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

**Toboggan Creek - WSC 460-245-500
Trout Creek - WSC 460-241-300**

**Working Unit 14 (Toboggan)
Cutting Permit 361**

Final report

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**Prepared For:
Pacific Inland Resources Ltd.
Smithers, BC**



FRBC Activity Number: 10305

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PROJECT REFERENCE INFORMATION

MELP Project Number	PIR-C172-001-1999
FDIS Project Number	1639 and 1640
FRBC Activity Number	10-595
FRBC Region	Skeena- Bulkley Region
MELP Region	Skeena (06)
MELP District	Bulkley District
FW Management Unit	6-09
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
FISS Reference Number	3004.863 (Triton Terrace)

WATERSHED INFORMATION

Watershed Group	Bulkley River
Watershed Name	Toboggan Creek, Trout Creek
Watershed Code	460-245-500-, 460-241-300-
Watershed area (unnamed sub-basins within Owens and Trout Creeks only)	40 km ²
UTM at Mouth of Toboggan	09.607900.6089400
Working Unit 14 Total Area	280 km ²
Stream Order	5 th , 5 th
NTS Map	93L/14
TRIM Maps for this project	93L.094, 93L.093
BEC Zone	ICH

SAMPLING DESIGN SUMMARY

Total Number of Reaches Sampled	12 (bias)
Field Sampling Dates	June 22nd to June 27th, 1999
Species Captured	coho salmon, cutthroat trout

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, Mr. Darrel Davis, Field Crew member, Mr. Don Davies, Field Crew member, Mr. Dave Warburton, GIS Manager, Ms. Jennifer Link, GIS Technician, and Ms. Karla Graf, Data Entry/Management.

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List of Attachments

1. Fisheries Interpretive/Inventory Maps (combined), 1:20,000 Scale (2 TRIM mapsheets in binder folder).
2. 1:5,000 Scale Road Maps showing site locations and road crossings (PIR and MoELP Regional Reports only, 3 mapsheets in binder folder)
3. Original Site Card and Photo Binder with negatives, prints, photodocumentation report and Photo CD (MoELP Regional only).
4. Digital Files on CD: watershed report, FDIS data, ArcInfo Map files and plot files, photo CD.

List of Abbreviations

Abbreviation	Definition
CM	chum salmon (<i>Oncorhynchus keta</i>)
CH	chinook salmon (<i>Oncorhynchus tshawytscha</i>)
CO	coho salmon (<i>Oncorhynchus kisutch</i>)
PK	pink salmon (<i>Oncorhynchus gorbuscha</i>)
SK	sockeye salmon (<i>Oncorhynchus nerka</i>)
DV	Dolly Varden char (<i>Salvelinus malma</i>)
RB or ST	rainbow or steelhead trout (<i>Oncorhynchus mykiss</i>)
CT	cutthroat trout (<i>Oncorhynchus clarki clarki</i>)
BT	bull trout (<i>Salvelinus confluentus</i>)
()	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 select stream reaches in the Toboggan and Trout Creek Watersheds, located 15 km north of Smithers, in the Bulkley Forest District. The surveys were conducted between June 22nd and June 27th, 1999.

This report presents the results of the stream inventories, including stream classifications and a summary of fish captured along with site, reach, and fish cards and site photos. The accompanying TRIM maps show sample site locations for only those sites that were located on streams currently found on the TRIM line work. For those sites not located on mapped streams, detailed 1:5,000 road layout maps are attached which show the site locations relative to proposed roads (PIR reports and MELP Regional report copies only). These hand annotated 1:5,000 scale maps were provided to PIR for inclusion in digital Forest Development Plans.

In 1996 and 1997, Triton completed 1:20,000 reconnaissance level fish and fish habitat inventories throughout 14 Working Units in the Bulkley Forest District including Fulton River Working Area 9 (Triton, 1998). This information was used for planning and is included on the attached TRIM maps. Follow-up sampling was conducted on several stream reaches (ILP 28, ILP 26) that were sampled in 1998 and were recommended to be re-sampled in 1999 (Triton, 1999).

1.1 Location of the Sampling Area within the Bulkley Forest District

The Bulkley Forest District is situated in the west-central interior of BC, encompassing 7,625 km² of land. The town of Smithers is situated in the lower third of the Forest District and was the base for field crews during the project. The Project Overview Map, Figure 1, shows the location of the sampling area for this project and Working Unit (highlighted in yellow) within the Forest District. The sampling area is in the southwest corner of mapsheet 93L.094 and southeast corner of 93L.093.

The sampling area is defined by the location of the 602 road and spur roads into Cutting Permit 361. These roads are situated adjacent to Reaches 1 and 2 of Trout Creek and in the watersheds of two tributaries to Toboggan Creek. The inventoried streams cross the 602 road and flow north into Reaches 1 and 2 of Trout Creek. Trout Creek flows eastward into the Bulkley River, approximately 16 km northwest of the Smithers

Airport, while Toboggan Creek flows northward into the Bulkley River approximately 15.5 km from the airport. Follow-up sampling was conducted in an unnamed third-order tributary (ILP 0028) to Reach 1 of Toboggan Creek and in an unnamed tributary to Reach 1 of Owens Creek.

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 (602 road) and stopped along this road to access the lower reach of a tributary, approximately 4 km after crossing the railway tracks.
- Alternatively, crews turned west from Highway 16 onto the 6000 FSR then turned south onto the 608 FSR and at 2km turned onto the 608A (since renamed to 602 Road).

Block 361-2 and 361-4 are located adjacent to Owens Creek. 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. Crews then hiked 1500m into the area.

