RECONNAISSANCE LAKE INVENTORY OF SKEEZER LAKE

Waterbody Identifier: 01158LIAR

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EDI Project No. 704-01

March 2001

PROJECT REFERENCE INFORMATION

Muskwa-Kechika Project Number	MK2000-01-47
FDIS Project Number	3958
FRBC Region	Omineca-Peace
MELP Region	Sub-Region 7B (Peace)
FW Management Unit	7-51
DFO Habitat Area	Northern BC Interior
Forest Region	Prince George
Forest District	Fort Nelson
Forest Licensee and Tenure #	N/A

WATERSHED INFORMATION

Watershed Group	Liard River (LIAR)
Watershed Code	210-547000-22600-82700-1560
Waterbody Identifier	01158LIAR
UTM at Lake Inlet	09.307174.6568205
Order at Lake Outlet (NTS)	4^{th}
Number of Tributaries	5
Drainage Area of Lake	4753 ha
Magnitude of Lake (NTS)	24
Elevation	1160 m
NTS Map	94M/01
TRIM Map	094M.029
BEC Zone	Spruce-Willow-Birch
Air Photo	BC5475 #165

LAKE SAMPLING SUMMARY

Lake Survey Type	Secondary
Water Surface Area	111 ha
Maximum Depth	21.0 m
Mean Depth	N/A
Secchi Depth	6
Volume	N/A
Area Above 6 m Contour	N/A
Shoreline Perimeter	6285 m
Number of Islands	0
Species Present in Lake	None
Survey Date	July 21-22, 2000

CONTRACTOR INFORMATION

Proponent:	Name:	Muskwa-Kechika Advisory Board
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	Phone:	(250) 562-5412
Field crew:	Names:	J. David Hamilton R.P.Bio., M.Sc., Robert M. Van Schubert R.P.Bio., Mary Duda, M.Sc., R.P.Bio. (Slocan Group).
Data entry by:	Names:	Robin Sharples, B.Sc., B.I.T., F.I.T.
Report prepared by:	Names:	Patrick Tobler, B.Sc. B.I.T., J. David Hamilton M.Sc, R.P.Bio.
Report edited by:	Names:	J. David Hamilton M.Sc, R.P.Bio.
Maps prepared by:	Names:	Paul Walsh
GIS services by:	Company:	*Environmental Dynamics Inc.*
	Address:	Suite 301-1705 - 3rd Avenue Prince George, B.C. V2L 3G7
	Phone:	(250) 562-5412
Genetic sample analysis by:	Name:	N/A
Voucher species ID confirmation by:	Name:	N/A
Water chemistry analysis:	Name:	N/A
Aging sample analysis:	Name:	N/A
Transportation	Name:	Canadian Helicopters
	Address:	Box 1078, Fort Nelson, BC V0C 1R0
	Phone:	(250) 774-6171

ACKNOWLEDGEMENTS

The Muskwa-Kechika Advisory Board provided funding for the majority of this inventory. Slocan Group, Fort Nelson Woodlands and Forest Renewal BC donated helicopter time necessary to complete this inventory. We would also like to thank Ms. Duda, M.Sc., R.P.Bio. (Slcoan Group – Ft. Nelson) for volunteering her time as a field crew member for a portion of the field work.

Report approved by: _____

J.D. Hamilton, M.Sc., R.P.Bio

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LIST OF ATTACHMENTS AVAILABLE AT MUSKWA-KECHIKA ADVISORY BOARD OFFICE

The following attachments to this report are available at the Muskwa-Kechika Advisory Board office in Fort St. John, B.C. The phone number and address are presented below.

Muskwa-Kechika Advisory Board
9908 100th Avenue
Fort St. John, BC
V1J 1Y5
(250) 262-0077

Attachments

I - Photo documentation
II - Digital Data
III - Phase Completion Report
IV - Field Cards
V - Aerial Photographs
VI - Fish Aging Structures
VII - Voucher Identification Forms
VIII - Planning Document
IX - FISS Data Forms and Maps

1.0 INTRODUCTION

An Overview Fish and Fish Habitat Inventory of the Vents and upper Toad rivers was conducted in July 2000 (Sharples et al. 2001). This type of fisheries inventory is intended to provide information regarding fish species presence, probable distributions within the watershed and broad habitat classification for interpretation of habitat sensitivity and capability for fish production (BC Ministry of Fisheries 1999).

As part of the Vents River inventory, a primary lake survey was conducted on Lapie Lake (Watershed Code (WSC) 210-547000-06100), and a secondary lake survey was conducted on Skeezer Lake (WSC 210-547000-22600-82700-1560. The results of the secondary lake survey detailed in this report provide baseline information on bathymetry, water quality, fisheries values, and associated lake tributary fish habitat quality.

1.1 Project Scope and Objectives

As several lake surveys had been previously conducted in the Vents River, project staff met with Ministry of Environment, Lands and Parks staff in Ft. St. John to review the existing lake survey reports and finalize the selection of the lakes to be surveyed as part of the overview inventory of the Vents River watershed. Skeezer Lake was selected for sampling as it was the next largest lake in the watershed that had yet to be surveyed.

Following the arrival of the sampling crews at Muncho Lake (the base of operations for the inventory sampling), discussions with one of the local lodge owners revealed that there were no fish in Skeezer Lake (Schildknecht, pers. comm. 2000). Therefore, the field crews made the decision to switch the primary lake sampling to Lapie Lake, as that lake was the fourth largest in the Vents River watershed and was known to support fish (refer to Sharples and Hamilton 2001). As a secondary lake survey could be accomplished within the existing field program, it was also decided that a secondary lake survey be conducted on Skeezer Lake to confirm the absence of fish and collect preliminary information on lake bathymetry and other lake characteristics (e.g., water temperature, clarity, etc.).

