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92-08-31

Small Lake Enhancement Feasibility Study

Vancouver Island

M.U. 1-4

Quamichan Lake

Prepared By:

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Ministry of Environment

Victoria, British Columbia

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1. INTRODUCTION

Quamichan Lake is a high use lake with limited natural recruitment. The lake is estimated to presently support 2,000 angler days annually. Recent hatchery records (1980-85) indicate the lake is stocked annually with up to 10,000 yearling cutthroat trout (Salmon clarki clarki).

On July 2 and 3, 1985, Fisheries Improvement Unit personnel conducted a biophysical assessment of Quamichan Lake and associated tributaries as part of a small lake enhancement feasibility study in M.U. 1-4. The purpose was to assess the feasibility of enhancing a natural fish production in small lakes with public road access, and to provide a preliminary prescription for fisheries enhancement.

2. LOCATION AND PUBLIC ACCESS

Quamichan Lake is located about 3 km east of Duncan (Figure 1). Map and air photo reference numbers are 92B/13E and BC 7760:127, respectively. A municipal park on the south shore provides public access to Quamichan Lake. A boat launch and picnic sites are provided for day use. No campsites are available.

3. LAKE MORPHOMETRY

A reduced bathymetric map of Quamichan Lake is presented in Figure 2. Quamichan Lake is a large, shallow lake of approximately 313.4 surface ha situated at an elevation of 30.5 m. The shoal area encompasses 55% (172.2 ha) of the lake's surface area. A new bench mark was established on a large rock at the north end of the island and measured 1.0 m above water level on July 2, 1985. Maximum depth measured in July, 1985 was 7.5 m, compared with 8.25 m measured on May 2, 1972.

4. INLET AND OUTLET STREAMS

The lake has one major outlet stream, Quamichan Creek, a tributary to the Cowichan River. This stream is considered marginal for salmonid spawning because of minimal velocities and soft mud or peat substrate. The low

gradient, slough-like habitat likely does not provide significant recruitment of trout to Quamichan Lake.

Inlet streams, MacIntyre and Elkington Creeks, were dry during July, 1985. These seasonal streams at the north end of the lake likely provide limited recruitment to Quamichan Lake with spawning occurring during the late winter high flow period (R. Ptolemy, pers. comm.).

5. WATER QUALITY

Quamichan Lake is eutrophic with high nutrient levels. Water chemistry results are included as Appendix I. The lake has a T.D.S. of 70-76 mg/L, a pH of 7.5-8.0 and a Secchi depth of 2.0 m recorded on July 2, 1985. The lake was not stratified on July 2 (Appendix II). Water temperature ranged from 21.5°C at the surface to 19.5°C at 7.5 m depth. Surface and bottom dissolved oxygen measurements were 10.0 and 0.10 ppm, respectively.

6. FISH SPECIES PRESENCE, DISTRIBUTION AND GROWTH

A standard 6-panel experimental monofilament gill net was set in Quamichan Lake near its north end and fished for 3 hours. Six cutthroat trout and five brown bullheads (Ictalurus nebulosus) were captured. The gill net report provides length, weight, and age data (Appendix III). Cutthroat trout up to 34.5 cm were captured with the following length-age characteristics: 34.5 cm - 3+, 33.3 cm - 3+, 28.1 cm - 2+, 28.0 cm - 2+ 27.3 cm - 2+, 23.7 cm - 2+.

7. RECRUITMENT POTENTIAL vs. THEORETICAL CAPACITY

The theoretical annual capacity of Quamichan Lake is 36,710 yearling trout resulting in approximately 22,000 catchable fish (Facchin 1983). To sustain an annual fishery providing 2,000 angler days with a success rate of 0.9 fish/angler day and a 30% exploitation rate, the lake would have to be stocked with 10,000 yearling fish.

Low natural recruitment potential is attributed to limited spawning habitat area.

