DEPARTMENT OF ENVIRONMENT

WATER RESOURCES SERVICE

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CUSHEON LAKE, SALTSPRING ISLAND

DATA REPORT FOR THE WATER QUALITY MONITORING PROGRAM

JUNE 1974 to JUNE 1975

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ABSTRACT

The results of the first year (June, 1974 to June, 1975) of a water quality monitoring program for Cusheon Lake, on Saltspring Island, are presented.

The results of the program to date show high concentrations of total and dissolved nitrogen, and lower concentrations of total and dissolved phosphorus. The mean phytoplankton population density is low and appears to be limited by some factor other than nutrient availability in the water. The shallow water areas of the lake support a dense population of aquatic macrophytes. Quantitative species lists for phytoplankton and zooplankton are included, together with a distribution map for the aquatic macrophytes.

ACKNOWLEDGEMENTS

The field work for this survey was supervised by Mr. R.S. Hawthorn and carried out by Ms. Bev Raymond and Mr. Richard Dabrowski. The drawings in this report were prepared by Don Dony, and the manuscript was typed by Lorrie Smith. The comments and constructive criticisms offered by the members of this Division have helped to eliminate the ambiguities and uncertainties which abounded in the early drafts of this report. I am indebted to all those mentioned above for their assistance in the preparation of this data report.

The chemical analyses of the water samples were carried out accurately and quickly by the staff of the Environmental Laboratory of the Water Resources Service. Special thanks are due to the Groundwater Section of the Hydrology Division, Water Investigations Branch, for allowing the use in this report of their data from an earlier sampling effort in Cusheon Lake.

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1. INTRODUCTION

Cusheon Lake is situated on Saltspring Island, and lies between Fulford Harbour and Ganges (Figure 1). The lake is well used as a recreational resource, with swimming, canoeing and angling for cutthroat trout ranking as the more popular pursuits. There are numerous homes, most occupied all year, around the lakeshore. Many of these homes take their drinking water from the lake: the Water Rights Branch lists 12 licences to withdraw domestic water (to 500 gallons per day) from the lake. In addition, the lake supplies water to a subdivision by a pumphouse situated on the east side of the lake. The Water Rights Branch has licenced the withdrawl of up to 62,000 gallons per day by the operator of the pumphouse and distribution system.

In response to concern expressed by residents regarding the quality of water in the lake, the Environmental Studies Division initiated a regular monitoring program for Cusheon Lake. This data report presents the results of the first year of the program, from June, 1974 to June, 1975. This program is intended to continue indefinitely as a means of documenting the present water quality and providing early notification of changes. Continuing pressure for residential development of the watershed of this lake, coupled with its importance to domestic water supplies and recreational pursuits, indicate the necessity for a watershed management plan. The data obtained in this monitoring program would be of considerable importance to development of such a plan.

2. PHYSICAL FEATURES OF CUSHEON LAKE

Cusheon Lake is situated on the east side of Saltspring Island (Figure 1) at an altitude of 300 feet. The maximum depth of water is 30 feet, at the northwest end of the lake (Figure 2), and the mean depth is 14.2 feet. The surface area of the lake is 66.5 acres, and the volume is calculated to be 942.3 acre-feet. The area of the bottom lying at less than 20 feet depth is 22.9 acres. Water enters Cusheon Lake from Blackburn Lake (see Figure 1) with input flow rate estimated at 5 cfs[1] and drains to the sea via Cusheon Creek, with an estimated flow rate of 5 cfs at the time of the lake survey carried out by Fish and Wildlife Branch personnel[1]. The terrain surrounding the lake is rolling hills, densely forested, mainly with fir. The immediate lake shoreline supports cedar and alder, and shows some swampland[1].

3. RESULTS

3.1 Vertical Profiles of Temperature and Dissolved Oxygen

Sampling in the deep portion of Cusheon Lake (Station 123 - see Figure 2) in June and August, 1974, showed a well stratified water mass. The epilimnion occupied the top 3 to 4 meters, with a temperature of 19°C (June) rising to 20-22°C in the August sample. The thermocline (metalimnion) lay between 3 and 6 meters, as the temperature values dropped to 10-11°C in the hypolimnion. The dissolved oxygen values showed a similar pattern of vertical distribution (Figure 3). The epilimnion was fully saturated with oxygen (9.5 to 10.5 mg/l), and the values declined rapidly in the metalimnion, becoming undetectable (i.e., anaerobic water) in the hypolimnion at 6 to 7 meters depth. By October 29, 1974, the fall turnover had occurred and the water column was isothermal at 11°C. Similarly, the dissolved oxygen content was uniform at 7.5 to 7.9 mg/l, which was an undersaturated condition (Figure 3). In December, 1974, the lake continued to be well mixed as the water temperatures declined to 6°C and the dissolved oxygen content increased to near-saturation values (11 mg/l). There was one anomalous, very low value for the bottom sample on this date (Figure 3). This should be disregarded as it seems probable that the oxygen sensor had made contact with the bottom -- such an event would register an anaerobic condition as the sensor entered the highly-reduced sediments. The data for April to June, 1975, showed the re-establishment of stratification of the water column as the surface waters warmed: the hypolimnion developed to the anaerobic condition at 6 meters depth by June 24, 1975.

The foregoing referred to sampling results for station 123 (Figure 2) and is summarized in Figure 3. Sampling in the shallower eastern portion of the lake (station 122-see Figure 2) showed essentially the same values. Because of the shallow depth of this station the water is epilimnetic only, with generally uniform temperature and oxygen values throughout the 3 to 4 meters depth sampled (Figure 3). Consequently the two anaerobic bottom samples recorded (June and October, 1974-- see Figure 3) should be regarded as the result of the oxygen sensor entering the sediment. The detailed

[1] Fish and Wildlife Branch lake survey data -- lake surveyed May 9, 1972.

results of the vertical profile sampling may be obtained from the data file (Appendix 1) and are summarized in Figure 3.

3.2 Water Chemistry

The detailed results may be obtained from the data file (Appendix 1), and are summarized in Figures 4 through 8.

The epilimnion samples (1 and 3 meters depth) showed higher pH values than the deeper water in the June and August samples, 1974. The fall turnover and mixing eliminated these diverse values (Figure 4) and established a uniform pH of 7.0 to 7.2 throughout the lake during the winter. The spring (April) sampling in 1975 showed the beginning of a new cycle of stratification, which was well established by June, 1975 (Figure 4).

Total alkalinity values increased with depth below the epilimnion reaching a peak value of 38.0 mg/l at 9 meters depth in August, 1974. The values in the epilimnion (1 and 3 meters depth samples) were markedly lower (Figure 4). In October, 1974 the fall overturn resulted in uniform total alkalinity values (27.0 to 27.5 mg/l) in all samples tested, followed by a decline throughout the winter in total alkalinity values in all samples to a minimum value of 19.5 mg/l in April, 1975. The samples for June, 1975, showed increasing values, and a return to the stratification of values as noted in the results for the previous summer (1974)-- see Figure 4.

Dissolved magnesium results showed essentially uniform values at all sample depths on each date, and a modest annual cycle. The maximum values were recorded in August, 1974 (2.2 to 2.5 mg/l) and the minimum (1.9 to 2.0 mg/l) in April, 1975 -- see Figure 5.

The results for dissolved calcium closely followed the trend, both spatially and temporally, demonstrated by the total alkalinity data (See Figures 5 and 4). Thus the highest values were recorded in the deeper water samples in August, 1974, while the epilimnion water (sampled at 1 and 3 meters depth) showed markedly lower dissolved calcium content. After

mixing in October, 1974, to a uniform value of 8.6 to 8.7 mg/l throughout, the dissolved calcium content of the lake diminished through the winter to a low value of 7.6 mg/l in April, 1975. By June, 1975, a new stratification had developed as the dissolved calcium content increased, especially in the deeper water (see Figure 5).

Dissolved nitrite + nitrate nitrogen was undetectable in all samples taken in June through to October, 1974. However, from December through to April, 1975, dissolved NO_2 + NO_3 was present at levels of 0.22 to 0.25 mg/l (December), rising to 0.35 to 0.37 mg/l (April, 1975). In the sample for June, 1975, the values at all depths had declined sharply to 0.08 to 0.15 mg/l (see Figure 6).

Total nitrogen values showed only slight increase with depth in the samples for June and August, 1974. The deepest water sampled (9 meters depth) showed a definite increase in total nitrogen content between June and August, 1974, while the values at all other depths remained essentially constant (Figure 6) until October. Following the fall turnover there was a trend towards increasing concentrations of total nitrogen in the 1, 3 and 6 meter depth samples to a maximum in April, 1975. Simultaneously, the deep water (9 meters) showed steadily declining total nitrogen values from the peak in August, 1974 to the common level in April, 1975. In the June survey, all depths sampled showed a decline, returning to the levels noted in June, 1974 (see Figure 6).

Dissolved phosphorus (as orthophosphate) was undetected in June, 1974, in all but the deepest sample (9 meters depth). A level of 0.015 mg/l was reported in this sample. There was a trend to increasing concentrations at all depths from June through to October, 1974, accompanied by a depth stratification which showed values proportional to depth. Following the fall turnover the stratification was eliminated in the mixing process and a trend towards decreasing concentrations began, leading to undetectable levels at most depths in April, 1975 (see Figure 7).

Total phosphate, measured at 1, 3 and 9 meters depth showed a marked temporal variation, with values rising from 0.006 to 0.008 mg/l in

June, 1974, to 0.027 to 0.036 mg/1 in October, and declining again through the winter months. At 9 meters depth, however, there was a sharp increase from June to August, 1974, followed by a steady decline as the lake waters mixed and promoted a uniform concentration of total phosphate in December, 1974 (see Figure 7).

The organic carbon content of water samples showed widely varying values in June and August, 1974, but no apparent trend with depth. Values in the epilimnion increased from June through August, while those in the hypolimnion decreased. In October, all samples showed a common value, which was maintained into December, and declined thereafter to the annual minima in April, 1975 (see Figure 8).

Inorganic carbon concentrations were highest in the hypolimnion and increased from June through to August, 1974. Conversely, the values in the epilimnion were low, and declined to near zero by August, 1974. The fall turnover and mixing eliminated these diverse values and produced a uniform concentration which was maintained through the winter to April, 1975. In June of 1975 a new cycle of stratification had begun, with values repeating those shown the previous year (see Figure 8).

The water samples taken in Cusheon Lake were analysed intermittently for a number of metals. No detectable levels of dissolved boron, total cadmium, total copper, total lead, total mercury, total nickel and total zinc were recorded (the detection limits for each of these tests are shown in Appendix 2. Total iron values ranged from undetectable (<0.1 mg/1) to 1.6 mg/1, and showed a tendency to increase from spring through to late summer. Thus, undetectable levels were recorded at all depths in April, 1975, whereas in June, 1974 and August, 1974, the values recorded at 1, 3 and 9 meters depth ranged from 0.1 to 0.3 mg/1 and 0.7 to 0.9 mg/1 respectively.

Dissolved potassium and sodium have been sampled only once (April, 1975) in the monitoring program to this date. The values indicated no variation between stations and no variation with depth. Dissolved potassium values of 0.30 to 0.40 mg/1 were noted, while dissolved sodium was present at 4.70 to 4.80 mg/1.