The lake survey methodology outlined by the Ministry of Fisheries (1998) was followed. The level of sampling intensity was modified so that gill nets and minnow traps could be left in overnight. This report details the results of the sampling carried out in July 2000.

1.2 Location

The study area lies within the 4.4 million hectare Muskwa-Kechika Management Area (M-KMA). The Muskwa-Kechika Management Area is a Special Management Area designed to allow resource development to continue while recognizing, accommodating and protecting important wildlife and environmental values in the area (BC Environment, 2000a). There had not been any major resource development in the Vents River Watershed at the time the study was conducted.

Skeezer Lake is located approximately 48 km northwest of the community of Muncho Lake, B.C. (Figure 1.1). The lake outlet forms a tributary of Berg Creek (Watershed code 210-547000-22600),

which is one of two 5th order sub-basins of the Vents River. Table 1.1 presents the survey site location summary for Skeezer Lake.

Table 1.1 Survey Site Location and Description.

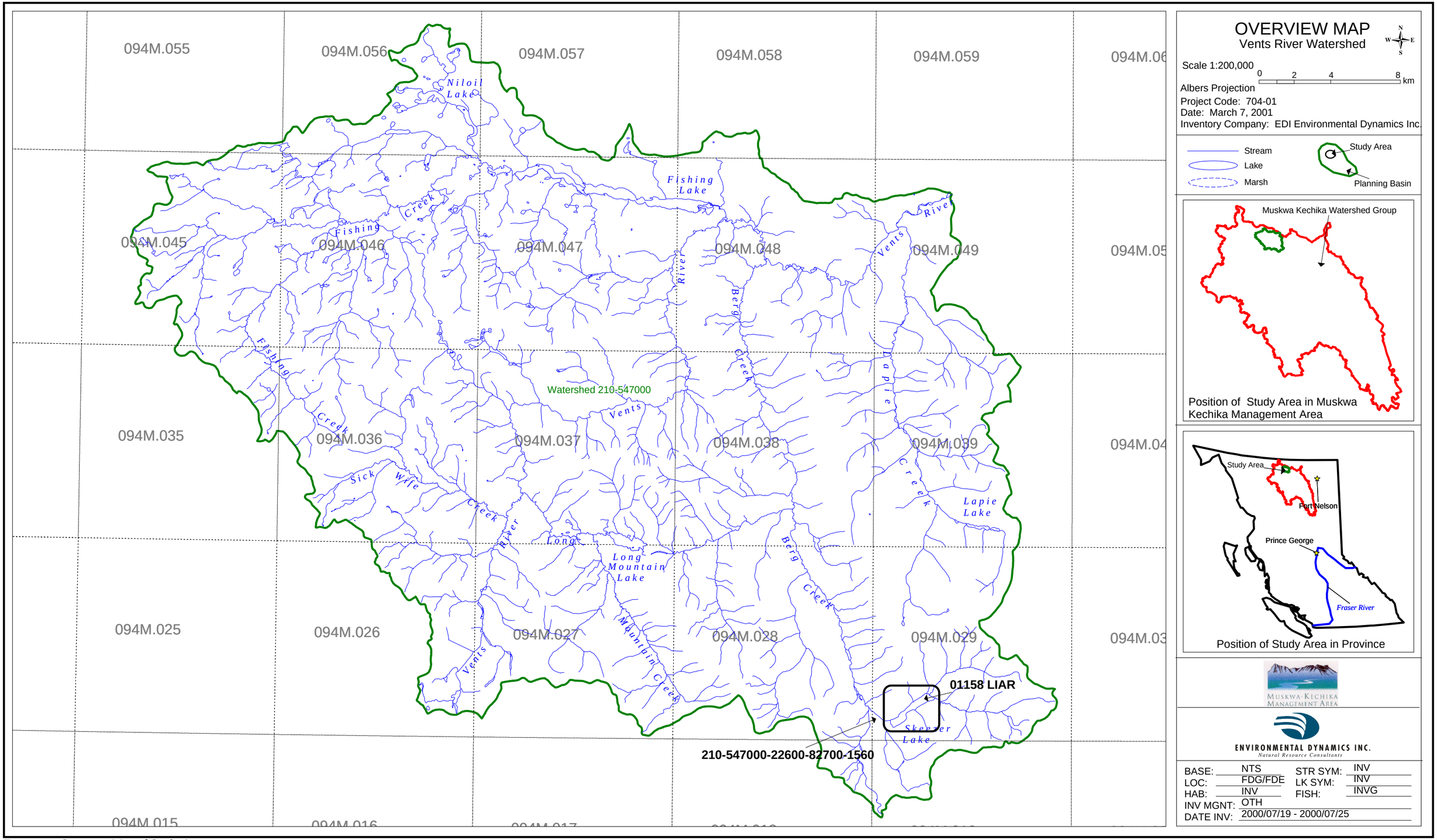
Watershed Code	UTM at Outlet	WBID	NTS / TRIM Maps	BEC[1] Zone	Lake Area (ha)	Air Photos
210-547000-22600-82700-1560	09.307174.6568205	01158LIAR	094M/01 094M.029	SWB	111	BC5475 #165

[1]Biogeoclimatic zone.

Skeezer Lake is located in the Spruce-Willow-Birch (SWB) biogeoclimatic zone. The SWB biogeoclimatic zone is a sub-alpine zone occurring at elevations above the boreal forest and below the Alpine Tundra (MacKinnon et al. 1992). At lower elevations, open forests of primarily white spruce (*Picea glauca*) and subalpine fir (*Abies lasiocarpa*) characterize the zone, while upper elevations are dominated by deciduous shrubs including scrub birch (*Betula glandulosa*) and willows (*Salix* spp.) (MacKinnon et al.1992).

1.3 Access

There is no road access within the vicinity of Skeezer Lake. A floatplane or a helicopter is required to access Skeezer Lake from Muncho Lake or Liard River BC.



