

Reconnaissance (1:20,000) Fish and Fish Habitat Inventory

Pierre and Twain Sub-units Fish Inventory - 1999

WSC's:

480-793000:	Kew C. (Alias) Watershed
480-802100:	Pierre C. Watershed
480-816400:	Twain C. Watershed
480-*****:	8 Small Tributaries to Babine Lake

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March 13, 2000

Project Reference Information

FRBC Multi-Year Agreement Number	0000105	
MELP Project Number	BFP-C016-001-2000	
FRBC Activity Number	10437	
	<u>FDIS Project Code:</u>	<u>FDIS Project WSC:</u>
	2103	480-000000
	2094	480-781500
	2093	480-793000
	2092	480-802100
	2091	480-805000
	2090	480-816400
FRBC Region	Smithers Region	
MELP Region	06 - Skeena	
FW Management Unit	6-6	
DFO Sub-District	4D	
Forest Region	Prince Rupert	
Forest District	Lakes Forest District	
Forest Licensee and Tenure #	Babine Forest Products Company	
	Forest Licences A-16823 and A-16825	
First Nations Claim Area	Carrier-Sekani Tribal Council	

Watershed Information

Watershed Group	BABL	
Watershed Name	Babine Lake Tributaries (Pierre and Twain Sub-unit Areas)	
Watershed Code	N/A	
UTM at Mouth	N/A	
Watershed Area	252	
Total of all Stream Lengths (km)	453	
Stream Order	1 to 5	
NTS Maps	93 K/12, 93 L/9	
TRIM Maps	93K.061, 93K.051, 93L.060, 93L.070	
BEC Zone	SBS	
Air Photos	<u>30BCC98024</u> : 129-144; 160-163	<u>30BCC96049</u> : 027-043;086-100
	<u>30BCC96155</u> : 024-041	<u>30BCB90065</u> : 130-145;167-183
	<u>30BCC96154</u> : 166-183	

Sampling Design Summary

Total Number of Reaches	785
Random Sample Reaches	34
Discretionary Sample Reaches	49
Total Sample Reaches	83 (86 sites)
% of Reaches Sampled	10.6
Field Sampling Dates	July 10 to September 29, 1999

Specific Watershed Reference Information

Sub-Unit	Project Watershed Code	Watershed Name	Subdrainage Watershed Code/ ILP	Sites	UTM at Mouth	Watershed Area (km2)	Total of all Stream Lengths (km)	Stream Order	NTS Map(s)	TRIM Maps	BEC Zone	Fish Species Present
Major Watersheds (streams 4th order or greater)												
Pierre	480-793000	Kew Creek	480-793000	5-13	10.313780.6059080	14	45.41	4	93 K/12	93K.061, 93L.070	SBS	CO
Pierre	480-802100	Pierre Creek	480-802100	16-65	10.315900.6057650	94	206.34	5	93 K/12, 93 L/9	93K.061, 93K.051, 93L.060, 93L.070	SBS	CT KO RB SK
Twain	480-816400	Twain Creek	480-816400	76-87	10.318390.6054980	135	180.8	5	93 K/12, 93 L/9	93K.061, 93K.051, 93L.060	SBS	RB SK
Small Tributaries to Babine Lake (streams 3rd order or less)												
Grouped Information				1-4,10,14,15, 66-75	N/A	9	19.95	N/A	93 K/12	93K.061	SBS	CAS CO

Information for Small Tributaries to Babine Lake

Sub-Unit	Project Watershed Code	Subdrainage Watershed Code/ ILP	Stream Order	Fish Species Present
Pierre	480-000000	61701	1	None
Pierre	480-781500	480-781500	1	None
Pierre	480-000000	61702	1	None
Pierre	480-000000	61703	1	None
Pierre	480-000000	61704	1	None
Pierre	480-000000	61725	1	None
Twain	480-805000	480-805000	2	CAS CO
Twain	480-000000	61755	1	CAS

Abbreviations Used in this Report

BGC	biogeoclimatic zone	MELP	Ministry of Environment, Lands and Parks
BB	burbot (<i>Lota lota</i>)	M/L	mainline
C	clear (not turbid)	MT	minnow trap
C.	creek	MW	mountain whitefish (<i>Prosopium williamsoni</i>)
CAS	prickly sculpin (<i>Cottus asper</i>)	NA	not applicable
CD	compact disc	NCD	not classified drainage
CO	coho salmon (<i>Oncorhynchus kisutch</i>)	NFC	no fish captured
Cond.	conductivity	NFP	no fish present
CPUE	catch per unit effort	NS	not sampled
CT	cutthroat trout (<i>O. clarki</i>)	NTS	National Topographic Survey
Cw	channel width	NVC	no visible channel
DFO	Department of Fisheries and Oceans	Prop	proposed
Dist.	distance	R.	river
d/s	downstream	RB	rainbow trout (<i>O. mykiss</i>)
EF	electrofishing	Rd	road
FDIS	Field Data Information System	Rip	riparian
FISS	Fisheries Information Summary System	RSS	regionally significant species
FPC	Forest Practices Code	S2 - S6	riparian classes
FRBC	Forest Renewal of British Columbia	s	seconds
FRIM	Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures (Version 1.1)	S	small size stream
Grad	slope gradient	SBS	Sub-Boreal Spruce BGC
H	high flow	SK	sockeye salmon (<i>O. nerka</i>)
Hz	Hertz	S/S/I	straight, sinuous or irregular wandering channels
ILP	Interim Locational Point	Spp.	species
I/M/T	irregular meandering, meandering or tortuous meandering channels	ST/SI/IR	straight, sinuous or irregular wandering channels
IM/ME/TM	irregular meandering, meandering or tortuous meandering channels	T	turbid
Info.	information	TRIM	Terrain Resource Information Management
km	kilometer	Turb	turbidity
KO	kokanee (<i>O. nerka</i>)	u/s	upstream
L	low flow, lightly turbid or large size stream	UTM	Universal Transverse Mercator coordinates
L.	lake	V	volts
LKC	lake chub (<i>Couesius plumbeus</i>)	Wb	bankfull depth
LSU	longnose sucker (<i>Catostomus catostomus</i>)	WSC	watershed code
LWD	Large Woody Debris	µs	microseconds
m	meter	µS	microsimens
mm	millimeter	°C	temperature
M	moderate flow, moderate turbid or medium size stream	%	slope gradient

Contractor Information

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Acknowledgments

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List of Attachments Available at Regional MELP Office in Smithers

Attachment I Planning Document

- i) Phase Completion Report
- ii) Project budget break-down by phase
- iii) Project sampling design plan
- iv) Hardcopy and digital Reach Table
- v) Hardcopy and digital Lake Table
- vi) Hardcopy and digital copy of the random sample table
- vii) List of air photographs

Attachment II Hardcopy FISS Update Data Forms and Maps

Attachment III Photodocumentation

- i) Photodocumentation Form 1
- ii) Photo Summary Report printout from FDIS Database
- iii) Indexed Album of all negatives uniquely labeled in plastic sleeves
- iv) 1 Indexed Copy of Photo CD's with numbered images and thumbnail references in each CD jacket

Attachment IV Field Data

- i) site cards, fish collection forms, individual fish data forms and field notes
- ii) field working maps

Attachment V Digital Data

Attachment VI Summary of DNA Samples

1. Introduction

1.1 Project Scope and Objectives

The objective of this project was to conduct a Reconnaissance (1:20,000) Fish and Fish Habitat Inventory in several drainages within the Babine Lake watershed group. This is a continuation of a multi-year FRBC project commenced in 1996 for Babine Forest Products Company.

These inventories have a multi-phased approach with a total of six phases required to complete the inventory. Phases I through III are known as the pre-field phases and consist of 1) existing data review, 2) classification and sampling design and, 3) project plan. Phase IV consists of field data collection where site level fish and fish habitat data is collected for pre-determined reaches. Phases V and VI embody data compilation, mapping and reporting for the project. This report encompasses Phases V and VI of this project. However, the pre-field deliverables and project-planning document (available at the MELP Regional office in Smithers) are essential references for this report.

Specific watersheds assessed within this project area include tributaries to Babine Lake within the Pierre and Twain sub-units in the Babine Forest Products operating area (see “Watershed Reference Information” at the beginning of this report). Major watersheds within this area include Kew C. (4th order), Pierre C. (5th order) and Twain C. (5th order). All remaining tributaries to Babine Lake within this area are 3rd order or smaller and have been grouped and discussed together throughout this report. No lakes were surveyed as part of this project.

1.2 Location

Watersheds within the project area are located in the southern section of the Babine Lake watershed, north of Burns Lake within the Lakes Forest District. All streams are within the Babine Lake (BABL) high-level watershed group and flow generally east into the western shore of Babine Lake. The location map (Figure 1) on the following page provides the general location of the study area.

1.2.1 Access

The predominant modes of access to reaches within the study area watersheds were boat, helicopter and vehicle. Boat access from Babine Lake was used for the lower reaches of Kew C., Pierre C. and the small tributaries to Babine Lake. The upper Pierre C. watershed was only accessible by helicopter. Remaining reaches were primarily accessed by vehicle from various logging roads and cutblock spur roads.

