

# **Reconnaissance (1:20,000 scale) Fish and Fish Habitat Inventory of Unnamed Tributaries to Babine Lake (Smithers Landing Planning Area)**

**WSC 480-Babine Lake**

*Prepared for:*

**Canadian Forest Products Ltd.**

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January 2001

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## PROJECT REFERENCE INFORMATION

|                                       |                                                                                                                      |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>FDIS Project Number:</b>           | 3496                                                                                                                 |
| <b>MELP Project Number:</b>           | CNF_C172_010_2001                                                                                                    |
| <b>FRBC Project Number:</b>           | 716564                                                                                                               |
| <b>FRBC Region:</b>                   | Skeena-Bulkley Region                                                                                                |
| <b>MELP Region:</b>                   | 06                                                                                                                   |
| <b>MELP District:</b>                 | Skeena                                                                                                               |
| <b>FW Management Unit:</b>            | 6-9                                                                                                                  |
| <b>Fisheries Planning Unit:</b>       | North Coast                                                                                                          |
| <b>DFO Sub-district:</b>              | 4D                                                                                                                   |
| <b>Forest Region:</b>                 | Prince Rupert                                                                                                        |
| <b>Forest District:</b>               | Morice                                                                                                               |
| <b>Forest Licensee and Tenure #:</b>  | Canadian Forest Products Ltd.<br>TSA 20                                                                              |
| <b>First Nation Traditional Area:</b> | Wet'suwet'en Nation, Broman Lake<br>Babine Band, Skin Tyee Band, Lake<br>Babine Nation, Sekanni-Carrier,<br>Natooten |

## WATERSHED INFORMATION

|                                     |                                                                                              |
|-------------------------------------|----------------------------------------------------------------------------------------------|
| <b>Watershed Group:</b>             | Babine Lake                                                                                  |
| <b>Watershed Code:</b>              | 480-000000-00000-00000-0000                                                                  |
| <b>UTM at Mouth:</b>                | NA                                                                                           |
| <b>Watershed Area:</b>              | 114.98 km <sup>2</sup>                                                                       |
| <b>Total of All Stream Lengths:</b> | 218.5 km                                                                                     |
| <b>Stream Order:</b>                | 4 <sup>th</sup> (largest)                                                                    |
| <b>NTS Map:</b>                     | 93L/16, 93M/01                                                                               |
| <b>TRIM Map:</b>                    | 93M.008, 93M.009<br>93L.098, 93L.099                                                         |
| <b>BGC Zone:</b>                    | SBS                                                                                          |
| <b>Air Photos:</b>                  | BCC96046 #102, 104-106, 204-212<br>108-110, 170, 173-174, 176-177,<br>BCC96048 #145, 147-148 |

## **SAMPLE DESIGN SUMMARY**

|                                             |                       |
|---------------------------------------------|-----------------------|
| <b>Total number of Reaches:</b>             | 215                   |
| <b>Random Sampling Sites:</b>               | 41                    |
| <b>Biased Sampling Sites:</b>               | 19                    |
| <b>Fish Sampling Only Sites:</b>            | 7                     |
| <b>Total Sampling Sites:</b>                | 67                    |
| <b>Field Sampling Dates:</b>                | September 17-24, 2000 |
| <b>Fish Species Captured During Survey:</b> | RB, DV, CT, CO        |

## **CONTRACTOR INFORMATION**

|                     |                                                                                                                                                                                                                                                              |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| Field Crew:         | J. Harris, J. Dorey, E. Miyagi, E. Wichmann                                                                                                                                                                                                                  |
| Data Entry by:      | J. Dorey, S. Hedberg                                                                                                                                                                                                                                         |
| Report Prepared by: | J. Harris, J Dorey                                                                                                                                                                                                                                           |
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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 of Canadian Forest Products Ltd. and Todd Mahon of WildFor Consulting Ltd. for their assistance throughout the planning and field phases of this project. John McInnis, Forest Ecosystem Specialist, Morice Forest District for his feedback and approval of the Non Fish Bearing Status Report and Chris Schell for his Quality Assurance participation and support in meeting Reconnaissance (1:20,000) Fish and Fish Habitat Inventory Standards. The principal contract monitor, Paul Giroux, BC Ministry of Environment, Lands and Parks, Smithers office for his guidance throughout the project.