OVERVIEW MAP
Vents River Watershed

Scale 1:200,000
0 2 4 8 km
Albers Projection
Project Code: 704-01
Date: March 7, 2001
Inventory Company: EDI Environmental Dynamics Inc.

Stream
Lake
Marsh

Study Area
Planning Basin

Muskwa Kechika Watershed Group

Position of Study Area in Muskwa Kechika Management Area

Study Area
Fort Nelson
Prince George
Fraser River

Position of Study Area in Province

MUSKWA-KECHIKA MANAGEMENT AREA

ENVIRONMENTAL DYNAMICS INC.
Natural Resource Consultants

BASE:	NTS	STR SYM:	INV
LOC:	FDG/FDE	LK SYM:	INV
HAB:	INV	FISH:	INVG
INV MGNT:	OTH		
DATE INV:	2000/07/19 - 2000/07/25		

Figure 1.1 Overview Map of Study Area

2.0 RESOURCE INFORMATION

An Overview Fish and Fish Habitat Inventory was conducted within the Vents River watershed in July of 2000. This inventory included the sampling of 21 streams as well as Skeezer Lake and Lapie Lake. The stream inventory surveys confirmed the presence of bulltrout (*Salvelinus confluentus*), lake whitefish (*Coregonus clupeaformis*), Arctic grayling (*Thymallus arcticus*), mountain whitefish (*Prosopium williamsoni*) and slimy sculpin (*Cottus cognatus*) within selected reaches within the Vents River watershed (Sharples et al. 2001).

In 1985 lake surveys of Fishing and Long Mountain Lakes revealed northern pike (*Esox lucius*), lake trout (*Salvelinus namaycush*), burbot (*Lota lota*), lake whitefish, and slimy sculpin (*Cottus cognatus*) in Fishing Lake and Arctic grayling and lake trout in Long Mountain Lake (Coombes 1985; 1985b). In addition, BC Environment (2000b) documented Arctic grayling, mountain whitefish, slimy sculpin, longnose sucker (*Catostomus catostomus*), burbot and bull trout in the lower portion of Vents River as well as bull trout and slimy sculpin in Lapie Creek. Northern pike were documented in Fishing Creek, approximately 500 meters upstream from Fishing Lake and lake whitefish were documented in Fishing Creek below Fishing Lake (BC Environment 2000b). No fisheries information was present for Skeezer Lake or associated tributaries.

Hunting and fishing were the only resource activity that was noted in the vicinity of Skeezer Lake during this study and several outfitter cabins were present elsewhere in the Vents River Watershed. Cabins were located on Skeezer, Lapie, Fishing, and Long Mountain lakes. As there are no roads in the watershed, hunters are flown in to the lakes by floatplane and in some cases access the area by horseback.

While there has been no major anthropogenic disturbance in the watershed, there was significant evidence of several recent (likely within the last 75 years) fires. The watershed was made up of several pure stands of lodgepole pine (*Pinus contorta*), a pioneer species that establishes after disturbances such as fire. While tree size was uniform within the stands, variation between stands indicated that a number of separate fires had impacted the watershed.

3.0 METHODS

Methodologies followed the Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures and Bathymetric Standards for Lake Inventories (BC Ministry of Fisheries 1998) and the approach outlined in the project plan (Environmental Dynamics 2000). Methods used and any deviations from the standard procedures are described below.

3.1 Sampling Equipment and Methodologies

- 4 m Polaris inflatable boat powered by a 15 hp outboard motor
- Meridata Model 100 electronic depth sounder
- Trimble Pro-XL GPS (for georeferencing depth soundings)
- YSI Model 57 oxygen/temperature meter (measured oxygen/temperature profile of water column)
- pH (field) measurement: EM Science colored pH indicator strips
- Conductivity (field) measurement: Hand-held Oakton Model TDS-TESTR 3
- Van Dorn bottle type field water sampler
- Hach H_2S field sample kit for hydrogen sulphide detection
- Six-panel 91 metre sinking monofilament gill net ranging between 25-89 mm (BC Environment standard)
- Six minnow traps
- Camera (Pentax Zoom, 35 mm) (lens focal length 38 - 90 mm)

Data entry and mapping were conducted with

- The Field Data Information System (FDIS) version 7.3 for data entry
- Microsoft Excel was used to produce graphs from the spreadsheet calculations
- Contour interpolation was conducted using Vertical Mapper software in MapInfo
- MapInfo was run on a PC based computer platform
- Air photos were digitized using an HP ScanJet 6100C scanner
- Digitized air photos were annotated using MapInfo® software

3.2 Fish Sampling

During a typical secondary lake survey, fish sampling is only conducted during the period that the crew is on the lake (BC Ministry of Fisheries 1998), which usually amounts to 4-6 hours. As it was necessary to confirm the absence of fish in Skeezer Lake, the decision was made to level the gill nets and minnow traps in overnight in order to maximize the fishing effort and effectiveness of the gear.

3.3 Bathymetric Mapping

Full bathymetric mapping of is not required as part of a secondary lake survey (BC Ministry of Fisheries 1998; 1999b). Instead, an "E"-line transects is made along the long axis of the lake to establish the maximum depth. Depth soundings of the lake bottom were taken using a Meridata Model 100 electronic depth sounder.

3.4 Annotated Air Photo

The air photo was scanned on an HP ScanJet 6100C scanner and enlarged for presentation. The unregistered raster image was imported into MapInfo® and adjusted so that the orientation of the lake in the photograph matched the orientation of the lake outline on the TRIM map. Symbols and legend were then added to the photograph. The annotated air photo was printed using an HP DeskJet 1120C colour printer.

3.5 Photodocumentation

Colour photographs of the surrounding area as well as photographs of shoreline conditions and any other significant features are presented within this report in Appendix III.

