

MINISTRY OF THE ENVIRONMENT

OBSERVATIONS ON THE WATER QUALITY
IN THE CHAIN - LINK - OSPREY LAKES SYSTEM,

Princeton, B.C. 1973 - 1976

Part 3. Water quality for Osprey Lake

WATER INVESTIGATIONS BRANCH

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ABSTRACT

The results of nine sampling efforts monitoring water quality in Osprey Lake, B.C., between July, 1973 and November, 1976, are presented. Zooplankton and phytoplankton species lists are also included.

This monitoring program in Osprey Lake serves as a comparison for similar studies carried out concurrently in Link Lake and Chain Lake with the objective of assessing the effectiveness of a stream diversion to Chain Lake as a eutrophication control measure.

Osprey Lake is shown to be a mesotrophic lake, becoming eutrophic. Biological productivity in the lake appears to be limited by the supply of phosphorus.

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INTRODUCTION

Osprey Lake is situated approximately 30 miles northeast of Princeton, B.C., and lies at the head of the three-lake system linked by Hayes Creek (Figure 1), a tributary to the Similkameen River. Numerous private residences and a public campground are situated on the borders of the lake. The residences are mostly for summer use only, and there are few year-round residents. The recreational value of the lake was undoubtedly enhanced by a trout stocking programme undertaken by the Fish and Wildlife Branch following Rotenone treatment of the lake in 1969 to eliminate the resident coarse fish.

The Water Investigations Branch has carried out limited water quality testing in Osprey Lake since July, 1973, as a control (or comparison) for similar testing in Chain Lake, some two to three miles (1.2 - 1.8 km) downstream (Figure 1). The sampling program in Chain Lake was undertaken to assess the effectiveness of a stream diversion in controlling eutrophication of that lake.

MORPHOMETRY

Osprey Lake, situated at 1099 meters elevation, is an elongated, relatively narrow body of water with a shoreline development index of 1.88 (lake perimeter = $1.88 \times$ perimeter of a circle of equal area). There is a single basin, with a maximum water depth of approximately 10 meters (Figure 2). Shallow areas with water depth less than six meters are found at the east and west ends of the lake, and represent 21.3×10^4 m², or 58 percent of the total lake surface area. The shallows are potential colonization sites for benthic algae and rotted aquatic vascular plants. The volume of water in the lake is approximately 1.7017×10^6 m³, while the annual outflow appears to vary between 0 (in dry years) and approximately 52.9×10^4 m³ in wetter years (see Appendix 1 for these calculations). Thus the flushing rate of the lake varies between 0 and 31.1 percent water volume exchanged per annum (Appendix 1).

The watershed of Osprey Lake is 99.88×10^4 m² in area, extending up to 1586 meters elevation (Figure 10). The land is composed of rolling hills, and near the lake, is heavily forested with Cariboo aspen, Lodgepole pine and Douglas fir in the valley and on the lower slopes. At higher elevations the forest type changes to subalpine Engelmann spruce and subalpine fir.

The climate of this region is warm and relatively dry in summer (mean annual precipitation 507.5 mm or 21.5 inches²) and cold in winter. The lakes are generally frozen from mid-November through to April or early May, and the mean total snowfall is 2500 mm or 100 inches per annum².

Sampling Methods and Schedule

The sampling and analytical methods used have been described in the Chain Lake report of this series (Reference 1) and will not be duplicated here. The schedule of sampling has provided nine sampling days from July, 1973 to this date. An outline of the sampling program is presented in Appendix 2.

WATER QUALITY RESULTS

1. Vertical Profiles of Temperature and Dissolved Oxygen

Temperature measurements conducted on July 23, 1973, showed a well-stratified water column at station 1100701, at the deepest part of the lake (Figure 2). The epilimnion occupied the top three meters, with a uniform temperature of 18°C. At greater depths the temperature declined uniformly with increasing depth to 11°C at 10 meters depth (Figure 3). The resulting density stratification was reflected in the dissolved oxygen concentrations (see Figure 3) which ranged from 8.6 to 8.2 mg/l from the surface down to four meters depth, representing approximately 82 to 78 percent saturation, respectively. The deeper water strata of the lake showed rapidly diminishing oxygen concentrations, becoming anaerobic (devoid of oxygen) at 7.5 meters depth (Figure 3). Temperature and oxygen concentration measurements were made on the same day at station 1100702, but were restricted to four meters depth only because of the shallow water at that station (Figure 2). The results (Figure 3) were very similar to the values recorded in the top four meters of water at station 1100701, and represented the epilimnion only.

The sampling results for May 29, 1974, indicated that the lake was warming and starting to stratify after the spring turnover (Figure 3). Thus there was only a slight temperature gradient, from 11°C at the surface to 7.2°C at 12 meters depth, while the temperature in the hypolimnion indicated a warming from the minimum temperatures of winter (approximately 4°C). Similarly, the dissolved oxygen concentrations ranged from approximately 8.7 mg/l at the surface, to 6.0 mg/l at 10 meters depth. These values represent 70 percent to 45 percent saturation, respectively (see Figure 3). The "undetectable oxygen" indicated at 11 meters depth probably results from the oxygen probe entering the sediment, since the observed temperature structure of the water column is not consistent with the requirements for such a dramatic change in oxygen content of the water (from 6 mg/l to "undetectable" in one meter change of depth).

Sampling on October 8, 1974, found the lake in the fall turnover. The water column was essentially isothermal at approximately 9.0 to 9.5°C from the surface down to 12 meters depth. The dissolved oxygen results showed the same trend (Figure 3), with values of 9.2 to 9.5 mg/l (74 to 71 percent saturation) at all depths sampled down to 11 meters depth. The anaerobic condition reported at 12 meters depth probably indicated contact of the probe with the sediment, as discussed in the preceeding paragraph.

Measurements of temperatures and dissolved oxygen concentration were made through the ice at station 1100701 on March 2, 1975, and showed the lake in winter stagnation. The temperature of the water immediately below the ice cover was approximately 1°C, and increased with depth to 4°C at nine meters depth. The resulting density stratification inhibited circulation of the water, permitting the development of a gradient of dissolved oxygen concentration. The observed values (Figure 3) ranged from 12.7 mg/l (80 percent saturation) at the ice-water interface down to <1 mg/l at nine meters depth.

On June 4, 1975, the temperature profile of Osprey Lake at station 1100701 showed well-defined epi-, meta- and hypo-limnion strata. The epilimnion showed warm water of nearly uniform temperature (14.2 to 14.7°C) down to three meters depth, and then gave way to the thermocline between three and seven meters depth (= the metalimnion) as the water temperature declined rapidly from 14.2°C to 8.7°C (Figure 3). The hypolimnion (four meters down to 11 meters depth) displayed a more modest temperature change to 7.5°C at 11 meters depth. The observed oxygen concentrations down to six meters depth ranged from 10.1 to 9.9 mg/l (90 to 80 percent saturation, respectively), but diminished rapidly from seven meters, becoming undetectable at the bottom (11 meters).

Sampling in 1976 was carried out at different times than in the previous years, and included data for the mid-summer period (July & September). These data showed that the hypolimnion in Osprey Lake does not become anaerobic even at the height of the summer stratification (Figure 3) and near-surface oxygen concentrations are usually very close to the oxygen saturation levels.

SUMMARY OF WATER CHEMISTRY RESULTS

The detailed test results from the monitoring programme are not given in this report, but may be obtained from the Water Resources Service Test Results file as directed in Appendix 3. The following summary refers to the results for station 1100701 (Figure 2), at the deepest point in the lake, but is also representative of the results for station 1100702. Comments about results from station 1100703 and 1100704 may be found following this summary of the data. The accompanying graphs (Figures 4 through 8) show time-series plots of water chemistry data for 1974 & 1975, with the data for 1976 superimposed.

pH values in Osprey Lake ranged from 7.2 to 8.4, with a mean of 7.8. The higher values were noted in the summer, especially in the surface water samples, while in winter lower pH values prevailed throughout the lake (Figure 4).

Total alkalinity values showed the opposite trend, with higher values recorded in the winter and lower values in summer. The results ranged from a high of 78.2 mg/l to a low of 62.0 mg/l, with a mean of 68.3 mg/l. There is a tendency for the surface water samples to show lower total alkalinity than the deeper samples, except in winter (sampled in February, 1975), as shown in Figure 4.

The dissolved magnesium concentrations showed a small range of values, with the recorded maximum and minimum being 4.6 & 3.8 mg/l, respectively, and a mean of 4.1 mg/l. As shown in Figure 5, the concentration of dissolved magnesium in Osprey Lake is lower in summer and higher in winter. This test was not carried out on water samples taken in 1976.

Dissolved calcium showed a similar trend. The measured concentrations ranged from 20.9 mg/l to 6.4 mg/l, with a mean of 18.2 mg/l (Figure 5).

Dissolved nitrogen as nitrite and nitrate was undetectable (concentration <0.02 mg/l) in all summer samples, whereas fall and winter samples, taken between November and May, showed concentrations up to a

maximum of 0.25 mg/l (Figure 6). The mean of all results was 0.054 mg/l.

Total nitrogen values (calculated as Kjeldahl-N and dissolved-N) ranged from 1.09 mg/l to 0.32 mg/l, with a mean of 0.48 mg/l. There was a tendency to higher values in the deeper samples on any date and to higher values at all depths in the winter (Figure 6). As the exception to this statement, the highest concentration noted (1.09 mg/l) occurred in the deepest sample taken in July, 1976.

Dissolved phosphorus was undetectable in all surface water samples, and in most of the deeper samples. However, relatively high concentrations (0.115 mg/l and 0.018 mg/l) were noted in near-bottom samples taken in July and September, 1976, respectively (see Figure 7).

Most values for total phosphorus lay below 0.02 mg/l (Figure 7) and the mean of the recorded results was 0.019 mg/l. However, there were instances of relatively high concentration in the deeper water samples, up to a maximum of 0.17 mg/l (recorded in July, 1976). The higher values occurred in the deeper samples and in the summer, while lower values were noted in the fall through to spring.

Total organic carbon showed values ranging from 7.0 to 15.0 mg/l, with a mean of 10.5 mg/l. Higher values were noted in summer and lower values in winter (Figure 8). There was no clear variation with depth. Total inorganic carbon (Figure 8) showed higher values in the winter and lower values in the summer. The values ranged from 12 to 21 mg/l, with a mean of 16 mg/l. The data presented do not show any clear variation with depth. These two tests were not carried out in 1976.

Water samples taken from Osprey Lake (sites 1100701 & 1100702) and from Lee Creek (site 1100703) were tested for selected heavy metals. A summary of the results is presented in Table 1. Only iron was regularly present in detectable concentrations, while mercury, zinc, nickel, cadmium, copper and lead were undetectable.

The analytical results for water samples taken at station 1100704 (Hayes Creek outflowing from Osprey Lake - see Figure 2) were generally comparable to the results for all the basic parameters (Appendix 2) from the Osprey Lake samples. However, Lee Creek (sampled at station 1100703) which drains Westmere Lake into Osprey Lake (Figure 2) showed water quality characteristics which differed from those of Osprey Lake. These differences, shown in Appendix 4, may be summarized as follows. The water in Lee Creek was softer than that of Osprey Lake (indicated by lower values for total alkalinity, specific conductance, inorganic carbon, dissolved calcium and dissolved magnesium), but showed similar pH values. The Lee Creek samples showed lower concentrations of nitrogen (both total and dissolved) than Osprey Lake samples. However, the phosphorus concentrations (both total and dissolved) were markedly higher in Lee Creek than in Osprey Lake, and this disparity was heightened in the fall samples (eg., October, 1974). These comparisons are presented in greater detail in Appendix 4.

Phytoplankton of Osprey Lake

Unconcentrated samples of phytoplankton were taken from all depths sampled for water quality in the lake (stations 1100701 and 1100702) in the 1973-1975 period. At the time of preparation of this report only the surface samples to 1975 had been analysed. The surface phytoplankton samples taken in 1976 had not been examined when this report was prepared. The results of examination of the remaining samples will be presented as an addendum to this report at a later date.

The results of the examination of the surface phytoplankton samples are presented in Appendix 5, and are summarized in Figure 9. The samples generally showed a great diversity of species, but numerical dominance was usually vested in a single species, which alone accounted for more than 50% of the total number of organisms present. Although the results showed little difference in total cell numbers or in dominant species between the two lake sampling stations on each date, there was considerable variation with time at each station. Thus there was a different dominant species on each sampling date, and the phytoplankton densities varied considerably from one date to the next, as shown in Figure 9. One of the dominant species recorded (Dinobryon divergens) belongs to a genus which has been implicated in taste and odour problems in water supply³, but all the other species are generally not associated with unfavourable water quality.

