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The Standing Crop of Plankton in Kamloops Lake, B.C., from March 1974 to April 1975

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Pacific Region
April 1976

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THE STANDING CROP OF PLANKTON IN KAMLOOPS LAKE, B.C., FROM MARCH, 1974, TO APRIL, 1975

by

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ABSTRACT

In 1973 a Federal-Provincial Task Force was established to determine the sources of nutrients and foaming agents in the Thompson River system, and document the effects of nutrients and colour on the biology of Kamloops Lake and lower Thompson River. The Environmental Protection Service, as part of this study, monitored the standing crop of plankton in Kamloops Lake. Six mid-lake stations were sampled monthly from March, 1974, to April, 1975. A minor peak in algal crop occurred in the late spring, which consisted mainly of the diatom, Tabellaria fenestrata; the phytoflagellate, Dinobryon sp.; and the green algae, Chlamydomonas sp. Large values of phaeophytin (mean 8.76 μg/ℓ) obtained at this time suggest that the greater part of both the phaeophytin and chlorophyll-a may have been from allochthonous sources. After the freshet, a second, larger bloom occurred in the early fall which was dominated by the diatoms Tabellaria fenestrata, Melosira italica, and Fragilaria crotenensis. Chlorophyll-a production values were low, with the highest value of 5.4 μg/ℓ being recorded in September, 1974.

Zooplankton numbers were very low and were comparable to other oligotrophic lakes. The total number of organisms ranged between 4,500 to 21,000/m^3. Two peaks of zooplankton were recorded, one in June, 1974 (20,993/m^3), and the second in September, 1974 (15,764/m^3). For the annual mean, Copepoda (32.5%) and Rotifera (9.7%) were more abundant than the Cladocera (5%). The Rotifer, Kellicottia longispina; the Copepods, Diaptomus ashlandi and Cyclops biscupidatus; and the Cladocerans, Daphnia longispina and Bosmina longerostris were the most dominant of each class.

The physical parameters of the lake, such as turbidity-related light limitation, temperature, and the complex circulation within the lake probably play a much more important role in the limitation of phytoplankton standing crop than the amount of nutrients within the lake.

En 1973, un groupe de travail fédéral-provincial a été formé en vue de déterminer l'origine des éléments nutritifs et des agents de moussage dans le réseau hydrographique de la rivière Thompson et d'obtenir des renseignements sur les effets des éléments nutritifs et de la couleur de l'eau sur la biologie du lac Kamloops et du cours inférieur de la rivière Thompson. Le Service de la protection de l'environnement a, dans le cadre de cette étude, évalué le stock actuel du plancton du lac Kamloops. Entre mars 1974 et avril 1975, on a recueilli une fois par mois des échantillons en six stations dans la partie centrale du lac. À la fin du printemps, on a observé une faible prolifération d'algues, parmi lesquelles se trouvaient notamment la diatomée Tabellaria fenestrata, les phytoflagellés Dinobryon sp. et les algues vertes Chlamydomonas. Les concentrations élevées de phéophytine (moyenne: 8,76 µg/l) alors observées portent à croire que cette dernière ainsi que la chlorophylle-a seraient allochtones. Au début de l'automne après la crue, on a observé une seconde prolifération, plus importante, où dominaient les diatomées Tabellaria fenestra, Melosira italica et Fragilaria crotenensis. La production de chlorophylle-a était alors faible, la valeur la plus élevée ayant été observée en septembre 1974 (5,4 µg/l).

La population de zooplancton était très faible mais comparable à celle d'autres lacs oligotrophes (entre 4,500 et 21,000 organismes par mètre cube). Deux maximums ont été observés, le premier en juin 1974 (20,993/m^3), le second en septembre 1974 (15,764/m^3). À l'échelle de l'année, les copépodes et les rotifères ont été en moyenne plus abondants que les cladocères 32,5 et 9,7 % respectivement contre 5 % . Le rotifère Kellicottis longispina, les copépodes Diaptomus ashlandi et Cyclops biscupidatus et les cladocères Daphnia longispina et Bosmina longerostri dominaient chez leur classe.

....2

Les paramètres physiques du lac, comme la limitation de la pénétration de la lumière attribuable à la turbidité, la température et les modes complexes de circulation des eaux, ont probablement joué un rôle limitant beaucoup plus important, à l'égard du phytoplancton que les éléments nutritifs.

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SUMMARY AND CONCLUSIONS

The overall standing crop of plankton in Kamloops Lake is very low. A small phytoplankton bloom occurred in the late spring, 1974 (mean 1.95 - 1.86 μg/ℓ Chlorophyll-a), which consisted mainly of the diatom, Tabellaria fenestrata; the phytoflagellate, Dinobryon sp.; and the green algae, Chlamydomonas sp. The phaeophytin values during this time period were very high (mean 8.76 μg/ℓ) which suggests that most of this pigment must have been from allochthonous origin. This also implies that part of the chlorophyll-a values obtained in the spring bloom could have been from the same source. A second, larger bloom occurred in September, 1974 (mean 2.91 μg/ℓ Chlorophyll-a), which consisted mainly of diatoms. Tabellaria fenestrata, Melosira italica, and Fragilaria crotonensis were the dominant species.

Zooplankton abundance peaked in June with a second, smaller increase in September. In both cases the Copepoda and Rotifera by far outnumbered the Cladocera. The Rotifers peaked in the spring of 1974, with Kellicottia longispina being the most abundant species. Diaptomus ashlandi and Cyclops bicupidatus thomasi were the more dominant Copepoda, while Daphnia longispina and Bosmina longirostris were the dominant Cladocera. The total number of organisms ranged between 4,500 to 21,000/m^3 over the fourteen-month sampling period.

The two main controlling factors affecting the standing crop of algae are deduced to be light limitations and temperature. During July and August when temperature was optimal for algal growth, the light penetration into the water was still at a very low level due to the high turbidity caused by the annual spring flood. Once the turbidity decreased, the standing crop of algae increased, but in the late fall with the association of decreasing temperature and deeper mixing of the epilimnion, the algae crop decreased to its winter minimum.

Two other factors that probably play a secondary role in the control of the productivity of the lake are low phosphate levels and the complex circulation within the lake. This is reported in detail in the Canada Centre for Inland Waters' report on Kamloops Lake (St. John *et al*, 1976).

No attempt was made to assess the effect water colour has on the standing crop of algae. However, due to the physical factors discussed above, it is doubtful that colour is a limiting factor.

Kamloops Lake would fall well within the classification of an oligotrophic lake. Furthermore, because of the nature of the lake, the phytoplankton would not be affected by any addition of nutrients by Weyerhaeuser Canada Limited or the City of Kamloops' sewage lagoon except for a brief period in the spring and fall of the year. Just before the beginning of the freshet, the temperature and light conditions begin to be more favourable for algal growth, but in the early fall after the freshet has passed, the physical and chemical conditions of the lake are the most favourable for growth.

1 INTRODUCTION

Starting early in 1971, Federal and Provincial agencies received an increasing number of complaints on the colour, foaming, algal growths, and fish tainting of the Thompson River and Kamloops Lake. To investigate these complaints, a Federal-Provincial Task Force was formed. An immediate short-term study of the North and South Thompson rivers, Kamloops Lake, and the Thompson River was carried out in April, 1973. Chemical (Federal-Provincial Task Force Report, 1973) and biological (Kelso, 1973) samples were collected and as a result it was recommended that the Federal-Provincial Task Force start an immediate program of data collection and fact finding to determine the source of nutrients and the type and source of foaming agents in the Thompson River system. The effects of nutrients and colour on the biological activity of Kamloops Lake and the lower Thompson River was also to be studied over a minimum one-year period.

From March, 1974, to April, 1975, the Environmental Protection Service conducted a detailed study of the standing crop of plankton in Kamloops Lake and related this information to the nutrient loadings from the upper Thompson River.

At the same time, the Canada Centre for Inland Waters conducted a detailed physical and chemical study of the lake, with assistance provided by the Environmental Protection Service on the collection of the chemical sampling (St. John et al, 1976). Productivity studies on phytoplankton were also conducted by the Canada Centre for Inland Waters and are included in their report.

Apart from the limnological study completed by Ward (1964), very little background data was available on the lake. Ward noted that the standing crop of net plankton in Kamloops Lake was very low. He concluded that the low level of standing crop was associated with the amount and character of the inflowing water. He further concluded that high turbidity and temperature as well as the brief residence time of surface water in the basin may have accounted for the relatively low standing crop of net plankton.

2 STUDY AREA

Kamloops Lake is approximately 29 kilometres long with a maximum depth of 150 metres and is located in the semi-arid plateau area of the central area of British Columbia (Figure 1). A description of the lake morphometry was given by Ward (1964) and a further, more detailed account of the lake is given in the report of the Canada Centre for Inland Waters (St. John et al, 1976).

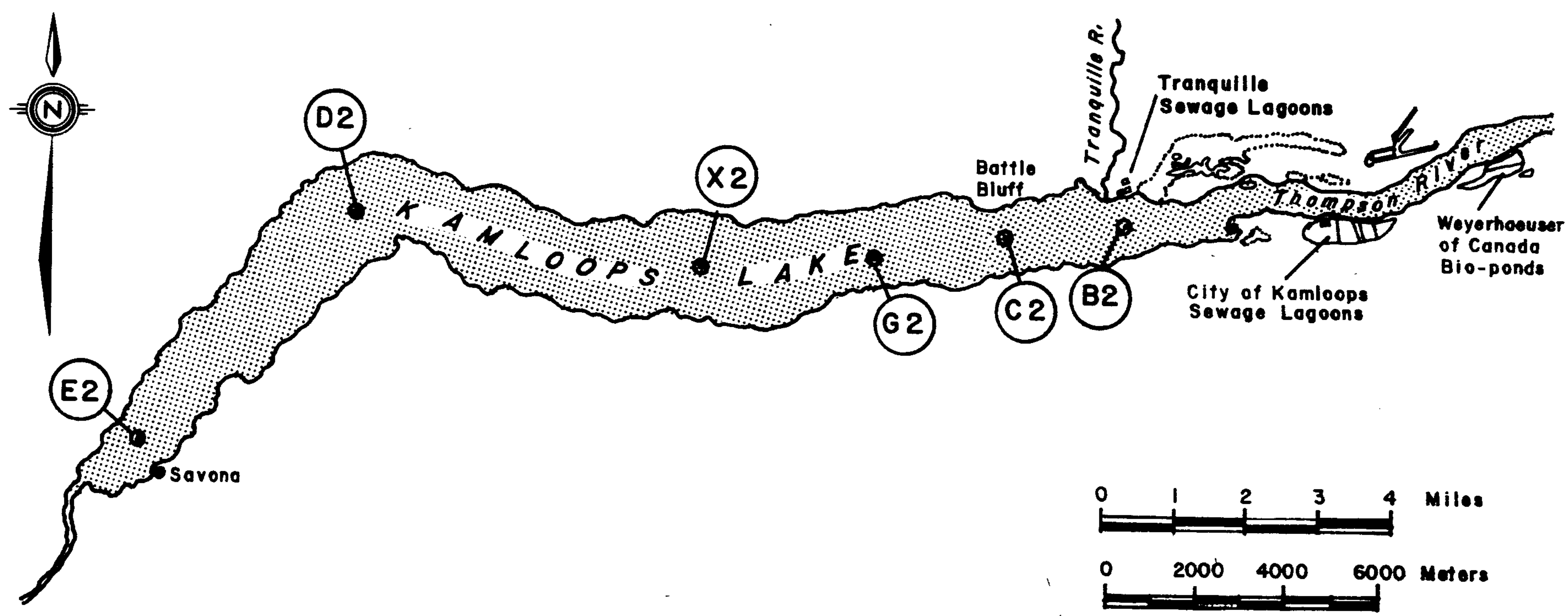

FIGURE I KAMLOOPS LAKE SHOWING THE SAMPLE SITES USED FOR SAMPLING THE STANDING CROP OF PHYTOPLANKTON AND ZOOPLANKTON

3 MATERIALS AND METHODS

Six sites on Kamloops Lake were sampled for phytoplankton and zooplankton on a monthly basis from March 19, 1974, to April 23, 1975. These were the mid-lake stations B_2, C_2, G_2, X_2, D_2, and E_2 (Figure 1). Permanently established marker buoys were placed at each sampling station.

3.1 Phytoplankton

The phytoplankton samples were collected by VanDorn water bottles at ten depths: 0, 2, 4, 6, 10, 15, 20, 30, 50, and 100 metres, except for stations B_2 and E_2, where the bottom samples were from 40 to 50 metres. Starting in August, 1974, the 50 and 100 metre samples were deleted because chlorophyll-a values were at or below detection limits. Two 1-litre water samples were taken at each depth and analyzed for chlorophyll-a and phaeophytin pigment and for ash-free dry weights. The 1-litre sample was filtered for chlorophyll-a and phaeophytin in the field using 0.45 micron cellulose nitrate filters in a sartorius filtering apparatus at a vacuum of 10 inches of mercury. The filters and contents were then frozen and transported on dry ice to the Laboratory Services, Pacific Region (Environmental Protection Service and Fisheries Service) in West Vancouver. The samples were analyzed using the Parson and Strickland method described in "Standard Methods" (1971). Spectrophotometer readings for chlorophyll-a were performed on the basis of a 1-cm cell instead of the preferred 10 cm cell and, consequently, the readings probably contain an inherent reduction in accuracy. The detection limit was .3 μg/ℓ for chlorophyll-a.

The 1-litre water samples for the ash-free weights were shipped immediately by courier truck to the West Vancouver Laboratory where they were filtered, weighed, ashed (500^{o}C for 2 to 3 hours), and re-weighed to determine the ash-free weight.

A 225 ml water sample was taken for identification of phytoplankton at the time of sampling. This was preserved with Lugal solution and examined at the Environmental Protection Service Biology Laboratory in North Vancouver. Phytoplankton was enumerated using the Untermohl method with a Wild inverted microscope. A 10 cc settling chamber was used and two counts were made, one of the whole bottom of the settling chamber at 100 x and a one-strip at 400 x magnification, excluding those counted at 100 x. For this report, only those values within the photic zone have been used for discussion purposes.

3.2 Zooplankton

The zooplankton samples were collected with a Wisconsin plankton net (25 cm diameter opening) from a depth of 30.5 metres. From March, 1974, to June, 1974, two different mesh sizes (3 hauls at each station) were used - #10 mesh (153 micron aperture) and #20 mesh (80 micron aperture). Preliminary analyses showed that the #10 mesh did not retain the majority of the Rotifers and only the #20 mesh size was used after June. From that time on, four hauls at each station were taken. The samples were preserved in 3% formalin and taken to the Environmental Protection Service Biology Laboratory. Enumeration was performed on two subsamples and these related back to the entire sample and reported as number per metre^3.

4 RESULTS

4.1 Phytoplankton

Chlorophyll-a values for Kamloops Lake throughout the study were very low. Depth profiles of chlorophyll-a for each month are shown in Appendix I. A small bloom occurred in the spring of 1974 in which values were less than 3 μg/ℓ. The largest bloom occurred in September, 1974. However, even at this time the maximum value obtained was only 5.4 μg/ℓ which occurred at 4 metres in depth at station G_2 (Appendix I).

The maximum depth of the photic zone was determined by Canada Centre for Inland Waters with the aid of a light metre or a secchi disk (Table 1).

