1:5,000 Fish and Fish Habitat Inventory of Unnamed Tributaries to Toboggan and Trout Creeks

Working Unit 14
Cutting Permit 361

Final Report

March, 1999

Prepared For:
Pacific Inland Resources
Smithers, B.C.

FRPC 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	Gitxsan

WATERSHED INFORMATION

Watershed Group	Bulkley
Watershed Name	Toboggan Creek
Watershed Code	460-242900-
Watershed area	109 km^2
UTM at Mouth	09.607900.6089400
Unit Area	280 km^2
Stream Order	4^{th}
NTS Map	93L/14
TRIM Map	93L.094
BEC Zone	ICH

SAMPLING DESIGN SUMMARY

Total Number of Reaches Sampled	6
Field Sampling Dates	Oct. 3,4 and 5, 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:**	**S.Jennings,B.Williams,S.Buchanan,M.Prins and 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 Ltd.**
	Tech:	**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. This project was funded by Forest Renewal B.C.

Table of Contents

List of Tables

List of Figures

List of Appendices

List of Attachments

(complete list to be submitted with final reports)

(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 October, 1998, and provides classifications for stream reaches within or adjacent Cutting Permit 361, located within Working Units 14, the Toboggan Creek watershed, and Unit 8, the Kitseguecla watershed.

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 Units 8 and 14 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 (93L.094).

Working Unit 14, the Toboggan Working Unit, is located on the west bank of the Bulkley River extending from Trout Creek, 20 km north-west of Smithers, to the Telkwa River located in Telkwa, approximately 14 km east of Smithers. It encompasses an area of approximately 280 km^2 and contains the Toboggan Creek Watershed along with numerous other smaller tributaries to the Bulkley River.

Cutting Permit 361 is located within Working Unit 14, the Toboggan Creek Watershed (proposed cutblocks 361-1, 361-2 and 361-4 are in Unit 14), and a small portion of the Working Unit 8, which includes the Kitseguecla Watershed and minor tributaries to the Bulkley (proposed cutblock 361-3 is in the southeast corner of Unit 8). In an effort to keep all the proposed cutblocks associated with one cutting permit in the same report, Block 361-3 is included in this report.

The study area for this project, defined by the location of CP 361, is situated in the watershed of Trout Creek (a small part of Working Unit 8, Kitseguecla) and in the watersheds of two tributaries to Toboggan Creek (Owens Creek and an unnamed creek). Trout Creek flows eastward into the Bulkley River approximately 16 km northwest, via Highway 16, of the Smithers Airport while Toboggan Creek flows northward into the Bulkley River approximately 15.5 km northwest of the airport, via Highway 16. The Cutblock Overview Map in Figure 2, shows the location of the proposed cutblocks within the watersheds and the results of the 1998 sampling. Detailed inventory results from 1998 field sampling (site locations and stream classifications) are illustrated on the attached TRIM map sheet 93L.094 and the block maps contained within the Results section of this report.

1.2 Access

Field crews accessed the Owens Creek and Trout Creek watersheds via the following route:

- Leaving Smithers and proceeding north along Highway 16 for approximately 13.5 km from the Smithers Airport turnoff and turning west onto a private ranch road;
- The private ranch road crosses Toboggan Creek immediately after leaving the highway, field crews drove for 750m in a southwesterly direction then crossed the railway tracks and turned northwesterly onto an old logging road and stopped along this road to access CP 361-1 approximately 4 km after crossing the railway tracks.
- Crews drove approximately 6 km from the railway crossing along the old forestry road and turned south onto a small spur road for 1 km and then hiked 2 km (south) up the creek into Block 361-3.

Block 361-2 and 361-4 are located adjacent to Owens Creek approximately 1.5 km southwest of Block 361-1. Crews accessed the blocks by:

- turning left onto the Toboggan Creek Hatchery road from Highway 16 and proceeding for 6km, through a private ranch, to a broken bridge over Owens Creek that is adjacent to Block 4. Crews then hiked into each cutblock.

1.3 1:5,000 scale 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 existing fisheries information. Watershed Restoration Program assessments have been carried out in the Toboggan Creek watershed but no additional information about the specific tributaries within the cutblocks was uncovered (J. Lough, Regional WRP Fisheries Specialist, MoELP, Smithers, pers. comm.).

