1:5,000 Fish and Fish Habitat Inventory of Unnamed Tributaries to the Babine River between Nilkitkwa River and Shahnagh Creek

Working Unit 2 (Babine)
Cutting Permits 633 and 639

Final report

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Prepared For:
Pacific Inland Resources Ltd.
Smithers, BC

FRBC Activity Number: 10-595 (1998)

Prepared by:

TRITON
Environmental Consultants Ltd.
Box 88
Terrace, B.C., V8G 4A2
Phone: (250) 635-1494
Fax: (250) 635-1495

PROJECT REFERENCE INFORMATION

MELP Project Number	PIR-C172-001-1999
FDIS Project Number	06-BABL-300000001-1999 06-BABL-300002949-1999
FRBC Activity Number	10-595 (1998)
FRBC Region	Skeena- Bulkley Region
MELP Region	Skeena (06)
MELP District	Bulkey District
FW Management Unit	6-08
Fisheries Planning Unit	North Coast Planning Unit
DFO Sub-District	4D Smithers
Forest Region	Prince Rupert
Forest District	Bulkley
Forest Licensee and Tenure #	Pacific Inland Resources
First Nation Claim Area	Lake Babine Nation

WATERSHED INFORMATION

Watershed Group	Babine
Watershed Name	Babine River
Watershed Code	480-000000-
Watershed area (covered by this survey)	148 km^2
UTM at Mouth	09.582200.6173000
Unit Area	285 km^2
Stream Order	7^{th}
NTS Map	93M/12
TRIM Map	93M.047, 93M.056, 93M.057, 93M.066, 93M.067
BEC Zone	SBS

SAMPLING DESIGN SUMMARY

Total Number of Reaches Sampled	31
Field Sampling Dates	August 15 & 16, 1998 October 1, 2, 22 1998

CONTRACTOR INFORMATION

Project Manager: **Name: Steve Jennings, B.Sc.**
Address: #300-4546 Park Avenue,
Terrace B.C. V8G 1V4
Phone: (250)-635-1494

Sub-contractor: **None**

Field crew: **Names: B.Williams, S.Buchanan, M.Prins, T.Millen**
Data entry by: **Names: M.Prins**
Report prepared by: **Names: S.Jennings, B.Williams**
Report edited by: **Names: S.Jennings, D.Gordon**

Maps prepared by: **Names: Triton Environmental Consultants Ltd.**
J.Link
Address: 120-13511 Commerce Parkway, Richmond B.C., V6V 2L1
Phone: (604) 279-2093

GIS services **Company: Triton Environmental Consultants**
Technician: J.Link
Address: 120-13511 Commerce Parkway, Richmond B.C., V6V 2L1
Phone: (604) 279-2093

Water chemistry analysis contractor: **None**
Aging sample analysis contractor: **None**
Genetic sample analysis contractor: **None**
Voucher Species ID contractor: **None**

Disclaimer

Interpreted information in this product developed for the purposes of the Forest Practices Code Act and Regulations, for example stream classifications, is subject to acceptance in an operational plan by the statutory decision-maker.

Acknowledgments

Triton Environmental Consultants Ltd.'s project team for this inventory project included Mr. Dave Gordon, Project Director, Mr. Stephen Jennings, Project Manager and co-author, Mr. Bryan Williams, Crew Leader and co-author, Ms. Sam Buchanan, Crew Leader, Ms. Michelle Prins, Field Crew member and FDIS Coordinator, Ms. Tania Millen, Field Crew member, Mr. Dave Warburton, GIS Manager, Ms. Jennifer Link, GIS Technician, Mr. Derik Woo, GIS Technician, Ms. Robyn Short, Database Coordinator, Ms. Michele Patterson, support staff, Ms. Heather Draper, support staff.

Triton Environmental Consultants Ltd. would like to thank Mr. Alan Baxter of Pacific Inland Resources and Mr. Jay Baker, Silvicon Services Inc, for their assistance throughout the planning and field phases of this project. The principal contract monitor was Mr. Jay Baker, Silvicon Services Inc, and the provincial ministry contact was Mr. Paul Giroux, Regional Inventory Specialist, BC Ministry of Environment, Lands and Parks, Smithers. The quality assurance was conducted by Mr. Chris Schell. Triton Environmental Consultants Ltd. would also like to thank Highland Helicopters for their assistance on this project.

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(available from Regional Fisheries Inventory Specialist, Ministry of Environment, Lands and Parks Regional Office in Smithers, BC)

1. Fisheries Interpretive/Inventory Maps (combined), 1:20,000 Scale TRIM based.
2. Photo Summary Report, slide binders and Photo CDs for all project photos.
3. Digital Files (7 watershed reports, FDIS data file, ArcInfo Map files and plot files).

List of Abbreviations

Abbreviation	Definition
CM	chum salmon (*Oncorhynchus keta*)
CH	chinook salmon *(Oncorhynchus tshawytscha)*
CO	coho salmon *(Oncorhynchus kisutch)*
PK	pink salmon *(Oncorhynchus gorbuscha)*
SK	sockeye salmon *(Oncorhynchus nerka)*
DV	Dolly Varden char (*Salvelinus malma*)
RB or ST	rainbow or steelhead trout *(Oncorhynchus mykiss)*
CT	cutthroat trout *(Oncorhynchus clarki clarki)*
BT	bull trout (*Salvelinus confluentus*)
( )	Assumed fish presence, seasonally or year round based on access, gradient or habitat capabilities, i.e. (DV) = assumed Dolly Varden.
NF	No fish
U/S	Upstream
D/S	Downstream
FISS	Fisheries Information Summary System (DFO/MoE)
E/F	Electrofishing
VO	Visual observation
FPC	Forest Practices Code
S1 - S6	Stream classifications S1 to S6 based on Ministry of Forests, Forest Practices Code, Riparian Management Area Guidebook.
FSZ	Fisheries Sensitive Zone
EFU	End of Fish Use
NVC	No Visible Channel
RMA	Riparian Management Area
M/L	Mainline (road)
NCD	Non-classified drainage (not a stream)

1. PROJECT INTRODUCTION

Triton Environmental Consultants Ltd. (Terrace branch) was retained by Pacific Inland Resources (PIR) to conduct 1:5,000 level fish and fish habitat inventory in sub-basins of 8 watersheds located in the Bulkley Forest District from August to October, 1998. In previous inventories, the Bulkley Forest District was divided into 14 Working Units, based on major watersheds (Saimoto, 1996). In 1996 and 1997, Triton completed 1:20,000 reconnaissance level fish and fish habitat inventories throughout all 14 Working Units (Triton, 1998).

In 1998, stream reaches within PIR's operating chart area in the following Working Units were inventoried at the 1:5,000 scale. The results of the inventory are presented in 7 reports (Table 1 below) and are organized by Working Unit number and Cutting Permit numbers. This report presents the results of fish and fish habitat inventories completed during August and October, 1998, and provides classifications for stream reaches within or adjacent Cutting Permits 633 and 639, located within Working Unit 2 (Babine).

Table 1. Report Titles and Working Units for 1:5,000 Stream Inventory by Triton for PIR Ltd. (FRBC Activity Number 10595 - 1998).

Report Title	Working Unit Number and Name	Cutting Permits (CP)
1:5,000 scale Fish and Fish Habitat Inventories of Unnamed Tributaries to the Nilkitkwa and West Nilkitkwa Rivers	1 - Nilkitkwa	395, 396, 397
1:5,000 scale Fish and Fish Habitat Inventories of Unnamed Tributaries to the Babine River between Nilkitkwa River and Shahnagh Creek	2 - Babine	633, 639
1:5,000 scale Fish and Fish Habitat Inventories of Tributaries to Nilkitkwa Lake and Nichyeskwa Creek	4 - Boucher (including Unit 3, Nichyeskwa	578, 580, 584
1:5,000 scale Fish and Fish Habitat Inventories of Unnamed Tributaries to Blunt Creek	6 - Blunt	563, 567
1:5,000 scale Fish and Fish Habitat Inventories of Unnamed Tributaries to the Bulkley River and Gramophone Creek	7 - Gramophone	553, 565
1:5,000 scale Fish and Fish Habitat Inventories of Unnamed Tributaries to the Telkwa River and Howson Creek	13 - Telkwa	701
1:5,000 scale Fish and Fish Habitat Inventories of Unnamed Tributaries to Toboggan and Trout Creeks	14 - Toboggan (including Unit 8, Kitseguecla	361

1.1 Location of the Study Area within Unit 2 of the Bulkley Forest District

The Bulkley Forest District is situated in the west-central interior of BC, encompassing 7,625 km^2 of land. The town of Smithers is situated in the lower third of the Forest District and was the base for field crews during most of the inventory. This forest district extends from the Nilkitkwa River in the north to the Telkwa River in the south and from the upper Zymoetz River in the west to Babine Lake in the east. The Overview Map, Figure 1, shows the location of the working unit within the Forest District with the TRIM sheets containing the study area highlighted in yellow (93M.057, 93M.056, 93M.066, 93M.067, 93M.047).

Working Unit 2, the **Babine Working Unit**, is located in the northern half of the Bulkley Forest District along the Babine River, just downstream from the confluence of the Nilkikwa River. It encompasses an area of approximately 285 km^2 and extends from the confluence with the Nilkitkwa River in the south, to the forest district boundary in the northwest. The eastern boundary runs along the height of land separating the Babine drainage from one of its main tributaries, the Nilkitkwa drainage (work unit #1). The southwest side separates the Babine drainage from the Nichyeskwa drainage (work unit #3) (Saimoto, 1996).

Unit 2 encompasses part or all of TRIM mapsheets 93M.066, 93M.067, 93M.056, 93M.057, 93M.046 and 93M.047. The specific boundaries of the Working Unit can be found on these TRIM mapsheets attached with this report or in the 1996/97 1:20,000 Reconnaissance Level Fish Inventory by Triton (1998). The study area for this project, defined by the location of **CP 633 and 639**, is situated in the watersheds of small unnamed tributaries to the north bank of the Babine River on TRIM mapsheets 93M.066, 93M.067, 93M.056 and 93M.057. The Nilkitkwa River flows southward and joins the Babine River approximately 4.5 km downstream (west) of the outflow of Nilkitkwa Lake. The Babine working unit is located northwest of this junction along both rivers.

The Cutting Permit Overview Maps in Figure 2 and Figure 3, show the location of the proposed cutblocks within the Babine River watershed. These maps are portions of the Fisheries Interpretive TRIM maps, 93M.066, 93M.067, 93M.056 and 93M.057, which accompany this report, and show the existing and proposed cutblocks and roads on the Transparency Overlay. Figure 2 and Figure 3 shows the 1996/97 Reconnaissance sample sites in black circles, while the Triton 1998 inventory info (stream classes, ILP, site number or NID) is shown in purple.

Detailed inventory results from 1998 field sampling (site locations and stream classifications) are illustrated on the attached TRIM map sheets 93M.066, 93M.067, 93M.056 and 93M.057, and the block maps contained within the Results section of this report.

