

**Reconnaissance (1:20,000)  
Fish and Fish Habitat Inventory  
at  
Three Sub-basins in the  
Morrison Creek Watershed**

Watershed Code: 480-598800

**Prepared for**

**Houston Forest Products Co.**  
Box 5000  
Houston, B.C.  
V0J 1Z0

**Prepared by**

**SKR Consultants Ltd.**  
RR#1, Site 11, Comp. 4  
Smithers, B.C.  
V0J 2N0

March 31<sup>st</sup>, 2001

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Approved by:

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Regina K. Saimoto, M.Sc., R.P.Bio.  
Biologist  
SKR Consultants Ltd.

**March 31, 2001**

## PROJECT SUMMARY SHEET

### PROJECT REFERENCE INFORMATION

MELP Project #:	HFP-SKR-001-2001
FRBC Project #	000108
FRBC Activity #:	10447
FDIS Project #:	06-BABL-000001175-1999
MELP Region:	Skeena Region (06)
MELP District:	unknown
FW Management Unit:	06-08
Fisheries Planning Units:	unknown
DFO Subdistrict:	Prince Rupert (6)
Forest Region:	Prince Rupert
Forest District:	Morice Forest District
Forest Licensee:	Houston Forest Products Co.
Tenure Number:	FLA – 16827
First Nations Claim Area:	Lake Babine Nation

### WATERSHED INFORMATION

Watershed Group	BABL
Watershed Name	Morrison Creek
Watershed Code	480-598800
UTM at Mouth	9.672969.6113965
Watershed Area	114.4 km <sup>2</sup> (study areas only)
Total of all stream lengths	212.917 km (study areas only: TRIM)
Stream Order	4 <sup>th</sup>
NTS Maps (1:50,000)	93M/01, 93M/08, 93M/09
TRIM Maps	093M.018, 093M.019, 093M.028, 093M.029, 093M.048, 093M.049
BEC Zone	SBSmc
Air Photos	30BCC93036 No.'s 171-176, 198-204, 258-267 30BCC93038 No.'s 193-195 30BCC96139 No.'s 6-8, 24, 49-57, 116-123, 144-157, 214-226

### SAMPLING DESIGN

Total # of Reaches	228
Random Sampling Sites	47 (47 proposed)
Discretionary Sample Sites	15 (15 proposed)
Value Added Sites	7 (7 discretionary)
Total Sample Sites	69 (62 proposed)
Field Sampling Dates	July 24 <sup>th</sup> - 28 <sup>th</sup> , 2000
Fish Species in Watershed	SK, CO, CH, PK, RB, CT, KO, DV, LT, LW, MW, NSC, CAS, RSC, PCC, LSU, CSU, LNC, BB.

## CONTRACTOR INFORMATION

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## **DISCLAIMER**

This product has been accepted as being in accordance with the approved standards within the limits of the Ministry quality assurance procedures. Users are cautioned that interpreted information on this product developed for the purposes of the Forest Practices Code Act and Regulations, for example stream classifications, is subject to review by a statutory decision maker for the purposes of determining whether or not to approve an operational plan.

## ACKNOWLEDGEMENTS

Funding for this project was provided by Forest Renewal B.C. and Houston Forest Products Co. (HFP), Houston, B.C. The contract was administered and monitored by Deidre Quinlan for HFP. Melissa Todd, Paul Ross and Deidre Quinlan (HFP) were invaluable in their support throughout this project. Western Geographic Information Systems Inc. (Prince George, B.C.) conducted all digital mapping for the project, and produced the project overview map, the fisheries project maps, and the fisheries interpretive maps. Helicopter services were provided by Highland Helicopters, and the help and effort of Pat Rooney, Karl Desjarlais and Tanya Booth are greatly appreciated. Editorial comments on drafts of this report were provided by Regina Saimoto (SKR Consultants Ltd.), Chris Schell (QA/QC Monitor), and Paul Giroux (B.C. Environment).

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- Appendix 2. Photodocumentation Forms 1 and 2.
- Appendix 3. Quality Assurance/Quality Control Communications.
- Appendix 4. List of DNA samples submitted to B.C. Environment.
- Appendix 5. 1:20,000 Fisheries Project/Interpretive Maps.

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

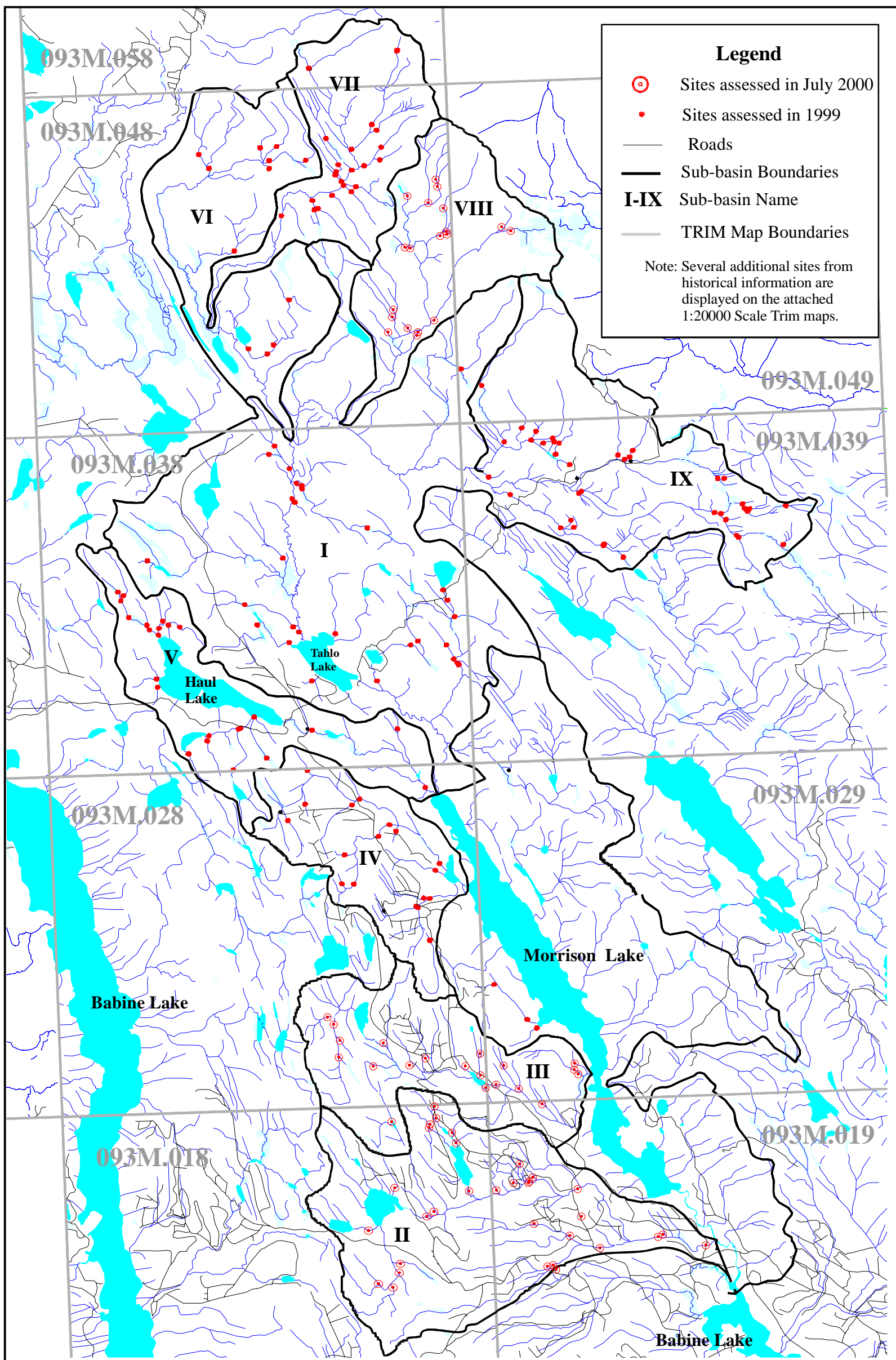
Digital Overview Map  
Digital Fisheries Project/Interpretive Maps  
Photograph Kodak CD's (2 sets)  
Indexed negatives  
Digital reports  
Digital FDIS database

## 1.0 INTRODUCTION

The Morrison watershed is divided into 13 sub-basins based on watershed boundaries established by B.C. Environment (1999). Of the 13 sub-basins, nine sub-basins (*see* Figure 1) are within the licensed area of Houston Forest Products Co. (HFP). The remaining four sub-basins to the east of Morrison Lake and Creek is within the licensed area of Canfor Ltd., and have been excluded from the study area of this project. SKR Consultants Ltd. (SKR) was retained by HFP to conduct fish and fish habitat inventories under funds provided jointly by Forest Renewal B.C. (FRBC) and HFP. Sub-basins I, IV, V, VI, VII, and IX were inventoried in 1999, and the remaining three sub-basins in HFP’s licensed area were inventoried in July 2000 during the second year of this two year study (*see bold text below*). In addition, two lakes (WBID 00412BABL and 00338BABL) were inventoried in 2000 (SKR 2001a, b) The sub-basin titles referred to throughout this report are described below:

- Sub-basin I: Morrison/lower Tahlo Creek (480-598800 West)  
excluding some main tributaries (480-598800-99100 lower included)
- **Sub-basin II: Fish Lake Sub-watershed (480-598800-10000)**
- **Sub-basin III: Sub-watershed on west side of Morrison Lake (480-598800-47500)**
- Sub-basin IV: Sub-watershed at northwest corner (480-598800-84000)  
of Morrison Lake
- Sub-basin V: Haul Lake (480-598800-99500)
- Sub-basin VI: West Northern Headwaters of (480-598800-91100-44800)  
Tahlo Creek
- Sub-basin VII: Mid Northern Headwaters of (480-598800-91100-44800-2240)  
Tahlo Creek
- **Sub-basin VIII: East Northern Headwaters of (480-598800-91100-44800-536)  
Tahlo Creek**
- Sub-Basin IX: Eastern Headwaters of Tahlo Creek (480-598800-91100)
- *Excluded Four Sub-basins east of Morrison (480-598800 East)  
Creek and Morrison Lake (480-598800-44800)  
(480-598800-77300)  
(480-598800-91100-05700)*

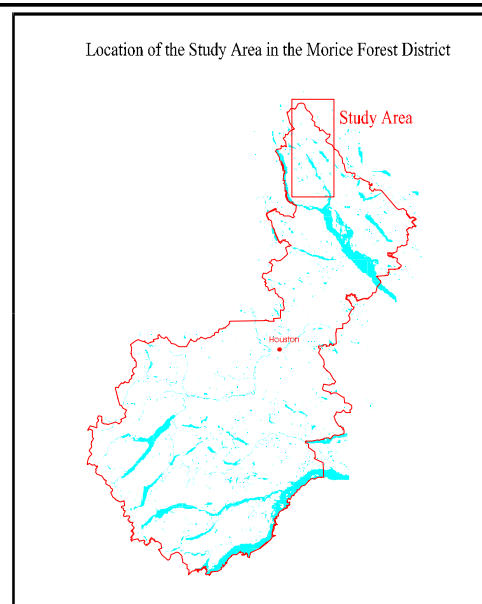
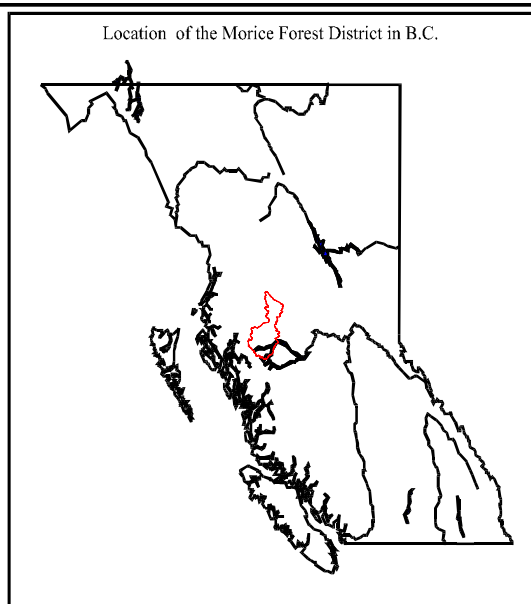
Note: Sub-basins in **Bold Text** were inventoried in 2000  
 Sub-basins in Normal Text were inventoried in 1999  
*Italic Text* indicates Sub-basins in the Morrison Creek watershed that are outside of HFP’s licenced area



**OVERVIEW MAP**  
**Morrison Watershed**  
**in the**  
**Babine Lake Watershed Group**

Scale 1:~125,000

PROJECT CODE: HFP-SKR-001-2001  
 DATE: 2001/01/15  
 INVENTORY COMPANY: SKR Consultants Ltd.  
 Printed in Canada by: SKR Consultants Ltd.