Relevant photographs of the lake are provided with a caption that includes Roll Number, Frame number, description and photo orientation. Photographs of Skeezer Lake have been scanned and copied to CD, organized in folders corresponding to roll numbers with a file name conforming to the following file naming convention: Img00001.tif, where:

- Img = Image
- 00001 = Frame number
- .tif = computer file extension

4.0 RESULTS AND DISCUSSION

4.1 Logistics

Fieldwork was conducted during the period of 21-22 July 2000. The lake was accessed by helicopter from Liard River Hot Springs, B.C. There were no logistical problems encountered during the survey that impacted the study.

4.2 Immediate Shoreline

The lakeshore was classed as 50% low rocky and 50% bluff. The only visible land use development at the time of survey was two cabins located near the northeast corner of the lake. The shoreline and water levels indicated high fluctuations in water levels in the lake. The shoreline high water mark was approximately 3 m above the water surface at time of survey. It was thought that the outlet of the lake might explain high fluctuations. Since the only outlet appeared to be a subsurface channel, it likely drains at constant rate; therefore, the lake would rise and fall depending on the inputs into the lake.

4.3 Terrain

The terrain surrounding Skeezer Lake is mountainous and dominated by coniferous forests. Species composition of vegetation varied with the aspect of the hill slopes.

4.4 Aquatic Flora

No emergent or submergent aquatic macrophytes were observed within Skeezer Lake. Some terrestrial grasses were present below the high water mark, suggesting that the lake is subject to prolonged low water periods.

4.5 Site Summary

The annotated air photo (Figure 4.1) and Lake Outline Map (Figure 4.2) illustrate the locations of gill net and minnow traps, photograph number and direction, limnological station, benchmark location and stream flow directions.

4.6 Bathymetry

Table 4.1 presents the morphometric characteristics at time of survey for Skeezer Lake. While a bathymetric map was not completed the location of the E-line is presented in Figure 4.3.

Table 4.1 Summary of lake morphometric characteristics.

Elevation (m)	Surface Area (ha)	Area Above 6 m contour (m^2)	Volume (m^3)	Mean Depth (m)	Max Depth (m)	Shoreline Perimeter (m)	Island Perimeter (m)	Benchmark Height (m)
1160	111	N/A	N/A	N/A	21	6,924	0	N/A

N/A = not applicable or not measured during secondary lake reconnaissance surveys