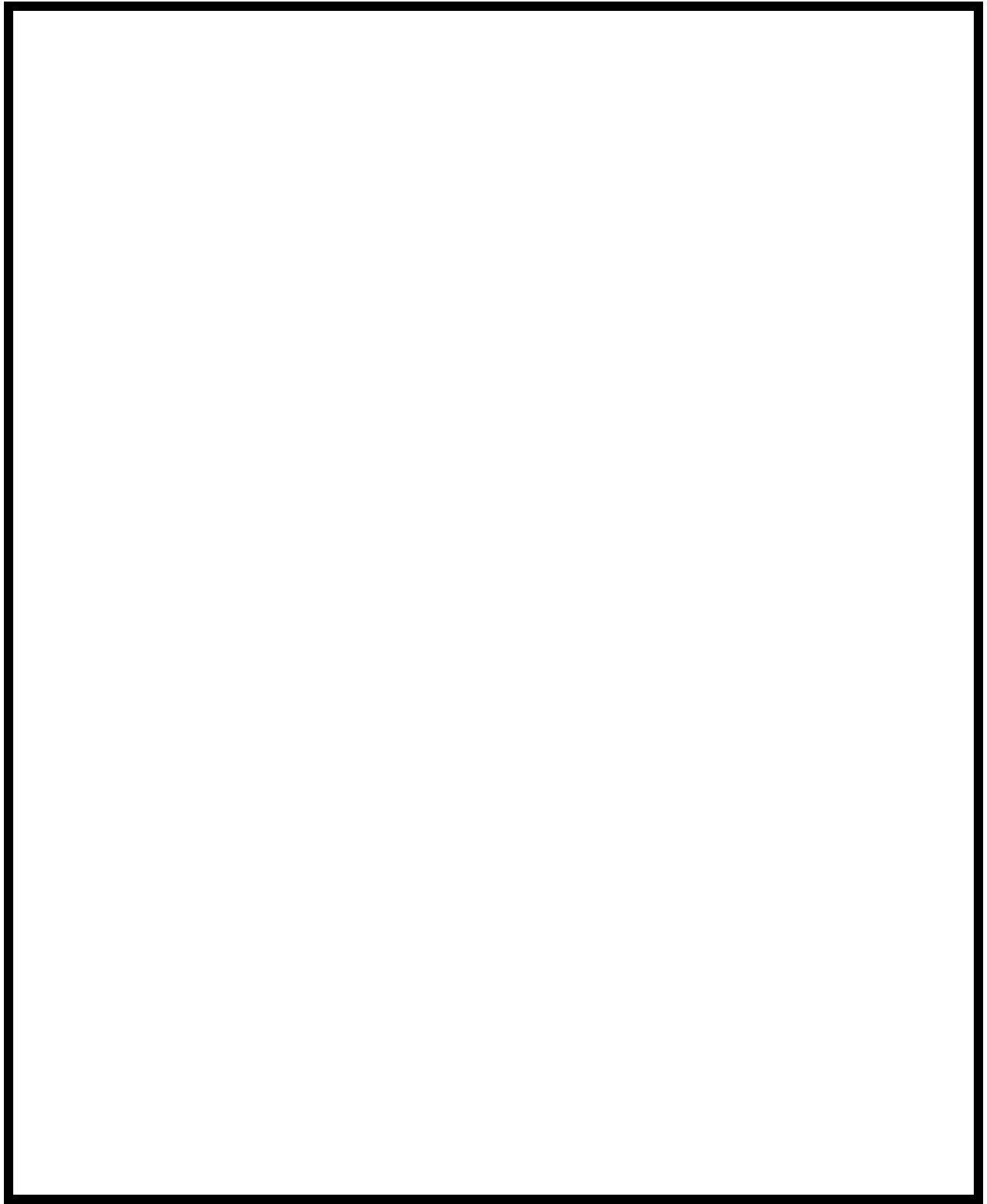


Figure 1: Location of Project Area. (Inset map shows the location within the province of British Columbia. Map scale is 1:600,000.)

Directions from Burns Lake to these watersheds is as follows:

- Drive north on the Babine Lake road (toward landfill) to the junction with the Augier Main at km 18.4
- Turn left at the Augier Main and stay left at the junction at the 47km board.
- This road crosses Twain C. at the 70km board. The watershed is accessible from numerous small spur roads.
- Remaining non-helicopter reaches were accessed by launching the boat at the barge landing on Babine Lake at the end of the Augier M/L (75km board).

2. Resource Information

There are a variety of resources available within the watersheds selected for sampling:

1. The primary resource use within all drainages is forest management for timber extraction in Babine Forest Products operating area.
2. There are several recreation opportunities as the study area is near Babine Lake, which provides opportunity for fishing, hiking and camping.
3. The entire area is located within the Carrier-Sekani Tribal Council claim area.
4. No significant wildlife use or impacts were noted within this area.
5. Historical information regarding fish presence was collected and presented in the planning report (FINS, 1999) and the results were incorporated into the interpretive maps for this project. Table 1 below summarizes historical fish presence within the selected watersheds.

Table 1: Historical information on fish presence within the selected drainages

Stream Name	Fish Species	Dates
Kew C.	CO SK	FISS – unknown
Pierre C.	CO KO RB SK	FISS – unknown
Twain C.	CAS CO KO RB SK	FISS – unknown

* FISS = Fisheries Information Summary System

3. Methods

3.1 Project Plan and Alterations

Initial work, such as review of all existing information, preparation of fisheries information maps, location of stream features and selection of sample sites was completed during Phase 1-3 by FINS (Sept, 1999). The original planning report identified 109 reaches for sampling (58 random and 51 discretionary) within 782 total reaches in the study area. Upon completion of Phase 4, the actual number of sample sites was 86 in 83 reaches (34 random and 49 discretionary). The reduced sample size was due in large part to major barriers to fish distribution in the Kew and Twain C. watersheds that rendered the systems non fish-bearing above the barriers. Reach sampling in these watersheds was abandoned in favour of confirming the non fish-bearing status above the obstructions. Fish absence in Twain C. above the falls resulted in a total of 30 reaches left unsampled (16 random and 14 discretionary). The remaining unsampled reaches within the project area were due to a confirmation of fish absence downstream in the system or their being inaccessible for cost efficient sampling. Additional discretionary sample reaches were chosen from a list of contingency sample reaches so that all reach categories remained appropriately represented.

3.2 Reconnaissance Standards

Methodology used throughout this project was consistent with the standards and methods as defined in the "Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures (May 1998)" manual (including all errata), and all standards referenced therein.

Fish Sampling

Electrofishing and visual observation were the primary methods used for fish sampling throughout the field portion of the project. These methods were to be supplemented by the use of minnow traps, when logistically feasible, when electrofishing was not effective or potentially harmful to fish (i.e. deep wetland channels, low water temperatures) and sampling results were inconclusive, but these circumstances did not occur.

The presence of bull trout and/or Dolly Varden char was expected in this area within direct tributaries to Babine Lake. Sampling in these watersheds therefore considered the different habitat requirements for these species, but none were encountered. However, the methodology for reconnaissance inventories of this type generally lacks the concentrated efforts within specific habitat types to target this species. Distribution of bull trout and Dolly Varden char would be better investigated in a separate inventory that could specifically focus on their habitat requirements.

Measurements

Stream channel and wetted widths were determined using a meter stick for smaller streams and a hip chain for streams with channel widths greater than 2.0m. A minimum of six channel width measurements were made along each site at a distance of approximately one channel width apart. Stream depth measurements were determined using a meter stick. Stream gradient measurements were determined using an Abney level along several sections of the site. Site

lengths were determined either by hip chain or by ground estimate. Measurements of falls were based on ground estimates or calculated using distance/ gradient while cascade heights and lengths were determined using a hip chain and Abney level. Vertical cascade height was calculated using the gradient and slope distance according to the formula:

$$\text{Height (m)} = \sin(\tan^{-1}(\text{gradient (\%)}) \times \text{slope distance (m)})$$

Stream water temperatures were determined using an alcohol thermometer while pH and conductivity measurements were made using Oakton portable meters, which were calibrated weekly using standardized solutions.

Site Numbering Convention

Site numbers for this project have been assigned in an upstream ascending order for all sampled reaches under the scope of this project. Site numbers have been included in all tables that provide specific reach sampling information and on all photographs and photodocumentation indices.

Usage of ILP Numbers

A naming convention for all ILP's has also been used in order to simplify stream referencing for this project for streams requiring watershed codes. All 5-digit ILP numbers that have been assigned are unique within the entire project area. This was done to avoid confusion in ILP referencing throughout the project and having to reference the ILP map number each time the ILP is referenced. Every ILP created uses the last two digits of its ILP map, combined with its number on the map. ILP number assignments for the 1999 project begin at **700 to avoid overlapping of ILP numbers that were assigned in the 1997 and 1998 projects. That is, the first ILP on TRIM mapsheet 93K.061 would be ILP 61700. There was no overlap of mapsheet numbers among the different TRIM map series (i.e. 93K vs. 93 L series). All streams with gazetted names will be referred to by those names in this report, while all unnamed streams will be referred to by their watershed code or ILP number.

NVC (No Visible Channel) Reaches

There were three types of situations in which site assessment in the field revealed no visible channel. They include reaches where no drainage was present, reaches that were not a stream by FPC definition, or wetland-type reaches where there was no defined channel present. These different types of NVC reaches were noted in the comments on the site cards and are summarized in the "Fish-Bearing Status" section of this report. It is expected that NVC reaches would receive a "Non Classified Drainage" (NCD) FPC classification.

Appendix I Layout - FDIS Reach/Site Summaries, Site Cards, Fish Forms and Photographs

FDIS reach site summary, site card and fish form reports, as well as representative photographs for each sampled reach and significant features, are presented in Appendix I, arranged by site number. They are arranged as reach/site summary followed by the corresponding site card and fish form. The representative photos have been reduced in size so that multiple sites can be presented on one page. The pages of photos, including an index, are placed in the appendix following the reach/site summaries, site cards and fish forms. Each photo is labelled with roll,

frame, watershed code/ILP, reach and site numbers so that each photo can be easily cross-referenced in the report, the FDIS database, the negative binder or the photo CD's. All photos were scanned onto CD's with high-resolution index prints enclosed in the CD's jacket (Attachment III).

Field Equipment

All sampling equipment specifications are listed below:

- 2 Smith-Root model 12B P.O.W. Backpack Electrofishers
- 50 Gee-type minnow traps
- 2 Oakton pHTestr2 pH meters (with pH 7 & 10 buffer solutions)
- 2 Oakton TDSTestr3 conductivity meters (with 1413 μ S/cm solution)
- 2 Abney Levels, alcohol thermometers, Silva compasses
- 2 Pentax Zoom 90WR cameras
- assorted other equipment including tight chains, hip chains, dip nets, fishing rods, magnifying lenses, meter sticks
- 2 4X4 trucks equipped with Level 1 First Aid kits and 4 personal First Aid kits, as per WCB requirements
- 12'6" inflatable Quicksilver boat with Mariner 20 HP jet
- Dissecting kit

4. Results and Discussion

The following sections present information for watersheds as identified in the Project Reference Information section of this report. Biophysical information for these watersheds is provided in tabular format in the Watershed Information and Specific Watershed Information sections at the beginning of this report. Each 4th order or larger watershed is discussed separately while smaller watersheds have been grouped together. This section discusses the Kew C., Pierre C. and Twain C. watersheds, and the remaining small tributaries to Babine Lake within the Pierre and Twain sub-units. The following sections provide a brief discussion regarding fish and fish habitat information for each of the above watersheds. Summarized information for all sampled reaches is presented in tabular format in the “Fish Bearing Status section” of this report while detailed site-specific information is available in the Appendices.

