Province of
British Columbia

Ministry of
Environment
Lands & Parks
Bulkley District
Smithers, B.C.

A RECONNAISSANCE INVENTORY OF CLOTA LAKE

BABINE R
UNNAMED

Watershed Code 480-4026

[SEQ #01]

FINAL REPORT

Klohn-Crippen Consultants Ltd.
10200 Shellbridge Way
Richmond, British Columbia
Canada, V6X 2W7

KLOHN-CRIPPEN

PW7507 0105

KLOHN-CRIPPEN

March 19, 1997

Ministry of Environment, Lands and Parks
Skeena Region
Box 5000
Smithers, British Columbia
V0J 2N0

Mr. Paul Giroux

Dear Mr. Giroux:

The following represents our final report for a Reconnaissance Survey of Clota Lake, Watershed Code 480-4026.

Yours truly,

KLOHN-CRIPPEN CONSULTANTS LTD.

Richard Couture, R.P. Bio.
Project Manager

PW 7507 0105
970312

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FINAL REPORT

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10200 Shellbridge Way
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MARCH, 1997

EXECUTIVE SUMMARY

Klohn-Crippen Consultants Ltd. was retained by the Fisheries Branch of the Ministry of Environment, Lands and Parks in Smithers, British Columbia, to conduct a reconnaissance level survey of Clota Lake (Watershed Code - 480-4026) which lies within the Babine River watershed. Clota lake is located east of Nilkitkwa Lake and approximately 6.6 km north of Fort Babine. The lake lies in a broad, flat basin with poor drainage and possesses abundant rooted vegetation at its northern and eastern ends. The lake also has a large sub-basin extending from the central eastern side of the main lake. This sub-basin is almost completely isolated from the main basin by dense growths of rooted vegetation and peat mats. There was no road or trail access to this lake at the time of survey but logging roads were under construction in the immediate vicinity. Lake access for this study was by float plane chartered from Smithers. Lastly, this lake was surveyed by Klohn-Crippen on September 23 and 24, 1996.

This lake has several inlets and one outlet. The inlets were inaccessible because of dense marshy areas at their confluences with the lake. The outlet passes over a 1.3 metre the high beaver dam prior to entering a stream channel which exhibits suitable fish habitat. The large beaver dam may however, be a barrier to the movement of fish between the stream and the lake. This lake is dominated by non-sport fish including longnose sucker (*Catostomus catostomus*), northern squawfish (*Ptycheilus oregonesis*) and redside shiner (*Richardsonius balteatus*). Only two specimens of cutthroat trout (*Oncorhynchus clarki*) were captured in Clota Lake.

The maximum depth of Clota Lake is 11.3 metres and at the time of sampling, the dissolved oxygen concentration was above that required for salmonids (8 mg/L: Anon. 1996b) from 0 to 5 metres. The dissolved oxygen concentration decreased rapidly with depth to its lowest concentration of 0.3 mg/L between 14 and 16 metres.

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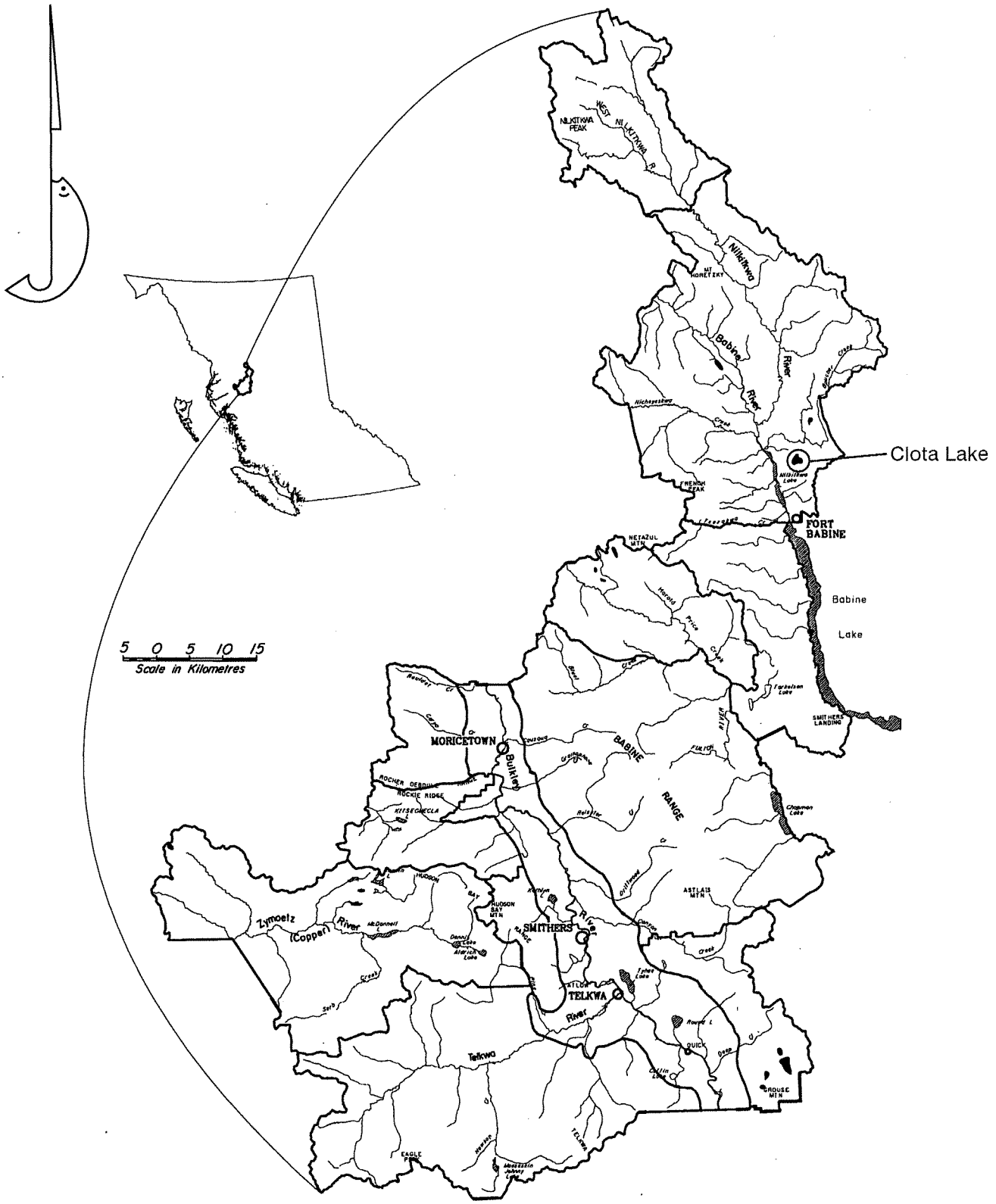
LIST OF APPENDICES

1. INTRODUCTION

Klohn-Crippen Consultants Ltd. was retained by the Fisheries Branch of the BC Ministry of Environment, Lands and Parks in Smithers, British Columbia, to conduct a reconnaissance survey of Clota Lake within the Babine River watershed. The field survey was conducted on September 23 and 24, 1996 by G. Scarborough and J. Calvert. This lake is located east of Nilkitkwa Lake (Figure 1), approximately 6.6 km north of Fort Babine, and has not previously been surveyed. The purpose of this survey was to provide the essential fish and fish habitat information required for resource planning or making management decisions that may affect the resource.

Fish sampling was conducted overnight through the use of gillnets and minnow traps while electrofishing was conducted on the lake's outlet during the daytime only. All surveys (except the bathymetric survey) were conducted according to Resource Inventory Committee (RIC) standards (Anon 1995a). The bathymetric survey of this lake utilized a Trimble Pro-XL GPS-data logger combined with a Meridata depth sounder. After post-mission differential correction, the GPS data provided sub-meter positional accuracy for plotting individual depth soundings. The perimeter of this lake was also traced using the GPS system which provided accuracy in lake perimeter and surface area estimates.



KLOHN-CRIPPEN

CLIENT: Province of British Columbia — Ministry of Environment Lands & Parks

PROJECT: Reconnaissance Inventory of Clota Lake

TITLE: **Lake Location**

DATE OF ISSUE	PROJECT No.	DWG No.	REV.
March 19, 1997	PW 7507 0105	Fig. 1	G.S.

APPROVED

2. DATA ON FILE

The following represents a directory of the specific components that can comprise a reconnaissance lake survey and also indicates those components that are completed in this survey.

Location	√	**Winter Diss. O_2/Temp. Profiles**	
Lake Morphometric Data	√	**Netting record**	√
Bench Mark	√	**Lake Catch Summary**	√
Terrain Features	√	**Individual Fish Summary**	√
Access	√	**Fish Preserved**	
Resorts and Campsites	√	**Stomach Analysis**	
Special Restrictions	√	**Scale Reading**	√
Aquatic Plants	√	**Location of Inventory Sites**	√
Wildlife Observations	√	**Appendices:**	√
Summary of Rare or Endangered Species	√	**I: Tributary Stream Data and Data Forms**	√
Lake Drainage	√	**II: Fish Scale Microfiche Prints**	√
Fisheries Management Comments	√	**III: Water Chemistry Analysis**	√
History of Previous Surveys	√	**IV: Photograph Directory**	√
Water Chemistry Summary	√	**Bathymetric Map Reduction**	
Dissolved O_2/Temp. Profiles	√	**Bathymetric Map**	√

3. SURVEY AND ANALYTICAL METHODS

3.1 Bathymetry

The bathymetric survey utilized a Trimble Pro-XL GPS datalogger unit coupled to a Meridata digital depth sounder. The datalogger was programmed to record position (NAD 83) once every second and depth and position every three seconds. The GPS antenna was attached to one end of a length of plywood (4' x 1/2' x 36') and the depth sounder transponder was attached to the other end. This plywood was then fixed to the boat's transom with a C-clamp and an angular wedge placed between the transom and plywood such that the plywood, antenna and transponder were oriented perpendicular to the water's surface. The antenna was positioned approximately 1 m above the water while the transponder was positioned immediately below the surface.

Due to the inherent error in GPS signals, post-mission processing of the field GPS data was necessary to achieve the sub-meter accuracy required to plot bathymetric data. Post-mission differential correction was achieved with the P-Finder software package (Trimble Corp.) by matching the field GPS data with British Columbia Active Control System (BCACS) 1-second network base station data from the Maps BC continuous GPS recorder base station in Terrace, British Columbia. A base station very close to the actual field GPS unit would provide the most accurate post-mission differential correction but Terrace was close enough (<500 km) to still provide sub-meter accuracy (Amin Kassam, Geographic Data BC, Ministry of Environment, Lands and Parks, Fourth Floor - 1802 Douglas St., Victoria, British Columbia, V8V 1X4; *pers. comm.* September 9, 1996).

The first task during a bathymetric survey was to trace the perimeter of the study lake. This was done by placing the outboard motor is shallow drive (to avoid collisions with rocks and logs) and driving around the perimeter maintaining a constant distance from shore for the entire perimeter trace. A distance of 4 m was usually sufficient to avoid collisions and still allow a detailed trace of the perimeter. After differential correction and analysis of this perimeter trace data, the perimeter was expanded by 4 m do delineate the actual lake perimeter and not just the boat's path.

Following the perimeter trace, the lake's longest axis (e-line) was traced to illuminate the general depth trends and then transects were made across the shorter axis in directions generally perpendicular to the e-line. These shorter transects were conducted such that the depth sounder was allowed to track depths from shore to opposite shore. Additional depth data were obtained through excursions into small bays along the shoreline. The coordinates for these bathymetric data were then differentially corrected and analyzed along with the corrected perimeter data to generate bathymetric contours via the AdCADD® Civil/Survey software package. The resulting bathymetric map was then

examined by Greg Scarborough (Klohn-Crippen, Aquatic Ecologist) and adjustments to contours were made as necessary. Bathymetric statistics (volume, area at 6m, etc.) were also generated from the AdCADD® Civil/Survey software package.

3.2 Stream Surveys

Stream surveys were conducted according to Resource Inventory Committee (RIC) standards (Anon. 1995a). Wherever possible, 500 m of stream was walked or at least to the first lake or impassable barrier. At a section of the stream possessing representative habitat, an area no less than 9 bank-full widths long was surveyed and the mandatory fields of the DFO/MoELP stream card were completed. Wherever possible, electrofishing of at least 100 m^2 of fish habitat was also conducted. Photographs of stream habitat and views from the upstream and downstream limits of the survey site were also taken if they provided additional detail of the surrounding habitat.

3.3 Gillnetting

Mesh sizes of monofilament gillnets used in this study, in experimental order, were: 18, 38, 63 and 88 mm. Each gillnet panel measured 17.4 metres long by 2.8 metres deep and the panels were ganged together for a total net size of 69.6 metres by 2.8 metres representing a sample surface area of 194.9 m^2. Each gillnet gang was set with the 18 mm mesh closest to shore and mesh size increasing towards the lake's center.

The Resource Inventory Committee (RIC) standards for gillnetting require a gillnet with six panels of varying mesh sizes to be ganged together in a specific sequence (i.e., 25 mm, 76 mm, 51 mm, 89 mm, 38 mm and 64 mm). The gillnet dimensions used for this inventory did not exactly match the RIC standard. Gillnet mesh sizes increased in size in the order as stated above. The only difference with the RIC standard net design is the absence of the 54 mm and 76 mm panels. RIC standard nets were not used for this survey because the Lake and Stream Inventory manual was unavailable to Klohn-Crippen when this project was initiated. The gillnets used for this inventory have been used by Klohn-Crippen for many years and have produced consistently defensible catch results. For comparison purposes with RIC standard gillnets and where catch data permit, an analysis of the catch length distribution has been provided to highlight trends in the fish length data and the occurrence of any bias in the catch population. See results for this discussion.

3.4 Minnow Traps

Standard gee type minnow traps were used in this study. Each trap was baited with a small piece of salted roe that was suspended by a length of line near the trap's center. The

traps were then attached to the shoreline with a long piece of line and the shoreline area was marked with flagging tape for easy re-location.

3.5 Set Lines

The set line used in this study consisted of a 30 lb monofilament center line with 1 m long 30 lb monofilament leaders extending outwards from this center line at 1 m intervals. Barbed hooks were fixed to the end of each leader and baited with small pieces of salted roe. The set line was weighted with a rock, then lowered to the bottom, after which the line was pulled taught and fixed to a large float at the surface.

3.6 Limnological Investigations

Bathymetric investigations (section 3.1) allowed the field crew to estimate the lake's deepest point. The boat was anchored here and general observations on weather and surface conditions were noted. Lake water temperature and dissolved oxygen were determined at 1 m intervals to the lake bottom and the resulting field data were examined to determine metalimnetic depth. Water samples were then extracted from the surface (0.5m) and from a depth below the metalimnion with a Van Dorn. Specific conductance and pH were also determined in the field at each of the sample depths.

3.7 Water Chemistry

Water chemistry was determined in the field (e.g., temperature, pH, specific conductance) or by a laboratory from samples collected in the field. Water samples collected in the field were stored in properly labeled, clean plastic sample bottles. A glass jar was used to store water for NH_3 analysis. These samples were then stored in a cooler under ice until the field crew returned to the motel where the samples were placed in a refrigerator at 4°C until shipment to Vancouver the following day. When samples were collected on a Friday or Saturday, they were placed in the freezer (-10°C) until shipment on Monday morning.

3.7.1 Alkalinity

Alkalinity was determined by the titration method outlined in Eaton et al. (1995).

3.7.2 Total Dissolved Solids

TDS was examined according to Eaton et al. (1995).

3.7.3 Ammonia (NH_3)

Ammonia was examined according to the Nessler method (Hach 1994).

