden captured downstream (ILP 3682, Reach 1 (Site 562)).
E12062	3638	1	1.9	7	NS	S3	n	Historical Site. Poor rearing, poor spawning and poor overwintering habitat available observed within site. Rainbow trout captured downstream (Site 531).
E12064	3645	1	1.1	1	NS	S4	n	Historical Site. Poor rearing, poor spawning and poor overwintering habitat available observed within site. No barriers to upstream fish migration were observed. Rainbow trout captured downstream (ILP 3802, Reach 2 (Site F14)).
E12065	3637	2	2.0	2	DV, RB	S3	n	Historical Site. Moderate rearing, moderate spawning and poor overwintering habitat observed within site. Dolly Varden and rainbow trout captured.
E12066	3697	2	3.7	5	DV, RB	S3	n	Historical Site. Moderate rearing, fair spawning and poor overwintering habitat observed within site. Dolly Varden and rainbow trout captured.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
E12068	3678	4	10.5	2	RB	S2	n	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within site. Rainbow trout captured.
E12069	3357	1	6.9	8	RB	S2-S5	n	Historical Site. Poor rearing, fair spawning and poor overwintering habitat observed within site. Falls (5 m) block upstream fish migration. Rainbow trout captured downstream of falls. Two sample sites upstream of falls resulted in no fish captured and confirms non fish bearing status of upstream section.
E12070	3678	7	12.0	1	RB	S2	n	Historical Site. Fair rearing, moderate spawning and fair overwintering habitat observed within site. Rainbow trout captured.
E12072	3308	1	3.2	11	NS	S3	n	Historical Site. Dewatered. Poor rearing, poor spawning and poor overwintering habitat observed within site. Rainbow trout captured downstream in mainstem Houston Tommy Creek. High gradient in the upper portion of this reach may block upstream fish access. No barriers observed within site.
E12074	3632	3	1.4	5	NFC	S4*	n	Historical Site. Dewatered. Poor habitat. No barriers observed. Inferred fish bearing.
E12075	3630	1	1.5	2	NS	S4	n	Historical Site. Dewatered. Poor rearing, poor spawning and poor overwintering habitat observed within site. Stream is dewatered to falls (0.8 m). Fish presence in upstream lake is unknown.
E12078	3603	2	18.8	3	RB	S2	n	Historical Site. Fair rearing, fair spawning and fair overwintering habitat observed within site. Rainbow trout captured.
E12079	3138	1	1.5	3	NS	S4	n	Historical Site. Fair rearing, fair spawning and poor overwintering habitat observed within site. No barriers to fish migration observed. Dolly Varden captured downstream (ILP 3599, Reach 1 (Site E12091)).
E12080	3695	4	0.6	22	DV	S4	n	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within reach. Dolly Varden captured.
E12081	3560	1	1.3	5	DV	S4	n	Historical Site. Fair rearing, fair spawning and poor overwintering habitat observed within site. Dolly Varden captured.
E12091	3599	1	7.0	5	RB, DV	S2	n	Historical Site. Moderate rearing, fair spawning and fair overwintering habitat observed within reach. Dolly Varden and rainbow trout captured.
E13051	3247	1	3.4	7	RB	S3	n	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within reach. Debris jam (1.1 m in height) is a non permanent obstruction to upstream fish migration. Rainbow trout captured downstream of debris jam.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
F12	3692	2	2.0	7	RB	S3/S6	n	Historical Site. Falls (1.8 and 1.9 m) within reach are a barrier to upstream fish migration. No fish captured upstream of falls. Five (5) sample sites upstream of falls confirms non fish bearing status. Fish captured with minimal effort downstream of falls.
F14	3802	2	3.0	3	RB	S3	n	Historical Site. Dry/Intermittent. Fair rearing habitat and poor spawning habitat due to low flows. Rainbow trout captured.
41	3749	2	4.3	10	NFC	S3*	n	Moderate rearing, poor spawning and potential overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Rainbow trout captured downstream in Reach 1 (Site 453).
42	3749	1	3.6	6	NFC	S3*	n	Moderate rearing, poor spawning and potential overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Rainbow trout captured downstream within this reach (Site 453).
43	3746	2	2.8	13	NFC	S3*	n	Moderate rearing, poor spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Inferred fish bearing.
44	3742	2	2.8	8	DV	S3	n	Moderate rearing, poor spawning and potential overwintering habitat observed within reach. Dolly Varden captured.
45	3740	2	1.7	3	NS	S3*	n	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Perennial habitat available in upstream lake. Coho and steelhead captured downstream in mainstem ILP 3736, Reach 1 (FISS-02). Inferred fish bearing.
46	3737	2	1.4	5	NS	S4*	n	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. Coho and steelhead captured downstream in mainstem ILP 3736, Reach 1 (FISS-02). Inferred fish bearing.
47	3792	5	0.5	19	NS	S4*/S6	n	Dry/Intermittent. High gradient (16-22%) sections upstream of road crossing prevent upstream fish access ~100 m upstream of confluence with ILP 3732. Inferred fish bearing from downstream of high gradient section to Morice River, S6 upstream. Poor rearing, no spawning and no overwintering habitat observed within site.
48	3787	3	1.4	5	NFC	S4*	n	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Inferred fish bearing.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
250	2445	2	7.8	2	CO, DV, RB	S2	n	Good rearing, poor spawning and poor overwintering habitat observed within reach. Coho, Dolly Varden and rainbow trout captured.
251	3007	4	0.7	5	NS	S4*	n	Poor rearing, poor spawning and no overwintering habitat observed within reach. No permanent barriers to fish migration were observed. Inferred fish bearing.
252	2999	3	1.0	3	NFC	S4*	n	Poor rearing, poor spawning and no overwintering habitat observed within reach. No permanent barriers to fish migration were observed. Inferred fish bearing.
253	2941	1	17.2	4	DV, CO, RB	S2	n	Poor rearing, poor spawning and poor overwintering habitat observed within site. Coho, Dolly Varden and rainbow trout captured.
255	2912	1	4.0	2	RB, CO	S3	n	Moderate rearing, good spawning and poor overwintering habitat observed within reach. Coho and rainbow trout captured.
257	2868	1	8.2	3	RB, DV, CO	S2	n	Fair rearing, good spawning and fair overwintering habitat observed within reach. Coho, rainbow trout and Dolly Varden were captured.
259	3028	2	2.4	4	CO, RB	S3	n	Dewatered. Poor rearing, poor spawning and no overwintering habitat observed within reach. All fish were captured in culvert outlet pool (~0.8 m deep). Substantial damage to stream bank by cattle. Coho and Rainbow trout captured.
263	2915	3	1.5	3	NFC	S3*	y	Poor rearing, poor spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Coho and rainbow trout were captured in downstream mainstem ILP 2912, Reach 1 (Site 255).
264	2917	1	0.7	5	NS	S4*	n	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Coho and rainbow trout were captured in downstream mainstem ILP 2912, Reach 1 (Site 255).
267	2868	6	9.3	5	NFC	S2	n	Good rearing, good spawning and good overwintering habitat observed within site. Rainbow trout captured upstream within this reach (Site 545).
268	2885	2	1.2	10	NFC	S4*	y	Dry/Intermittent. Good rearing, poor spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. Culvert (0.9 m x 15 m) is perched 0.8 m and is presently a barrier to upstream fish migration.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
269	2874	1	0.6	8	NS	S4*	n	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. Inferred fish bearing.
272	2873	2	1.6	2	NFC	S3*	n	Dewatered. Poor rearing, no spawning and no overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. Inferred fish bearing.
274	2453	1	1.0	9	NS	S4*	n	Dry/Intermittent. No rearing, no spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Rainbow trout captured downstream in mainstem ILP 2450, Reach 2 (Site 275). Inferred fish bearing.
275	2450	2	3.0	3	RB	S3	n	Good rearing, fair spawning and poor overwintering habitat observed within site. Rainbow trout captured.
277	2448	2	1.0	6	NS	S4*	n	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Coho, Dolly Varden and rainbow trout captured downstream in mainstem ILP 2445, Reach 2 (Site 250). Inferred fish bearing.
278	2877	1	3.2	4	NFC	S3*	y	Dry/Intermittent. Poor rearing, poor spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. A debris jam (1.0 m in height) was observed ~50 m up from the confluence with Emerson Creek. Inferred fish bearing.
279	2873	1	2.1	10	NFC	S3*	y	Dry/Intermittent. Poor rearing, poor spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. A debris jam (0.9 m in height) was observed ~80 m up from the confluence with Emerson Creek. Stream becomes completely dry ~50 m upstream of confluence with Emerson Creek.
280	2868	5	6.6	13	NFC	S2	n	Good rearing, poor spawning and good overwintering habitat observed within site. Rainbow trout captured upstream in Reach 6 (Site 545).
281	2868	5	11.2	4	NFC	S2	n	Good rearing, good spawning and good overwintering habitat observed within site. Rainbow trout captured upstream in Reach 6 (Site 545).
282	2868	4	5.4	13	NFC	S2	n	Good rearing, no spawning and good overwintering habitat observed within site. Bedrock falls (2.7 m) were observed within this reach. Rainbow trout captured upstream in Reach 6 (Site 545).

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
283	2877	4	1.1	3	NFC	S4*	n	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. Inferred fish bearing.
284	2879	1	0.8	5	NFC	S4*	n	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within site. Culvert (0.6 m x 8 m) is a non permanent barrier to upstream fish migration. Inferred fish bearing.
285	2877	2	3.7	4	NFC	S3*	n	Dry/Intermittent. Good rearing, good spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream migration were observed. Perennial habitat available in upstream lake. Inferred fish bearing.
286	3028	6	1.2	6	NS	S4*	n	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Coho and rainbow trout captured downstream in Reach 2 (Site 259).
296	3406	3	11.3	3	RB, BT	S2	n	Good rearing, poor spawning and good overwintering habitat observed within site. Bull trout and rainbow trout captured.
297	3412	1	5.8	12	RB	S2	n	Moderate rearing, poor spawning and poor overwintering habitat observed within site. Rainbow trout captured.
298	3406	6	12.9	4	BT	S2	n	Good rearing, moderate spawning and good overwintering habitat observed within site. Resident bull trout captured upstream of falls (6.5 m).
299	3477	1	8.3	5	BT	S2	n	Good rearing, moderate spawning and good overwintering habitat observed within reach. Bull trout captured.
301	3776	1	1.9	1	DV	S3	n	Good rearing, good spawning and no overwintering habitat observed within reach. Dolly Varden captured.
303	3777	1	1.7	2	NFC	S3*	n	Good rearing, moderate spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Dolly Varden captured downstream in Reach 1. Inferred fish bearing.
308	3791	1	0.9	11	NS	S4*	n	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. Culvert is perched 10 cm and is a partial barrier to upstream fish migration. No permanent barriers observed. Inferred fish bearing.
309	3736	3	1.7	10	NS	S3*/S6	n	High gradient (27%) blocks upstream fish access. No perennial habitat upstream of the barrier. Inferred fish bearing downstream of high gradient section.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
310	3739	2	1.2	6	NS	S4*/S6	n	Dry/Intermittent. High gradient (20%) increasing to 25% in upper portion of reach blocks upstream fish access. Inferred fish bearing downstream of high gradient section.
311	3580	1	1.0	2	NFC	S4*	n	Poor rearing, no spawning and no overwintering habitat observed within site. Rainbow trout captured in downstream mainstem ILP 3617, Reach 3.
312	3617	4	3.1	0	NFC	S3*	n	Good rearing, no spawning and good overwintering habitat observed within site. No barriers to fish migration were observed. Rainbow trout captured downstream in Reach 3.
313	3623	1	2.3	0	NFC	S3*	n	Good rearing, no spawning and good overwintering habitat observed within site. No barriers to fish migration were observed. Lake Chub captured in downstream lake (Site 902).
314	3618	5	1.6	1	NFC	S3*	n	Moderate rearing, moderate spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed in overflight. Lake Chub captured in downstream lake (Site 902). Inferred fish bearing.
316	3618	4	1.1	0	NFC	S4*	n	Good rearing, no spawning and good overwintering habitat observed within reach. No barriers to fish migration were observed. Lake Chub captured in downstream lake (Site 902). Inferred fish bearing.
317	3620	1	6.4	0	NFC	S2*	n	Good rearing, no spawning and good overwintering habitat observed within reach. Area is ponded by beavers. No barriers to fish migration were observed. Lake Chub captured in downstream lake (Site 902). Inferred fish bearing.
321	3315	2	1.3	2	NFC	S4*	n	Poor rearing, poor spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Rainbow trout captured downstream in Houston Tommy Creek mainstem, Reach 4 (Site E12068). Inferred fish bearing.
322	3315	1	2.5	10	NFC	S3*	n	Moderate rearing, no spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Rainbow trout captured downstream in Houston Tommy Creek mainstem, Reach 4 (Site E12068). Inferred fish bearing.
323	3723	1	0.8	0	NFC	S4*	n	Poor rearing, no spawning and no overwintering habitat. No barriers to fish migration were observed. Inferred fish bearing.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
324	3559	2	0.7	4	NFC	S4*/S6	n	Poor rearing, no spawning and no overwintering habitat observed within site. Gradient barrier (23%) within reach prevents upstream fish migration. Fish bearing downstream of high gradient section.
331	3599	4	1.5	1	DV	S3	n	Good rearing, good spawning and good overwintering habitat observed within reach. Dolly Varden captured.
332	3162	1	0.5	2	NS	S4*	n	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No barriers observed up from the confluence with mainstem ILP 3599. Dolly Varden captured in downstream mainstem ILP 3599, Reach 4 (Site 331). Inferred fish bearing.
333	3158	2	0.5	10	NS	S4*	n	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. Dolly Varden captured in downstream mainstem ILP 3599, Reach 4 (Site 331). Inferred fish bearing.
334	3155	2	1.9	8	NFC	S3*	n	Poor rearing, poor spawning and no overwintering habitat observed within reach. Dolly Varden captured in downstream mainstem ILP 3599, Reach 4 (Site 331). Inferred fish bearing.
343	3357	1	4.9	5	NFC	S3	n	Moderate rearing, moderate overwintering and good spawning habitat observed within reach. Rainbow trout captured within this reach (Site E12069).
344	3678	6	NS	NS	NFC	NS	n	Fish only sampling site.
345	3349	1	2.1	9	NFC	S3	n	Moderate rearing, poor spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Inferred fish bearing.
346	3678	6	NS	NS	NFC	NS	n	Fish only sampling site.
348	3332	1	4.8	15	RB	S3	n	Moderate rearing, poor spawning and poor overwintering habitat observed within reach. Rainbow trout captured.
349	3247	1	3.4	7	NFC	S3	n	Good rearing, good spawning and moderate overwintering habitat observed within site. No fish captured upstream of debris jam. Rainbow trout captured within this reach downstream of debris jam (Site E13051).
350	3601	4	5.4	10	DV	S2	n	Good rearing, good spawning and good overwintering habitat observed within site. Dolly Varden captured.
352	3601	5	4.1	17	NFC	S3	n	Moderate rearing, poor spawning and poor overwintering habitat observed within site. Dolly Varden captured upstream of this site (Site 615).
354	3164	6	0.6	5	NFC	S4*	n	Poor rearing, poor spawning and no overwintering habitat observed within reach. Dolly Varden captured downstream in Reach 2. Inferred fish bearing.
450	3753	1	11.1	9	RB	S2	n	Rainbow trout captured.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
452	3749	1	3.9	6	RB	S3	n	Low rearing, low spawning and no overwintering habitat observed within site. Rainbow trout captured.
453	3742	1	2.7	6	NFC	S3*		Limited rearing, limited spawning and no overwintering habitat observed within site. Stream is accessible from Morice Lake. Inferred fish bearing.
456	3471	3	3.2	12	DV	S3	n	Moderate rearing, low spawning and low overwintering habitat observed within reach. Dolly Varden captured.
457	3532	3	NS	NS	CT	NS	n	Fish only sampling site. Channelized wetland with good spawning, rearing and overwintering habitat. Cutthroat trout captured.
459	2908	2	1.0	15	NFC	S4*	n	Low rearing, low spawning and no overwintering habitat observed within reach. No barriers observed. Dolly Varden captured in downstream mainstem ILP 3471, Reach 5 (Site 460). Inferred fish bearing.
460	3471	5	1.8	13	DV	S3/S6	n	Limited rearing, low spawning and no overwintering habitat observed within site. Cascade (20 m x 40 m) in this Reach (with a 1 m and 1.5 m falls within) located ~100 m upstream of the confluence with ILP 2908 is a barrier to upstream fish migration. Dolly Varden captured downstream of cascade / falls.
500	3571	1	1.4	5	NS	S4*	y	Dry/Intermittent. Low rearing, low spawning and no overwintering habitat observed within reach. Inferred fish bearing.
501	3402	1	0.8	16	NS	S4*/S6	n	Dry/Intermittent. Inferred fish bearing downstream of road, S6 upstream of road (high gradient >20% upstream of road).
502	3401	1	2.0	8	NS	S3*	n	Inferred fish bearing.
505	3520	1	1.3	5	RB	S4	n	Moderate rearing, low spawning and no overwintering habitat observed within reach. Rainbow trout captured.
508	3528	2	NS	NS	RB	NS	n	Fish only sampling site.
509	3532	1	2.4	3	RB	S3	n	Moderate rearing, moderate spawning and low overwintering habitat observed within reach. Rainbow trout captured.
510	3529	1	NS	NS	NFC	NS	n	Fish only sampling site.
511	3526	3	1.3	5	CT, DV	S4	n	Moderate rearing, low spawning and no overwintering habitat observed within reach. Dolly Varden and cutthroat trout captured.
512	3549	2	0.7	4	CT	S4	n	Potential rearing, no spawning and no overwintering habitat observed within reach. Cutthroat trout captured.
515	3530	2	NS	1	NS	NVC	n	No Visible Channel with some Non Classified Drainage characteristics. No fish habitat. Willow swale with some isolated depressions, may have connections during increased runoff conditions / snow melt.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
517	3688	1	1.8	19	NFC	S3*/S6	n	Low rearing, low spawning and no overwintering habitat observed within site. Inferred fish bearing from the confluence of Houston Tommy Creek to 300 m upstream. High gradient sections of 20% over 20 m throughout surveyed section block upstream fish access. Dewatered section (~75 m) at bottom of reach at confluence with Houston Tommy Creek further limits fish access to this reach. Second pass sampling upstream of Dewatered section and sampling of upstream lake confirms non fish bearing status.
519	3706	2	2.0	4	NS	S3*	y	Dry/Intermittent. Low spawning, low rearing and no overwintering habitat observed within reach. No barriers to fish migration were observed. Inferred fish bearing.
520	3711	1	1.5	6	NFC	S3*	y	Low spawning, low rearing and no overwintering habitat. No barriers to fish migration were observed. No fish captured. Inferred fish bearing.
521	3710	3	1.3	6	NS	S4*	n	Dry/Intermittent. Potential spawning, potential rearing with no overwintering habitat observed within site. No barriers to fish migration were observed.
524	3715	4	1.0	6	DV	S4	n	Low rearing, low spawning and no overwintering habitat observed. Dolly Varden captured.
527	3633	2	2.4	3	CT	S3	n	Good rearing, good spawning and good overwintering habitat observed within site. Culvert at this site blocks upstream fish access. Cutthroat trout captured.
529	3801	4	0.8	5	NS	S4*	n	Dry/Intermittent. Low spawning, low rearing with no overwintering habitat observed. No barriers to upstream fish migration were observed. Cutthroat trout captured in downstream lake. Inferred fish bearing.
530	3637	5	NS	NS	NFC	NS	n	Fish only sampling site.
531	3638	1	1.1	5	RB	S4	n	Moderate rearing, moderate spawning and limited overwintering habitat. Rainbow trout captured.
532	3633	2	NS	NS	CT	NS	n	Fish only sampling site.
533	3633	6	1.5	4	CT	S4	n	Low rearing, low spawning and no overwintering habitat observed. Perennial habitat available in downstream lake. Cutthroat trout captured.
536	2981	12	11.7	3	NFC	S2*	n	Moderate rearing, low spawning and potential overwintering habitat observed within site. Potential perennial habitat available in downstream lake. No fish captured at site. Inferred fish bearing.
537	2981	10	NS	NS	NFC	NS	n	Fish only sampling site.
538	2981	8	NS	NS	NFC	NS	n	Fish only sampling site.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
539	2981	7	7.4	5	NFC	S2*	n	Moderate rearing, low spawning and moderate overwintering habitat observed within site. Potential perennial habitat available in upstream or downstream (Melissen) lakes. No fish captured at sites. Lakes were not sampled for fish presence or absence. Inferred fish bearing.
540	2941	6	5.7	9	DV	S2	n	Moderate rearing, moderate spawning and potential overwintering habitat observed within reach. Dolly Varden captured.
545	2868	6	9.3	3	RB	S2	n	Potential rearing, moderate spawning and potential overwintering habitat observed within site. Rainbow trout captured.
546	3406	4	10.3	3	DV, BT	S2	n	High rearing, high spawning and good overwintering habitat observed within reach. Dolly Varden and bull trout captured.
547	3439	1	4.8	5	BT, DV	S2	n	High rearing, moderate spawning and potential overwintering habitat observed within reach. Dolly Varden and bull trout captured.
548	3406	5	NS	NS	DV,BT	NS	n	Fish only sampling site.
549	3439	2	2.7	8	DV	S3	n	Moderate rearing, low spawning and potential overwintering habitat observed within reach. Dolly Varden captured at site and access for bull trout is available to falls. Falls (8 m) located at the top of this reach are a barrier to upstream fish migration. Lake sampling (Site 900) conducted upstream of falls resulted in no fish captured, confirming absence of a resident fish population above the falls.
551	3406	9	5.1	8	BT	S2	n	Moderate rearing, low spawning and low overwintering habitat observed within reach. Bull trout captured.
552	3406	9	NS	NS	NFC	NS	n	Fish only sampling site.
555	3406	9	NS	NS	NFC	NS	n	Fish only sampling site.
556	3412	4	1.8	4	CT	S3	n	Moderate spawning, moderate rearing and potential overwintering in downstream lake. Cutthroat trout captured.
558	3003	2	NS	NS	NS	NVC	n	No Visible Channel. No fish habitat. Potential perennial habitat in upstream beaver pond. Beaver pond has flooded road and blocked culvert. Beaver dam has totally altered natural drainage pattern.
562	3682	1	2.7	11	DV	S3	n	Low rearing, low spawning and potential overwintering habitat observed within reach. Dolly Varden captured.
563	3684	1	NA	NA	NFC	NA	n	Fish only sampling site.
564	3698	3	NA	NA	NFC	NA	n	Fish only sampling site.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
569	3602	2	3.6	5	RB, DV	S3	n	Moderate rearing, moderate spawning and potential overwintering habitat observed within reach. Dolly Varden and rainbow trout captured. Falls (5 m) located at the top of this reach are a barrier to upstream fish migration. Five (5) sample sites conducted upstream of the falls as well as sampling in an upstream lake (Site 904) confirms non fish bearing status.
570	3602	2	NS	NS	RB	NS	n	Fish only sampling site.
573	3164	1	4.4	12	DV	S3	n	Moderate rearing, low spawning and potential overwintering habitat observed within site. Dolly Varden captured.
574	3164	2	NS	NS	DV	NS	n	Fish only sampling site.
575	3601	3	9.8	6	RB, DV	S2	n	Moderate rearing, moderate spawning and potential overwintering habitat observed within site. Rainbow trout and Dolly Varden captured.
581	3617	2	5.0	4	RB	S3	n	Moderate rearing, moderate spawning and moderate overwintering habitat observed within site. Rainbow trout captured.
582	3626	1	1.8	6	NFC	S3	n	Low rearing, low spawning and no overwintering habitat observed within reach. No barriers observed. Rainbow trout captured in downstream mainstem ILP 3617, Reach 2.
583	3628	1	NS	NS	RB	NS	n	Fish only sampling site.
584	3617	3	3.4	2	RB	S3	n	Moderate rearing, moderate spawning and potential overwintering habitat observed within reach. Rainbow trout captured.
588	3618	2	NS	NS	NFC	NS	n	Fish only sampling site.
589	3618	1	2.0	1	NFC	S3*	n	Low rearing, low spawning and low overwintering habitat observed within reach. No barriers observed. Rainbow trout captured in downstream mainstem ILP 3617, Reach 2 and Lake Chub were captured in upstream lake (Site 902). Inferred fish bearing.
591	3259	1	8.4	9	RB	S2	n	Moderate rearing, low spawning and potential overwintering habitat observed within site. Rainbow trout captured.
592	3275	1	5.2	6	RB	S2	n	Low rearing, low spawning and potential overwintering habitat observed within site. Rainbow trout captured.
593	3678	3	NS	NS	RB	NS	n	Fish only sampling site.
595	3315	3	1.0	1	NFC	S4*	n	Low rearing, low spawning and potential overwintering habitat available within site. No barriers to fish migration were observed during helicopter RECCI. Perennial habitat is available in upstream lake. Inferred fish bearing.
596	3725	1	1.7	1	NS	S3	n	Dry/Intermittent. Low rearing, low spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Fish could potentially access this reach. Riffle section for >300 m may limit access.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
597	3693	1	1.6	7	NS	S3	n	Dry/Intermittent. Low rearing, low spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Dolly Varden and rainbow trout captured in mainstem ILP 3697, Reach 2 (Site E12066).
598	3138	2	1.2	6	NFC	S4*	n	Low rearing, low spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Dolly Varden captured in downstream mainstem ILP 3599, Reach 1 (Site E12091). Inferred fish bearing.
600	3599	2	4.5	8	DV	S3	n	Moderate rearing, moderate spawning and potential overwintering habitat observed within reach. Dolly Varden captured.
601	3146	1	2.9	18	DV	S3	n	Low rearing, low spawning and potential overwintering habitat observed within site. Dolly Varden were captured in low gradient section ~20 m upstream of the confluence with mainstem ILP 3599. High gradient (20-23%) in upper portion of this reach limits upstream fish access.
610	3275	3	1.0	6	NFC	S4*	n	Low rearing, low spawning and potential overwintering habitat observed within reach. Gradient and cascade / pool habitat downstream may block upstream access. Gradient downstream looked to be >20% from helicopter. No fish captured. Inferred fish bearing.
615	3601	5	4.3	19	DV	S3	n	Dolly Varden captured.
624	3697	2	4.3	5	DV	S3	n	Moderate rearing, low spawning and potential overwintering habitat observed within reach. Dolly Varden captured.
901	3623	1	NS	NS	NFC	NS	n	Fish only sampling site.
902	3667	2	NS	NS	LKC	NS	n	Fish only sampling site. Lake Chub captured.
905	2877	3	NS	NS	NFC	NS	n	Fish only sampling site.
906	2877	3	NS	NS	NFC	NS	n	Fish only sampling site.
907	3412	3	NS	NS	NFC	NS	n	Fish only sampling site.
909	3633	4	NA	NA	LKC	NA	n	Fish only sampling site.
909	3633	4	NA	NA	LKC	NA	n	Fish only sampling site.
945	2868	4	NS	NS	NFC	NS	n	Fish only sampling site.
982	2941	3	NS	NS	DV, RB	NS	n	Fish only sampling site.
986	2981	4	9.1	2	DV	S2	n	Good rearing, good spawning and good overwintering habitat observed within reach. Dolly Varden captured.
987	3543	1	0.7	1	NS	S4*	n	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Rainbow trout captured in downstream mainstem ILP 3528, Reach 2. Perennial habitat available in downstream lake. Inferred fish bearing.