For the watersheds which contain CP 361, a brief summary of fish distribution information from Triton (1998) is presented below. **Proposed cutblocks 361-2 and 361-4** are located adjacent to Reaches 1 and 2 of Owens Creek. **Proposed cutblock 361-3** is located in a small sub-basin which flows into Reach 1 of Trout Creek. 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.

Owens Creek (applies to proposed cutblocks 361-2 and 361-4)

Owens Creek is 10.0 km in length and is fed by 20 tributaries. A 10 meter falls and a 10 meter cascade occur in reach 2 of Owens Creek, approximately 4.5 km upstream of the Owens and Toboggan confluence. (1998 Note: This barrier is located approximately 1 km upstream of the proposed cutblocks adjacent to Owens Creek.) No sampling was carried out in reach 2 as access was limited by bad weather. Reach 1 of the mainstem has low gradient and is unconfined. The confinement and gradient increase in reach 2 and the channel is steep and quite confined in reach 3. In 1996/97, the Owens Creek system was sampled at 2 locations, including reach 1 of the mainstem.

The historical information indicates the presence Dolly Varden in reach 1 of Owens Creek at the road crossing, just upstream from the confluence with Toboggan Creek. Two sites on this system were electrofished, with Dolly Varden caught in reach 1 of the mainstem. Fish distribution is most likely limited by the 10 meter falls and the 10 meter cascade noted in reach 2. One of the tributaries to Owens Creek sampled in this inventory, was classified as an "NC" based on the absence of a defined channel in the sampling area. The other was classified as an S3 based on an average channel width of 3.55 meters and the presence of fish habitat in the sampling areas. No fish were caught in this reach, located above a section of steep gradient at the confluence with the Owens mainstem. This reach has some good Dolly Varden rearing habitat and future sampling is recommended.

Trout Creek

The Trout Creek mainstem is 18.4 km in length and is fed by 32 tributaries. Reach 1 of Trout Creek is moderately confined, while reach 2 has low gradient and is unconfined. Reaches 3 and 4 of Trout Creek are quite confined, while reach 5 is unconfined, has low gradient, and 2 large wetlands identified as fisheries sensitive zones. Reach 6 has increasing gradient, which becomes steep in the headwaters of reach 7. A falls was noted in the historical information 1.4 km from the mouth of Trout Creek. Extensive road crossings, as well as railway and power line crossings occur in reach one. The Trout Creek watershed was sampled at 42 locations in1996/97, including reaches 1, 2, 4, 5 and 6 of the mainstem.

The historical records indicate coho, cutthroat trout, pink, rainbow trout and steelhead at the mouth of Trout Creek. Spawning steelhead and coho have been observed in the vicinity of the falls in reach one and cutthroat trout have been recorded upstream in a tributary to the main creek, which drains Taltzen Lake. Fish were caught by electrofishing at 16 sites in this watershed in1996/97 and were visually observed at 1. Cutthroat trout were caught in reaches 1 and 2 of the main creek and no fish were caught in or above reach three. In reach 1 the Trout Creek mainstem was classified as an S2 based on an average channel width of 10.6 meters and the presence of cutthroat trout in the sampling area. In reach 2, it was classified as an S3, based on an average channel width of 2.3 meters and the presence of cutthroat trout at the site. Trout Creek was also classified as S3 in reaches 4 and 5. This watershed is particularly productive for cutthroat trout, with abundant rearing and spawning habitat.

Figure 1: Bulkley Forest District with Telkwa and Toboggan Creek Work Units

Figure 2: Cutting Permit 361 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

3.1 Overview

Two field crews inventoried streams in CP 361 on October 4 and 5, 1998. Field conditions were not ideal for photography with frequent rain and sleet and daytime maximum temperatures of only 5 degrees Celcius. Cutblock boundaries were not marked with flagging tape in the field and crews used the 1:5,000 block level recce maps to find streams within or adjacent to the proposed block boundaries. Chris Schell, Quality Control representative for the MoELP, accompanied one field crew on the assessment of streams within and adjacent to Block 361-1.

The detailed results are presented in the following order:

3.2 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.

3.3 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

3.4 Stream Summary Table

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

3.5 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.

3.6 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.

3.7 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

No fish were captured throughout the sampling conducted by field crews. Fish (salmonids) were observed in ILP 6124 at the base of a 2m cascade, just downstream of proposed cutblock CP 361-2

5. CP 361

5.1 Block 361-1

Block 361-1 is located approximately 2.5 km southwest of the confluence of Toboggan Creek and the Bulkley River. The block lies within the Trout Creek valley on the south side of Trout Creek.