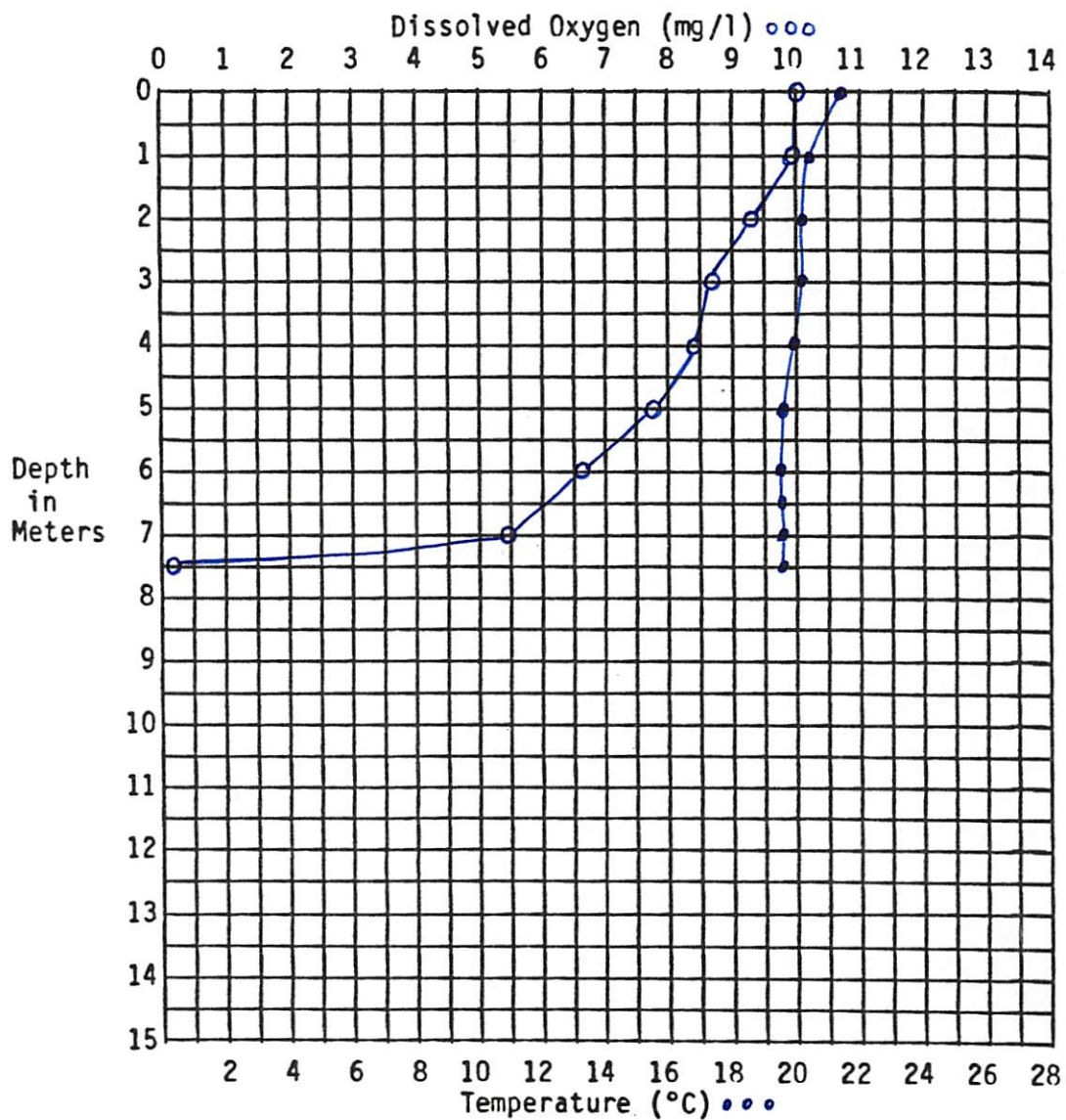
8. PROPOSED ACTION

Enhancement opportunities to improve natural recruitment are very limited. Continued hatchery stocking of Quamichan Lake with yearling cutthroat trout is recommended.

APPENDIX II - Dissolved oxygen and temperature profiles for Quamichan Lake

Quamichan Lake (July 2, 1985)

DISSOLVED OXYGEN AND TEMPERATURE PROFILE



APPENDIX III - Gillnetting report for Quamichan Lake.