Table 13. Summary of fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
988	3028	3	2.0	3	NFC	S3*	n	Dewatered. Poor rearing, poor spawning and no overwintering habitat observed within site. Private culvert is plugged and stream flow is ponded upstream. Coho and rainbow were captured downstream in Reach 2 of this stream. Inferred fish bearing.

BT = bull trout

DV = Dolly Varden

CO = coho

CT = cutthroat trout

LKC = lake chub

RB = rainbow trout

NFC = No Fish Captured

NVC = No Visible Channel

NS = Not Sampled

* = Indicates inferred fish bearing

Table 14. Additional sampling recommendations for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments	Additional Sampling Recommendations
263	2915	3.0	093L.046	1.5	3	NFC	S3*	Poor rearing, poor spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Coho and rainbow trout were captured in downstream mainstem ILP 2912, Reach 1 (Site 255).	Additional sampling downstream of this site will confirm the fish bearing status of this reach and tributaries.
268	2885	2.0	093L.046	1.2	10	NFC	S4*	Dry/Intermittent. Good rearing, poor spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. Culvert (0.9 m x 15 m) is perched 0.8 m and is presently a barrier to upstream fish migration.	Additional sampling downstream in Reach 1 will confirm the fish bearing status of the this reach and the road crossing.
278	2877	1.0	093L.046	3.2	4	NFC	S3*	Dry/Intermittent. Poor rearing, poor spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. A debris jam (1.0 m in height) was observed ~50 m up from the confluence with Emerson Creek. Inferred fish bearing.	Additional sampling during higher flows upstream of this site will confirm the fish bearing status of this reach and lake upstream. Three sites in upstream reaches and on tributaries (including the lake) resulted in NFC.

Table 14. Additional sampling recommendations for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments	Additional Sampling Recommendations
279	2873	1.0	093L.046	2.1	10	NFC	S4*	Dry/Intermittent. Poor rearing, poor spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. A debris jam (0.9 m in height) was observed ~80 m up from the confluence with Emerson Creek. Stream becomes completely dry ~50 m upstream of confluence with Emerson Creek.	Additional sampling during higher flows upstream of this site will confirm the fish bearing status of this reach and tributaries.
500	3571	1.0	093L.037	1.4	5	NS	S4*	Dry/Intermittent. Low rearing, low spawning and no overwintering habitat observed within reach. Inferred fish bearing.	Second pass sampling upstream of a 1.5 m cascade will confirm the fish bearing status of this reach.
519	3706	2.0	093L.026	2.0	4	NS	S3*	Dry/Intermittent. Low spawning, low rearing and no overwintering habitat observed within reach. No barriers to fish migration were observed. Inferred fish bearing.	Additional sampling at higher flows downstream of this site will confirm the fish bearing status of this reach and the road crossing.
520	3711	1.0	093L.026	1.5	6	NFC	S4*	Low spawning, low rearing and no overwintering habitat. No barriers to fish migration were observed. No fish captured. Inferred fish bearing.	Additional sampling downstream of this site will confirm the fish bearing status of this reach and the road crossing.

NFC = No Fish Captured

* = Indicates inferred fish bearing

NS = Not Sampled

4.7.3 Non-Fish Bearing Status

Non-fish bearing status was assigned to 179 of the 354 sample sites within the study area (current and historical data) (Table 15). For sampling during the 2002 field season, 125 of 265 sites were classified as non fish bearing. 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 and/or other regionally significant species or are inaccessible to fish. Non-fish bearing status was assigned to reaches where:

- The drainage feature 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;
- Gradient prevented upstream fish migration and the stream did not have perennial fish habitat upstream;
- Permanent barriers (cascades, falls, etc.) prevented upstream fish migration and the stream did not have perennial fish habitat upstream;
- No fish habitat was present;
- 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 $>20\%$;
- The stream gradient is $>30\%$ (through map interpretation); Gradients were calculated during the pre field planning phases;
- The stream lacked a continuous definable channel bed as per the *Forest Practices Code Fish Stream Identification Guidebook*, (BC Forest Practices Code, 1998).

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

- The average stream gradient assigned was greater than 20% (through map interpretation) with no headwater lake present;
- Reaches above a stream section with an average gradient greater than or equal to 20% (through map interpretation) with no headwater lake present.