Three streams were identified within Block 361-1 on TRIM map 93L.094. ILP 6121 and 6123 are second order streams flowing parallel in an easterly direction through the block. ILP 6122 is a first order stream which flows into the right bank of ILP 6121 approximately 150 m upstream from where ILP 6121 exits the block (see Figure 2 and Figure 3).

5.1.1 Stream Descriptions

ILP 6121 is an unconfined, low gradient (avg. 1.5%) stream with an average channel width of 2.04 m. The stream is intermittent as it was not flowing during the survey. Potential rearing values were moderate yet the cover was abundant provided mainly by overstream vegetation and woody debris. The spawning values were poor as there was only fine substrate present. The field crew examined this creek approximately 2.5 km downstream of the block and for several hundred meters immediately downstream of the block and no barriers were located although a steep (10% gradient) section of channel downstream of the block would be challenging for fish to ascend. Triton sampled the same stream downstream of the cutblock at site Y73 in 1997 during summer low flows, and no fish were captured by electroshocking. **ILP 6121 is tentatively classified as S3 due to the following information**:

- There were no barriers present between the cutblock and a fish bearing tributary to Owens Creek (Triton, 1998) located 4 km downstream.
- Suitable fish habitat was present at the sampling site.
- The creek was less than 20% gradient.

A second sampling survey is recommended for the spring season (April-June) as it will determine fish presence in the stream during spring high flows. The second sampling would involve electroshocking the entire reach above the 10% gradient section (through the entire cutblock) with appropriate sampling intensity (likely several thousand seconds of electroshocking) and using minnow traps set overnight if water conditions permitted. If no fish are caught during second sampling the stream classification may be amended to non-fish bearing (S6).

ILP 6122 is an unconfined, low gradient (avg. 2%) stream with an average channel width of 0.32 m. The stream was wetted at the time of survey but in some places the flow was negligible, and the stream likely ceases flow at certain times of the year. The water depth did not exceed 5 cm in isolated standing pools; water temperatures and dissolved oxygen levels during summer may be lethal to any fish trapped in pools. No electrofishing was conducted since not enough water was present. No fish were observed in pools. **The stream provided no fish habitat and was therefore classified S6.**

ILP 6123 is an unconfined, low gradient (avg. 1.5%) stream with an average channel width of 1.43 m. The stream is intermittent as standing pools were present but not flowing during the survey. The isolated pools that were encountered when the crew walked the creek were shocked (total of 50 seconds). The high water marks along the banks were approximately 40 to 50 cm above the channel bed indicating substantial runoff and spring flows which might support fish. Potential rearing values were moderate yet the cover was abundant provided mainly by overstream vegetation, undercut banks and woody debris. The spawning values were poor as there was only fine substrate present. There were no barriers located downstream of the sample site**. The classification of ILP 6123 is S4.**

Triton sampled the same stream downstream of the cutblock at site Y74 in 1997 during summer low flows, and no fish were captured by electroshocking. **A second sampling survey is recommended for the spring season** as it will determine fish presence in the stream during spring high water. The second sampling would involve electroshocking the entire reach (through the entire cutblock) with appropriate sampling intensity (likely several thousand seconds of electroshocking) and using minnow traps set overnight if water conditions permitted. If no fish are caught during second sampling the stream classification may be amended to non-fish bearing (S6).

5.1.2 Stream Summary Table

Table 2: Summary of Stream Assessments for Block 361-1 of the Toboggan Study Area

Block	TRIM Map No.	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan Width (m)	Steam Class.	Location of End of Fish Use	Fish Present	Photo Number	Habitat Comments
361-1	93L.094	6121	5121	Y73, Y76	2.04	S3	u/s of the cutblock	No fish caught	1	Moderate potential rearing and poor potential spawning values.
361-1	93L.094	6122	5122		0.32	S6	at the mouth	None	2, 3	No fish habitat.
361-1	93L.094	6123	5123	Y74	1.43	S4	u/s of the cutblock	No fish caught	4	Moderate potential rearing and poor potential spawning values.

Figure 3: Block 361-1 map

5.2 Block 361-2

Block 361-2 is located approximately 3.5 km upstream of the confluence of Toboggan Creek and Owens Creek. The block lies along the northeasterly facing slopes immediately north of Owens Creek.