TABLE 1 THE MONTHLY MAXIMUM DEPTHS OF THE PHOTIC ZONE OF THE WATER COLUMN FOR KAMLOOPS LAKE

Date	Depth (m)	Date	Depth (m)
March 13, 1974	15	October 23, 1974	10
April 24, 1974	15	November 22, 1974	10
May 29, 1974	2	December 18, 1974	10
June 27, 1974	2	January 22, 1975	10
July 26, 1974	10	February 25, 1975	10
August 21, 1974	10	March 19, 1975	10
September 25, 1974	10	April 24, 1975	6

A mean value of the concentrations of chlorophyll-a, phaeophytin, and ash-free weight was determined for the photic zone. From this, a mean value of the standing crop of phytoplankton was determined for Kamloops Lake (Figure 2). As stated above, the peak of chlorophyll-a production was in September, 1974. A high value of phaeophytin, 8.76 μg/ℓ, was obtained in July. This value does not correspond to any

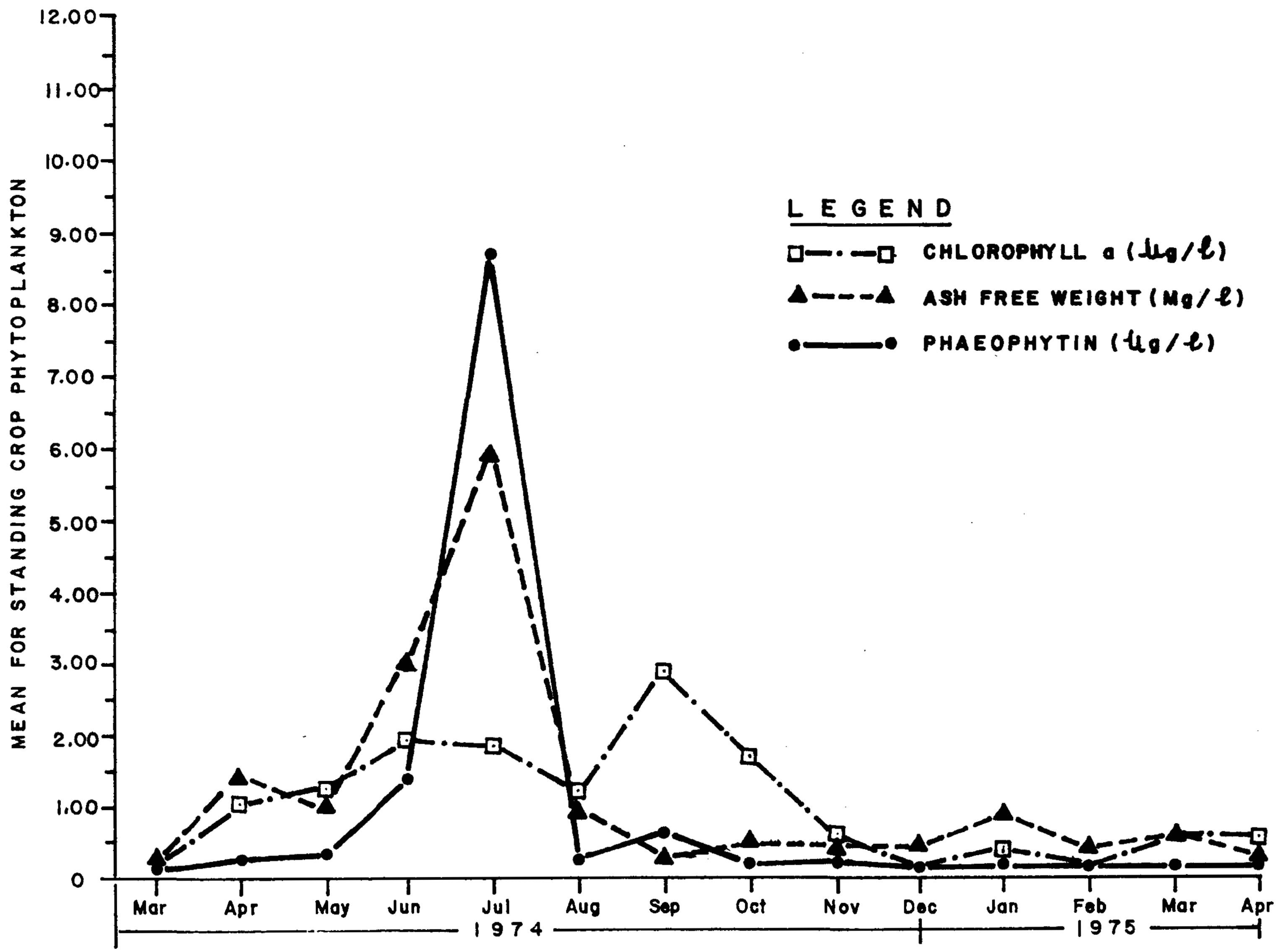

FIGURE 2 MONTHLY MEAN CONCENTRATIONS OF PHYTOPLANKTON PIGMENTS AND ASH FREE WEIGHT FOR KAMLOOPS LAKE. SEE TABLE I FOR MAXIMUM DEPTH USED.

of the phytoplankton values from within the lake, which suggests that these pigment values may be of allochthonous origin. The ash-free weight also rises to a high value during July and this is attributed, most probably, to the detritus carried into the lake by the annual river flood.

The river flow for the North Thompson River at McLure and the South Thompson River at Chase from March 1, 1974, to April 30, 1975, is shown in Figure 3. The South Thompson River peaked on June 27 and 28, 1974, at 46,300 cfs, while the North Thompson River reached its maximum flow at McLure on June 24, 1974, at 80,800 cfs. Thus, the maximum impact of the flood on the lake was in the latter part of June.

In comparison of stations, station G_2 shows the greatest standing crop of planktonic algae (Figure 4). A small bloom was evident at each station in the spring but this had declined by August. The phaeopigment measurement of the phytoplankton is very low except for the July sample (Figure 5). During July there was a wide range of phaeopigment between stations, a low of 3.39 µg/ℓ at station D_2 to a high of 12.78 µg/ℓ at station X_2. This variation is probably caused by the complex lake circulation and the internal wave motions generated within the lake (St. John <u>et al</u>, 1976). Small peaks of pigments occur in September with the exception of station B_2 where this does not occur until November.

The ash-free weight measurements throughout the lake were greatly affected by the river flood (Figure 6). Station B_2 had the highest value as it is nearest the entrance to the lake. The river flows of the North and South Thompson rivers reached their peak in June, but the ash-free weight in the lake did not peak until July, which shows that the detritus carried into the lake during the latter part of June was still in suspension.

Over 30 species of phytoplankton were identified in Kamloops Lake. The most dominant class was by far the Bacillariophyceae or

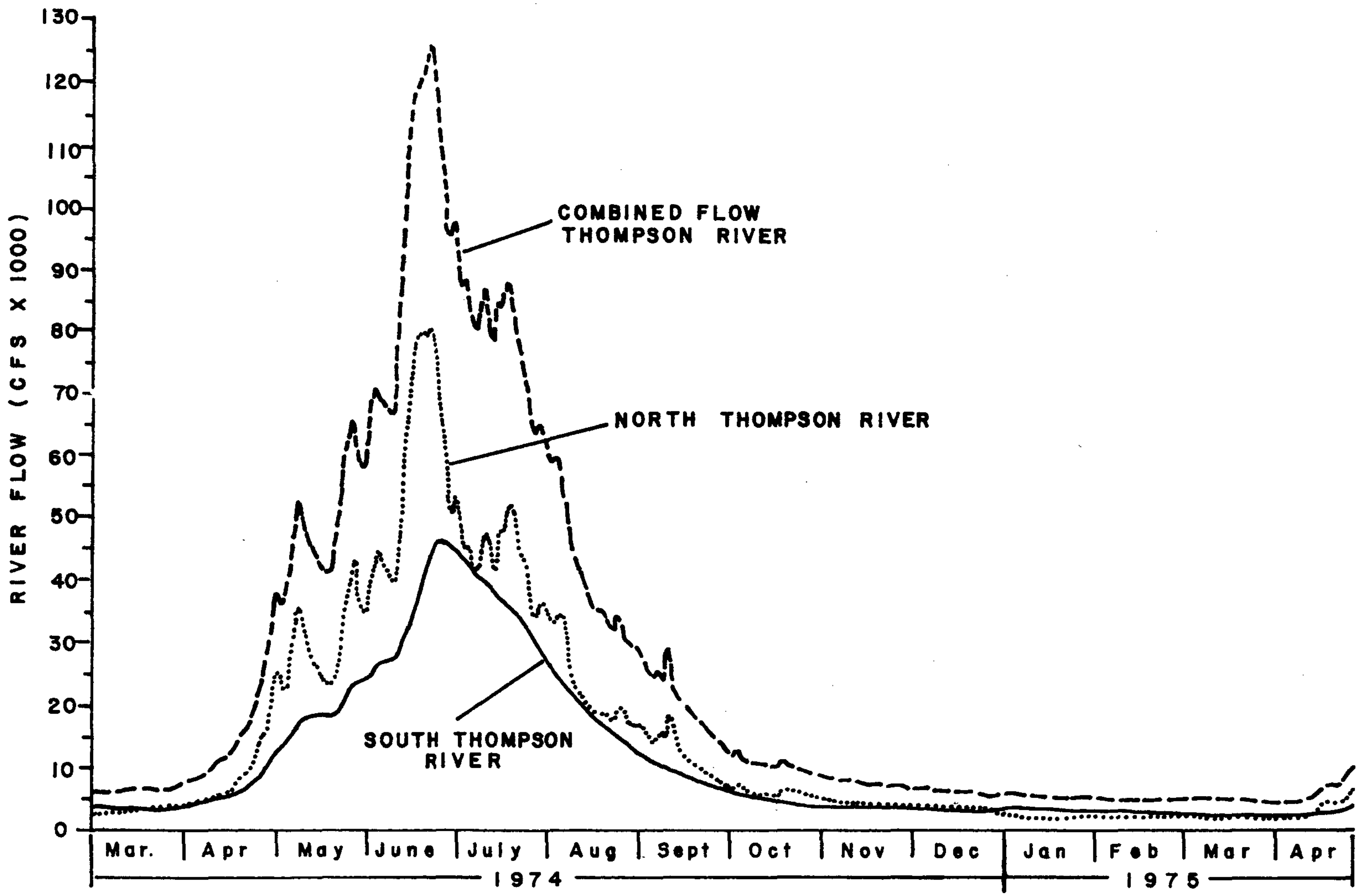

FIGURE 3 DAILY RIVER FLOWS FOR THE NORTH THOMPSON RIVER AT McLURE AND SOUTH THOMPSON RIVER AT CHASE. THE TWO FLOWS WERE ADDED TO GIVE THE FLOW FOR THE THOMPSON RIVER.
(Data supplied by Water Survey Branch, Inland Waters Directorate)

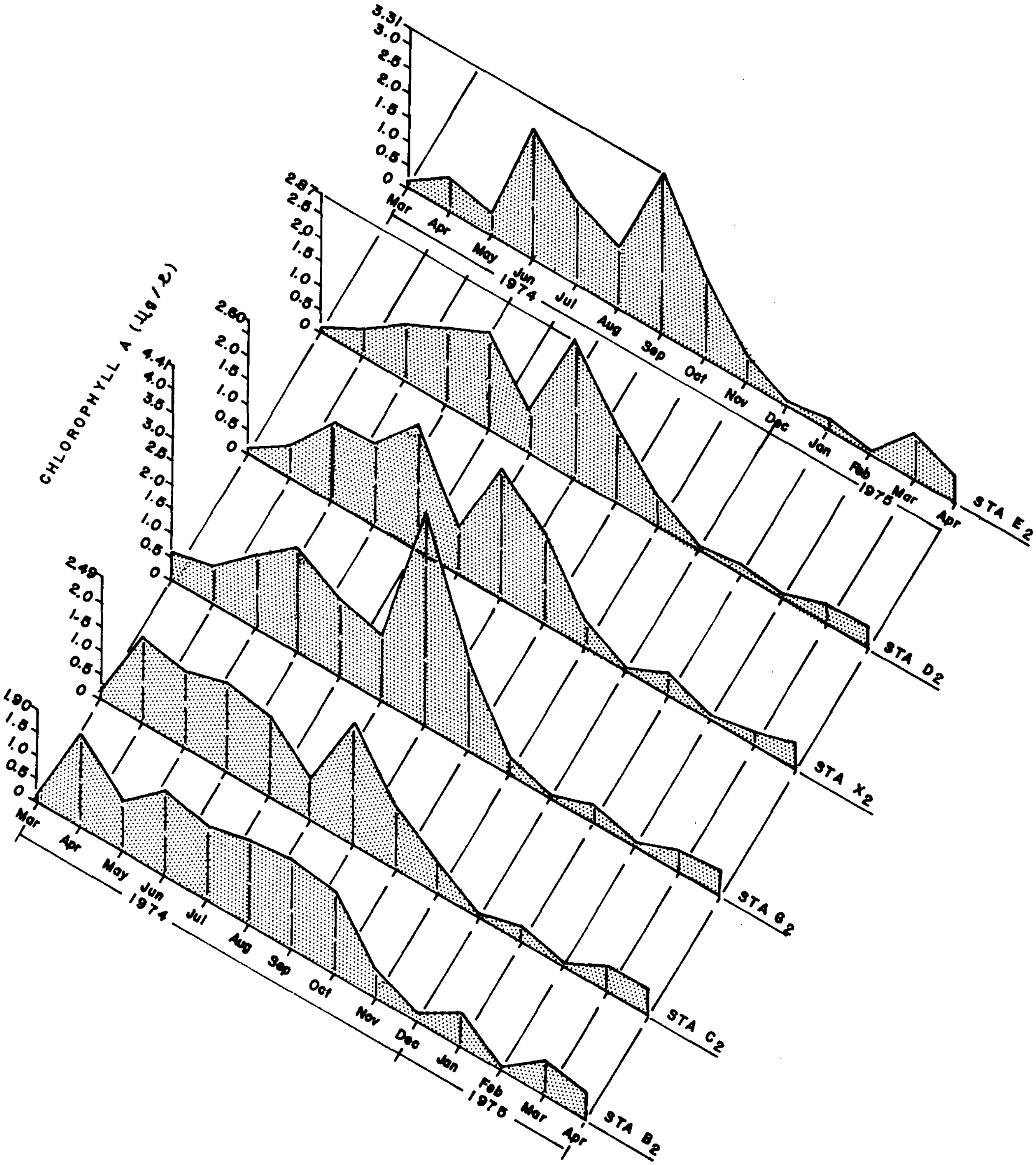

FIGURE 4 MEAN CONCENTRATION OF CHLOROPHYLL a IN THE PHOTIC ZONE OF THE WATER COLUMN AT EACH STATION. SEE TABLE I FOR DEPTH OF PHOTIC ZONE.

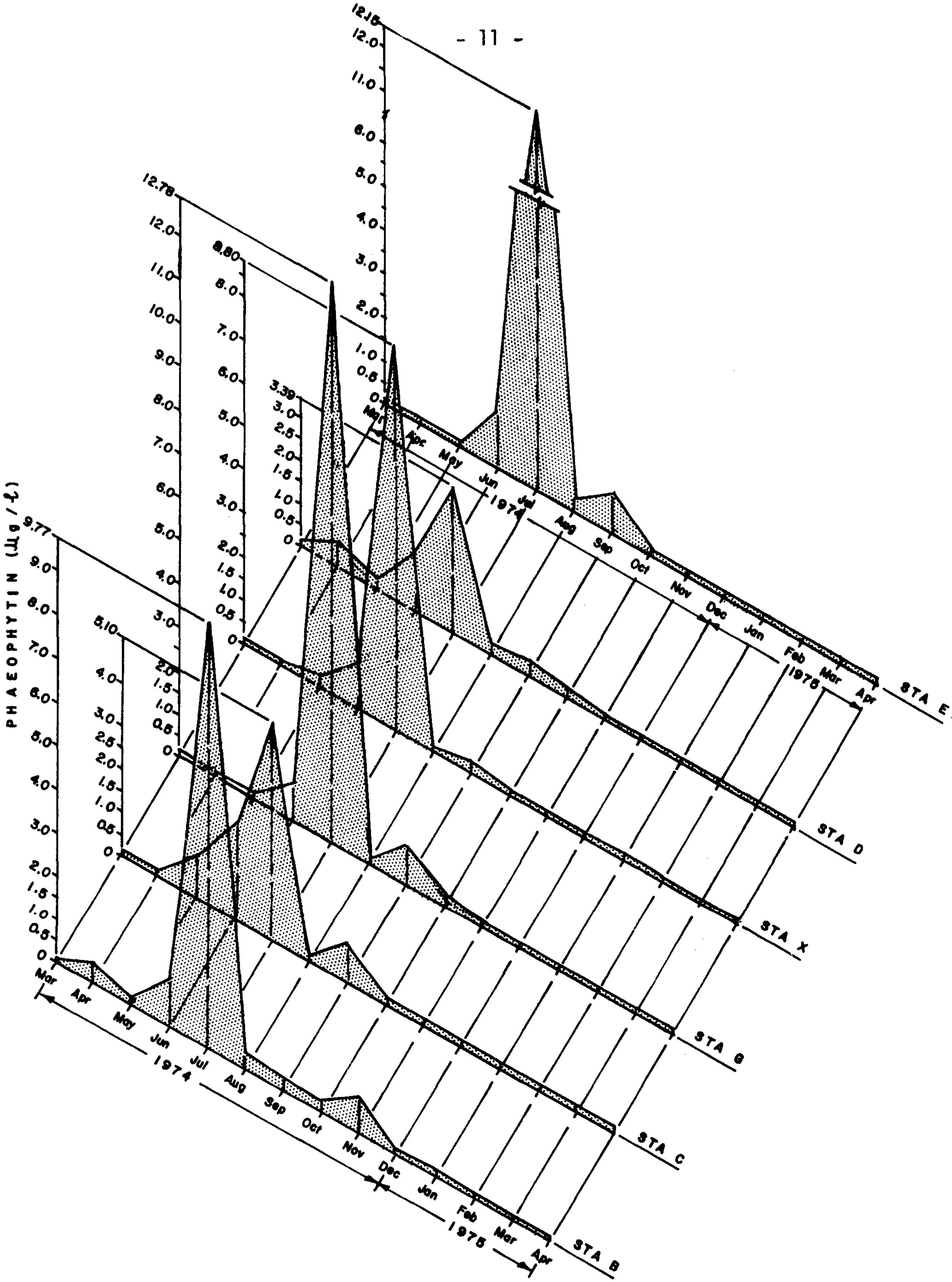

FIGURE 5 MEAN CONCENTRATION OF PHAEOPHYTIN IN THE PHOTIC ZONE OF THE WATER COLUMN AT EACH STATION. SEE TABLE I FOR DEPTH OF PHOTIC ZONE.

