WSC #920-4628-213-000
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LAKE SURVEYS:

NANAIMO RIVER WATERSHED

JULY 1980

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Nanaimo River

Salmonid Enhancement Project

INTRODUCTION

The purpose of the lake survey program in the Nanaimo River watershed was to gather baseline data on:

1. biophysical features of the lakes
2. water quality
3. fish utilization and species and diseases present
4. to find a suitable lake pen rearing site

MATERIALS AND METHODS

Lake surveys were carried out on nineteen lakes within the Nanaimo River watershed (Fig. 1). These lakes included:

1. Barsby Lake
2. Beck Lake
3. Blackjack Lake
4. Blind Lake
5. Cassidy Gravel Pit
6. Crystal Lake
7. First Lake
8. Fourth Lake
9. Green Mountain (or Heart) Lake
10. Healy (or Panther) Lake
11. Holden Lake
12. McKay Lake
13. Myles Lake
14. Quennel Lake
15. Second Lake
16. Shelton Lake
17. Third Lake
18. Timberlands Lake
19. Williams Lake

In most cases, the write up for each lake contains a physical description

a contour map with vegetation noted, water quality data and gill net data.

PHYSICAL DESCRIPTION

The physical description of the lake contains the following information and the method by which it was determined.

NAME: Name of the lake.

DATE: Date of the survey.

LOCATION: NTS map number, latitude and longitude and the UTM number.

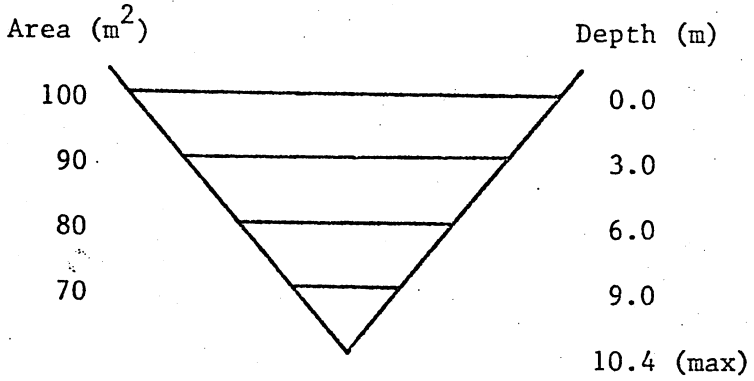
ACCESS: Recorded by the S.E.P. field technicians. All directions start from Nanaimo.

PHYSICAL DATA: Surface Area - Calculated from the survey map using a polar planimeter.
Perimeter - Calculated in metres using a map measurer.
Volume - Calculated in cubic metres using the following formula:

$$\text{Volume} = \left[\sum_{i=1}^{k} A_{i+1}(D_{i+1} - D_i) + \tfrac{1}{2}(A_i - A_{i+1})\ (D_{i+1} - D_i)\right] + \tfrac{1}{2}A_k(D_{max} - D_k)$$

Where A = the area of the contour line
D = the depth at the contour interval
k = the number of contour lines

For example:



Volume = $90(3 - 0) + \tfrac{1}{2}(100 - 90)\ (3 - 0) + 80(6 - 3) + \tfrac{1}{2}(90 - 80)\ (6 - 3) + 70(9 - 6) + \tfrac{1}{2}(80 - 70)\ (9 - 6) + \tfrac{1}{2} \times 70(10.4 - 9)$

Elevation - In metres, determined from the NTS map.

Maximum Depth - In metres, determined by the field technicians using a hand line.

Mean Depth - Calculated in metres using the formula;

$$\text{Mean Depth} = \frac{\text{Volume } (m^3)}{\text{Surface Area } (m^2)}$$

DRAINAGE: Taken from the Fish and Wildlife Branch maps or from the NTS maps.

PHYSICAL CHARACTERISTICS: Noted by the S.E.P. field technicians.