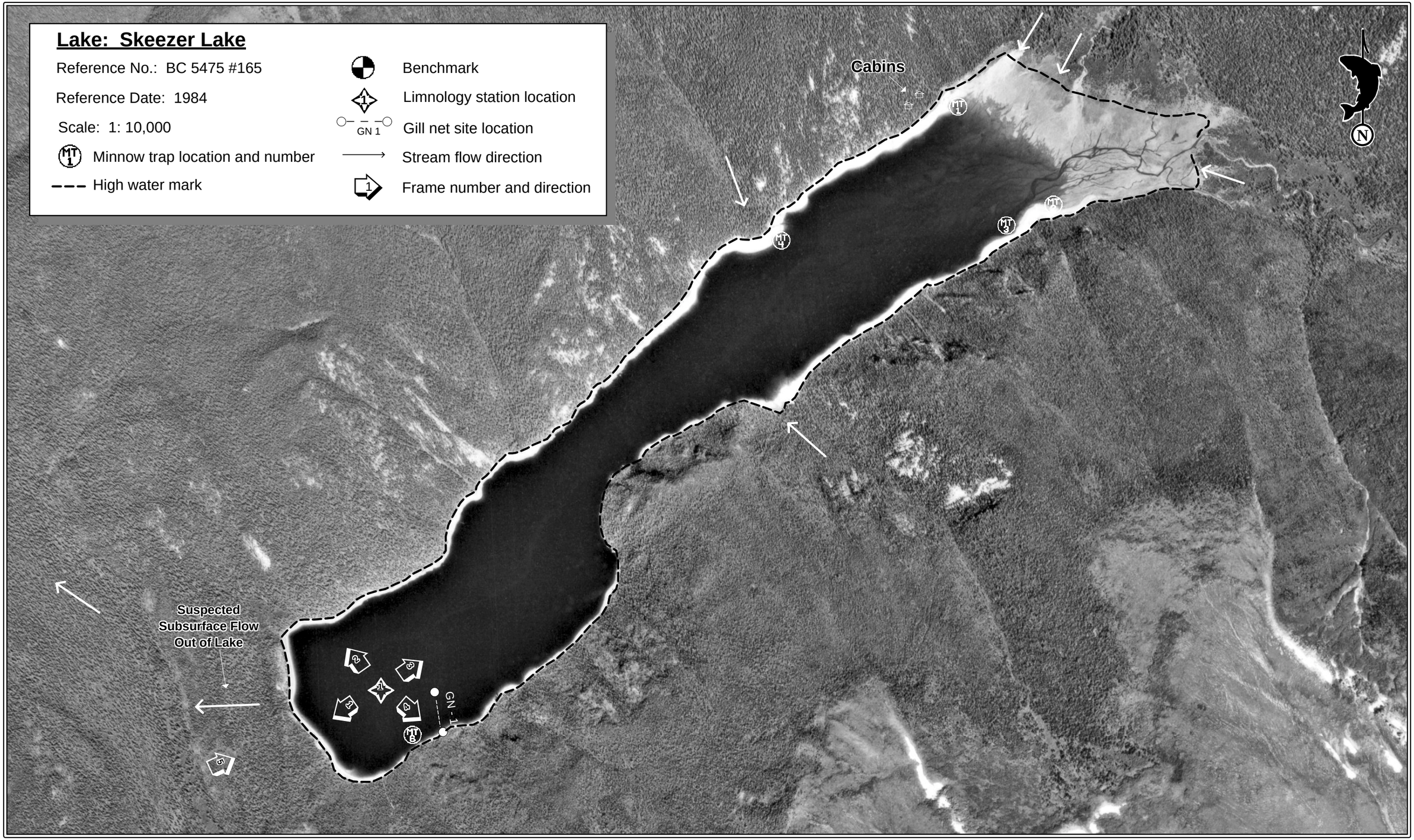
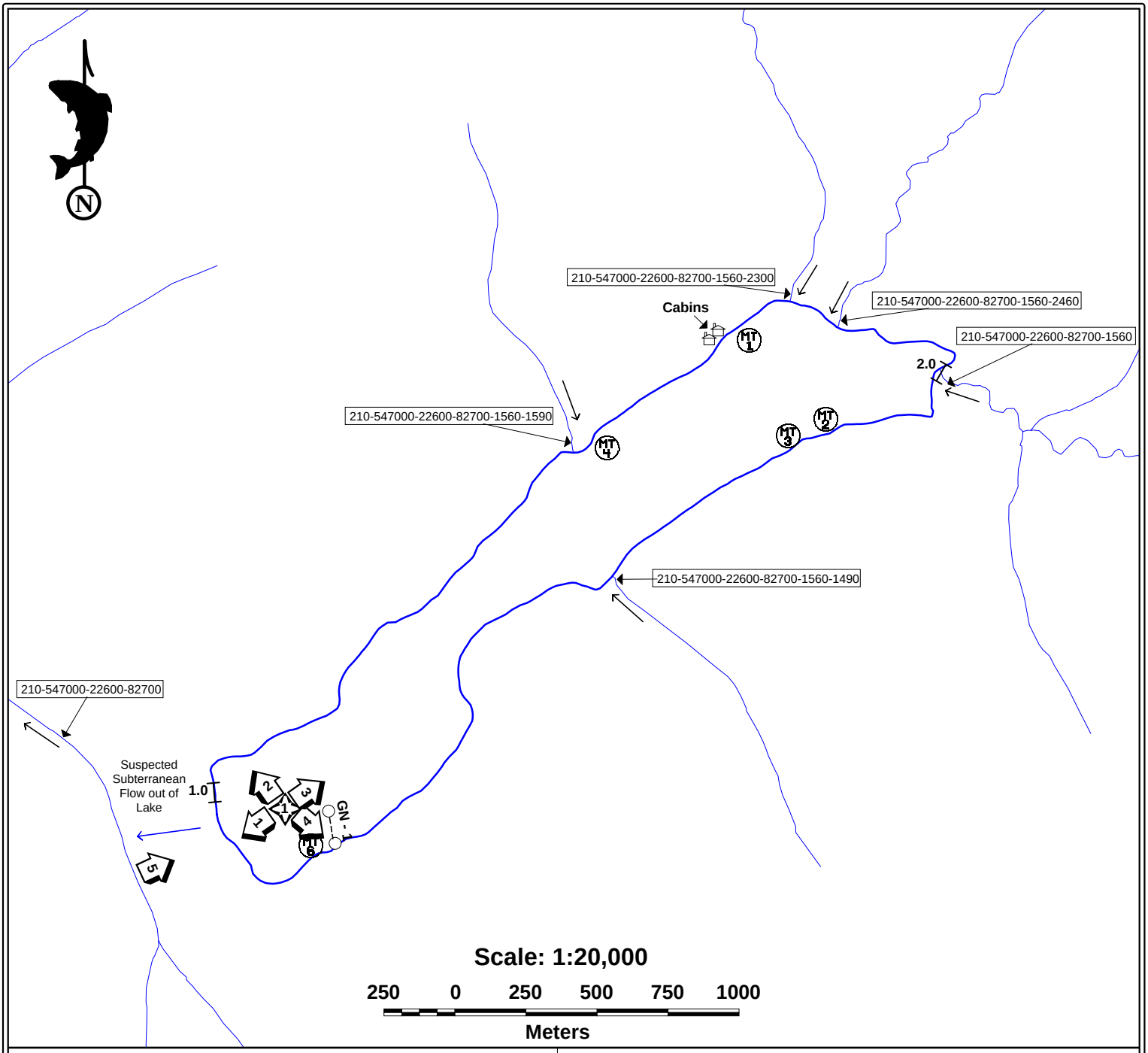


Figure 4.1 Annotated Air Photo



Skeezer Lake

Figure 4.2 Location of Sampling Sites

- Benchmark
- GN - 1 — Gill net sampling site
- MT 1 — Minnow trap site number
- 1 — Limnology station number
- 2 — Frame number and direction
- 2.0 — Upper reach break and number

