Final Report

Assessment of Plankton Resources and Their Environmental Interactions in Biscayne Bay, Florida

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This study constitutes an integral part of the Biscayne Bay Restoration and Enhancement Program. It is the primary goal of the Program to maintain, restore or enhance those qualities of Biscayne Bay that provide the basic character and value of the resource. One of the objectives set forth to effect the realization of this goal includes the completion of specific baseline studies.

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INTRODUCTION

Biscayne Bay is a rather unique environment in the United States, a subtropical lagoon next to a large metropolis. Biologically, it provides a habitat to both temperate and tropical species, to estuarine, coastal and even occasional oceanic species. This unique and diverse community provides an important resource for both recreational and commercial fisheries. Being situated next to Miami, however, the Biscayne Bay ecosystem has been affected by substantial anthropogenic impacts during the twentieth century. The recent history of Biscayne Bay and documentation of its environmental deterioration has been given in detail by Chardon (1976), Michel (1976), Wanless (1976) and Thorhaug et al. (1976) and need not be repeated here. Public officials have recognized the importance of Biscayne Bay to the people of the region and are attempting to manage this ecosystem and the human impacts upon it in a rational manner. A better knowledge and understanding of the phytoplankton and zooplankton (the base of the food chain) of Biscayne Bay should aid in developing rational management plans for the bay.

Surprisingly little is known about the plankton of Biscayne Bay. A few studies (Reeve 1964, 1970, 1975; Roman, et al., 1983) have examined the zooplankton, but apparently no one has examined the phytoplankton community in detail. Reported here is a comprehensive study, both qualitative and quantitative, of the phytoplankton and zooplankton of Biscayne Bay, their spatial and seasonal distribution, and their role in the overall ecosystem of the bay. This study examined not only the planktonic plants and animals that serve as food for the animals of recreational and commercial value, but also the larval stages of the shrimp, crabs, and fish of importance. The abundance of these larval stages is critically important to the abundance of the adult populations on the bottom or in the water column (Levinton, 1982).

METHODS

Plankton resources of the bay were assessed at 24 stations distributed throughout the bay (Figure 1), covering the entire range of environmental conditions found in Biscayne Bay. The correspondence between these stations and those used by DERM is shown in Table 1. These samples were taken monthly for a year (from March 1986 to February 1987) to cover the entire seasonal range experienced in the bay. The standing stock biomass of both phytoplankton and zooplankton were measured. Community composition was assessed using size fractionation and identification of the major phylogenetic groups. Primary productivity and photosynthetic capacity of the water column plankton was measured and experiments were conducted to determine which nutrients are in excess in the bay and which are potentially limiting to the plankton community.

Sampling

The sampling plan was designed to cover the entire seasonal cycle and sample the variety of habitats and basins found throughout the geographic range of Biscayne Bay.

Once a month, 12 samples were taken in north Biscayne Bay, and on another day (usually the following day), 12 samples were taken in south Biscayne Bay. At each station, 4 liters of water were collected by submerging 4 liter bottles one half meter below the surface. One half meter diameter 280 micron and 5 inch diameter 64 micron mesh zooplankton nets were towed at 2 knots for 5 minutes and the cod ends emptied into 1 liter and

100 ml polyethylene jars, respectively. All samples were kept in large insulated chests and transported to the laboratory within a few hours for processing.

Phytoplankton biomass and size distribution

Phytoplankton biomass and size distribution was measured monthly at all stations in Biscayne Bay. To measure total chlorophyll concentration, three 100 milliliter replicates of sample water with 1 milligram magnesium carbonate added was filtered onto GF/C glass fiber filters. Another 500 milliliters of sample water was size fractionated by first passing through 64 micron Nitex netting, then through a 5 micron Nucleopore filter, and then through a GF/C glass fiber filter. The 64 micron netting was backwashed onto a GF/C glass fiber filter. Each of the samples (total chlorophyll, greater than 64 micron fraction, 64 to 5 micron fraction, and less than 5 micron fraction) was extracted for 30 minutes with 10 milliliters of dimethyl sulfoxide in complete darkness. Then 10 milliliters of 90% acetone was added and the extracts were stored in complete darkness for one hour for further chemical extraction and then measured in a calibrated Turner 10-000R fluorometer equipped with an infrared-sensitive photomultiplier. Two drops of 5% hydrochloric acid were added to each 20 milliliter sample, and after thirty seconds, fluorescence measured once again. Total chlorophyll, the chlorophyll size fractions, and phaeopigments were calculated using the equations of Parsons et al. (1984). The fluorometer was calibrated with pure chlorophyll. The methods used are derived from Parsons et al. (1984) and Burnison (1980).

Phytoplankton community composition

Samples for determination of the phytoplankton community composition were taken monthly at each of the 24 stations, but only samples from alternate months at every other station were analyzed to reduce expense. Unanalyzed samples were stored. Two 100 milliliter samples at each station were preserved, one with five drops' of Lugol's solution and one with 5 milliliters of sodium tetraborate buffered formalin. These two preservatives complement each other in that they preserve different parts of the phytoplankton community. This is necessary because there is no universal preservative for phytoplankton (Holmes et al, 1969; Guillard, 1973). Both types of preserved samples were placed in a settling chamber for 24 hours and examined under a Wild inverted compound microscope. The major phylogenetic groups (centric diatoms, pennate diatoms, dinoflagellates, coccolithophores, cyanobacteria, flagellates and coccoids) were identified.

Photosynthetic capacity

The fraction of light absorbed by phytoplankton that is used for photosynthesis is a good indicator of general "health" and growth rate of the phytoplankton (Samuelsson and Oquist, 1977; Samuelsson et al, 1978; Cullen and Renger, 1979). As such, it can be used in a general way to detect poor health as a result of such factors as pollutants, nutrient limitation and adverse temperatures. It was analyzed by measuring in vivo chlorophyll fluorescence of phytoplankton before and after the blockage of the photosynthetic electron transport system with

DCMU (3-3,4-dichlorophenyl-1, 1-dimethylurea) and expressed as photosynthetic capacity.

The photosynthetic capacity of the phytoplankton was measured monthly at 24 stations. The in vivo chlorophyll fluorescence of the community in three replicate samples was measured in a Turner 10-000R fluorometer. Then DCMU was added to the sample to a final concentration of 10^{-5} M to block the photosynthetic electron transport chain between photosystems I and II. After blockage, the DCMU enhanced chlorophyll fluorescence was measured and photosynthetic capacity was calculated according to the equations of Cullen and Renger (1979).

Primary Productivity

Primary productivity of the phytoplankton was measured by the ^{14}C fixation method at every other station bimonthly. 400 milliliter water samples were split four ways. Each 100 milliliter sample was incubated for four hours in polycarbonate bottles with one microcurie $Na^{14}CO2$. The four samples were incubated at ambient temperature at 0.3 ly/min, 0.1 ly/min, 0.03 ly/min, and in total darkness. After four hours, the samples were filtered onto 0.6 micron Millipore filters. These filters were exposed to hydrochloric acid fumes for two minutes to remove inorganic calcium carbonate and then placed in scintillation vials with 10 milliliters of Aquasol. Disintegrations per minute were then counted in a liquid scintillation counter and the relationship between light intensity and photosynthetic rate determined.

Nutrient bioassays

In order to determine which nutrients were limiting the growth and biomass of phytoplankton in Biscayne Bay, one liter of sample water was collected in acid cleaned polycarbonate bottles bimonthly at every other station and prefiltered with 200 micron mesh. This was split into 20 milliliter samples in polycarbonate test tubes. The potentially limiting nutrients considered were nitrogen, phosphorus, silicon, iron, zinc, and manganese. Added to three replicate test tubes were different nutrient combinations –- either each nutrient alone or all but one of the nutrients. Added to all test tubes were 10^{-9} M cobalt, 10^{-9} M biotin, 10^{-8} M vitamin B_{12}, and 10^{-7} M thiamine. Added to some test tubes were 10^{-4} M nitrate, 10^{-5} M phosphate, 10^{-4} M silicate, 10^{-6} M iron, 10^{-8} M zinc and 10^{-8} M manganese. These were incubated at ambient temperature and 0.1 ly/min. Growth of the phytoplankton was monitored daily by *in vivo* chlorophyll fluorescence measurements using the method of Brand *et al*. (1981). The relative importance of the different nutrients to the Biscayne Bay ecosystem was determined from an evaluation of these experiments.

Zooplankton biomass

Zooplankton comprise a large percentage of food used by the larvae of shrimp, crabs, and fish in Biscayne Bay. Their abundances were estimated with five minute tows with a 280 micron mesh half meter plankton net with a flow meter nested inside, and with a 64 micron mesh net, taken monthly at each station. The large net sample was split into 4 samples. One sample was settled for 24 hours in a graduated centrifuge tube to determine wet volume of the plankton. A second sample was filtered onto a preweighed GF/A glass fiber filter, rinsed with 6% ammonium formate and dried in an oven at 70 C. Ash free dry weight was determined by weighing the sample, ashing at 500 C and then weighing again (Omori and Ikeda, 1984).

The third and fourth replicate samples from the 280 micron net were preserved with 5% formalin buffered with sodium tetraborate and 1% propylene phenoxytol in glass jars. Bimonthly samples from every other station were examined under a Wild dissecting microscope and the major phylogenetic and ontogenetic groups quantified.

Microzooplankton samples from the 64 micron mesh net were preserved with 5% formalin buffered with sodium tetraborate. Bimonthly samples from every other station were placed in a settling chamber for 24 hours and then examined under a Wild inverted compound microscope for the identification of major groups of microzooplankton. Unanalyzed samples were stored.

RESULTS

In addition to presenting the data at individual stations, the average of the stations within types of water bodies are: I small northern basins (stations 1, 2, and 3), II northern canal mouths (stations 5, 7, and 10), III southern canal mouths (stations 13, 15, 20, and 21), IV northern open water (stations 4, 6, 8, 9, 11, and 12) and V southern open water (stations 14, 16, 17, 18, 19, 22, 23, and 24).

Temperature

The temperatures measured at each of the 24 stations each month are given in Table 2. They indicate that the entire bay is roughly the same temperature at any given time. Large thermal gradients do not exist in Biscayne Bay. The temperatures of all 24 stations were averaged and the overall seasonal change by month is shown in Figure 2. In nine months out of the year (April to December) the bay is quite warm, ranging from 25 to 31 degrees. In January, February and March, the temperatures were between 19 and 21 degrees. These wintertime temperatures are higher than what are normally seen in the winter in Biscayne Bay, based on data from 1971 to 1985 (Dr. John Wang, personal communication).

Salinity

The salinities measured at each of the stations each month are given in Table 3. Figure 3 shows the yearly salinity average for each of the open water stations (canal mouths are excluded) and Figure 4 shows a map of the yearly salinity average throughout the bay. They show that the salinity of northern Biscayne Bay is always a few parts per thousand lower than in southern Biscayne Bay. The difference is larger during the summer wet season than during the winter dry season, as illustrated in Figure 5. Figure 5 shows the average salinity of each of the five water body types by month. The small basins north of Broad Causeway (stations 1, 2 and 3) have similar temporal patterns (Figure 6), with Dumfoundling Bay (station 1) showing the strongest fluctuation.

Canal mouths have strong fluctuations in salinity, but do so independently (Figures 7 and 8). This is probably the result of the independent opening and closing of the different canal locks. Therefore, rainfall data alone do not predict salinities at the mouths of the canals that empty into Biscayne Bay. Overall salinity was reasonably constant in the open waters with the exception of a small decline in July when the watershed received a particularly large amount of rainfall. The small northern basins and the canal mouths are more variable and also show an overall decline in salinity in July, August, and September as a result of the rainy season.

Phytoplankton biomass

Total chlorophyll concentrations, as a measure of phytoplankton biomass, at each station each month are given in Table 4. A map of the average yearly chlorophyll concentrations throughout the bay is shown in Figure 9. Chlorophyll concentrations are uniformly low (around 0.2 micrograms per liter) in the open waters in southern Biscayne Bay both spatially (Figure 10) and temporally (Figure 11). Open water in the northern bay has higher chlorophyll concentrations (Figure 10) and shows more sporadic fluctuations. The small basins north of Broad Causeway (stations 1,2 and 3) generally have the highest average chlorophyll concentrations in the bay (Figure 11), with Dumfoundling Bay (station 1) showing the largest fluctuations over time (Figure 12). Canal mouths also have chlorophyll concentrations higher than the open water (Figure 11). Each canal mouth fluctuates independently of the others (Figures 13 and 14). An overall decline in chlorophyll concentrations from April to the following February is observed throughout the bay except for open water in the south, which has low phytoplankton biomass levels throughout the year (Figure 11). The lack of a downward trend in the southern open water data indicates that there is not a long-term problem with the methods and that the overall decline is real. Two possible explanations seem most plausible. One is that this is part of the natural seasonal cycle. Note that the initial March samples are low in chlorophyll, similar to the concentrations observed in the following February.

Thus we may be observing a spring bloom of phytoplankton in April and a long term decline afterward. One possible reason for this seasonal pattern in chlorophyll is a seasonal buildup and flushing of nutrients in the groundwater of Miami adjacent to Biscayne Bay (Dr. Brian Lapointe, personal communication). He has hypothesized that nutrient concentrations build up in the groundwater during the winter when there is very little rainfall and flushing. The first spring rains then flush this nutrient rich water into the adjacent marine waters, generating large phytoplankton blooms. Once the high concentrations of nutrients have been flushed out of the groundwater system, subsequent rainfalls during the summer and fall carry less nutrients into the local waters than the first major rainstorm of the rainy season. This may explain the large phytoplankton bloom in April when there was a significant decline in salinity as a result of a large amount of rainfall and the subsequent long term decline throughout the rest of the year. Alternatively, another hypothesis is that the initial March chlorophyll data are unusually low and we are observing part of a long-term decline in phytoplankton biomass in the bay. If this is the case, this may be evidence that the efforts to reduce nutrient inputs to the bay are succeeding. Unfortunately, we cannot test between the two hypotheses with only one year of data.

Figures 15, 16, 17, 18 and 19 for each of the types of water bodies show that the higher chlorophyll concentrations are always associated with lower salinities. This suggests that runoff from land is the major source of nutrients that generate phytoplankton blooms in the bay. Although high chlorophyll concentrations are always associated with low salinity, low salinity water does not always have high chlorophyll concentrations. This indicates that freshwater runoff is probably the only major source of nutrients for the phytoplankton, but variable salinity can cause osmotic problems for some phytoplankton and inhibit blooms. This can be clearly seen in comparing the chlorophyll-salinity relationship between the basins north of Broad Causeway (Figure 15) and the canal mouths in the southern bay (Figure 17). That low salinity always generates high phytoplankton biomass in the basins north of Broad Causeway (Figure 15) is probably the result of the fact that salinities are persistently low in these waters and do not fluctuate very rapidly (Figure 6). Indigenous populations adapted to low salinities can be maintained in these small basins. On the other hand, at the canal mouths in the southern bay where salinity fluctuates dramatically (Figure 8), phytoplankton biomass never develops to high concentrations in salinities below 20 parts per thousand. This suggests that the phytoplankton in the south bay where salinities are generally higher are unable to adapt to the sudden drops in salinities at the canal mouths.

The spatial and temporal patterns of phaeopigments, the degradation products of chlorophyll, are very similar to those seen in chlorophyll distributions. The phaeopigment concentrations at each station each month are given in Table 5. Figure 20 shows the yearly average of phaeopigment concentrations at each of the open water stations (canal mouths excluded). Phaeopigments are uniformly low in the south bay and increase toward the north starting near the Rickenbacker Causeway. Figure 21 shows the average phaeopigment concentrations in each type of water body by month. Virtually no seasonal change in phaeopigment change is observed in the open waters of the south bay. All other types of water bodies show sporadic variability (although less than observed in chlorophyll concentrations) and a long-term decline as was seen in chlorophyll concentrations.

The ratio of chlorophyll to phaeopigments is a good indicator of the physiological health of phytoplankton populations and the grazing pressures on them. These ratios at each station each month are given in Table 6. Figure 22 shows that the ratio is consistently somewhat lower in the open waters of the south bay than in the north. This is most likely the result of stronger nutrient limitation in the south bay. The canal mouths and waters in the northern part of the bay have somewhat higher chlorophyll to phaeopigment ratios, but there is no obvious pattern among them (Figure 23). Figure 23 also shows no obvious seasonal trend in the chlorophyll to phaeopigment ratio. As a high chlorophyll to phaeopigments ratio indicates healthy, more actively growing phytoplankton, plots showing the generally positive relationship between the chlorophyll to phaeopigment ratios and total chlorophyll concentrations (Figures 24, 25, 26, 27 and 28) indicate that the high biomass and chlorophyll concentrations are the result of more active growth. Tables 7, 8, and 9 give the percentage of chlorophyll contained in particles less than 5 microns, between 5 and 60 microns, and over 60 microns in size, respectively. Figure 29 shows the yearly average for each of the open water stations of the percentages of the three size fractions of phytoplankton biomass measured as chlorophyll. Phytoplankton less than 5 microns in size are dominant throughout the bay. They are about 60% of the phytoplankton biomass in the northern part of the bay and around 80% in the southern part. Cells this small cannot be identified taxonomically without the use of an electron microscope. Typically, however, in marine waters the small cells are predominantly cyanobacteria, cryptophytes, eustigmatophytes, prasinophytes and prymnesiophytes. Phytoplankton larger than 60 microns are uniformly low throughout the bay, contributing about 10% of the biomass, while phytoplankton between 5 and 60 microns in size increase from 10% in the south to 30% in the north (Figure 29). Larger size fractions of phytoplankton also tend to be more important in the canal mouths (Figures 30, 31 and 32). In general, it appears that larger phytoplankton are more prevalent where phytoplankton biomass is higher and where nutrient concentrations are presumed to be higher. This reflects the fact that smaller phytoplankton are generally better adapted for low nutrient concentrations (Parsons and Takahashi, 1973). Smaller phytoplankton generally support longer food chains, resulting in much less fish production as a result of compounded trophic loss (Ryther, 1969). Over the course of the year, there appears to be a small shift toward smaller phytoplankton (Figures 30, 31 and 32). This trend corresponds with the observed overall decline in chlorophyll throughout the year (Figure 11).

Photosynthetic capacity

Table 10 gives the DCMU enhanced chlorophyll fluorescence measured at each station each month. Figures 33, 34, 35, 36 and 37 show the excellent relationship between DCMU enhanced chlorophyll fluorescence and total chlorophyll concentration measured by extraction. This indicates that the electron transport system was totally blocked by the method using DCMU and allows the enhanced fluorescence to be used as a good indicator of phytoplankton biomass. Yearly averages of the DCMU enhanced chlorophyll fluorescence at each of the open water stations (Figure 38) show the same pattern as seen earlier in chlorophyll concentrations, uniformly low levels in the south and much higher levels in the north. Figure 39 shows the seasonal trend in DCMU-enhanced chlorophyll fluorescence and the differences between the different types of water. As with chlorophyll, one observes an overall decline through the year and higher levels in canal mouths and in the north than in the south.

Photosynthetic capacity is the efficiency with which solar energy is being channeled into the photosynthetic electron transport chain for the production of organic carbon and not being wasted as fluorescence of energy back into the environment. Higher photosynthetic capacity indicates more efficient use of solar energy. Table 11 gives the photosynthetic capacity measured at each station each month. Figure 40 shows the yearly average of photosynthetic capacity at each of the open water stations. Phytoplankton populations in the north clearly have higher photosynthetic capacities than those in the south, presumably as a result of more nutrients in the north. Figure 41 shows the seasonal change in photosynthetic capacity for each of the types of water bodies. An overall decline through the year is observed, similar to the decline observed in chlorophyll. As with chlorophyll, this decline may be attributed to a reduction in nutrient flux into the bay. Figures 42, 43 and 44 show that photosynthetic capacity tends to be lower at lower salinities. That this occurs in environments with higher than normal levels of nutrients is probably an indication of osmotic stress.

Primary Productivity

Rates of photosynthesis measured every other month at three different light intensities with phytoplankton communities from 12 stations are shown in Table 12. Figures 45 and 46 shows the yearly average at the highest light intensity at each station and throughout the bay, indicating that planktonic primary productivity is about five to eight times higher in the north bay than in the south bay. To a large extent, this is the result of the much higher phytoplankton biomass in the north bay present to intercept the light. Figure 47 shows the seasonal change in maximum primary productivity in north and south bay. The seasonality in rates of primary productivity follows the seasonality in light intensity quite well, with the exception of somewhat higher rates in the north bay in April as a result of a particularly large phytoplankton bloom in the north bay at that time. The maximum assimilation numbers also reflect the seasonal change in light intensity quite well (Table 13, Figure 4s). The assimilation number is the maximum rate of photosynthesis that can be carried out with a given amount of chlorophyll. Phytoplankton adapted to higher light intensities have higher rates of photosynthesis per unit chlorophyll. Figure 49 shows the yearly average assimilation number at each station. The lower assimilation numbers in the north bay are probably the result of more light limitation in the north bay as a result of more resuspended sediments and higher chlorophyll concentrations per liter in the north. Indeed, lower assimilation numbers are generally associated with higher chlorophyll concentrations in the north bay where chlorophyll concentrations are more variable (Figures 50 and 51). The ratios of photosynthetic rates at high and low light intensities can indicate the degree to which the phytoplankton are photoadapted to light limitation. The significantly lower ratios observed in the north compared to the south (Table 14, Figure 52) indicate that the phytoplankton in the north bay are indeed more adapted to light limitation. One can see the same photoadaptational change in the ratio on a seasonal basis in Figure 53.

Nutrient bioassays

Nutrient bioassays were conducted by both adding only one nutrient into each test regime and by adding all nutrients except one into each regime. The results are shown in Table 15. No obvious seasonal trends occurred, so the data were averaged over the entire year. Figure 54 shows the average ratio of growth rate with a particular added nutrient to growth rate with no nutrients added for each station. It clearly indicates that phosphorus is the primary limiting nutrient throughout the bay.

None of the other nutrients stimulate growth very much except nitrogen in Dumfoundling Bay. Figure 55 shows the same ratios for the final biomass yield after 6 days growth with the different added nutrients. It also shows phosphorus to be the primary limiting nutrient throughout Biscayne Bay. Figure 56 shows the average ratio of growth rate with all nutrients but one added to growth rate with all nutrients added. It shows not only that phosphorus is the primary limiting nutrient throughout the bay but also that nitrogen is the secondary limiting nutrient. Figure 57 shows the same ratios for the final biomass yield after 6 days growth with the different nutrients deleted. It also shows phosphorus and nitrogen to be the most important limiting nutrients. It also shows some evidence of silicon being partially limiting in the north bay. The overall conclusion of these bioassays is that phosphorus is the primary limiting nutrient throughout Biscayne Bay.

