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 Netalzul Meadow Lake (alias); Watershed Code unknown.

Yours truly,

KLOHN-CRIPPEN CONSULTANTS LTD.

Richard Couture, R.P. Bio.
Project Manager

PW 7507 0105
970312

Province of
British Columbia

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

A RECONNAISSANCE INVENTORY OF NETALZUL MEADOW LAKE (ALIAS)

Watershed Code Unknown

FINAL REPORT

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

PW7507 0105

MARCH, 1997

EXECUTIVE SUMMARY

Klohn-Crippen Consultants Ltd. was retained by the Fisheries Branch of the Ministry of Environment, Lands and Parks (MELP) in Smithers, British Columbia, to conduct a reconnaissance survey of Netalzul Meadow Lake (alias) which lies within the Bulkley River Watershed. This lake is located approximately 40.3 km north of Smithers in a divot which lies within the Bulkley River Watershed near the top of a small mountain near the much larger Netalzul Mountain. There is no road or trail access to this lake which is also only barely accessible by helicopter.

This lake contained a significant population of Dolly Varden (*Salvelinus malma*), many of which were mature and appeared to be spawning. These fish were also of good condition and appeared healthy. The average Fulton's Condition Factor for this species was 1.06. The lake also contained a large and diverse population of invertebrates and waterfowl.

Due to the lack of access to this lake, it is unlikely that angler pressure is a management concern. Furthermore, the lake appears to be very productive and wildlife was abundant. Planned access might be considered for this lake because of its high recreational potential.

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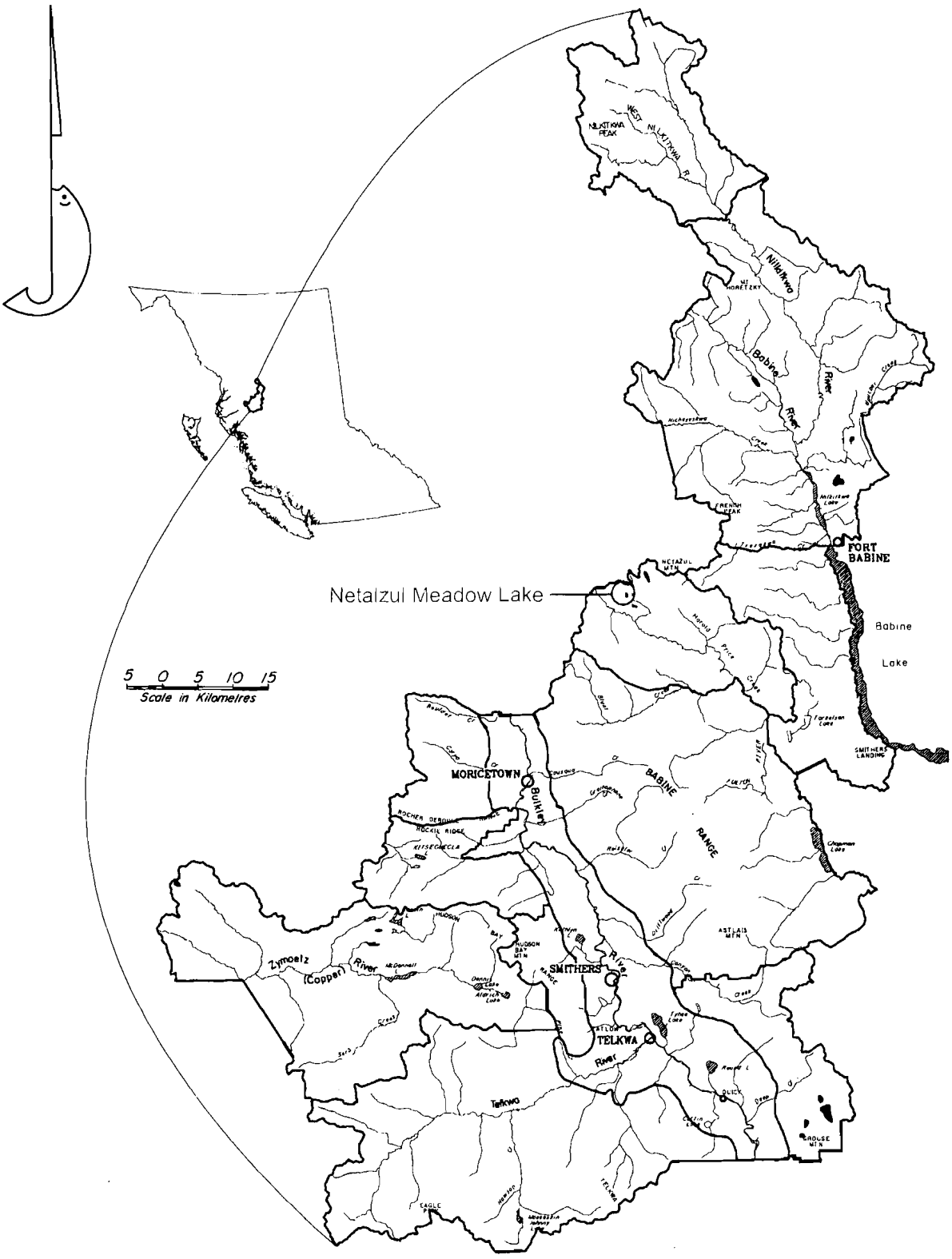
1. INTRODUCTION

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 Netalzul Meadow Lake (alias) within the Bulkley River watershed. The field survey was conducted by G. Scarborough and J. Calvert on September 19 and 21, 1996. This lake is located 40.3 km north of Smithers (Figure 1) near Netalzul Mountain, and has not previously been surveyed. The purpose of this survey was to collect fish and fish habitat information necessary for management of the resources of Netalzul Meadow Lake (alias).