TRIM Features

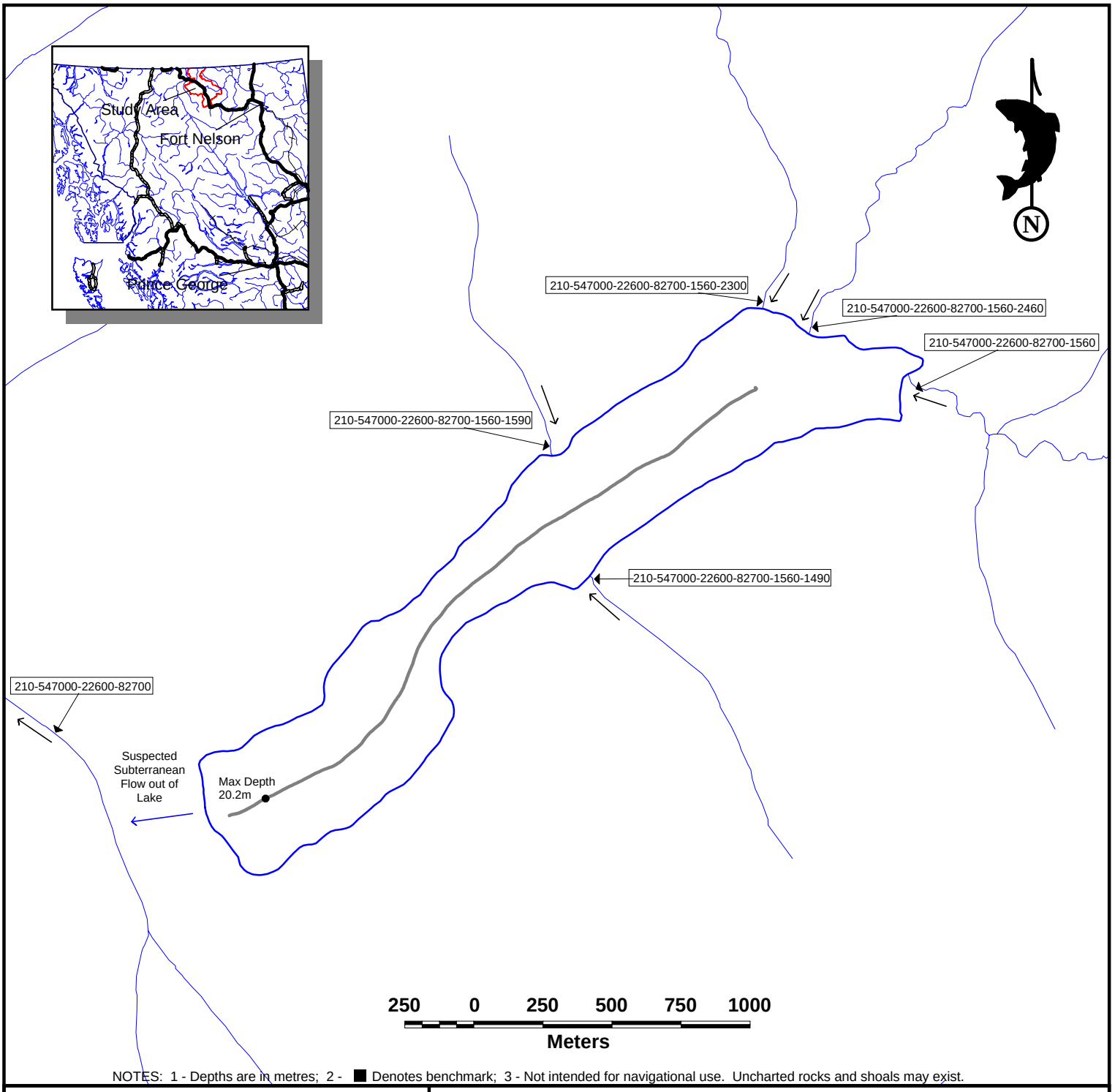
- Permanent stream direction
- Seasonal stream direction
- Swamp
- Marsh
- Lake
- Road
- Cutblock boundary
- Tributary sample site

***Angling Carried out Through Entire Lake**

Map features based on digital Terrain Resource Information Management, digital forest harvest information, and/or field survey information.

Produced by: Environmental Dynamics Inc., February 2001

2000 Secondary Lake Reconnaissance Survey of Skeezer Lake (Waterbody ID: 01158 LIAR)



NOTES: 1 - Depths are in metres; 2 - ■ Denotes benchmark; 3 - Not intended for navigational use. Uncharted rocks and shoals may exist.

SURVEYED BY: JDH / RMV / MD
OUTLINE SOURCE: 94M.029 Digital TRIM Mapsheet
DATE: July 21 - 22, 2000

Skeezer Lake

Elevation	1 129 m
Surface Area	1 175 000 m²
Area Above 6 m Contour	N/A m²
Volume	N/A m³
Mean Depth	N/A m
Maximum Depth	20.2 m
Perimeter, Main Shore	7 270 m
Perimeter, Islands	0 m
Benchmark	N/A m

Prepared for: MUSKWA - KECHIKA

By: ENVIRONMENTAL DYNAMICS INC. Natural Resource Consultants

Suite 301, 1705 - 3rd Ave.
Prince George, BC
Phone: (250)-562-5412
Fax: (250)-562-5413

WATERSHED CODE: 210-547000-22600-82700-1560		UTM COORDINATE: 9.651934.6567704	
WATERBODY ID: 01158 LIAR	DATE: February, 2001	REVISION DATE:	SCALE: 1:20,000
DIGITIZED: MapInfo	REACH NO: 2.0	APPROVED:	
CONTOURS: Vertical Mapper	MU: 7-54		NTS NO: 94M/1
TECH. CHECK: PJW	ESTIMATED ANNUAL FLUCTUATION: 3.0 m		

Figure 4.3. E Line

4.7 Limnological Sampling

Since secondary lake surveys do not require full limnological measurements to be taken, the only measurements collected were secchi depth, pH, water colour, conductivity, temperature and dissolved oxygen profiles, and hydrogen sulphide presence. The water sampling station was established at one of the deepest points of the lake (approximately 18.5 metres).

The Secchi depth was 6 meters and the water colour was green at the time of survey. Dissolved oxygen levels ranged between 10.9 mg/L at the surface and 5.3 mg/L at the bottom. A pH of 7 was recorded at the water surface.

In northern temperate climates, lakes typically experience temperature stratification in the summer months as a result of daytime heating of the water column. The result is a distinct formation of a thermocline zone where temperature drops at least 1°C with each 1 m increase in depth (Cole 1994). A weak thermocline is present between 4 and 6 m depth (Figure 4.4). This lake most likely would not develop a strong thermocline due to a number of factors. These include a high latitude (above the 59^{o} N parallel) and high elevation, the long axis of the lake is oriented in the direct of prevailing winds, and the majority of the lake was fairly shallow (i.e., < 10 m). The latter two conditions combine to create strong mixing conditions in lakes and would inhibit the formation of thermally stratified layers. A more prominent thermocline may develop later in the summer than the July 22 sampling date
.
The lake was well oxygenated from the surface to a depth of approximately 15.0 m (Figure 4.4). Above this depth the dissolved oxygen levels were well above the recommended standard of 7 mg/L required for salmonids (CCME 1996). The dissolved oxygen levels rapidly decreased to 5 mg/L at depths below 15.0 m. The decline in dissolved oxygen is most likely a result of consumption of oxygen during bacterial decomposition of organic matter in the lake sediments (Wetzel 1983). As the volume of the lake below 15.0 m would comprise only a small portion of the lake, the dissolved oxygen profile suggests that fish could utilize the majority of the lake, if fish were present in this lake.

