
Reconnaissance (1:20,000) Fish and Fish Habitat Stream Inventory of Larkworthy Creek

Watershed Code: 400 - 593800

**Kispiox Forest District Fish and
Fish Habitat Inventory Project**

Final Report

Prepared for:

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PROJECT REFERENCE INFORMATION

Project Code:	06-KISP-3068-0002-1998
Proponent:	Ministry of Environment, Lands and Parks
Inventory Program:	Forest Renewal BC
Contract Number:	Section of CSK 3068, Skeena Region
FRBC Project Number:	SB96120

WATERSHED INFORMATION

Stream Names:	Larkworthy Creek
Watershed Codes:	400 593800
TRIM map sheets	93M.081, 93M.082
Total Number of Reaches:	140
Number of Reaches/Sites Sampled:	8
Fish Species Present:	CH, RB, DV
Biogeoclimatic Zone(s):	ICH
Survey Dates:	September 4-5, 1997.
MELP Region:	Skeena Region (6)
Management Units:	6-7
Forest District:	Kispiox Forest District
Forest Licensee:	Skeena Cellulose Inc.

CONTRACTOR INFORMATION

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Data Entry:	Lloyd Dallyn and Sam Buchanan, D. Tech.,
Inventory Mapping:	Shannon Shields, B.A., and Michele Patterson, D. Tech.

DISCLAIMER

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

ACKNOWLEDGMENTS

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We would like to thank Todd Mahon, Skeena Cellulose Inc. representative who was the contract administrator and provided valuable input throughout the contract, and Paul Giroux, Fisheries Inventory Specialist, Ministry of Environment, Lands and Parks, Skeena Region, who acted as contract monitor and provided technical expertise as well as valuable input throughout the project.

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1. INTRODUCTION

1.1 Project Objectives

Triton Environmental Consultants Ltd. was by the British Columbia Ministry of Environment, Lands and Parks, Fisheries Branch to conduct stream inventories in select watersheds within the Kispiox Forest District. Information was collected on the biological and physical stream characteristics, fish species assemblage, and fish distribution. The purpose of the Reconnaissance (1:20 000) Fish and Fish Habitat Inventory is to describe watershed-wide fish distributions and habitat characteristics for the project area.

1.2 Study Area

The project area is within the Kispiox Forest District in northwestern central British Columbia (Figure 1). The project area covered 11 discrete working areas (Table 1). This report covers project working area #5: Larkworthy Creek watershed (Table 1). Larkworthy Creek flows northwest into the Skeena River approximately 125 km north-northwest of Smithers (Figure 1). Access to this area was by helicopter from Hazelton, B.C.

Table 1. Watershed working areas within the Kispiox Forest District

Working Area #	Working Area	Stream Network	Watershed Code
1	Shedin Creek	Unnamed Creeks, Sperry Creek, Rosenthal Creek, Damsumlo Creek ⇒ Shedin Creek ⇒ Babine River ⇒ Skeena River ⇒ Pacific Ocean	480 027800
2	Goathead Creek	Unnamed Creeks ⇒ Goathead Creek ⇒ Shedin Creek ⇒ Babine River ⇒ Skeena River ⇒ Pacific Ocean	480 027800 11600
3	West Kitsuns Creek Tributary	Unnamed Creeks ⇒ Unnamed Creek ⇒ Kitsuns Creek ⇒ Kitseguecla River ⇒ Skeena River ⇒ Pacific Ocean	450 318200 18200 45700
4	Kitsuns Creek	Unnamed Creek ⇒ Kitsuns Creek ⇒ Kitseguecla River ⇒ Skeena River ⇒ Pacific Ocean	450 318200
5	Larkworthy Creek	Unnamed Creeks ⇒ Larkworthy Creek ⇒ Skeena River ⇒ Pacific Ocean	400 593800
6	Cranberry River Tributaries	Unnamed Creeks ⇒ Cranberry River ⇒ Nass River ⇒ Pacific Ocean	530-000000
7	Carrigan Creek Tributaries	Unnamed Creeks ⇒ Carrigan Creek ⇒ Skeena River ⇒ Pacific Ocean	400 519600
8	Skeena River Tributaries (S. of Larkworthy Cr.)	Unnamed Creeks ⇒ Skeena River ⇒ Pacific Ocean	400-
9	Deep Canoe Creek	Unnamed Creeks ⇒ Deep Canoe Creek ⇒ Skeena River ⇒ Pacific Ocean	400 574200
10	Skeena River Tributaries (S. of Sicintine R.)	Unnamed Creeks ⇒ Skeena River ⇒ Pacific Ocean	400
11	Moonlit Creek	Unnamed Creeks ⇒ Moonlit Creek ⇒ Kitwanga River ⇒ Skeena River ⇒ Pacific Ocean	400 694900 48600