1.3 Fish Stream Identification and Inventory Objectives

The purpose of this inventory was to conduct fish and fish habitat inventories at road crossing sites and to gather additional fish distribution information, classify stream reaches and improve the applicability to land use planning of existing fish inventory data. 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 and determine the End-of-Fish Use (EFU) for reaches influenced by proposed harvesting and to collect channel information for 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 Resource Information

Extensive road building and logging, ranching and small scale farming occur in the Toboggan and Trout Creek watersheds. Logging is the dominant resource activity with many cutblocks and roads present throughout the Trout Creek valley. Future forest harvesting is planned for the hillslopes and upper reaches of the watershed. Private residences and ranching exist along the first 15 km of the 6000 FSR and the lower reaches of Owens and Toboggan Creeks while headwater reaches are on Crown land. Rural residences and farms within the watersheds influence riparian vegetation and stream channels. Recreational activities include hunting, camping, fishing and hiking. Water quality monitoring in Toboggan Creek is briefly summarized below. No major wildlife issues were identified although suitable habitat exists within the sampling area for animals typically found in valleys of the Bulkley Forest District.

1.5 Background Data Review

Limited information exists about the first and second order tributaries to Owens and Trout Creeks. Many of these streams were inventoried in 1996 and 1997 by Triton as part of the 1:20,000 reconnaissance inventory and this is the most relevant background information for stream classification purposes. Triton conducted fish stream inventory in these watersheds in October of 1998. Follow-up sampling in several of these streams was recommended and formed part of the field activities in 1999 (Triton, 1999). Relevant fisheries information for tributaries to Owens and Trout Creeks is summarized below.

Owens Creek

Owens Creek is 10 km in length and flows into the west bank of Reach 1 of Toboggan Creek, approximately 2.7 km upstream of the mouth of Toboggan Creek. 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. These features are likely barriers to fish and are 1 km upstream of the confluence of ILP 0034 and Owens Creek. Sampling in 1996/97 did not capture fish above these barriers while Dolly Varden and coho are known to exist in low gradient Reach 1 (S3). Fish were not captured in two tributaries to Owens Creek sampled in 1997 (Triton, 1998) and in 1998 (Site 3116, Triton, 1998). Fish distribution in Owens Creek is likely limited to the mainstem and short sections of the low gradient tributaries. The headwater reaches typically have steep gradient and likely contain barriers to fish migration.

Toboggan Creek

Background information for Toboggan Creek includes descriptions of hatchery operations, stock assessment and monitoring at the Toboggan Creek Hatchery (DFO SEP facility), water quality monitoring in 1996-98, FISS historical information, previous Triton Fish Inventory sampling, and water removal via water licenses. With the exception of the Triton reports (1999, 1998) very little of this information applied to the unnamed tributaries to Toboggan Creek which were sampled in June, 1999. Consequently, the background information about mainstem Toboggan Creek was not reviewed or reported here in detail. Watershed Restoration Program fish habitat assessments were completed for portions of the Toboggan Creek watershed several years ago but no additional information about the specific tributaries within the 1999 field sampling area was uncovered (J. Lough, Regional WRP Fisheries Specialist, MoELP, Smithers, pers. comm.).

Toboggan Creek is 21 km in length and is fed by 44 unnamed tributaries. Owens Creek and ILP 28 flow into fish bearing Reach 1 and fish can migrate into these two tributaries from the Toboggan mainstem. Reach 1 of Toboggan is low gradient and unconfined while Reach 2 is confined with moderately steep gradient. The tributaries to the Reaches 3 to 5 have extreme gradient. Toboggan Creek is flanked by numerous linear developments, including Highway 16, secondary roads, CNR railway and Hydro powerline which impact the stream channel, fish passage and riparian vegetation. Agricultural activity is also prevalent, with cultivated fields and cattle operations throughout the watershed, particularly around Glass Creek, a tributary to Toboggan Lake.

Toboggan Creek contains substantial and valuable fish stocks and fish habitat (FHIIP, 1991, FISS maps, Remington and Donas, 1999). Coho, chinook and pink salmon, cutthroat trout, rainbow trout/steelhead, Dolly Varden, mountain whitefish, sculpin and lamprey spawn and rear within Toboggan Creek (Remington and Donas, 1999). In addition, Toboggan Lake contains kokanee, mountain whitefish, longnose sucker, coho salmon, cutthroat trout, rainbow trout/steelhead, Dolly Varden, mountain whitefish and sculpins (Remington and Donas, 1999). ILP 28 is an unnamed tributary to Toboggan Creek and cutthroat trout and coho juveniles were captured in 1997 in Reach 1 (Triton, 1998).

Water quality and fish pathology investigations in 1996-1998 throughout the Toboggan Creek watershed found provincial guidelines were exceeded at different times and sites for microbial indicators, temperature, dissolved oxygen, and benthic algae (periphyton

crop) (Remington and Donas, 1999). Early signs of eutrophication of Toboggan Creek are reported by Remington and Donas (1999), possibly due to seasonal run-off from farm fields and rural development. Due to the extensive development and use of the watershed, additional monitoring of fish health, water quality, flow, nutrient production, agricultural impacts and hatchery operations were recommended (Remington and Donas, 1999)

Trout Creek

The Trout Creek mainstem is 18.4 km in length and is fed by 32 tributaries. Many road crossings, railway and power line crossings occur in Reach 1, which is 8 km in length. The Trout Creek watershed was sampled at 42 locations in 1996/97, including Reaches 1, 2, 4, 5 and 6 of the mainstem and in Schippers Creek.