Occasional sampling was also carried out on Lee Creek (station 1100703) and on Hayes Creek, flowing out of Osprey Lake (station 1100704). The results for these samples are also presented in Appendix 5 and in Figure 9. The two samples from Lee Creek showed very low population densities, while the results from Hayes Creek tended to closer agreement in density and dominant species with the results from the lake (Figure 9).

Zooplankton in Osprey Lake

The composition of the zooplankton in Osprey Lake may be inferred from the results of four oblique tows made on three sampling dates to 1975.

Samples obtained in 1976 have not yet been examined. The detailed results are presented in Appendix 6. In summary, all of the samples were numerically dominated by Diaptomus venai and Daphnia galeata mendotae, with Daphnia pulicaria ranking as dominant also in two of the four samples. These results are not adequate for a reasonable description of the zooplankton of the lake, but the consistency of the results over a wide time span (July 23, 1973; May 29, 1974; October 8, 1974 and June 4, 1975) suggest that the dominant fauna, at least, is quite stable.

Aquatic Macrophytes

A detailed survey of aquatic plants in Osprey Lake was carried out on September 28, 1976. Most of the lake shore has no aquatic plants and is forested to the water's edge. In front of most of the developed lots there are shallow, sandy beaches, probably artificial. These support occasional patches of Ranunculus aquatilis and Potamogeton pectinatus. There are patches of Equisetum fluviatile, Eleocharis sp., and Carex sp., with lesser amounts of Potentilla palustris, R. aquatilis and P. pectinatus associated in the northwest, west, east and southeast corners of the lake. Most of the shoreline shows washed-up fragments of Potamogeton richardsonii, Myriophyllum exalbescens and R. aquatilis. The latter is present in two forms: a short-leaved, rigid form which does not collapse when lifted from the water and a long-leaved form which does. These are probably subspecies subrigidus and aquatilis.

DISCUSSION

The mean of the cell densities reported in the samples from stations 1100701 and 1100702, 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 comparison shows that the mean algal population density in Osprey Lake (2911 cells/ml) lies between the mean values for Okanagan and Skaha lakes. These are regarded, respectively, as mesotrophic and eutrophic lakes. On the basis of this comparison, then, Osprey Lake should be regarded as approaching the eutrophic status. Furthermore, oxygen depletion in the hypolimnion, as shown in the data presented here, is generally regarded as an indication of eutrophication.

A scrutiny of the data for total nitrogen and total phosphorus concentrations in the lake suggests that productivity is probably limited by the phosphorus supply as dissolved - P is most frequently undetectable (Figure 7). It is generally accepted that where the ratio of total - N: total - P exceeds 15 (by atoms or 6-7 by weight) that phosphorus is likely to be the limiting factor. This situation apparently exists in Osprey Lake, as shown by the N:P ratio given (Table 3) which range from 10.3 to 66, with a mean of 31.4, by weight.

SUMMARY

1. Osprey Lake showed a well-developed summer stratification, accompanied by oxygen depletion in the hypolimnion.
2. The mean phytoplankton population density was 2.911 cells/ml.
3. On the basis of the foregoing, Osprey Lake should be regarded as mesotrophic and becoming eutrophic.
4. Further biological activity in the lake may be limited by the availability of phosphorus.

A handwritten signature in cursive script, reading "J. M. Goddard", is written over a horizontal line.

J. M. Goddard

Biologist

Environmental Studies Division

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2. "Climate of B.C. - climatic normals 1941 to 1970". B.C. Dept. of Agriculture.
3. Palmer, C.M. (1962). "Algae in water supplies". Public Health Service Publication No. 657, U.S. Dept. of Health, Education and Welfare.
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.

TABLE 1

Mean Metal Concentrations in Water Samples from Osprey Lake
and tributary streams

<u>Metal, detection limit & units of measurement</u>		<u>Osprey Lake</u>		<u>Lee Creek</u>
		<u>1100701</u>	<u>1100702*</u>	<u>1100703</u>
Total cadmium	(0.0005), mg/l	<0.0005	<0.0005	<0.0005
Total copper	(0.001) , mg/l	<0.001	<0.001	<0.001
Total iron	(0.1) , mg/l	0.23	0.1	0.15
Total lead	(0.001) , mg/l	<0.001	<0.001	<0.001
Total Mercury	(0.01) , µg/l	<0.05	<0.05	<0.05
Total Nickel	(0.005) , mg/l	<0.01	<0.01	<0.01
Total Zinc	(0.005) , mg/l	0.006	<0.005	<0.005

* Single sample only

TABLE 2

Comparison of phytoplankton population densities

<u>Lake</u>	<u>Mean population density</u> <u>(cells/ml)</u>	<u>Trophic status</u>
Osprey Lake	2911	
Kalamalka Lake *	700 (sparse population)	Oligotrophic
Okanagan Lake *	1500 (low population)	Mesotrophic
Skaha Lake *	3700 (High population)	Eutrophic
Wood Lake *	7900 (Very high population)	Highly eutrophic

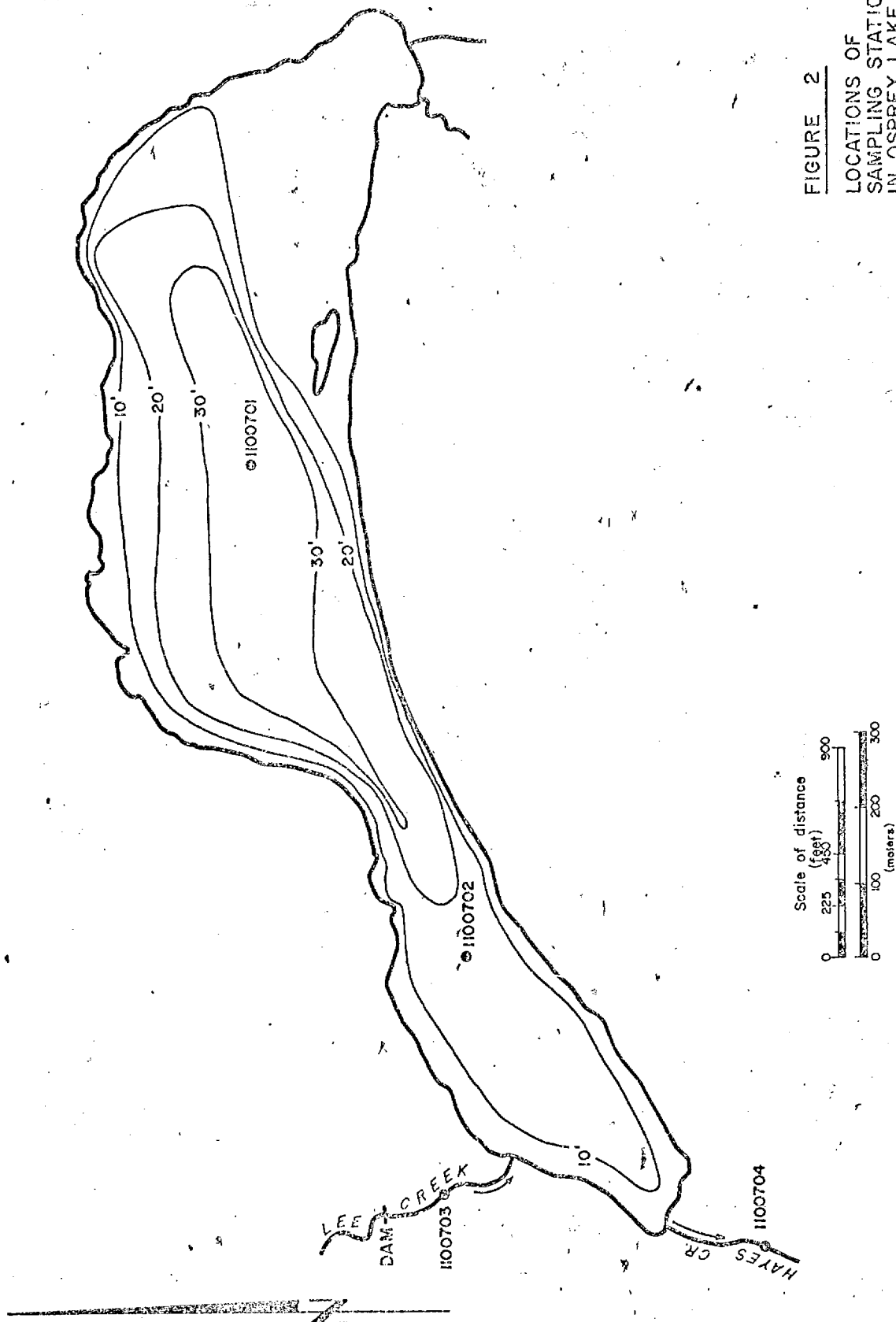
*Data from Stockner and Northcote, (1974).⁴

TABLE 3

Ratios of total - N: total - P at site 1100701
(mean values for all depths on each date)

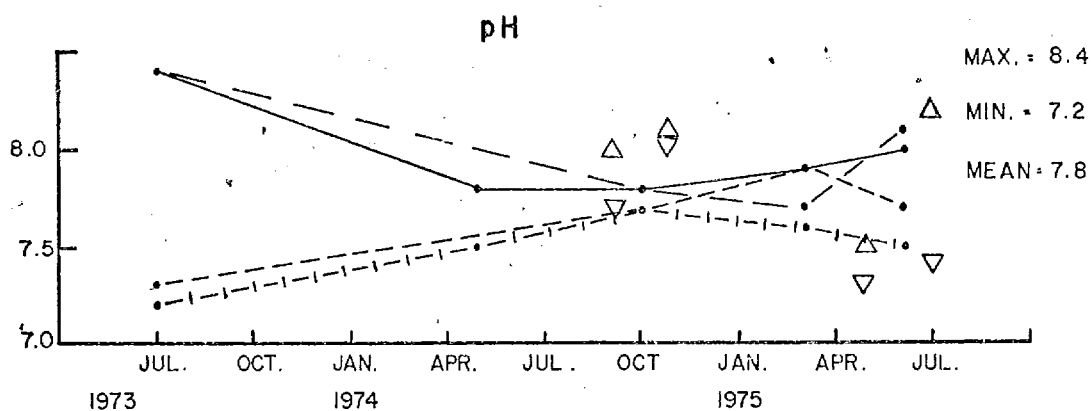
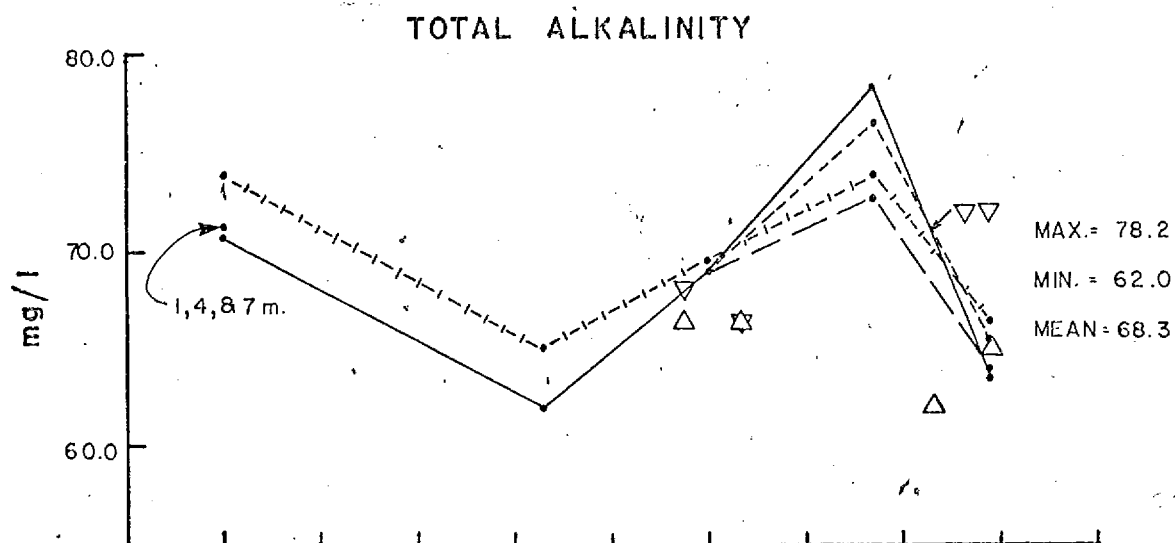
<u>Date</u>	<u>Mean total N</u>	<u>Mean Total P</u>	<u>N:P</u>
23 July 1973	0.45	0.018	25
29 May 1974	0.60	0.04	14.8
8 October 1974	0.41	0.012	32.6
2 March 1975	0.54	0.008	66
4 June 1975	0.41	0.016	24.5
4 May 1976	0.44	0.008	51.8
20 July 1976	0.54	0.052	10.3
28 September 1976	0.41	0.018	23.1
4 November 1976	0.44	0.013	34.5

Mean N:P ratio = 31.4



BASED ON FISH AND WILDLIFE DRAWING

No. 92H-9E



KEY

- 1 meter
 - - - 4 meters
 - ... 7 meters
 - · - · 9 or 10 meters
- } Not sampled, May 1974