Prior to the initiation of this monitoring program in June, 1974, the Groundwater Section (Hydrology Division, Water Investigations Branch) had

carried out some water quality tests for Cusheon Lake. These data are presented in Appendix 5.

3.3 Distribution of Aquatic Macrophytes

The distribution of aquatic macrophytes in Cusheon Lake was mapped on three occasions in 1974: June 26, August 29 and October 29. The results of these surveys are summarized in Figure 9. Our observations revealed a band of emergent vegetation extending 2-3 meters offshore along most of the lakeshore. These observations represent background data and may be used for comparison with similar observations at a later date. No species list is available at this time as plant specimens collected have not yet been identified.

3.4 Phytoplankton of Cusheon Lake

Unconcentrated samples of phytoplankton were taken from all depths sampled for water quality. At the time of preparation of this report only surface samples from stations 121, 122 and 123 had been analysed. Subsequent identifications for the remaining samples will be added to this report at a later date.

The results of examination of the surface phytoplankton samples are presented in Appendix 3, and the numerically dominant species are summarized in Table 1. The populations sampled throughout the monitoring program showed a seasonal succession of species and types. Thus in 1974, the diatoms were dominant from June through to December, while the immediate subdominant species were chrysophytes, cryptophytes, blue-greens or diatoms (see Table 1). The phytoplankton population of Cusheon Lake thus showed considerable species diversity and included some species regarded as characteristic of eutrophic conditions (e.g., Aphanizomenon flos-aquae).

The densities of the total algal populations recorded in Cusheon Lake are shown in Appendix 2. The mean of these, representing the mean annual algal population of the lake, was compared with the mean population densities of lakes of known trophic status (Table 2). This shows that the mean algal population density in Cusheon Lake is similar to that noted in Kalamalka Lake, an oligotrophic lake.

3.5 Zooplankton of Cusheon Lake

The zooplankton population in Cusheon Lake was numerically dominated by cladocerans, cyclopoids and calanoids (see species list in Appendix 3). These data are summarized in Table 3, demonstrating the seasonal succession of species. Three species (*Daphnia pulicaria*, *Cyclops bicuspidatus* and *Diaptomus oregonensis*) were taken in all samples throughout the year. *Diaphanosoma brachyurum* was restricted to samples taken in the summer, while *Daphnia laevis* occurred only in the winter samples. *Ceriodaphnia quadrangula* occurred in all samples except that for December, 1974, and is probably restricted to spring, summer and fall samples only. *Daphnia galatea*, *Bosmina longirostris* and *Holopedium gibberum* occurred only in the June, 1974 sample. These data (Appendix 3) represent background data and may be used as the basis for comparison with future sampling in Cusheon Lake.

4. SUMMARY AND DISCUSSION

Although the phytoplankton population densities in Cusheon Lake were low and comparable to those reported for Kalamalka Lake (Table 2), the nutrient concentrations differed in the two lakes. Total nitrogen and dissolved nitrogen concentrations in Cusheon Lake were high and greatly exceeded those in Kalamalka Lake, Skaha Lake and Wood Lake, both in the spring and in the summer samples (Table 4). On the other hand, the mean values for total and dissolved phosphate in Cusheon Lake were similar to, or lower than those recorded in Kalamalka Lake, and lower than those for Wood and Skaha Lakes (see Table 4).

Comparison of the nutrient content of water samples from Cusheon Lake and from St. Mary Lake, both of which are situated on Saltspring Island (Figure 1), showed a close agreement for the nutrient parameters considered (Table 4). However, it has earlier been shown that the mean phytoplankton density is markedly lower in Cusheon Lake than in St. Mary Lake (Table 2). Thus it would seem that the phytoplankton population in Cusheon Lake is limited to a low density by some factor other than nutrient availability. Examination of the data obtained in this monitoring program showed detectable differences in several chemical parameters between the samples from Cusheon and St. Mary Lakes (Table 5), but it is beyond the scope of this study to identify which (if any) of these might be the limiting factor.

5. REFERENCES CITED

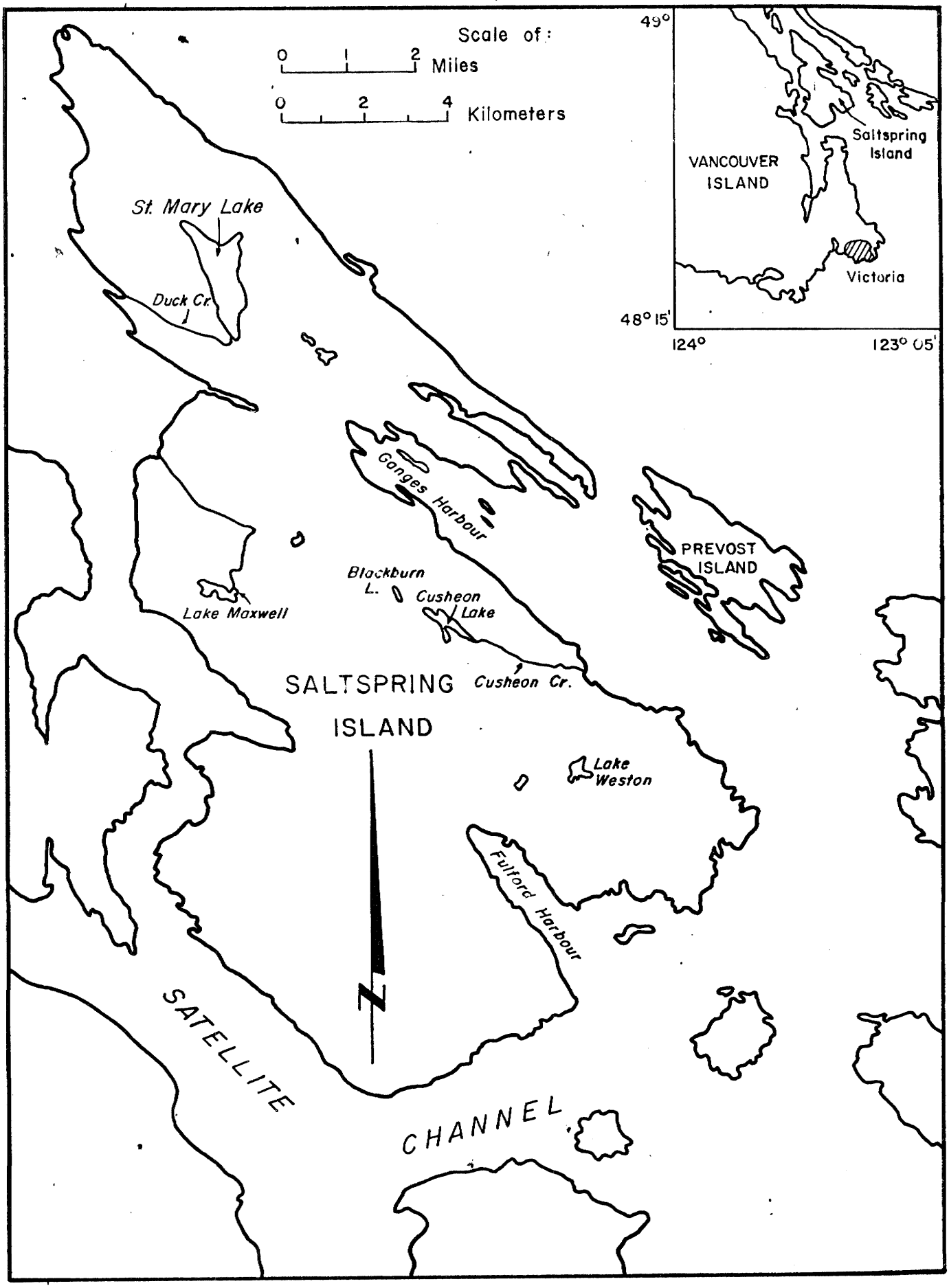
1. Fish & Wildlife Branch lake survey data - lake surveyed May 9, 1972.

2. "Limnology of the major lakes in the Okanagan Basin". Technical Supplement No. V, Canada-British Columbia Okanagan Basin Agreement, April, 1974.

3. "St. Mary Lake, Saltspring Island. Data report for the water quality monitoring program, June, 1974 to June, 1975". J.M. Goddard, Environmental Studies Division, Water Investigations Branch, B.C. Water Resources Service. August, 1975.

4. Stockner, J.G. and T.G. Northcote (1974). "Recent limnological studies of Okanagan Basin lakes and their contribution to comprehensive water resource planning". J. Fish. Res. Bd. Canada, 31(5):955-976.

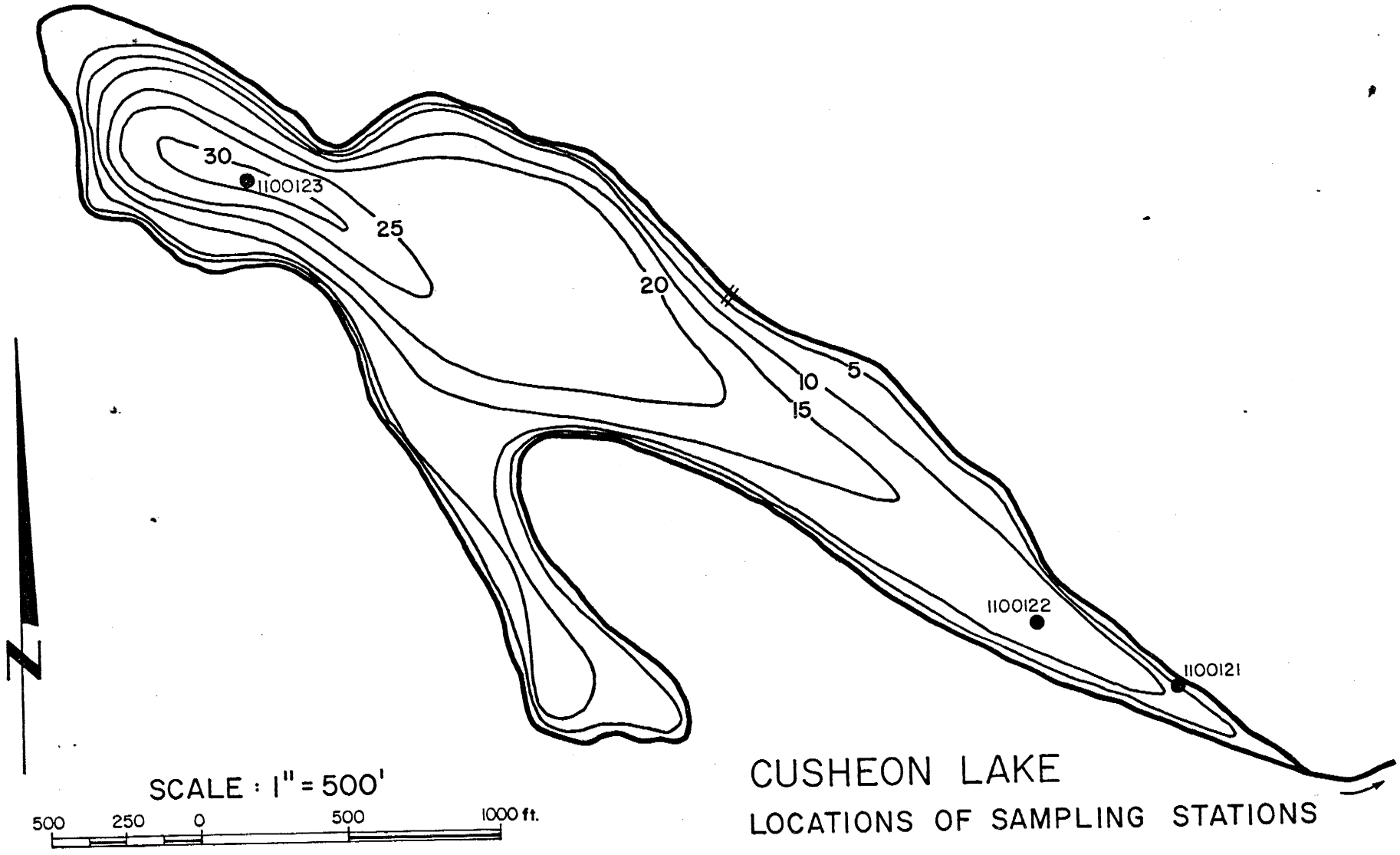
5. "General limnology of the Okanagan mainstem lakes". D.J. Williams, Preliminary report No. 19, prepared for the Okanagan Study Committee, Canada-British Columbia Okanagan Basin Agreement. June, 1973.