Historical information (FHIIP, 1991) indicates coho, cutthroat trout, pink, rainbow trout and steelhead occur at the mouth of Trout Creek. Spawning steelhead and coho have been observed in the vicinity of the falls in Reach 1, located 1.6 km upstream of the Bulkley, and cutthroat trout have been recorded upstream in a tributary stream which drains Taltzen Lake (FHIIP, 1991, Triton, 1998, FISS maps). No evidence exists that anadromous fish utilize the watershed above the barrier falls at 1.6 km, with the exception of two attempts to stock steelhead fry above the barrier in 1985 and 1986. (FHIIP, 1991).

Fish were caught by electrofishing at 16 sites in this watershed in 1996/97 and were visually observed at one site (Triton, 1998). Cutthroat trout were caught in Reaches 1 and 2 of the main creek and no fish were caught in or above Reach 3, likely due to steep gradient preventing fish from accessing the upper reaches. Reach 1 of Trout Creek is classified S2 while Reaches 2 to 5 were classified S3 due to confirmed or inferred fish presence. Only cutthroat trout were captured upstream of a 10m falls in a north flowing fourth order tributary to the south bank of Reach 2 in 1996/97 Triton Inventory.

Schippers Creek is a fourth order tributary to Trout Creek which joins above the falls at 1.6 km. Cutthroat trout and Dolly Varden were captured in Reaches 1 and 2 of Schippers while no fish were captured further upstream.

This watershed is productive for cutthroat trout, with abundant rearing and spawning habitat. Fish distribution in the Trout Creek watershed is limited by the barrier at 1.6 km, above which only resident Dolly Varden and cutthroat trout exist. Trout are spread throughout the watershed above the barrier in low to moderate gradient streams

accessible from the mainstem, while Dolly Varden have been captured only in Reach 1 of Schippers Creek.

Figure 1: Project Sampling Area within the Bulkley Forest District

2. METHODS

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.

2.1 Pre-field Planning

Tasks completed during Phases I-III 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. 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.

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, local consultants and Regional Fisheries Branch representatives but little useful information was found for the sampling area.

2.2 Sample selection

Stream reaches that were crossed by proposed or existing logging roads, slated for 1999 construction, and did not have adequate fisheries information to assign stream classification were selected for sampling. 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. Stream reaches that were sampled in 1998 and recommended for re-sampling were also assessed. Watercourses crossed by proposed or existing roads and identified by timber cruising crews as Non-classified Drainage's (NCD) were not sampled.

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 the road crossing. Crews walked upstream and/or downstream of road crossings and sampled 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 above the EFU to confirm fish absence. Waterfall barriers and steep gradient cascade sections, which were judged to be impassable to fish due to lack of plunge pools and overall height, were typically identified as the EFU. In 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.

2.4 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 to 20m;
- S3 - average channel width greater than 1.5m to 5m;
- S4 - average channel width greater than 0 to 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 to 3m.

2.5 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 and visual observations. Electrofishing was conducted using Smith - Root type 12B electroshockers; electroshocker effort and settings were recorded on the Fish Form. Electrofishing is 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. Captured fish were identified to species, measured for fork length and photographed. No voucher specimens were collected.

According to the Fish Stream Identification Guidebook (2nd Ed., MoF, 1998), 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 behavioral changes of fish in low temperatures (late fall and winter) (Cowx and Lamarque, 1990).

The Fish Stream Identification Guidebook (2nd Ed., MoF, 1998), 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. Of specific note for 1999 field sampling was the relative ease of capture of fish in low temperature (3 to 9 degrees Celcius) and low conductivity waters (10 to 60 microSiemens/cm) in the sampling area. Adjacent waters, in which no fish were captured, had similar water temperature and conductivity values and the lack of fish

capture was not attributed to poor electrofishing efficiency but to fish not occurring within the stream. Additional sampling with minnow traps in many of the small streams less than 2 m wide was not possible due to lack of pools deeper than 20cm (deep enough to submerge trap) and lack of large enough pools to contain a trap. Consequently electrofishing at high voltages (500 to 900 volts) was used to increase capture efficiency and somewhat offset low conductivity water.

2.6 Stream Channel and Gradient Measurements

The bankfull channel width of stream channels was measured with an Esilon tape or meter stick. Multiple measurements (minimum of 6) were made for each site; each measurement at least one channel width distance apart and average bankfull channel width was used for classification. Stream gradients were determined from 1:20,000 maps and measured during field surveys with a Suunto clinometer (accuracy +/- 1%).

2.7 Stream and Feature Identification

Sample sites were marked in the field with a tree blaze and metal tag identifying *Triton, Stream or ILP #, Site #, Date, S classification or S4 / S6 boundary, field crew initials*. ILPs were used for stream identification (series 0000) while sample sites were given a NID (Numeric Identifier) number. Sample site (NID) numbers occur in the 1100 or 1200 series with the 1000 digit identifying the number as a Site (NID) number while the 100 or 200 series corresponds to Crew 1 or Crew 2. The last two numbers of the site (NID) correspond to the ILP the site is on. For example site 1254 was a site done by Crew 2 on ILP 0054. Significant features (barriers, cascades) were assigned numbers in the 8000 series in ascending order of occurrence (eg. 8102).

2.8 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. 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.

2.9 Mapping

Stream classifications and classification boundaries for each stream reach are shown on accompanying TRIM, Forest Development Plan maps and 1:5,000 layout maps. 1:20,000 scale FDP maps and 1:5,000 layout maps were prepared and submitted to PIR Ltd only.