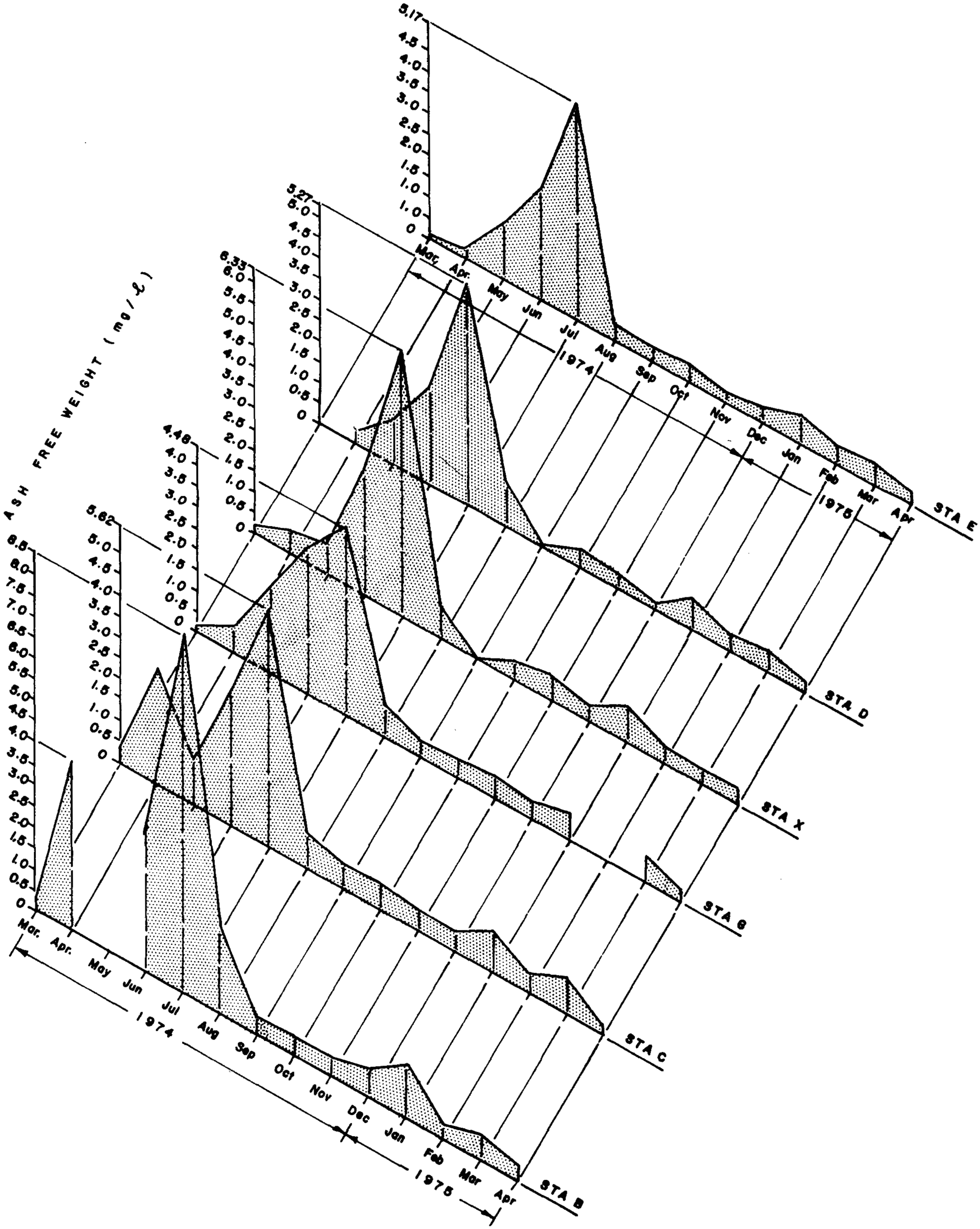

FIGURE 6 MEAN CONCENTRATION OF ASH FREE WEIGHT IN THE PHOTIC ZONE OF THE WATER COLUMN AT EACH STATION. SEE TABLE I FOR DEPTH OF PHOTIC ZONE.

diatoms. As there was more than one lab technician employed in the enumeration of the phytoplankton, there was some controversy regarding the identification of the species of some of the minor genera. For this reason the data is taken only to genera. However, in the case of the most dominant diatoms, Tabellaria fenestrata was the only species present; while for Melosira, two species existed, M. distans and M. italica, the latter being the more numerous of the two. As an example of the genera present, the enumeration of station G_2 for September, 1974, is given in Appendix II. Copies of the data in its entirety may be obtained from the author upon request.

The average number of algal cells per mℓ of the photic zone, of the water column, for each genera, on each sample day, at each station, were calculated. The eleven most dominant species of diatoms were used and the remainder were added together as "Other Diatoms". The calculations for this data are shown in Appendix III for the entire sampling period.

The bloom that occurred in September, 1974, was the result of increased diatom abundance (Figure 7), while the smaller spring bloom in 1974 was due to the other algal classes, mainly Dinobryon species of the Chrysophyceae (Table 2). The most dominant diatoms in the plankton in the spring were Tabellaria fenestrata and Melosira italica. In August, 1974, Cycolotella sp. was dominant while during the bloom in September, 1974, Tabellaria fenestrata was by far the most abundant species. After the fall bloom, the Tabellaria numbers declined and Melosira and Tabellaria were almost equal in number.

4.2 Zooplankton

Thirteen different species of crustacean plankton were recorded in Kamloops Lake. The enumeration of the eleven most dominant zooplankton is given in Appendix IV. The most abundant Copepoda, Diaptomus ashlandi, peaked in September and October, 1974. The second most abundant species, Cyclops biscupidatus thomasi, reached its peak in

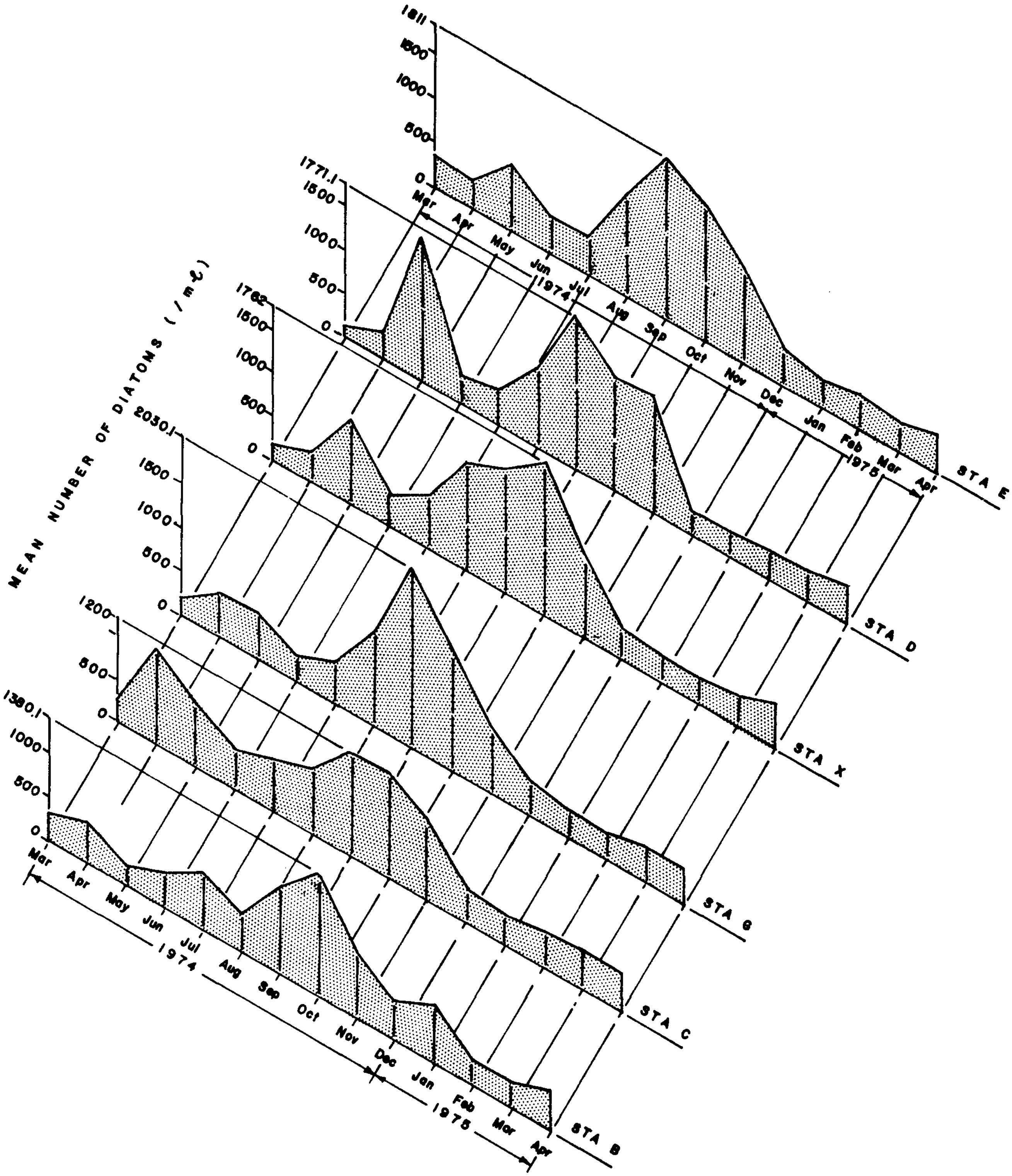

FIGURE 7 MEAN NUMBER OF DIATOMS IN THE PHOTIC ZONE OF THE WATER COLUMN FOR KAMLOOPS LAKE. SEE TABLE I FOR DEPTH OF PHOTIC ZONE.

TABLE 2 MEAN NUMBER OF PHYTOPLANKTON (EXCLUDING THE DOMINATE DIATOMS) CELLS PER ML OF THE WATER COLUMN TO THE BOTTOM OF THE PHOTIC ZONE

Date	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
1974						
March 12	4.9	5.1	3.7	30.3	4.4	-
April 24	30.3	30.3	3.4	4.1	7.2	10.0
May 29	2.0	59.4	35.7	37.3	12.9	-
June 26	159.6	193.1	250.5	112.4	165.5	172.0
July 26	197.1	92.6	101.2	87.5	115.4	164.4
August 21	31.7	-	8.3	4.0	-	-
September 25	30.6	19.1	83.9	28.9	21.4	105.8
October 23	-	2.0	-	1.2	-	0.8
November 22	0.8	1.2	5.5	3.2	-	4.8
December 18	-	0.4	-	-	-	-
1975						
January 22	9.1	-	1.2	2.0	2.0	-
February 25	1.2	1.6	1.2	0.8	0.4	0.8
March 19	-	-	1.2	1.6	1.2	-
April 24	2.0	1.3	-	2.7	0.7	1.3

June, 1974, as well as a smaller peak in the winter months. For Cladocera, the more dominant organisms were Daphnia longispina and Bosmina longirostris. Daphnia reached its peak in September while Bosmina reached its maximum in June and again in November-December of 1974. The number 10 mesh Wisconsin net (153 μ) was sufficient to catch all of these organisms. In some samples it was more efficient than the number 20 mesh net (80 μ).

The most dominant Rotifera were Kellocottia longispina which peaked at station G_2 in June at 10,515 organisms per cubic metre and Asplanchna sp. which also reached its maximum number in June. In most instances the #20 mesh net was the most efficient sampler except for Asplanchna where the #10 mesh net was more effective. Some of the Rotifers less than 80 microns in size would have been missed even with the #20 mesh net.

The greatest total peak of zooplankton occurred in June, 1974, with the Rotifers, Nauplii, and Copepoda being the most abundant (Figure 8). The Copepoda as well as the Cladocera peaked at a greater number in September. However, the Cladocera did not form a significant number of the zooplankton at any time. No attempt was made to identify the Nauplii. It is interesting to note that the Nauplii started to increase after the spring bloom in September, 1974, and was still on the increase when sampling stopped in April, 1975. The exact reason for this is not known at this time.

The two stations B_2 and C_2 nearest the east end of the lake were the most productive for zooplankton (Figure 9). Unfortunately, the June samples for B_2 were lost, but in the September-October peak, this station contained 34% of the total number of individuals sampled. The overall number of organisms decreased as one progressed down the lake, except at station E_2 where there is a slight increase in numbers. The exact reason that more zooplankton reside in the delta area is not known.