1.2 Access

Field crews accessed the proposed cutblocks of **CP 633** and **CP 639** in the **Babine River Watershed** via the following route:

- Leave Smithers and proceed south-east along Highway 16 for 5 km and turning east onto the Babine Lake Road (5000 Road).
- Continue up the Babine Lake Road for approximately 40 km and turn left onto the Nilkitkwa Forest Service Road (4000 Road).
- Travel up the Nilkitkwa Forest Service Road for approximately 87 km passing over the Babine River and beyond Charleston Logging Camp.
- Field crews were based in Charleston Logging Camp at 79 kilometer for this survey.

- For **CP 633, Block 1** turn right onto the 486 Road approximately 7 km past Charleston Camp. Block 1 is runs along the left side of the road approximately 4 km from the 4000 Road. For **CP 633, Blocks 2 through 5**, turn right off of the 4000 Road onto the 487 Road approximately 8 km past Charleston Camp. The CP 633 Blocks start approximately 3 km from the beginning of the 489 Road. Block 1 is located approximately 4 along the 486 road which

- For **CP 639, Blocks 1 through 12** turn left off of the 4000 Road onto the 489 Road approximately 10 km past Charleston Camp. The CP 639 Blocks start at the beginning of the 489 Road.

1.3 Fish Stream Identification and Inventory Objectives

The purpose of this inventory was to conduct fish and fish habitat inventories at a reach level to gather additional fish distribution information, classify stream reaches and improve the applicability to land use planning of existing fish inventory data. Reach specific fish and fish habitat information was collected to determine classification of stream reaches within or adjacent to proposed timber harvesting areas and proposed roads. The inventory information is necessary for planning land development (forest harvesting and road building) and ensuring appropriate protection of sensitive aquatic resources. The 1:5,000 inventory information is essential to site specific Silviculture Prescription planning for

proposed harvesting areas and provides greater definition of fish distributions within small watersheds affected by proposed blocks and roads.

Key tasks of the fish and fish habitat inventory were to sample for fish presence and determine the End-of-Fish Use (EFU) for fish-bearing stream reaches potentially influenced by proposed harvesting and to collect channel width and channel morphology information to determine stream classification. The methods used in this detailed inventory of stream reaches were based upon, but did not follow exclusively, the reconnaissance level (1:20,000 scale) fish inventory methods (RIC, 1998). Methods were utilized as applicable from Fish Stream Identification (MoF, 2nd Ed., 1998).

1.4 Background Data Review

Fish presence and species distribution information for much of the Bulkley Forest District, including the proposed Cutting Permit areas in this report, was gathered during the 1:20,000 reconnaissance level fish and fish habitat inventory conducted by Triton in the summer and fall of 1996 and 1997 (Triton, 1998). Site cards, which describe channel features and fish sampling effort, from the 1996 and 1997 inventory are included in the Appendices to this report. The 1996/97 inventory information was critical for planning the 1998 1:5,000 inventory as well as assigning stream classifications and recording fish presence and barriers to fish. Additional background information on the watersheds is generally restricted to the larger mainstem rivers and creeks. The smaller streams and headwater stream reaches (first and second order) that were examined in this inventory were typically not mapped at the 1:20,000 TRIM scale and had little or no detailed fisheries information.

For the watersheds which contain **CP 633 and 639**, a brief summary of fish distribution information from Triton (1998) is presented below. No previous fisheries information was found for the unnamed tributaries sampled in 1998. Please note that the inventory information and fish sampling, described in the paragraph below, was conducted in 1996 and 1997 and was not part of the 1998 1:5,000 fish inventory. The results from the 1998 project, with associated stream classifications, is found in the Results Section.

Babine Working Unit (applies to proposed cutblocks CP 633 #1-5 and CP 639 # 1 - 13)

The survey took place between July 28th and August 7th 1996 and July 7 and September 20 1997. Approximately 28.8 km of the Babine River flows through this working unit.

The Babine River has low gradient and multiple rapids in this area. In addition, the side slopes have moderate to low gradient. The Babine River supports a diverse array of fish species including chinook, coho, pink, kokanee and sockeye salmon as well as lake trout, lake whitefish, Rocky Mountain whitefish, northern squawfish, red sided shiner, suckers, steelhead, cutthroat trout, rainbow trout, sculpins and Dolly Varden char.

Figure 1: Bulkley Forest District with the Babine River Working Unit

Figure 2: Cutting Permit 633 Overview Map

Figure 3: Cutting Permit 639 Overview Map

2. METHODS

The methods employed for this inventory project are described below under the following sections:

- Pre-field activities: planning and sample site selection;
- Field activities: stream assessment, fish sampling, stream classification, channel measurements, feature identification, photography;
- Post-field activities: mapping, data entry, reporting.

In general, stream assessment methodology followed procedures outlined in *Fish Stream Identification Guidebook* (MoF, 2nd Ed., 1998), which is based upon the procedures outlined in the Resources Inventory Committee manual *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures* (RIC, 1998). Deviations from RIC Standard stream inventory procedures are noted where appropriate. In addition the *Riparian Management Area Guidebook* (MoF, 1995) was consulted regarding assignment of correct stream classification.

A local area agreement exists between PIR (forest licensee), Bulkley Forest District Forest Ecosystem Specialists (Ministry of Environment, Lands and Parks representative) and Ministry of Forests regarding stream classification procedures and was used by field crews as necessary. This local area agreement, titled "*Proposed Bulkley District Single Survey Stream Classification Procedures"*, describes methods for assessing and classifying unmapped streams (less than 1.5m in width) and is described below.

2.1 Prefield Planning

Pre-field planning for this inventory involved a planning meeting in Smithers with the contract monitor, client and Regional Fisheries Inventory Specialist and office procedures. Tasks completed include background information review, map review of proposed Cutting Permit areas and identification of affected streams and watersheds, selection of reaches to sample, creation of a field work plan as well as budget and logistical planning. Every task identified in the RIC reconnaissance level Phase 1, 2 and 3 planning process was not utilized for this project. This project focused on collecting reach-specific fish and channel information for small first to third order watersheds with proposed harvesting and not on sub-sampling reaches within large watersheds to determine fish distribution over major watershed. The previous 1:20,000 inventory (Triton, 1998) addressed reconnaissance level fish distributions over major watersheds. Pre-field data entry of ILPs and reach data

was post-poned till after field assessment in order to save costs, improve efficiency and reduce entry of redundant data.

An extensive background information search was not completed since the most relevant background information was contained within the 1:20,000 Reconnaissance Inventory report produced by Triton (1998). Triton's Reconnaissance report incorporated field results from 1996 and 1997 inventory, historical information summarized in Saimoto (1996) and FISS background information. Additional information was sought from contract monitors and Ministry of Forests and Regional Fisheries Branch representatives.

Maps reviewed included existing 1:20,000 reconnaissance level fish inventory information (Triton, 1998), Forest Development Plan maps (1:20,000 and 1:50,000 scale) and block level (1:5,000 scale) maps provided by PIR and Silvicon. Based upon the map review and identification of stream reaches requiring sampling, a preliminary list of cutblocks and reaches to assess was prepared.

2.2 Sample selection

Stream reaches to assess were selected using the following criteria. Previously unclassified streams or reaches with inferred fish presence, that were located within or adjacent to the cutblocks boundaries or were crossed by proposed logging roads, were identified on field maps as reaches to sample. Only streams which did not have sufficient prior information to assign appropriate stream classifications were chosen as reaches to sample. Reaches with known fish presence that extended upstream of proposed harvesting areas were not chosen for sampling since stream classification could be determined from existing information. Reaches which were sampled by Triton in 1996/97 and did not have fish captures or known downstream barriers to fish movement were identified as high priority candidates for sampling. Unmapped streams that were mapped by timber cruising crews and were adjacent to or within proposed cutblocks or roads were chosen as sample sites. Watercourses identified by timber cruising crews and labeled on block maps as Non-classified Drainages (NCD) were not chosen as reaches to sample. NCD denotes a watercourse which does not meet the FPC technical definition of a stream and does not contain fish habitat. Streams located close to the proposed block boundaries, which may have reserve or management zones which conflict with cutting areas, were also identified as possible sample sites.

Logistical planning, budgeting and permit applications were completed prior to initiation of field work in late summer.

2.3 Field Phase: Stream Assessment Strategy

The **End of Fish Use (EFU)** point is the location along the stream channel which, for biological or physical reasons, is the upstream limit of fish distribution within the stream. This means that fish do not occur upstream of the EFU in the stream channel or in tributaries which flow into the channel, upstream of the EFU location. The identification of the barriers to fish and the EFU are important to fish inventory and stream classification activities. Barriers to fish passage and steep gradient cascade sections are often, but not always, the location of the EFU within the main channel of a sub-basin.

For maximum efficiency of field time and operating budgets, field crews sampled for fish presence and determined the EFU in stream reaches downstream of or within proposed cutblocks. Using block recce maps and TRIM maps, crews walked the downslope boundary of proposed cutblocks to find streams adjacent to or flowing from within the cutblocks or crossing roads. For each affected stream reach, crews conducted fish sampling and walked upstream and/or downstream to determine fish presence or the point of end of fish use (EFU). Once the location of the EFU for a stream was determined, field crews collected channel information, completed site cards and electrofished or set minnow traps above the EFU to confirm fish absence.

Where the EFU was located an unknown distance upstream of the upslope cutblock boundary, crews walked upstream of the cutblock boundary along the stream for approximately one hundred to two hundred meters and assigned the appropriate fish bearing stream class up to the next reach break. Waterfall barriers and steep gradient cascade sections of the channel, which were judged to be impassable to fish due to lack of plunge pools and overall height, were typically identified as the EFU within many reaches.

Previous experience with 1:5,000 level stream inventories has confirmed that this approach, whereby field crews determine the EFU and then sample appropriately above the EFU, has resulted in substantial savings in time and cost since not every stream reach upstream of the EFU needs to be visited. Fish sampling completed by Triton in 1996 and 1997 provided additional confirmation of non-fish bearing status above the EFU. Site card and channel information, collected by timber cruising crews in reaches above the EFU location, provided relevant channel information which can be used to assign the appropriate S5 or S6 stream classification.

Streams that were crossed by proposed logging roads were similarly assessed, with the determination of the EFU being a key factor. If fish were caught at proposed stream

crossings then no further fish sampling was required and site card information was collected at the proposed crossing. If no fish were caught at the crossing site then crews typically proceeded downstream to find the EFU, often a barrier or cascade, and mapped the EFU location and collected site card information. In stream crossing reaches where no fish were captured, no barriers to fish were found downstream of the proposed crossing and the stream flowed into a fish bearing reach, additional sampling was recommended or default gradient guidelines were used to assign stream classification for the affected reach.

Single Sample Protocol

The local area agreement for stream classification, *Single Survey Protocol*, was incorporated into assessment of unmapped, first order streams with gradient less than 20% and average channel width less than 1.5m. The *Single Survey Protocol* enables field crews to evaluate the potential for a stream to support fish, based upon barriers, channel conditions and instream habitat quality, and assign a non-fish bearing classification if no potential exists to support fish. If habitat quality is considered suitable for fish then an appropriate level of fish sampling must be performed following FPC guidelines.