## 1.1 OBJECTIVES

The main objectives of the watershed reconnaissance level stream inventory project in the Morrison Creek watershed were:

- to review and summarize historical fisheries information for the study area,
- to undertake a reconnaissance level stream inventory to describe fish distribution and diversity,
- to document barriers to fish passage,
- to document fish habitat characteristics,
- to conduct secondary lake inventories at small lakes where fish presence and diversity is unknown,
- to identify further sampling requirements, and
- to classify reaches sampled according to the B.C. Forest Practices Code Fish – Stream Identification guidebook (1998).

## 1.2 LOCATION

The Morrison Creek watershed is the fourth largest drainage in the Babine Lake watershed group. Morrison Creek drains into the Morrison Arm of Babine Lake approximately 28 km north of Granisle, B.C. (Figure 1). The entire area is within the Morice Forest District (Prince Rupert Forest Region) and the Skeena Environment Region. The study area has been divided into nine sub-basins which have been grouped into three general areas for discussion: Morrison/lower Tahlo Creek, Northern Headwaters of Tahlo Creek, and Eastern Headwaters of Tahlo Creek (SKR 2000a).

### 1.2.1 Morrison Lake and lower Tahlo Creek: Sub-basins I-V

The Morrison Lake and lower Tahlo Creek area includes the inlet streams to the west shore of Morrison Lake, and the lower portion of the Tahlo Creek drainage: Sub-basins I-V. The area contains the majority of lower gradient terrain in the foothills of the Bait Range. Sub-basin I includes the lower third of the Tahlo Drainage, and the small drainage systems into the west shore of Morrison Lake, excluding Sub-basins III, IV and V. Sub-Basin II is the only drainage system on the 1:20000 TRIM map that flows into the west side of Morrison Creek and its confluence is approximately 2.5 km upstream from Babine Lake. Sub-Basin III drains into the west side of Morrison Lake at its narrows. Sub-basin IV is a small sub-watershed that drains into the northwest corner of Morrison Lake and Sub-basin V (Haul Lake) drains into the northern tip of Morrison Lake. Sub-basins I, IV, and V were sampled in 1999 (SKR 2000), and Sub-basins II and III were inventoried during this study in July 2000.

### 1.2.2 Northern Headwaters of Tahlo Creek: Sub-basins VI-VIII

The northern headwaters of Tahlo Creek include three main sub-basins in the northern arm of the Tahlo Creek watershed: Sub-basins VI-VIII. The eastern proportion of the Morrison Creek headwater area is within steeper gradient mountains in the Bait Range along the eastern

watershed boundary. Sub-basin VI is the area on the west side of the northern headwaters of the Morrison Creek watershed and drains into Tahlo Creek approximately 6.5 km upstream from Tahlo Lake. Sub-basin VII drains the eastern portion of Sub-basin VI and connects to Sub-basin VI approximately 4.5 km upstream from Tahlo Creek. Sub-basin VIII is the area on the east side of the northern arm and drains into Tahlo Creek approximately 9.5 km upstream of Tahlo Lake. Sub-basins VI and VII were sampled in 1999 (SKR 2000), and Sub-basin VIII was inventoried during this study in July 2000.

### **1.2.3 Eastern Headwater of Tahlo Creek: Sub Basin IX**

The eastern headwater of Tahlo Creek is the eastern portion of the headwaters that wraps around the north arm of the Sakeniche watershed. This sub-basin includes the upper 13.7 km section of Tahlo Creek (reaches 13-21) and its tributaries. Sub-basin IX is bordered to the south by the Friday Lake sub-watershed (Sakeniche drainage) and the Bait Range to the east and north. Stream inventory of Sub-basin IX was completed in 1999 (SKR 2000a).

## **1.3 ACCESS**

Access to this study area included four wheel drive road access, and helicopter access to several isolated areas in the watershed. The Morrison Logging Camp was used as the main base for this fish and fish habitat inventory project.

Directions from Granisle B.C. to HFP Morrison Logging Camp:

- Turn left from the Granisle Highway approximately 7 kilometers south of Granisle onto the Michell Bay Road to the Nose Bay barge terminal.
- Cross Babine Lake on the barge to Nose Bay (Permit is required)
- Travel 9 km north on Jinx Main Forest Road
- Turn left on Hagen Forest Road and travel 39 km to the Morrison Creek bridge
- Continue travelling along the Hagen Forest Road to km 42
- Turn left onto the Morrison Main Forest Road
- Travel 6 km south on the Morrison Main Forest Road to the Morrison Logging Camp (Km 0).

## **1.4 HISTORICAL INFORMATION**

A relatively large amount of fisheries information was available for the majority of the Morrison Creek watershed prior to this study (FISS, SKR 2000a). The three largest lakes (Morrison, Tahlo, and Haul lakes) have been inventoried and provide valuable information on the species diversity of fish for this system (FISS). Six of the nine sub-basins in the study area and Guitar Lake were inventoried in 1999 during the first year of this study and have provided a good understanding of the watershed with respect to fish distribution (SKR 2000a, 2000b). Table 1 summarizes all historical fisheries information for the Morrison Creek watershed.

**Table 1.** A summary of fish previously documented present in the study area within the Morrison Creek watershed (*see below for species codes*).

General Area	Sub-basin	Fish Species <sup>1</sup>	Reference
Morrison Creek	Sub-basin I	CH/CO/PK/SK KO/RB LNC/NSC/RSC, (BT/CT/ DV/MW)	FISS
Morrison Lake	Sub-basins I	CO/SK BB/CT/KO/LT/LW/MW/RB NSC (LSU/PCC/RSC)	FISS
Tributary (ILP 10317) to the west shore of Morrison Lake	Sub-basin IV	RB CT/CAS	SKR 1998a SKR 1997
Haul Lake	Sub-basin V	no anadromous species RB/LW LNC/LSU/NSC/PCC/RSC	FISS
Haul Creek	Sub-basin V	LSU/CSU/PCC/RSC/NSC	SKR 2000a
Lower Tahlo Creek downstream of Tahlo Lake	Sub-basin I	CO/SK CT/DV/RB	FISS SKR 2000a,b
Tributary to Tahlo Creek (outlet of Fission Lake)	Sub-basin VI	RB/CT/LSU/RSC	SKR 1996a
Tahlo Lake	Sub-basin VI	CO/SK CT/KO/LW/MW/RB	FISS
Guitar Creek	Sub-basin I	RB/CT/LKC	SKR 2000a
Fission Lake	Sub-basin VI	CT/LSU/ RSC/NSC	FISS
Lower Tahlo u/s Tahlo Lake	Sub-basin I	(SK/CO)/ RB CSU,CT, DV	FISS SKR 1998b, 2000a
Northern Tahlo Creek Headwaters	Sub-basin VI, VII, and VIII	CT/DV/RB DV CT	FISS McElhanney 1995 SKR 1996b
Eastern Tahlo Creek Headwaters	Sub-basin IX	CT/RB/DV	SKR 2000a

Note: Brackets around species codes (e.g. (CO) and (SK)) indicate suspected species).

1 species codes are as follows and are used to refer to species in tables throughout the text.

Code	Species	Species
BB	burbot	<i>Lota lota</i>
BT	bull trout	<i>Salvelinus confluentus</i>
CAS	prickly sculpin	<i>Cottus asper</i>
CH	chinook salmon	<i>Oncorhynchus tshawytscha</i>
CO	coho salmon	<i>Oncorhynchus kisutch</i>
CSU	largescale sucker	<i>Catostomus macrocheilus</i>
CT	cutthroat trout	<i>Oncorhynchus clarki</i>
DV	Dolly Varden	<i>Salvelinus malma</i>
KO	kokanee	<i>Oncorhynchus nerka</i>
LNC	longnose dace	<i>Rhinichthys cataractae</i>
LSU	longnose sucker	<i>Catostomus catostomus</i>
LT	lake trout	<i>Salvelinus namaycush</i>
LW	lake whitefish	<i>Coregonus clupeaformis</i>
MW	mountain whitefish	<i>Prosopium williamsoni</i>
NSC	northern pikeminnow (squawfish)	<i>Ptychocheilus oregonensis</i>
PCC	peamouth chub	<i>Mylocheilus caurinus</i>
PK	pink salmon	<i>Oncorhynchus gorbuscha</i>
RB	rainbow trout	<i>Oncorhynchus mykiss</i>
RSC	reidside shiner	<i>Richardsonius balteatus</i>
SK	sockeye salmon	<i>Oncorhynchus nerka</i>
WSU	white sucker	<i>Catostomus commersoni</i>

#### **1.4.1 Morrison Creek and lower Tahlo Creek: Sub-basins I-V**

Coho, sockeye, and pink salmon are the three anadromous species that are documented in Morrison Creek (FISS). Coho and sockeye have also been recorded upstream as far as Tahlo Lake (FISS). The presence of juvenile chinook has been documented in a small tributary approximately four kilometres upstream from Morrison Creek (FISS), but the location suggests that they were possibly coho that were incorrectly identified. Cutthroat trout, rainbow trout, mountain whitefish, lake whitefish, and kokanee have been recorded present in both Morrison and Tahlo lakes (FISS). Lake trout and burbot have also been recorded in Morrison Lake (FISS). Rainbow trout and cutthroat trout appear to be the most abundant species present in many of the streams in this lower portion of the watershed, except in the Haul Lake system (Sub-basin V) which appears to be dominated by non-salmonids (FISS). Coho have also been documented in the lower reach of a few of the main tributaries to Morrison Creek and Morrison Lake (FISS). Interestingly, Dolly Varden have not been documented in this lower portion of the Morrison Creek watershed.

#### **1.4.2 Northern Headwaters of Tahlo Creek watershed: Sub-basins VI-VIII**

Dolly Varden, cutthroat trout, and rainbow trout have been documented in the headwater portion of the northern headwaters of the Tahlo Creek watershed (SKR 2000a). During previous studies, rainbow trout and cutthroat trout were observed to be the dominant species in Sub-basin VI, and Dolly Varden were observed to be the dominant species in Sub-basin VII (SKR 2000a). Both cutthroat trout and Dolly Varden have been documented in the lower mainstem of Sub-basin VIII (FISS). No anadromous species have been documented and it is not suspected that anadromous species utilize this headwater portion of the Morrison Creek watershed.

#### **1.4.3 Eastern Headwaters of Tahlo Creek: Sub-basin IX**

Rainbow trout and cutthroat trout are the more common species in the majority of the eastern headwaters of Tahlo Creek (SKR 2000a). Dolly Varden were also captured in a few upper reaches of this sub-basin (SKR 2000a). No anadromous species have been documented or are suspected to be using this headwater portion of the Morrison Creek watershed.