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

## TABLE OF CONTENTS

|                                                             | Page |
|-------------------------------------------------------------|------|
| PROJECT REFERENCE INFORMATION .....                         | I    |
| WATERSHED INFORMATION .....                                 | I    |
| SAMPLE DESIGN SUMMARY .....                                 | II   |
| CONTRACTOR INFORMATION.....                                 | II   |
| DISCLAIMER .....                                            | III  |
| ACKNOWLEDGMENTS .....                                       | III  |
| LIST OF TABLES.....                                         | V    |
| LIST OF FIGURES .....                                       | V    |
| LIST OF APPENDICES .....                                    | VI   |
| LIST OF ATTACHMENTS AVAILABLE AT MELP REGIONAL OFFICE ..... | VI   |
| 1.0 INTRODUCTION .....                                      | 1    |
| 1.1 Project Scope/Objectives .....                          | 1    |
| 1.2 Location .....                                          | 1    |
| 1.2.1 Access .....                                          | 2    |
| 2.0 RESOURCE INFORMATION.....                               | 2    |
| 2.1 Existing Fisheries Information.....                     | 4    |
| 3.0 METHODS .....                                           | 5    |
| 3.1 Field Data Collection .....                             | 5    |
| 3.1.1 Pre field Preparations.....                           | 5    |
| 3.1.2 Field Procedures .....                                | 5    |
| 3.2 Field Data Compilation.....                             | 7    |
| 3.2.1 Site Cards.....                                       | 7    |
| 3.2.2 Fish Collection Cards .....                           | 7    |
| 4.0 RESULTS AND DISCUSSION .....                            | 7    |
| 4.1 Logistics.....                                          | 7    |
| 4.2 Survey Information .....                                | 8    |
| 4.3 Fish Age, Size and Life History.....                    | 8    |
| 4.4 Habitat and Fish Distribution.....                      | 14   |
| 4.5 Significant Features and Fisheries Observations .....   | 15   |
| 4.5.1 Fish and Fish Habitat .....                           | 15   |
| 4.5.2 Habitat Protection Concerns .....                     | 15   |
| 4.5.2.1 Fisheries Sensitive Zones .....                     | 15   |
| 4.5.2.2 Fish above 20% Gradients .....                      | 15   |
| 4.5.2.3 Restoration and Rehabilitation Opportunities .....  | 15   |
| 4.5.2.4 Unstable Slopes .....                               | 15   |
| 4.6 Fish Bearing Status .....                               | 17   |
| 4.6.1 Fish Bearing Reaches .....                            | 17   |
| 4.6.2 Additional Sampling Recommendations .....             | 17   |
| 4.6.3 Non-Fish Bearing Status.....                          | 22   |
| 5.0 STREAM CLASSIFICATION SUMMARY .....                     | 23   |
| 6.0 REFERENCES .....                                        | 30   |

## LIST OF TABLES

| Table   | Page                                                           |
|---------|----------------------------------------------------------------|
| Table 1 | Survey summary information .....8                              |
| Table 2 | Fish capture locations within the study area .....9            |
| Table 3 | Features within the study area .....16                         |
| Table 4 | Fish bearing reaches within the study area .....18             |
| Table 5 | Additional sampling recommendations for the study area .....21 |
| Table 6 | Non fish bearing reaches within the study area .....24         |
| Table 7 | Stream sampling summary.....27                                 |

## LIST OF FIGURES

|          |                                                           |
|----------|-----------------------------------------------------------|
| Figure 1 | Study area location map.....3                             |
| Figure 2 | Length frequency distribution for rainbow trout .....10   |
| Figure 3 | Length frequency distribution for cutthroat trout .....11 |
| Figure 4 | Length vs age for cutthroat trout.....11                  |
| Figure 5 | Length frequency distribution for Dolly Varden .....12    |
| Figure 6 | Length vs age for Dolly Varden .....13                    |
| Figure 7 | Length frequency distribution for coho .....14            |

## **LIST OF APPENDICES**

|              |                                                              |
|--------------|--------------------------------------------------------------|
| 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 IV  | Project/Interpretive Maps                                    |

## **LIST OF ATTACHMENTS AVAILABLE AT MELP REGIONAL OFFICE**

|                |                                                                                                                                                                                                                                                                                              |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Attachment I   | Planning Document<br>Triton Environmental Consultants Ltd., July 2000. Phase I-III<br>Pre-field Project Planning Report Reconnaissance (1:20,000) Fish<br>and Fish Habitat Inventory in selected tributaries within the Babine<br>Lake watershed. Prepared for Canadian Forest Products Ltd. |
| Attachment II  | Field Notes<br>Site Cards/Fish Collection Forms                                                                                                                                                                                                                                              |
| Attachment III | Fish Ageing Structures                                                                                                                                                                                                                                                                       |
| Attachment IV  | Photodocumentation<br>Photo Summary Report<br>Photo CD<br>Prints in Plastic Sleeves<br>Negatives in Plastic Sleeves                                                                                                                                                                          |
| Attachment V   | Digital Data<br>Watershed Report Files<br>FDIS Files<br>Mapping Files                                                                                                                                                                                                                        |
| Attachment VI  | FISS Update Data<br>FISS Update Forms<br>FISS Update Maps                                                                                                                                                                                                                                    |

## **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 Smithers Landing operating area, which is located within the Morice Timber Supply Area (T.S.A. 20).