VEGETATION: Noted by the S.E.P. field technicians.

BENCHMARK: Noted and placed by the S.E.P. field technicians.

PUBLIC UTILIZATION: Noted by the S.E.P. field technicians.

COMMENTS: Noted by the S.E.P. field technicians.

CONTOUR MAP

The contour maps of the lakes were either taken from the Nanaimo Fish and Wildlife Branch or were drawn from data gathered using a hand line. The vegetation marked on the contour maps was identified and noted by the S.E.P. field technicians.

WATER QUALITY DATA

The water quality was determined by the S.E.P. field technicians. The tests and equipment included:

SECCHI DEPTH: The depth of light penetretion in metres using a secchi disc.

WATER TEMPERATURE: Taken at one metre depth intervals using a max/min thermometer or a Yellow Springs Instrument - model 33 S.C.T. metre.

DISSOLVED OXYGEN (mg/l), ALKALINITY (gr/gal) and pH: Standard Hach tests were carried out at a minimum of 2 depths. Carbon dioxide (mg/l) and hardness tests were also carried out on occasion.

CONDUCTIVITY (umhos) - Tests were carried out at each of the test depths using the Yellow Springs Instrument - model 33 S.C.T. meter. If the instrument was unavailable, a ½ litre water sample from each depth was taken back to the office for testing.

GILL NET DATA: Gill netting was carried out in only 9 of the 19 lakes. The nets used were sinking monofilament, 50 x 6 ft., 1/2, 3/4, 1, 11/2, 2, 21/2 and 3 inch mesh. All fish caught were taken to the Pacific Biological Station to be tested for diseases and parasites.

RESULTS

Disease and parasite analysis on gill net caught fish were completed at the Pacific Biological Station in Nanaimo. The results were:

Parasites:

Digenea: Crepidostomum farionis
Tetracotyle sp.

Cestoda: Diphyllobothrium sp.
Proteocephalus sp.

Acanthocephala: Neoechinorhynchus sp.

Nematoda: Rhabdochona sp.
Sterliadochona tenuissima

Trematoda: Neascus sp.

Protozoa: Myxobotus neurobius

Parasites were found in normal numbers for wild stocks - specific cases were not given.

Diseases:

The only disease found in the gill netted fish was furunculosis. There were 2 cases of the disease, one chinook smolt and one spawned out adult chinook.