Due to bad weather conditions, the field crew was prevented from accessing the lake on September 20. Therefore, fish sampling was conducted over more than 48 hours through the combination of gillnets and minnow traps left in the lake for two nights. Additionally, bad weather prevented access to the lake on September 21 until noon that day. The resulting shortness of field survey time prevented the field crew from conducting bathymetry, dissolved oxygen and temperature profiles or stream surveys for this lake. All remaining surveys were conducted according to Resource Inventory Committee (RIC) standards (Anon 1995a). Although this lake is not gazetted, it is herrein referred to as Netalzul Meadow Lake which is an alias and not the lake's official name.

The data that were collected during the field survey were entered into a digital storage medium that is stored with the lake files in the MELP office in Smithers. All photographs taken at this lake are stored in an album that is also with the lake files in the Smithers MELP office.



KLOHN-CRIPPEN

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

PROJECT: Reconnaissance Inventory of Netazul Meadow 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 and Endangered Species	√	**I: Data Forms**	√
Lake Drainage	√	**II: Water Chemistry Analysis**	√
Fisheries Management Comments	√	**III: Photograph Directory**	√
History of Previous Surveys	√	**Bathymetric Map Reduction**	
Water Chemistry Summary	√	**Bathymetric Map**	
Dissolved O_2/Temp. Profiles	√		

3. SURVEY AND ANALYTICAL METHODS

3.1 Bathymetry

Due to a shortage of time, the bathymetry of Netalzul Meadow Lake was not investigated

3.2 Stream Surveys

Due to a shortage of time, the inflow and outflow of Netalzul Meadow Lake were not investigated

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 Angling

Angling was not conducted in this lake.

3.6 Limnological Investigations

The boat was anchored approximately near the lakes deep water station and general observations on weather and surface conditions were noted. Time constraints did not permit water temperature and dissolved oxygen to be determined at 1 m intervals. Only water samples were extracted from the lake's surface (0.5m) and from 5 m with a Van Dorn water sampler. The latter depth was assumed to be located below the metalimnion. Specific conductance and pH were also determined in the field from the two 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 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 Netalzul Meadow Lake.

Dates of Survey	September 19 and 21, 1996
Watershed Name:	Bulkley River Watershed
Watershed Code:	Unknown
Watershed Area:	811,000 m^2
Location:	40.3 km north of Smithers
Elevation:	860 m (determined from TRIM Map 93M.025)
Latitude/Longitude:	lat. - 55° 14' 42" long. - 127° 3' 8"
U.T.M.:	9. 623835. 6123774
N.T.S. Map No.:	93M.3
TRIM Map No.	93M.025
Biogeoclimatic Zone:	Sub-Boreal Spruce, Moist Cold
Forest Region:	Prince Rupert
Forest District:	Bulkley
Wildlife Management Unit:	6-8
LRMP Planning Unit:	4: Harold Price
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:	Core Ecosystem
Native Land Claim Area:	Nat'oot'en First Nation, Gitskan Nation
Drainage:	Netalzul Meadow Lake > Unnamed Outflow > Netalzul Creek > Harold Price Creek > Suskwa River > Bulkley River

4.1 Lake Morphometric Data

The bathymetry of Netalzul Meadow Lake was not investigated.

4.2 Benchmark

Due to the lack of a bathymetric survey of this lake, a benchmark was not established.

4.3 Terrain Features

4.3.1 Immediate Shoreline

Netalzul Meadow Lake is forested to its shoreline for the entire perimeter by a narrow band of deciduous shrubs. Beyond this, the forest is dominated by spruce trees. The shoreline is composed almost entirely of small rocks and gravels presenting abundant suitable fish spawning habitat. The immediate lake bed substrate appeared to be composed of fines and gravel that do not contribute significantly to fish habitat. There are no extensive macrophyte ledges in this lake except for a small area near the lake's outlet. Tree fall is also relatively absent from this lake.

4.3.2 Surrounding Terrain

This lake is located in a divot on the top of a small mountain (Plate 1). The sides of this small mountain drop off quickly to both the southwest and northeast. A small lake located near Netalzul Meadow Lake but approximately 40 metres higher in elevation, drains into this lake at its northern shore.

4.3.3 Sources of Pollution

Significant sources of pollution were not noted anywhere in Netalzul Meadow Lake.

4.4 Stream Surveys

Streams were not surveyed for this inventory.

Stream #1 (Watershed Code unknown)

Stream #1 is the single outlet of Netalzul Meadow Lake. This stream begins at a small meadow (Plate 2) prior to draining into Netalzul Creek.

Stream #2 (Watershed Code unknown)

Steam #2 is the single inlet to Netalzul Meadow Lake. This stream drains a small lake located near this lake but approximately 40 metres higher in elevation.

Plate 1 View of Netalzul Meadow Lake from helicopter. (Roll #4, Negative #23)

Plate 2 View of inlet and also the only suitable helicopter landing area. (Roll #4, Negative #29)

5. LAKE ACCESS AND AREA DEVELOPMENT

5.1 Access and Directions

There appears to be no road or trail access to this lake. Therefore, access to the lake for this study was via helicopter chartered from Smithers. To reduce the amount of ferrying time required to transport all the necessary gear to the lake, a nearest-point pickup was arranged with the helicopter pilot. This pick-up point was located in a clear-cut off the side of the 2000 Forestry Services Road (FSR). This pick-up point was accessed by driving north from Smithers on Highway 16 for approximately 30 km, then turning right at Moricetown onto Causqua Creek Road. Follow this road for approximately 7.5 km then keep right and turn onto the 2000 FSR. Follow the 2000 FSR for 20 km past a series of clear-cuts, to a large clear-cut on the right where a loading area has been cleared. Netalzul Meadow Lake is a 15 minute helicopter flight north from the pick-up site but is a 25 minute helicopter flight north from Smithers. The total distance flown by the helicopter was approximately 40 km from Smithers. There are no large mountain ranges blocking a straight path from Smithers to Netalzul Meadow Lake.