Figure 1. Project overview map

1.3 Review of Existing Information

The Fisheries Information Summary System (FISS) Map 93M/13 has no fisheries information for the Larkworthy Creek watershed.

2. METHODS

Standard methodology as outlined in Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures (RIC 1997) for performing stream inventories were followed. The reconnaissance level fish and fish habitat inventory is a sample-based survey covering whole watersheds as defined from 1:20,000 scale maps and air photos. The project includes 6 phases as listed below:

- Phase 1: Data Review: A review of all available background information was completed. All known fisheries information is summarized in this report; new data were transcribed onto the 1:20,000 TRIM maps, and 1:50,000 NTS maps to update Fisheries Information Summary System (FISS) database (DFO).
- Phase 2: Classification and Sampling Design: A comprehensive map and air photo review was completed for all waterbodies identified on 1:20,000 TRIM maps. Reach characteristics (gradient, order, pattern, confinement) were recorded for all streams within the project area and recorded on the Reach Table (RIC,1997). The Reach Table was used to generate a sample size (a subset of reaches to be sampled) within the working area based on RIC guidelines. The Reach Totals and Sample Size Sheet (RIC, 1997) was generated which provides a summary of the number of reaches of each type (based on gradient class, size and pattern/confinement) to be sampled. Detailed Reach Forms were completed for selected reaches to be sampled.
- Phase 3: Project Plan: A field sampling plan was developed to sample sites in a variety of stream gradients and stream orders. The purpose of the plan was to describe watershed wide fish distribution, not necessarily to sample all potential fish bearing reaches. Data from Phases 1 and 2, and the Project Plan were presented to and approved by Paul Giroux, MELP Fisheries Inventory Specialist.

Phase 4: Field Inventory: Field sampling of selected sites was completed from September 4-5, 1997.

Phase 5: Data Entry and Analysis: Field sampling data (including site cards, fish cards, and photodocumentation) were entered into the FDIS database. 1:50,000 scale NTS maps of the study area were updated with new information as per the FISS Data Compilation and Mapping Procedures (DFO, 1997).

Phase 6: Reporting and Final Mapping: Field and office data were mapped using Arc View and Arc Info software, photographs were scanned and printed, and draft and final reports were completed.

2.1 Changes To Methodology

2.1.1 Phase 2

The required number of sample sites as determined by the Reach Sampling Summary were chosen with bias (rather than randomly) to incorporate biological concerns (fish distribution) and access issues. Additional reaches were chosen upstream and downstream of known barriers to determine limits of fish distribution.

2.1.2 Phase 4

All sample site locations (except for no visible channel sites) were marked in the field with flagging tape and with the ILP and site numeric identifier (NID) on a steel tag fixed to a blaze on a tree.

2.1.3 Phase 5

Photographic data were edited when entered into FDIS from the original field data forms to reduce duplication of photographs and to eliminate poor quality photographs. Field data forms remain unaltered as a permanent record for the sample site. All photos were taken with 35mm slide film, and scanned using a Nikon LS-1000 film scanner. Slides were scanned at 300 dpi, and saved as *.JPG files (.8 compression). Stored photo files are about 300kb, and uncompress to about 5mg each. Digital photos were printed as thumbnails using Corel Mosaic. All site photos were copied to CD, 2 copies have been sent to MELP Smithers, and Triton will retain 1 copy on file.