1976 data

- △ 0 meters
- ▽ 8-9 meters

FIGURE 4
pH AND TOTAL ALKALINITY

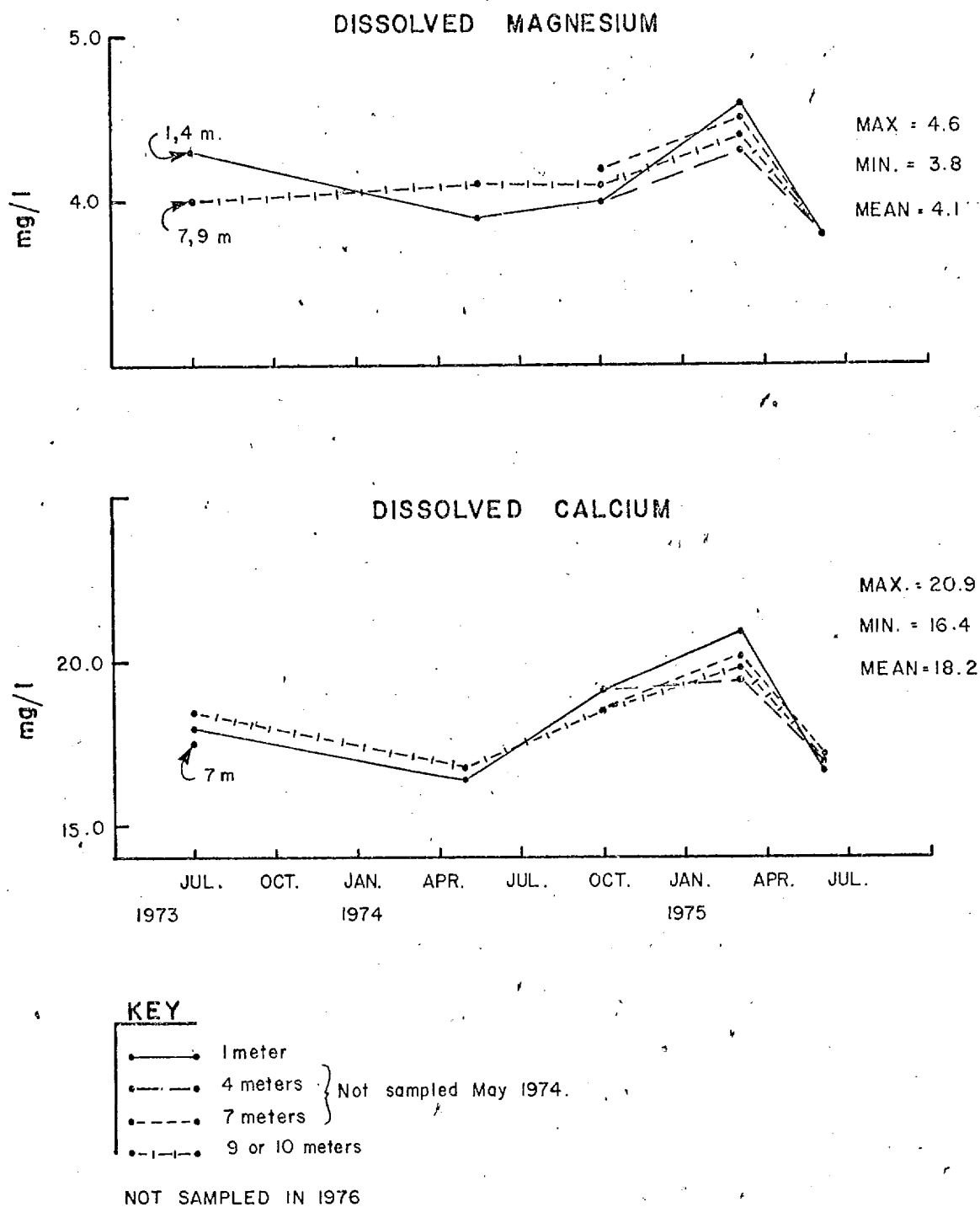
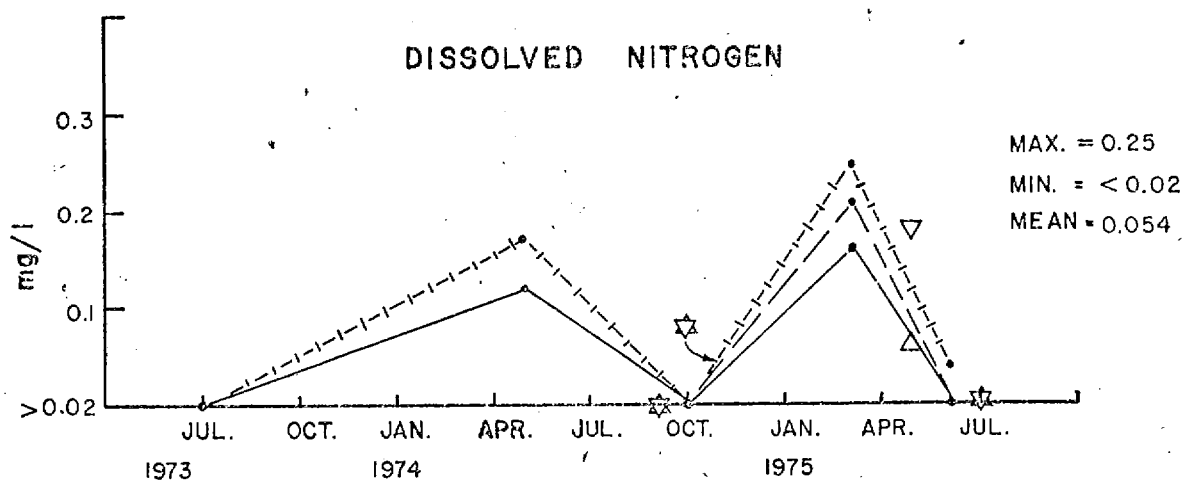
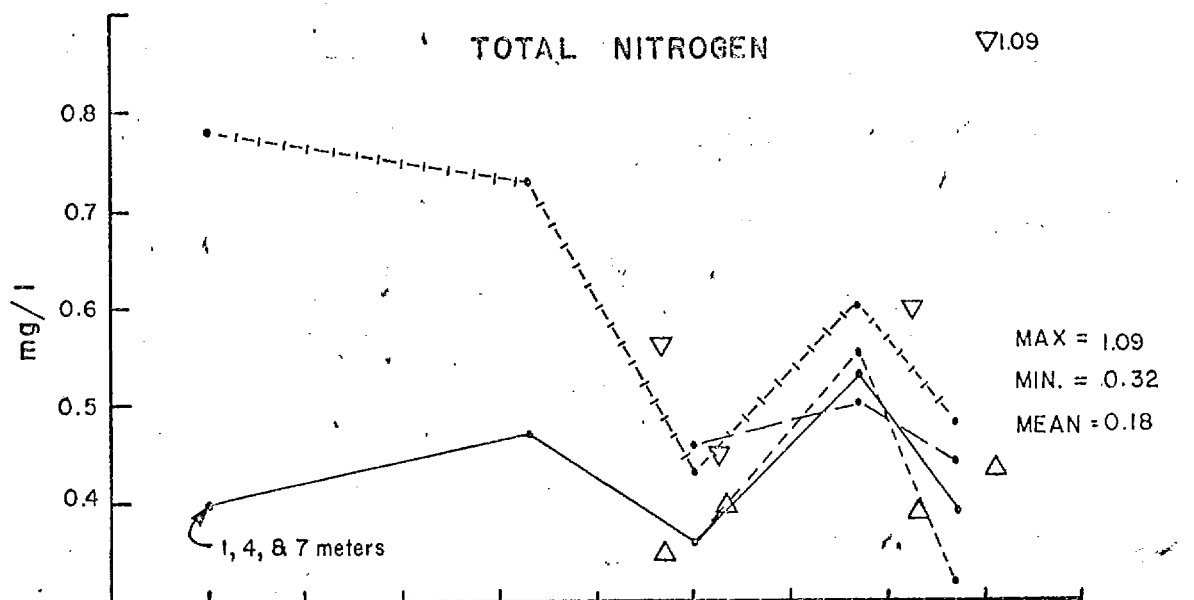


FIGURE 5
DISSOLVED CALCIUM AND
DISSOLVED MAGNESIUM

**KEY**

- 1 meter
 - - • 4 meters
 - · · · 7 meters
 - · - • 9 or 10 meters
- } Not sampled May 1974.

1976 data

- △ 0 meters
- ▽ 8-9 meters

FIGURE 6

DISSOLVED NITROGEN ($\text{NO}_2 + \text{NO}_3$)
AND TOTAL NITROGEN

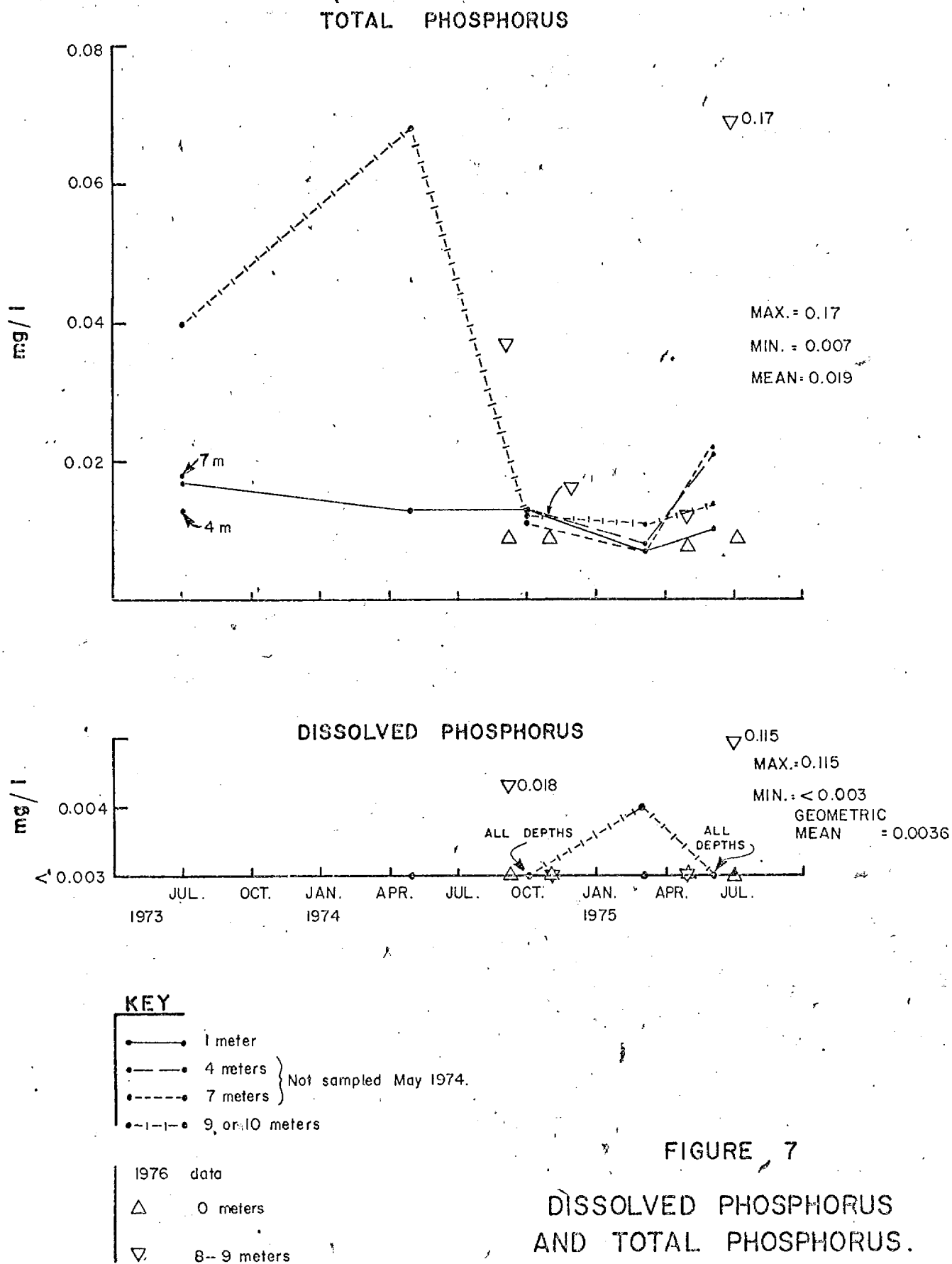
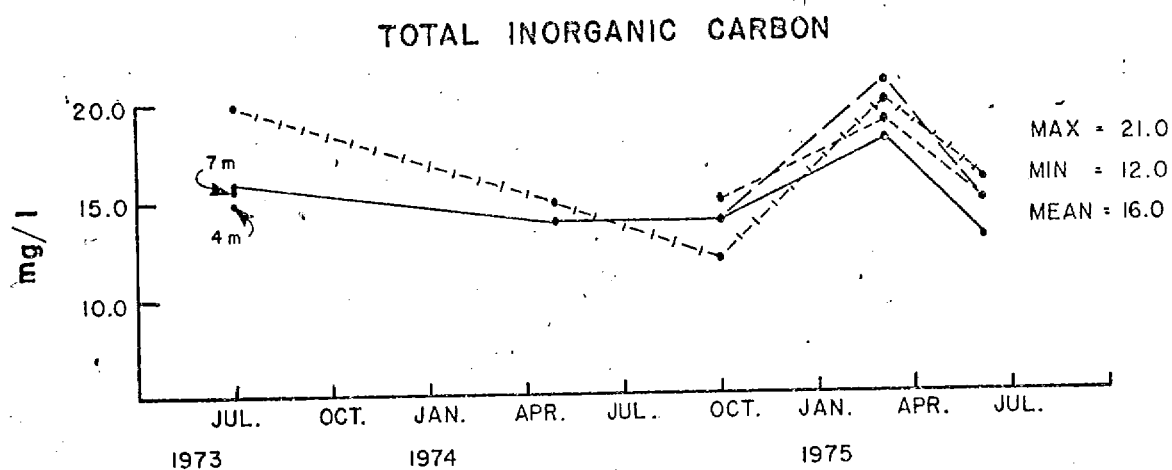
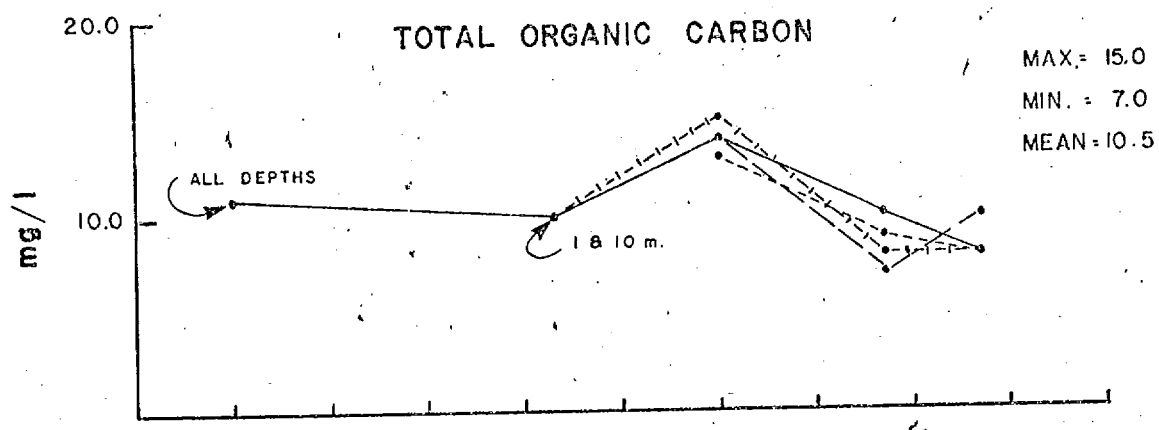