One stream was identified within Block 361-2. ILP 2113 is a first order stream which flows in an easterly direction through the block and exits the northeast corner of the block. (see Figure 2 and Figure 4).

5.2.1 Stream Descriptions

One stream was identified within Block 361-2 on TRIM mapsheet 93L.094. ILP 2113 flows east through the proposed cutblock exiting the east side. ILP 2113 does not flow as indicated on the TRIM map. The TRIM map incorrectly shows this stream joining Owens Creek at the northeast corner of cutblock 361-2. ILP 2113 actually exits the northeast corner of block 361-2 and then flows northward through a 15 year old cutblock for 1.2 km to a beaver pond and then spills into Owens Creek, immediately downstream of the broken bridge over Owens Creek.

Within cutblock 361-2 ILP 2113 is a frequently confined, moderate gradient (avg. 10%) stream with an average channel width of 1.4 m. Potential rearing values were moderate and spawning values were poor to moderate as there was limited gravel present. The water level was low and potential fish holding area was limited. No fish were captured after 295 seconds of electroshocking within the lower 400m of the stream in cutblock 361-2. Due to time limitations, the field crew walked and assessed only the lower 450 of the creek in cutblock 361-2, then examined the 1000 m of creek downstream of the proposed cutblock looking for barriers to fish. Downstream of cutblock 361-2, the stream is choked with slash and LWD which was pushed into the channel during previous logging; the LWD creates small obstructions to fish. Water flow was extremely low with only isolated standing pools that could be electroshocked and 193 seconds of shocking effort was conducted over 100m in the lower portion of the creek.

ILP 2113 is tentatively classified as S4 due to the following information:

- There were no permanent barriers to fish between cutblock 361-2 and Owens Creek, a known fish bearing stream (Triton, 1998) located 1 km downstream of cutblock 361-2.
- Suitable fish habitat was present at the sampling site.
- The creek within cutblock 361-2 was less than 20% gradient.

A second sampling survey is recommended for the spring season (May - June) to determine if fish are present in the stream during high spring flows when rainbow and cutthroat trout will be spawning. Second sampling would involve electroshocking from the beaver pond and proceeding upstream through the old cutblock into the proposed cutblock to the upper end of the reach upstream of the cutblock (approximately 1800m of 0.5 m wide channel). If no fish are captured during sampling in the spring then amending the classification of the stream to S6 may be justified. This is due to:

- The spawning season for rainbow/cutthroat trout is in the spring when they typically migrate up streams.
- Higher stream flows will be present during the spring which may allow fish access to the channel within cutblock 361-2.
- Access to the channel within cutblock 361-2 is difficult due to woody debris and beaver dam obstructions.
- Sufficient fish inventory effort demonstrates fish presence or absence in the reach.

Note: See **Habitat Protection Section** regarding road and stream conflicts and recommendation to remove old logging bridge in Owens Creek.

5.2.2 Stream Summary Table

Table 3: Summary of Stream Assessments for Block 361-2 in the Toboggan Study Area.

Block	TRIM Map No.	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan Width (m)	Steam Class.	Location of End of Fish Use	Fish Present	Photo Number	Habitat Comments
361-2	93L.094	2113 (1)	3116	W230	1.4	S4	Upstream of the cutblock	No fish caught	5	Moderate potential rearing and limited potential spawning.

Figure 4: Block 361-2 map

5.3 Block 361-3

Block 361-3 is located within the Kitseguecla Study Area (Unit 8) yet it is the same cutting permit as the Toboggan Creek (Unit 14) cutblocks. It has been included as part of the Unit 14 Study Area.

Block 361-3 is located approximately 3. km south of Trout Creek, upstream on ILP 6124. The block lies along the north facing slopes on the south side of Trout Creek.

One stream was identified within Block 361-3. ILP 6124 is a second order stream which flows due north from the cutblock (see Figure 2 and Figure 4).

5.3.1 Stream Descriptions

ILP 6124 is a second order stream (second order at the cutblock- third order at the bottom end) flowing (elevation 1160 m) north for approximately 4 km into Trout Creek (elevation 560 m). The overall gradient of the stream is 15%, however, the lower 1.5 km averages less than 10% whereas the upper 2.5 km averages over 22% with some sections exceeding 30%. The section close to the block averaged <20% and under the FPC would be a fish stream unless proved otherwise through sampling.