Phytoplankton abundance

Tables 16 and 17 show the abundance of the different groups of phytoplankton at each station throughout the year. Figures 58 and 59 show the yearly average phytoplankton cell abundance at each of the stations along the central axis of the bay and Figure 60 shows the abundance of phytoplankton cells throughout Biscayne Bay. On average, phytoplankton cell concentrations are around five times higher in the northern bay than in the southern bay. Figures 61 and 62 show the average phytoplankton cell abundance for the northern embayments, northern open water and southern open water throughout the year. Although the data are somewhat sporadic because each preservative only preserves a fraction of the phytoplankton community, the data clearly show that phytoplankton cell abundance in the south is only around one fifth the abundance in the northern part of the bay. Furthermore, cell abundance remains uniformly low throughout the year in the south, and is much more variable with no clear seasonal trend in the north. Figures 63 and 64 show a very general correlation between cell abundance and chlorophyll concentrations in the water. The scatter reflects the variation in the chlorophyll content per cell in different habitats as a result of both cell size and photoadaptation. Figures 65 and 66 show that chlorophyll per cell is higher in the north than in the south. There are two possible reasons for this trend, not mutually exclusive. One is that the cells are larger (Figure 29) and thus contain more chlorophyll in the northern bay. The other is that the cells in the more turbid waters of the north bay receive less light and photoadapt (suggested by Figure 52) by synthesizing more chlorophyll. The possibility that nutritional status also influences the chlorophyll content is indicated by the positive chlorophyll per cell and the correlation between the photosynthetic capacity in the northern bay (Figures 67 and 68). Abundant nutrients would be expected to increase both cellular chlorophyll content and photosynthetic capacity. The trend is much less clear in the nutrient poor southern waters (Figures 69 and 70).

Small coccoid cells are the dominant phytoplankton throughout the bay, comprising an average of around 80% of the phytoplankton cells in the north bay and around 90% in the south bay (Figures 71 and 72). Absolute concentrations of coccoid cells were around four or five million cells per liter in the north bay and one to two million per liter in the south bay (Figures 73 and 74). Figures 75 and 76 show no significant seasonal trend in the relative abundance of the coccoid cells.

Centric diatoms comprise 10 to 20% of the phytoplankton community on the average in the north bay, but are 1% or less in the south bay (Figures 77 and 78). Figures 79 and 80 show the absolute concentration of centric diatoms to be far higher in the north bay than in the south bay. Figures 81 and 82 show a drop in the absolute abundance of diatoms in the open waters of the north bay through the year. This decline parallels the decline observed in the overall chlorophyll, suggesting that both declines may be related to a changing nutrient regime in the north bay.

Pennate diatoms always comprise less than one percent of the phytoplankton community, with absolute abundances two to three times higher in the north bay than the south bay on average (Figures 83 and 84).

Dinoflagellates are also always less than one percent of the phytoplankton community, ranging between 30 thousand and 110 thousand cells per liter throughout the bay (Figures 85 and 86).

Zooplankton biomass and abundance

Table 18 shows the ash free dry weight of zooplankton at each station throughout the year. Figure 87 shows the yearly average of ash free dry weight of zooplankton at each open water station and Figure 88 shows the distribution throughout the bay. They show that zooplankton biomass is uniformly low in the south bay and generally two to five times higher in the north bay, reflecting the greater abundance of food in the north. Zooplankton biomass is highest in Dumfoundling Bay, where chlorophyll concentrations are also highest. Figure 89 shows the positive correlation between the yearly average phytoplankton biomass measured as chlorophyll and zooplankton biomass as ash free dry weight at each station. Table 19 shows the wet volume of zooplankton at each station throughout the year. Figure 90 shows the yearly average of zooplankton biomass at each open water station measured by wet volume. No obvious difference appears between north and south bay when zooplankton abundance is measured by wet volume because of the greater proportion of gelatinous zooplankton in the south. Figures 91 and 92 show the seasonal change in zooplankton biomass for each of the different types of water bodies. They show that zooplankton biomass is usually higher in canal mouths than in open water and that zooplankton biomass is very low throughout the bay during summer months when water temperatures are high. This has been observed by others as well (Reeve, 1975).

Tables 20 and 21 show the abundance of zooplankton groups at each station throughout the year sampled with the micro zooplankton and zooplankton nets, respectively. Figure 93, with yearly average abundances at each of the stations, shows that the tintinnids are generally about twice as abundant in north Biscayne Bay as in the south. Figure 94 shows that they are most abundant during the warm summer months when macrozooplankton are extremely sparse (Figures 91 and 92). In general the abundance of copepod nauplii (Figure 95), copepodites (Figure 96) and adult copepods (Figure 97) are two to three times higher in northern Biscayne Bay than in southern Biscayne Bay. All three groups were particularly high in Dumfoundling Bay (station 1) where food abundance is especially high. All developmental stages of copepods were also somewhat higher in Card Sound (station 24) than elsewhere in southern Biscayne Bay, for reasons that are not clear. Seasonality in the abundance of copepod nauplii, copepodites and adult copepods is shown in Figures 98, 99, and 100 respectively. In general, there appears to be an overall increase in the copepodites and adult copepods during the fall and winter months after a minimum in June. Figures 101 and 102 show that the distributions of shrimp larvae and juveniles are somewhat variable, although both are most abundant in the seagrass beds just north of the Julia Tuttle Causeway (station 8). Berkeley and Campos (1984) also found shrimp to be most abundant in the seagrass beds of the Julia Tuttle Causeway. This suggests that the seagrass beds in Biscayne Bay are important to the shrimp fishery. The juvenile shrimp were more abundant in the north bay than in the south. The shrimp larvae were generally most abundant in the fall (Figure 103) and the juveniles were most abundant in the winter (Figure 104). The abundances of ostracods (Figure 105) and amphipods (Figure 106) were sparse enough that their distributions were rather sporadic with no apparent trends either geographically or seasonally. Cladocerans, being brackish water animals, were predictably found primarily in Dumfoundling Bay (station 1) with very few individuals found elsewhere (Figure 107). Crab zoea were distributed throughout the bay with no obvious pattern (Figure 108), but the megalops stage was quite sparse with the exception of large numbers caught at station 19 in April (Figure 109). Polychaete larvae are generally around five to ten times more abundant in north Biscayne Bay than in the south (Figure 110), but there is no obvious seasonal trend. Bivalve larvae are also five to ten times more abundant in the north bay than in the south, but they are also very abundant in the middle of the bay as well (Figure 111). Again, they are present year round with no obvious seasonal trend. Gastropod larvae are generally around five times more abundant in northern Biscayne Bay than in southern Biscayne Bay (Figure 112) and generally more abundant in the late summer and fall (Figure 113). Barnacle larvae are generally rather sparse, with the data dominated by large numbers collected at station 6 in June (Figure 114).

Isopods are generally several times more abundant in the south than in the north bay (Figure 115) and most abundant in the spring and early summer (Figure 116). Chaetognaths were found throughout the bay with no obvious distributional pattern (Figure 117) and were most abundant in the late winter and early spring (Figure 118). They were least abundant during the warm summer months. Larvaceans were only present in any significant number in the spring in the extreme northern end of Biscayne Bay (Figures 119 and 120). Medusae were found throughout the bay (Figure 121) but were most prevalent in June (Figure 122).

Fish eggs were found in high abundance only in the very northern part of Biscayne Bay, north of the 79th Street Causeway (Figure 123), but were found throughout the year (Figure 124).

A high abundance of fish larvae was found only at Bakers Haulover (station 4) in April (Figure 125).

CONCLUSIONS

Eutrophication

It appears fairly clear that the major source of new nutrients into Biscayne Bay is from land runoff through the canals. Large blooms of phytoplankton are observed near the canal mouths and phytoplankton biomass levels are higher where salinity is lower as a result of fresh water runoff. It does not appear that eutrophication has been detrimental to the food chain however. In fact, one finds higher abundance of animals in the north bay where phytoplankton abundance is higher as a result of eutrophication. The higher phytoplankton abundance at the canal mouths and in the north bay in general resulting from eutrophication is probably the cause of the slight depletion of dissolved oxygen in these areas (Alleman, 1985). Any further input of nutrients to the bay would reduce dissolved oxygen concentrations further.

Phosphate appears to be the primary limiting nutrient in Biscayne Bay, probably as a result of phosphate being adsorbed onto the limestone of South Florida. Therefore, it is the addition of phosphate in runoff that contributes to eutrophication. The one place where nitrate is as important a limiting nutrient as phosphate is Dumfoundling Bay. This may be the result of denitrification converting much of the nitrate to dinitrogen gas in the anaerobic waters. The reduction of oxygen in Dumfoundling Bay is the result of rather stagnant water flow and the input of excess nutrients, resulting in the production of excess organic matter. Future attempts to reduce eutrophication of Biscayne Bay should emphasize phosphate. The south bay can withstand more phosphate input better than can the north bay because the north bay is already experiencing some oxygen depletion as a result of eutrophication. Channeling phosphate rich water through the mangroves lining the south bay would not only remove much of the eutrophication causing phosphate but also stimulate the growth of the mangroves (Onuf et al, 1977).

Productivity and food chains

Photosynthetic assimilation numbers for phytoplankton in Biscayne Bay are quite high (generally around 10 micrograms carbon/microgram chlorophyll a/hr), indicating that ultimately it is the low standing stock biomass of phytoplankton that limits planktonic productivity in the bay. These results are similar to the estimates of Reeve (1975). In the south bay where seagrasses cover 60% to 75% of the bay bottom (Markley and Milano, 1985) and phytoplankton are particularly sparse, seagrasses account for at least 80% of the total primary productivity. In the north bay where phytoplankton abundance is ten times higher and seagrasses cover only around 30% of the bay bottom (Markley and Milano, 1985), phytoplankton are the dominant primary producers and generate more organic carbon than seagrasses. Thus, in moving from the oligotrophic south bay to the eutrophic north bay, one finds a decline in seagrass productivity and a dramatic increase in phytoplankton productivity. This is associated with an increase in many types of animals that apparently derive more nutrition from the phytoplankton than from the seagrass community. Tintinnids, copepods, juvenile shrimp, polychaete larvae, bivalve larvae, gastropod larvae, larvaceans, and fish larvae are all more abundant in the north bay, indicating that they are probably more dependent on the phytoplankton for food than on the seagrass communities. It is generally thought that seagrass communities are important to many benthic animals and juvenile crustaceans and fish. Berkeley (1984) calculated that seagrass habitat supported ten times more fish by weight than a similar sized area that had been dredged or was barren of vegetation. The data presented here show that the planktonic larval stages are generally more abundant where phytoplankton dominate over seagrasses. There are several plausible reasons for this. First of all, very little seagrass biomass is consumed directly by animals. Most of the material is processed through the detrital food chain and is first converted to bacterial and fungal biomass and then to protozoan and microzooplankton biomass before it is available to the planktonic animals that feed on suspended particles. Well over 90% of the biomass is lost as it is processed through two additional steps in the food chain. As a result, planktonic animal productivity is lower in a seagrass community. Another reason for the higher planktonic animal biomass in the north bay is the greater input of nutrients in the north. This allows for the production of more animal protoplasm. In the nutrient poor south bay, productivity of the seagrasses is high mainly because large amounts of nutrient poor cellulose are being produced, not nutrient rich protoplasm. Thus the simple production of organic carbon is a poor predictor of animal production. Animal production is dependent on the input of nutrients and in Biscayne Bay the higher input of nutrients into the north bay helps contribute to phytoplankton dominating over the seagrasses and being the major primary producers of organic carbon leading to animal production. Seagrass beds provide important nursery areas for animals, but the food availability depends on the nutrient input to the bay.

A rough estimate of energy flow through the planktonic food chain of Biscayne Bay indicates that planktonic primary productivity can support the fish yield of the bay. Average primary productivity in the bay appears to be around 40 milligrams of carbon per square meter per day. This is in agreement with the findings of Roman et al. (1983). Total production of organic carbon by phytoplankton in the entire bay covering 220 square miles (Markley and Milano, 1985) would then be around 8.3 billion grams of carbon per year. Because most of the phytoplankton of Biscayne Bay are so small, they are probably mostly consumed by protozoa rather than copepods, making the food chain longer. A shift to larger phytoplankton that could be eaten directly by copepods would probably lead to about a three fold increase in the production of fish in the bay. Protozoa have an ecological efficiency of around 30%, making their yearly production around 2.5 billion grams of carbon. They would then be eaten primarily by copepods, which have an ecological efficiency of around 20%. This would lead to the production of around 500 million grams of carbon of copepods each year in Biscayne Bay. A large percentage of the fish in Biscayne Bay (particularly the clupeoids) can then feed directly on these copepods with an ecological efficiency of around 15%. This would lead to a yearly fish production in the bay of 75 million grams of carbon or 750 tons of fresh weight fish. It is estimated that the commercial catch of fish (mostly pilchard) in the bay is around 80 tons each year (Berkeley, 1984). The recreational catch is estimated to be another 140 tons each year (Berkeley, 1984). It appears that the planktonic food chain alone could support the fish catch in Biscayne Bay, if our understanding of the food chain is correct. This is not to say that it does support the entire fishery, because undoubtedly the detrital food chain from the seagrasses and mangroves is important to many species. The estimated commercial catch of shrimp is 80 tons a year, with an additional 60 tons for the recreational catch. Adult shrimp, however, most likely depend more on the detrital food chain in the benthos than on the planktonic food chain.

Some unknown fraction of the planktonic food chain is contributing to the detrital food chain and the production of shrimp and crabs. These fisheries do depend more directly upon the planktonic food chain however, because their larval stages feed almost exclusively upon phytoplankton and zooplankton. The food chain calculations show that the planktonic food chain is capable of supporting the fisheries in Biscayne Bay, and the higher abundance of animals and their larvae where phytoplankton are most abundant indicates that it is important.

Turbidity

Turbidity is a major problem in Biscayne Bay both for aesthetic reasons and because it reduces the amount of light available to seagrasses. One possible source of turbidity that was examined was phytoplankton blooms. Chlorophyll concentrations in the south bay averaged around 0.2 micrograms per liter and were around 2 micrograms per liter in the north bay. The very highest concentration of chlorophyll ever observed in the bay was 8.6 micrograms per liter. The data of Smith and Baker (1978) indicate that 0.2 micrograms chlorophyll per liter would allow a photic zone about 70 meters deep, 2 micrograms per liter would allow one around 45 meters deep and even 8.6 micrograms per liter will allow a photic zone 10 meters deep. Clearly, the phytoplankton are not a major source of turbidity in Biscayne Bay, nor are they shading the seagrasses significantly. Resuspended sediments are much more important in reducing water clarity in Biscayne Bay. These conclusions agree with those of Wanless et al. (1984).

Recommendations for future monitoring and study

Routine monitoring of chlorophyll concentrations in the bay would be the best way to assess the planktonic ecosystem in Biscayne Bay. High concentrations of chlorophyll are a good indicator of the location of high inputs of nutrients to the bay and generally of the location of the depletion of dissolved oxygen in the water. Higher abundances of planktonic animals are also generally associated with higher chlorophyll concentrations. The excellent correlation between the DCMU-enhanced fluorescence and the extracted chlorophyll measurements means that routine monitoring could be carried out quickly and reliably. Long term monitoring would be able to resolve several questions that could not be resolved in a one year study such as the present one. For example, the present study observed a rather steady decline in chlorophyll concentrations in the north bay over the study period of one year. Was this just the natural seasonal pattern of abundance in Biscayne Bay or was this part of a long term decline resulting from a reduction in nutrient inputs to the bay? Only a multiyear monitoring program could answer this question. A multiyear sampling program would also tell us how much the planktonic ecosystem of Biscayne Bay changes from year to year, as there probably is no "average" year. Such baseline data are needed before one can accurately identify any large scale changes resulting from anthropogenic perturbations. The measurement of chlorophyll concentrations (by DCMU enhanced fluorescence) in the bay would be the least expensive and most sensitive method for detecting anthropogenic changes.

To document specific events that cause eutrophication in Biscayne Bay, detailed sampling around canal mouths should be made at short time intervals. Closely spaced sampling around canal mouths would show how far out from the canal mouths eutrophication is occurring and would provide an early warning system if the eutrophied area started to expand. The present sampling regime has stations too widely separated to accurately assess the area around canal mouths that are affected by eutrophication. The present sampling regime of once a month could only show that chlorophyll concentrations were higher when there was more fresh water in the canal mouth. Sampling every few days would allow one to determine if and when algal blooms develop after canal dams are opened.

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TABLES

Table 1

Station Number	Derm Station Number
1	2
2	4
3	5
4	6
5	8
6	9
7	12
8	14
9	17
10	20
11	22
12	27
13	30
14	31
15	33
16	34
17	35
18	36
19	38
20	39
21	40
22	41
23	44
24	47

Table 2 Temperature (^{o}C)

Station	Mar	Apr	May	Jun	Jul	Aug
1	18.9	23.9	26.0	28.8	28.4	30.5
2	19.5	24.2	25.5	28.8	28.8	29.0
3	20.0	25.4	25.5	28.0	29.0	29.2
4	20.4	24.5	25.5	28.2	29.0	30.0
5	18.9	25.8	26.0	28.0	28.5	30.1
6	18.3	25.0	25.5	28.6	29.0	30.4
7	19.1	26.8	26.5	28.6	28.0	29.8
8	17.4	25.6	26.3	28.4	29.4	30.5
9	18.2	25.5	26.4	28.6	29.2	30.5
10	19.7	24.2	25.5	27.5	27.8	29.5
11	19.9	25.0	26.5	28.1	28.5	30.6
12	19.0	25.3	26.4	28.5	28.2	30.8
13	18.9	26.9	27.6	29.0	29.7	32.0
14	18.9	25.9	26.8	29.1	29.2	30.5
15	19.7	26.3	26.9	29.0	28.0	31.2
16	19.8	26.0	26.5	28.5	29.2	30.8
17	19.0	25.2	26.5	28.5	29.0	30.8
18	19.0	25.3	26.2	28.4	29.2	30.4
19	19.3	25.5	26.4	28.4	29.2	30.5
20	19.4	27.0	27.4	29.0	28.2	31.2
21	18.8	26.2	26.1	28.5	27.5	31.5
22	17.8	25.4	25.9	28.0	28.9	30.5
23	17.2	25.0	26.0	28.0	28.9	30.8
24	18.0	25.1	26.2	27.9	28.9	30.8

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	29.8	29.7	26.9	26.2	18.1	20.6
2	30.2	29.6	27.0	26.6	19.8	20.8
3	30.5	29.6	27.4	26.6	19.8	19.9
4	29.7	29.4	27.5	26.1	21.2	21.6
5	30.4	29.6	28.0	26.5	20.8	20.3
6	30.2	29.2	27.2	26.2	19.5	19.5
7	29.8	29.7	27.7	26.2	20.2	20.9
8	30.5	30.2	27.9	26.5	18.0	19.5
9	30.5	30.0	28.0	26.7	18.7	20.1
10	29.8	28.8	27.0	26.6	19.7	20.0
11	30.9	29.8	27.7	26.5	20.7	20.0
12	30.5	29.8	27.8	26.3	19.0	19.6
13	31.0	30.5	27.9	26.8	20.2	21.2
14	29.6	29.4	27.2	26.0	17.2	19.6
15	30.5	30.0	27.3	26.6	19.3	21.1
16	29.8	29.8	27.3	26.4	18.2	20.9
17	29.8	29.4	27.1	26.0	17.2	19.6
18	29.5	29.4	27.1	26.0	17.1	19.5
19	29.6	29.4	27.2	26.0	17.0	19.7
20	29.2	29.5	27.5	26.2	19.6	21.9
21	27.9	30.2	27.9	25.8	19.7	21.0
22	29.3	29.5	27.5	26.3	16.9	20.0
23	29.7	30.0	27.4	26.6	16.9	20.0
24	29.8	29.8	27.2	26.5	17.1	20.0

Table 3 Salinity ($^{o}/oo$)

Station	Mar	Apr	May	Jun	Jul	Aug
1	27.5	12.5	32.0	29.0	8.0	9.5
2	31.5	24.0	33.5	31.0	22.0	20.5
3	32.0	29.5	34.0	26.0	25.0	24.0
4	34.5	29.0	35.0	27.0	26.0	25.7
5	32.0	20.0	32.0	17.5	15.0	23.8
6	34.0	24.0	34.0	26.0	26.0	27.5
7	19.0	15.0	14.0	17.5	8.0	9.7
8	32.0	27.0	32.0	30.0	26.0	30.0
9	33.0	28.0	33.0	30.0	28.0	29.8
10	33.0	21.0	33.0	20.0	16.0	10.5
11	33.5	31.0	33.0	34.0	27.5	30.3
12	34.0	32.0	34.0	33.0	28.0	34.0
13	32.5	20.5	22.0	10.0	22.0	29.0
14	33.0	28.5	33.5	33.0	29.5	34.5
15	28.0	29.0	33.0	33.5	4.0	32.0
16	33.0	31.0	34.0	36.0	31.0	33.0
17	34.5	32.5	34.5	35.5	32.0	36.5
18	34.0	34.0	35.0	36.0	35.0	37.5
19	35.5	34.0	35.5	36.0	35.5	37.5
20	24.5	9.5	24.5	24.0	6.0	23.7
21	29.0	16.0	29.0	35.0	2.0	34.5
22	35.0	32.0	34.5	37.5	34.0	37.3
23	36.0	35.0	36.0	37.5	35.0	36.5
24	34.0	35.0	35.5	37.5	35.0	36.7

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	12.0	28.2	18.0	16.0	22.5	31.0
2	21.0	30.3	27.5	28.0	27.5	32.0
3	25.0	30.3	30.5	26.0	32.0	30.0
4	35.0	34.0	34.0	28.0	34.5	35.0
5	12.0	27.8	28.5	17.0	17.0	16.0
6	29.0	29.8	28.5	26.0	32.0	30.0
7	12.0	24.8	20.5	10.0	26.0	25.5
8	30.0	30.2	30.0	29.0	30.0	32.0
9	33.0	31.7	31.5	30.0	30.0	33.0
10	21.0	24.7	32.0	24.0	24.0	29.0
11	31.0	32.2	32.5	32.0	32.0	33.0
12	32.0	33.0	32.5	34.0	31.5	33.0
13	33.0	31.0	30.0	29.0	27.0	30.0
14	36.0	35.1	35.0	33.5	32.5	32.0
15	26.0	32.2	32.4	31.0	28.5	29.0
16	36.0	34.1	33.0	33.5	32.0	30.0
17	38.0	34.2	34.8	34.5	33.5	34.0
18	38.0	35.7	34.7	34.5	34.0	35.0
19	39.0	35.5	34.8	34.5	34.0	35.0
20	10.0	17.0	25.2	4.0	14.5	10.0
21	4.0	30.2	10.2	13.0	19.5	26.5
22	36.0	35.2	35.5	34.5	32.0	33.0
23	37.0	35.2	35.0	35.0	32.5	34.0
24	37.0	34.2	34.8	34.5	33.0	33.0

Table 4 Chlorophyll a (µg/l)