LAKE GILLNETTING REPORT

LAKE NAME: QUAMICHAN

MANAGEMENT UNIT: 1-4

LAKE NUMBER: 104006

LAT./LONG.: 48°48'0"/123°40'0"

LOCATION: 3km from Duncan

UTM:

SURVEYED BY: YAWORSKI/GRIFFITH

NTS MAP: 92B/13E

REPORT PREPARED BY: YAWORSKI

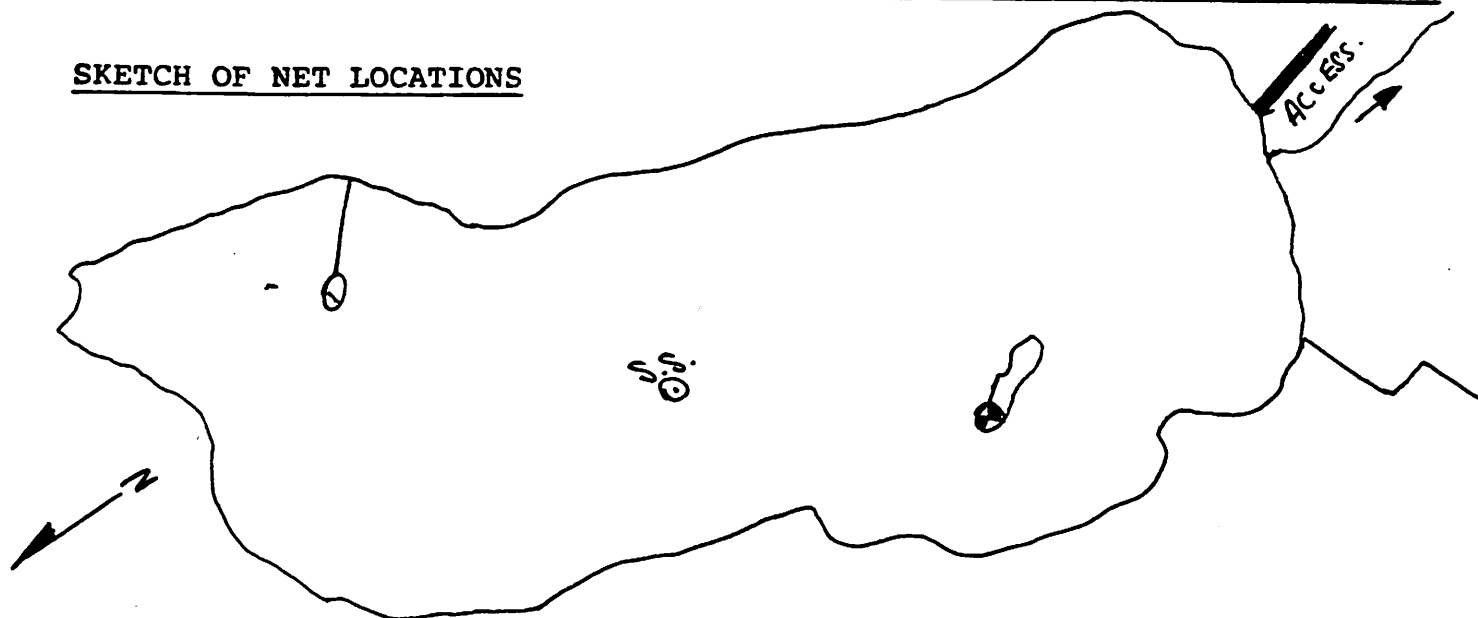
SURVEY DATE: 85-07-03

REPORT DATE: 85-11-28

NETTING METHODS

<u>NET #</u>	<u>IN Date&Time</u>	<u>OUT Date&Time</u>	<u>Floating/ Sinking, or?</u>	<u>Length/Mesh Size & Order</u>
1	1100hr 850703	1500hr 850703	sinking	standard 6-panel experimental monofilament