3.7.4 Nitrate

Nitrate was examined according to the Nessler method (Hach 1994).

3.7.5 Total Phosphorus

Total phosphorus was examined through the ascorbic acid method using powder pillows. A method equivalent to USEPA method 365.2 and Standard Method 4500-P-E for wastewater (Hach 1994).

3.7.6 Total Dissolved Phosphorus

Total Dissolved Phosphorus was examined by the ascorbic acid method using powder pillows after first filtering the sample through a Whatman GFC filter (Hach 1994).

3.7.7 Chlorophyll *a*

The measurement of chlorophyll *a* followed APHA standard methods, 18th Edition, pages 10-17. Plankton are extracted from the sample through a Whatman GFC filter prior to pigment extraction in aqueous acetone. The optical density of the extract is then determined by spectrophotometry.

3.7.8 Total Kjeldhal Nitrogen

The measurement of total nitrogen followed APHA standard methods, 18th Edition, pages 94-94 as well as the EPA-600/4-79-020 method 351. The method basically involved conversion of all the solution's nitrogenous compounds into ammonia through acidification then distillation. Measurement is then made with an ammonia selective electrode.

3.7.9 Filterable Residue

Filterable residue was estimated by passing 25 ml of solution through a washed and weighed 0.45 µm filter. This filter was then washed again, dried and weighed with the amount of filterable residue equal to the difference in weight of the filter and the volume of sample used.

3.7.10 Metals (Sodium, Magnesium and Calcium)

Solution is filtered through a 0.45 µm filter then acidified with Nitric acid, prior to analysis with ICPMS.

3.8 Biogeoclimatic zone

Biogeoclimatic zone was determined with PC-Arc Info by matching lake outflow coordinates with those on a digital map of British Columbia's biogeoclimatic zones.

3.9 Native Land Claim Area

The Native land claim area applicable to each lake was determined from up to date land claim area maps provided by the British Columbia Treaty Commission and, for the Gitskan Nation claim, from a map provided directly from the Gitskan First Nation.

3.10 Mining Claims

Existing mining claims were searched under the Mineral and Placer, No Staking Reserve document, BC Reg. 91/91, March 24, 1993: Amended by BC Reg. 119/95 on March 29, 1995.

4. LAKE GEOGRAPHICAL AND MANAGEMENT INFORMATION

The following represents a summary of the geophysical and management information for Clota Lake.

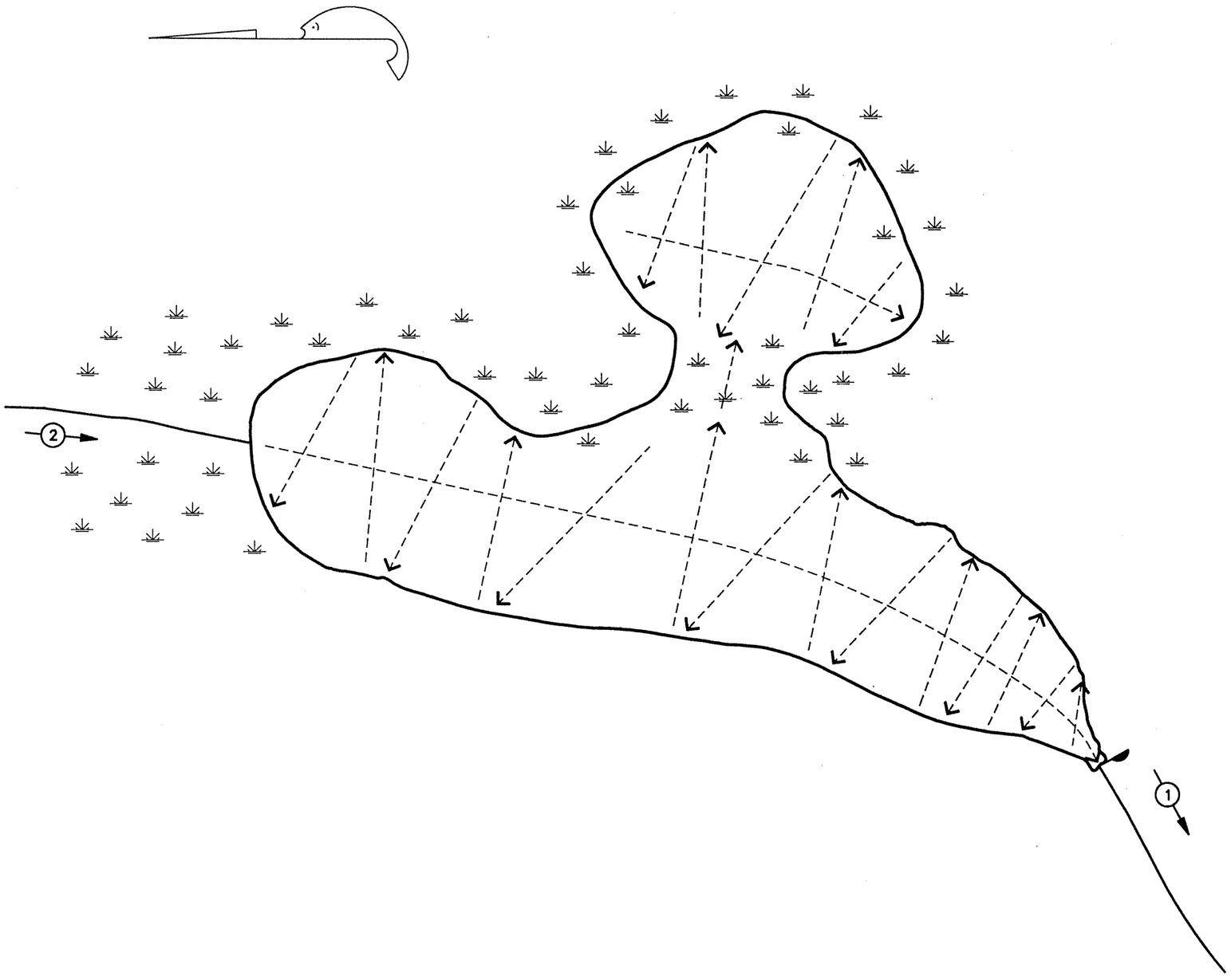
Dates of Survey:	September 23-24, 1996
Watershed Name:	Babine River Watershed
Watershed Code:	480-4026
Watershed Area:	8,600,000 m^3
Location:	East of Nilkitkwa Lake, approximately 6.6 km north of Fort Babine
Elevation:	803.9 m ± 1 m (determined from corrected GPS data)
Latitude/Longitude:	lat. - 55° 22' 55" long. - 126° 36' 49"
U.T.M.:	9. 651187. 6139961
N.T.S. Map No.:	93M.7
TRIM Map No.:	93M.037 and 93M.038
Biogeoclimatic Zone:	Sub-Boreal Spruce, Moist Cold
Forest Region:	Prince Rupert
Forest District:	Bulkley
Wildlife Management Unit:	6-8
LRMP Planning Unit:	2: Babine River
LRMP Management Zone:	Integrated Resource Management Zone • A full range of resource values is recognized in this zone (see Anon. 1996c) • Equal consideration must be given to all values
LRMP Ecosystem Network:	Landscape Corridor
Native Land Claim Area:	Nat'oot'en First Nation, Carier Sekani Tribal Council
Drainage:	Clota Lake > Unnamed outflow > Nilkitkwa Lake > Babine River

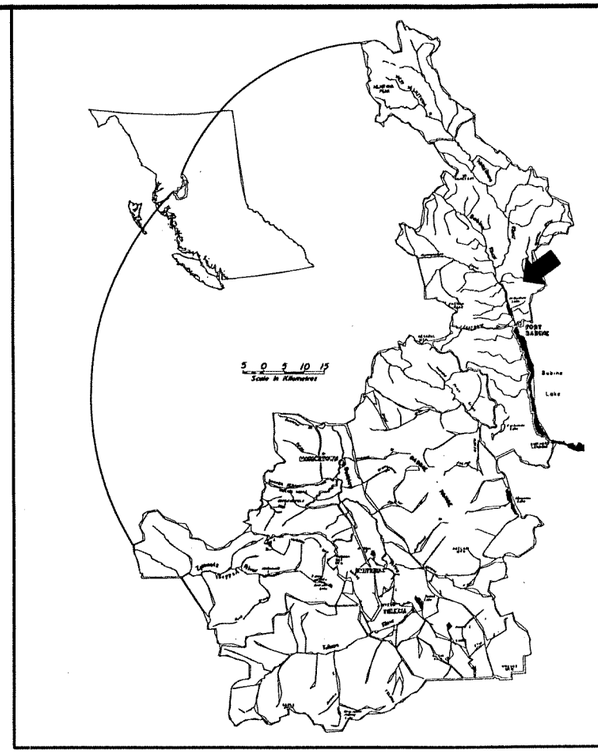
4.1 Lake Morphometric Data

An investigation of Clota Lake's morphometry was conducted on September 24, 1996. This lake has a small sub basin extending from the east side of the main lake so the main basin and the sub-basin were treated separately in this bathymetric survey. For both the sub and main basins, the longest axis was traced. Traces of the shorter axes of this lake resulted in fourteen transects of the main basin and five transects of the sub-basin. Because the survey technique used here involved a GPS unit with post-mission differential correction allowing sub-meter locational accuracy, the standard method for bathymetric surveys was not followed. This resulted in the lack of paper traces, transect calculation sheets and percentage distance along transect determinations (see Anon. 1996a) so these required items are not summarized here. However, the survey transects for assessing Clota Lake's bathymetry have been recorded and are shown in Figure 2. The bathymetric contour map generated from these surveys is shown in Figure 3.

The following bathymetric summary statistics for Clota Lake are:

Total surface area:	577,382 m^2
Surface area at 6m contour:	47,502 m^2
Shoreline perimeter:	4,590 m
Maximum depth:	11.3 m
Perimeter of islands:	0
Number of islands:	0
Mean depth:	3.0 m
Secchi depth:	1.6 m
Sounding device:	Meridata depth sounder





LEGEND

- SURVEY TRANSECT AND DIRECTION
- STREAM FLOW DIRECTION AND NUMBER
- BEAVER DAM

SCALE 1:7500

KLOHN-CRIPPEN

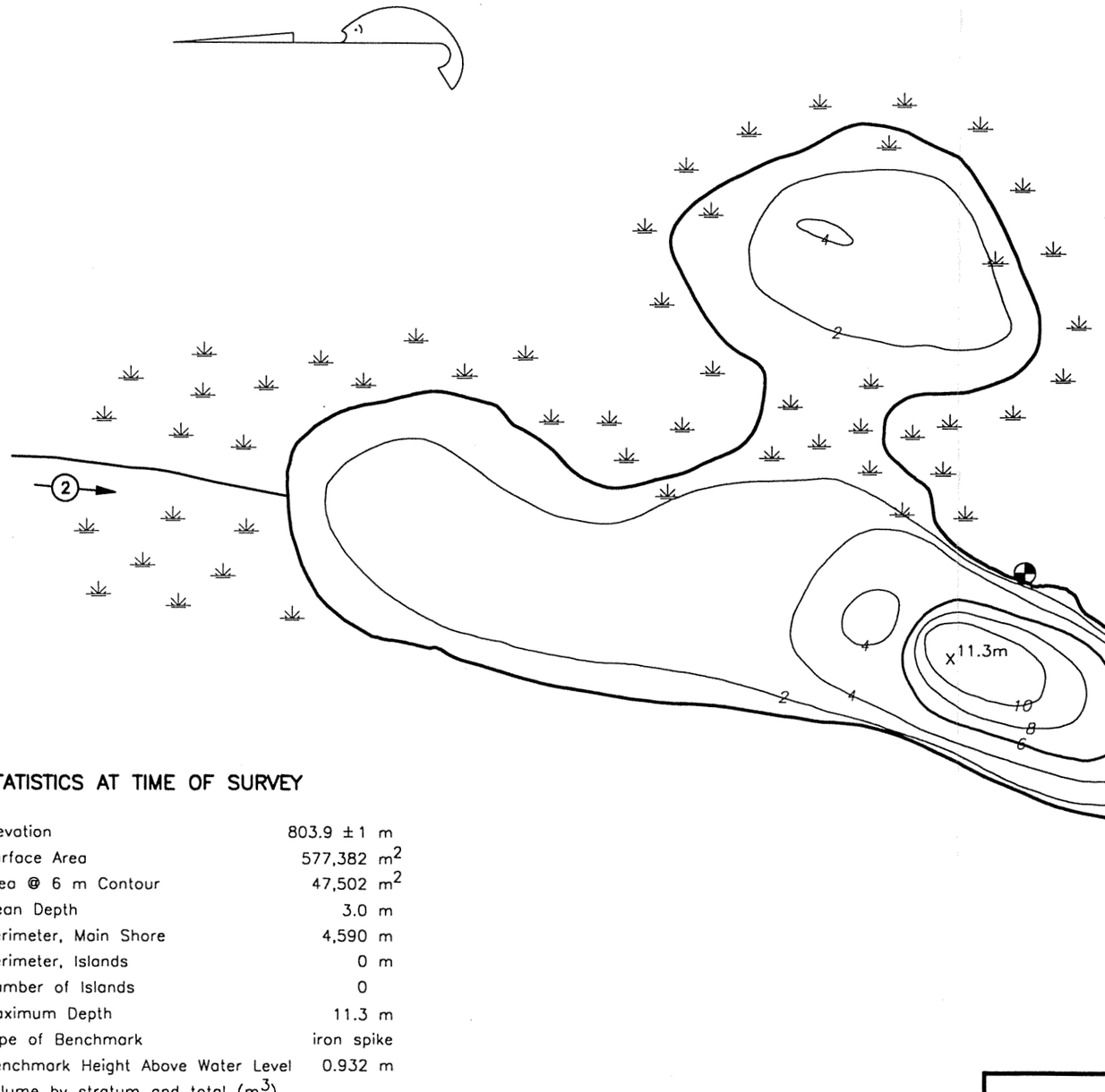
CLIENT

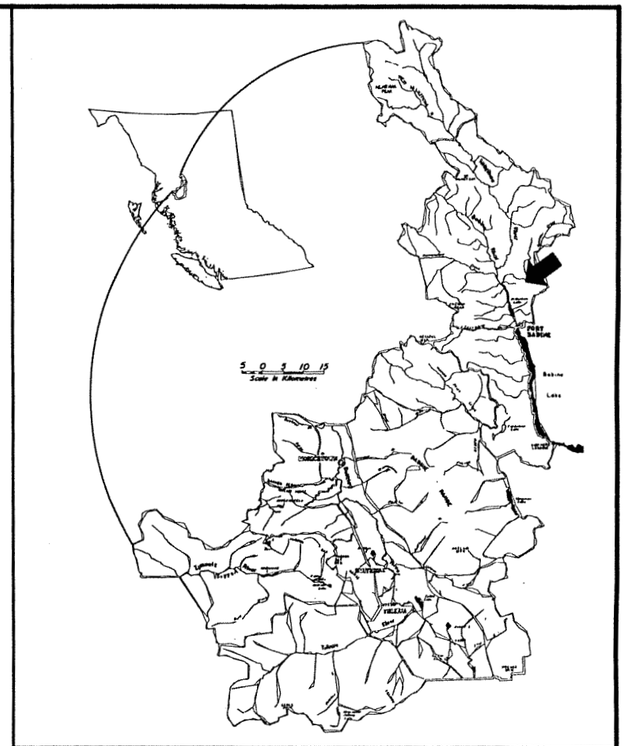
Fisheries Branch
Ministry of Environment, Lands, and Parks