THE LAKES OF SALTSPRING ISLAND

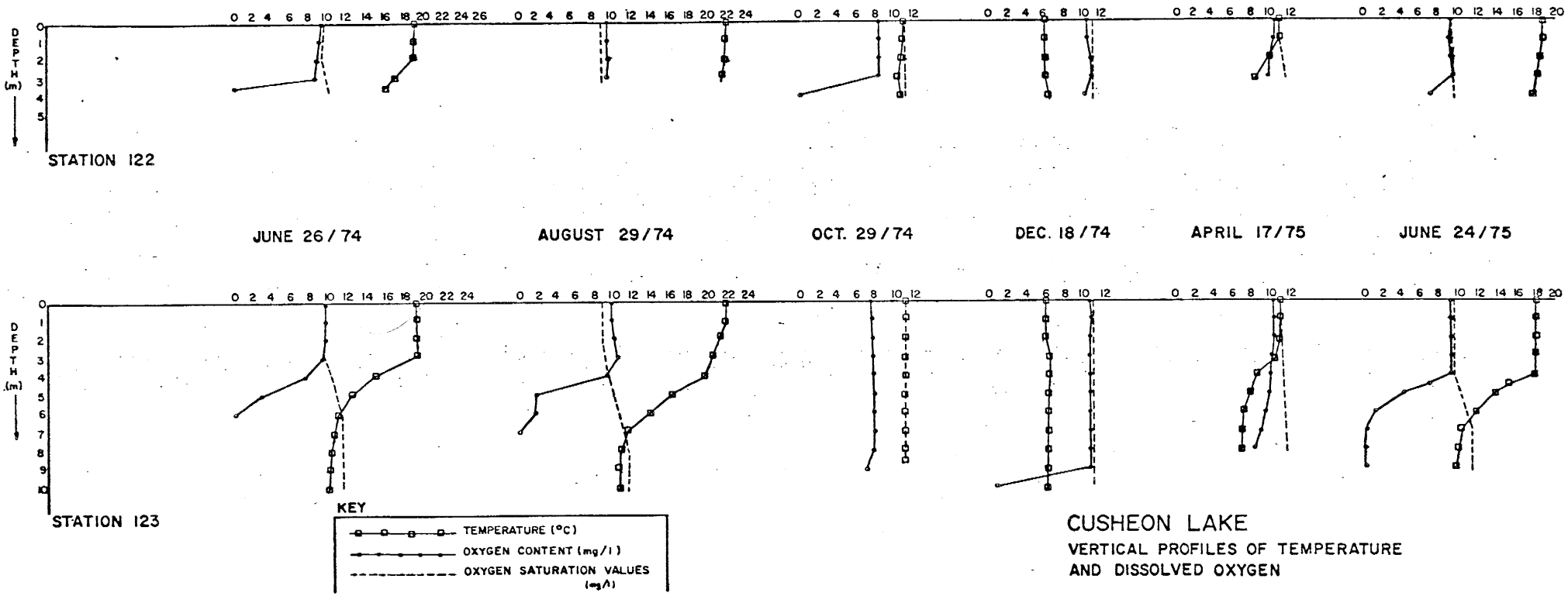
FIGURE 1

MAP BASED ON DRAWING NO. 92-B-14W
FISH AND WILDLIFE BRANCH



CUSHEON LAKE
LOCATIONS OF SAMPLING STATIONS

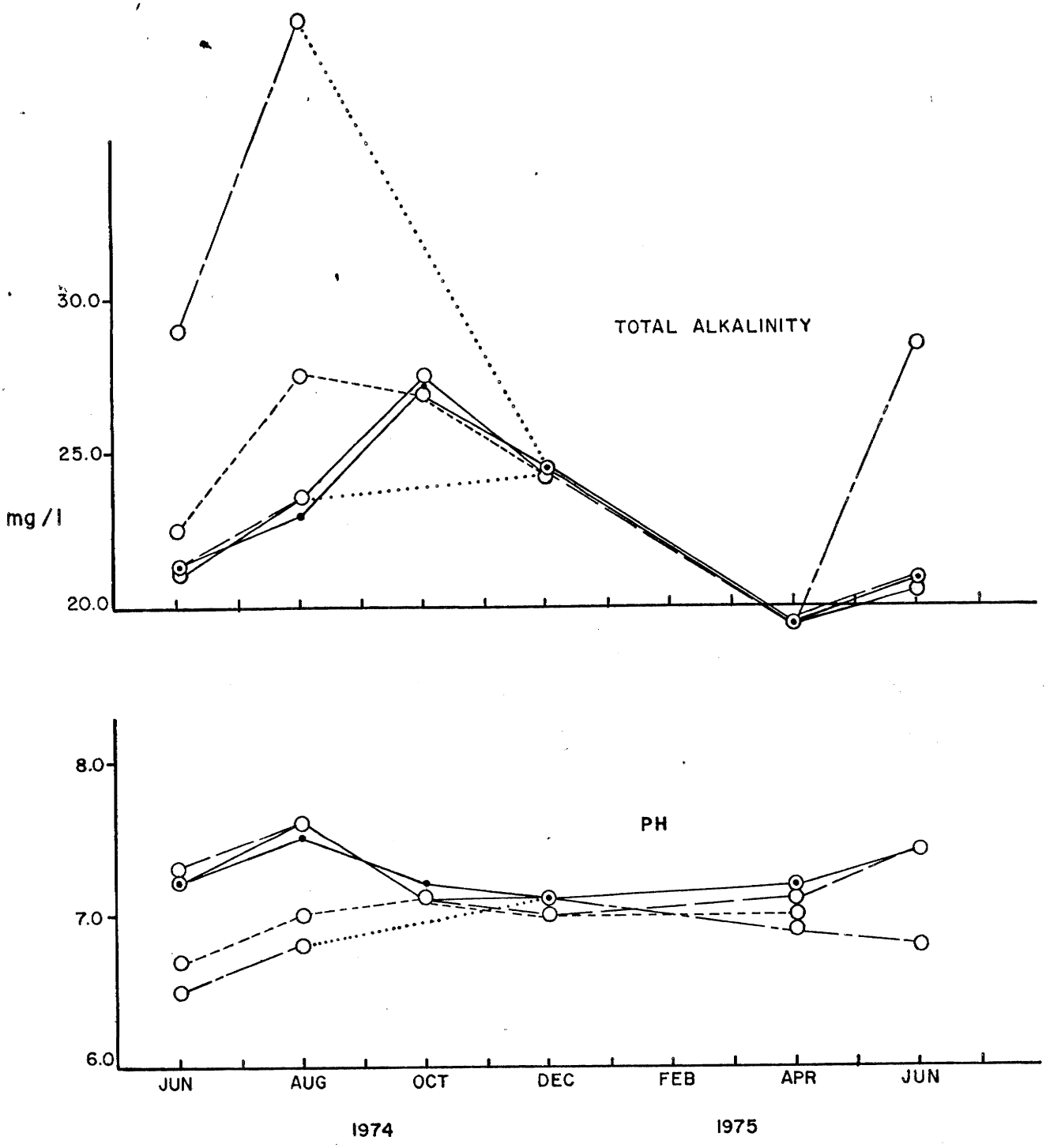
FIGURE 2



CUSHEON LAKE

VERTICAL PROFILES OF TEMPERATURE AND DISSOLVED OXYGEN

Figure 3



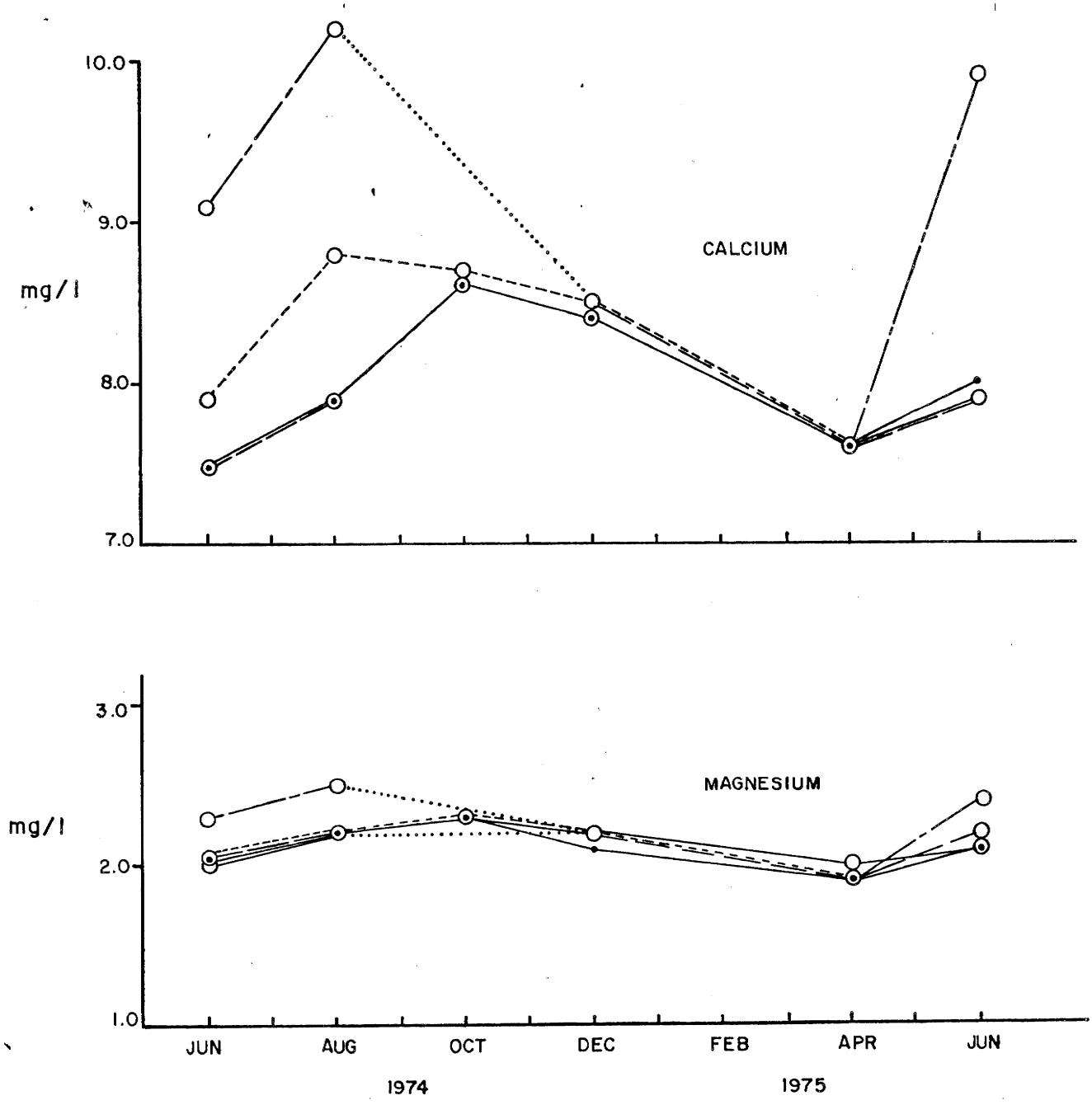
KEY

STATION 122, 3 ft. depth. 1 meter
STATION 123, 3 ft depth
" ", 10 ft. depth. 3
, 20 ft. depth. 6
, 30 ft. depth. 9
INTERPOLATION (SEE NOTE)