## 2.0 RESOURCE USE

The study area is on public land, which is primarily utilized by Houston Forest Products Co. for forest harvest. Smaller operations also provide hunting, angling, and wilderness tours in this area. The following list summarizes resource use in the Morrison Creek watershed:

1. First Nations issues and interests in the study area:
  - The Babine Nation has claimed the entire Morrison Landscape Unit as part of their traditional territories, and are currently in stage four of the treaty negotiation process (B.C. Treaty Commission 2000).
2. Development and land use: forestry, mining, recreation:
  - The study area falls into forest license FLA-16827 (Houston Forest Products Co.), and harvest within sub-basin VIII is proposed to 2002. Within Sub-basins II and III, there are harvest areas proposed to 2002 and 2003. (HFP 1999)
  - No mineral tenures are located in the area (Ministry of Employment and Investment 2000).
  - The guide outfitter territory in the study area is 608G003, and the trapline territories are 608T023, 608T025, 608T026 (HFP 1999).
  - A grease trail can be used to access the area by foot or snowmobile from the Morrison Main. The grease trail connects the east shore of Babine Lake to Friday Lake (Sakeniche drainage) (MoF 1997). There is no public access to the study area (access is via a private barge operated by Houston Forest Products Co. and Canfor Ltd.).
3. Other developments, concerns or points of interest:
  - No Protected Areas Strategies (PAS) study sites are known to exist in the area (Land use Coordinator Office 2000).
  - No water licenses or community watersheds are noted to be located in the area (B.C. Environment 1999).
4. Existing water quality data:
  - none available at time of survey (Giroux pers. comm. 2000).
5. Previous presence of fish in systems of interest:
  - Fish presence documented in the study area is summarized in Table 1.

### **3.0 METHODS**

This project closely follows all applicable RIC Standards (1998a, 1999, 2000) and the Forest Practice Code fish - stream identification guidebook (1998). Details on methodologies, sampling site selection, field assessments, and digital mapping are provided in the following subsections.

#### **3.1 SAMPLE SITE SELECTION**

Sample sites were selected by conducting reach break analysis and random sampling queries using the Fish Data Information System (FDIS version 7.0) data tool for each of the sub-basins in the study area. All streams on the 1:20,000 TRIM map scale were identified numerically by assigning an Interim Location Point (ILP) or watershed code, following 1:20,000 fish and fish habitat inventory standards (RIC 1998a, 1999, 2000). Streams were divided into reaches based on map and air photo interpretation. Necessary reach information was entered in the FDIS database, following Resource Inventory Committee standards (RIC 1998a, 1999, 2000). Version 7.0 of the FDIS ACCESS 2.0 data tool was used to randomly select sampling sites to determine the general distribution and total number of sites required in the study area (SKR 1999, SKR 2000c). Some sites were deleted or moved based on previous fish sampling in the watershed and site accessibility. Random and biased sampling sites were mapped on 1:20,000 scale, along with existing fisheries information for presentation to the contract monitor and the ministry representative. The sampling plan was summarized in a project plan (SKR 1999, 2000c) for ministry and contract monitor approval.

#### **3.2 STREAM ASSESSMENT**

All stream assessments in Sub-basins II, III, and VIII were conducted in July 2000. Stream sites were accessed by four wheel drive vehicle and helicopter. Stream sections of interest were assessed to determine fish presence and habitat values. Fish Data Information System (FDIS) site cards and fish collection cards were completed at sample sites, following Resource Inventory Committee Standards (RIC 1998a, 1999, 2000), and data were entered into the FDIS database using the FDIS data entry tool.

All fish that were captured during this study were identified to species in the field or small sub-samples were preserved for confirmation using a dissecting microscope. Fork lengths were recorded for all fish captured. DNA samples were also collected for a sub-sample of cutthroat trout (Appendix 3). DNA samples usually consisted of a tissue plug preserved in 90% ethanol.





### 3.3 MAPPING

Reach break analysis was conducted during phase I-III of this reconnaissance (1:20000) fish and fish habitat inventory project (RIC 1998a, 1999, 2000) by SKR Consultants Ltd. (SKR) and Western Geographic Information System Inc. (WGIS)(SKR 1999, 2000c). The majority of reach break information for the FDIS database was obtained from TRIM map and air photograph interpretations by SKR. WGIS provided lengths, gradients, and UTM coordinates for all reaches in the study area after linking new spatial data to TRIM map data that was obtained from the FTP//...TRIM library (BC Environment 1999). All reach break mapping closely followed the RIC standards for reach analysis (1998a) and digital mapping (1998b).

After completing the field portion (Phase IV) of this study, SKR provided WGIS with the completed FDIS database and draft hardcopy maps. Data presented on the maps included sub-basin boundaries, sample site locations, significant features, and historical information within the study area. In addition, SKR identified reaches with known fish presence, suspected fish presence, suspected fish absence, and known fish absence for presentation of fish distribution on the interpretive maps. The criteria used by SKR for determining fish presence and absence are presented in Table 2. Digitizing of all spatial data for the final mapping deliverables of this project was conducted by WGIS.

Final digital mapping and hardcopy deliverables were provided by Nancy Elliot (WGIS), under supervision of John Rustad (WGIS), following RIC (1998b) and B.C. Environment (Skeena Region) mapping standards.

**Table 2.** Criteria used to evaluate fish distribution for presentation on the Fisheries Project/Interpretive Hardcopy Maps (Appendix 5) of this study area.

<p>Fish Present  </p>	<ul style="list-style-type: none"> <li>• Stream reaches where FPC listed fish species have been captured or where reaches can be classified as fish bearing based on FPC listed fish species being captured upstream.</li> </ul> <p>NOTE: fish distribution may not always extend to the upper limit of all reaches symbolized as fish bearing</p>
<p>Fish Suspected Present  </p>	<ul style="list-style-type: none"> <li>• Stream reaches with gradients less than 21% and with any potential for fish presence, excluding first order streams less than 1 km in length on 1:20000 TRIM map</li> </ul>
<p>Fish Suspected Absent  </p>	<ul style="list-style-type: none"> <li>• First order streams less than 1 km in total length on 1:20000 TRIM map</li> <li>• Streams visited with limited potential for fish presence, but no definable barriers to fish passage following RIC standards, thus still requiring resampling</li> </ul>
<p>Fish Absent  </p>	<ul style="list-style-type: none"> <li>• Reaches with no fish captured in two seasons upstream of natural obstructions to fish migration</li> <li>• Reaches upstream of identified natural barriers to fish migration following intensive sampling in one season</li> <li>• First and small second order streams flowing into non fish bearing reaches</li> <li>• Reaches with gradients exceeding 20%                      (Note: the location of lower reach break is not defined until field sampling is conducted)</li> </ul>

## 4.0 RESULTS AND DISCUSSION

The remaining three of the nine sub-basins in the project area within the Morrison Creek watershed were inventoried during the 2000 field season. In conjunction with results from the first year of inventory in the Morrison Creek watershed (SKR 2000), the summary of results and of biophysical, fish habitat, and fish distribution information from this study is presented for the following three areas:

- Morrison Creek and lower Tahlo Creek: Sub-basins I – V,
- Northern headwaters of the Tahlo Creek watershed: Sub-basins VI – VIII, and
- Eastern headwaters of Tahlo Creek: Sub-basin IX.

In total, 69 reaches of 228 stream reaches in the study area (Sub-basins II, III, and VIII) were sampled and two secondary lake inventories were conducted to complete the fish inventory in HFP's licensed area portion of the Morrison Creek watershed. Stream reach sampling included 47 random sites from the FDIS data base tool, and 22 discretionary sites. The following sections present and discuss the findings from the field inventory incorporating all historical information that was available for the Morrison Creek watershed (*see* Table 1) as outlined in the "Buba Creek Example Report" (B.C. Environment 1999).

### 4.1 LOGISTICS

This project was completed with no critical logistical problems. No significant problems in terms of inclement weather or field conditions were encountered during the sampling, which allowed the addition of seven value added sites in attempts to evaluate fish distribution in more detail for some reaches where no fish were captured, but no barriers were identified. Electrofishing efficiency was deemed good since turbidity was low, water temperatures were greater than six degrees celsius and conductivity ranged from 30 to 360  $\mu$ S.

## **4.2 SUMMARY OF BIOPHYSICAL INFORMATION**

The Morrison Creek watershed is located in the Humid Continental Highlands Ecodivision of the Humid Temperate Ecodomain. Within the Sub-Boreal Interior Ecoprovince, this drainage system is found within the Fraser Basin Ecoregion of the Babine Upland Ecosection. The streams in the study area are characterized by the Moist Cold Subzone of the Sub-Boreal Spruce Biogeoclimatic Zone (MOF 1988, Meidinger and Pojar 1991). Table 3 provides a summary of watershed information for the sub-basins within the Morrison Creek watershed. The following sections briefly describe biophysical information for the three areas in the Morrison Creek watershed: Morrison Creek and lower Tahlo Creek, Northern headwaters of the Tahlo Creek watershed, and Eastern headwaters of Tahlo Creek.

### **4.2.1 Morrison Lake and lower Tahlo Creek**

The lower portion of the Morrison Creek watershed is characterized by low gradient terrain in rolling hills. A moderate number of small lakes and flooded wetlands are distributed over this lower portion of the Morrison watershed. The majority of streams on the valley bottom are characterized by wide bands of wetland or riparian vegetation dominated by alder and willow. Beaver dams are abundant throughout this entire area and were observed to be non-permanent obstructions to fish migration in several reaches.

### **4.2.2 Northern Headwaters of Tahlo Creek**

The west side of the northern headwaters of Tahlo Creek is on a wide, low gradient, bench between 900 and 1000 meters above sea level. The northeastern half of this area is within the Bait Range of the Skeena Mountains where streams are characterized by moderate gradient and channel confinement.

### **4.2.3 Eastern Headwaters of Tahlo Creek**

The eastern headwaters of the Tahlo Creek watershed is located on the Interior plateau and separated from the Fraser drainage by only a few hundred meters. The majority of streams in this area have low to moderate gradients and well defined channels. Only a few small first order tributaries that drain from Trail Mountain to the north, have gradients exceeding 20%.

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**Table 3.** Summary of watershed information for sub-basins in the Morrison Creek watershed.

Sub-basin	Description	Watershed Code	Watershed Area (ha)	Stream Length (km) (NTS Map)	Stream Order (NTS Map)	NTS Maps	BEC Zone	Lake Names
Sub-basin I:	Morrison/lower Tahlo Creek excluding some main tributaries UTM: 9.672969.6113965	(480-598800 West) (480-598800-99100 lower included)	139.2	97.1	5 <sup>th</sup>	93M/1 93M/7 93M/8	SBSmc	Morrison Lake Tahlo Lake “Guitar” Lake Fission Lake
<b>Sub-basin II:</b>	<b>Fish Lake Sub-watershed on west side of Morrison Lake</b> UTM: 9.672323.6115654	<b>(480-598800-10000)</b>	<b>53.9</b>	<b>46.5</b>	<b>3<sup>rd</sup></b>	<b>93M/1</b>	<b>SBSmc</b>	<b>Fish Lake</b>
<b>Sub-basin III:</b>	<b>Sub-watershed on west side of Morrison Lake</b> UTM: 9.668588.6121103	<b>(480-598800-47500)</b>	<b>31.9</b>	<b>25.0</b>	<b>3<sup>rd</sup></b>	<b>93M/1</b>	<b>SBSmc</b>	<b>1 unnamed lake</b>
Sub-basin IV:	Sub-watershed at northwest corner of Morrison Lake UTM: 9.664885.6127233	(480-598800-84000)	25.7	27.8	3 <sup>rd</sup>	93M/8	SBSmc	1 Unnamed Lake
Sub-basin V:	Haul Lake UTM: 9.658592.6132758	(480-598800-99500)	30.2	17.0	3 <sup>rd</sup>	93M/7 93M/8	SBSmc	Haul Lake 2 unnamed lakes
Sub-basin VI:	West Northern Headwaters of Tahlo Creek UTM: 9.659654.6141833	(480-598800-91100-44800)	34.2	38.0	4 <sup>th</sup>	93M/7 93M/8	SBSmc	2 unnamed lakes
Sub-basin VII:	Mid Northern Headwaters of Tahlo Creek UTM: 9.657973.6145655	(480-598800-91100-4800-2240)	27.5	28.0	3 <sup>rd</sup>	93M/8	SBSmc	None
<b>Sub-basin VIII:</b>	<b>East Northern Headwaters of Tahlo Creek</b> UTM: 9.661078.6142435	<b>(480-598800-91100-44800-5360)</b>	<b>28.6</b>	<b>38.0</b>	<b>4<sup>th</sup></b>	<b>93M/8</b>	<b>SBSmc</b>	<b>None</b>
Sub-Basin IX:	Eastern Headwaters of Tahlo Creek UTM: 9.664056.6130253	(480-598800-91100)	47	31.8	3 <sup>rd</sup>	93M/8	SBSmc	1 unnamed lake
<i>Excluded</i>	<i>Sub-watersheds east of Morrison Lake</i>	<i>(480-598800 East) (480-598800-44800) (480-598800-77300) (480-598800-91100-05700)</i>	66		1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup>	<b>93M/1</b> <b>93M/8</b>	<b>SBSmc</b> <b>ESSFmc</b>	6 unnamed lakes

Note: Bold text refers to the remaining three sub-basins that were sampled in 2000.