PROJECT
RECONNAISSANCE INVENTORY OF CLOTA LAKE

TITLE
CLOTA LAKE
BATHYMETRIC SURVEY TRANSECTS

DATE OF ISSUE	PROJECT No.	FIG. No.
MAR.19, 1997	PW7507 0105	FIGURE 2





LEGEND

- BENCHMARK
- 2 — BATHYMETRIC CONTOUR AND DEPTH (m)
- (1) → STREAM FLOW DIRECTION AND NUMBER
- BEAVER DAM

STATISTICS AT TIME OF SURVEY

Elevation	803.9 ± 1 m
Surface Area	577,382 m^2
Area @ 6 m Contour	47,502 m^2
Mean Depth	3.0 m
Perimeter, Main Shore	4,590 m
Perimeter, Islands	0 m
Number of Islands	0
Maximum Depth	11.3 m
Type of Benchmark	iron spike
Benchmark Height Above Water Level	0.932 m

Volume by stratum and total (m^3)

0– 2m	848,657
2– 4m	485,641
4– 6m	161,868
6– 8m	75,093
8–10m	41,038
10–max.depth	8,741
TOTAL	1,721,038

SCALE 1:7500

KLOHN-CRIPPEN

CLIENT: Fisheries Branch, Ministry of Environment, Lands, and Parks

SURVEYED BY: G. SCARBOROUGH	SURVEY DATE: SEPT. 24, 1996	PLOT DATE: DEC. 1, 1996	NTS SHEET: 93L.07
LAKE OUTLINE SOURCE: GPS DATA		REVISION DATE: MAR. 19, 1997	PROJECT No.: PW7507 0105
METHOD OF PREPARATION: ADCADD CIVIL SURVEY SOFTWARE		APPROVED DATE:	FIG. No.: FIGURE 3

PROJECT: RECONNAISSANCE INVENTORY OF CLOTA LAKE

TITLE: CLOTA LAKE
BATHYMETRIC CONTOURS AND RELATED STATISTICS

WATERSHED CODE: 480–4026

UTM: 9.651187.6139961

Volume (by Stratum, and Total):

Stratum	Volume (m^3)
0-2	848,675
2-4	485,641
4-6	161,868
6-8	75,093
8-10	41,038
10-12 max. depth	8,741
Total	1,721,038

4.2 Benchmark

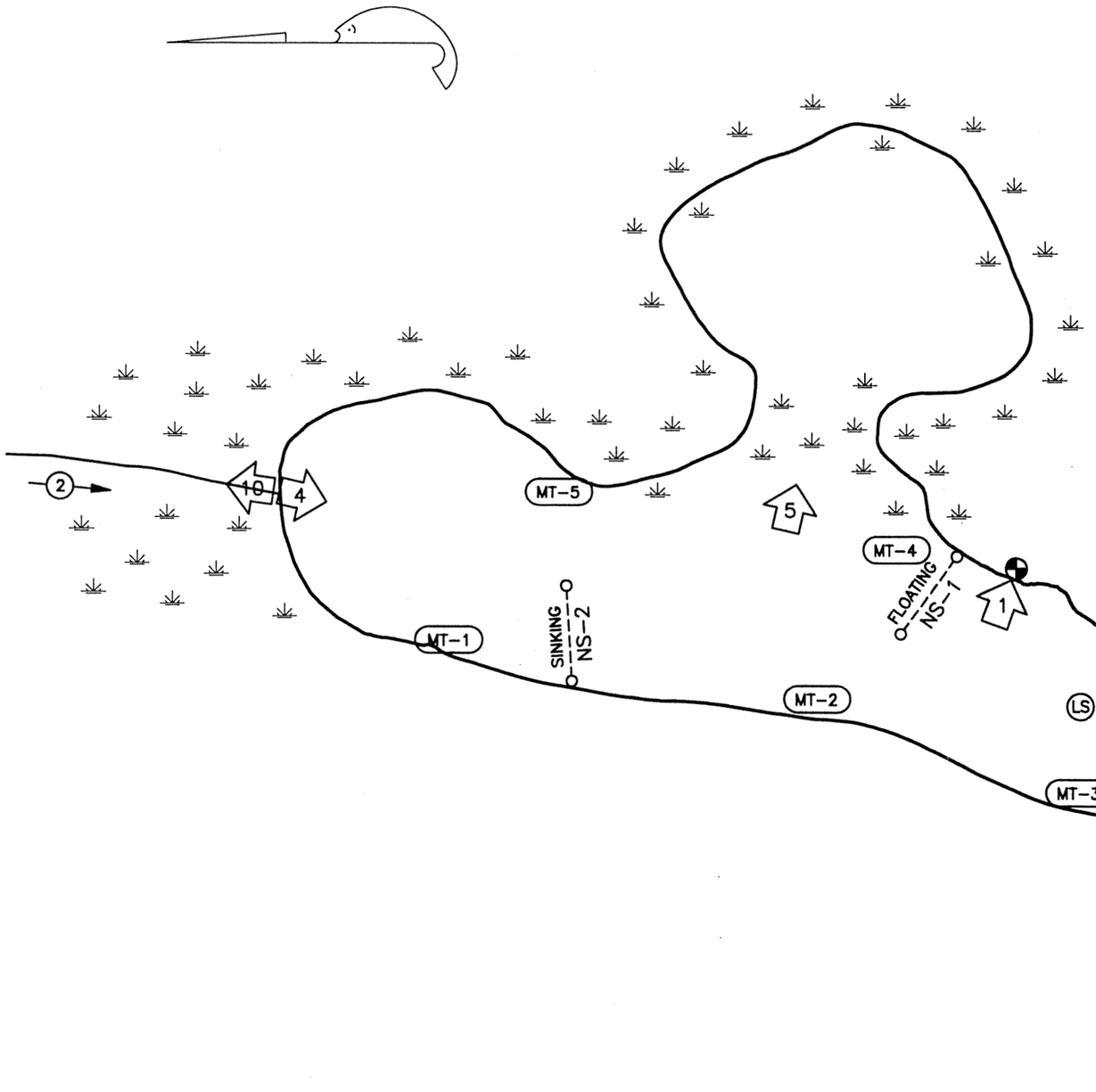
The benchmark in Clota Lake was indicated by an iron spike driven 93.2 cm above the water surface into the base of a small pine tree emerging from bedrock near the lakeshore southwest of the lake's small sub-basin. The spike itself is marked by fluorescent orange flagging tape, as is the surrounding area, for easy re-location (Plate 1). The coordinates for the benchmark, as recorded in the field by GPS, are 9.651606.6140218 (NAD83). The location of the benchmark in relation to the lake is indicated in Figure 4. Figure 5 shows an air photo enlargement of Clota Lake plus the benchmark's location.

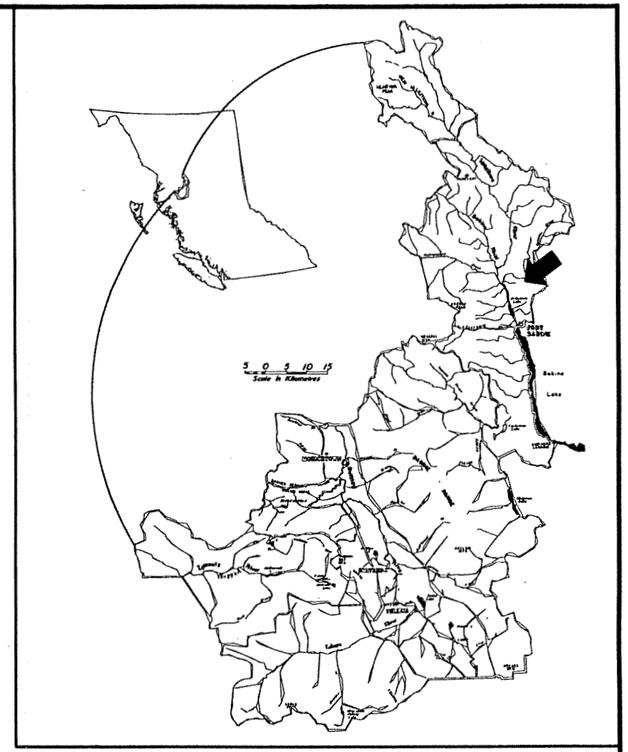
The high water mark for this lake could not be determined at the time of this survey suggesting that the lake was at its highest level. A large beaver dam at the lake's outlet appeared well established and held water to it's maximum height, further suggesting that the lake was at its highest level at the time of this survey.

4.3 Terrain Features

4.3.1 Immediate Shoreline

Only the western shore of Clota Lake is forested with pine and spruce trees consistently to the shoreline. The remainder of the lake perimeter is mostly encircled by marsh and grasses, especially the area around the inflow where a large marsh exists (Plate 2) between the main basin and sub-basin, and around the entire perimeter of the sub-basin. Tree fall is also prevalent along the lake's western shore where a rocky substrate and cover provided by the treefall combines to provide good fish habitat. Plates 3, 4 and 5 provide panoramic views of Clota Lake from its south end, north end and center looking east, respectively.





LEGEND

- BENCHMARK
- BEAVER DAM
- 1 — PLATE NUMBER AND DIRECTION
- (1) — SURVEY SITE LOCATION AND NUMBER
- NS–1 — NETTING SITE LOCATION AND NUMBER
- (LS) — LIMNOLOGICAL STATION LOCATION
- MT–1 — MINNOW TRAP LOCATION AND NUMBER
- (1)→ — STREAM FLOW DIRECTION AND NUMBER

SCALE 1:7500

KLOHN-CRIPPEN

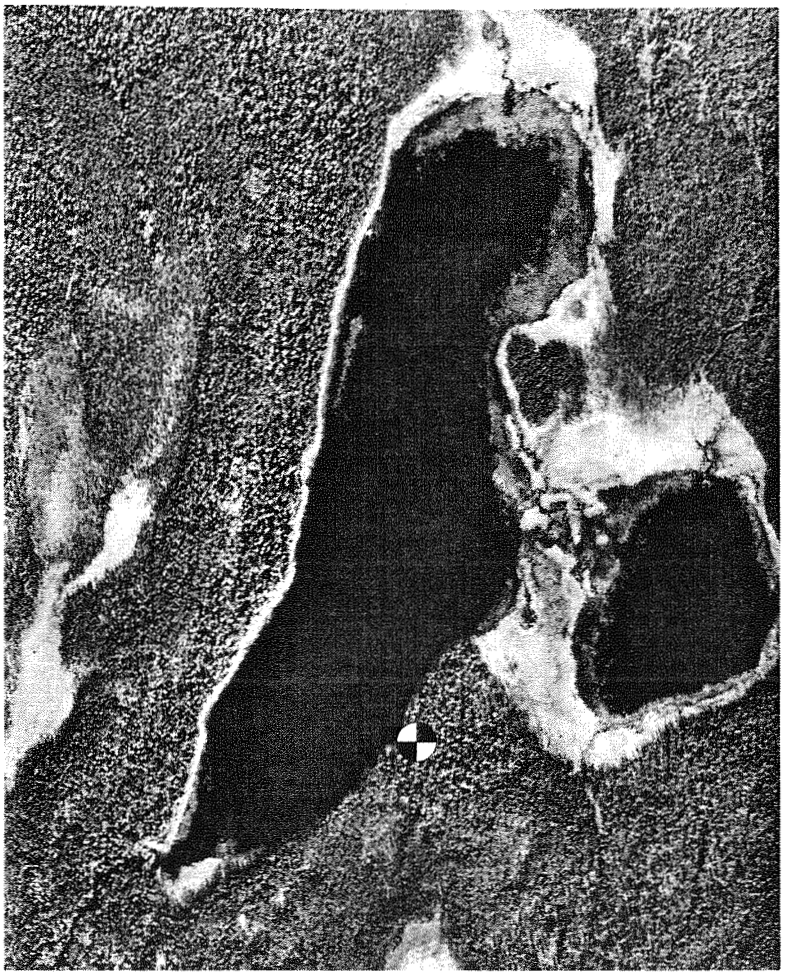
CLIENT

Fisheries Branch
Ministry of Environment,
Lands, and Parks

PROJECT
RECONNAISSANCE INVENTORY OF CLOTA LAKE

TITLE
CLOTA LAKE
LOCATION OF LAKE SURVEY SITES

DATE OF ISSUE	PROJECT No.	FIG. No.
MAR.19, 1997	PW7507 0105	FIGURE 4



KLOHN-CRIPPEN

PROJECT: Reconnaissance Inventory of Clota Lake(Watershed Code: 480-4026)

TITLE: Air photograph enlargement (#30BCB92119 NO.106 - 143%) showing Clota Lake and the benchmark's location

CLIENT: Province of British Columbia — Ministry of Environment, Lands & Parks

DATE OF ISSUE	PROJECT No.	DWG No.	REV.
March 19, 1997	PW 7507 0105	Fig. 5	G.S.

APPROVED

Plate 1 View of benchmark. (Roll #6, Negative #22)

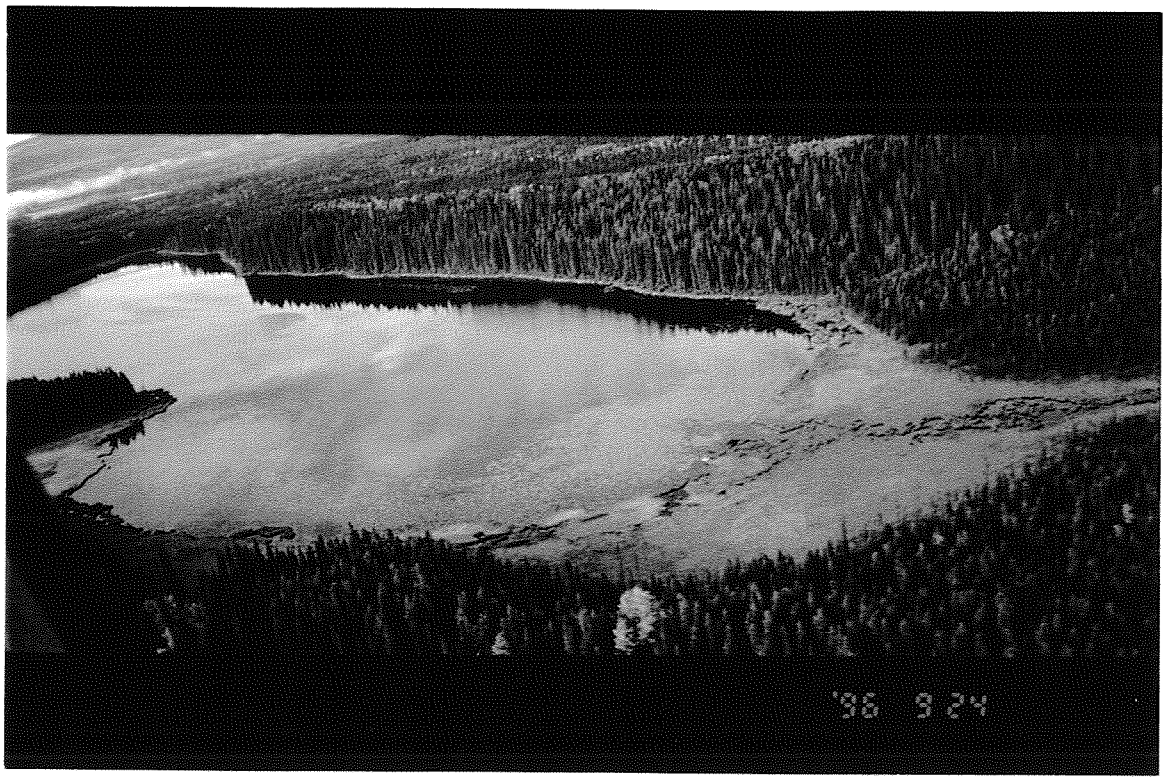


Plate 2 View of western half of Clota Lake looking south from float plane. (Roll #6, Negative #5)