Fish were visually observed approximately 2 km from Trout Creek at the base of the steep incline in ILP 6124 (previously classified as S3 by the 1996/97 Triton inventory (1998). Numerous obstructions and barriers to fish were present through the steep (15 to 30%), incised grade leading to the cutblock (between 1.5 and 2.8 km from Trout Creek).

The low gradient section of stream adjacent to Block 361-3 (the proposed cutblock is located 3.5 km from Trout Creek) is an unconfined stream with an average channel width of 2.45 m. The potential spawning and rearing values were good yet there was limited overwintering habitat as the residual pool depth rarely exceeded 0.3 m. There is a 4 m falls located 2.5 km upstream from Trout Creek which is a barrier to fish. No fish were captured after 502 sec of electroshocking upstream of the falls. **ILP 6124 is classified as S6 from the falls located 2.5 km upstream from Trout Creek and further upstream.** All streams upstream of this point are classified as S6 as well.

5.3.2 Stream Summary Table

Table 4: Summary of Stream Assessments for Block 361-3 in the Toboggan Study Area.

Block	TRIM Map No.	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan Width (m)	Steam Class.	Location of End of Fish Use	Fish Present	Photo Number	Habitat Comments
362-3	93L.094	6124	5124	Y69, Y68	2.45	S6	2.5 km from Trout Creek	None	6, 7	Good potential spawning and rearing values.

Figure 5: Block 361-3map

5.4 Block 361-4

Block 361-4 is located immediately adjacent to Owens Creek, approximately 2.5 km upstream of the Owens Creek and Trout Creek confluence. One larger watercourse was identified on the block map supplied by Silvicon.

5.4.1 Stream Descriptions

ILP 2112 is a first order stream which flows east from within Block 361-4, crosses the eastern block boundary and is mapped as joining with Owens Creek. The stream has moderate gradient (6-7 %) with an average channel width of 0.9 m. The stream was dry at the time of survey. The field crew walked the stream for 400m within the lower section of the cutblock. Once beyond the eastern cutblock boundary the stream channel disappeared into overland flow with no discrete continuous channel present downstream of the cutblock. When flowing, water would flow overland downstream of the cutblock with no defined banks and no visible channel. **Due to the discontinuous stream channel ILP 2112 is a non-classified drainage (NCD).**

The field crew walked the road along the northern block boundary and did not identify any streams or drainages flowing into Owens Creek. The timber cruising crew identified a stream on the block map which flowed into the dry channel (described above) from a selectively logged area (1960's). **This stream would be defaulted to non-fish bearing because it was dry and did not contribute flow into ILP 2112, the NCD**.

5.4.2 Stream Summary Table

Table 5: Summary of Stream Assessments for Block 361-4 of the Toboggan Study Area.

Block	TRIM Map No.	Stream ILP (Reach)	Site Number (NID)	1996/97 Site Number	Mean Chan Width (m)	Steam Class.	Location of End of Fish Use	Fish Present	Photo Number	Habitat Comments
361-4	93L.094	2112	3115	W230, Z64	0.8	Non classified drainage	Downstream of cutblock	None	8	Non classified drainage. Dry at time of survey

Figure 6: Block 361-4 map

5.5 Additional Sampling Summary

Three streams within CP 361 were identified as candidates for a second sampling. In each case no barriers were found between the stream and known fish-bearing streams. Fish habitat was present in each of the streams yet no fish were captured. This could likely have been due to low water levels. A spring season (May - June) fish sampling survey is recommended for each stream, when water levels are potentially higher and seasonal migrations may bring fish into the stream (e.g. spawning).

Table 6: Streams requiring second sampling for the Toboggan Creek Study Area

Stream ILP (Reach)	Site NID	Mean Chan Width (m)	Preliminary Stream Class	Water levels when surveyed	Fish access	Distance from known fish stream	Habitat Comments
2113	3116	1.4	S4	Very low	obstructed	Flows into Owens Creek 1 km d/s	Marginal fish habitat
6121	5121	2.04	S3	Very low	obstructed	4 km to Owens	Moderate rearing and poor spawning
6123	5123	1.43	S4	Very low	obstructed	4 km to Owens	Moderate rearing and poor spawning

5.6 Habitat Protection Concerns for CP 361

For CP 361, fish are present downstream of all the first and second order tributaries which flow from within the cutblocks. Since road building and forest harvesting typically introduce sediment to watercourses, the protection of downstream water quality by minimizing the input of sediment into streams and ditches would help to protect downstream fish habitat and fish values. 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.