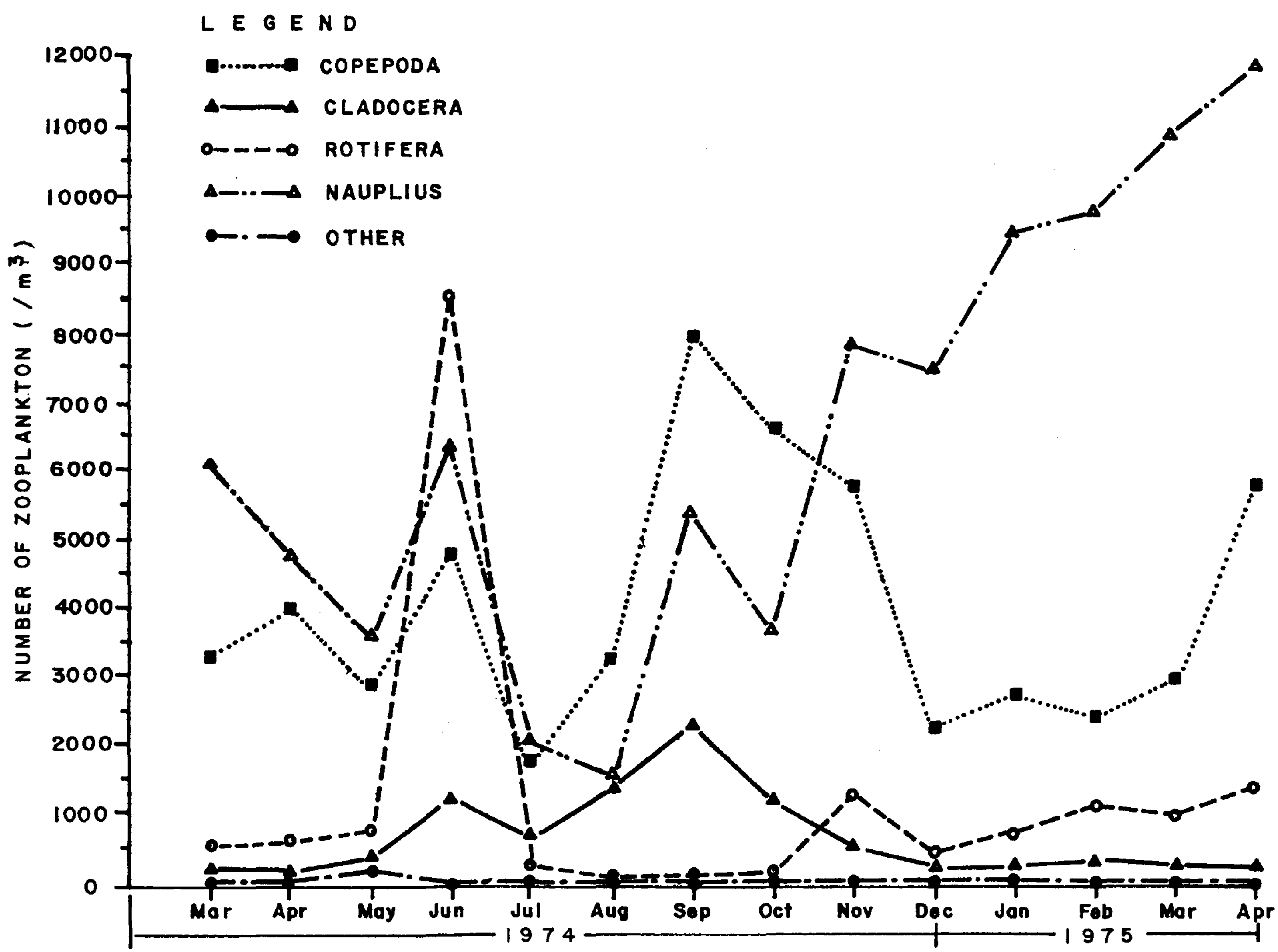

FIGURE 8 MEAN NUMBER OF ZOOPLANKTON PER MONTH FOR KAMLOOPS LAKE. NUMBER 20 MESH WISCONSIN HAUL FROM 30.5 METERS IN DEPTH.

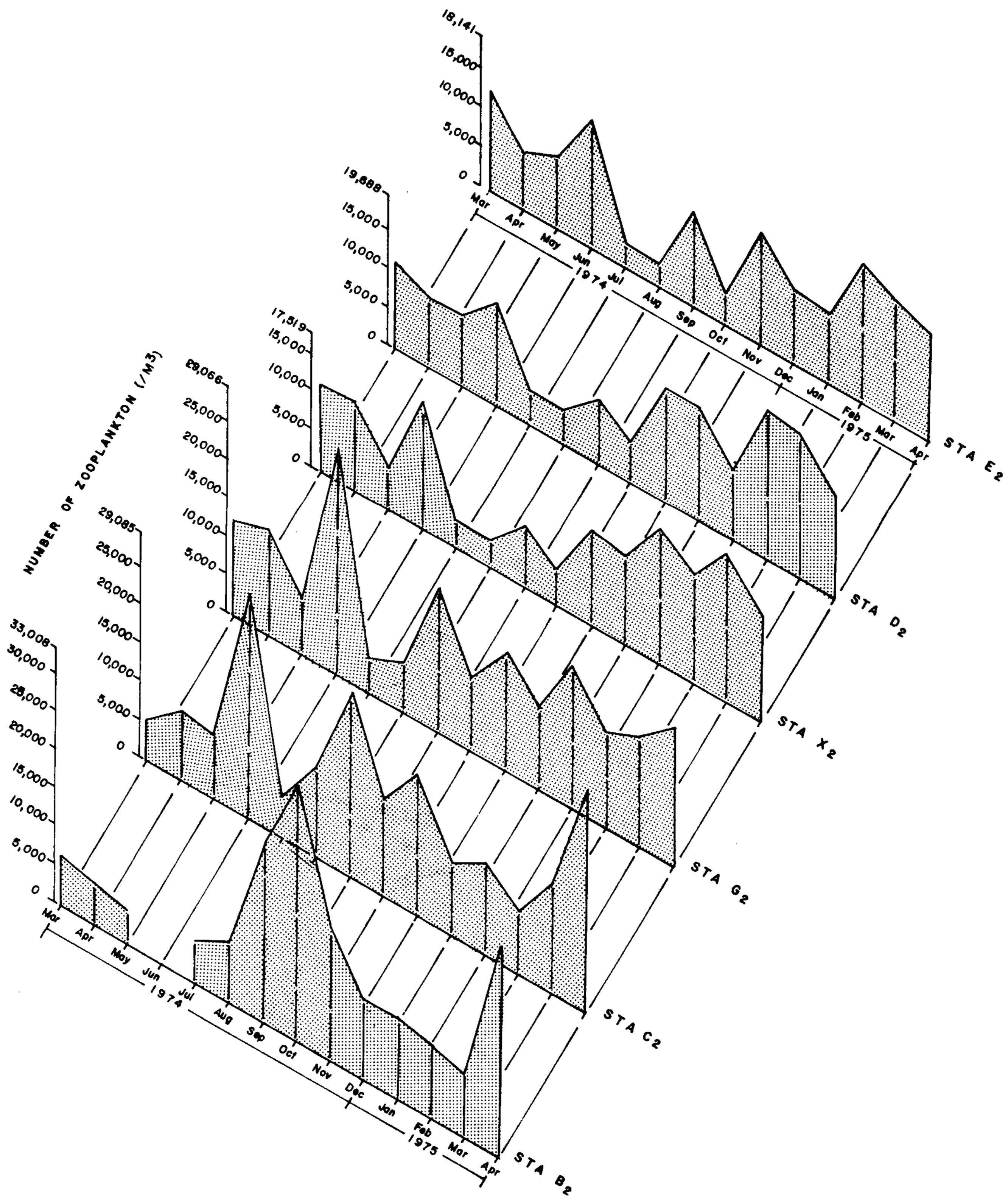

FIGURE 9 ZOOPLANKTON WISCONSIN HAULS AT KAMLOOPS LAKE, 30.5 METERS IN DEPTH (80 MICRON MESH NET).

5 DISCUSSION

Nutrient loadings indirectly influence primary production and hence the standing crop of algae. The main purpose of this part of the study was to document the effects of the nutrient loadings on certain lake flora and fauna. Primary productivity is generally influenced by the availability of nutrients, light, and the temperature of the surrounding waters. The level of chlorophyll-a in Kamloops Lake was very low as indicated by the maximum bloom in September (mean chlorophyll-a for lake 2.91 μg/ℓ). Schindler (1974) states that most experts consider lakes to be eutrophic when the algae blooms have more than 30 μg/ℓ chlorophyll-a. For Kamloops Lake, light limitation caused by turbidity and temperature would seem to be very important factors in the control of primary production (Figure 10). The annual flooding of the Thompson River system caused an increase of turbidity in the lake starting in May, 1974, and reached its peak in the last part of June and first part of July. Coinciding with the above, temperature also increased and reached its maximum in August. Phytoplankton abundance started to increase in the spring, but as the lake turbidity increased, the diatom population declined and only the Chrysophyceae and Chlorophyceae were able to produce in the more turbid waters during June and July. It must be stated at this time that these figures are based on the total number of phytoplankton and not on the total biomass of the phytoplankton. R. Daley found in his study of the lake that the biomass of Chrysophyceae and Chlorophyceae make up 30.8% of the phytoplankton while the diatoms occupied 54.9% of the total biomass (St. John et al, 1976). There is also the possibility that some of the chlorophyll-a total in the spring may have been from allochthonous sources brought in by the spring flood.

In August, when the turbidity had dropped to near 1-JTU, the diatom population began to increase. In September, after conditions had been more favourable for algal growth for at least a month (i.e., low turbidity and sustained high temperatures), the diatom population

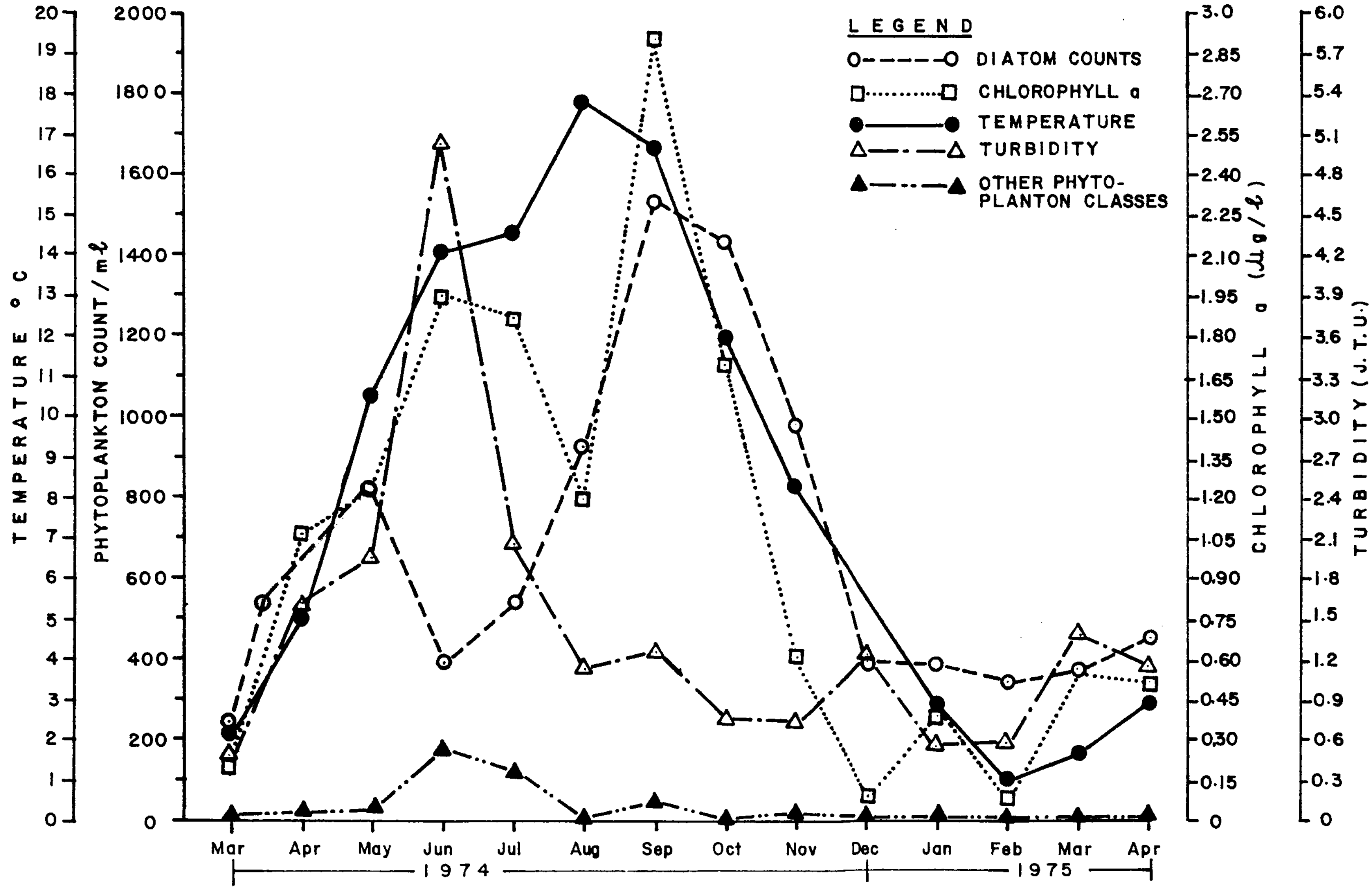

FIGURE 1a THE MONTHLY RELATIONSHIP BETWEEN PHYTOPLANKTON, TEMPERATURE AND TURBIDITY IN KAMLOOPS LAKE FOR THE PHOTIC ZONE OF THE WATER COLUMN.
(Physical Data supplied by C.C.I.W. Pacific Br.)

reached its maximum. After September, the diatom population decreased with the decreasing water temperature.

There was a negative correlation (r^2 = -0.64) between the chlorophyll-a concentration and nitrate concentration over the whole sampling period, while no correlation of significance was found between chlorophyll-a and total dissolved phosphate (Figure 11) (raw chemical data supplied by CCIW). The concentration of nitrate may not have been decreasing solely because of the uptake for algal growth, because during the same period the nitrate concentration in the inflow river was also decreasing and by approximately the same amount (St. John et al, 1976). Between August and September the average chlorophyll-a concentration doubles but the net nitrate concentration drops by less than 10%. Thus, nitrate appears to be in excess of algal requirements at this time.

Another very important factor that affects the productivity of the lake is the complex circulation pattern caused by the movement of the river plume through the lake. The bulk residence time in the lake can vary from 18 days in June to 340 days in February (St. John et al, 1976). As mentioned earlier, the diatom abundance decreases during June and July (Figure 10). The very high flushing rate in the epilimnion, together with the decreased light penetration caused by the turbidity, would account for most of this decrease. The increase in chlorophyll-a and phaeophytin, especially the latter, at this time, is probably from allochthonous sources brought into the lake by the river plume. The mixing zone of the epilimnion during summer and early fall is much deeper than the photic zone (St. John et al, 1976). Thus, a continuous supply of nutrients is being brought up from deeper layers. After September, along with the decrease in temperature, there is the increased depth of mixing and thus the phytoplankton population declines. Furthermore, it is quite feasible that algal cells from the east end of the lake may start to settle out and be caught in the currents to be carried down the lake and resurface at the west end. This may explain why the peak of diatoms occurs at station G_2 in September, yet at station X_2 the number

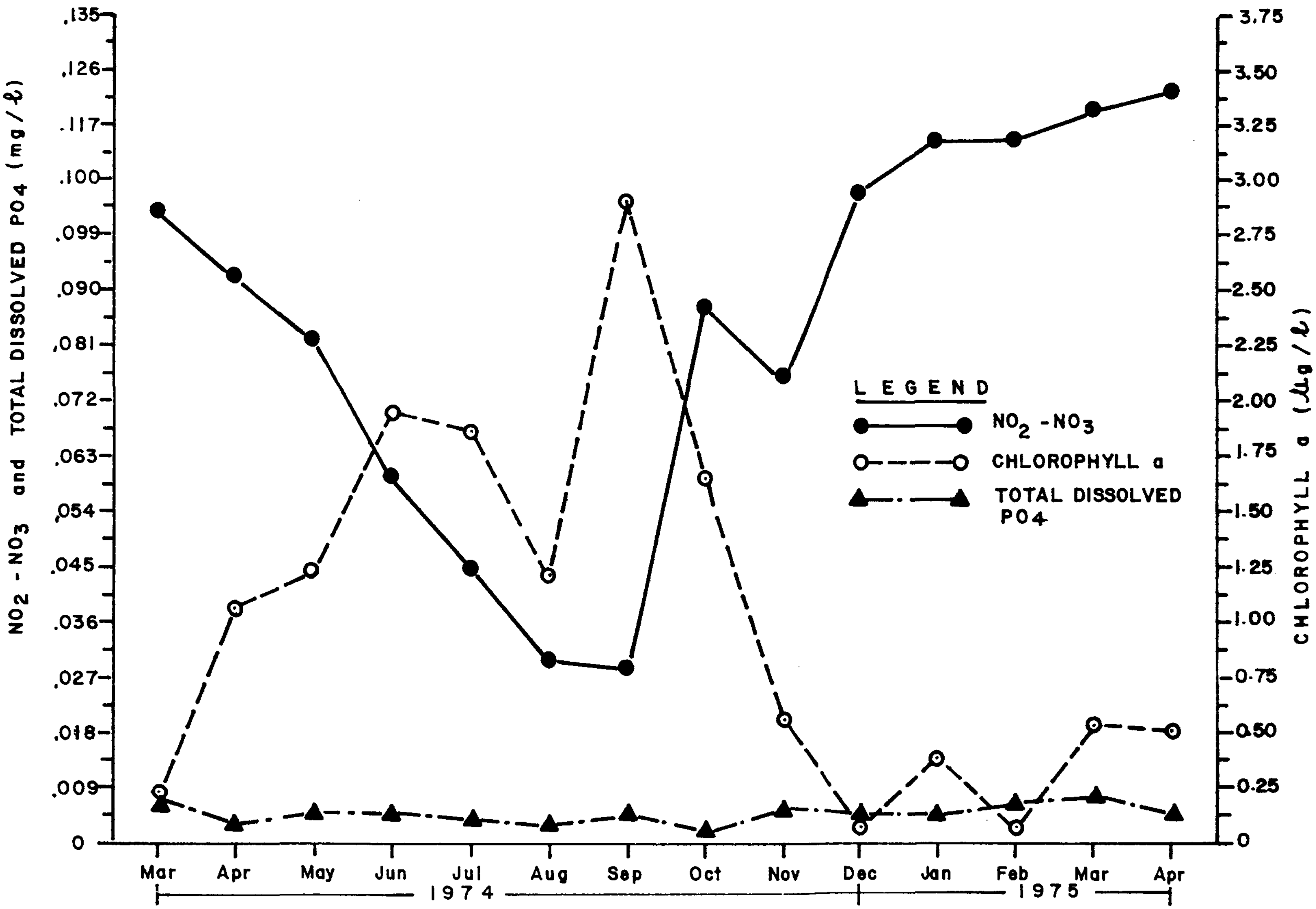

FIGURE 11 THE MONTHLY RELATIONSHIP BETWEEN CHLOROPHYLL a, NO_2-NO_3 AND TOTAL DISSOLVED PO_4 IN KAMLOOPS LAKE FOR THE PHOTIC ZONE OF THE WATER COLUMN. (Chemical Data supplied by C.C.I.W., Pacific Br.).

of organisms are higher in October than September. Calculations of the mean number of organisms to the depth of the epilimnion (40 metres instead of just within the photic zone) shows the peak algal growth occurring in October instead of September.