The lack of aquatic macrophytes and the high transparency of the water column indicates that Skeezer Lake has oligotrophic conditions (Cole 1994). Oligotrophic lakes tend to have very limited inputs of inorganic nutrients, which in turn limits the phytoplankton productivity and thus the overall productivity of the lake (Wetzel 1983).

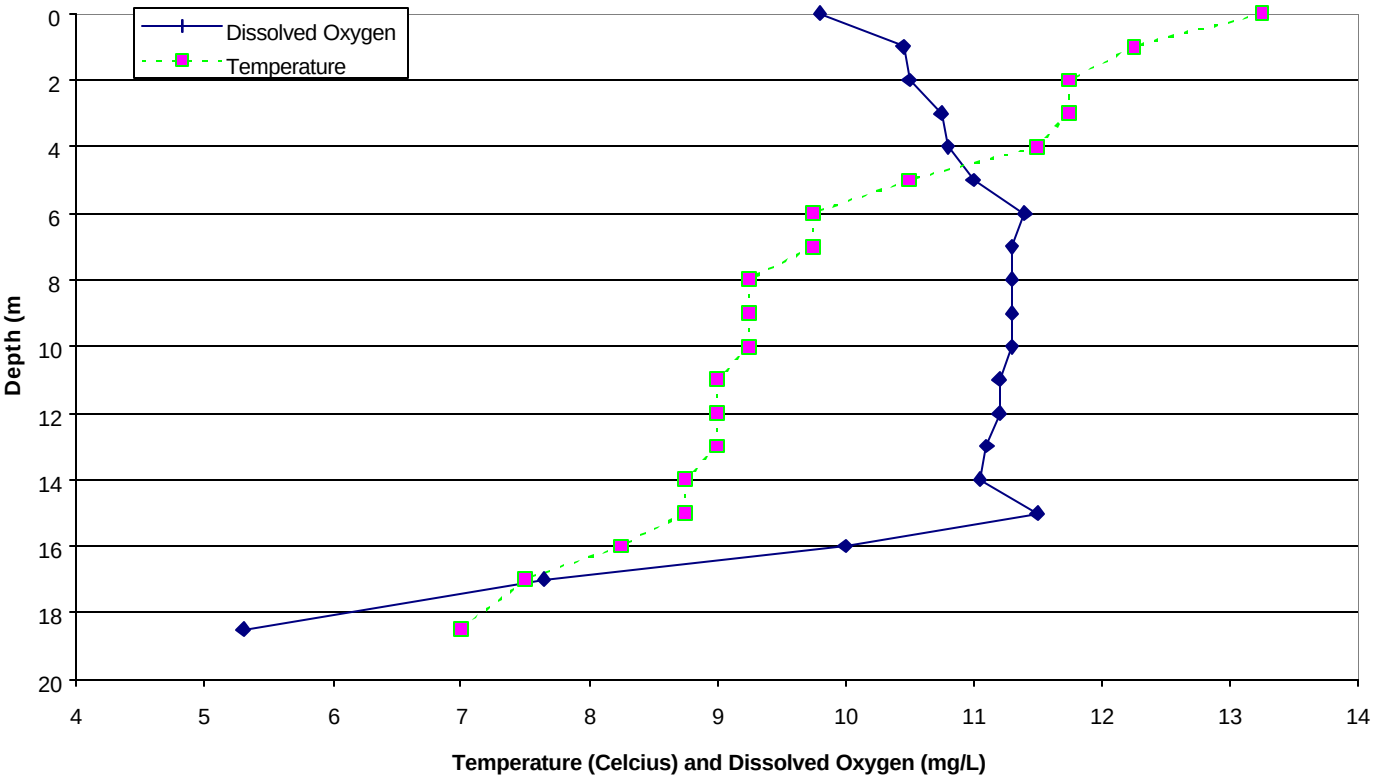


Figure 4.4 Dissolved Oxygen and Temperature Profiles of Skeezer Lake Taken on July 22, 2000.

4.8 Inlets and Outlets

Skeezer Lake has five inlet streams and a single outlet. While secondary lakes do not require tributary streams to be surveyed, field crews noted the presence of spawning habitat in the two inlets (WSC 210-547000-22600-82700-1560 and WSC: 210-547000-22600-82700-1560-2300). The other inlets had limited habitat due to small size, limited water flow, and high gradients where the streams flowed across the beach into the lake.

The lake had no surface outlet stream, although, there appears to be a subterranean outlet to this lake. At the west end of Skeezer Lake there is a ridge that blocks surface flow from leaving the lake; however, the stream immediately west of this ridge appears to form quickly into a large stream (3-5 m wide) as it cascades down the valley. It is suspected that the very large stream is probably fed from underground flows that probably originate in the very deep hole that was located in the western basin of the lake.

4.9 Fish Age, Size, and Life History

A multi-panel sinking gill net ranging between 25-89 mm and six baited Gee type minnow traps were set overnight to capture fish (Table 4.2). The multi-panel sinking gill net was set for period of 18 hours and 22 minutes and each minnow trap was set for approximately 18.5 hours. No fish were captured by any of the methods used.

Table 4.2 Summary of fish sampling in Skeezer Lake.