NOTE: 10 & 30 ft. samples omitted in October

PH & Total alkalinity

Figure 4

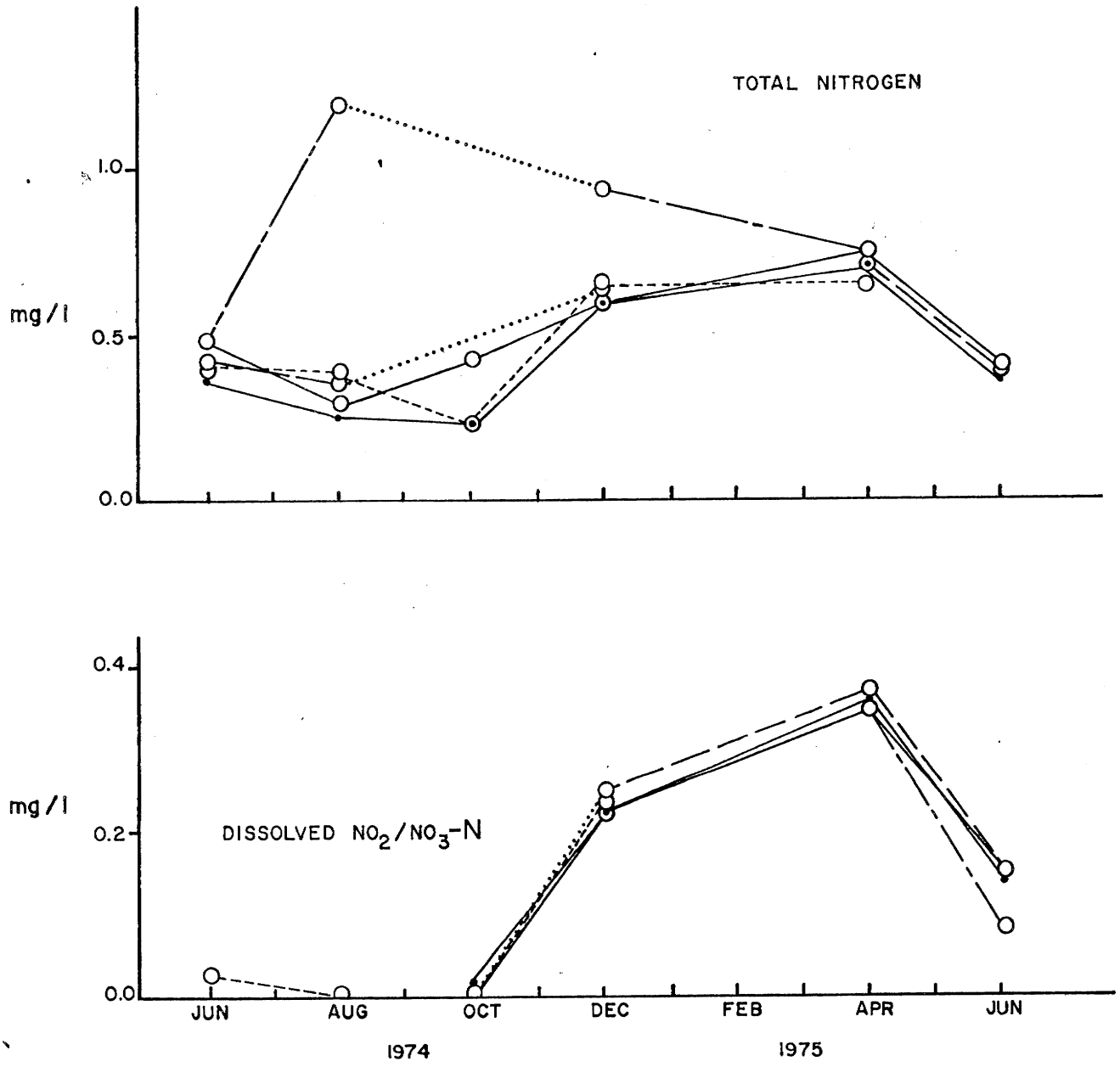


KEY

●—●	STATION 122, 3 ft. depth.	1 meter
O—O	STATION 123, 3 ft. depth.	
O—O	" " , 10 ft. depth.	3
O---O	, 20 ft. depth	6
O--O	, 30 ft. depth.	9
.....	INTERPOLATION (SEE NOTE)	

NOTE : 10 & 30 ft. samples omitted in October, 1974
20 ft. sample omitted in june, 1975

Dissolved calcium & magnesium Figure 5

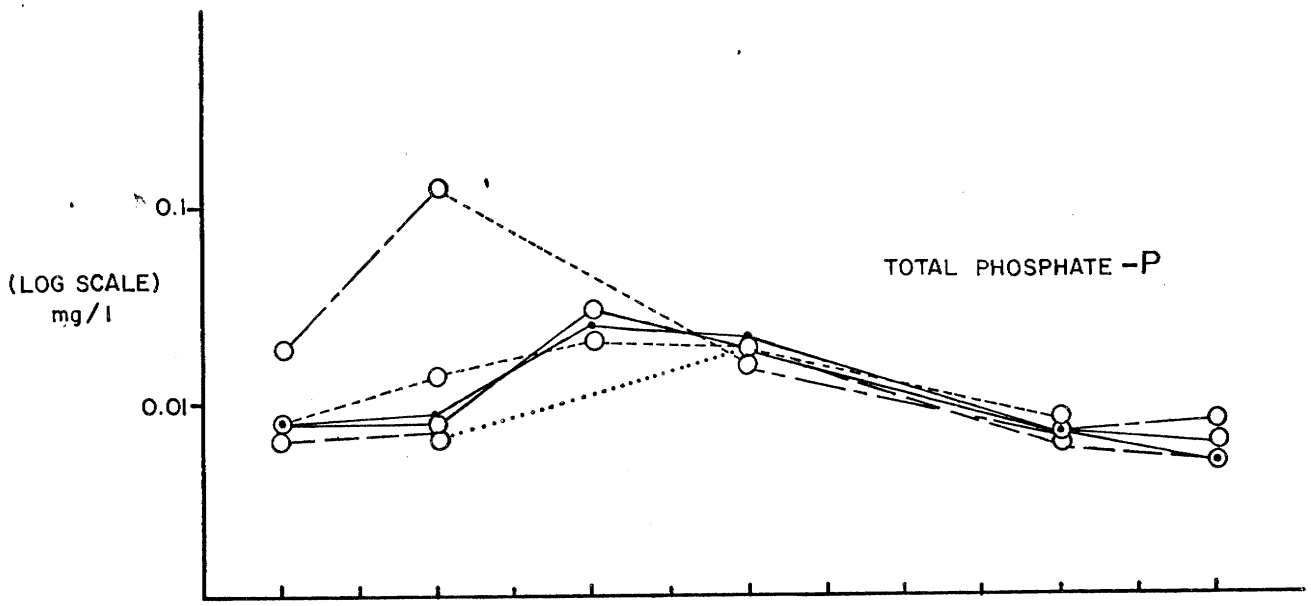


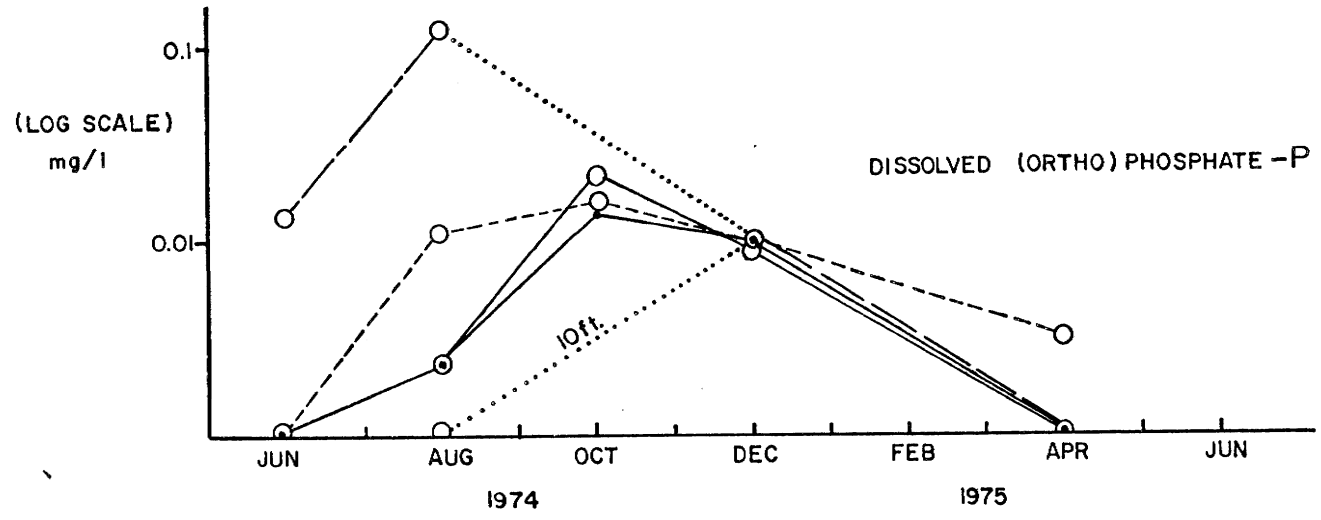
KEY

- STATION 122, 3 ft. depth — 1 meter
- STATION 123, 3 ft. depth
- " " , 10 ft. depth — 3
- ,20 ft. depth — 6
- ,30 ft. depth — 9
- INTERPOLATION (SEE NOTE)

NOTE: 10 & 30 ft. samples omitted in October.
20 ft. sample omitted in june, 1975