SKETCH OF NET LOCATIONS



LAKE GILLNETTING REPORT CONTINUED

LAKE NAME OR NUMBER: *Quamichan*

REPORT DATE: *85-11-28*

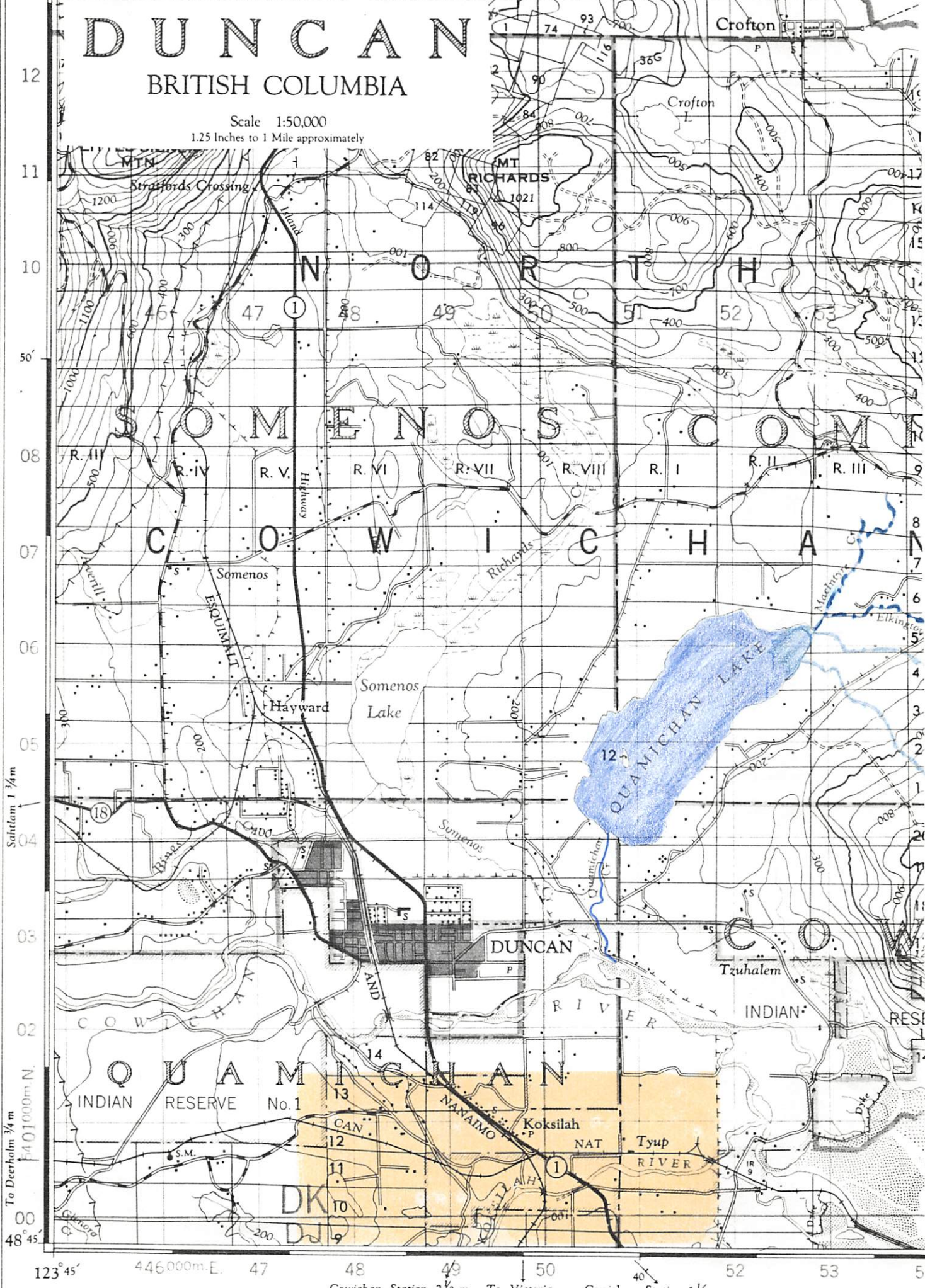
RESULTS (group fish by species & clips)