2.4 Recommendations for Additional Sampling

In stream reaches where an obvious stream feature did not exist to determine the EFU downstream of the block or road, a fish-bearing steam was present downstream and habitat conditions were suitable for supporting fish, but no fish were caught by electrofishing, then crews recommended second sampling. Second sampling was only recommended in streams which had a high likelihood of containing fish at some point during the year. These streams are noted as "second sampling" candidates in the Stream Description section and the Stream Summary Table. Second sampling was not recommended in reaches where electrofishing did not catch fish, downstream barriers were present, poor habitat quality or permanently dry stream channels were found. The *Single Survey Protocol*, mentioned above, was applied where applicable for small, first order streams and meant some reaches could be classified without recommending additional sampling. Streams that are greater than 20% gradient can be classified as non-fish bearing using gradient criteria alone, but field crews sampled steep gradient reaches if suitable fish habitat existed in the stream.

The possibility of seasonal fish presence of the reach was explored by noting distances to known fish bearing streams as well as habitat type and quality within the reach, and anticipated water levels. Streams where no fish were captured yet contained suitable habitat and were easily accessed from a known fish bearing stream were considered fish-

bearing streams as they may provide seasonal habitat. Streams that may provide habitat for fish yet are not easily accessible to fish (obstructions, sections greater than 20%) or are a large distance (e.g. 1 km) from a known fish stream were considered non-fish bearing. At the end of the results for each cutting permit, a table lists non-fish bearing reaches. Typically only the most downstream non-fish bearing reach of a stream is listed; reaches further upstream of the listed reach are assumed non-fish bearing.

2.5 Stream Classification Criteria

Stream classifications were assigned following the process outlined in the *Fish Stream Identification Guidebook* (MoF, 2nd Ed., 1998) with the following classifications used.
For streams less than 20% gradient and/or fish bearing:

- S1 - average channel width greater than 20m;
- S2 - average channel width greater than 5m and less than 20m;
- S3 - average channel width greater than 1.5m and less than 5m;
- S4 - average channel width greater than 0 and less than 1.5m.

For streams that are not fish bearing or greater than 20%:

- S5 - average channel width greater than 3m;
- S6 - average channel width greater than 0m and less than 3m.

2.6 Fish sampling

The field surveys were conducted with two field crews of two people each. Both crews were equipped with a four wheel drive vehicle and appropriate field gear. Key field equipment included:

- safety gear: maps, Level 1 First Aid kit and bear spray;
- fish sampling gear: electroshocker, gloves, dip nets, voucher bottles, fry boards, fish anesthetic, fish identification manual;
- channel measuring gear: 15 or 30m fiberglass tape, 2m folding wooden ruler, Suunto clinometer, hip chain;
- water quality gear: alcohol thermometer, portable pH and conductivity meters, sample bottles;
- waterproof 35mm camera with 32mm lens and film.

Fish sampling was conducted by electrofishing, Gee (minnow) trapping and visual observations. Electrofishing was conducted using Smith - Root type 12B electroshockers; electroshocker effort and settings were recorded on the Fish Form. Electrofishing was considered the most effective fish sampling method since most of the streams had good

water visibility and were at low flow, very shallow and generally less than 4m wide. Gee-traps were used as a second fish sampling method, where required, with catch, soak times and water temperature recorded. The traps were baited with commercial salmon roe and left for up to 24 hours.

Captured fish were identified to species and a length and photograph was taken and recorded on the Site Card and Fish Collection Summary Card. Voucher specimens were collected and stored in ethanol or formalin and submitted to the Regional Fisheries Branch. As described in the *Fish Stream Identification Guidebook* (MoF, 2nd Ed., 1998), once fish were confirmed as being present in a stream, no further fish sampling was conducted.

According to the Forest Practises Code, for purposes of stream classification an acceptable fish inventory method must be used to confirm fish absence prior to assigning non-fish bearing status to streams of less than 20% gradient. Since most watercourses surveyed were small first and second order streams with cool, shallow and clear water the preferred sampling method is electrofishing due to portability, ease of fish capture, and for normal field conditions, the high capture efficiency. Electroshocking efficiency in cold water conditions and low conductivity is a concern due to the decrease in capture efficiency, potential lethal effect of shocking on immobile fish and incubating eggs and behavioural changes of fish in low temperatures (late fall and winter) (Cowx and Lamarque, 1990).

The FPC specifies that electroshocking below 4 degrees Celcius and 30 microSiemens/cm is not considered an acceptable fish inventory method. For the purposes of assigning stream classifications, electroshocking at low temps is not used as the sole criteria for assigning non-fish bearing status. Often, habitat quality and downstream barriers are used in conjunction with electroshocking results to determine fish presence and capacity to support fish. Where physical conditions decrease the effectiveness of electroshocking, alternate sampling methods (minnow traps) or additional sampling during more appropriate times of the year (summer) are recommended to confirm fish absence.

2.7 Stream Channel and Gradient Measurements

The bankfull channel width of stream channels was measured with an Eslon tape or meter stick. Multiple measurements (minimum of 6) were made for each site; each measurement at least one channel width distance apart. Where average channel widths were close to 1.5, 3 or 5 m, more than 6 measurements were made to accurately locate the break

between stream classes. These measurements were averaged to determine the average bankfull channel width for classification purposes.

Stream gradients were determined from 1:20,000 maps and measured during field surveys with a Suunto clinometer (accuracy +/- 1%). Field crews sighted through the clinometer to an upstream or downstream crew member or flagging tape which was raised above the stream channel to the eye level of the crew member. Where sections of reaches had gradients between 18% and 22% multiple shots were made to obtain an average gradient. Where conditions were safe, the gradient over cascades and barriers were measured and lengths and heights of these features were estimated and photographed.

2.8 Stream and Feature Identification

Stream reaches and sample sites were marked in the field by Triton at the classification break of each stream (between fish and non-fish bearing reaches) or at a convenient location (road crossing or downstream block boundary) with red and white striped 'creek' flagging tape. At the same spot a tree was blazed and painted with blue spray paint and stream information was imprinted on steel tags and nailed to the blaze. Information recorded on the tag included *Triton, Stream or ILP #, Site #, Date, S classification or S4 / S6 boundary, field crew initials*.

Streams are referred to within the results section of this report by their ILP (Interim Locational Point) number, which is also shown on the TRIM and block maps. ILPs were issued to streams as the streams were surveyed with only one ILP issued to each stream. Tributaries were assigned unique ILPs if they flowed into streams which had existing ILPs. Sample sites and special features (barriers, cascades) were given a NID (Numeric Identifier) number in ascending order as the sites or features were visited. In order to avoid overlap of numbering sequences, one crew started ILPs at 6000 and NIDs at 5000 where the other crew started ILP's at 2000 and NID's at 3000.

2.9 Photographs

Photographs of sites, streams, fish and channel features were taken with a 35 mm camera fixed with a 32 mm lens. Representative photographs are presented in the Appendix at the back of the report. Due to adverse weather conditions, some photos were over or under exposed. Additional photos that were taken but are not presented in the Appendix can be found on the accompanying Photo CD(s). A photo log is presented in the Appendix at the back of this report which can be used to cross-reference the site number, roll and frame number with the image file name located on the appropriate Photo CD. Digital photos can be viewed with appropriate graphical software (Corel DRAW, Power Point, etc).

2.10 Mapping

Stream classifications and classification boundaries for each stream reach are shown on accompanying TRIM maps (separate from the report), Cutting Permit Overview maps and 1:5,000 hand-drawn block maps within the Results section. Field crews hand-annotated working maps with site numbers and feature NIDs, ILPs, obstructions and stream classifications. Digital maps were created using the field information from the hand drawn copies. Block level maps at 1:5,000 or 1:10,000 scale are included in each results section and contain all field survey information (stream classification and colour, site numbers, ILPs, barriers or obstructions). TRIM maps show all sites but not all streams found in the field. During the project meeting with Regional Fisheries Inventory Specialist, it was agreed to add sites on unmapped streams as floating points and not to draw in the stream since field crews would not necessarily follow unmapped streams and locate these streams on the maps.

The accompanying 1:20,000 Fisheries Inventory and Interpretive TRIM maps were originally developed in 1996 and 1997, prior to implementation of detailed Ministry of Environment mapping standards. Consequently, mapping of 1998 stream inventory information is limited by the digital formats and symbology developed in 1996. The accompanying 1:20,000 Fisheries Inventory and Interpretive TRIM maps do not comply with 1998 Ministry of Environment Digital Mapping Standards. The cost and time to update the 1996 and 1997 maps to 1998 standards was beyond the scope and budget of this project. The accompanying maps do utilize the standard colours for stream classification (red, blue, yellow) but symbology is designed for ease of use rather than meeting Digital Mapping standards. Streams which were identified in the field and on 1:5,000 block recce maps, but do not show up on the 1:20,000 scale maps, were sampled but not mapped. The sites located on these 'unmapped' streams are placed on the TRIM sheets and appear as floating points which are not on the stream network. The ILP and stream classification for all sites, on mapped and unmapped streams, are shown.

Fish bearing streams (S1-S4) are coloured in red, non - fish streams (S5 and S6) are shown in blue and fish sensitive zones are in yellow. Dotted red or blue streams indicate 'inferred' fish presence or absence (usually based upon gradient) and may require additional sampling to confirm stream classification. Non-Classified Drainages or NCDs are watercourses that are technically not streams as defined by the FPC (i.e. they have no continuous, definable banks or alluvial substrate) and were noted in the study areas. NCDs are labeled on the maps provided as brown lines and are described within the respective cutblock section. Streams that were mapped at 1:20,000 scale but did not exist

in the field at the specified location were identified as 'Creek not present' and coloured pink. The 'No Visible Channel' (NVC) designation is equivalent to the 'Creek not present' designation. Since the maps use 'Creek not present', any NVC situations are identified as 'Creek not present' on the maps.

Hardcopy maps and digital GIS data files and plotting files were created and are available from the Regional Fisheries Inventory Specialist, Ministry of Environment, Lands and Parks, Smithers office.

2.11 Digital Data Entry into FDIS

Stream site card and Fish Collection Form data were entered into the Microsoft Access custom application *Field Data Information System (FDIS) version 6.4*. Reach forms were completed for mapped and unmapped stream reaches after field work was completed. Hardcopies of the Site card, Fish Collection Form and Reach Form (for mapped reaches only) are included in the Appendices at the back of this report.

Watershed codes were added post field work and towards the end of the reporting phase. All watershed codes available at final report production can be found within FDIS and on the site, reach and fish cards in the Appendices.

For a detailed explanation of the codes, fields and field collection methods found on the Site, Fish and Reach cards please refer to the Resources Inventory Committee manuals *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures* and *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Data Forms and User Notes* (RIC, 1998).

3. RESULTS: CP 633 AND CP 639 OVERVIEW

As seen in Figure 2 and Figure 3, 5 cutblocks of CP 633 and 13 blocks of CP 639 as well as several mainline and spur roads are proposed in an area with substantial existing forestry development along the north side of the Babine River between the Nilkitkwa River confluence and Shahnagh Creek. The cutblocks are located on gently sloping slopes of a bench located between the Babine and Nilkitkwa Rivers with first, second and third order tributaries draining into the Babine River. Historical information indicates that the Babine River Watershed supports coho, chinook, sockeye, chum and pink salmon, kokanee, cutthroat and rainbow trout, steelhead, mountain and lake whitefish, burbot, lake trout and Dolly Varden char. Previous inventory information indicates that the small tributaries to the Babine River support Dolly Varden, rainbow trout and cutthroat trout.