Total nitrogen & dissolved NO_2/NO_3-N Figure 6



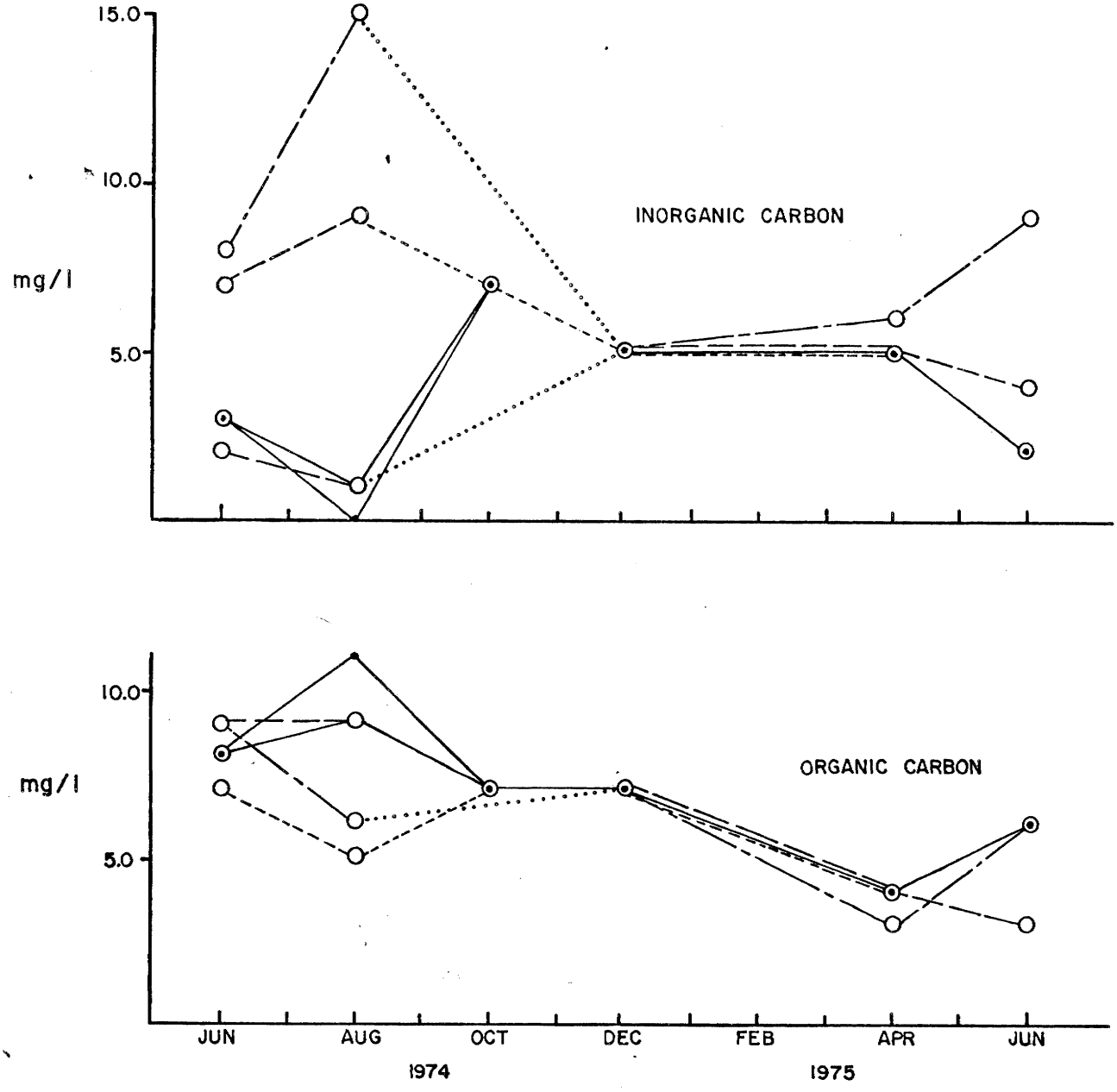


KEY

STATION 122, 3 ft. depth 1 meter
STATION 123, 3 ft. depth
" " , 10 ft. depth 3
, 20 ft. depth 6
, 30 ft. depth 9
INTERPOLATION (SEE NOTE)

NOTE: 10 & 30 ft. samples omitted in October, 1974
20 ft. sample omitted in june 1975

Total & dissolved phosphate-P Figure 7



KEY

- STATION 122, 3 ft. depth 1m
- STATION 123, 3 ft. depth
- " " , 10 ft. depth 3m
- , 20 ft. depth 6m
- , 30 ft. depth 9m
- INTERPOLATION (SEE NOTE)

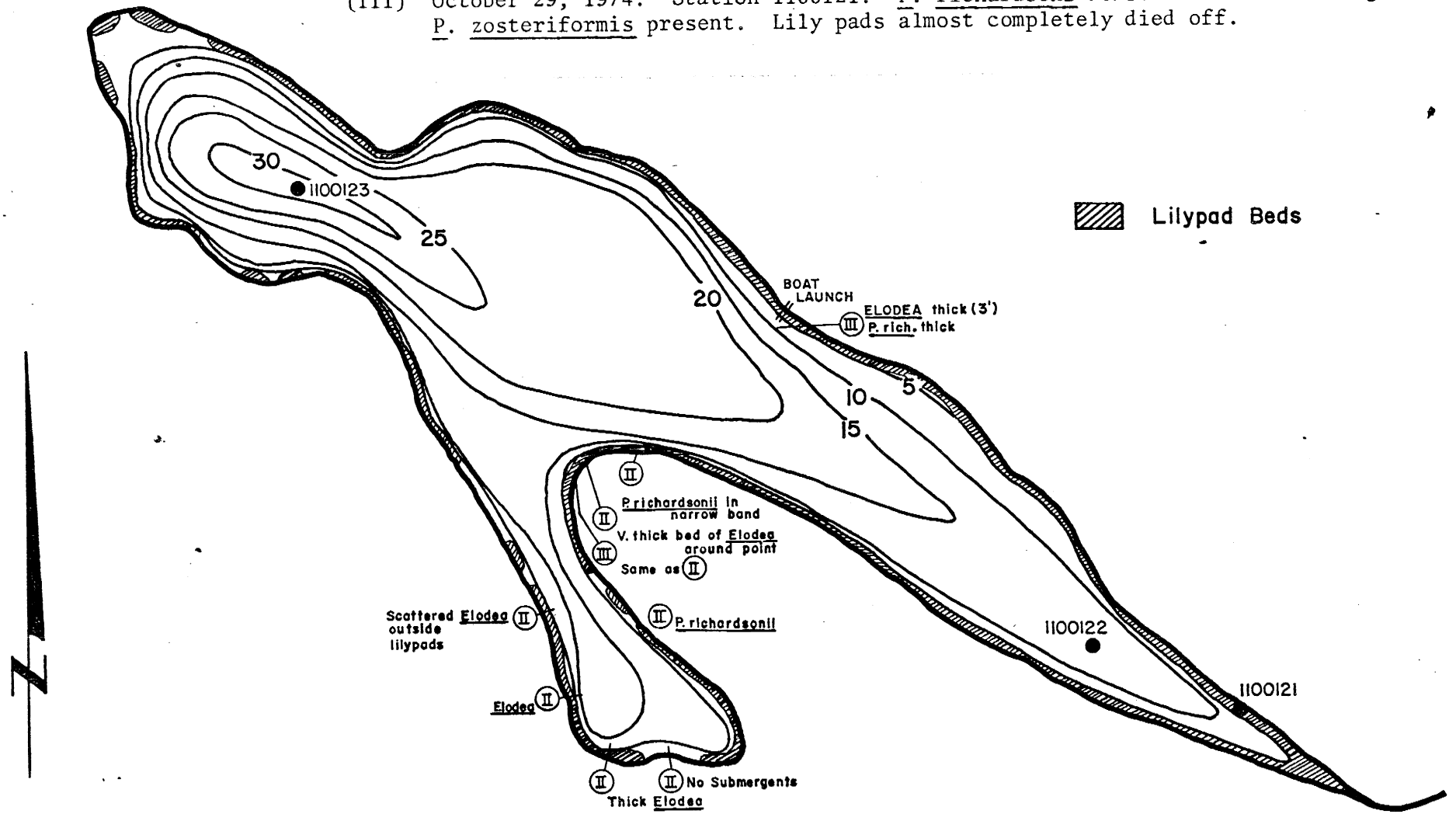
NOTE: 10 & 30 ft. samples omitted in October, 1974.
20 ft. sample omitted june, 1975

Organic & inorganic carbon Figure 8

(I) June 26, 1974. Station 1100121. Lily pads in soft mud to 5 feet depth of water. Potomogeton zosteriformis along outer edge of lily pads. Potomogeton richardsoni(?) in thick band outside lily pads. Northwest Arm: lily pads patchy, no submergents. Southeast Arm: as 1100121. South Arm: on East side, lily pads and submergents patchy. Few emergents behind lily pads.

(II) August 29, 1974. Station 1100121. P. richardsoni reaching surface. Lily pads form band 10 feet wide around most of lake.

(III) October 29, 1974. Station 1100121. P. richardsoni dense and with floating leaves. P. zosteriformis present. Lily pads almost completely died off.



CUSHEON LAKE

SUMMARY OF DISTRIBUTION OF AQUATIC MACROPHYTES

FIGURE 9

TABLE 1

Summary of Numerically Dominant Species of Phytoplankton

Sampling Date	Station Number #121 (3 ft. depth)	#122 (3 ft. depth)	#123 (3 ft. depth)
26 June 1974	-	-	A
29 August 1974	A, C	A, C	-
29 October 1974	-	A, F	F, G
17 December 1974	-	B, G*	G*
17 December 1974	-	E*	E, H*
24 June 1975	-	D, E	D, E

KEY

A = Asterionella formosa	(Diatom)
B = Melosira islandica	(Diatom)
C = Stylochrysallis parasitica	(Chrysophyte)
D = Dinobryon divergens	(Chrysophyte)
E = Rhodomonas minuta	(Cryptophyte)
F = Aphanizomenon flos-aquae	(Blue-green)
G = Melosira italica	(Diatom)
H = Mallomonas akrokomos	(Diatom)

*Owing to inadequate sample identification, there is some doubt regarding the depths sampled in December, 1974. The species lists fall into two pairs, dominated by M. italica and R. minuta respectively. Accordingly, one suspects that the samples represent two different depths, but this cannot be confirmed from the pertinent field notes.

