

March 19, 1997

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

**Mr. Paul Giroux**

Dear Mr. Giroux:

The following represents our final report for a Reconnaissance Survey of Boucher Lake (alias); Watershed Code unknown.

Yours truly,

**KLOHN-CRIPPEN CONSULTANTS LTD.**

Richard Couture, R.P. Bio.  
Project Manager

## 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 survey of Boucher Lake (alias - Watershed Code unknown), which lies within the Babine River watershed. This lake is located approximately 10.3 km north of Fort Babine. Lake access was by helicopter as road or trail access did not exist at the time of this survey. The lake was surveyed on September 25 and 26, 1996.

This lake has one obvious inlet and outlet. The inlet enters the lake from an expansive marsh so could not be surveyed but the outlet possessed abundant fish habitat and electrofishing produced cutthroat trout (*Oncorhynchus clarki*) and burbot (*Lota lota*).

The fishery of this lake was moderately productive and contained a mixed species assemblage of sport and non-sport fish including cutthroat trout, northern squawfish (*Ptycheilus oregonensis*), redbelt shiner (*Richardsonius balteatus*) and longnose sucker (*Catostomus catostomus*).

The maximum depth of Boucher Lake is 8.3 m with mean depths and volumes of 24 m and 945,658, respectively. At the time of sampling, dissolved oxygen concentrations remained above the minimum for salmonids (78 mg/L, Anon. 1966b) from the surface essentially to the bottom of the lake indicating an abundance of pelagic salmonid habitat.

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Appendix I	Stream Card Survey Information, Fish Collection Data Form and Lake Biophysical Data Form
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Appendix III	Water Chemistry Analysis
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## 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 Boucher Lake (alias) within the Bulkley River watershed. The field survey was conducted by G. Scarborough and J. Calvert on September 25 and 26, 1996. This lake is located approximately 10.3 km north of Fort Babine and has not previously been surveyed (Figure 1). The purpose of this survey was to collect fish and fish habitat information necessary for the effective management of the resources of Boucher Lake. Fish sampling was conducted using a combination of gillnets and minnow traps left in the lake overnight 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 providing accuracy in lake perimeter and surface area estimates greater than that achieved by tracing air photos.

Although this lake is not gazetted, it is herein referred to as Boucher Lake. It should be emphasized, however, that Boucher is not the lake's official name and that it is only an alias.



**Figure 1 Lake Location**

**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.

<b>Location</b>	<u>√</u>	<b>Winter Diss. O<sub>2</sub>/Temp. Profiles</b>	<u>    </u>
<b>Lake Morphometric Data</b>	<u>√</u>	<b>Netting record</b>	<u>√</u>
<b>Bench Mark</b>	<u>√</u>	<b>Lake Catch Summary</b>	<u>√</u>
<b>Terrain Features</b>	<u>√</u>	<b>Individual Fish Summary</b>	<u>√</u>
<b>Access</b>	<u>√</u>	<b>Fish Preserved</b>	<u>    </u>
<b>Resorts and Campsites</b>	<u>√</u>	<b>Stomach Analysis</b>	<u>    </u>
<b>Special Restrictions</b>	<u>√</u>	<b>Scale Reading</b>	<u>    </u>
<b>Aquatic Plants</b>	<u>√</u>	<b>Location of Inventory Sites</b>	<u>√</u>
<b>Wildlife Observations</b>	<u>√</u>	<b>Appendices:</b>	<u>√</u>
<b>Summary of Rare or Endangered Species</b>	<u>√</u>	<b>I: Tributary Stream Data and Data Forms</b>	<u>√</u>
<b>Lake Drainage</b>	<u>√</u>	<b>II Fish Scale Microfiche Prints</b>	<u>√</u>
<b>Fisheries Management Comments</b>	<u>√</u>	<b>III: Water Chemistry Analysis</b>	<u>√</u>
<b>History of Previous Surveys</b>	<u>√</u>	<b>IV: Photograph Directory</b>	<u>√</u>
<b>Water Chemistry Summary</b>	<u>√</u>	<b>Bathymetric Map Reduction</b>	<u>    </u>
<b>Dissolved O<sub>2</sub>/Temp. Profiles</b>	<u>√</u>	<b>Bathymetric Map</b>	<u>√</u>

### 3. SURVEY AND ANALYTICAL METHODS

#### 3.1 Bathymetry

The bathymetric survey was conducted with 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 surface of the water. 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 required to achieve the sub-meter accuracy necessary 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 in 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 to 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 from 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<sup>2</sup> 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<sup>2</sup>. 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. pH and specific conductance 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<sub>3</sub> 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<sub>3</sub>)**

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

### **3.7.4 Nitrate**

Nitrate was examined according to the Nester 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, 18<sup>th</sup> 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, 18<sup>th</sup> 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 and 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 geographical and management information for Boucher Lake.

<b>Dates of Survey:</b>	September 25-26, 1996
<b>Watershed Name:</b>	Babine River Watershed
<b>Watershed Code:</b>	Unknown
<b>Watershed Area:</b>	12,480,000
<b>Location:</b>	Approximately 10.3 km north of Fort Babine.
<b>Elevation:</b>	833.8 m $\pm$ 0.9 m (determined from corrected GPS data)
<b>Latitude/Longitude:</b>	lat. - 54° 26, 12.047'' long. - 126° 34' 37.413''
<b>U.T.M.:</b>	9. 653289. 6146103
<b>N.T.S. Map No.:</b>	93M.7
<b>TRIM Map No.:</b>	93M.048
<b>Biogeoclimatic Zone:</b>	Sub-Boreal Spruce, Moist Cold
<b>Forest Region:</b>	Prince Rupert
<b>Forest District:</b>	Bulkley
<b>Wildlife Management Unit:</b>	6-8
<b>LRMP Planning Unit:</b>	2: Babine River
<b>LRMP Management Zone:</b>	Integrated Resource Management Zone <ul style="list-style-type: none"><li>• A full range of resource values is recognized in this zone (see Anon. 1996c)</li><li>• Equal consideration must be given to all values</li></ul>
<b>LRMP Ecosystem Network:</b>	n/a
<b>Native Land Claim Area:</b>	Nat'oot'en First Nation, Carrier Sekani Tribal Council
<b>Drainage:</b>	Boucher Lake > Unnamed outlet > Boucher Creek > Babine River



#### 4.1 Lake Morphometric Data

An investigation of Boucher Lake's morphometry was conducted on September 26, 1996. Fourteen transects were made across the short axis of this lake and a single transect was made along the lake's long axis (the e-line). 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 in this study. 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 bathymetric survey transects have been recorded and are shown in Figure 2. The bathymetric map generated from these surveys is shown in Figure 3.

The following bathymetric summary statistics for Boucher Lake are:

<b>Total surface area:</b>	389,000 m <sup>2</sup>
<b>Surface area at 6m contour:</b>	31,400 m <sup>2</sup>
<b>Shoreline perimeter:</b>	3,290 m
<b>Perimeter of islands:</b>	0
<b>Number of islands:</b>	0
<b>Maximum depth:</b>	8.3 m
<b>Mean depth:</b>	2.4 m
<b>Secchi depth:</b>	4.1 m
<b>Sounding device:</b>	Meridata depth sounder

**Figure 2 Bathymetric Survey Transects**

**Figure 3 Bathymetric Contours**

**Volume (by Stratum, and Total):**

<b>Stratum</b>	<b>Volume (m<sup>3</sup>)</b>
0-2 m	543,490
2-4 m	246,615
4-6 m	123,525
6-8 m	31,975
8m - max. depth	53
Total	945,658

**4.2 Benchmark**

The benchmark in Boucher Lake was indicated by an iron spike driven 146.7 cm above the water surface into the base of an old tree near the water's edge on the lake's southwest shore. The spike itself and the surrounding area are marked by fluorescent orange flagging tape for easy relocation (Plate 1). The coordinates for the benchmark, as recorded in the field by GPS, are 9.653247.6146464 (NAD83). The location of the benchmark in relation to Boucher Lake is indicated in Figure 4. Figure 5 shows an air photo enlargement of Boucher Lake and also shows the benchmark's location.

This lake appeared to be at its highest level at the time of this survey.

**4.3 Terrain Features**

**4.3.1 Immediate Shoreline**

Boucher Lake is almost entirely surrounded by a dense mat of floating peat and unidentified hedges. This mat ranged between 3-10 metres in width. Any exposed shoreline was often composed of rocks and unidentified grasses. Beyond the band of grassy vegetation, the shoreline was dominated by pine and spruce trees. The north end of this lake was particularly unique because it was covered with a dense growth of *Potamogeton sp.* and *Nuphar sp.* The northern end of this lake was also surrounded by a large marsh. From the helicopter it appeared to extend east for almost 1 km.

**Figure 4 Location of Lake Inventory Sites**

**Figure 5 Air Photo Enlargement Showing Location of Benchmark**

#### 4.3.2 Surrounding Terrain

Boucher Lake (alias) is located in a broad flat area east of the confluence of the Nilkitkwa, Babine and Nicheyskwa Rivers. Drainage in this area is very poor and the surrounding area is dotted with peat bogs and marshes (Plates 2, 3 and 4).

#### 4.4 Stream Surveys

The outflow was the only accessible stream of Boucher Lake (alias). It was 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 at the overflow survey site and a photocopy of this stream card is included in Appendix I. Data from this stream card were also entered into the DFO/MoELP stream survey digital data entry tool that produced the stream card summary reports also included in Appendix I.