No direct attempt was made to determine if colour played an important role in productivity. However, due to the strong influences of other controlling factors (e.g., turbidity and temperature), it is doubtful that water colour in Kamloops Lake would be a controlling factor.

Stockner and Northcote (1974) found a close relationship between chlorophyll-a concentration and total phosphorus for Okanagan Lake and Kalamalka Lake in the photic zone during the summer period. Okanagan Lake showed approximately 30 μg/ℓ total phosphorus with a mean of 5 μg/ℓ of chlorophyll-a, while Kalamalka had approximately 15 μg/ℓ of total phosphorus and a mean of 2.5 μg/ℓ of chlorophyll-a. Kamloops Lake was much lower in September with a mean of 5 μg/ℓ of total dissolved phosphorus and 2.9 μg/ℓ of chlorophyll-a in the photic zone. Stockner and Shortreed (1974) report Babine Lake, another large oligotrphic lake, as being more productive than Okanagan Lake, with a mean seasonal chlorophyll-a value of 1.78 μg/ℓ, while the mean chlorophyll-a value for Kamloops Lake from March, 1975, to February, 1976, was 1.1 μg/ℓ.

It is generally agreed that most oligotrophic lakes are dominated by diatoms and that the presence of bluegreen algae indicates a more eutrophic lake (Stein and Coulthard, 1971). In Kamloops Lake very few blue-green organisms were found. The dominate phytoplankton were by far the bacillariophyceae or diatoms. This was confirmed by Daley where he found, in calculating total biomass, that the diatoms were greater than 50% of the total phytoplankton by volume, except during the peak biomass period in early fall when they consisted of 34% of the volume (St. John et al, 1976). In June and July, there was a small peak of phytoflagellates, mainly *Dinobryon sp*. and a few green algae, primarily *Chlamydomonas* sp. However, Daley (St. John *et al*, 1976) found that during this period the dominate genera of the Chrysophyta biomass were *Chromulina*, *Mallomonas*, and *Ochromonas* and from the Chlorophyta biomass, *Botryococcus* and *Chlorella* were the most dominant. For Kalamalka and Okanagan lakes, Stein and Coulthard (1971) found that the dominate algae in Kalamalka were blue-greens in early summer, but gave way to phytoflagellates by late summer. In the spring the phyto-flagellates and diatoms were equal for Kalamalka Lake. For Okanagan Lake in early spring, with the exception of the north end, diatoms were dominate but this changed to blue-green dominance by late summer for the whole lake and reverted to diatom dominance by spring. The main diatoms for the two lakes were *Cyclotella ocellata*, *C. kutzingiana*, and *Melosira italica* for Kalamalka and *M. italica*, *C. ocellata*, and *Fragilaria crotonensis* for Okanagan Lake. For Kamloops Lake, *Tabellaria fenestrata*, *M. italica* and *Fragilaria crotonensis* were the most dominate diatoms.

Ward (1964) identified eight common pelagic zooplankton in Kamloops Lake, four cladocerans and four copepods. However, due to the large mesh size of his sampling net, he was unable to report on the community of Rotifers. Hutchinson (1967) states that planktonic Rotifers occupy fairly discrete niches in the plankton community. Hutchinson further states that much has to be learned about the feeding habits of Rotifers as different species of a class can be herbivorous and primary or even secondary carnivores. He reports that *Keratella* and *Kellicottia* can capture *Cryptomonas*. *Keratella* normally can ingest small whole organisms. *Asplanchna* eats a variety of food, notably algae, *Keratella*, *Ascomorpha*, and other Rotifers and even small Crustacea.

The Cladocera are filter feeders while some Copepoda can feed on both plant and animal material. *Cyclops biscupidatus thomasi* is predacious while Diaptomus is a filter feeder and thus feeds mainly on diatoms.

The greatest overall abundance of zooplankton in Kamloops Lake was found in the east end of the lake and the exact reason for this is not known. At certain times of the year they could be feeding on detritus brought in by the river, but during the September-October peaks, the river flow is greatly reduced and very little detritus would enter the lake. Also, during this time period the phytoplankton values were higher at the other stations on the lake. However, part of the reduced phytoplankton levels in the delta area could be because of the increased grazing . One possible explanation for the higher standing crop of zooplankton in the delta area could be caused by allochthonous organisms being carried into the area by the South Thompson River from the Shuswap Lake system.

In Kamloops Lake, the zooplankton reached a peak in June, 1974. However, at this time the diatom population decreased when the phyto-flagellates and green algae reached their maximum (Figure 12). In the fall of the year the zooplankton again reached a peak at the same time the diatom population reached a maximum. The zooplankton decreased as the diatoms decreased except in November. In December the diatom population was very low but the total zooplankton population began to increase. However, if one subtracted the nauplii, the zooplankton number followed the phytoplankton curve much closer. As previously mentioned, it was interesting to note that the number of nauplii in the spring of 1975 was much higher than the same time period in 1974. The chlorophyll-a values and diatom counts were slightly higher in March, 1975, than the same period in the previous year. This and other environmental factors may have caused an earlier hatch of the over-wintering eggs, thus giving the zooplankton standing crop an earlier start.

On the same basis as the phytoplankton, a very important factor affecting the zooplankton population would be the complex lake circulation and the flow of the river through the lake.

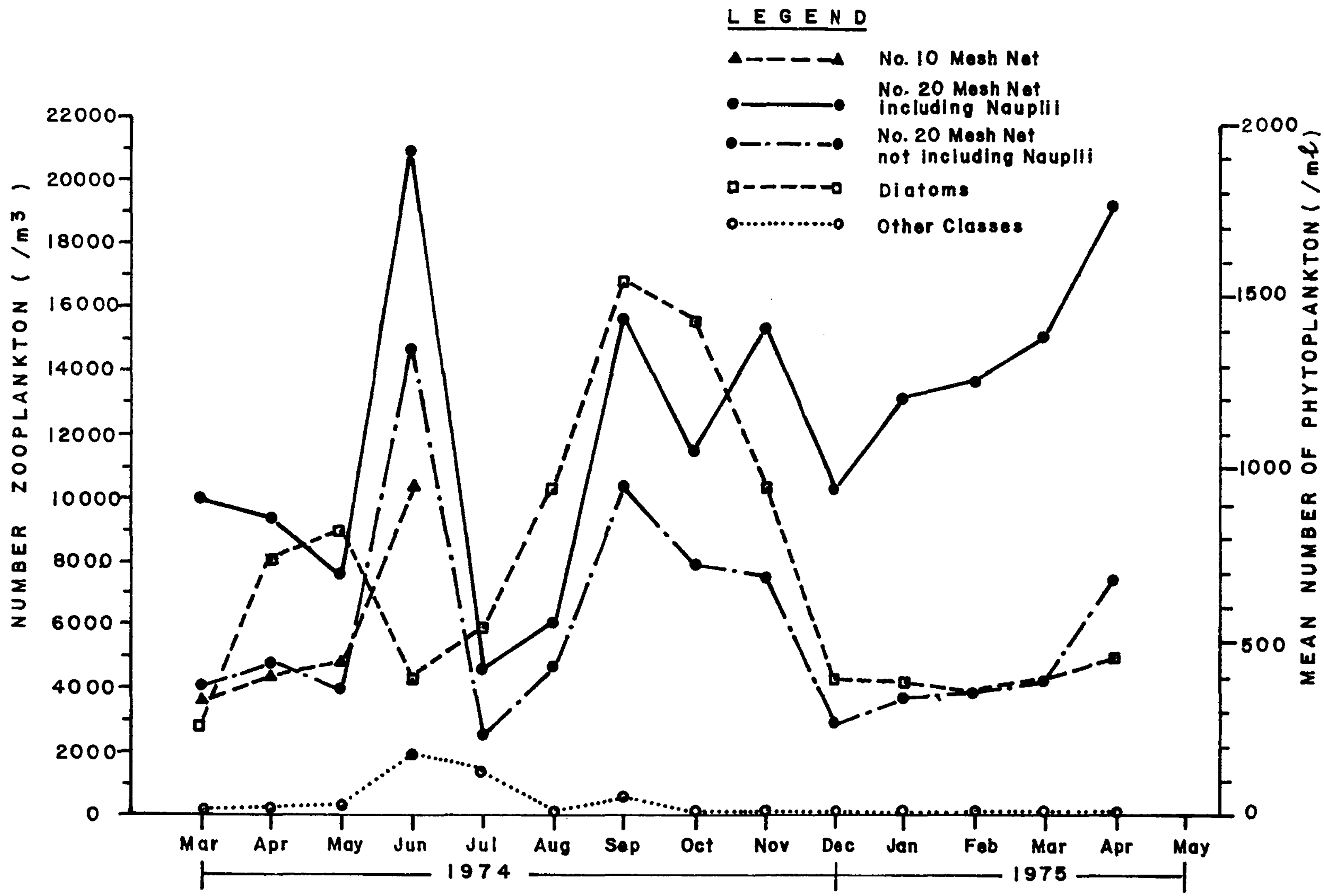

FIGURE 12 THE MONTHLY RELATIONSHIP BETWEEN NUMBER OF ZOOPLANKTON AND NUMBER OF PHYTOPLANKTON IN KAMLOOPS LAKE

In comparison of zooplankton communities to other lakes, Patalas and Salki (1973) found 13 species in Okanagan Lake. The densities in September were between 30,000 and 40,000 individuals/m^3 through the central and most northern part of the lake, while higher numbers (50,000 to 70,000/m^3) were found at the southern end of the lake. Kalamalka Lake showed a rather uniform distribution throughout the lake of between 20,200 and 33,800/m^3. For both lakes, Cyclops bicuspidatus thomasi and Diaptomus ashlandi were the most abundant of the copepods; the same was found in Kamloops Lake. Of the cladocerans, Daphnia thorata and Daphnia longiremis were dominate in Okanagan while only Daphnia longiremis was most numerous in Kalamalka Lake.

Watson (1974) showed the range of zooplankton of the Great Lakes to be as follows:

Lake Huron	2,000 to 24,000/m^3
Lake Ontario	2,000 to 55,000/m^3
Lake Erie	2,000 to 200,000/m^3

In comparison, Kamloops Lake's range of zooplankton over the 14 month sampling period of 4,500 to 21,000/m^3 would fall close to Lake Huron and below both Kalamalka and Okanagan lakes.

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APPENDIX I

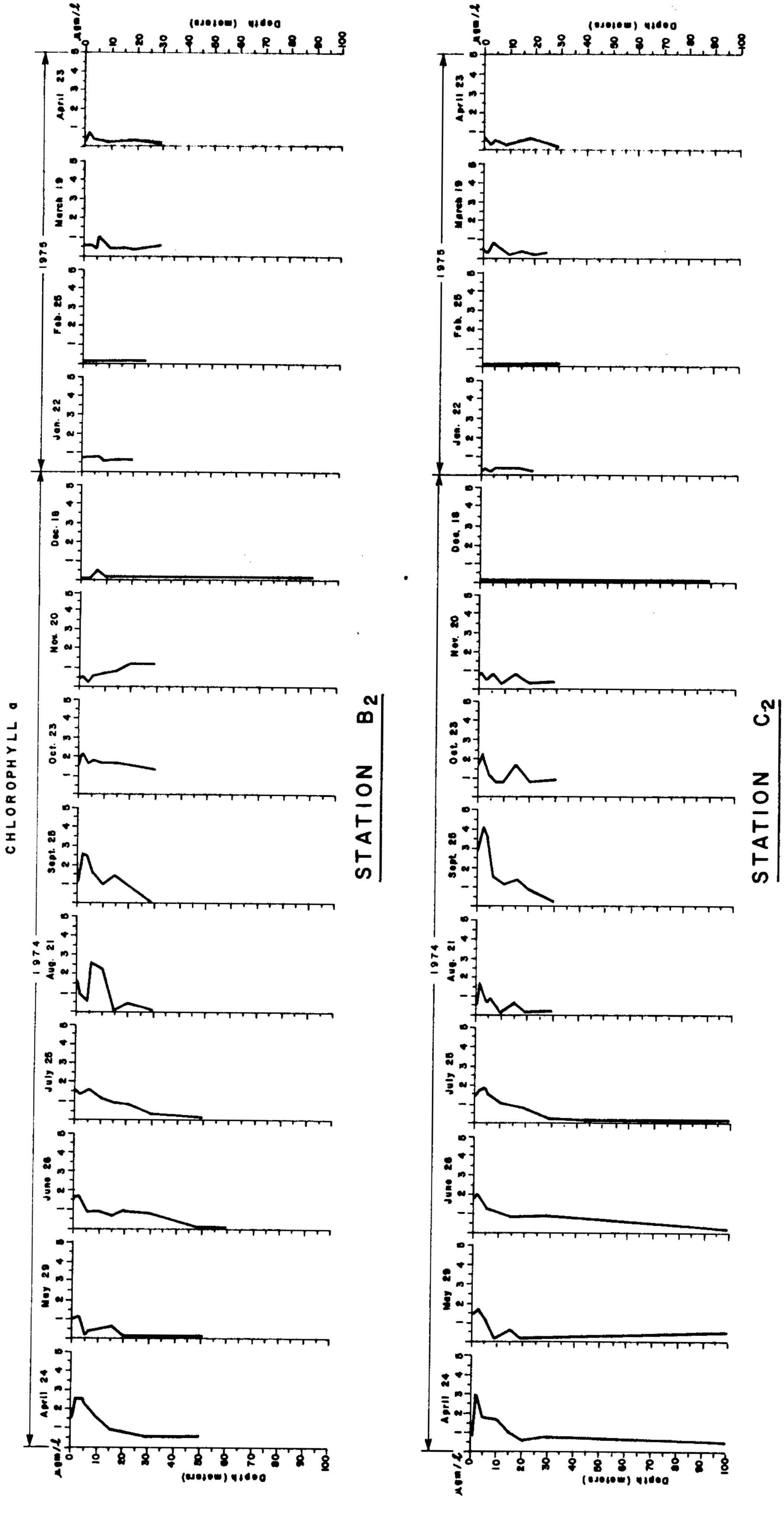
MID LAKE DEPTH PROFILES OF KAMLOOPS LAKE FOR CHLOROPHYLL-A