FIGURE 7

DISSOLVED PHOSPHORUS
AND TOTAL PHOSPHORUS.

**KEY**

- 1 meter
 - 4 meters
 - 7 meters
 - |-|- 9 or 10 meters
- } Not sampled May 1974.

NOT SAMPLED IN 1976

FIGURE 8

TOTAL ORGANIC, AND
TOTAL INORGANIC CARBON

APPENDIX 1MORPHOMETRIC DATA FOR OSPREY LAKE

Elevation	3606 feet	1099 meters
Surface area	91 acres	0.368 km ²
Volume	1380 acre feet	1.7017 x 10 ⁶ m ³
Mean Depth	15 feet	4.6 m
Maximum Depth	33 feet	10.1 m
Perimeter	13,259 feet	4044 m
Shoreline development	1.88	
Area of lake bottom at less than 20 ft. (6.1 m) depth	52.7 acres	0.21 km ² (58% of lake area)

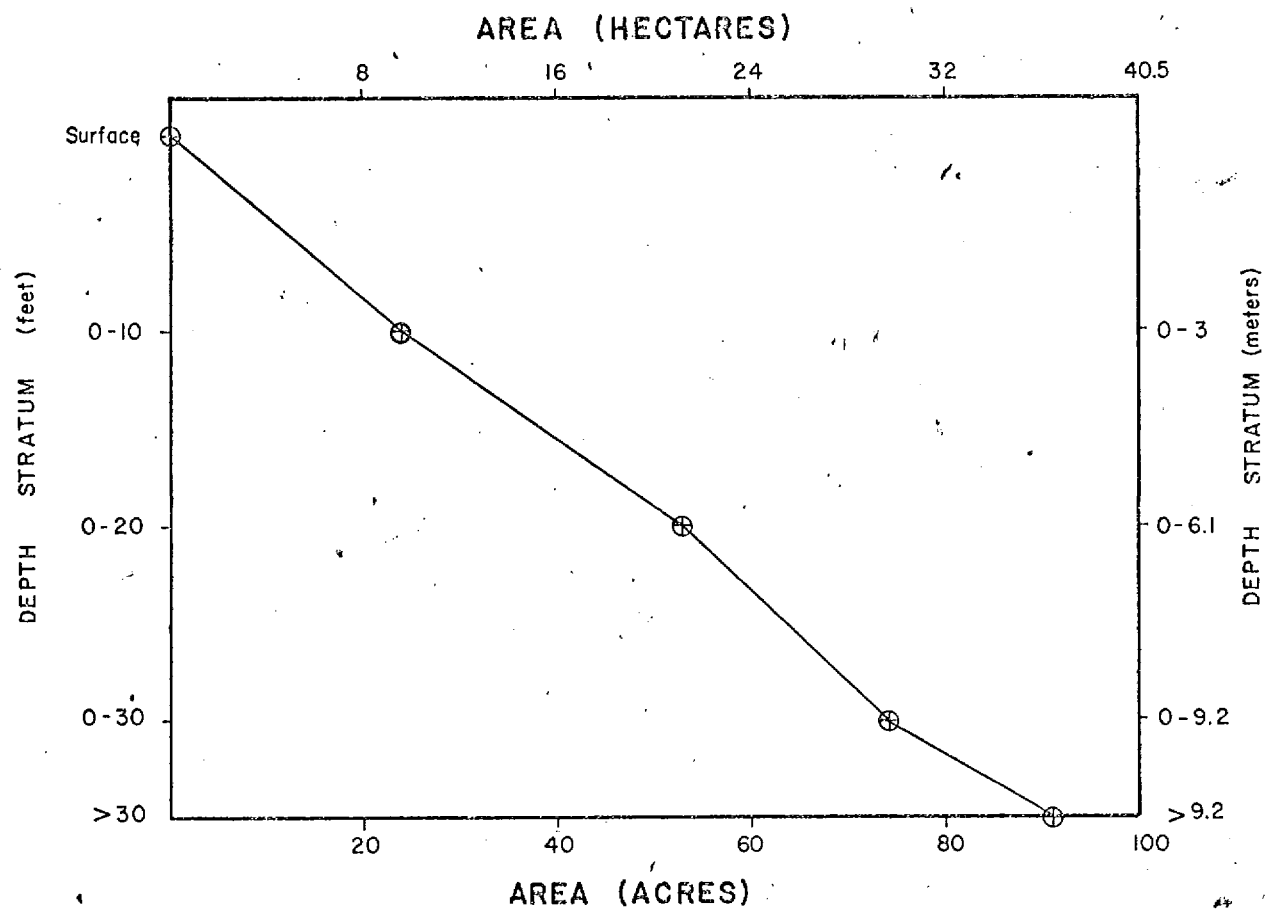
Calculation of flushing rates Chain, Link & Osprey Lakes

Measurements of water inflow to Chain Lake via Hayes Creek and via the Shinish Creek diversion, and outflow from the lake via Hayes Creek were taken by Fish & Wildlife Branch during the summers of 1970 and 1971 (Taylor, 1971, 1972). It may be assumed that Hayes Creek inflow to Chain Lake is representative of the water flow through the drainage area of the three-lake system (Figure 1). Then, if one assumes that the ratio of inflow: lake drainage area for Chain Lake is applicable to Link & Osprey Lakes, the outflow from these lakes can be calculated from knowledge of their respective drainage areas (Figure 11). Losses to groundwater and to evaporation are of no consequence here since the objective is calculation of flushing rates, which are determined by the rate of water movement through the lakes.

	<u>1970</u>	<u>1971</u>
<u>Chain Lake</u> (From Taylor, 1971 & 1972).		
Measured - Hayes Creek inflow*	0	$186.8 \times 10^4 \text{ m}^3$
Ratio - flow:area	$17.7 \text{ m}^3/\text{km}^2$	$53 \text{ m}^3/\text{km}^2$
Annual Flushing rate**. Outflow: volume of lake	24.1 %	85 %
<u>Link Lake</u> : calculated outflow		
	0	$77.0 \times 10^4 \text{ m}^3$
Flushing rate. Outflow: volume of lake	0	113.1 %
<u>Osprey Lake</u> : calculated outflow		
	0	$52.9 \times 10^4 \text{ m}^3$
Flushing rate. Outflow: volume of lake	0	31.1 %

* This does not include the flow diverted to Chain Lake from Shinish Creek.

** Calculation includes flow contribution from Shinish Creek diversion and over-winter storage for irrigation purposes.



HECTARE = $\text{km}^2 \times 10^{-2}$

FIGURE 10

OSPREY LAKE:
HYPSOGRAPHIC CURVE.

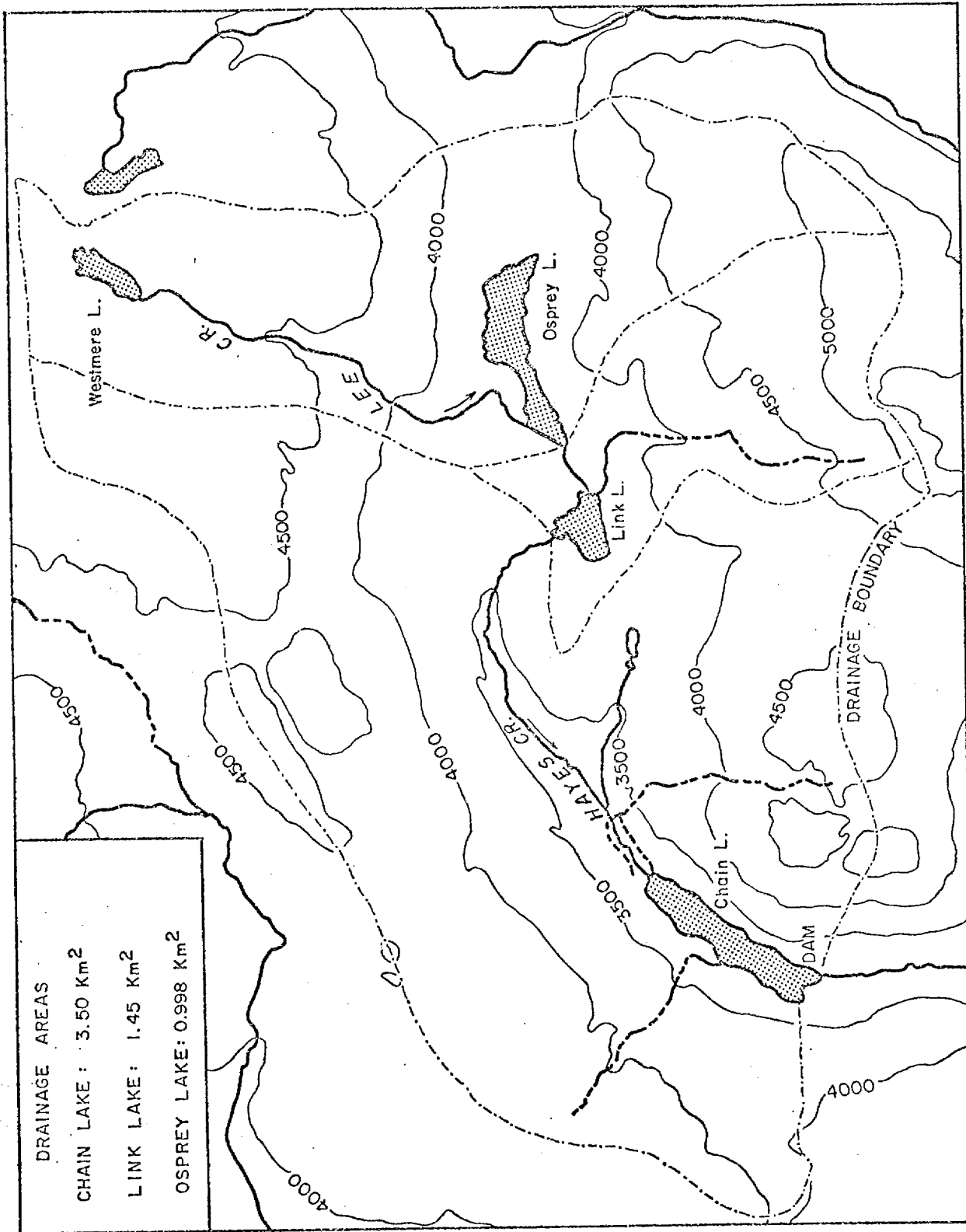


FIGURE II
CHAIN LAKE - OSPREY LAKE SYSTEM
OUTLINE OF DRAINAGE AREA

APPENDIX 2SCHEDULE AND SAMPLING PROGRAM FOR OSPREY LAKE

<u>Date</u>	<u>Station #</u>	<u>Depths sampled (meters)</u>	<u>Surface phytoplankton samples taken</u>	<u>Water chemistry tests</u>	<u>Temperature & oxygen profiles</u>
July 23, 1973	1100701	1,2,3,4,5, 6,7,8,9	✓	} Basic* } (except dis- } solved P) + } hardness	✓
	1100702	0,1,2,3,4			✓
May 29, 1974	1100701	1,10	✓	Basic*	✓
	1100702	1,5	✓	Basic*	✓
	1100703	0		Basic*	
August 1, 1974	1100703		✓		
	1100704		✓		
October 8, 1974	1100701	1,4,7,10	✓	Basic*	✓
	1100702	0		Basic*	
	1100703	0		Basic* + heavy metals**	
March 2, 1975	1100701	1,4,7,10		Basic* + dis- solved boron	✓
June 4, 1975	1100701	1,4,7,10	✓	Basic* + heavy metals**	✓
	1100702	1	✓	Basic* + heavy metals**	✓
	1100703	0		Basic* + heavy metals**	