These can be viewed on request. Accompanying TRIM maps only show those sites which occur on streams mapped on TRIM. Sites which occur on streams not mapped on TRIM can be viewed on FDP maps or 1:5,000 scale layout maps. For a similar project conducted in 1998 (Triton, 1999), stream inventory sites which occurred on unmapped streams at 1:20,000 scale were annotated as floating points on the TRIM maps. This procedure was not used for 1999 mapping.

The accompanying 1:20,000 Fisheries Inventory and Interpretive TRIM maps and base layers were developed in 1996 and 1997, and do not comply with 1999 Ministry of Environment Hardcopy Mapping Standards. The accompanying GIS digital databases are completed as fully as possible to the 1999 Digital Mapping Standards for 1999 sample sites and reaches only. 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.

2.10 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 7.2*. Reach forms were completed for mapped stream reaches only once 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.

3. RESULTS: OVERVIEW AND FISH SAMPLING SUMMARY

The fish inventory and stream classification results are presented in the following order:

- project overview,
- fish sampling summary,
- descriptions of streams crossed by the 602 spur road and adjacent to proposed blocks,
- habitat protection comments,
- stream summary tables.

3.1 Overview

Triton crews sampled streams crossed by the 602 spur road as well as streams near or downstream of proposed spur roads and cut blocks CP 361-2, 361-4 and 361-6. Twelve stream crossings were assessed along the first 5 km of the 602 spur road. Intensive follow-up sampling was conducted in two streams (ILP 28, ILP 34) adjacent to Block 361-2 while one stream (ILP 34) was sampled downstream of Block 361-6. Eight of the streams assessed along the 602 road were classified as fish-bearing (ILP 13, 14, 15, 16, 17, 23, 25, 22), while one was S6 (ILP 18) and two were non-classified drainage's (ILP 24, 19).

The surveys were conducted between June 22nd and June 27th, 1999. Field conditions were good for sampling streams. Weather conditions were mild and overcast with little precipitation throughout the survey. Water temperatures ranged from 5 to 14 degrees Celcius. The conductivity ranged from 40 to 90 umhos/cm, with the majority of measurements between 40 and 50 umhos/cm.

Chris Schell, Quality Control Contractor, accompanied one field crew on the assessment of streams within and adjacent to Block 361-1.

3.2 Fish Sampling Summary

As expected, cutthroat trout were captured in streams flowing into Trout Creek while juvenile coho salmon were found in ILP 28, a tributary to Reach 1 of Toboggan Creek. No Dolly Varden were captured in tributaries to Trout, Owens or Toboggan Creeks but they exist within the mainstem of Owens Creek, adjacent to tributaries ILP 26 and ILP 34. Histograms are not presented due to the very low number of fish captured.

Three small cutthroat trout (fork length range 56-63mm, mean=59mm) and two coho juveniles (fork length for both = 82mm) were captured and released. No samples were retained for voucher specimens. The following Table presents fish captures in the sampling area. In summary, no unusual or unexpected captures occurred within the study area.

Additional fish sampling occurred as part of another fish salvage project within the study area in September and October, 1999. No site cards or fish cards were completed since the work was not part of this RIC project and the information is discussed here only to provide greater perspective of the fish distribution within the sampling area.

Fish salvage work was conducted on ILPs 13, 15, 21, and 17 and approximately 50 cutthroat trout were captured in total. Estimated fork lengths ranged from 35mm to 50mm for newly-emerged fry to 140 to 200mm for juvenile and adult fish. This early fall sampling found that several size classes and age classes (fry to adult) exist within these streams. Fry of the year were not captured in the June sampling since they had not emerged from the gravel and distributed throughout streams, although fry were captured in the fall sampling in ILP 13 and 15. This indicates successful spawning in these streams or in larger streams downstream of the road crossing. Planning for future sampling for fish stream classification should take this factor into account. Even though the streams crossed by the 602 Road are very small, they are important for maintaining cutthroat trout populations within this watershed. The fish passage structures installed by PIR in fall, 1999, will maintain access for fish in these streams.

Table 1. Fish captured during June sampling within Owens and Trout Creek tributary streams.

ILP	ILP Map	Reach #	Site #	Capture Method	Fish Species	Stage	Total Number of Fish	Minimum Length (mm)	Maximum Length (mm)	Average Length (mm)	Activity
13	93L.093	1	1113	EF	CT	J	1	56	56	56	R
15	93L.093	1	1115	EF	CT	J	2	57	63	60	R
28	93L.094	1	1228	EF	CO	J	2	82	82	82	R

Notes: EF-electrofishing, J-juvenile, A-adult, R-rearing, DV - Dolly Varden, CT - cutthroat trout

4. STREAM DESCRIPTIONS

4.1 Streams crossed by the 602 Road and access roads to proposed cutblocks

Stream descriptions and classifications are provided below for the following streams which cross the 602 road. A summary table of the sampling effort follows the descriptions. Non-fish bearing classifications follow the summary table.

Sites:

- ILP 0013, Site 1113, Road station 0+100,
- ILP 0014, Site 1114, Road station 0+300,
- ILP 0015, Site 1115, Road station 0+600,
- ILP 0016, Site 1116, Road station 0+900,
- ILP 0017, Site 1117, Road station 2+200,
- ILP 0018, Site 1118, Road station 2+400,
- ILP 0019, Site 1119, Road station 2+700,
- ILP 0020, Site 1120, Road station 2+900,
- ILP 0022, Site 1222, Road station 3+400,
- ILP 0023, Site 1223, Road station 4+000,
- ILP 0024, Road station 4+300,
- ILP 0025, Site 1225, Road station 5+200,
- ILP 0026 Reach 1, Sites 1126, 1181, 1182, 1183, Road station 1+099 on Block 2 Road, Follow-up sampling
- ILP 0028, Site 1228, Follow-up sampling
- ILP 0034, Site 1134, Downstream of Block 6.