2.1.4 Phase 6

The inventory and interpretative maps were combined to produce one map. The working area is indicated by blue coloured stream lines. Fish presence is represented by light red highlighting over stream lines (sampled: solid or inferred: dashed) and no fish presence is represented by light blue highlighting over stream lines (sampled: solid or inferred: dashed). Stream classifications are provided for sampled reaches only. Stream summary symbols provide the following information for each sampled site:

- sample site ID,
- fish species presence, not sampled or no fish caught,
- stream or wetland,
- reach confinement,
- reach gradient,
- reach pattern,
- site gradient,
- site channel width,
- site morphology,
- site dominant substrate type,
- site disturbance(s) if applicable, and
- stream classification.

2.2 Field Assessments

The Larkworthy Watershed was surveyed on September 4-5, 1997. Field assessments followed procedures outlined in Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures (RIC, 1997). Generally, the process we followed in the field was to:

- assess the watershed during a helicopter overflight to confirm reach boundaries, identify access points, and photograph reaches at a watershed scale.
- assess each reach on the ground by completing a standard site card, sampling for fish presence, completing a fish collection card and photographing representative habitats.
- identify key features such as barriers to fish migration, spawning locations and bridges; photograph and recorded features on site cards with a unique numeric identifier (NID).

Sample site lengths were equal to the greater of 100m or 10 bankfull widths. Stream widths were determined by measuring the channel width with a tape measure, or by visual estimate. At least 6 channel width measurements were made within each reach, each one at least one channel width distance apart. These measurements were averaged

to determine the average channel width. Stream gradients were measured using a clinometer. Stream morphology was determined using the *Channel Assessment Procedures Guidebook* (MOF 1996). Depths were measured using a folding meter stick. Water quality (pH and conductivity) was assessed using a Hannah pHTestr2™ and TDSTestr3™. Turbidity was assessed by ground estimate. Habitat quality was assessed for rearing, spawning, overwintering and cover, each of these habitat types was rated as either Good, Fair, Moderate or Poor. Wildlife observations were noted.

2.3 Fish Sampling

Fish presence was determined by electrofishing at least 100m² or the equivalent of 10 bankfull widths of habitat in each reach using a Smith Root Model 12B electroshocker. Captured fish were measured (nose-fork length) and keyed out to species using the *Field Key to the Freshwater Fishes of British Columbia* (McPhail and Carveth, 1994). Fish collection forms were completed for each site where fish sampling occurred.

3. INVENTORY DATA

3.1 Survey Information

A total of 140 reaches were identified within the Larkworthy Creek working area. A total of 8 sample sites were visited for inventory purposes.

Project inventory maps are presented in Appendix A - Inventory Map. Individual site card information and fish collection data is presented in Appendix B - Stream Site Data from FDIS and Fish Collection Data. Individual site photographs and contact sheets are presented in Appendix C - Photograph Captions and Contact Sheets.

3.1.1 Problems

Watershed codes were not available at the time of mapping and have therefore not been included. All streams were identified with a numeric interim locational point (ILP), ILP's are used throughout this report to identify specific streams.

3.2 Fish Distribution

Chinook salmon (*Oncorhynchus tshawytscha*), rainbow trout (*O. mykiss*), and Dolly Varden char (*Salvelinus malma*) were captured in Larkworthy Creek. A 2m waterfall barrier approximately 7.7 km upstream from the mouth in Reach 3 is likely the upstream limit to fish distribution as no fish were captured in 3 sample sites upstream. No fish

were captured in any of the sampled tributary reaches as there is no access from the mainstem.

3.3 Fish Habitat

Fish habitat is limited to the mainstem of Larkworthy Creek up to a 2m waterfall in Reach 3. Mainstem habitat is suitable for all life phases of salmonids. Only rearing habitat was noted during the field sampling. No definitive spawning areas were observed although spawning habitat occurs in Reach 1 of Larkworthy Creek. Larkworthy Creek is entrenched and tributaries within the fish bearing reaches of Larkworthy Creek are too steep (gradient >30%) to support fish. Average gradient in the mainstem is 7.7% (averaged from the 3 mainstem sites) and is stepped pool/cascade habitat.

3.4 Fish Condition

All captured fish appeared to be healthy. Chinook salmon ranged in size from 52mm - 70mm; one rainbow trout was 78mm in length; and Dolly Varden ranged in size from 35mm - 175mm; all were considered to be rearing. No attempt was made to examine captured fish internally for the determination. No fish were exhibiting spawning colouration.