Station	Mar	Apr	May	Jun	Jul	Aug
1	2.28	4.85	3.24	2.08	6.99	5.17
2	1.51	3.27	1.85	1.18	2.56	2.25
3	2.11	5.17	1.35	2.29	2.80	2.15
4	0.82	3.36	0.88	2.11	1.99	2.34
5	0.72	7.61	2.27	2.63	3.59	2.39
6	1.11	7.30	2.00	2.28	2.82	1.95
7	1.16	7.03	1.63	3.51	2.79	4.48
8	0.34	1.57	0.42	0.43	0.57	0.93
9	0.76	2.08	2.18	2.76	1.05	3.55
10	1.49	2.22	2.55	4.29	1.34	1.57
11	1.28	2.60	1.84	1.06	0.97	3.86
12	0.83	1.34	2.10	0.59	0.90	0.80
13	0.35	2.80	5.52	2.20	4.52	4.44
14	0.20	0.28	0.88	0.46	0.67	2.02
15	0.30	0.58	0.95	0.25	1.70	0.53
16	0.15	0.24	0.30	0.23	0.24	0.24
17	0.28	0.29	0.30	0.34	0.29	0.25
18	0.13	0.12	0.22	0.24	0.21	0.30
19	0.14	0.13	0.20	0.23	0.19	0.18
20	5.17	1.09	8.61	1.76	1.38	1.16
21	0.30	0.38	0.21	0.23	1.40	0.27
22	0.17	0.18	0.23	0.17	0.17	0.23
23	0.21	0.13	0.15	0.14	0.15	0.13
24	0.22	0.23	0.25	0.13	0.13	0.19

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	3.82	4.56	3.24	2.65	1.47	1.39
2	2.27	2.22	1.40	2.32	1.04	1.70
3	2.05	2.39	1.52	3.24	0.75	1.68
4	0.44	0.37	0.62	3.78	0.64	0.65
5	1.41	3.14	1.49	2.63	1.00	1.81
6	1.18	1.75	1.57	4.48	0.93	1.63
7	2.70	1.75	1.89	1.68	0.97	1.64
8	1.41	0.56	0.49	0.66	0.56	0.85
9	2.39	1.34	0.72	1.97	0.73	1.69
10	1.06	1.48	1.15	1.03	1.27	1.30
11	1.76	1.34	1.18	0.84	0.76	1.01
12	1.61	0.86	1.17	0.80	0.93	0.66
13	1.46	1.66	1.13	1.12	0.69	1.46
14	0.36	0.27	0.30	0.21	0.44	0.18
15	0.53	0.51	0.52	0.46	0.32	0.25
16	0.37	0.21	0.38	0.24	0.10	0.19
17	0.28	0.28	0.39	0.46	0.36	0.30
18	0.21	0.47	0.18	0.24	0.19	0.22
19	0.20	0.23	0.15	0.15	0.20	0.19
20	0.47	0.80	1.38	1.72	0.47	1.68
21	2.89	0.58	0.61	0.48	0.29	0.32
22	0.21	0.19	0.22	0.22	0.15	0.22
23	0.18	0.17	0.25	0.22	0.22	0.20
24	0.22	0.20	0.22	0.31	0.25	0.26

Table 5 Phaeopigments ($\mu g/l$)

Station	Mar	Apr	May	Jun	Jul	Aug
1	7.27	2.56	2.50	1.34	5.61	2.61
2	4.08	1.99	0.97	1.34	1.71	1.66
3	2.68	1.68	0.74	2.32	2.05	1.35
4	0.96	1.60	0.61	2.03	1.14	0.88
5	2.14	2.77	1.40	2.52	2.57	1.27
6	1.37	2.80	0.93	1.57	1.44	0.95
7	1.82	3.07	1.84	1.77	1.47	2.52
8	0.54	0.76	0.35	0.38	0.28	0.51
9	0.94	1.04	0.77	1.42	0.63	1.45
10	0.85	1.18	1.20	1.83	1.00	0.98
11	0.96	1.41	0.78	0.63	0.59	1.28
12	1.01	0.83	1.17	0.32	0.60	0.44
13	0.66	1.48	2.03	1.00	1.69	1.77
14	0.33	0.27	0.69	0.34	0.41	0.54
15	0.44	0.42	0.63	0.29	1.51	0.46
16	0.29	0.25	0.30	0.22	0.32	0.32
17	0.29	0.37	0.28	0.27	0.24	0.23
18	0.21	0.11	0.15	0.27	0.20	0.25
19	0.14	0.11	0.14	0.14	0.15	0.18
20	4.00	0.72	3.57	2.43	1.43	0.86
21	0.47	0.42	0.36	0.50	0.79	0.30
22	0.19	0.13	0.21	0.31	0.29	0.24
23	0.21	0.14	0.13	0.36	0.25	0.14
24	0.44	0.20	0.18	0.33	0.31	0.21

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	2.11	1.00	2.69	1.91	1.39	0.73
2	1.31	0.95	1.16	2.05	0.96	1.34
3	1.06	0.87	0.89	2.01	0.83	0.63
4	0.39	0.31	0.50	1.68	0.78	0.49
5	1.26	1.98	0.94	1.99	1.28	1.58
6	0.50	0.57	0.72	2.29	0.93	0.85
7	2.39	0.99	1.07	1.45	1.34	1.03
8	0.52	0.32	0.40	0.44	0.71	0.46
9	1.41	0.52	0.63	1.20	0.65	0.57
10	0.90	0.86	0.55	0.80	1.30	0.59
11	0.87	0.50	0.77	0.60	0.75	0.54
12	0.71	0.40	0.48	0.58	0.69	0.30
13	0.70	1.07	0.98	1.07	0.54	0.76
14	0.26	0.34	0.29	0.43	0.35	0.20
15	0.55	0.56	0.71	0.57	0.57	0.31
16	0.40	0.32	0.37	0.34	0.24	0.16
17	0.26	0.27	0.32	0.49	0.58	0.29
18	0.26	0.29	0.22	0.31	0.27	0.16
19	0.19	0.19	0.26	0.22	0.35	0.22
20	0.67	0.63	1.13	1.77	0.62	0.60
21	1.80	0.43	0.76	0.73	0.75	0.37
22	0.30	0.24	0.22	0.24	0.20	0.09
23	0.23	0.22	0.21	0.14	0.31	0.15
24	0.21	0.23	0.36	0.33	0.26	0.24

Table 6 Chlorophyll a/Phaeopigments (μg/l/μg/l)

Station	Mar	Apr	May	Jun	Jul	Aug
1	0.31	1.89	1.30	1.55	1.24	1.98
2	0.37	1.64	1.90	0.88	1.50	1.35
3	0.79	3.07	1.82	0.99	1.36	1.59
4	0.85	2.10	1.44	1.04	1.75	2.67
5	0.33	2.74	1.62	1.04	1.40	1.89
6	0.81	2.60	2.15	1.45	1.95	2.04
7	0.64	2.29	0.89	1.99	1.90	1.78
8	0.63	2.07	1.20	1.13	2.03	1.82
9	0.81	2.00	2.83	1.94	1.67	2.45
10	1.75	1.89	2.12	2.34	1.34	1.60
11	1.33	1.85	2.34	1.69	1.63	3.01
12	0.82	1.61	1.79	1.84	1.51	1.83
13	0.52	1.90	2.72	2.21	2.67	2.51
14	0.60	1.01	1.28	1.37	1.63	3.72
15	0.67	1.37	1.50	0.85	1.13	1.15
16	0.51	0.98	1.03	1.05	0.76	0.75
17	0.97	0.77	1.07	1.26	1.19	1.11
18	0.61	1.09	1.52	0.89	1.06	1.20
19	0.99	1.15	1.35	1.70	1.33	1.01
20	1.29	1.52	2.41	0.73	0.97	1.34
21	0.64	0.91	0.57	0.46	1.77	0.90
22	0.90	1.39	1.12	0.54	0.59	0.98
23	0.99	0.87	1.14	0.41	0.59	0.93
24	0.50	1.18	1.43	0.39	0.43	0.94

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	1.81	4.54	1.21	1.39	1.06	1.90
2	1.74	2.35	1.21	1.13	1.09	1.27
3	1.93	2.75	1.71	1.61	0.91	2.66
4	1.13	1.17	1.23	2.25	0.83	1.32
5	1.12	1.59	1.59	1.32	0.78	1.14
6	2.34	3.06	2.17	1.96	1.00	1.91
7	1.13	1.77	1.76	1.16	0.72	1.59
8	2.69	1.75	1.21	1.50	0.79	1.86
9	1.70	2.59	1.15	1.64	1.12	2.97
10	1.18	1.72	2.11	1.29	0.98	2.19
11	2.02	2.69	1.53	1.39	1.02	1.89
12	2.27	2.13	2.42	1.38	1.36	2.22
13	2.09	1.55	1.16	1.05	1.28	1.91
14	1.39	0.80	1.04	0.48	1.27	0.90
15	0.97	0.92	0.73	0.80	0.56	0.81
16	0.94	0.65	1.02	0.70	0.41	1.14
17	1.09	1.05	1.20	0.93	0.62	1.04
18	0.80	1.63	0.80	0.77	0.71	1.36
19	1.06	1.22	0.58	0.68	0.59	0.86
20	0.70	1.27	1.22	0.97	0.77	2.77
21	1.60	1.34	0.80	0.66	0.38	0.86
22	0.70	0.77	1.00	0.92	0.76	2.44
23	0.77	0.74	1.18	1.58	0.71	1.33
24	1.01	0.86	0.61	0.94	0.96	1.09

Table 7 Percent Chlorophyll a <5 μm

Station	Mar	Apr	May	Jun	Jul	Aug
1	12.8	90.2	12.8	34.2	75.8	65.5
2	33.3	58.2	33.3	50.5	77.5	73.5
3	5.3	29.4	5.3	29.0	72.4	80.0
4	62.5	34.7	62.5	25.3	82.6	80.5
5	85.1	17.4	85.1	59.0	70.0	91.9
6	32.3	14.8	32.3	40.8	68.4	80.9
7	75.0	37.6	75.0	51.4	78.1	82.6
8	83.3	27.8	83.3	56.2	88.3	91.1
9	71.4	31.7	71.4	28.2	85.3	43.2
10	65.2	52.4	65.2	76.6	73.5	78.3
11	74.1	54.1	74.1	48.6	85.0	79.4
12	74.1	59.8	74.1	73.4	84.2	70.2
13	73.0	76.1	73.0	66.8	85.6	57.0
14	81.2	89.1	81.2	88.9	96.9	26.8
15	86.3	67.9	86.3	78.0	84.5	77.9
16	81.3	74.3	81.3	80.5	85.5	76.3
17	87.3	91.3	87.3	87.9	85.7	76.5
18	88.5	80.4	88.5	85.0	80.3	77.7
19	84.2	75.9	84.2	84.7	77.9	51.5
20	19.3	63.6	19.3	43.7	89.1	41.2
21	68.2	90.6	68.2	62.7	86.4	78.2
22	78.7	85.4	78.7	74.4	62.6	75.6
23	84.5	80.8	84.5	73.8	75.9	56.8
24	90.1	79.6	90.1	80.1	68.0	73.6

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	88.7	23.0	87.0	82.9	68.5	82.3
2	81.3	42.6	81.3	79.4	68.7	84.4
3	77.6	46.2	86.7	71.3	55.9	76.2
4	54.0	90.9	92.1	33.8	72.5	60.2
5	87.1	71.8	75.5	72.6	72.7	77.8
6	82.6	57.1	59.1	35.9	28.1	78.9
7	79.1	62.1	73.5	55.1	68.4	73.8
8	75.5	83.0	88.1	82.5	73.6	86.0
9	66.3	81.4	87.0	89.8	86.1	83.6
10	72.2	76.9	89.6	78.4	82.2	84.7
11	62.5	74.7	53.3	77.2	83.6	78.9
12	61.3	71.2	92.0	72.3	81.1	89.2
13	35.1	42.0	80.5	76.3	67.2	57.3
14	43.1	78.5	85.4	86.0	48.0	87.4
15	24.1	87.8	86.3	89.2	76.7	89.9
16	29.5	87.8	91.8	87.0	78.0	91.4
17	14.2	83.9	90.8	85.4	76.0	93.2
18	28.2	90.7	85.5	84.0	85.1	92.5
19	60.9	82.3	89.6	83.1	84.6	82.2
20	37.7	89.8	75.9	87.4	83.2	84.2
21	84.6	88.3	73.2	77.5	66.3	72.4
22	17.9	86.8	94.0	86.7	79.2	89.0
23	79.6	79.2	87.8	81.2	86.6	90.0
24	28.9	81.3	91.4	83.7	82.9	86.2

Table 8 Percent Chlorophyll a 5-60 μm

Station	Mar	Apr	May	Jun	Jul	Aug
1	34.0	8.5	74.3	13.0	21.9	28.4
2	33.3	32.7	43.5	17.4	19.6	20.6
3	21.1	57.6	18.6	45.2	24.7	17.7
4	31.3	51.0	7.9	55.7	14.2	16.9
5	10.6	66.1	35.7	35.9	25.0	7.3
6	64.5	68.5	0.0	44.2	29.3	14.6
7	25.0	57.9	26.7	43.5	20.4	15.8
8	0.0	67.5	13.1	38.2	9.6	7.2
9	17.9	63.3	27.8	51.3	12.8	15.3
10	32.6	41.2	20.0	17.5	17.6	13.3
11	24.7	42.5	29.2	31.4	13.3	16.5
12	24.7	36.5	39.7	13.0	13.0	10.7
13	19.1	18.5	17.2	30.8	13.6	6.6
14	13.0	8.9	13.9	6.7	1.2	5.0
15	7.1	12.3	10.3	7.8	13.5	8.4
16	15.6	8.0	8.6	9.2	6.8	9.3
17	5.6	7.8	6.8	8.8	8.6	9.8
18	6.6	15.6	13.7	11.1	17.1	14.9
19	12.3	17.4	20.9	9.8	18.2	24.2
20	65.1	32.9	31.7	53.4	9.9	39.7
21	30.3	7.4	33.3	23.5	11.4	16.9
22	9.8	12.7	18.6	21.9	17.4	13.4
23	11.3	16.8	17.4	18.5	19.0	33.1
24	7.2	15.9	17.2	12.9	25.2	19.0

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	5.1	41.0	12.3	14.3	25.3	13.9
2	13.1	40.4	17.8	14.3	24.4	12.8
3	17.2	34.6	11.4	23.4	36.3	17.9
4	39.6	5.5	5.3	59.6	20.3	25.9
5	11.6	24.5	19.3	22.2	19.4	19.3
6	8.7	16.1	29.5	55.5	56.2	17.8
7	19.4	30.8	25.7	39.8	25.6	24.4
8	18.9	12.8	8.8	9.6	21.6	10.8
9	21.3	15.0	11.9	6.9	11.3	14.1
10	17.8	20.9	9.4	18.6	15.9	12.2
11	25.9	19.9	38.7	17.8	11.9	18.6
12	17.7	19.6	6.4	19.5	15.8	7.1
13	7.9	16.0	16.1	20.3	24.4	35.2
14	33.3	11.9	9.7	9.6	36.0	11.0
15	17.2	6.8	10.8	9.5	16.8	6.8
16	36.4	8.2	5.8	7.0	16.1	7.4
17	19.8	11.7	6.8	12.8	16.5	5.6
18	42.3	7.5	10.4	14.0	12.8	5.7
19	13.9	15.1	7.5	12.5	12.9	12.7
20	37.7	8.3	22.5	12.0	13.9	14.7
21	9.5	9.4	22.0	19.0	29.2	24.1
22	59.7	8.3	4.1	8.7	14.9	8.5
23	14.4	16.5	9.2	13.3	11.2	7.4
24	28.1	14.4	7.0	11.5	12.7	7.3

Table 9 Percent Chlorophyll a >60 μm

Station	Mar	Apr	May	Jun	Jul	Aug
1	53.2	1.3	3.2	52.8	2.3	6.1
2	33.3	9.1	4.3	32.1	2.8	5.9
3	73.7	12.9	4.3	25.8	2.9	2.3
4	6.3	14.3	1.1	19.0	3.2	2.6
5	4.3	16.5	6.3	5.1	5.0	0.9
6	3.2	16.7	17.0	15.0	2.3	4.6
7	0.0	4.5	6.7	5.1	1.5	1.7
8	16.7	4.8	1.6	5.6	2.1	1.7
9	10.7	5.0	27.8	20.5	1.9	41.4
10	2.2	6.4	33.8	5.9	8.8	8.4
11	1.2	3.5	37.5	20.0	1.8	4.1
12	1.2	3.7	31.0	13.6	2.8	19.0
13	7.9	5.3	12.1	2.3	0.9	36.4
14	5.8	2.0	53.0	4.4	1.9	68.2
15	6.6	19.8	30.5	14.2	2.0	13.6
16	3.1	17.7	18.5	10.3	7.7	14.4
17	7.1	0.9	2.6	3.3	5.7	13.7
18	4.9	4.0	5.3	3.9	2.6	7.4
19	3.5	6.6	3.4	5.5	3.9	24.2
20	15.7	3.5	26.8	2.9	1.0	19.1
21	1.5	2.0	26.7	13.7	2.3	4.9
22	11.5	1.9	9.7	3.7	20.0	10.9
23	4.2	2.4	30.4	7.7	5.1	10.1
24	2.7	4.5	12.1	7.0	6.8	7.4

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	6.1	36.0	0.7	2.9	6.2	3.9
2	5.6	17.0	0.9	6.3	6.9	2.8
3	5.2	19.2	1.9	5.3	7.8	6.0
4	6.5	3.6	2.6	6.6	7.2	13.9
5	1.3	3.8	5.2	5.2	7.9	3.0
6	8.7	26.8	11.4	8.6	15.7	3.3
7	1.4	7.1	0.7	5.1	6.0	1.8
8	5.7	4.2	3.1	7.9	4.8	3.2
9	12.4	3.6	1.2	3.3	2.6	2.3
10	10.0	2.2	0.9	2.9	1.9	3.1
11	11.6	5.3	8.0	5.0	4.5	2.5
12	21.0	9.2	1.6	8.2	3.0	3.7
13	57.0	42.0	3.4	3.4	8.4	7.5
14	23.6	9.6	4.9	4.4	16.0	1.6
15	58.6	5.4	2.9	1.3	6.5	3.3
16	34.1	4.1	2.3	6.1	6.0	1.1
17	66.0	4.4	2.4	1.8	7.4	1.2
18	29.6	1.8	4.1	2.0	2.1	1.8
19	25.2	2.6	3.0	4.4	2.5	5.1
20	24.7	2.0	1.6	0.7	2.9	1.1
21	6.0	2.3	4.8	3.5	4.5	3.4
22	22.4	5.0	1.9	4.7	5.9	2.5
23	6.0	4.3	3.0	5.5	2.2	2.6
24	43.0	4.3	1.6	4.8	4.4	6.5

Table 10 DCMU enhanced fluorescence (dimensionless relative parameter)

Station	Mar	Apr	May	Jun	Jul	Aug
1	275.3	281.3	169.0	145.3	371.7	288.3
2	158.0	211.0	106.7	79.0	162.7	168.0
3	162.7	256.7	76.7	169.3	174.3	143.0
4	57.3	210.7	61.3	149.3	123.0	133.7
5	96.3	396.7	104.0	140.0	175.0	130.7
6	101.3	377.3	102.7	131.3	157.0	129.0
7	128.0	340.0	137.7	155.3	183.0	226.7
8	44.8	117.0	36.3	42.3	47.7	65.0
9	64.0	133.7	109.3	153.3	62.0	143.3
10	82.7	149.3	113.7	162.0	132.0	164.0
11	84.7	147.3	112.3	66.0	64.3	166.7
12	62.7	92.7	156.7	42.3	51.3	49.0
13	35.7	176.7	276.7	138.7	204.0	216.7
14	20.5	32.7	71.0	36.3	44.0	101.3
15	42.3	50.7	53.0	30.3	128.0	61.7
16	20.1	24.7	23.3	24.7	26.7	32.7
17	21.8	31.0	21.2	23.7	25.7	22.3
18	16.2	14.7	15.2	22.7	19.3	27.3
19	15.6	15.7	16.9	19.7	21.0	24.0
20	255.0	57.3	373.3	138.3	68.3	57.3
21	38.7	41.0	37.7	43.0	59.3	45.7
22	14.7	19.3	12.5	20.7	21.0	24.7
23	19.3	14.0	12.9	18.1	20.7	20.3
24	24.9	24.3	19.9	20.5	19.3	23.3

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	221.7	270.0	225.0	171.3	127.0	86.7
2	153.7	146.0	112.0	96.0	84.0	89.0
3	158.7	125.0	97.0	159.3	54.7	87.3
4	34.3	29.7	46.0	184.0	47.0	53.3
5	111.3	157.3	98.7	138.3	112.3	137.7
6	70.0	84.3	97.3	198.3	63.0	88.3
7	179.3	110.0	119.3	145.0	91.7	108.7
8	74.7	49.3	48.0	53.0	54.7	52.3
9	130.0	66.0	53.0	106.7	68.0	76.7
10	104.0	75.7	59.7	75.0	90.3	57.0
11	89.0	79.3	71.0	60.3	50.3	69.0
12	87.3	63.3	61.0	48.0	60.3	41.0
13	75.7	101.7	76.3	70.3	48.7	85.3
14	29.7	32.3	26.3	20.7	37.7	19.3
15	63.0	44.0	57.0	36.3	36.7	32.3
16	27.0	23.0	32.0	23.7	14.3	20.3
17	22.7	23.3	27.0	24.3	31.0	22.7
18	18.3	35.7	19.3	16.7	15.7	16.0
19	19.0	24.0	16.7	16.3	18.7	16.7
20	52.0	60.3	87.0	72.7	35.7	86.3
21	96.3	45.0	41.7	33.3	30.3	31.3
22	21.3	20.0	17.0	15.3	13.7	15.7
23	18.0	21.0	20.7	14.7	18.7	18.7
24	19.7	25.0	22.3	22.0	19.7	22.7

Table 11 Photosynthetic Capacity (dimensionless relative parameter)