* Basic water chemistry tests were as follows: pH, specific conductance, turbidity, total alkalinity, organic carbon, nitrogen (dissolved & total), phosphorus (dissolved & total), inorganic carbon, dissolved calcium & dissolved magnesium.

** Heavy metals tested were cadmium, copper, iron, lead, mercury, nickel and zinc.

Appendix 2 (cont'd)

Date	Station #	Depths sampled (meters)	Surface phytoplankton samples taken	Water chemistry tests	Temperature & oxygen profiles
May 4, 1976	1100701	0,3,6,9	✓	Basic* + metals**	✓
	1100703	0		Basic*	
July 20, 1976	1100701	0,3,6,9	✓	Basic*	✓
	1100703	0		Basic*	
September 28, 1976	1100701	0,3,6,9	✓	Basic* + metals**	✓
	1100703	0		Basic*	
November 4, 1976	1100701	0,3,6,9	✓	Basic*	✓
	1100703	0		Basic*	

* Basic water chemistry tests were as follows: pH, specific conductance, turbidity, total alkalinity, organic carbon, nitrogen (dissolved & total), phosphorus (dissolved & total), inorganic carbon, dissolved calcium & dissolved magnesium.

** Heavy metals tested were cadmium, copper, iron, lead, mercury, nickel and zinc.

APPENDIX 3Requests for detailed physical and chemical data

The detailed test results for the monitoring programme at Osprey Lake are held in the EQUIS Test Result File of the Ministry of the Environment. 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
Ministry of the Environment
Parliament Buildings
Victoria, B.C.
V8V 1X4

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

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

REQUEST FOR PRINTED OUTPUT FROM TEST RESULT FILE

TYPE OF OUTPUT

10

MANUAL

FOR

AVAILABLE

OPTIONS

SUBMITTED BY

FOR

DATE _____

[illegible]

* 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 4

GRAPHICAL COMPARISON OF RESULTS AT FOUR STATIONS

EC-4001

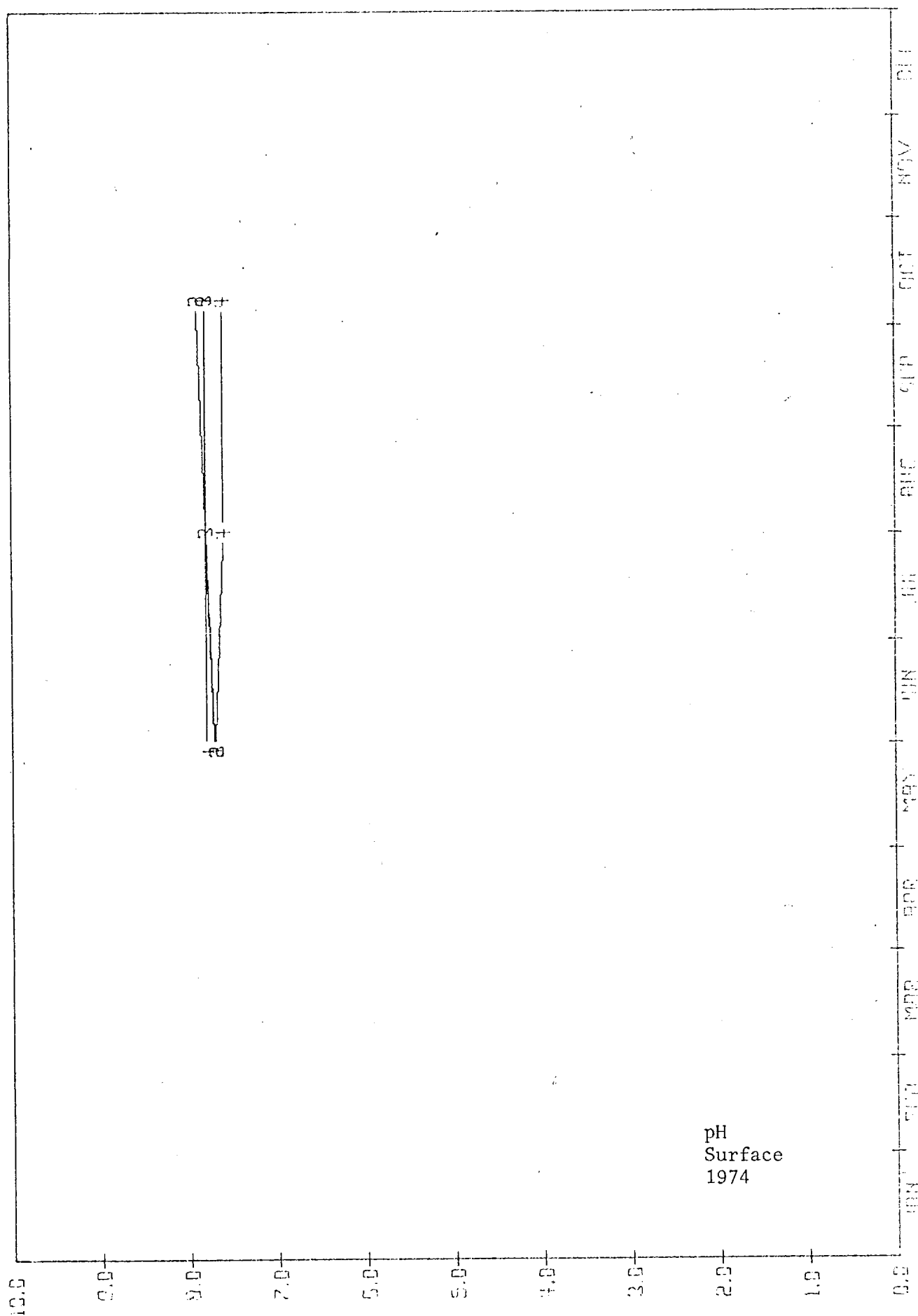
YEAR 1974

SUB AGENCY - ALL

SAMP LOCATION - ALL

DEPTH - 0 TO 5

1 SITE 1100701 OSPREY LK MIDLAKE E HALF
 2 SITE 1100702 OSPREY LK MIDLAKE W HALF
 3 SITE 1100703 LEE CREEK AT OSPREY LAKE
 4 SITE 1100704 OSPREY LAKE W END OUTFLOW