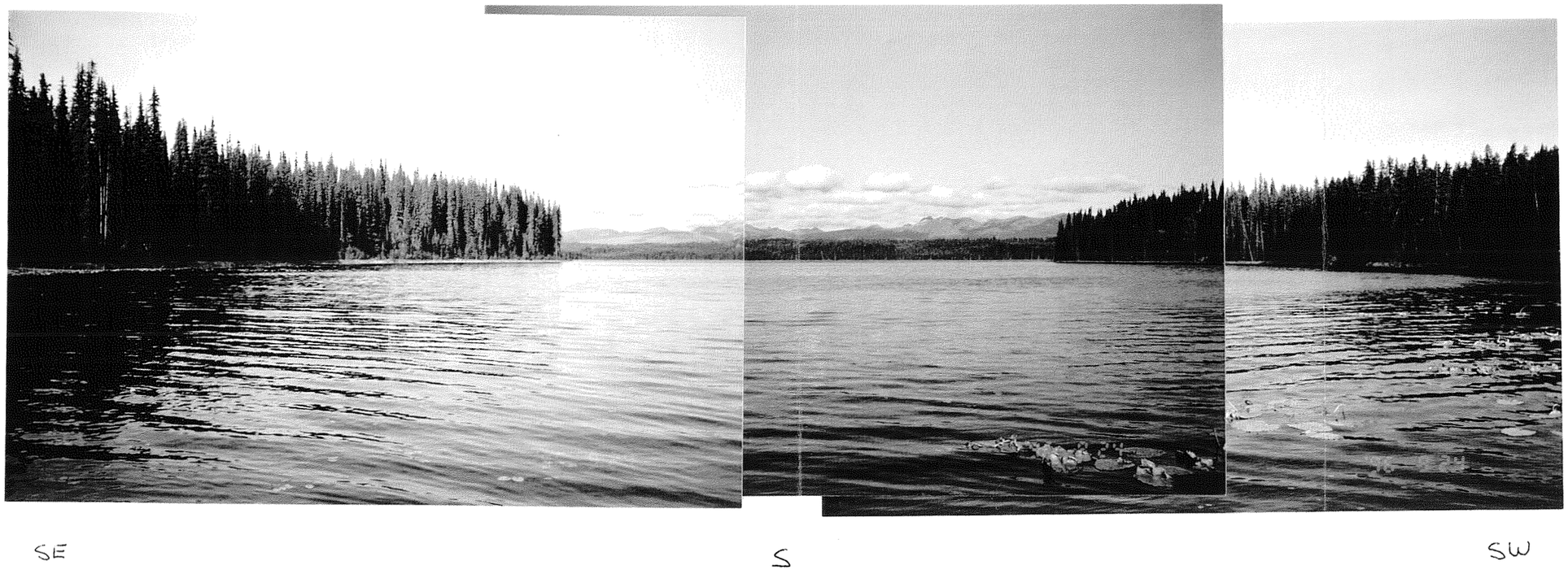


Plate 3 - Panoramic view of Clota Lake from lake's south end. Approximate compass headings are shown below picture. (Roll #6, Negatives #23-25)

PW 7507 0105
961223 COTA

E SE S

SW W

Plate 4 - Panoramic views of Clota Lake from lake's north end. Approximate compass headings are shown below the pictures. (Roll #6, Negatives #27-31)

PW 7507 0105
961223 CLOTA

Plate 5 Panoramic view of marsh area between main body of Clota Lake and sub-basin located to the east. (Roll #6, Negatives 14 and 15)

4.3.2 Surrounding Terrain

Clota Lake is located in a very broad flat area east of Nilkitwa Lake. Drainage in this area is poor and many small lakes and ponds dominate the landscape (Plate 2). Many of the smaller water bodies in this area are also in very advanced successional stages suggesting that the entire area is dominated by a peat bog ecosystem. Logging roads are also being extended into this area and machinery was often heard while the survey was being conducted.

4.4 Stream Surveys

Streams were surveyed using standard Department of Fisheries and Oceans (DFO)/Ministry of Environment, Lands and Parks (MoELP) stream survey methodology as outlined in Anonymous (1995a). A DFO/MoELP stream card was filled out for the outflow of Clota Lake but a large marsh prevented access to the inflow so a stream card was not completed here. A Xerox copy of the competed stream card is included in Appendix I. Data from this stream card was also entered into the DFO/MoELP stream survey digital data entry tool that produced a stream card summary report included in Appendix I.

Stream #1 (Watershed Code 460-4026)

Stream #1 is the single obvious outlet of Clota Lake. This stream flows over a large 1.3 metre high beaver dam located immediately at the lake outlet (Plate 6). This dam appeared to be fairly old and contained many pieces of wood that were dry and rotting. A second 0.6 metre high beaver dam was located 12 metre downstream of the first emphasizing the high degree of influence beaver have on both the lake and its outlet. After passing the second beaver dam, this stream passes through a broad, bouldery channel with very low flow. The width of this channel suggests that at one time, the stream possessed a significant discharge but (probably) due to the beaver dam, discharge has since been reduced. The channel width averaged 4.4 metre at the survey site and the stream habitat here was dominated by larger. Boulders and overstream vegetation provided more than half of the available cover in this stream. Only 180 metres of this stream was surveyed. Plates 7, 8 and 9 provide views of the habitat in stream #1.

Electrofishing was also conducted in this stream but no fish were captured.

Stream #2 (Watershed Code unknown) -4026-679

Steam #2 is one of the inlets into Clota Lake. This stream enters the lake through a broad marsh that was not navigable by either boat or on foot (Plate 10). Therefore, a stream card was not completed here.

4.5 Previous Surveys

The only existing data directly relevant to this lake come from the Fisheries Information Summary System (FISS) database which indicated that Clota Lake has an area of 50.8 ha and an elevation of 713 metres. These data differ from the field data determined by GPS which provided a lake elevation of 803.9 ± 1 metre and surface area of 577,382 m^2 or 57.7 ha.

Plate 6 View of beaver dam in Clota Lake outlet. (Roll #6, Negative #18)

Plate 7 View looking downstream from upstream limit of outlet sample site. (Roll #6, Negative #19)

Plate 8. View looking upstream from downstream limit of outlet sample site. (Roll #6, Negative #20).

Plate 9 Example of habitat in outlet sample site. (Roll #6, Negative #21)

Plate 10 View of inlet and extensive marsh area through which it passes. (Roll #6, Negative #17)

Plate 11 View of littoral area and minnow trap Sample Site #4. (Role #6, Negative #13)

5. LAKE ACCESS AND AREA DEVELOPMENT

5.1 Access and Directions

There is no road or trail access directly to Clota Lake but logging road construction was occurring to the west, so future road/trail access might be possible. Access to the lake for this study was via floatplane chartered from Smithers. The floatplane base is located on Tyhee Lake, approximately 10 km southeast of Smithers. The airbase was accessed by driving south from Smithers on Highway 16 for 8 km, turning left onto the Old Babine Lake road and following this for 2 km, then turning right onto the Telkwa High Road and following this for 2 km prior to tuning left onto the Seaplane Base Road, which is only about 400 metres long and leads directly to the seaplane base. From Tyhee Lake, Clota Lake is 59.1 km and a 30 minute flight north by north east of Tyhee Lake.

5.2 Road Type and Conditions

Highway 16 is entirely paved but all other roads to the seaplane base are gravel. All roads are suitable for two-wheel drive vehicles.

5.3 Restrictions

There are no known aircraft restrictions applicable to Clota Lake.

5.4 Resorts and Campsites

None is known.

5.5 Mining Claims

None is known.

5.6 Timber Harvests

Forest cover maps do not indicate any logging around Clota Lake although, as mentioned above, logging roads were being constructed at the time of this survey so timber harvesting will likely occur here in the near future. Forest development plan maps indicate that logging is scheduled for an area southeast of the lake in1998.

5.7 Waste Permits

None is known (Remington and Lough 1995).

5.8 Water Licenses

None is known (Remington and Lough 1995).

6. FLORA AND FAUNA

6.1 Aquatic Plants

Clota Lake had an abundance of aquatic plants, both emergent and submerged. Some areas were so clustered with vegetation at the time of the survey, that boat navigation was impossible. Aquatic plants were identified in the field to genus with the aid of Prescott (1969) and Warrington (1994) and their distribution throughout the lake was recorded. Figure 6 summarizes the distribution of the three aquatic plants recorded in Clota Lake; lilly (*Nuphar sp.*), *Potamogeton sp.*, and *Polygonum sp.*

6.2 Aquatic Invertebrates

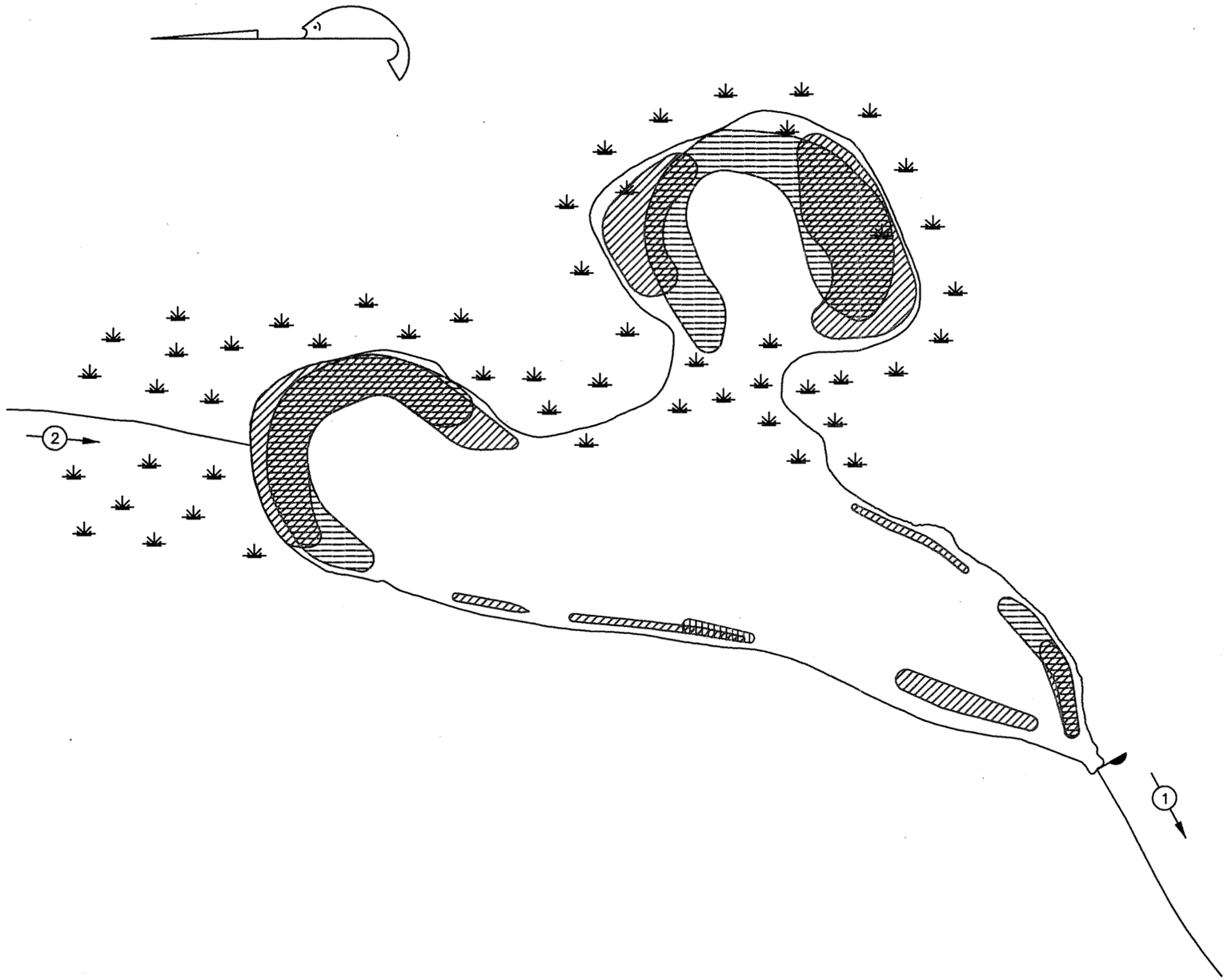
Aquatic invertebrates were not observed in this lake.

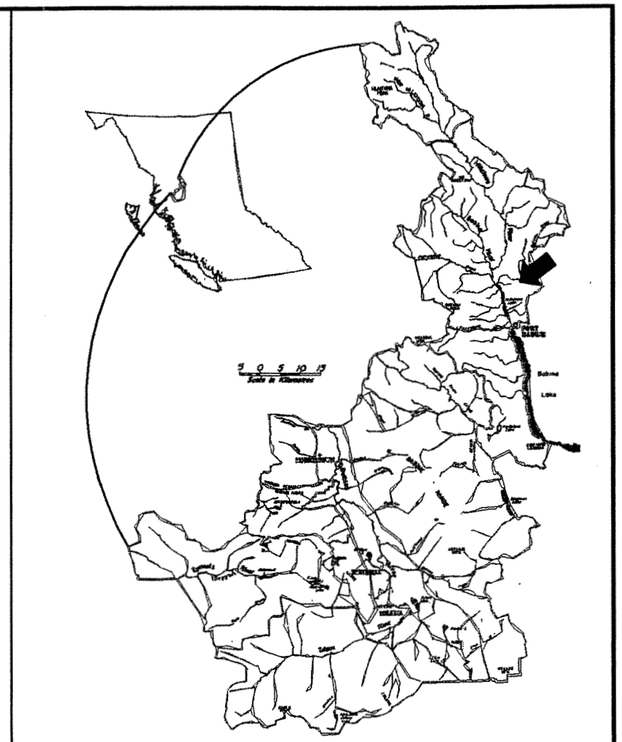
6.3 Wildlife Observations

Wildlife observed in and around Clota lake included moose, beaver, black bear, loon and other migratory waterfowl.

6.4 Summary of Rare and Endangered Species

Rare or endangered species were not encountered in or around Clota Lake.





LEGEND

- ① → STREAM FLOW DIRECTION AND NUMBER
- BEAVER DAM
- *Nuphar sp.*
- *Potamogeton sp.*
- *Polygonum sp.*

SCALE 1:7500

KLOHN-CRIPPEN

CLIENT

Fisheries Branch
Ministry of Environment,
Lands, and Parks

PROJECT
RECONNAISSANCE INVENTORY OF CLOTA LAKE

TITLE
CLOTA LAKE
DISTRIBUTION OF AQUATIC PLANT COMMUNITIES

DATE OF ISSUE	PROJECT No.	FIG. No.
MAR.19, 1997	PW7507 0105	FIGURE 6

7. FISH POPULATION SAMPLING

7.1 Total Fish Catch Summary

Clota Lake is dominated by non-sport fish species including northern squawfish (*Ptycheilus oregonesis*), longnose sucker (*Catostomus catostomus*) and redside shiner (*Richardsonius balteatus*). A single species of sport fish; cutthroat trout (*Oncorhynchus clarki*) is also found in this lake but is much less abundant than the non-salmonids. Overall, a total of 38 longnose suckers, 9 northern squawfish, 39 redside shiner and 2 cutthroat trout were captured in this lake. Both cutthroat trout were sampled for age analysis by scale removal and all captured fish (except for 6 redside shiners captured in minnow traps) were sexed, measured (fork length) and weighed. The netting gear and minnow traps sampled this lake for a total of 111 hours and 52 minutes resulting in maximum catch per unit effort values of 19.67 fish/100m^2/12 hour period and 3.1 fish/trap/12 hour period for gillnet and minor trap sampling gear, respectively.