Station	Mar	Apr	May	Jun	Jul	Aug
1	0.58	0.35	0.58	0.49	0.39	0.29
2	0.63	0.47	0.60	0.44	0.39	0.29
3	0.62	0.56	0.58	0.53	0.49	0.38
4	0.65	0.53	0.65	0.55	0.42	0.39
5	0.58	0.54	0.58	0.36	0.33	0.44
6	0.62	0.56	0.62	0.45	0.51	0.48
7	0.21	0.43	0.16	0.29	0.17	0.21
8	0.37	0.47	0.37	0.37	0.35	0.41
9	0.52	0.51	0.59	0.60	0.39	0.46
10	0.59	0.39	0.62	0.49	0.17	0.09
11	0.58	0.57	0.64	0.51	0.36	0.51
12	0.57	0.50	0.69	0.39	0.44	0.46
13	0.49	0.60	0.61	0.43	0.60	0.60
14	0.43	0.35	0.61	0.41	0.47	0.55
15	0.27	0.41	0.47	0.22	0.18	0.41
16	0.36	0.23	0.38	0.39	0.43	0.29
17	0.51	0.44	0.52	0.44	0.38	0.34
18	0.42	0.41	0.46	0.49	0.50	0.39
19	0.52	0.30	0.48	0.47	0.33	0.35
20	0.62	0.28	0.63	0.42	0.29	0.16
21	0.35	0.20	0.25	0.25	0.35	0.21
22	0.38	0.31	0.33	0.38	0.39	0.29
23	0.42	0.21	0.28	0.42	0.37	0.23
24	0.38	0.38	0.44	0.36	0.36	0.31

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	0.29	0.52	0.41	0.36	0.39	0.42
2	0.33	0.54	0.44	0.44	0.42	0.49
3	0.42	0.54	0.52	0.55	0.50	0.47
4	0.55	0.48	0.51	0.58	0.62	0.52
5	0.17	0.58	0.47	0.38	0.26	0.21
6	0.39	0.45	0.49	0.57	0.55	0.50
7	0.21	0.34	0.26	0.16	0.42	0.31
8	0.46	0.32	0.31	0.37	0.43	0.34
9	0.51	0.43	0.39	0.50	0.52	0.53
10	0.20	0.26	0.45	0.25	0.44	0.37
11	0.40	0.35	0.49	0.24	0.54	0.36
12	0.48	0.43	0.46	0.42	0.55	0.41
13	0.49	0.52	0.44	0.48	0.51	0.55
14	0.43	0.35	0.39	0.37	0.51	0.40
15	0.15	0.33	0.31	0.33	0.35	0.37
16	0.38	0.26	0.29	0.38	0.28	0.18
17	0.40	0.40	0.30	0.45	0.55	0.45
18	0.33	0.36	0.24	0.32	0.40	0.31
19	0.41	0.38	0.34	0.33	0.41	0.36
20	0.12	0.19	0.33	0.30	0.25	0.43
21	0.43	0.24	0.18	0.21	0.31	0.26
22	0.25	0.35	0.30	0.29	0.41	0.41
23	0.19	0.22	0.30	0.18	0.36	0.23
24	0.32	0.25	0.31	0.29	0.37	0.28

Table 12 Primary Production (μg C/l/hr)

Station		Apr	June	Aug	Oct	Dec	Feb
1	0.03 ly/min	2.56	2.96	2.06	5.67	0.86	2.48
1	0.1 ly/min	5.71	7.23	3.80	13.69	4.20	6.11
1	0.3 ly/min	7.79	13.07	N.D.	19.71	7.69	9.21
4	0.03 ly/min	6.30	2.09	3.18	1.16	3.61	1.83
4	0.1 ly/min	13.30	12.65	11.16	4.14	10.73	4.13
4	0.3 ly/min	21.30	15.87	17.28	7.41	19.89	6.61
6	0.03 ly/min	7.40	2.02	N.D.	1.82	4.32	2.00
6	0.1 ly/min	17.84	9.45	11.57	6.33	10.38	7.08
6	0.3 ly/min	24.50	17.47	20.48	12.00	15.84	9.33
8	0.03 ly/min	1.90	0.92	1.82	1.42	1.30	1.44
8	0.1 ly/min	7.34	3.49	7.26	4.83	4.28	4.87
8	0.3 ly/min	9.69	5.02	12.07	8.91	7.05	7.03
11	0.03 ly/min	4.62	2.91	4.31	2.64	1.66	1.77
11	0.1 ly/min	15.22	7.96	19.60	9.29	3.61	5.41
11	0.3 ly/min	21.91	10.95	36.27	15.39	6.50	8.39
12	0.03 ly/min	2.57	0.96	1.64	2.08	1.37	0.81
12	0.1 ly/min	8.12	3.82	5.77	6.89	4.25	3.32
12	0.3 ly/min	12.53	6.91	12.02	12.84	6.69	5.61
14	0.03 ly/min	0.41	0.81	3.85	0.92	0.74	0.27
14	0.1 ly/min	1.26	3.22	10.98	2.19	1.91	0.67
14	0.3 ly/min	2.16	5.06	16.61	4.01	3.09	1.18
18	0.03 ly/min	0.16	0.38	1.05	0.75	0.24	0.18
18	0.1 ly/min	0.80	2.70	1.98	3.27	1.01	0.87
18	0.3 ly/min	1.30	4.62	3.66	5.75	1.61	1.22
19	0.03 ly/min	0.28	0.55	0.37	0.45	0.28	0.34
19	0.1 ly/min	0.78	1.53	1.44	1.60	0.80	0.95
19	0.3 ly/min	1.37	2.42	2.68	3.21	1.38	1.34
22	0.03 ly/min	0.10	0.45	0.74	0.40	0.59	0.24
22	0.1 ly/min	0.80	1.57	1.77	1.66	1.49	0.72
22	0.3 ly/min	1.25	2.50	3.32	2.78	2.36	1.22
23	0.03 ly/min	0.31	0.42	0.11	0.32	0.26	0.23
23	0.1 ly/min	0.83	1.42	0.57	0.98	0.94	0.87
23	0.3 ly/min	1.29	2.71	1.41	2.08	1.45	1.30
24	0.03 ly/min	0.47	0.21	0.21	0.41	0.95	0.34
24	0.1 ly/min	1.96	1.46	0.70	1.63	2.32	1.18
24	0.3 ly/min	2.63	2.03	2.10	2.64	3.62	1.86

Table 13 Maximum Assimilation Number (μg C/μg chlorophyll a/hr)

Station	Apr	June	Aug	Oct	Dec	Feb
1	1.61	6.27	N.D.	4.33	2.90	6.63
4	6.34	7.53	7.39	20.20	5.26	10.19
6	3.36	7.67	10.53	6.85	3.54	5.73
8	6.18	11.61	13.03	15.81	10.74	8.28
11	8.42	10.31	9.39	11.45	7.72	8.29
12	9.33	11.62	14.97	14.98	8.41	8.45
14	7.84	10.92	8.21	14.63	14.82	6.64
18	10.72	18.88	12.15	12.21	6.77	5.64
19	10.44	10.31	14.77	13.86	9.03	6.94
22	6.77	14.72	14.33	15.00	10.54	5.54
23	10.31	18.77	10.56	12.53	6.48	6.43
24	11.28	15.84	10.88	13.15	11.58	7.19

Table 14 Ratio of Primary Productivity at High/Low light

Station	Apr	June	Aug	Oct	Dec	Feb
1	3.04	4.42	N.D.	3.48	8.94	3.71
4	3.38	7.59	5.43	6.39	5.51	3.61
6	3.31	8.65	N.D	6.59	3.67	4.67
8	5.10	5.46	6.63	6.27	5.42	4.88
11	4.74	3.76	8.42	5.83	3.92	4.74
12	4.88	7.20	7.33	6.17	4.88	6.93
14	5.27	6.25	4.31	4.36	4.18	4.37
18	8.13	12.16	3.49	7.67	6.71	6.78
19	4.89	4.40	7.24	7.13	4.93	3.94
22	12.50	5.56	4.49	6.95	4.00	5.08
23	4.16	6.45	12.82	6.50	5.58	5.65
24	5.60	9.67	10.00	6.44	3.81	5.47

Table 15 Nutrient Bioassay

Sta	Media additions	April Growth Rate	April Yield	June Growth Rate	June Yield	August Growth Rate	August Yield
1	none	0.17	213.3	0.21	76.3	0.08	211.0
1	+N	0.24	223.3	0.22	81.3	0.11	216.7
1	+P	0.91	650.0	0.46	156.0	0.54	320.0
1	+Si	0.13	211.7	0.06	68.7	0.20	238.3
1	+Fe	0.18	211.7	0.16	73.7	0.27	238.3
1	+Zn	0.26	238.3	0.09	64.3	0.20	235.0
1	+Mn	0.22	220.0	0.12	64.3	0.24	231.7
1	all-N	0.98	645.0	0.06	70.3	0.86	400.0
1	all-P	0.18	228.3	0.18	98.7	0.08	223.3
1	all-Si	1.57	1066.7	0.89	436.7	1.11	1000.0
1	all-Fe	1.22	1546.7	1.33	466.7	0.99	1146.7
1	all-Zn	2.50	1200.0	1.77	1056.7	0.98	1183.3
1	all-Mn	1.50	1546.7	1.93	956.7	1.05	1266.7
1	all	1.29	1273.3	2.13	1333.3	1.20	1966.7
4	none	0.59	222.0	0.43	125.0	0.30	128.3
4	+N	0.62	236.7	0.45	113.7	0.34	135.0
4	+P	1.54	358.3	0.63	157.3	0.64	185.0
4	+Si	0.64	196.0	0.57	125.0	0.35	116.7
4	+Fe	0.66	237.7	0.43	124.0	0.35	128.3
4	+Zn	0.62	241.7	0.47	120.7	0.30	108.3
4	+Mn	0.57	241.7	0.47	127.7	0.37	132.7
4	all-N	1.54	386.7	0.65	146.7	0.91	192.7
4	all-P	0.56	230.0	0.37	140.0	0.25	113.3
4	all-Si	1.98	1250.0	1.65	906.7	1.30	560.0
4	all-Fe	1.73	1373.3	1.30	856.7	1.00	723.3
4	all-Zn	1.90	1766.7	1.34	990.0	1.09	630.0
4	all-Mn	1.81	1766.7	1.29	883.3	1.28	816.7
4	all	1.92	1716.7	1.90	1150.0	1.32	1080.0
6	none	0.38	255.0	0.47	123.3	0.34	105.0
6	+N	0.42	258.3	0.34	96.3	0.42	103.3
6	+P	0.62	266.7	0.91	155.0	0.69	125.0
6	+Si	0.34	269.0	0.53	128.3	0.60	111.0
6	+Fe	0.40	263.3	0.54	116.0	0.68	135.0
6	+Zn	0.36	251.7	0.57	110.0	0.65	104.0
6	+Mn	0.35	258.3	0.41	106.7	0.66	125.0
6	all-N	0.76	330.0	0.89	150.0	0.66	116.7
6	all-P	0.32	258.3	0.53	119.3	0.40	128.3
6	all-Si	1.61	743.3	0.96	513.3	1.49	760.0
6	all-Fe	1.28	793.3	1.34	716.7	1.18	950.0
6	all-Zn	1.51	1433.3	1.52	1150.0	0.92	571.7
6	all-Mn	1.53	1416.7	1.45	1006.7	1.09	576.7
6	all	1.50	1076.7	2.02	1023.3	1.19	753.3

Table 15 (continued) Nutrient Bioassay

Sta	Media additions	April Growth Rate	April Yield	June Growth Rate	June Yield	August Growth Rate	August Yield
8	none	0.21	87.0	0.16	40.7	0.51	70.7
8	+N	0.45	125.3	0.23	49.7	0.86	216.7
8	+P	0.87	138.3	0.21	56.7	0.49	71.3
8	+Si	0.17	85.3	0.13	44.7	0.49	58.7
8	+Fe	0.36	104.0	0.08	38.3	0.62	64.7
8	+Zn	0.47	111.7	0.16	45.0	0.44	60.3
8	+Mn	0.36	109.3	0.06	38.7	0.41	56.0
8	all-N	0.75	120.0	0.72	63.3	0.62	96.0
8	all-P	0.38	121.3	0.21	46.0	1.01	255.0
8	all-Si	1.88	655.0	1.47	596.7	1.82	733.3
8	all-Fe	1.37	390.0	1.30	793.3	1.78	1800.0
8	all-Zn	1.70	870.0	1.58	826.7	1.64	1040.0
8	all-Mn	2.28	1016.7	1.70	753.3	1.66	1150.0
8	all	1.76	853.3	1.90	683.3	1.70	1200.0
11	none	0.50	121.7	0.11	50.0	0.56	146.7
11	+N	0.31	106.0	0.21	82.0	1.38	313.3
11	+P	0.76	146.7	0.06	46.3	0.62	157.7
11	+Si	0.23	97.7	0.07	46.3	0.50	148.3
11	+Fe	0.37	115.0	0.18	47.7	0.59	161.7
11	+Zn	0.41	121.7	0.21	49.0	0.49	143.3
11	+Mn	0.05	73.3	0.18	55.0	0.38	135.7
11	all-N	0.79	131.7	0.19	45.0	0.55	165.0
11	all-P	0.36	131.7	0.24	77.7	1.40	506.7
11	all-Si	1.26	350.0	1.43	383.3	1.39	400.0
11	all-Fe	1.65	900.0	1.58	890.0	1.34	1300.0
11	all-Zn	2.17	1216.7	1.67	870.0	1.76	1283.3
11	all-Mn	1.63	1193.3	1.74	1100.0	1.59	966.7
11	all	1.79	946.7	2.17	1083.3	1.36	1233.3
12	none	0.38	72.0	0.24	42.3	0.22	35.3
12	+N	0.41	91.7	0.23	48.7	0.10	35.0
12	+P	0.80	96.3	0.44	56.3	0.46	51.3
12	+Si	0.23	69.7	0.14	41.0	0.23	37.0
12	+Fe	0.36	67.3	0.29	38.0	0.30	30.3
12	+Zn	0.27	77.3	0.26	48.0	0.30	43.0
12	+Mn	0.34	72.3	0.21	43.7	0.32	39.3
12	all-N	0.85	100.7	0.20	42.0	0.49	55.3
12	all-P	0.33	83.3	0.19	36.7	0.36	55.0
12	all-Si	1.64	443.3	1.53	333.3	1.88	423.3
12	all-Fe	1.93	1333.3	1.74	1516.7	1.05	789.0
12	all-Zn	2.33	1176.7	1.79	1253.3	1.81	1250.0
12	all-Mn	1.83	1343.3	2.36	1616.7	1.45	1076.7
12	all	1.78	1333.3	2.15	1616.7	1.45	1193.3

Table 15 (continued) Nutrient Bioassay

Sta	Media additions	April Growth Rate	April Yield	June Growth Rate	June Yield	August Growth Rate	August Yield
14	none	0.13	31.3	0.34	40.0	0.15	44.0
14	+N	0.09	35.0	0.31	39.3	0.36	63.3
14	+P	0.47	42.0	0.28	36.0	0.42	59.0
14	+Si	0.20	33.8	0.43	41.7	0.18	56.3
14	+Fe	0.12	32.2	0.14	28.5	0.09	51.0
14	+Zn	0.21	34.3	0.53	48.7	0.11	50.0
14	+Mn	0.36	38.7	0.47	37.3	0.06	54.7
14	all-N	0.45	55.3	0.44	47.3	0.21	62.7
14	all-P	0.22	36.0	0.47	34.3	0.35	72.0
14	all-Si	1.72	466.7	1.56	360.0	1.51	260.0
14	all-Fe	1.85	1270.0	1.37	1111.7	1.50	1103.3
14	all-Zn	1.93	1846.7	1.49	1026.7	1.40	1376.7
14	all-Mn	2.41	1750.0	1.48	1100.0	1.55	933.3
14	all	1.99	1650.0	1.07	370.0	1.35	523.3
18	none	0.31	25.0	0.37	28.7	0.26	21.3
18	+N	0.12	22.0	0.30	32.7	0.16	21.0
18	+P	0.60	30.3	0.46	30.7	0.63	34.3
18	+Si	0.36	24.3	0.50	29.0	0.23	21.0
18	+Fe	0.09	20.3	0.22	20.3	0.20	16.7
18	+Zn	0.24	23.6	0.23	23.7	0.26	21.0
18	+Mn	0.37	24.3	0.36	20.8	0.32	22.0
18	all-N	0.36	34.3	0.59	29.7	0.41	29.7
18	all-P	0.27	27.3	0.65	32.7	0.23	20.3
18	all-Si	1.01	152.7	1.06	155.0	1.31	133.3
18	all-Fe	1.90	150.3	0.60	47.0	0.87	125.0
18	all-Zn	1.41	180.7	0.66	106.3	1.32	138.3
18	all-Mn	2.20	673.3	0.75	128.3	1.29	246.7
18	all	1.12	175.0	0.87	92.7	0.96	110.0
19	none	0.21	20.0	0.30	29.7	0.45	27.0
19	+N	0.16	17.5	0.38	24.3	0.26	21.7
19	+P	0.45	26.8	0.33	33.3	0.70	35.0
19	+Si	0.19	19.8	0.33	23.3	0.44	29.3
19	+Fe	0.18	15.4	0.27	18.7	0.43	21.7
19	+Zn	0.09	18.7	0.20	20.3	0.54	29.7
19	+Mn	0.49	22.0	0.32	18.2	0.58	24.7
19	all-N	0.35	30.0	0.70	55.3	0.55	39.0
19	all-P	0.30	22.0	0.63	22.0	0.55	30.0
19	all-Si	1.80	146.7	0.90	135.0	1.02	89.7
19	all-Fe	0.36	32.3	0.50	45.7	0.62	58.7
19	all-Zn	1.69	238.3	0.73	151.7	1.17	171.7
19	all-Mn	1.81	418.3	0.78	176.7	1.11	153.3
19	all	1.24	142.3	0.79	81.0	1.16	93.3

Table 15 (continued) Nutrient Bioassay

		April		June		August	
Sta	Media additions	Growth Rate	Yield	Growth Rate	Yield	Growth Rate	Yield
22	none	0.13	23.0	0.34	27.0	0.27	23.8
22	+N	0.19	29.0	0.29	27.7	0.31	24.7
22	+P	0.43	29.0	0.71	38.3	0.52	45.3
22	+Si	0.33	25.3	0.34	25.3	0.24	21.7
22	+Fe	0.16	28.2	0.31	25.0	0.34	24.3
22	+Zn	0.26	28.7	0.19	23.3	0.13	21.2
22	+Mn	0.41	30.0	0.29	23.3	0.39	26.5
22	all-N	0.52	43.7	0.50	30.7	0.59	33.3
22	all-P	0.27	27.0	0.46	25.7	0.41	24.7
22	all-Si	0.63	44.3	0.86	60.7	1.19	170.0
22	all-Fe	0.75	48.3	0.59	66.0	1.28	122.7
22	all-Zn	0.75	55.0	0.43	49.0	1.48	175.0
22	all-Mn	1.68	181.7	0.88	105.0	1.60	265.0
22	all	0.91	62.0	0.57	53.7	1.15	94.3
23	none	0.30	25.0	0.38	26.3	0.31	27.0
23	+N	0.18	22.2	0.51	25.3	0.39	25.7
23	+P	0.50	28.0	1.03	65.7	0.76	34.0
23	+Si	0.28	24.7	0.34	30.3	0.49	33.0
23	+Fe	0.26	21.3	0.45	25.7	0.47	22.0
23	+Zn	0.36	25.0	0.52	18.5	0.33	22.7
23	+Mn	0.30	26.3	0.24	23.0	0.44	32.7
23	all-N	0.58	50.2	0.59	41.3	0.55	50.0
23	all-P	0.25	29.3	0.53	28.3	0.39	34.7
23	all-Si	1.03	72.7	0.82	136.7	1.40	149.0
23	all-Fe	0.78	54.3	0.32	41.3	0.83	77.3
23	all-Zn	1.11	126.7	0.56	70.7	1.53	243.3
23	all-Mn	1.47	220.0	0.80	92.3	1.80	486.7
23	all	1.19	112.0	0.78	60.3	1.35	126.3
24	none	0.11	26.7	0.35	25.7	0.30	32.0
24	+N	0.29	27.7	0.22	24.3	0.51	41.7
24	+P	0.45	49.7	0.31	34.7	0.80	43.3
24	+Si	0.18	27.8	0.24	26.3	0.44	29.3
24	+Fe	0.15	27.7	0.15	21.8	0.45	31.0
24	+Zn	0.47	34.7	0.17	21.0	0.33	30.0
24	+Mn	0.34	36.3	0.19	22.0	0.40	31.3
24	all-N	0.61	54.3	0.53	26.3	0.61	37.7
24	all-P	0.30	32.0	0.72	27.0	0.59	40.7
24	all-Si	1.27	138.3	1.84	81.0	1.75	238.3
24	all-Fe	1.74	212.7	0.51	56.7	1.45	301.7
24	all-Zn	1.68	361.3	0.88	118.3	1.82	853.3
24	all-Mn	1.74	446.7	0.67	71.3	1.90	703.3
24	all	1.37	241.7	0.74	77.0	1.70	453.3

Table 15 (continued) Nutrient Bioassay

Sta	Media additions	October Growth Rate	October Yield	December Growth Rate	December Yield	February Growth Rate	February Yield
1	none	0.02	121.7	0.62	192.7	0.46	103.0
1	+N	0.51	213.3	0.79	243.3	0.76	173.3
1	+P	0.28	127.0	0.93	503.3	0.64	113.3
1	+Si	0.00	124.7	0.63	246.7	0.52	87.3
1	+Fe	0.00	113.3	0.78	320.0	0.52	102.0
1	+Zn	0.00	119.7	0.90	314.0	0.60	101.0
1	+Mn	0.17	117.0	0.72	249.3	0.52	102.7
1	all-N	0.09	137.7	0.88	388.3	0.60	105.0
1	all-P	0.33	231.7	0.71	261.7	0.68	223.3
1	all-Si	1.47	510.0	1.22	1150.0	1.46	743.3
1	all-Fe	1.64	1113.3	1.71	2250.0	1.64	963.3
1	all-Zn	2.20	1283.3	1.27	1226.7	1.59	766.7
1	all-Mn	1.30	963.3	1.24	1350.0	1.55	843.3
1	all	1.91	1356.7	1.42	1506.7	1.53	970.0
4	none	0.46	37.3	0.57	146.0	0.17	30.0
4	+N	0.65	57.0	0.51	115.0	0.52	52.3
4	+P	0.60	44.7	0.94	161.0	0.15	28.7
4	+Si	0.81	31.0	0.81	140.7	0.20	23.0
4	+Fe	0.36	33.0	0.63	136.0	0.22	31.3
4	+Zn	0.45	30.3	0.58	127.7	0.32	36.0
4	+Mn	0.39	36.3	0.54	128.3	0.30	29.7
4	all-N	0.86	44.7	1.12	195.0	0.15	27.0
4	all-P	0.50	35.7	0.75	178.3	0.46	57.3
4	all-Si	1.78	365.0	1.27	560.0	1.10	171.7
4	all-Fe	2.00	1283.3	1.83	1216.7	1.48	743.3
4	all-Zn	2.18	983.3	1.29	796.7	1.50	1056.7
4	all-Mn	1.97	1516.7	1.05	523.3	1.15	453.3
4	all	2.66	1346.7	1.82	1050.0	1.42	880.0
6	none	0.39	83.7	0.60	131.3	0.52	101.0
6	+N	0.54	131.7	0.60	120.3	0.27	58.7
6	+P	0.77	116.3	1.01	172.7	0.60	100.3
6	+Si	0.41	81.3	0.49	129.7	0.22	57.0
6	+Fe	0.37	71.3	0.75	148.3	0.38	62.7
6	+Zn	0.39	77.0	0.61	138.0	0.34	62.0
6	+Mn	0.54	108.7	0.55	123.3	0.36	66.3
6	all-N	0.86	99.0	0.86	160.0	0.35	65.0
6	all-P	0.48	95.7	0.66	140.3	0.23	53.3
6	all-Si	1.87	881.7	1.08	450.0	1.53	786.7
6	all-Fe	2.11	1286.7	1.86	1066.7	1.81	1130.0
6	all-Zn	1.70	1110.0	1.73	1113.3	1.83	1150.0
6	all-Mn	1.76	1250.0	1.41	876.7	1.51	683.3
6	all	1.92	1023.3	1.53	1016.7	1.62	920.0