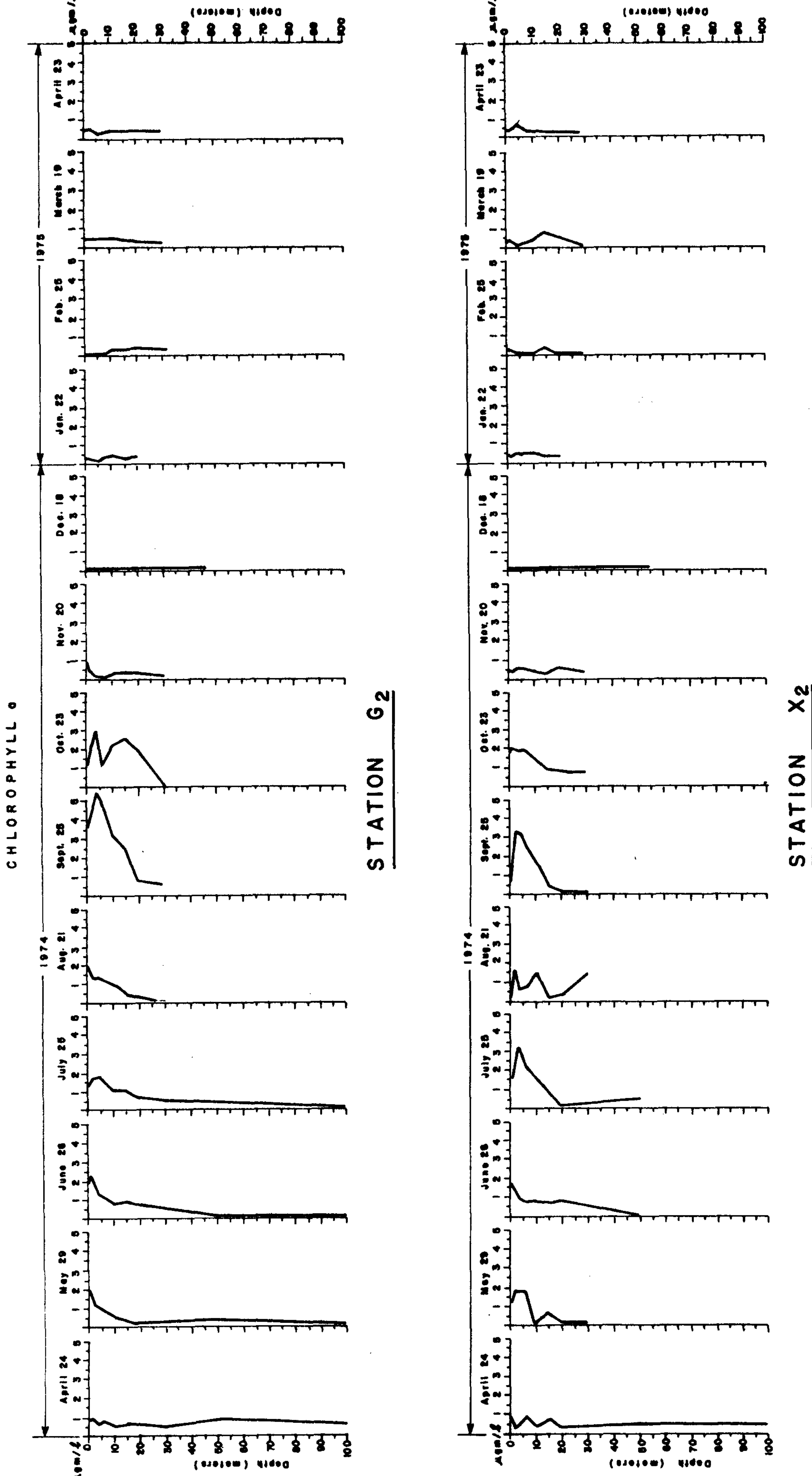
(After August, 1974, sampling at 50 and 100 metres depth was stopped)

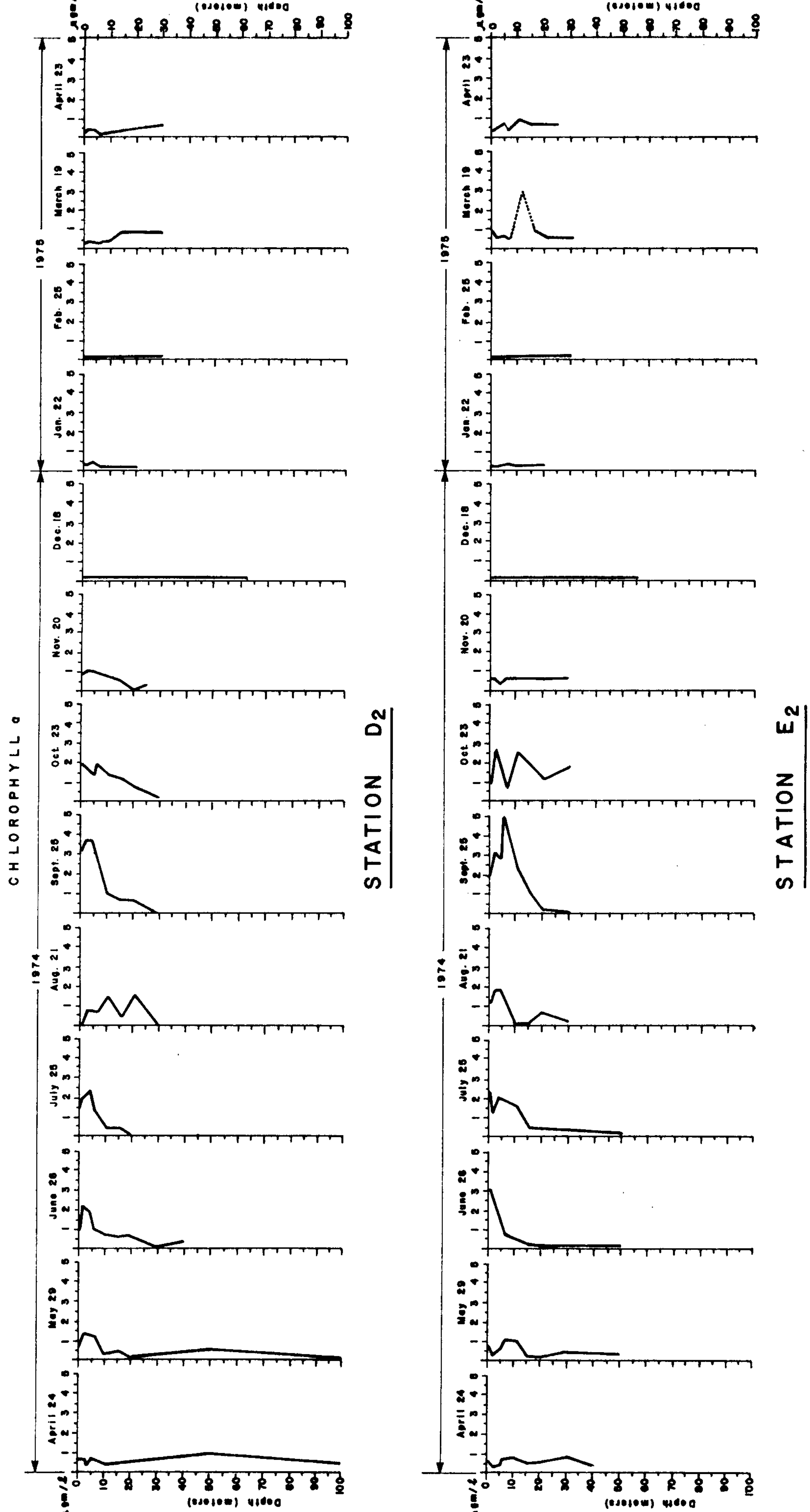
Stations B_2 and C_2

Stations G_2 and X_2

Stations D_2 and E_2


CHLOROPHYLL a
STATION B2
STATION C2
1974
1975
April 24
May 29
June 26
July 25
Aug. 21
Sept. 25
Oct. 23
Nov. 20
Dec. 18
Jan. 22
Feb. 25
March 19
April 23
μgm/ℓ
Depth (meters)


CHLOROPHYLL a
STATION G_2
STATION X_2
1974
1975
April 24
May 29
June 26
July 25
Aug. 21
Sept. 25
Oct. 23
Nov. 20
Dec. 18
Jan. 22
Feb. 25
March 19
April 23
Depth (meters)
µgm/ℓ


CHLOROPHYLL a
STATION D2
STATION E2
1974
1975
April 24
May 29
June 26
July 25
Aug. 21
Sept. 25
Oct. 23
Nov. 20
Dec. 18
Jan. 22
Feb. 25
March 19
April 23
Depth (meters)
mgm/ℓ

APPENDIX II

KAMLOOPS LAKE PHYTOPLANKTON FOR STATION G_2
SEPTEMBER, 1974. (/mℓ)

APPENDIX II KAMLOOPS LAKE PHYTOPLANKTON FOR STATION G_2, SEPTEMBER 25, 1974. (/mℓ)

Class	Depth (m)							
	0	2	4	6	10	15	20	30
Bacillariophyceae								
Tabellaria	1315	1604	1418	1418	998	1010	151	140
Fragilaria	285	273	347	337	214	277	65	40
Asterionella	210	111	163	170	135	99	71	44
Cymbella	-	-	-	-	4	-	16	16
Melosira	176	93	234	160	143	257	77	77
Achnanthes	12	4	4	-	8	12	97	107
Navicula	-	-	-	-	-	-	28	40
Synedra	4	28	4	24	8	36	28	8
Cyclotella	24	36	32	36	55	-	83	91
Gomphonema	-	4	-	-	4	4	4	20
Hannaea	-	-	-	-	-	-	-	4
Stephanodiscus	-	-	-	-	-	-	-	-
Nitzschia	-	-	-	-	-	-	8	4
Stauroneis	-	-	-	-	-	-	4	-
Disploneis	-	-	-	-	-	-	-	-
Mastogloia	-	-	-	-	-	-	-	-
Amphipleura	-	-	-	-	-	-	-	-
Cocconeis	-	-	-	-	-	-	-	-
Surirella	-	-	-	-	-	-	4	-
Diatoma	-	-	-	-	-	-	8	8
Neidium	-	-	-	-	-	-	-	-
Pinnularia	-	-	-	-	-	-	-	8
Chrysophyceae								
Dinobryon	-	16	4	16	-	4	16	12
Ceratium	-	-	-	-	-	-	-	-

continued....

Class	Depth (m)							
	0	2	4	6	10	15	20	30
continued...								
Chlorophyceae								
<u>Crucigenia</u>	-	-	-	-	-	32	-	-
<u>Onychonema</u>	-	-	-	-	-	-	-	-
Cyanophyceae								
<u>Borzia</u>	111	-	-	273	-	-	-	-
Dinophyceae								
Dinoflagellate	-	-	-	-	-	-	-	-

APPENDIX III

MEAN NUMBER OF PHYTOPLANKTON PER ML OF THE PHOTIC ZONE FROM APRIL, 1974, TO APRIL, 1975, FOR KAMLOOPS LAKE.

March 13, 1974	-	15 metres
April 24, 1974	-	15 metres
May 29, 1974	-	2 metres
June 26, 1974	-	2 metres
July 26, 1974	-	6 metres
August 21, 1974	-	10 metres
September 25, 1974	-	10 metres
October 23, 1974	-	10 metres
November 22, 1974	-	10 metres
December 18, 1974	-	10 metres
January 22, 1975	-	10 metres
February 25, 1975	-	10 metres
March 19, 1975	-	10 metres
April 24, 1975	-	6 metres

March 13, 1974

(15 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
<u>Tabellaria fenestrata</u>	223.3	212.1	151.6	147.9	81.9	131.0
<u>Fragilaria spp.</u>	12.8	13.2	3.3	7.2	4.3	29.7
<u>Asterionella spp.</u>	25.4	6.3	12.8	7.5	13.0	9.9
<u>Cymbella</u>	5.2	1.9	1.4	2.0	0.6	4.0
<u>Melosira italica</u>	5.5	21.1	14.7	7.7	4.0	48.0
<u>Achnanthes</u>	5.4	7.3	2.9	4.9	4.1	17.8
<u>Navicula</u>	3.8	2.3	2.4	1.4	1.7	28.7
<u>Synedra</u>	3.0	4.3	0.8	2.3	1.0	14.9
<u>Cyclotella spp.</u>	4.8	3.3	2.7	5.4	1.8	24.7
<u>Gomphonema</u>	1.5	1.1	0.5	2.2	0.3	15.9
<u>Hannaea</u>	2.4	1.9	1.2	0.6	-	5.9
Other Diatoms	11.6	8.7	6.1	7.4	6.6	22.8
Chrysophyceae	0.8	0.7	0.9	-	1.5	-
Chlorophyceae	2.4	1.4	1.8	30.3	2.4	-
Cyanophyceae	1.7	3.0	-	-	-	-
Dinophyceae	-	-	1.0	-	0.5	-

April 24, 1974

(15 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	402.7	865.2	392.4	276.3	224.1	244.4
Fragilaria spp.	13.2	47.5	18.7	7.3	8.3	5.6
Asterionella spp.	6.2	11.7	10.6	4.0	9.5	13.5
Cymbella	3.1	10.7	8.5	1.4	3.4	2.4
Melosira italica	17.3	21.7	37.7	18.6	39.3	48.5
Achnanthes	9.5	45.0	12.1	8.2	7.3	1.5
Navicula	3.0	6.4	3.6	1.5	4.0	0.8
Synedra	3.6	11.2	3.5	12.5	1.5	1.7
Cyclotella spp.	2.6	14.2	5.2	5.8	2.7	3.0
Gomphonema	2.1	9.6	7.9	4.9	2.5	0.3
Hannaea	3.0	8.7	1.2	4.3	2.6	0.9
Other Diatoms	12.9	45.7	12.5	7.6	6.4	5.3
Chrysophyceae	25.4	20.4	1.3	0.9	0.6	1.1
Chlorophyceae	4.9	9.9	2.1	3.2	6.6	8.9
Cyanophyceae	-	-	-	-	-	-
Dinophyceae	-	-	-	-	-	-

May 29, 1974

(2 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	193.3	585.1	436.6	897.0	1594.9	635.6
Fragilaria spp.	3.0	50.5	7.0	-	14.9	53.5
Asterionella spp.	11.9	9.9	12.9	8.0	22.8	13.9
Cymbella	1.0	4.5	0.0	-	2.0	3.0
Melosira italica	-	59.4	36.6	31.7	6.0	47.6
Achnanthes	-	9.9	7.9	7.9	4.0	-
Navicula	3.9	4.0	2.0	-	-	2.0
Synedra	3.0	3.0	5.9	8.9	4.0	3.0
Cyclotella spp.	7.2	17.3	5.5	5.0	7.9	-
Gomphonema	1.0	1.0	-	3.5	-	-
Hannaea	-	-	-	1.0	7.9	2.0
Other Diatoms	8.9	7.5	17.4	1.5	4.0	3.0
Chrysophyceae	2.0	11.9	21.8	17.9	2.0	-
Chlorophyceae	-	47.5	13.9	19.4	10.9	-
Cyanophyceae	-	-	-	-	-	-
Dinophyceae	-	-	-	-	-	-

June 26, 1974

(2 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	279.2	363.3	237.6	231.7	207.9	338.6
Fragilaria spp.	6.9	18.8	1.0	6.5	2.0	5.0
Asterionella spp.	9.9	12.9	8.9	13.9	-	-
Cymbella	4.5	2.0	-	1.0	-	1.0
Melosira italica	11.9	-	8.9	29.7	29.7	17.8
Achnanthes	2.0	20.8	6.0	8.4	7.9	11.9
Navicula	7.9	11.9	-	6.5	-	1.0
Synedra	13.9	5.5	6.0	6.9	11.9	6.0
Cyclotella spp.	8.9	27.3	16.8	30.7	45.1	31.7
Gomphonema	1.0	1.0	2.5	4.0	1.0	-
Hannaea	-	-	1.0	-	-	-
Other Diatoms	68.5	17.0	30.7	23.8	20.4	5.5
Chrysophyceae	108.9	105.0	100.0	87.1	128.7	72.3
Chlorophyceae	50.7	88.1	150.5	25.3	36.7	99.7
Cyanophyceae	-	-	-	-	-	-
Dinophyceae	-	-	-	-	-	-