Field crews inventoried streams in CP 639 on August 15th and 16th and in CP 633 on October 1st and 2nd, 1998. Crews were based in Charleston Camp while working on these Cutting Permits and accessed the work areas mainly by truck. A helicopter was used to fly over the area and examine creek mouths for barriers on October 22. Cutblock boundaries were marked with flagging tape in the field and crews used these boundaries and 1:5,000 block level recce maps to find streams within or adjacent to the proposed cutblocks.

Field conditions were fair in October with occasional rain and daytime maximum air temperatures of 6 degrees Celcius. Weather conditions included overcast days and occasional rain showers. In August, weather conditions were better with warm days and little precipitation. Water temperatures for the creeks assessed ranged from 1 to 5 degrees Celcius in October and 7 to 10 degrees Celcius in August. The pH values ranged from 6.9 to 8.3. The conductivity ranged from 50 to 300 umhos/cm, with the majority of measurements between 60 and 140 umhos/cm.

Cutting Permit 633 (assessed in October) is discussed first followed by CP 639 (assessed in August). The detailed results are presented in the following order:

3.1 Fish Sampling Summary

A summary of **FISH INFORMATION** is presented prior to the Stream Classification Results and describes fish captures, locations, and, if appropriate, biological data.

3.2 Stream descriptions

The **ILP** for each stream is used to organize the stream description paragraphs with the stream classification bolded and underlined. Key parameters for each stream within or adjacent to a proposed cutblock are described.
Parameters described include:

- location of the End of Fish Use (EFU),
- gradient
- instream cover
- length of stream assessed
- locations of barriers and fisheries sensitive zones
- channel width
- stream classification
- fish presence
- fish sampling effort
- locations of reach breaks
- water quality comments

3.3 Stream Summary Table

Essential stream classification, site and photo reference information is summarized in a table for each cutblock.

3.4 Block Map

The detailed block map presents stream classification information, stream feature and site card location information. The block maps (various scales: 1:4,000 to 1:6,000) show streams, stream classifications and site locations relative to the cutblocks and/or proposed roads. Streams which do not show up on the 1:20,000 TRIM map and were identified in the field or by layout crews are indicated on the block maps. The block maps present the clearest picture and most accurate positioning of streams, sites, reach breaks and features with respect to the adjacent cutblocks. If a discrepancy exists between the 1:20,000 TRIM map and the block map, the block map should be considered more accurate since distances measured in the field were compared to the block map for accuracy.

3.5 Additional Sampling and Habitat Protection Recommendations

If additional sampling within a Cutting Permit is deemed necessary to confirm stream classifications the relevant information is described. The streams, reaches, presence of barriers and locations of additional sampling, as well as the recommended sampling method and time of year are described to guide future sampling efforts. Habitat Protection recommendations are provided for areas with sensitive aquatic habitats or features.

3.6 Summary Table for Non-Fish Bearing Reaches

Non-fish bearing reaches that were sampled or determined to be non-fish bearing based upon downstream sampling are summarized in a table for each Cutting Permit. Fish sampling, channel and barrier information is presented for non-fish bearing reaches.

4. FISH SAMPLING SUMMARY

Field crews sampled streams and stream reaches throughout the areas of proposed Cutting Permit 633 and 639. Previous inventories had identified Dolly Varden, cutthroat trout and rainbow trout in the study area (Triton, 1998). The historical information indicates the presence of sockeye, coho, pink, and chinook salmon, Dolly Varden, mountain whitefish, rainbow trout, cutthroat trout and steelhead in the Babine River Watershed. Aside from two cutthroat trout (100mm, 113mm fork length) captured in ILP 2170 at the 487 road crossing, no other fish were captured during the 1998 inventory survey in the vicinity of CP 633 and 639. Fish distribution is limited by permanent waterfalls and cascade barriers over which fish cannot pass within these small tributaries; barriers were typically located just upstream of the confluence with the Babine River. No resident fish populations were found to exist above permanent barriers. Stream classifications were assigned using physical criteria, lack of fish captures, potential access for fish and previous inventory information.

5. STREAM ASSESSMENT RESULTS

5.1 CP 633 Block 1

Proposed cutblock 633-1 is located on a gradual south facing slope on the east side of the Babine Valley near Mount Horetsky. Using the recce layout map supplied by Silvicon, the field crew identified six streams within the proposed block (**ILP 6106, ILP 6107, ILP 6108, Streams IV, V and VI).**

5.1.1 Stream Descriptions

ILP 6106, Site NID 5106

ILP 6106 is a first order, low gradient stream (3-4%) with an average channel width of 2.03 m. The rearing and spawning values were good throughout the sample site. Spawning gravels were abundant and rearing habitat consisted of good quality cover and a riffle/pool channel morphology ideal for rearing juvenile salmonids. No fish were captured through 476 seconds of electroshocking. According to the previous 1:20,000 Inventory (Triton, 1998), **ILP 6106** was sampled at site T27 and T36 in August, 1996, and no fish were captured or observed after a total of 200 m was sampled for 578 seconds with an electroshocker. Also ILP 6107 (described below), a tributary to ILP 6106, was shocked for 207 seconds and no fish were caught. To complete the classification process the stream was flown by helicopter on October 22, 1998, to determine if there was a barrier to fish migration in the lower reaches of the stream. According to TRIM 1:20,000 maps there is a high gradient section of stream located ~400 m upstream of the confluence with the Babine River which may constitute a barrier to fish. The helicopter flight confirmed a fish barrier (a set of falls approximately 3 m in height) at the mouth of the stream. Due to the large amount of sampling without catching fish (totaling over 1200 seconds) and the barrier to fish near the mouth of the stream, **ILP 6106 is classified as S6**.

ILP 6107, Site NID 5107

ILP 6107 is a first order, low gradient stream (2-3%) with an average channel width of 0.44 m. ILP 6106 flows into Block 1 approximately midway along the north block boundary. It joins ILP 6106 approximately 350 m downstream from the upper block boundary close to the centre of the block. There was no spawning habitat present yet moderate rearing values were present in limited amounts. No fish were captured through 207 seconds of electroshocking (207 was added to the collective stream shocking described in section ILP 6106 to confirm 'non-fish' status for the entire stream including

tributaries). The **ILP 6106 mainstem and all tributaries including ILP 6107 are classified as S6.**

ILP 6108, Site NID 5108

ILP 6108 is a first order, low gradient stream (2-3%) with an average channel width of 0.70 m. ILP 6108 flows into the block at the north-west corner, through the west side of the block and exits the south-west corner. There was no spawning habitat throughout the site yet there was limited rearing habitat provided. No fish were captured after 453 seconds of electroshocker sampling.

The stream flows from the proposed cutblock into a large harvested area. According to the previous 1:20,000 Inventory (Triton, 1998), **ILP 6108** was sampled at site E290 in August, 1996, (approximately 1 km downstream of this survey site, NID 5108) and classified as No Visible Channel. After further surveying the stream in October 1998 downstream of the harvested area it was clear the stream did not have stable surface flows and disappeared underground periodically. Even though the watercourse did not have a continuous channel downstream of the sample site, the watercourse within the proposed block at the sample site was continuous and considered a stream and classified based upon lack of fish captures. **ILP 6108 is classified as S6.**

Three streams identified by Roman Numerals IV, V and VI identified by Silvicon layout crews are located on the west side of the block. They are parallel to each other flowing from the north block boundary through the block and exiting the south boundary. These streams were not surveyed as they were identified as S6 streams in a previous survey (Triton, 1998). A 4 m falls is located approximately 3 km downstream of the block on the mainstem which these three streams (Roman Numerals IV, V and VI) flow into. Electroshocker sampling upstream of the falls did not catch fish. The lack of fish captures validates the existing non-fish bearing classification.

5.1.2 Stream Summary Table

Table 2: Summary of Stream Assessments for Block 633-1 of the Babine Study Area

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Habitat Comments
633-1	93m.067	6106 (1)	5106	T27, T36	2.03	S6	Mouth	None	Good potential spawning and Rearing habitat.
633-1	93m.067	6107 (1)	5107	T137	0.44	S6	Mouth	None	No potential spawning and limited potential rearing habitat.
633-1	93m.067	6108 (1)	5108	E290	0.7	S6	Mouth	None	No potential spawning and limited potential rearing habitat.
633-1	93m.067	IV	IV	R34	-	S6	3 km d/s of the block	None	N/A
633-1	93m.067	V	V	R34	-	S6	3 km d/s of the block	None	N/A
633-1	93m.067	VI	VI	R34	-	S6	3 km d/s of the block	None	N/A

Figure 4: Block 633-1 map

5.2 CP 633 Block 2

Block 633-2 is located adjacent to blocks CP 638-4 and 638-5, on the north side of the 487 Road, approximately 4 km from the start of this road. The topography is low gradient, gently sloping ground. Two creeks flow along the east and west block boundaries (ILP 2106, ILP 2170 (J40 stream)) and two drainages flow from within the block (**ILP 2108, ILP 2162-NCD).**

5.2.1 Stream Descriptions

ILP 2106, site NID 3106

This creek flows along the west edge of Blocks 633-2 and 633-3 and was sampled in 1997 at site Y61 and in 1996 at site R34 (Triton, 1998). No fish were captured during the 1996 and 1997 electroshocking. In October, 1998, the field crew assessed this creek 150m upstream and downstream of the 487 Road crossing, just downstream of the cutblock 633-2. Reach 3 has 3.4m average channel width, low gradient (4-6%) and riffle-pool morphology. Good quality fish habitat exists throughout this reach. No fish were captured after 428 seconds of effort over 200 lineal meters of stream (3m average wetted width). Electroshocking conditions were good with a water temperature of 7 degrees Celsius and conductivity of 40 μS/cm and shallow clear water. On October 22, 1998, a helicopter was used to fly the creek mouth and a series of barriers were observed and photographed. Two and three meter cascades were present approximately 75 to 100m upstream of the Babine River confluence. Consequently, **Reach 3 of ILP 2106 is classified as non-fish bearing (S5) due to the downstream barrier and lack of fish captures while Reach 4, adjacent to block 633-2, is classified as S6 due to a 2.8m average channel width and lack of fish captures**. Upstream reaches and tributaries to ILP 2106 were sampled in 1996/97 and no fish were captured. Consequently, tributary reaches upstream in Block CP 633-1 are also non-fish bearing S6.

ILP 2170

This creek flows south along the east border of Blocks 633-2 and 633-3 and is a confirmed fish bearing stream with 1996 sample sites J40 and T25 in Reach 2. In October, 1998, the field crews assessed several small tributaries to this creek which originate from Blocks 633-2, 633-3 and 633-4 and are described below. Reach 2 has 2.4m average channel width, low gradient (3%) and riffle-pool morphology (Triton, 1998).