Table 15 (continued) Nutrient Bioassay

Sta	Media additions	October Growth Rate	October Yield	December Growth Rate	December Yield	February Growth Rate	February Yield
8	none	0.30	67.7	0.47	52.0	0.16	31.7
8	+N	0.28	54.3	0.44	70.0	0.33	43.3
8	+P	0.86	95.7	0.43	56.0	0.14	33.7
8	+Si	0.43	86.7	0.31	64.7	0.19	38.7
8	+Fe	0.25	59.3	0.32	44.0	0.35	33.0
8	+Zn	0.43	74.3	0.24	48.7	0.19	32.0
8	+Mn	0.30	64.0	0.28	46.0	0.28	34.7
8	all-N	0.95	95.3	0.41	46.7	0.21	30.0
8	all-P	0.30	63.0	0.34	58.0	0.08	33.0
8	all-Si	1.89	613.3	1.51	453.3	1.44	393.3
8	all-Fe	2.62	1436.7	1.72	1073.3	1.56	433.3
8	all-Zn	2.40	1566.7	1.95	710.0	2.09	773.3
8	all-Mn	2.30	1213.3	1.13	500.0	1.72	463.3
8	all	2.34	1460.0	1.39	596.0	2.11	836.7
11	none	0.27	59.0	0.30	52.7	0.14	29.7
11	+N	0.18	50.3	0.28	54.7	0.15	39.0
11	+P	0.51	63.3	0.81	107.7	0.08	31.7
11	+Si	0.21	55.0	0.24	57.0	0.21	34.7
11	+Fe	0.16	53.0	0.31	59.3	0.21	33.3
11	+Zn	0.28	61.3	0.30	58.0	0.21	35.0
11	+Mn	0.21	58.0	0.25	58.7	0.16	36.0
11	all-N	0.50	73.3	0.76	113.7	0.11	34.0
11	all-P	0.22	54.3	0.27	59.3	0.14	42.3
11	all-Si	1.27	286.7	1.33	353.3	1.16	250.0
11	all-Fe	1.96	1226.7	1.25	730.0	1.64	645.0
11	all-Zn	2.12	1363.3	1.66	1206.7	1.88	853.3
11	all-Mn	1.78	796.7	1.00	293.3	1.95	886.7
11	all	2.04	1276.7	1.07	570.0	1.98	1023.3
12	none	0.40	53.7	0.74	77.7	0.23	26.0
12	+N	0.34	60.0	0.36	48.3	0.26	35.3
12	+P	0.41	61.7	0.88	85.0	0.19	30.3
12	+Si	0.28	44.0	0.35	50.7	0.18	28.7
12	+Fe	0.32	41.7	0.41	51.0	0.24	34.3
12	+Zn	0.25	43.7	0.24	48.0	0.26	28.0
12	+Mn	0.19	43.0	0.27	46.7	0.24	25.7
12	all-N	0.50	56.3	0.80	74.3	0.24	28.3
12	all-P	0.36	51.3	0.34	47.3	0.26	32.0
12	all-Si	1.47	315.0	1.90	613.3	1.58	330.0
12	all-Fe	2.06	1066.7	1.96	1313.3	2.08	673.3
12	all-Zn	1.96	1276.7	2.21	1466.7	1.70	633.3
12	all-Mn	2.20	1603.3	1.76	1336.7	2.11	883.3
12	all	2.28	1740.0	1.53	1140.0	2.15	763.3

Table 15 (continued) Nutrient Bioassay

Sta	Media additions	October Growth Rate	October Yield	December Growth Rate	December Yield	February Growth Rate	February Yield
14	none	0.29	24.0	0.21	20.4	0.22	20.7
14	+N	0.33	25.7	0.20	21.8	0.29	19.3
14	+P	0.87	45.7	0.70	33.3	0.30	21.3
14	+Si	0.50	27.3	0.37	25.7	0.36	18.8
14	+Fe	0.44	27.0	0.35	25.2	0.30	19.5
14	+Zn	0.43	24.3	0.41	21.7	0.36	22.2
14	+Mn	0.28	24.0	0.19	20.5	0.15	18.7
14	all-N	0.65	43.0	0.72	40.3	0.34	24.0
14	all-P	0.45	31.3	0.49	26.3	0.24	21.8
14	all-Si	1.70	363.3	1.78	391.7	0.43	45.3
14	all-Fe	1.21	442.3	1.21	216.7	0.68	72.7
14	all-Zn	1.68	575.0	1.73	458.3	0.69	76.7
14	all-Mn	1.69	876.7	1.77	860.0	0.70	83.7
14	all	1.55	526.7	1.41	300.0	0.73	65.3
18	none	0.42	45.0	0.17	18.7	0.36	20.0
18	+N	0.42	40.7	0.16	17.5	0.12	19.5
18	+P	1.03	111.7	0.28	22.0	0.37	22.2
18	+Si	0.49	46.7	0.26	18.2	0.41	20.7
18	+Fe	0.52	44.7	0.23	17.2	0.33	18.5
18	+Zn	0.37	37.7	0.21	19.2	0.37	19.0
18	+Mn	0.44	49.0	0.29	16.8	0.18	15.8
18	all-N	0.73	86.0	0.43	26.3	0.36	25.0
18	all-P	0.42	54.7	0.29	17.1	0.34	23.3
18	all-Si	1.43	286.7	1.45	203.3	0.47	40.7
18	all-Fe	0.48	112.7	1.31	303.3	0.40	45.0
18	all-Zn	1.48	676.7	2.04	463.3	0.50	50.7
18	all-Mn	1.50	596.7	1.79	211.7	0.50	51.7
18	all	1.49	473.3	1.47	136.0	0.60	47.0
19	none	0.27	22.0	0.23	20.3	0.19	18.0
19	+N	0.44	21.7	0.21	16.8	0.17	15.5
19	+P	0.87	40.7	0.60	25.7	0.51	24.7
19	+Si	0.27	21.0	0.23	17.3	0.17	16.7
19	+Fe	0.45	20.3	0.27	14.4	0.19	14.7
19	+Zn	0.19	18.6	0.25	16.3	0.19	16.5
19	+Mn	0.23	18.3	0.25	15.0	0.25	13.7
19	all-N	0.59	44.3	0.54	27.3	0.28	21.7
19	all-P	0.33	22.7	0.20	18.2	0.45	20.2
19	all-Si	1.51	256.7	1.48	150.7	0.53	41.3
19	all-Fe	1.32	260.0	1.07	91.3	0.62	62.7
19	all-Zn	1.32	433.3	1.51	203.3	0.60	58.3
19	all-Mn	1.94	1003.3	1.59	221.7	0.57	56.0
19	all	1.24	223.3	1.28	120.0	0.56	44.0

Table 15 (continued) Nutrient Bioassay

Sta	Media additions	October Growth Rate	October Yield	December Growth Rate	December Yield	February Growth Rate	February Yield
22	none	0.27	21.3	0.29	18.2	0.19	18.7
22	+N	0.18	21.0	0.25	20.5	0.17	20.5
22	+P	0.77	52.7	1.33	131.0	0.53	29.7
22	+Si	0.46	26.3	0.15	17.2	0.31	17.7
22	+Fe	0.31	21.3	0.09	16.7	0.26	20.3
22	+Zn	0.27	22.3	0.26	18.7	0.22	17.7
22	+Mn	0.28	20.7	0.38	18.7	0.18	16.5
22	all-N	0.66	56.3	1.21	115.0	0.71	39.7
22	all-P	0.28	24.0	0.21	17.7	0.55	22.2
22	all-Si	1.09	128.3	1.59	256.7	0.49	36.7
22	all-Fe	1.25	170.0	1.01	58.7	0.37	31.7
22	all-Zn	1.05	156.7	1.77	175.0	0.52	36.7
22	all-Mn	1.44	426.7	1.22	103.0	0.58	47.7
22	all	1.17	155.0	1.32	80.0	0.56	41.0
23	none	0.23	23.7	0.18	16.5	0.33	22.7
23	+N	0.18	20.0	0.13	16.3	0.14	19.0
23	+P	0.49	30.0	0.49	21.7	0.50	26.3
23	+Si	0.34	26.7	0.14	18.0	0.20	23.7
23	+Fe	0.20	17.7	0.33	16.2	0.22	18.7
23	+Zn	0.10	16.3	0.19	15.7	0.37	22.0
23	+Mn	0.15	18.3	0.35	18.0	0.29	22.7
23	all-N	0.39	36.3	0.50	26.0	0.40	29.3
23	all-P	0.20	21.3	0.19	21.0	0.37	23.0
23	all-Si	1.63	183.3	1.45	161.7	0.55	56.0
23	all-Fe	1.48	298.3	1.79	208.3	0.61	73.7
23	all-Zn	1.40	275.0	1.71	215.0	0.70	73.7
23	all-Mn	1.73	656.7	1.58	161.0	0.67	77.7
23	all	1.39	196.7	1.17	77.3	0.73	67.7
24	none	0.22	28.0	0.21	25.7	0.24	25.7
24	+N	0.39	30.7	0.18	23.5	0.22	22.0
24	+P	1.10	85.0	0.64	46.3	0.38	27.7
24	+Si	0.27	25.3	0.24	25.3	0.20	20.5
24	+Fe	0.38	30.7	0.23	22.3	0.29	23.0
24	+Zn	0.27	25.7	0.22	26.5	0.17	22.0
24	+Mn	0.31	31.3	0.20	24.8	0.19	22.7
24	all-N	1.13	74.7	0.72	58.0	0.44	38.3
24	all-P	0.31	27.3	0.41	23.7	0.14	25.0
24	all-Si	1.86	253.3	1.56	168.3	0.60	50.3
24	all-Fe	1.37	786.7	1.26	270.0	0.41	42.3
24	all-Zn	1.61	1016.7	2.11	943.3	0.64	72.7
24	all-Mn	2.03	1216.7	1.66	750.0	0.29	36.7
24	all	1.99	1183.3	1.53	251.7	0.31	32.2

Table 16 Phytoplankton Counts (lugols), (cells/liter)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
1	CENTRIC DIATOMS	9.97E+05	7.97E+05	7.05E+05	1.43E+06	9.20E+04	4.60E+04
1	COCCOIDS	8.62E+06	3.82E+06	6.03E+06	4.62E+06	8.86E+06	6.18E+06
1	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	DINOFLAGELLATES	9.20E+04	1.07E+05	1.53E+05	4.60E+04	1.23E+05	6.13E+04
1	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	PENNATE DIATOMS	1.53E+04	6.13E+04	3.07E+04	1.23E+05	4.60E+04	1.23E+05
1	TOTAL CELLS	9.72E+06	4.78E+06	6.92E+06	6.21E+06	9.12E+06	6.41E+06
4	CENTRIC DIATOMS	3.50E+06	1.43E+06	4.14E+05	1.84E+05	1.09E+06	8.89E+05
4	COCCOIDS	4.91E+06	5.03E+06	4.74E+06	1.32E+06	3.86E+06	2.22E+06
4	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	DINOFLAGELLATES	9.20E+04	1.07E+05	7.67E+04	3.68E+04	7.67E+04	7.67E+04
4	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	PENNATE DIATOMS	1.23E+05	7.67E+04	1.07E+05	1.01E+05	1.69E+05	7.67E+04
4	TOTAL CELLS	8.62E+06	6.64E+06	5.34E+06	1.64E+06	5.20E+06	3.27E+06
6	CENTRIC DIATOMS	5.14E+06	1.47E+06	2.15E+05	9.11E+05	1.30E+06	2.45E+05
6	COCCOIDS	5.18E+06	3.97E+06	3.47E+06	3.14E+06	3.79E+06	4.52E+06
6	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	DINOFLAGELLATES	3.07E+04	9.20E+04	1.38E+05	6.44E+04	1.53E+05	1.38E+05
6	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	PENNATE DIATOMS	1.23E+05	6.13E+04	1.23E+05	1.47E+05	1.99E+05	2.61E+05
6	TOTAL CELLS	1.05E+07	5.60E+06	3.94E+06	4.26E+06	5.44E+06	5.17E+06
8	CENTRIC DIATOMS	1.24E+06	1.55E+06	3.07E+04	1.29E+05	0.00E+00	4.60E+04
8	COCCOIDS	2.33E+06	4.94E+06	2.97E+06	3.43E+06	4.40E+06	4.66E+06
8	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	DINOFLAGELLATES	4.60E+04	7.67E+04	1.99E+05	7.36E+04	6.13E+04	9.20E+04
8	FILAMENTOUS CYAN	0.00E+00	0.00E+00	1.53E+04	0.00E+00	1.53E+04	0.00E+00
8	PENNATE DIATOMS	3.07E+04	1.07E+05	7.67E+04	6.44E+04	6.13E+04	9.20E+04
8	TOTAL CELLS	3.65E+06	6.67E+06	3.30E+06	3.70E+06	4.54E+06	4.89E+06
11	CENTRIC DIATOMS	1.23E+06	2.91E+05	1.38E+05	4.60E+05	0.00E+00	6.13E+04
11	COCCOIDS	6.01E+06	2.74E+06	2.78E+06	4.39E+06	3.79E+06	4.83E+06
11	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	DINOFLAGELLATES	9.20E+04	1.07E+05	1.07E+05	1.07E+05	1.07E+05	7.67E+04
11	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	PENNATE DIATOMS	1.07E+05	1.38E+05	6.13E+04	2.61E+05	3.37E+05	1.69E+05
11	TOTAL CELLS	7.43E+06	3.28E+06	3.08E+06	5.21E+06	4.23E+06	5.14E+06
12	CENTRIC DIATOMS	8.43E+05	3.45E+04	9.20E+04	9.20E+04	1.53E+04	1.53E+05
12	COCCOIDS	2.02E+06	2.30E+06	2.01E+06	2.05E+06	2.53E+06	2.78E+06
12	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	DINOFLAGELLATES	4.60E+04	2.30E+04	6.13E+04	8.05E+04	9.20E+04	7.67E+04
12	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	PENNATE DIATOMS	3.07E+04	1.04E+05	6.13E+04	1.38E+05	1.69E+05	1.38E+05
12	TOTAL CELLS	2.94E+06	2.46E+06	2.22E+06	2.36E+06	2.81E+06	3.14E+06

Table 16 (continued) Phytoplankton Counts (lugols), (cells/liter)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
14	CENTRIC DIATOMS	0.00E+00	0.00E+00	9.20E+04	0.00E+00	0.00E+00	9.20E+03
14	COCCOIDS	1.97E+06	2.31E+06	2.79E+06	1.76E+06	3.28E+06	3.66E+06
14	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	DINOFLAGELLATES	4.60E+04	0.00E+00	3.07E+04	8.28E+04	6.13E+04	9.20E+04
14	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	1.84E+04	0.00E+00	0.00E+00
14	PENNATE DIATOMS	1.84E+04	4.60E+04	4.60E+04	1.47E+05	9.20E+04	4.60E+04
14	TOTAL CELLS	2.03E+06	2.36E+06	2.96E+06	2.01E+06	3.43E+06	3.81E+06
18	CENTRIC DIATOMS	1.15E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	COCCOIDS	1.26E+06	1.09E+06	9.38E+05	2.00E+06	1.38E+06	2.20E+06
18	COCCOLITHOPHORES	5.75E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	DINOFLAGELLATES	4.03E+04	1.01E+05	4.60E+04	1.20E+05	5.75E+04	5.75E+04
18	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	9.20E+03	0.00E+00	0.00E+00
18	PENNATE DIATOMS	1.15E+04	2.76E+04	1.10E+05	7.36E+04	3.45E+04	4.60E+04
18	TOTAL CELLS	1.33E+06	1.22E+06	1.09E+06	2.20E+06	1.47E+06	2.30E+06
19	CENTRIC DIATOMS	0.00E+00	0.00E+00	0.00E+00	9.20E+03	0.00E+00	0.00E+00
19	COCCOIDS	8.23E+05	1.04E+06	1.14E+06	1.52E+06	1.05E+06	1.46E+06
19	COCCOLITHOPHORES	1.38E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	DINOFLAGELLATES	1.84E+04	4.60E+04	4.60E+04	2.76E+04	1.84E+04	2.30E+04
19	FILAMENTOUS CYAN	0.00E+00	0.00E+00	9.20E+03	0.00E+00	0.00E+00	0.00E+00
19	PENNATE DIATOMS	9.20E+03	0.00E+00	5.52E+04	1.20E+05	7.36E+04	3.45E+04
19	TOTAL CELLS	8.64E+05	1.09E+06	1.25E+06	1.67E+06	1.14E+06	1.52E+06
22	CENTRIC DIATOMS	4.60E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E+04
22	COCCOIDS	5.82E+05	9.38E+05	1.13E+06	2.39E+06	1.36E+06	1.00E+06
22	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	DINOFLAGELLATES	9.20E+03	9.20E+04	8.28E+04	7.36E+04	2.30E+04	2.76E+04
22	FILAMENTOUS CYAN	4.60E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	PENNATE DIATOMS	0.00E+00	0.00E+00	1.01E+05	2.76E+04	4.60E+04	1.84E+04
22	TOTAL CELLS	6.00E+05	1.03E+06	1.32E+06	2.49E+06	1.43E+06	1.08E+06
23	CENTRIC DIATOMS	5.37E+04	0.00E+00	0.00E+00	2.76E+04	0.00E+00	0.00E+00
23	COCCOIDS	1.60E+06	1.36E+06	1.09E+06	2.45E+06	1.39E+06	1.61E+06
23	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	DINOFLAGELLATES	2.30E+04	3.68E+04	7.36E+04	7.36E+04	1.84E+04	1.04E+05
23	FILAMENTOUS CYAN	1.07E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	PENNATE DIATOMS	0.00E+00	0.00E+00	3.68E+04	4.60E+04	9.20E+04	9.20E+04
23	TOTAL CELLS	1.79E+06	1.40E+06	1.21E+06	2.59E+06	1.50E+06	1.81E+06
24	CENTRIC DIATOMS	0.00E+00	0.00E+00	0.00E+00	4.60E+04	0.00E+00	1.84E+04
24	COCCOIDS	3.57E+05	1.11E+06	1.23E+06	1.24E+06	1.24E+06	1.29E+06
24	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	DINOFLAGELLATES	3.83E+03	1.84E+04	1.01E+05	9.20E+03	5.52E+04	4.60E+04
24	FILAMENTOUS CYAN	7.67E+03	0.00E+00	9.20E+03	0.00E+00	0.00E+00	0.00E+00
24	PENNATE DIATOMS	3.07E+04	9.20E+03	6.44E+04	5.52E+04	1.01E+05	4.60E+04
24	TOTAL CELLS	3.99E+05	1.14E+06	1.41E+06	1.35E+06	1.40E+06	1.40E+06

Table 17 Phytoplankton Counts (formalin), (cells/liter)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
1	CENTRIC DIATOMS	5.21E+05	6.13E+05	1.44E+06	1.09E+06	2.61E+05	3.07E+04
1	COCCOIDS	7.72E+06	4.72E+06	4.03E+06	3.11E+06	2.81E+06	7.51E+06
1	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	DINOFLAGELLATES	4.60E+04	6.13E+04	1.38E+05	7.67E+04	1.53E+04	7.67E+04
1	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	PENNATE DIATOMS	6.13E+04	1.53E+04	7.67E+04	9.20E+04	0.00E+00	1.38E+05
1	TOTAL CELLS	8.35E+06	5.41E+06	5.69E+06	4.37E+06	3.08E+06	7.76E+06
4	CENTRIC DIATOMS	2.97E+06	2.27E+06	3.99E+05	0.00E+00	4.29E+05	3.22E+05
4	COCCOIDS	4.45E+06	5.34E+06	4.98E+06	2.51E+06	3.62E+06	4.77E+06
4	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	DINOFLAGELLATES	6.13E+04	7.67E+04	7.67E+04	3.68E+04	7.67E+04	7.67E+04
4	FILAMENTOUS CYAN	1.53E+04	0.00E+00	1.53E+04	0.00E+00	0.00E+00	0.00E+00
4	PENNATE DIATOMS	1.53E+04	7.67E+04	9.20E+04	3.68E+04	3.07E+04	7.67E+04
4	TOTAL CELLS	7.51E+06	7.76E+06	5.57E+06	2.59E+06	4.16E+06	5.24E+06
6	CENTRIC DIATOMS	3.42E+06	1.78E+06	2.15E+05	6.62E+05	1.10E+06	2.15E+05
6	COCCOIDS	5.80E+06	1.67E+07	3.11E+06	1.32E+06	1.87E+06	4.95E+06
6	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	DINOFLAGELLATES	1.53E+04	3.07E+04	7.67E+04	6.44E+04	6.13E+04	1.53E+05
6	FILAMENTOUS CYAN	0.00E+00	0.00E+00	1.53E+04	0.00E+00	0.00E+00	0.00E+00
6	PENNATE DIATOMS	3.07E+04	6.13E+04	1.23E+05	4.60E+04	3.07E+04	1.07E+05
6	TOTAL CELLS	9.26E+06	1.85E+07	3.54E+06	2.10E+06	3.07E+06	5.43E+06
8	CENTRIC DIATOMS	1.87E+06	6.13E+05	3.07E+04	5.52E+04	1.23E+05	2.91E+05
8	COCCOIDS	1.55E+06	1.84E+07	2.81E+06	2.03E+06	1.23E+06	2.78E+06
8	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	DINOFLAGELLATES	4.60E+04	3.07E+04	9.20E+04	7.36E+04	1.07E+05	9.20E+04
8	FILAMENTOUS CYAN	0.00E+00	0.00E+00	3.07E+04	0.00E+00	0.00E+00	0.00E+00
8	PENNATE DIATOMS	3.07E+04	6.13E+04	7.67E+04	3.68E+04	6.13E+04	1.07E+05
8	TOTAL CELLS	3.50E+06	1.91E+07	3.04E+06	2.20E+06	1.52E+06	3.27E+06
11	CENTRIC DIATOMS	8.13E+05	1.53E+05	1.53E+05	2.61E+05	2.61E+05	1.84E+05
11	COCCOIDS	4.74E+06	5.01E+06	5.80E+06	4.28E+06	2.07E+06	5.66E+06
11	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	DINOFLAGELLATES	0.00E+00	1.38E+05	9.20E+04	1.07E+05	1.23E+05	1.84E+05
11	FILAMENTOUS CYAN	1.53E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	PENNATE DIATOMS	1.53E+05	4.60E+04	9.20E+04	1.84E+05	1.23E+05	3.07E+05
11	TOTAL CELLS	5.72E+06	5.35E+06	6.13E+06	4.83E+06	2.58E+06	6.33E+06
12	CENTRIC DIATOMS	7.82E+05	1.15E+05	0.00E+00	2.88E+05	4.60E+04	0.00E+00
12	COCCOIDS	1.55E+06	1.52E+06	3.16E+06	3.67E+06	2.07E+06	5.95E+06
12	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	DINOFLAGELLATES	4.60E+04	9.20E+04	4.60E+04	1.38E+05	9.20E+04	1.99E+05
12	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	PENNATE DIATOMS	3.07E+04	5.75E+04	1.69E+05	6.90E+04	7.67E+04	9.20E+04
12	TOTAL CELLS	2.41E+06	1.78E+06	3.37E+06	4.16E+06	2.28E+06	6.24E+06