### 4.3 HABITAT AND FISH DISTRIBUTION

Based on information collected during stream sampling in 1999 (SKR 2000a,b) and July 2000, species listed in the FPC stream identification guidebook (1998) were found to be widely distributed throughout the entire Morrison Creek watershed. Dolly Varden were found to be predominant in, but limited to the higher elevation reaches in Sub-basin VIII . Interestingly, only rainbow trout and coho were captured in streams in Sub-basins II and III. Cutthroat trout appear to be dispersed and in relatively low densities in the Morrison watershed and were captured at only one mainstem site in Sub-basin VIII. Juvenile coho were captured in the lower reach of the mainstem of Sub-basin II, and at a small upper tributary to the mainstem of Sub-basin III upstream of Unnamed Lake (00338BABL). As was observed in the first year of this study (SKR 2000a,b), results from the sampling in July 2000 confirmed the extensive distribution of freshwater fish species in this study area due to the presence of very few barriers to fish migration (Table 4). However, anadromous species (i.e. coho, pinks, chinook and sockeye) appear to be restricted to within a short distance of Morrison Creek and Morrison Lake.

Fish were confirmed present in 53.1 of the 212.9 kilometres (24.9%) of stream in Sub-basins II, III, and VIII combined. All of the fourth order reaches (19.8 km) were confirmed to be fish bearing and all of the third order reaches (28.7 km) in the study area were either fish bearing or suspected to be fish bearing . As was found in the initial year of this study (SKR 2000a,b), unusually high proportions of all order streams sampled in July 2000 were confirmed or suspected to be fish bearing (Figure 2, Tables 5-8). Interestingly, usable habitat was identified in some first order reaches including 4.8 kilometres (3.8%) that have been confirmed to be fish bearing and 32.2 kilometres (25.9%) that are suspected to be fish bearing (Table 5). Overall, rearing and spawning habitat was species specific in the three sub-basins inventoried in 2000, but it appeared to be being used to its upstream limits.

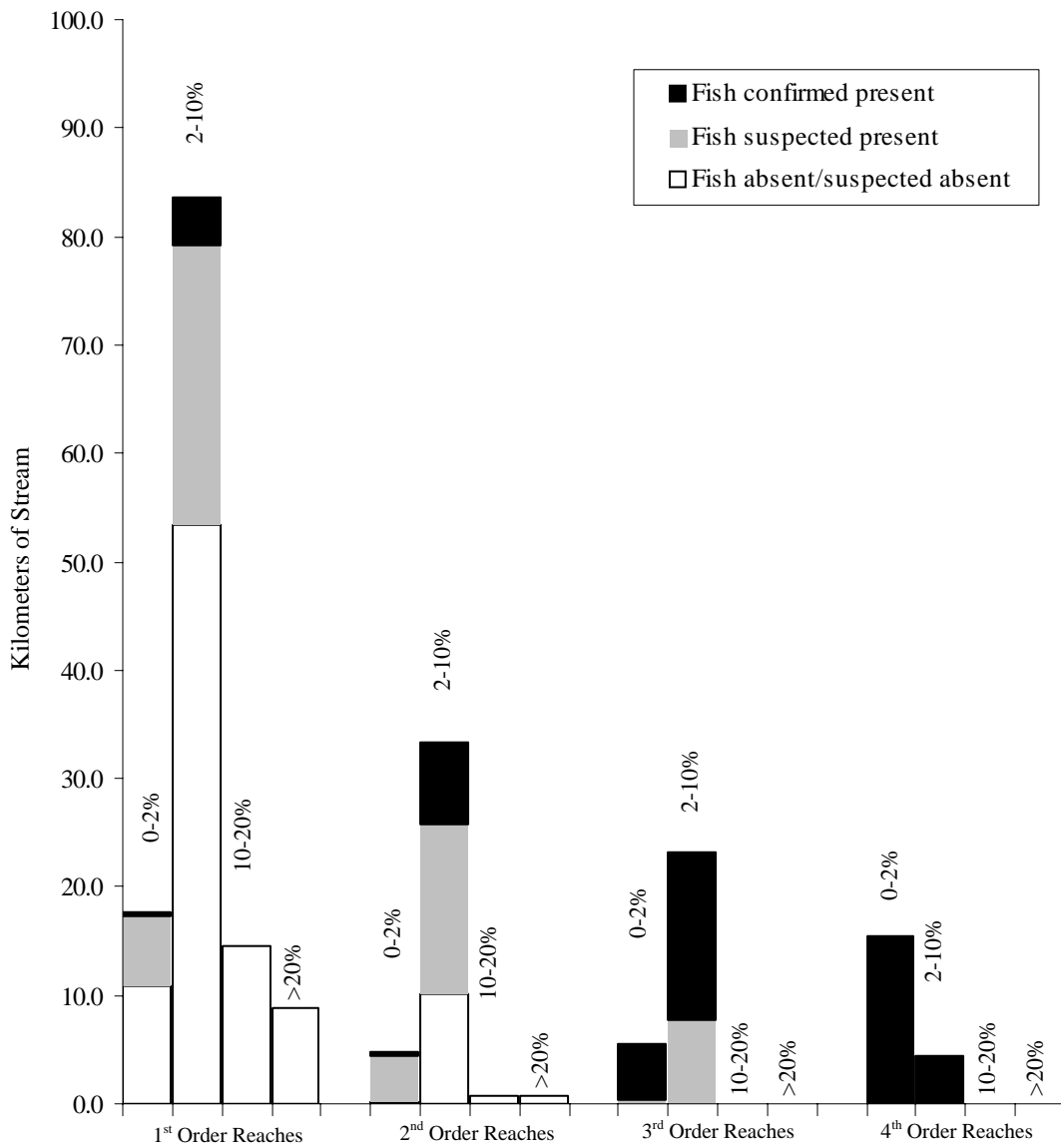
The following sections summarize the historical fisheries information for the six sub-basins in the Morrison Creek watershed that were inventoried in 1999 (SKR 2000) in conjunction with the results from field assessments of the final three sub-basins that were inventoried in July 2000.

**Table 4.** Summary of historic and new barriers to fish migration found in Sub-basins II, III, and VIII in the Morrison Creek.

Stream (ILP)	TRIM Map #	Reach #	Barrier			
			Type <sup>1</sup>	Height (m)	Verified in field	Description
10252	093M.018	1	C	15	yes	18% gradient cascade (15C80) was identified in the field to be an obstruction to limited fish habitat upstream in this first order tributary to ILP 10154.
10253	093M.018	1	C	35	yes	35% gradient cascade (35C100) starting at confluence with ILP 10154
10142	093M.019	1	BD		no	No definite obstructions were observed in this large beaver dam complex but no fish were captured upstream

<sup>1</sup>C = cascade, F = falls, FSB = sub-surface flow, BD = beaver dam, CV = culvert

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**Figure 2.** Summary of available fish habitat in the portion of the Morrison Creek watershed that was inventoried in July 2000 (data labels represent ranges in gradient).



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**Table 5.** Amount of potential habitat available to fish in first order reaches in the study area.

% Gradient Range	1 <sup>st</sup> order reaches (km)			Totals (km)
	Fish Confirmed Present	Fish Suspected Present	Fish Absent/ Suspected Absent	
0-2	0.4	6.4	10.9	<b>17.7</b>
2-10	4.4	25.8	53.4	<b>83.6</b>
10-20	0.0	0.0	14.6	<b>14.6</b>
>20	0.0	0.0	8.8	<b>8.8</b>
<b>Totals (km)</b>	<b>4.8 (3.8 %)</b>	<b>32.2 (25.9 %)</b>	<b>87.7 (70.3 %)</b>	<b>124.7</b>

**Table 6.** Amount of potential habitat available to fish in second order reaches in the study area.

% Gradient Range	2 <sup>nd</sup> order reaches (km)			Totals (km)
	Fish Confirmed Present	Fish Suspected Present	Fish Absent/ Suspected Absent	
0-2	0.3	4.3	0.1	<b>4.7</b>
2-10	7.6	15.6	10.2	<b>33.4</b>
10-20	0.0	0.0	0.8	<b>0.8</b>
>20	0.0	0.0	0.8	<b>0.8</b>
<b>Totals (km)</b>	<b>7.9 (19.9 %)</b>	<b>19.9 (50.1 %)</b>	<b>11.9 (30.0 %)</b>	<b>39.7</b>

**Table 7.** Amount of potential habitat available to fish in third order reaches in the study area.

% Gradient Range	3 <sup>rd</sup> order reaches (km)			Totals (km)
	Fish Confirmed Present	Fish Suspected Present	Fish Absent/ Suspected Absent	
0-2	5.2	0.3	0.0	<b>5.5</b>
2-10	15.4	7.8	0.0	<b>23.2</b>
10-20	0.0	0.0	0.0	<b>----</b>
>20	0.0	0.0	0.0	<b>----</b>
<b>Totals (km)</b>	<b>20.6 (71.8 %)</b>	<b>8.1 (28.2 %)</b>	<b>----</b>	<b>28.7</b>

**Table 8.** Amount of potential habitat available to fish in fourth order reaches in the study area.

% Gradient Range	4 <sup>th</sup> order reaches (km)			Totals (km)
	Fish Confirmed Present	Fish Suspected Present	Fish Absent/ Suspected Absent	
0-2	15.4	0.0	0.0	<b>15.4</b>
2-10	4.4	0.0	0.0	<b>4.4</b>
10-20	0.0	0.0	0.0	<b>----</b>
>20	0.0	0.0	0.0	<b>----</b>
<b>Totals (km)</b>	<b>19.8 (100 %)</b>	<b>----</b>	<b>----</b>	<b>19.8</b>

#### **4.3.1 Morrison Creek and lower Tahlo Creek: Sub basins I-V**

Sub-basins I, IV, and V were inventoried in 1999 (SKR 2000a,b) and sub-basins II and III were inventoried in 2000 to complete the stream inventory for the portion of the Morrison Creek and lower Tahlo Creek within HFP's licensed area. Sockeye, coho, and pink salmon are the three anadromous species that have been confirmed to be present in this area (FISS). Lake trout, rainbow trout, cutthroat, mountain whitefish, lake whitefish, burbot, and kokanee (FISS) are the lacustrine and/or lacustrine-adfluvial species that have been documented in this area.

The distribution of anadromous species is confined to this lower portion of the study area. Pink salmon have only been documented upstream to the outlet from Morrison Lake (FISS). Sockeye salmon have been documented up to Tahlo Lake, but not to Haul Lake. Coho is the most widely distributed anadromous species and has been documented present upstream to the main inlet of Tahlo Lake and in the first reaches of most tributaries or inlet streams to Morrison and Tahlo creeks and lakes that contain suitable spawning habitat (FISS). Chinook and steelhead may also be present in the lower reach of Morrison Creek, but would likely be infrequent and have not been confirmed. Coho was the only anadromous species captured during this study and juveniles were abundant in reach 1 of the mainstem (ILP10154) of Sub-basin II.

Several non-anadromous species are distributed throughout this portion of the watershed. Kokanee, lake whitefish, mountain whitefish, rainbow trout, and cutthroat have all been documented present in both Morrison and Haul lakes. Lake trout and burbot have only been documented in Morrison Lake, but both species are suspected to be present in Tahlo Lake. Burbot may also be present in Big Fish Lake (sub-basin II) and possibly in Fission Lake. Rainbow and cutthroat trout are dispersed throughout many lakes in the study area, and have been documented to be present in the Big Fish Lake system (FISS). Interestingly, no cutthroat trout were documented in streams or lakes that were sampled in Sub-basins II and III. Rainbow trout was the only non-anadromous species in the FPC species list (FPC Guidebook 1998) that was captured in Sub-basins II and III.