4.1.1 ILP 0013, Site 1113, Road station 0+100

ILP 0013 flows north into Reach 1 of Trout Creek. Habitat quality is fair and a cutthroat trout was captured. With an average channel width of 3.2m, **ILP 0013 is classified S3 at the road crossing.**

4.1.2 ILP 0014, Site 1114, Road station 0+300

ILP 0014 flows north into Reach 1 of ILP 0013, downstream of the road crossing. Fish habitat quality is fair, no fish were captured but access is possible from ILP 0013. This creek becomes an NCD on the upstream side of the road crossing due to discontinuous channel and seepage. With an average channel width of 1.3m, **ILP 0014 is classified S4 downstream of the road crossing and NCD upstream of the road.**

4.1.3 ILP 0015, Site 1115, Road station 0+600

ILP 0015 flows north into Reach 1 of Trout Creek. Habitat quality is fair and a cutthroat trout was captured. With an average channel width of 1.7m, **ILP 0015 is classified S3 at the road crossing.**

4.1.4 ILP 0016, Site 1116, Road station 0+900

ILP 0016 flows north into Reach 1 of ILP 0015, downstream of the road crossing. Fish habitat quality is fair, no fish were captured but access is possible from ILP 0015. With an average channel width of 1.4m, **ILP 0016 is classified S4.** Multiple channel measurements were made in the stream, downstream of the road.

4.1.5 ILP 0017, Site 1117, Road station 2+200

ILP 0017 flows into ILP 0021 downstream of the road crossing which is a confirmed S3 stream with cutthroat trout (Triton, 1998). Fish habitat quality is fair, no fish were captured but access is possible from ILP 0021. Cattle and previous logging have substantially impacted the channel and trampled banks and riparian vegetation were observed. Flows were low during the time of the survey. The field crew hiked approximately 700m of the creek below the 602 road crossing down to the confluence with ILP 21. Small cascades and debris jams, 0.1 to 0.3m in height, were observed near the confluence but these would not be permanent barriers to upstream fish migration. Three watercourses (ILP 18, 19, 20) flow into ILP 0017 between the 602 road crossing and the confluence of ILP 17 and ILP 21. With an average channel width of 1.4m, **ILP 0017 is classified S4 at the 602 road crossing.**

4.1.6 ILP 0018, Site 1118, Road station 2+400

ILP 0018 flows north into Reach 1 of ILP 0017 with the confluence located downstream of the 602 road crossing. Fish habitat quality is poor (no deep pools, shallow channel, likely dry in summer), no fish were captured after 380 seconds over 250m of stream and access into ILP 18 from ILP 17 is very difficult for fish due to a discontinuous channel and steep gradient where ILP 18 crosses under the 602 Road. Upstream of the road crossing, ILP 18 has no deep overwintering pools, a discontinuous channel, and was impacted by previous logging. The stream flows through a 15 year old cutblock with 2 to 4 m high second-growth conifers. The road intersects the creek along a short steep gradient section of the creek (15%). With an average channel width of 0.8 m, obstructed channel and no fish present upstream of the road, **ILP 0018 is classified S6.**

4.1.7 ILP 0019, Site 1119, Road station 2+700

ILP 0019 flows north into Reach 1 of ILP 0017, downstream of the 602 road crossing. Fish habitat quality is extremely poor to non-existent, no fish were captured after 340 seconds of shocking and no access is possible into ILP 19 from ILP 17. A site card was not completed on this ILP since water flows downstream at the road crossing and becomes discontinuous and has overland seepage. The watercourse appeared to be mainly ditch run-off. The watercourse was classified as an NCD downstream of the road which does not provide access for fish from ILP 17 into the reaches at the road. **ILP 0019 is classified NCD downstream of the 602 road crossing.**

4.1.8 ILP 0020, Site 1120, Road station 2+900

ILP 0020 flows north into Reach 1 of ILP 0017, downstream of the 602 road crossing. Fish habitat does not exist and no access is possible into ILP 20 from ILP 17. A site card was not completed on this ILP since this watercourse is essentially a road ditch into which water seeps and is **classified as an NCD.**

4.1.9 ILP 0021, No Site, Road station 3+100

ILP 0021 flows north into Reach 1 of Trout Creek. ILP 0017, mentioned above, flows into ILP 21 approximately 150m downstream of the 602 road crossing. A site card and fish sampling were not completed for ILP 21 since this is a known S3 fish bearing stream with good fish habitat (Triton, 1998, 1999). **Based upon previous sampling and channel widths, ILP 0021 is classified S3 at the 602 road crossing.**

4.1.10 ILP 0022, Site 1222, Road station 3+400

ILP 0022 flows north possibly joining ILP 0023 before entering Trout Creek. The stream was not mapped correctly on the TRIM map base and was shown to flow directly into ILP 20, upstream of the 602 road. The stream crosses the 602 road, flows down a steep gradient section then into ILP 20. Electrofishing was conducted for 233 seconds immediately downstream of the road crossing in a steep gradient section (15%) with no fish captured. Fish habitat quality was poor as no deep pools, overwintering habitat or spawning habitat were observed downstream of the road. The stream gradient was approximately 15% at the road crossing, since the road was built along a steep sided bench of land, and fish access upstream of the road was considered obstructed by cascades. Similar to all the other streams which occur in this cutblock, no mature riparian vegetation was left along the stream side when logged 15 years ago and cattle have trampled the banks of the stream. Although fish were not found, the stream likely goes dry in summer (no upper elevation watershed) since it only exists within the cutblock and habitat quality is poor, fish may be able to ascend the steep gradient section at the road crossing. For this reason, we recommend additional sampling at this site. The likelihood of finding fish is low due to the constraints on fish habitat mentioned above, but sampling would confirm this during the late summer. **ILP 0022 is classified S4 at the road crossing.**