TABLE 2

Comparison of Phytoplankton Population Densities

Lake	Mean Population Densities (cells/ml)		Trophic Status
Cusheon Lake (Saltspring)	532 (range 223-1082)		
St. Mary Lake (Saltspring)[3]	2957		
Kalamalka Lake[4]	700	Sparse Population	Oligotrophic
Okanagan Lake[4]	1500	Low Population	Mesotrophic
Skaha Lake[4]	3700	High Population	Eutrophic
Wood Lake[4]	7900	Very High Population	Highly Eutrophic

[3] St. Mary Lake data report (Reference 3)

[4] Data from Stockner and Northcote (Reference 4)

TABLE 3

Seasonal Succession of Dominant Zooplankton

Species	SAMPLING DATE					
	June, 1974	August, 1974	October, 1974	December, 1974	April, 1975	June, 1975
Daphnia galatea	X					
D. pulicaria	X	X	X	X	X	X
D. laevis			X	X	X	
Diaphanosoma brachyurum	X	X				X
Bosmina longirostris	X					
Ceriodaphnia quadrangula	X	X	X		X	X
Holopedium gibberum	X					
Cyclops bicuspidatus thomasi	X	X	X	X	X	X
Diaptomus oregonensis	X	X	X	X	X	X

X = Species present and dominant

TABLE 4

Comparison of Nutrient Content of Water Samples From Cusheon Lake and Samples From Various Other Lakes

	Mean Values (mg/l)			
	Total Nitrogen	NO_2+ NO_3	Total Phosphorus	Dissolved Phosphorus
Cusheon Lake (Saltspring Island)				
Mean fall & winter values-1974	0.58	0.16	0.040	0.014
Mean spring values - 1975	0.705	0.36	0.012	0.003
Mean summer values - 1974 & 1975	0.48	0.0037	0.026*	0.003*
St. Mary Lake (Saltspring Island)[3]				
Mean fall & winter values-1974	0.50	0.02	0.030*	0.003
Mean spring values - 1974	0.45	0.02	0.023	0.003
Mean summer values - 1974 & 1975	0.40	0.02	0.027	0.003
Kalamalka Lake (Okanagan Valley)[2]				
Spring overturn - 1970	0.264		0.014	0.012
Spring overturn - 1971 0.199	0.007	0.004		
Mean summer values - 1969	0.080		0.200	
Kalamalka Lake (Okanagan Valley)[5]				
Spring overturn - 1971	0.24	0.023	0.030*	0.014*
Skaha Lake (Okanagan Valley)[5]				
Spring overturn - 1971	0.21	0.010	0.062	0.016
Wood Lake (Okanagan Valley)[5]				
Spring overturn - 1971	0.44	0.017	0.200	0.060

* A single, very high value, occurred but was excluded from the calculation of the mean. The mean value noted here therefore approximates to the median value for all the values (including the high value).

2 - See reference 2

3 - See reference 3

5 - See reference 5

TABLE 5

Comparison of Nutrient and Chemical Parameters For

Water Samples From Cusheon and St. Mary Lakes, Saltspring Island

Parameter (and Units)	Mean Values for Parameters			
	Cusheon Lake		St. Mary Lake	
	East Arm	West Arm	North End	South End
pH (relative units)	7.3	7.1	7.4	7.5
Specific conductance (μmho/cm)	94.4	85.9	127.8	138.8
Total alkalinity (mg/l)	22.7	24.2	28.4	27.6
Organic carbon (mg/l)	7.2	6.4	5.8	4.6
Chloride (mg/l)	5.8	5.7	17.4	17.4
NO_2 + NO_3 nitrogen (mg/l)	0.130	0.14	0.020	0.020
Kjeldahl nitrogen (mg/l)	0.291	0.42	0.444	0.419
Total nitrogen (mg/l)	0.415	0.55	0.451	0.424
Dissolved phosphorus (mg/l)	0.006	0.014	0.015	0.003
Total phosphorus (mg/l)	0.015	0.028	0.029	0.014
Total iron (mg/l)	0.30	0.41	0.22	0.1
Dissolved mganesium (mg/l)	2.13	2.16	2.59	2.57
Dissolved sodium (mg/l)	4.7	4.7	15.88	15.9
Number of values considered in calculation of the mean for each parameter except Chloride and Dissolved Sodium	6	21	24	11
Number of values for Chloride and Dissolved Sodium	1	4	4	2

APPENDIX 1

The detailed test results for the monitoring program at Cusheon Lake are held in the Test Result File of the Water Resources Service. The interested reader may obtain a copy of the printed output, by submitting a copy of the following request form to:

Environmental Studies Division
Water Investigations Branch
Water Resources Service
Parliament Buildings
Victoria, B.C.

A copy of one page of the printed output is included here to demonstrate the style used.

TEST RESULTS FOR SITE 1100122 CUSHEON LK MIDLAKE E ARM

SUBMITTING AGENCY: ALL
DEPTH: ALL
SAMPLING LOCATION: ALL

** START ** Y M D H M	DEPTH FEET	COMP TYPE	004 PH REL UNIT	011 SPF COND UMHO/CM	013 T SAMPLG DEG.C	014 OXY DISS MG/L	015 TURBIDTY J.T.UNIT
750624 1000	0			78.0	18.70	9.30	
750624 1000	3		7.40	84.0 79.0	18.70	9.0	0.50
750624 1000	3.28			79.0	18.70	9.0	
750624 1000	6.56			80.0	18.50	9.30	
750624 1000	9.84			80.0	18.30	9.40	
750624 1000	11.5			80.0	17.80	7.10	
NUMBER OF VALUES			1	7	6	6	1
MAXIMUM			7.40	84.0	18.70	9.40	0.50
MINIMUM			7.40	78.0	17.80	7.10	0.50
AVERAGE			7.40	80.0	18.450	8.850	0.50
STANDARD DEVIATION				1.7728	0.32509	0.79739	
GEOMETRIC MEAN			7.40	79.981	18.447	8.8099	0.50
PERCENTILES:							
PCT10							
PCT25				79.0	18.175	8.5250	
PCT50				80.0	18.60	9.150	
PCT75				80.0	18.70	9.3250	
PCT90							
				@@@			

EXPLANATORY NOTES:
COLUMNS FLAGGED WITH '@@@' INCLUDE MORE THAN ONE TEST METHOD

TO: DATA PROCESSING CENTRE
421 MENZIES STREET
VICTORIA, B.C.

DEPARTMENT OF LANDS FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE
REQUEST FOR PRINTED OUTPUT FROM TEST RESULT FILE

SUBMITTED BY R.J. Buchanan

FOR Water Investigations Branch

DATE

TYPE OF OUTPUT SEE MANUAL FOR AVAILABLE OPTIONS

*	* PERMIT OR SITE NUMBER (2)	SAMP BY (11)	FROM DEPTH (FEET) (13)	TO DEPTH (FEET) (17)	* FROM DATE YR MO DAY (21)	TO DATE YR MO DAY (27)	SAMP LOC (33)	ASSOC. SITES (34)	(35) TEST CODE	TEST CODE (42)	TEST CODE (49)	TEST CODE (56)	TEST CODE (63)	TEST CODE (70)	LOAD UNITS CODE (77,78)
A	1,1,0,0,1,2,2,				7,4,0,1,0,1										
A	1,1,0,0,1,2,3,				7,4,0,1,0,1										

REQUEST FOR DATA LIST FOR CUSHEON LAKE DATA REPORT.

* TYPE OF OUTPUT, PERMIT OR SITE NUMBER AND FROM DATE MUST BE COMPLETED FOR EACH ENTRY; OTHER ENTRIES MAY BE REQUIRED DEPENDING ON OUTPUT TYPE.

APPENDIX 2

Detection Limits* For the Metals Tested in the Water Samples

Iron	0.1 mg/l
Lead	0.001 mg/l
Copper	0.001 mg/l
Boron	0.1 mg/l
Cadmium	0.0005 mg/l
Mercury	0.05 µg/l
Nickel	0.01 mg/l
Zinc	0.005 mg/l

*By the techniques usually used for these tests.

APPENDIX 3

SPECIES LISTS OF PHYTOPLANKTON TAKEN IN CUSHEON LAKE

PLANKTON COUNT OF CUSHEON LAKE

Number: 1100121 Depth: 3 feet Date: August 29, 1974

Slide Type: 1 cc chamber

	NUMBER PER SLIDE	NUMBER PER ML.
BACILLARIOPHYTA		
Asterionella formosa	213	451
Cyclotella kuetzingiana	3	6
Tabellaria fenestrata	1	2
CHLOROPHYTA		
Botryococcus braunii	1	2
Schroederia setigera	5	11
Scenedesmus arcuatus	1	2
Selenastrum minutum	2	4
Oocystis borgei	2	4
CYANOPHYTA		
Microcystis flos-aquae	11	23
Aphanocapsa elachista	20	42
Aphanothece nidulans	13	28
Anabaena planctonica	4	8
Anabaena circinalis	8	17
Anabaena limnetica	1	2
Aphanizomenon flos-aquae	1	2
CRYPTOPHYTA		
Rhodomonas minuta	1	2
CHRYSOPHYTA		
Stylochrysallis parasitica	100	210
EUGLENOPHYTA		
Euglena gracilis	1	2
VORTICELLIDAE (ZOOPLANKTON)		
Vorticella sp.	1	2
TOTAL PHYTOPLANKTON		818
TOTAL		820

PLANKTON COUNT OF CUSHEON LAKE

Number 1100122 Depth: 3 feet Date Taken: August 29, 1974

Slide Type: 1 cc chamber

	NUMBER PER SLIDE	NUMBER PER ML.
BACILLARIOPHYTA		
Asterionella formosa	218	457
Cyclotella kuetzingiana	6	13
Cymbella sp. (girdle view)	1	2
CHLOROPHYTA		
Scenedesmus arcuatus	3	6
Selenastrum minutum	6	13
Scenedesmus incrassulata	1	2
Elakatothrix gelatinosa	2	4
CYANOPHYTA		
Anabaena circinalis	10	21
Aphanizomenon flos-aquae	6	13
Microcystis flos-aquae	17	36
Aphanocapsa elachista	21	44
Aphanothece nidulans	17	36
Anabaena planctonica	5	10
Chroococcus minutus	4	8
Anabaena limnetica	2	4
CRYPTOPHYTA		
Rhodomonas minuta	1	2
CHRYSOPHYTA		
Stylochrysallis parasitica	104	218
VORTICELLIDAE (ZOOPLANKTON)		
Vorticella campanula	1	2
TOTAL PHYTOPLANKTON		889
TOTAL		891

PLANKTON COUNT OF CUSHEON LAKE

Number 1100122 Depth: 1 foot Date Taken: October 29, 1974

Slide Type: 1 cc chamber

	NUMBER PER SLIDE	NUMBER PER ML.
BACILLARIOPHYTA		
Asterionella formosa	22	47
Fragilaria crotonensis	4	8
Tabellaria fenestrata	5	11
Cymbella sp. (girdle view)	1	2
Synedra radians	1	2
Amphiprora sp.	1	2
Melosira italica	14	30
CHLOROPHYTA		
Oocystis borgei	7	15
Cosmarium punctulatum	1	2
Arthrodesmus convergens	1	2
Botryococcus braunii	2	4
Eudorina elegans	1	2
Staurastrum paradoxum	2	4
CYANOPHYTA		
Aphanizomenon flos-aquae	28	59
Anabaena planctonica	3	6
Coelosphaerium naegelianum	1	2
CRYPTOPHYTA		
Cryptomonas rostrata	5	11
CHRYSOPHYTA		
Ochromonas mutabilis	2	4
Mallomonas akrokomos	3	6
Chromulina minutum	2	4
ACTINOPODA (ZOOPLANKTON)		
Adinosphaerium sp.	2	4
VORTICELLIDAE (ZOOPLANKTON)		
Vorticella campanula	1	2
TOTAL PHYTOPLANKTON		223
TOTAL		229