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

### **1.1 Project Scope/Objectives**

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

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

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

### **1.2 Location**

Canfor's Smithers Landing operating area is comprised of several third order watersheds and smaller tributaries to Babine Lake (WSC 480-Babine Lake). The study area includes tributaries entering from the southwest bank of Babine Lake, between WSC 480-548800 and WSC 480-627900. The Smithers Landing Study Area is located northwest of Granisle, B.C.

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 114.98 km<sup>2</sup> and covers 4 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 (Demarchi, 1996).

### 1.2.1 Access

Granisle is the largest community located near the study area. Sampling sites within the watershed were accessed by both road and air.

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

- From Granisle drive north 6 km towards the Granisle Connector.
- Stay right at the Granisle Connector and continue north on the Old Fort Mainline another 6 km into the study area.

Sites located in the study area that did not possess road networks were accessed by helicopter.

## **2.0 RESOURCE INFORMATION**

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

Traditional fishing grounds of the Wet'suwet'en Nation, Broman, Lake Band, Lake Babine Nation, Sekanni – Carrier, Natooten and Skin Tyee Band lie in and adjacent to the study area.

Fig.1

Two de-activated open-pit copper mines (Bell Mine & Granisle Mine) located on a peninsula and an island within Babine Lake were visually observed during the project. Both the Bell Mine and Granisle mine are dealing with the problem of acid rock drainage and the discharge of soluble metals into Babine Lake (Remmington, 1995). No water quality data specific to the study area were identified.

Babine Lake is important recreationally, as it offers excellent fishing and boating opportunities. Babine lake is the principal sockeye salmon (*Oncorhynchus nerka*) lake of the Skeena River system which supports the second largest sockeye run in British Columbia (Groot & Margolis 1991). Rainbow trout (*O. mykiss*), also present in the Babine watershed, make Babine Lake important to anglers and businesses supported by fishing (Scott & Crossman 1985). 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 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**

FISS (1995) records indicate that sockeye salmon, chinook salmon (*O. tshawytscha*), coho salmon (*O. kisutch*), pink salmon (*O. gorbuscha*), steelhead (*O. mykiss*), Kokanee (*O. nerka*), rainbow trout, cutthroat trout (*O. clarki*), lake trout (*Salvelinus namaycush*) Dolly Varden (*S. malma*), largescale sucker (*Catostomus macrocheilus*), longnose sucker (*C. columbianus*), white sucker (*C. commersoni*), lake whitefish (*C. clupeaformis*), northern pikeminnow (*Ptychocheilus oregonensis*), peamouth chub (*Mylocheilus caurinus*), reidside shiner (*Richardsonius balteatus*), longnose dace (*Rhinichthys cataractae*), pygmy whitefish (*Prosopium coulteri*), prickly sculpin (*Cottus asper*), and burbot (*Lota lota*) are present in the Babine Lake watershed. The fish species identified from existing sources were placed in the FDIS database for this project and mapped according to RIC standards for historical information.

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

### **3.0 METHODS**

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

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

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

#### **3.1 Field Data Collection**

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

##### 3.1.1 Pre field Preparations

The stream reaches inventoried were identified by two methods: random sites generated by the FDIS planning tool and biased sites identified by Canfor and Triton. Biased sites were selected to address gaps in the random sampling plan. The Final sample sites incorporated into the contract were reviewed by John Brockley (Canfor), Todd Mahon (FRBC Coordinator), Paul Giroux (FIS, MELP Skeena Region 6), and Triton (Terrace) to ensure the sample sites met the requirements of Canfor, MELP and the FDIS planning model.

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

##### 3.1.2 Field Procedures

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

Fieldwork was conducted by two field crews each consisting of two people. In watersheds where road access was available, the crews used 4X4 pick-up trucks. In

watersheds where road access was unavailable transportation was provided by Westland's Bell Jet Ranger helicopter.

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

- stream classification,
- 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
- 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. 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.

### **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. Field crews were in constant contact with Paul Giroux (Fisheries Inventory Specialist) when the originally proposed plan needed modifications. 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 MELP's FDIS database following the completion of the Phase 4 field inventory. Hard copy versions of the Reach/Site Cards are presented in Appendix I.

#### **3.2.2 Fish Collection Cards**

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

## **4.0 RESULTS AND DISCUSSION**

### **4.1 Logistics**

Weather conditions were variable over the field sampling dates. The number of dry intermittent streams was consistent with past inventories (Triton, 1998) in this type of terrain and for the time of year. A total of 11 out of 60 sampled sites were classified as dry/intermittent. Poor driving conditions were encountered on secondary roads and crews often had to use winches to make it through muddy sections of road. Bridge

removal was the biggest obstacle to gaining road access to sample sites. In many cases the use of a helicopter was necessary to gain access to the sites where road access was prevented by bridge removal. 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 Smithers Landing Study Area.