4.1 Logistics

The major problem encountered throughout the course of the sampling that was common to all drainages within the project area was the effect of low water levels on sampling effectiveness. Intermittent or dry channels were common which often resulted in very limited sampling possibilities within the site due to the lack of sufficient water. However, presence and accessibility of fish habitat at higher flow conditions was considered in determining potential fish use. In addition, only limited electrofishing could be undertaken in Pierre C. due to presence of large numbers of spawning sockeye salmon and kokanee. Visual observation was the primary method of fish sampling in this situation. Other fish species may have been present in the system but this was not confirmed in the field. No other logistical problems were encountered.

4.2 Habitat and Fish Distribution

The presence of barriers to fish migration was confirmed in several streams within the project area. These are summarized in Table 2 below.

Table 2: Summary of historic and new barriers to fish migration found in the Pierre/Twain sub-units

Stream Name	Watershed Code/ILP	TRIM Map	Reach	Site	Barrier Type	Height (m)	Length (m)	Verified in Field	Comments
Kew C.	480-793000	93K.061	3	6	Falls	5.1		Y	Impassable to all fish species. Located at the end of reach 3, 2.2km u/s from Babine Lake.
Pierre C.	480-802100	93K.061	3	18	Canyon	50	700	Y	Falls and steep gradients in canyon likely limit fish passage. Located at the start of reach 3, 1.5km u/s from Babine Lake.
Pierre C.	480-802100	93K.061	3	19	Falls	10		Y	Impassable to all fish species. Located at the end of reach 3, 3.0km u/s from Babine Lake.
Pierre C.	480-802100	93K.061	5	20	Falls	5		Y	Impassable to all fish species. Located at the end of reach 5, 4.0km u/s from Babine Lake.
Pierre C.	480-802100	93K.061	5	20	Falls	5		Y	Impassable to all fish species. Located at the end of reach 5, 4.0km u/s from Babine Lake.
	480-802100-16400	93K.061	2	31	Falls	14		Y	Impassable to all fish species. Located at the end of reach 2, 1.8km u/s from Pierre C.
	61735	93K.061	2	34	Cascade	4.9	18	Y	Impassable to all fish species. Located at the end of reach 2, 0.8km u/s from Pierre C.
	480-805000	93K.061	3	67	Falls	3		Y	Impassable to all fish species. Located at the end of reach 3, 1.6km u/s from Babine Lake.
Twain C.	480-816400	93K.051	3	76	Falls	20		Y	Impassable to all fish species. Located at the end of reach 3, 2.4km u/s from Babine Lake.
Twain C.	480-816400	93K.051	4	77	Falls	7		Y	Impassable to all fish species. Located in middle of reach 4, 2.6km u/s from Babine Lake.
	480-816400-06800	93K.051	2	82	Cascade	5	10	Y	Suspected barrier to all fish species. Located at the end of reach 2, 0.6km u/s from Twain C.

4.2.1 Kew Creek

The only species encountered in this watershed was coho salmon. They were present in the mainstem of Kew C. in addition to the first reach of one large tributary (-793000-13100). The lower section of the first reach of Kew C. provided exceptional overwintering habitat for coho in flooded beaver impoundments. Excellent rearing habitat was available in abundant deep pool, cutbank and LWD habitat in the upper section of the reach above the beaver impoundments. This part of the reach also provided good potential spawning habitat for coho. Excellent rearing and spawning habitat for coho was also present in the first reach of -793000-13100, which is a major tributary to Kew C. No fish habitat was present in any other tributaries to Kew C. below the falls.

Fish distribution in Kew C. is limited by a 5m falls obstruction located at the end of reach 3. These falls are impassable and mark the upstream distribution limit for all fish species. In addition, no fish were present in reach 3 of –793000-13100, suggesting the possibility of an obstruction in reach 2.

4.2.2 Pierre Creek

Fish species encountered within the Pierre C. watershed include sockeye salmon, kokanee, rainbow and cutthroat trout. Sockeye salmon, kokanee and rainbow trout were only present in the lower reaches of the Pierre C. mainstem. Exceptional salmonid spawning habitat is present in the first reach while reach 2 provided additional moderate to good sockeye salmon spawning habitat. Approximately 1000 and 400 spawning sockeye were observed in reaches 1 and 2, respectively. Spawning kokanee were also observed in reach 1. Good rainbow trout rearing habitat was present throughout the lower reaches below the canyon, distributed mainly among deep pools in reach 1 and 3 and boulders in reach 2. The most diverse rearing habitat was observed in reach 1. Overwintering for rainbow trout was good in reaches 1 and 3, with the best within step-pool habitat in reach 3. No significant fish habitat was present in any tributaries to Pierre C. below the canyon.

A vertical wall canyon begins in reach 3 that contains frequent falls and cascades that limit upstream distribution for these species. Historical information indicates presence of 12m falls 120m into this canyon (FISS), which are likely to be the first impassable obstruction in Pierre C. This could not be confirmed in the field due to lack of access into the canyon for sampling. The first measurable obstruction was at the end of this canyon at the end of reach 3. Falls measuring 10m in height were located at this point. Cutthroat trout were present immediately below the falls and were the only species present in the watershed upstream from this point. The historical falls at the start of the canyon are thought to be the upstream distribution limit for sockeye salmon, kokanee and rainbow trout.

Cutthroat trout were only fish species present in the Pierre C. watershed above reach 3. They were present throughout the mainstem to reach 21 and in several of the larger tributaries. They were generally present in all reaches that provided any suitable habitat regardless of stream size, unless a barrier was present downstream in the system that precluded fish use. Overall rearing habitat is good to excellent in diverse habitat throughout the watershed while overwintering habitat is abundant throughout the numerous wetland reaches. No significant spawning habitat was observed – spawning by cutthroat trout likely occurs on an opportunistic basis watershed wide.

No cutthroat trout were present in Pierre C. upstream from the lake in reach 22. During a helicopter flight over this lake, a large spring was noted in the lake, which contributes significant flow into the system at this point. No cutthroat trout habitat was present in the two surveyed reaches of Pierre C. above the lake. There was an overall lack of sufficient flow and channel continuity in Pierre C. upstream from the lake, suggesting that the water contributed by the spring plays a major role in cutthroat trout distribution in the system.

Physical barriers to fish distribution were present on two of the surveyed tributaries to Pierre C. 14m falls are present at the end of reach 2 on stream –802100-16400 that are impassable to

cutthroat trout and mark their upstream distribution limit in this system. ILP 61735 has a 5m high cascade present at the end of reach 2. This cascade blocks cutthroat trout passage and marks their upper limit of distribution in this system. Presence of a physical obstruction is suspected upstream from reach 5 of stream –802100-66400. Sampling in this system was insufficient to determine fish distribution between reach 5 and reach 11. Limits to fish distribution for the remaining tributaries to Pierre C. were generally due to habitat deterioration near their headwaters.

4.2.3 Twain Creek

Rainbow trout was the only fish species encountered within the Twain C. watershed. They were present in the mainstem of Twain C. in addition to the first two reaches of one tributary (-816400-06800). However, Twain C. was sampled only in reach 3 below the falls. Excellent rainbow trout rearing and overwintering habitat is available in this reach in cascade-pool type habitat. Spawning habitat is limited and is likely opportunistic throughout scattered gravel pockets. Good rearing habitat is also available in mainly pool-type habitats throughout the first two reaches of –816400-06800. No significant fish habitat was present in any other tributaries to Twain C. below the falls.

Historical fisheries information in this watershed (FISS) identifies presence of sockeye and coho salmon, kokanee and prickly sculpin in the first two reaches of Twain C. Spawning by coho and sockeye salmon and kokanee is documented in FISS in these reaches.

Fish distribution in Twain C. is limited by a 20m falls obstruction located at the end of reach 3. These falls are impassable and mark the upstream distribution limit for all fish species. No fish were captured in five sites above these falls, although excellent fish habitat was present. In addition, no fish were present in reach 3 of stream –816400-06800, suggesting that the 5m high cascade present at the end of reach 2 blocks fish passage and precludes fish use in the upper reaches.

4.2.4 Small Tributaries to Babine Lake

Coho salmon and prickly sculpin were the only fish species encountered within these tributaries. They were both present in the mainstem of 480-805000 while prickly sculpin were present in ILP 61755. Fish habitat was best in the first reach of both of these streams. Reach 1 of 480-805000 provided excellent overwintering and good rearing habitat for coho salmon within beaver impoundments. ILP 61755 provided good salmonid rearing habitat within deep pools. No significant spawning habitat was observed in these streams. No significant fish habitat was observed in any other reaches.

A 3m high falls barrier is present on 480-805000 at the end of reach 3. These falls are impassable to all fish species and mark the upper limit of fish distribution in this watershed. All remaining tributaries to Babine Lake were small, 1st order drainages that lacked sufficient water to provide fish habitat.

4.3 Fish Stage, Size and Life History

Fork length and maturity level of all fish sampled were recorded on the individual fish data forms. The life stage (fry, juvenile, or adult) for each fish was determined in the field based on length measurements, physical characteristics, and the habitat in which each fish was found. All captured fish appeared healthy and did not exhibit any external signs of disease.

4.3.1 Kew Creek

A total of 18 coho salmon were sampled in Kew Creek. Only the juvenile life stage was represented within the sample group based on the physical characteristics observed.

The following table presents data for fish species encountered in this watershed. The CPUE column in the table indicates the number of fish captured per second of electrofishing. This data is extracted only from those reaches where the species were sampled.

Table 3: Summary of life stage, length and CPUE data from fish sampled within the Kew Creek Watershed

Stream Name	Watershed Code	Spp.	Stage	Number of Fish	Mean Length (mm)	Range of Lengths (mm)	CPUE (# of fish/sec electrofishing)
Kew C.	480-793000	CO	J	18	56.9	51-69	0.132

4.3.2 Pierre Creek

Fish species presence and diversity within the Pierre Creek watershed is varied depending on location within the system. The falls/canyon at the start of reach 3 divides fish populations inhabiting this watershed.

Fish populations that utilize Pierre C. below the obstruction consist of anadromous sockeye salmon, adfluvial kokanee and rainbow trout. The presence of both large and small adult rainbow trout suggests that both fluvial and adfluvial populations inhabit Pierre C. The adfluvial population likely migrates into the system during the salmon and kokanee spawning periods as well as in the spring to spawn. Numerous large rainbow trout were observed preying on their eggs. Near the falls, the rainbow trout adults were smaller and inhabited deep pools devoid of spawning fish, indicating that there is also a fluvial population residing in Pierre Creek.