Table 17 (continued) Phytoplankton Counts (formalin), (cells/liter)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
14	CENTRIC DIATOMS	0.00E+00	1.15E+04	1.07E+05	0.00E+00	0.00E+00	0.00E+00
14	COCCOIDS	1.04E+06	8.51E+05	1.64E+06	1.58E+06	1.84E+06	1.10E+06
14	COCCOLITHOPHORES	0.00E+00	1.15E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	DINOFLAGELLATES	0.00E+00	2.30E+04	6.13E+04	1.10E+05	1.07E+05	9.20E+04
14	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	PENNATE DIATOMS	1.73E+04	2.30E+04	6.13E+04	1.10E+05	4.60E+04	5.52E+04
14	TOTAL CELLS	1.06E+06	9.20E+05	1.87E+06	1.80E+06	1.99E+06	1.25E+06
18	CENTRIC DIATOMS	1.15E+04	0.00E+00	0.00E+00	6.44E+04	0.00E+00	1.15E+04
18	COCCOIDS	1.51E+06	1.29E+06	1.27E+06	2.42E+06	1.09E+06	3.08E+06
18	COCCOLITHOPHORES	5.75E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	DINOFLAGELLATES	2.30E+04	4.60E+04	4.60E+04	1.38E+05	1.27E+05	9.20E+04
18	FILAMENTOUS CYAN	1.15E+04	0.00E+00	2.76E+04	9.20E+03	0.00E+00	0.00E+00
18	PENNATE DIATOMS	0.00E+00	1.84E+04	4.60E+04	1.01E+05	3.45E+04	1.15E+04
18	TOTAL CELLS	1.56E+06	1.35E+06	1.39E+06	2.73E+06	1.25E+06	3.20E+06
19	CENTRIC DIATOMS	4.60E+03	9.20E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	COCCOIDS	1.75E+06	2.06E+06	2.47E+06	2.16E+06	9.48E+05	1.84E+06
19	COCCOLITHOPHORES	4.60E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	DINOFLAGELLATES	4.60E+03	3.68E+04	7.36E+04	9.20E+04	7.36E+04	1.50E+05
19	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	PENNATE DIATOMS	9.20E+03	0.00E+00	4.60E+04	5.52E+04	0.00E+00	4.60E+04
19	TOTAL CELLS	1.78E+06	2.11E+06	2.59E+06	2.31E+06	1.02E+06	2.04E+06
22	CENTRIC DIATOMS	4.60E+03	0.00E+00	0.00E+00	0.00E+00	5.75E+04	0.00E+00
22	COCCOIDS	8.97E+05	8.92E+05	1.78E+06	1.58E+06	2.73E+06	1.15E+06
22	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	DINOFLAGELLATES	0.00E+00	4.60E+04	4.60E+04	6.44E+04	3.45E+04	1.01E+05
22	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	PENNATE DIATOMS	1.38E+04	2.76E+04	2.76E+04	1.84E+04	3.45E+04	1.84E+04
22	TOTAL CELLS	9.15E+05	9.66E+05	1.85E+06	1.67E+06	2.85E+06	1.27E+06
23	CENTRIC DIATOMS	0.00E+00	0.00E+00	0.00E+00	1.84E+04	0.00E+00	1.15E+04
23	COCCOIDS	1.49E+06	9.38E+05	1.97E+06	1.80E+06	9.48E+05	1.43E+06
23	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	DINOFLAGELLATES	0.00E+00	8.28E+04	6.44E+04	3.68E+04	1.56E+05	1.04E+05
23	FILAMENTOUS CYAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.20E+03	0.00E+00
23	PENNATE DIATOMS	7.67E+03	2.76E+04	1.01E+05	1.84E+04	1.84E+04	5.75E+04
23	TOTAL CELLS	1.49E+06	1.05E+06	2.13E+06	1.88E+06	1.13E+06	1.60E+06
24	CENTRIC DIATOMS	7.67E+03	0.00E+00	0.00E+00	0.00E+00	9.20E+03	0.00E+00
24	COCCOIDS	4.83E+05	1.73E+06	2.75E+06	2.22E+06	1.64E+06	1.44E+06
24	COCCOLITHOPHORES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	DINOFLAGELLATES	0.00E+00	2.76E+04	1.29E+05	6.44E+04	6.44E+04	6.44E+04
24	FILAMENTOUS CYAN	3.83E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.20E+03
24	PENNATE DIATOMS	5.37E+04	9.20E+03	7.36E+04	1.84E+04	1.20E+05	2.76E+04
24	TOTAL CELLS	5.48E+05	1.77E+06	2.95E+06	2.30E+06	1.83E+06	1.54E+06

Table 18 Zooplankton Ash Free Dry Weight, (grams/m^3)

Station	Mar	Apr	May	Jun	Jul	Aug
1	0.00128	0.14342	0.00430	0.00346	0.00159	0.00114
2	0.00290	0.02801	0.00597	0.00236	0.00139	0.00092
3	0.00333	0.00454	0.00130	0.00142	0.00258	0.00019
4	0.00333	0.00708	0.00777	0.00120	0.00099	0.00063
5	N.D.	0.00501	0.00408	0.00071	0.00463	0.00106
6	0.00350	0.03307	0.00536	0.00981	0.00767	0.00057
7	N.D.	0.02193	0.00299	0.00422	0.00208	0.00130
8	0.00359	0.00820	0.00152	0.00469	0.00059	0.00041
9	N.D.	0.01848	0.00565	0.00976	0.00423	0.00154
10	0.00419	0.00985	0.00928	0.00107	0.00054	0.00014
11	0.00208	0.03772	0.00828	0.00398	0.00036	0.00013
12	0.00160	0.01961	0.00463	0.00240	0.00517	0.00036
13	0.00146	0.02349	0.00380	0.00016	0.00032	0.00053
14	0.00093	0.00434	0.00047	0.00087	0.00086	0.00051
15	0.00072	0.00088	0.00033	0.00095	0.00049	0.00142
16	0.00160	0.00107	0.00010	0.00050	0.00053	0.00148
17	0.01067	0.00153	0.00011	0.00076	0.00038	0.00018
18	0.00093	0.00436	0.00015	0.00024	0.00041	0.00023
19	0.00110	0.00067	0.00036	0.00027	0.00038	0.00013
20	0.00204	0.00073	0.00263	0.00101	0.00086	0.00267
21	0.00200	0.00660	0.00290	0.00453	0.00040	0.00013
22	0.00377	0.00171	0.00165	0.00025	0.00014	0.00057
23	0.00173	0.00085	0.00077	0.00049	0.00024	0.00020
24	0.01099	0.00344	0.00075	0.00079	0.00048	0.00012

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	0.00097	0.00148	0.01526	0.00750	0.00216	0.02313
2	0.00023	0.00086	0.00325	0.00147	0.00272	0.00805
3	0.00032	0.00123	0.00314	0.00469	0.00222	0.00067
4	0.00024	0.00251	0.00593	0.00219	0.00135	0.00441
5	0.00091	0.00520	0.00921	0.02381	0.01341	0.01471
6	0.00252	0.00254	0.00128	0.02050	0.00468	0.01177
7	0.00074	0.00111	0.00184	0.00163	0.00710	0.00229
8	0.00024	0.00057	0.00186	0.00040	0.00548	0.00220
9	0.00035	0.00028	0.00116	0.00082	0.00236	0.00369
10	0.00095	0.00103	0.00182	0.00116	0.00301	0.00168
11	0.00025	0.00020	0.00011	0.00039	0.00073	0.00025
12	0.00014	0.00038	0.00012	0.00010	0.00047	0.00225
13	0.00022	0.00023	0.00092	0.00030	0.00269	0.00175
14	0.00034	0.00013	0.00027	0.00033	0.00171	0.00035
15	0.00072	0.00092	0.00049	0.00036	0.00023	0.00080
16	0.00077	0.00283	0.00021	0.00100	0.00079	0.00206
17	0.00029	0.00053	0.00023	0.00049	0.00075	0.00243
18	0.00011	0.00031	0.00011	0.00117	0.00063	0.00009
19	0.00030	0.00100	0.00043	0.00028	0.00033	0.00084
20	0.00025	0.00351	0.00041	0.00041	0.00100	0.00143
21	0.00015	0.00096	0.00038	0.00010	0.00033	0.00057
22	0.00032	0.00195	0.00020	0.00280	0.00018	0.00143
23	0.00042	0.00017	0.00010	0.00012	0.00072	0.00049
24	0.00023	0.00020	0.00038	0.00044	0.00169	0.00204

Table 19 Zooplankton Wet Volume (milliliters/m^3)

Station	Mar	Apr	May	Jun	Jul	Aug
1	0.10090	4.53482	0.34853	4.51827	0.08363	0.07369
2	0.13851	1.80126	0.36302	0.74803	0.08866	0.04017
3	0.13661	0.19298	0.08437	0.14118	0.13426	0.01214
4	0.27776	0.38899	0.34463	0.10891	0.05573	0.02677
5	62.04469	0.52170	0.42986	0.07367	0.47358	0.08037
6	0.11499	1.18775	0.57064	0.96421	0.20108	0.03496
7	1.12926	1.41941	0.47802	0.27179	0.15496	0.10897
8	0.25556	0.26124	0.24929	0.43203	0.03263	0.04233
9	1.48565	1.17275	0.32497	0.31601	0.16993	0.06129
10	0.23794	0.54317	0.15178	0.06235	0.03712	0.01297
11	0.15690	1.08834	0.26763	0.13962	0.02972	0.02602
12	0.14187	0.58662	0.18652	0.17204	0.25038	0.01137
13	0.08412	1.12944	0.22168	0.00934	0.03800	0.03936
14	0.03376	0.18552	0.02954	0.03375	0.04464	0.01943
15	0.04900	0.11575	0.07109	0.03942	0.02639	0.08886
16	0.07456	0.08580	0.01417	0.01852	0.03666	0.02700
17	0.34382	0.07348	0.04080	0.02711	0.01680	0.00650
18	0.04185	0.24897	0.04607	0.00778	0.03040	0.01187
19	0.04831	0.06476	0.02522	0.01519	0.03956	0.01618
20	0.60099	0.24500	0.20200	0.04390	0.04694	0.04218
21	0.07503	0.67311	0.16621	0.22722	0.04406	0.00768
22	0.12954	0.16148	0.12521	0.01380	0.01417	0.02118
23	0.10997	0.07788	0.10137	0.01807	0.00607	0.00858
24	0.31168	0.23679	0.10289	0.02859	0.02415	0.00646

Station	Sep	Oct	Nov	Dec	Jan	Feb
1	0.06421	0.09578	0.69406	0.46411	0.18723	0.02313
2	0.01245	0.03598	0.15642	0.05608	0.12605	0.00805
3	0.01891	0.27070	0.12936	0.17508	0.11285	0.00067
4	0.00523	0.15367	0.17868	0.11127	0.04808	0.00441
5	0.05335	0.21269	1.29163	1.24885	0.83843	0.01471
6	0.11620	0.49372	0.36228	0.90351	0.44980	0.01177
7	0.07066	0.08336	0.09504	0.09753	1.19876	0.00229
8	0.01678	0.02771	0.05075	0.02155	0.29404	0.00220
9	0.02578	0.22461	0.06337	0.04122	0.13056	0.00369
10	0.06663	0.03545	0.11938	0.07555	0.14844	0.00168
11	0.02471	0.01159	0.00719	0.01629	0.03318	0.00025
12	0.01294	0.00837	0.00705	0.83448	0.01716	0.00225
13	0.01430	0.01879	0.04273	0.02459	0.18823	0.00175
14	0.01603	0.01139	0.01436	2.84986	0.05932	0.00035
15	0.02645	0.02708	0.02879	0.03083	0.01250	0.00080
16	0.02684	0.04740	0.00542	2.58489	0.03358	0.00206
17	0.01066	0.00901	0.00673	0.03835	0.04191	0.00243
18	2.68259	0.00500	0.01371	3.27507	0.04116	0.00009
19	0.01468	0.33014	0.01961	0.00725	0.01622	0.00084
20	0.00836	0.09137	0.01293	0.00715	0.04765	0.00143
21	0.01394	0.02199	0.01527	0.00308	0.01769	0.00057
22	0.01833	0.06700	5.11555	0.06100	0.00883	0.00143
23	0.01443	0.03497	2.66869	2.91470	0.09828	0.00049
24	0.01471	0.02013	0.01358	3.32607	0.12654	0.00204

Table 20 Microzooplankton (numbers/liter)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
1	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E+00	0.0E+00
1	BIVALVE LARVAE	7.6E-01	3.4E+00	1.9E+00	4.6E+00	0.0E+00	0.0E+00
1	CENTRIC DIATOM	7.6E-01	3.4E+00	1.9E+00	1.5E+00	1.0E+01	2.2E+01
1	CHAETOGNATH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	COPEPOD NAUPLII	8.2E+01	1.7E+01	4.9E+01	1.1E+01	1.4E+02	2.3E+01
1	COPEPODITES	1.7E+01	0.0E+00	9.5E+00	4.6E+00	1.4E+01	1.3E+01
1	COPEPODS	9.9E+00	0.0E+00	5.1E+00	4.6E+00	1.3E+01	1.7E+01
1	CRAB ZOEA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	DINOFLAGELLATE	5.3E+00	1.3E+02	1.4E+01	3.0E+01	1.4E+01	2.0E+01
1	ECHINODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	EGGS	3.8E+00	1.4E+01	1.0E+01	1.5E+01	2.9E+00	1.3E+00
1	FILAMENTOUS CYAN	0.0E+00	3.4E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	FISH LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	GASTROPOD LARVAE	0.0E+00	0.0E+00	0.0E+00	6.1E+00	1.4E+00	1.3E+00
1	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	NAUPLII-OTHER	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E+00	5.1E+00
1	PENNATE DIATOM	3.8E+00	2.5E+02	5.1E+00	3.3E+01	5.8E+00	2.7E+01
1	POLYCHAETE LARVAE	0.0E+00	0.0E+00	0.0E+00	2.3E+00	0.0E+00	1.3E+00
1	SHRIMP LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	TINTINNID	2.3E+00	1.0E+01	1.3E+00	7.7E-01	1.4E+00	0.0E+00
4	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E+00	0.0E+00
4	BIVALVE LARVAE	1.0E+00	0.0E+00	2.3E+00	1.6E+00	0.0E+00	1.1E+00
4	CENTRIC DIATOM	0.0E+00	4.1E+00	5.9E+00	7.9E+00	1.2E+01	9.5E+00
4	CHAETOGNATH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4	COPEPOD NAUPLII	1.5E+01	1.1E+01	1.8E+01	1.6E+01	6.6E+00	5.3E+00
4	COPEPODITES	2.1E+00	0.0E+00	2.9E+00	1.0E+01	4.4E+00	1.1E+00
4	COPEPODS	3.5E-01	1.0E+00	1.6E+00	8.7E+00	7.3E-01	1.1E+00
4	CRAB ZOEA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4	DINOFLAGELLATE	2.2E+01	4.9E+01	9.8E+00	7.1E+00	1.5E+01	2.6E+01
4	ECHINODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4	EGGS	6.9E+00	1.4E+01	2.3E+00	3.9E+00	2.9E+00	3.2E+00
4	FILAMENTOUS CYAN	0.0E+00	0.0E+00	1.3E+00	1.6E+00	0.0E+00	1.1E+00
4	FISH LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4	GASTROPOD LARVAE	0.0E+00	0.0E+00	6.8E+00	7.9E+00	1.5E+00	8.4E+00
4	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4	NAUPLII-OTHER	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E-01	0.0E+00
4	PENNATE DIATOM	1.7E+00	1.6E+02	6.5E+00	2.4E+00	4.8E+01	4.0E+01
4	POLYCHAETE LARVAE	0.0E+00	1.0E+00	3.3E-01	0.0E+00	0.0E+00	0.0E+00
4	SHRIMP LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4	TINTINNID	1.0E+00	7.2E+00	3.6E+00	1.6E+00	7.3E-01	2.1E+00

Table 20 (continued) Microzooplankton (numbers/liter)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
6	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	BIVALVE LARVAE	2.4E+00	3.7E+00	2.9E+00	4.2E+00	2.3E+00	0.0E+00
6	CENTRIC DIATOM	0.0E+00	0.0E+00	9.5E-01	0.0E+00	6.8E+00	2.2E+00
6	CHAETOGNATH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	COPEPOD NAUPLII	6.9E+00	1.1E+01	2.4E+01	2.0E+01	9.0E+00	1.7E+01
6	COPEPODITES	3.6E+00	3.7E+00	7.6E+00	5.7E+00	9.0E+00	7.8E+00
6	COPEPODS	6.0E-01	0.0E+00	8.6E+00	7.1E+00	4.5E+00	6.7E+00
6	CRAB ZOEA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	DINOFLAGELLATE	2.0E+01	2.5E+02	1.5E+02	7.5E+01	2.4E+02	3.2E+01
6	ECHINODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	EGGS	3.3E+00	4.9E+00	0.0E+00	1.1E+01	1.1E+01	0.0E+00
6	FILAMENTOUS CYAN	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	FISH LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	GASTROPOD LARVAE	6.0E-01	0.0E+00	1.0E+01	2.4E+01	2.3E+00	1.1E+00
6	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	NAUPLII-OTHER	0.0E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	1.1E+00
6	PENNATE DIATOM	6.0E-01	1.3E+02	1.9E+00	1.1E+01	1.2E+02	3.3E+01
6	POLYCHAETE LARVAE	0.0E+00	1.2E+00	0.0E+00	2.8E+00	0.0E+00	0.0E+00
6	SHRIMP LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	TINTINNID	2.7E+00	0.0E+00	2.9E+00	4.2E+00	4.5E+00	1.1E+00
8	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	BIVALVE LARVAE	5.2E-01	2.0E+00	7.7E+00	2.4E+00	3.7E+00	7.5E-01
8	CENTRIC DIATOM	5.2E-01	2.7E+00	6.2E+00	8.1E-01	2.7E+00	1.5E+00
8	CHAETOGNATH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	COPEPOD NAUPLII	7.3E+00	8.1E+00	4.0E+01	1.1E+01	1.4E+01	1.5E+00
8	COPEPODITES	1.3E+00	1.3E+00	1.4E+01	1.1E+01	1.4E+01	3.7E+00
8	COPEPODS	1.0E+00	0.0E+00	7.7E+00	3.3E+00	9.6E+00	1.5E+00
8	CRAB ZOEA	2.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	DINOFLAGELLATE	1.6E+01	1.8E+01	4.5E+01	2.4E+00	1.9E+01	2.3E+01
8	ECHINODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	EGGS	1.0E+00	6.7E-01	3.1E+00	5.7E+00	1.6E+00	0.0E+00
8	FILAMENTOUS CYAN	5.2E-01	4.7E+00	1.1E+01	1.6E+00	1.1E+00	7.5E-01
8	FISH LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	GASTROPOD LARVAE	1.6E+00	6.7E-01	9.2E+00	4.9E+00	3.2E+00	0.0E+00
8	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	NAUPLII-OTHER	0.0E+00	0.0E+00	0.0E+00	1.6E+00	5.3E-01	2.2E+00
8	PENNATE DIATOM	2.5E+01	1.0E+02	1.9E+02	1.4E+01	4.5E+01	4.4E+01
8	POLYCHAETE LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	SHRIMP LARVAE	2.6E-01	0.0E+00	0.0E+00	8.1E-01	0.0E+00	0.0E+00
8	TINTINNID	1.0E+00	0.0E+00	1.5E+00	0.0E+00	1.1E+00	0.0E+00

Table 20 (continued) Microzooplankton (numbers/liter)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
11	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
11	BIVALVE LARVAE	7.4E-01	2.1E+00	2.6E+00	2.2E+00	9.3E+00	4.4E-01
11	CENTRIC DIATOM	3.0E+00	7.1E-01	6.5E-01	2.9E+00	5.8E+00	4.4E-01
11	CHAETOGNATH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E+00	0.0E+00
11	COPEPOD NAUPLII	1.6E+01	9.2E+00	1.2E+01	4.4E+00	1.4E+01	1.3E+00
11	COPEPODITES	4.8E+00	2.8E+00	2.6E+00	8.8E+00	1.2E+01	2.6E+00
11	COPEPODS	7.4E-01	7.1E-01	1.3E+00	1.5E+00	4.7E+00	4.4E-01
11	CRAB ZOEA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
11	DINOFLAGELLATE	6.7E+00	4.6E+01	3.3E+01	1.3E+01	2.1E+01	9.2E+00
11	ECHINODERM LARVAE	0.0E+00	1.4E+00	0.0E+00	1.5E+00	1.2E+00	0.0E+00
11	EGGS	1.1E+00	0.0E+00	6.5E+00	2.2E+00	4.7E+00	8.8E-01
11	FILAMENTOUS CYAN	3.7E-01	1.4E+00	6.5E-01	0.0E+00	3.5E+00	0.0E+00
11	FISH LARVAE	0.0E+00	7.1E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
11	GASTROPOD LARVAE	2.2E+00	0.0E+00	3.3E+00	7.3E-01	1.3E+01	1.8E+00
11	MEDUSAE	3.7E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
11	NAUPLII-OTHER	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
11	PENNATE DIATOM	2.6E+01	2.3E+01	3.3E+01	7.8E+01	1.7E+02	2.4E+01
11	POLYCHAETE LARVAE	3.7E-01	7.1E-01	0.0E+00	7.3E-01	1.2E+00	0.0E+00
11	SHRIMP LARVAE	7.4E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
11	TINTINNID	7.4E-01	7.1E-01	9.8E+00	7.3E-01	0.0E+00	0.0E+00
12	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	BIVALVE LARVAE	2.9E-01	2.7E+00	1.6E+00	7.7E-01	1.5E+01	2.5E-01
12	CENTRIC DIATOM	5.8E-01	8.0E+00	8.2E+00	2.3E+00	7.4E+00	1.5E+00
12	CHAETOGNATH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	COPEPOD NAUPLII	1.0E+01	1.2E+01	1.6E+01	1.0E+01	1.0E+01	2.0E+00
12	COPEPODITES	1.5E+00	0.0E+00	4.9E+00	4.6E+00	6.7E+00	7.5E-01
12	COPEPODS	5.8E-01	8.9E-01	0.0E+00	3.8E+00	2.7E+00	5.0E-01
12	CRAB ZOEA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	DINOFLAGELLATE	1.3E+01	7.5E+01	5.7E+01	1.5E+01	1.7E+01	9.8E+00
12	ECHINODERM LARVAE	0.0E+00	8.9E-01	0.0E+00	2.3E+00	0.0E+00	0.0E+00
12	EGGS	1.5E+00	9.8E+00	1.1E+01	5.4E+00	4.0E+00	1.3E+00
12	FILAMENTOUS CYAN	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.7E-01	2.5E-01
12	FISH LARVAE	2.9E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	GASTROPOD LARVAE	8.8E-01	1.8E+00	3.3E+00	3.1E+00	1.3E+00	2.5E-01
12	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	NAUPLII-OTHER	0.0E+00	8.9E-01	0.0E+00	0.0E+00	6.7E-01	0.0E+00
12	PENNATE DIATOM	7.1E+00	1.7E+01	2.8E+01	5.4E+00	3.3E+01	1.4E+01
12	POLYCHAETE LARVAE	0.0E+00	0.0E+00	0.0E+00	7.7E-01	0.0E+00	0.0E+00
12	SHRIMP LARVAE	0.0E+00	0.0E+00	0.0E+00	7.7E-01	0.0E+00	0.0E+00
12	TINTINNID	0.0E+00	2.7E+00	1.2E+01	2.3E+00	0.0E+00	0.0E+00