The only suitable helicopter landing area on this lake is in the grassy area near the lake outlet (Figures 2 and 3 and Plate 2). The water here is up to 1.2 metres deep and were it not for submerged logs extending across the outlet, helicopter access to this lake would only be possible with floats.

5.2 Road Type and Conditions

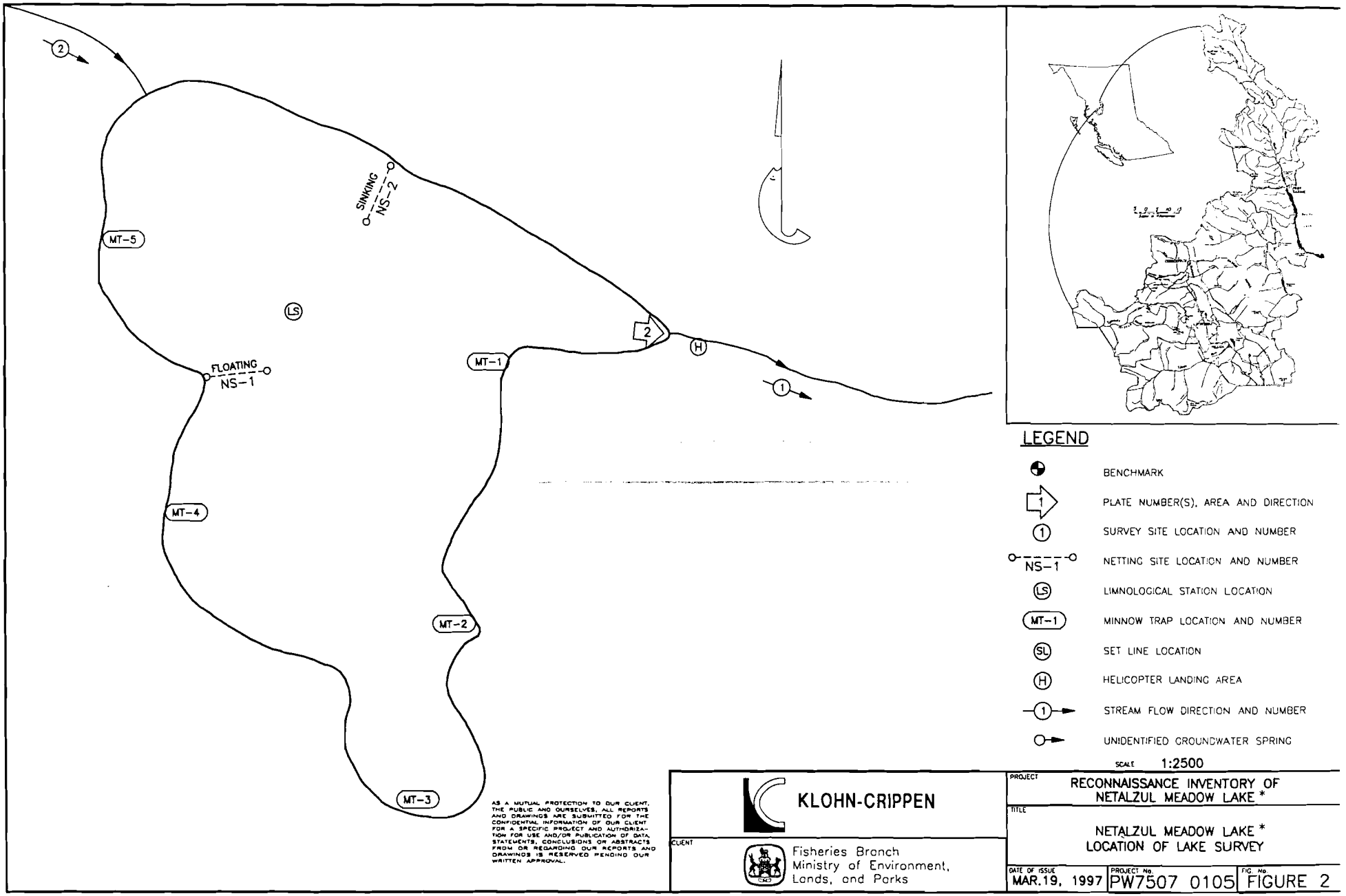
Highway 16 is paved for 30 km from Smithers to the turnoff at Moricetown. The remaining FSRs are gravel. All roads are suitable for two-wheel drive vehicles.

5.3 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. Other than the need for long helicopter landing gear to allow touching down in the marsh, there are no known aircraft restrictions for this lake.

5.4 Resorts and Campsites

None is known. Impacts on the fishery of this lake from nearby campsites/resorts are, therefore, unlikely.



LEGEND

- BENCHMARK
- 1 — PLATE NUMBER(S), AREA 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
- (SL) — SET LINE LOCATION
- (H) — HELICOPTER LANDING AREA
- (1) — STREAM FLOW DIRECTION AND NUMBER
- UNIDENTIFIED GROUNDWATER SPRING

SCALE 1:2500

KLOHN-CRIPPEN

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

PROJECT: RECONNAISSANCE INVENTORY OF NETALZUL MEADOW LAKE *

TITLE: NETALZUL MEADOW LAKE *
LOCATION OF LAKE SURVEY

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

Ⓗ - Helicopter landing area

KLOHN-CRIPPEN

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

PROJECT: Reconnaissance Inventory of Netalzul Meadow Lake*

TITLE: Air photograph enlargement (#30BCB92095 NO.203 - 234%) showing Netalzul Meadow Lake and the Helicopter landing area

DATE OF ISSUE	PROJECT No.	DWG No.	REV
March 19, 1997	PW 7507 0105	Fig. 3	G.S.

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5.5 Mining Claims

No placer or mineral claims are located near this lake.