Above the obstruction only a fluvial population of cutthroat trout is present in the watershed. They were more abundant in the upper Pierre C. watershed than in the reaches immediately above the falls, possibly due to more favourable habitat conditions in the upper watershed (i.e. lower gradient, higher proportion of instream cover and presence of overwintering habitat in wetland reaches). Both adults and juveniles were represented in this sample in healthy proportion. No fry were present due to the lateness of the sampling, but the presence of small juveniles indicates that spawning had occurred earlier in the season.

The following table presents data for fish species encountered in this watershed. The CPUE column in the table indicates the number of fish captured per second of electrofishing. This data is extracted only from those reaches where the species were sampled.

Table 4: Summary of life stage, length and CPUE data from fish sampled within the Pierre Creek Watershed

Stream Name	Watershed Code	Spp.	Stage	Number of Fish	Mean Length (mm)	Range of Lengths (mm)	CPUE (# of fish/sec electrofishing)
Pierre C.	480-793000	SK	A	1401	~550	400-650	N/A (observed)
		KO	A	50	~275	250-300	N/A (observed)
		RB	J	8	54.8	43-112	0.205
		RB	A	2	168.5	154-183	0.080
		RB	A	4	~300	250-350	N/A (observed)
		CT	A	2	151	136-166	0.006
		CT	J	30	75.3	36-111	0.025
		CT	J	11	~109	100-150	N/A (observed)

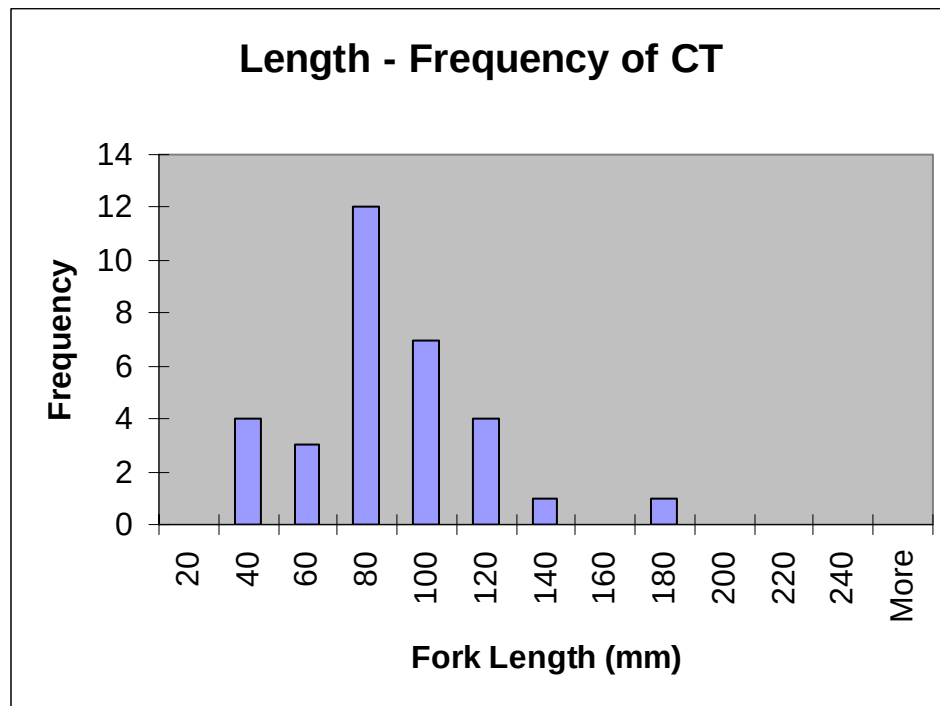


Figure 2: Length-frequency histogram of sampled cutthroat trout from the Pierre Creek Watershed, July 10 to September 29, 1999

4.3.3 Twain Creek

A total of 16 rainbow trout were sampled in Twain Creek. Only the juvenile life stage was represented within the sample group based on the physical characteristics observed. However, this does not preclude use of the system by both fluvial and adfluvial populations. Rainbow trout likely migrate into Twain Creek from Babine Lake during salmon spawning, as well as

during the spring to spawn. A fluvial population may also utilize the system, given the availability of excellent rearing and overwintering habitat.

The following table presents data for fish species encountered in this watershed. The CPUE column in the table indicates the number of fish captured per second of electrofishing. This data is extracted only from those reaches where the species were sampled.

Table 5: Summary of life stage, length and CPUE data from fish sampled within the Twain Creek Watershed

Stream Name	Watershed Code	Spp.	Stage	Number of Fish	Mean Length (mm)	Range of Lengths (mm)	CPUE (# of fish/sec electrofishing)
Twain C.	480-816400	RB	J	16	78.3	47-135	0.068

4.3.4 Small Tributaries to Babine Lake

A total of 5 coho salmon were sampled in this area, all present in stream 480-805000. Only the juvenile life stage was represented within the sample group based on the physical characteristics observed.

Only two prickly sculpin were sampled in this area. This number is not sufficient to provide any meaningful biological analysis.

The following table presents data for fish species encountered in this watershed. The CPUE column in the table indicates the number of fish captured per second of electrofishing. This data is extracted only from those reaches where the species were sampled.

Table 6: Summary of life stage, length and CPUE data from fish sampled within Small Tributaries to Babine Lake

Stream Name	Watershed Code	Spp.	Stage	Number of Fish	Mean Length (mm)	Range of Lengths (mm)	CPUE (# of fish/sec electrofishing)
N/A	N/A	CO	J	5	69.2	58-76	0.068
		CAS	J	1	29	29	0.011
		CAS	A	1	79	79	0.014

4.4 Significant Features and Fisheries Observations

4.4.1 Fish and Fish Habitat

Two significant fisheries observation and features within this project area that were not already documented in existing publications was the presence of a fluvial population of cutthroat trout in the Pierre C. watershed above the falls/canyon barrier in reach 3. This is the only watershed in which this species has been encountered over the past four years of reconnaissance inventories within the Babine Forest Products Co. operating area. Adipose fin tissue samples were collected from 15 specimens and sent to MELP in Smithers for DNA analysis (see Attachment VI).

In addition, fish absence was confirmed in the Twain C. watershed above the first falls obstruction at the end of reach 3. Although these falls have been previously documented, it was unknown whether any fish species were present above the falls. Sampling above the falls was sufficient to reasonably conclude that the watershed is non fish-bearing above this obstruction.

All streams within this area were too small to provide any significant sport fishing opportunities.

4.4.2 Habitat Protection Concerns

Four fisheries sensitive zones (FSZ) were identified within the Pierre/Twain sub-units. Three of these were within the Pierre C. watershed and were located in the first reaches of streams – 802100-66400, -802100-79900 and ILP 70722. These were all marsh areas that may provide important rearing and overwintering habitat for cutthroat trout in the watershed. The fourth FSZ was in reach 1 of stream 480-805000. This was a wetland reach containing numerous beaver impoundments that could provide important overwintering habitat for coho salmon.

No other habitat protection concerns were identified in this area. No fish were captured in gradients greater than 20%, no restoration opportunities were noted and no problem culverts or unstable slopes were encountered.

4.5 Fish Bearing Status

The following three sections summarize the fish-bearing status for all surveyed reaches within the Pierre/Twain sub-unit. The first section summarizes all surveyed reaches; the second section presents information for all non fish-bearing reaches, while the third section identifies reaches where follow-up sampling should be conducted. An overview of the process used in determining fish-bearing status is presented in a flowchart in Figure 3 on the following page.

4.5.1 Summary of all Surveyed Reaches

Table 7 on the following pages summarizes all surveyed reaches in the Pierre/Twain sub-unit. In addition to confirmed fish-bearing reaches, non fish-bearing reaches and reaches requiring follow-up sampling have also been identified and summarized in this table. They are also discussed in further detail in the “Non Fish-bearing Reaches” and “Follow-up Sampling Required” sections of this report.

Stream Classification Process

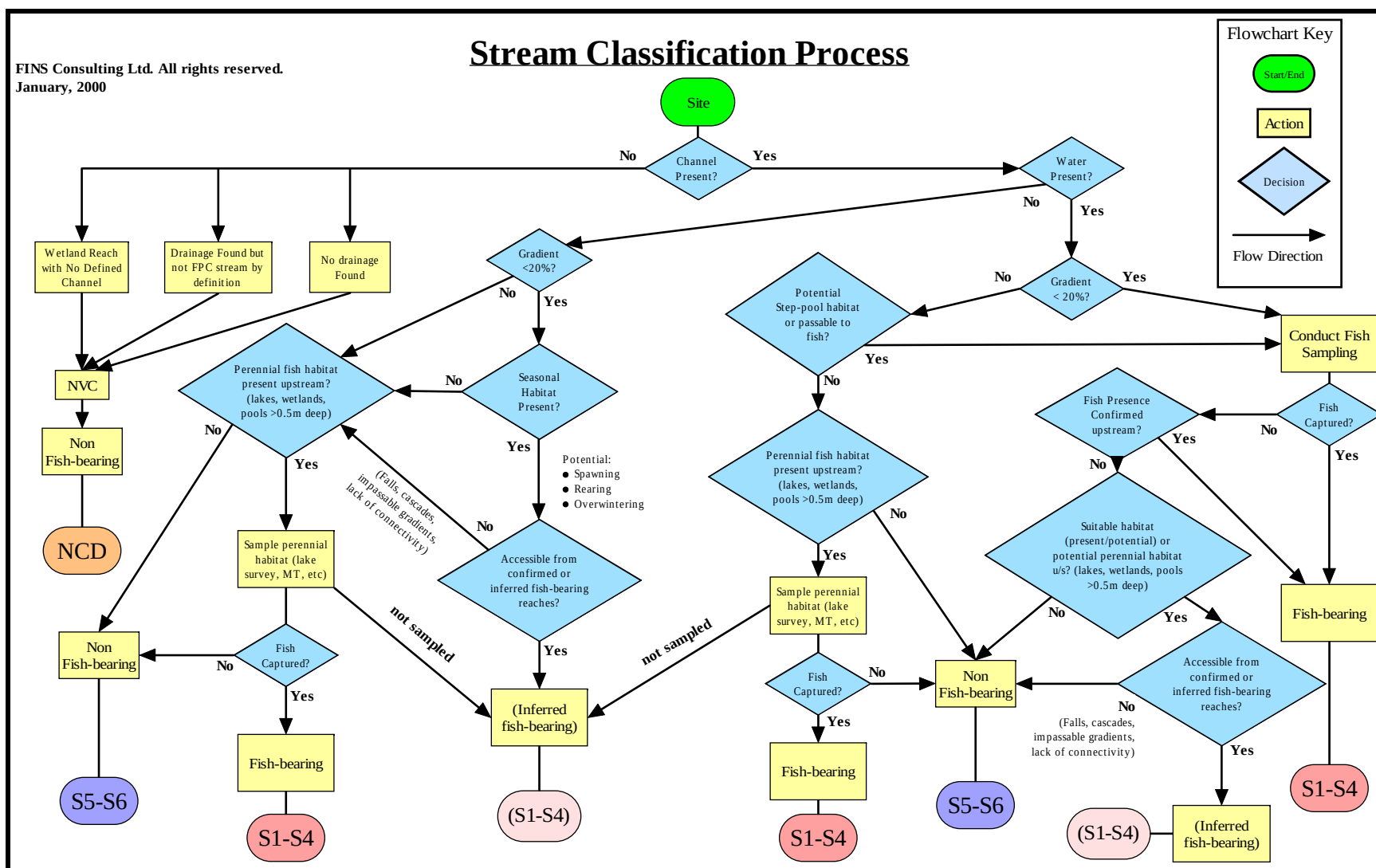
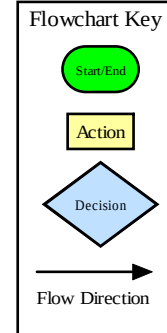