Table 20 (continued) Microzooplankton (numbers/liter)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
14	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	BIVALVE LARVAE	9.2E-01	9.7E-02	3.5E+00	8.9E+00	4.4E+00	2.4E+00
14	CENTRIC DIATOM	7.2E-01	2.6E+00	7.0E-01	3.8E+00	1.7E+00	5.9E-01
14	CHAETOGNATH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	COPEPOD NAUPLII	4.6E+00	2.4E+00	1.5E+01	1.3E+01	4.4E+00	4.1E+00
14	COPEPODITES	4.0E-01	1.9E-01	4.9E+00	3.2E+00	9.9E+00	8.3E+00
14	COPEPODS	2.0E-01	9.7E-02	4.2E+00	2.5E+00	3.3E+00	8.3E+00
14	CRAB ZOEA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	DINOFLAGELLATE	1.9E+00	8.3E+00	3.4E+01	2.0E+01	6.1E+00	9.5E+00
14	ECHINODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	EGGS	0.0E+00	1.7E+00	4.9E+00	1.3E+00	2.8E+00	1.2E+00
14	FILAMENTOUS CYAN	0.0E+00	5.8E-01	7.0E-01	1.3E+00	5.5E-01	0.0E+00
14	FISH LARVAE	0.0E+00	0.0E+00	0.0E+00	6.3E-01	0.0E+00	0.0E+00
14	GASTROPOD LARVAE	9.2E-01	1.9E-01	1.4E+00	3.2E+00	3.3E+00	5.3E+00
14	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	NAUPLII-OTHER	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	PENNATE DIATOM	3.3E+00	3.3E+00	3.4E+01	2.3E+01	1.7E+01	5.3E+00
14	POLYCHAETE LARVAE	0.0E+00	0.0E+00	7.0E-01	0.0E+00	0.0E+00	0.0E+00
14	SHRIMP LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	TINTINNID	0.0E+00	0.0E+00	5.6E+00	6.3E-01	0.0E+00	5.9E-01
18	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	BIVALVE LARVAE	3.0E-01	4.3E-01	0.0E+00	2.8E+00	1.3E+00	6.3E-01
18	CENTRIC DIATOM	0.0E+00	1.4E-01	0.0E+00	1.1E+00	0.0E+00	1.6E+00
18	CHAETOGNATH	1.0E-01	0.0E+00	3.5E-01	0.0E+00	0.0E+00	0.0E+00
18	COPEPOD NAUPLII	6.9E+00	4.2E+00	1.1E+01	5.1E+00	2.1E+00	6.0E+00
18	COPEPODITES	3.7E+00	4.3E-01	2.5E+00	1.1E+00	1.8E+00	3.5E+00
18	COPEPODS	3.0E-01	2.9E-01	3.5E-01	1.7E+00	3.1E-01	2.8E+00
18	CRAB ZOEA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	DINOFLAGELLATE	2.3E+00	1.0E+00	7.7E+00	1.2E+01	2.0E+00	7.2E+00
18	ECHINODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	EGGS	1.0E-01	1.9E+00	2.5E+00	5.7E-01	7.3E-01	1.3E+00
18	FILAMENTOUS CYAN	0.0E+00	0.0E+00	4.3E+01	5.1E+00	9.4E-01	0.0E+00
18	FISH LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	GASTROPOD LARVAE	1.2E+00	0.0E+00	0.0E+00	1.1E+00	5.2E-01	3.1E-01
18	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	NAUPLII-OTHER	0.0E+00	5.8E-01	7.0E-01	0.0E+00	4.2E-01	1.9E+00
18	PENNATE DIATOM	4.4E+00	9.3E+00	1.2E+01	1.4E+01	3.6E+00	1.5E+01
18	POLYCHAETE LARVAE	0.0E+00	0.0E+00	0.0E+00	5.7E-01	0.0E+00	0.0E+00
18	SHRIMP LARVAE	1.0E-01	0.0E+00	0.0E+00	0.0E+00	1.0E-01	0.0E+00
18	TINTINNID	0.0E+00	1.9E+00	4.6E+00	4.5E+00	4.2E-01	0.0E+00

Table 20 (continued) Microzooplankton (numbers/liter)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
19	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	BIVALVE LARVAE	1.6E-01	2.4E-01	2.4E-01	2.8E-01	1.0E-01	4.4E-01
19	CENTRIC DIATOM	0.0E+00	1.5E+00	4.8E-01	2.8E-01	0.0E+00	0.0E+00
19	CHAETOGNATH	0.0E+00	0.0E+00	2.4E-01	0.0E+00	1.0E-01	0.0E+00
19	COPEPOD NAUPLII	5.7E+00	2.0E+00	7.4E+00	5.8E+00	3.3E+00	2.7E+00
19	COPEPODITES	9.6E-01	3.7E-01	2.1E+00	1.1E+00	2.0E+00	1.6E+00
19	COPEPODS	8.0E-02	3.7E-01	0.0E+00	5.5E-01	1.2E+00	1.3E+00
19	CRAB ZOEA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	DINOFLAGELLATE	3.5E+00	7.3E-01	1.3E+01	9.4E+00	2.7E+00	4.4E+00
19	ECHINODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	EGGS	9.6E-01	7.3E-01	1.2E+01	1.9E+00	2.0E-01	6.7E-01
19	FILAMENTOUS CYAN	8.0E-02	0.0E+00	7.2E+00	3.9E+00	1.0E-01	0.0E+00
19	FISH LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	GASTROPOD LARVAE	4.8E-01	2.4E-01	2.4E-01	5.5E-01	2.0E-01	4.4E-01
19	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	NAUPLII-OTHER	0.0E+00	3.7E-01	1.2E+00	1.1E+00	1.2E+00	2.2E-01
19	PENNATE DIATOM	1.6E+00	2.4E+00	1.4E+01	2.2E+00	2.1E+00	4.9E+00
19	POLYCHAETE LARVAE	0.0E+00	0.0E+00	2.4E-01	0.0E+00	0.0E+00	0.0E+00
19	SHRIMP LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-01
19	TINTINNID	0.0E+00	7.3E-01	3.1E+00	3.6E+00	1.4E+00	0.0E+00
22	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	BIVALVE LARVAE	5.0E-01	0.0E+00	2.1E-01	5.8E-01	8.3E-01	0.0E+00
22	CENTRIC DIATOM	0.0E+00	4.9E-01	2.6E+00	0.0E+00	1.2E-01	2.3E-01
22	CHAETOGNATH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-01
22	COPEPOD NAUPLII	9.7E+00	4.9E-01	4.7E+00	1.3E+01	4.5E+00	3.9E+00
22	COPEPODITES	1.4E+00	3.5E+00	1.3E+00	6.9E+00	2.5E+00	3.4E+00
22	COPEPODS	4.0E-01	3.7E-01	0.0E+00	3.5E+00	1.1E+00	2.9E+00
22	CRAB ZOEA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	DINOFLAGELLATE	1.1E+00	8.6E-01	8.6E-01	4.6E+00	1.8E+00	3.4E+00
22	ECHINODERM LARVAE	0.0E+00	0.0E+00	2.1E-01	0.0E+00	0.0E+00	0.0E+00
22	EGGS	1.0E+00	2.5E-01	7.5E-01	5.8E-01	2.4E-01	2.3E-01
22	FILAMENTOUS CYAN	2.0E-01	1.2E-01	2.1E-01	1.2E+00	0.0E+00	0.0E+00
22	FISH LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	GASTROPOD LARVAE	9.0E-01	1.2E-01	5.4E-01	1.2E+00	9.5E-01	0.0E+00
22	MEDUSAE	1.0E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	NAUPLII-OTHER	0.0E+00	0.0E+00	2.1E-01	0.0E+00	9.5E-01	4.5E-01
22	PENNATE DIATOM	3.3E+00	7.0E+00	5.1E+00	4.6E+00	3.1E+00	4.5E+00
22	POLYCHAETE LARVAE	0.0E+00	1.2E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	SHRIMP LARVAE	0.0E+00	0.0E+00	0.0E+00	5.8E-01	2.4E-01	0.0E+00
22	TINTINNID	0.0E+00	3.6E+00	2.5E+00	0.0E+00	2.4E-01	2.3E-01

Table 20 (continued) Microzooplankton (numbers/liter)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
23	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	BIVALVE LARVAE	4.4E-01	3.8E-01	9.3E-02	0.0E+00	4.5E-01	0.0E+00
23	CENTRIC DIATOM	0.0E+00	2.7E-01	0.0E+00	1.0E+00	0.0E+00	1.2E-01
23	CHAETOGNATH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	COPEPOD NAUPLII	5.6E+00	1.8E+00	4.2E+00	7.1E+00	2.4E+00	3.2E+00
23	COPEPODITES	1.3E+00	5.4E-02	1.0E+00	1.0E+00	1.4E+00	9.4E-01
23	COPEPODS	0.0E+00	1.6E-01	9.3E-02	5.1E-01	7.9E-01	7.0E-01
23	CRAB ZOEA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	DINOFLAGELLATE	1.9E+00	6.5E-01	1.4E+00	3.0E+00	1.7E+00	3.9E+00
23	ECHINODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00
23	EGGS	3.3E-01	2.7E-01	6.5E-01	3.0E+00	5.6E-01	9.4E-01
23	FILAMENTOUS CYAN	3.3E-01	1.0E+00	6.5E-01	2.5E+00	2.3E-01	0.0E+00
23	FISH LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	GASTROPOD LARVAE	7.6E-01	1.1E-01	5.6E-01	0.0E+00	3.4E-01	5.8E-01
23	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	NAUPLII-OTHER	0.0E+00	0.0E+00	1.6E+00	0.0E+00	1.0E+00	1.9E+00
23	PENNATE DIATOM	1.5E+00	3.0E+00	3.6E+00	4.5E+01	6.4E+00	4.4E+00
23	POLYCHAETE LARVAE	1.1E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	SHRIMP LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-01
23	TINTINNID	0.0E+00	2.4E+00	3.1E+00	1.5E+00	6.8E-01	0.0E+00
24	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	BIVALVE LARVAE	2.7E-01	7.8E-01	4.0E-01	3.9E+00	1.5E+00	1.3E+00
24	CENTRIC DIATOM	0.0E+00	3.1E-01	1.4E+00	1.3E+00	5.5E-01	3.3E+00
24	CHAETOGNATH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.6E-01
24	COPEPOD NAUPLII	3.4E+00	5.0E+00	6.3E+00	1.3E+01	3.2E+00	2.9E+01
24	COPEPODITES	4.5E-01	9.4E-01	1.4E+00	5.1E+00	9.8E-01	2.1E+01
24	COPEPODS	3.6E-01	9.4E-01	7.9E-01	2.6E+00	8.7E-01	2.6E+01
24	CRAB ZOEA	0.0E+00	0.0E+00	0.0E+00	1.9E+00	0.0E+00	0.0E+00
24	DINOFLAGELLATE	1.5E+00	3.1E+00	5.8E+00	9.6E+00	2.3E+00	3.3E+01
24	ECHINODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	6.4E-01	0.0E+00	0.0E+00
24	EGGS	7.2E-01	1.6E-01	4.4E+00	0.0E+00	8.7E-01	6.6E-01
24	FILAMENTOUS CYAN	9.0E-02	2.8E+00	1.6E+00	1.3E+00	1.1E-01	0.0E+00
24	FISH LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	GASTROPOD LARVAE	5.4E-01	4.7E-01	1.4E+00	2.6E+00	6.6E-01	2.6E+00
24	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	NAUPLII-OTHER	0.0E+00	3.1E-01	0.0E+00	0.0E+00	4.4E-01	6.6E-01
24	PENNATE DIATOM	9.5E+00	6.1E+00	1.2E+01	2.3E+01	4.7E+00	5.9E+00
24	POLYCHAETE LARVAE	9.0E-02	0.0E+00	0.0E+00	0.0E+00	1.1E-01	0.0E+00
24	SHRIMP LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-01	0.0E+00
24	TINTINNID	2.7E-01	7.8E-01	3.4E+00	3.2E+00	2.3E+00	0.0E+00

Table 21 Zooplankton (numbers/m^3)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
1	AMPHIPOD	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	BARNACLE NAUPLII	3.4E-01	2.4E-01	0.0E+00	1.6E+00	0.0E+00	9.5E-01
1	BIVALVE LARVAE	0.0E+00	3.4E+00	0.0E+00	3.8E-01	3.8E+00	2.9E+00
1	CHAETOGNATH	1.0E+00	2.2E-01	0.0E+00	1.3E+00	3.4E-02	1.1E+01
1	CLADOCERANS	0.0E+00	4.9E-01	0.0E+00	1.5E+00	9.1E+00	0.0E+00
1	COPEPOD	2.3E+04	1.7E+02	4.1E+02	3.1E+02	9.8E+02	5.1E+03
1	CRAB MEGALOPA	0.0E+00	0.0E+00	0.0E+00	3.3E-01	2.7E-01	7.7E-01
1	CRAB ZOEA	4.7E+00	1.9E+00	1.6E+00	7.1E+00	9.9E+00	8.1E+00
1	ECHNIODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	EGGS (FISH)	1.5E+00	1.6E+01	0.0E+00	2.4E+01	2.4E-01	5.2E+00
1	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	FISH LARVAE	5.6E+00	2.0E-01	3.4E-01	3.2E-02	1.0E+00	7.1E-01
1	FLATWORMS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	GASTROPOD LARVAE	0.0E+00	3.2E+00	0.0E+00	7.6E-01	8.2E-01	9.5E-01
1	ISOPOD	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1	LARVACEANS	0.0E+00	1.2E+01	0.0E+00	3.8E-01	8.2E-01	1.1E+01
1	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	3.2E-02	0.0E+00	2.4E-01
1	OSTRACOD	5.1E-01	8.9E-02	0.0E+00	1.3E-01	0.0E+00	0.0E+00
1	POLYCHAETE LARVAE	0.0E+00	3.5E-01	5.2E-01	0.0E+00	0.0E+00	0.0E+00
1	SHRIMP JUVENILE	0.0E+00	6.6E-02	0.0E+00	1.3E-01	3.8E-01	2.3E+00
1	SHRIMP LARVAE	2.2E+00	1.2E+00	7.1E-01	4.8E+00	4.7E+00	1.5E+01
1	TINTINNID	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4	AMPHIPOD	1.5E-02	0.0E+00	0.0E+00	0.0E+00	1.7E-02	0.0E+00
4	BARNACLE NAUPLII	1.9E+00	8.7E-01	0.0E+00	2.6E-01	2.0E-01	0.0E+00
4	BIVALVE LARVAE	4.8E-01	9.5E-01	0.0E+00	3.9E-01	5.4E-01	0.0E+00
4	CHAETOGNATH	9.6E-01	1.9E-01	6.1E-02	1.4E+00	1.0E-01	2.4E+00
4	CLADOCERANS	0.0E+00	2.3E-01	6.1E-02	0.0E+00	0.0E+00	0.0E+00
4	COPEPOD	3.6E+03	8.0E+01	3.6E+01	1.9E+02	1.7E+02	1.3E+02
4	CRAB MEGALOPA	3.0E-02	0.0E+00	0.0E+00	1.2E-01	0.0E+00	3.2E-01
4	CRAB ZOEA	4.8E+00	5.5E+00	1.6E+01	8.9E+00	1.5E+01	7.8E-01
4	ECHNIODERM LARVAE	4.8E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4	EGGS (FISH)	7.3E+01	1.2E+01	1.7E+00	0.0E+00	1.2E+01	6.8E-01
4	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4	FISH LARVAE	7.5E+01	4.7E-02	3.1E-02	6.6E-02	3.4E-02	9.8E-02
4	FLATWORMS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-02	0.0E+00
4	GASTROPOD LARVAE	8.4E+01	1.5E+00	1.3E+00	1.3E+01	5.4E-01	2.9E-01
4	ISOPOD	1.5E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-02	0.0E+00
4	LARVACEANS	1.8E+02	6.8E-01	3.1E-01	9.2E-01	1.3E-01	4.9E-01
4	MEDUSAE	3.1E-01	1.5E-01	6.1E-02	4.9E-02	0.0E+00	0.0E+00
4	OSTRACOD	2.3E+01	1.5E-01	6.1E-02	1.3E-01	0.0E+00	7.8E-01
4	POLYCHAETE LARVAE	5.0E+01	3.8E-02	6.1E-02	9.9E-02	3.4E-02	2.4E-02
4	SHRIMP JUVENILE	9.0E-02	4.7E-02	3.1E-02	4.9E-02	1.7E-01	2.1E+00
4	SHRIMP LARVAE	2.4E+00	6.1E-01	7.3E-01	1.4E+00	5.5E+00	1.6E+00
4	TINTINNID	7.2E-01	0.0E+00	1.2E-01	8.2E-02	0.0E+00	0.0E+00