5.6 Timber Harvests

None is known.

5.7 Waste Permits

None is known (Remington and Lough 1995).

5.8 Water Licences

None is known (Remington and Lough 1995).

5.9 Special Regulations and Restrictions

The Freshwater Fishing Regulations Synopsis (BC Environment 1996) indicates that there is a bait ban between August 1 and December 31.

6. FLORA AND FAUNA

6.1 Aquatic Plants

Aquatic plants were not noted in Netalzul Meadow Lake.

6.2 Aquatic Invertebrates

Aquatic invertebrates were fairly abundant in this lake. Specific taxa noted in Netalzul Lake include macrocrustacea (*Amphipoda sp.*), leeches (*Hirudinea sp.*) and beetles (*Coleoptera sp.*). The former taxa were particularly abundant as clusters attached to the side of gillnet fish moralities (Plate 3).

6.3 Wildlife Observations

Wildlife was fairly abundant in and around this lake. A pair of loons was nesting here and migratory ducks were also present. Moose activity was also noted along the shoreline. Tadpoles were also captured in two of the minnow traps (traps # 1 and 2) but they could not be identified (Plate 4).

6.4 Summary of Rare and Endangered Species

Rare or endangered species were not encountered in or around this lake.

Plate 3 Example of fish specimens/Dolly Varden, (*Salvelinus malma*) and invertebrate infestation of the smaller specimen's opercular plate. (Roll #4, Negative #30)

Plate 4 Example of tadpole specimens captured in minnow traps. (Roll #4, Negative #31)

7. FISH POPULATION SAMPLING

7.1 Total Fish Catch Summary

Thirty-three Dolly Varden (*Salvelinus malma*) were captured from Netalzul Meadow Lake. The sampling gear remained in the lake for almost two days, representing a total sampling time of 335 hours, 35 minutes. Therefore, the sampling gear catch per unit effort (CPUE) for this lake was relatively low given the extraordinarily long sampling period. Otoliths were removed from 30 specimens for aging purposes. Unfortunately, these aging structures were lost during shipping and so age data for the captured specimens could not be obtained.

Many of the fish captured were very large in size. This suggests that adults were mature. Furthermore, many of the females were gravid and the males showed advanced stages of gonadal maturity. This suggests that some fish were spawning at the time of this survey. However, redds were not observed along the shoreline suggesting the Dolly Varden were either spawning in obscure places along the shoreline or were spawning in the inlet and/or the outlet.

7.2 Netting Record

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 gillnet sample record for Netalzul Meadow Lake is shown in Table 1.

Table 1 Gillnet Summary

Site No.	Net type	Date set	Time set	Depths (m)		Date lifted	Time lifted	Soak time	CPUE.
				Shallow	Deep				
1	floating	96/9/19	16:45	0-2	0-2	96/9/21	15:04	46:19	1.46
2	sinking	96/9/19	17:00	0-2	2-4	96/9/21	15:34	46:34	3.05

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

7.3 Minnow Trap Record

The minnow trap sampling summary for Netalzul Meadow 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	96/9/19	16:30	0.5	Rock, LWD	96/9/21	17:00	48:30	0.0
4	2	96/9/19	16:33	0.5	Rock	96/9/21	17:05	48:32	0.0
5	3	96/9/19	16:35	0.5	Rock, LWD	96/9/21	17:10	48:35	0.0
6	4	96/9/19	16:37	0.5	Rock, LWD	96/9/21	17:15	48:38	0.0
7	5	96/9/19	16:40	0.5	LWD	96/9/21	17:20	48:40	0.0

Notes:

- See Figure 2 for location of minnow trap sample sites.
- LWD - large woody debris.
- C.P.U.E. - #fish/trap/12 hr period.

7.4 Individual Fish Data

The individual dolly varden sampling data for Netalzul Meadow Lake are shown in Table 3. Unfortunately, fish aging data are unavailable for these fish specimens.

Table 3 Individual Dolly Varden (*Salvelinus malma*) Fish Data

Site No.	Fork Length (cm)	Weight (g)	Sex	Site No.	Fork Length (cm)	Weight (g)	Sex	Site No.	Fork Length (cm)	Weight (g)	Sex
1	488	1260	F	2	429	986	M	2	488	1188	F
1	341	422	F	2	512	1170	F	2	560	1760	F
1	536	1726	M	2	459	1056	F	2	513	1272	F
1	563	1658	F	2	533	1350	F	2	322	390	F
1	392	642	F	2	419	806	F	2	489	1280	M
1	423	874	M	2	479	1078	F	2	471	1144	M
1	492	1250	M	2	552	1872	M	2	492	1506	M
1	223	140	F	2	539	1602	M	2	171	56	F
1	485	1222	F	2	485	1130	F	2	462	1024	F
1	503	1314	F	2	483	1010	F	2	471	1030	F
1	474	1086	M	2	504	1530	F	2	478	1108	F
2	433	894	M								

Notes:

- See Figure 2 for location of sample sites. Sex-M=male, F=female.

7.5 Fisheries Management Concerns

This small lake contains a substantial and large population of Dolly Varden, some of which appeared to be spawning. The average Fulton's Condition Factor for specimens was 1.06 (SD = 0.1) suggesting that the fish were of a good weight for their length (Figure 4). An abundant aquatic invertebrate population could, in part, explain the healthy size of these fish. However, stomach analysis was not included in this survey so the diet of the specimens could not be determined.

There is no road or trail access to this lake and it is located near the top of a fairly steep sided hill, making access on foot difficult. It is unlikely that angler pressure will ever be a management factor for this lake. The fishery of this lake also appears to be healthy supporting a relatively large population of mature Dolly Varden. Moreover, this lake appears to possess abundant spawning habitat as well as an abundant fish food supply so, with the limited lake access, management concerns are minimal for this lake at this time. However, the attractive viewscapes of this lake might deserve the development of future lake access which will require management.