Figure 3: Flowchart of the stream classification process used in determining fish-bearing status of surveyed reaches

Table 7: Summary of data from all surveyed reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Species	Channel		Proposed Riparian Class	Follow-up Sampling ¹ (Y, N or blank)	Comments
						Width (m)	Grad. (%)			
Pierre Sub-unit										
		61701	1	1		NVC		NCD	N	
	480-781500		1	2		NVC		NCD	N	
		61703	1	3		NVC		NCD	N	
		61704	1	4		NVC		NCD	N	
Kew C.	480-793000		1	5	CO	4.48	0.9	S3		
Kew C.	480-793000		3	6	NFC	2.47	6.5	S3	Y	Accessible to fish from lower fish-bearing reaches.
Kew C.	480-793000		3.1	7	NFC	3.20	3.5	S5	N	
Kew C.	480-793000		3.1	8	NFC	2.53	3.3	S6	N	
Kew C.	480-793000		3.1	9	NFC	2.70	3.5	S6	N	
		61710	1	10		NVC		NCD	N	
	480-793000-13100		1	11	CO	1.93	1.6	S3		
	480-793000-13100		3	12	NFC	1.70	4.0	S3	Y	Lack of overwintering habitat and potential obstruction in Reach 2.
	480-793000-13100		5	13		1.44	3.9	S6	N	
		61718	1	14		NVC		NCD	N	
		61706	1	15		NVC		NCD	N	
Pierre C.	480-802100		1	16	RB KO SK	9.80	1.9	S2		
Pierre C.	480-802100		2	17	SK	12.00	2.0	S2		
Pierre C.	480-802100		3	18	RB SK	7.50	2.8	S2		
Pierre C.	480-802100		3	19	CT	9.55	2.5	S2		
Pierre C.	480-802100		5	20	CT	8.20	6.4	S2		
Pierre C.	480-802100		6	21	CT	9.30	1.8	S2		

¹ Blank cell indicates confirmed fish presence with no follow up sampling required

“N” indicates a non fish-bearing reach - See “Non fish-bearing reaches” section

“Y” indicates an inferred fish-bearing reach with low probability of fish use or determine upstream fish distribution limit - See “Follow-up Sampling Required” section

“Y” indicates an inferred fish-bearing reach with high probability of fish use - See “Follow-up Sampling Required” section

Table 7: Summary of data from all surveyed reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Species	Channel		Proposed Riparian Class	Follow-up Sampling ¹ (Y, N or blank)	Comments
						Width (m)	Grad. (%)			
Pierre C.	480-802100		17	22	CT					
Pierre C.	480-802100		19	23	CT	1.95	4.0	S3		
Pierre C.	480-802100		21	24	CT					
Pierre C.	480-802100		24	26	NFC	1.77	3.5	S6	N	
Pierre C.	480-802100		26	27	NFC	0.54	5.5	S6	N	
	480-802100-03500		1	28	NFC	0.88	2.9	S4	Y	Potential rearing at higher flow.
	480-802100-03500		2	29	NFC	0.66	0.5	S4	Y	Potential rearing at higher flow but unlikely.
		61726	1	30		NVC		NCD	N	
	480-802100-16400		2	31	NFC	6.27	4.3	S2	Y	Excellent habitat for CT unless obstruction d/s
	480-802100-16400		9	32	NFC	2.75	1.5	S6	N	No resident fish population above falls barrier d/s in reach 2
	480-802100-16400		10	33	NFC	2.88	0.9	S6	N	No resident fish population above falls barrier d/s in reach 2
		61735	2	34	NFC	1.45	13.0	S3	Y	Potential rearing at higher flow - accessible from Pierre C.
		61735	2.1	35	NFC	1.18	5.5	S6	N	
		61745	1	36	NFC	0.60	14.8	S6	N	
		70704	5	37	NFC	0.58	0.5	S6	N	
	480-802100-64500		4	38	NFC	0.58	0.7	S6	N	Potential obstruction to fish in d/s reaches
	480-802100-64500		5	39		NVC	14.0	NCD	N	
		60713	1	40	NFC	0.30	1.5	S6	N	
	480-802100-66400		1	41	CT	5.00	0.1	S3		based on u/s reach channel widths
	480-802100-66400		5	42	CT	2.88	4.1	S3	Y	Determine u/s fish distribution limit
	480-802100-66400		11	43	NFC	2.08	0.0	S6	N	
		60715	3	44	NFC	3.50	0.0	S3		CT presence confirmed u/s
		60715	5	45	CT	2.75	0.2	S3		
		60715	7	46	NFC	2.25	0.0	S3	Y	Accessible from d/s fish-bearing reaches
		60726	1	47		NVC	3.0	NCD	N	
		60736	1	48	NFC	1.02	2.5	S4	Y	Accessible from d/s fish-bearing reaches
	480-802100-66400-72600		3	49	NFC	2.52	0.1	S6	N	

Table 7: Summary of data from all surveyed reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Species	Channel		Proposed Riparian Class	Follow-up Sampling ¹ (Y, N or blank)	Comments
						Width (m)	Grad. (%)			
		60800	2	50	NFC	1.96	0.0	S3	Y	Potential obstruction to fish in d/s reaches
		70720	2	51		NVC		NCD	N	
	480-802100-79900		1	52	CT	2.50	0.0	S3		
		70722	1	53	CT	3.17	0.0	S3		Based on u/s channel widths
		70731	1	54	NFC	1.30	1.9	S6	N	
	480-802100-89200		4	55	CT	1.56	2.0	S3		
	480-802100-89200		9	56	CT	1.07	0.1	S4		
		70734	1	57		NVC	38.0	NCD	N	
		70735	1	58	NFC	0.80	9.3	S4	Y	Accessible from d/s fish-bearing reaches
		70742	1	59	NFC	1.47	0.9	S4	Y	Accessible from d/s fish-bearing reaches
		70750	1	60	CT	1.18	5.1	S4		
		70750	4	61	NFC	0.76	0.0	S6	N	
		70751	1	62	NFC	0.98	3.4	S4	Y	Accessible from d/s fish-bearing reaches
		70752	1	63	CT	1.76	0.6	S3		
		70752	2	64		0.36	5.3	S6	N	
		70755	1	65		NVC		NCD	N	
Twain Sub-unit										
	480-805000		1	66	CO CAS	1.52	0.9	S3		
	480-805000		3	67	NFC	0.93	17.8	S4	Y	Accessible from d/s fish-bearing reaches.
	480-805000		4	68	NFC	1.57	3.3	S6	N	
	480-805000		6	69	NFC	1.08	0.9	S6	N	
		61751	1	70		NVC		NCD	N	
	480-805000-06800		2	71	NFC	0.98	6.0	S6	N	No habitat, no access through reach 1
	480-805000-17000		1	72	NFC	0.52	5.5	S6	N	
		61755	1	73	CAS	2.10	1.3	S3	Y	Accessible from Babine Lake
		61755	2	74	NFC	0.78	13.8	S6	N	
		61755	3	75		NVC		NCD	N	

Table 7: Summary of data from all surveyed reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Species	Channel		Proposed Riparian Class	Follow-up Sampling ¹ (Y, N or blank)	Comments
						Width (m)	Grad. (%)			
Twain C.	480-816400		3	76	RB	7.78	5.5	S2		Below falls.
Twain C.	480-816400		4	77	NFC	8.93	2.5	S5	N	
Twain C.	480-816400		5	78	NFC	11.05	2.0	S5	N	
Twain C.	480-816400		6	79	NFC	9.27	4.0	S5	N	
Twain C.	480-816400		11	80	NFC	5.03	1.8	S5	N	
	480-816400-06800		1	81	RB	1.72	3.7	S3		
	480-816400-06800		2	82	RB	1.83	12.0	S3		
	480-816400-06800		3	83	NFC	1.35	5.0	S4	Y	Accessible from d/s fish-bearing reaches.
	480-816400-06800-04500		2	84		0.93	1.8	S6	N	
		61756	1	85		0.68	6.0	S6	N	
		51711	1	86		NVC		NCD	N	
	480-816400-26900		5	87	NFC	4.10	3.3	S5	N	

4.5.2 Non Fish-bearing Reaches

This section summarizes all surveyed reaches within this project area that have been recommended for a non fish-bearing FPC classification. This has been based on interpretations and conclusions from the synthesis of data collected during Phases I through IV of this inventory. In addition, sampling results from Reconnaissance Inventory data in similar watersheds (Babine Forest Products Co. 1997 through 1999 Reconnaissance Inventories) have also been incorporated into this section to provide comparisons between reaches with similar channel characteristics. Specifically, fish sampling results (% of reaches with fish captured) in reaches within the same size, gradient and pattern classes, as defined in FRIM. Each site has been placed into a specific gradient, channel pattern and size class (based on reach and site data) in order to compare it to the historical inventory results. This is by no means an absolute indication of fish presence, but rather a useful tool to provide a general comparison among the differing reach types. It has been used only as further supporting evidence for the non fish-bearing designation. Table 8 below summarizes this categorized information.