Rainbow trout is the most widespread species in Sub-basins II and III and were found rearing in streams throughout the study area. Rainbow trout, prickly sculpin, white sucker, longnose sucker, and lake chub were captured in Unnamed Lake (WBID 00338BABL) in Sub-basin III (SKR 2001a). Rainbow trout, prickly sculpin, and redbreast shiners were captured in Unnamed Lake (412BABL, ILP 10170) in Sub-basin II (SKR 2001b). One limit to fish distribution to a major third order tributary in Sub-basin II (ILP 10142) appeared to be due to a series of non-permanent obstructions (i.e. beaver dams) at the time of survey. The only other limits to fish distribution in this part of the watershed were due to the lack of spawning and overwintering habitat in many lower order reaches.

#### **4.3.2 Northern Headwaters of Tahlo Creek Watershed: Sub-basins VI - VIII**

The western (Sub-basin VI) and central (Sub-basin VII) sub-basins were inventoried in 1999 (SKR 2000a), and Sub-basin VIII was inventoried in July 2000 to complete assessment of the northern headwaters of the Tahlo Creek watershed. Cutthroat trout, rainbow trout, and Dolly Varden are the only three species that have been identified in this portion of the Morrison Creek watershed (SKR 2000).

Cutthroat trout and Dolly Varden were captured in Sub-basin VIII during July 2000. Although the cutthroat trout appear to be present in only the lower reaches of the mainstem of Sub-basin VIII. Dolly Varden were present in almost all reaches sampled that contained suitable habitat upstream to the headwaters of this drainage. The dominance of Dolly Varden that was identified in this part of the watershed supports the fact noted in the first year of this study (SKR 2000) that the northern headwaters of the Tahlo Creek watershed (i.e. notably Sub-basin VII and VIII) play an important role in supporting a geographically isolated population of Dolly Varden of the Babine Lake watershed.

#### **4.3.3 Eastern Headwaters of Tahlo**

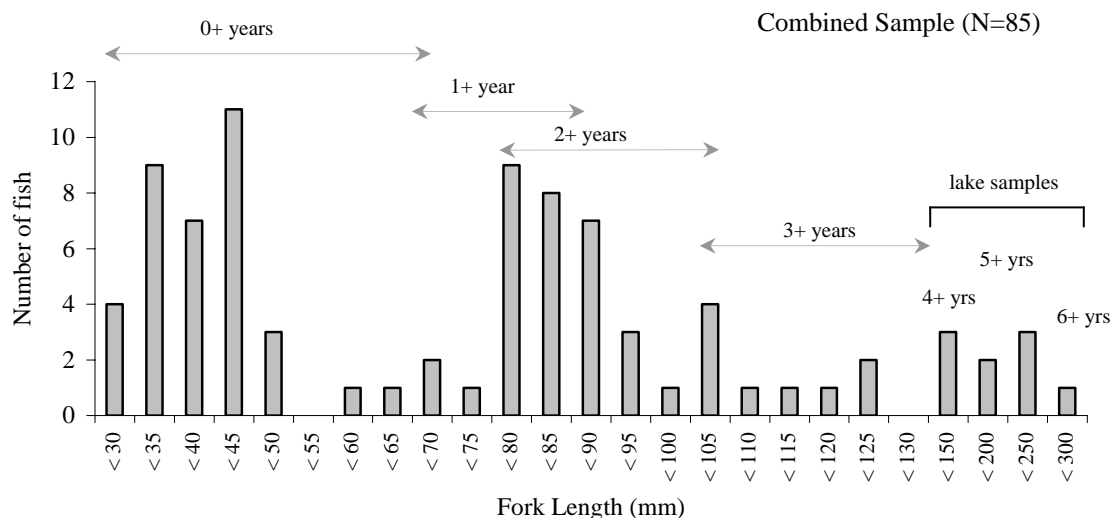
The eastern headwaters of the Tahlo Creek watershed (Sub-basin IX) was inventoried in 1999 (SKR 2000a). Cutthroat trout, rainbow trout, and Dolly Varden are the only three species that have been identified in this part of the Morrison Creek watershed. Rainbow trout appear to be limited to the lower mainstem reaches, but cutthroat trout and Dolly Varden are distributed throughout much of this sub-basin, and appear to be limited only by a small number of gradient barriers in its very headwaters (SKR 2000a) .

#### 4.4 FISH AGE, SIZE AND LIFE HISTORY

Coho salmon, rainbow trout, cutthroat trout, and Dolly Varden were the four species captured in streams during the inventory of Sub-basins II, III, and VIII in the Morrison Creek watershed. Rainbow trout reidside shiners, lake chub, longnose suckers, white suckers, and prickly sculpin were also captured in two lakes that were sampled in conjunction with this stream inventory (SKR 2001a, 2001b). The following sub-sections present interpretations and discussion of size and inferred ages from size data, and life history strategies for fish species that were captured during stream sampling in the Morrison Creek watershed during July 2000.

##### 4.4.1 Rainbow trout

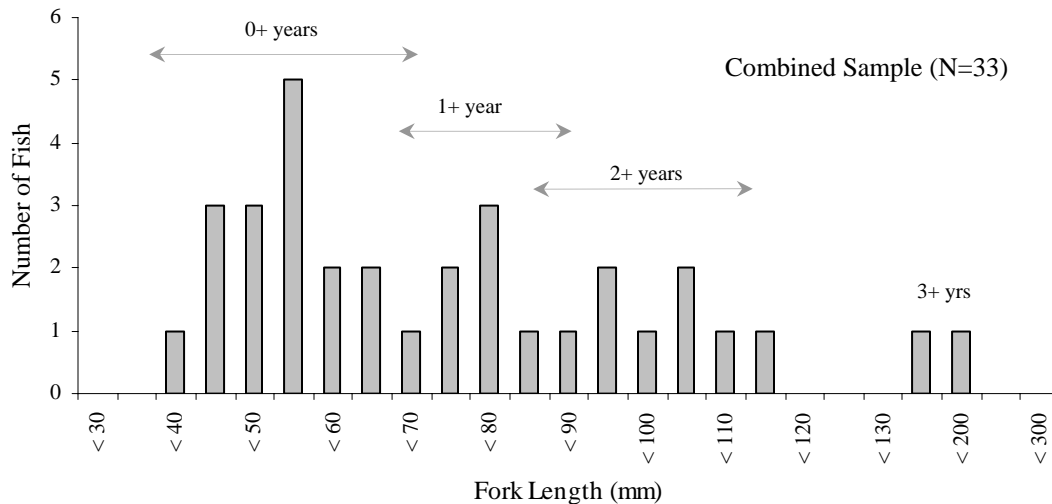
A total of 85 rainbow trout were captured in streams and lakes within the Morrison Creek watershed during July 2000. Fork lengths in this entire sample ranged from 28 to 285 millimetres which appears to represent seven age classes (0+ to 6 years) based on scale aging that was conducted on a sub-sample of 24 fish (Figure 3, *for details see Appendix 1*). All adult rainbow trout in the sample were captured during two secondary lake inventories that were conducted in conjunction with this stream inventory project (SKR 2001a,b). The five adult rainbow trout ranged in length from 189 to 285 millimetres and in age from four to six years. Based on stream and lake sampling conducted in 1999 (SKR 2000) and in July 2000, the majority of rainbow trout in the Morrison Creek watershed appear to have lacustrine-adfluvial life histories with juveniles rearing in streams for up to three winters. Based on the time when fry appear to have emerged in the areas sampled it is suspected that spawning in many tributaries in the lower Morrison Creek watershed occurs from April to June which is not an uncommon time for rainbow trout in this region (Scott and Crossman 1973).



**Figure 3.** Fork length frequency histogram of rainbow trout captured in Sub-basins II, III, and VIII of the Morrison Creek watershed.

#### 4.4.2 Dolly Varden

A total of 33 Dolly Varden were captured in streams within Sub-basin VIII of this study area. Fork lengths in this sample ranged from 38 to 185 millimetres which appears to represent four age classes: 0+, 1+, 2+, and 3+ years (Figure 4). Two maturing adult Dolly Varden were captured in upper reaches of the watershed which supports that this Morrison Creek population of Dolly Varden in the headwaters of the Morrison Creek watershed appear to have adfluvial-fluvial life histories. No indication of the spawning times for Dolly Varden in the upper Morrison watershed were observed.



Note: age classes were estimated based on the aging results from eight readable scale samples.

**Figure 4.** Fork length frequency histogram of Dolly Varden captured in Sub-basins II, III, and VIII of the Morrison Creek watershed.

#### 4.4.3 Cutthroat trout

Only four juvenile cutthroat trout were captured at only one of the sites sampled in the Morrison Creek watershed in July 2000 (Site 54, mainstem ILP 10530 of Sub-basin VIII). Fork lengths of the four juveniles that were captured ranged from 43 to 80 millimetres which represent two age classes based scale aging: 0+, and 1+ years. Although no adult cutthroat trout were captured in July 2000, rearing adults were captured in 1999 (SKR 2000a) indicating the presence of both fluvial and lacustrine-adfluvial life histories of cutthroat trout in the Morrison Creek watershed. Based on the size range of 0+ year old cutthroat trout captured (43-58 mm), it is suspected that spawning may occur in April or May which is not uncommon for the Skeena watershed (Scott and Crossman 1973).

#### 4.4.4 Coho

Six juvenile coho salmon were captured in the Morrison Creek watershed in July 2000. Fork lengths of the six juveniles that were captured ranged from 53 to 86 millimetres which represent two age classes based scale aging: 0+ (53-68 mm), and 1+ years (86 mm). This catch vaguely implies that juvenile coho may be moving out of smaller tributaries in the Morrison watershed after only one winter, but sampling intensity in coho habitat (e.g. reaches with large channel morphology) was relatively low during both years of this two year study.

#### 4.4.5 Other Species

Red side shiners were captured in minnow traps set in the inlets to Unnamed Lake (WBID 00412BABL) in Sub-basin II, and four other species were captured during two secondary lake inventories that were conducted in conjunction with this study (SKR 2001a, 2001b). The data from the lake inventories for prickly sculpin, longnose sucker, white sucker, redbside shiner, and lake chub is summarized in Table 9.

**Table 9.** Summary of data obtained for non-salmonids captured in the study area.

Species	Length (mm)		Sample Size	Comments
	Min.	Max.		
longnose sucker	80	156	3	Lake WBID 00338BABL (SKR 2001a)
white sucker	62	166	5	Lake WBID 00338BABL (SKR 2001a)
redside shiner	47	97	58	Lake WBID 00412BABL (SKR 2001b) and inlets
prickly sculpin	47	121	31	Lake WBID 00338BABL (SKR 2001a)
	55	55	1	Lake WBID 00412BABL (SKR 2001b)
lake chub	70	104	32	Lake WBID 00338BABL (SKR 2001a)

## **4.5 SIGNIFICANT FEATURES AND FISHERIES OBSERVATIONS**

The Morrison Creek watershed appears to be a very productive system for both commercial and sport fish species. The following sections describe features related to fish, fish habitat, and habitat protection concerns in the Morrison Creek watershed based on historical information and the findings from this study.

### **4.5.1 Fish and Fish Habitat**

Fish appear to be relatively widespread throughout the Morrison watershed due to the low topographic relief in the area and the limited number of barriers in the drainage. Coho salmon appear to utilize Morrison Creek and the lower reaches of the tributaries to Morrison Creek and the main inlet streams to Morrison Lake. Sockeye salmon appear to be somewhat confined to Morrison Creek and Morrison Lake. Rainbow trout were the dominant species in streams in the lower half of the watershed and Dolly Varden were clearly dominant in the northern headwaters. Cutthroat trout were found to be at comparatively low densities and although they appear to be centered in the lower half of the Tahlo Creek watershed (SKR 2000a), they have also been documented interspersed throughout the entire watershed (*see* Table 1).