Often the non-fish bearing status of stream reaches with average gradients less than 20% is supported by evidence concerning the accessibility to potential fish bearing water. For example, obvious permanent barriers such as falls, cascades and high gradient sections are measured and adequate sampling is conducted above the potential barrier to confirm that the portion of stream above the barrier is non-fish bearing. Many of the headwater reaches and smaller streams reaches draw from such a small watershed area that they lack sufficient discharge volume required to develop significant channels and habitat complexity. These reaches are often ephemeral, containing shallow water depths, subsurface flows, lack of significant pools and have a predominance of organic and fine substrates.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
E11056	3606	2	NS	NS	NVC	9/11/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. No Visible Channel.
E11059	3699	1	1.1	2	S6	9/11/97	100	432	90	L	C	10.5	NA	NA	Historical Site. No connection to Houston Tommy Creek, non classified drainage with discontinuous sections in Reach 1 (see Site 565).
E11060	3698	3	1.0	3	S6	9/11/97	100	440	110	L	C	10.8	NA	NA	Historical Site. No fish habitat observed within site. No connection to Houston Tommy Creek, non classified drainage with discontinuous sections in Reach 1 (see Site 565).
E11062	3683	1	NS	NS	NVC	9/11/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. No Visible Channel. Wetland appears dry, no fish habitat within wetland.
E11066	3655	1	0.3	0	S6	9/16/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dry/Intermittent. Falls (3 m) located downstream (ILP 3802, Reach 3) are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
E11067	3802	7	6.3	3	S5	9/12/97	100	451	90	L	C	9.9	NA	NA	Historical Site. Falls (3 m) located downstream in Reach 3 are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
E11070	3658	1	0.6	NS	S6	9/13/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dry/Intermittent. Falls (3 m) located downstream in ILP 3802, Reach 3 are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
E11071	3659	2	0.9	4	S6	9/16/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Falls (3 m) located downstream in mainstem ILP 3802 Reach 3 are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
E11072	3660	1	1.0	4	S6	9/16/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Falls (3 m) downstream in mainstem ILP 3802, Reach 3 prevent upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
E11073	3661	1	1.2	0	S6	9/13/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dewatered. Falls (3 m) located downstream in mainstem ILP 3802, Reach 3 prevent upstream fish access. Stream has very little water and it looks like channel was mapped based on vegetation. No fish captured upstream of the falls with 18 sampling sites.
E11074	3663	1	0.8	7	S6	9/13/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dry/Intermittent. Falls (3 m) downstream in mainstem ILP 3802, Reach 3 prevent upstream fish access. No fish captured upstream of the falls with 18 sampling sites. No perennial habitat.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
E11075	3609	1	NS	NS	NVC	9/13/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. No Visible Channel. Cascade (30 m x 30 m) located downstream on mainstem ILP 3607. Reach 1 is a barrier to upstream fish migration. Sampling in upstream lake (Site 903) resulted in no fish captured and confirms non fish bearing status.
E11081	3598	1	0.6	25	S6	9/14/97	NA	NA	NA	NA	NA	NA	NA	NA	
E11082	3597	1	1.0	20	S6	9/14/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dewatered. No fish habitat. Gradient >20%. No connectivity.
E11084	3803	1	0.7	21	S6	9/14/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Gradient 22%. No fish habitat observed.
E11085	3688	3	1.0	0	S6	9/16/97	200	425	70	L	C	8.1	NA	NA	Historical Site. High gradient sections (20% over 20 m) throughout Reach 1 block upstream fish access. No fish captured within site and sampling in upstream lake resulted in no fish captured and confirms non fish bearing status.
E11086	3802	6	4.9	1	S5	9/18/97	100	300	50	L	C	7	NA	NA	Historical Site. Falls (3 m) in Reach 3 are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
E12054	3607	1	2.3	4	S6	9/16/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dry Intermittent. Cascade (30 m x 30 m) located downstream in this reach is a barrier to upstream fish migration. Sampling in upstream lake (Site 903) resulted in no fish captured and confirms non fish bearing status.
E12055	3608	1	0.9	0	S6	9/16/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Cascade (30 m x 30 m) located downstream on mainstem ILP 3607. Reach 1 is a barrier to upstream fish migration. Sampling in upstream lake (Site 903) resulted in no fish captured and confirms non fish bearing status.
E12056	3587	3	1.3	4	S4	9/11/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within reach. Second pass sampling confirms non fish bearing status. No fish access from below cutblock (Triton, 1999b).
E12057	3588	1	0.5	5	S6	9/11/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dewatered. Poor rearing, poor spawning and poor overwintering habitat observed within reach. Channel is likely subsurface gully flow.
E12061	3685	1	1.0	3	S6	9/11/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dewatered. Poor rearing, poor spawning and poor overwintering habitat observed within site. No discernible channel, flows go subsurface and should not be classified as a stream (Triton, 1999b).
E12063	3639	1	NS	NS	NVC	9/11/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. No Visible Channel. No fish habitat.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
E12067	3678	8	8.6	3	S5	9/12/97	100	543	60	M	C	7	NA	NA	Historical Site. Falls (5 m) located downstream in Reach 7 are a barrier to upstream fish migration. No fish captured upstream of falls.
E12069	3357	1	6.9	8	S2/S5	9/12/97	100	213	140	L	C	8	NA	NA	Historical Site. Poor rearing, fair spawning and poor overwintering habitat observed within site. Falls (5 m) block upstream fish migration. Rainbow trout captured downstream of falls. Two sample sites upstream of falls resulted in no fish captured and confirms non fish bearing status of upstream section.
E12071	3607	5	NS	NS	NVC	9/12/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Non Visible Channel. Cascade (30 m x 30 m) located downstream in Reach 1 blocks upstream fish access. Sampling in downstream lake (Site 903) resulted in no fish captured and confirms non fish bearing status.
E12076	3219	1	2.8	5	S6	9/13/97	100	223	130	L	C	8	NA	NA	Historical Site. Falls (5 m) located downstream on ILP 3602. Reach 2 are a barrier to upstream fish migration. No fish captured upstream of falls.
E12077	3605	3	NS	NS	NVC	9/13/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. No Visible Channel. Falls (5 m) located downstream on mainstem ILP 3602. Reach 2 are a barrier to upstream fish migration. Sampling in upstream lake (Reach 4, Site 904) resulted in no fish captured and confirms non fish bearing status of this stream.
E12082	3692	4	3.0	0	S6	9/14/97	100	254	70	M	C	8	NA	NA	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within site. Two falls (2 m and 2 m) located downstream in Reach 1 are barriers to upstream fish migration. No fish captured upstream of falls.
E12083	3556	1	NS	NS	NVC	9/14/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. No Visible Channel. Wetland. Two falls (2 m and 2 m) located downstream on mainstem ILP 3692. Reach 1 are barriers to upstream fish migration. This site is one (1) of five (5) sites conducted upstream of the barrier. No fish captured upstream of falls.
E12084	3556	2	NS	NS	NVC	9/14/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. No Visible Channel. No fish habitat.
E12085	3692	2	1.4	4	S6	9/14/97	100	315	70	M	C	9	NA	NA	Historical Site. Two falls (2 m and 2 m) located downstream are barriers to upstream fish migration. Five (5) sample sites upstream of falls resulted in no fish captured and confirms non fish bearing status.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
F12086	3687	2	1.6	3	S6	9/16/97	100	212	70	L	C	8	NA	NA	Historical Site. High gradient sections (20% over 20 m) throughout Reach 1 of mainstem ILP 3688 block upstream fish migration to this reach. No fish captured within site or downstream lake confirms non fish bearing status.
F12087	3694	1	NS	NS	NVC	9/16/97	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. No Visible Channel. No fish habitat.
F12089	3637	6	1.8	4	S6*	9/18/97	100	135	150	L	C	7.5	NA	NA	Historical Site. Poor spawning, poor rearing and poor overwintering habitat observed within site. Ephemeral stream. No fish captured downstream (Site 530 and Site E11069). Inferred non fish bearing.
F12090	3643	1	0.3	11	S6	9/18/97	100	243	190	L	C	6	NA	NA	Historical Site. Poorly defined channel with subsurface flow. Poor habitat. No fish captured.
F11	3692	3	2.0	6	S6	8/17/98	135	421	30	L	C	9	NA	NA	Historical Site. Two falls (2 m and 2 m) located downstream in Reach 1 are barriers to upstream fish migration. No fish captured upstream of falls.
F12	3692	2	2.0	7	S3-S6	8/17/98	300	438	60	L	M	10	NA	NA	Historical Site. Falls (1.8 and 1.9 m) within reach are a barrier to upstream fish migration. No fish captured upstream of falls. Five (5) sample sites upstream of falls confirms non fish bearing status. Fish captured with minimal effort downstream of falls.
F13	3687	4	2.0	3	S6	8/19/98	400	227	60	L	C	10	NA	NA	Historical Site. High gradient sections of 20% over 20 m throughout Reach 1 (site 517) block upstream fish access. No fish captured at this site and in downstream lake (Site 908) confirms non fish bearing status.
F15	3608	2	1.0	10	S6	8/21/98	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dry/Intermittent. No fish habitat. Second pass sampling confirms S6 classification.
F16	3587	3	1.0	3	S6	8/19/98	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dry/Intermittent. Second pass sampling confirmed the absence of fish habitat. No fish access from below cutblock (Triton, 1999c).
F17	3802	7	3.0	2	S6	8/21/98	300	1137	40	L	C	10	NA	NA	Historical Site. Dry/Intermittent. Falls (3 m) in Reach 3 are a barrier to upstream fish migration. No fish captured upstream of falls.
F18	3655	1	1.0	4	S6	8/21/98	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dry/Intermittent. Falls (3 m) downstream in mainstem ILP 3802 Reach 3 prevent upstream fish access. No fish captured upstream of the falls with 18 sampling sites.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
F19	3657	1	1.0	2	S6	8/21/98	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dry/Intermittent. Falls (3 m) downstream in mainstem ILP 3802. Reach 3 prevent upstream fish access. No fish captured upstream of the falls with 18 sampling sites.
F110	3661	1	1.0	2	S6	8/21/98	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dry/Intermittent. Falls (3 m) downstream in mainstem ILP 3802. Reach 3 prevent upstream fish access. Poor habitat. No fish captured upstream of the falls with 18 sampling sites.
F111	3802	9	2.0	3	S6	8/21/98	300	200	60	L	C	10	MT	over night set	Historical Site. Falls (3 m) in Reach 3 are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
F112	3663	1	1.0	2	S6	8/21/98	100	102	40	L	C	11	NA	NA	Historical Site. Dry/Intermittent. Falls (3 m) downstream in ILP 3802. Reach 3 prevent upstream fish access. No fish captured upstream of the falls with 18 sampling sites.
F113	3802	5	3.0	1	S6	8/21/98	100	203	40	L	L	14	MT	over night set	Historical Site. Falls (3 m) in Reach 3 of this stream are a barrier to upstream fish migration. No fish captured with minnow trapping and electrofishing conducted at this site. No fish captured upstream of the falls with 18 sampling sites.
F114	3652	1	1.0	2	S6	8/21/98	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. Dry/Intermittent. Falls (3 m) downstream in mainstem ILP 3802. Reach 3 prevent upstream fish access. No fish habitat. No fish captured upstream of the falls with 18 sampling sites.
F115	3653	2	NS	NS	NVC	8/21/98	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. No Visible Channel. No fish habitat. Falls (3 m) downstream in mainstem ILP 3802. Reach 3 prevent upstream fish access. No fish captured upstream of the falls with 18 sampling sites.
F1215	3802	3	3.0	1	S6	8/27/98	300	207	50	L	C	12	MT	over night set	Historical Site. Cascade (1 m x 10 m) and falls (3 m) located within this reach are barriers to upstream fish migration. No fish captured upstream of falls with 18 sample sites. Downstream of falls is S3 with rainbow trout captured in reach 2 (Site F14).
F1216	3603	3	1.0	11	S6	8/22/98	NA	NA	NA	NA	NA	NA	NA	NA	Historical Site. No fish habitat. Subsurface flows. More of a vegetated gully with flows due to run-off only. Additional sampling confirmed S6 classification. No perennial habitat.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
47	3792	5	0.5	19	S4*/S6	9/3/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. High gradient (16-22%) sections upstream of road crossing prevent upstream fish access ~100 m upstream of confluence with ILP 3732. Inferred fish bearing from downstream of high gradient section to Morice River, S6 upstream. Poor rearing, no spawning and no overwintering habitat observed within site.
49	3783	3	2.7	4	S6	9/3/02	300	329	40	NA	C	8.0	NA	NA	Cascades (10 m x 50 m) downstream in Reach 2, along with falls (3 m) in this reach block upstream fish access. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
50	3783	4	1.1	2	S6	9/3/02	100	216	50	L	C	8.0	NA	NA	Cascades (10 m x 50 m) downstream in Reach 2, along with falls (3 m) in Reach 3 prevent upstream fish access. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
51	3731	1	1.1	6	S6	2002/09/03	100	104	50	NA	C	8.0	NA	NA	Dry/Intermittent. Cascades (10 m x 50 m) located on downstream mainstem ILP 3783, Reach 2 and falls (3 m) on mainstem ILP 3783, Reach 3 are barriers to upstream fish access. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
52	3783	5	1.3	2	S6	2002/09/03	100	119	50	L	C	8.0	NA	NA	Cascades (10 m x 50 m) downstream in Reach 2 along with falls (3 m) in Reach 3 prevent upstream fish migration. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
80	3679	2	0.7	3	S6	9/22/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. High gradient (45% for 100 m) in Reach 1 prevents upstream fish access. No perennial habitat available upstream.
81	3701	2	1.0	5	S6	2002/09/27	400	351	60	L	C	10.0	NA	NA	High gradient (18-22%) downstream in Reach 1 prevents upstream fish access. No fish caught upstream of high gradient.
82	3702	1	NS	NS	NVC	2002/09/27	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. High gradient (18-22%) on mainstem (ILP 3701, Reach 1) prevents upstream fish access. No fish habitat.
254	2937	1	NS	3	NVC	9/3/02	NA	NA	NA	NA	NA	NA	NA	NA	Non Classified Drainage. No channel observed 100 m downstream and upstream of road crossing. No fish habitat. No signs of alluvium or scour.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
256	2910	1	NS	5	NVC	9/3/02	NA	NA	NA	NA	NA	NA	NA	NA	Non Classified Drainage. No evidence of alluvium or scour observed upstream of culvert. No fish habitat.
258	2857	1	NS	7	NVC	9/3/02	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. No fish habitat. No visible channel observed in rangeland upstream. Non Classified Drainage.
260	2937	2	0.6	2	S6	2002/09/03	125	201	120	L	C	9.0	NA	NA	Stream channel becomes Non Classified Drainage ~150 m downstream of site. No potential for fish access. Non Classified Drainage observed downstream in Reach 1 (Site 254). No perennial habitat.
261	2910	3	0.6	15	S6	9/3/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. Non fish bearing due to Non Classified Drainage downstream in Reach 1 (Site 256).
262	2913	1	NS	3	NVC	9/4/02	10	50	10	NA	L	8.0	NA	NA	Non Classified Drainage observed for >100 m downstream of culvert. No fish habitat. Electrofishing was conducted in a small isolated pond (10 m x 4 m) at culvert inlet.
265	2934	1	1.5	3	S6	9/4/02	100	245	120	M	C	9.0	NA	NA	Bedrock falls (4 m) located downstream in mainstem ILP 2912, Reach 3 are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
266	2912	5	1.6	3	S6	9/4/02	225	365	100	M	C	8.0	NA	NA	Bedrock falls (4 m) located downstream in Reach 3 are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
270	2929	2	NS	1	NVC	9/4/02	NA	NA	NA	NA	NA	NA	NA	NA	Non Classified Drainage. No fish habitat. Bedrock falls (4 m) located downstream in mainstem ILP 2912, Reach 3 are a barrier to upstream fish migration.
271	2876	1	NS	1	NVC	9/4/02	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. No fish habitat.
273	2450	3	2.0	2	S6	9/5/02	120	340	110	L	C	6.0	NA	NA	Cascade (1.5 m x 2.1 m) located ~335 m downstream of road crossing within this reach is a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the barrier confirms non fish bearing status.
276	2450	6	0.9	4	S6	9/5/02	100	123	50	L	C	7.0	NA	NA	Dry/Intermittent. Cascade (1.5 m x 2.1 m) located at the bottom of Reach 3 is a barrier to upstream fish migration. Poor fish habitat observed within reach. Three (3) sampling sites conducted upstream of the barrier confirms non fish bearing status.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
287	2593	3	3.3	4	S5	9/7/02	350	518	60	M	C	5.0	NA	NA	Cascades (100 m x 400 m) combined with falls (40 m x 10 m) located in Reach 2 of this stream are barriers to upstream fish migration. Four (4) sampling sites conducted upstream of the barriers resulted in no fish captured and confirm non fish bearing status.
288	2610	1	1.3	13	S6	9/7/02	100	105	40	M	C	4.0	NA	NA	Cascades (100 m x 400 m) combined with falls (40 m x 10 m) located in Reach 2 of mainstem ILP 2593 along with cascade (80 m x 100 m) in Reach 4 of mainstem ILP 2593 are barriers to upstream fish migration. Four (4) sample sites conducted upstream of the barriers resulted in no fish captured and confirms non fish bearing status.
289	2593	6	3.4	10	S5	9/7/02	125	179	40	M	C	4.0	NA	NA	Cascades (100 m x 400 m) combined with falls (40 m x 10 m) located in Reach 2 of this stream along with cascade (80 m x 100 m) in Reach 4 are barriers to upstream fish migration. Four (4) sample sites conducted upstream of the barriers resulted in no fish captured and confirms non fish bearing status.
290	2868	8	10.5	4	S5	9/7/02	250	632	80	M	C	6.0	NA	NA	Falls (5 m) located downstream in Reach 7 blocks upstream fish access to this reach. Seven (7) sample sites upstream of the falls resulted in no fish captured and confirms non fish bearing status.
291	2868	7	NS	NS	NS	9/7/02	200	486	80	NA	L	6.0	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.
292	2906	1	2.7	12	S6	9/7/02	NA	NA	NA	NA	NA	NA	NA	NA	Falls (5 m) located on downstream mainstem Emerson Creek ILP 2868, Reach 7 blocks upstream fish access to this reach. Seven (7) sample sites upstream of the falls resulted in no fish captured and confirms non fish bearing status.
293	2925	1	1.4	12	S6	9/7/02	50	97	80	L	C	6.0	NA	NA	Dry/Intermittent. Bedrock falls (4 m) located downstream in mainstem ILP 2912, Reach 3 are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
294	2912	3	4.6	4	S5	9/7/02	250	596	100	L	C	7.0	NA	NA	Bedrock falls (4 m) located in the middle of this reach are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
295	2912	4	3.1	6	S5	9/7/02	100	167	100	L	C	7.0	NA	NA	Bedrock falls (4 m) located downstream in Reach 3 are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
300	3528	6	NS	1	NVC	9/9/02	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. No alluvium or scour observed for 100 m upstream or downstream.
302	3776	2	NS	22	NVC	9/11/02	NA	NA	NA	NA	NA	NA	NA	NA	Non Classified Drainage. No sign of alluvium or scour for 100 m upstream and 50 m downstream of UTM. No fish habitat.
304	3781	3	NS	NS	NVC	9/11/02	2	50	70	NA	C	7.0	NA	NA	No Visible Channel for 50 m upstream and 75 m downstream. Non Classified Drainage - upstream S6. No fish habitat.
305	3784	1	0.7	50	S6	9/11/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. High gradient (50%) at the bottom of reach block upstream fish access. Cascades (10 m x 50 m) located on downstream mainstem ILP 3783, Reach 2 are also barriers to upstream fish migration. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
306	3783	2	3.0	16	S6	9/11/02	100	112	50	L	C	6.0	NA	NA	Cascades (10 m x 50 m) in the middle of this reach along with falls (3 m) in Reach 3 block upstream fish access. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
309	3736	3	1.7	10	S3*/S6	9/11/02	NA	NA	NA	NA	NA	NA	NA	NA	High gradient (27%) blocks upstream fish access. No perennial habitat upstream of the barrier. Inferred fish bearing downstream of high gradient section.
310	3739	2	1.2	6	S4*/S6	9/11/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. High gradient (20%) increasing to 25% in upper portion of reach blocks upstream fish access. Inferred fish bearing downstream of high gradient section.
315	3622	1	NS	0	NVC	9/14/02	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. No fish habitat.
318	3618	6	NS	1	NVC	9/14/02	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. No fish habitat.
319	3042	2	1.4	14	S6	9/14/02	155	135	20	L	C	9.0	NA	NA	High gradient (27%) downstream in Reach 1 blocks upstream fish access. No fish captured confirms non fish bearing status. No perennial habitat available upstream.
320	3259	4	1.3	25	S6	9/14/02	190	197	20	M	C	9.0	NA	NA	High gradient (25%) within this site blocks upstream fish access. No fish habitat observed within site and no perennial habitat available upstream. No fish captured confirms non fish bearing status.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
324	3559	2	0.7	4	S4*/S6	9/17/02	200	218	70	M	C	6.0	NA	NA	Poor rearing, no spawning and no overwintering habitat observed within site. Gradient barrier (23%) within reach prevents upstream fish migration. Fish bearing downstream of high gradient section.
325	3695	7	0.9	5	S6	9/17/02	180	420	50	L	C	6.5	NA	NA	High gradient (22%) downstream in Reach 5 blocks upstream fish access. No fish captured upstream of high gradient.
326	3561	1	NS	NVC	NS	9/17/02	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. Wetland type habitat. Flows into non fish bearing reach.
327	3477	6	3.3	3	S5	9/17/02	270	546	20	L	C	5.5	NA	NA	Falls (25 m) located downstream in Reach 4 and falls (12 m) within Reach 5 are barriers to upstream fish migration. Four (4) sample sites upstream of the 25 m falls resulted in no fish captured and confirms non fish bearing status.
328	3122	1	1.6	11	S6	9/17/02	175	287	20	M	C	5.0	NA	NA	Falls (25 m) located downstream in mainstem ILP 3477, Reach 4 and falls (12 m) within mainstem ILP 3477, Reach 5 are barriers to upstream fish migration. Four (4) sample sites upstream of the 25 m falls resulted in no fish captured and confirms non fish bearing status.
329	3477	5	3.6	6	S5	9/17/02	325	626	20	M	C	5.5	NA	NA	Falls (25 m) located downstream in Reach 4 and falls (12 m) within this reach are barriers to upstream fish migration. Four (4) sample sites upstream of the 25 m falls resulted in no fish captured and confirms non fish bearing status.
330	3112	1	1.8	7	S6	9/17/02	170	256	20	M/C		5.0	NA	NA	Falls (25 m) located downstream in mainstem ILP 3477, Reach 4 are a barrier to upstream fish migration. Four (4) sample sites upstream of the 25 m falls resulted in no fish captured and confirms non fish bearing status.
335	2445	8	1.8	2	S6	9/19/02	320	530	20	H	M	5.5	NA	NA	Falls (5 m) located downstream in Reach 4 are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
336	2445	9	3.1	3	S5	9/19/02	220	450	30	H	L	4.5	NA	NA	Falls (5 m) located downstream in Reach 4 are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
337	2445	11	3.4	3	S5	9/19/02	220	338	30	H	L	5.0	NA	NA	Falls (5 m) located downstream in Reach 4 are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
338	3678	8	4.9	2	S5	9/19/02	170	514	20	NA	L	4.0	NA	NA	Falls (5 m) located downstream in Reach 7 are a barrier to upstream fish migration. Five (5) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
339	3678	7	7.5	2	S5	9/19/02	350	469	50	H	C	5.0	NA	NA	Falls (5 m) located downstream on Houston Tommy Creek mainstem Reach 7 block fish access. Five (5) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
340	2774	1	3.1	13	S5	9/19/02	210	319	30	M	L	4.0	NA	NA	Falls (5 m) located downstream on Houston Tommy Creek mainstem Reach 7 block fish access to this stream. Five (5) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
341	3361	2	2.3	4	S6	9/19/02	220	218	30	H	L	4.0	NA	NA	Falls (5 m) in Reach 1 are a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
342	3357	3	3.0	6	S5	9/19/02	180	220	30	H	C	4.5	NA	NA	Falls (5 m) located downstream in Reach 1 are a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
347	3332	2	4.7	23	S5	9/20/02	100	212	50	H	C	4.5	NA	NA	High gradient (23%) within this site prevents upstream fish migration. Additional fish sampling in Reach 3 of this stream confirms non fish bearing status.
351	3182	1	4.7	31	S5	9/20/02	NA	NA	NA	NA	NA	NA	NA	NA	Cascade (20 m x 35 m) located ~80 m from the bottom of this reach is a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the cascade resulted in no fish captured and confirms non fish bearing status.
353	3174	2	1.8	4	S6	9/20/02	200	326	90	M	C	5.0	NA	NA	Cascade (5 m x 12 m) and bedrock falls (2 m) located in Reach 1 are barriers to upstream fish migration. No fish captured upstream of barriers.
451	3753	2	NS	NS	NS	10/1/02	200	750	50	NA	C	5.0	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.
454	3742	3	4.8	9	S5	10/1/02	110	330	50	L	C	5.0	NA	NA	Cascade (5 m x 1 m) located downstream in Reach 2 is a barrier to upstream fish migration. Two (2) sampling sites upstream of cascade resulted in no fish captured and confirms non fish bearing status.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
455	3743	1	1.9	10	S6	10/1/02	100	466	50	M	C	5.0	NA	NA	Cascade (5 m x 1 m) located downstream on mainstem ILP 3742, Reach 2 is a barrier to upstream fish migration. Two (2) sampling sites upstream of cascade resulted in no fish captured and confirms non fish bearing status.
458	2868	8	NS	NS	NS	10/2/02	200	690	80	NA	C	6.0	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.
460	3471	5	1.8	13	S3/S6	10/2/02	100	180	30	M	C	6.0	NA	NA	Limited rearing, low spawning and no overwintering habitat observed within site. Cascade (20 m x 40 m) in this Reach (with a 1 m and 1.5 m falls within) located ~100 m upstream of the confluence with ILP 2908 is a barrier to upstream fish migration. Dolly Varden captured downstream of cascade / falls.
461	3471	5	0.9	5	S6	10/2/02	100	270	20	L	C	6.0	NA	NA	Cascade (20 m x 40 m) in this Reach (with a 1 m and 1.5 m falls within) located ~100 m upstream of the confluence with ILP 2908 is a barrier to upstream fish migration. No fish captured upstream of barriers.
501	3402	1	0.8	16	S4*/S6	9/3/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. Inferred fish bearing downstream of road, S6 upstream of road (high gradient >20% upstream of road).
503	3401	2	1.3	11	S6	9/3/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. Stream is S6 upstream of road crossing. Cascade (1.5 m x .30 m) over cobble located ~50 m downstream of road and interstitial flows block upstream fish access. Stream offers no habitat within surveyed section and no perennial habitat is available upstream.
504	3405	2	NS	1	NVC	9/3/02	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. No fish habitat.
506	3524	2	NS	1	NVC	9/3/02	NA	NA	NA	NA	NA	NA	NA	NA	Seasonally flooded depressions. No fish habitat.
507	3525	3	1.1	15	S6	9/3/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. High gradient (>20%) ~150 m downstream of site prevents upstream fish access. No perennial habitat.
513	3675	4	NS	1	NVC	9/4/02	NA	NA	NA	NA	NA	NA	NA	NA	Non Classified Drainage. Seasonally wetted depressions connected by subsurface / surface connections. No fish habitat.
514	3675	1	1.5	18	S6	9/4/02	100	67	40	L	C	7.0	NA	NA	Dry/Intermittent. High gradient (17-18%) and small cascades (0.5 m x 1 m) over cobble block upstream fish access. No rearing, no spawning and no overwintering habitat observed within reach. No fish captured and no perennial habitat available upstream.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
516	3529	3	0.4	3	S6	9/4/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. S6 from surveyed section upstream. Numerous organic barriers. Barely classifiable as a stream. No rearing, no spawning and no overwintering habitat observed within site.
517	3688	1	1.8	19	S3*/S6	9/4/02	600	965	60	L	C	8.0	NA	NA	Low rearing, low spawning and no overwintering habitat observed within site. Inferred fish bearing from the confluence of Houston Tommy Creek to 300 m upstream. High gradient sections of 20% over 20 m throughout surveyed section block upstream fish access. Dewatered section (~75 m) at bottom of reach at confluence with Houston Tommy Creek further limits fish access to this reach. Second pass sampling upstream of Dewatered section and sampling of upstream lake confirms non fish bearing status.
518	3681	1	0.5	12	S6	9/4/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. High gradient in excess of 20% and no perennial habitat present.
522	3715	8	NS	1	NVC	9/5/02	NA	NA	NA	NA	NA	NA	NA	NA	Non Classified Drainage. Seasonally wetted depressions. No fish habitat.
523	3715	6	0.5	5	S6	9/5/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. High gradient (26%) 100 m downstream of road crossing is a barrier to upstream fish migration. Sampling in upstream lake resulted in no fish captured and confirms non fish bearing status.
525	3716	2	1.0	5	S6	9/5/02	100	143	90	L	C	7.0	NA	NA	No connection to downstream fish bearing water. Discontinuity of >100 m with no surface connection. No upstream perennial habitat. Numerous organic / cobble falls ~1 m drops upstream of road crossing. No fish captured.
526	3721	2	NS	NS	NVC	9/5/02	NA	NA	NA	NA	NA	NA	NA	NA	Non Classified Drainage. Seasonally wetted depression. No fish habitat.
528	3635	1	NS	NS	NVC	9/6/02	NA	NA	NA	NA	NA	NA	NA	NA	No fish habitat. Unable to determine natural drainage pattern due to upstream disturbances. Drainage has Non Classified Drainage characteristics.
534	3724	2	NS	NS	NVC	9/6/02	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. No fish habitat.
535	3607	1	1.7	8	S6	9/6/02	600	652	80	L	C	7.0	NA	NA	Cascade (30 m x 30 m) at the bottom of this Reach is a barrier to upstream fish migration. Five (5) sampling sites and lake sampling conducted upstream of the cascade resulted in no fish captured and confirms non fish bearing status.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
541	2593	4	2.4	11	S6	9/7/02	250	841	60	M	C	5.0	NA	NA	Cascades (100 m x 400 m) combined with falls (40 m x 10 m) located in Reach 2 of this stream are barriers to upstream fish migration. Four (4) sample sites conducted upstream of the cascade / falls resulted in no fish captured and confirms non fish bearing status.
542	2868	10	2.6	18	S6	9/7/02	200	680	80	M	C	6.0	NA	NA	Falls (5 m) located downstream in Reach 7 are a barrier to upstream fish migration. Cascade (5 m x 7 m) as well as falls (1 - 3 m) within cascades are barriers to upstream fish migration. Seven (7) sample sites upstream of the falls resulted in no fish captured and confirms non fish bearing status.
543	2690	1	2.0	12	S6	9/7/02	200	520	80	L	C	6.0	NA	NA	Falls (5 m) located on downstream mainstem Emerson Creek, Reach 7 are a barrier to upstream fish migration. Falls (3.5 m) and cascade (10 m x 20 m) located within this reach are obstructions to upstream fish migration. Seven (7) sample sites upstream of the falls resulted in no fish captured and confirms non fish bearing status.
544	2868	9	NS	NS	NS	9/7/02	200	927	80	NA	C	6.0	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.
550	3439	3	NS	NS	NS	9/9/02	180	624	80	NA	C	5.0	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.
553	3073	1	3.9	16	S5	9/9/02	150	690	60	M	C	5.0	NA	NA	Bedrock cascade (3 m x 3 m) is a barrier to upstream fish migration. Low rearing, low spawning and potential overwintering habitat observed within site. No perennial habitat available upstream. No fish captured upstream of cascade confirms non fish bearing status.
554	3406	10	3.2	15	S5	9/9/02	250	469	70	L	C	6.	NA	NA	High gradient (22% for 50 m and >20% for 20 m) observed within site blocks upstream fish access. No fish captured.
557	2881	2	0.4	5	S6	9/10/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. No fish habitat. Marginal S6, close to Non Classified Drainage classification. Non fish bearing.
559	2999	4	NS	24	NVC	9/10/02	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. No fish habitat. High gradient (>20%) in section below road crossing. Non Classified Drainage characteristics.
560	2942	1	2.3	15	S6	9/10/02	200	520	80	L	C	6.0	NA	NA	Two falls (2 m and 5 m) located at the confluence with Dockrill creek are barriers to upstream fish migration. Two (2) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
561	2939	2	0.4	12	S6	9/3/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry/Intermittent. Barely classifiable as a stream. No fish habitat. Downstream mainstem ILP 2937, is non fish bearing. No fish access to this site. No perennial habitat.
565	3698	1	NS	5	NVC	9/10/02	NA	NA	NA	NA	NA	NA	NA	NA	Non classified drainage with discontinuous sections. No fish habitat. No overwintering habitat available upstream.
566	3707	1	NS	NS	NVC	9/10/02	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. No fish habitat. Stream has been so disturbed by previous logging practices that it is impossible to follow or distinguish within harvested area downstream of road. Stream channel meanders within block, loses energy and then disappears within and under vegetation and disturbance. Non fish bearing stream.
567	3706	3	NS	NS	NVC	9/10/02	NA	NA	NA	NA	NA	NA	NA	NA	No Visible Channel. No fish habitat. Stream has been so disturbed that it is impossible to follow or distinguish within harvested area. Non fish bearing stream.
568	3602	3	NS	NS	NS	9/12/02	180	395	110	NA	C	7.0	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.
571	3602	2	NS	NS	NS	9/12/02	300	365	110	NA	C	7.0	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.
572	3605	2	NS	NS	NS	9/12/02	150	459	110	NA	C	7.0	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.
585	3628	2	2.0	1	S6	9/14/02	300	525	30	M	C	8.0	NA	NA	Cascade (50 m x 50 m) (5 m falls within) at the top of Reach 1 of this stream blocks upstream fish migration. Three (3) sample sites upstream of cascade / falls resulted in no fish captured and confirms non fish bearing status. Rainbow trout captured downstream at the bottom of Reach 1 (Site 583).
586	3375	1	0.9	1	S6	9/14/02	100	250	30	M	C	7.0	NA	NA	Cascade (50 m x 50 m) and 5 m falls located downstream on mainstem ILP 3628, Reach 1 blocks upstream fish migration. Three (3) sampling sites conducted upstream of the cascade / falls resulted in no fish captured and confirms non fish bearing status.
587	3628	3	2.7	1	S6	9/14/02	150	180	30	L	C	7.0	NA	NA	Cascade (50 m x 50 m) with a 5 m falls located at the top of Reach 1 blocks upstream fish migration. Three (3) sampling sites conducted upstream of the cascade / falls resulted in no fish captured and confirms non fish bearing status. Rainbow trout captured downstream at the bottom of Reach 1 (Site 583).
590	3619	1	0.0	12	S6	9/14/02	NA	NA	NA	NA	NA	NA	NA	NA	Non Classified Drainage.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
599	3146	2	1.7	1	S6	9/17/02	100	210	40	M	C	7.0	NA	NA	High gradient (23%) within Reach 1 of this stream is a barrier to upstream fish migration. No fish captured upstream of high gradient section.
602	2445	7	NS	NS	NS	9/19/02	200	761	50	NA	L	6.0	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.
603	2445	14	1.4	10	S6	9/19/02	200	580	20	H	L	6.0	NA	NA	Falls (5 m) located downstream in Reach 4 are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
604	2445	13	2.2	10	S6	9/19/02	100	340	20	H	L	6.0	NA	NA	Falls (5 m) located downstream in Reach 4 are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
605	3678	7	NS	NS	NS	9/19/02	100	650	30	NA	L	4.5	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.
606	3357	1	6.8	7	S5	9/19/02	200	660	40	M	L	5.0	NA	NA	Falls (5 m) within this reach are a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
607	3350	1	1.6	27	S6	9/20/02	150	275	60	M	C	4.0	NA	NA	High gradient (33%), cascades and falls in mid portion of Reach 2 on downstream mainstem ILP 3349 block all upstream fish access. High gradient (27%) within this reach and no fish captured confirms non fish bearing status.
608	3349	3	1.3	26	S6	9/20/02	120	160	50	M	C	4.0	NA	NA	High gradient (33%), cascades and falls located downstream in the mid portion of Reach 2 block all upstream fish access. High gradient (26%) within this reach and no fish captured confirms non fish bearing status. No fish habitat.
609	3332	3	3.5	14	S5	9/20/02	300	530	50	M	C	4.0	NA	NA	High gradients (23%) downstream in Reach 1 blocks upstream fish migration. 1199
611	3252	1	1.0	22	S6	9/20/02	100	270	50	M	C	5.0	NA	NA	High gradient (20% over 40 m and >20% at confluence to downstream tributary ILP3247) blocks upstream fish access. No perennial habitat available. Electrofishing at this site and Site 612 (upstream), resulted in no fish captured which confirms non fish bearing status.
612	3247	4	NS	NS	NS	9/20/02	120	367	50	NA	C	5.0	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
613	3182	2	2.5	4	S6	9/20/02	220	270	50	M	C	5.0	NA	NA	Cascade (20 m x 35 m) located in Reach 1 is a barrier to upstream fish migration. Numerous falls, cascades and gradient barriers were also observed in Reach 1. Three (3) sampling sites conducted upstream of the cascade resulted in no fish captured and confirms non fish bearing status.
614	3184	1	1.6	8	S6	9/20/02	200	210	50	M	C	5.0	NA	NA	Cascade (20 m x 35 m) located downstream on mainstem ILP 3182, Reach 1 is a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the cascade resulted in no fish captured and confirms non fish bearing status.
616	3178	2	1.5	14	S6	9/20/02	150	530	110	H	C	6.0	NA	NA	High gradient (in excess of 20%) was observed in Reach 1 and 2 of this stream during helicopter RECCI. No fish captured confirms non fish bearing status.
900	3439	3	NS	NS	NS	10/1/02	NA	NA	NA	NA	NA	NA	GN	over night set	Fish only sampling site used to confirm non fish bearing status of stream.
903	3607	3	NS	NS	NS	10/1/02	NA	NA	NA	NA	NA	NA	GN	over night set	Fish only sampling site.
904	3605	4	NS	NS	NS	10/1/02	NA	NA	NA	NA	NA	NA	MT	over night set	Fish only sampling site. No fish captured within lake, confirms non fish bearing status of this stream.
908	3688	6	NS	NS	NS	9/30/02	NA	NA	NA	NA	NA	NA	MT	over night set	Fish only sampling site. High gradient sections of 20% over 20 m throughout Reach 1 (site 517) block upstream fish access. No fish captured within lake, confirms non fish bearing status of this stream.
918	3705	1	0.7	14	S6	9/5/02	NA	NA	NA	NA	NA	NA	NA	NA	Dry. Stream has been harvested. Cobble falls (1.5 m) combined with gradient (13.5%) and sections of discontinuous channel in upper portion block fish access. Potential barrier at confluence with the Morice River. No perennial habitat.
958	3715	7	NS	NS	NS	9/30/02	NA	NA	NA	NA	NA	NA	GN	over night set	Fish only sampling site used to confirm non fish bearing status of stream.
980	2445	4	8.2	4	S5	9/30/02	250	840	50	M	C	5.0	NA	NA	Falls (5 m) within this reach are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.