Table 8: Fish sampling results for categorized reach classes (from 1997 through 1999 inventory data)

Reach Gradient Class	Reach Pattern Type	Reach Size Class								
		Small (1 st order)			Medium (2 nd and 3 rd order)			Large (4 th and higher order)		
		Total # of Reaches	# of Reaches with Fish Capture	%	Total # of Reaches	# of Reaches with Fish Capture	%	Total # of Reaches	# of Reaches with Fish Capture	%
1 (≤4%)	ST/SI/IR	118	1	0.8	215	64	29.8	54	42	77.8
	IM/ME/TM	27	3	11.1	79	20	25.3	18	11	61.1
2 (>4% and ≤8%)	ST/SI/IR	93	1	1.1	125	31	24.8	19	12	63.2
	IM/ME/TM	8	0	0.0	0	0	0.0	0	0	0.0
3 (>8% and ≤20%)	ST/SI/IR	77	0	0.0	59	8	13.6	4	2	50.0
	IM/ME/TM	0	0	0.0	0	0	0.0	0	0	0.0
4 (>20% and ≤30%)	ST/SI/IR	32	0	0.0	12	0	0.0	1	0	0.0
	IM/ME/TM	0	0	0.0	0	0	0.0	0	0	0.0
5 (>30%)	ST/SI/IR	7	0	0.0	3	0	0.0	0	0	0.0
	IM/ME/TM	0	0	0.0	0	0	0.0	0	0	0.0

Determining whether or not any fish use occurs in a specific reach is a complex process, involving much more than applying fish sampling results on a site-specific basis. Specifically, in applying a non fish-bearing recommendation when fish are not captured in a sampling event, a more systematic process is required in order to provide an adequate rationale to support a conclusion of fish absence. Biological evaluation is used which factors in such considerations as known fish distributions and behavior, barriers, gradients, invertebrate presence, habitat quality, and presence/absence of headwater lakes. This process is summarized in the flowchart in Figure 3 above.

As a general rule, two conditions must usually exist in order for fish to inhabit a specific stream reach; 1) presence of fish habitat and 2) accessibility to that habitat. There are exceptions to this, such as presence of resident or adfluvial populations above barriers which otherwise block access, but these situations are considered on an individual basis when appropriate sampling can be undertaken to accurately determine fish presence under these circumstances.

Determining presence of fish habitat requires biological judgement but is based on many tangible factors. A “snapshot” method is used to determine presence of fish habitat at the time of sampling, but this is not sufficient when lack of water limits available habitat. Under these circumstances, a temporal approach is required which factors in the potential for fish habitat presence during a different flow period. In this manner, different habitat requirements for suspected fish species are also considered, such as potential seasonal use for rearing (i.e., higher flow rearing or refuge habitat) or spawning (i.e. suitable gravels, gradient and potential flow). Again, biological judgement is required to recognize this potential habitat, bearing in mind how the different flow regimes may affect the availability of this habitat. Moreover, the presence of potential overwintering or perennial habitat upstream in the watershed (i.e. lakes, wetlands, pools >0.5m deep) is also taken into account and has influence on the fish-bearing status of a specific reach. Existence of habitat or potential habitat, if present, is noted and described in the comments on the site cards.

Once presence of fish habitat has been established, it must be determined whether fish are capable of accessing this habitat. The presence of obstructions to fish in the form of falls, cascades, impassable gradients and lack of connectivity within a watershed may limit fish distribution within a watershed and must be evaluated. When questionable obstructions or soft barriers (i.e., beaver dams, wetlands, NVC reaches) are present, the process for determining the presence of fish habitat upstream must be undertaken and combined with adequate sampling in order to determine fish use.

The fish-bearing status of a specific reach is dependent on the presence of fish habitat, the accessibility to that habitat and is supported by the results of fish sampling. The above process for determining fish presence is an overview of the variables evaluated before fish-bearing status can be accurately ascertained. This entire process is always supplemented by existing fisheries information and interpretations from map and air photo analysis.

Table 9 on the following page is a summary of all surveyed reaches within this project area that have been recommended for a non fish-bearing designation. It includes relevant site-specific data, some historical information and comments that provide a brief rationale to support the interpretation. The table is simply a summary of the interpretation, and not meant to be a reiteration of the data it summarizes. This data is available in the appendices included in this report.

Once a non-fish bearing conclusion has been established for a sampled reach, all reaches located upstream from that location are considered to be non fish-bearing. This is inherent in the process used to determine the non fish-bearing status.

Table 9: Summary of data from surveyed non-fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Date	Cw (m)	Wb (m)	Grad (%)	Expected Species	FPC Class	Sampling Specs			Stream Conditions				Categorized Historical Information (1997 – 1999 Site Data Sampling Results)				Comments
											Meth	(m)	(s)	Flow	(°C)	(µS)	Turb	Grad Class	Pattern Class	Size Class	% of reaches with fish captured	
		61701	1	1	9/16/99	NVC				NCD								3	S/S/I	S	0	No drainage present at mapped location.
	480-781500		1	2	9/16/99	NVC				NCD								3	S/S/I	S	0	No drainage present at mapped location.
		61703	1	3	9/16/99	NVC				NCD								3	S/S/I	S	0	No drainage present at mapped location.
		61704	1	4	9/16/99	NVC				NCD								2	S/S/I	S	1.1	No drainage present at mapped location.
Kew C.	480-793000		3.1	7	9/17/99	3.20	0.53	3.5	RB	S5	EF	100	178	L	7	70	C	1	S/S/I	L	77.8	5m falls at end of reach 3 d/s block fish passage. No fish populations present above the falls. NFC in 3 sites above the falls.
Kew C.	480-793000		3.1	8	9/17/99	2.53	0.53	3.3	RB	S6	EF	150	271	L	8	70	C	1	S/S/I	L	77.8	5m falls at end of reach 3 d/s block fish passage. No fish populations present above the falls. NFC in 3 sites above the falls.
	480-793000		3.1	9	9/17/99	2.70	0.57	3.5	RB	S6	EF	200	327	L	8	70	C	1	S/S/I	L	77.8	5m falls at end of reach 3 d/s block fish passage. No fish populations present above the falls. NFC in 3 sites above the falls.
		61710	1	10	9/16/99	NVC				NCD								1	S/S/I	S	0.8	No drainage present at mapped location.
	480-793000-13100		5	13	9/17/99	1.44	0.2	3.9	RB	S6				L				1	S/S/I	M	29.8	Dry channel with no fish habitat present. No suitable gravels for RB spawning, no instream cover for potential RB rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. NFC with suspected fish absence in reach 3 d/s **Fish-bearing reaches in this category (64 of 215 surveyed) had CW>0.8m and Wb>0.17m. Substrate was either fines (in LC morphology) or gravels and cobbles. Cover was moderate to abundant and flow was either intermittent or permanent. Morphology was generally riffle-pool.
		61718	1	14	9/17/99	NVC				NCD								3	S/S/I	S	0	No drainage present at mapped location.
		61706	1	15	9/17/99	NVC				NCD								1	S/S/I	S	0.8	No drainage present at mapped location.

Table 9: Summary of data from surveyed non-fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Date	Cw (m)	Wb (m)	Grad (%)	Expected Species	FPC Class	Sampling Specs			Stream Conditions				Categorized Historical Information (1997 – 1999 Site Data Sampling Results)				Comments
											Meth	(m)	(s)	Flow	(°C)	(µS)	Turb	Grad Class	Pattern Class	Size Class	% of reaches with fish captured	
Pierre C.	480-802100		24	26	9/20/99	1.77	0.23	3.5	CT	S6	EF	180	157	M	6	30	C	1	S/S/I	M	29.8	No suitable CT habitat - Borderline NVC - frequent sub flow and discontinuous channel (disperses in fan) - lacks connectivity to d/s fish-bearing reaches. No suitable gravels for CT spawning, no instream cover for potential CT rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. NFC in 2 sites u/s from reach 23. **Fish-bearing reaches in this category (64 of 215 surveyed - see Table 8) had CW>0.8m and Wb>0.17m. Substrate was either fines (in LC morphology) or gravels and cobbles. Cover was moderate to abundant and flow was either intermittent or permanent. Morphology was generally riffle-pool.
Pierre C.	480-802100		26	27	9/20/99	0.54	0.17	5.5	CT	S6	EF	150	214	L	7	50	C	2	S/S/I	S	1.1	No suitable CT habitat - Borderline NVC - shallow, exposed channel, headwater reach, frequent sub flow - lacks connectivity d/s. No suitable gravels for CT spawning, no instream cover for potential CT rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. NFC in 2 sites u/s from reach 23. ** Only 1 reach (of 93 surveyed - see Table 8) that contained fish in this category - ILP 52002 reach 1 (site 26) in 1997 inventory (ILP 52001 report), which flowed directly into a confirmed fish-bearing reach where RB were abundant. This reach had water, abundant cover, and gravels in the substrate, a channel width of 4.6m and Wb depth of 0.55m. Water in this stream during low flow period is supplied by large wetland complex u/s n reach 2.
		61726	1	30	9/18/99	NVC				NCD								1	S/S/I	S	0.8	No drainage present at mapped location.

Table 9: Summary of data from surveyed non-fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Date	Cw (m)	Wb (m)	Grad (%)	Expected Species	FPC Class	Sampling Specs			Stream Conditions				Categorized Historical Information (1997 – 1999 Site Data Sampling Results)				Comments
											Meth	(m)	(s)	Flow	(°C)	(µS)	Turb	Grad Class	Pattern Class	Size Class	% of reaches with fish captured	
	480-802100-16400		9	32	9/29/99	2.75	0.33	1.5	CT	S6	EF	200	203	M	7	30	C	1	S/S/I	M	29.8	14m falls at end of reach 2 d/s block fish passage. No fish populations present above the falls. NFC in 2 sites above the falls. Also NFC in FHAP inventory (EDI, 1998). **Fish-bearing reaches in this category (64 of 215 surveyed - see Table 8) had CW>0.8m and Wb>0.17m. Substrate was either fines (in LC morphology) or gravels and cobbles. Cover was moderate to abundant and flow was either intermittent or permanent. Morphology was generally riffle-pool.
	480-802100-16400		10	33	9/29/99	2.88	0.43	0.9	CT	S6	EF	115	279	M	7	30	C	1	S/S/I	M	29.8	14m falls at end of reach 2 d/s block fish passage. No fish populations present above the falls. NFC in 2 sites above the falls. Also NFC in reach 9 in FHAP inventory (EDI, 1998). **Fish-bearing reaches in this category (64 of 215 surveyed - see Table 8) had CW>0.8m and Wb>0.17m. Substrate was either fines (in LC morphology) or gravels and cobbles. Cover was moderate to abundant and flow was either intermittent or permanent. Morphology was generally riffle-pool.
		61735	2.1	35	9/19/99	1.18	0.17	5.5	CT	S6	EF	150	168	M	6	60	C	2	S/S/I	M	24.8	5m high cascade at end of reach 2 d/s block fish passage. No fish populations present above the cascade. NFC in 1 site above the cascade; also NFC below cascade. **Fish-bearing reaches in this category (31 of 125 surveyed - see Table 8) had CW>1.0m and Wb>0.13m. Substrate was gravels and cobbles. Cover was moderate to abundant and diverse and flow was either intermittent or permanent. Morphology was riffle-pool, step-pool or cascade-pool.