Good quality fish habitat exists throughout this reach. Consequently, **Reach 2 of ILP 2170 is classified as S3 due to the fish captures at site J40 and T25.**

ILP 2108, site NID 3111

This creek flows southeasterly from within Block 633-2 and into fish bearing ILP 2170 (Triton, 1998). In October, 1998, the field crew assessed this creek (identified on block map as Stream VIII) from the confluence with ILP 2170 and for approximately 500m into Block 2, at which point the stream changed from an S4 to an NCD. ILP 2108 has 0.5m average channel width, low gradient (4-6%) and riffle-pool morphology. Fair quality fish habitat exists in the lower 250m of creek. No fish were captured after 270 seconds of effort over 230 lineal meters of stream. Electroshocking conditions were good with a water temperature of 6 degrees Celsius and conductivity of 100 μS/cm and shallow clear water. Electroshocking was difficult due to the extensive alder brush cover along and over the creek. Consequently, **Reach 1 of ILP 2108 is classified S4 due to the ease of access from an adjacent fish bearing stream and fair quality fish habitat. Reach 2 of ILP 2108 is classified as NCD due to the lack of defined continuous channel and banks and seepage.**

ILP 2162, site NID 3110

This watercourse drains easterly from between Block 633-2 and existing block 638-4 into fish bearing ILP 2108. In October, 1998, the field crew assessed this creek for approximately 200m from the confluence with ILP 2108. No defined channel was apparent with abundant seepage and occasional isolated pools. No fish habitat was present and no electroshocking was conducted. Consequently, **ILP 2162 is classified NCD.**

5.2.2 Stream Summary Table

Table 3: Summary of Stream Assessments for Block 633-2 in the Babine Study Area.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Habitat Comments
633-2	93M.066	2106 (3)	3106	Y61, R34	3.4	S5	at confluence with Babine R	none captured	Good quality fish habitat but no fish caught and barriers downstream.
633-2	93M.066	2106 (4)	-	Y61, R34	2.8	S6	at confluence with Babine R	none captured	Good quality fish habitat but no fish caught and barriers downstream.
633-2	93M.066	ILP 2170 (2)	-	J40, T25, E289	2.4	S3	upstream of cutting area	RB, CT	Good quality fish habitat and fish caught in 1996.
633-2	93M.066	2162	3110	-	-	NCD	in ILP 2108	none	No defined channel.
633-2	93M.066	2108 (1)	3111	-	0.5	S4	at reach 1 and 2 break	none captured but RB, CT down-stream	Difficult to shock but good access into ILP 2170 downstream.

Figure 5: Block 633-2 map

5.3 CP 633 Block 3

5.3.1 Stream Descriptions

Block 633-3 is located adjacent to blocks CP 638-7, on the south side of the 487 Road, approximately 4 km from the turnoff from the 4000 Road. The topography is low gradient, gently sloping ground. Two creeks, described previously, flow along the east and west block boundaries (ILP 2106, ILP 2170 (J40 stream)) and three drainages were identified within the block (**ILP 2107, ILP 2161(NCD), ILP 2160 (NCD)).**

ILP 2107, site NID 3107

This creek flows south from within Block 638-4, underneath the 487 Road and through 633-3 and into fish bearing ILP 2170 (S3). In October, 1998, the field crew assessed this creek from the 487 road crossing and downstream for approximately 1200m, at which point the stream flowed into a swampy area adjacent to ILP 2170 (Fisheries Sensitive Zone, Triton, 1998). ILP 2107 has 0.6m average channel width, moderate gradient (8-9%) and riffle-pool morphology. Fair quality fish habitat exists in the creek. No fish were captured after 341 seconds of effort over 210 lineal meters of stream. Electroshocking conditions were fair with a water temperature of 5 degrees Celsius and conductivity of 50 μS/cm and shallow clear water. Electroshocking was difficult due to the extensive alder brush cover along and over the creek which makes observing stunned fish difficult and permits fish to escape before being shocked. Consequently, **Reach 1 of ILP 2107 is classified S4 due to the access from an adjacent fish bearing stream and fair quality fish habitat.** The creek was not assessed upstream of the 487 Road in an existing cutblock. The culvert underneath the existing access road into the proposed block may be an obstruction to fish migrating upstream, but it is unlikely that many fish will be seeking out habitat upstream of the spur road crossing.

ILP 2160, site NID 3108

This watercourse is very short and drains into ILP 2107 between the spur road and 487 road. In October, 1998, a defined channel was not present but occasional seepage was observed. No fish habitat was present and no electroshocking was conducted. Consequently, **ILP 2160 is classified as no visible channel.**

ILP 2161, site NID 3109

This watercourse is very short and drains into ILP 2170 approximately 150m downstream of the 487 road. In October, 1998, a defined channel was not present but occasional

seepage was observed. No fish habitat was present and no electroshocking was conducted. Consequently, **ILP 2161 is classified as no visible channel.**

5.3.3 Stream Summary Table

Table 4: Summary of Stream Assessments for Block 633-3 in the Babine Study Area.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Habitat Comments
633-3	93M.066	2106 (3)	3106	Y61, R34	3.4	S5	at confluence with Babine R	none captured	Good quality fish habitat but no fish caught and barriers downstream.
633-3	93M.066	2107 (1)	3107		0.6	S4	upstream of cutblock 633-3	in ILP 2170 downstream	Fair quality fish habitat but no fish caught.
633-3	93M.066	2160	3108	-	-	No Visible Channel		-	No channel.
633-3	93M.066	2161	3109	-	-	No Visible Channel	in ILP 2170	none	No defined channel.
633-3	93M.066	ILP 2170 (2)	-	J40, T25	2.4	S3	upstream of cutting area	RB, CT	Good quality fish habitat and fish caught in 1996.

Figure 6: Block 633-3 map

5.4 CP 633 Block 4

Proposed cutblock 633-4 is located in a relatively flat area on the north side of the Babine River Valley. Cutblock 4 has been separated into three units identified as A, B and C. Unit A is the largest of the three units and is located at the south end of the block. Units B and C are located at the north end of the block and are much smaller than Unit A. Using the recce layout map of the blocks and roads supplied by Silvicon**, three streams** were identified within proposed cutblock **CP 633-4 (ILP 6112, ILP 6113, and ILP 2170)**.

5.4.1 Stream Descriptions

ILP 2170

ILP 2170 flows along the west edge of proposed cutblock CP 633-4 in between proposed cutblocks CP 633-2 and CP 633-4. Triton sampled ILP 2170 at site T25 (Triton, 1998) in July, 1996 approximately 1 km downstream from CP 633-4. Juvenile cutthroat trout were captured through 362 seconds of electroshocking. The average channel width at site T25 was 2.4 m. The 1996 sample site was conducted in Reach 2 which begins approximately 1.5 km downstream of the T25 site) to 1 km upstream of CP 633-4. **Adjacent to CP 633-4, ILP 2170 is classified S3.**

ILP 6112, site NID 5112

ILP 6112 is an unconfined, low gradient stream (1-2%) with an average channel width of 0.4 m. The stream flows west through Units B and C into ILP 2170 at the upstream end of CP 633-4. ILP 6112 contains suitable fish habitat for approximately 100 m upstream of its confluence with ILP 2170 . Upstream of this ILP 6112 flows through a wetland area between Units B and C (marked as the end of fish use). The substrate consists exclusively of fines, the stream becomes shallow and often disappears and very little cover exists. In the lower 100 m the stream provides moderate rearing habitat but no spawning values. No electroshocking was conducted as the stream flowed into a known fish stream, and access into the stream was without impediments. **The lower 100 m of the stream is classified as S4 and upstream it is a NCD.**

ILP 6113, site NID 5113

This stream is an unconfined, low gradient stream (1%) with an average channel width of 0.6 m. ILP 6113 flows through a culvert under the CP 633-4 spur road, along the south boundary of Unit A (the lower edge of CP 633-4) and into ILP 2170. **ILP 6113** is a first

order stream with moderate to poor fish habitat for 500 m upstream of ILP 2170. There was no spawning gravel but there was moderate rearing values. Upstream of the lower 500 m the stream flows from a marshy area and the defined channel disappears. No fish were captured by electrofishing for 419 seconds over a total distance of approximately 150 m. Electroshocking conditions were fair with a water temperature of 5 degrees Celcius and conductivity of 90 microSiemens/cm. Based upon the unimpeded access from a known fish stream and available fish habitat **ILP 6113 is classified as S4 for the lower 500 m (40 m upstream of CP 633-4 spur road) and is NCD upstream of the reach break (1/2)**.

5.4.2 Stream Summary Table

Table 5: Summary of Stream Assessments for Block 633-4 in the Babine Study Area.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Photo Number	Habitat Comments
633-4	93M.067	2170 (2)	-	T25	2.4	S3	upstream of CP 633-4	CT		Noted as having excellent rearing habitat.
633-4	93M.067	6112	5112	-	0.4	S4/NCD	100m upstream of ILP 2170	NFC		Moderate rearing and no spawning habitat.
633-4	93M.067	6113	5113	-	0.6	S4/NCD	500m upstream of ILP 2170	NFC		Moderate rearing and no spawning habitat.

Figure 7: Block 633-4 map

5.5 Block 633-5

Proposed cutblock CP 633-5 is located in a relatively flat area on the north side of the Babine River Valley. It is the block in the south east corner of a group of four blocks; CP 633-3 is to the west, CP 633-2 is to the north-west and CP 633-4 is to the north side. The 487 Road enters the east side of the proposed block, goes through the centre and exits the west side of the block. Two spur roads leave the 487 Road within the block. One goes north into CP 633-4 and the second goes south east into a previously harvested cutblock.

Using the recce layout map of the blocks and roads supplied by Silvicon**, four streams** were identified within proposed cutblock **CP 633-5**. **(ILP 6109, ILP 6110, ILP 6111 and ILP 2170)**.

5.5.1 Stream Descriptions

ILP 6109, site NID 5109

ILP 6109 is an occasionally confined, moderate gradient (3-4%) stream with an average channel width of 1.60 m. The stream was dry at the time of survey. There were no potential spawning values observed and potential rearing values were limited. During previous 1:20,000 Inventory in July, 1996 (Triton, 1998), **ILP 6109** was sampled at site T26 located approximately 1.5 km downstream of CP 633-4 and E291 located approximately 1 km upstream of CP 633-4. No fish were captured or observed at either site after 225 m was sampled for 493 seconds (the combined shocking totals) with an electroshocker. To complete the classification process the stream was flown by helicopter on October 22, 1998 to determine if a barrier to fish migration exists in the lower reaches. TRIM 1:20,000 maps indicate a high gradient, entrenched section of stream, which may contain a barrier to fish, located approximately 300 m upstream of the confluence with the Babine River. A barrier (a set of falls approximately 3-5 m in height) exists 350m upstream of the mouth of the stream. Due to the lack of fish captures and a barrier to fish, **ILP 6109 is classified as S6**.