Table 15. Summary of non fish bearing reaches within the study area.

Site	ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (°C)	Type	Method	
981	2942	1	3.0	7	S6	9/30/02	100	328	80	L	C	6.0	NA	NA	Two falls (2 m and 5 m) within this Reach block upstream fish migration. No fish habitat observed. Two (2) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
996	2927	1	2.9	3	S6	9/7/02	35	543	80	L	C	7.0	NA	NA	Bedrock falls (4 m) located downstream in mainstem ILP 2912, Reach 3 are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
2732	2450	3	NS	NS	NS	9/15/02	80	270	110	NA	C	6.0	NA	NA	Fish only sampling site used to confirm non fish bearing status of stream.

NFC = No Fish Captured

NVC = No Visible Channel

NA = Not Applicable

NS = Not Sampled

* = Indicates inferred stream class

H = High

M = Moderate

L = Low

C = Clear

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 have been assigned a non fish bearing status and are classified as Non Visible Channel (NVC) do not possess potential fish habitat and are not streams due to the fact that they do not possess the criteria necessary to classify them as such. Reaches classified as NVC are largely drainages that are mapped incorrectly and no stream channel exists where the map indicates. They may also be drainages that lack evidence of scour, contain no continuous definable channel bed, lack alluvial deposits, and exhibit no evidence of extensive ponding.