##### **Stream #1** (Watershed Code unknown)

Stream #1 is the single outlet of Boucher Lake (alias). This stream passes over two beaver dams in the first 20 metres (Plate 7). The largest of the two dams measured 1 metre in height and is located immediately at the lake outlet, while the second dam was smaller (0.75 m high). Downstream of the beaver dams, the stream passes through a wide, deep channel filled with aquatic vegetation and boulders. The discharge here was particularly high suggesting that water retention time in the lake is short. At the survey site conducted 175 metres downstream from the lake, the channel had an average width of 3.3 metres and average pool and riffle depths of 30.2 and 15.8 cm, respectively (Plates 8 to 10). Electrofishing conducted over a length of 250 metres resulted in the capture of three cutthroat trout (*Oncorhynchus clarki*) juveniles and two burbot (*Lota lota*).

##### **Stream #2** (Watershed Code unknown)

Stream #2 is the single obvious inlet to Boucher Lake. Prior to entering the lake, this stream passes a large beaver dam, and another which was under construction at the time of this survey, (Plates 11 and 12). The area upstream of the beaver dams is extensively flooded and inaccessible by either boat or foot (Plate 13).

**Plate 1 View of benchmark**

**Plate 2 View looking south of lake from helicopter**



**Plate 3 View of north end of Boucher Lake from helicopter**

**Plate 4 View looking north west from centre of lake showing aquatic plant coverage**

**Plate 5 Panoramic view looking north from Boucher Lake's south end**

**Plate 6 Panoramic views of Boucher Lake from north end**

**Plate 7 View of outlet from boat**

**Plate 8 View looking downstream from upstream limit of outlet sample site**

**Plate 9 View of looking upstream from downstream limit of outlet sample site**

**Plate 10 Example of habitat in outlet sample site**

**Plate 11 View of inlet from lake**

**Plate 12 View of large beaver dam down in lake's inlet**

**Plate 13 View of marsh through which inlet flows**

**Plate 14 View of littoral habitat and minnow trap**

## **5. LAKE ACCESS AND AREA DEVELOPMENT**

### **5.1 Access and Directions**

There was no road or trail access to this lake at the time of survey. Logging roads in the immediate vicinity of the lake were under construction, so future road access is likely possible. Access to the lake for this study was via helicopter chartered from Smithers. To reduce the amount of time required to transport necessary gear to the lake, a nearest-point pickup was arranged with the helicopter pilot. This pick-up point was located in a construction clearing off the side of a logging road still under construction. The pick-up point was reached by driving 6.6 km south from Smithers along Highway 16 then turning left onto Beckman Road which eventually becomes Burnt Cabin Road. Follow Beckman/Burnt Cabin Road east for 20 km to the junction with the Old Babine Lake Road. At the Babine Lake Road, turn right and continue for 31.9 km to the Nikitkwa Forest Service Road, turn left onto this road and continue north for 62.4 km, over the Babine River Bridge, then take the second right hand turn after the bridge. Follow this unnamed logging road for another 2 km until the construction clearing. Boucher Lake (alias) is only a 4 minute helicopter flight east from this pick-up point.

### **5.2 Road Type and Conditions**

Highway 16, Eckman Road and Burnt Cabin Road are paved. All remaining Forestry Service Roads (FSR) are gravel but are still suitable for two-wheel drive vehicles.

#### **5.2.1 Restrictions**

The FSR roads are frequented by logging trucks so as a safety precaution, appropriate VHF radio channels should be monitored for logging truck activity. There are no known aircraft restrictions applicable to this lake.

### **5.3 Resorts and Campsites**

None is known.

### **5.4 Mining Claims**

None is known.



## **5.5 Timber Harvests**

Forest cover maps indicate that logging has not taken place around Boucher Lake but the field crew observed several cut blocks in the vicinity and also noted the construction of several new logging roads.

## **5.6 Waste Permits**

None is known (Remington and Lough 1995).

## **5.7 Water Licenses**

None is known (Remington and Lough 1995).

## **6. FLORA AND FAUNA**

### **6.1 Aquatic Plants**

Boucher Lake possessed abundant and well distributed aquatic plant communities. Some parts of this lake were even inaccessible by boat because of the dense growths of emergent vegetation. 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 five aquatic plant taxa recorded in Boucher Lake (Alias); *Sphagnum sp.*, *Potamogeton sp.*, *Myriophyllum sp.*, *Ceratophyllum sp.* and *Nuphar sp.*

### **6.2 Aquatic Invertebrates**

Only scattered macrocrustacea (*Amphipoda sp.*) were noted in this lake.

### **6.3 Wildlife Observations**

Wildlife observed on or around Boucher Lake included moose, beaver, squirrels and migratory waterfowl.

### **6.4 Summary of Rare and Endangered Species**

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

**Figure 6 Distribution of Aquatic Plant Communities**

## 7. FISH POPULATION SAMPLING

### 7.1 Total Fish Catch Summary

The fishery of Boucher Lake provided a total catch of 66 fish. The catch was dominated by the sport fish cutthroat trout (*Oncorhynchus clarki*) but also contained northern squawfish (*Ptycheilus oregonensis*), reidside shiner (*Richardsonius balteatus*) and longnose sucker (*Catostomus catostomus*). The relative species components of this catch were: 40 cutthroat, 17 squawfish, 3 shiner and 6 suckers. Twenty-nine of the cutthroat were subsampled for aging by removal of a lateral scale. Only the reidside shiner were captured by minnow traps, all other specimens were captured by the single floating gillnet set in this lake.

The total netting effort on this lake was 16 hours and 9 minutes. Forty cutthroat were captured by the gillnet during this period representing a Catch Per Unit Effort (CPUE/# of fish/12 hrs/100 m<sup>2</sup>) of 15 sportfish/12 hrs/100 m<sup>2</sup>. Twenty-five nonsport fish were also captured by the gillnet representing a CPUE of 9.6 nonsport fish/12 hrs/100 m<sup>2</sup>.

The total minnow trapping effort in the lake was 76 hours and 32 minutes. Despite this considerable sampling effort, only 3 reidside shiners were captured representing a CPUE of 0.094 fish/trap/12 hr period.

Figure 7 shows the relationships between fork length and weight for the three non-sport fish species captured in this lake. Figure 8 shows the same relationship but only for cutthroat trout while Figure 9 shows the relationship between cutthroat age and fork length as well as the linear regression equation, line and statistics for this relationship. The fish collection data form is included in Appendix I.

### 7.2 Netting Record

Upon arrival to this lake, an abundance of jumping fish and several specimens were observed in the littoral zone. Therefore, to minimize fish kill, the field crew set only one gillnet in this lake. The gillnet sample record for Boucher Lake is shown in Table 1.

**Table 1 Gillnet Summary**

Site No.	Net Type	Date Set	Time Set	Depths (m)		Date Lifted	Time Lifted	Total Net Set (hr)	CPUE
				Shallow	Deep				
1	floating	96/9/25	18:16	0-2	0-2	96/9/26	10:25	16:09	25

Notes:

- See Figure 4 for location of gillnet sample site.
- CPUE - #fish/12 hrs/100 m<sup>2</sup>.

**Figure 7 Fork Length versus Weight for Three Species of Fish**

**Figure 8 Cutthroat Trout Fork Length versus Weight**

**Figure 9 Cutthroat Trout Fork Length versus Age**

### 7.3 Minnow Trap Record

The minnow trap sample summary 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
2	1	96/9/25	18:04	0.5	Silt	96/9/26	09:21	15:17	0
3	2	96/9/25	18:06	0.5	Silt	96/9/26	09:24	15:18	236
4	3	96/9/25	18:08	0.5	LWD, silt	96/9/26	09:28	15:20	0
5	4	96/9/25	18:12	0.5	LWD, silt	96/9/26	09:30	15:18	0
6	5	96/9/25	18:14	0.5	LWD, silt	96/9/26	09:33	15:19	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.

### 7.5 Fish Data

Individual fish data are shown in Tables 3 and 4.



**Table 3 Fish Data**

Site No.	Species Code	Fork Length (mm)	Weight (g)	Scale Sample No.	Sex	Age	Samples
1	CT	215	98	e223701-01	F	2+	SC
1	CT	194	72	e223701-02	M	2+	SC
1	CT	205	78	e223701-03	M	2+	SC
1	CT	228	112	e223701-04	M	3+	SC
1	CT	178	58	e223701-05	M	1+	SC
1	CT	225	102	e223701-06	M	2+	SC
1	CT	230	112	e223701-07	M	3+	SC
1	CT	244	144	e223701-08	M	3+	SC
1	CT	277	126	e223701-09	F	2+	SC
1	CT	200	78	e223701-10	M	3+	SC
1	CT	179	52	e223701-11	M	2+	SC
1	CT	243	128	e223701-12	F	3+	SC
1	CT	247	150	e223701-13	M	2+	SC
1	CT	214	96	e223701-14	F	2+	SC
1	CT	236	128	e223701-15	F	2+	SC
1	CT	229	108	e223701-16	F	2+	SC
1	CT	222	116	e223701-17	F	2+	SC
1	CT	320	290	e223701-18	M	2+	SC
1	CT	215	94	e223701-19	F	2+	SC
1	CT	175	54	e223701-20	F	1+	SC
1	CT	214	92	e223701-21	M	2+	SC
1	CT	185	60	e223701-22	M	n/a	SC
1	CT	189	64	e223701-23	F	2+	SC
1	CT	204	76	e223701-24	M	2+	SC
1	CT	179	52	e223701-25	F	1+	SC
1	CT	208	76	e223701-26	F	2+	SC
1	CT	209	82	e223701-27	M	2+	SC
1	CT	216	92	e223701-28	M	2+	SC
1	CT	195	66	e223701-29	F	1+	SC

Notes:

- See Figure 4 for location of sample site.
- CT - cutthroat trout (*Oncorhynchus clarki*)
- F - female, M - male, SC - scale sample.