WEST WILLOW SPR COND

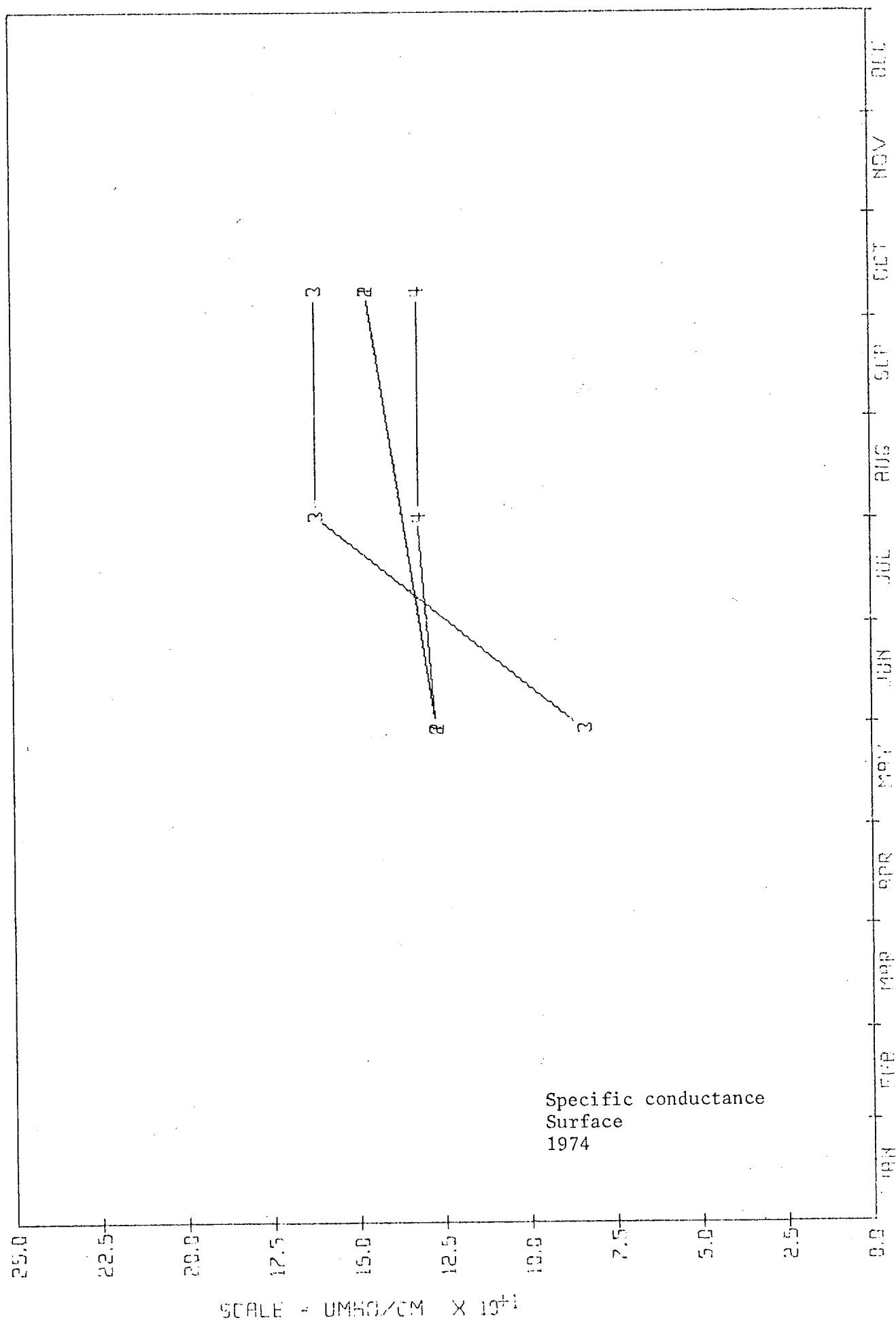
YEAR 1974

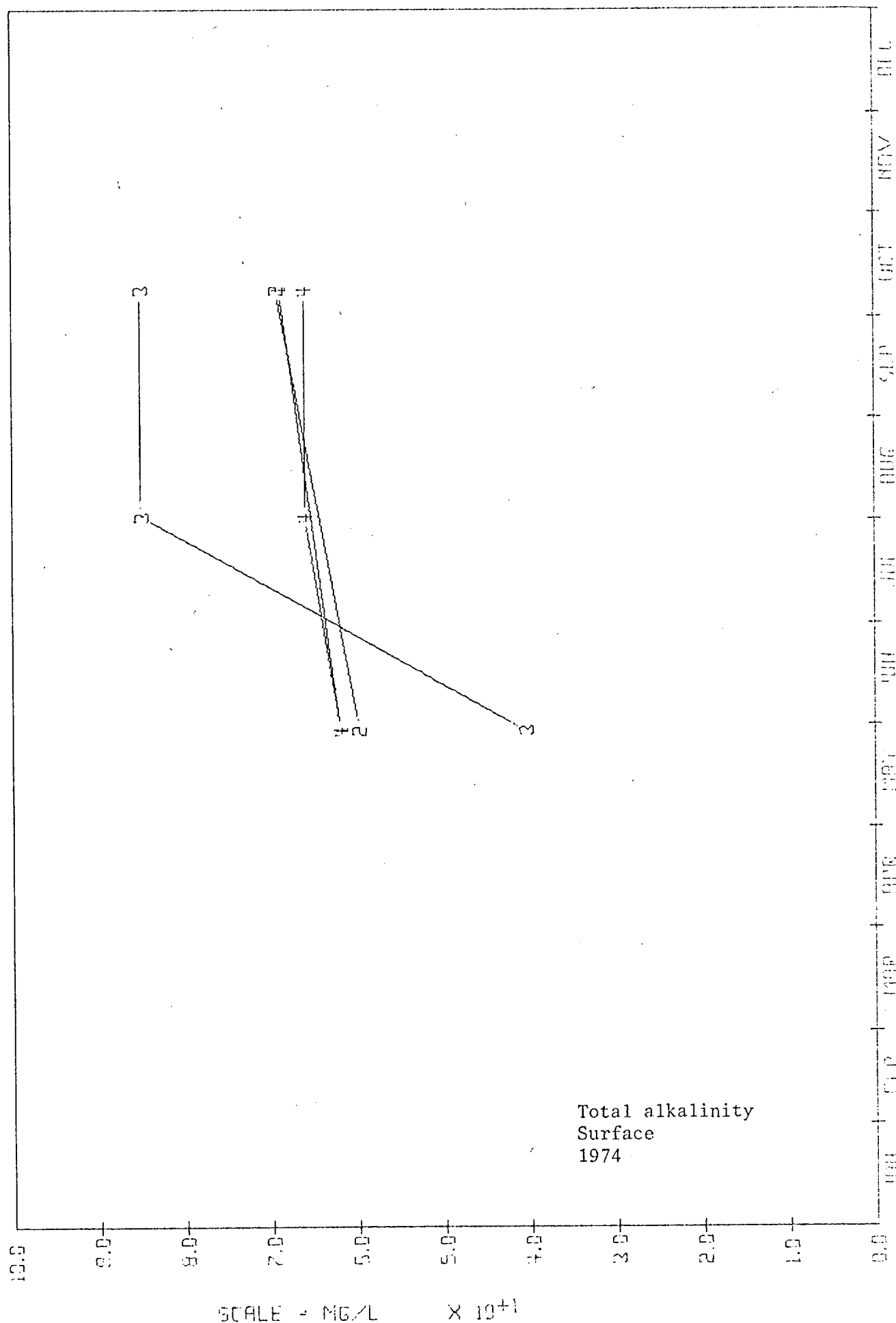
SUB AGENCY - ALL

SAMP LOCATION- ALL

DEPTHS - 0 TO 5

1 SITE 1100701 OSPREY LK MIDLAKE E HALF
 2 SITE 1100702 OSPREY LK MIDLAKE W HALF
 3 SITE 1100703 LEE CREEK AT OSPREY LAKE
 4 SITE 1100704 OSPREY LAKE W END OUTFLOW





1251 1240101 LARSEN IO

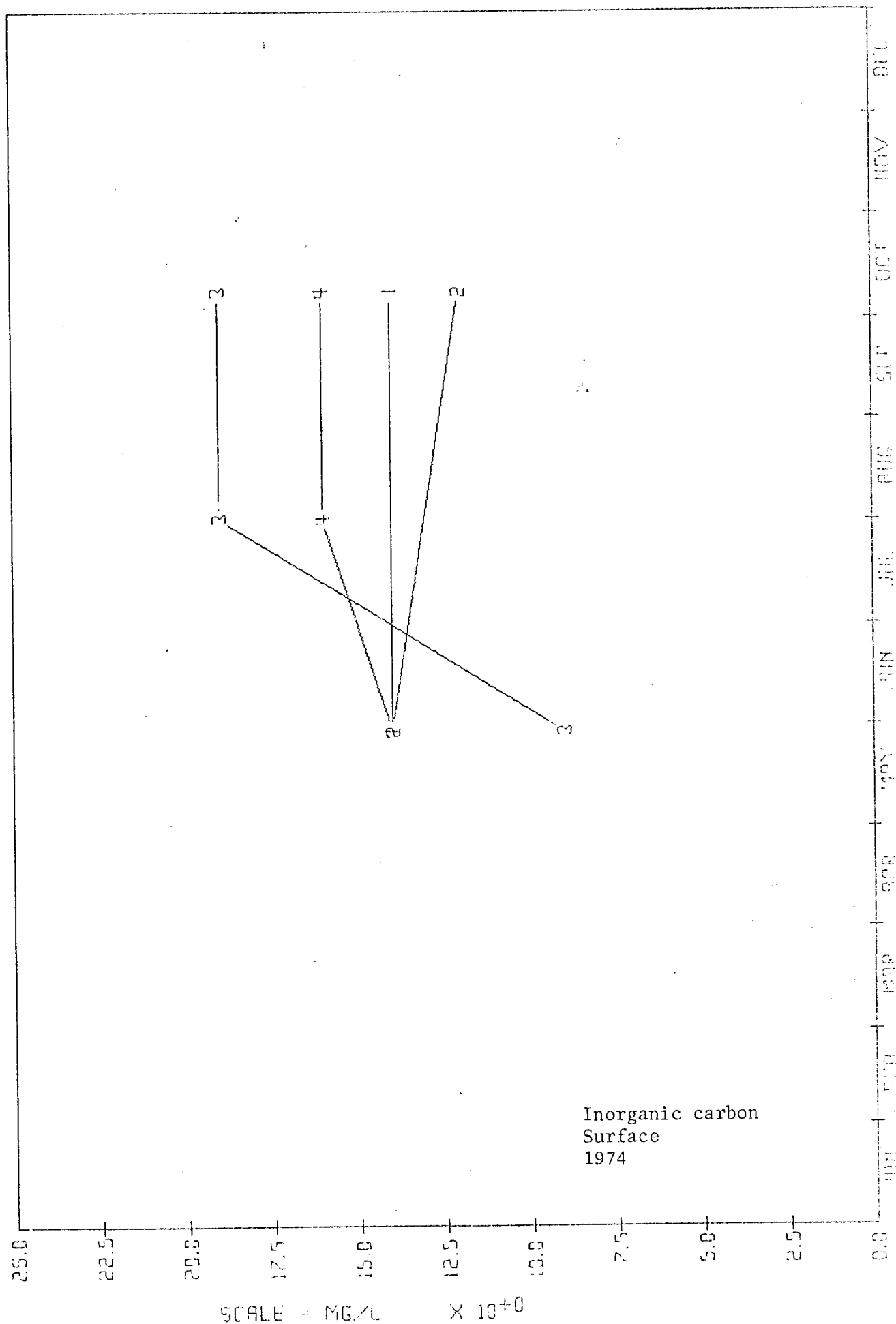
YEAR 1974

SUB AGENCY - ALL

SAMP LOCATION- ALL

DEPTHS - 0 TO 5

1 SITE 1100701 OSPREY LK MIDLAKE E HALF
 2 SITE 1100702 OSPREY LK MIDLAKE W HALF
 3 SITE 1100703 LEE CREEK AT OSPREY LAKE
 4 SITE 1100704 OSPREY LAKE W END OUTFLOW