ILP 6110, Site NID 5110

ILP 6110 is a first order, low gradient stream (1%) with an average channel width of 0.80 m. ILP 6110 flows from within proposed block CP 633-5 towards the south east corner of the block where it flows into ILP 6109. There was no spawning habitat present yet moderate rearing values existed in limited amounts. As described in the above section, ILP 6109 was classified S6 due to a barrier to upstream migration located near the

confluence with the Babine River and no fish captured throughout the stream network. **Consequently, ILP 6109 mainstem and all tributaries including ILP 6110 are classified as S6.**

ILP 6111, Site NID 5111

ILP 6111 flows west along the south edge of proposed block CP 633-5 for approximately 100 m and angles south away from the block boundary. The channel disappeared into the ground and reappeared numerous times over the section surveyed. This drainage did not meet the technical definition of a stream under the Forest Practises Code since it did not have continuous channels and banks with alluvial substrate. This **NCD** had a discontinuous channel and overland flow through alders. There was limited water present during the survey and no potential fish habitat. **This seepage was classified as a NCD.**

ILP 2170

ILP 2170 lows along the west edge of proposed cutblock CP 633-5 between proposed cutblocks CP 633-3 and CP 633-5. Triton sampled ILP 2170 adjacent to CP 633-5 (site T25) in July, 1996 during the previous 1:20,000 Inventory. Juvenile cutthroat trout were captured through 362 seconds of electroshocking. The average channel width at the site was 2.4 m. **The entire section of stream adjacent to CP 633-5 is classified S3.**

5.5.2 Stream Summary Table

Table 6: Summary of Stream Assessments for Block 633-5 in the Babine Study Area.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Photo Number	Habitat Comments
633-5	93M.056	6109 (3)	5109	E291, T26	1.6	S6	300m u/s of the Babine R.	None		No potential spawning habitat and limited potential rearing habitat.
633-5	93M.057	6110 (1)	5110	-	0.8	S6	300m u/s of the Babine R.	None		No potential spawning habitat and limited potential rearing habitat.
633-5	93M.057	6111 (1)	5111	-		NCD	Mouth	None		No fish habitat.
633-5	93M.057	2170 (2)	-	T25	2.4	S3	U/s of the block	CT		Noted as having excellent rearing habitat.

Figure 8: Block 633-5 map

5.6 Additional Sampling Summary

No additional sampling is required to confirm stream classifications within CP 633. For streams assessed in CP 633, the streams either:

- had barriers and were sampled for fish but no fish were captured and were classified as non-fish bearing,
- had no fish habitat and could not be sampled for fish and were classified as non-fish bearing,
- had fish which were caught by electroshocking and were classified S1-S4,
- or were close to known fish-bearing streams and did not contain barriers or obstructions to prevent fish from entering the reach and were classified S1-S4.

5.7 Habitat Protection Concerns for CP 633

Within CP 633, fish passage at road crossings is only a concern for ILP 2170 and fish bearing tributaries within Blocks 633-2, 633-3 and 633-4 and along access roads into these blocks. With the exception of the streams just mentioned, the rest of the proposed roads and stream crossings of CP 633 are not over fish bearing waters. By utilizing appropriate road building and harvesting practices the delivery of forestry-related sedimentation can be controlled and reduced. Minimizing the generation and delivery of sedimentation into watercourses which flow into fish bearing streams (ILP 2107, ILP 2170 and tributaries) will help protect downstream fish habitat and fishery values.

No fish were captured above 20% gradient sections of channel and no additional fisheries sensitive zones were found throughout the CP 633 area. No watershed restoration or rehabilitation opportunities were identified throughout the CP 633 area.

5.8 Non-Fish Bearing Reaches

A Non-fish bearing Reach Summary Table is provided for relevant reaches within CP 633 (Table 7). Reaches of a stream which were determined to be non-fish bearing are identified in the report since they were typically the reaches sampled by the field crew. Upstream reaches which are non-fish bearing are not included in this table but are identified on the maps since field crews may not have assessed every upstream reach to assign classification.

Table 7: Non-Fish Bearing Report for Streams in the Babine Study Area (CP 633)

1998 Sampling Date and Block	1996/97 sample sites or additional sampling required	Watershed Code or ILP number	Reach Number	Site #	Map Sheet Number	Gradient	Capture Method (electro-shocker settings)	Area covered (sq. m)	Sampling Effort (seconds)	Cond-uctivity uS	Water Temp. (degrees Celsius)	Flow Stage (VO)*	Turbidity (VO)**	Known Fish Presence (upstream or downstream)	Obstructions to Fish Migration	Location of End of Fish Use	Seasonal Fish Use
October, 1998 CP 633-1	T35, T27	6106	1 and all upstream reaches	5106	93M.056, 57, 67	low (3-4%) at site	600V 70Hz 6ms	600	476	80	5	M	C	none	Barrier falls at mouth on 93m.056	mouth	none
October, 1998 CP 633-1		6107	1 and all upstream reaches	5107	93M.067	low (3-4%) at site	600V 70Hz 6ms	20	207	90	5	L	C	none	Barrier falls at mouth of ILP 6106on 93m.056	d/stream in main creek	none
October, 1998 CP 633-1	E290	6108	1 and all upstream reaches	5108	93M.067	low (3-4%) at site	600V 70Hz 6ms	40	453	60	6	L	C	approximately 3km downstream was CT	no defined channel in reach 1	reach 1	none
October, 1998 CP 633-2	Y61, R34	2106	2and all upstream reaches	3106	93M.066	low (3-4%) at site	700V 70Hz 6ms	580	428	40	7	L	C	none	barrier in reach 1	reach 1	none
October, 1998 CP 633-2		2162	entire short drainage	3110	93M.066	low (3-4%) at site	-	-	-	-	-	L	C	none	NCD drainage	mouth	none
October, 1998 CP 633-2		2108	Reach 2 and upstream	3111	93M.066	low at site	-	-	-	-	-	L	C	CT in creek 700m down-stream	NCD drainage upstream of reach break	reach 1 and 2 break	none
October, 1998 CP 633-3		2160	entire drainage	3108	93M.056	low at site	-	-	-	-	-	L	C	CT in creek 1600m down-stream	NCD drainage	confluence	none
October, 1998 CP 633-3		2161	entire drainage	3109	93M.056	low at site	-	-	-	-	-	L	C	CT in creek down-stream	No visible channel drainage	confluence	none
October, 1998 CP 633-4		6113	Reach 2	5113	93M.067	low at site	-	-	-	-	-	L	C		at reach 1 and 2 break	at reach 1 and 2 break	none

NOTES:

* - Flow stage: L - low flow, M - medium (not bankfull), H - High (bankfull flow)

** - Turbidity: C - clear water (visible to bottom), L - lightly turbid (still good visibility), M - moderately turbid (visibility only fair), T - turbid (visibility poor)

Table 7 continued: Non-Fish Bearing Report for Streams in the Babine Study Area (CP 633)

1998 Sampling Date and Block	1996/97 sample sites or additional sampling required	Watershed Code or ILP number	Reach Number	Site #	Map Sheet Number	Gradient	Capture Method (electro-shocker settings)	Area covered (sq. m)	Sampling Effort (seconds)	Cond-uctivity uS	Water Temp. (degrees Celsius)	Flow Stage (VO)*	Turbidity (VO)**	Known Fish Presence (upstream or downstream)	Obstructions to Fish Migration	Location of End of Fish Use	Seasonal Fish Use
October, 1998 CP 633-4		6112	Reach 2	5112	93M.067	low at site	-	-	-	-	-	L	C		at reach 1 and 2 break	at reach 1 and 2 break	none
October, 1998 CP 633-5		6109	2and all upstream reaches	5109	93M.057	low (3-4%) at site		-	-	-	-	dry	-	none	Barrier falls at mouth of ILP 6109 on 93m.056	d/stream in main creek	none
October, 1998 CP 633-5		6110	1 and upstream	5110	93M.057	low at site		-	-	-	-	dry	-	none	Barrier falls at mouth of ILP 6109 on 93m.056	d/stream in main creek	none
October, 1998 CP 633-5		6111	1 and upstream	5111	93M.057	low at site	-	-	-	-	-		-	none	NCD drainage	NCD drainage	none

NOTES:

* - Flow stage: L - low flow, M - medium (not bankfull), H - High (bankfull flow)

** - Turbidity: C - clear water (visible to bottom), L - lightly turbid (still good visibility), M - moderately turbid (visibility only fair), T - turbid (visibility poor)

5.9 CP 639 Blocks 1 and 2

Blocks 1 and 2 are located adjacent to each other along the same watercourses, just south east of Kilometer 90 on the 4000 Forest Service Road. The small tributaries which drain through the cutblocks eventually empty into the Babine River, approximately 1500m downstream. Three watercourses were identified within or adjacent to Blocks 1 and 2 **(ILP 2001, ILP 2002, ILP 2003).**

5.9.1 Stream Descriptions

A 2m barrier exists within a steep entrenched channel section between reach 1 and 2 of the mainstem ILP 2002, approximately 1000m downstream of block 2. In 1996/97, fish sampling was conducted at two sites (T26, T29) located along upper tributaries, upstream of the cutblock locations, and no fish were captured.

ILP 2002, site NID 3002, site NID 3003

This mainstem watercourse flows southeast under the 4000 Road and along the north east edge of block 1 and between blocks 1 and 2 then along the north edge of existing block 515-1. Between Blocks 1 and 2 and further downstream, the average width was 3.2m and the gradient was low (2-5%) with abundant grass and sedges and good fish habitat. The channel adjacent to Block 1 was dry while downstream of Block 1 isolated standing pools and minimal flow was present. No fish were captured after 100 seconds of shocking. **The barrier on ILP 2002 is the End of Fish use and consequently ILP 2002 was classified S5 upstream of this barrier due to the lack of fish captures.**

Mapping note: The stream channel is incorrectly mapped on the TRIM maps. The Cutting Permit Overview map shows the corrected channel orientation. Field crews found that ILP 2002 actually flows between Blocks 1 and 2 and then along the southwest boundary of Block 2 and not around the northeast corner of Block 2. ILP 2003 is a very small tributary to ILP 2002 and flows along the northeast side of Block 2 then into ILP 2002 at the southwest corner of Block 2.

ILP 2001, site NID 3001

This short watercourse flows southeast under the 4000 Road and along the southwest edge of block 1 then into ILP 2002. The creek was less than 1.5m average width, low gradient and flowed through abundant grass and sedges before flowing into the larger ILP 2002. No fish were captured after 250 seconds of shocking. **The barrier on ILP 2002 is the End of Fish use and consequently ILP 2001 was classified S6.**

ILP 2003, site NID 3004

This watercourse flows along the northeast edge of block 1 then into ILP 2002. The creek was less than 1.5m average width, low gradient and flowed through cobble and gravel before flowing into the larger ILP 2002. This creek had very little flow and was mostly dry and no fish were captured after 50 seconds of shocking. **The barrier on ILP 2002, located downstream of the confluence, is the End of Fish use and consequently ILP 2003 was classified S6.**

5.9.2 Stream Summary Table

Table 8: Summary of Stream Assessments for Block 639-1 and 639-2.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Habitat Comments
639-1	93M.057	2001 (1)	3001		less than 1.5	S6	falls in Reach 1 of ILP 2002	none captured	Poor fish habitat.
639-1	93M.057	2002 (3)	3002, 3003	T28, T29	3.2	S5	falls in Reach 1 of ILP 2002	none captured	Good fish habitat.
639-2	93M.057	2003 (1)	3004		less than 1.5	S6	falls in Reach 1 of ILP 2002	none captured	Fair fish habitat.

Figure 9: Blocks 639-1 and 639-2 map

5.10 CP 639 Blocks 3 and 7

Blocks 3 and 7 are located adjacent to the same creek, with Block 7 located further upstream and along the 489 Road.