July 26, 1974

(6 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	256.4	343.0	187.9	276.9	202.0	202.0
Fragilaria spp.	75.9	45.6	30.3	55.9	6.3	55.3
Asterionella spp.	72.6	23.8	58.5	56.4	46.7	35.0
Cymbella	6.3	2.8	8.1	1.3	0.8	2.3
Melosira italica	39.4	16.9	7.6	50.5	31.7	9.2
Achnanthes	11.2	9.7	11.6	0.7	5.9	7.3
Navicula	2.7	10.4	0.0	0.0	-	0.3
Synedra	20.3	27.7	23.5	32.4	17.8	12.9
Cyclotella spp.	111.7	106.9	135.0	122.0	91.7	81.0
Gomphonema	5.0	7.2	6.8	-	-	3.3
Hannaea	2.6	1.5	1.0	2.6	-	0.3
Other Diatoms	52.6	16.9	25.0	16.6	21.7	14.8
Chrysophyceae	21.5	21.3	22.8	44.9	24.5	49.9
Chlorophyceae	175.6	71.3	78.4	42.6	90.9	114.5
Cyanophyceae	-	2.0	-	-	-	-
Dinophyceae	-	-	-	-	-	-

August 21, 1974

(10 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	174.7	292.2	361.2	375.8	374.2	413.4
Fragilaria spp.	63.2	121.2	147.9	158.4	132.9	138.8
Asterionella spp.	3.0	15.9	26.1	26.1	19.0	46.4
Cymbella	7.4	6.0	2.4	6.4	0.8	1.6
Melosira italica	22.4	4.0	7.5	13.9	12.7	32.3
Achnanthes	25.5	20.6	59.8	46.3	22.2	19.4
Navicula	16.9	26.9	21.0	41.6	9.1	13.9
Synedra	15.0	5.2	8.3	8.7	7.5	19.8
Cyclotella spp.	91.4	219.4	386.1	507.7	325.1	480.0
Gomphonema	12.0	7.5	7.1	6.3	2.8	0.8
Hannaea	0.8	1.6	-	-	-	-
Other Diatoms	24.9	44.4	25.4	50.4	7.2	24.2
Chrysophyceae	10.4	-	1.2	0.8	-	-
Chlorophyceae	-	-	0.0	-	-	-
Cyanophyceae	21.3	-	7.1	4.0	-	-
Dinophyceae	-	-	0.0	-	-	-

September 25, 1974

(10 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	457.8	596.2	1360.7	876.8	1128.6	1129.2
Fragilaria spp.	177.8	134.9	296.2	175.4	295.6	254.8
Asterionella spp.	85.1	119.2	153.6	152.9	135.8	144.6
Cymbella	7.1	3.2	0.8	0.8	0.8	-
Melosira italica	75.9	130.9	159.8	156.6	121.4	121.6
Achnanthes	46.1	41.6	4.4	15.9	21.8	13.9
Navicula	15.8	16.2	-	3.2	11.9	3.6
Synedra	5.2	2.0	15.5	25.0	8.3	10.9
Cyclotella spp.	75.6	130.8	37.6	32.5	41.4	28.5
Gomphonema	5.2	3.6	1.6	0.8	2.4	2.0
Hannaea	1.6	2.0	-	-	0.8	-
Other Diatoms	24.2	8.4	-	3.2	2.4	2.0
Chrysophyceae	3.2	4.8	8.7	3.6	8.7	10.3
Chlorophyceae	-	-	-	-	-	2.4
Cyanophyceae	23.4	12.7	75.2	25.3	12.7	93.1
Dinophyceae	4.0	1.6	-	-	-	-

October 23, 1974

(10 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	238.0	240.2	221.8	308.5	276.4	314.0
Fragilaria spp.	119.8	94.7	136.2	161.4	88.9	141.0
Asterionella spp.	4.0	10.3	9.9	21.4	4.4	22.9
Cymbella	4.0	2.0	-	2.4	0.8	2.8
Melosira italica	915.6	747.2	946.8	1140.7	859.5	972.9
Achnanthes	25.0	36.4	25.0	45.4	17.0	17.4
Navicula	12.5	10.3	5.9	12.3	2.0	7.9
Synedra	13.9	8.7	14.6	17.0	21.4	12.7
Cyclotella spp.	40.0	38.4	19.4	36.0	25.0	36.4
Gomphonema	3.6	5.1	5.1	6.7	3.6	2.4
Hannaea	2.0	3.2	-	-	1.2	-
Other Diatoms	2.0	3.6	6.0	11.1	3.2	3.2
Chrysophyceae	-	2.0	-	1.2	-	0.8
Chlorophyceae	-	-	-	-	-	-
Cyanophyceae	-	-	-	-	-	-
Dinophyceae	-	-	-	-	-	-

November 22, 1974

(10 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	132.7	171.6	117.6	122.0	179.4	132.6
Fragilaria spp.	91.9	64.9	66.5	58.0	115.4	61.0
Asterionella spp.	5.5	16.6	21.8	12.3	19.8	11.1
Cymbella	5.6	4.0	1.6	10.7	3.2	0.8
Melosira italica	442.6	585.8	459.8	558.2	894.2	764.3
Achnanthes	53.9	43.6	39.2	77.6	42.8	35.2
Navicula	9.9	21.8	21.8	21.4	16.6	10.3
Synedra	10.3	6.7	13.9	17.4	13.1	7.1
Cyclotella spp.	23.0	17.0	37.6	53.9	56.2	32.1
Gomphonema	9.5	11.1	4.4	6.0	5.2	1.2
Hannaea	-	-	1.2	0.8	-	0.0
Other Diatoms	3.2	4.8	4.4	11.1	7.2	14.7
Chrysophyceae	0.8	1.2	-	-	-	0.8
Chlorophyceae	-	-	5.5	3.2	-	4.0
Cyanophyceae	-	-	-	-	-	-
Dinophyceae	-	-	-	-	-	-

December 18, 1974

(10 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	128.7	123.6	125.9	67.3	50.5	94.6
Fragilaria spp.	34.4	24.2	36.0	22.2	26.1	41.6
Asterionella spp.	7.9	9.5	7.1	9.9	4.4	8.3
Cymbella	8.3	5.6	12.3	7.5	2.4	5.9
Melosira italica	117.0	94.9	104.3	142.7	132.5	156.2
Achnanthes	70.5	50.7	20.2	29.3	22.6	38.4
Navicula	34.4	14.3	60.5	46.3	19.8	43.2
Synedra	11.5	13.1	6.8	4.8	13.5	6.7
Cyclotella spp.	19.4	28.5	20.2	9.1	11.9	26.1
Gomphonema	6.0	15.8	7.1	5.2	3.6	5.9
Hannaea	1.6	1.6	-	-	1.6	-
Other Diatoms	29.4	13.9	13.5	4.8	6.8	12.3
Chrysophyceae	-	-	-	-	-	-
Chlorophyceae	-	0.4	-	-	-	-
Cyanophyceae	-	-	-	-	-	-
Dinophyceae	-	-	-	-	-	-

January 22, 1975

(10 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
<u>Tabellaria fenestrata</u>	197.2	103.4	100.6	74.1	53.9	85.5
<u>Fragilaria spp.</u>	71.9	24.2	26.1	11.9	14.5	15.2
<u>Asterionella spp.</u>	5.6	-	7.1	1.6	9.5	5.5
<u>Cymbella</u>	10.3	8.7	2.0	7.5	7.1	3.6
<u>Melosira italica</u>	114.5	89.9	112.7	74.9	88.7	116.2
<u>Achnanthes</u>	92.3	46.3	29.7	55.5	32.1	42.8
<u>Navicula</u>	71.7	24.9	13.1	56.6	56.2	19.8
<u>Synedra</u>	10.3	4.4	5.9	2.4	5.6	4.8
<u>Cyclotella spp.</u>	57.8	21.0	12.3	23.8	19.0	13.9
<u>Gomphonema</u>	13.9	9.1	10.3	6.7	6.3	3.6
<u>Hannaea</u>	4.8	0.8	-	-	1.2	0.8
Other Diatoms	31.0	15.9	1.2	10.7	12.7	10.7
Chrysophyceae	-	-	-	0.8	2.0	-
Chlorophyceae	9.1	-	1.2	1.2	-	-
Cyanophyceae	-	-	-	-	-	-
Dinophyceae	-	-	-	-	-	-

February 25, 1975

(10 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	85.1	134.3	78.8	84.3	98.6	95.1
Fragilaria spp.	22.0	9.1	16.6	5.9	21.4	38.4
Asterionella spp.	2.0	0.8	5.2	7.5	2.0	0.8
Cymbella	3.6	10.3	4.0	5.6	6.7	4.8
Melosira italica	77.2	90.7	75.4	75.7	104.8	95.6
Achnanthes	45.6	61.4	39.2	34.8	31.7	43.1
Navicula	23.8	36.1	37.2	39.6	32.9	63.8
Synedra	4.8	14.6	7.5	6.7	8.3	7.5
Cyclotella spp.	15.1	19.8	18.6	20.2	19.0	32.1
Gomphonema	7.9	15.1	5.9	8.3	11.1	13.5
Hannaea	2.0	2.8	1.6	2.4	1.2	-
Other Diatoms	9.6	19.6	13.9	12.8	7.6	13.9
Chrysophyceae	-	-	1.2	0.8	-	0.8
Chlorophyceae	1.2	1.6	-	-	0.4	-
Cyanophyceae	-	-	-	-	-	-
Dinophyceae	-	-	-	-	-	-

March 19, 1975

(10 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	85.2	121.2	100.6	126.7	122.0	87.9
Fragilaria spp.	9.9	31.1	25.4	18.4	19.8	18.6
Asterionella spp.	8.3	22.6	4.8	2.0	10.7	4.4
Cymbella	3.2	10.3	9.5	5.6	5.6	4.8
Melosira italica	101.3	111.9	130.7	129.9	89.5	113.3
Achnanthes	33.3	54.7	40.4	24.2	19.4	24.6
Navicula	24.1	32.1	46.7	35.3	46.3	42.4
Synedra	4.4	9.1	6.7	1.6	4.8	5.6
Cyclotella spp.	13.5	21.0	19.0	19.0	13.9	17.0
Gomphonema	7.9	17.0	8.3	8.7	7.9	2.8
Hannaea	1.6	0.8	1.6	-	3.6	0.8
Other Diatoms	13.5	15.9	28.6	10.3	7.2	13.1
Chrysophyceae	-	-	-	0.8	-	-
Chlorophyceae	-	-	1.2	0.8	1.2	-
Cyanophyceae	-	-	-	-	-	-
Dinophyceae	-	-	-	-	-	-

April 24, 1975

(6 metres)

Class	Station					
	B_2	C_2	G_2	X_2	D_2	E_2
Bacillariophyceae						
Tabellaria fenestrata	105.6	143.9	124.8	153.8	117.5	131.3
Fragilaria spp.	23.4	8.6	31.0	37.6	22.4	12.5
Asterionella spp.	17.1	3.3	15.8	4.6	9.3	8.6
Cymbella	15.8	1.3	7.9	8.6	6.6	2.7
Melosira italica	143.2	142.3	138.3	201.0	189.7	219.4
Achnanthes	51.5	43.6	28.4	38.3	22.5	24.4
Navicula	48.2	17.2	15.8	29.7	40.9	16.5
Synedra	3.3	16.5	3.3	2.7	6.6	7.9
Cyclotella spp.	18.5	26.4	19.1	18.5	11.2	19.8
Gomphonema	15.2	4.6	6.6	7.3	7.3	1.3
Hannaea	1.3	-	2.0	1.3	0.7	-
Other Diatoms	19.8	13.3	16.6	11.3	18.6	8.7
Chrysophyceae	2.0	1.3	-	2.7	-	-
Chlorophyceae	-	-	-	-	0.7	1.3
Cyanophyceae	-	-	-	-	-	-
Dinophyceae	-	-	-	-	-	-

APPENDIX IV

ZOOPLANKTON WISCONSIN HAULS, KAMLOOPS LAKE, FROM 30.5 METRES IN DEPTH (NO./m^3). $\overline{x}$ = MEAN OF 3 SAMPLES MARCH/74 TO JUNE/74; MEAN OF 4 SAMPLES AFTER JUNE. sd = STANDARD DEVIATION. NO SAMPLES WERE TAKEN WITH #10 MESH NET AFTER JUNE, 1974.

STATION B_2

STATION C_2

STATION G_2

STATION X_2

STATION D_2

STATION E_2

STATION B_2

	Mesh Size	13/3/74 $\bar{x}$	13/3/74 sd	24/4/74 $\bar{x}$	24/4/74 sd	28/5/74 $\bar{x}$	28/5/74 sd	26/6/74 $\bar{x}$	26/6/74 sd	24/7/74 $\bar{x}$	24/7/74 sd	21/8/74 $\bar{x}$	21/8/74 sd	25/9/74 $\bar{x}$	25/9/74 sd	23/10/74 $\bar{x}$	23/10/74 sd	20/11/74 $\bar{x}$	20/11/74 sd	18/12/74 $\bar{x}$	18/12/74 sd	22/1/75 $\bar{x}$	22/1/75 sd	25/2/75 $\bar{x}$	25/2/75 sd	19/3/75 $\bar{x}$	19/3/75 sd	23/4/75 $\bar{x}$	23/4/75 sd
COPEPODA																													
Diaptomus ashlandi	20	3257	808	2271	503	1298	173	*	*	1515	214	4332	571	15850	1913	21701	1634	5759	674	1345	95	1856	163	1678	428	2272	84	3986	274
	10	*	*	2023	124	1719	244	1702	306																				
Cyclops biscupidatus thomasi	20	493	206	267	123	613	53	*	*	969	273	685	132	770	315	1754	181	1241	167	778	45	492	9	423	171	327	44	3789	277
	10	*	*	435	190	820	53	3271	745																				
Epischura nevadensis	20	-	-	-	-	-	-	*	*	-	-	177	47	171	126	471	35	43	18	27	14	-	-	-	-	-	-	-	-
	10	*	*	-	-	-	-	23	13																				
Other	20	-	-	-	-	-	-	*	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	*	*	2	-	-	-	-	-																				
CLADOCERA																													
Daphnia longispina	20	5	4	7	12	125	43	*	*	676	101	671	107	1102	222	2802	823	321	87	67	27	16	6	3	6	8	10	22	25
	10	*	*	5	6	182	49	1127	312																				
Bosmina longirostris	20	99	66	50	33	128	65	*	*	288	19	217	48	107	43	161	73	246	108	302	83	107	23	145	53	145	37	337	140
	10	*	*	64	24	150	43	510	130																				
Leptodora kindtii	20	-	-	-	-	-	-	*	*	13	7	-	-	-	-	43	60	-	-	-	-	-	-	-	-	-	-	-	-
	10	*	*	-	-	-	-	16	14																				
Holopedium gibberum	20	-	-	7	6	11	18	*	*	16	14	719	65	546	327	97	88	52	51	-	-	-	-	-	-	-	-	-	-
	10	*	*	5	6	29	16	151	8																				
ROTIFERA																													
Kellicottia longispina	20	-	-	7	12	18	6	*	*	165	81	11	22	118	73	193	128	727	120	399	47	329	124	262	98	172	45	1583	606
	10	*	*	-	-	14	16	613	162																				
Keratella sp.	20	71	33	18	22	4	6	*	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	*	*	-	-	-	-	-	-																				
Notholca sp.	20	-	-	157	146	4	6	*	*	-	-	-	-	-	-	-	-	481	197	345	55	3	6	-	-	11	22	209	81
	10	*	*	12	17	-	-	-	-																				
Asplanchna sp.	20	-	-	-	-	-	-	*	*	8	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	*	*	-	-	-	-	1825	442																				
Other	20	16	-	18	-	-	-	*	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	*	*	-	-	-	-	-	-																				
NAUPLIUS	20	2610	232	2656	690	2061	598	*	*	2654	865	1168	521	4481	965	5786	2695	8241	1266	7519	462	7968	346	6644	800	5338	644	17263	1351
	10	*	*	430	70	293	169	326	20																				
OTHER CLASSES	20	-	-	4	-	262	-	*	*	17	-	17	-	11	-	-	-	-	-			6	-	3	-	3	-	-	-
	10	*	*	4	-	78	-	7	-																				