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

Site No.	Species Code	Fork Length (mm)	Wt. (g)	Sex	Site No.	Species Code	Fork Length (mm)	Wt. (g)	Sex	Site No.	Species Code	Fork Length (mm)	Wt. (g)	Sex
1	CT	213	92	F	1	LSU	288	298	M	1	NSC	169	58	M
1	CT	210	92	M	1	LSU	162	50	F	1	NSC	184	70	F
1	CT	235	118	M	1	LSU	176	58	M	1	NSC	194	80	F
1	CT	234	122	M	1	LSU	272	242	M	1	NSC	176	58	M
1	CT	211	104	F	1	LSU	296	302	M	1	NSC	216	108	F
1	CT	239	134	F	1	NSC	183	80	F	1	NSC	217	110	F
1	CT	212	86	F	1	NSC	179	54	M	1	NSC	238	142	M
1	CT	169	46	F	1	NSC	201	96	F	1	NSC	153	38	M
1	CT	169	48	F	1	NSC	164	46	M	1	NSC	175	58	M
1	CT	221	110	M	1	NSC	185	72	F	1	NSC	178	70	M
1	CT	152	36	M	1	NSC	166	54	F	3	RSC	56	2	-
1	LSU	137	30	F	1	NSC	166	50	M	3	RSC	43	2	-
										3	RSC	52	2	-

Notes:

- See Figure 4 for location of sample sites.
- CT - cutthroat trout (*Oncorhynchus clarki*), NSC - northern squawfish (*Ptycheilus oregonensis*), RSC - reidside shiner (*Richardsonius balteatus*) and LSU - longnose sucker (*Catostomus catostomus*)
- F - female, M - male.

## 7.6 Electrofishing Record

Electrofishing was conducted in the lake outlet only because of the inaccessibility of this lake's inlet. Suitable habitat in the outlet was electrofished for 145 seconds providing 3 cutthroat trout and 2 burbot (*Lota lota*). This represents a C.P.U.E. of 1 fish per 29 seconds of effort.

## 7.7 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 10. 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.

**Figure 10 Frequency Distribution of Fish Fork Length Groupings**

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.). Figure 10 indicates that almost half (46%) of the fish captured in Boucher Lake were from the 179-228 mm fork length group. The average fork length for the most abundant species captured from Boucher Lake, cutthroat trout, was 213.5 mm so the latter fork length group frequency probably best indicates the cutthroat population. Additionally, large fish were not captured from this lake as indicated by the nil 346-380 mm fork length group frequency. This suggests that the small amount of fish in the 281-345 mm category (4.5%) is a population trend and not a result of any bias due to mesh size. Overall, the gillnets used in this study targeted the minimum through maximum possible sizes of fish and thus provided data to describe the entire fish fork length distribution as a whole.

## 7.8 Fisheries Management Concerns

The fishery of this lake appeared healthy and fish were relatively abundant. Road or trail access to this lake did not exist at the time of survey so access and recreation are not likely to be immediate management concerns. However, the field crew noted construction of logging roads in close proximity to the lake so access management might be a future issue. The cutthroat trout condition factor was less than 1 ( $K = 0.94$ ) but still indicative of a healthy stock.

## 7.9 History of Previous Surveys

The Fisheries Information Summary System (FISS) database does not provide information for Boucher Lake (alias) but does summarize information for Boucher Creek and its' tributaries. According to FISS, steelhead trout (*Oncorhynchus mykiss*) have been found in Boucher Creek, 2 km upstream from Babine River. FISS also summarizes data for Acorn Lake, a tributary of Boucher Creek, in which burbot, cutthroat trout, mountain whitefish (*Prosopium williamsoni*), longnose sucker and lake chubb (*Couesius plumbeus*) have been documented.

## 8. FIELD CONDITIONS AND WATER CHEMISTRY

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

**Date:** September 26, 1996      **Time:** 12:40  
**Limnology Station:** LS      **Maximum Depth:** 8.3 m  
**Seam Site:** e 223701      **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 Boucher Lake was investigated on a warm, cloudy 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)	0	Estimation
Wind Direction	n/a	Observation
Air Temperature (°C)	13°C	Glass thermometer
Cloud Cover	100%	Observation
Surface Condition	smooth	Observation
Water Color	clear/murky	Observation
Water Clarity (m)	4.1	Secchi Disk

### 8.2 Water Chemistry

Water samples were removed from Boucher Lake at depths of 0.5 and 5 metres. Boucher Lake did not appear to be strongly stratified at the time of this survey so the latter depth was chosen to best sample non-surface water quality. Table 6 presents a summary of the water chemistry findings from the two sample depths while Table 7 presents a summary of the water nutrient data for the 2 sample depths. Appendix III contains laboratory summary reports of the water quality analysis for Boucher Lake.

**Table 6 Water Chemistry Summary**

Parameter Measured	Result (0.5 m)	Result (5 m)	Method Used
Dissolved Oxygen (mg/L)	11.67	8.20	YSI model 57 O <sub>2</sub> meter
Water Temperature (°C)	10.1	9.7	YSI model 57 O <sub>2</sub> meter
pH (field)	8.2	8.0	Oakpon pH tester-2
Specific Conductance (µS/cm)	40	50	Oakpon TDS tester
Chlorophyll <i>a</i> (mg/m <sup>3</sup> )	0.51	0.53	See Section 3
Filterable Residue(ppm)	<1	<1	See Section 3
Dissolved Sodium (ppb)	630	1050	See Section 3
Dissolved Magnesium (ppb)	546	832	See Section 3
Calcium (ppb)	6060	8960	See Section 3
Alkalinity (mg/L)	53.04	60.92	See Section 3
TDS (mg/L)	17.39	2.17	See Section 3

### 8.3 Water Nutrient Summary

**Table 7 Summary of Available Phosphorus and Nitrogen.**

Parameter Measured	Result (0.5 m)	Result (5 m)	S Method Used
NH <sub>3</sub> (mg/L)	0.04	0.062	See Section 3
Total Dissolved Phosphorus (ppm)	0.02	0.12	See Section 3
Total Phosphorus (ppm)	0.05	0.31	See Section 3
Total Kjeldahl Nitrogen (ppm)	0.13	0.13	See Section 3
N:P Ratio	2.6	0.42	Average = 1.5

Notes:

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

The total phosphorus data for this lake (see Appendix III) suggest it has an ultra-eutrophic classification (Wetzel 1983). However, algal production in the lake is not limited by the availability of phosphorus (N:P < 15) and the water was not green which is a characteristic of ultra-eutrophic lakes. Therefore, perhaps an ultra-eutrophic classification for this lake is too extreme. In fact, this lake may be difficult to classify because its water retention time might be very short based on the lake's relatively small volume and the high discharge observed in the lake's outlet.

## 8.4 Dissolved Oxygen and Temperature Data

**Table 8 Dissolved Oxygen Concentration and Temperature Data**

Depth (m)	Dissolved Oxygen (ppm)	Temperature (°C)
0	11.67	10.1
1	11.40	9.9
2	10.80	9.8
3	10.65	9.8
4	9.60	9.8
5	8.20	9.7
6	7.96	9.2

Dissolved oxygen and temperature were determined at 1 metre intervals from a vertical profile below the limnological station in Boucher Lake on September 26, 1996. Table 8 summarizes the dissolved oxygen concentration and temperature profiles for Boucher Lake while Figure 11 displays these data. This data suggests that the lake was not thermally stratified at the time of survey and dissolved oxygen concentrations remained suitable for salmonids at all surveyed depths (Anon 1996b).

**Figure 11 Dissolved Oxygen and Temperature Profiles**



## 9. SUMMARY AND RECOMMENDATIONS

Boucher Lake is located approximately 10.3 km north of Fort Babine. The maximum depth of this lake is 8.3 metres, with mean depths and volumes of 2.4 metres and 945,658 m<sup>3</sup>, respectively. There are no shoal areas that would present a hazard to navigation except that aquatic plant proliferation in some places made boat navigation difficult.

Boucher Lake contains a multi-species assemblage of both sport and non-sport fish species. The fish appeared healthy and were moderately abundant. Water quality was good as dissolved oxygen concentrations remained above 8 mg/l for all sampled depths. Cutthroat and burbot were also captured in the lake's outlet.

Access to this lake at the time of survey was by air only. However, nearby logging roads are under construction so road access might be possible in the future. The fishery here is also moderately productive and viewscapes are not that attractive so recreational potential for this lake is low.