### **4.5.2 Habitat Protection Concerns**

No significant habitat concerns were noted during this study. The following sections incorporate historical fisheries information to summarize any potential habitat concerns for areas in the Morrison Creek watershed.

#### 4.5.2.1 Fisheries Sensitive Zones

No fisheries sensitive zones were identified during inventory of Sub-basins II, III, VIII..

#### 4.5.2.2 Fish above 20% gradient

No fish were captured in reaches with gradients greater than 20%, but no larger order streams (> 2<sup>nd</sup> order) with gradients greater than 20% are present in this watershed. However, gradient barriers appeared to be the main limit to Dolly Varden distribution at the headwaters of this system. The Forest Practice Code default of fish absence in reaches with gradients greater than 20% appear to be appropriate for conservative management of this watershed.

#### 4.5.2.3 Rare and Endangered Species

No rare or endangered species were captured during this fish inventory of the Morrison Creek watershed. However, the presence of lake trout (i.e. a regional management concern) has been documented in Morrison Lake (FISS). Cutthroat trout and Dolly Varden were also identified in the Morrison Creek watershed and are considered sensitive to human activities and natural disturbances (CDC 2001).

#### 4.5.2.4 Restoration and Rehabilitation Opportunities

No stream restoration or rehabilitation opportunities were identified during this study.

## **4.6 FISH BEARING STATUS**

No permanent barriers to valuable fish habitat were identified in the Morrison Creek watershed. However, a major obstruction to fish distribution (beaver dam complex) was present in reach 1 of one third order tributary (ILP 10142) of Sub-basin II. Fish bearing reaches are summarized in Table 10, while proposed non-fish bearing reaches are summarized in Table 11. Reaches upstream of barriers to fish migration where no fish were captured, or where no perennial fish habitat was identified, are classified as non-fish bearing based on one season of sampling. Some reaches where no fish were captured, but no definite barrier to fish migration was observed, were noted to require further sampling to conclusively establish fish presence or absence (Table 12).

### **4.6.1 Fish Bearing Reaches**

Fish bearing status was assigned to all reaches in which species listed in the Forest Practices Code Fish Stream Identification guidebook were captured (FPC 1998). In addition, reaches in which no fish were captured, but where fish presence has been documented upstream or where no barriers to fish migration are present were defaulted as fish bearing. Table 10 summarizes information obtained for 25 reaches or lower portions of reaches that were documented to be fish bearing. Other reaches in the study area with some potential to be fish bearing reaches are identified on the Interpretive Hardcopy Maps (Appendix 5).

### **4.6.2 Non - Fish Bearing Reaches**

Non-fish bearing status was assigned to reaches that were intensively sampled upstream of barriers to fish migration and no fish were captured, or no perennial fish habitat was present upstream of a barrier to fish migration. Reaches with significant obstructions to fish migration and have had no fish captured in two seasons of sampling were also given non-fish bearing status. Table 11 summarizes the information obtained for 21 reaches that were documented to be non-fish bearing. Other non-fish bearing reaches with gradients exceeding 20% are indicated on the interpretation map (Appendix 5).

### **4.6.3 Follow – Up Sampling Required**

Several reaches sampled in the study area during this reconnaissance fish and fish habitat inventory project could not be classified conclusively. Table 12 summarizes information and provides re-sampling recommendations for 23 reaches that require re-sampling to indicate if seasonal fish use is present or to confirm fish absence as determined under Forest Practices Code Standards (FPC 1998). In some of these streams, barriers to upstream fish migration were not identified, and extra efforts should be made during re-sampling to identify the barriers to fish migration.



Results and Discussion  
FISH BEARING REACHES

**Table 10.** Summary of data for 25 fish bearing reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were inventoried in July 2000 (*for details see Appendix 1*).

Site #	ILP/Stream name	TRIM Map	Reach	Species*	Channel		Proposed Riparian Class	Comments
					Width (m)	Site Gradient (%)		
1	ILP 10154	093M.019	1	RB, CO	3.3	2.0	S3	28 juvenile rainbow trout and 5 juvenile coho were captured
2	ILP 10154	093M.019	3	RB	4.5	0.5	S3	nine juvenile rainbow trout were captured
3	ILP 10154	093M.019	3	RB	3.3	3.5	S3	six juvenile rainbow trout were captured
16	ILP 10170	093M.019	2	RSC, RB	0.8	0.5	S4/W3	fifteen redbase shiners were captured using minnow traps, and rainbow trout were captured in small lake just upstream
Lake	ILP 51084/00412BABL	093M.019	3	RB, RSC CAS			L1	one adult rainbow was captured during a secondary lake inventory (SKR 2001b)
17	ILP 10170	093M.018	4	RSC, (RB)	2.1	0.5	S3/W5	This lake wetland reach consisted of a wide large channel where only redbase shiners were captured, but rainbows are presumed to use this reach for rearing
26	ILP 10855	093M.019	1	RB	3.0	0	S3/W1	One rainbow trout was captured in this wetland reach with large channel morphology approximately 90 cm deep.
27	ILP 10830	093M.019	3	RB	1.8	1.5-2	S3	Three juvenile rainbow trout were captured.
30	ILP 10859	093M.018	1	RB	1.3	1	S4	One juvenile rainbow trout was captured and one other was observed but escaped during electrofishing.
31	ILP 10317	093M.029	3	RB	4.6	2-2.5	S3	Seventeen juvenile and one maturing (162 mm) rainbow trout were captured despite poor electrofishing efficiency.
Lake	ILP 51085/00338BABL	093M.028	7	RB,WSU CAS,LKC			L1	Four rainbow trout were captured by angling
39	ILP 10316	093M.028	2	CO	1.1	1-1.5	S4	One juvenile coho salmon was captured in poor to fair habitat at this location which was unusually far upstream of Morrison Lake.

\* see Table 1 for a list of species abbreviations

\*\* species in ( ) indicated suspected present

Results and Discussion  
FISH BEARING REACHES

**Table 10 (cont.).** Summary of data for 25 fish bearing reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were inventoried in July 2000 (*for details see Appendix 1*).

Site #	ILP/Stream name	TRIM Map	Reach	Species*	Channel		Proposed Riparian Class	Comments
					Width (m)	Site Gradient (%)		
42	ILP 10326	093M.028	2	RB	1.7	2	S3	One juvenile rainbow trout was captured despite difficult conditions due to thick alder and abundance of large woody debris over this small stream.
44	ILP 10427	093M.028	1	RB	1.3	1.5-3	S4	Thirteen juvenile rainbow trout were captured.
48	ILP 10303	093M.029	1	(RB)	1.9	0	S3/W1	This wetland reach with large channel morphology is directly linked to a fish bearing mainstem. although no fish were captured during 747 seconds of electrofishing (100 m), efficiency was poor due to the deep channel and abundant cover and no permanent barriers to fish migration are present.
52	ILP 10530	093M.048	4	DV	4.4	0.5	S3/W1	Two Dolly Varden including one adult were captured despite poor shocking due to deep large channel morphology.
53	ILP 10530	093M.048	6	DV	1.3	2	S4	Five juvenile Dolly Varden were captured.
54	ILP 10530	093M.048	2	CT, DV	7.3	2.5-3	S2	Four juvenile cutthroat trout and one juvenile Dolly Varden were captured and one adult fish was observed but not identified.
58	ILP 10617	093M.048	1	DV	2.1	3-4	S3	Three juvenile and one adult Dolly Varden were captured.
59	ILP 10808	093M.048	1	DV	4.5	3-3.5	S3	Six juvenile Dolly Varden were captured and three other juveniles were observed.
60	ILP 10808	093M.048	3	(DV)	1.7	0-0.5	S3	No fish were captured during 445 sec of electrofishing (100 m), but no barriers to fish migration were identified between this site and tributary ILP 10809 where Dolly Varden were captured (Site 61). Water temperatures (11° C) may limit use of this reach by DV during summer months.

\* see Table 1 for a list of species abbreviations

\*\* species in ( ) indicated suspected present

Results and Discussion  
FISH BEARING REACHES

**Table 10 (cont.).** Summary of data for 25 fish bearing reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were inventoried in July 2000 (*for details see Appendix 1*).

Site #	ILP/Stream name	TRIM Map	Reach	Species*	Channel		Proposed Riparian Class	Comments
					Width (m)	Site Gradient (%)		
61	ILP 10809	093M.049	1	DV	1.3	2	S4	Four juvenile Dolly Varden including three young of the year were captured 250 metres upstream from the confluence with ILP 10808.
62	ILP 10594	093M.048	1	DV	1.8	7	S3	Three juvenile Dolly Varden were captured.
65	ILP 10597	093M.048	1	DV	1.4	10	S4	Two juvenile Dolly Varden were captured approximately 50 metres upstream of its confluence
66	ILP 10591	093M.048	1	DV	1.4	4-6	S4	One Dolly Varden was captured 200 metres upstream of confluence with reach 6 of ILP 10530.
67	ILP 10589	093M.048	1	DV	2.0	4	S3	Four juvenile Dolly Varden were captured at upper end of this reach.
68	ILP 10585	093M.048	1	DV	1.4	1-1.5	S4	Two juvenile Dolly Varden were captured.

\* see Table 1 for a list of species abbreviations

\*\* species in ( ) indicated suspected present

Results and Discussion  
NON-FISH BEARING REACHES

**Table 11.** Summary of data from 21 non-fish bearing reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were surveyed in July 2000 (*for details see Appendix 1*).

Site #	ILP/Stream name	Reach	TRIM map	Site Grad. (%)	Chan. Width (m)	Dist. (m)	Time (s)	Electrofishing Specifications					Proposed Riparian Class	Comments
								Cond. (µS)	Temp (°C)	Stage	Turbidity	Date (2000)		
4	ILP 10145	1	093M.019	2.5	---	---	---	---	---	---	---	07/26	<b>NCD</b>	Surveyed the lower 350 metres where a few short sections of "channel" (10 – 20 metres long) were separated by longer sections of seepage flow with no potential for fish access
8	ILP 10153	1	093M.019	6-7	---	---	---	---	---	---	---	07/26	<b>NCD</b>	No scour, alluvium, or fish habitat were identified in the lower 450 metres of this reach was surveyed within a 20-30 metre wide band of riparian vegetation
11	ILP 10161	1	093M.019	4-7	0.4	---	---	---	---	---	---	07/27	<b>S6</b>	Stream was dry at time of survey and several sections of seepage were noted in the lower 400 metres, but 100 metre sections of defined channel were also noted. A 50 metre section of seepage at the confluence of this stream was identified to be a barrier to fish migration. Fish absence is based on no perennial habitat upstream of a barrier to fish migration.
13	ILP 10169	1	093M.019	2-4	---	---	---	---	---	---	---	07/27	<b>NCD</b>	No fish habitat and only short sections of poorly defined channel (<30 metres) were observed in the lower 250 metres of this reach.
14	ILP 10163	1	093M.019	1-2	---	---	---	---	---	---	---	07/27	<b>NCD</b>	No scour or alluvium were noted in the lower 150 metres of the reach that was surveyed. No potential fish habitat was observed in the section surveyed.

Results and Discussion  
NON-FISH BEARING REACHES

**Table 11 (cont.).** Summary of data from 21 non-fish bearing reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were surveyed in July 2000 (*for details see Appendix 1*).