PLANKTON COUNT OF CUSHEON LAKE

Number: 1100122 Depth: 3 feet Date Taken: December 17, 1974

Slide Type: 1 cc chamber

	NUMBER PER SLIDE	NUMBER PER ML.
BACILLARIOPHYTA		
Melosira italica	353	751
Tabellaria fenestrata	3	6
Melosira islandica	57	121
Synedra radians	1	2
Asterionella formosa	14	30
Cymbella tumida	1	2
Fragilaria crotonensis	2	4
CHLOROPHYTA		
Eudorina elegans	2	4
CYANOPHYTA		
Aphanizomenon flos-aquae	19	40
Microcystis flos-aquae	2	4
Anabaena planctonica	4	8
CRYPTOPHYTA		
Rhodomonas minuta	9	19
CHRYSOPHYTA		
Mallomonas caudata	3	6
Uroglena volvox	1	2
VORTICELLIDAE (ZOOPLANKTON)		
Vorticella campanula	4	8
TOTAL PHYTOPLANKTON		999
TOTAL		1007

PLANKTON COUNT OF CUSHEON LAKE

Number: 1100122 Depth: 3 feet Date Taken: December 17, 1974

Slide Type: 1 cc chamber

	NUMBER PER SLIDE	NUMBER PER ML.
BACILLARIOPHYTA		
Navicula cryptocephala	1	2
Synedra radians	1	2
Cyclotella ocellata	5	11
Tabellaria fenestrata	1	2
Asterionella formosa	1	2
Caloneis bacillum	1	2
Diploneis sp.	1	2
CHLOROPHYTA		
CYANOPHYTA		
Anabaena planctonica	2	4
CRYPTOPHYTA		
Cryptomonas ovata	7	15
Rhodomonas minuta	78	170
CHRYSOPHYTA		
Mallomonas akrokomos	37	81
Dinobryon divergens	4	9
Mallomonas caudata	1	2
Uroglena volvox	2	4
EUGLENOPHYTA		
Trachelomonas hispida	1	2
TOTAL PHYTOPLANKTON		310

PLANKTON COUNT OF CUSHEON LAKE

Number: 1100122 Depth: 3 feet Date Taken: June 24, 1975

Slide Type: 1 cc chamber

	NUMBER PER SLIDE	NUMBER PER ML.
BACILLARIOPHYTA		
Asterionella formosa	26	62
Synedra ulna	1	2
Amphora ovalis	2	5
Navicula cryptocephala	2	5
Cyclotella meneghiniana	9	22
Tabellaria fenestrata	9	22
Surirella robusta	1	2
Synedra radians	1	2
CHLOROPHYTA		
Crucigenia quadrata	1	2
Chlamydomonas polypyrenoideum	3	7
Sphaerocystis schroeteri	10	24
Crucigenia tetrapedia	1	2
Elakatothrix gelatinosa	1	2
Schroederia setigera	1	2
Gloeocystis gigas	3	7
Oocystis borgei	1	2
CYANOPHYTA		
Anabaena flos-aquae	1	2
CRYPTOPHYTA		
Cryptomonas ovata	2	5
Rhodomonas minuta	124	298
CHRYSOPHYTA		
Dinobryon divergens	201	482
Ochromonas mutabilis	38	91
Mallomonas akrokomos	14	34
DINOPHYTA		
Glenodinium limneticum	1	2
CONCHOSTRACA (ZOOPLANKTON)		
unidentified clam shrimp	1	2
TOTAL PHYTOPLANKTON		1082
TOTAL		1086

PLANKTON COUNT OF CUSHEON LAKE

Number: 1100123 Depth: 3 feet Date Taken: June 26, 1974

Slide Type: 1 cc chamber

	NUMBER PER SLIDE	NUMBER PER ML.
BACILLARIOPHYTA		
Asterionella formosa	72	151
Melosira islandica	2	4
CHLOROPHYTA		
Crucigenia fenestrata	6	13
Schoederia setigerum	2	4
Botryococcus braunii	4	8
Eudorina elegans	1	2
Crucigenia tetrapedia	1	2
Selenastrum minutum	2	4
Scenedesmus arcuatus	1	2
CYANOPHYTA		
Chroococcus minuata	21	42
Anabaena circinalis	3	6
Microcystis flos-aquae	8	18
Aphanocapsa elachista	1	2
Dactyloccopsis smithii	2	4
CHRYSOPHYTA		
Chromulina minutum	2	4
VORTICELLIDAE (ZOOPLANKTON)		
Vorticella campanula	1	2
TOTAL PHYTOPLANKTON		266
TOTAL		268

PLANKTON COUNT OF CUSHEON LAKE

Number: 1100123 Depth: 3 feet Date Taken: October 29, 1974

Slide Type: 1 cc chamber

	NUMBER PER SLIDE	NUMBER PER ML.
BACILLARIOPHYTA		
Asterionella formosa	6	13
Melosira italica	15	32
Tabellaria fenestrata	11	22
Achnanthes minutissima	1	2
Synedra radians	1	2
CHLOROPHYTA		
Cosmarium punctulatum	1	2
Ankistrodesmus falcatus var. *acicularis*	1	2
Oocystis borgei	1	2
CYANOPHYTA		
Aphanizomenon flos-aquae	18	59
Anabaena planctonica	7	15
Aphanothece nidulans	2	4
Anabaena limnetica	2	4
Anabaena circinalis	1	2
CRYPTOPHYTA		
Cryptomonas rostrata	5	11
CHRYSOPHYTA		
Mallomonas caudata	1	2
EUGLENOPHYTA		
Phacus longicauda	1	2
VORTICELLIDAE (ZOOPLANKTON)		
Vorticella campanula	1	2
TOTAL PHYTOPLANKTON		176
TOTAL		178

PLANKTON COUNT OF CUSHEON LAKE

Number 1100123 Depth: 3 feet Date Taken: December 17, 1974

Slide Type: 1 cc chamber

	NUMBER PER SLIDE	NUMBER PER ML.
BACILLARIOPHYTA		
Melosira italica	223	494
Cymbella tumida	1	2
Melosira islandica	30	67
Cyclotella kuetzingiana	2	4
Tabellaria fenestrata	8	17
Synedra radians	2	4
Surirella ovata	1	2
Asterionella formosa	7	15
CHLOROPHYTA		
Eudorina elegans	4	9
Crucigenia quadrata	1	2
CRYPTOPHYTA		
Rhodomonas minuta	9	20
CHRYSOPHYTA		
Mallomonas caudata	2	4
COPEPODA (ZOOPLANKTON)		
nauplii	1	2
ACTINOPODA (ZOOPLANKTON)		
Actinosphaerium sp.	1	2
TOTAL PHYTOPLANKTON		640
TOTAL		644

PLANKTON COUNT OF CUSHEON LAKE

Number: 1100123 Depth: 3 feet Date Taken: December 17, 1974

Slide Type: 1 cc chamber

	NUMBER PER SLIDE	NUMBER PER ML.
BACILLARIOPHYTA		
Cyclotella meneghiniana	7	15
Navicula cryptocephala	2	4
Achnanthes minutissima	2	4
Asterionella formosa	4	8
Tabellaria fenestrata	8	17
Synedra radians	2	4
Melosira italica	2	4
CHLOROPHYTA		
CYANOPHYTA		
CHRYSOPHYTA		
Mallomonas akrokomos	77	162
Rhodomonas minuta	174	365
Dinobryon divergens	6	13
Chromulina mutabilis	10	21
Ochromonas minutum	12	25
VORTICELLIDAE (ZOOPLANKTON)		
Vorticella campanula	2	4
TOTAL PHYTOPLANKTON		642
TOTAL		646

PLANKTON COUNT OF CUSHEON LAKE

Number: 1100123 Depth: 3 feet Date Taken: June 24, 1975

Slide Type: 1 cc chamber

	NUMBER PER SLIDE	NUMBER PER ML.
BACILLARIOPHYTA		
Cyclotella meneghiniana	5	11
Cyclotella kuetzingiana	5	11
Asterionella formosa	11	24
CHLOROPHYTA		
Dictyosphaerium pulchellum	1	2
Chlamydomonas polypyrenoideum	4	9
Scenedesmus incrassulata	2	4
Gloeocystis gigas	4	9
Botryococcus braunii	1	2
Crucigenia quadrata	1	2
Cosmarium contractum var. ellipsoideum	1	2
Sphaerocystis schroeteri	2	4
Eudorina elegans	1	2
CYANOPHYTA		
Aphanozomenon flos-aquae	1	2
Anabaena flos-aquae	2	4
Microcystis robusta	1	2
CRYPTOPHYTA		
Cryptomonas ovata	4	9
Rhodomonas minuta	178	384
CHRYSOPHYTA		
Dinobryon divergens	146	314
Mallomonas akrokomos	13	28
Ochromonas mutabilis	40	86
COPEPODA (ZOOPLANKTON)		
nauplii	1	2
CONCHOSTRACA (ZOOPLANKTON)		
unidentified clam shrimp	3	6
TOTAL PHYTOPLANKTON		911
TOTAL		919

APPENDIX 4

SPECIES LISTS OF ZOOPLANKTON TAKEN IN CUSHEON LAKE

PLANKTON ANALYSIS OF CUSHEON LAKE

June 26, 1974

Dominant:

Cladocerans:	Daphnia galeata mendotae Birge 1918	$X10^3$
	Daphnia pulicaria Forbes 1893	$X10^2$
	Diaphanosoma brachyurum (Lieven) 1848	$X10^2$
	Bosmina longirostris (O.F.M.) 1785	$X10^4$
	Ceriodaphnia quadrangula (O.F.M.) 1785	$X10^4$
	Holopedium gibberum Zaddach 1855	$X10^2$
Cyclopoids:	Cyclops bicuspidatus thomasi Forbes 1882	$X10^2$
Calanoids:	Diaptomus oregonensis Lillj. 1889	$X10^3$

Other Species Present:

Cladocerans:	Alonella affinis (Leydig) 1860	few
Rotifers:	Keratella cochlearis	few
	Polyarthra vulgaris	few

Ratio:

Daphnia galeata:	Diaphanosoma:	D. pulicaria:	Diaptomus:	Ceriodaphnia:	Bosmina
1	1	2	5	7	10

Remarks: (Refers to all Cusheon Lake data)
Numbers refer to estimated abundance in the total sample
(Volume variable and not recorded)

PLANKTON ANALYSIS OF CUSHEON LAKE

August 29, 1974

Dominant:

Cladocerans:	Daphnia pulicaria Forbes 1893	$X10^3$
	Ceriodaphnia quadrangula (O.F.M.) 1785	$X10^2$
	Diaphanosoma brachyurum (Lieven) 1848	$X10^2$
Cyclopoids:	Cyclops bicuspidatus thomasi Forbes 1882	$X10^2$
Calanoids:	Diaptomus oregonensis Lillj. 1889 (is most likely this species, late copepodites and 1 adult	$X10^2$

Other Species Present:

Cladocerans:	Alonella affinis (Leydig) 1860	few
	Eubosmina longispina	1 specimen
Rotifers:	Asplanchna priodonta	few
	Trichocera (?) sp.	50 specimens
Cyclopoids:	Macrocyclops albidus (Jurine) 1820	2 specimens
Trichoptera:	Oxytheira sp.(?)	1 larva
Diptera (Culicidae):	Chaoborus sp.	few larvae

Ratio:

Diaphanosoma:	Cyclops:	Daphnia pulicaria:	Ceriodaphnia:	Diaptomus
1	2	2	3	12

PLANKTON ANALYSIS OF CUSHEON LAKE

October 29, 1974

Dominant:

Cladocerans:	Daphnia pulicaria Forbes 1893	$X10^4$
	Ceriodaphnia quadrangula (O.F.M.) 1785	$X10^4$
	Daphnia laevis Birge 1879	$X10^2$
Cyclopoids:	Cyclops bicuspidatus thomasi Forbes 1882	$X10^3$
Calanoids:	Diaptomus oregonensis Lillj. 1889	$X10^2$

Other Species Present:

Cladocerans:	Diaphanosoma brachyurum (Leiven) 1848	few
	Holopedium gibberum Zaddach 1855	few
Diptera:	Chaoborus sp.	1 larva (Culicidae)
	Pentaneura sp.	1 larva (Chironomidae)
Rotifers:	small roundish rotifer - could be early Asplanchna (Horella shape)	50 photo record
Ostracod:	Cypria turneri Hoff 1942	1
Hydracarine:		

Ratio:

Diaptomus:	Daphnia laevis:	C. bicusp. thomasi:	D. pulicaria:	Ceriodaphnia
1	2	2	7	7

PLANKTON ANALYSIS OF CUSHEON LAKE

December 18, 1974

Dominant:

Cladocerans:	Daphnia pulicaria Forbes 1893	$X10^3$
	Daphnia laevis Birge 1879	$X10^3$
Cyclopoids:	Cyclops bicuspidatus thomasi Forbes 1882	$X10^2$
Calanoids:	Diaptomus oregonensis Lillj.1889	$X10^2$

Other Species Present:

Cyclopoids:	Macrocyclops albidus (Jurine) 1820
Cladocerans:	Eubosmina longispina

Remarks: This sample was full of blue-green Aphanizomenon flos-aquae; possibly explains absence of rotifers. Also due to its presence, ratio of dominant species impossible to obtain.