Richard Couture, R.P.Bio.  
Project Manager

Greg Scarborough, B.Sc.  
Aquatic Ecologist

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## **APPENDIX I**

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

## Lake Biophysical Data Form

Date (yy/mm/dd): 96/9/25-26

Crew: GS/JC

### Site ID

Watershed Code: n/a  
 Gazetted Name: n/a  
 FW Region: n/a  
 Management Unit: n/a

Sequence No.: n/a  
 Alias: Boucher  
 UTM (Zone, Easting, Northing): 9.653289.6146103  
 NTS Map No.: 93M.7

### Biophysical

Biogeo Zone: Sub-boreal Spruce, Moist Cold  
 Benchmark (Y/N): Y  
 Benchmark details: iron spike

Biogeo Zone No.: PR-235  
 Elevation (m): 833.8 m

### Nutrient Status

SEAM No.: e223701  
 Secchi depth (m): 4.1  
 Other samples taken: water quality

Limno Station No.:	1(0.5 m)	1(5 m)	
H2S (mg/l)			
H2S comments			
TDS method			
TEMP method			
Alkalinity	53.04		

### Field Conditions

Wind velocity (km/h): 0 Wind direction: n/a Air temp. (c): 13  
 Cloud cover (/10 O.C.): 100 Surface conditions: calm Water colour: clear/murky

### 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:

# Fish Collection Data Form

Card 1 of 1

Date (yy/mm/dd): 96/9/25-26  
 Gazetted Name: n/a  
 Lake/Stream/Wetland: Lake  
 Sequence No.: n/a  
 Watershed Code: n/a

Agency: Kohn-Crippen  
 Alias: Boucher Lake  
 Location: Bulkley Valley  
 Weather: calm  
 Reach #: n/a

Crew: GS/JC  
 UTM: 9.653289.6146103

Area Sampled: _____ Air Temp (C): <u>13</u> Water Temp (C): <u>10.1</u> EC ms/cm: <u>40</u>											
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)	Scale and DNA vial #
1	GL	1	CT	n/a	213	92	1	F	n/a	n/a	
1	GL	1	CT	n/a	210	92	2	M	n/a	n/a	
1	GL	1	CT	n/a	235	118	3	M	n/a	n/a	
1	GL	1	CT	n/a	234	122	4	M	n/a	n/a	
1	GL	1	CT	n/a	211	104	5	F	n/a	n/a	
1	GL	1	CT	n/a	239	134	6	F	n/a	n/a	
1	GL	1	CT	n/a	212	86	7	F	n/a	n/a	
1	GL	1	CT	n/a	169	46	8	F	n/a	n/a	
1	GL	1	LSU	n/a	137	30	9	F	n/a	n/a	
1	GL	1	CT	n/a	169	48	10	F	n/a	n/a	
1	GL	1	CT	n/a	221	110	11	M	n/a	n/a	
1	GL	1	CT	n/a	152	36	12	M	n/a	n/a	
1	GL	1	NS	n/a	183	80	13	F	n/a	n/a	
1	GL	1	NS	n/a	179	54	14	M	n/a	n/a	
1	GL	1	NS	n/a	201	96	15	F	n/a	n/a	
1	GL	1	NS	n/a	164	46	16	M	n/a	n/a	
1	GL	1	NS	n/a	185	72	17	F	n/a	n/a	
1	GL	1	NS	n/a	166	54	18	F	n/a	n/a	
1	GL	1	NS	n/a	166	50	19	M	n/a	n/a	
1	GL	1	NS	n/a	169	58	20	M	n/a	n/a	
1	GL	1	NS	n/a	184	70	21	F	n/a	n/a	
1	GL	1	NS	n/a	194	80	22	F	n/a	n/a	
1	GL	1	NS	n/a	176	58	23	M	n/a	n/a	
1	GL	1	NS	n/a	216	108	24	F	n/a	n/a	
1	GL	1	NS	n/a	217	110	25	F	n/a	n/a	
1	GL	1	NS	n/a	238	142	26	M	n/a	n/a	

Area Sampled: _____ Air Temp (C): <u>13</u> Water Temp (C): <u>10.1</u> EC ms/cm: <u>40</u>											
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)	Scale and DNA vial #
1	GL	1	NS	n/a	153	38	27	M	n/a	n/a	
1	GL	1	NS	n/a	175	58	28	M	n/a	n/a	
1	GL	1	LSU	n/a	288	298	29	M	n/a	n/a	
1	GL	1	LSU	n/a	162	50	30	F	n/a	n/a	
1	GL	1	LSU	n/a	176	58	31	M	n/a	n/a	
1	GL	1	LSU	n/a	272	242	32	M	n/a	n/a	
1	GL	1	LSU	n/a	296	302	33	M	n/a	n/a	
1	GL	1	NS	n/a	178	70	34	M	n/a	n/a	
1	GL	1	CT	n/a	215	98	35	F	n/a	n/a	e223701-01
1	GL	1	CT	n/a	194	72	36	M	n/a	n/a	e223701-02
1	GL	1	CT	n/a	205	78	37	M	n/a	n/a	e223701-03
1	GL	1	CT	n/a	228	112	38	M	n/a	n/a	e223701-04
1	GL	1	CT	n/a	178	58	39	M	n/a	n/a	e223701-05
1	GL	1	CT	n/a	225	102	40	M	n/a	n/a	e223701-06
1	GL	1	CT	n/a	230	112	41	M	n/a	n/a	e223701-07
1	GL	1	CT	n/a	244	44	42	M	n/a	n/a	e223701-08
1	GL	1	CT	n/a	277	126	43	F	n/a	n/a	e223701-09
1	GL	1	CT	n/a	200	78	44	M	n/a	n/a	e223701-10
1	GL	1	CT	n/a	179	52	45	M	n/a	n/a	e223701-11
1	GL	1	CT	n/a	243	128	46	F	n/a	n/a	e223701-12
1	GL	1	CT	n/a	247	150	47	M	n/a	n/a	e223701-13
1	GL	1	CT	n/a	214	96	48	F	n/a	n/a	e223701-14
1	GL	1	CT	n/a	236	128	49	F	n/a	n/a	e223701-15
1	GL	1	CT	n/a	229	108	50	F	n/a	n/a	e223701-16
1	GL	1	CT	n/a	222	116	51	F	n/a	n/a	e223701-17
1	GL	1	CT	n/a	320	290	52	M	n/a	n/a	e223701-18
1	GL	1	CT	n/a	215	94	53	F	n/a	n/a	e223701-19
1	GL	1	CT	n/a	175	54	54	F	n/a	n/a	e223701-20
1	GL	1	CT	n/a	214	92	55	M	n/a	n/a	e223701-21
1	GL	1	CT	n/a	185	60	56	M	n/a	n/a	e223701-22
1	GL	1	CT	n/a	189	64	57	F	n/a	n/a	e223701-23
1	GL	1	CT	n/a	204	76	58	M	n/a	n/a	e223701-24
1	GL	1	CT	n/a	179	52	59	F	n/a	n/a	e223701-25
1	GL	1	CT	n/a	208	76	60	F	n/a	n/a	e223701-26

Area Sampled: _____ Air Temp (C): <u>13</u> Water Temp (C): <u>10.1</u> EC ms/cm: <u>40</u>											
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)	Scale and DNA vial #
1	GL	1	CT	n/a	209	82	61	M	n/a	n/a	e223701-27
1	GL	1	CT	n/a	216	92	62	M	n/a	n/a	e223701-28
1	GL	1	CT	n/a	195	66	63	F	n/a	n/a	e223701-29
3	MT	3	RS	n/a	56	2	64		n/a	n/a	
3	MT	3	RS	n/a	43	2	65		n/a	n/a	
3	MT	3	RS	n/a	52	2	66		n/a	n/a	

- 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.

## **APPENDIX II**

### **Fish Scale Microfiche Prints**



## **APPENDIX III**

### **Water Chemistry Analysis**

## **APPENDIX IV**

### **Photograph Directory**

**Photo Survey Form 1 - Equipment Details**

**Survey Start Date:** 13/09/1996

**Agency:** Klohn-Crippen

**Survey end Date:** 27/09/1996

**Crew:** GS/JS or GS/JC

**Camera # 1**

<b>Make and Model:</b> Ricoh LX-33W date	<b>Lenses:</b> A
<b>Format:</b> 35 mm film	

**Camera # 2**

<b>Make and Model:</b> Fuji Disposable	<b>Lenses:</b> A
<b>Format:</b> 35 mm film	