Site #	ILP/Stream name	Reach	TRIM map	Site Grad. (%)	Chan. Width (m)	Electrofishing Specifications							Proposed Riparian Class	Comments
						Dist. (m)	Time (s)	Cond. (µS)	Temp (°C)	Stage	Turbidity	Date (2000)		
15	ILP 10165	1	093M.019	1	---	---	---	---	---	---	---	07/27	<b>NCD</b>	No scour or alluvium was identified in the lower 250 metres of this reach.
19	ILP 10262	1	093M.019	12-14	---	---	---	---	---	---	---	07/26	<b>NCD</b>	No scour or alluvium was identified in the lower 200 metres of this reach.
24	ILP 10253	1	093M.018	5	0.6	---	---	---	---	L	---	07/26	<b>S6</b>	Channel was dry at the time of survey upstream of a 35 % gradient cascade in the initial 100 metres of this reach (Table 4).
25	ILP 10251	1	093M.018	1-1.5	---	---	---	---	---	---	---	07/26	<b>NCD</b>	Only a series of puddles with facultative iron bacteria. No scour, alluvial deposits, or continuous channel were identified.
28	ILP 10830	5	093M.019	1.5-2	---	---	---	---	---	---	---	07/24	<b>NCD</b>	No scour, alluvium, or continuous channel were observed in the lower 420 metres of this reach.
29	ILP 10237	2	093M.019	0.5-1	---	---	---	---	---	---	---	07/24	<b>NCD</b>	Entire reach was surveyed and no scour, alluvium, or continuous channel were identified.
33	ILP 10307	2	093M.019	2-3	---	---	---	---	---	---	---	07/24	<b>NCD</b>	No scour, alluvium or continuous channel were identified in the lower 318 metres of this reach. This reach consisted of a few small puddles and sandy areas linked by long seepage sections and no fish habitat was identified.
35	ILP 10309	2	093M.029	9-11	---	---	---	---	---	---	---	07/27	<b>NCD</b>	No scour, alluvium, continuous channel, or surface flow was observed in the lower 330 metre section of this reach.

Results and Discussion  
NON-FISH BEARING REACHES

**Table 11 (cont.).** Summary of data from 21 non-fish bearing reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were surveyed in July 2000 (*for details see Appendix 1*).

Site #	ILP/Stream name	Reach	TRIM map	Site Grad. (%)	Chan. Width (m)	Electrofishing Specifications							Proposed Riparian Class	Comments
						Dist. (m)	Time (s)	Cond. (µS)	Temp (°C)	Stage	Turbidity	Date (2000)		
36	ILP 10313	2	093M.028	2-4	---	---	---	---	---	---	---	07/28	<b>NCD/S6</b>	No fish habitat was observed in the lower 220 metres where no continuous channel was identified and seepage sections are barriers to fish migration. The channel was more defined further upstream but no perennial habitat (no spawning or overwintering habitat) was observed. The upper portion of this reach may require S6 classification if more than 100 metres of continuous channel is present.
40	ILP 10323	2	093M.028	2-3	---	---	---	---	---	---	---	07/27	<b>NCD</b>	The lower 360 metres of this reach consisted of puddles linked by surface and seepage flow with no signs of scour or alluvium.
46	ILP 10425	1	093M.028	1	---	---	---	---	---	M	---	07/25	<b>NCD</b>	No scour or alluvium or visible channel was observed during survey of the entire length of this 40-50 metre wide band of riparian vegetation.
50	ILP 10302	1	093M.029	0.5	---	---	---	---	---	---	---	07/25	<b>NCD</b>	No visible channel, no scour, and no alluvium were identified in lower 300 metres of this reach.
51	ILP 10613	4	093M.048	0	---	---	---	---	---	---	---	07/24	<b>NCD</b>	No sign of scour or alluvium was identified in an incorrectly mapped side channel of reach 2 of ILP 10530 ( <i>see Site 54, Table 10</i> ).

Results and Discussion  
NON-FISH BEARING REACHES

**Table 11 (cont.).** Summary of data from 21 non-fish bearing reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were surveyed in July 2000 (*for details see Appendix 1*).

Site #	ILP/Stream name	Reach	TRIM map	Site Grad. (%)	Chan. Width (m)	Electrofishing Specifications							Proposed Riparian Class	Comments
						Dist. (m)	Time (s)	Cond. (µS)	Temp (°C)	Stage	Turbidity	Date (2000)		
56	ILP 10619	1	093M.048	3	0.7	---	---	120	9	L	C	07/24	<b>S6</b>	No perennial habitat (No spawning or overwintering habitat) was identified upstream of the lower 100 metres where no defined channel with no potential for fish passage was identified.
57	ILP 10620	1	093M.048	4-5	---	---	---	---	---	---	---	07/24	<b>NCD</b>	No scour or alluvium were observed in the lower 200 metres of this reach. Some surface flow over moss was observed.
63	ILP 10595	1	093M.048	6	---	---	---	---	---	---	---	07/25	<b>NCD</b>	A few puddles, but no continuous channel, scour or alluvium were identified in the lower 300 metres of this reach.

Results and Discussion  
RESAMPLING REQUIREMENTS

**Table 12.** Follow - up sampling requirements for classification of 23 reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were sampled in July 2000 (*for details see Appendix 1*).

Site #	ILP/Stream name	Reach	TRIM map	Channel Width (m)	Timing	Methods	Proposed Riparian Class	Comments
5	ILP 10142	1	093M.019	4.0	Spring	EF	S3	Heavy braiding and a beaver dam complex was observed approximately 300 metres downstream from West Main FSR. No definite barriers to fish migration were identified, but no fish were captured during 1411 seconds (100 m) of electrofishing. Recommend re-sampling and a field survey for barriers in the lower section of this reach to accurately determine the limits of fish distribution in this drainage.
6	ILP 10142	2	093M.019	2.5	Spring	EF	S3	Electrofished for 736 seconds (100 m), but no fish were observed. No barriers to fish migration were identified, but very limited overwintering habitat was observed. Re-sampling of this reach during high flows in conjunction with resampling in reach 1 ( <i>see Site 5</i> ) is recommended to confirm limits of fish distribution in this drainage.
7	ILP 10152	1	093M.019	2.4	Spring	EF	S3	Electrofished for 931 seconds (210 m), but no fish were observed. No barriers to fish migration were identified, but very limited overwintering habitat was observed. Re-sampling of this reach during high flows in conjunction with re-sampling in mainstem reaches 1 and 2 of ILP 10142 ( <i>see Sites 5 and 6</i> ) is recommended to confirm limits of fish distribution in this drainage.
9	ILP 10150	1	093M.019	1.3	Spring	EF	S4	Electrofished for 404 seconds (100 m), but no fish were observed. No barriers to fish migration were identified, but no overwintering habitat was observed. Re-sampling of this reach during high flows in conjunction with re-sampling in reach 1 of ILP 10142 ( <i>see Site 5</i> ) is recommended to confirm limits of fish distribution in this drainage.
10	ILP 10147	2	093M.019	1.2	Spring	EF	S4	Electrofished for 671 seconds (210), but no fish were observed. No barriers to fish migration were identified, but limited overwintering habitat was observed. Re-sampling of this reach, and mainstem reach 1 during high flows in conjunction with re-sampling in reach 1 of ILP 10142 ( <i>see Site 5</i> ) is recommended to confirm limits of fish distribution.



Results and Discussion  
RESAMPLING REQUIREMENTS

**Table 12 (cont.).** Follow - up sampling requirements for classification of 23 reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were sampled in July 2000 (*for details see Appendix 1*).

Site #	ILP/Stream name	Reach	TRIM map	Channel Width (m)	Timing	Methods	Proposed Riparian Class	Comments
12	ILP 10162	1	093M.019	1.6	Spring	EF	S3	Stream was dry at time of survey and was braided in lower 50 metres. Re-sampling of this reach during high flows is recommended to better evaluate fish distribution.
18	ILP 10170	7	093M.018	1.4	Spring	EF	S4	Electrofished for 280 seconds (100 m), but no fish were observed. Only some moderate quality rearing habitat was observed in the lower 400 metres of this reach. Some sections of very poorly defined channel appear to limit fish distribution to the lower portion of this reach. Re-sampling of this reach during high flow is recommended to determine the limits of fish distribution in this drainage.
20	ILP 10258	1	093M.018	0.5	Spring	EF	S4	Very limited potential fish habitat was identified in the lower 400 metres of this reach. Electrofishing was not conducted due to very limited flow at the time of survey and no fish were captured downstream in mainstem (ILP 10170 Reach 7 Site 18). Re-sampling of this reach during high flows in conjunction with re-sampling in reach 7 of ILP 10170 ( <i>see Site 18</i> ) is recommended to confirm limits of fish distribution in this drainage.
21	ILP 10259	1	093M.018	0.8	Spring	EF	S4	The majority of this reach was dry at the time of survey. Very limited potential fish habitat was identified in the lower 300 metres of this small tributary to reach 2 of ILP 10260. Re-sampling of this reach during high flows in conjunction with sampling reaches 1, 2, and 3 of ILP 10260 ( <i>see Site 22</i> ) is recommended to confirm limits of fish distribution in this drainage.
22	ILP 10260	3	093M.018	0.7	Spring	EF	S4	The majority of this reach was dry at the time of survey. Re-sampling of this reach during high flows in conjunction with sampling further downstream in reaches 1 and 2 is recommended to confirm limits of fish distribution in this drainage.

Results and Discussion  
RESAMPLING REQUIREMENTS

**Table 12 (cont.).** Follow - up sampling requirements for classification of 23 reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were sampled in July 2000 (*for details see Appendix 1*).

Site #	ILP/ Stream name	Reach	TRIM map	Channel Width (m)	Timing	Methods	Proposed Riparian Class	Comments
23	ILP 10252	1	093M.018	0.9	Spring	EF	S4	No perennial habitat was identified upstream of a 100 metre long cascade with 18% gradient. No fish were captured during 380 seconds of electrofishing (100 m) upstream of the cascade, but re-sampling is recommended to confirm fish absence.
32	ILP 10317	11	093M.029	1.6	Spring or Fall	EF	S3	Fair to good fish habitat was observed in this reach. No barriers to fish migration were identified downstream to reach 10 where RB have been documented, but no fish were captured during 679 seconds of electrofishing (100 m). Re-sampling and detailed investigation of the upper section of reach 10 and the lower section of this reach is recommended to better assess the limits of fish distribution in this drainage.
34	ILP 10309	1	093M.029	1.5	Spring	EF	S3	Stream was mostly dry at time of survey and only poor fish habitat was identified in the lower 431 metres of this reach. No electrofishing was conducted due to very low flow at the time of survey. Some potential rearing/refuge habitat was identified in the lower section of the reach, thus sampling during high flow is recommended to confirm fish presence/absence.
37	ILP 10314	1	093M.028	1.0	Spring or Fall	EF	S4	Some potential spawning habitat was observed but fish access appeared to be significantly obstructed in the lower section of this reach. No fish were captured during 782 seconds of electrofishing although vision was obstructed by dense overhanging vegetation and large substrate. Re-sampling is recommended to help define the limits to fish distribution in this drainage.
38	ILP 10314	2	093M.028	1.0	Spring	EF	S4	Electrofished for 536 seconds, but no fish were observed. A culvert at road crossing downstream is a barrier to fish migration, but no fish were captured downstream of the culvert. Re-sampling in reach 1 ( <i>see Site 37</i> ) is recommended to confirm limits of fish distribution in this drainage.

Results and Discussion  
RESAMPLING REQUIREMENTS

**Table 12 (cont.).** Follow - up sampling requirements for classification of 23 reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were sampled in July 2000 (*for details see Appendix 1*).