Figure 7 shows the relationships between fork length and weight for each of the sampled non-sport fish species captured in this lake. The average Fulton's Condition Factor for longnose sucker was 1.19 (SD=0.11), 1.15 (SD=0.1) for northern squawfish and 1.18 (SD=0.23) for redside shiner. Figure 8 shows the relationship between fork length and weight for the two cutthroat trout captured in this study. This species has an average Fulton's Condition Factor of 1 (SD=0.04). Only one of the scales taken from the cutthroat trout could be aged so a length vs. age relationship could not be determined.

7.2 Netting Record

The gillnet sampling record for Clota Lake is shown in Table 1.

Table 1 Gillnet Summary

Site No.	Net Type	Date Set	Time Set	Depth (m)		Date Lifted	Time Lifted	Soak Time	CPUE
				Shallow	Deep				
1	floating	96/9/23	18:30	0-2	0-2	96/9/24	11:19	16:49	10.26
2	sinking	96/9/23	18:48	0-2	3-5	96/9/24	11:39	16:51	19.67

Notes:

- See Figure 4 for location of gillnet sample sites.
- See Figure 4 for location of gillnet sample sites.
- CPUE-#fish/100m^2/ 12- hour period.

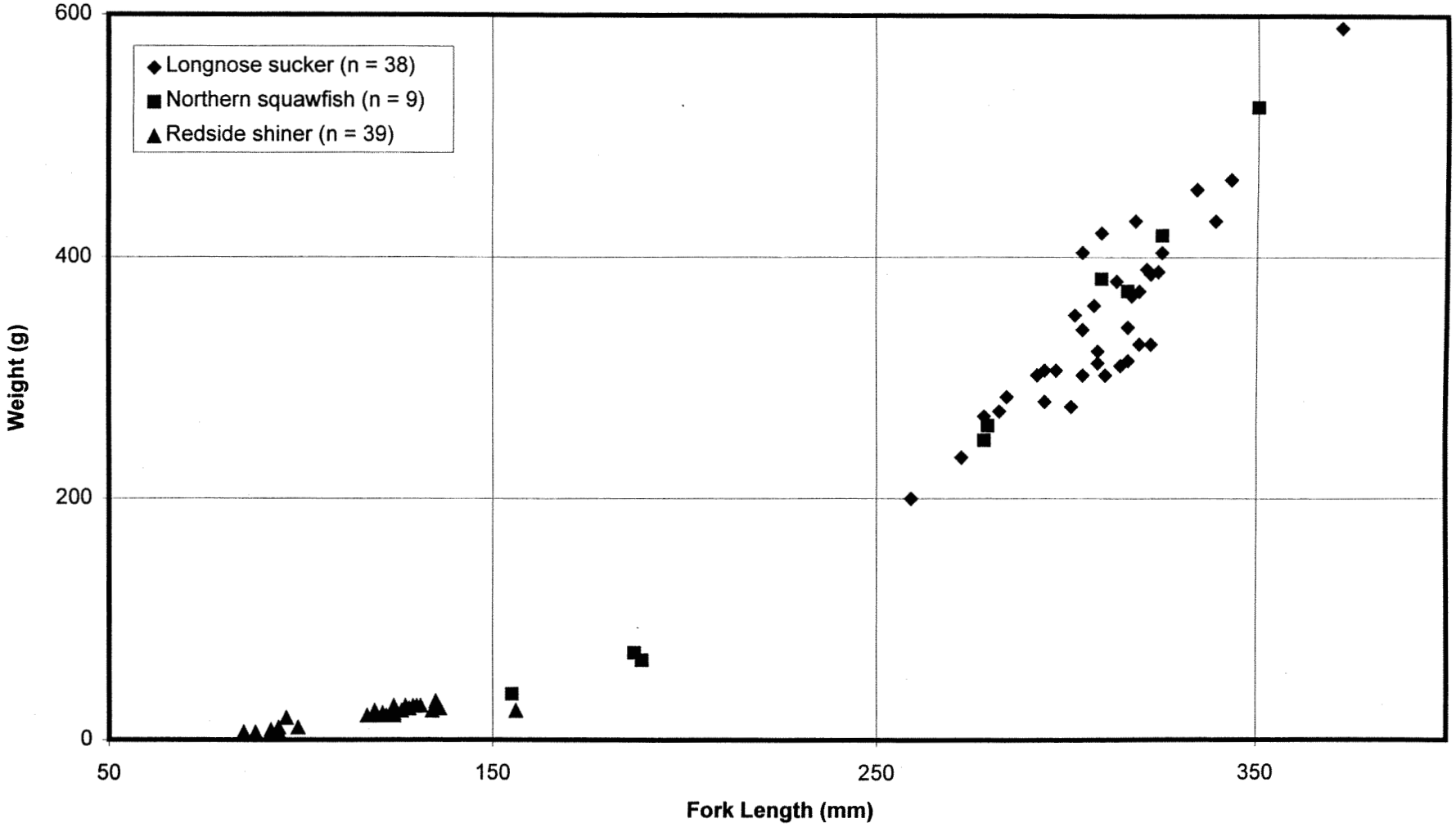


Figure 7 - Fork length versus weight for non-sport fish species.

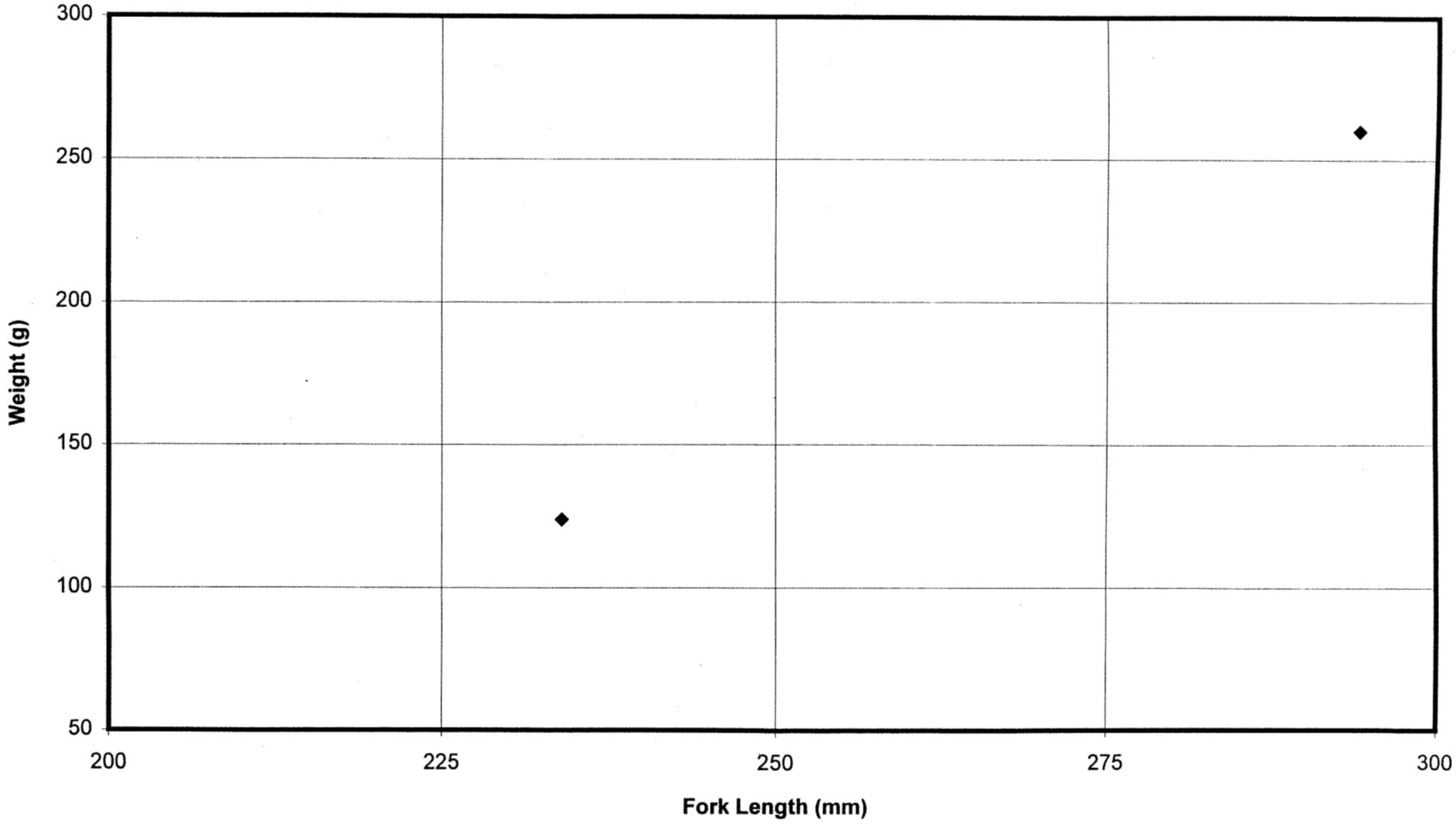


Figure 8 - Cutthroat trout fork length versus weight (n = 2). Fulton's Condition Factor = 1 (SD = 0.04).

7.3 Minnow Trap Record

The minnow trap sampling record for Clota Lake is shown in Table 2.

Table 2 Minnow Trap Summary

Site No.	Gee Trap No.	Date Set	Time Set	Depth (m)	Substrate	Date Lifted	Time Lifted	Soak Time	CPUE
3	1	96/9/23	18:10	0.5	LWD, silt	96/9/24	09:48	15:38	1.29
4	2	96/9/23	18:13	0.5	Silt, LWD	96/9/24	09:50	15:37	3.1
5	3	96/9/23	18:16	0.5	LWD	96/9/24	09:56	15:40	1.29
6	4	96/9/23	18:20	0.5	Silt, LWD	96/9/24	09:58	15:38	0.0
7	5	96/9/23	18:23	0.5	LWD	96/9/24	10:02	15:39	0.0

Notes:
- See Figure 4 for location of minnow trap sample sites.
- LWD - large woody debris
- CPUE - #fish/trap/12 hr period.

7.4 Set Line Record

A set line was not placed in this lake so no data is available.

7.5 Individual Fish Data

Individual fish sampling data are shown in Tables 3 and 4 while the fish collection data form is shown in Appendix I.

Table 3 Individual Fish Data

Site No.	Species Code	Fork Length (cm)	Weight (g)	Scale Sample No.	Sex	Age	Samples Taken
1	CT	294	260	e223700-01	M	R	SC
1	CT	234	124	e223700-02	M	1+	SC

Notes:
- See Figure 4 for location of sample sites.
- CT - cutthroat trout (*Oncorhynchus clarki).*
- F - female; M - male; SC - scale sample; R - regenerate scale that could not be aged.

Table 4 Individual Fish Data, Site, Species, Fork Length and Weight Only.

Site No.	Species Code	Fork Length (mm)	Weight (g)	Sex	Site No.	Species Code	Fork Length (mm)	Weight (g)	Sex	Site No.	Species Code	Fork Length (mm)	Weight (g)	Sex
1	NSC	325	418	F	2	LSU	278	268	F	2	LSU	316	314	M
1	NSC	279	260	M	2	LSU	322	386	M	2	LSU	325	404	F
1	NSC	278	248	M	2	LSU	310	302	M	2	NSC	309	382	F
1	NSC	187	72	F	2	LSU	304	302	F	2	NSC	316	372	F
1	NSC	189	66	M	2	LSU	343	464	M	2	NSC	350	524	F
1	NSC	155	38	M	2	LSU	339	430	F	2	RSC	128	26	F
1	RSC	121	22	F	2	LSU	307	360	F	2	RSC	119	20	F
1	RSC	124	28	M	2	LSU	297	306	F	2	RSC	88	6	M
1	RSC	119	24	M	2	LSU	316	342	M	2	RSC	129	28	F
1	RSC	131	28	F	2	LSU	259	200	M	2	RSC	85	6	M
1	RSC	127	28	M	2	LSU	284	284	F	2	RSC	122	20	M
1	RSC	117	20	F	2	LSU	272	234	M	2	RSC	92	8	F
1	RSC	119	20	F	2	LSU	308	322	M	2	RSC	94	10	F
1	RSC	129	28	M	2	LSU	282	272	F	2	RSC	128	26	M
1	RSC	135	32	M	2	LSU	317	368	F	2	RSC	130	28	M
1	RSC	134	24	M	2	LSU	322	328	M	2	RSC	96	18	F
1	RSC	124	20	M	2	LSU	294	280	F	2	RSC	99	10	M
1	RSC	121	20	F	2	LSU	383	248	M	2	RSC	94	6	F
1	RSC	119	20	M	2	LSU	318	430	F	2	LSU	314	310	M
1	RSC	126	24	F	2	LSU	321	390	M	2	LSU	319	328	F
1	RSC	156	24	F	2	LSU	372	590	M	2	LSU	304	340	M
1	RSC	121	22	F	2	LSU	302	352	M	2	LSU	313	380	M
1	RSC	119	20	M	2	LSU	319	372	M	2	LSU	368	216	F
1	RSC	136	26	F	2	LSU	334	456	M	2	LSU	308	312	F
1	RSC	124	22	M	2	LSU	304	404	M	2	LSU	301	276	M
1	RSC	124	24	M	2	LSU	292	302	F	2	LSU	324	388	F
2	LSU	309	420	F	2	LSU	294	306	M					

Notes:

- See Figure 4 for location of sample sites
- NSC - northern squawfish (*Ptycheilus oregonensis*), RSC - redside shiner (*Richardsonius balteatus*) and LSU - longnose sucker (*Catastomus catastomus*)
- F - female, M - male.

7.6 Electrofishing Record

Electrofishing effort in Clota Lake's outlet was 109 seconds applied through 400 V. Approximately 75% of this effort was expended on pool habitat. Despite this sampling effort, fish were net captured in the lake outlet.

7.7 Fisheries Management Concerns

This survey indicated an abundance of non-sport fish and only two cutthroat trout. Although the cutthroat trout captured here appeared healthy and of good condition, their relative low abundance suggests that the non-sport fish species might be outcompeting the trout and suppressing their numbers. Therefore, the dominance of competitive species in this lake should be taken into consideration if sport-fish stocking is planned for the future.

Access to this lake at the time of this survey was by air only which limits recreation and angling potential. However, logging roads are being built in the area so road/trail access might be possible in the future presenting potential access management concerns. The presence of an anoxic hypalimnion and the lack of both a significant sport fish population and interesting viewscapes, however, suggest that this lake in its current status will not be a popular recreation site.

7.8 Catch Analysis - Fork Length Frequency Distribution

The frequency distribution of fish fork length groupings for all fish measured in this inventory is shown in Figure 9. These fork length range groupings were selected based on those used by Hamley (1972, cited in Anon. 1995a) who determined the average size of whitefish caught in various gillnet mesh sizes. The RIC Standards for experimental gillnet gangs are based on this research.

The gillnets Klohn-Crippen employed in this inventory did not have the mesh panels that select for fish in approximately the 179-228 mm and 281-345 mm fork length ranges as suggested by Hamley (1972 op. cit.). These fish groupings are apparently best captured by mesh sizes of 54 and 76 mm, respectively. Figure 9 suggests that the fish in the 179-228 mm range are under-represented but this figure also indicates that the 281-345 mm range group represents the largest proportion (45%) of the total fish catch. However, since the catch from Clota Lake consisted mostly of redside shiner and longrose sucker, Figure 9 is representative of a binodal distribution in fork lengths that would be expected from these two species. The data suggest that size selection bias due to the absence of the 54 and 76 mm gillnet panels probably did not occur. Additionally, the mesh sizes used in this study targeted the minimum, average and maximum sizes of fish and thus provided data to describe the entire fish population as a whole.