7.6 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 4. 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.). Figure 5 indicates that almost all the fish captured in Netalzul Meadow Lake were from the 346-380 mm fork length group. The gillnets used targeted the minimum, average and maximum fish sizes and thus provided data to describe the size range for the entire fish population as a whole. Therefore, no size selection bias in the catch is discernible due to the absence of the 54 and 76 mm panels.

7.7 History of Previous Surveys

Previous surveys of Netalzul Meadow Lake do not apparently exist.

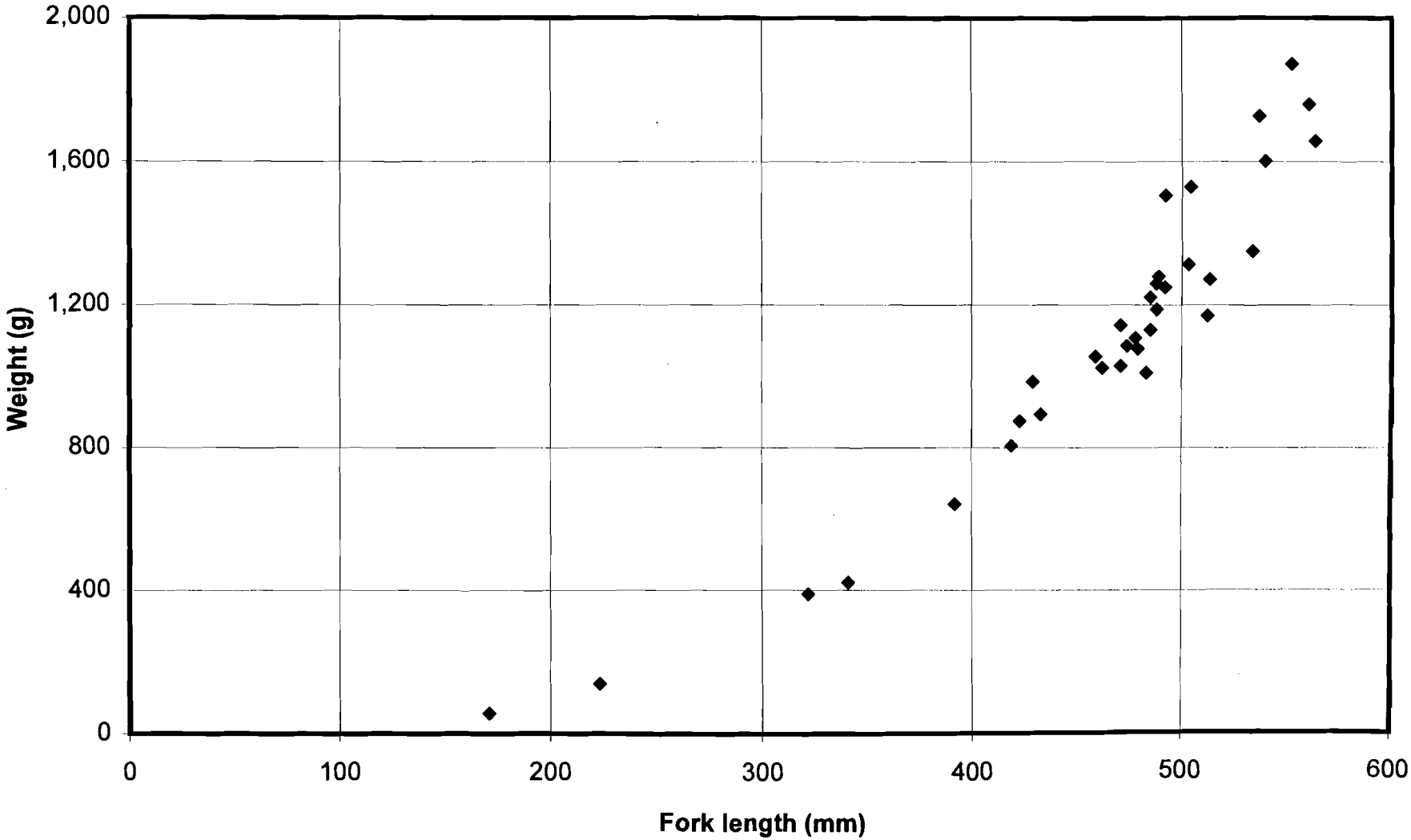

Figure 4 - Dolly Varden fork length versus weight (n = 32). Fulton's Condition Factor = 1.06 (SD = 0.1).