3.5 Rehabilitation/Enhancement Opportunities

There are no rehabilitation or enhancement opportunities in the Larkworthy Creek working area.

3.6 Follow-up Sampling

No follow-up sampling is recommended for Larkworthy Creek. The sampling rate and locations of sites determined fish distribution at the 1:20,000 level for the entire watershed.

3.7 Other Concerns/Interest Points

No concerns or points of interest were observed in this working area.

3.8 Non-Fish Bearing Reaches

Non-fish bearing reach reports are provided for relevant reaches including intermittent streams (Table 2). The most downstream reach of a stream which was determined to be non-fish bearing is identified in the report. All subsequent reaches upstream are non-fish bearing by default and are not identified separately. No reports are provided for the TRIM anomaly of a no visible channel - a channel that appears on a TRIM map but was not found in the field.

Table 2. Non-Fish Bearing Status Report for the Larkworthy Creek Watershed

Initial Sampling Date	Follow-up Sampling Date	Watershed Code or ILP Number	Stream Name	Reach Number	Site Number	Map Sheet Number	Capture Method (electrofishing settings)	Area Covered (m ²)	Sampling Effort	Cond. (µS)	Water Temp. (deg. Celsius)	Flow Stage (VO)	Turbidity (V0)	Known Fish Presence (u/s-d/s)	Obstructions to Fish Migration	Seasonal Habitat Availability	Seasonal Fish Use
04/09/1997	-	400-593800	Larkworthy Creek	3	1057	93M.081	EF, 600/70/6	140	303 seconds	180	8	Low	Clear	RB, CH, DV downstream in Larkworthy Creek	2m falls barrier 800m upstream of the Reach 2-3 break	All	None
04/09/1997	-	28	Unnamed	1	1056	93M.081	EF, 600/70/6	25	102 seconds	-	10	Low	Clear	RB, CH, DV downstream in Larkworthy Creek	67% gradient at mouth for first 60m	No overwintering habitat	None

4. REFERENCES

Department of Fisheries and Oceans. 1997. Fisheries Information Summary System Data Compilation and Mapping Procedures.