5.10.1 Stream Descriptions

ILP 2004, site NID 3005

This mainstem watercourse flows southwest through Block 7 then under the 489 Road and along the northwest edge of block 3 then down a steep slope into the Babine River. Adjacent to Block 7 the average width was less than 1.5m and the gradient was moderate (10-14%) and abundant alder vegetation obscured the channel with very poor quality fish habitat. Three previous inventory sample sites are located on ILP 2004 and a tributary (Z1, Z2, Y48) and no fish were captured by electrofishing. In August, 1998, the creek was dry adjacent to the cutblock with an average width of 1m and low gradient (1-2%). Isolated pools and minimal flow were present 400m downstream of the block but a 200m long gradient barrier (25-30% slope) was present immediately upstream of the confluence with the Babine. **The creek was mostly dry and the gradient barrier prevents fish access so ILP 2004 was classified S6.**

5.10.2 Stream Summary Table

Table 9: Summary of Stream Assessments for Blocks 639-3 and 639-7.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Habitat Comments
639-3	93M.057	2004 (1)	3005	Y48, Z1, Z2	1m	S6	gradient barrier at mouth	none	Poor habitat and dry creek with barrier at mouth.
639-7	93M.057	2004 (2)	3005	Y48, Z1, Z2	1m	S6	gradient barrier at mouth	none	Poor habitat and dry creek with barrier at mouth.

Figure 10: Block 639-3 map

Figure 11: Block 639-7 map

5.11 CP 639 Blocks 4 and 5

Blocks 4 and 5 are located several hundred meters southwest of the 489 Road, approximately 2.5 to 3 km from the 4000 Road turnoff. Blocks 4 and 5 are located adjacent to the same creek (**ILP 2006**), with the west boundary of Block 8 located along reach 3 of **ILP 2006**, near the 489 Road. ILP 2005 is a small tributary to ILP 2006 which flows across the 489 Road then between blocks 4 and 5 and into ILP 2006.

5.11.1 Stream Descriptions

ILP 2006, site NID 3006

This stream is mapped as flowing southwesterly across the 489 Road, along the south east boundary of Block 5 then alongside a large meadow (800m in length) and then into the Babine River. The field crew hiked along the creek from the 489 Road to the downstream end of the meadow and found that the creek did not have a flowing channel or connection across the meadow. The channel for ILP 2006 disappeared as a seepage into the meadow and no defined channel existed at the outlet of the meadow. A channel did exist adjacent to block 5 (1m channel width, low gradient) but fish habitat quality was extremely poor and the creek was dry. **Consequently no fish were living within the channel or meadow and the creek was classified S6**.

ILP 2005, site NID 3007

Similar to ILP 2006, this creek was dry with occasional seepage apparent in the 1m wide channel. Fish habitat was extremely poor in this low gradient channel which disappeared into the dry meadow downstream. **Consequently the creek was classified S6.**

5.11.2 Stream Summary Table

Table 10: Summary of Stream Assessments for Block 639-4, 5 in the Babine Study Area.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Habitat Comments
639-5, 639-8	93M.057	2006 (3)	3006	Y47	1m	S6	downstream of large meadow below cutblocks	none	Poor habitat and dry creek with discontinuous channel in meadow.
639-4,	93M.057	2005 (1)	3007		1m	S6	downstream of large meadow below cutblocks	none	Poor habitat and dry creek with discontinuous channel in meadow.

Figure 12: Blocks 639-4 and 639-5 map

5.12 CP 639 Block 6

Proposed cutblock 639-6 is located on a gradual south facing slope on the east side of the Babine River. Using the recce layout map supplied by Silvicon, the field crew identified two streams within close proximity of the proposed block (**ILP 6001 and ILP 6002**).

5.12.1 Stream Descriptions

ILP 6001

ILP 6001 flows south west from a small lake, down the gradually sloped valley into the Babine River located approximately 8.5 km downstream. This stream does not flow within the proposed cutblock CP 639-6 although it approaches the south east corner of the block. It is a second order, moderate gradient stream when it flows past CP 639-9. **ILP 6001** was sampled and classified during Triton's 1996/97 1:20,000 Inventory (Triton, 1998) and again during the 1998 1:5,000 stream inventory. Site T31, located approximately 1 km upstream of CP 639-9 (Triton's 1996/97 sample site), and site NID 5001, located 4 km downstream of CP 639-9 (Triton's 1998 sample site) in association with CP 639-12. Both rainbow and cutthroat trout were caught at site T31 in 1996 and fish were visually observed at site NID 5001 in August 1998. The stream widths at both sites exceed 1.5 m and are less than 5 m. **ILP 6001 was classified as S3**.

ILP 6002, site NID 5002

ILP 6002 is a first order, low to moderate gradient stream (2 to 10%) with an average channel width of 1.26 m. **ILP 6002** flows south west for approximately 3 km and joins with **ILP 6001** approximately 400 m south of CP 639-6. In the 3 km it flows down the slope, it crosses the west side of CP 639-9, along the east boundary of CP 639-8 and along the west side of CP 639-6. The stream does not provide any spawning habitat or overwintering habitat yet the rearing values were good, in part, due to the abundant cover. No fish were captured by shocking but due to the extensive overhanging, brushy cover, fish capture was very difficult. Based on the unimpeded access from a known fish stream (ILP 6001) and suitable fish habitat present, **ILP 6002 is classified as S4** to upstream of CP 639-9 (the entire length of CP 639-6).

5.12.2 Stream Summary Table

Table 11: Summary of Stream Assessments for Block 639-6 in the Babine Study Area.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Habitat Comments
639-6	93M.057	6001	-	T31	1.64	S3	U/s of CP 639-9	CT RB	Good rearing values noted.
639-6	93M.057	6002	5002	Y46	1.26	S4	U/s of CP 639-9	No fish caught	No overwintering or spawning habitat-good rearing values.

Figure 13: Block 639-6 map

5.13 CP 639 Block 8

Proposed cutblock 639-8 is located on a gradual south facing slope on the east side of the Babine River. The 489 Road crosses through the centre of the block approximately 3.5 km from the 4000 Road. Using the recce layout map supplied by Silvicon, the field crew identified two streams within close proximity of the proposed block (**ILP 6002 and ILP 2006**).

ILP 2006 was classified S6 and is discussed in Section 0 above.

5.13.1 Stream Descriptions

ILP 6002, site NID 5002

ILP 6002 is initially discussed in section 0 with reference to CP 639-6. It is a first order, low to moderate gradient stream (2 to 10%) with an average channel width of 1.26 m. ILP 6002 flows south west for approximately 3 km from relatively high on the valley wall and joins with ILP 6001 approximately 400 m south of CP 639-6. In the 3 km it flows down the slope, it crosses the west side of CP 639-9, along the east boundary of CP 639-8 and along the west side of CP 639-6. The stream does not provide any spawning habitat or overwintering habitat yet the rearing values were good, in part, due to the abundant cover. Based on the unimpeded access from a known fish stream and suitable fish habitat present, **ILP 6002 is classified as S4** to upstream of CP 639-9 (the entire length of CP 639-6).

5.13.2 Stream Summary Table

Table 12: Summary of Stream Assessments for Block 639-8 in the Babine Study Area.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Habitat Comments
639-6	93M.057	6002	5002	Y46	1.26	S4	U/s of CP 639-9	No fish caught	No overwintering or spawning habitat-good rearing values.
639-5, 639-8	93M.057	2006 (3)	3006	Y47	1m	S6	downstream of large meadow below cutblocks	none	Poor habitat and dry creek with discontinuous channel in meadow.

Figure 14: Block 639-8 map

5.14 CP 639 Block 9

Proposed cutblock 639-9 is located on a gradual south facing slope on the east side of the Babine River. It is located approximately 1.2 km north of the 489 Road, at a point 4 km from the 4000 Road. Using the recce layout map supplied by Silvicon, the field crew identified two streams within close proximity of the proposed block (**ILP 6001 and ILP 6002**).

5.14.1 Stream Descriptions

ILP 6001, site NID 5001

ILP 6001 flows south west from a small lake, down the gradually sloped valley wall into the Babine River located approximately 8.5 km further below. This stream does not flow within the proposed cutblock CP 639-9 although it parallels the east boundary of the block. It is a second order, moderate gradient stream as it flows past CP 639-9. ILP 6001 was sampled and classified during Triton's 1996/97 1:20,000 Inventory (Triton, 1998) and again during the 1998 1:5,000 stream inventory. Site T31, located approximately 1 km upstream of CP 639-9 (Triton's 1996/97 sample site), and site NID 5001, located 4 km downstream of CP 639-9 (Triton's 1998 sample site) in association with CP 639-12. Both rainbow and cutthroat trout were caught at site T31 and fish were visually observed at site NID 5001. The stream widths at both sites exceed 1.5 m and are less than 5 m. **ILP 6001 is classified as S3**.

ILP 6002, site NID 5002

ILP 6002 is a first order, low to moderate gradient stream (2 to 10%) with an average channel width of 1.26 m. ILP 6002 flows south west for approximately 3 km from relatively high on the valley wall and joins with ILP 6001 approximately 400 m south of CP 639-6. In the 3 km it flows down the slope, it crosses the west side of CP 639-9, along the east boundary of CP 639-8 and along the west side of CP 639-6. The stream was initially surveyed downstream beside block CP 639-6. Crews then followed the stream up to block CP 639-9. As observed lower downstream, the stream does not provide any spawning habitat or overwintering habitat yet the rearing values were good. The access for fish remained good for the entire length of stream. Based on the unimpeded access from a known fish stream and suitable fish habitat present, **ILP 6002 is classified as S4** to upstream of CP 639-9.

5.14.2 Stream Summary Table

Table 13: Summary of Stream Assessments for Block 639-9.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Habitat Comments
639-6	93M.057	6001	5001	T31	1.64	S3	U/s of CP 639-9	CT RB	Good rearing values noted.
639-6	93M.057	6002	5002	Y46	1.26	S4	U/s of CP 639-9	No fish caught	No overwintering or spawning habitat-good rearing values.

Figure 15: Block 639-9 map

5.15 CP 639 Blocks 10 and 11

CP 639 Blocks 10 and 11 had no streams within or in close proximity to their boundaries according to 1:20,000 TRIM mapping and Silvicon lay-out crew assessments. No assessments of these blocks were made by Triton field crews.

5.16 CP 639 Block 12

Proposed cutblock 639-12 is located on a gradual south facing slope on the east side of the Babine River. It is located approximately 6 km from the 4000 Road along the 489 Road. Using the recce layout map supplied by Silvicon, the field crew identified two streams within close proximity of the proposed block (**ILP 6001 and ILP 6000**).

5.16.1 Stream Descriptions

ILP 6001, site NID 5001

ILP 6001 flows south west from a small lake, down the gradually sloped valley wall into the Babine River located approximately 8.5 km further below. This stream was sampled and classified during Triton's 1996/97 1:20,000 Inventory (Triton, 1998). It is a second order, moderate gradient stream with an average channel width of 1.64 m. The stream at site T31, located approximately 5 km upstream of CP 639-12, was **classified as S3** as both rainbow and cutthroat trout were caught there (and an average channel width of 1.64 m).

ILP 6001, site NID 5001 was assessed for the purpose of acquiring additional inventory information. The stream contained only isolated pools and was not flowing at the time of survey. It is an unconfined, low gradient stream (average 2%) with an average channel width of 2.60 m. There was no spawning habitat available but there was both overwintering habitat and rearing habitat. Fish were visually observed in a large pool in a marshy area, however, it was not possible to identify what species they were. **ILP 6001 was classified as S3 at NID 5001**.