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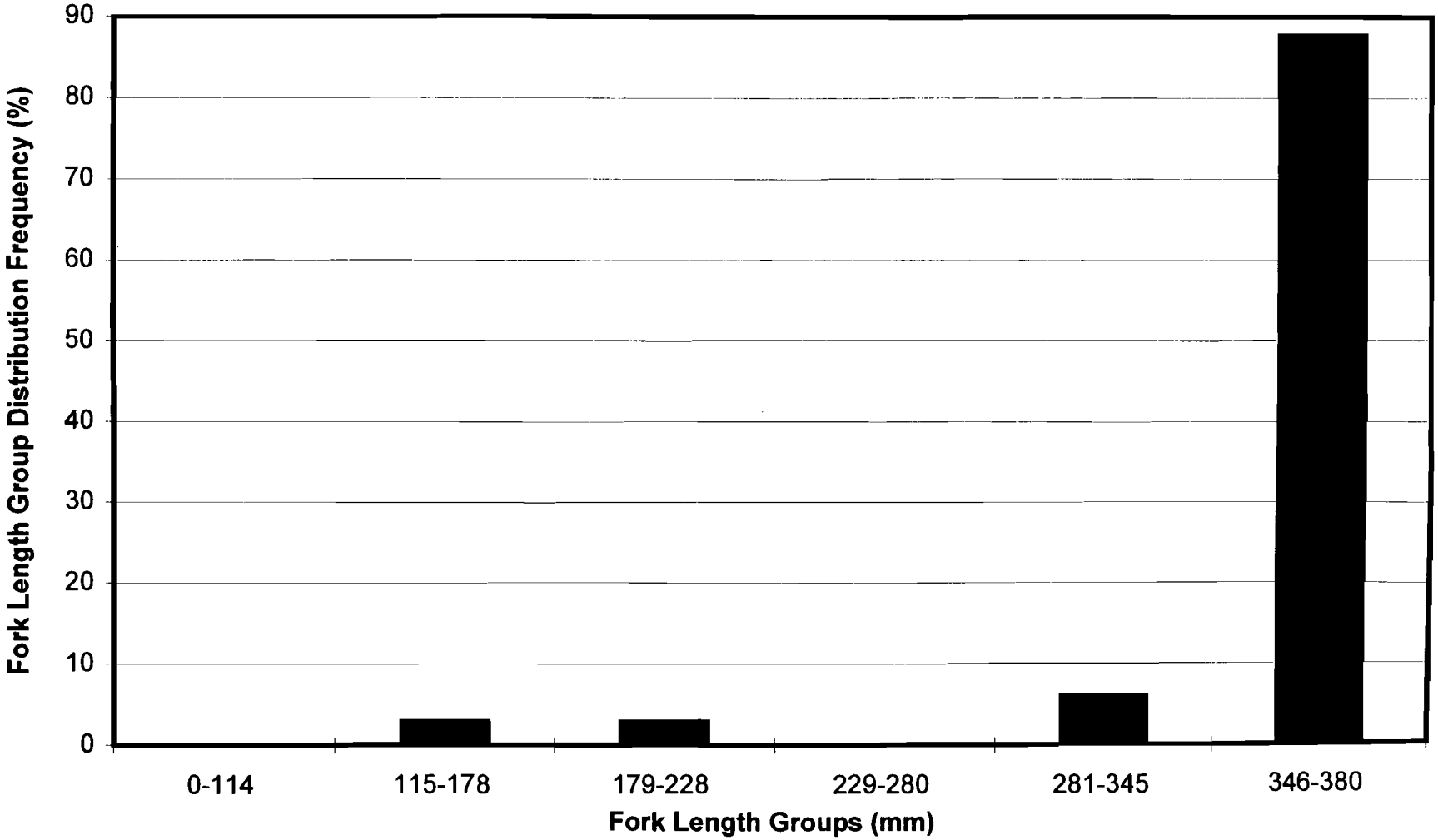

Figure 5 - Frequency distribution of Dolly Varden fork length groupings (n = 33).

8. FIELD CONDITIONS AND WATER CHEMISTRY

The following is a summary of the limnological investigations of Netalzul Meadow Lake.

Date:	September 21, 1996	**Time:**	15:50
Limnology Station:	LS	**Maximum Depth:**	Unknown
Seam Site:	e 223698	**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 water quality of Netalzul Meadow Lake was investigated on a warm, sunny day. Table 4 summarizes the field conditions at the time of this survey.

Table 4 Field Conditions

Parameter Measured	Result	Method Used
Wind Velocity (m/s)	0	Estimation
Wind Direction	n/a	Observation
Air Temperature (°C)	8°C	Glass thermometer
Cloud Cover	0%	Observation
Surface Condition	smooth	Observation
Water Color	clear/green	Observation
Water Clarity (m)	3.4	Secchi Disk

8.2 Water Chemistry

Water samples were removed from Netalzul Meadow Lake at depths of 0.5 and 5 metres. The latter depth was assumed to occur below the metalimnion. Table 5 presents a summary of the water chemistry findings from the two sample depths while Table 6 provides a summary of the water nutrient data for Netalzul Meadow Lake.

Table 5 Water Chemistry Summary

Parameter Measured	Result (0.5 m)	Result (5 m)	Method Used
Dissolved Oxygen (mg/L)	12.4	unknown	YSI model 57 O_2 meter
Water Temperature (°C)	11.2	unknown	YSI model 57 O_2 meter
pH (field)	7.6	7.2	Oakpon PH tester-2
Specific Conductance (µS/cm)	50	70	Oakpon TDS tester
Chlorophyll *a* (mg/m^3)	2.15	1.44	See Section 3
Filterable Residue(ppm)	<1	<1	See Section 3
Dissolved Sodium (ppb)	4190	4400	See Section 3
Dissolved Magnesium (ppb)	2340	2463	See Section 3
Calcium (ppb)	11600	12200	See Section 3
Alkalinity (mg/L)	75.44	72.93	See Section 3
TDS (mg/L)	104.4	101.05	See Section 3

8.3 Water Nutrient Summary

Table 6 Summary of Available Phosphorus and Nitrogen

Parameter Measured	Result (0.5 m)	Result (10 m)	Method Used
NH_3 (mg/L)	0.04	0.16	See Section 3
Total Dissolved Phosphorus (ppm)	0.02	0.03	See section 3
Total Phosphorus (ppm)	0.05	0.14	See section 3
Total Kjeldahl Nitrogen (ppm)	0.428	0.470	See section 3
N:P Ratio	8.6	3.4	Average = 6

Notes:

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

The total phosphorus concentration of this lake suggests that it has an eutrophic lake classification (Wetzel 1983). Although the N:P ratio suggests that the lake is not phosphorus limited (i.e., N:P < 15), algal abundance was high in this lake which also suggests a eutrophic state (Wetzel 1983).

8.4 Dissolved Oxygen and Temperature Data

A dissolved oxygen concentration and temperature profile was not recorded for this lake due to time constraints.

9. SUMMARY AND RECOMMENDATIONS

Netalzul Meadow Lake is located approximately 40.3 km north of Smithers in a divot near the top of a small mountain near the much larger Netalzul Mountain. There is no road or trail access to this lake and only a barely accessible helicopter landing area. Future re-visits should consider a helicopter with floats due to this narrow landing area and the fact that this lake is too small for a floatplane.