**Lenses**

<b>Focal Length (mm)</b>
A - fixed

**Roll and/or Batch Details**

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

Date	Roll	Negative	Counter	NTS Map Sheet	Watershed Code	Description	Photodocumentation Form 1 Direction	Photodocumentation Form 2 Reach	Site	Picture Type	UTM Zone	Efield	Nfield	Ecorrect	Ncorrect	Crew	Focal Length	Scale
12/09/1996	1	4	4	93L10	460-7449-858	Gee Trap #1 in North L, note the lack of aquatic vegetation	NW			L						GS/JS	St	n/a
14/09/1996	1	5	5	93L10	460-7449-858	View west over the Bulkley Valley taken from above North L	W			WS						GS/JS	St	n/a
14/09/1996	1	6	6	93L10	460-7449-858	Panoramic of the south end of North L taken from the helicopter				L						GS/JS	Wd	n/a
14/09/1996	1	7	7	93L10	460-7449-858	North L Inlet looking upstream from the L	W	1		Ch	9			677930	6048686	GS/JS	St	n/a
14/09/1996	1	8	8	93L10	460-7449-858	Marsh located 110m upstream of North L Inlet	Up	1		Ch						GS/JS	St	n/a
14/09/1996	1	9	9	93L10	460-7449-858	Looking S from outlet of L that drains into North L (190m upstream from North L)	S	1		Ch						GS/JS	St	n/a
14/09/1996	1	10	10	93L10	460-7449-858	Looking upstream from downstream limit of North L Inlet site	Up	1	1	Ch						GS/JS	St	Folding ruler hanging in tree
14/09/1996	1	11	11	93L10	460-7449-858	Old cabin near North L outlet				O	9			647794	6049278	GS/JS	St	n/a
14/09/1996	1	12	12	93L10	460-7449-858	Example of the falls that cover the North L Outlet (falls are 1.2 m high, 140 m downstream from outlet)	Up	1		Ch						GS/JS	St	Folding ruler placed near top of falls
14/09/1996	1	13	13	93L10	460-7449-858	looking down chute section of North L outlet	Dn	1	1	Ch						GS/JS	St	n/a
12/09/1996	1	14	14	93L10	460-7449-858	90 cm high falls 90 m downstream from North L outlet	Up	1	1	Ch						GS/JS	St	Folding ruler
14/09/1996	1	16	16	93L10	460-7449-858	Just upstream of falls in #14: Bottom end of North L Outflow site	Up	1	1	Ch						GS/JS	St	n/a
14/09/1996	1	17	17	93L10	460-7449-858	Upstream limit of North L outflow site	Dn	1	1	Ch						GS/JS	St	n/a
14/09/1996	1	18	18	93L10	460-7449-858	North L outlet taken from L	E			L,Ch	9			647794	6049278	GS/JS	St	n/a
14/09/1996	1	19	19	93L10	460-7449-858	Panoramic (#1) of north end of North L	S			L						GS/JS	Wd	n/a
14/09/1996	1	20	20	93L10	460-7449-858	Panoramic (#2) of north end of North L	S			L						GS/JS	Wd	n/a
14/09/1996	1	21	21	93L10	460-7449-858	Panoramic (#3) of north end of North L	S			L						GS/JS	Wd	n/a
14/09/1996	1	22	22	93L10	460-7449-858	Panoramic (#1) of south end of North L	N			L						GS/JS	Wd	n/a
14/09/1996	1	23	23	93L10	460-7449-858	Panoramic (#2) of south end of North L	N			L						GS/JS	Wd	n/a
14/09/1996	1	24	24	93L10	460-7449-858	Panoramic (#3) of south end of North L	N			L						GS/JS	Wd	n/a
14/09/1996	1	25	25	93L10	460-7449-858	Panoramic (#4) of south end of North L	N			L						GS/JS	Wd	n/a
14/09/1996	1	26	26	93L10	460-7449-858	Benchmark in North L (note aquatic vegetation)	E			L	9			647878	6048791	GS/JS	St	n/a
14/09/1996	1	27	27	93L10	460-7449-858	Aerial view of North L from helicopter	W			WS						GS/JS	St	n/a
14/09/1996	1	28	28	93L10	460-7449-858	Aerial view of North L from helicopter	E			WS						GS/JS	St	n/a
14/09/1996	1	30	30	93L10	460-5177-361	Zodiac in Coppermine L on shore near old mine entrance	N			L						GS/JS	St	10'2" Zodiac
14/09/1996	1	31	31	93L10	460-5177-361	Panoramic (#1, E to W) of Coppermine L taken from mine site	NE			L						GS/JS	Wd	n/a
14/09/1996	1	32	32	93L10	460-5177-361	Panoramic (#2, E to W) of Coppermine L taken from mine site	N			L						GS/JS	Wd	n/a
14/09/1996	1	34	34	93L10	460-5177-361	Panoramic (#4, E to W) of Coppermine L taken from mine site	NW			L						GS/JS	Wd	n/a
14/09/1996	1	35	35	93L10	460-5177-361	Panoramic (#5, E to W) of Coppermine L taken from mine site	W			L						GS/JS	Wd	n/a
14/09/1996	1	35	35	93L10	460-5177-361	Old cabin near the outlet of Coppermine L	NW			WS						GS/JS	St	n/a
14/09/1996	1	37	37	93L10	460-5177-361	Sunset over Coppermine L	W			L						GS/JS	St	n/a
15/09/1996	2	0	1	93L10	460-5177-361	Coppermine inflow from the edge of Coppermine L	Up	1		Ch						GS/JS		
15/09/1996	2	1	2	93L10	460-5177-361	Benchmark in Coppermine L	W			L	9			647157	6048020	GS/JS	St	n/a

Date	Roll	Negative	Counter	NTS Map Sheet	Watershed Code	Description	Photodocumentation Direction	Platform	Form 2 Reach	Site	Picture Type	UTM Zone	Efield	Nfield	Ecorrect	Ncorrect	Crew	Focal Length	Scale
15/09/1996	2	2	3	93L10	460-5177-361	Coppermine L outflow taken from the lake, note the structure in background	n/a				L, Ch	9	647181	6047903			GS/JS	St	n/a
15/09/1996	2	3	4	93L10	460-5177-361	Upstream limit of Coppermine outflow stream site	Dn		1	1	Ch	9					GS/JS	St	n/a
15/09/1996	2	4	5	93L10	460-5177-361	Downstream limit of Coppermine L outlet	Up		1	1	Ch	9					GS/JS	St	n/a
15/09/1996	2	5	6	93L10	460-5177-361	Meadow below the downstream limit of Coppermine L outlet site	Dn		1		Ch	9					GS/JS	St	n/a
15/09/1996	2	6	7	93L10	460-5177-361	Coppermine L from helicopter	E				WS	9					GS/JS	St	n/a
15/09/1996	2	7	8	93L10	460-5177-361	North L form helicopter	N				WS	9					GS/JS	St	n/a
15/09/1996	2	8	9	n/a	n/a	Access (helicopter) to Ceber L from Smithers along Toboggan Creek	W				O	9					GS/JS	St	n/a
15/09/1996	2	9	10	n/a	n/a	Toboggan Glacier from helicopter	S				O	9					GS/JS	St	n/a
15/09/1996	2	10	11	93L13	n/a	Shoreline area where gee trap #2 was placed in Ceber L	NW				L	9					GS/JS	St	n/a
15/09/1996	2	11	12	93L13	n/a	Shoreline area where gee trap #3 was placed in Ceber L	NE				L	9					GS/JS	St	n/a
15/09/1996	2	13	13	93L13	n/a	Tree fall to which gee trap #4 was attached in Ceber L	E				L	9					GS/JS	St	n/a
15/09/1996	2	15	15	93L13	n/a	Shoreline area where gee trap #1 was placed in Ceber L. Note the aquatic vegetation	E				L	9					GS/JS	St	n/a
16/09/1996	2	17	17	93L13	n/a	Ceber L from helicopter (south end)	W				WS	9					GS/JS	St	n/a
16/09/1996	2	16	16	93L13	n/a	Ceber L from helicopter (north end)	NW				WS	9					GS/JS	St	n/a
15/09/1996	2	18	18	93L10	n/a	Rainbow trout mortality from gillnet in Ceber L	n/a				Fi	9					GS/JS	St	10 L pail near fish's head
16/09/1996	2	19	19	93L13	n/a	Greg releasing rainbow that remained alive in gillnet in Ceber L	n/a				Fi	9					GS/JS	St	Person
16/09/1996	2	20	20	93L10	n/a	Example of invertebrate (copepods) size found in Ceber L (also in North L and Coppermine L)	n/a				O	9					GS/JS	St	persons hand
16/09/1996	2	21	21	93L13	n/a	Ceber L outlet taken from lakeshore	S				L, Ch	9			589191	6077763	GS/JS	St	person and boat
16/09/1996	2	22	22	93L13	n/a	80 cm falls in Ceber L outlet, 60 m from lake	Up		1		Ch	9					GS/JS	St	folding ruler
16/09/1996	2	23	23	93L13	n/a	Habitat and vegetation at Ceber outlet sample site. Note the abundant tree fall	Up		1	1	Ch	9					GS/JS	St	n/a
16/09/1996	2	24	24	93L13	n/a	1.8 m chute in Ceber outflow 100 m from outlet	Up		1		Ch	9					GS/JS	St	field book with scale in inches
16/09/1996	2	25	25	93L10	n/a	Downstream limit of Ceber L outlet site	Up		1	1	Ch	9					GS/JS	St	n/a
16/09/1996	2	26	26	93L13	n/a	Upstream limit of Ceber L outlet site. Note the extensive cover	Dn		1	1	Ch	9					GS/JS	St	n/a
16/09/1996	2	27	27	93L13	n/a	Ceber L inlet from the shoreline	E, Up		1		L, Ch	9			582282	6078000	GS/JS	St	n/a
16/09/1996	2	28	28	93L13	n/a	Benchmark in tree near Ceber L (note flagging tape)	N				L	9	588883	6077755			GS/JS	St	n/a
16/09/1996	2	29	29	93L13	n/a	Jack Mould L from helicopter. Note access rode in foreground and background	N				WS	9					GS/JS	St	n/a
16/09/1996	2	30	30	93L13	n/a	Jack Mould L inlet taken from the boat. Note beaver dam in background	E				L, Ch	9					GS/JS	St	n/a
16/09/1996	2	31	31	93L13	n/a	Beaver dam in Jack Mould outlet, separates lake from channel	W, Up		1		L, Ch	9					GS/JS	St	n/a
16/09/1996	2	32	32	93L13	n/a	1.2 m high beaver dam at Jack Mould L outlet	W, Up		1		L, Ch	9					GS/JS	St	note book with scale in inches