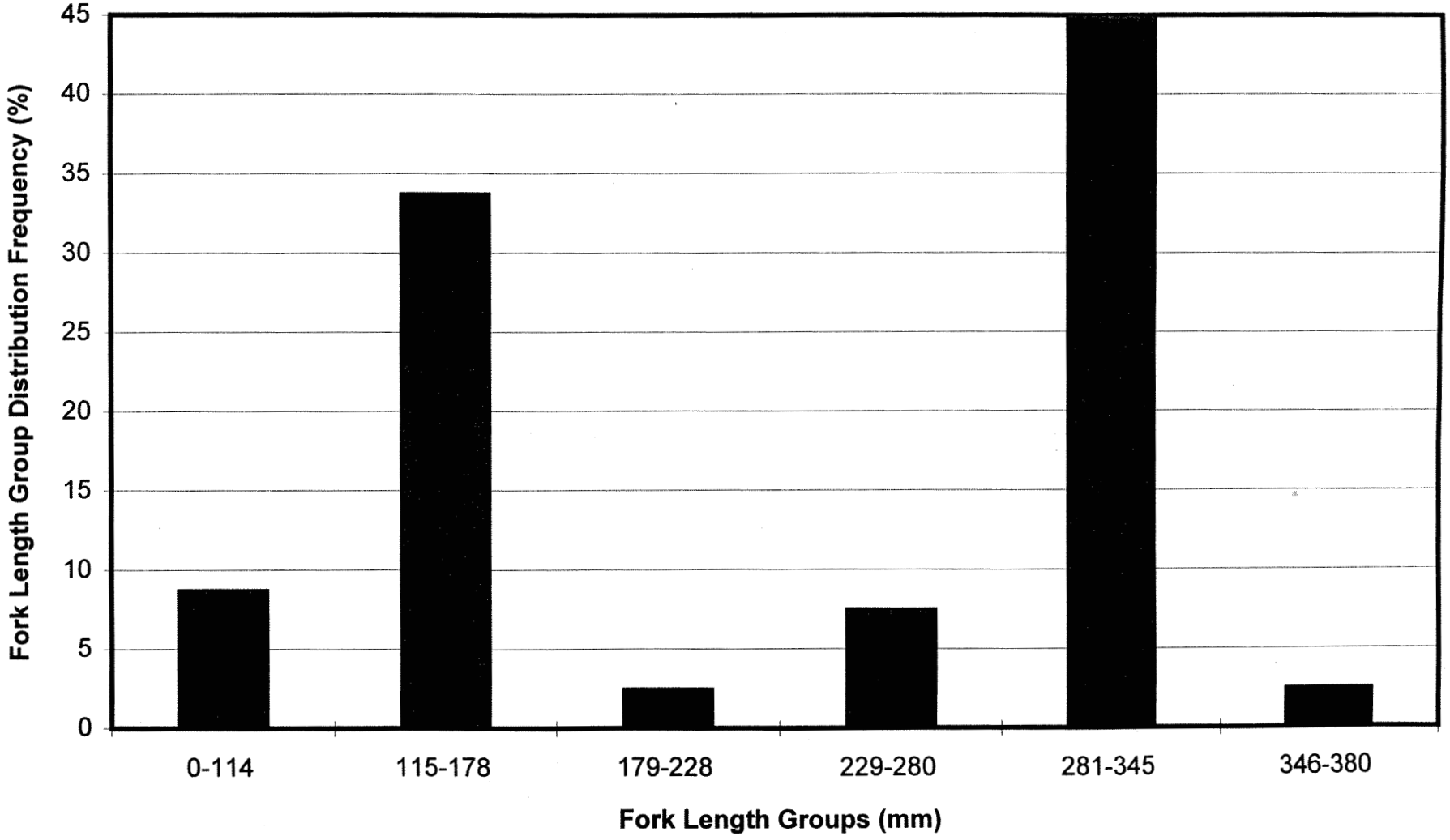


Figure 9 - Frequency distribution of fish fork length groupings (n = 80).

8. FIELD CONDITIONS AND WATER CHEMISTRY

The following is a summary of the limnological investigations of Clota Lake.

Date:	September 24, 1996	**Time:**	11:55
Limnology Station:	LS	**Maximum Depth:**	11.3 m
Seam Site:	e 223700	**Water Sampler Used:**	Van Dorn

Laboratories Used 1) Elemental Research Inc.: #309-267 West Esplanade, North Vancouver, British Columbia, V7M 1A5.
2) Klohn-Crippen in-house laboratory
3) Chlorophyll *a* and Total Kjeldahl Nitrogen were measured by the CAEAL certified laboratory: Analytical Services Laboratories Ltd., 1988 Triumph St., Vancouver, British Columbia, V5L 1K5.

8.1 Field Conditions

The limnology of Clota Lake was investigated on a coal, clear day. Table 5 summarizes the field conditions at the time of the limnological survey.

Table 5 Field Conditions

Parameter Measured	Result	Method Used
Wind Velocity (m/s)	10	Estimation
Wind Direction	S	Observation
Air Temperature (°C)	7°C	Glass thermometer
Cloud Cover	10%	Observation
Surface Condition	small ripples	Observation
Water Colour	brown	Observation
Water Clarity (m)	1.6	Secchi Disk

8.2 Water Chemistry

Water samples were removed from Clota Lake at depths of 0.5 and 10 metres. The latter depth occurred within the hypolimnion at the time of this survey. Table 6 presents a summary of the water chemistry findings from the two samples depths while Table 7 presents a summary of the water nutrient data for the two sample depths. Appendix III contains laboratory summary reports of the water quality analysis for Clota Lake.

Table 6 Water Chemistry Summary

Parameter Measured	Result (0.5 m)	Result (10 m)	Method Used
Dissolved Oxygen (mg/L)	10.5	0.50	YSI model 57 O_2 meter
Water Temperature (°C)	11.0	6.5	YSI model 57 O_2 meter
pH (field)	8.4	7.9	Oakpon pH tester-2
Specific Conductance (µS/cm)	40	50	Oakpon TDS tester
Chlorophyll *a* (mg/m^3)	1.87	2.51	See Section 3
Filterable Residue(ppm)	<1	4	See Section 3
Dissolved Sodium (ppb)	1587	1590	See Section 3
Dissolved Magnesium (ppb)	1330	3760	See Section 3
Calcium (ppb)	3390	3760	See Section 3
Alkalinity (mg/L)	20.27	25.52	See Section 3
TDS (mg/L)	103.33	108.99	See Section 3

8.3 Water Nutrient Summary

Table 7 Summary of Available Phosphorus and Nitrogen

Parameter Measured	Result (0.5 m)	Result (10 m)	Method Used
NH_3 (mg/L)	0.21	0.17	See Section 3
Total Dissolved Phosphorus (ppm)	0.08	0.12	See Section 3
Total Phosphorus (ppm)	0.09	0.21	See Section 3
Total Kjeldahl Nitrogen (ppm)	0.460	0.655	See Section 3
N:P Ratio	5.1	3.1	Average = 4.1

Notes:

- N:P ratio determined as: $\frac{\text{Total Kjeldahl Nitrogen}}{\text{Total Phosphorus}}$

The total phosphorus (TP) data for this lake (see Appendix III) suggest that it has a hypereutrophic classification (Wetzel 1983). However, the lake was not very green as most hypereutrophic lakes are and the N:P ratio indicates that algal production in the lake is not limited by the availability of phosphorus (i.e., N:P < 15) suggesting that perhaps TP is not a very useful tool for classifying this lake. Furthermore, the lake was a dark brown color with very abundant littoral zone vegetation. This suggests that rooted vegetation, not pelagic algae, are the dominant productive plants in this lake and also suggests that the lake could be classified as dystrophic (Wetzel 1983). However, this lake remains difficult to classify because although its water colour, algal abundance and littoral vegetation suggest dystrophy, this classification of lakes normally has a low pH which was not the

case for Clota Lake (pH = 8.4-7.9). Therefore, the most appropriate classification for this lake will require further investigation.

8.4 Dissolved Oxygen and Temperature Data

Dissolved oxygen concentration and temperature were determined at 1 metre intervals from a vertical profile below the limnological station in Clota Lake on September 24, 1996. The data from this survey are listed in Table 8 and displayed in Figure 10. This figure suggests that the hypolimnion of Clota Lake, which probably occurs below 5 metres, is anoxic but not very cold. The surface water of this lake is also quite warm which is not surprising given its very dark brown color.

Table 8 Dissolved Oxygen Concentration and Temperature Data

Depth (m)	Dissolved Oxygen (ppm)	Temperature (°C)
0	10.05	11.0
1	9.79	10.5
2	9.21	10.0
3	9.07	9.8
4	6.40	9.7
5	1.97	9.5
6	1.44	8.6
7	0.72	7.3
8	0.55	6.8
9	0.50	6.6
10	0.50	6.5

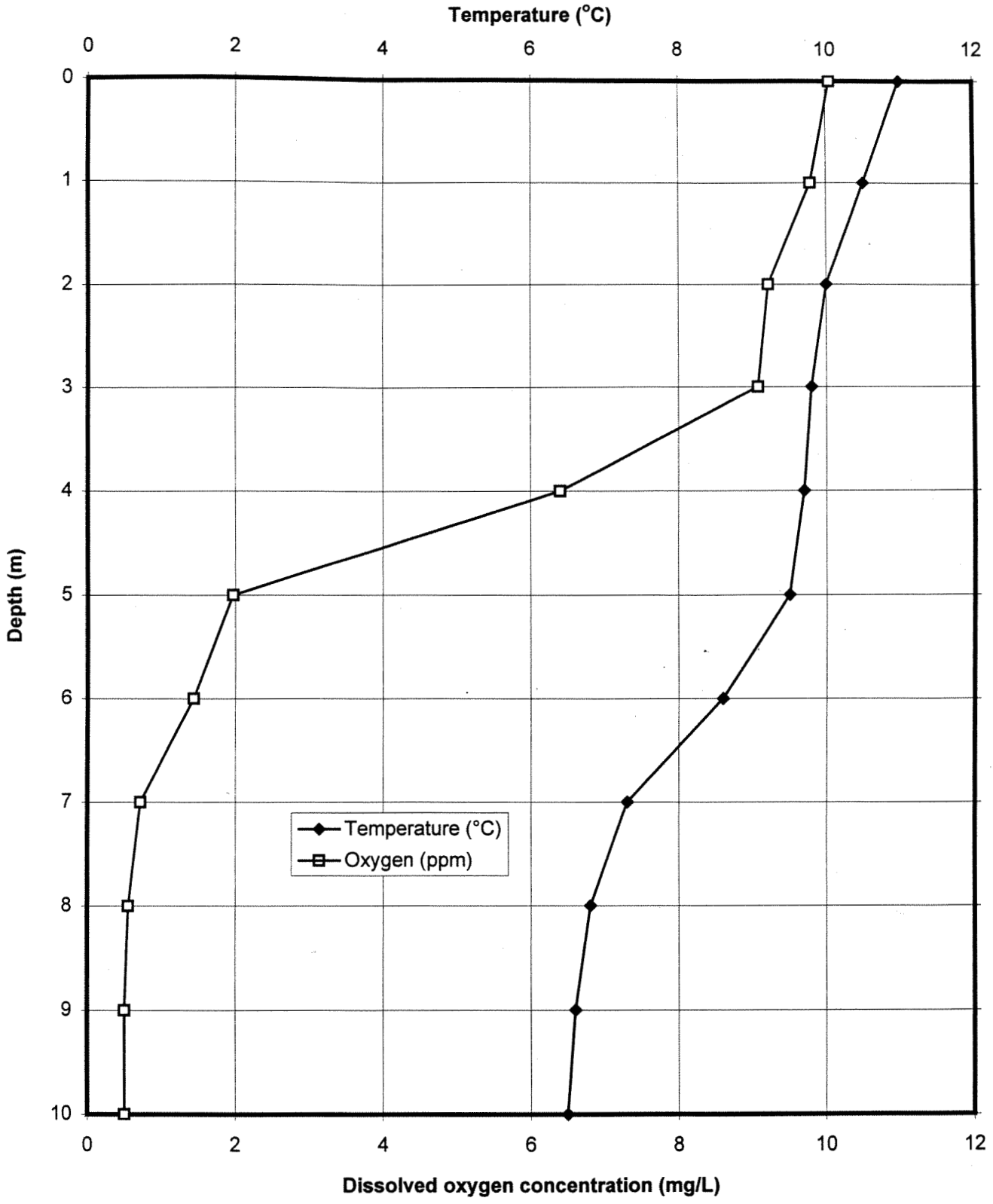


Figure 10 - Dissolved Oxygen and Temperature Profiles.

9. SUMMARY AND RECOMMENDATIONS

Clota lake is located east of Nilkitkwa Lake, approximately 6.6 km north of Fort Babine. The lake lies in a broad, flat basin with poor drainage and possesses abundant rooted vegetation at its northern and eastern ends. The lake also has a large sub-basin extending from the central eastern side of the main lake. This sub-basin is almost completely isolated from the main basin by dense growths of rooted vegetation and peat mats. The maximum depth in this lake is 11.3 metres with mean depths and volumes of 3.0 metres and 1,721,038m^3, respectively. There are no shoal areas that would present a hazard to navigation.

This lake is dominated by three species of non-sport fish; longnose sucker, redside shiner and northern squawfish. Only 2 cutthroat trout were captured in this lake. Clota lake's water chemistry is suitable for fish (Anon. 1996b) but dissolved oxygen only remained suitable for salmonids above 6 metres and the lake's hypolimnion was anoxic at the time of this survey.

Access to Clota Lake was by float plane only at the time of this survey but logging roads in the immediate vicinity were under construction suggesting that road access might be possible in the future. However, since this lake is dominated by non-sport fish and does not have any particularly fascinating viewscapes, its recreational potential is low.

KLOHN-CRIPPEN CONSULTANTS LTD.

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APPENDIX I

Stream Card Survey Information, Fish Collection Data Form and Lake Biophysical Data Form

FISH SUMMARY

C	Species	No.	Size Range (mm)	Life Phase	Use	Method/Ref.
	No Fish					

STREAM/VALLEY CROSS-SECTION (Looking Downstream) ☐ L R

PLANIMETRIC VIEW ☐

COMMENTS

Channel Stability ☐ Debris ☐ Management Concerns ☐ Obstructions X Riparian Zone ☐ Valley Wall Processes ☐ Etc.