This lake contained a significant population of dolly varden, many of which were mature and appeared to be spawning. These fish were of good condition and appeared healthy. The lake also contained a large and diverse population of invertebrates and waterfowl.

Due to the lack of access to this lake, it is unlikely that angler pressure will ever be a management concern. Furthermore, the fish in this lake were abundant and appeared healthy and wildlife were also abundant. The fishery and viewscapes of this lake would be attractive to anglers and other recreational users so access management might be a consideration for the future.

Richard Couture, R.P.Bio.
Project Manager

Greg Scarborough, B.Sc.
Aquatic Ecologist

ASSOCIATION OF PROFESSIONAL BIOLOGISTS OF B.C.
Richard D. Couture
R. C.
R. P. Bio
#603
APB

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APPENDIX I

Fish Collection Data Form and Lake Biophysical Data Form

Fish Collection Data Form

Card 1 of 1

Date (yy/mm/dd): 96/9/19-21
Gazetted Name: n/a
Lake/Stream/Wetland: Lake
Sequence No.: n/a
Watershed Code: n/a

Agency: Kohn-Crippen
Alias: Netalzul Meadow Lake
Location: 40.3 km north of Smithers
Weather: sunny and warm
Reach #: n/a

Crew: GS/JC
UTM: 9.623835.6123774

Area Sampled: n/a Air Temp (C): 8 Water Temp (C): 11.2 EC ms/cm: 50-70

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 Nos.
1	GL	1	DV	n/a	341	422	1	F	n/a	n/a	
1	GL	1	DV	n/a	563	1658	2	F	n/a	n/a	
1	GL	1	DV	n/a	223	140	3	F	n/a	n/a	
1	GL	1	DV	n/a	474	1086	4	M	n/a	n/a	
1	GL	1	DV	n/a	488	1260	5	F	n/a	n/a	e223698-1
1	GL	1	DV	n/a	536	1726	6	M	n/a	n/a	e223698-2
1	GL	1	DV	n/a	392	642	7	F	n/a	n/a	e223698-3
1	GL	1	DV	n/a	423	874	8	M	n/a	n/a	e223698-4
1	GL	1	DV	n/a	492	1250	9	M	n/a	n/a	e223698-5
1	GL	1	DV	n/a	485	1222	10	F	n/a	n/a	e223698-6
1	GL	1	DV	n/a	503	1314	11	F	n/a	n/a	e223698-7
1	GL	1	DV	n/a	488	1260	12	F	n/a	n/a	
1	GL	1	DV	n/a	341	422	13	F	n/a	n/a	
1	GL	1	DV	n/a	536	1726	14	M	n/a	n/a	
1	GL	1	DV	n/a	563	1658	15	F	n/a	n/a	
1	GL	1	DV	n/a	392	642	16	F	n/a	n/a	
1	GL	1	DV	n/a	423	874	17	M	n/a	n/a	
1	GL	1	DV	n/a	492	1250	18	M	n/a	n/a	
1	GL	1	DV	n/a	223	140	19	F	n/a	n/a	
1	GL	1	DV	n/a	485	1222	20	F	n/a	n/a	
1	GL	1	DV	n/a	503	1314	21	F	n/a	n/a	
1	GL	1	DV	n/a	474	1086	22	M	n/a	n/a	
2	GL	2	DV	n/a	533	1350	23	F	n/a	n/a	
2	GL	2	DV	n/a	485	1130	24	F	n/a	n/a	
2	GL	2	DV	n/a	504	1530	25		n/a	n/a	
2	GL	2	DV	n/a	489	1280	26	M	n/a	n/a	
2	GL	2	DV	n/a	471	1144	27	M	n/a	n/a	
2	GL	2	DV	n/a	492	1506	28	M	n/a	n/a	

Klohn-Crippen

Area Sampled: n/a Air Temp (C): 8 Water Temp (C): 11.2 EC ms/cm: 50-70

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 Nos.
2	GL	2	DV	n/a	171	56	29	F	n/a	n/a	
2	GL	2	DV	n/a	462	1024	30	F	n/a	n/a	
2	GL	2	DV	n/a	471	1030	31	F	n/a	n/a	
2	GL	2	DV	n/a	433	894	32	M	n/a	n/a	
2	GL	2	DV	n/a	459	1056	33	F	n/a	n/a	e223698-10
2	GL	2	DV	n/a	419	806	34	F	n/a	n/a	e223698-11
2	GL	2	DV	n/a	479	1078	35	F	n/a	n/a	e223698-12
2	GL	2	DV	n/a	552	1872	36	M	n/a	n/a	e223698-13
2	GL	2	DV	n/a	539	1602	37	M	n/a	n/a	e223698-14
2	GL	2	DV	n/a	483	1010	38	F	n/a	n/a	e223698-15
2	GL	2	DV	n/a	488	1188	39	F	n/a	n/a	e223698-16
2	GL	2	DV	n/a	560	1760	40	F	n/a	n/a	e223698-17
2	GL	2	DV	n/a	513	1272	41	F	n/a	n/a	e223698-18
2	GL	2	DV	n/a	322	390	42	F	n/a	n/a	e223698-19
2	GL	2	DV	n/a	478	1108	43	F	n/a	n/a	e223698-20
2	GL	2	DV	n/a	429	986	44	M	n/a	n/a	e223698-8
2	GL	2	DV	n/a	512	1170	45	F	n/a	n/a	e223698-9
2	GL	2	DV	n/a	429	986	46	M	n/a	n/a	
2	GL	2	DV	n/a	512	1170	47	F	n/a	n/a	
2	GL	2	DV	n/a	459	1056	48	F	n/a	n/a	
2	GL	2	DV	n/a	533	1350	49	F	n/a	n/a	
2	GL	2	DV	n/a	419	806	50	F	n/a	n/a	
2	GL	2	DV	n/a	479	1078	51	F	n/a	n/a	
2	GL	2	DV	n/a	552	1872	52	M	n/a	n/a	
2	GL	2	DV	n/a	539	1602	53	M	n/a	n/a	
2	GL	2	DV	n/a	485	1130	54	F	n/a	n/a	
2	GL	2	DV	n/a	483	1010	55	F	n/a	n/a	
2	GL	2	DV	n/a	504	1530	56	F	n/a	n/a	
2	GL	2	DV	n/a	488	1188	57	F	n/a	n/a	
2	GL	2	DV	n/a	560	1760	58	F	n/a	n/a	
2	GL	2	DV	n/a	513	1272	59	F	n/a	n/a	
2	GL	2	DV	n/a	322	390	60	F	n/a	n/a	
2	GL	2	DV	n/a	489	1280	61	M	n/a	n/a	
2	GL	2	DV	n/a	471	1144	62	M	n/a	n/a	
2	GL	2	DV	n/a	492	1506	63	M	n/a	n/a	
2	GL	2	DV	n/a	171	56	64	F	n/a	n/a	
2	GL	2	DV	n/a	462	1024	65	F	n/a	n/a	