Date	Roll	Negative	Counter	NTS Map Sheet	Watershed Code	Description	Photodocumentation Platform Direction	Form 2 Reach	Site	Picture Type	UTM Zone	Efield	Nfield	Ecorrect	Ncorrect	Crew	Focal Length	Scale
16/09/1996	2	33	33	93L13	n/a	1.2 m high beaver dam in Jack Mould L outlet	W			L, Ch	9					GS/JS	St	n/a
16/09/1996	2	35	35	103I16	440-6382-012	Mulwain Creek from helicopter, also represents access to Mulwain L	NW			WS	9					GS/JS	St	n/a
16/09/1996	2	36	36	103I16	n/a	Mulwain L from helicopter	n/a			WS	9					GS/JS	St	n/a
17/09/1996	3	0	1	103I16	n/a	Moose near Mulwain L inlet	E			O	9					GS/JS	St	n/a
17/09/1996	3	1	2	103I16	n/a	Moose near Mulwain L inlet	E			O	9					GS/JS	St	n/a
17/09/1996	3	2	3	103I16	n/a	Jamie under zodiac seeking protection from the rain	NW			L, O	9					GS/JS	St	10'6" boat & person
17/09/1996	3	3	4	103I16	n/a	Benchmark in Mulwain L	SE			L	9					GS/JS	St	n/a
17/09/1996	3	4	5	103I16	n/a	Unsurveyed inflow into Mulwain L	Up			L, Ch	9					GS/JS	St	n/a
17/09/1996	3	5	6	103I16	440-6382-012	Small 0.7 m falls in Mulwain L inlet	Up	1		Ch	9					GS/JS	St	note book with scale in inches
17/09/1996	3	6	7	103I16	440-6382-012	Downstream limit of Mulwain L outlet sample site	Up	1	1	Ch	9					GS/JS	St	30 m tape
17/09/1996	3	7	8	103I16	440-6382-012	Upstream limit of Mulwain L outlet sample site	Dn	1	1	Ch	9					GS/JS	St	n/a
17/09/1996	3	8	9	103I16	440-6382-012	Example of a ground water pool discharging into Mulwain L outlet. Pool was 0.7 m above main channel	Dn	1		Ch	9					GS/JS	St	notebook with scale in inches
17/09/1996	3	9	10	103I16	440-6382-012	Large meadow at 500m mark of Mulwain L outlet	Dn	1		Ch	9					GS/JS	St	n/a
17/09/1996	3	10	11	103I16	440-6382-012	Example of meandering outlet of Mulwain L	Up	1		Ch	9					GS/JS	St	n/a
17/09/1996	3	12	13	103I16	440-6382-012	Small 100m x 30m lake immediately downstream of Mulwain L	Dn	1		Ch	9					GS/JS	St	n/a
17/09/1996	3	11	12	103I13	440-6382-012	Area where large tributary empties into Mulwain L outlet	Dn	1		Ch	9					GS/JS	St	n/a
1006/9/17	3	13	14	103I16	n/a	Mulwain L outlet taken from stream section	Up, N	1		L, Ch	9					GS/JS	St	boat in background
17/09/1996	3	14	15	103I16	n/a	Downstream limit of Mulwain L inlet sampling site	Up	1	1	Ch	9					GS/JS	St	notebook with scale in inches
17/09/1996	3	15	16	103I16	n/a	Upstream limit of Mulwain L inlet sample site	Dn	1	1	Ch	9					GS/JS	St	rain jacket and 30m tape
17/09/1996	3	16	17	103I16	n/a	End of Mulwain L Inlet at a groundwater pool	Up	1		Ch	9					GS/JS	St	n/a
17/09/1996	3	17	18	103I16	n/a	Example of how Mulwain L inlet meanders through meadow	Up	1		Ch	9					GS/JS	St	20x13 cm field chemistry case placed in grass
17/09/1996	3	18	19	103I16	n/a	Mulwain L inlet taken from edge of lake	Up	1		Ch	9					GS/JS	St	n/a
17/09/1996	3	19	20	103I16	n/a	Gee trap #5 in Mulwain L	E			L	9					GS/JS	St	n/a
17/09/1996	3	24	24	103I16	n/a	Mulwain L from helicopter	NW			WS	9					GS/JS	St	n/a
18/09/1996	4	3	3	93L13	n/a	Old beaver dam across outlet of Bud L (doesn't hold water)	Dn	1		Ch	9			586644	6078191	GS/JS	St	n/a
18/09/1996	4	4	4	93L13	n/a	Second old beaver dam across Bud L outlet (doesn't hold water)	Up	1		Ch	9					GS/JS	St	30m tape coil
18/09/1996	4	5	5	93L13	n/a	Example of how Bud L outlet flows through a meadow area immediately downstream of outlet	Up	1	1	Ch	9					GS/JS	St	person (6')
18/09/1996	4	6	6	93L13	n/a	2 m high chute/falls in Bud L outlet	Up	1	1	Ch	9					GS/JS	St	Person (6')
18/09/1996	4	7	7	93L13	n/a	Looking upstream from 500 m mark on Bud L outlet	Up	1		Ch	9					GS/JS	St	Person (6')
18/09/1996	4	8	8	93L13	n/a	Upstream limit of Bud L outlet sample site	Dn	1	1	Ch	9					GS/JS	St	n/a
18/09/1996	4	9	9	93L13	n/a	Downstream limit of Bud L outlet sample site	Dn	1	1	Ch	9					GS/JS	St	n/a
18/09/1996	4	10	10	93L13	n/a	GS electrofishing in Bud L outlet	Up	1	1	Ch	9					GS/JS	St	Person (6'1")

Date	Roll	Negative	Counter	NTS Map Sheet	Watershed Code	Description	Photodocumentation Platform	Direction	Form 2 Reach	Site	Picture Type	UTM Zone	Efield	Nfield	Ecorrect	Ncorrect	Crew	Focal Length	Scale
18/09/1996	4	11	11	93L13	n/a	Possible inlet to Bud L, no water or channel visible though		Up, XS			Ch	9					GS/JS	St	n/a
18/09/1996	4	12	12	93L13	n/a	Gee trap #1 in Bud L		S			L	9					GS/JS	St	Gee trap
18/09/1996	4	13	13	93L13	n/a	Gee trap # 3 in Bud L		NW			L	9					GS/JS	St	n/a
18/09/1996	4	14	14	93L13	n/a	Second possible inlet to Bud L. No water or channel visible		Up, S			L, Ch	9					GS/JS	St	n/a
18/09/1996	4	15	15	93L13	n/a	Shoreline area where gee trap # 5 was placed in Bud L		E			L	9					GS/JS	St	n/a
18/09/1996	4	16	16	93L13	n/a	Benchmark in Bud L. Note old high water marks		SW			L	9					GS/JS	St	n/a
19/09/1996	4	17	17	93L13	n/a	Gee trap # 5 in Bud L		E			L	9					GS/JS	St	n/a
19/09/1996	4	18	18	93L13	n/a	Gee trap # 4 in Bud L		N			L	9					GS/JS	St	Gee trap
19/09/1996	4	19	19	93L13	n/a	Shoreline area of Bud L where gee trap #2 was placed		W			L	9					GS/JS	St	n/a
19/09/1996	4	21	21	93L13	n/a	Example of invertebrates in Bud L		n/a			O	9					GS/JS	St	Note book with scale in inches
19/09/1996	4	22	22	93M3	n/a	Netalzul Meadow L from the helicopter		n/a			WS	9					GS/JC	St	n/a
19/09/1996	4	23	23	93M3	n/a	Netalzul Meadow L from the helicopter		n/a			WS	9					GS/JC	St	n/a
19/09/1996	4	24	24	93M3	n/a	Netalzul Meadow L from the helicopter		n/a			WS	9					GS/JC	St	n/a
19/09/1996	4	25	25	93M3	n/a	Netalzul Meadow L from the helicopter		n/a			WS	9					GS/JC	St	n/a
19/09/1996	4	26	26	93M3	n/a	Netalzul Meadow L from the helicopter		n/a			WS	9					GS/JC	St	n/a
19/09/1996	4	27	27	93M3	n/a	Netalzul Meadow L from the helicopter		n/a			WS	9					GS/JC	St	n/a
21/09/1996	4	28	28	93M3	n/a	Netalzul Meadow L from helicopter					WS	9					GS/JC	St	n/a
21/09/1996	4	29	29	93M3	n/a	Helicopter landing area and Netalzul Meadow inlet		Up, E			L, Ch	9					GS/JC	St	n/a
21/09/1996	4	30	30	93M3	n/a	Example of fish caught in gillnets		n/a			Fi	9					GS/JC	St	Zodiac pontoon
21/09/1996	4	31	31	93M3	n/a	Tadpoles and invertebrates captured in gee trap # 1 in Netalzul Meadow L		n/a			Fi	9					GS/JC	St	Zodiac pontoon
21/09/1996	4	32	32	93M6	n/a	Netalzul L form N end, zodiac in foreground		S			L	9					GS/JC	St	10'6" zodiac
22/09/1996	4	34	34	93M6	n/a	Netalzul L from helicopter, approached from SE end		NW			WS	9					GS/JC	St	n/a
22/09/1996	4	35	35	93M6	n/a	Netalzul L from helicopter, approached from SE end		NW			WS	9					GS/JC	St	n/a
22/09/1996	4	36	36	93M6	n/a	Netalzul L from helicopter, view of N end of lake		NW			WS	9					GS/JC	St	n/a
22/09/1996	5	1	1	93M6	n/a	Gee trap #1 in Netalzul L		N			L	9					GS/JC	St	n/a
22/09/1996	5	2	2	93M6	n/a	Example of large lake trout captured in Netalzul L gillnets		n/a			Fi	9					GS/JC	St	n/a
22/09/1996	5	3	3	93M6	n/a	Example of abundant tree-fall in Netalzul L		n/a			L	9					GS/JC	St	n/a
22/09/1996	5	4	4	93M6	n/a	Netalzul L inflow. Note abundant cover		Up	1		Ch	9					GS/JC	St	n/a
22/09/1996	5	5	5	93M6	n/a	Upstream limit of Netalzul L inflow sample site		Dn	1	1	Ch	9					GS/JC	St	n/a
22/09/1996	5	6	6	93M6	n/a	Downstream limit of Netalzul L inflow sample site		Up	1	1	Ch	9					GS/JC	St	n/a
22/09/1996	5	7	7	93M6	n/a	Panoramic (#1) looking N from lake's S end		N			L	9					GS/JC	St	n/a
22/09/1996	5	8	8	93M6	n/a	Panoramic (#2) looking N from lake's S end		N			L	9					GS/JC	St	n/a
22/09/1996	5	9	9	93M6	n/a	Panoramic (#3) looking N from lake's S end		N			L	9					GS/JC	St	10'6" zodiac