Table 9: Summary of data from surveyed non-fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Date	Cw (m)	Wb (m)	Grad (%)	Expected Species	FPC Class	Sampling Specs			Stream Conditions				Categorized Historical Information (1997 – 1999 Site Data Sampling Results)				Comments
											Meth	(m)	(s)	Flow	(°C)	(µS)	Turb	Grad Class	Pattern Class	Size Class	% of reaches with fish captured	
		61745	1	36	9/22/99	0.60	0.3	14.8	CT	S6	EF	140	213	M	7	40	C	3	S/S/I	M	13.6	No suitable CT habitat - shallow, ephemeral, intermittent trickle over organic fines/cobbles. Frequent sub flow, moderately steep. No suitable gravels for CT spawning, lacks sufficient instream cover for potential CT rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. **Fish-bearing reaches in this category (8 of 59 surveyed - see Table 8) had CW>1.8m and Wb>0.17m. Substrate was mainly cobbles with gravels/boulder/rock. Cover was trace to abundant and flow was permanent. Morphology was step-pool or cascade-pool.
		70704	5	37	9/22/99	0.58	0.17	0.5	CT	S6	EF	180	191	M	8	50	C	1	I/M/T	S	11.1	No suitable CT habitat - borderline NVC - water disperses in wetland with marginal channel. Shallow, ephemeral, intermittent over organic fines. Channel exposed to sun. Water stagnant, filmy, and smelly. No suitable gravels for CT spawning, lacks sufficient instream cover for potential CT rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. **Fish-bearing reaches in this category (3 of 27 surveyed - see Table 8) had CW>0.9m and Wb>0.32m. Substrate was either fines (in LC morphology) or gravels. Cover was abundant and flow was permanent. These reaches flowed directly into confirmed fish-bearing reaches.

Table 9: Summary of data from surveyed non-fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Date	Cw (m)	Wb (m)	Grad (%)	Expected Species	FPC Class	Sampling Specs			Stream Conditions				Categorized Historical Information (1997 – 1999 Site Data Sampling Results)				Comments
											Meth	(m)	(s)	Flow	(°C)	(µS)	Turb	Grad Class	Pattern Class	Size Class	% of reaches with fish captured	
	480-802100-64500		4	38	9/22/99	0.58	0.37	0.7	CT	S6	EF	140	221	M	8	40	C	1	S/S/I	M	29.8	Channel full of algae, mosses. Exposed to sun - likely very warm water in summer. Abundant Gammaridae indicates fish absence. No suitable gravels for CT spawning. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. NFC in 2 sites in this system. **Fish-bearing reaches in this category (64 of 215 surveyed - see Table 8) had CW>0.8m and Wb>0.17m. Substrate was either fines (in LC morphology) or gravels and cobbles. Cover was moderate to abundant and flow was either intermittent or permanent. Morphology was generally riffle-pool.
	480-802100-64500		5	39	9/22/99	NVC		14.0		NCD								3	S/S/I	S	0	No channel present - not a stream by FPC definition.
		60713	1	40	9/22/99	0.30	0.2	1.5	CT	S6	EF	100	51	M	8	30	C	1	S/S/I	S	0.8	No CT habitat - Channel full of mosses. Exposed to sun - likely very warm water in summer. Abundant Gammaridae indicates fish absence. No suitable gravels for CT spawning, lacks sufficient instream cover for potential CT rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. NFC in 2 sites in this system. ** Only 1 reach (of 118 surveyed - see Table 8) that contained fish in this category - ILP 12522 reach 1 (site 11) in 1998 inventory (Nechako report), which flowed directly into a confirmed fish-bearing reach where RB were abundant. However, RB were found in ILP 12522 only for the first 30m near mouth before habitat deteriorated and no fish were captured. This stream had water, abundant cover, and gravels in the substrate, a channel width of 0.7m and Wb depth of 0.33m.

Table 9: Summary of data from surveyed non-fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Date	Cw (m)	Wb (m)	Grad (%)	Expected Species	FPC Class	Sampling Specs			Stream Conditions				Categorized Historical Information (1997 – 1999 Site Data Sampling Results)				Comments
											Meth	(m)	(s)	Flow	(°C)	(µS)	Turb	Grad Class	Pattern Class	Size Class	% of reaches with fish captured	
	480-802100-66400		11	43	9/23/99	2.08	0.4	0.0	CT	S6	EF	80	154	M	5	50	C	1	I/M/T	M	25.3	No CT habitat - water stagnant and full of algae, organic fines. Channel exposed to sun, no shade - water likely very warm in summer. Abundant Gammaridae indicates fish absence. No suitable gravels for CT spawning. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. **Fish-bearing reaches in this category (20 of 79 surveyed - see Table 8) had CW>0.7m and Wb > 0.3m. Substrate was either fines (in LC morphology) or gravel/cobble/fines. Cover was moderate to abundant and flow was permanent.
		60726	1	47	9/23/99	NVC		3.0		NCD								1	S/S/I	S	0.8	No channel present - not a stream by FPC definition. Water percolates underground through wetland.
	480-802100-66400-72600		3	49	9/23/99	2.52	1.13	0.1	CT	S6	EF	100	281	M	6	20	C	1	I/M/T	M	25.3	No CT habitat - water stagnant and full of algae, organic fines. Channel exposed to sun, no shade - water likely very warm in summer. Abundant Gammaridae indicates fish absence. No suitable gravels for CT spawning. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. **Fish-bearing reaches in this category (20 of 79 surveyed - see Table 8) had CW>0.7m and Wb > 0.3m. Substrate was either fines (in LC morphology) or gravel/cobble/fines. Cover was moderate to abundant and flow was permanent.
		70720	2	51	9/22/99	NVC				NCD								1	S/S/I	S	0.8	No channel present - not a stream by FPC definition. Lacks continuous channel bed, banks.

Table 9: Summary of data from surveyed non-fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Date	Cw (m)	Wb (m)	Grad (%)	Expected Species	FPC Class	Sampling Specs			Stream Conditions				Categorized Historical Information (1997 – 1999 Site Data Sampling Results)				Comments
											Meth	(m)	(s)	Flow	(°C)	(µS)	Turb	Grad Class	Pattern Class	Size Class	% of reaches with fish captured	
		70731	1	54	9/22/99	1.30	0.2	1.9	CT	S6	EF	130	173	M	5	50	C	1	S/S/I	S	0.8	No CT habitat - frequent sub flow, shallow, exposed channel. No suitable gravels for CT spawning, lacks sufficient instream cover for potential CT rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. ** Only 1 reach (of 118 surveyed - see Table 8) that contained fish in this category - ILP 12522 reach 1 (site 11) in 1998 inventory (Nechako report), which flowed directly into a confirmed fish-bearing reach where RB were abundant. However, RB were found in ILP 12522 only for the first 30m near mouth before habitat deteriorated and no fish were captured. This stream had water, abundant cover, and gravels in the substrate, a channel width of 0.7m and Wb depth of 0.33m.
		70734	1	57	9/20/99	NVC		38.0		NCD								5	S/S/I	S	0	No channel present by FPC definition.
		70750	4	61	9/20/99	0.76	0.17	0.0	CT	S6	EF	150	182	M	12	20	C	1	I/M/T	S	11.1	No CT habitat - shallow, exposed channel - water likely very warm in summer. Abundant Gammaridae indicates fish absence. No suitable gravels for CT spawning, lacks sufficient instream cover for potential CT rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. **Fish-bearing reaches in this category (3 of 27 surveyed - see Table 8) had CW>0.9m and Wb>0.32m. Substrate was either fines (in LC morphology) or gravels. Cover was abundant and flow was permanent. These reaches flowed directly into confirmed fish-bearing reaches.

Table 9: Summary of data from surveyed non-fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Date	Cw (m)	Wb (m)	Grad (%)	Expected Species	FPC Class	Sampling Specs			Stream Conditions				Categorized Historical Information (1997 – 1999 Site Data Sampling Results)				Comments
											Meth	(m)	(s)	Flow	(°C)	(µS)	Turb	Grad Class	Pattern Class	Size Class	% of reaches with fish captured	
		70752	2	64	9/20/99	0.36	0.17	5.3	CT	S6				M	7	40	C	2	S/S/I	M	24.8	No CT habitat - tiny, shallow, exposed channel. Frequent sub flow - marginal FPC stream. No suitable gravels for CT spawning, lacks sufficient instream cover for potential CT rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. **Fish-bearing reaches in this category (31 of 125 surveyed - see Table 8) had CW>1.0m and Wb>0.13m. Substrate was gravels and cobbles. Cover was moderate to abundant and diverse and flow was either intermittent or permanent. Morphology was riffle-pool, step-pool or cascade-pool.
		70755	1	65	9/20/99	NVC				NCD								3	S/S/I	S	0	No continuous channel bed - not a stream by FPC definition.
	480-805000		4	68	7/10/99	1.57	0.33	3.3	RB	S6	EF	120	111	M	9	210	C	1	S/S/I	M	29.8	3m falls at end of reach 3 d/s block fish passage. No fish populations present above the falls. NFC in 2 sites above the falls.
	480-805000		6	69	9/19/99	1.08	0.2	0.9	RB	S6	EF	110	83	L	8	210	C	1	S/S/I	M	29.8	3m falls at end of reach 3 d/s block fish passage. No fish populations present above the falls. NFC in 2 sites above the falls.
		61751	1	70	9/18/99	NVC				NCD								1	S/S/I	S	0.8	No continuous channel bed - not a stream by FPC definition.