A **collapsed logging road bridge** was observed within Owens Creek, immediately north of Block 361-4 where the access road crosses the creek. This bridge should be deactivated and removed to prevent potential wood jamming and torrenting or channel diversion from occurring. This creek crossing is approximately 2.5 km upstream of the confluence of Owens Creek and Toboggan Creek at site W230. This may be private land.

Immediately north of this collapsed logging bridge, **ILP 2113 is dammed by a beaver dam on the upstream side of a culvert** and flows over the logging road causing the road to washout in places. This should be rectified by removing the culvert and installing a water bar to permit unobstructed water flow.

No fish were captured above 20% gradient sections of channel and no additional fisheries sensitive zones were found throughout the CP 361 area. No watershed restoration or rehabilitation opportunities were identified throughout the CP 361 area.

5.7 Non-Fish Bearing Reaches

Non-fish bearing reach reports are provided for relevant reaches including intermittent streams (Table 7). The most downstream reach of a stream which was determined to be non-fish bearing is identified in the report.

Table 7: Non-Fish Bearing Status Report for Select Streams in the Toboggan Creek Study Area

Initial Sampling Date	Follow-up Sampling Date	Watershed Code or ILP number	Reach Number	Site Number	Map Sheet Number	Capture Method (electrofishing settings)	Area covered (sq. m)	Sampling Effort (seconds)	Cond-uctivity uS	Water Temperature (degrees Celsius)	Flow Stage (VO)	Turbidity (VO)	Known Fish Presence (u/s-d/s)	Obstructions to Fish Migration	Location of End of Fish Use	Seasonal Fish Use
Oct. 4, 1998	Spring 1999	6122	1	5122	93L.094	None	-	-	-	-	Very Low	-	d/s 4 km in Owens Creek	>10% grade	The mouth	None
Oct. 5, 1998	Spring 1999	6124	3	5124	93L.094	EF	150	502	160	4	Med	Lightly turbid	d/s at the bottom of the grade- 1.5 km upstream of Trout Creek	4 m falls located 2.5 km upstream of Trout Creek	4 m falls located 2.5 km upstream of Trout Creek	None
Oct. 4, 1998	Spring 1999	2112	1	3115	93L.094	none	-	-	-	-	dry	-	Owens Creek-mouth of this stream	discontinuous channel and banks	fish in Owens	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

Argent, H.W. and V.A. Poulin. 1997. Stream Crossing Guidebook for Fish Streams. A Working Draft for 1997/1998.

Cowx, I. G. and P. Lamarque. Eds. 1990. Fishing with Electricity. Blackwell Scientific Publications Ltd. Oxford, Great Britain. pp243 include. bibliography.

Hancock, M.J., A.J. Leaney-East and D.E. Marshall. 1983. Catalogue of Salmon Streams and Spawning Escapements of Statistical Area 4 (Upper Skeena River). Canadian Data Report of Fisheries and Aquatic Sciences, # 394. Department of Fisheries and Oceans, Vancouver, BC

Hancock, M.J., A.J. Leaney-East and D.E. Marshall. 1983. Catalogue Of Salmon Streams And Spawning Escapements Of Statistical Area 4 (Lower Skeena River) Including Coastal Streams. Canadian Data Report of Fisheries and Ocean Sciences # 395, April, 1983. pp 1-422

Meidinger, D. and J. Pojar. 1991. Ecosystems of British Columbia. Special Report Series 6. BC Ministry of Forests.

Resource Inventory Committee. April 1998. Reconnaissance (1:20000) Fish and Fish Habitat Inventory: Data Forms and User Notes. Version 1.1. BC Ministry of Fisheries, Fisheries Inventory Section. Victoria, BC.

Resource Inventory Committee. April 1998. Reconnaissance (1:20000) Fish and Fish Habitat Inventory: Standards and Procedures. Version 1.1. BC Ministry of Fisheries, Fisheries Inventory Section. Victoria, BC.

BC Ministry of Forests. 1996. Channel Assessment Procedure Guidebook.

BC Ministry of Forests. 1995. Forest Practices Code of British Columbia Regulations.