5.0 STREAM CLASSIFICATION SUMMARY

Table 16 Provides a summary of stream inventory information collected during the project and Riparian Management Area (RMA) classifications for each reach sampled.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
E11065	3678	6	093L.035	24.2	2	RB	S1	Historical Site. Good rearing, good spawning and good overwintering habitat observed within reach. Rainbow trout captured.
E11090	3136	1	093L.035	1.3	22	DV	S4	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within site. Dolly Varden captured in lower section approximately 50 m upstream of confluence.
E11054	3602	2	093L.025	1.9	5	NFC	S3	Historical Site. Good rearing, fair spawning and poor overwintering habitat observed within site. Rainbow trout and Dolly Varden captured within this reach (Site 569 and Site 570).
E11055	3604	1	093L.025	1.4	6	NFC	S4	Historical Site. Good rearing, fair spawning and poor overwintering habitat observed within site. Rainbow trout and Dolly Varden captured downstream in mainstem ILP 3602, Reach 2.
E11056	3606	2	093L.025	NS	NS	NS	NVC	Historical Site. No Visible Channel.
E11057	3725	1	093L.025	2.8	3	NS	S3	Historical Site. No barriers to fish migration were observed. Potential perennial habitat available in upstream wetland and small upstream lake.
E11058	3586	1	093L.025	1.9	3	NS	S3	Historical Site. Dewatered, highly ephemeral. No barriers to fish migration were observed.
E11059	3699	1	093L.026	1.1	2	NFC	S6	Historical Site. No connection to Houston Tommy Creek, non classified drainage with discontinuous sections in Reach 1 (see Site 565).
E11060	3698	3	093L.026	1.0	3	NFC	S6	Historical Site. No fish habitat observed within site. No connection to Houston Tommy Creek, non classified drainage with discontinuous sections in Reach 1 (see Site 565).
E11061	3682	1	093L.026	0.5	7	NS	S4	Historical Site. Dry / Intermittent. Poor rearing, poor spawning and poor overwintering habitat. Dolly Varden captured downstream within this reach (Site 562).
E11062	3683	1	093L.026	NS	NS	NS	WNVC	Historical Site. No Visible Channel. Wetland appears dry, no fish habitat within wetland.
E11063	3695	2	093L.026	2.4	3	DV, RB	S3	Historical Site. Good rearing, fair spawning and poor overwintering habitat observed within site. Dolly Varden and rainbow trout captured.
E11064	3727	1	093L.026	1.8	1	NFC	S3	Historical Site. Poor rearing, poor spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Dolly Varden and rainbow trout were captured in mainstem ILP 3697, Reach 2 (Site E12066).
E11066	3655	1	093L.025	0.3	0	NS	S6	Historical Site. Dry/Intermittent. Falls (3 m) located downstream (ILP 3802, Reach 3) are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
E11067	3802	7	093L.025	6.3	3	NFC	S5	Historical Site. Falls (3 m) located downstream in Reach 3 are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
E11068	3802	2	093L.025	4.5	6	NFC	S3	Historical Site. Good spawning, good rearing and fair overwintering habitat. Rainbow trout captured upstream (Site F14).
E11069	3637	5	093L.025	2.0	4	NS	S3	Historical Site. Good rearing, good spawning and poor overwintering habitat. No barriers to fish migration were observed. Not enough water to electrofish.
E11070	3658	1	093L.025	0.6	3	NS	S6	Historical Site. Dry/Intermittent. Falls (3 m) located downstream in ILP 3802. Reach 3 are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
E11071	3659	2	093L.025	0.9	4	NS	S6	Historical Site. Falls (3 m) located downstream in mainstem ILP 3802. Reach 3 are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
E11072	3660	1	093L.025	1.0	4	NS	S6	Historical Site. Falls (3 m) downstream in mainstem ILP 3802. Reach 3 prevent upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
E11073	3661	1	093L.025	1.2	0	NS	S6	Historical Site. Dewatered. Falls (3 m) located downstream in mainstem ILP 3802. Reach 3 prevent upstream fish access. Stream has very little water and it looks like channel was mapped based on vegetation. No fish captured upstream of the falls with 18 sampling sites.
E11074	3663	1	093L.025	0.8	7	NS	S6	Historical Site. Dry/Intermittent. Falls (3 m) downstream in mainstem ILP 3802. Reach 3 prevent upstream fish access. No fish captured upstream of the falls with 18 sampling sites. No perennial habitat.
E11075	3609	1	093L.025	NS	NS	NS	NVC	Historical Site. No Visible Channel. Cascade (30 m x 30 m) located downstream on mainstem ILP 3607. Reach 1 is a barrier to upstream fish migration. Sampling in upstream lake (Site 903) resulted in no fish captured and confirms non fish bearing status.
E11076	3594	1	093L.025	1.0	5	NS	S4	Historical Site. Fair rearing, good spawning and poor overwintering habitat observed within reach. No barriers to fish migration were observed. Potential perennial habitat available in small lake on mainstem ILP 3725. Reach 7.
E11077	3725	6	093L.025	1.9	3	NS	S3	Historical Site. Poor rearing, poor spawning and poor overwintering habitat. Beaver dam at lake controls stream flow. Potential perennial habitat available in small upstream lake.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
E11078	3164	1	093L.035	1.4	11	NS	S4	Historical Site. Fair rearing, fair spawning and poor overwintering habitat observed within reach. Dolly Varden captured within reach (Site 573).
E11079	3601	1	093L.025	8.6	4	RB, DV*	S3	Historical Site. Rainbow trout and Dolly Varden captured.
E11080	3630	1	093L.025	0.5	3	NS	S4	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within reach. Fish presence in upstream lake is unknown.
E11081	3598	1	093L.025	0.6	25	NS	S6	Historical Site. Dewatered. Gradient 25%.
E11082	3597	1	093L.025	1.0	20	NS	S6	Historical Site. Dewatered. No fish habitat. Gradient >20%. No connectivity.
E11083	3802	1	093L.015	6.2	3	NS	S2	Historical Site. Good rearing, good spawning and fair overwintering habitat observed within reach. Dolly Varden and rainbow trout captured upstream.
E11084	3803	1	093L.015	0.7	21	NS	S6	Historical Site. Gradient 22%. No fish habitat observed.
E11085	3688	3	093L.026	1.0	0	NFC	S6	Historical Site. High gradient sections (20% over 20 m) throughout Reach 1 block upstream fish access. No fish captured within site and sampling in upstream lake resulted in no fish captured and confirms non fish bearing status.
E11086	3802	6	093L.025	4.9	1	NFC*	S5	Historical Site. Falls (3 m) in Reach 3 are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
E11087	3802	4	093L.025	NS	NS	NS	WNVC	Historical Site. Good rearing, fair spawning and fair overwintering habitat. Potential Fisheries Sensitive Zone.
E12054	3607	1	093L.025	2.3	4	NS	S6	Historical Site. Dry/Intermittent. Cascade (30 m x 30 m) located downstream in this reach is a barrier to upstream fish migration. Sampling in upstream lake (Site 903) resulted in no fish captured and confirms non fish bearing status.
E12055	3608	1	093L.025	0.9	0	NS	S6	Historical Site. Cascade (30 m x 30 m) located downstream on mainstem ILP 3607. Reach 1 is a barrier to upstream fish migration. Sampling in upstream lake (Site 903) resulted in no fish captured and confirms non fish bearing status.
E12056	3587	3	093L.025	1.3	4	NS	S6	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within reach. Second pass sampling confirms non fish bearing status. No fish access from below cutblock (Triton, 1999b).
E12057	3588	1	093L.025	0.5	5	NS	S6	Historical Site. Dewatered. Poor rearing, poor spawning and poor overwintering habitat observed within reach. Channel is likely subsurface gully flow.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
E12058	3590	1	093L.025	1.1	5	NS	S4	Historical Site. Dry/Intermittent. Poor rearing, poor spawning and poor overwintering habitat. No barriers to fish migration were observed. Potential perennial habitat in downstream wetland/lake on mainstem (ILP 3725, Reach 7).
E12059	3725	4	093L.025	2.2	5	NFC	S3	Historical Site. Moderate rearing, moderate spawning and poor overwintering habitat observed within site. No barriers to fish migration observed. Potential perennial habitat available in downstream wetland/lake.
E12060	3686	1	093L.026	1.6	3	NFC	S3	Historical Site. Moderate rearing, poor spawning and poor overwintering habitat. No barriers observed within site. Dolly Varden captured downstream (ILP 3682, Reach 1 (Site 562)).
E12061	3685	1	093L.026	1.0	3	NS	S6	Historical Site. Dewatered. Poor rearing, poor spawning and poor overwintering habitat observed within site. No discernible channel, flows go subsurface and should not be classified as a stream (Triton, 1999b).
E12062	3638	1	093L.025	1.9	7	NS	S3	Historical Site. Poor rearing, poor spawning and poor overwintering habitat available observed within site. Rainbow trout captured downstream (Site 531).
E12063	3639	1	093L.025	NS	NS	NS	NVC	Historical Site. No Visible Channel. No fish habitat.
E12064	3645	1	093L.025	1.1	1	NS	S4	Historical Site. Poor rearing, poor spawning and poor overwintering habitat available observed within site. No barriers to upstream fish migration were observed. Rainbow trout captured downstream (ILP 3802, Reach 2 (Site F14)).
E12065	3637	2	093L.025	2.0	2	DV, RB	S3	Historical Site. Moderate rearing, moderate spawning and poor overwintering habitat observed within site. Dolly Varden and rainbow trout captured.
E12066	3697	2	093L.026	3.7	5	DV, RB	S3	Historical Site. Moderate rearing, fair spawning and poor overwintering habitat observed within site. Dolly Varden and rainbow trout captured.
E12067	3678	8	093L.045	8.6	3	NFC	S5	Historical Site. Falls (5 m) located downstream in Reach 7 are a barrier to upstream fish migration. No fish captured upstream of falls.
E12068	3678	4	093L.035	10.5	2	RB	S2	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within site. Rainbow trout captured.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
E12069	3357	1	093L.035	6.9	8	RB	S2-S5	Historical Site. Poor rearing, fair spawning and poor overwintering habitat observed within site. Falls (5 m) block upstream fish migration. Rainbow trout captured downstream of falls. Two sample sites upstream of falls resulted in no fish captured and confirms non fish bearing status of upstream section.
E12070	3678	7	093L.035	12.0	1	RB	S2	Historical Site. Fair rearing, moderate spawning and fair overwintering habitat observed within site. Rainbow trout captured.
E12071	3607	5	093L.025	NS	NS	NS	NVC	Historical Site. Non Visible Channel. Cascade (30 m x 30 m) located downstream in Reach 1 blocks upstream fish access. Sampling in downstream lake (Site 903) resulted in no fish captured and confirms non fish bearing status.
E12072	3308	1	093L.035	3.2	11	NS	S3	Historical Site. Dewatered. Poor rearing, poor spawning and poor overwintering habitat observed within site. Rainbow trout captured downstream in mainstem Houston Tommy Creek. High gradient in the upper portion of this reach may block upstream fish access. No barriers observed within site.
E12074	3632	3	093L.035	1.4	5	NFC	S4*	Historical Site. Dewatered. Poor habitat. No barriers observed. Inferred fish bearing.
E12075	3630	1	093L.025	1.5	2	NS	S4	Historical Site. Dewatered. Poor rearing, poor spawning and poor overwintering habitat observed within site. Stream is dewatered to falls (0.8 m). Fish presence in upstream lake is unknown.
E12076	3219	1	093L.035	2.8	5	NFC	S6	Historical Site. Falls (5 m) located downstream on ILP 3602. Reach 2 are a barrier to upstream fish migration. No fish captured upstream of falls.
E12077	3605	3	093L.035	NS	NS	NS	NVC	Historical Site. No Visible Channel. Falls (5 m) located downstream on mainstem ILP 3602. Reach 2 are a barrier to upstream fish migration. Sampling in upstream lake (Reach 4, Site 904) resulted in no fish captured and confirms non fish bearing status of this stream.
E12078	3603	2	093L.035	18.8	3	RB	S2	Historical Site. Fair rearing, fair spawning and fair overwintering habitat observed within site. Rainbow trout captured.
E12079	3138	1	093L.035	1.5	3	NS	S4	Historical Site. Fair rearing, fair spawning and poor overwintering habitat observed within site. No barriers to fish migration observed. Dolly Varden captured downstream (ILP 3599, Reach 1) (Site E12091).
E12080	3695	4	093L.036	0.6	22	DN	S4	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within reach. Dolly Varden captured.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
E12081	3560	1	093L.036	1.3	5	DV	S4	Historical Site. Fair rearing, fair spawning and poor overwintering habitat observed within site. Dolly Varden captured.
E12082	3692	4	093L.036	3.0	0	NFC	S6	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within site. Two falls (2 m and 2 m) located downstream in Reach 1 are barriers to upstream fish migration. No fish captured upstream of falls.
E12083	3556	1	093L.036	NS	NS	NS	NVC	Historical Site. No Visible Channel. Wetland. Two falls (2 m and 2 m) located downstream on mainstem ILP 3692. Reach 1 are barriers to upstream fish migration. This site is one (1) of five (5) sites conducted upstream of the barrier. No fish captured upstream of falls.
E12084	3556	2	093L.036	NS	NS	NS	NVC	Historical Site. No Visible Channel. No fish habitat.
E12085	3692	2	093L.036	1.4	4	NFC	S6	Historical Site. Two falls (2 m and 2 m) located downstream are barriers to upstream fish migration. Five (5) sample sites upstream of falls resulted in no fish captured and confirms non fish bearing status.
E12086	3687	2	093L.026	1.6	3	NFC	S6	Historical Site. High gradient sections (20% over 20 m) throughout Reach 1 of mainstem ILP 3688 block upstream fish migration to this reach. No fish captured within site or downstream lake confirms non fish bearing status.
E12087	3694	1	093L.026	NS	NS	NS	NVC	Historical Site. No Visible Channel. No fish habitat.
E12089	3637	6	093L.025	1.8	4	NFC	S6*	Historical Site. Poor spawning, poor rearing and poor overwintering habitat observed within site. Ephemeral stream. No fish captured downstream (Site 530 and Site E11069). Inferred non fish bearing.
E12090	3643	1	093L.025	0.3	11	NFC	S6	Historical Site. Poorly defined channel with subsurface flow. Poor habitat. No fish captured.
E12091	3599	1	093L.035	7.0	5	RB, DV	S2	Historical Site. Moderate rearing, fair spawning and fair overwintering habitat observed within reach. Dolly Varden and rainbow trout captured.
E13051	3247	1	093L.035	3.4	7	RB	S3	Historical Site. Poor rearing, poor spawning and poor overwintering habitat observed within reach. Debris jam (1.1 m in height) is a non permanent obstruction to upstream fish migration. Rainbow trout captured downstream of debris jam.
F11	3692	3	093L.036	2.0	6	NFC	S6	Historical Site. Two falls (2 m and 2 m) located downstream in Reach 1 are barriers to upstream fish migration. No fish captured upstream of falls.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
F12	3692	2	093L.036	2.0	7	RB	S3/S6	Historical Site. Falls (1.8 and 1.9 m) within reach are a barrier to upstream fish migration. No fish captured upstream of falls. Five (5) sample sites upstream of falls confirms non fish bearing status. Fish captured with minimal effort downstream of falls.
F13	3687	4	093L.036	2.0	3	NFC	S6	Historical Site. High gradient sections of 20% over 20 m throughout Reach 1 (site 517) block upstream fish access. No fish captured at this site and in downstream lake (Site 908) confirms non fish bearing status.
F14	3802	2	093L.025	3.0	3	RB	S3	Historical Site. Dry/Intermittent. Fair rearing habitat and poor spawning habitat due to low flows. Rainbow trout captured.
F15	3608	2	093L.025	1.0	10	NS	S6	Historical Site. Dry/Intermittent. No fish habitat. Second pass sampling confirms S6 classification.
F16	3587	3	093L.025	3.0	1	NS	S6	Historical Site. Dry/Intermittent. Second pass sampling confirmed the absence of fish habitat. No fish access from below cutblock (Triton, 1999c).
F17	3802	7	093L.025	3.0	2	NFC	S6	Historical Site. Dry/Intermittent. Falls (3 m) in Reach 3 are a barrier to upstream fish migration. No fish captured upstream of falls.
F18	3655	1	093L.025	1.0	4	NS	S6	Historical Site. Dry/Intermittent. Falls (3 m) downstream in mainstem ILP 3802 Reach 3 prevent upstream fish access. No fish captured upstream of the falls with 18 sampling sites.
F19	3657	1	093L.025	1.0	2	NS	S6	Historical Site. Dry/Intermittent. Falls (3 m) downstream in mainstem ILP 3802. Reach 3 prevent upstream fish access. No fish captured upstream of the falls with 18 sampling sites.
F110	3661	1	093L.025	1.0	2	NS	S6	Historical Site. Dry/Intermittent. Falls (3 m) downstream in mainstem ILP 3802. Reach 3 prevent upstream fish access. Poor habitat. No fish captured upstream of the falls with 18 sampling sites.
F111	3802	9	093L.025	2.0	3	NFC	S6	Historical Site. Falls (3 m) in Reach 3 are a barrier to upstream fish migration. No fish captured upstream of the falls with 18 sampling sites.
F112	3663	1	093L.025	1.0	2	NFC	S6	Historical Site. Dry/Intermittent. Falls (3 m) downstream in ILP 3802, Reach 3 prevent upstream fish access. No fish captured upstream of the falls with 18 sampling sites.
F113	3802	5	093L.025	3.0	1	NFC	S6	Historical Site. Falls (3 m) in Reach 3 of this stream are a barrier to upstream fish migration. No fish captured with minnow trapping and electrofishing conducted at this site. No fish captured upstream of the falls with 18 sampling sites.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
F114	3652	1	093L.025	1.0	2	NS	S6	Historical Site. Dry/Intermittent. Falls (3 m) downstream in mainstem ILP 3802, Reach 3 prevent upstream fish access. No fish habitat. No fish captured upstream of the falls with 18 sampling sites.
F115	3653	2	093L.025	NS	NS	NS	NVC	Historical Site. No Visible Channel. No fish habitat. Falls (3 m) downstream in mainstem ILP 3802, Reach 3 prevent upstream fish access. No fish captured upstream of the falls with 18 sampling sites.
F1215	3802	3	093L.025	3.0	1	NFC	S6	Historical Site. Cascade (1 m x 10 m) and falls (3 m) located within this reach are barriers to upstream fish migration. No fish captured upstream of falls with 18 sample sites. Downstream of falls is S3 with rainbow trout captured in reach 2 (Site F14).
F1216	3603	3	093L.035	1.0	11	NS	S6	Historical Site. No fish habitat. Subsurface flows. More of a vegetated gully with flows due to run-off only. Additional sampling confirmed S6 classification. No perennial habitat.
41	3749	2	093L.013	4.3	10	NFC	S3*	Moderate rearing, poor spawning and potential overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Rainbow trout captured downstream in Reach 1 (Site 453).
42	3749	1	093L.013	3.6	6	NFC	S3*	Moderate rearing, poor spawning and potential overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Rainbow trout captured downstream within this reach (Site 453).
43	3746	2	093L.013	2.8	13	NFC	S3*	Moderate rearing, poor spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Inferred fish bearing.
44	3742	2	093L.013	2.8	8	DV	S3	Moderate rearing, poor spawning and potential overwintering habitat observed within reach. Dolly Varden captured.
45	3740	2	093L.013	1.7	3	NS	S3*	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Perennial habitat available in upstream lake. Coho and steelhead captured downstream in mainstem ILP 3736, Reach 1 (FISS-02). Inferred fish bearing.
46	3737	2	093L.013	1.4	5	NS	S4*	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. Coho and steelhead captured downstream in mainstem ILP 3736, Reach 1 (FISS-02). Inferred fish bearing.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
47	3792	5	093L.013	0.5	19	NS	S4*/S6	Dry/Intermittent. High gradient (16-22%) sections upstream of road crossing prevent upstream fish access ~100 m upstream of confluence with ILP 3732. Inferred fish bearing from downstream of high gradient section to Morice River, S6 upstream. Poor rearing, no spawning and no overwintering habitat observed within site.
48	3787	3	093L.013	1.4	5	NFC	S4*	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Inferred fish bearing.
49	3783	3	093L.014	2.7	4	NFC	S6	Cascades (10 m x 50 m) downstream in Reach 2, along with falls (3 m) in this reach block upstream fish access. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
50	3783	4	093L.013	1.1	2	NFC	S6	Cascades (10 m x 50 m) downstream in Reach 2, along with falls (3 m) in Reach 3 prevent upstream fish access. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
51	3731	1	093L.013	1.1	6	NFC	S6	Dry/Intermittent. Cascades (10 m x 50 m) located on downstream mainstem ILP 3783, Reach 2 and falls (3 m) on mainstem ILP 3783, Reach 3 are barriers to upstream fish access. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
52	3783	5	093L.013	1.3	2	NFC	S6	Cascades (10 m x 50 m) downstream in Reach 2 along with falls (3 m) in Reach 3 prevent upstream fish migration. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
80	3679	2	093L.026	0.7	3	NS	S6	Dry/Intermittent. High gradient (45% for 100 m) in Reach 1 prevents upstream fish access. No perennial habitat available upstream.
81	3701	2	093L.026	1.0	5	NFC	S6	High gradient (18-22%) downstream in Reach 1 prevents upstream fish access. No fish caught upstream of high gradient.
82	3702	1	093L.026	NS	NS	NS	NVC	No Visible Channel. High gradient (18-22%) on mainstem (ILP 3701, Reach 1) prevents upstream fish access. No fish habitat.
250	2445	2	093L.056	7.8	2	CO, DV, RB	S2	Good rearing, poor spawning and poor overwintering habitat observed within reach. Coho, Dolly Varden and rainbow trout captured.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
251	3007	4	093L.046	0.7	5	NS	S4*	Poor rearing, poor spawning and no overwintering habitat observed within reach. No permanent barriers to fish migration were observed. Inferred fish bearing.
252	2999	3	093L.046	1.0	3	NFC	S4*	Poor rearing, poor spawning and no overwintering habitat observed within reach. No permanent barriers to fish migration were observed. Inferred fish bearing.
253	2941	1	093L.046	17.2	4	DV, CO, RB	S2	Poor rearing, poor spawning and poor overwintering habitat observed within site. Coho, Dolly Varden and rainbow trout captured.
254	2937	1	093L.046	NS	3	NS	NVC	Non Classified Drainage. No channel observed 100 m downstream and upstream of road crossing. No fish habitat. No signs of alluvium or scour.
255	2912	1	093L.046	4.0	2	RB, CO	S3	Moderate rearing, good spawning and poor overwintering habitat observed within reach. Coho and rainbow trout captured.
256	2910	1	093L.046	NS	5	NS	NVC	Non Classified Drainage. No evidence of alluvium or scour observed upstream of culvert. No fish habitat.
257	2868	1	093L.046	8.2	3	RB, DV, CO	S2	Fair rearing, good spawning and fair overwintering habitat observed within reach. Coho, rainbow trout and Dolly Varden were captured.
258	2857	1	093L.046	NS	7	NS	NVC	No Visible Channel. No fish habitat. No visible channel observed in rangeland upstream. Non Classified Drainage.
259	3028	2	093L.046	2.4	4	CO, RB	S3	Dewatered. Poor rearing, poor spawning and no overwintering habitat observed within reach. All fish were captured in culvert outlet pool (~0.8 m deep). Substantial damage to stream bank by cattle. Coho and Rainbow trout captured.
260	2937	2	093L.046	0.6	2	NFC	S6	Stream channel becomes Non Classified Drainage ~150 m downstream of site. No potential for fish access. Non Classified Drainage observed downstream in Reach 1 (Site 254). No perennial habitat.
261	2910	3	093L.046	0.6	15	NS	S6	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. Non fish bearing due to Non Classified Drainage downstream in Reach 1 (Site 256).
262	2913	1	093L.046	NS	3	NFC	NVC	Non Classified Drainage observed for >100 m downstream of culvert. No fish habitat. Electrofishing was conducted in a small isolated pond (10 m x 4 m) at culvert inlet.
263	2915	3	093L.046	1.5	3	NFC	S3*	Poor rearing, poor spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Coho and rainbow trout were captured in downstream mainstem ILP 2912, Reach 1 (Site 255).