Site #	ILP/ Stream name	Reach	TRIM map	Channel Width (m)	Timing	Methods	Proposed Riparian Class	Comments
41	ILP 10321	1	093M.028	1.2	Spring or Fall	EF	S4	Electrofished for 822 seconds (100 metres), but no fish were observed. Many short sections of sub-surface flow may limit fish migration through this marginal habitat. Re-sampling in reach 1 of ILP 10314 ( <i>see</i> Site 37) is recommended to confirm limits of fish distribution in this drainage.
43	ILP 10267	1	093M.018	0.9	Spring or Fall	EF/ MT	S4	Electrofished for 640 seconds (100 m), but no fish were observed. Re-sampling is recommended in conjunction with an overnight setting of minnow traps in the small lake downstream and electrofishing at the lake outlet (ILP 10326, Reach 3).
45	ILP 10418	1	093M.028	0.7	Spring	EF	S4	Some moderate to good fish habitat was identified 240 metres upstream of the mainstem, but this small stream was heavily braided in its lower 200 metres. No fish were captured during 432 seconds of electrofishing (100 m) upstream of the braided section. Re-sampling is recommended to confirm limits of fish distribution in this small second order drainage.
47	ILP 10424	1	093M.028	0.6	Spring	EF	S4	Some good potential rearing habitat was identified in this reach, but no fish were observed during 412 seconds of electrofishing (100 m). Re-sampling this reach in conjunction with re-sampling reach 11 of its mainstem (ILP 10317, Site 32) is recommended to confirm fish absence or presence from this small first order stream.
49	ILP 10303	2	093M.029	0.6	Spring or Fall	EF	S4/NCD	Only poor to fair fish habitat was observed in the lower 300 metres of this reach that was surveyed. No fish were captured during 482 seconds of electrofishing (100 m). Channel becomes undefined 187 metres upstream from wetland reach 1. Re-sampling this reach is recommended to confirm fish absence or presence.
55	ILP 10622	2	093M.048	0.8	Spring or Fall	EF	S4	No fish were captured during 250 sec of electrofishing (100 m). Very poor fish habitat (no pools or gravel) was observed in the lower 300 metres of this reach. Re-sampling of this reach and sampling of reach 1 is recommended to confirm the limits of fish distribution in this small drainage.

Results and Discussion  
RESAMPLING REQUIREMENTS

**Table 12 (cont.).** Follow - up sampling requirements for classification of 23 reaches (sorted by site number) in Sub-basins II, III, and VIII of the Morrison Creek watershed that were sampled in July 2000 (*for details see Appendix 1*).

Site #	ILP/ Stream name	Reach	TRIM map	Channel Width (m)	Timing	Methods	Proposed Riparian Class	Comments
64	ILP 10594	3	093M.048	0.7	Spring or Fall	EF	S4	Very poor fish habitat was observed and many short sections of seepage flow appeared to be barriers to fish migration. No fish were captured during 442 seconds of electrofishing (100 m0. Re-sampling is recommended to confirm fish absence or presence for this reach.
69	ILP 10586	1	093M.048	0.8	Spring or Fall	EF	S4	Some good rearing and small pockets of potential spawning habitat were observed in the lower 290 metres of this reach that was surveyed. No fish were captured during 480 seconds of electrofishing (100 m) and some small steps with shallow plunge pools and moderate gradient may limit fish passage. Re-sampling is recommended to confirm fish absence or presence in this reach.

## 5.0 REFERENCES

- B.C. Environment. 1997. British Columbia Recreational Atlas. Infomap, Victoria, B.C.
- B.C. Environment. 2000. B.C. Environment web site <http://www.env.gov.bc.ca>
- B.C. Treaty Commission. 1999. <http://www.bctreaty.net>
- Conservation Data Centre 2000. Provincial list status and CDC ranks  
<http://www.elp.gov.bc.ca/rib/wis/cdc/list.htm>.
- Federal/Provincial Fish Habitat Inventory and Information Program. 1998. Fisheries Information Summary System Maps. Cited as FISS
- Forest Practices Code of British Columbia. 1998. Fish – stream identification guidebook.
- Giroux, P. 2000. Personal communications regarding water quality data at B.C. Environment, Skeena Region.
- Groot C. and L. Margolis 1991. Pacific salmon life histories. U.B.C. Press, Vancouver, B.C.
- Houston Forest Products. 1999. Five year development plan maps (1:20,000).
- Land Use Coordination Office. 1999. web page at <http://ftp.gis.luco.gov.bc.ca>
- McElhanney Engineering Ltd. 1995. letter summarizing stream sampling results for Hoston Forest Products in the tahlo Creek watershed. Houston Forest Products, Houston, B.C..
- McPhail, J.D. and R. Carveth. 1994. Key to Freshwater Fishes of British Columbia.
- Meidinger D. and Jim Pojar. 1991. Ecosystems of British Columbia. B.C. Ministry of Forests.
- Ministry of Employment and Investment. 1998. web page at <http://webmap.ei.gov.bc.ca/minpot/map/mtitles.mwf>
- Ministry of Forests, Research Branch. 1988. Biogeoclimatic and ecoregion units of the Prince Rupert Forest Region. Victoria, B.C..
- Ministry of Forests. 1997. Forest Service Recreation Map for the Morice Forest District.
- Resource Inventory Committee. 1998a. 1:20,000 Fish and Fish Habitat Inventory Standards. Victoria, B.C.
- Resource Inventory Committee. 1998b. Standards for Fish and Fish Habitat Mapping. Victoria, B.C.

## References

- Resource Inventory Committee. 1999. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory Standards and Procedures Version 1.1. Errata, March 1999.
- Resource Inventory Committee. 2000. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory Standards and Procedures Version 1.1. Errata, April 2000.
- SKR Consultants Ltd. 1996a. Stream classification at selected planned harvest areas in the Morice Forest District: CP 051-2, CP 071-1 and 2, CP 610-1 and 3, CP 560 -4, CP 572-2 and 3, CP453-2, and CP 438-5. Unpublished report prepared for Houston Forest Products Co.
- SKR Consultants Ltd. 1996b. Stream classification at selected sites in the Tahlo Creek area: CP 585-1 and CP 585-2. Unpublished report prepared for Houston Forest Products Co.
- SKR Consultants Ltd. 1997. Aquatic stream inventory in the Morrison IRM unit: CP 527-1, CP 535-3, CP 540-1, CP 540-2, CP 541-3, CP 555-1, CP 555-2, CP 555-3. Unpublished report prepared for Houston Forest Products Co.
- SKR Consultants Ltd. 1998a. Fish and fish habitat inventory for operational areas in the Morrison Landscape Unit: CP 529-1, 2, 3, & 4, 3000 Road extension and West Arm of 3000 Road. Unpublished report prepared for Houston Forest Products Co.
- SKR Consultants Ltd. 1998b. Fish and fish habitat inventory for operational areas in the Morrison Landscape Unit: CP 577-1 and the CP 586 access road. Unpublished report prepared for Houston Forest Products Co.
- SKR Consultants Ltd. 1999. Phases I to III Pre-Field Project Planning Report: Nadina 1:20,000 Reconnaissance Fish and Fish Habitat Inventory. Unpublished report prepared for Houston Forest Products Co. Houston, B.C..
- SKR Consultants Ltd. 2000a. Reconnaissance (1:20,000) fish and fish habitat inventory of six sub-basins in the Morrison Creek watershed. Watershed Code: 480-598800. Unpublished report prepared for Houston Forest Products Co..
- SKR Consultants Ltd. 2000b. Reconnaissance lake inventory of Guitar Lake (alias in the headwaters to Guitar Creek located 3.7 km northeast of Tahlo Lake. Watershed Code: 480-598800-99100-0900, Waterbody identifier 00128BABL. Unpublished report prepared for Houston Forest Products Co..
- SKR Consultants Ltd. 2001a. Secondary lake inventory of Unnamed Lake: 480-598800-47500, Waterbody identifier 00338BABL. Located 11.0 km northwest of the outlet of Morrison Lake and 19 km north northeast of Smithers Landing on Babine Lake Unpublished report prepared for Houston Forest Products Co..
- SKR Consultants Ltd. 2001b. Reconnaissance lake inventory of Unnamed Lake. Watershed Code: 480-598800-10000-61400, Waterbody identifier: 00412BABL. Located 6.5 km west of the outlet of Morrison Lake and 14.7 km northeast of Smithers Landing. Unpublished report prepared for Houston Forest Products Co..
- Scott, W.B. and E.J. Crossman. 1973. Freshwater fishes of Canada. Fish. Res. Board Can. Bull. 184: 966 pp.

**Appendix 1.** Sample Site Information Including FDIS Site Cards, Fish Forms, and Site Photographs, (sorted by site number).

## SITE CARD INDEX

ILP	Reach_ID	Site_ID	ILP_MAP	Page #
10154	1	1	093M.019	S - 1
10154	3	2	093M.019	S - 2
10154	5	3	093M.019	S - 3
10145	1	4	093M.019	S - 4
10142	1	5	093M.019	S - 5
10142	2	6	093M.018	S - 6
10152	1	7	093M.019	S - 7
10153	1	8	093M.019	S - 8
10150	1	9	093M.019	S - 9
10147	2	10	093M.019	S - 10
10161	1	11	093M.019	S - 11
10162	1	12	093M.019	S - 12
10169	1	13	093M.019	S - 13
10163	1	14	093M.019	S - 14
10165	1	15	093M.019	S - 15
10170	2	16	093M.018	S - 16
10170	4	17	093M.018	S - 17
10170	7	18	093M.018	S - 18
10262	1	19	093M.018	S - 19
10258	1	20	093M.018	S - 20
10259	1	21	093M.018	S - 21
10260	3	22	093M.018	S - 22
10252	1	23	093M.018	S - 23
10253	1	24	093M.018	S - 24
10251	1	25	093M.018	S - 25
10855	1	26	093M.018	S - 26
10830	3	27	093M.018	S - 27
10830	5	28	093M.029	S - 28
10237	2	29	093M.029	S - 29
10859	1	30	093M.029	S - 30
10317	3	31	093M.019	S - 31
10317	11	32	093M.029	S - 32
10307	2	33	093M.029	S - 33
10309	1	34	093M.028	S - 34
10309	2	35	093M.028	S - 35
10313	2	36	093M.028	S - 36
10314	1	37	093M.028	S - 37
10314	2	38	093M.029	S - 38
10316	2	39	093M.029	S - 39
10323	2	40	093M.028	S - 40
10321	1	41	093M.028	S - 41
10326	2	42	093M.028	S - 42
10267	1	43	093M.028	S - 43



## SITE CARD INDEX (cont.)

<b>ILP</b>	<b>Reach_ID</b>	<b>Site_ID</b>	<b>ILP_MAP</b>	<b>Page #</b>
10427	1	44	093M.028	S – 44
10418	1	45	093M.028	S – 45
10425	1	46	093M.028	S – 46
10424	1	47	093M.048	S – 47
10303	1	48	093M.048	S – 48
10303	2	49	093M.048	S – 49
10302	1	50	093M.048	S – 50
10530	3	51	093M.048	S – 51
10530	6	52	093M.048	S – 52
10530	8	53	093M.048	S – 53
10613	1	54	093M.048	S – 54
10622	2	55	093M.048	S – 55
10619	1	56	093M.048	S – 56
10620	1	57	093M.048	S – 57
10617	1	58	093M.048	S – 58
10808	1	59	093M.048	S – 59
10808	3	60	093M.048	S – 60
10809	1	61	093M.048	S – 61
10594	1	62	093M.048	S – 62
10595	1	63	093M.048	S – 63
10594	3	64	093M.048	S – 64
10597	1	65	093M.049	S – 65
10591	1	66	093M.018	S – 66
10589	1	67	093M.018	S – 67
10585	1	68	093M.018	S – 68
10586	1	69	093M.018	S – 69

Note: Digital versions of all forms are available on the Field Data Information System (FDIS) databases delivered to B.C. Environment, Skeena Region and Houston Forest Products, Houston, B.C..



**Appendix 3. Quality Assurance/Quality Control Communications.**

**Appendix 4.** List of DNA samples submitted to B.C. Environment.

Stream name	Watershed Code	Reach	Site	Genetic sample	Voucher	Species ID	Fork Length (mm)	Maturity	Verified ID	Comments
Unnamed	10427	1	<b>44</b>	RB 104		<b>RB</b>	132	IM		adipose fin

## **Appendix 5. 1:20,000 Fisheries Project/Interpretive Maps**

### **TRIM MAPS**

**093M.018**

**093M.019**

**093M.028**

**093M.029**

**093M.048**

**093M.049**

**Reconnaissance (1:20,000)  
Fish and Fish Habitat Inventory  
of six Sub-basins in the  
Morrison Creek Watershed**

Watershed Code:  
480-598800

**APPENDIX 1: SITE CARDS  
Sites 1 - 69**

**Prepared for**

**Houston Forest Products Co.**  
Box 5000  
Houston, B.C.  
V0J 1Z0

**Prepared by**

**SKR Consultants Ltd.**  
RR#1, Site 11, Comp. 4  
Smithers, B.C.  
V0J 2N0

Approved by: