
FRBC RESOURCE INVENTORY PROGRAM

1:5,000 Scale Fish Stream Identification

**Unnamed Tributaries to Ootsa Lake (WSC
180-678300 to 180-770900)
and the Cheslatta River (WSC 180-545300)**



TRITON

Environmental Consultants Ltd.

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Prepared for:

Fraser Lake Sawmills
A Division of West Fraser Mills Ltd.
P.O. Box 100
Fraser Lake, B.C., V0J 1S0

Prepared by:

Triton Environmental Consultants Ltd.
413 Campbell Street
Nanaimo B.C., V9R 3G8

June 1998



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Environmental Consultants Ltd.

Project Reference Information

FDIS Project Number: 06-CHES-3089-0001-1998
MELP Project or Contract Number: CSK3089-FLSM
FRBC Project Number: SB97115-1IN
Name of subcontractors: n/a
Project Manager: Scott Northrup, R.P.Bio.
Field crew: Jason Harris/Stephanie Von Westarp
Data entry by: Jason Harris
Report prepared by: Jason Harris
Report edited by: Scott Northrup, R.P.Bio.
Voucher species ID: Jason Harris
GIS analysis by: David Warburton
Water analysis by: n/a
Fish aging by: n/a

Watershed Information

Watershed Name: Ootsa Lake; Cheslatta River
Watershed Code: 180-000000
180-545300
UTM at Mouth: n/a
Watershed Area: n/a
Total Stream Length: 63 km
Stream Order: 4
NTS Map No.'s: 93 L/3; 93 L/4; 93 L/5
TRIM Map No.'s.: 93L.022; 93L.023; 93L.033
Biogeoclimatic Zone: SBS
Aerial Photographs: BCC89040: 117-186; BCC89047: 103-128;
BCC89061: 191-194; BCC89065: 200-225;
BCC89069: 212-280; BCC89071: 246-249;
BCC89074: 16

Sampling Design Summary

Total Number of Reaches: 67
Total Sample Sites: 67
Random Sample Sites: 0
Discretionary Sites: 67
Field Sampling Dates: August 29 - September 9, 1997
Fish Species Captured During Survey: RB
Fish Species Present in Watershed: CAS, CO, CT, DV, LNC, MW, RB,
RSC, ST

Disclaimer

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

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

Acknowledgements

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LIST OF ATTACHMENTS AVAILABLE AT MELP REGIONAL OFFICE

1. Project Overview Map
2. Inventory Maps
3. Distribution Maps
4. Photograph CD
5. Indexed Slides
6. Voucher Specimens

1.0 INTRODUCTION

Triton Environmental Consultants Ltd. (Triton Nanaimo) was retained by Fraser Lake Sawmills (FLSM) to conduct a 1:5,000 Scale Fish Stream Identification Project in the Ootsa watershed. The area of inventory included tributaries to Ootsa and Cheslatta Lakes.

The project commenced as a result of a Forest Renewal of British Columbia (FRBC) initiative to describe watershed-wide fish distribution and habitat characteristics for sub-basins (in the Fraser Lake Sawmills TSA) within the Ootsa watershed. The inventory was intended to provide information regarding stream classification, fish species characteristics, distributions and relative abundance, as well as stream reach biophysical data for interpretation of habitat sensitivity and capability for fish production (Anonymous 1997a). The results of the inventory may be applied to initial Riparian Management Area (RMA) classification for forest development planning and watershed restoration and for the establishment of some landscape-level biodiversity objectives (Anonymous 1997a).

1.1 Study Objectives

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

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

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

2.0 STUDY AREA

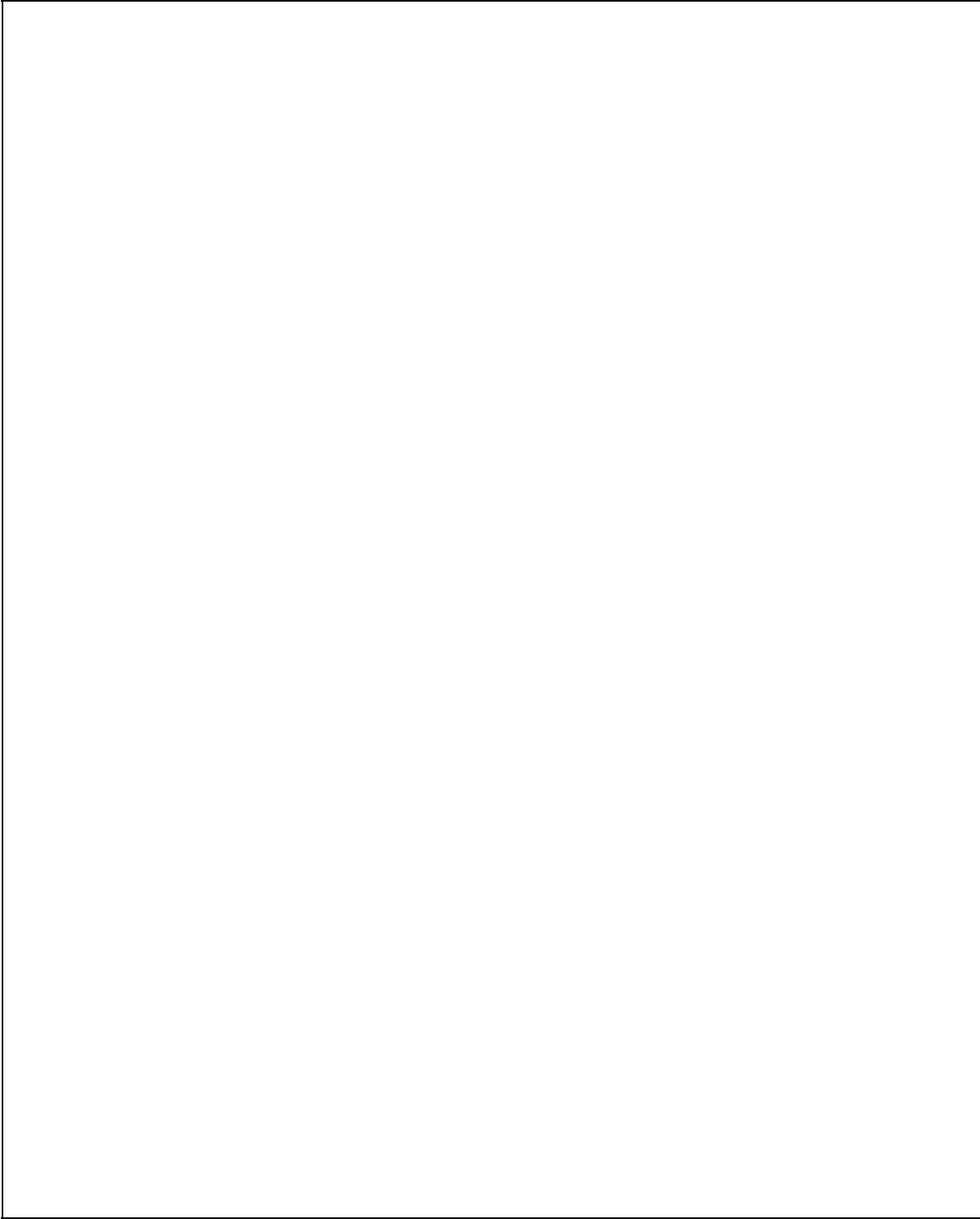
2.1 Location

The Ootsa watershed is situated in the sub-boreal interior eco-province located east of the Coast Mountains and west of the Interior Plains (Demarchi, 1996). The sub-boreal eco-province extends northwest from the low lying plateau of the Nechako lowlands, the northern portion of the Nechako Plateau, and the southern portion of the Rocky Mountain Trench; east to include the Skeena and Omineca Mountains as well as the Hart Ranges, and south to the Muskwa and McGregor Ranges (Demarchi, 1996). The study area lies in the flat lowlands and rolling uplands of the Fraser Basin ecoregion, in the Babine Upland eco-section (Demarchi, 1996). The biogeoclimatic zonation for the study area is Sub-boreal Spruce (Demarchi, 1996).

Demarchi (1996) describes the climate within the sub-boreal interior eco-province:

Prevailing westerly winds bring Pacific air to the area over the Coast Mountains by way of the low Kitimat Ranges or the higher Boundary Ranges. Much of this area is in a rain shadow. Summer surface heating leads to convective showers, and winter frontal systems result in precipitation that is evenly distributed throughout the year.

Stream sampling was conducted south of Cheslatta Lake and north of the Intata Reach of Ootsa Lake. The majority of sample sites were accessed via Ootsa Camp on the north shore of Intata Reach. Ootsa Camp is accessed via the Marilla Main which originates south of Fraser Lake Sawmills on Highway 16. Travel distance along the Marilla Main to Ootsa Camp is approximately 120 km southwest of the access point on Highway 16.



Source: British Columbia Recreational Atlas, 1993.

Figure 1. Ootsa inventory area location map.

3.0 METHODS

The 1:5,000 Scale Fish Stream Identification inventory was completed in six phases:

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

The methods employed for each phase of the project followed those outlined in the *Reconnaissance Fish and Fish Habitat Inventory: Standards and Procedures, June 1997* (Anonymous 1997a).

3.1 Phase 1: Existing Data Review

Phase 1 involved a review of pertinent fisheries information and the production of interim maps to provide background information necessary for the planning phases of the inventory. Relevant stream and lake inventory reports, files, maps, summaries and aerial photographs were obtained from MELP Region 6 and Region 7, the Pacific Biological Station (PBS) (Canada Department of Fisheries and Oceans (*DFO*)) and from Fraser Lake Sawmills.

The review also included the following information sources:

- Fisheries Information Summary System (FISS) database (DFO)
- Stream Information Summary System (SISS) database (MELP)
- 1: 50 000 National Topographic Series (NTS) maps
- Aquatic biophysical inventory maps (MELP)

- Stream classification maps/reports (Fraser Lake Sawmills)
- 1:20 000 Terrain Resource Information Management (TRIM) maps
- 1:5 000 Block Layout Maps (Fraser Lake Sawmills)
- Licensee Forest Cover maps (1:20 000 scale) (Fraser Lake Sawmills)
- Forest Development Plan maps (1: 20 000 scale) (Fraser Lake Sawmills)
- Aerial photographs (1: 20 000 scale) (Fraser Lake Sawmills)
- Overview, Level 1 and Level 2 Fish Habitat Assessment (Watershed Restoration Projects (WRP)) (MELP)
- Other inventory and consultant reports
- BC Conservation Data Centre (CDC) summaries.

Background information obtained from these sources included:

- known fisheries values within the study area
- known reach designations
- known locations of obstructions to fish migration
- known areas of sensitive fish habitat
- identification of areas requiring priority assessment
- location of suitable access points.

A list of persons contacted and a bibliography of information sources was compiled (Appendix I and II).

The FISS database was the first information source reviewed and this data was plotted on 1:20 000 scale TRIM maps. Subsequent to the preparation of these maps other information sources were examined.

TRIM based, 1:20 000 Interim maps were produced by combining existing drainage information from TRIM maps, Forest Cover maps and Forest Development Plan maps. All waterbodies, including lakes, wetlands and streams in the study area were identified.

Interim Locator Points (ILPs) were assigned to each watercourse/waterbody which had not previously been assigned a watershed code or waterbody identifier. Universal Trans Mercator (UTMs) coordinates were recorded manually from the TRIM maps.

Numeric identifiers (NIDs) were assigned to features identified during the Phase I review and plotted on interim maps (NID is a unique number that links features and information on interim maps to the FDIS database to allow for quick data referencing).

Phase 1 deliverables included:

- list of contacts (Appendix I)
- bibliography of references used (Appendix II)
- FISS data maps and data compilation forms
- Interim maps
- ILP data sheets
- Phase 1 completion report (Appendix III).

All of the above items were submitted to Doug Reid (contract monitor, Van Dolah Enterprises Ltd.) upon completion.

3.2 Phase 2: Map and Air Photo Analysis

Phase 2 involved detailed map and aerial photograph interpretation. Watershed characteristics (stream order, stream magnitude and basin type) for all streams in the study area were recorded in a basin classification table.

The map interpretation also included waterbody identification. The following definitions were used to determine the grouping of streams, lakes and wetlands:

- **stream:** a watercourse having an alluvial sediment bed, formed when water flows on a perennial or intermittent basis between continual definable streambanks (*FPC Riparian Management Area Guidebook, Dec. 1995*) (Anonymous 1995b).
- **lake:** an open body of water with a depth greater than 2 m and with less than 25 % of its surface area covered with wetland vegetation (*Reconnaissance Fish and Fish Habitat Inventory, Standards and Procedures*) (Anonymous 1997a).
- **wetland:** defined as an area where the water table is at, near or above the surface, or where soils are water saturated for a sufficient length of time so that excess water and resulting low oxygen are the principle determinants of vegetation and soil development (*Reconnaissance Fish and Fish Habitat Inventory, Standards and Procedures*) (Anonymous 1997a).

Maps and air photos were also used to determine reach breaks for all streams within the project area. Reach breaks were determined using the following key characteristics:

- channel pattern
- confinement
- gradient
- streambed and bank materials.

For survey purposes, lakes and wetlands were treated as individual reaches. Stream reaches were numbered sequentially upstream. Each reach break was subsequently assigned a NID.

The following reach characteristics were recorded in a Reach Table for each reach, on every stream within the project area:

- order

- gradient
- channel pattern
- confinement
- anastamosing/braided channel
- basin type
- wetland
- features known to occur within the reach.

Once the reach table was completed the reaches to be sampled were identified and plotted on interim maps. Sample site selection was discretionary based on one or more of the following:

- proximity of stream reach to identified cutblocks
- site selection above and below barriers
- selection of sites to establish connectivity between sub-basins to determine fish utilization and that identify the upstream limits of fish distribution
- to ensure that all basin types and basin connectivities were adequately represented.

Reach forms (a map/air photo based recording form designed to capture the physical information required to characterize a stream reach) were completed for each of the sample sites (Appendix V).

Forms were also completed for reaches identified as lakes identified for sampling by FLSM. Lakes were designated as primary or secondary lakes based on their location and connectivity within watersheds and basin type, lake class and lake group were recorded on lake forms. Primary lakes play a dominant role in the watershed and generally possess the physical characteristics that are representative of most of the lakes within a group of lakes (Anonymous 1997a). Primary lakes often have the largest surface areas and/or are central in a cluster or chain of lakes (Anonymous 1997a).

The following deliverables for Phase 2 were submitted to the contract monitor:

- Basin Classification sheets
- Reach tables
- Lake tables
- Reach forms
- Phase 2 Completion Report.

The Phase 2 Completion report is included in Appendix III and Reach Forms are included in Appendix V.

3.3 Phase 3: Sampling Design and Project Plan

A project plan for the field portion of the project was developed and presented to the contract monitor. The project plan outlined the approach to be applied in field sampling, data collection and reporting, and an estimate of the time and cost required to conduct the inventory was provided. Sample sites identified in Phase 2 were reviewed with the contract monitor, MELP Fisheries Inventory Specialist and Triton's project manager and modified accordingly.

The following deliverables were submitted to the contract monitor:

- Fish sampling strategy for the inventory area
- Budget requirements for Phase 4
- Project plan for Phases 4 to 6 (Appendix IV)
- Phase 3 completion report (Appendix III)

3.4 Phase 4: Field Data Collection

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

3.4.1 Pre-field Preparation

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

3.4.2 Field Procedures

Field work was conducted by a field crew, consisting of two people. In watersheds where road access was available, the crew used a 4X4 crew cab to travel from site to site and in watersheds where road access was unavailable transportation was provided by a Bell Jet Ranger helicopter.

Each crew was equipped with the following:

- Smith-Root Model 12A backpack electrofisher
- electrofisher safety gear (leak proof waders, wading belts, Linesman's gloves, hat)
- minnow traps and bait
- backpacks
- clinometer
- compass
- hip chain
- 50 m tape
- metre stick
- VHF radio
- first aid kit

- water quality kit (hand held pH and conductivity meters)
- thermometer
- floating chip
- stop watch
- Canon waterproof camera and slide film
- voucher specimen container
- MELP Site cards
- MELP fish collection cards
- Triton photodocumentation forms
- field maps

3.4.3 Fish Species Sampling

Fish sampling efforts focused on reaches identified by FLSM corresponding to stream reaches potentially affected by forest planning and harvesting activities and followed procedures outlined in the *Reconnaissance Fish and Fish Habitat Inventory: Standards and Procedures*, (Anonymous 1997a) and the *Forest Practices Code Fish Stream Identification Guidebook*, (Anonymous 1995a). A minimum of 100 m of stream length or a length equal to 10 bankfull widths (whichever was greater) was sampled at sample site.

Fish presence, relative abundance and species diversity were evaluated by electroshocking at least 100 linear meters of representative habitat. In areas not suited for electroshocking (deep pools and wetlands) and where return visits were practical, minnow traps baited with salmon roe were set and allowed to soak for a 24 hour period. Visual observations and angling were also used to document the presence of fish.

The following were collected and recorded on Fish Collection Forms at each sample site:

- species (identified using RIC's Field Key to Freshwater Fishes of BC).

- fork length (measured to the nearest mm)
- life-cycle stage
- a representative sample of any abnormal or unidentified fish or species of fish was preserved and submitted to the contract monitor.

Follow-up sampling was recommended (if necessary) for specific sites within the study area. A written explanation detailing the areas of concern, the initial results of the survey and recommendations from the survey crew were composed and summarized in the Additional Sampling Recommendations table (Table 3).

For all reaches with non-fish bearing classifications a written explanation (Non-Fish Bearing Status Table) (Table 4) was completed. The explanation focused on sampling methods utilized during the field program and included a summary of sampling effort, water quality parameters (conductivity and turbidity) and habitat characteristics.

3.4.4 Habitat (Site) Description

A site description was completed on Site Description forms for each reach (at fish sampling sites). The length of each sample site was between 100 and 300 m, or 10 bankfull widths (whichever was greater). The following data were collected at each sample site:

- site length (m)
- stream gradient (%)
- six individual channel width measurements (m)
- six individual wetted width measurements (m)
- six residual pool depth measurements (m)
- three individual bankfull depth measurements (m)
- flood signs (visual observation)
- water temperature (°C)

- pH
- conductivity (μs)
- turbidity (visual observation)
- total instream cover for fish (%)
- individual instream cover types for fish(%)
- presence of large woody debris (LWD)(visual observation)
- distribution of LWD (visual observation)
- crown closure (visual observation (%))
- shape of left and right stream bank (visual observation)
- texture of stream banks (visual observation)
- riparian vegetation on left and right stream banks (none, grass, shrub, conifer, mixed, deciduous and wetland)
- stage of riparian vegetation (Initial, Shrub, Pole sapling, Young Forest, Mature Forest)
- composition of bed material (dominant and subdominant)
- D95 (cm)
- D (cm)
- channel morphology (riffle/pool, step/pool, cascade/pool)
- presence of disturbance indicators
- channel pattern (tortuous/irregular meandering, meandering, sinuous, straight)
- occurrence of islands and bars
- channel coupling (coupled, decoupled, partially coupled)
- channel confinement (entrenched, confined, occasionally confined, unconfined, not applicable)
- presence of features
- habitat type and quality rating (poor, fair, moderate, good)
- identification of fisheries sensitive zones (FSZ's)
- photo documentation
- wildlife observations
- comments

3.4.5 Wildlife Observations

Wildlife observations were noted and specific details recorded on the Site Cards. Aquatic invertebrates and macrophytes were described and field identified to Order and Family. Photographs were taken for further documentation and confirmation.

3.4.6 Photographic Documentation

Photographs were used to provide extensive visual records at each sample site; at least two photographs (upstream/downstream perspective) were taken at each sample site. In addition, photographs were taken of key areas of interest (*e.g.*, migration barriers, major erosion sites, fish samples, riparian conditions and any other unique features).

The photographs were documented accordingly on Site Cards, Fish Collection Cards and Photodocumentation Forms. Thumbnail photographs of each reach, features and fish captured are presented in Appendix VI. Project slides and an accompanying Compact Disk file are presented in a separate bound document.

3.4.7 Field Data Compilation

Immediately following each field day, the field crew met in the field office to compile field notes, review field data and summarize the field findings on hard copy maps. This system ensured that all field information was thoroughly documented while field work was still fresh with the crew and allowed for preliminary classifications to be available as required.

3.4.8 Phase 4 Deliverables

The following deliverables were submitted to the contract monitor:

- Site Forms
- Fish Collection Forms
- Phase 4 completion reports.

The Phase 4 completion report is included in Appendix III. The Site Forms and Fish Collection Forms are presented in appendices VII and VIII.

3.5 Phase 5: Data Compilation

Phase 5 was comprised of data entry (Site and Fish Collection Forms) into the MELP FDIS database. Interim locator points (ILPs) submitted during Phase 1 were converted to watershed codes and NID's were converted to UTM coordinates for mapping and georeferencing purposes. Photographs taken during the field portion of the project were developed, captioned and coupled with Site Cards and indexed in referenced binders.

Deliverables for Phase 5 included:

- electronic versions of the Reach Forms
- electronic versions of the Site Cards
- electronic versions of the Fish Collection Forms
- Photodocumentation indices
- Indexed photographic slides
- FISS update maps and data forms
- Phase 5 completion report.

The Phase 5 completion report is included in Appendix III and the indexed slides were included in a separate binder.

3.6 Phase 6: Reporting and Mapping

The final report and maps for all sub-basins in the study area were developed following the format outlined in Chapter 5 of the *Reconnaissance Fish and Fish Habitat Inventory: Standards and Procedures* (Anonymous 1997a).

3.6.1 Reporting

The final report is a summary of background information and a discussion of problems and concerns with the implementation of the phased approach taken to conduct the inventory. The report focused on descriptions and justifications for non-sampled reaches, non-fish bearing reaches and reaches that require additional sampling.

3.6.2 Mapping

All maps were produced using the GIS software program ARC/INFO. The final maps that were produced included:

- Draft Project Overview map
- Draft Inventory maps
- Draft Distribution maps
- Hardcopies Final Project Overview, Inventory and Distribution maps
- Digital copies Final Project Overview, Inventory and Distribution maps.

3.6.3 Phase 6 Deliverables

The deliverables for Phase 6 included:

- Draft Project Overview map
- Draft Inventory maps
- Draft Distribution maps
- Hardcopies Final Project Overview, Inventory and Distribution maps
- Digital copies Final Project Overview, Inventory and Distribution maps
- Draft Final Report
- Hardcopies Final Report
- digital copies Final Report
- Photo CD's
- Phase 6 Completion Report.

4.0 RESULTS

4.1 Existing Information

Background and existing information for the streams surveyed during the inventory was very limited. FISS (1989) information was plentiful for systems such as the Nechako Reservoir and the Cheslatta River. FISS (1989) did not identify streams included in the study area as sustaining fish. Stream classification reports conducted in 1996 by Fraser Lake Sawmills (Tripp, 1996) indicated that rainbow trout (*Oncorhynchus mykiss*) were present in some small stream systems in the area. No specific information for the streams included in the inventory was obtained. Anecdotal information (Tom Olafson, FLSM, pers. comm.) and historic lake file information (Paul Giroux, FIS, MELP Smithers, pers. comm.) identified the presence of rainbow trout in Robison Lake. This was not confirmed within the context of the survey, although fish were captured in stream reaches downstream of the lake.

4.2 Survey Information

Table 1 provides an overview of the survey information compiled for to the fish stream identification in the East Ootsa Operating area for Fraser Lake Sawmills.

Table 1. Summary Survey Information

Major Watershed Codes	180-678300-00000 180-681600-00000 180-684900-00000 180-688900-00000 180-692900-00000 180-701796-00000 180-705252-00000 180-707179-00000 180-707500-00000 180-770900-00000 180-545300-00000		
Watershed Names	Unnamed Tributaries to Ootsa Lake Unnamed Tributaries to the Cheslatta R. (180-545300)		
TRIM Maps:	93E.080; 93F.062; 93F.063; 93F.053; 93F.054		
Total Number of Lakes:	4 (separate lakes reports)		
Total Stream Length:	63 km		
Total Number of Reaches:	79		
Stream Field Sampling Dates:	August 29 - September 9, 1997		
Number of Reaches/Sites Sampled:	67		
Total Number of Sample Sites Along Cutblock Boundaries	67		
Fish Capture Summary:			
Stream Name	Stream Identifier	Reach #	Species
Unnamed	180-545300-53500-35307	1	RB
Unnamed	180-545300-53500-63106	1	RB
Unnamed	180-545300-62800-72710	1	RB

Note: RB = rainbow trout

4.3 Field Data

4.3.1 Site Cards

Site Cards and Reach Forms were entered into MELP's FDIS database following the completion of Phase 4. Reach Forms and Site Cards presented in appendices V and VII respectively.

4.3.2 Fish Collection Cards

The Fish Collection Cards were entered into MELP's FDIS database following the completion of Phase 4. Hardcopy of the Fish Collection Cards are presented in Appendix VIII.

4.4 Survey Comments

4.4.1 Problems

The streams identified to inventory were readily accessible and all sites were accessed either by 2WD vehicle or helicopter. Crews were located at either the FLSM Ootsa Camp or in Vanderhoof. Drive sites were generally accessed along FLSM's Marilla or Deerfoot mains and spur roads originating along these mains. Helicopter sites included those areas that did not have existing logging roads (ie. 180-770900 on the south side of Ootsa Lake). Helicopter sites were accessed from Vanderhoof and flight times to sample sites were generally less than 20 minutes in duration.

Small, first order streams, selected for sampling were often indistinguishable in the field and were described as No Visible Channel (NVC). In most cases these first order streams did not have alluvial channels and were likely intermittent spring run-off channels (created by snow melt). The majority of first order streams (those described as streams) were dewatered or sustained very low water levels at the time of survey. Fish species sampling could not be conducted in many of these dry reaches.

4.4.2 Fish Comments

Fish species were captured in 3 of 67 sample locations. The following table (Table 2) provides a summary of the reach number and order of the streams sampled.

Table 2. Summary Of Fish Captured in the FLSM Inventory Area

Stream Name/Identifier	Site Number	Reach Number	Fish Species	Mean Fork Length (mm)
180-545300-53500-35307	17/18	1/2	RB	65
180-545300-53500-63106	65	1	RB	100
180-545300-62800-72710	46	1	RB	290

Note: RB= rainbow trout

The locations where fish were captured generally were characterized as having headwater lakes or were third order stream systems. Many first order streams and stream reaches were heavily dependent on snow melt and likely only contain water for a short period of the year. Rainbow trout captured were described as maturing or mature adults with a fork length range of 60-290 mm. A 290 mm mature adult was captured in an isolated pool in Reach 1 of an unnamed tributary (180-545300-62800-72710) to the creek that flows from Robison Lake to Enz Lake. The size of this fish suggests that it may be lake dwelling fish (adfluvial spawner) that has become stranded as water levels drop in the intermittent system. The majority of rainbow trout captured were maturing adults in the 60-120 mm range. These fish are likely stream populations that utilize mainstem systems that sustain sufficient flows throughout the season.

4.4.3 Habitat Comments

The study area is situated on a large plateau and was characterized by low gradient streams and gullies and numerous wetlands and low-lying boggy areas. Fish distribution is likely limited to 3rd order or higher stream reaches and large lakes for the majority of the year.

Gradient and physical barriers were typically associated with small stream systems that drain directly into the Nechako reservoir/Ootsa Lake system although very few gradient barriers and physical barriers (chutes, falls) were identified. The majority of barriers identified were beaver dams. Access for fish was provided through most systems from stream confluences to headwater areas.

The limiting factors for fish distribution in the system are the seasonality of water supply and a lack of habitats usable by fish. Many streams identified without barriers were dewatered (intermittent) during the survey. These streams or stream reaches likely only sustain flows for a short period of time during runoff from snow packs. They generally possessed small channel widths (<1.0 m), fine substrates and abundant instream and overstream vegetation. Habitat characteristics important to fish (pools, boulders, cutbanks etc.) were lacking in these systems.

4.4.4 Additional Sampling Recommendations

Twelve (12) of the 67 sample sites were identified for additional or follow-up sampling in the inventory area. A summary of sampling effort, water quality and flow characteristics, seasonal habitat availability, the known presence of fish upstream/downstream, the location of any barriers to migration and recommendations for second trial sampling is presented in Table 3.

Table 3. Ootsa Inventory Area Additional Sampling Recommendations

Site Number	ILP Number	Reach Number	Date Sampled	Time Sampled	Area Covered (m)	EF Seconds	EF Settings (Volts, Pulse Frequency)	Water Temp. (deg. Celcius)	Conductivity	Flow Stage (VO)	Turbidity	Habitat Comments	Known Fish Presence (U/D)	Obstruction(s) to Fish Migration	Seasonal Habitat Availability	Second Trial Sampling Recommendations
33	56	1	30/08/1997	13:00	470	NS	NA			L		poor habitat conditions	unknown	NI	S/S	should determine presence/absence downstream for classification purposes. (EF) S4 by default
34	57	1	30/08/1997	11:30	1250	NS	NA			L		poor habitat some puddles present (swampy)	unknown	NI	S/S	should determine presence/absence downstream for classification purposes. (EF) S4 by default
36	40	8	30/08/1997	14:40	700	840	300,5,I	14	70	M	L	habitat available but possibly inaccessible	unknown	BD	S/S	Spring sampling in DS Reaches should be conducted to determine fish presence and to determine the location of barriers (EF)
37	40	9	30/08/1997	14:00	240	385	300,5,I	12	70	M	L	wetland with heavy beaver activity	unknown	BD	S/S	Spring sampling in DS Reaches should be conducted to determine fish presence and to determine the location of barriers (EF)
38	40	10	30/08/1997	12:00	225	1100	400,5,I	13	70	L	L	wetland with heavy beaver activity	unknown	NI	S/S	Spring sampling in DS Reaches should be conducted to determine fish presence and to determine the location of barriers (EF)
35	40	7	30/08/1997	15:15	100	720	300,5,I	10	70	M	L	wetland with heavy beaver activity	unknown	BD	S/S	Spring sampling in DS Reaches should be conducted to determine fish presence and to determine the location of barriers (EF)
4	1	2	06/09/1997	13:35	400	56	400,5,D	11	70	L	C	poor rating for habitat quality	unknown	NI	S/S	determine if stream is accessible to fish from DS fish bearing waters (EF)
16	115	8	04/09/1997	14:14	500	580	400,5,I	11	60	L	L	limited habitat potential	unknown	NI	S/S	Spring sampling in DS Reaches should be conducted to determine fish presence and to determine the location of barriers (EF)
15	42	1	28/08/1997	16:45	400	250	300,5,I	15	60	M	M	limited habitat	unknown	CV	S/S	Culvert may have altered streams natural course follow-up sampling should be conducted during the spring to assess fish usage
49	45	2	29/08/1997	12:45	275	NS	NA	10	220	L	L	limited habitat potential	unknown	CV	S/S	determine accessibility from DS fish bearing waters classified S4 by default
44	63	10	31/08/1997	17:30	200	NS	NA			INT		limited habitat	RB	CV/BD	S/S	anecdotal information suggests that rainbow trout are present U/S (Robison Lake)
45	63	11	31/08/1997	12:00	800	237	300,5,I	10	30	L	C	limited habitat	RB	CV/BD	S/S	anecdotal information suggests that rainbow trout are present U/S (Robison Lake)
NS= not sampled, NA= not applicable; L= low flow, INT.= intermittent flow, DW= seasonally dewatered, M= moderated flow; C= clear, L= slightly turbid, M= moderately turbid; RB= rainbow trout, KO= kokanee, RSS= red side shiner, MW= mountain whitefish; NI= none identified, BD= beaver dam, CV= culvert, FLD= seasonal barrier, F= falls, G= gradient; S/S= spring /summer utilization, W= winter utilization,N= none, U= unlikely																
*All sample sites were surveyed open and Smith Root electroshockers, Model 12A or 12B were used																

4.4.5 Non-Fish Bearing Status

A non-fish bearing status was assigned to 45 of the 67 sample sites in the inventory area. A summary of the sampling effort, water quality and flow characteristics, habitat quality, the known presence of fish upstream/downstream, the location of any barriers to migration, seasonal habitat availability and comments on the potential for seasonal fish use are provided in Table 4.

Table 4. Ootsa Inventory Area Non-Fish Bearing Status

Site Number	ILP Number	Reach Number	Date Sampled	Time Sampled	Area Covered (m)	EF Seconds	EF Settings (Volts, Pulse Frequency)	Water Temp. (deg. Celcius)	Conductivity	Flow Stage (VO)	Turbidity (VO)	Habitat Comments	Known Fish Presence (U/D)	Obstruction(s) to Fish Migration	Seasonal Habitat Availability	Seasonal Fish Use
5	2	1	06/09/1997	13:06	800	132	400,5,I	9	140	L	C	no fish habitat, intermittent	U	NI	N	subsurface flows, difficult access, overgrown
18	132	2	04/09/1997	17:00	400	637	300,5,I	13	30	L	L	no fish habitat, winter kill	U	NI	N	fish subject to winter kill
6	36	1	05/09/1997	8:45	500	NS	NA			L		dry, no fish habitat	U	NI	N	none
9	31	6	05/09/1997	9:22	550	NS	NA			L		dry, vegetation choked	U	NI	N	none
8	31	5	05/09/1997	9:40	600	237	400,5,D	8	90	L	T	low DO, intermittent	U	NI	N	none
7	31	4	05/09/1997	10:00	450	NS	NA			L		dried out channel, vegetation choked	U	NI	N	none
47	91	2	31/08/1997	16:30	750	NS	NA			L		vegetation choked, dry	U	NI	N	none
48	91	4	31/08/1997	15:45	250	NS	NA			NVC		no visible channel	U	NI	N	none
32	221	1	03/09/1997	17:28	800	NS	NA			L		no fish habitat, intermittent, overgrown	U	NI	N	none
29	17	3	03/09/1997	16:24	250	NS	NA			L		gully run-off	U	BD, Lake	N	anoxic lake creates winter and summer kill
54	48	1	29/08/1997	9:06	500	NS	NA			INT		channel is difficult to distinguish	U	NI	N	none
50	45	5	29/08/1997	6:30	200	NS	NA			INT		dry, overgrown	U	NI	N	subsurface flows, difficult access, overgrown
51	45	6	29/08/1997	7:52	550	NS	NA			INT		dry, overgrown	U	NI	N	subsurface flows, difficult access, overgrown
52	47	2	29/08/1997	10:40	400	480	300,5,I	10	70	INT	L	likely a spring run-off channel	U	NI	N	none
53	47	3	29/08/1997	10:00	700	NS	NA			INT		poor habitat quality rating, spring run-off	U	NI	N	none
56	92	16	02/09/1997	19:00	250	243	400,5,I	10	50	INT	L	standing water, low DO	U	NI	N	subsurface flows, difficult access, overgrown
55	92	15	02/09/1997	19:30	200	NS	NA			INT		dry cobbly channel, poor habitat	U	NI	N	none
57	92	17	02/09/1997	17:35	500	NS	NA			INT		limited habitat potential	U	NI	N	none
58	92	18	02/09/1997	13:00	650	NS	NA			INT		wetland area, heavily overgrown	U	NI	N	none
59	111	1	02/09/1997	15:52	150	NS	NA			INT		dried out, subsurface flows	U	NI	N	none
60	114	1	02/09/1997	18:30	300	NS	NA			INT		no distinct channel, heavily overgrown	U	NI	N	none
61	114	2	02/09/1997	18:00	450	NS	NA			DW		subsurface flows from wetland area	U	NI	N	none
26	13	1	03/09/1997	13:40	400	NS	NA			NVC		channel difficult to distinguish	U	NI	N	none
27	13	2	03/09/1997	12:20	400	NS	NA			NVC		no alluvial channel, only saturated soils	U	NI	N	none
23	197	1	06/09/1997	10:41	650	NS	NA			INT		poor habitat quality rating	U	NI	U	none
67	197	2	06/09/1997	11:05	300	NS	NA			INT		poor habitat, dry, overgrown	U	NI	N	none

NS= not sampled, NA= not applicable; M= moderate flow, NVC= no visible channel, L= low flow, INT.= intermittent flow, DW= seasonally dewatered; C= clear, T= turbid; NI= none identified, CV= culvert, F= falls; N= none, U= unknown, BD= beaver dam, G= gradient; RB= rainbow trout, KO= kokanee, MW= mountain whitefish; UL= upstream of lake, DL= downstream of lake, U= upstream of confluence

Table 4. Ootsa Inventory Area Non-Fish Bearing Status

Site Number	ILP Number	Reach Number	Date Sampled	Time Sampled	Area Covered (m)	EF Seconds	EF Settings (Volts, Pulse Frequency)	Water Temp. (deg. Celcius)	Conductivity	Flow Stage (VO)	Turbidity (VO)	Habitat Comments	Known Fish Presence (U/D)	Obstruction(s) to Fish Migration	Seasonal Habitat Availability	Seasonal Fish Use
22	128	6	06/09/1997	9:00	650	720	300,5,I	8	30	L	L	wetland area	U	NI	N	unlikely
39	58	2	30/08/1997	10:45	570	NS	NA			INT		no habitat, heavily braided, swampy	U	NI	N	none
40	59	2	30/08/1997	16:30	400	NS	NA			INT		no habitat, heavily braided, swampy	U	NI	N	none
41	59	3	30/08/1997	17:26	300	NS	NA			INT		channel difficult to distinguish	U	NI	N	none
42	68	4	07/09/1997	11:20	300	NS	NA			INT		poor habitat quality rating	U	NI	N	none
43	68	5	07/09/1997	12:24	550	150	400,5,I	10	60	INT		standing water, subsurface flows	U	NI	N	none
62	26	4	05/09/1997	15:00	300	NS	NA			INT		dry, braided channels	U	NI	N	none
63	26	5	05/09/1997	13:00	675	NS	NA			INT		dry, braided channels	U	NI	N	none
64	26	6	05/09/1997	11:50	400	NS	NA			INT		dry, braided channels	U	NI	N	none
10	23	2	07/09/1997	14:52	175	NS	NA			NVC		no visible channel	U	NI	N	none
11	23	3	07/09/1997	14:10	250	NS	NA			NVC		no visible channel	U	NI	N	none
12	24	1	07/09/1997	14:44	300	NS	NA			NVC		no visible channel	U	NI	N	none
13	25	1	07/09/1997	15:20	250	NS	NA			NVC		no visible channel	U	NI	N	none
14	30	1	07/09/1997	16:20	500	NS	NA			NVC		no visible channel	U	NI	N	none
19	92	5	04/09/1997	12:10	300	535	400,5,I	10	40	M	T	Lake U/S subject to winter/summer kill	U	B	N	unlikely
20	92	7	04/09/1997	11:10	600	660	400,5,I	12	30	M	T	Lake U/S subject to winter/summer kill	U	B	N	unlikely
21	118	1	04/09/1997	9:00	350	NS	NA			NVC		no visible channel	U	NI	N	none
24	3	4	03/09/1997	8:45	300	730	300,5,I	10	100	L	C	INT, subsurface flows, vegetation choked	U	CV	N	none
25	3	5	03/09/1997	10:55	500	NS	NA			INT		channel filled with moss and vascular plants	U	CV	N	none

NS= not sampled, NA= not applicable; M= moderate flow, NVC= no visible channel, L= low flow, INT.= intermittent flow, DW= seasonally dewatered; C= clear, T= turbid; NI= none identified, CV= culvert, F= falls; N= none, U= unknown, BD= beaver dam, G= gradient; RB= rainbow trout, KO= kokanee, MW= mountain whitefish; UL= upstream of lake, DL= downstream of lake, U= upstream of confluence

5.0 STREAM CLASSIFICATION SUMMARY

Table 5 provides a summary of stream inventory information collected during the project.

Table 5. Stream Sampling Summary

Block	Site	ILP	Reach	Width (m)	Gradient (%)	Fish Sp.	Stream Class	Comments
104	1	222	1	1.30	8	---	S4	no barriers downstream
	2		2	1.90	2	---	S3	no barriers downstream
	3		3	1.30	3	---	S4	no barriers downstream
225	4	1	2	0.65	10	---	S4	potential fish habitat
	5	2	1	0.70	7	---	S6	no fish habitat present
236/238	7	31	4	0.95	2	---	S6	poor habitat quality
	8		5	1.50	3	---	S6	poor habitat quality
	9		6	0.53	4	---	S6	poor habitat quality
	6	36	1	0.63	5	---	S6	poor habitat quality
240	10	23	2	---	---	---	NVC	stream difficult to distinguish
	11		3	---	---	---	NVC	stream difficult to distinguish
	12	24	1	---	---	---	NVC	stream difficult to distinguish
	13	25	1	---	---	---	NVC	stream difficult to distinguish
	14	30	1	---	---	---	NVC	stream difficult to distinguish
241	15	42	1	1.30	2	---	S6	poor habitat quality
219	16	115	8	1.10	5	---	S6	poor habitat quality
222	17	132	1	0.85	7	RB	S4	fair access for resident trout
	18		2	0.78	7	RB	S4/S6	access to 75 m
239	19	92	5	1.30	2	---	S6	D.O. levels very low (3 mg/L)
	20		2	1.76	2	---	S6	D.O. levels very low (3 mg/L)
242	21	118	1	---	---	---	NVC	stream difficult to distinguish
224	22	128	6	1.50	2	---	S6	wetland area

Table 5. Stream Sampling Summary (contd.)

Block	Site	ILP	Reach	Width (m)	Gradient (%)	Fish Sp.	Stream Class	Comments
224	23	197	1	0.68	8	---	S6	dry at time of sampling
	67		2	0.32	8	---	S6	channel disappears
251/252	24	3	4	0.96	4	---	S6	D.O. levels very low (3 mg/L)
	25		5	0.71	10	---	S6	poor habitat quality
253	26	13	1	0.22	11	---	S6	poor habitat quality
	27		2	---	---	---	S4	stream difficult to distinguish
256	28	17	1	1.13	8	---	S6	fair access for resident trout
	29		3	0.82	7	---	S4	D.O. levels very low (3 mg/L)
	30	16	1	0.70	4	---	S4	potential access from d/s
	31		2	0.90	4	---	S4	potential access from d/s
	32		221	1	0.52	5	---	S6
202	33	56	1	0.46	4	---	S4/S6	potential fish habitat/access to 150 m
	34	57	1	0.82	5	---	S4/S6	potential fish habitat/access to 150 m
	35	40	10	1.20	2	---	S4	potential fish habitat/access
	36		9	4.60	3	---	S3	potential fish habitat/access
	37		8	1.90	2	---	S3	potential fish habitat/access
	38		7	1.60	3	---	S3	potential fish habitat/access
203	40	59	2	0.55	7	---	S6	poor habitat quality
	41		3	0.48	6	---	S6	poor habitat quality
	39	58	2	0.37	9	---	S6	stream difficult to distinguish
206	42	68	4	0.96	5	---	S6	poor habitat quality
	43		5	1.28	2	---	S6	D.O. levels very low (4 mg/L)
207	44	63	10	0.52	7	---	S4	potential fish access
	45		11	0.93	5	---	S4	potential fish access
208	46	91	1	0.93	4	RB	S4	fair access for resident trout
	47		2	0.58	5	---	S6	poor habitat quality
	48		4	---	---	---	NVC	stream was difficult to distinguish

Table 5. Stream Sampling Summary (contd.)

Block	Site	ILP	Reach	Width (m)	Gradient (%)	Fish Sp.	Stream Class	Comments
210	49	45	2	1.0	12	---	S4	no downstream barriers
213	52	47	2	0.30	3	---	S6	intermittent
	53		3	0.35	6	---	S6	poor habitat quality
	50	45	5	0.50	3	---	S6	no salmonid habitat present
	51		6	0.25	15	---	S6	no salmonid habitat present
	54		48	1	0.30	15	---	S6
217	55	92	15	0.50	3	---	S6	poor habitat quality
	56		16	0.67	3	---	S6	poor habitat quality
	57		17	0.46	2	---	S6	no salmonid habitat present
	58		18	0.83	5	---	S6	stream difficult to distinguish
	60	114	1	0.48	6	---	S6	no salmonid habitat present
	61		2	0.46	5	---	S6	no salmonid habitat present
218	59	111	1	0.53	2	---	S6	subsurface flows and seepage
233	65	140	1	1.18	9	RB	S4	good habitat
	66		4	0.47	3	---	S4/S6	fish access possible to 200 m d/s of Block 58-12
231	62	26	4	0.74	4	---	S6	fish access difficult
	63		5	0.54	8	---	S6	poor habitat quality
	64		6	0.23	4	---	S6	poor habitat quality

6.0 REFERENCES

Anonymous, 1997a. Reconnaissance (1:20 000) Fish and Fish Habitat Inventory. British Columbia Ministry of Environment, Lands and Parks.

Anonymous, 1997b. User's Guide to British Columbia's Watershed/Waterbody Identifier System, *version 2.1*. Resources Inventory Committee. Province of British Columbia.

Anonymous, 1996a. A Guide to Photodocumentation, Resources Inventory Committee Manual. Province of British Columbia.

Anonymous, 1996b. Fish Collection Methods and Standards. Resources Inventory Committee Manual. Province of British Columbia.

Anonymous, 1995a. Forest Practices Code Fish Stream Identification Guidebook. Forest Practices Code of British Columbia Act. Co-published by Forest Service British Columbia and British Columbia Environment.

Anonymous, 1995b. Riparian Management Area Guidebook. Forest Practices Code Guidebook. British Columbia Ministry of Forests.

Anonymous, 1995c. Fisheries Information Summary System: Data Compilation and Mapping Procedures. British Columbia Ministry of Environment, Lands and Parks, and Department of Fisheries and Oceans.

Demarchi, D. 1996. An introduction to the ecoregions of British Columbia. MELP, Wildlife Branch. Victoria, B.C. 46 pp + appendices.

Fish Habitat Inventory and Information Program. 1991. Stream Summary Catalogue. Subdistrict 29I, Prince George. Department of Fisheries and Oceans, Vancouver, BC.

Tripp, D. 1996. Stream classification in the East Ootsa Operating area for Fraser Lake Sawmills. Consultants report. Nanaimo, B.C.