**Table 1. Summary Survey Information for the Study Area.**

|                                        |                                                           |
|----------------------------------------|-----------------------------------------------------------|
| <b>Major Watershed Code:</b>           | 480-000000-00000-00000-0000-0000-000-000-000-000-         |
| <b>Watershed Name:</b>                 | Babine Lake Watershed                                     |
| <b>Drainage:</b>                       | Babine Lake → Babine River → Skeena River → Chatham Sound |
| <b>NTS Maps:</b>                       | 93L/16 93M/01                                             |
| <b>TRIM Maps:</b>                      | 93M.008 93M.009 93L.098 93L.099                           |
| <b>Total Number of Lakes:</b>          | 6                                                         |
| <b>Total Number of Reaches:</b>        | 215                                                       |
| <b>Stream Field Sampling Dates:</b>    | September 17-24, 2000                                     |
| <b>Number of Random Sites Sampled:</b> | 41                                                        |
| <b>Number of Bias Sites Sampled:</b>   | 19                                                        |
| <b>Number of Fish Sampling Sites:</b>  | 7                                                         |
| <b>Total Number of Sampling Sites:</b> | 67                                                        |

## 4.3 Fish Age, Size and Life History

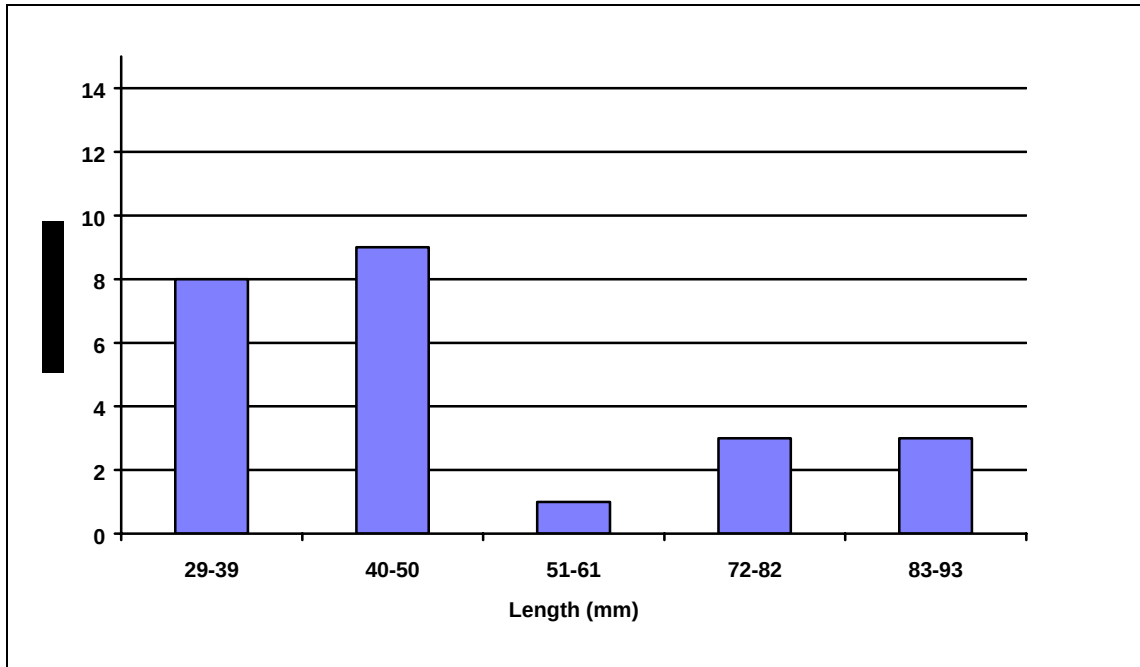
Fish were captured in 25 of 67 sample locations. Table 2 provides a summary of the reaches in which fish were captured. Rainbow trout, coho salmon, Dolly Varden, and cutthroat trout were captured in the study area. Length frequency distributions are provided in the figures below for the sport species captured. Quantitative abundance figures were not generated in this study as sampling methods to determine abundance were not utilized.

### Rainbow trout

Rainbow trout captured during this survey were found to utilize small to moderately large streams, which have moderate flows, gravel substrates, riffle pool morphology and shallow depths. The presence of very few juveniles and no adults suggests that rainbow trout utilize these moderate size streams for spawning then return to the lake for rearing. Spawning for rainbow trout usually occurs from mid-April to late June with fry emergence occurring from mid-June to mid-August (Scott & Crossman 1985).

Figure 2 provides a length frequency distribution for rainbow trout captured in the study area.