Site No.	Method	Set		Pulled		Species Captured[1]
		Date	Time	Date	Time	
Site 7	Sinking Gill Net	July 21	1645	July 22	1107	NFC
Site 1	Minnow Trap #1	July 21	1605	July 22	1040	NFC
Site 2	Minnow Trap #2	July 21	1610	July 22	1045	NFC
Site 3	Minnow Trap #3	July 21	1615	July 22	1050	NFC
Site 4	Minnow Trap #4	July 21	1620	July 22	1055	NFC
Site 5	Minnow Trap #5	July 21	1625	July 22	1100	NFC
Site 6	Minnow Trap #6	July 21	1630	July 22	1105	NFC

[1]NFC = no fish captured.

4.10 Significant Features and Fisheries Observations

No significant features or fisheries observations were observed on Skeezer Lake. The absence of fish precludes any sportfishing opportunities in Skeezer Lake.

4.10.1 Fish and Fish Habitat

Sampling efforts conducted within Skeezer Lake revealed the absence of fish, although suitable habitat existed in the lake. There was no surface outlet present in Skeezer Lake; however, there was evidence that there was a subsurface outlet that drained the lake. This stream below Skeezer Lake had a high gradient that was not conducive to fish passage. The high gradient and the suspected subsurface flow is a barrier to fish passage and thus has prevented fish from colonizing Skeezer Lake.

Evaluation of physical and chemical characteristics of the lake indicated a suitable environment exists for fish populations. For optimal survival, salmonids require dissolved oxygen concentrations greater than or equal to 6.5 mg/L. The dissolved oxygen concentrations were within acceptable ranges to a depth of 17 m at the time of survey (Figure 4.4); therefore, dissolved oxygen would not significantly limit the useable habitat for salmonids. In addition, a *Gammarus* sp. was captured in one of the minnow traps, which would suggest that there is a food source for fish.

4.10.2 Habitat Concerns

There were no habitat concerns identified for Skeezer Lake or the stream reaches immediately adjacent to the lake.

4.10.3 Restoration and Rehabilitation Opportunities

No potential restoration or rehabilitation opportunities were identified for Skeezer Lake.

4.11 Wildlife Observations

Golden eye (*Bucephala sp.*) were observed on this lake. In addition, a deer (species could not be determined) was observed in the vicinity of the lake. No other significant or unusual wildlife observations were noted during the survey.

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APPENDIX I

Lakes Survey Form

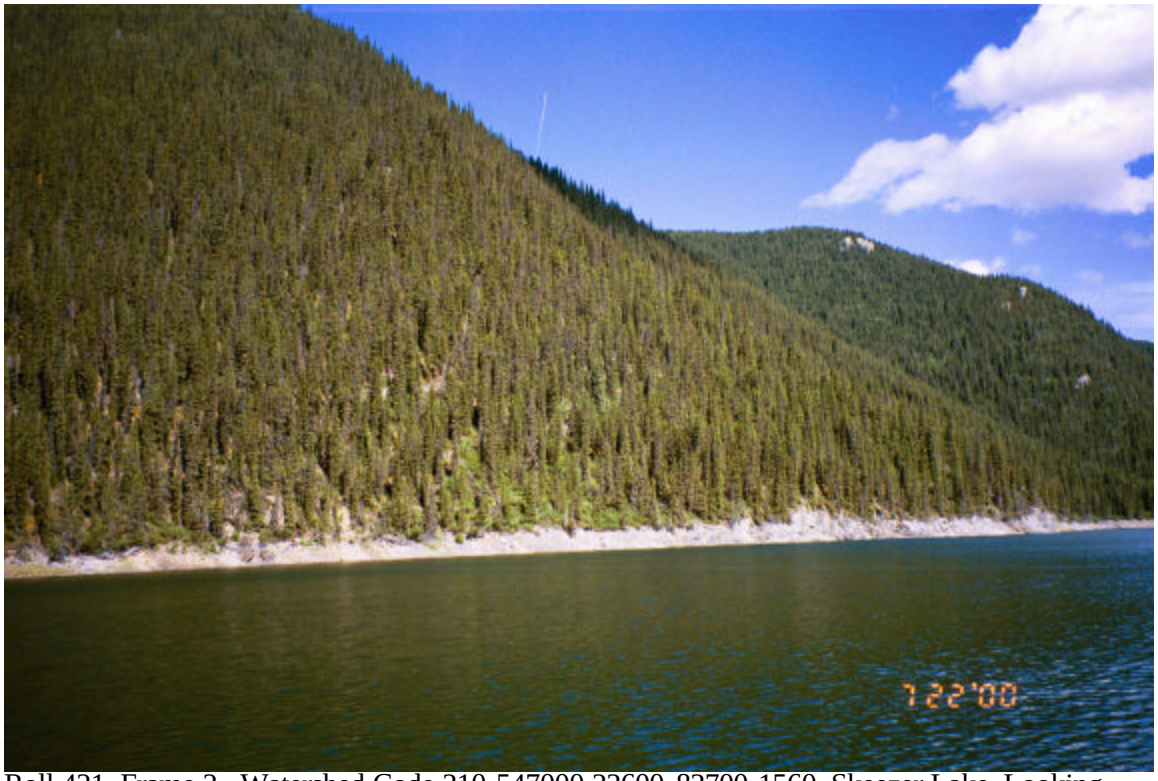
APPENDIX II

Fish Data Collection Form

APPENDIX III

Photographs

Roll 421, Frame 1. Watershed Code 210-547000-22600-82700-1560, Skeezer Lake, Looking west from limnology station.



Roll 421, Frame 2. Watershed Code 210-547000-22600-82700-1560, Skeezer Lake, Looking north from limnology station.

Roll 421, Frame 3. Watershed Code 210-547000-22600-82700-1560, Skeezer Lake, Looking east from limnology station.

Roll 421, Frame 4. Watershed Code 210-547000-22600-82700-1560, Skeezer Lake, Looking south from limnology station.

Roll 431, Frame 5. Watershed Code 210-547000-22600-82700-1560, Aerial view of west end of Skeezer Lake.