Date	Roll	Negative	Counter	NTS Map Sheet	Watershed Code	Description	Photodocumentation Direction	Station	Form2 Reach	Site	Picture Type	UTM Zone	Efield	Nfield	Ecorrect	Ncorrect	Crew	Focal Length	Scale
22/09/1996	5	10	10	93M6	n/a	Netalzul L outflow from lake's edge	S		1		L, Ch	9			624878	6128369	GS/JC	St	n/a
22/09/1996	5	11	11	93M6	n/a	Example of habitat in Netalzul L outlet	Bd		1	1	Ch	9					GS/JC	St	n/a
22/09/1996	5	12	12	93M6	n/a	lake downstream from Netalzul L	Dn		1		Ch, L	9					GS/JC	St	n/a
22/09/1996	5	13	13	93M6	n/a	Downstream limit of Netalzul lake outlet sample site	Up		1	1	Ch	9					GS/JC	St	note book
22/09/1996	5	14	14	93M6	n/a	Upstream limit of Netalzul L outflow sample site	Dn		1	1	Ch	9					GS/JC	St	notebook
22/09/1996	5	15	15	93M6	n/a	Benchmark in Netalzul lake	NE				L	9					GS/JC	St	n/a
23/09/1996	5	16	16	93M3	n/a	Helicopter access to Camp L	SW				WS	9					GS/JC	St	n/a
23/09/1996	5	17	17	93M3	n/a	Camp L from helicopter	NE				WS	9					GS/JC	Wd	n/a
23/09/1996	5	18	18	93M3	n/a	Gee trap #1 in Camp L	n/a				L	9					GS/JC	St	Side of zodiac
23/09/1996	5	19	19	93M3	n/a	Shoreline area near which gee trap #2 is placed	SW				L	9					GS/JC	St	n/a
23/09/1996	5	20	20	93M3	n/a	Tree fall where gee trap #3 is placed in Camp L	n/a				L	9					GS/JC	St	Side of zodiac
23/09/1996	5	21	21	93M3	n/a	Tree fall where gee trap #4 was placed in Camp L	n/a				L	9					GS/JC	St	n/a
23/09/1996	5	22	22	93M3	n/a	LOD where gee trap #5 was placed in Camp L	n/a				L	9					GS/JC	St	n/a
23/09/1996	5	23	23	93M3	n/a	Panoramic (#1) of Camp L from N end	NW				L	9					GS/JC	Wd	n/a
23/09/1996	5	24	24	93M3	n/a	Panoramic (#2) of Camp L from N end	NW				L	9					GS/JC	Wd	n/a
23/09/1996	5	25	25	93M3	n/a	Panoramic (#3) of Camp L from N end	W				L	9					GS/JC	Wd	n/a
23/09/1996	5	26	26	93M3	n/a	Panoramic (#4) of Camp L from N end	W				L	9					GS/JC	Wd	n/a
23/09/1996	5	27	27	93M3	n/a	Panoramic (#5) of Camp L from N end	SW				L	9					GS/JC	Wd	n/a
23/09/1996	5	28	28	93M3	n/a	Panoramic (#6) of Camp L from N end	SW				L	9					GS/JC	Wd	n/a
23/09/1996	5	29	29	93M3	n/a	Panoramic (#7) of Camp L from N end	S				L	9					GS/JC	Wd	n/a
23/09/1996	5	30	30	93M3	n/a	Dock for the hunting camp on Camp L	NE				L	9					GS/JC	St	n/a
23/09/1996	5	31	31	93M3	n/a	Road crossing on Camp L outlet, also bottom of sample site	Bd		1	1	Ch	9					GS/JC	St	n/a
23/09/1996	5	32	32	93M3	n/a	Upstream limit of Camp lake outlet sample site	Dn		1	1	Ch	9					GS/JC	St	n/a
23/09/1996	5	33	33	93M3	n/a	Black wolf shot the previous night at hunting camp	n/a				O	9					GS/JC	St	n/a
23/09/1996	5	34	34	93M3	n/a	Benchmark on Camp lake	NE				L	9	626275	6122305			GS/JC	St	n/a
23/09/1996	5	35	35	93M3	n/a	Camp L inlet taken from shoreline	NW				L, Ch	9	626275	6122305			GS/JC	St	n/a
23/09/1996	5	36	36	93M3	n/a	Camp L outlet taken from boat	S				L, Ch	9					GS/JC	St	n/a
23/09/1996	6	1	1	93M7	480-4026	Young bear swimming across Clota L	W				L	9					GS/JC	St	n/a
23/09/1996	6	2	2	93M7	480-4026	Young bear swimming across Clota L	W				L	9					GS/JC	St	n/a
24/09/1996	6	3	3	93M10		Twin L from floatplane	S				WS	9					GS/JC	Wd	n/a
24/09/1996	6	4	4	93M10		Twin L from floatplane	S				WS	9					GS/JC	Wd	n/a
24/09/1996	6	5	5	93M7	480-4026	Clota L from floatplane	S				WS	9					GS/JC	Wd	n/a
24/09/1996	6	6	6	93M7	480-4026	Clota L from floatplane	S				WS	9					GS/JC	Wd	n/a
24/09/1996	6	7	7	93M7	480-4026	Clota L from floatplane	S				WS	9					GS/JC	Wd	n/a
24/09/1996	6	8	8	93M7	480-4026	Clota L from floatplane	S				WS	9					GS/JC	Wd	n/a
24/09/1996	6	9	9	93M7	480-4026	Floatplane leaving Clota L	S				L	9					GS/JC	St	n/a
24/09/1996	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
24/09/1996	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
24/09/1996	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
24/09/1996	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
24/09/1996	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
24/09/1996	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



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24/09/1996	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
24/09/1996	6	17	17	93M7	480-4026	Extensive marshy area surrounding Clota L inlet	N				L	9					GS/JC	St	n/a
24/09/1996	6	18	18	93M7	480-4026	Beaver dam at Clota L outlet	N	1			L, Ch	9	651187	6139961			GS/JC	St	notebook
24/09/1996	6	19	19	93M7	n/a	Upstream limit of Clota L outlet sample site	Dn	1	1		Ch	9					GS/JC	St	n/a
24/09/1996	6	20	20	93M7	n/a	Downstream limit of Clota L outlet sample site	Up	1	1		Ch	9					GS/JC	St	n/a
24/09/1996	6	21	21	93M7	n/a	Substrate of Clota L outlet sample site	Bd	1	1		Ch	9					GS/JC	St	Electrofisher backpack
24/09/1996	6	22	22	93M7	480-4026	Benchmark in Clota L	E				L	9	651606	6140218			GS/JC	St	n/a
24/09/1996	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
24/09/1996	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
24/09/1996	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
24/09/1996	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
24/09/1996	6	27	27	93M7	480-4026	Panoramic (#1) of Clota L from N end going W to E	NW				L	9					GS/JC	St	Equipment on zodiac
24/09/1996	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
24/09/1996	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
24/09/1996	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
24/09/1996	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
24/09/1996	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
24/09/1996	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
25/09/1996	6	34	34	93M10	n/a	Gee trap #2 in Twin L	E				L	9					GS/JC	St	Gee trap
25/09/1996	6	35	35	93M10	n/a	Habitat in which gee trap #3 was placed in Twin L	n/a				L	9					GS/JC	St	n/a
25/09/1996	6	36	36	93M10	n/a	Gee trap #4 in Twin L	S				L	9					GS/JC	St	Gee trap
25/09/1996	6	37	37	93M10	n/a	Gee trap #5 in Twin L	n/a				L	9					GS/JC	St	Bow of zodiac
25/09/1996	7	1	1	93M10	n/a	Example of the number of fish caught in Twin L gillnets	n/a				L	9					GS/JC	St	Side of zodiac
25/09/1996	7	2	2	93M10	n/a	Only accessible site on Twin L inlet	Dn	1	1		Ch	9					GS/JC	St	n/a
25/09/1996	7	3	3	93M10	n/a	Only accessible site on Twin L inlet	Up	1	1		Ch	9					GS/JC	St	n/a
25/09/1996	7	4	4	93M10	n/a	Twin L inlet from lake shore: inaccessible	Dn, W	1			Ch, L	9	640730	6154528			GS/JC	St	n/a
25/09/1996	7	5	5	93M10	n/a	Panoramic (#1) of Twin L from S end	NE				L	9					GS/JC	St	n/a
25/09/1996	7	6	6	93M10	n/a	Panoramic (#2) of Twin L from S end	N				L	9					GS/JC	St	n/a
25/09/1996	7	7	7	93M10	n/a	Panoramic (#3) of Twin L from S end	N				L	9					GS/JC	St	n/a
25/09/1996	7	8	8	93M10	n/a	Panoramic (#4) of Twin L from S end	NW				L	9					GS/JC	St	n/a
25/09/1996	7	9	9	93M10	n/a	Panoramic (#5) of Twin L from S end	W				L	9					GS/JC	St	n/a
25/09/1996	7	10	10	93M10	n/a	Twin L outlet from boat	SE	1			L	9	640837	6154539			GS/JC	St	
25/09/1996	7	11	11	93M10	n/a	Panoramic (#1) of Twin L from N end going W to S	W				L	9					GS/JC	St	n/a
25/09/1996	7	12	12	93M10	n/a	Panoramic (#2) of Twin L from N end going W to S	W				L	9					GS/JC	St	n/a
25/09/1996	7	13	13	93M10	n/a	Panoramic (#3) of Twin L from N end going W to S	SW				L	9					GS/JC	St	n/a
25/09/1996	7	14	14	93M10	n/a	Panoramic (#4) of Twin L from N end going W to S	S				L	9					GS/JC	St	n/a