4.1.11 ILP 0023, Site 1223, Road station 4+000

ILP 0023 flows north under the 602 Road at km marker 4.0 and into Trout Creek, approximately 900m downstream. Upstream of the 602 road crossing, fish were observed in the creek during the 1:5,000 Fisheries Inventory completed in 1998 by Triton (Triton, 1998). Based on an average channel width of 3.03m and known fish presence from previous sampling in 1998, **ILP 0023 is classified S3 at the road crossing.**

4.1.12 ILP 0024, Road station 4+300

ILP 0024 is located at km marker 4.3 along the 602 Road. The watercourse did not contain a clearly defined and continuous channel. The channel disappeared in several places and reappeared several meters further downstream. There was no water flowing at the time of survey and did not appear to carry high flows during the year, based on the very shallow water marks along the banks. Due to a discontinuous channel and very little alluvial scour, **ILP 0024 is classified NCD at the road crossing.**

4.1.13 ILP 0025, Site 1225, Road station 5+200,

ILP 0025 flows north-east across the 602 Road at km marker 5.2 and into Trout Creek approximately 2 km downstream. No fish were captured at Site 1225 after 204 seconds of electroshocking, however, no barriers were found downstream of the 602 Road crossing and access for fish up to the site from Trout Creek is possible. Based on an average channel width of 1.12m and inferred fish presence, **ILP 0025 is classified S4 at the road crossing.**

4.1.14 ILP 0026, Sites 1126, 1181, 1182, 1183, Road station 1+099 on Block 2 Road

Extensive electroshocking in this stream in October, 1998 did not capture any fish and so additional sampling was recommended (Triton, 1998). In June, 1999, a field crew was accompanied by Mr. Chris Schell, QA Monitor, and walked ILP 26 from the old logging road at the beaver pond adjacent to Owens Creek (S3), upstream for approximately 1500m to the proposed road crossing site (station 1+099, block 2 road) in proposed Block 361-2. A beaver dam and pond on ILP 26 is located 40m upstream of the confluence with Owens Creek. ILP 26 flows over and seeps through the beaver dam and does not have a clearly defined main channel downstream of the beaver dam connecting ILP 26 and Owens Creek. Consequently water flows overland and through vegetation. A seepage channel does flow over the 2 m high bank of Owens Creek and has very steep gradient (50%). The lack of easy access for fish into the channel and over the beaver dam essentially prevents fish from entering this stream at this point in time. Extensive electroshocking was conducted at four sites (1126, 1181, 1182, 1183) along the 1500m length of stream and no fish were captured even though fish habitat was fair quality. A 1.5 m high cascade is located at the block 2 road crossing station 1+099 which would prevent any access for fish into the upper reaches. **Consequently, ILP 0026 is classified as S6 due to the lack of fish captures after extensive sampling over 2 years in two different seasons and due to the presence of barriers at the confluence with Owens Creek and at the road crossing in the block.**

A small tributary watercourse to ILP 26 crosses the proposed block 2 road at station 1+267 and is S6 since the gradient is substantially greater than 20% at the road crossing. Several streams which cross the proposed Block 6 road, located at higher elevation, likely drain into ILP 0026, upstream of the Block 2 road station 1+099. These streams are likely non-fish bearing as well.

4.1.15 ILP 0028, Site 1228, Follow-up sampling downstream of Block 4 road

Extensive electroshocking in this stream and tributaries within the cutblock in October, 1998, did not capture any fish and so additional sampling was recommended (Triton, 1998). In June, 1999, a field crew walked this creek from the BC Hydro line crossing in Reach 1 upstream to a 1.5 m high cascade section at the reach break. Two juvenile coho salmon were captured downstream of the cascade in Reach 1 (S3 section) while extensive electroshocking over the past three years in Reach 2, upstream of the cascade, did not capture fish. **Consequently, ILP 0028 is classified as S6 in Reach 2 due to the lack of fish captures after extensive sampling over 3 years above a 1.8 m high barrier.**

4.1.16 ILP 0034, Site 1134, Downstream of Block 6

ILP 0034 flows south into Reach 2 of Owens Creek, a known fish bearing stream. The field crew hiked upstream from the confluence with Owens Creek for approximately 600m. The channel increased in gradient to a short 50 m section with 23% gradient and then decreased in gradient to approximately 12% further upstream. The 23% gradient section is the EFU for this stream with drops of 20 to 50 cm that do not have any plunge pools deeper than 5 cm. Fish access over these drops would be extremely difficult due to the lack of substantial flow and lack of plunge pools. Electroshocking for 212 seconds above this steep gradient section did not capture fish and the reach break was assigned to the steep gradient section, located approximately 300m upstream of the confluence with Owens Creek. Fish habitat quality was fair in the section upstream of the gradient barrier. **ILP 0034 is classified S6 from the reach 1 and 2 break and further upstream.**

4.2 Habitat Protection Concerns for Streams

Use of appropriate road building practices and environmental protection equipment will result in the prevention of major impacts to aquatic resources. Key issues are the prevention and reduction in sedimentation into ditches and streams which contain fish, minimizing machinery fording creeks, and adequate crossing structures. Important fish habitat exists in these streams and will be crossed by the road. Silt fencing, fish salvage and environmental monitoring to prevent excess sedimentation are necessary for protection of aquatic habitat and fish stocks. Particular attention should be paid to environmental protection around any streams in which fish were captured and the Owens Creek crossing.