Net#	Species	Length(mm)	Weight(gm)	Sex	Maturity	Clips	Scale Taken	Comments
1	<i>Br. Bullhead.</i>	223	159.0					
		220	159.4					
		216	147.6					
		310	300++					
		104						
	<i>CT</i>	273	214.5					
		281				✓	2+	
		237				✓	2+	
		333				✓	3+	
		345				✓	3+	
		280				✓	2+	

DUNCAN

BRITISH COLUMBIA

Scale 1:50,000
1.25 Inches to 1 Mile approximately



Sahlam 1 3/4 m

To Deerholm 3/4 m

123° 45' 446 000 m. E. 47 48 49 50 51 52 53 54
Cowichan Station 2 1/2 m To Victoria Cowichan Station 1 1/2 m

APPENDIX I - Water quality analysis for Quamichan Lake (July 2, 1985).

Fish & Wildlife Br. - Fish Program

ATTN: YAWORSKI B A

om : 85/07/03:0000 To : 85/07/03:0000 Depth Range 0.5 0.0 Tide
Sample State Fresh Water Sample 85005362

Parameter Description	Analytical Technique	Result	Units
pH	pH Meter	8.0	pH units
Residue Filterable	Gravimetric 105C	70	mg/L
Conductance Specific	Cond. Meter Siebold	123	uS/cm
Nitrogen Organic-Tot	Calculated Result	0.56	mg/L
Nitrogen Kjel. Tot(N)	Block Dig. Auto. Color	0.60	mg/L
Nitrogen Total	Calculated Result	0.60	mg/L
Nitrogen Amm. Diss(N)	Automated Bertholot meth	0.036	mg/L
Nitrogen NO3+NO2 Dis	Auto. Cadmium Reduction	< 0.02	mg/L
Phosphorus Total	Dig. Auto. Ascorbic Acid	0.034	mg/L

Sample Date: Fresh Water
To: 88\07\03:0000
From: 88\07\03:0000
Depth Range: 0.5
Time: 0.0
Sample: 8800348

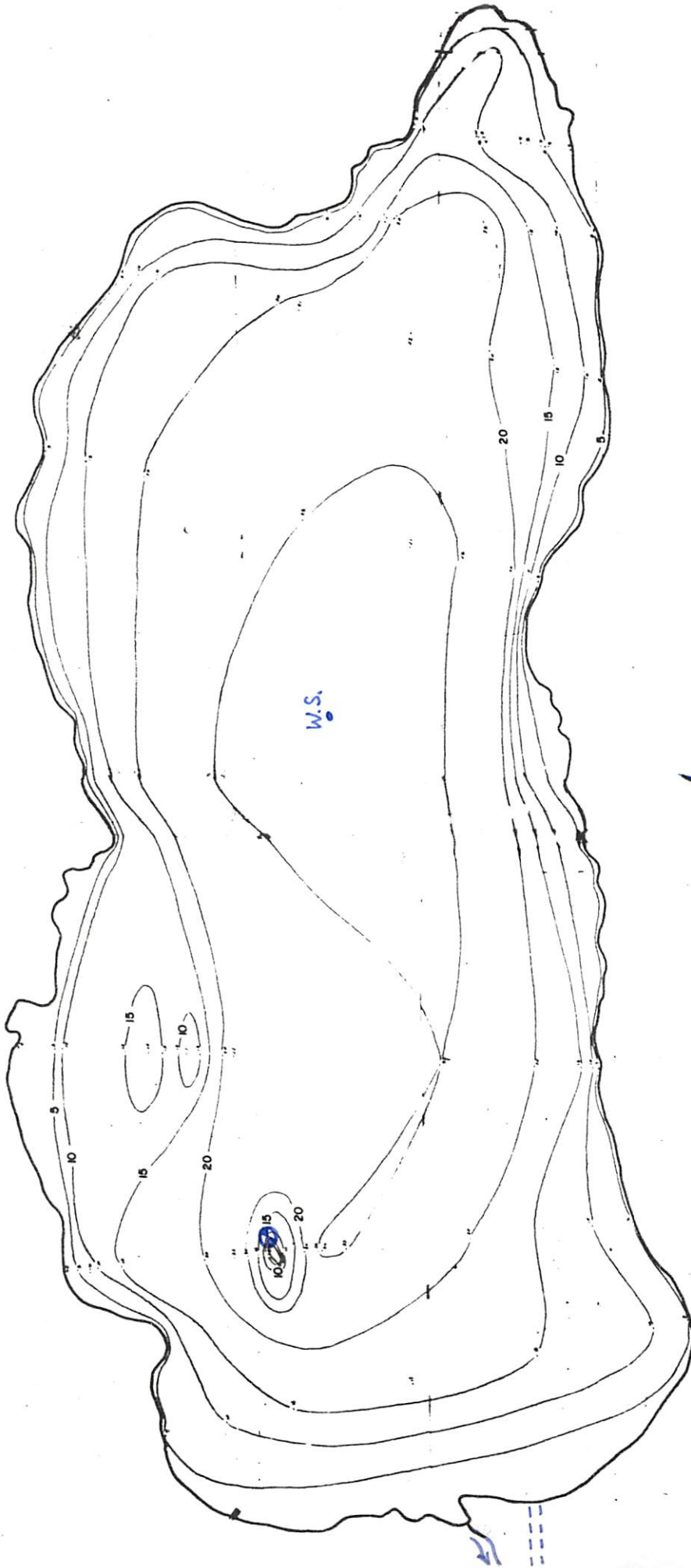
Parameter Description	Analytical Technique	Result	Units
pH	pH Meter	7.0	pH units
Residue Filterable	Gravimetric 105C	70	mg/L
Conductance Specific	Cond. Meter Stabid	128	uS/cm
Nitrogen Organic-Tot	Calculated Result	0.55	mg/L
Nitrogen Kjeld(Tot(N))	Block Dig. Auto. Color	0.50	mg/L
Nitrogen Total	Calculated Result	0.50	mg/L
Nitrogen Amm. Dis(N)	Automated Berthlot meth	0.036	mg/L
Nitrogen NDS+NOE Dis	Auto. Cadmium Reduction	< 0.02	mg/L
Phosphorus Total	Dig. Auto. Ascorbic Acid	0.034	mg/L