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
264	2917	1	093L.046	0.7	5	NS	S4*	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Coho and rainbow trout were captured in downstream mainstem ILP 2912, Reach 1 (Site 255).
265	2934	1	093L.046	1.5	3	NFC	S6	Bedrock falls (4 m) located downstream in mainstem ILP 2912, Reach 3 are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
266	2912	5	093L.046	1.6	3	NFC	S6	Bedrock falls (4 m) located downstream in Reach 3 are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
267	2868	6	093L.046	9.3	5	NFC	S2	Good rearing, good spawning and good overwintering habitat observed within site. Rainbow trout captured upstream within this reach (Site 545).
268	2885	2	093L.046	1.2	10	NFC	S4*	Dry/Intermittent. Good rearing, poor spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. Culvert (0.9 m x 15 m) is perched 0.8 m and is presently a barrier to upstream fish migration.
269	2874	1	093L.046	0.6	8	NS	S4*	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. Inferred fish bearing.
270	2929	2	093L.046	NS	1	NS	NVC	Non Classified Drainage. No fish habitat. Bedrock falls (4 m) located downstream in mainstem ILP 2912, Reach 3 are a barrier to upstream fish migration.
271	2876	1	093L.046	NS	1	NS	NVC	No Visible Channel. No fish habitat.
272	2873	2	093L.046	1.6	2	NFC	S3*	Dewatered. Poor rearing, no spawning and no overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. Inferred fish bearing.
273	2450	3	093L.056	2.0	2	NFC	S6	Cascade (1.5 m x 2.1 m) located ~335 m downstream of road crossing within this reach is a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the barrier confirms non fish bearing status.
274	2453	1	093L.056	1.0	9	NS	S4*	Dry/Intermittent. No rearing, no spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Rainbow trout captured downstream in mainstem ILP 2450, Reach 2 (Site 275). Inferred fish bearing.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
275	2450	2	093L.056	3.0	3	RB	S3	Good rearing, fair spawning and poor overwintering habitat observed within site. Rainbow trout captured.
276	2450	6	093L.056	0.9	4	NFC	S6	Dry/Intermittent. Cascade (1.5 m x 2.1 m) located at the bottom of Reach 3 is a barrier to upstream fish migration. Poor fish habitat observed within reach. Three (3) sampling sites conducted upstream of the barrier confirms non fish bearing status.
277	2448	2	093L.056	1.0	6	NS	S4*	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Coho, Dolly Varden and rainbow trout captured downstream in mainstem ILP 2445, Reach 2 (Site 250). Inferred fish bearing.
278	2877	1	093L.046	3.2	4	NFC	S3*	Dry/Intermittent. Poor rearing, poor spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. A debris jam (1.0 m in height) was observed ~50 m up from the confluence with Emerson Creek. Inferred fish bearing.
279	2873	1	093L.046	2.1	10	NFC	S3*	Dry/Intermittent. Poor rearing, poor spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. A debris jam (0.9 m in height) was observed ~80 m up from the confluence with Emerson Creek. Stream becomes completely dry ~50 m upstream of confluence with Emerson Creek.
280	2868	5	093L.046	6.6	13	NFC	S2	Good rearing, poor spawning and good overwintering habitat observed within site. Rainbow trout captured upstream in Reach 6 (Site 545).
281	2868	5	093L.046	11.2	4	NFC	S2	Good rearing, good spawning and good overwintering habitat observed within site. Rainbow trout captured upstream in Reach 6 (Site 545).
282	2868	4	093L.046	5.4	13	NFC	S2	Good rearing, no spawning and good overwintering observed within site. Bedrock falls (2.7 m) were observed within this reach. Rainbow trout captured upstream in Reach 6 (Site 545).
283	2877	4	093L.036	1.1	3	NFC	S4*	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No permanent barriers to upstream fish migration were observed. Inferred fish bearing.
284	2879	1	093L.046	0.8	5	NFC	S4*	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within site. Culvert (0.6 m x 8 m) is a non permanent barrier to upstream fish migration. Inferred fish bearing.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
285	2877	2	093L.046	3.7	4	NFC	S3*	Dry/Intermittent. Good rearing, good spawning and poor overwintering habitat observed within reach. No permanent barriers to upstream migration were observed. Perennial habitat available in upstream lake. Inferred fish bearing.
286	3028	6	093L.046	1.2	6	NS	S4*	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Coho and rainbow trout captured downstream in Reach 2 (Site 259).
287	2593	3	093L.045	3.3	4	NFC	S5	Cascades (100 m x 400 m) combined with falls (40 m x 10 m) located in Reach 2 of this stream are barriers to upstream fish migration. Four (4) sampling sites conducted upstream of the barriers resulted in no fish captured and confirm non fish bearing status.
288	2610	1	093L.045	1.3	13	NFC	S6	Cascades (100 m x 400 m) combined with falls (40 m x 10 m) located in Reach 2 of mainstem ILP 2593 along with cascade (80 m x 100 m) in Reach 4 of mainstem ILP 2593 are barriers to upstream fish migration. Four (4) sample sites conducted upstream of the barriers resulted in no fish captured and confirms non fish bearing status.
289	2593	6	093L.045	3.4	10	NFC	S5	Cascades (100 m x 400 m) combined with falls (40 m x 10 m) located in Reach 2 of this stream along with cascade (80 m x 100 m) in Reach 4 are barriers to upstream fish migration. Four (4) sample sites conducted upstream of the barriers resulted in no fish captured and confirms non fish bearing status.
290	2868	8	093L.046	10.5	4	NFC	S5	Falls (5 m) located downstream in Reach 7 blocks upstream fish access to this reach. Seven (7) sample sites upstream of the falls resulted in no fish captured and confirms non fish bearing status.
291	2868	7	093L.046	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
292	2906	1	093L.046	2.7	12	NFC	S6	Falls (5 m) located on downstream mainstem Emerson Creek ILP 2868, Reach 7 blocks upstream fish access to this reach. Seven (7) sample sites upstream of the falls resulted in no fish captured and confirms non fish bearing status.
293	2925	1	093L.046	1.4	12	NFC	S6	Dry/Intermittent. Bedrock falls (4 m) located downstream in mainstem ILP 2912, Reach 3 are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
294	2912	3	093L.046	4.6	4	NFC	S5	Bedrock falls (4 m) located in the middle of this reach are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
295	2912	4	093L.046	3.1	6	NFC	S5	Bedrock falls (4 m) located downstream in Reach 3 are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
296	3406	3	093L.036	11.3	3	RB, BT	S2	Good rearing, poor spawning and good overwintering habitat observed within site. Bull trout and rainbow trout captured.
297	3412	1	093L.036	5.8	12	RB	S2	Moderate rearing, poor spawning and poor overwintering habitat observed within site. Rainbow trout captured.
298	3406	6	093L.036	12.9	4	BT	S2	Good rearing, moderate spawning and good overwintering habitat observed within site. Resident bull trout captured upstream of falls (6.5 m).
299	3477	1	093L.036	8.3	5	BT	S2	Good rearing, moderate spawning and good overwintering habitat observed within reach. Bull trout captured.
300	3528	6	093L.036	NS	1	NS	NVC	No Visible Channel. No alluvium or scour observed for 100 m upstream or downstream.
301	3776	1	093L.014	1.9	1	DV	S3	Good rearing, good spawning and no overwintering habitat observed within reach. Dolly Varden captured.
302	3776	2	093L.014	NS	22	NS	NVC	Non Classified Drainage. No sign of alluvium or scour for 100 m upstream and 50 m downstream of UTM. No fish habitat.
303	3777	1	093L.014	1.7	2	NFC	S3*	Good rearing, moderate spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Dolly Varden captured downstream in Reach 1. Inferred fish bearing.
304	3781	3	093L.014	NS	NS	NFC	NVC	No Visible Channel for 50 m upstream and 75 m downstream. Non Classified Drainage - upstream S6. No fish habitat.
305	3784	1	093L.014	0.7	50	NS	S6	Dry/Intermittent. High gradient (50%) at the bottom of reach block upstream fish access. Cascades (10 m x 50 m) located on downstream mainstem ILP 3783, Reach 2 are also barriers to upstream fish migration. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
306	3783	2	093L.014	3.0	16	NFC	S6	Cascades (10 m x 50 m) in the middle of this reach along with falls (3 m) in Reach 3 block upstream fish access. Seven (7) sampling sites conducted upstream of barriers resulted in no fish captured and confirms non fish bearing status.
307	3783	3	093L.014	NS	NS	NFC	NS	Fish only sampling site.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
308	3791	1	093L.013	0.9	11	NS	S4*	Dry/Intermittent. Poor rearing, poor spawning and no overwintering habitat observed within reach. Culvert is perched 10 cm and is a partial barrier to upstream fish migration. No permanent barriers observed. Inferred fish bearing.
309	3736	3	093L.013	1.7	10	NS	S3*/S6	High gradient (27%) blocks upstream fish access. No perennial habitat upstream of the barrier. Inferred fish bearing downstream of high gradient section.
310	3739	2	093L.013	1.2	6	NS	S4*/S6	Dry/Intermittent. High gradient (20%) increasing to 25% in upper portion of reach blocks upstream fish access. Inferred fish bearing downstream of high gradient section.
311	3580	1	093L.024	1.0	2	NFC	S4*	Poor rearing, no spawning and no overwintering habitat observed within site. Rainbow trout captured in downstream mainstem ILP 3617, Reach 3.
312	3617	4	093L.024	3.1	0	NFC	S3*	Good rearing, no spawning and good overwintering habitat observed within site. No barriers to fish migration were observed. Rainbow trout captured downstream in Reach 3.
313	3623	1	093L.025	2.3	0	NFC	S3*	Good rearing, no spawning and good overwintering habitat observed within site. No barriers to fish migration were observed. Lake Chub captured in downstream lake (Site 902).
314	3618	5	093L.025	1.6	1	NFC	S3*	Moderate rearing, moderate spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed in overflight. Lake Chub captured in downstream lake (Site 902). Inferred fish bearing.
315	3622	1	093L.025	NS	0	NS	NVC	No Visible Channel. No fish habitat.
316	3618	4	093L.025	1.1	0	NFC	S4*	Good rearing, no spawning and good overwintering habitat observed within reach. No barriers to fish migration were observed. Lake Chub captured in downstream lake (Site 902). Inferred fish bearing.
317	3620	1	093L.025	6.4	0	NFC	S2*	Good rearing, no spawning and good overwintering habitat observed within reach. Area is ponded by beavers. No barriers to fish migration were observed. Lake Chub captured in downstream lake (Site 902). Inferred fish bearing.
318	3618	6	093L.025	NS	1	NS	NVC	No Visible Channel. No fish habitat.
319	3042	2	093L.034	1.4	14	NFC	S6	High gradient (27%) downstream in Reach 1 blocks upstream fish access. No fish captured confirms non fish bearing status. No perennial habitat available upstream.
320	3259	4	093L.035	1.3	25	NFC	S6	High gradient (25%) within this site blocks upstream fish access. No fish habitat observed within site and no perennial habitat available upstream. No fish captured confirms non fish bearing status.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
321	3315	2	093L.035	1.3	2	NFC	S4*	Poor rearing, poor spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Rainbow trout captured downstream in Houston Tommy Creek mainstem, Reach 4 (Site E12068). Inferred fish bearing.
322	3315	1	093L.035	2.5	10	NFC	S3*	Moderate rearing, no spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Rainbow trout captured downstream in Houston Tommy Creek mainstem, Reach 4 (Site E12068). Inferred fish bearing.
323	3723	1	093L.026	0.8	0	NFC	S4*	Poor rearing, no spawning and no overwintering habitat. No barriers to fish migration were observed. Inferred fish bearing.
324	3559	2	093L.035	0.7	4	NFC	S4*/S6	Poor rearing, no spawning and no overwintering habitat observed within site. Gradient barrier (23%) within reach prevents upstream fish migration. Fish bearing downstream of high gradient section.
325	3695	7	093L.036	0.9	5	NFC	S6	High gradient (22%) downstream in Reach 5 blocks upstream fish access. No fish captured upstream of high gradient.
326	3561	1	093L.036	NS	1	NS	NVC	No Visible Channel. Wetland type habitat. Flows into non fish bearing reach.
327	3477	6	093L.035	3.3	3	NFC	S5	Falls (25 m) located downstream in Reach 4 and falls (12 m) within Reach 5 are barriers to upstream fish migration. Four (4) sample sites upstream of the 25 m falls resulted in no fish captured and confirms non fish bearing status.
328	3122	1	093L.035	1.6	11	NFC	S6	Falls (25 m) located downstream in mainstem ILP 3477, Reach 4 and falls (12 m) within mainstem ILP 3477, Reach 5 are barriers to upstream fish migration. Four (4) sample sites upstream of the 25 m falls resulted in no fish captured and confirms non fish bearing status.
329	3477	5	093L.035	3.6	6	NFC	S5	Falls (25 m) located downstream in Reach 4 and falls (12 m) within this reach are barriers to upstream fish migration. Four (4) sample sites upstream of the 25 m falls resulted in no fish captured and confirms non fish bearing status.
330	3112	1	093L.035	1.8	7	NFC	S6	Falls (25 m) located downstream in mainstem ILP 3477, Reach 4 are a barrier to upstream fish migration. Four (4) sample sites upstream of the 25 m falls resulted in no fish captured and confirms non fish bearing status.
331	3599	4	093L.035	1.5	1	DV	S3	Good rearing, good spawning and good overwintering habitat observed within reach. Dolly Varden captured.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
332	3162	1	093L.035	0.5	2	NS	S4*	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No barriers observed up from the confluence with mainstem ILP 3599. Dolly Varden captured in downstream mainstem ILP 3599, Reach 4 (Site 331). Inferred fish bearing.
333	3158	2	093L.035	0.5	10	NS	S4*	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. Dolly Varden captured in downstream mainstem ILP 3599, Reach 4 (Site 331). Inferred fish bearing.
334	3155	2	093L.035	1.9	8	NFC	S3*	Poor rearing, poor spawning and no overwintering habitat observed within reach. Dolly Varden captured in downstream mainstem ILP 3599, Reach 4 (Site 331). Inferred fish bearing.
335	2445	8	093L.055	1.8	2	NFC	S6	Falls (5 m) located downstream in Reach 4 are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
336	2445	9	093L.055	3.1	3	NFC	S5	Falls (5 m) located downstream in Reach 4 are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
337	2445	11	093L.055	3.4	3	NFC	S5	Falls (5 m) located downstream in Reach 4 are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
338	3678	8	093L.045	4.9	2	NFC	S5	Falls (5 m) located downstream in Reach 7 are a barrier to upstream fish migration. Five (5) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
339	3678	7	093L.045	7.5	2	NFC	S5	Falls (5 m) located downstream on Houston Tommy Creek mainstem Reach 7 block fish access. Five (5) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
340	2774	1	093L.045	3.1	13	NFC	S5	Falls (5 m) located downstream on Houston Tommy Creek mainstem Reach 7 block fish access to this stream. Five (5) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
341	3361	2	093L.035	2.3	4	NFC	S6	Falls (5 m) in Reach 1 are a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
342	3357	3	093L.045	3.0	6	NFC	S5	Falls (5 m) located downstream in Reach 1 are a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
343	3357	1	093L.035	4.9	5	NFC	S3	Moderate rearing, moderate overwintering and good spawning habitat observed within reach. Rainbow trout captured within this reach (Site E12069).
344	3678	6	093L.035	NS	NS	NFC	NS	Fish only sampling site.
345	3349	1	093L.035	2.1	9	NFC	S3	Moderate rearing, poor spawning and no overwintering habitat observed within reach. No barriers to fish migration were observed. Inferred fish bearing.
346	3678	6	093L.035	NS	NS	NFC	NS	Fish only sampling site.
347	3332	2	093L.035	4.7	23	NFC	S5	High gradient (23%) within this site prevents upstream fish migration. Additional fish sampling in Reach 3 of this stream confirms non fish bearing status.
348	3332	1	093L.035	4.8	15	RB	S3	Moderate rearing, poor spawning and poor overwintering habitat observed within reach. Rainbow trout captured.
349	3247	1	093L.035	3.4	7	NFC	S3	Good rearing, good spawning and moderate overwintering habitat observed within site. No fish captured upstream of debris jam. Rainbow trout captured within this reach downstream of debris jam (Site E13051).
350	3601	4	093L.035	5.4	10	DV	S2	Good rearing, good spawning and good overwintering habitat observed within site. Dolly Varden captured.
351	3182	1	093L.035	4.7	31	NS	S5	Cascade (20 m x 35 m) located ~80 m from the bottom of this reach is a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the cascade resulted in no fish captured and confirms non fish bearing status.
352	3601	5	093L.035	4.1	17	NFC	S3	Moderate rearing, poor spawning and poor overwintering habitat observed within site. Dolly Varden captured upstream of this site (Site 615).
353	3174	2	093L.035	1.8	4	NFC	S6	Cascade (5 m x 12 m) and bedrock falls (2 m) located in Reach 1 are barriers to upstream fish migration. No fish captured upstream of barriers.
354	3164	6	093L.035	0.6	5	NFC	S4*	Poor rearing, poor spawning and no overwintering habitat observed within reach. Dolly Varden captured downstream in Reach 2. Inferred fish bearing.
450	3753	1	093L.013	11.1	9	RB	S2	Rainbow trout captured.
451	3753	2	093L.013	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
452	3749	1	093L.013	3.9	6	RB	S3	Low rearing, low spawning and no overwintering habitat observed within site. Rainbow trout captured.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
453	3742	1	093L.013	2.7	6	NFC	S3*	Limited rearing, limited spawning and no overwintering habitat observed within site. Stream is accessible from Morice Lake. Inferred fish bearing.
454	3742	3	093L.013	4.8	9	NFC	S5	Cascade (5 m x 1 m) located downstream in Reach 2 is a barrier to upstream fish migration. Two (2) sampling sites upstream of cascade resulted in no fish captured and confirms non fish bearing status.
455	3743	1	093L.013	1.9	10	NFC	S6	Cascade (5 m x 1 m) located downstream on mainstem ILP 3742, Reach 2 is a barrier to upstream fish migration. Two (2) sampling sites upstream of cascade resulted in no fish captured and confirms non fish bearing status.
456	3471	3	093L.036	3.2	12	DV	S3	Moderate rearing, low spawning and low overwintering habitat observed within reach. Dolly Varden captured.
457	3532	3	093L.036	NS	NS	CT	NS	Fish only sampling site. Channelized wetland with good spawning, rearing and overwintering habitat. Cutthroat trout captured.
458	2868	8	093L.046	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
459	2908	2	093L.046	1.0	15	NFC	S4*	Low rearing, low spawning and no overwintering habitat observed within reach. No barriers observed. Dolly Varden captured in downstream mainstem ILP 3471, Reach 5 (Site 460). Inferred fish bearing.
460	3471	5	093L.046	1.8	13	DV	S3/S6	Limited rearing, low spawning and no overwintering habitat observed within site. Cascade (20 m x 40 m) in this Reach (with a 1 m and 1.5 m falls within) located ~100 m upstream of the confluence with ILP 2908 is a barrier to upstream fish migration. Dolly Varden captured downstream of cascade / falls.
461	3471	5	093L.046	0.9	5	NFC	S6	Cascade (20 m x 40 m) in this Reach (with a 1 m and 1.5 m falls within) located ~100 m upstream of the confluence with ILP 2908 is a barrier to upstream fish migration. No fish captured upstream of barriers.
500	3571	1	093L.037	1.4	5	NS	S4*	Dry/Intermittent. Low rearing, low spawning and no overwintering habitat observed within reach. Inferred fish bearing.
501	3402	1	093L.036	0.8	16	NS	S4*/S6	Dry/Intermittent. Inferred fish bearing downstream of road, S6 upstream of road (high gradient >20% upstream of road).
502	3401	1	093L.036	2.0	8	NS	S3*	Inferred fish bearing.
503	3401	2	093L.036	1.3	11	NS	S6	Dry/Intermittent. Stream is S6 upstream of road crossing. Cascade (1.5 m x .30 m) over cobble located ~50 m downstream of road and interstitial flows block upstream fish access. Stream offers no habitat within surveyed section and no perennial habitat is available upstream.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
504	3405	2	093L.036	NS	1	NS	NVC	No Visible Channel. No fish habitat.
505	3520	1	093L.036	1.3	5	RB	S4	Moderate rearing, low spawning and no overwintering habitat observed within reach. Rainbow trout captured.
506	3524	2	093L.036	NS	1	NS	NVC	Seasonally flooded depressions. No fish habitat.
507	3525	3	093L.036	1.1	15	NS	S6	Dry/Intermittent. High gradient (>20%) ~150 m downstream of site prevents upstream fish access. No perennial habitat.
508	3528	2	093L.036	NS	NS	RB	NS	Fish only sampling site.
509	3532	1	093L.036	2.4	3	RB	S3	Moderate rearing, moderate spawning and low overwintering habitat observed within reach. Rainbow trout captured.
510	3529	1	093L.036	NS	NS	NFC	NS	Fish only sampling site.
511	3526	3	093L.036	1.3	5	CT, DV	S4	Moderate rearing, low spawning and no overwintering habitat observed within reach. Dolly Varden and cutthroat trout captured.
512	3549	2	093L.036	0.7	4	CT	S4	Potential rearing, no spawning and no overwintering habitat observed within reach. Cutthroat trout captured.
513	3675	4	093L.026	NS	1	NS	NVC	Non Classified Drainage. Seasonally wetted depressions connected by subsurface / surface connections. No fish habitat.
514	3675	1	093L.026	1.5	18	NFC	S6	Dry/Intermittent. High gradient (17-18%) and small cascades (0.5 m x 1 m) over cobble block upstream fish access. No rearing, no spawning and no overwintering habitat observed within reach. No fish captured and no perennial habitat available upstream.
515	3530	2	093L.036	NS	1	NS	NVC	No Visible Channel with some Non Classified Drainage characteristics. No fish habitat. Willow swale with some isolated depressions, may have connections during increased runoff conditions / snow melt.
516	3529	3	093L.036	0.4	3	NS	S6	Dry/Intermittent. S6 from surveyed section upstream. Numerous organic barriers. Barely classifiable as a stream. No rearing, no spawning and no overwintering habitat observed within site.
517	3688	1	093L.026	1.8	19	NFC	S3*/S6	Low rearing, low spawning and no overwintering habitat observed within site. Inferred fish bearing from the confluence of Houston Tommy Creek to 300 m upstream. High gradient sections of 20% over 20 m throughout surveyed section block upstream fish access. Dewatered section (~75 m) at bottom of reach at confluence with Houston Tommy Creek further limits fish access to this reach. Second pass sampling upstream of Dewatered section and sampling of upstream lake confirms non fish bearing status.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
518	3681	1	093L.026	0.5	12	NS	S6	Dry/Intermittent. High gradient in excess of 20% and no perennial habitat present.
519	3706	2	093L.026	2.0	4	NS	S3*	Dry/Intermittent. Low spawning, low rearing and no overwintering habitat observed within reach. No barriers to fish migration were observed. Inferred fish bearing.
520	3711	1	093L.026	1.5	6	NFC	S3*	Low spawning, low rearing and no overwintering habitat. No barriers to fish migration were observed. No fish captured. Inferred fish bearing.
521	3710	3	093L.026	1.3	6	NS	S4*	Dry/Intermittent. Potential spawning, potential rearing with no overwintering habitat observed within site. No barriers to fish migration were observed.
522	3715	8	093L.026	NS	1	NS	NVC	Non Classified Drainage. Seasonally wetted depressions. No fish habitat.
523	3715	6	093L.026	0.5	5	NS	S6	Dry/Intermittent. High gradient (26%) 100 m downstream of road crossing is a barrier to upstream fish migration. Sampling in upstream lake resulted in no fish captured and confirms non fish bearing status.
524	3715	4	093L.026	1.0	6	DV	S4	Low rearing, low spawning and no overwintering habitat observed. Dolly Varden captured.
525	3716	2	093L.026	1.0	5	NFC	S6	No connection to downstream fish bearing water. Discontinuity of >100 m with no surface connection. No upstream perennial habitat. Numerous organic / cobble falls ~1 m drops upstream of road crossing. No fish captured.
526	3721	2	093L.026	NS	1	NS	NVC	Non Classified Drainage. Seasonally wetted depression. No fish habitat.
527	3633	2	093L.025	2.4	3	CT	S3	Good rearing, good spawning and good overwintering habitat observed within site. Culvert at this site blocks upstream fish access. Cutthroat trout captured.
528	3635	1	093L.025	0.0	0	NS	NVC	No fish habitat. Unable to determine natural drainage pattern due to upstream disturbances. Drainage has Non Classified Drainage characteristics.
529	3801	4	093L.025	0.8	5	NS	S4*	Dry/Intermittent. Low spawning, low rearing with no overwintering habitat observed. No barriers to upstream fish migration were observed. Cutthroat trout captured in downstream lake. Inferred fish bearing.
530	3637	5	093L.025	NS	NS	NFC	NS	Fish only sampling site.
531	3638	1	093L.025	1.1	5	RB	S4	Moderate rearing, moderate spawning and limited overwintering habitat. Rainbow trout captured.
532	3633	2	093L.026	NS	NS	CT	NS	Fish only sampling site.
533	3633	6	093L.026	1.5	4	CT	S4	Low rearing, low spawning and no overwintering habitat observed. Perennial habitat available in downstream lake. Cutthroat trout captured.
534	3724	2	093L.026	NS	NS	NS	NVC	No Visible Channel. No fish habitat.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
535	3607	1	093L.025	1.7	8	NFC	S6	Cascade (30 m x 30 m) at the bottom of this Reach is a barrier to upstream fish migration. Five (5) sampling sites and lake sampling conducted upstream of the cascade resulted in no fish captured and confirms non fish bearing status.
536	2981	12	093L.045	11.7	3	NFC	S2*	Moderate rearing, low spawning and potential overwintering habitat observed within site. Potential perennial habitat available in downstream lake. No fish captured at site. Inferred fish bearing.
537	2981	10	093L.045	NS	NS	NFC	NS	Fish only sampling site.
538	2981	8	093L.045	NS	NS	NFC	NS	Fish only sampling site.
539	2981	7	093L.045	7.4	5	NFC	S2*	Moderate rearing, low spawning and moderate overwintering habitat observed within site. Potential perennial habitat available in upstream or downstream (Melissen) lakes. No fish captured at sites. Lakes were not sampled for fish presence or absence. Inferred fish bearing.
540	2941	6	093L.045	5.7	9	DV	S2	Moderate rearing, moderate spawning and potential overwintering habitat observed within reach. Dolly Varden captured.
541	2593	4	093L.045	2.4	11	NFC	S6	Cascades (100 m x 400 m) combined with falls (40 m x 10 m) located in Reach 2 of this stream are barriers to upstream fish migration. Four (4) sample sites conducted upstream of the cascade / falls resulted in no fish captured and confirms non fish bearing status.
542	2868	10	093L.045	2.6	18	NFC	S6	Falls (5 m) located downstream in Reach 7 are a barrier to upstream fish migration. Cascade (5 m x 7 m) as well as falls (1 - 3 m) within cascades are barriers to upstream fish migration. Seven (7) sample sites upstream of the falls resulted in no fish captured and confirms non fish bearing status.
543	2690	1	093L.045	2.0	12	NFC	S6	Falls (5 m) located on downstream mainstem Emerson Creek, Reach 7 are a barrier to upstream fish migration. Falls (3.5 m) and cascade (10 m x 20 m) located within this reach are obstructions to upstream fish migration. Seven (7) sample sites upstream of the falls resulted in no fish captured and confirms non fish bearing status.
544	2868	9	093L.045	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
545	2868	6	093L.046	9.3	3	RB	S2	Potential rearing, moderate spawning and potential overwintering habitat observed within site. Rainbow trout captured.
546	3406	4	093L.036	10.3	3	DV, BT	S2	High rearing, high spawning and good overwintering habitat observed within reach. Dolly Varden and bull trout captured.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
547	3439	1	093L.036	4.8	5	BT, DV	S2	High rearing, moderate spawning and potential overwintering habitat observed within reach. Dolly Varden and bull trout captured.
548	3406	5	093L.036	NS	NS	DV,BT	NS	Fish only sampling site.
549	3439	2	093L.036	2.7	8	DV	S3	Moderate rearing, low spawning and potential overwintering habitat observed within reach. Dolly Varden captured at site and access for bull trout is available to falls. Falls (8 m) located at the top of this reach are a barrier to upstream fish migration. Lake sampling (Site 900) conducted upstream of falls resulted in no fish captured, confirming absence of a resident fish population above the falls.
550	3439	3	093L.036	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
551	3406	9	093L.035	5.1	8	BT	S2	Moderate rearing, low spawning and low overwintering habitat observed within reach. Bull trout captured.
552	3406	9	093L.035	NS	NS	NFC	NS	Fish only sampling site.
553	3073	1	093L.035	3.9	16	NFC	S5	Bedrock cascade (3 m x 3 m) is a barrier to upstream fish migration. Low rearing, low spawning and potential overwintering habitat observed within site. No perennial habitat available upstream. No fish captured upstream of cascade confirms non fish bearing status.
554	3406	10	093L.035	3.2	15	NFC	S5	High gradient (22% for 50 m and >20% for 20 m) observed within site blocks upstream fish access. No fish captured.
555	3406	9	093L.035	NS	NS	NFC	NS	Fish only sampling site.
556	3412	4	093L.036	1.8	4	CT	S3	Moderate spawning, moderate rearing and potential overwintering in downstream lake. Cutthroat trout captured.
557	2881	2	093L.046	0.4	5	NS	S6	Dry/Intermittent. No fish habitat. Marginal S6, close to Non Classified Drainage classification. Non fish bearing.
558	3003	2	093L.046	NS	NS	NS	NVC	No Visible Channel. No fish habitat. Potential perennial habitat in upstream beaver pond. Beaver pond has flooded road and blocked culvert. Beaver dam has totally altered natural drainage pattern.
559	2999	4	093L.046	NS	24	NS	NVC	No Visible Channel. No fish habitat. High gradient (>20%) in section below road crossing. Non Classified Drainage characteristics.
560	2942	1	093L.046	2.3	15	NFC	S6	Two falls (2 m and 5 m) located at the confluence with Dockrill creek are barriers to upstream fish migration. Two (2) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
561	2939	2	093L.046	0.4	12	NS	S6	Dry/Intermittent. Barely classifiable as a stream. No fish habitat. Downstream mainstem ILP 2937, is non fish bearing. No fish access to this site. No perennial habitat.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
562	3682	1	093L.026	2.7	11	DV	S3	Low rearing, low spawning and potential overwintering habitat observed within reach. Dolly Varden captured.
563	3684	1	093L.026	NS	NS	NFC	NS	Fish only sampling site.
564	3698	3	093L.026	NS	NS	NFC	NS	Fish only sampling site.
565	3698	1	093L.026	NS	5	NS	NVC	Non classified drainage with discontinuous sections. No fish habitat. No overwintering habitat available upstream.
566	3707	1	093L.026	NS	NS	NS	NVC	No Visible Channel. No fish habitat. Stream has been so disturbed by previous logging practices that it is impossible to follow or distinguish within harvested area downstream of road. Stream channel meanders within block, loses energy and then disappears within and under vegetation and disturbance. Non fish bearing stream.
567	3706	3	093L.026	NS	NS	NS	NVC	No Visible Channel. No fish habitat. Stream has been so disturbed that it is impossible to follow or distinguish within harvested area. Non fish bearing stream.
568	3602	3	093L.025	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
569	3602	2	093L.025	3.6	5	RB, DV	S3	Moderate rearing, moderate spawning and potential overwintering habitat observed within reach. Dolly Varden and rainbow trout captured. Falls (5 m) located at the top of this reach are a barrier to upstream fish migration. Five (5) sample sites conducted upstream of the falls as well as sampling in an upstream lake (Site 904) confirms non fish bearing status.
570	3602	2	093L.025	NS	NS	RB	NS	Fish only sampling site.
571	3602	2	093L.025	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
572	3605	2	093L.035	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
573	3164	1	093L.035	4.4	12	DV	S3	Moderate rearing, low spawning and potential overwintering habitat observed within site. Dolly Varden captured.
574	3164	2	093L.035	NS	NS	DV	NS	Fish only sampling site.
575	3601	3	093L.035	9.8	6	RB, DV	S2	Moderate rearing, moderate spawning and potential overwintering habitat observed within site. Rainbow trout and Dolly Varden captured.
581	3617	2	093L.025	5.0	4	RB	S3	Moderate rearing, moderate spawning and moderate overwintering habitat observed within site. Rainbow trout captured.
582	3626	1	093L.025	1.8	6	NFC	S3	Low rearing, low spawning and no overwintering habitat observed within reach. No barriers observed. Rainbow trout captured in downstream mainstem ILP 3617, Reach 2.
583	3628	1	093L.025	NS	NS	RB	NS	Fish only sampling site.
584	3617	3	093L.025	3.4	2	RB	S3	Moderate rearing, moderate spawning and potential overwintering habitat observed within reach. Rainbow trout captured.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
585	3628	2	093L.035	2.0	1	NFC	S6	Cascade (50 m x 50 m) (5 m falls within) at the top of Reach 1 of this stream blocks upstream fish migration. Three (3) sample sites upstream of cascade / falls resulted in no fish captured and confirms non fish bearing status. Rainbow trout captured downstream at the bottom of Reach 1 (Site 583).
586	3375	1	093L.035	0.9	1	NFC	S6	Cascade (50 m x 50 m) and 5 m falls located downstream on mainstem ILP 3628, Reach 1 blocks upstream fish migration. Three (3) sampling sites conducted upstream of the cascade / falls resulted in no fish captured and confirms non fish bearing status.
587	3628	3	093L.035	2.7	1	NFC	S6	Cascade (50 m x 50 m) with a 5 m falls located at the top of Reach 1 blocks upstream fish migration. Three (3) sampling sites conducted upstream of the cascade / falls resulted in no fish captured and confirms non fish bearing status. Rainbow trout captured downstream at the bottom of Reach 1 (Site 583).
588	3618	2	093L.025	NS	NS	NFC	NS	Fish only sampling site.
589	3618	1	093L.025	2.0	1	NFC	S3*	Low rearing, low spawning and low overwintering habitat observed within reach. No barriers observed. Rainbow trout captured in downstream mainstem ILP 3617, Reach 2 and Lake Chub were captured in upstream lake (Site 902). Inferred fish bearing.
590	3619	1	093L.025	0.0	12	NS	S6	Non Classified Drainage.
591	3259	1	093L.035	8.4	9	RB	S2	Moderate rearing, low spawning and potential overwintering habitat observed within site. Rainbow trout captured.
592	3275	1	093L.035	5.2	6	RB	S2	Low rearing, low spawning and potential overwintering habitat observed within site. Rainbow trout captured.
593	3678	3	093L.035	NS	NS	RB	NS	Fish only sampling site.
595	3315	3	093L.035	1.0	1	NFC	S4*	Low rearing, low spawning and potential overwintering habitat available within site. No barriers to fish migration were observed during helicopter RECCI. Perennial habitat is available in upstream lake. Inferred fish bearing.
596	3725	1	093L.026	1.7	1	NS	S3	Dry/Intermittent. Low rearing, low spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Fish could potentially access this reach. Riffle section for >300 m may limit access.
597	3693	1	093L.026	1.6	7	NS	S3	Dry/Intermittent. Low rearing, low spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Dolly Varden and rainbow trout captured in mainstem ILP 3697, Reach 2 (Site E12066).