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

4.3 Additional Sampling

Additional sampling was recommended for only ILP 22 in this area as it was connected to a known fish bearing stream and fish may exist upstream of the road crossing, although the likelihood of this is low.

5. BARRIER INFORMATION

Barriers to fish migration are summarized in the Table 2. Fish access into reaches was prevented by several types of barriers; discrete cascades and steep gradient sections of channel. Stream reaches which had impassable NCD's downstream were not considered to be above barriers.

Table 2. Barriers to fish.

ILP	ILP Map	Mapped on TRIM	Reach #	Site #	Barrier type	Length m	Height m	Gradient	Comments
18	93L.093	no	1	1118	steep gradient	15	0.2 to 0.3	greater than 20%	Steep section occurs downstream of road crossing.
26	93L.093	yes, incorrectly	1	1126, 1181, 1182, 1183	cascade at site 1126	2	2	vertical	Cascade at proposed road crossing at site.
34	93L.094	yes	2	1134	cascade at reach 1/2 break	25	0.2 to 0.4m	23%	Series of small cascades with no plunge pool and very little water in stream.
28	93L.094	yes	2	1228	cascade at reach 1/2 break	2	1.8	vertical	Cascade which is a barrier to fish.

6. STREAM SUMMARY TABLES

A summary of the sites sampled in the Trout and Toboggan watersheds is presented in Table 3. Key location information, channel and gradient data and stream classifications are summarized for comparison of all sites while Table 4 presents fish sampling settings for electrofishing gear. Fish were captured in most streams with relative ease and in most cases the field crew stopped sampling once a fish was captured. Non-fish bearing discussion follows this section.

Table 3. Summary of 1999 Sites in Trout and Owens Creek Sampling Area.

Parent Watershed	Site #	ILP	Reach #	NID Map	Average Channel Width (m)	Average Gradient %	Average Pool Depth (m)	Water Temp. C	pH	Conductivity	Turbidity (C/ML)	Stream Class	Fish Site #	Species
Trout Creek	1113	13	1	93L.093	3.2	5	0.18	5	7.9	40	C	S3	1113	CT
Trout Creek	1114	14	1	93L.093	1.3	4	0.13	8	7.4	90	C	S4	1114	NFC
Trout Creek	1115	15	1	93L.093	1.7	8	0.18	7	7.8	70	C	S3	1115	CT
Trout Creek	1116	16	1	93L.093	1.45	4	0.16	9	6.8	40	C	S4	1116	NFC
Trout Creek	1117	17	1	93L.093	1.4	1	0.11	10	7.1	40	C	S4	1117	NFC
Trout Creek	1118	18	1	93L.093	0.8	2	0.10	11	7	40	C	S6	1118	NFC
Trout Creek	1119	19	1	93L.093	less than 1	-	-	-	-	-	-	NCD	none	no sampling
Trout Creek	1120	20	1	93L.093	less than 1	-	-	-	-	-	-	NCD	none	no sampling
Trout Creek	1121	21	1	93L.094	-	-	-	-	-	-	-	S3	1996 site	CT
Trout Creek	1222	22	1	93L.094	1.1	9	0.13	14	8.5	90	C	S4	1222	NFC
Trout Creek	1223	23	1	93L.094	3.0	6	0.29	7	7.8	50	C	S3	1998 site	CT (1998)
Trout Creek	1225	25	2	93L.094	1.1	6	0.16	9	8.4	90	C	S4	1225	NFC
Toboggan Creek	1228	28	3	93L.094	2.4	8	0.43	9	7.4	60	C	S3	1228	CO
Owens Creek	1126	26	1	93L.094	1.6	17	0.16	6	8	50	C	S6	1126	NFC
Owens Creek	1134	34	2	93L.094	1.8	13	0.08	6	7.8	40	C	S6	1134	NFC

Table 4. Summary of Fish Sampling Data for Trout and Owens Creek Sampling Area.

Parent Watershed	ILP	Reach #	Site #	Stream Class	Fish Species	Temperature C	Conductivity micro-siemens/cc	Turbidity	EF (Seconds)	EF (Length-m)	EF (Width-m)	Voltage	Frequency	Pulse	Make	Model
460-000000	13	1	1113	S3	CT	5.	40	C	108	25	3	400	60	7	SR	12 B POW
460-000000	14	1	1114	S4	NFC	8.	90	C	739	265	0.8	300	I	5	SR	12 B POW
460-000000	15	1	1115	S3	CT	7.	70	C	113	50	1	300	I	5	SR	12 B POW
460-000000	16	1	1116	S4	NFC	9.	40	C	1615	1107	0.8	400	I	5	SR	12 B POW.
460-000000	17	1	1117	S4	NFC	10.	40	C	1307	600	1.3	400	I	5	SR	12 B POW
460-000000	18	1	1118	S6	NFC	11.	40	C	380	250	1	400	I	5	SR	12 B POW
460-000000	22	1	1222	S4	NFC	14.	90	C	233	250	1	500	70	6	SR	12 B POW
460-000000	23	1	1223	S3	CT	7.	50	C		fish	found	in	previous	years		
460-000000	25	2	1225	S4	NFC	9.	90	C	204	300	1	500	70	6	SR	12 B POW
460-000000	28	3	1228	S3	CO	9.	60	C	1321	800	2	300	60	7	SR	12 B POW
460-000000	26	1	1126	S6	NFC	6.	50	C	210	150	1	400	I	6	SR	12 B POW
460-000000	26	1	1181	S6	NFC	6.	50	C	230	200	1	400	I	6	SR	12 B POW
460-000000	26	1	1182	S6	NFC	6.	50	C	220	125	1	300	I	6	SR	12 B POW
460-000000	26	1	1183	S6	NFC	6.	50	C	335	75	1	300	I	6	SR	12 B POW
460-000000	34	2	1134	S6	NFC	6.	40	C	212	150	1	400	I	6	SR	12 B POW

7. NON-FISH BEARING REPORT

In addition to the stream sampling information of the previous section, a brief summary of non-fish bearing reaches and classification follows with the Non-fish Summary Table 5. Non-fish classification was assigned to reaches in which no fish were captured, in some cases, over several seasons of sampling. Two typical situations were encountered for non-fish bearing streams and lack of access for fish from downstream reaches was common to both.