Table 2

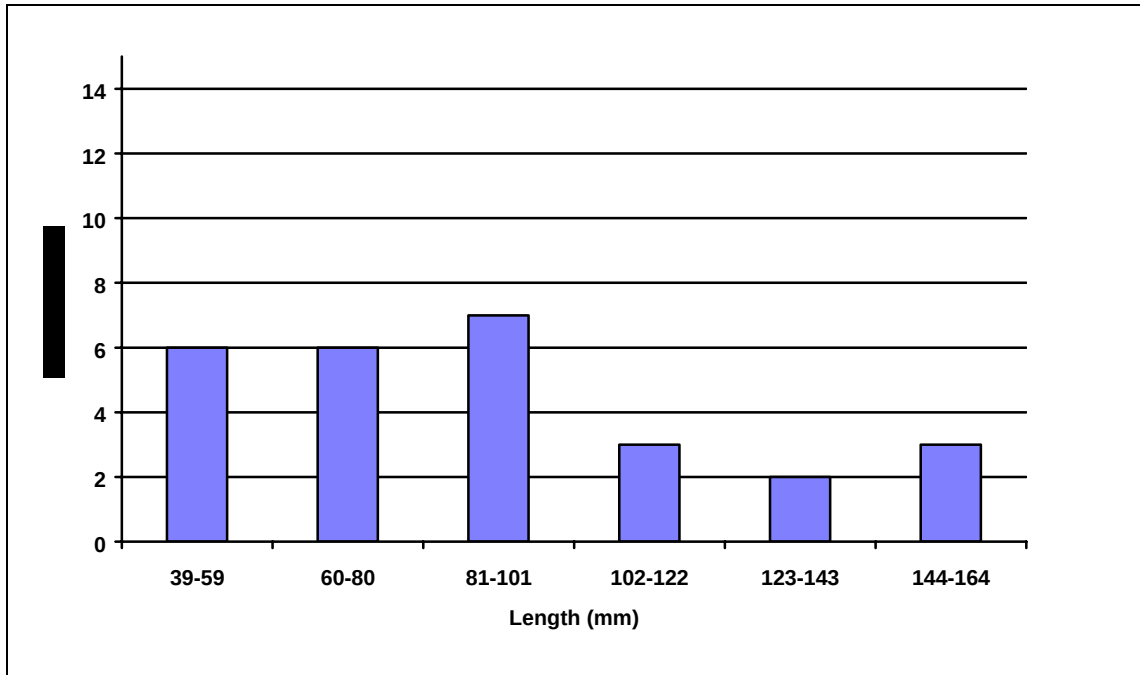


**Figure 2. Length frequency distribution for rainbow trout captured in the study area (n=23).**

### **Cutthroat trout**

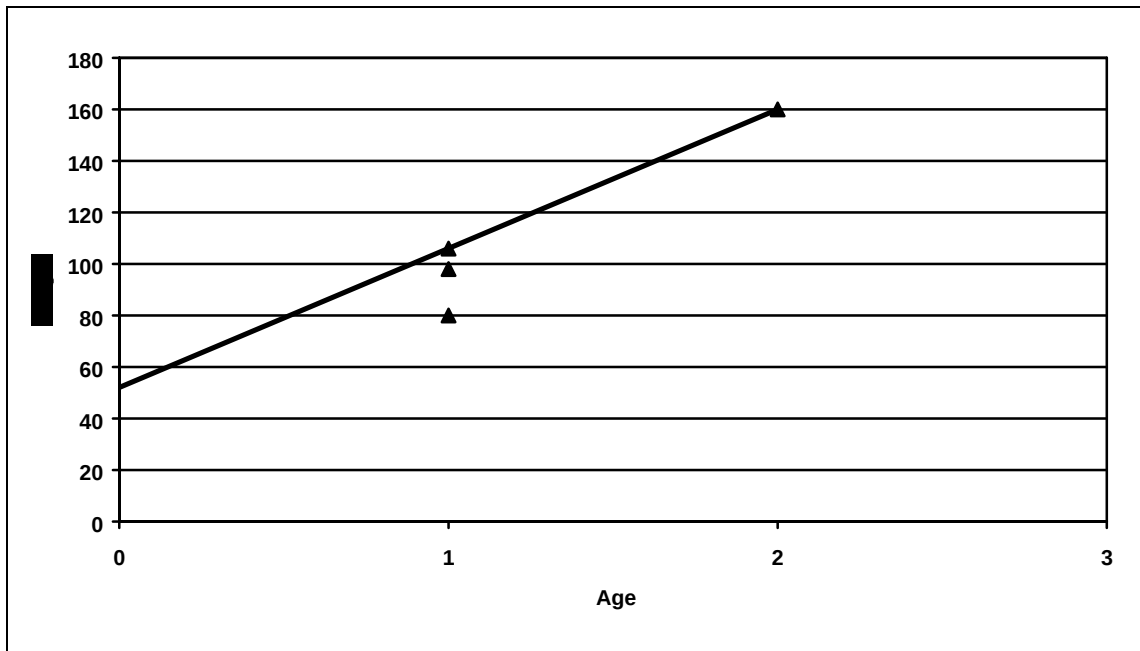
Cutthroat trout were captured in a variety of habitats throughout the study area. They were most often found in or adjacent to the larger streams that provided overwintering habitat. The majority of the cutthroat captured during the survey were fry and juveniles, which indicates they are likely utilizing the small stream habitat for juvenile rearing and refuge. Adults were only captured in one location (3<sup>rd</sup> order stream), which indicates that these fish may be resident fish from Babine Lake. Adult cutthroat likely utilize these tributary streams for spawning during the spring. Cutthroat live to a maximum of 10 years and can reach sexual maturity in as little as 2 years. Spawning takes place in the spring (February to May) in streams with adequate gravel substrates. Redds are constructed and the eggs hatch within 6-7 weeks depending on water temperatures. Fry emerge from the redds in 1-2 weeks (Scott & Crossman 1985).