Fish & Wildlife Br. - Fish Program

ATTN: YAWORSKI B A

From : 85/07/03:0000 To : 85/07/03:0000 Depth Range 6.5 0.0 Tide
Sample State Fresh Water Sample 85005363

Parameter Description	Analytical Technique	Result	Units
pH	pH Meter	7.4	pH units
Residue Filterable	Gravimetric 105C	76	mg/L
Conductance Specific	Cond. Meter Siebold	130	uS/cm
Nitrogen Organic-Tot	Calculated Result	0.36	mg/L
Nitrogen Kjel. Tot(N)	Block Dig. Auto. Color	0.58	mg/L
Nitrogen Total	Calculated Result	0.58	mg/L
Nitrogen Amm. Diss(N)	Automated Bertholot meth	0.224	mg/L
Nitrogen NO3+NO2 Dis	Auto. Cadmium Reduction	< 0.02	mg/L
Phosphorus Total	Dig. Auto. Ascorbic Acid	0.121	mg/L



NOTE: 5' DENOTES BENCH MARK SURVEYED BY: E. J. KILM WORK OUTFIT FROM: 414 1078 A-14 DATE: APR. 2, 1972		FISH AND WILDLIFE BRANCH DEPARTMENT OF RECREATION AND CONSERVATION	
STATISTICS AT TIME OF SURVEY		QUAMICHAN L. reduced	
1. ELEVATION	30.5 m	DATE	4/2/72
2. SURFACE AREA	313.4 ha	SCALE	1" = 300'
3. VOLUME	14,848,736 m ³	PROJECT	
4. SURFACE FLUCTUATION	4.7 m	NO. OF BENCH MARKS	1
5. DEPTH	8.2 m	NO. OF WATER LEVELS	1
6. PERIMETER	141.2 ha		
7. AREA, 30 FT. CONTOUR	5.3 ha		
8. HEIGHT OF BENCH MARK ABOVE WATER LEVEL			
		92-9-188	

Figure 2 - Morphometric map of Quamichan Lake.