* = sample lost

STATION C_2

	Mesh Size	13/3/74		24/4/74		28/5/74		26/6/74		24/7/74		21/8/74		25/9/74		23/10/74		20/11/74		18/12/74		22/1/75		25/2/75		19/3/75		23/4/75	
		$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd
COPEPODA																													
Diaptomus ashlandi	20	1537	987	3194	362	1871	102	2909	482	1324	191	6102	1144	11926	1680	5685	495	6503	968	845	105	2115	157	1774	148	2034	59	3404	479
	10	1901	213	2373	389	1985	494	2856	547																				
Cyclops biscupidatus thomasi	20	275	220	599	231	909	28	4200	420	845	324	776	145	578	281	727	190	1374	140	343	40	602	32	441	24	787	51	4843	1117
	10	393	111	362	81	1041	303	3701	413																				
Epischura nevadensis	20	-	-	-	-	-	-	21	22	11	5	391	111	171	35	75	41	86	25	8	16	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	68	49																				
Other	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-																				
CLADOCERA																													
Daphnia longispina	20	8	6	7	12	121	6	1155	128	599	131	829	147	1402	361	738	199	385	91	32	15	-	-	-	-	11	15	54	37
	10	16	8	19	3	107	92	1016	285																				
Bosmina longirostris	20	130	102	36	13	97	18	863	86	195	60	294	140	43	35	128	30	481	123	113	52	58	24	107	68	161	29	498	264
	10	165	26	59	14	104	16	716	225																				
Leptodora kindtii	20	-	-	-	-	-	-	22	21	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	18	12																				
Holopedium gibberum	20	-	-	-	-	28	13	193	22	28	18	1059	254	1401	383	80	48	75	28	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	18	6	129	49																				
ROTIFERA																													
Kellicottia longispina	20	27	18	42	18	624	171	8770	439	472	510	37	21	54	22	129	60	824	157	260	49	519	56	246	29	725	64	2151	497
	10	-	-	-	-	250	184	1630	578																				
Keratella sp.	20	96	39	200	154	-	-	-	-	16	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	6	5	11
	10	-	-	-	-	-	-	-	-																				
Notholca sp.	20	50	34	310	19	235	57	-	-	-	-	-	-	-	-	-	-	1219	646	241	111	94	38	-	-	110	46	246	168
	10	-	-	2	3	43	22	-	-																				
Asplanchna sp.	20	-	-	-	-	-	-	1376	62	8	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	1472	279																				
Other	20	8	-	18	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-																						
NAUPLIUS	20	3230	2150	4585	841	4310	279	9576	712	1921	186	1824	392	8460	1669	5048	213	7150	990	7491	706	8567	898	5568	328	9975	397	17701	1986
	10	100	47	909	263	403	54	178	106																				
OTHER CLASSES	20	2	3	7	12	76	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	3	6	-	-	11	12
	10	-	-	4	6	68	-	-	-																				

* = sample lost

STATION G_2

	Mesh Size	13/3/74		24/4/74		28/5/74		26/6/74		24/7/74		21/8/74		25/9/74		23/10/74		20/11/74		18/12/74		22/1/75		25/2/75		19/3/75		23/4/75	
		$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd
COPEPODA																													
Diaptomus ashlandi	20	3629	1389	3601	1011	2239	214	2552	457	561	58	1289	413	7698	225	4331	2636	3481	645	1457	273	2711	401	2026	237	2199	379	3254	503
	10	2742	75	2570	200	2381	472	2627	287																				
Cyclops biscupidatus thomasi	20	485	184	1975	496	1144	195	4456	179	795	45	695	53	727	60	778	195	1012	203	522	152	1014	178	757	135	825	207	1884	167
	10	527	41	1745	395	1289	424	4257	329																				
Epischura nevadensis	20	-	-	-	-	-	-	-	-	-	-	115	39	22	25	24	18	-	-	5	11	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	47	38																				
Other	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-																				
CLADOCERA																													
Daphnia longispina	20	25	34	29	25	214	54	677	325	188	47	660	55	2225	747	776	170	107	80	21	15	17	15	11	22	5	11	21	18
	10	21	18	21	28	330	181	941	288																				
Bosmina longirostris	20	143	104	57	65	300	167	599	128	164	26	313	106	107	55	59	48	161	41	118	58	423	124	391	122	150	39	128	72
	10	160	47	39	22	439	360	645	91																				
Leptodora kindtii	20	-	-	-	-	-	-	-	-	2	2	8	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	25	6																				
Holopedium gibberum	20	-	-	-	-	54	57	71	89	28	12	834	136	835	379	153	81	64	52	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	50	16	71	33																				
ROTIFERA																													
Kellicottia longispina	20	53	37	100	12	585	119	10515	1191	341	45	32	23	129	60	166	121	610	165	236	75	971	206	671	162	813	153	1263	261
	10	-	-	-	-	210	163	4278	442																				
Keratella sp.	20	430	184	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	11
	10	-	-	-	-	-	-	-	-																				
Notholca sp.	20	25	8	1155	210	28	33	-	-	-	-	-	-	-	-	-	-	1128	685	160	71	311	140	104	57	102	37	182	118
	10	-	-	-	-	11	18	-	-																				
Asplanchna sp.	20	-	-	-	-	-	-	2446	336	8	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	3120	323																				
Other	20	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-																				
NAUPLIUS	20	7437	3134	6930	1375	2488	616	7750	742	2441	342	1676	409	6941	907	3020	1278	8658	562	8174	1530	13177	964	8792	1099	10676	273	11238	167
	10	364	49	414	180	100	49	300	93																				
OTHER CLASSES	20	89	-	7	-	136	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	191	-	-	-																				

* = sample lost

STATION X_2

	Mesh Size	13/3/74 $\bar{x}$	13/3/74 sd	24/4/74 $\bar{x}$	24/4/74 sd	28/5/74 $\bar{x}$	28/5/74 sd	26/6/74 $\bar{x}$	26/6/74 sd	24/7/74 $\bar{x}$	24/7/74 sd	21/8/74 $\bar{x}$	21/8/74 sd	25/9/74 $\bar{x}$	25/9/74 sd
COPEPODA															
Diaptomus ashlandi	20	2798	1124	3446	673	2186	271	1383	592	486	66	875	53	1528	620
	10	2978	71	2875	188	2581	166	1515	220						
Cyclops biscupidatus thomasi	20	404	207	1031	331	1476	75	2361	159	768	83	443	66	530	136
	10	584	103	418	213	1644	281	2474	142						
Epischura nevadensis	20	-	-	-	-	-	-	28	13	3	3	39	12	17	19
	10	-	-	-	-	-	-	28	6						
Other	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-						
CLADOCERA															
Daphnia longispina	20	36	35	7	12	160	29	298	43	190	11	384	81	673	194
	10	18	12	32	19	271	34	467	65						
Bosmina longirostris	20	242	75	146	63	107	11	453	134	143	30	257	47	92	40
	10	220	171	82	24	189	89	542	135						
Leptodora kindtii	20	-	-	-	-	4	6	-	-	5	11	-	-	3	6
	10	-	-	-	-	7	6	8	5						
Holopedium gibberum	20	-	-	-	-	75	22	43	38	48	14	352	66	860	70
	10	-	-	-	-	214	280	32	0						
ROTIFERA															
Kellicottia longispina	20	103	45	136	41	1091	368	5358	219	96	45	23	13	16	32
	10	4	6	-	-	271	284	2039	277						
Keratella sp.	20	1159	252	642	93	-	-	-	-	-	-	-	-	-	-
	10	4	6	-	-	-	-	-	-						
Notholca sp.	20			228	35	371	112	-	-	-	-	-	-	-	-
	10			7	6	68	33	-	-						
Asplanchna sp.	20			-	-	-	-	1651	105	4	8	-	-	-	-
	10			-	-	-	-	1929	146						
Other	20	190	-	25	-	-	-	-	-	-	-	-	-	-	-
	10	7	-	-	-	-	-	-	-						
NAUPLIUS	20	6506	5185	6157	352	214	57	4971	815	1585	286	1296	93	4325	2605
	10	186	182	1940	258	228	59	107	47						
OTHER CLASSES	20	-	-	11	-	221	-	-	-	1	-	-	-	-	-
	10	-	-	-	-	268	-	-	-						

	Mesh Size	23/10/74 $\bar{x}$	23/10/74 sd	20/11/74 $\bar{x}$	20/11/74 sd	18/12/74 $\bar{x}$	18/12/74 sd	22/1/75 $\bar{x}$	22/1/75 sd	25/2/75 $\bar{x}$	25/2/75 sd	19/3/75 $\bar{x}$	19/3/75 sd	23/4/75 $\bar{x}$	23/4/75 sd
COPEPODA															
Diaptomus ashlandi	20	821	32	3257	415	2113	259	2973	227	1753	276	2403	502	2777	267
Cyclops biscupidatus thomasi	20	402	109	610	211	682	147	952	201	936	160	967	212	1199	230
Epischura nevadensis	20	8	7	-	-	3	6	-	-	-	-	-	-	-	-
Other	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLADOCERA															
Daphnia longispina	20	259	29	59	32	26	6	21	18	5	11	5	11	-	-
Bosmina longirostris	20	86	25	80	81	206	37	257	97	335	181	326	93	118	57
Leptodora kindtii	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holopedium gibberum	20	497	46	64	63	-	-	-	-	-	-	-	-	-	-
ROTIFERA															
Kellicottia longispina	20	91	49	257	109	286	107	1150	342	1100	129	1033	231	1156	252
Keratella sp.	20	-	-	-	-	-	-	-	-	5	11	5	11	5	11
Notholca sp.	20	-	-	893	155	214	174	193	52	147	28	102	20	134	54
Asplanchna sp.	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NAUPLIUS	20	2651	207	7085	2435	7960	548	11968	243	9833	422	14304	461	8614	805
OTHER CLASSES	20	-	-	-	-	-	-	5	11	-	-	-	-	-	-

* = sample lost

STATION D_2

	Mesh Size	13/3/74 x̄	13/3/74 sd	24/4/74 x̄	24/4/74 sd	28/5/74 x̄	28/5/74 sd	26/6/74 x̄	26/6/74 sd	24/7/74 x̄	24/7/74 sd	21/8/74 x̄	21/8/74 sd	25/9/74 x̄	25/9/74 sd	23/10/74 x̄	23/10/74 sd	20/11/74 x̄	20/11/74 sd	18/12/74 x̄	18/12/74 sd	22/1/75 x̄	22/1/75 sd	25/2/75 x̄	25/2/75 sd	19/3/75 x̄	19/3/75 sd	23/4/75 x̄	23/4/75 sd
COPEPODA																													
Diaptomus ashlandi	20	2893	831	2018	215	1968	363	950	96	703	97	1392	125	2078	173	1244	161	4150	720	1859	305	1586	245	1456	257	2488	290	3564	396
	10	2442	22	1661	293	2086	264	1488	298																				
Cyclops biscupidatus thomasi	20	326	63	2945	506	952	167	1390	177	834	177	734	92	711	45	665	215	1364	196	490	135	436	142	918	167	1124	81	1332	207
	10	271	43	3030	499	920	211	1758	43																				
Epischura nevadensis	20	-	-	-	-	-	-	-	-	3	3	60	25	8	10	4	6	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	5	6																				
Other	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-																				
CLADOCERA																													
Daphnia longispina	20	16	5	46	27	32	45	458	122	281	61	352	85	1428	307	542	165	129	63	24	6	8	10	5	11	8	10	43	39
	10	10	9	25	27	42	22	512	76																				
Bosmina longirostris	20	118	38	246	91	268	136	354	32	222	77	308	69	78	20	80	14	123	11	150	38	390	62	265	143	287	167	43	46
	10	103	28	303	127	114	12	421	75																				
Leptodora kindtii	20	-	-	-	-	-	-	-	-	5	8	1	3	3	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-																				
Heolopedium gibberum	20	-	-	-	-	54	15	7	6	11	12	177	18	711	80	290	115	187	36	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	36	13																				
ROTIFERA																													
Kellicottia longispina	20	37	6	14	25	203	136	4020	1089	150	121	30	39	38	28	25	8	177	21	123	26	361	84	1672	418	1480	359	744	158
	10	-	-	-	-	396	92	1104	263																				
Keratella sp.	20	196	69	-	-	-	-	75	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	11	43	35
	10	-	-	-	-	-	-	-	-																				
Notholca sp.	20	48	28	278	482	834	242	-	-	-	-	-	-	-	-	-	-	460	245	61	40	69	63	145	11	166	192	139	45
	10	-	-	-	-	168	91	-	-																				
Asplanchna sp.	20	-	-	-	-	-	-	1561	289	7	7	-	-	-	-	-	-	-	-	-	-	3	6	-	-	-	-	-	-
	10	-	-	-	-	-	-	1656	81																				
Other	20	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10					-	-	-	-																				
NAUPLIUS	20	7550	2150	3533	2207	5200	59	4498	543	2101	637	1615	310	3326	962	2356	565	8396	1730	6637	611	7889	383	15227	1127	13581	2258	7904	1028
	10	442	30	207	103	738	436	160	141																				
OTHER CLASSES	20	5	-	-	-	75	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	5	11	-	-	-	-	1	1
	10	-	-	-	-	107	-	-	-																				

* = sample lost

STATION E_2

	Mesh Size	13/3/74		24/4/74		28/5/74		26/6/74		24/7/74		21/8/74		25/9 /74		23/10/74		20/11/74		18/12/74		22/1/75		25/2/75		19/3/75		23/4/75	
		$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd
COPEPODA																													
Diaptomus ashlandi	20	2722	255	1904	656	1512	532	1811	348	523	86	689	124	4530	218	587	52	4187	765	2000	265	1305	179	1124	101	1857	70	3393	90
	10	2577	247	*	*	2453	409	1492	368																				
Cyclops biscupidatus thomasi	20	560	145	748	130	685	154	1918	157	811	63	630	46	599	255	405	69	1278	169	558	102	348	135	1070	257	712	27	1429	188
	10	601	137	*	*	854	422	1731	357																				
Epischura nevadensis	20	-	-	-	-	-	-	14	12	-	-	29	10	59	64	9	5	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	*	*	-	-	9	3																				
Other	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	*	*	-	-	-	-																				
CLADOCERA																													
Daphnia longispina	20	18	16	7	6	-	-	385	119	211	18	122	32	1401	460	187	23	102	56	40	10	5	11	16	21	4	7	27	11
	10	16	14	*	*	-	-	508	112																				
Bosmina longirostris	20	148	112	50	25	114	89	485	108	202	39	302	72	75	28	46	14	396	65	238	67	153	53	835	246	337	197	86	25
	10	164	45	*	*	164	81	388	204																				
Leptodora kindtii	20	-	-	-	-	-	-	7	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	*	*	-	-	7	12																				
Holopedium gibberum	20	-	-	4	6	-	-	-	-	1	3	21	14	663	74	142	23	113	59	-	-	-	-	-	-	-	-	-	-
	10	-	-	*	*	-	-	7	12																				
ROTIFERA																													
Kellicottia longispina	20	46	3	-	-	-	-	6039	873	49	29	19	13	64	18	72	31	551	37	83	51	278	57	2365	537	963	120	487	128
	10	-	-	*	*	-	-	2394	341																				
Keratella sp.	20	444	366	4	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
	10	-	-	*	*	-	-	7	12																				
Notholca sp.	20	41	12	46	80	214	196	-	-	-	-	-	-	-	-	-	-	551	37	54	20	5	11	101	71	-	-	11	22
	10	-	-	*	*	221	197	-	-																				
Asplanchna sp.	20	-	-	-	-	-	-	1276	381	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	145	83	118	75
	10	-	-	*	*	-	-	1499	97																				
Other	20	20	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	*	*	-	-	-	-																				
NAUPLIUS	20	8952	2248	4592	1412	7051	5096	5012	703	1577	305	1358	336	4893	1119	2573	161	7669	1523	6952	564	7327	290	12630	1141	11799	446	8530	884
	10	768	312	*	*	1471	358	189	31																				
OTHER CLASSES	20	41	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	11	5	11	-	-	-	-
	10	-	-	*	*	11	-	-	-																				

* = sample lost