Figure 3 provides a length frequency distribution for cutthroat trout captured in the study area.



**Figure 3. Length frequency distribution for cutthroat trout captured in the study area (n=27).**

Figure 4 provides a summary of length at age for cutthroat trout captured in the study area.

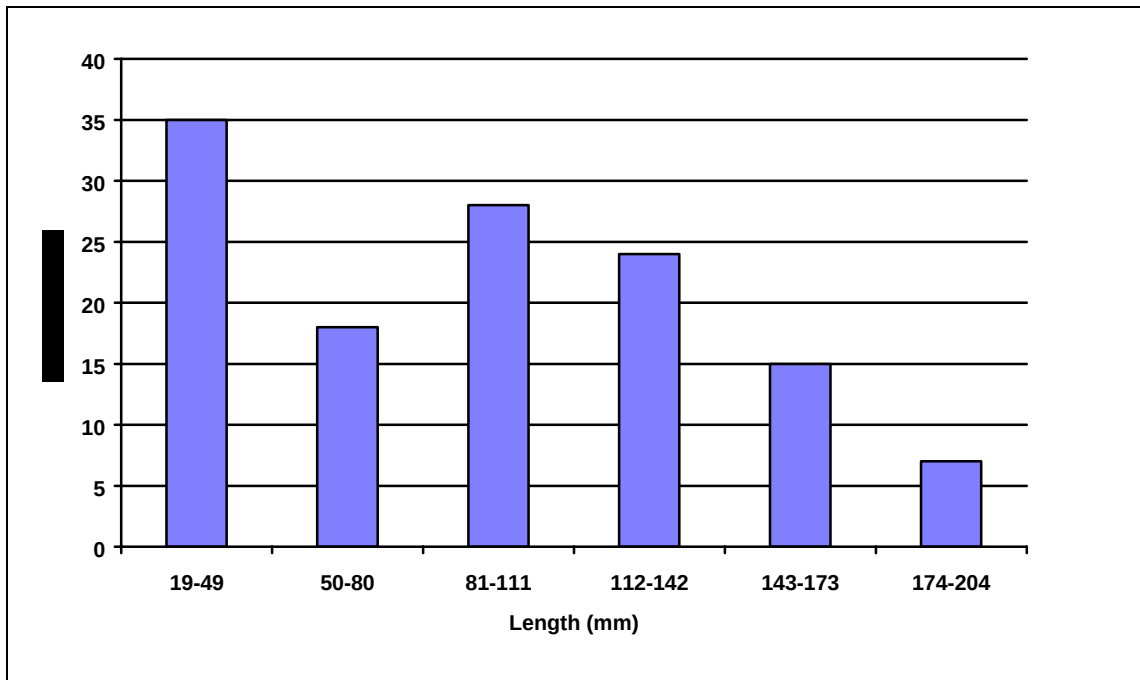


**Figure 4. Length vs age for cutthroat trout captured within the study area (n=16).**

## Dolly Varden

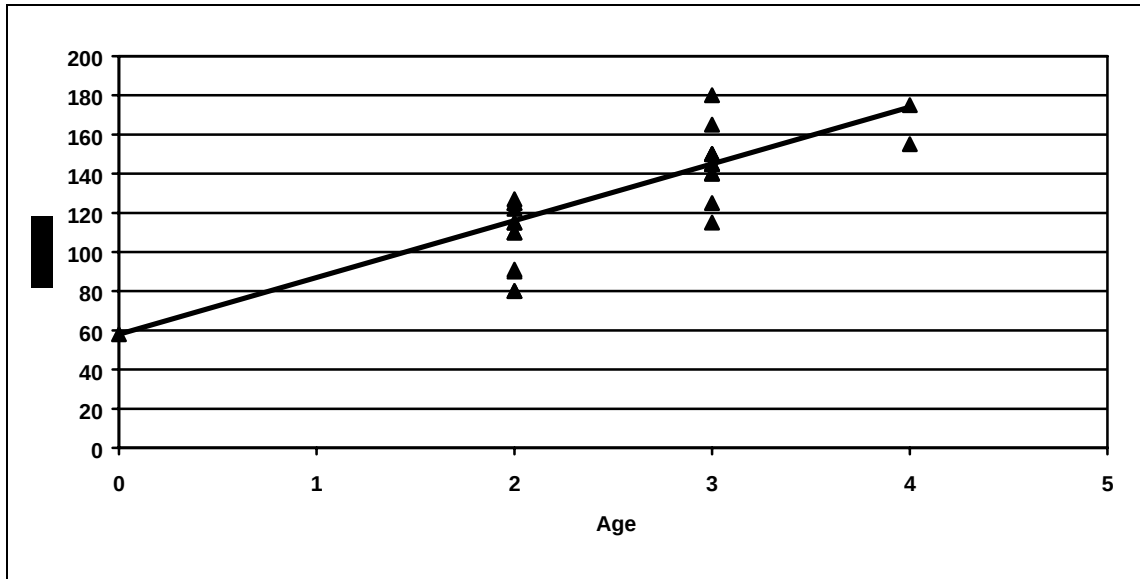
Dolly Varden char were found in habitats that ranged from high gradient streams to low gradient stagnant pools. Fry and juvenile Dolly Varden were found to inhabit the smaller secondary streams adjacent to overwintering habitat (larger mainstems and lakes), and the larger (mature) Dolly Varden were found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