BC Ministry of Forests. 1998. Fish Stream Identification Guidebook. 2nd Ed.

BC Ministry of Forests. 1995. Riparian Management Area Guidebook.

Saimoto, R. S. 1996. Literature review for stream inventory in the Bulkley Forest District. Report prepared for Pacific Inland Resources by SKR Consultants Ltd, Smithers, BC. pp.20

Triton Environmental Consultants Ltd. 1998. Reconnaissance Level Fish and Fish Habitat Inventory in the Bulkley T.S.A. Report prepared for Pacific Inland Resources and BC Ministry of Environment, Lands and Parks. Smithers, BC. Vols. 1-19. approx. 2000 pg. including appendices, site cards, photos and 80 TRIM maps.

7. APPENDICES

Appendix I. Stream Photos

The following pages contain representative stream photos for:

1. Block 361-1

- ILP 6121, site NID 5121,
- ILP 6122, site NID 5122,
- ILP 6123, site NID 5123.

2. Block 361-2

- ILP 2113, site NID 3116.

Note: Photo is 1.3 km downstream of site location at beaver dam in Owens Creek, no photos of site available due to camera malfunction.

3. Block 361-3

- ILP 6124, site NID 5124.

4. Block 361-4

- ILP 2112, site NID 3115.

Photo 1: Reference number: Roll 21, Frame 2. Location: ILP 6121, Site NID 5121, CP 361-1, Unit 14. Description: view of obscured channel looking upstream.

Photo 2: Reference number: Roll 21, Frame 3. Location: ILP 6122, Site NID 5122, CP 361-1, Unit 14. Description: side view of S6 stream.

Photo 3: Reference number: Roll 21, Frame 4. Location: ILP 6122, Site NID 5122, CP 361-1, Unit 14. Description: view of S6 stream looking downstream.

Photo 4: Reference number: Roll 21, Frame 6. Location: ILP 6123, Site NID 5123, CP 361-1, Unit 14. Description: view of stream looking upstream.

Photo 5: Reference number: Roll 28, Frame 22. Location: ILP 2113, Site NID 3116, CP 361-2, Unit 14. Description: view of stream looking upstream at beaver dam.

Photo 6: Reference number: Roll 21, Frame 9. Location: ILP 6124, Site NID 5124, CP 361-3, Unit 14. Description: view of entrenched stream looking upstream.

Photo 7: Reference number: Roll 21, Frame 10. Location: ILP 6124, Site NID 5124, CP 361-3 Unit 14. Description: view of S6 stream looking downstream.

Photo 8: Reference number: Roll 28, Frame 19. Location: ILP 2112, Site NID 3115, CP 361-4, Unit 14. Description: view of stream bed that disappears downstream.

Appendix II. Stream Site Cards and Fish Collection Forms for of Toboggan Working Unit 14

The following pages contain the Stream Site Cards and Fish Collection Forms for:

1. Block 361-1
ILP 6121, site NID 5121,
ILP 6122, site NID 5122,
ILP 6123, site NID 5123.

2. Block 361-2
ILP 2113, site NID 3116.

3. CP 361-3
ILP 6124, site NID 5124.

3. CP 361-4
ILP 2112, site NID 3115.

Appendix III. Reach Forms for Selected Reaches surveyed in Toboggan Working Unit 14.

Reach card hardcopies are available for those reaches mapped on existing 1:20,000 TRIM network. Digital information is available in the FDIS database for unmapped streams assessed by the Triton field crew.

The following pages contain the Reach Forms for:

1. Block 361-1

ILP 6121, site NID 5121,
ILP 6123, site NID 5123.

2. Block 361-2

ILP 2113, site NID 3116.

3. CP 361-3

ILP 6124, site NID 5124.

3. CP 361-4

There are no Reach Forms for this block

Appendix IV. 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 361-1
- site Y73, on ILP 6121,
- site Y74, on ILP 6123,
- site Y76, on ILP 6121.

2. Block 361-2
- site W230, on Owens Creek.

3. Block 361-3
- site Y69, on ILP 6124,
- site Y68, on ILP 6124.
-

4. Block 361-4
- site W230, on Owens Creek,
- site Z64, on Owens Creek.

Appendix V. Photo log and thumbnails for all photos taken during the survey of Toboggan Working Unit 14.

Appendix VI. 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**