NANAIMO RIVER WATERSHED

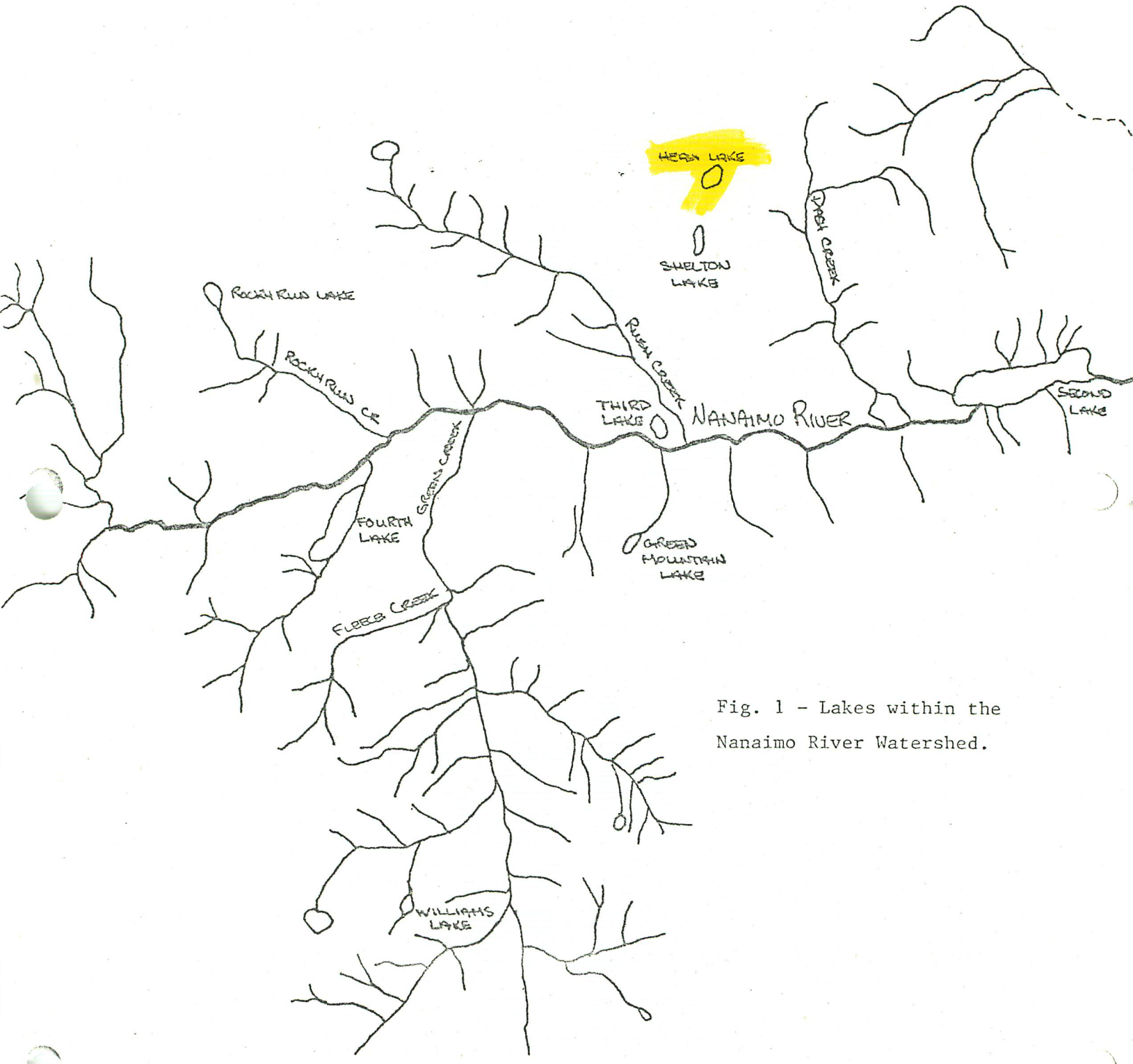