1 lake outlet ingress @ a 1.25 m high beaver dam → see photo with a second beaver dam 12 m below this (height only = 60 cm though)

* We only walked 50m because of time constraints and because the big beaver dam @ lake outlet is a barrier to fish & we don't have to survey past barriers → This site is a zero on the project

2 Air temp = 7.0°C @ 3:00 Beautiful sunny day with almost no cloud cover to contend with; measured in µS

3 Electrofishing effort 109 seconds @ 35.4 V

Edited by: GS

Date Y M D: 96 [illegible] 26

DFO/MOE
STREAM SURVEY FORM

Stream Name (gaz.)		(local) Clota Lake outflow				Access	H	Method	
Watershed Code	480402600			Reach No.	1	Length (km)			
Location	Clota L outflow	Map #	93M.7	Site No.	1	Lth surv (m)	180	T	
		UTM	9.651187.6139961	Fish Card	Y (N)		Field X	Hist. ☐	
Date Y M D	960924	Time	12:40	Agency	KC	Crew	GS / JC	Photos #	6/18-21
Air Photos	30 BCB 92119 #100								

C	PARAMETER	VALUE	METH.	SPECIFIC DATA
	Ave. Chan. Width (m)	4.4	T	4.2, 3.8, 6.1, 3.3, 3.6, 5.2
	Ave. Wet. Width (m)	3.0	T	1.3, 1.2, 1.8, 2.1, 2.1, 3.6
	Ave. Max. Riffle Depth (cm)	10.8	MS	9, 14, 12, 9, 10, 11
	Ave. Max. Pool Depth (cm)	18.7	MS	19, 17, 19, 19, 17, 21
	Gradient %	2.0	CL	
	% Pool 25 Riffle 75 Run 0 Other 0		GE	
	Side Chan. % 5 (0 ☐ 0-10 X 10-40 ☐ >40 ☐)		GE	
	Debris Area % 25 (0 ☐ 0-5 ☐ 5-15 X >15 ☐)		GE	
	Stable %	80	GE	
	COVER: Total %	30	GE	
	Comp. sum 100% — Dp Pool 10, L O.D. 30, Boulder 30, In Veg 0, Over Veg 20, Cutbank 0			
	Crown Closure % 65	C	Aspect	

C	BED MATERIAL		%
	Fines	clay, silt, sand (<2mm)	0
	Gravels	small (2-16mm)	5
		large (16-64mm)	15
	Larges	sm. cobble (64-128mm)	20
		lge cobble (128-256mm)	30
		boulder (>256mm)	30
	Bedrock (R)		0
	D_{90} (cm) 47	C	Compaction L M (H)

C	BANKS				
	Height (m) 0.1	% Unstable 0			
	Texture (F) G L R				
	Confinement	EN CO FC (OC) UC N/A			
	Valley: Channel Ratio	0-2 2-5 5-10 (10+) N/A			
	Stage	Dry (L) M H Flood			
	Flood Signs Ht (m) 0	Braided Y (N)			
	Bars (%) 60	pH 8.4	O_2 (ppm) -		
Z	Water Temp (°C) 9.0	Turb. (cm)		Cond. (25°C) 40	

C	OBSTRUCTIONS			
	C	Ht (m)	Type	Loc'n
	1	1.3	BD	0
		0.6	BD	12

DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)			
Mean Depth (m)			
Mean Velocity (m/s)			
Discharge (m^3/s)			

REACH SYMBOL (Fish) ∅

4, D, 2 (Width, Valley, Channel, Slope) | 0, 2, 8, 0 (Bed Material)

QP #18241 REVISED DEC 87 SS187

DFO/MoELP Stream Survey Form

30-Dec-96 **Stream:** UNNAMED **Watershed Code:** 480-4026-000-000-000-000-000-000-000-000-000-000

Stream Survey Report

Header Information

Stream Name:	UNNAMED	**Stream "Local":**	CLOTA LAKE OUTLET			**Access:**	H
Watershed Code:	480-4026-000-000-000-000-000-000-000-000-000			**Reach No.:**	1	**Reach Length (km):**	**Method:**
Location:	CLOTA LAKE OUTLET	**Map #:**	93M.7	**Site No.:**	1	**Length surveyed (m):** 180.0	**Method:** T
		U.T.M. :	09.651187.6139961	**Fish Card:**	N	**Field:** Yes	**Historical:** No
Date: 9/24/96	**Time:** 12:40	**Agency:** KC	**Survey Crew:** GS \JC \ \ \ \ \ \ \	**Photos:**	#6/18-21	**Air Photos:**	BCB3092119:106

Channel Characteristics

				Specific Data					
Av. Chan. Width (m):	4.4	**Method Av. Chan. Width (m):**	T	4.2	3.8	6.1	3.3	3.6	5.2
Av. Wet. Width (m):	2.0	**Method Av. Wet. Width (m):**	T	1.3	1.2	1.8	2.1	2.1	3.6
Av. Max. Rif. Depth (cm):	11	**Av. Max. Riffle Depth (cm):**	MS	9	14	12	9	10	11
Av. Max. Pool Depth (cm):	19	**Av. Max. Pool Depth (cm):**	11	19	17	19	19	17	21
Gradient (%):	2.0	**Method Gradient:**	CL						

% Pool: 25 **% Riffle:** 75 **% Run:** 0 **% Other:** 0 **Method:** GE

% Side Channel: 10-40 **Method Side Channel:** GE

% Debris Area: 10-40 **Method Debris Area:** GE

Cover

Cover Total % : 30 **Method Cover Total %:** GE

Dp Pool : 10 **L.O.D.:** 30 **Boulder:** 30 **In Veg.:** 0 **Over Veg:** 30 **Cutbank:** 0

Crown Closure % : 65 **Method Crown Closure:** **Aspect :** **Method Aspect:**

Discharge

		Specific Data
Wetted Width (m) :	**Method Wetted Width (m) :**	
Mean Depth (m) :	**Method Mean Depth (m) :**	
Mean Velocity (m/s) :	**Method Mean Velocity (m/s**	
Discharge (m3/s) :	**Method Discharge (m3/s) :**	

Reach Symbol

(Fish)

0

4 D 2.0	0280
(Width, Valley: Channel, Slope)	(Bed Material)

Bed Material

% Fines (<2mm):	0	**% Fines (<2mm):**	0
% Gravels:	20	**Small (2-16mm):**	5
		Large (16-64mm):	15
% Larges:	80	**Small cobble (64-128mm):**	20
		Large cobble (128-256mm):	30
		Boulder cobble (>256mm):	30
% Bedrock:	0	**% Bedrock:**	0
D90 (cm):	47	**Compaction:**	Low

Banks

Height (m):	0.1	**% Unstable:**	0
Textures Fines:	Yes	**Gravel:** Yes **Larges:** No **Bedrock:**	No
Confinement:	4		
Valley: Chan. Ratio:	4		
Stage:	L		
Flood Signs Ht(m):	0	**Method Flood Signs:**	
Braided:	N	**Method Braided:**	
Bars (%):	60	**Method Bars:**	
pH:	8.4	**Method pH:**	
02 (ppm):		**Method Dissolved Oxygen:**	
Water Temp. (°C):	9.0	**Method Temperature:**	
Turb. (cm):		**Method Turbidity:**	
Cond. (µmhos):	40	**Method Conductivity:**	AAA

Klohn-Crippen

I

DFO/MoELP Stream Survey Form

30-Dec-96 **Stream:** UNNAMED **Watershed Code:** 480-4026-000-000-000-000-000-000-000-000-000-000

Stream Survey Report

Stream/Valley Cross-Section

Fish Summary

Kiohm-Crippen

Obstructions

Obstruction Ht(m)	Type	Location
1	BD	0.0
1	BD	12.0

Comments

C1	Lake outlet begins @ a 1.25 m high beaver dam (see photo) with a second beaver dam 12 m below this (height only = 60 cm though).
CX1	We only walked 180 m because of time constraints and because the big beaver dam at lake outlet is a barrier to fish and we don't have to survey past barriers. This site is a bonus to the project.
C2	Air temp = 7.0 degrees C @ 13:00. Beautiful sunny day with almost no cloud cover. Conductivity in-situ, measure in microSeimens.
C3	Electrofishing for 109 seconds @ J5, 400 V.

Fish Collection Data Form

Card 1 of 1

Date (yy/mm/dd): 1996/9/23-24
Gazetted Name: Clota Lake
Lake/Stream/Wetland: Lake
Sequence No.: n/a
Watershed Code: 480-4046

Agency: Kohn-Crippen
Alias: Clota Lake
Location: 6.6 km north of Fort Babine
Weather: warm and sunny
Reach #: n/a

Crew: GS/JC
UTM: 9.651187.6139961

Area Sampled: n/a Air Temp (C): 7 Water Temp (C): 11-6.5 EC ms/cm: 40-50

Site No.	Capture Method	Pass # or trap/net #	Species (code)	Mark or Tag No.	Length FL (mm)	Weight (g)	Fish #	Sex (code)	Maturity (code)	Activity (code)	Comments and scale No.
1	GL	1	CT	n/a	294	260	1	M	n/a	n/a	e223700-01
1	GL	1	CT	n/a	234	124	2	M	n/a	n/a	e223700-02
1	GL	1	NSC	n/a	325	418	3	F	n/a	n/a	
1	GL	1	NSC	n/a	279	260	4	M	n/a	n/a	
1	GL	1	NSC	n/a	278	248	5	M	n/a	n/a	
1	GL	1	NSC	n/a	187	72	6	F	n/a	n/a	
1	GL	1	NSC	n/a	189	66	7	M	n/a	n/a	
1	GL	1	NSC	n/a	155	38	8	M	n/a	n/a	
1	GL	1	RSC	n/a	121	22	9	F	n/a	n/a	
1	GL	1	RSC	n/a	124	28	10	M	n/a	n/a	
1	GL	1	RSC	n/a	119	24	11	M	n/a	n/a	
1	GL	1	RSC	n/a	131	28	12	F	n/a	n/a	
1	GL	1	RSC	n/a	127	28	13	M	n/a	n/a	
1	GL	1	RSC	n/a	117	20	14	F	n/a	n/a	
1	GL	1	RSC	n/a	119	20	15	F	n/a	n/a	
1	GL	1	RSC	n/a	129	28	16	M	n/a	n/a	
1	GL	1	RSC	n/a	135	32	17	M	n/a	n/a	
1	GL	1	RSC	n/a	134	24	18	M	n/a	n/a	
1	GL	1	RSC	n/a	124	20	19	M	n/a	n/a	
1	GL	1	RSC	n/a	121	20	20	F	n/a	n/a	
1	GL	1	RSC	n/a	119	20	21	M	n/a	n/a	
1	GL	1	RSC	n/a	126	24	22	F	n/a	n/a	
1	GL	1	RSC	n/a	156	24	23	F	n/a	n/a	
1	GL	1	RSC	n/a	121	22	24	F	n/a	n/a	
1	GL	1	RSC	n/a	119	20	25	M	n/a	n/a	
1	GL	1	RSC	n/a	136	26	26	F	n/a	n/a	
1	GL	1	RSC	n/a	124	22	27	M	n/a	n/a	
1	GL	1	RSC	n/a	124	24	28	M	n/a	n/a	
2	GL	2	LSU	n/a	309	420	29	F	n/a	n/a	
2	GL	2	LSU	n/a	278	268	30	F	n/a	n/a	

Kohn-Crippen

Area Sampled: n/a | Air Temp (C): 7 | Water Temp (C): 11-6.5 | EC ms/cm: 40-50

Site No.	Capture Method	Pass # or trap/net #	Species (code)	Mark or Tag No.	Length FL (mm)	Weight (g)	Fish #	Sex (code)	Maturity (code)	Activity (code)	Comments and scale No.
2	GL	2	LSU	n/a	322	386	31	M	n/a	n/a	
2	GL	2	LSU	n/a	310	302	32	M	n/a	n/a	
2	GL	2	LSU	n/a	304	302	33	F	n/a	n/a	
2	GL	2	LSU	n/a	343	464	34	M	n/a	n/a	
2	GL	2	LSU	n/a	339	430	35	F	n/a	n/a	
2	GL	2	LSU	n/a	307	360	36	F	n/a	n/a	
2	GL	2	LSU	n/a	297	306	37	F	n/a	n/a	
2	GL	2	LSU	n/a	316	342	38	M	n/a	n/a	
2	GL	2	LSU	n/a	259	200	39	M	n/a	n/a	
2	GL	2	LSU	n/a	284	284	40	F	n/a	n/a	
2	GL	2	LSU	n/a	272	234	41	M	n/a	n/a	
2	GL	2	LSU	n/a	308	322	42	M	n/a	n/a	
2	GL	2	LSU	n/a	282	272	43	F	n/a	n/a	
2	GL	2	LSU	n/a	317	368	44	F	n/a	n/a	
2	GL	2	LSU	n/a	322	328	45	M	n/a	n/a	
2	GL	2	LSU	n/a	294	280	46	F	n/a	n/a	
2	GL	2	LSU	n/a	318	430	47	F	n/a	n/a	
2	GL	2	LSU	n/a	321	390	48	M	n/a	n/a	
2	GL	2	LSU	n/a	372	590	49	M	n/a	n/a	
2	GL	2	LSU	n/a	302	352	50	M	n/a	n/a	
2	GL	2	LSU	n/a	319	372	51	M	n/a	n/a	
2	GL	2	LSU	n/a	334	456	52	M	n/a	n/a	
2	GL	2	LSU	n/a	304	404	53	M	n/a	n/a	
2	GL	2	LSU	n/a	292	302	54	F	n/a	n/a	
2	GL	2	LSU	n/a	294	306	55	M	n/a	n/a	
2	GL	2	LSU	n/a	316	314	56	M	n/a	n/a	
2	GL	2	LSU	n/a	325	404	57	F	n/a	n/a	
2	GL	2	LSU	n/a	314	310	58	M	n/a	n/a	
2	GL	2	LSU	n/a	319	328	59	F	n/a	n/a	
2	GL	2	LSU	n/a	304	340	60	M	n/a	n/a	
2	GL	2	LSU	n/a	313	380	61	M	n/a	n/a	
2	GL	2	LSU	n/a	308	312	622	F	n/a	n/a	
2	GL	2	LSU	n/a	301	276	63	M	n/a	n/a	
2	GL	2	LSU	n/a	324	388	64	F	n/a	n/a	
2	GL	2	NSC	n/a	309	382	65	F	n/a	n/a	
2	GL	2	NSC	n/a	316	372	66	F	n/a	n/a	
2	GL	2	NSC	n/a	350	524	67	F	n/a	n/a	
2	GL	2	RSC	n/a	128	26	68	F	n/a	n/a	

Klohn-Crippen

Area Sampled: n/a Air Temp (C): 7 Water Temp (C): 11-6.5 EC ms/cm: 40-50

Site No.	Capture Method	Pass # or trap/net #	Species (code)	Mark or Tag No.	Length FL (mm)	Weight (g)	Fish #	Sex (code)	Maturity (code)	Activity (code)	Comments and scale No.
2	GL	2	RSC	n/a	119	20	69	F	n/a	n/a	
2	GL	2	RSC	n/a	88	6	70	M	n/a	n/a	
2	GL	2	RSC	n/a	129	28	71	F	n/a	n/a	
2	GL	2	RSC	n/a	85	6	72	M	n/a	n/a	
2	GL	2	RSC	n/a	122	20	73	M	n/a	n/a	
2	GL	2	RSC	n/a	92	8	74	F	n/a	n/a	
2	GL	2	RSC	n/a	94	10	75	F	n/a	n/a	
2	GL	2	RSC	n/a	128	26	76	M	n/a	n/a	
2	GL	2	RSC	n/a	130	28	77	M	n/a	n/a	
2	GL	2	RSC	n/a	96	18	78	F	n/a	n/a	
2	GL	2	RSC	n/a	99	10	79	M	n/a	n/a	
2	GL	2	RSC	n/a	94	6	80	F	n/a	n/a	
3	MT	3	RSC	n/a	57	n/a	81	n/a	n/a	n/a	No. = 1
4	MT	4	RSC	n/a	51-67	n/a	82-85	n/a	n/a	n/a	No. = 4
5	MT	5	RSC	n/a	49	n/a	86	n/a	n/a	n/a	No. = 1

1 Capture method: angler report (AR), angling (AG), creel census (CR), dead capture (DC), dip netting (DN), electroshocking (EL), gill netting (GN), minnow trapping (MT), seining (SN), swimming (SW), visual observation above water (VO), method unknown (UN).