- **A) NCD downstream:** Stream reaches at the road crossing contained fish habitat (of moderate to poor quality) but, further downstream, the channel bed was discontinuous or became an NCD (non-classified drainage) and was not accessible to fish. The lack of continuous channel, underground seepage or dispersal of water overland prevented fish from accessing the reach by the road crossing. This applies to ILP 19 and 20.
- **B) Steep cascade barrier in channel:** A steep cascade (barrier) exists which was judged to be impassable to fish (CT, DV) and no fish were captured upstream. This circumstance applies to ILP 34, 26, 28 and 18.

Table 5. Non-fish bearing reaches for 1999 Sites.

Parent Watershed	Site #	ILP	Reach #	Stream Class	Electroshock Effort (Seconds)	Channel length shocked (m)	Channel width shocked (m)	Voltage	Frequency	Pulse	Shocker Model	Species	Water Temp. C	Conductivity micro-Siemens	Turbidity	Comments
Trout Creek	1118	18	1	S6	380	250	1	400	60	5	Smith Root 12 B	NFC	11.	40	C	Cascade barrier
Trout Creek	1119	19	1	NCD	340	220	0.3	400	60	5	Smith Root 12 B	NFC	-	-	C	NCD downstream
Trout Creek	1120	20	1	NCD	NO SHOCKING	-	-	-	-	-	-	-	-	-	-	NCD downstream
Trout Creek	1224	24	1	NCD	NO SHOCKING	-	-	-	-	-	-	-	-	-	-	NCD
Toboggan Creek	1228	28	2	S6	1321	800	2	300	60	7	Smith Root 12 B	CO	9.	60	C	Cascade barrier
Owens Creek	1126	26	1	S6	210	150	1	400	60	6	Smith Root 12 B	none	6.	50	C	No connection, cascade barrier
Owens Creek	1134	34	2	S6	212	150	1	400	60	6	Smith Root 12 B	none	6.	40	C	Cascade barrier

8. REFERENCES

- BC Ministry of Forests. 1995. Forest Practices Code of British Columbia Regulations.
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- Triton Environmental Consultants Ltd. 1999. 1:5,000 Fish and Fish Habitat Inventory of Unnamed Tributaries to Toboggan and Trout Creeks. Working Unit 14 (Toboggan), Cutting Permit 361. Report (Reference #2665.WPT-600) prepared for Pacific Inland Resources and BC Ministry of Environment, Lands and Parks. Smithers, BC. Available from MoELP, Region 6, Smithers.
- 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. Available from MoELP, Region 6, Smithers.

9. APPENDICES

Appendix I. Stream Photos

The following pages contain representative stream photos for the sites listed below:

- Site 1113
- Site 1114
- Site 1115
- Site 1116
- Site 1117
- Site 1118
- ILP 0019
- ILP 0020
- Site 1222
- Site 1223
- Site 1225
- Site 1126
- Site 1228
- Site 1134

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

Survey start date: 1999/06/15

Agency: C172

Survey end date: 1999/07/29

Crew:BLW/SMJ/DDD/DJD

Camera #1

Make & Model: Pentax Zoom90-WR	Lenses: A, B
Format: 35mm film	

Camera #2

Make & Model: Red Canon	Lenses: A
Format: 35mm 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
1, 7, 18	1	print	colour	200
2(X), 8	2	print	colour	200

Appendix III. Photo Documentation Report for all photos taken during the survey of Toboggan Working Unit 14.

Addendum to Appendix III. Photo Documentation Report: Photos not entered into FDIS for this sampling area.

Roll #	Frame #	Negative	CD #	Image #	Comment
1	23	23A	1927	53	NCD; no site card completed
1	24	24A	1927	54	NCD; no site card completed
2(X)	1	1	1927	55	NCD; no site card completed (ILP 0020)
2(X)	2	2	1927	56	NCD; no site card completed (ILP 0020)

Appendix IV. Reach Planning Report

Appendix V. 1999 Field Data: Reach Forms, Stream Site Cards and Fish Collection Forms for Toboggan Working Unit 14

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

- Site 1113
- Site 1114
- Site 1115
- Site 1116
- Site 1117
- Site 1118
- Site 1222
- Site 1223
- Site 1225
- Site 1126
- Site 1228
- Site 1134

Appendix VI. 1998 Site and Fish Cards

The following pages contain the Reach Cards, 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.

Appendix VII. 1996/97 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. Streams which cross the 602 Road:

- Site Y68, on ILP 00023
- Site Y70, on ILP 00024
- Site Y72, on ILP 00025
- Site R131, on ILP 00013
- Site R109, tributary to Trout Creek
- Site R110, tributary to Trout Creek

2. Streams located near Block 361-2 (H7):

- site W230, on Owens Creek (ILP 00034)

3. Streams located near Block 361-1 (H6):

- Site Y76, on ILP 00028
- Site Y74, on ILP 00028
- Site Y73, on a tributary to ILP 00028