Figure 5 provides a length frequency distribution for Dolly Varden captured in the study area.



**Figure 5. Length frequency distribution for Dolly Varden captured in the study area (n=137).**

Figure 6 provides a summary of length at age for Dolly Varden captured in the study area.

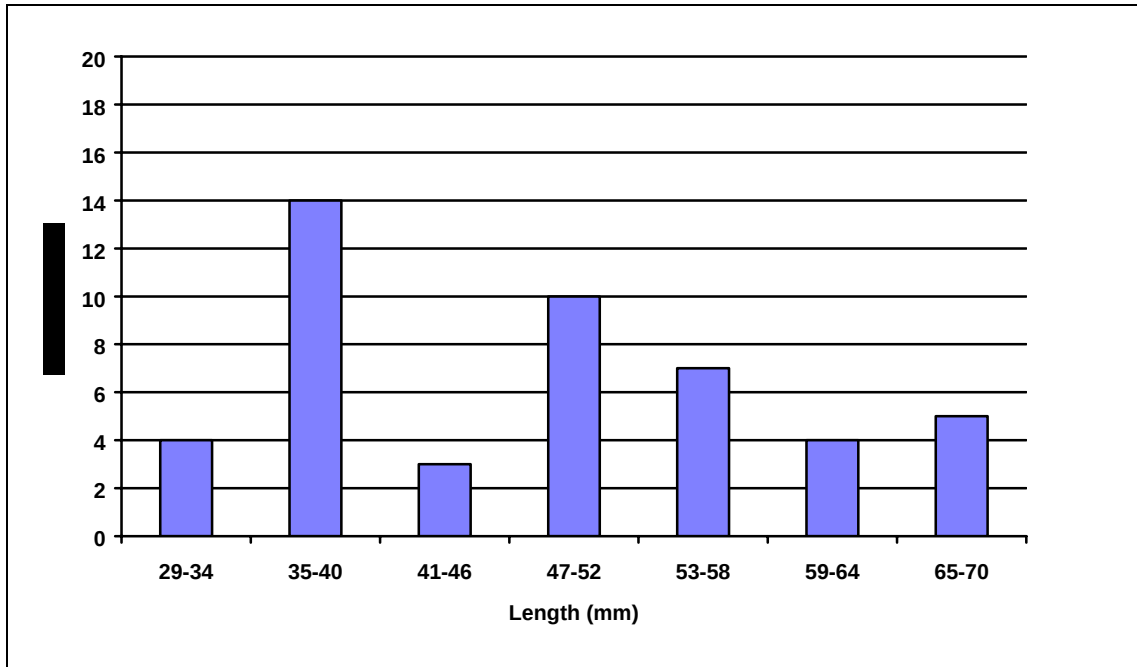


**Figure 6. Length vs age for Dolly Varden captured within the study area (n=9).**

### **Coho**

Coho juveniles were captured at several locations adjacent to Babine Lake. Historical information (SISS, FISS) identified coho adults within the Fulton River (WSC 480-697200), which lies to the south of the study area. The lack of adult spawning habitat identified within the capture locations indicates that adult coho are not utilizing these small streams for spawning. Adult coho are likely spawning in the Fulton River and the juveniles are migrating along the lakeshore and finding their way into lower portions of the study area streams. Coho fry emerge from the gravel in the spring and early summer (March to July) and juveniles usually remain in freshwater for 1-2 years before migrating (downstream) to the ocean for 1 to 3 years.

Figure 7 provides a length frequency distribution for Dolly Varden captured in the study area.