2 Activity: migration (MI), spawning (S), incubation (I), rearing (feeding or resting) (R).

3a Level of life phase, Method 1: egg/alevin (E), fry (F), ,juvenile (J), adult (A) - or use Method 2.

3b Level of maturity, Method 2: egg/alevin (E), fry (F), immature (IM), maturing (MT), mature (M), spawning (SP), spent (ST).

4 Species codes: see manual.

Lake Biophysical Data Form

Date (yy/mm/dd): 1996/9/23-24 Crew: GS/JC

Site ID

Watershed Code: 480-4046 Sequence No.: n/a
Gazetted Name: Clota Lake Alias: Clota Lake
FW Region: Prince Rupert UTM (Zone, Easting, Northing): 9.651187.6139961
Management Unit: 6-8 NTS Map No.: 93M.7

Biophysical

Biogeo Zone: Sub-boreal Spruce Biogeo Zone No.: PR-235
Benchmark (Y/N) Y Elevation (m): 803.9 m
Benchmark details: iron spike

Nutrient Status

SEAM No.: e223700
Secchi depth (m): 1.6
Other samples taken: water (0.5 and 10 m)

Limno Station No.:	1(0.5 m)	1(10 m)	
H2S (mg/l)	n/a	n/a	
H2S comments	n/a	n/a	
TDS method	n/a	n/a	
TEMP method	n/a	n/a	
Alkalinity	20.27	25.52	

Field Conditions

Wind velocity (km/h): 10 Wind direction: S Air temp. (c): 7
Cloud cover (/10 O.C.): 10 Surface conditions: small ripples Water colour: brown

Development

MOF rec sites (Y/N) N Resort cmpsts (Y/N) N Residences (Y/N) N
MOF campsites (Y/N) N Resots (Y/N) N Co. Rec facilities N
Parks cmpgrds (Y/N) N Resort cabins (Y/N) N

Recreation

ROS N Biophys features: N Biophys subfeat.: N

Inlets/Outlets **see Stream Survey Card for mandatory fields**

Biological

Fish Card attached (Y/N) Y Fish Man. Com. Y
Wildlife: Y Reptiles: N
Aquatic Birds: Y Invertebrates: Y
Amphibians: N Aquatic Plants: Y

Comments:

APPENDIX II

Fish Scale Microfiche Prints

Clota Lake E 225100-01

Regenerated
No Age

Lilota Lake #C 22/100

APPENDIX III

Water Chemistry Analysis

KLOHN CRIPPEN ENVIRONMENTAL LABORATORY
Analytical Test Report

Project Name: Reconnaissance Level Inventory of Bulkley District Lakes
Project Number: PW 7507 0103
Date of Report: Oct. 17, 1996

Lake	Sample ID	Depth	Date Sampled	Date Received and Analyzed	Alkalinity* (mg/l)	TDS* (mg/l)	NH3** (mg/l)	Nitrate** (mg/l)	Total P** (mg/L)	Total dissolved P** (mg/l)
Clota	e223700	top	24-Sep	27-Sep	20.27	103.33	0.21	0.26	0.09	0.08
		bottom	24-Sep	27-Sep	25.52	108.99	0.17	0.35	0.21	0.12

Notes:

1 * = Analytical methods employed are described in the "Standard Methods for the Examination of Water and Wastewater, 19th ed., 1995.

2 ** = Analytical methods employed are described in the "DR/2000 Spectrophotometer Procedure Manual" which has adapted the procedures from the Standard Methods for the Examination of Water and Wastewater and the procedures are USEPA approved.

3 The Laboratory QA/QC included running standards and analytical triplicates for each set of samples received.

4 The division manager and laboratory personnel oversee and review the test regularly.

Rob Stephenson, Ph.D.
Manager, EnviroChemical Engineering

Vita Yan, B.Sc., B.A.Sc.
Environmental Engineer

Elemental Research Inc.

Greg Scarborough
Klohn Krippen
10200 Shellbridge Way
Richmond B.C.
V6X 2W7

29th November 1996

Your Ref: Clota Lake

ERI Ref: 9812

		Clota Lake e223700 Sep.24/96 Surface	Clota Lake e223700 Sep.24/96 Surface DUPLICATE	Clota Lake e223700 Sep.24/96 Surface TRIPLICATE	Clota Lake e223700 Sep.24/96 Bottom 8m
DISSOLVED METALS					
Sodium	ppb	1580	1620	1560	1590
Magnesium	ppb	1330	not run	not run	1300
Calcium	ppb	3390	not run	not run	3760
PARAMETERS					
Filterable Residue	mg/L	<1	not run	not run	4
Total Nitrogen	mg N/L	0.460	not run	not run	0.655
Chlorophyll	mg/m3	1.87	not run	not run	2.51

9819xls

Analyst.....

APPENDIX IV

Photograph Directory

Photo Survey Form 2 - Photo Details

Date	Roll	Negative	Counter	NTS Map Sheet	Watershed Code	Description	Photo Direction	Reach	Site	Picture Type	UTM Zone	Easting (field)	Northing (field)	Easting (correct)	Northing (correct)	Crew	Focal Length	Scale
9/23/96	6	1	1	93M7	480-4026	Young bear swimming across Clota L	W			L	9					GS/JC	St	n/a
9/23/96	6	2	2	93M7	480-4026	Young bear swimming across Clota L	W			L	9					GS/JC	St	n/a
9/24/96	6	3	3	93M10		Twin L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	4	4	93M10		Twin L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	5	5	93M7	480-4026	Clota L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	6	6	93M7	480-4026	Clota L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	7	7	93M7	480-4026	Clota L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	8	8	93M7	480-4026	Clota L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	9	9	93M7	480-4026	Floatplane leaving Clota L	S			L	9					GS/JC	St	n/a
9/24/96	6	10	10	93M7	480-4026	Shoreline area where gee trap #1 was placed in Clota L	W			L	9					GS/JC	St	n/a
9/24/96	6	11	11	93M7	480-4026	Shoreline area where gee trap #2 was placed in Clota L	W			L	9					GS/JC	St	n/a
9/24/96	6	12	12	93M7	480-4026	Shoreline area where gee trap #3 was placed in Clota L	W			L	9					GS/JC	St	n/a
9/24/96	6	13	13	93M7	480-4026	Shoreline area where gee trap #4 was placed in Clota L	SE			L	9					GS/JC	St	n/a
9/24/96	6	14	14	93M7	480-4026	Shoreline area where gee trap #5 was placed in Clota L	E			L	9					GS/JC	St	n/a
9/24/96	6	15	15	93M7	480-4026	Panoramic (#1) showing marshy section between main and secondary basins of Clota L	SE			L	9					GS/JC	Wd	n/a
9/24/96	6	16	16	93M7	480-4026	Panoramic (#2) showing marshy section between main and secondary basins of Clota L	SE			L	9					GS/JC	Wd	n/a
9/24/96	6	17	17	93M7	480-4026	Extensive marshy area surrounding Clota L inlet	N			L	9					GS/JC	St	n/a
9/24/96	6	18	18	93M7	480-4026	Beaver dam at Clota L outlet	N	1		L, Ch	9	651187	6139961			GS/JC	St	notebook
9/24/96	6	19	19	93M7	n/a	Upstream limit of Clota L outlet sample site	Dn	1	1	Ch	9					GS/JC	St	n/a

Date	Roll	Negative	Counter	NTS Map Sheet	Watershed Code	Description	Photo Direction	Reach	Site	Picture Type	UTM Zone	Easting (field)	Northing (field)	Easting (correct)	Northing (correct)	Crew	Focal Length	Scale
9/24/96	6	20	20	93M7	n/a	Downstream limit of Clota L outlet sample site	Up	1	1	Ch	9					GS/JC	St	n/a
9/24/96	6	21	21	93M7	n/a	Substrate of Clota L outlet sample site	Bd	1	1	Ch	9					GS/JC	St	Electrofisher backpack
9/24/96	6	22	22	93M7	480-4026	Benchmark in Clota L	E			L	9	651606	6140218			GS/JC	St	n/a
9/24/96	6	23	23	93M7	480-4026	Panoramic (#1) of Clota L from S end going E to W	SE			L	9					GS/JC	St	n/a
9/24/96	6	24	24	93M7	480-4026	Panoramic (#2) of Clota L from S end going E to W	S			L	9					GS/JC	St	n/a
9/24/96	6	25	25	93M7	480-4026	Panoramic (#3) of Clota L from S end going E to W	SW			L	9					GS/JC	St	n/a
9/24/96	6	26	26	93M7	480-4026	Example of water lilies that are found throughout N, S, and W shores of Clota L	n/a			L	9					GS/JC	St	notebook with scale in inches
9/24/96	6	27	27	93M7	480-4026	Panoramic (#!) of Clota L from N end going W to E	NW			L	9					GS/JC	St	Equipment on zodiac
9/24/96	6	28	28	93M7	480-4026	Panoramic (#2) of Clota L from N end going W to E	NW			L	9					GS/JC	St	Equipment on zodiac
9/24/96	6	29	29	93M7	480-4026	Panoramic (#3) of Clota L from N end going W to E	N			L	9					GS/JC	St	n/a
9/24/96	6	30	30	93M7	480-4026	Panoramic (#4) of Clota L from N end going W to E	NE			L	9					GS/JC	St	n/a
9/24/96	6	31	31	93M7	480-4026	Panoramic (#5) of Clota L from N end going W to E	NE			L	9					GS/JC	St	n/a
9/24/96	6	32	32	93M7	480-4026	Example of tree fall and macrophyte habitat along shoreline of Clota L	W			L	9					GS/JC	St	n/a
9/24/96	6	33	33	93M7	480-4026	GS on top of beaver lodge at N end of Clota L	W			L	9					GS/JC	St	n/a

APPENDIX IV

Photograph Directory

Photo Survey Form 1 - Equipment Details

Survey Start Date:1996/09/13 **gency: Kohn_Crippen Consultants Ltd.**
Survey End Date:1996/09/27 **Crew: GS/JS**

Camera #1

Make and Model: Ricoh LX-33W date	**Lenses:** A
Format: 35 mm film	

Camera #2

Make and Model: Fuji Disposable	**Lenses:** A
Format: 35 mm film	

Lenses

Focal length (mm)
A - Fixed

Roll and/or Batch Details

Roll #	Camera #	Output Medium	Film Type	ISO
1	1	neg, print	color	400
2	1	neg, print	color	400
3	2	neg, print	color	400
4	1	neg, print	color	400
5	1	neg, print	color	400
6	1	neg, print	color	400
7	1	neg, print	color	400
8	1	neg, print	color	400

Photo Survey Form 2 - Photo Details

Date	Roll	Negative	Counter	NTS Map Sheet	Watershed Code	Description	Photo Direction	Reach	Site	Picture Type	UTM Zone	Easting (field)	Northing (field)	Easting (correct)	Northing (correct)	Crew	Focal Length	Scale
9/23/96	6	1	1	93M7	480-4026	Young bear swimming across Clota L	W			L	9					GS/JC	St	n/a
9/23/96	6	2	2	93M7	480-4026	Young bear swimming across Clota L	W			L	9					GS/JC	St	n/a
9/24/96	6	3	3	93M10		Twin L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	4	4	93M10		Twin L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	5	5	93M7	480-4026	Clota L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	6	6	93M7	480-4026	Clota L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	7	7	93M7	480-4026	Clota L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	8	8	93M7	480-4026	Clota L from floatplane	S			WS	9					GS/JC	Wd	n/a
9/24/96	6	9	9	93M7	480-4026	Floatplane leaving Clota L	S			L	9					GS/JC	St	n/a
9/24/96	6	10	10	93M7	480-4026	Shoreline area where gee trap #1 was placed in Clota L	W			L	9					GS/JC	St	n/a
9/24/96	6	11	11	93M7	480-4026	Shoreline area where gee trap #2 was placed in Clota L	W			L	9					GS/JC	St	n/a
9/24/96	6	12	12	93M7	480-4026	Shoreline area where gee trap #3 was placed in Clota L	W			L	9					GS/JC	St	n/a
9/24/96	6	13	13	93M7	480-4026	Shoreline area where gee trap #4 was placed in Clota L	SE			L	9					GS/JC	St	n/a
9/24/96	6	14	14	93M7	480-4026	Shoreline area where gee trap #5 was placed in Clota L	E			L	9					GS/JC	St	n/a
9/24/96	6	15	15	93M7	480-4026	Panoramic (#1) showing marshy section between main and secondary basins of Clota L	SE			L	9					GS/JC	Wd	n/a
9/24/96	6	16	16	93M7	480-4026	Panoramic (#2) showing marshy section between main and secondary basins of Clota L	SE			L	9					GS/JC	Wd	n/a
9/24/96	6	17	17	93M7	480-4026	Extensive marshy area surrounding Clota L inlet	N			L	9					GS/JC	St	n/a
9/24/96	6	18	18	93M7	480-4026	Beaver dam at Clota L outlet	N	1		L, Ch	9	651187	6139961			GS/JC	St	notebook
9/24/96	6	19	19	93M7	n/a	Upstream limit of Clota L outlet sample site	Dn	1	1	Ch	9					GS/JC	St	n/a

Date	Roll	Negative	Counter	NTS Map Sheet	Watershed Code	Description	Photo Direction	Reach	Site	Picture Type	UTM Zone	Easting (field)	Northing (field)	Easting (correct)	Northing (correct)	Crew	Focal Length	Scale
9/24/96	6	20	20	93M7	n/a	Downstream limit of Clota L outlet sample site	Up	1	1	Ch	9					GS/JC	St	n/a
9/24/96	6	21	21	93M7	n/a	Substrate of Clota L outlet sample site	Bd	1	1	Ch	9					GS/JC	St	Electrofisher backpack
9/24/96	6	22	22	93M7	480-4026	Benchmark in Clota L	E			L	9	651606	6140218			GS/JC	St	n/a
9/24/96	6	23	23	93M7	480-4026	Panoramic (#1) of Clota L from S end going E to W	SE			L	9					GS/JC	St	n/a
9/24/96	6	24	24	93M7	480-4026	Panoramic (#2) of Clota L from S end going E to W	S			L	9					GS/JC	St	n/a
9/24/96	6	25	25	93M7	480-4026	Panoramic (#3) of Clota L from S end going E to W	SW			L	9					GS/JC	St	n/a
9/24/96	6	26	26	93M7	480-4026	Example of water lilies that are found throughout N, S, and W shores of Clota L	n/a			L	9					GS/JC	St	notebook with scale in inches
9/24/96	6	27	27	93M7	480-4026	Panoramic (#!) of Clota L from N end going W to E	NW			L	9					GS/JC	St	Equipment on zodiac
9/24/96	6	28	28	93M7	480-4026	Panoramic (#2) of Clota L from N end going W to E	NW			L	9					GS/JC	St	Equipment on zodiac
9/24/96	6	29	29	93M7	480-4026	Panoramic (#3) of Clota L from N end going W to E	N			L	9					GS/JC	St	n/a
9/24/96	6	30	30	93M7	480-4026	Panoramic (#4) of Clota L from N end going W to E	NE			L	9					GS/JC	St	n/a
9/24/96	6	31	31	93M7	480-4026	Panoramic (#5) of Clota L from N end going W to E	NE			L	9					GS/JC	St	n/a
9/24/96	6	32	32	93M7	480-4026	Example of tree fall and macrophyte habitat along shoreline of Clota L	W			L	9					GS/JC	St	n/a
9/24/96	6	33	33	93M7	480-4026	GS on top of beaver lodge at N end of Clota L	W			L	9					GS/JC	St	n/a