REG. 116001-1012

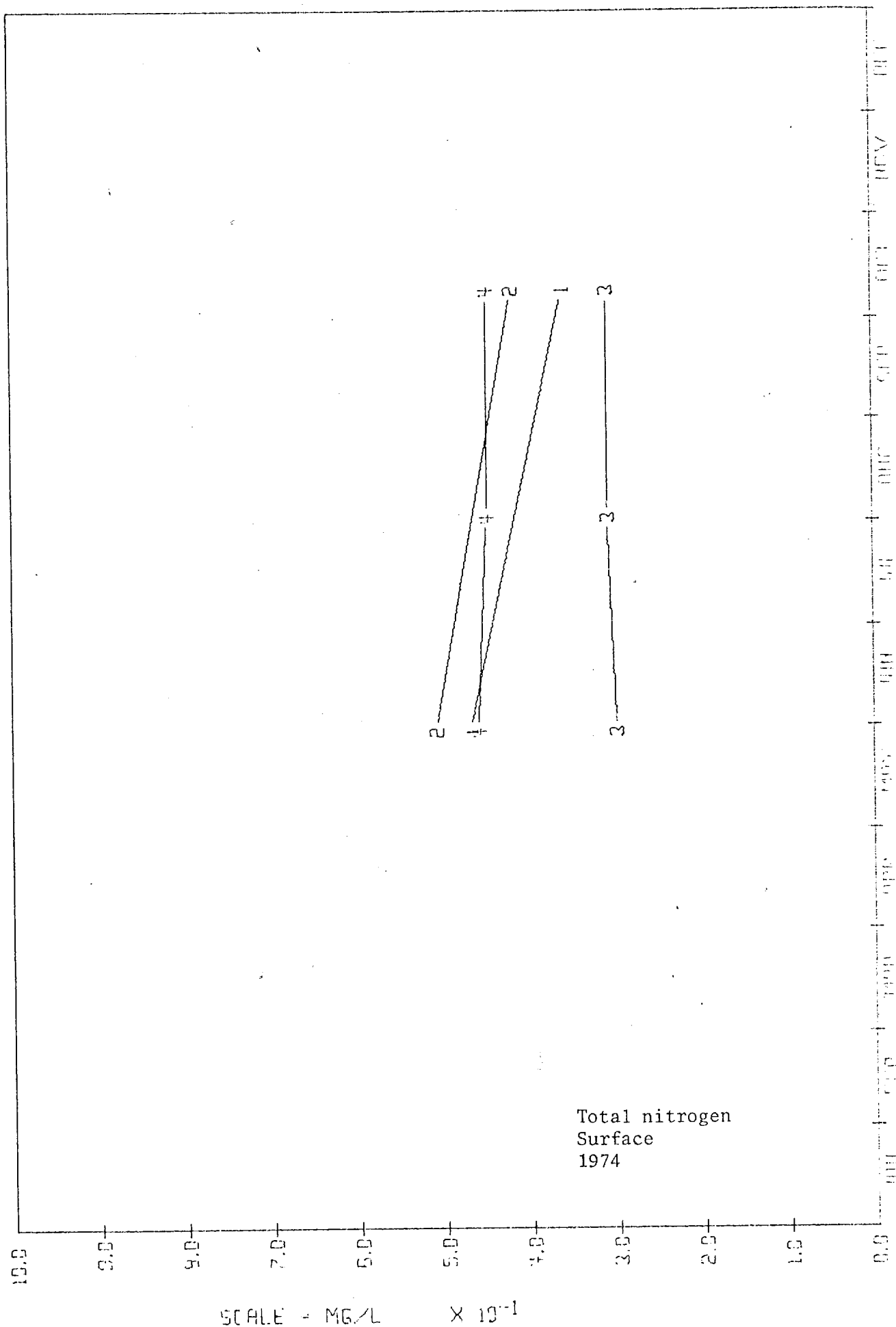
YEAR 1974

SUB AGENCY - ALL

SAMP LOCATION- ALL

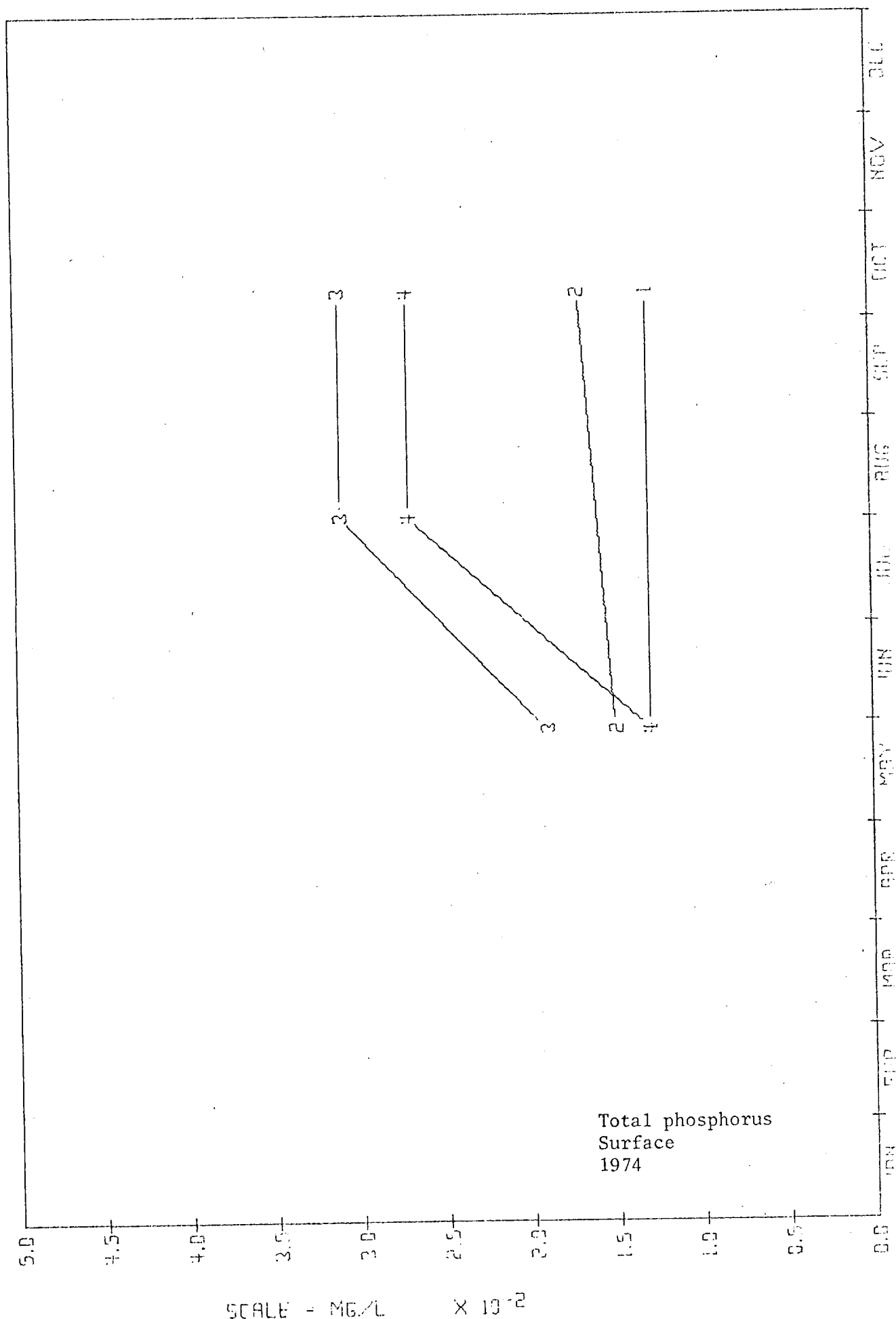
DEPTHS - 0 TO 5

1 SITE 1100701 OSPREY LK MIDLAKE E HALF
2 SITE 1100702 OSPREY LK MIDLAKE W.HALF
3 SITE 1100703 LEE CREEK AT OSPREY LAKE
4 SITE 1100704 OSPREY LAKE W END OUTFLOW



5 01 5 SHLSTO

1 SITE 1109701	OSPREY LK MIDLAKE E HALF
2 SITE 1109702	OSPREY LK MIDLAKE W HALF
3 SITE 1109703	LEE CREEK AT OSPREY LAKE
4 SITE 1109704	OSPREY LAKE W END OUTFLOW



APPENDIX 5

SPECIES LISTS OF PHYTOPLANKTON SAMPLED

PLANKTON ANALYSIS

Hayes Creek at Osprey Lake - Station 1100704

Depth - Surface Date - 01.VIII.74 Slide Type - 1 cc chamber

Number
Per Ml.

BACILLARIOPHYTA

<u>Nitzschia palea</u>	8
<u>Eunotia lunaris</u>	6
<u>Achnanthes lanceolata</u>	33
<u>Synedra radians</u>	24
<u>Fragilaria virescens</u>	36
<u>Asterionella formosa</u>	181
<u>Cyclotella kützingiana</u>	9
<u>Gomphonema constrictum</u>	8
<u>Tabellaria fenestrata</u>	8
<u>Amphora ovalis</u>	2
<u>Cymbella tumida</u>	11
<u>Navicula cryptocephala</u>	19
<u>Fragilaria construens</u>	11
<u>Frustula rhomboides</u>	6
<u>Meridion circulare</u>	2
<u>Fragilaria crotonensis</u>	3
<u>Cocconeis placentula</u>	2

CHLOROPHYTA

<u>Quadrigula lacustris</u>	9
<u>Ankistrodesmus falcatus</u> var. <u>acicularis</u>	2
<u>Hormoptilopsis gelatinosa</u>	8
<u>Oocystis borgei</u>	2

CYANOPHYTA

<u>Oscillatoria subbrevis</u>	2
<u>Aphanocapsa elachista</u>	4
<u>Chroococcus limneticus</u>	9

Phytoplankton Count Continued

	<u>Number Per Ml.</u>
CRYPTOPHYTA	
<u>Cryptomonas ovata</u>	4
CHRYSOPHYTA	
<u>Ochromonas mutabilis</u>	40
TOTAL PHYTOPLANKTON	449

PHYTOPLANKTON ANALYSIS

Hayes Creek at Osprey Lake - Station 1100704

Depth - 1 foot

Date - 04.VI.75

Slide Type - 1 cc chamber

Number
Per Ml.

BACILLARIOPHYTA

<u>Fragilaria virescens</u>	31
<u>Fragilaria crotonensis</u>	92
<u>Achnanthes minutissima</u>	26
<u>Synedra ulna</u>	2
<u>Synedra pulchellum</u>	59
<u>Cymbella cistula</u>	2
<u>Cyclotella kützingiana</u>	7

CHLOROPHYTA

<u>Ankistrodesmus falcatus</u>	9
<u>Schroederia indica</u>	2
<u>Botryococcus braunii</u>	2
<u>Gloeocystis major</u>	2

CYANOPHYTA

<u>Chroococcus minutus</u>	9
<u>Gomphosphaeria lacustris</u>	4

CRYPTOPHYTA

<u>Cryptomonas ovata</u>	254
<u>Rhodomonas minuta</u>	9

CHRYSTOPHYTA

<u>Dinobryon divergens</u>	5874
<u>Ochromonas mutabilis</u>	61
<u>Synura uvella</u>	2

Phytoplankton Analysis Continued

	<u>Number Per Ml.</u>
DINOPHYTA	
<u>Peridinium pusillum</u>	2
TINTINNIDAE (ZOOPLANKTON)	
<u>Tintinnopsis</u> sp.	4
TOTAL PHYTOPLANKTON	6451
TOTAL	6453

PHYTOPLANKTON ANALYSIS

Lee Creek at Osprey Lake - Station 1100703

Depth - surface

Date - 01.VIII.74

Slide Type - 1 cc chamber

Number
Per Ml.

BACILLARIOPHYTA

<u>Achnanthes lanceolata</u>	17
<u>Meridion circulare</u>	12
<u>Fragilaria virescens</u>	10
<u>Cyclotella kützingiana</u>	4
<u>Asterionella formosa</u>	2

CHLOROPHYTA

<u>Chlamydomonas polypyrenoideum</u>	2
<u>Mougeotia sp.</u>	1
<u>Ulothrix zonata</u>	1
<u>Selenastrum minutum</u>	4

CRYPTOPHYTA

<u>Rhodomonas minuta</u>	7
<u>Cryptomonas ovata</u>	6

CHRYSTOPHYTA

<u>Ochromonas minutum</u>	142
<u>Chromulina minutum</u>	17
<u>Okrostylon sp.</u>	1
<u>Chromulina</u>	4

EUGLENOPHYTA

<u>Trachelomonas hispida</u>	1
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TOTAL PHYTOPLANKTON 231

TOTAL 231

PHYTOPLANKTON ANALYSIS

Lee Creek at Osprey Lake - Station 1100703

Depth - 1 foot

Date - 04.VI.75

Slide Type - 1 cc chamber

Number
Per Ml.

BACILLARIOPHYTA

<u>Surirella ovata</u>	2
<u>Achnanthes lanceolata</u>	9
<u>Cymbella cuspidata</u>	2
<u>Eunotia lunaris</u>	2
<u>Achnanthes minutissima</u>	13
<u>Gomphonema olivaceum</u>	4

CHLOROPHYTA

<u>Ankistrodesmus convolutus</u>	2
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CYANOPHYTA

<u>Lyngbya limnetica</u>	2
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CHRYSTOPHYTA

<u>Dinobryon divergens</u>	2
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TOTAL PHYTOPLANKTON 38

TOTAL 38

PHYTOPLANKTON ANALYSIS

Osprey Lake - Station 1100702

Depth - unknown

Date - 23.VII.73

Slide Type - 1 cc chamber

Number
Per Ml.

BACILLARIOPHYTA

<u>Navicula cryptocephala</u>	7
<u>Cyclotella meneghiniana</u>	9
<u>Cyclotella kützingiana</u>	5
<u>Fragilaria virescens</u>	5
<u>Achnanthes minutissima</u>	7

CHLOROPHYTA

<u>Quadrigula lacustris</u>	50
<u>Oocystis borgei</u>	35
<u>Botryococcus braunii</u>	17
<u>Scenedesmus incrassulata</u>	2
<u>Crucigenia tetrapedia</u>	2
<u>Eudorina elegans</u>	12

CYANOPHYTA

<u>Anabaena circinalis</u>	17
<u>Aphanocapsa elachista</u>	9
<u>Chroococcus minutus</u>	123
<u>Aphanothece nidulans</u>	1246

CRYPTOPHYTA

<u>Cryptomonas ovata</u>	38
<u>Rhodomonas minuta</u>	68

TINTINNIDAE (ZOOPLANKTON)

<u>Tintinnopsis</u> sp.	2
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TOTAL PHYTOPLANKTON 1652

TOTAL 1654

PHYTOPLANKTON ANALYSIS

Osprey Lake - Station 1100702

Depth - no depth given Date - 29.V.74 Slide Type - 1 cc chamber

	<u>Number Per Ml.</u>
BACILLARIOPHYTA	
<u>Fragilaria crotonensis</u>	19
<u>Cymbella cistula</u>	2
<u>Nitzschia palea</u>	2
<u>Eunotia lunaris</u>	2
<u>Achnanthes minutissima</u>	2
<u>Caloneis bacillum</u>	6
<u>Fragilaria virescens</u>	2
<u>Cyclotella kützingiana</u>	30
CHLOROPHYTA	
<u>Quadrigula lacustris</u>	63
<u>Gloeocystis gigas</u>	50
<u>Schroederia setigera</u>	17
<u>Oocystis borgei</u>	2
<u>Ankistrodesmus falcatus var. acicularis</u>	238
CRYPTOPHYTA	
<u>Cryptomonas ovata</u>	6
<u>Rhodomonas minuta</u>	156
CHRYSOPHYTA	
<u>Mallomonas akrokomos</u>	6
<u>Chromulina minutum</u>	5590
VORTICELLIDAE (ZOOPLANKTON)	
<u>Vorticella campanula</u>	4
TOTAL PHYTOPLANKTON	6193
TOTAL	6197

PHYTOPLANKTON ANALYSIS

Osprey Lake - Station 1100702

Depth - 3 feet

Date - 08.X.74

Slide Type - 1 cc chamber

Number
Per Ml.

BACILLARIOPHYTA

<u>Stephanodiscus niagarae</u>	2
<u>Cyclotella kützingiana</u>	46
<u>Tabellaria fenestrata</u>	4
<u>Achnanthes minutissima</u>	4
<u>Synedra radians</u>	2
<u>Cocconeis placentula</u>	2

CHLOROPHYTA

<u>Ankistrodesmus sigmoides</u>	208
<u>Oocystis borgei</u>	20
<u>Eudorina elegans</u>	2
<u>Crucigenia tetrapedia</u>	4
<u>Botryococcus braunii</u>	12
<u>Crucigenia rectangularis</u>	4
<u>Scenedesmus arcuatus</u> var. <u>capitatus</u>	6
<u>Schroederia setigera</u>	6
<u>Ankistrodesmus falcatus</u> var. <u>mirabilis</u>	2
<u>Sphaerocystis shroeteri</u>	2

CRYPTOPHYTA

<u>Rhodomonas minuta</u>	1313
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CHRYSTOPHYTA

<u>Ochromonas mutabilis</u>	64
<u>Mallomonas akrokomos</u>	148
<u>Okrostylon</u> sp.	16

Phytoplankton Analysis Continued

	<u>Number Per Ml.</u>
CYANOPHYTA	
<u>Gomphosphaeria aponina</u>	8
<u>Anabaena flos-aquae</u>	6
<u>Gomphosphaeria lacustris</u>	2
TOTAL PHYTOPLANKTON	1883

PHYTOPLANKTON ANALYSIS

Osprey Lake - Station 1100702

Depth - 3 feet

Date - 04.VI.75

Slide Type - 1 cc chamber

Number
Per Ml.