ILP 6000 site NID 5000

ILP 6000 flows west along the south west boundary of CP 639-12 for approximately 150 m, along the gradually sloped valley and into ILP 6001, approximately 2.6 km upstream of the Babine River. It is a first order, low gradient stream (2%) with an average channel width of 1.18 m. The stream did not provide any spawning or overwintering habitat but rearing habitat was present (as long as water is present). The stream was dry at the time of survey so no sampling was conducted. Due to unimpeded access from a known fish stream, low gradient and suitable fish habitat available, **ILP 6000 was classified as S4**.

5.16.2 Stream Summary Table

Table 14: Summary of Stream Assessments for Block 639-12 in the Babine Study Area.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Habitat Comments
639-12	93M.057	6000	5000	T31	1.18	S4	upstream of block	fish observed, likely RB,Ct	Fair rearing habitat present, but creek dry at time of survey. Likely only seasonal use during spring high water period. Accessible from nearby fish bearing stream.
639-12	93M.057	6001	5001	T31	1.64	S3	fish bearing to lake upstream	RB,CT	Good fish habitat present.

Figure 16: Block 639-12 map

5.17 CP 639 Block 13

Proposed cutblock 639-13 is located on a gradual south west facing slope on the north east side of the Babine River. It is located approximately 3 km north of the Babine River, approximately 2 km beyond the end of the constructed portion of the 489 Road. One stream was identified within close proximity of the proposed block (**Unnamed Stream T32**) which was classified using existing information from previous inventories.

5.17.1 Stream Descriptions

Unnamed Stream T32

Unnamed Stream T32 flows south for approximately 4 km before turning west and continuing for a further 2 km to the Babine River. The stream flows along the north east and then the south east boundaries of CP 639-13. The stream was sampled and classified during Triton's 1996/97 1:20,000 Inventory (Triton, 1998). It is a second order, low to moderate gradient stream (3-4%) with an average channel width of 1.90 m. 1996/97 Triton Inventory Site T32 is located alongside the north east boundary of the block. One Dolly Varden was captured during the 1996 survey after 185 seconds of electroshocking. **Unnamed Stream T32 is classified as S3.**

5.17.2 Stream Summary Table

Table 15: Summary of Stream Assessments for Block 639-13 in the Babine Study Area.

Block	TRIM Map Number	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan. Width (m)	Stream Class.	Location of End of Fish Use	Fish Present	Photo Number	Habitat Comments
639-13	93M.057	T32	-	T32	1.9	S3	U/s of block CP 639-13	DV		Mainly fine substrate. Instream cover was abundant.

Figure 17: Block 639-13 map

5.18 Additional Sampling Summary

No additional sampling is required to confirm stream classifications within CP 639. For streams assessed in CP 639, the streams either:

- had barriers and were sampled for fish but no fish were captured and were classified as non-fish bearing,
- had no fish habitat and could not be sampled for fish and were classified as non-fish bearing,
- had fish which were caught by electroshocking and were classified S1-S4,
- or were close to known fish-bearing streams and did not contain barriers or obstructions to prevent fish from entering the reach and were classified S1-S4.

5.19 Habitat Protection Concerns for CP 639

Within CP 639, fish passage at road crossings is only a concern for ILP 6001 and ILP 6002 for fish bearing tributaries. With the exception of the streams just mentioned, the rest of the proposed roads and stream crossings of CP 639 are not over fish bearing waters.

By utilizing appropriate road building and harvesting practices the delivery of forestry-related sedimentation can be controlled and reduced. Minimizing the generation and delivery of sedimentation into watercourses which flow into fish bearing streams will help protect downstream fish habitat and fishery values.

No fish were captured above 20% gradient sections of channel and no additional fisheries sensitive zones were found throughout the CP 639 area. No watershed restoration or rehabilitation opportunities were identified throughout the CP 639 area.

5.20 Non-Fish Bearing Reaches

A Non-fish bearing Reach Summary Table is provided for relevant reaches within CP 633 (Table 16). Reaches of a stream which were determined to be non-fish bearing are identified in the report since they were typically the reaches sampled by the field crew. Upstream reaches which are non-fish bearing are not included in this table but are identified on the maps since field crews may not have assessed every upstream reach to assign classification.

Table 16: Non-Fish Bearing Report for Streams in the Babine Study Area (CP 639)

1998 Sampling Date and Block	1996/97 sample sites or additional sampling required	Watershed Code or ILP number	Reach Number	Site #	Map Sheet Number	Gradient	Capture Method (electro-shocker settings)	Area covered (sq. m)	Sampling Effort (seconds)	Cond-uctivity uS	Water Temp. (degrees Celsius)	Flow Stage (VO)*	Turbidity (VO)**	Known Fish Presence (upstream or downstream)	Obstructions to Fish Migration	Location of End of Fish Use	Seasonal Fish Use
August, 1998 CP 639-1,2	T29, T28	2002	1 and all upstream reaches	3002, 3003	93M.057	low (3-4%) at site	400V 70Hz 7ms	50	150	80	10	L	L	none	Barrier falls at mouth on 93m.057	mouth	none
August, 1998 CP 639-1,2	T29, T28	2001	1 and all upstream reaches	3001	93M.057	low (3-4%) at site	400V 70Hz 7ms	100	250	80	10	L	L	none	Barrier falls at mouth on ILP 2002	Barrier falls at mouth on ILP 2002	none
August, 1998 CP 639-1,2	T29, T28	2003	1 and all upstream reaches	3004	93M.057	low (3-4%) at site	400V 70Hz 7ms	-	-	-	-	almost dry	-	none	Barrier falls at mouth on ILP 2002	Barrier falls at mouth on ILP 2002	none
August, 1998 CP 639-3,7	Y48, Z1, Z2	2004	1 and all upstream reaches	3005	93M.057	low (3-4%) at site	-	-	-	-	--	dry	-	none	Gradient barrier at mouth	Gradient barrier at mouth	none
August, 1998 CP 639-4,5, 8	Y47	2006	2 and all upstream reaches	3006	93M.057	low (3-4%) at site	-	-	-	-	--	dry	-	none	No defined channel below dry meadow	No defined channel below dry meadow	none
August, 1998 CP 639-4,5		2005	1 and all upstream reaches	3007	93M.057	low (3-4%) at site	-	-	-	-	--	dry	-	none	No defined channel below dry meadow	No defined channel below dry meadow	none
August, 1998 CP 639-6		2005	1 and all upstream reaches	3007	93M.057	low (3-4%) at site	-	-	-	-	--	dry	-	none	No defined channel below dry meadow	No defined channel below dry meadow	none

NOTES:

* - Flow stage: L - low flow, M - medium (not bankfull), H - High (bankfull flow)

** - Turbidity: C - clear water (visible to bottom), L - lightly turbid (still good visibility), M - moderately turbid (visibility only fair), T - turbid (visibility poor)

6. REFERENCES

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7. APPENDICES

Appendix 1 Stream Photos

Appendix 2 Stream Site Cards, Fish Collection Forms and Reach Forms for Babine Working Unit 2.

Appendix 3 1996/97 Triton Site Cards

Appendix 4 Photo log and thumbnails for all photos taken during survey of Babine Working Unit 2.

Appendix 5 Photo Survey Form 1 - For entire project and all working units.

Appendix I. Stream Photos

The following pages contain representative stream photos for:

1. Block 633-1
ILP 6106, site NID 5106
ILP 6107, site NID 5107
ILP 6108, site NID 6108

2. Block 633-2
ILP 2108, site NID 3111

3. Block 633-3
ILP 2107, site NID 3107

4. Block 633-4
ILP 6112, site NID 5112
ILP 6113, site NID 5113

5. Block 633-5
ILP 6109, site NID 5109
ILP 6110, site NID 5110

6. Block 639-1
ILP 2001, site NID 3001
ILP 2002, site NID 3002

7. Block 639-2
ILP 2003, site NID 3004

8. Block 639-3
ILP 2004, site NID 3005

9. Block 639-5
ILP 2005, site NID 3007

10. Block 639-8
ILP 2006, site NID 3006

11. Block 639-12
ILP 6000, site NID 5000
ILP 6001, site NID 5001

Appendix II. Stream Site Cards, Fish Collection Forms and Reach Forms for Babine Working Unit 2.

The underlined ILP/NIDs do not contain Reach Cards as the streams were not present on the TRIM 1:20,000 maps. The collection of critical Reach Card data was not possible.
The following pages contain the Stream Site Cards and Fish Collection Forms for:

1. Block 633-1
- ILP 6106, site NID 5106
- ILP 6107, site NID 5107
- ILP 6108, site NID 6108

2. Block 633-2
- ILP 2108, site NID 3111
- ILP 2162, site NID 3110

3. Block 633-3
- ILP 2106, site NID 3106
- ILP 2107, site NID 3107
- ILP 2160, site NID 3108
- ILP 2161, site NID 3109

4. Block 633-4
- ILP 6112, site NID 5112
- ILP 6113, site NID 5113

5. Block 633-5
- ILP 6109, site NID 5109
- ILP 6110, site NID 5110
- ILP 6111, site NID 5111

6. Block 639-1
- ILP 2001, site NID 3001
- ILP 2002, site NID 3002

7. Block 639-2
- ILP 2002, site NID 3003
- ILP 2003, site NID 3004

8. Block 639-3

- ILP 2004, site NID 3005

9. Block 639-5

- ILP 2005, site NID 3007

10. Block 639-8

- ILP 2006, site NID 3006
- ILP 6002, site NID 5002

11. Block 639-12

- ILP 6000, site NID 5000
- ILP 6001, site NID 5001

Appendix III. 1996/97 Triton Site Cards

The following pages contain the Stream Site Cards, from the 1996 and 1997 Reconnaissance (1:20,000) Stream Inventory (Triton, 1998), for:

1. Block 633-1
- T36
- E289
- E290

2. Block 633-2
- R34

3. Block 633-3
- J40
- T25
- Y61

4. Block 633-5
- T26
- E291

5. Block 639-1
- T28

6. Block 639-3
- Y48

7. Block 639-6
- Y46

8. Block 639-7
- Z2

9. Block 639-8
- Y47

10. Block 639-13
- T32

Appendix IV. Photo log and thumbnail contact sheet for all photos taken during the survey of Babine Working Unit 2.

Appendix V. Photo Survey Form 1 - For entire project and all working units.

Survey start date: 1998/08/15 **Agency: C172**
Survey end date: 1998/10/22 **Crew:BLW/SMJ/MLP/SKB/TMM**

Camera #1

Make & Model: Pentax Zoom90-WR	**Lenses: A, B**
Format: 135mm film	

Camera #2

Make & Model: Pentax Zoom90-WR	**Lenses: A, B**
Format: 135mm film	

Lenses

Focal Length (mm)	Focal Length (mm)
A 38	D
B 90	E
C	F

Roll Details

Roll#	Camera #	Output Medium	Film Type	ISO
4,5,9	2	slide	colour	200
6,8	1	slide	colour	200
20,21,33	1	slide	colour	200
22,24,28	2	slide	colour	200
29,34	2	slide	colour	200