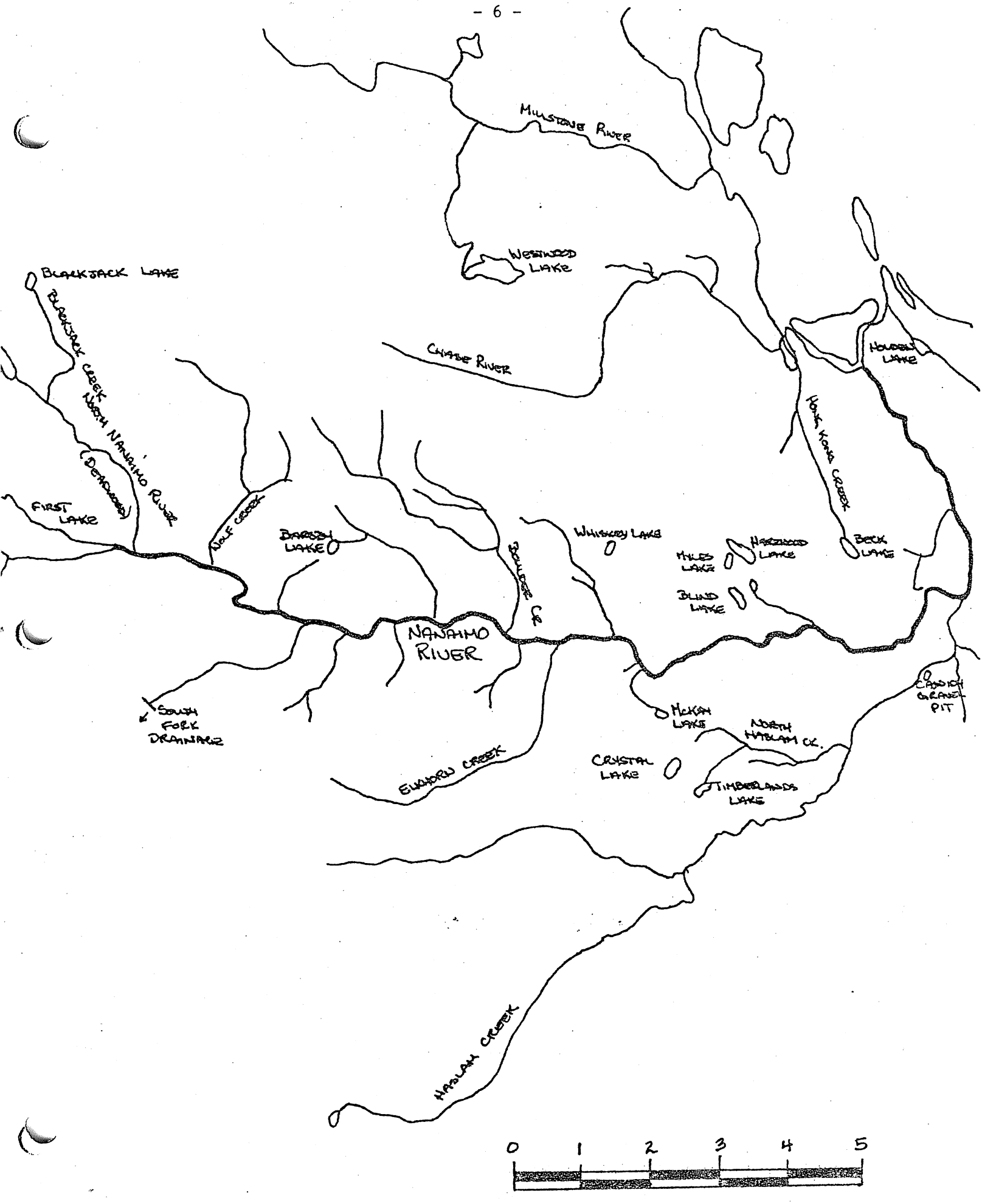
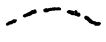