Table 9: Summary of data from surveyed non-fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Date	Cw (m)	Wb (m)	Grad (%)	Expected Species	FPC Class	Sampling Specs			Stream Conditions				Categorized Historical Information (1997 – 1999 Site Data Sampling Results)				Comments
											Meth	(m)	(s)	Flow	(°C)	(µS)	Turb	Grad Class	Pattern Class	Size Class	% of reaches with fish captured	
	480-805000-06800		2	71	9/27/99	0.98	0.1	6.0	RB	S6	EF	120	154	M	7	170	C	2	S/S/I	S	1.1	No RB habitat - intermittent and extremely shallow over fines. Upper reach dry. Observed fan with no continuous channel in reach 1 - lacks connectivity. No suitable gravels for RB spawning, lacks sufficient instream cover for potential RB rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. ** Only 1 reach (of 93 surveyed - see Table 8) that contained fish in this category - ILP 52002 reach 1 (site 26) in 1997 inventory (ILP 52001 report), which flowed directly into a confirmed fish-bearing reach where RB were abundant. This reach had water, abundant cover, and gravels in the substrate, a channel width of 4.6m and Wb depth of 0.55m. Water in this stream during low flow period is supplied by large wetland complex u/s n reach 2.
	480-805000-17000		1	72	9/27/99	0.52	0.03	5.5	RB	S6	EF	115	106	L	7	180	C	2	S/S/I	S	1.1	No RB habitat - extremely small, shallow over fines with frequent sub flow. No suitable gravels for RB spawning, lacks sufficient instream cover for potential RB rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. ** Only 1 reach (of 93 surveyed - see Table 8) that contained fish in this category - ILP 52002 reach 1 (site 26) in 1997 inventory (ILP 52001 report), which flowed directly into a confirmed fish-bearing reach where RB were abundant. This reach had water, abundant cover, and gravels in the substrate, a channel width of 4.6m and Wb depth of 0.55m. Water in this stream during low flow period is supplied by large wetland complex u/s n reach 2.
		61755	2	74	7/10/99	0.78	0.17	13.8	RB	S6	EF	110	107	L	9	170	C	3	S/S/I	S	0	No RB habitat - small, shallow, moderately steep. Too steep, no suitable gravels for RB spawning, lacks sufficient instream cover for potential RB rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat.
		61755	3	75	7/10/99	NVC				NCD								1	S/S/I	S	0.8	No continuous channel bed - ditch runoff. Not a stream by FPC definition.

Table 9: Summary of data from surveyed non-fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Date	Cw (m)	Wb (m)	Grad (%)	Expected Species	FPC Class	Sampling Specs			Stream Conditions				Categorized Historical Information (1997 – 1999 Site Data Sampling Results)				Comments
											Meth	(m)	(s)	Flow	(°C)	(µS)	Turb	Grad Class	Pattern Class	Size Class	% of reaches with fish captured	
Twain C.	480-816400		4	77	9/27/99	8.93	0.7	2.5	CT RB	S5	EF	100	295	L	6	80	C	1	S/S/I	L	77.8	20m falls at end of reach 3 d/s block fish passage. No fish populations present above the falls. NFC in 5 sites above the falls.
Twain C.	480-816400		5	78	9/29/99	11.05	0.67	2.0	CT RB	S5	EF	110	294	M	6	70	C	1	S/S/I	L	77.8	20m falls at end of reach 3 d/s block fish passage. No fish populations present above the falls. NFC in 5 sites above the falls.
Twain C.	480-816400		6	79	9/29/99	9.27	0.77	4.0	CT RB	S5	EF	110	214	L	6	60	C	1	S/S/I	L	77.8	20m falls at end of reach 3 d/s block fish passage. No fish populations present above the falls. NFC in 5 sites above the falls.
Twain C.	480-816400		11	80	9/29/99	5.03	0.37	1.8	CT RB	S5	EF	135	247	M	6	30	C	1	S/S/I	L	77.8	20m falls at end of reach 3 d/s block fish passage. No fish populations present above the falls. NFC in 5 sites above the falls.
	480-816400-06800-04500		2	84	9/29/99	0.93	0.13	1.8	RB	S6				L				1	S/S/I	M	29.8	No RB habitat - channel totally dry. No fluvium - exposed fines - marginal FPC stream. No suitable gravels for RB spawning, lacks sufficient instream cover for potential RB rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. **Fish-bearing reaches in this category (64 of 215 surveyed - see Table 8) had CW>0.8m and Wb>0.17m. Substrate was either fines (in LC morphology) or gravels and cobbles. Cover was moderate to abundant and flow was either intermittent or permanent. Morphology was generally riffle-pool.

Table 9: Summary of data from surveyed non-fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Date	Cw (m)	Wb (m)	Grad (%)	Expected Species	FPC Class	Sampling Specs			Stream Conditions				Categorized Historical Information (1997 – 1999 Site Data Sampling Results)				Comments
											Meth	(m)	(s)	Flow	(°C)	(µS)	Turb	Grad Class	Pattern Class	Size Class	% of reaches with fish captured	
		61756	1	85	9/29/99	0.68	0.13	6.0	RB	S6				L				2	S/S/I	S	1.1	No RB habitat - channel totally dry. Channel bed is exposed fines , organics- marginal FPC stream. Channel moss-covered. No suitable gravels for RB spawning, lacks sufficient instream cover for potential RB rearing at higher flow. No potential overwinter habitat observed and no lakes/wetlands u/s in system to provide perennial habitat. ** Only 1 reach (of 93 surveyed - see Table 8) that contained fish in this category - ILP 52002 reach 1 (site 26) in 1997 inventory (ILP 52001 report), which flowed directly into a confirmed fish-bearing reach where RB were abundant. This reach had water, abundant cover, and gravels in the substrate, a channel width of 4.6m and Wb depth of 0.55m. Water in this stream during low flow period is supplied by large wetland complex u/s n reach 2.
		51711	1	86	9/27/99	NVC				NCD								3	S/S/I	S	0	Dry gully with no channel bed or banks. Not an FPC stream by definition.
	480-816400-26900		5	87	9/29/99	4.10	0.43	3.3	CT RB	S5	EF	195	349	M	7	50	C	1	S/S/I	L	77.8	20m falls at end of reach 3 in Twain C. d/s block fish passage. No fish populations present above the falls. NFC in 5 sites above the falls.

4.5.3 Follow-up Sampling Required

Table 10 on the following page summarizes the need for follow-up sampling in sampled reaches where fish presence has been inferred. The table doesn't include inferred fish-bearing reaches where fish presence was confirmed in upstream reaches. A level of confidence has also been included in the table to facilitate prioritization of the follow-up sampling process. Each reach has been assigned a priority number of either 1 or 2 where,

- **Priority 1:** unlikely fish use (marginal fish habitat at any time of year or isolated by obstruction with insufficient sampling to confirm a non fish-bearing status)
- **Priority 2:** likely fish use (fish habitat available or potentially available and easily accessible from confirmed or inferred fish-bearing reaches)

The interpretive maps reflect this prioritization process. A dashed blue line has been used to indicate that fish presence has been inferred but that fish absence is suspected in that reach. Priority 1 reaches fall within this criteria. A dashed red line has been used to indicate that fish presence has been inferred and is considered likely. Priority 2 reaches fall within this criteria.

Not all inferred fish-bearing reaches have been designated for follow-up sampling. Reaches where the inferred fish-bearing designation is considered unlikely to change, regardless of the results of the follow-up sampling (i.e. habitat available and easily accessible), have not been placed in this table. Rather, the follow-up sampling is intended to focus on those streams where potential habitat exists and must be evaluated during a different time of year, and those streams where sampling conducted was considered to be insufficient to classify the reach as non-fish bearing.

It is anticipated that follow-up sampling in Priority 1 reaches will result in a confirmation of fish absence in a reach, while sampling in Priority 2 reaches have a high probability of confirming fish presence. However, some discretion should be used in the follow-up sampling process. In some reaches, sampling conditions were not conducive to the capture of fish and more successful attempts at sampling may be made in bordering reaches that weren't sampled but may offer better habitat and thus a better probability of confirming fish presence in the system.

Table 10: Follow-up sampling required for classification of inferred fish-bearing reaches in the Pierre/Twain Sub-units

Stream Name	Watershed Code	ILP	Reach	Site	Timing	Method	Priority	Comments
	480-793000-13100		3	12	June/July	EF	1	Determine u/s distribution limit for CO/RB. Sample reach 2.
	480-802100-03500		1	28	June/July	EF	1	Determine rearing habitat suitability for RB and u/s distribution limit.
	480-802100-03500		2	29	June/July	EF	1	Determine rearing habitat suitability for RB and u/s distribution limit.
		61735	2	34	June/July	EF	1	Determine rearing habitat suitability for CT.
	480-802100-66400		5	42	June/July	EF	1	Determine u/s distribution limit for CT. Sample reach 6.
		60715	7	46	June/July	EF	1	Determine rearing habitat suitability for CT and u/s distribution limit
		60800	2	50	June/July	EF	1	Determine u/s distribution limit for CT. Sample reach 1.
		70751	1	62	June/July	EF	1	Determine u/s distribution limit for CT. Sample reach 1.
	480-805000		3	67	June/July	EF	1	Determine rearing habitat suitability for RB.
	480-816400-06800		3	83	June/July	EF	1	Determine RB presence/absence above falls obstruction at the end of reach 2. Sample reach 2.1.
Kew C.	480-793000		3	6	June/July	EF	2	Determine spring rearing habitat suitability for CO/RB.
	480-802100-16400		2	31	June/July	EF	2	Determine u/s distribution limit for CT. Sample reach 1.
		60736	1	48	June/July	EF	2	Determine rearing/spawning habitat suitability for CT.
		70735	1	58	June/July	EF	2	Determine rearing habitat suitability for CT.
		70742	1	59			2	Determine rearing/spawning habitat suitability for CT. Sample reach 2.
		61755	1	73			2	Determine spring rearing habitat suitability for CO/RB.

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6. List of Appendices

Appendix I: FDIS Reach/Site Summary, Site Card and Fish Form Reports and Representative Photographs

Appendix II: Hardcopy maps

**Reconnaissance (1:20,000) Fish and Fish Habitat
Inventory**

Pierre and Twain Sub-units Fish Inventory - 1999

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