**Figure 7. Length frequency distribution for coho captured in the study area (n=46).**

#### **4.4 Habitat and Fish Distribution**

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

Fish bearing 1<sup>st</sup> order streams were not located far from perennial fish habitat. Habitat quality within these 1<sup>st</sup> order reaches was generally poor with smaller average channel widths and low water flows. Field observations indicated that the small channel widths and ephemeral nature of these streams likely limit or prevent their ability to sustain fish populations, particularly throughout the year. It is unlikely that fish use these reaches, unless they flow into a major system (i.e. 3<sup>rd</sup> or 4<sup>th</sup> order), due to the short duration of water flows and lack of suitable fish habitat.

No fish were captured in reaches with an average channel width of less than 0.57 m, or with an average gradient greater than 7.8%. Fish bearing 1<sup>st</sup> order streams had an average channel width of 0.95 m. Fish-bearing 2<sup>nd</sup> order streams had an average channel width of 2.01 m. Fish-bearing 3<sup>rd</sup> and 4<sup>th</sup> order streams had average channel widths of 2.78 m and 3.58 m respectively.

Fisheries values within the project area are largely associated with the limited occurrence of high quality spawning and rearing habitats for rainbow trout. The prevalence of very 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 habitats for resident trout.

## **4.5 Significant Features and Fisheries Observations**

### 4.5.1 Fish and Fish Habitat

No critical fish habitat such as staging areas, large spawning grounds, or other circumstances was identified where special habitat protection or measures might be warranted. No special populations or rare and sensitive wild stocks were identified within the study area. No high value sport fishing opportunities were identified within the study area however sport fishing opportunities exist outside the study as described in the Resource Information section.

### 4.5.2 Habitat Protection Concerns

#### *4.5.2.1 Fisheries Sensitive Zones*

No fisheries sensitive zones were identified in the study area. Several wetlands were identified as containing fisheries values and should be managed according to FPC guidelines pertaining to wetlands.

#### *4.5.2.2 Fish above 20% Gradients*

No fish were identified above 20% gradient.

#### *4.5.2.3 Restoration and Rehabilitation Opportunities*

One culvert (Table 3) was identified as a barrier to upstream fish migration. In this case the culvert outlet was perched above the outlet pool creating a barrier at all flows. The habitat above the culvert is marginal and no fish were identified within the reach. This stream should be resampled in the spring to confirm fish bearing status.

#### *4.5.2.4 Unstable Slopes*

One landslide (site 125) was identified in the study area. The landslide was a result of natural stream erosion of steep unstable slopes.

Table 3

## **4.6 Fish Bearing Status**

### **4.6.1 Fish Bearing Reaches**

Fish species were captured in 25 of the 47 reaches classified as fish bearing (Table 4). Twenty-three (23) reaches in the fish bearing classification table were classified as fish bearing by default. Nine (9) of these reaches were identified as accessible from downstream fish bearing waters and could be utilized for a portion of the year. It was determined that fish can access these reaches (from downstream fish bearing waters) and further sampling is not recommended.

The fish bearing status of streams may be directly supported by sampling data or 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 classed 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.

High gradient sections and cascades were the dominant physical barriers to upstream fish migration in the study area. Other features affecting fish habitat in the study area included culverts and a landslide (Table 3).

### **4.6.2 Additional Sampling Recommendations**

Thirteen (13) reaches were recommended for additional sampling (Table 5). Additional sampling will clarify fish presence/absence and establish if any barriers exist in downstream reaches. No sport fish were captured in reaches recommended for additional sampling.

Table 4

Table 4

Table 4

Table 5

Many of the reaches selected for additional sampling represent small tributaries with limited habitat values, and most exhibit ephemeral flows. Based on additional sampling efforts in the past, these reaches often provide limited values for salmonids, and even under optimal conditions, fish are often present at low densities and are not always captured. The reaches selected for additional sampling were required by default due to a lack of water, or negative sampling results. The lack of barriers and gradients less than 20% also increased the additional sampling number. As it is not practical, or necessary, to resample every reach selected in the additional sampling table, additional sampling sites should be selected strategically to optimize additional sampling results.

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.

#### 4.6.3 Non-Fish Bearing Status

A non-fish bearing status was assigned to 21 of the 67 sample sites within the study area (Table 6). A non-fish bearing classification has been assigned to all sampled reaches within the non-fish bearing table. Non-fish bearing classifications are associated with reaches that lack suitable habitat to sustain salmonids or are inaccessible to fish. Non-fish bearing status was assigned to reaches where:

- The stream was labeled a non-visible channel containing no potential fish habitat;
- The stream was deemed inaccessible from fish bearing waters and did not have perennial fish habitat;
- 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 lacked a continuous definable channel.

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

- The average stream gradient was greater than or equal to 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. Obvious 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.

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

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

## **5.0 STREAM CLASSIFICATION SUMMARY**

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

Table 6

Table 6

Table 6

Table 7

Table 7

Table 7

## 6.0 REFERENCES

- Anonymous, 1998. Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures. April 1998. British Columbia Ministry of Environment, Lands and Parks.
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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**