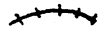
Fig. 1 - Lakes within the Nanaimo River Watershed.


MILLSTONE RIVER
WESTWOOD LAKE
BLACKJACK LAKE
BLACKJACK CREEK
NORTH NANAIMO RIVER
(DIVERSION)
CHARLIE RIVER
HOUDEN LAKE
HOWE HORN CREEK
FIRST LAKE
WOLF CREEK
BARGEY LAKE
WHISKEY LAKE
BOULDER CR
MILES LAKE
HARWOOD LAKE
BECK LAKE
BLIND LAKE
NANAIMO RIVER
SOUTH FORK DRAINAGE
MCKAY LAKE
NORTH HASLAM CK.
CADDICK GRAVEL PIT
CRYSTAL LAKE
TIMBERLANDS LAKE
ELKHORN CREEK
HASLAM CREEK
0 1 2 3 4 5

LAKE SURVEY MAP LEGEND

SYMBOLS


Road

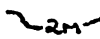

Railway

Power Transmission Line


Bridge


Building


Stream Flow Direction



Contour Line


Water Chemistry Station


Benchmark

Gill Net


Flat Shoreline


Moderate Shoreline


Steep Shoreline - 30°+


Very Steep Shoreline - 45°+


Beaver House


Beaver Dam


Picnic Site


Campsite

VEGETATION

D Alder

C Cedar

F Douglas Fir

H Hemlock

P Pine

S Sitka Spruce

W Willow


Swamp

CT Cattails

LL Leather Leaf

LP Lily Pads

DET Detritus

LAKE SURVEY

NAME: Healy (or Panther) Lake

DATE: June 11, 1979

LOCATION: NTS # 92F/1 Lat., Long. 49° 07', 124° 18' UTM # 038 437

ACCESS:
- -right off Island Highway onto Extension Road
- -go 6.2 km and turn right onto Nanaimo River Road
- -go 20.8 km to Crown Zellerbach station
- -go 4.2 km and turn right onto gravel road
- -stay on main gravel road for 10.5 km (heeding Panther Lake signs) and turn left
- -follow to lake
- -private access, check in at Crown Zellerbach office. Good roads

PHYSICAL DATA:
- Surface Area - 338,000 m^2
- Perimeter - 2396 m
- Volume - 474,898 m^3
- Elevation - 527 m
- Maximum Depth - 6.5 m
- Mean Depth - 1.4 m

Converted to metric from E. + Ab. Br. maps

DRAINAGE: South Englishman River

PHYSICAL CHARACTERISTICS:
- -marsh extends around entire lake. Marsh area less than 1 m in depth
- -bottom is gravel covered by layer of detritus
- -good outlet flow
- -there are at least 3 inlet streams
- -several meters up outlet stream is a small area of water dammed by fallen trees and debris
- -mountain side northwest of lake has been clearcut, the remaining area surrounding lake is second growth with the exception of shoreline trees which are intermittent patches of virgin timber

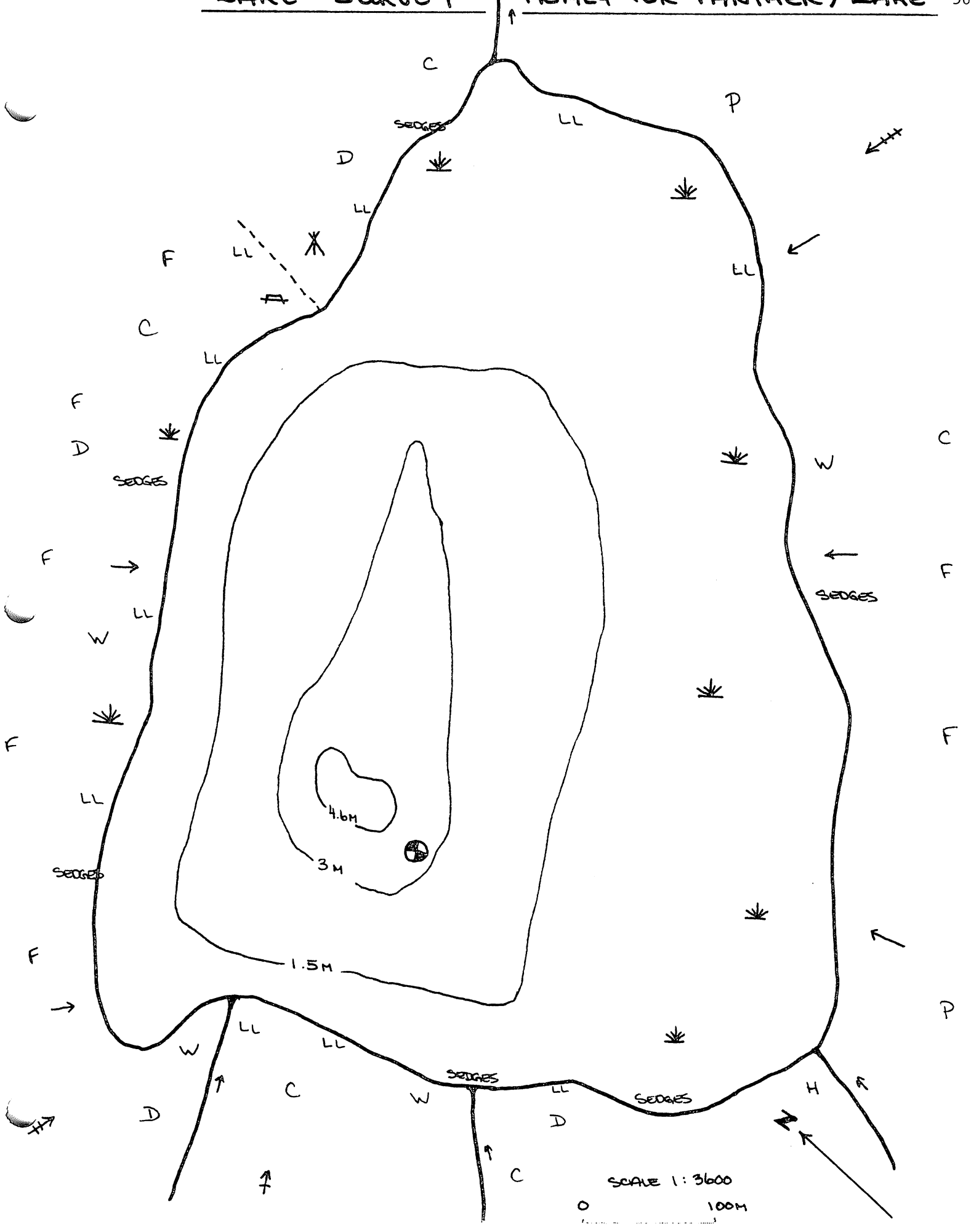
VEGETATION: -bullrushes, Canadian shield, yellow lily pads, and some cattails and buckbean emergent
-on shoreline primarily leather leaf, salal and sedges
-also skunk cabbage, willow and small alder on shoreline
-further back is 60% hemlock, 20% cedar, 10% fir and 10% pine