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25/09/1996	7	15	15	93M10	n/a	Panoramic (#5) of Twin L from N end going W to S		S			L	9					GS/JC	St	n/a
25/09/1996	7	16	16	93M7	n/a	Moose on shoreline of Boucher L. Note abundant macrophytes		E			L	9					GS/JC	St	n/a
26/09/1996	7	17	17	93M7	n/a	N end of Boucher L from helicopter		n/a			WS	9					GS/JC	St	n/a
26/09/1996	7	18	18	93M7	n/a	Boucher L from helicopter. Note old lake in top right corner		S			WS	9					GS/JC	St	n/a
26/09/1996	7	19	19	93M7	n/a	Looking NW from center of lake showing aquatic plant coverage		NW			L	9					GS/JC	St	n/a
26/09/1996	7	20	20	93M7	n/a	Habitat in which gee trap #1 was placed in Boucher L		n/a			L	9					GS/JC	St	n/a
26/09/1996	7	21	21	93M7	n/a	Habitat in which gee trap #2 was placed in Boucher L		n/a			L	9					GS/JC	St	bow of zodiac, gee trap
26/09/1996	7	22	22	93M7	n/a	Habitat in which gee trap #3 was placed in Boucher L		n/a			L	9					GS/JC	St	Gee trap
26/09/1996	7	23	23	93M7	n/a	Habitat in which gee trap #4 was placed in Boucher L		n/a			L	9					GS/JC	St	n/a
26/09/1996	7	25	25	93M7	n/a	Habitat in which gee trap #6 was placed in Boucher L		n/a			L	9					GS/JC	St	n/a
26/09/1996	7	26	26	93M7	n/a	Inlet to Boucher L. Note the 2 beaver dams		E			L, Ch	9			653205	6147248	GS/JC	St	n/a
26/09/1996	7	27	27	93M7	n/a	Another angle showing the aquatic vegetation infestation of Boucher L		E			L	9					GS/JC	St	n/a
26/09/1996	7	28	28	93M7	n/a	Boucher L outlet from boat		S			L, Ch	9			653289	6146103	GS/JC	St	n/a
26/09/1996	7	29	29	93M7	n/a	Beaver lodge 80 m from Boucher L outlet		S			L	9					GS/JC	St	n/a
26/09/1996	7	30	30	93M10	n/a	Upstream limit of Boucher L outlet sample site		Dn	1	1	Ch	9					GS/JC	St	notebook
26/09/1996	7	31	31	93M10	n/a	Downstream limit of Boucher L outlet sample site		Up	1	1	Ch	9					GS/JC	St	30m tape
26/09/1996	7	32	32	93M10	n/a	Example of habitat at Boucher L outlet sample site		Bd	1	1	Ch	9					GS/JC	St	30m tape
26/09/1996	7	33	33	93M10	n/a	Marsh above beaver dam at Boucher L inlet: not surveyed		E	1		L, Ch	9					GS/JC	St	n/a
26/09/1996	7	34	34	93M10	n/a	Beaver dam in Boucher L inlet		E	1		L, Ch	9					GS/JC	St	n/a
26/09/1996	7	35	35	93M10	n/a	Benchmark in Boucher L		E			L	9	653247	6146464			GS/JC	St	n/a
26/09/1996	7	36	36	93M10	n/a	Panoramic (#1) of Boucher L from S end going E to W		NE			L	9					GS/JC	St	n/a
26/09/1996	7	37	37	93M10	n/a	Panoramic (#2) of Boucher L from S end going E to W		N			L	9					GS/JC	Wd	n/a
26/09/1996	8	1	5	93M10	n/a	Panoramic (#3) of Boucher L from S end going E to W		N			L	9					GS/JC	Wd	n/a
26/09/1996	8	2	6	93M10	n/a	Panoramic (#4) of Boucher L from S end going E to W		N			L	9					GS/JC	Wd	n/a
26/09/1996	8	3	7	93M10	n/a	Panoramic (#5) of Boucher L from S end going E to W		N			L	9					GS/JC	Wd	n/a
26/09/1996	8	4	8	93M10	n/a	Panoramic (#6) of Boucher L from S end going E to W		NW			L	9					GS/JC	Wd	n/a
26/09/1996	8	5	9	93M10	n/a	Panoramic (#7) of Boucher L from S end going E to W		NW			L	9					GS/JC	Wd	n/a
26/09/1996	8	6	10	93M10	n/a	Panoramic (#8) of Boucher L from S end going E to W		NW			L	9					GS/JC	Wd	n/a
26/09/1996	8	7	11	93M10	n/a	Panoramic (#1) of Boucher L from N end going W to E		SW			L	9					GS/JC	Wd	n/a
26/09/1996	8	8	12	93M10	n/a	Panoramic (#2) of Boucher L from S end going W to E		S			L	9					GS/JC	Wd	n/a
26/09/1996	8	9	13	93M10	n/a	Panoramic (#3) of Boucher L from S end going W to E		SE			L	9					GS/JC	Wd	n/a
27/09/1996	8	11	15	93L10	n/a	Unnamed L from helicopter		E			WS	9					GS/JC	St	n/a
27/09/1996	8	12	15	93L10	n/a	S end of Unnamed L from helicopter including meandering inlet		E			WS	9					GS/JC	St	n/a

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27/09/1996	8	15	18	93L10	n/a	Gee trap #3 in littoral habitat of Unnamed L	E				L	9					GS/JC	St	Gee trap
27/09/1996	8	16	19	93L10	n/a	Littoral habitat of Unnamed L in which gee trap #4 was placed	S				L	9					GS/JC	St	n/a
27/09/1996	8	17	20	93L10	n/a	Unnamed L outlet including beaver lodge to right. Gee trap #5 placed at edge of dam	N				L	9	647527	6166191			GS/JC	Wd	n/a
27/09/1996	8	18	21	93L10	n/a	Gee trap #4 in Unnamed L	W				L	9					GS/JC	St	Gee trap
27/09/1996	8	19	22	93L10	n/a	View from behind 1m high beaver dam at Unnamed L outlet	S	1			L	9					GS/JC	St	30m tape roll
27/09/1996	8	20	23	93L10	n/a	Second beaver dam 20m below first in Unnamed L outlet	S	1			Ch	9					GS/JC	St	n/a
27/09/1996	8	21	24	93L10	n/a	Third beaver dam below second in Unnamed L outlet	S	1			Ch	9					GS/JC	St	n/a
27/09/1996	8	22	25	93L10	n/a	Fourth beaver dam below third in Unnamed L outlet	S	1			Ch	9					GS/JC	St	30m tape roll
27/09/1996	8	23	26	93L10	n/a	Downstream limit of Unnamed L outlet sample site	Up	1	1		Ch	9					GS/JC	St	30m tape roll
27/09/1996	8	24	27	93L10	n/a	Upstream limit of Unnamed L outlet sample site	Dn	1	1		Ch	9					GS/JC	St	30m tape roll
27/09/1996	8	25	28	93L10	n/a	GS electrofishing in Unnamed L outlet	XS	1	1		Ch	9					GS/JC	St	Person (6'1")
27/09/1996	8	26	29	93L10	n/a	Example of habitat in Unnamed L outlet sample site	Bd	1	1		Ch	9					GS/JC	St	Person (6'1")
27/09/1996	8	27	30	93L10	n/a	Beaver dam in Unnamed L inlet	Up, S	1			Ch, L	9					GS/JC	St	Person and notebook
27/09/1996	8	28	31	93L10	n/a	Benchmark in Unnamed L	E				L	9	651565	6054572			GS/JC	St	n/a
27/09/1996	8	29	32	93L10	n/a	Littoral habitat of Unnamed L in which gee trap #1 was placed	E				L	9					GS/JC	St	n/a
27/09/1996	8	30	33	93L10	n/a	Littoral habitat of Unnamed L in which gee trap #2 was placed	E				L	9					GS/JC	St	n/a
27/09/1996	8	32	35	93L10	n/a	Marshy area of Unnamed L Inlet: inaccessible by boat	S	1			WS, Ch	9					GS/JC	St	n/a