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
598	3138	2	093L.035	1.2	6	NFC	S4*	Low rearing, low spawning and no overwintering habitat observed within site. No barriers to fish migration were observed. Dolly Varden captured in downstream mainstem ILP 3599, Reach 1 (Site E12091). Inferred fish bearing.
599	3146	2	093L.035	1.7	1	NFC	S6	High gradient (23%) within Reach 1 of this stream is a barrier to upstream fish migration. No fish captured upstream of high gradient section.
600	3599	2	093L.035	4.5	8	DV	S3	Moderate rearing, moderate spawning and potential overwintering habitat observed within reach. Dolly Varden captured.
601	3146	1	093L.035	2.9	18	DV	S3	Low rearing, low spawning and potential overwintering habitat observed within site. Dolly Varden were captured in low gradient section ~20 m upstream of the confluence with mainstem ILP 3599. High gradient (20-23%) in upper portion of this reach limits upstream fish access.
602	2445	7	093L.056	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
603	2445	14	093L.055	1.4	10	NFC	S6	Falls (5 m) located downstream in Reach 4 are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
604	2445	13	093L.055	2.2	10	NFC	S6	Falls (5 m) located downstream in Reach 4 are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
605	3678	7	093L.045	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
606	3357	1	093L.035	6.8	7	NFC	S5	Falls (5 m) within this reach are a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
607	3350	1	093L.035	1.6	27	NFC	S6	High gradient (33%), cascades and falls in mid portion of Reach 2 on downstream mainstem ILP 3349 block all upstream fish access. High gradient (27%) within this reach and no fish captured confirms non fish bearing status.
608	3349	3	093L.035	1.3	26	NFC	S6	High gradient (33%), cascades and falls located downstream in the mid portion of Reach 2 block all upstream fish access. High gradient (26%) within this reach and no fish captured confirms non fish bearing status. No fish habitat.
609	3332	3	093L.035	3.5	14	NFC	S5	High gradients (23%) downstream in Reach 1 blocks upstream fish migration. 1199