BENCHMARK: Done previously on snag near access, 1.7 m above water level

PUBLIC UTILIZATION: Camping area on access, has garbage can and evidence of many campfires and general litter

COMMENTS: -observed many good sized fry in dammed area on outlet
-several large splashes made by jumping fish
-observed many mallard ducks
-water is clear

LAKE SURVEY - HEALY (OR PANTHER) LAKE



LAKE SURVEYS

NAME: HEALY (OR PANTHER) LAKE

DATE: June 11, 1979
STN NO: 1
AIR TEMP: 4°C
WEATHER: DRIZZLE
% CLOUD COVER: 100%
WAVE HEIGHT: RIPPLED
SECCHI DEPTH: 2.6 M
THERM DEPTH:

DEPTH	TEMP	D.O. (mg/l)	ALK (gr/gal)	COND (umhos)	pH
SURFACE	17.0				
1	17.0	8	1	24	6.8
2	17.0				
3	17.0	8	2	23	6.5
4	17.0				

DATE: August 1, 1979
STN NO: 1
AIR TEMP: 21°C
WEATHER: SUNNY
% CLOUD COVER: 20%
WAVE HEIGHT: RIPPLED
SECCHI DEPTH: TO BOTTOM +
THERM DEPTH:

DEPTH	TEMP	D.O. (mg/l)	ALK (gr/gal)	COND (umhos)	pH
SURFACE	21.5				
1	21.0	8	2		7.0
2	20.5				
3	20.0	8	2		6.9

DATE:
STN NO:
AIR TEMP:
WEATHER:
% CLOUD COVER:
WAVE HEIGHT:
SECCHI DEPTH:
THERM DEPTH:

DEPTH	TEMP	D.O. (mg/l)	ALK (gr/gal)	COND (umhos)	pH

DATE:
STN NO:
AIR TEMP:
WEATHER:
% CLOUD COVER:
WAVE HEIGHT:
SECCHI DEPTH:
THERM DEPTH:

DEPTH	TEMP	D.O. (mg/l)	ALK (gr/gal)	COND (umhos)	pH