Klohn-Crippen

Area Sampled: n/a			Air Temp (C): 8		Water Temp (C): 11.2			EC ms/cm: 50-70			
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 Nos.
2	GL	2	DV	n/a	471	1030	66	F	n/a	n/a	
2	GL	2	DV	n/a	478	1108	67	F	n/a	n/a	
2	GL	2	DV	n/a	433	894	68	M	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.

Klohn-Crippen

Lake Biophysical Data Form

Date (yy/mm/dd): 96/9/19-21 Crew: GS/JC

Site ID

Watershed Code: n/a Sequence No.: n/a
Gazetted Name: n/a Alias: Netalzul Meadow Lake
FW Region: Prince Rupert UTM (Zone, Easting, Northing): 9.623835.6123274
Management Unit: 6-8 NTS Map No.: 93M.3

Biophysical

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

Nutrient Status

SEAM No.: e223698
Secchi depth (m): 3.4
Other samples taken: water (0.5 m - 5 m)

Limno Station No.:	1(0.5 m)	1(5 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	75.44	72.93	

Field Conditions

Wind velocity (km/h): 0 Wind direction: n/a Air temp. (c): 8
Cloud cover (/10 O.C.): 0 Surface conditions: calm Water colour: clear/green

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: Y Aquatic Plants: N

Comments:

APPENDIX II

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)
Netalzul Meadow	e223698	top	20-Sep	24-Sep	75.44	104.40	0.04	0.22	0.05	0.02
		bottom	20-Sep	24-Sep	72.93	101.05	0.16	0.22	0.14	0.03

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: Netalzul Meadow Lake

ERI Ref: 9798a

		Netalzul Meadow Lake e223698 Surface 0.5m	Netalzul Meadow Lake e223698 Surface 0.5m DUPLICATE	Netalzul Meadow Lake e223698 Surface 0.5m TRIPLICATE	Netalzul Meadow Lake e223698 Bottom	Netalzul Meadow Lake e223698 Bottom DUPLICATE	Netalzul Meadow Lake e223698 Bottom TRIPLICATE
DISSOLVED METALS							
Sodium	ppb	4190	not run	not run	4400	not run	not run
Magnesium	ppb	2340	not run	not run	2450	2490	2450
Calcium	ppb	11600	11700	11500	12200	not run	not run
PARAMETERS							
Filterable Residue	mg/L	<1	not run	not run	<1	not run	not run
Total Nitrogen	mg N/L	0.428	not run	not run	0.470	not run	not run
Chlorophyll	mg/m3	2.15	not run	not run	1.44	not run	not run

9798a.xls

Analyst: N. Turner

Appendix III

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
9/24/96	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
9/25/96	6	34	34	93M10	n/a	Gee trap #2 in Twin L	E			L	9					GS/JC	St	Gee trap
9/25/96	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
9/25/96	6	36	36	93M10	n/a	Gee trap #4 in Twin L	S			L	9					GS/JC	St	Gee trap
9/25/96	6	37	37	93M10	n/a	Gee trap #5 in Twin L	n/a			L	9					GS/JC	St	Bow of zodiac
9/25/96	7	1	1	93M10	n/a	Example of the number of fish caught in Twin L	n/a			L	9					GS/JC	St	Side of zodiac
9/25/96	7	2	2	93M10	n/a	Only accessible site on Twin L inlet	Dn	1	1	Ch	9					GS/JC	St	n/a
9/25/96	7	3	3	93M10	n/a	Only accessible site on Twin L inlet	Up	1	1	Ch	9					GS/JC	St	n/a
9/25/96	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
9/25/96	7	5	5	93M10	n/a	Panoramic (#1) of Twin L from S end	NE			L	9					GS/JC	St	n/a
9/25/96	7	6	6	93M10	n/a	Panoramic (#2) of Twin L from S end	N			L	9					GS/JC	St	n/a
9/25/96	7	7	7	93M10	n/a	Panoramic (#3) of Twin L from S end	N			L	9					GS/JC	St	n/a
9/25/96	7	8	8	93M10	n/a	Panoramic (#4) of Twin L from S end	NW			L	9					GS/JC	St	n/a
9/25/96	7	9	9	93M10	n/a	Panoramic (#5) of Twin L from S end	W			L	9					GS/JC	St	n/a
9/25/96	7	10	10	93M10	n/a	Twin L outlet from boat	SE	1		L	9	640837	6154539			GS/JC	St	
9/25/96	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
9/25/96	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
9/25/96	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
9/25/96	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
9/25/96	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