PLANKTON ANALYSIS OF CUSHEON LAKE

April 17, 1975

Dominant:

Cladocerans:	Daphnia pulicaria Forbes 1893	$X10^6$
	Daphnia laevis Birge 1879	$X10^3$
	Ceriodaphnia quadrangula (O.F.M.) 1785	$X10^2$
Cyclopoids:	Cyclops bicuspidatus thomasi Forbes 1882	$X10^3$
Calanoids:	Diaptomus oregonensis Lillj. 1889	$X10^5$

Other Species Present:

Rotifers:	Kellicottia longispina	$X10^3$
	Asplanchna priodonta	$X10^2$
	Ploesoma (hudsoni)?	$X10^2$
	Gastropus (stylifer)?	$X10^2$
Cladocerans:	Holopedium gibberum Zaddach 1855	few
Diptera:	Pentaneura sp.	20 larvae (Chironomidae)

Ratio:

Cyclops:	Daphnia pulicaria:	D. laevis:	Diaptomus
1	2	2	3

PLANKTON ANALYSIS OF CUSHEON LAKE

June 6, 1975

Dominant:

Cladocerans:	Daphnia pulicaria Forbes 1893	$X10^2$
	Diaphanosoma brachyurum (Lieven) 1848	$X10^2$
	Ceriodaphnia quadrangula (O.F.M.)1785	$X10^2$
Cyclopoids:	Cyclops bicuspidatus thomasi Forbes 1882	$X10^2$
Calanoids:	Diaptomus oregonensis Lillj. 1889	$X10^3$
Rotifers:	Asplachna priodonta	$X10^2$
	Gastropus stylifer	$X10^2$

Other Species Present:

Rotifers:	Keratella cochlearis	50-100
	Kellicottia longispina	50-100
	Filinia longiseta	50
Protozoa:	Euglena (rubra)?	10
	Actinobolina radians	(closest I.D.)
Cladocerans:	Holopedium gibberum Zaddach 1855	few

Ratio:

Cyclops:	Ceriodaphnia:	Daphnia:	Diaptomus
1	1	3	6

APPENDIX 5

Data for Cusheon Lake Prior to the Monitoring Program.

The following data were obtained by the Groundwater Section of the British Columbia Water Resources Service from samples taken on August 29, 1973. A map indicating the station locations is attached (see next page): These data are included in this report in order to bring together in one document all information gathered by the Water Resources Service for Weston Lake. The kindness of Dr. Foweraker in making these data available in greatly appreciated.

CUSHEON LAKE Station 1400547 August 29, 1973

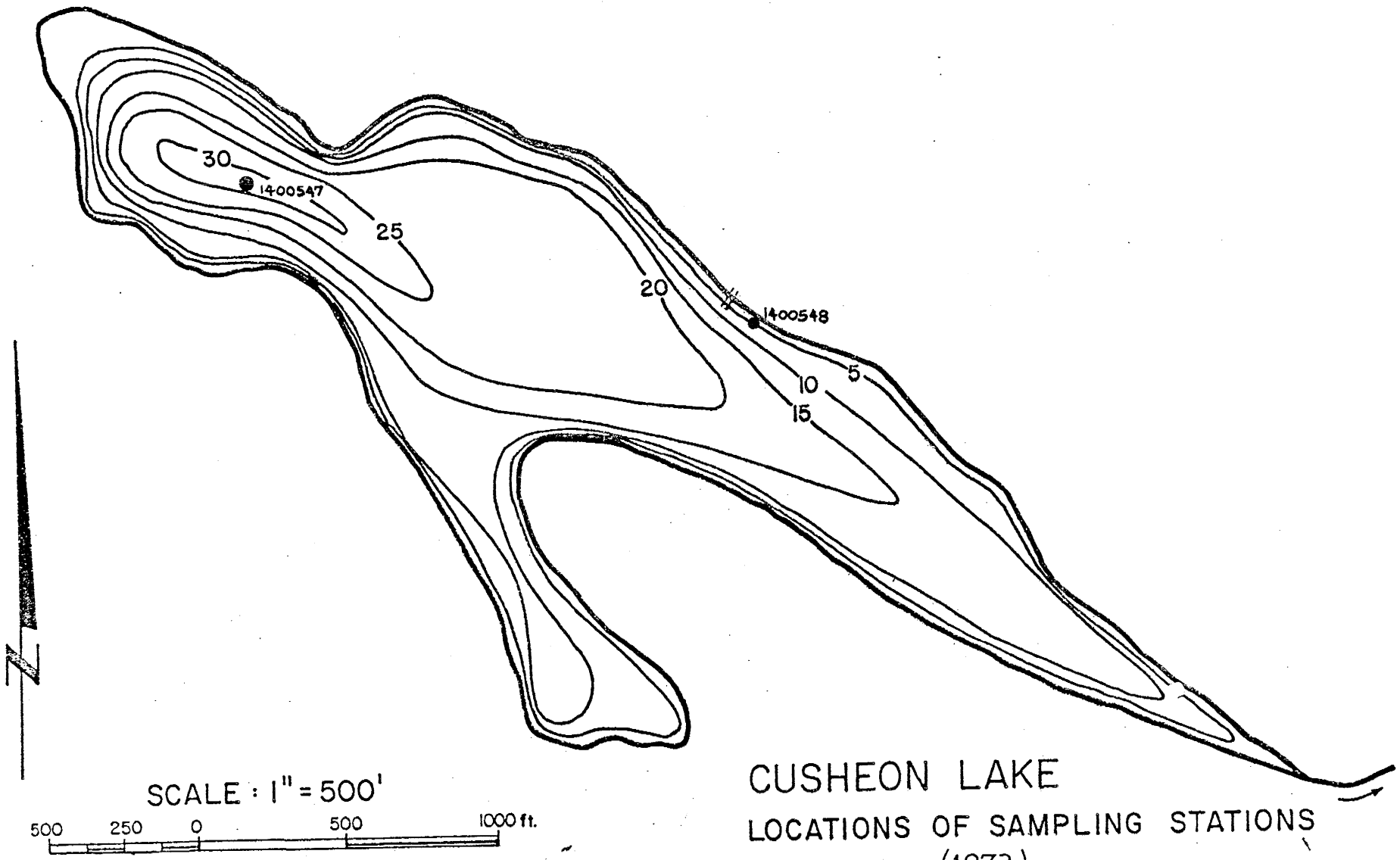
Parameters (and units)	Values at the depths sampled			
	0 meters	3.3 meters	6.5 meters	9.2 meters
pH (relative units)	7.4	7.4	6.9	6.8
Dissolved solids (mg/l)	76.0	74.0	82.0	92.0
Specific conductance (μmho/cm)	88.0	88.0	98.0	112.0
Temperature (^{o}C)	18.3	18.3	13.9	10.5
Dissolved oxygen (mg/l)	9.14	8.9	<0.4	<0.4
Total alkalinity (mg/l)	26.2	28.6	37.3	49.8
Chloride (mg/l)	6.9	6.8	6.1	6.0
Hardness (mg/l)	29.1	29.1	34.4	39.0
Dissolved NO_3-N (mg/l)	<0.02	<0.02	<0.02	<0.02
Dissolved NO_2-N (mg/l)	<0.005	<0.005	<0.005	<0.005
Kjeldahl nitrogen	0.37	0.41	0.5	1.24
Silica (mg/l)	8.7	9.0	11.8	13.3
Sulphate (mg/l)	7.6	8.0	6.6	<5.0
Dissolved calcium (mg/l)	8.2	8.2	10.0	11.5
Dissolved magnesium (mg/l)	2.1	2.1	2.3	2.5
Dissolved potassium (mg/l)	0.5	0.5	0.6	0.8
Dissolved sodium (mg/l)	5.5	5.5	5.1	5.2

CUSHEON LAKE Station 1400548 August 29, 1973

Values at the depths sampled.

Parameters (and units)	1 meter
pH (relative units)	6.9
Dissolved solids (mg/1)	76.0
Specific conductance (μmho/cm)	91.0
Total alkalinity (mg/1)	32.7
Chloride (mg/1)	6.5
Hardness (mg/1)	31.4
Dissolved NO_3-N (mg/1)	<0.02
Dissolved NO_2-N (mg/1)	<0.005
Kjeldahl nitrogen (mg/1)	0.440
Silica (mg/1)	10.2
Sulphate (mg/1)	8.0
Dissolved calcium (mg/1)	8.8
Dissolved magnesium (mg/1)	2.3
Dissolved potassium (mg/1)	0.5
Dissolved sodium (mg/1)	5.5

MAP BASED ON DRAWING NO. 92-B-14W
FISH AND WILDLIFE BRANCH



CUSHEON LAKE
LOCATIONS OF SAMPLING STATIONS
(1973)

FIGURE 10

APPENDIX 6

Glossary of Terms

This glossary is intended as an aid to those not trained in limnology, but who may nevertheless be required to become aware of this study and the results presented.

Epilimnion	- water lying above the thermocline (or metalimnion).
Eutrophic	- highly productive in terms of organic matter formed.
Hypolimnion	- water lying below the thermocline (or metalimnion).
Macrophytes	- in this report, the term is restricted to aquatic vascular plants.
Mesotrophic	- moderately productive in terms of organic matter formed.
Metalimnion	- the region where the thermocline (or area of greatest temperature change with change of depth) is found.
Oligotrophic	- low productivity in terms of organic matter formed.
Phytoplankton	- microscopic plants found suspended in the water.
Total alkalinity	- a measure of the bicarbonate, carbonate and hydroxide ions concentrations. Carbonate and hydroxide ions are not present at pH values less than 8.3.
Zooplankton	- microscopic animals which live in suspension in the water.