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Appendix A - Inventory Map

Appendix B - Stream Site Data from FDIS and Fish Collection Data

Appendix C - Photograph Captions and Contact Sheets

Photo Date	Watershed/ Working area	Stream Name or ILP	ILP Mapsheet	Card Site #	Site or Feature NID	NID Mapsheet #	Roll #	Frame #	CD#	Folder	Image	Focal Length (St, Wd, Te)	Dir (Up, Dn, Xs, Fish, Ae)	Comments (Description and/or scale item)
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1054	01054	93M.081	19	24	KISPIOX	19	21	Te	Fish	RB 78mm
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1054	01054	93M.081	19	25	KISPIOX	19	22	Te	Fish	CH 70mm
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1054	01054	93M.081	19	27	KISPIOX	19	23	Te	Fish	DV 43mm
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1054	01054	93M.081	19	28	KISPIOX	19	24	Te	Fish	CH 67mm
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1054	01054	93M.081	19	29	KISPIOX	19	25	Te	Fish	CH 67mm
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1054	01054	93M.081	19	31	KISPIOX	19	26	St	Up	Start of confined section, upstream end of Reach 1, large boulders in foreground.
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1054	01054	93M.081	19	32	KISPIOX	19	27	St	Dn	Glide section.
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1054	01054	93M.081	19	33	KISPIOX	19	28	St	Dn	Person on right bank.
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1054	01054	93M.081	19	34	KISPIOX	19	29	St	Up	Riffle, boulders on right bank.
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1054	01054	93M.081	19	35	KISPIOX	19	30	St	Dn	Log over channel.
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1054	01054	93M.081	19	36	KISPIOX	19	31	St	Up	Log without bark in foreground.
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1055	01055	93M.081	12	1	KISPIOX	12	1	Te	Fish	DV 65mm
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1055	01055	93M.081	12	3	KISPIOX	12	2	Te	Fish	DV 175mm
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1055	01055	93M.081	12	4	KISPIOX	12	3	St	Ae	Aerial view of Reach 2 Larkworthy Creek.
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1055	01055	93M.081	12	5	KISPIOX	12	4	St	Ae	Aerial view of Reach 2 Larkworthy Creek.
97-Sep-4	Larkworthy C	Larkworthy	93M.081	1055	01055	93M.081	12	6	KISPIOX	12	5	St	Ae	Aerial view of Reach 2 Larkworthy Creek.
97-Sep-4	Larkworthy	00028	93M.081	1056	01056	93M.081	12	12	KISPIOX	12	6	St	Up	Small channel with overstream shrub layer, plastic bag in foreground.
97-Sep-4	Larkworthy	00028	93M.081	1056	01056	93M.081	12	13	KISPIOX	12	7	St	Dn	Small channel with wand across stream.
97-Sep-4	Larkworthy	Larkworthy	93M.081	1057	02080	93M.081	12	14	KISPIOX	12	8	St	Ae	Aerial view of R3 Larkworthy 2m falls d/s of site.
97-Sep-4	Larkworthy	Larkworthy	93M.081	1057	01057	93M.081	12	16	KISPIOX	12	9	St	Up	Step pool with falls on steep wall on right.
97-Sep-4	Larkworthy	Larkworthy	93M.081	1057	01057	93M.081	12	17	KISPIOX	12	10	St	Dn	Step pool with bedrock banks on right.
97-Sep-4	Larkworthy	Larkworthy	93M.081	1057	01057	93M.081	12	18	KISPIOX	12	11	St	Ae	Aerial view of R3 Larkworthy.
97-Sep-4	Larkworthy	Larkworthy	93M.081	1057	01057	93M.081	12	19	KISPIOX	12	12	St	Ae	Aerial view of R3 Larkworthy, debris jam on banks.
97-Sep-4	Larkworthy	Larkworthy	93M.081	1057	01057	93M.081	12	20	KISPIOX	12	13	St	Ae	Aerial view of R3 Larkworthy.
97-Sep-5	Larkworthy	00054	93M.081	1059	01059	93M.071	12	35	KISPIOX	12	24	St	Up	Skunk cabbage, small channel, blue jacket on left.
97-Sep-5	Larkworthy	00054	93M.081	1059	01059	93M.071	12	36	KISPIOX	12	25	St	Up	Person electroshocking, devils club, small channel.

Photo Date	Watershed/ Working area	Stream Name or ILP	ILP Mapsheet	Card Site #	Site or Feature NID	NID Mapsheet #	Roll #	Frame #	CD#	Folder	Image	Focal Length (St, Wd, Te)	Dir (Up, Dn, Xs, Fish, Ae)	Comments (Description and/or scale item)
97-Sep-5	Larkworthy	00044	93M.081	1062	01062	93M.082	5	8	KISPIOX	5	5	St	Up	Wand across small channel
97-Sep-5	Larkworthy	00044	93M.081	1062	01062	93M.082	5	9	KISPIOX	5	6	St	Dn	Wand across small channel
97-Sep-5	Larkworthy	00044	93M.081	1062	01062	93M.082	5	10	KISPIOX	5	7	St	Up	Person on right, small channel
97-Sep-5	Larkworthy	00045	93M.081	1063	01063	93M.082	5	11	KISPIOX	5	8	St	Up	Pool with grasses on banks
97-Sep-5	Larkworthy	00045	93M.081	1063	01063	93M.082	5	12	KISPIOX	5	9	St	Dn	Small channel, mossy boulders.
97-Sep-5	Larkworthy	00044	93M.081	1062	01062	93M.082	5	13	KISPIOX	5	10	St	Up	Person with shocker on left above log.
97-Sep-5	Larkworthy	00044	93M.081	1062	01062	93M.082	5	15	KISPIOX	5	11	St	Up	Person on top of cascade section.
97-Sep-5	Larkworthy	00045	93M.081	1063	01063	93M.082	5	16	KISPIOX	5	12	St	Up	Small channel, alpine stream, anode on left.
97-Sep-14	Larkworthy	Larkworthy	93M.081	1054	01054	93M.081	6	24	KISPIOX	6	23	St	Ae	Aerial view of confluence of Larkworthy and Skeena.