BACILLARIOPHYTA

<u>Fragilaria virescens</u>	24
<u>Fragilaria crotonensis</u>	51
<u>Achnanthes minutissima</u>	11
<u>Synedra ulna</u>	2
<u>Cyclotella kützingiana</u>	21
<u>Cyclotella meneghiniana</u>	4
<u>Stephanodiscus niagarae</u>	4
<u>Melosira varians</u>	2
<u>Synedra radians</u>	133

CHLOROPHYTA

<u>Oocystis borgei</u>	6
<u>Coelosphaerium naegelianum</u>	4
<u>Gloeocystis gigas</u>	11
<u>Selenastrum minutum</u>	4
<u>Crucigenia tetrapedia</u>	4
<u>Gloeocystis planctonica</u>	2
<u>Scenedesmus arcuatus</u> var. <u>capitatus</u>	2
<u>Ankistrodesmus falcatus</u> var. <u>acicularis</u>	4

CYANOPHYTA

<u>Gomphosphaeria lacustris</u>	2
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CRYPTOPHYTA

<u>Cryptomonas ovata</u>	498
<u>Rhodomonas minuta</u>	387

Phytoplankton Analysis Continued

	<u>Number Per Ml.</u>
CHRYSTOPHYTA	
<u>Dinobryon divergens</u>	3213
<u>Mallomonas akrokomos</u>	30
<u>Chromulina minutum</u>	4
<u>Ochromonas mutabilis</u>	38
CONCHOSTRACA	
unidentified clam shrimp	2
TINTINNIDAE	
<u>Tintinnopsis</u> sp.	6
TOTAL PHYTOPLANKTON	4461
TOTAL	4469

PHYTOPLANKTON ANALYSIS

Osprey Lake - Station 1100701

Depth - 1 m.

Date - 23.VII.73

Slide Type - 1 cc chamber

Number
Per Ml.

BACILLARIOPHYTA

<u>Cyclotella kützingiana</u>	22
<u>Achnanthes minutissima</u>	18
<u>Navicula cryptocephala</u>	4
<u>Cymbella cistula</u>	2
<u>Melosira italica</u>	4
<u>Eunotia lunaris</u>	2

CHLOROPHYTA

<u>Oocystis borgei</u>	26
<u>Quadrigula lacustris</u>	68
<u>Scenedesmus incrassulata</u>	2
<u>Actinastrum hantzschii</u>	2
<u>Crucigenia rectangularis</u>	4
<u>Ankistrodesmus convolutus</u>	2
<u>Staurostrum paradoxum</u>	2
<u>Spondylosium lütkenmülleri</u>	2

CYANOPHYTA

<u>Aphanothece nidulans</u>	883
<u>Anabaena circinalis</u>	26
<u>Chroococcus minutus</u>	114
<u>Aphanocapsa elachista</u>	4

CRYPTOPHYTA

<u>Cryptomonas ovata</u>	62
<u>Rhodomonas minuta</u>	90

Phytoplankton Analysis Continued

	<u>Number Per Ml.</u>
EUGLENOPHYTA	
<u>Euglena oxyuris</u>	2
TINTINNIDAE (ZOOPLANKTON)	
<u>Tintinnopsis</u> sp.	4
CONCHOSTRACA	
unidentified clam shrimp	2
 TOTAL PHYTOPLANKTON	 1341
 TOTAL	 1347

PHYTOPLANKTON ANALYSIS

OSPREY LAKE - Station 1100701

Depth - 1 m.

Date - 29.V.74

Slide Type - 1 cc chamber

Number
Per Ml.

BACILLARIOPHYTA

<u>Cyclotella kützingiana</u>	69
<u>Navicula cryptocephala</u>	7
<u>Cyclotella meneghiniana</u>	2
<u>Caloneis bacillum</u>	11
<u>Achnanthes minutissima</u>	7
<u>Fragilaria virescens</u>	2
<u>Fragilaria crotonensis</u>	4

CHLOROPHYTA

<u>Schroederia setigera</u>	25
<u>Ankistrodesmus falcatus</u> var. <u>acicularis</u>	161
<u>Quadrigula lacustris</u>	103
<u>Gloeocystis gigas</u>	22
<u>Botryococcus braunii</u>	2

CRYPTOPHYTA

<u>Rhodomonas minuta</u>	283
<u>Cryptomonas ovata</u>	7

CYANOPHYTA

<u>Anabaena circinalis</u>	2
<u>Chroococcus minutus</u>	4
<u>Gomphosphaeria lacustris</u>	2

CHRYSTOPHYTA

<u>Chromulina minutum</u>	4734
<u>Mallomonas akrokomos</u>	9
<u>Dinobryon divergens</u>	2

TOTAL PHYTOPLANKTON

5458

PHYTOPLANKTON ANALYSIS

Osprey Lake - Station 1100701

Depth - 3 feet

Date - 08.X.74

Slide Type - 1 cc chamber

Number
Per Ml.

BACILLARIOPHYTA

<u>Achnanthes lanceolata</u>	2
<u>Tabellaria flocculosa</u>	2
<u>Cyclotella kützingiana</u>	24
<u>Stephanodiscus niagarae</u>	4
<u>Cocconeis placentula</u>	2

CHLOROPHYTA

<u>Oocystis borgei</u>	26
<u>Schroederia setigera</u>	201
<u>Crucigenia rectangularis</u>	22
<u>Crucigenia fenestrata</u>	11
<u>Spondylosium lütkenmülleri</u>	2
<u>Scenedesmus arcuatus</u> var. <u>capitatus</u>	2

CRYPTOPHYTA

<u>Cryptomonas ovata</u>	9
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CYANOPHYTA

<u>Gomphosphaeria lacustris</u>	7
<u>Aphanocapsa elachista</u>	

CHRYSTOPHYTA

<u>Mallomonas akrokomos</u>	102
<u>Ochromonas mutabilis</u>	116
<u>Chromulina nannos</u>	7
<u>Okrostylon</u> sp.	2

Phytoplankton Analysis Continued

	Number <u>Per Ml.</u>
EUGLENOPHYTA	
<u>Trachelomonas hispida</u>	2
DINOPHYTA	
<u>Peridinium pusillum</u>	2
TOTAL PHYTOPLANKTON	545

PHYTOPLANKTON ANALYSIS

Osprey Lake - Station 1100701

Depth - 3 feet

Date - 02.III.75

Slide Type - 1 cc chamber

	<u>Number Per Ml.</u>
BACILLARIOPHYTA	
<u>Achnanthes minutissima</u>	2
<u>Synedra radians</u>	2
CHLOROPHYTA	
<u>Chlamydomonas polypyrenoideum</u>	1
CRYPTOPHYTA	
<u>Rhodomonas minuta</u>	16
<u>Cryptomonas ovata</u>	59
CHRY SOPHYTA	
<u>Ochromonas mutabilis</u>	201
<u>Chromulina minutum</u>	2
<u>Chromulina nannoplanktonica</u>	22
CYANOPHYTA	
<u>Oscillatoria subbrevis</u>	5
EUGLENOPHYTA	
<u>Trachelomonas hispida</u>	4
TOTAL PHYTOPLANKTON	314

PHYTOPLANKTON ANALYSIS

Osprey Lake - Station 1100701

Depth - 3 feet

Date - 04.VI.75

Slide Type - 1 cc chamber

Number
Per Ml.

BACILLARIOPHYTA

<u>Achnanthes minutissima</u>	9
<u>Synedra radians</u>	146
<u>Fragilaria crotonensis</u>	9
<u>Cyclotella meneghiniana</u>	13
<u>Synedra ulna</u>	2
<u>Fragilaria virescens</u>	15
<u>Cocconeis placentula</u>	2

CHLOROPHYTA

<u>Gloeocystis planctonica</u>	9
<u>Botryococcus braunii</u>	2
<u>Ankistrodesmus falcatus</u> var. <u>acicularis</u>	4
<u>Scenedesmus arcuatus</u> var. <u>capitatus</u>	2
<u>Selenastrum minutum</u>	4
<u>Ankistrodesmus convolutus</u>	2

CRYPTOPHYTA

<u>Rhodomonas minuta</u>	315
<u>Cryptomonas ovata</u>	189

CHRYSTOPHYTA

<u>Dinobryon divergens</u>	3629
<u>Mallomonas akrokomos</u>	4

TINTINNIDAE (ZOOPLANKTON)

<u>Tintinnopsis</u> sp.	2
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TOTAL PHYTOPLANKTON 4356

TOTAL 4358

APPENDIX 6

SPECIES LISTS OF ZOOPLANKTON SAMPLED

PLANKTON ANALYSIS OF OSPREY LAKE

July 23, 1973 Station 1100701 Plankton Tow

Dominant: No. in Sample

Calanoids: Diaptomus kenai Wilson 1953 $\times 10^3$

Cladocerans: Daphnia galeata mendotae $\times 10^2$

Other Species Present:

Cyclopoids: Macrocyclops albidus (Jurine) 1820 1

Cyclops bicuspidatus Claus 1857 1

Cladocerans: Chydorus sphaericus (O.F.M.) 1785 3

Rotifers: Trichocerca longiseta $< \times 10^2$

Kellicottia longispina < 50

Brachionus sp? 50

Ratio:

<u>Trichocerca:</u>	<u>Daphnia pulicaria:</u>	<u>D. galeata:</u>	<u>Diaptomus</u>
2	2	3	27

PLANKTON ANALYSIS OF OSPREY LAKE

July 23, 1973

Station 1100702

Plankton Tow

Dominant:

No. in Sample

Cladocerans: Daphnia pulicaria $\times 10^3$ Calanoids: Diaptomus kenai? $\times 10^4$
late copepodites

Other Species Present:

Cyclopoids: Macrocylops albidus (Jurine) 1820 1Cladocerans: Diaphanosoma leuchtenbergianum
P.E. Muller 1867 fewChydorus sphaericus (O.F.M.) 1785 fewRotifers: Keratella quadrata fewTrichocerca longisetaBrachionus?Dipterans: Chaoborus 1 larvaRatio:Diaptomus: Daphnia

1

1

PLANKTON ANALYSIS OF OSPREY LAKE

May 29, 1974 near 1100701 Plankton Haul

Dominant

No. in Sample

Calanoids:

Diaptomus kenai Wilson 1953

 $\times 10^5 +$

Cladocerans:

Daphnia rosea or D. galeata mendotae*

$\times 10^5$
(see remarks)

Other Species Present:

Rotifers:

Kellicottia longispina

few

*On basis of other tows favour *D. g. mendotae*.

Remarks :

Sample not preserved properly. As a result Daphnia are badly distorted and a decision on species impossible to make. Other plankters than above had deteriorated.

PLANKTON ANALYSIS OF OSPREY LAKE

October 8, 1974 near 1100701 Plankton Tow

Dominant:		No. in Sample
Calanoid:	<u>Diaptomus kenai</u> Wilson 1953	$X10^4$
Cladocerans:	<u>Daphnia laevis</u> Birge 1879*	$X10^2$ (see remarks)
	<u>Daphnia pulicaria</u> Forbes 1893	$X10^2$
Other Species Present:		
Cladocerans:	<u>Ceriodaphnia laticaudata</u> P.E. Muller 1867	50-100
	<u>Diaphanosoma leuchtenbergianum</u> Fischer 1850	50-100
	<u>Bosmina longirostris</u>	50-100 verify
Rotifers:	<u>Keratella cochlearis</u>	1
	<u>Kellicottia longispina</u>	50-100
	Unident. sac-like rotifer-photo	20
	<u>Keratella quadrata</u>	few
	<u>Polyarthra vulgaris</u>	
Cyclopoids:	<u>Cyclops vernalis</u> Fischer 1853	<50

*If a deep lake D. galeata mendotae; if shallow approaching a pond, D. laevis.

Ratio:

<u>Ceriodaphnia:</u>	<u>D. pulicaria:</u>	<u>D. laevis:</u>	<u>Diaptomus</u>
1	3	6	8

PLANKTON ANALYSIS OF OSPREY LAKE

June 4, 1975 1100701 8-0 m. Large Mesh

Dominant:

No. in Sample

Calanoids: Diaptomus kenai Wilson 1953-verify X10²

Cladocerans: Daphnia galeata mendotae x10²

Daphnia schodleri Sars 1862 $\times 10^2$

Bosmina longirostris (O.F.M.) 1785 50

Other Species Present:

Cladocerans:	<u>Diaphanosoma leuchtenbergianum</u>	20
	Fischer 1850	

Chydorus sphaericus (O.F.M.) 1785 20
(var. *punctatus*)

Cyclopoids:	Cyclops vernalis Fischer 1853	10
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Macrocyclops albidus (Jurine)1820 2

Rotifers: *Kellicottia longispina* $\times 10^2$

Unident. rotifer - photo

Harpactocoid: Attheyella nordenskioldii (Lillje.) 1902

Ratio:

Cyclops: Kellicottia: D. pulicaria: D. schodleri: Diaptomus
2 4 4 6 7

Photoplankton tow additional species:

Rotifers: *Polyarthra vulgaris* $\times 10^3$

Unident. Chromogaster shape-photo $\times 10^2$

Keratella cochlearis $\times 10^2$