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
610	3275	3	093L.035	1.0	6	NFC	S4*	Low rearing, low spawning and potential overwintering habitat observed within reach. Gradient and cascade / pool habitat downstream may block upstream access. Gradient downstream looked to be >20% from helicopter. No fish captured. Inferred fish bearing.
611	3252	1	093L.035	1.0	22	NFC	S6	High gradient (20% over 40 m and >20% at confluence to downstream tributary ILP3247) blocks upstream fish access. No perennial habitat available. Electrofishing at this site and Site 612 (upstream), resulted in no fish captured which confirms non fish bearing status.
612	3247	4	093L.035	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
613	3182	2	093L.035	2.5	4	NFC	S6	Cascade (20 m x 35 m) located in Reach 1 is a barrier to upstream fish migration. Numerous falls, cascades and gradient barriers were also observed in Reach 1. Three (3) sampling sites conducted upstream of the cascade resulted in no fish captured and confirms non fish bearing status.
614	3184	1	093L.035	1.6	8	NFC	S6	Cascade (20 m x 35 m) located downstream on mainstem ILP 3182, Reach 1 is a barrier to upstream fish migration. Three (3) sampling sites conducted upstream of the cascade resulted in no fish captured and confirms non fish bearing status.
615	3601	5	093L.035	4.3	19	DV	S3	Dolly Varden captured.
616	3178	2	093L.035	1.5	14	NFC	S6	High gradient (in excess of 20%) was observed in Reach 1 and 2 of this stream during helicopter RECCI. No fish captured confirms non fish bearing status.
624	3697	2	093L.026	4.3	5	DV	S3	Moderate rearing, low spawning and potential overwintering habitat observed within reach. Dolly Varden captured.
900	3439	3	093L.036	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
901	3623	1	093L.025	NS	NS	NFC	NS	Fish only sampling site.
902	3667	2	093L.025	NS	NS	LKC	NS	Fish only sampling site. Lake Chub captured.
903	3607	3	093L.025	NS	NS	NFC	NS	Fish only sampling site. No fish captured within lake, confirms non fish bearing status of this stream.
904	3605	4	093L.035	NS	NS	NFC	NS	Fish only sampling site. No fish captured within lake, confirms non fish bearing status of this stream.
905	2877	3	093L.046	NS	NS	NFC	NS	Fish only sampling site.
906	2877	3	093L.046	NS	NS	NFC	NS	Fish only sampling site.
907	3412	3	093L.036	NS	NS	NFC	NS	Fish only sampling site.
908	3688	6	093L.026	NS	NS	NFC	NS	Fish only sampling site. High gradient sections of 20% over 20 m throughout Reach 1 (site 517) block upstream fish access. No fish captured within lake, confirms non fish bearing status of this stream.
909	3633	4	093L.026	NS	NS	LKC	NS	Fish only sampling site.

Table 16. Stream sampling summary for the study area.

Site	ILP	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
918	3705	1	093L.026	0.7	14	NS	S6	Dry. Stream has been harvested. Cobble falls (1.5 m) combined with gradient (13.5%) and sections of discontinuous channel in upper portion block fish access. Potential barrier at confluence with the Morice River. No perennial habitat.
945	2868	4	093L.046	NS	NS	NFC	NS	Fish only sampling site.
958	3715	7	093L.026	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.
980	2445	4	093L.046	8.2	4	NFC	S5	Falls (5 m) within this reach are a barrier to upstream fish migration. Seven (7) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
981	2942	1	093L.046	3.0	7	NFC	S6	Two falls (2 m and 5 m) within this Reach block upstream fish migration. No fish habitat observed. Two (2) sampling sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
982	2941	3	093L.046	NS	NS	DV, RB	NS	Fish only sampling site.
986	2981	4	093L.045	9.1	2	DV	S2	Good rearing, good spawning and good overwintering habitat observed within reach. Dolly Varden captured.
987	3543	1	093L.036	0.7	1	NS	S4*	Dry/Intermittent. Poor rearing, no spawning and no overwintering habitat observed within reach. No barriers to upstream fish migration were observed. Rainbow trout captured in downstream mainstem ILP 3528, Reach 2. Perennial habitat available in downstream lake. Inferred fish bearing.
988	3028	3	093L.046	2.0	3	NFC	S3*	Dewatered. Poor rearing, poor spawning and no overwintering habitat observed within site. Private culvert is plugged and stream flow is ponded upstream. Coho and rainbow were captured downstream in Reach 2 of this stream. Inferred fish bearing.
996	2927	1	093L.046	2.9	3	NFC	S6	Bedrock falls (4 m) located downstream in mainstem ILP 2912, Reach 3 are a barrier to upstream fish migration. Seven (7) sample sites conducted upstream of the falls resulted in no fish captured and confirms non fish bearing status.
2732	2450	3	093L.056	NS	NS	NFC	NS	Fish only sampling site used to confirm non fish bearing status of stream.

BT = bull trout

DV = Dolly Varden

CO = coho

CT = cutthroat trout

LKC = lake chub

RB = rainbow trout

NFC = No Fish Captured

NVC = No Visible Channel

WNVC = Wetland No Visible Channel

NS = Not Sampled

* = Indicates inferred stream class

6.0 REFERENCES

- BC Conservation Data Center. 2002. Ministry of Sustainable Resource Management.
<http://srmwww.gov.bc.ca/cdc/>
- BC Forest Practices Code. 1998. Forest Practices Code Fish Stream Identification Guidebook. Forest Practices Code of British Columbia Act. Co-published by Forest Service British Columbia and British Columbia Environment.
- BC Ministry of Environment, Lands and Parks, and Department of Fisheries and Oceans. 1995. Fisheries Information Summary System (FISS) Data Compilation and Mapping Procedures. British Columbia Ministry of Environment, Lands and Parks, and Department of Fisheries and Oceans.
- Bahr, M. 2002. Examination of bull trout (*Salvelinus confluentus*) in the Morice River Watershed. Final Report prepared for Canadian Forest Products, Houston Forest Products and BC Ministry of Environment, Lands and Parks, Forest Renewal BC.
- Bustard, D. 1998. Stream Inventory Tagit Creek and Adjacent Tributaries 1997. Report prepared for Houston Forest Products Ltd.
- Campbell, W.R., N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser & M.C. McNall. 1990. The birds of British Columbia. Volume One. Nonpasserines. UBC Press, Vancouver, Canada. pp. 514.
- David Bustard and Associates Ltd. 1999. 1:20,000 Intensive Fish Inventory Gosnell Watershed Project. Report prepared for Northwood Inc., Houston BC.
- Demarchi, D. 1996. An introduction to the ecoregions of British Columbia. MELP, Wildlife Branch. Victoria, B.C. 46 pp. + appendices.
- Envirocon Ltd. 1984. Environmental studies associated with the proposed Kemano completion hydroelectric development. Volume 4: Fish resources of the Morice River system baseline information. Prepared for Aluminum Company of Canada, Ltd.
- Environmental Mining Council of British Columbia (EMCBC). 2002. Interactive Mapping Website. http://emcbc.miningwatch.org/emcbc/mapping/activemaps/choose_map_BC.htm.
- Ford, B.S., P.S. Higgins, A.F. Lewis, K.L. Cooper, T.A. Watson, C.M. Gee, G.L. Ennis, and R.L. Sweeting. 1995. Literature reviews of the life history, habitat requirements and mitigation/compensation strategies for thirteen sport fish species in the Peace, Liard and Columbia River drainages of British Columbia. Canadian Manuscript Report of Fisheries and Aquatic Sciences No. 2321.

- Gottesfeld, A.S., Rabnett, K.A., Hall, P.E. 2002. Conserving Skeena Fish Populations and Their Habitat. Prepared for the Skeena Fisheries Commission.
- Government of British Columbia, Treaty Negotiations. 2002. Mapping Website. http://www.gov.bc.ca/tno/img/maps/map_4.htm.
- Groot, C. and L. Margolis (eds). 1991. Pacific Salmon Life Histories. UBC Press, Vancouver . pp 564.
- Hartman, G.F., T.G. Northcote, and C.C. Lindsey. 1962. Comparison of inlet and outlet spawning of rainbow trout in Loon Lake, British Columbia. Journal of Fisheries Research Board Canada 19(2):173-200.
- Hancock, M.J., Leaney-East, A.J. and D.E. Marshall. 1983. Catalogue of salmon streams and spawning escapements of statistical area 4 (Upper Skeena River). Can. Data Rep. Fish Aquat. Sci. 394: xxii + 324 pp.
- Hooper, D.R. 1973. Evaluation of the effects of flows on trout stream ecology. Pacific Gas and Electric, Dept. of Engineering Research, Emeryville, California. 97p. In: Walburg, C.H., Novotny, J.F., Jacobs, K.E., Swink, W.D., Campbell, T.M., Nestler, J., Saul, G.E. 1981. Effects of reservoir releases on tail water ecology; a literature review. Tech. Rep. E-81-12, Prep. By U.S. Dept. of Int. Fish and Wild. Ser. Nat. Reservoir Research Program, East Central Research and Environmental Lab, U.S. Army Corps of Engineers Waterways Experimental Station. Vixburg, Mississippi.
- Lough, M.J. 1980. Radio telemetry studies of summer run steelhead trout in the Skeena River drainage, 1979, with particular reference to Morice, Suskwa, Kispiox and Zymoetz River stocks. Prepared for the British Columbia Fish and Wildlife Branch, Smithers, BC.
- Liknes, G.A. and P.J. Graham. 1988. Westslope cutthroat trout in Montana: life history, status, and management. Amer. Fish Soc. Symp. 4:61-70.
- Lyndsey, C.C., T.G. Northcote, and G.F. Hartman. 1959. Homing of rainbow trout to inlet and outlet spawning streams at Loon Lake, British Columbia. Journal of Fisheries Research Board Canada 16(5):695-719.
- McPhail, J.D. and J.S. Baxter. 1996. A review of bull trout (*Salvelinus confluentus*) life-history and habitat use in relation to compensation and improvement opportunities. Fisheries Management Report No. 104. Department of Zoology, UBC, Vancouver, BC.
- McPhail, J.D. and C.B. Murray. 1979. The early life history and ecology of Dolly Varden (*Salvelinus malma*) in the Upper Arrow lakes. Prepared for B.C. Hydro and the Kootenay Region Fish and Wildlife Branch by the University of British Columbia.

- Meidinger, D. & J. Pojar. 1991. Ecosystems of British Columbia. British Columbia Ministry of Forests. Victoria, B.C. pp. 330
- Ministry of Sustainable Resource Management. 2002. Release database. <http://www.fishwizard.com>
- Northcote, T.G. and G.F. Hartman. 1988. The biology and significance of stream trout populations (*salmo spp.*) living above and below waterfalls. Pol. Arch. Hydrobio. 35: 409-442.
- Post, J. R. and F. D. Johnston. 2002. Status of the Bull Trout (*Salvelinus confluentus*) in Alberta. Alberta Sustainable Resource Development, Fish and Wildlife Division, and Alberta Conservation Association, Wildlife Status Report No. 39, Edmonton, AB. 40 pp.
- Reiser, D.W. and T.C. Bjornn. 1979. The influence of forest and rangeland management on anadromous fish habitat in the western United States and Canada: habitat requirements of anadromous salmonids. U.S. D.A. Forest Serv. Gen. Tech. Rep. PNW-96.
- Remington, Dawn. 1995. Review and Assessment of Water Quality in the Skeena River Watershed, British Columbia. Habitat Management Sector, Habitat Enhancement Branch, Department of Fisheries and Oceans.
- Resource Inventory Committee. 2001. Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures – Version 2.0, April 2001. Prepared by the BC Fisheries Information Services Branch for the Resource Inventory Committee.
- Scott, W.B. & E.J. Crossman. 1973. Freshwater fishes of Canada. Bryant Press Ltd. Ottawa, Canada.
- Shepard, B.B., K.L. Pratt, and P.J. Graham. 1984. Life Histories of Westslope Cutthroat and bull trout in the Upper Flathead River basin, Montana. Environmental Protection Agency, Region VIII, Water Division, Denver, CO. 85 p.
- Smith J.L. and G.F. Berezay. 1983. Biophysical Reconnaissance of the Morice River System, 1978-1980. Prepared for Fisheries and Oceans, SEP Operations, Vancouver. BC.
- The Fisheries Committee: Andy Witt, Dionys de leeuw, Brian Fuhr, Chris Broster, Jeff Lough, Rick Keim, Tom Olson. 1999. Skeena Region – In-stream Work Windows and Measures. Prepared for Habitat Protection BC Environment, Smithers, BC.

- Triton Environmental Consultants Ltd. 1998. Reconnaissance (1:20,000 Scale) Fish and Fish Habitat Inventory in the Houston Tommy Creek Watershed. Report prepared for Northwood Pulp and Timber Ltd.
- Triton Environmental Consultants Ltd. 1999a. 1:5,000 Scale Fish Stream Identification of Unnamed Tributaries in the Houston Tommy Creek Watershed. Report prepared for Northwood Pulp and Timber Ltd.
- Triton Environmental Consultants Ltd. 1999b. Reconnaissance (1:20,000 scale) Fish and Fish Habitat Inventory in the Babine Lake Watershed. Report prepared for Northwood Pulp and Timber Ltd. and the Ministry of Environment, Lands and Parks, Smithers, BC.
- Triton Environmental Consultants Ltd. 2000. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory in the Upper Morice Watershed. Report prepared for Northwood Pulp and Timber Ltd. and the Ministry of Environment, Lands and Parks, Smithers, BC.
- Triton Environmental Consultants Ltd. 2001a. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory in the Telkwa River Watershed. Report prepared for Pacific Inland Resources Ltd. and the Ministry of Environment, Lands and Parks, Smithers, BC.
- Triton Environmental Consultants Ltd. 2001b. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory of Unnamed Tributaries to Babine Lake (Smithers Landing Planning Area). Report prepared for Canadian Forest Products Ltd. and the Ministry of Environment, Lands and Parks, Smithers, BC.
- Triton Environmental Consultants Ltd. 2001c. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory of Selected Tributaries within the Fulton River Watershed (Tanglechain Planning Area). Report prepared for Canadian Forest Products Ltd. and the Ministry of Environment, Lands and Parks, Smithers, BC.
- Triton Environmental Consultants Ltd. 2002. Reconnaissance (1:20,000 scale) Fish and Fish Habitat Inventory of Selected Tributaries to the South Side of the Fulton River Watershed (Guess Planning Area). Report prepared for Canadian Forest Products Ltd. and the Ministry of Environment, Lands and Parks, Smithers, BC.
- Weaver, T.M. and R.G. White. 1984. Coal Creek fisheries monitoring study number II. Quarterly progress report to United States Department of Agriculture, Forest Service, Flathead National Forest, contract number 53-0385-3-2685, from Montana State Cooperative Fisheries Research Unit, Bozeman, Montana, USA.