Table 21 (continued) Zooplankton (numbers/m^3)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
6	AMPHIPOD	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	BARNACLE NAUPLII	1.9E-01	1.8E+01	5.0E-01	2.0E-01	3.4E-01	0.0E+00
6	BIVALVE LARVAE	1.2E+00	3.7E+00	3.1E-02	1.8E-01	6.9E+00	5.1E-01
6	CHAETOGNATH	1.5E+00	1.6E+00	7.8E-02	4.4E-01	1.4E+01	3.1E+01
6	CLADOCERANS	0.0E+00	1.1E+00	5.0E-01	2.9E-02	0.0E+00	0.0E+00
6	COPEPOD	3.7E+03	1.2E+03	1.1E+02	4.4E+01	5.8E+02	7.1E+02
6	CRAB MEGALOPA	3.8E-02	0.0E+00	0.0E+00	5.8E-02	4.3E-02	5.7E-01
6	CRAB ZOEA	6.0E+01	3.9E+00	1.5E+00	1.5E+01	2.6E+01	8.6E+00
6	ECHNIODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	EGGS (FISH)	4.1E+01	1.8E+00	7.5E+00	6.4E-01	3.1E+00	4.0E+01
6	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	FISH LARVAE	3.6E-01	6.7E-02	3.1E-02	2.9E-02	3.9E-01	1.9E-01
6	FLATWORMS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	GASTROPOD LARVAE	1.8E+00	9.1E+00	8.7E-01	9.9E-01	4.5E+00	2.5E+00
6	ISOPOD	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	LARVACEANS	0.0E+00	8.0E-01	4.7E-02	5.8E-02	6.9E-01	7.1E+00
6	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	1.2E-01	0.0E+00	0.0E+00
6	OSTRACOD	1.2E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	POLYCHAETE LARVAE	1.5E-01	6.7E-01	3.1E-02	4.1E-01	6.9E-01	0.0E+00
6	SHRIMP JUVENILE	7.7E-02	5.0E-02	1.6E-02	6.4E-01	4.5E+00	3.1E+00
6	SHRIMP LARVAE	5.6E+01	9.1E+00	5.0E+00	4.4E+00	2.0E+01	4.8E+01
6	TINTINNID	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	AMPHIPOD	6.6E-02	6.0E-01	0.0E+00	1.8E-02	1.4E-02	0.0E+00
8	BARNACLE NAUPLII	2.7E-01	6.7E-02	0.0E+00	2.4E-01	5.7E-02	0.0E+00
8	BIVALVE LARVAE	2.8E-02	3.3E-01	0.0E+00	3.7E-02	1.5E+00	0.0E+00
8	CHAETOGNATH	4.7E-01	6.7E-01	2.1E-02	5.5E-02	1.7E-01	4.7E-01
8	CLADOCERANS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	COPEPOD	8.6E+02	1.1E+03	1.1E+01	3.8E+01	4.8E+01	9.4E+01
8	CRAB MEGALOPA	0.0E+00	0.0E+00	0.0E+00	1.8E-02	0.0E+00	1.7E-02
8	CRAB ZOEA	3.0E-01	6.0E-01	4.2E-01	1.2E+01	2.9E-01	3.1E+00
8	ECHNIODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	EGGS (FISH)	1.7E-01	2.0E-01	2.0E+00	3.7E-01	0.0E+00	2.7E-01
8	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	FISH LARVAE	9.5E-02	3.5E-01	2.1E-02	1.8E-02	1.4E-02	3.3E-02
8	FLATWORMS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-02	0.0E+00
8	GASTROPOD LARVAE	2.3E-01	4.7E-01	1.5E-01	6.3E-01	1.1E+00	2.0E-01
8	ISOPOD	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	LARVACEANS	2.8E-02	0.0E+00	0.0E+00	0.0E+00	2.9E-02	0.0E+00
8	MEDUSAE	9.0E-03	6.7E-02	6.3E-02	0.0E+00	2.9E-02	0.0E+00
8	OSTRACOD	1.1E-01	1.3E-01	2.1E-02	3.1E-01	1.4E-02	0.0E+00
8	POLYCHAETE LARVAE	3.8E-02	2.7E-01	3.8E-01	1.1E-01	2.9E-02	0.0E+00
8	SHRIMP JUVENILE	3.4E-01	5.3E-01	4.2E-02	0.0E+00	7.6E+00	1.8E-01
8	SHRIMP LARVAE	7.9E+00	1.7E+01	3.0E+00	3.3E+00	0.0E+00	2.2E+01
8	TINTINNID	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Table 21 (continued) Zooplankton (numbers/m^3)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
11	AMPHIPOD	0.0E+00	0.0E+00	4.5E-02	0.0E+00	0.0E+00	0.0E+00
11	BARNACLE NAUPLII	1.2E-01	1.9E+00	3.0E-02	7.7E-02	3.5E-01	0.0E+00
11	BIVALVE LARVAE	3.4E+01	7.8E-01	1.5E-02	1.5E-02	6.1E-01	2.0E-01
11	CHAETOGNATH	2.4E+01	3.3E+00	0.0E+00	1.5E-02	4.1E-02	6.2E-02
11	CLADOCERANS	0.0E+00	1.6E-01	0.0E+00	0.0E+00	1.8E-01	0.0E+00
11	COPEPOD	5.4E+03	6.9E+02	1.1E+00	2.3E+00	8.7E+00	7.8E+00
11	CRAB MEGALOPA	8.2E-02	9.7E-03	0.0E+00	0.0E+00	0.0E+00	1.5E-02
11	CRAB ZOEA	3.4E+01	4.4E+00	1.0E+00	5.4E-01	6.9E-01	3.4E-01
11	ECHNIODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	4.5E-01	0.0E+00	0.0E+00
11	EGGS (FISH)	8.2E-02	1.3E+00	5.9E-01	6.2E-02	4.5E-01	2.2E-01
11	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
11	FISH LARVAE	4.9E-01	2.0E-01	1.5E-02	0.0E+00	0.0E+00	0.0E+00
11	FLATWORMS	0.0E+00	0.0E+00	0.0E+00	7.7E-02	2.0E-02	3.1E-02
11	GASTROPOD LARVAE	1.0E+02	4.2E+01	1.2E-01	2.0E-01	3.1E-01	2.3E-01
11	ISOPOD	0.0E+00	9.7E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00
11	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
11	LARVACEANS	4.1E-02	2.0E+00	1.5E-02	0.0E+00	2.0E-02	0.0E+00
11	MEDUSAE	2.9E-01	2.1E+00	4.5E-02	0.0E+00	0.0E+00	1.5E-02
11	OSTRACOD	1.2E-01	7.8E-02	0.0E+00	1.5E-02	4.1E-02	0.0E+00
11	POLYCHAETE LARVAE	2.9E-01	0.0E+00	3.0E-02	4.6E-02	2.0E-02	0.0E+00
11	SHRIMP JUVENILE	1.2E-01	6.8E-02	0.0E+00	0.0E+00	1.2E-01	3.1E-02
11	SHRIMP LARVAE	4.3E+01	1.4E+01	1.3E+00	1.1E-01	1.6E+00	3.1E-01
11	TINTINNID	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	AMPHIPOD	0.0E+00	0.0E+00	9.1E-02	0.0E+00	0.0E+00	0.0E+00
12	BARNACLE NAUPLII	3.4E-01	6.4E-01	0.0E+00	2.0E-01	0.0E+00	0.0E+00
12	BIVALVE LARVAE	1.7E+00	9.1E-02	0.0E+00	0.0E+00	6.6E-02	3.4E-01
12	CHAETOGNATH	1.4E+02	2.2E+00	1.5E-01	5.2E-01	0.0E+00	1.2E+00
12	CLADOCERANS	0.0E+00	1.4E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	COPEPOD	1.2E+03	5.2E+02	1.0E+00	1.3E+01	8.1E-01	6.7E+01
12	CRAB MEGALOPA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-02
12	CRAB ZOEA	3.6E+01	1.5E+00	4.4E+00	4.6E+00	4.4E-02	6.8E-01
12	ECHNIODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	6.7E-01	0.0E+00	0.0E+00
12	EGGS (FISH)	2.4E-01	2.2E+00	1.8E-01	3.5E-01	0.0E+00	5.7E-01
12	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	FISH LARVAE	2.6E-01	9.1E-02	0.0E+00	1.7E-02	0.0E+00	0.0E+00
12	FLATWORMS	0.0E+00	0.0E+00	0.0E+00	1.7E-02	8.8E-02	0.0E+00
12	GASTROPOD LARVAE	7.1E+01	1.4E+00	1.5E-01	3.3E-01	1.1E-01	1.1E-01
12	ISOPOD	0.0E+00	4.5E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-02	0.0E+00
12	LARVACEANS	0.0E+00	7.3E-01	3.0E-02	0.0E+00	4.4E-02	0.0E+00
12	MEDUSAE	3.4E-01	2.7E-01	7.6E-02	0.0E+00	0.0E+00	0.0E+00
12	OSTRACOD	6.9E-01	3.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	POLYCHAETE LARVAE	2.1E-02	0.0E+00	1.4E-01	0.0E+00	4.4E-02	0.0E+00
12	SHRIMP JUVENILE	2.1E-02	3.4E-02	1.5E-02	1.8E-01	0.0E+00	2.4E-01
12	SHRIMP LARVAE	2.7E+01	7.3E+00	8.2E+00	5.9E+00	2.6E-01	5.7E-01
12	TINTINNID	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Table 21 (continued) Zooplankton (numbers/m^3)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
14	AMPHIPOD	0.0E+00	7.6E-02	0.0E+00	0.0E+00	3.6E-02	0.0E+00
14	BARNACLE NAUPLII	2.1E-02	7.6E-02	0.0E+00	1.9E-02	0.0E+00	0.0E+00
14	BIVALVE LARVAE	1.5E+00	3.4E-01	1.9E-02	1.9E-02	0.0E+00	5.9E-02
14	CHAETOGNATH	3.2E+00	3.4E-01	3.9E-02	0.0E+00	8.9E-02	2.8E-01
14	CLADOCERANS	0.0E+00	3.8E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	COPEPOD	2.0E+03	9.4E+01	4.5E+00	1.1E+00	1.1E+01	3.4E+01
14	CRAB MEGALOPA	0.0E+00	1.9E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	CRAB ZOEA	2.4E+01	2.4E+00	1.4E+00	4.9E-01	1.8E-02	2.4E-01
14	ECHNIODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	EGGS (FISH)	3.1E-02	7.6E-02	9.3E-01	1.1E-01	0.0E+00	3.9E-02
14	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	FISH LARVAE	1.5E-01	7.6E-02	3.9E-02	0.0E+00	3.6E-02	3.9E-02
14	FLATWORMS	0.0E+00	0.0E+00	1.2E-01	2.8E-01	0.0E+00	0.0E+00
14	GASTROPOD LARVAE	1.2E+02	3.6E+00	7.8E-02	5.7E-02	0.0E+00	4.1E-01
14	ISOPOD	0.0E+00	4.7E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	LARVACEANS	1.0E-02	3.8E-02	0.0E+00	0.0E+00	0.0E+00	2.0E-02
14	MEDUSAE	5.2E-02	3.8E-02	0.0E+00	0.0E+00	5.3E-02	0.0E+00
14	OSTRACOD	1.0E-02	1.5E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	POLYCHAETE LARVAE	0.0E+00	0.0E+00	1.4E-01	1.9E-02	1.1E-01	0.0E+00
14	SHRIMP JUVENILE	3.1E-02	4.7E-02	0.0E+00	5.7E-02	0.0E+00	2.0E-02
14	SHRIMP LARVAE	3.0E+01	2.1E+00	1.1E+00	4.9E-01	3.0E-01	1.5E+00
14	TINTINNID	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	AMPHIPOD	0.0E+00	0.0E+00	0.0E+00	1.0E-01	3.4E-02	0.0E+00
18	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	1.7E-02	0.0E+00	0.0E+00
18	BIVALVE LARVAE	6.2E-02	0.0E+00	0.0E+00	0.0E+00	1.7E-02	0.0E+00
18	CHAETOGNATH	4.7E+00	0.0E+00	2.0E-02	6.7E-02	1.7E-02	2.1E-02
18	CLADOCERANS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	COPEPOD	8.7E+02	9.5E+00	5.3E+00	2.7E+00	4.4E+00	1.3E+01
18	CRAB MEGALOPA	0.0E+00	1.2E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	CRAB ZOEA	1.8E+01	1.6E-01	1.4E-01	8.3E-02	1.7E-02	4.3E-02
18	ECHNIODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	EGGS (FISH)	7.1E-02	0.0E+00	2.0E-02	3.3E-02	1.7E-02	0.0E+00
18	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.2E+01	0.0E+00
18	FISH LARVAE	5.7E-01	2.5E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	FLATWORMS	0.0E+00	0.0E+00	0.0E+00	3.3E-02	0.0E+00	0.0E+00
18	GASTROPOD LARVAE	9.9E-01	3.6E-01	1.6E-01	1.7E-02	3.4E-02	1.5E-01
18	ISOPOD	1.8E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	LARVACEANS	0.0E+00	1.2E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-02	0.0E+00
18	OSTRACOD	3.5E-02	6.2E-02	2.0E-02	0.0E+00	0.0E+00	0.0E+00
18	POLYCHAETE LARVAE	0.0E+00	3.7E-02	0.0E+00	0.0E+00	1.0E-01	0.0E+00
18	SHRIMP JUVENILE	1.8E-02	1.2E-02	1.4E-01	0.0E+00	0.0E+00	0.0E+00
18	SHRIMP LARVAE	8.3E+00	3.2E-01	4.7E-01	1.2E-01	2.1E-01	4.7E-01
18	TINTINNID	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Table 21 (continued) Zooplankton (numbers/m^3)

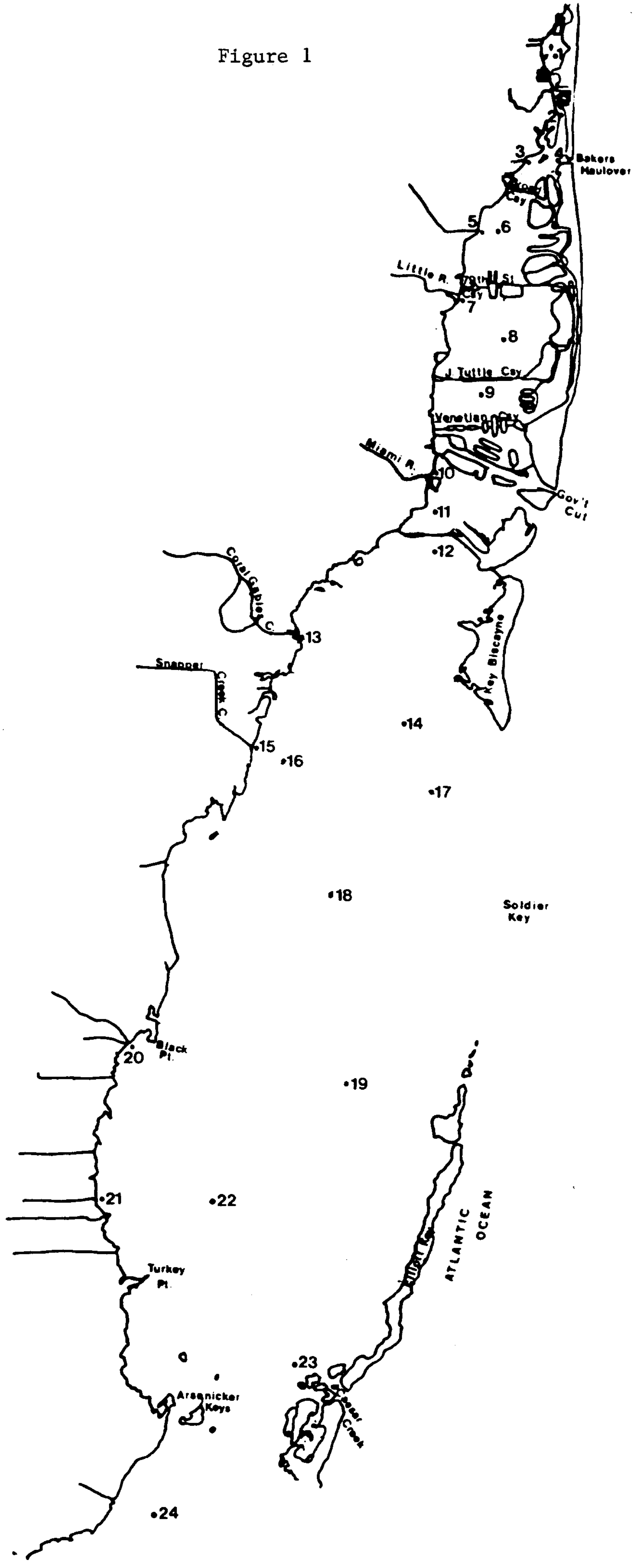
Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
19	AMPHIPOD	0.0E+00	0.0E+00	0.0E+00	1.5E-01	3.6E-02	0.0E+00
19	BARNACLE NAUPLII	0.0E+00	1.1E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	BIVALVE LARVAE	0.0E+00	2.2E-02	0.0E+00	1.5E-02	0.0E+00	0.0E+00
19	CHAETOGNATH	1.1E-01	2.4E-01	2.8E-01	2.2E-01	1.8E-02	3.5E-02
19	CLADOCERANS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	COPEPOD	0.0E+00	2.9E+01	7.1E+00	3.6E+01	1.5E+01	7.3E+01
19	CRAB MEGALOPA	3.9E+01	0.0E+00	1.6E-02	2.9E-02	0.0E+00	0.0E+00
19	CRAB ZOEA	0.0E+00	1.2E-01	1.9E-01	7.3E-01	1.8E-01	7.4E-01
19	ECHNIODERM LARVAE	9.8E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	EGGS (FISH)	0.0E+00	5.5E-02	1.6E-02	7.3E-02	1.8E-02	3.5E-02
19	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	FISH LARVAE	5.6E-02	1.2E-01	8.1E-02	1.5E-02	0.0E+00	1.8E-02
19	FLATWORMS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	GASTROPOD LARVAE	2.3E-01	4.9E-01	4.9E-02	9.3E-01	7.2E-02	0.0E+00
19	ISOPOD	9.0E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	LARVACEANS	0.0E+00	8.8E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	OSTRACOD	9.0E-03	3.3E-02	0.0E+00	5.8E-02	0.0E+00	0.0E+00
19	POLYCHAETE LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	SHRIMP JUVENILE	1.3E-01	0.0E+00	2.9E-01	7.3E-02	0.0E+00	5.4E-01
19	SHRIMP LARVAE	1.6E+00	6.7E-01	7.8E-01	1.4E+00	1.0E+00	4.0E+00
19	TINTINNID	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	AMPHIPOD	0.0E+00	1.1E-02	0.0E+00	2.9E+00	0.0E+00	5.1E-02
22	BARNACLE NAUPLII	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	BIVALVE LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-01	0.0E+00
22	CHAETOGNATH	1.3E+01	2.1E-01	1.1E-01	2.9E+00	2.6E+00	3.3E+00
22	CLADOCERANS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	COPEPOD	1.4E+03	6.4E+00	1.4E+00	8.8E+01	1.3E+02	1.0E+02
22	CRAB MEGALOPA	0.0E+00	0.0E+00	1.8E-02	0.0E+00	4.4E-02	0.0E+00
22	CRAB ZOEA	1.7E+01	8.8E-02	1.6E-01	3.6E+01	1.2E+01	1.3E+00
22	ECHNIODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	EGGS (FISH)	0.0E+00	1.1E-02	1.8E-02	4.2E-02	0.0E+00	1.4E-01
22	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	FISH LARVAE	7.2E-02	1.3E-01	5.3E-02	5.6E-02	0.0E+00	5.1E-02
22	FLATWORMS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	GASTROPOD LARVAE	1.3E+00	9.7E-01	1.4E-01	7.1E-02	4.7E-01	1.7E-02
22	ISOPOD	2.7E-02	2.2E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	LARVACEANS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	MEDUSAE	3.5E-01	2.4E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	OSTRACOD	0.0E+00	6.6E-02	0.0E+00	9.0E+00	0.0E+00	3.4E-02
22	POLYCHAETE LARVAE	1.8E-02	2.2E-02	0.0E+00	4.2E-02	0.0E+00	0.0E+00
22	SHRIMP JUVENILE	5.4E-02	1.1E-02	7.8E-01	2.8E-02	4.4E-02	1.7E-02
22	SHRIMP LARVAE	8.4E+00	2.0E-01	1.4E-01	3.1E+01	6.4E+00	5.1E-01
22	TINTINNID	0.0E+00	1.1E-02	3.5E-02	0.0E+00	0.0E+00	0.0E+00

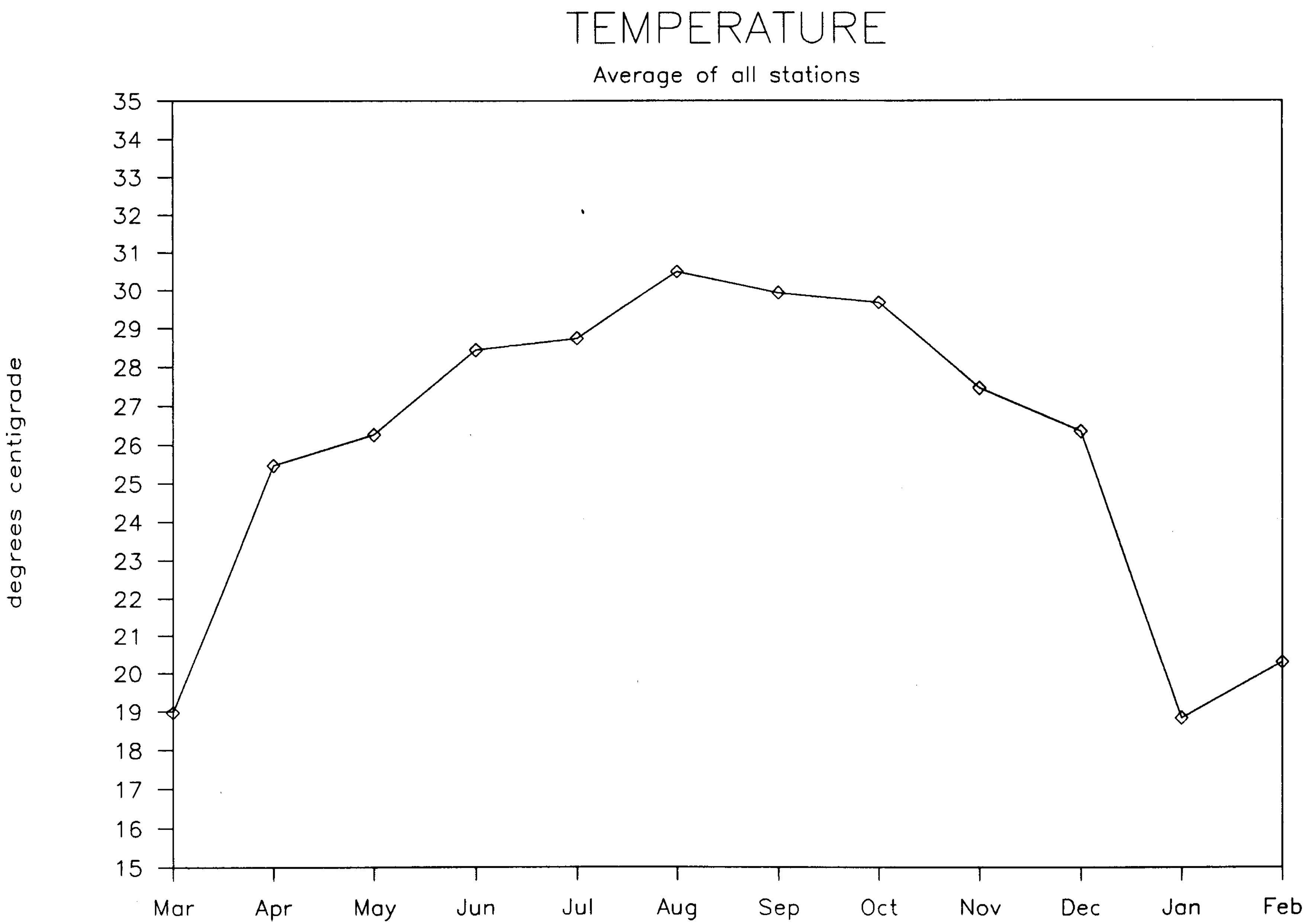
Table 21 (continued) Zooplankton (numbers/m^3)

Sta	Group	Apr	Jun	Aug	Oct	Dec	Feb
23	AMPHIPOD	0.0E+00	1.2E-02	0.0E+00	7.9E-02	0.0E+00	6.4E-02
23	BARNACLE NAUPLII	1.0E-02	0.0E+00	1.4E-02	1.6E-02	0.0E+00	1.6E-02
23	BIVALVE LARVAE	0.0E+00	0.0E+00	0.0E+00	4.8E-02	0.0E+00	2.1E-01
23	CHAETOGNATH	1.2E+00	4.8E-02	0.0E+00	3.2E-02	0.0E+00	3.5E-01
23	CLADOCERANS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	COPEPOD	2.4E+02	1.7E+01	1.6E+00	5.1E+00	2.0E+00	1.5E+01
23	CRAB MEGALOPA	1.0E-02	3.6E-02	1.4E-02	0.0E+00	0.0E+00	0.0E+00
23	CRAB ZOEA	6.6E-01	2.0E-01	6.0E-01	1.3E+00	2.4E-01	5.8E-01
23	ECHNIODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	EGGS (FISH)	2.5E-01	4.8E-02	5.7E-02	7.9E-02	7.3E-02	1.6E-01
23	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	FISH LARVAE	3.1E-02	1.2E-02	2.9E-02	1.6E-02	0.0E+00	0.0E+00
23	FLATWORMS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	GASTROPOD LARVAE	1.2E-01	1.9E+00	8.6E-02	1.7E-01	3.6E-02	2.1E-01
23	ISOPOD	1.0E-02	3.6E-02	0.0E+00	3.2E-02	0.0E+00	0.0E+00
23	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	LARVACEANS	0.0E+00	0.0E+00	1.4E-02	0.0E+00	0.0E+00	0.0E+00
23	MEDUSAE	2.4E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.6E-02
23	OSTRACOD	0.0E+00	3.6E-02	0.0E+00	2.5E-01	0.0E+00	0.0E+00
23	POLYCHAETE LARVAE	8.3E-02	1.2E-02	1.4E-02	1.6E-02	0.0E+00	0.0E+00
23	SHRIMP JUVENILE	2.2E-01	7.2E-02	4.4E-01	0.0E+00	0.0E+00	1.6E-02
23	SHRIMP LARVAE	1.2E+00	9.6E-02	1.1E+00	1.3E+00	2.4E-01	1.3E+00
23	TINTINNID	0.0E+00	2.4E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	AMPHIPOD	0.0E+00	0.0E+00	0.0E+00	2.0E-02	2.0E-02	0.0E+00
24	BARNACLE NAUPLII	0.0E+00	4.6E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	BIVALVE LARVAE	2.0E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.6E-01
24	CHAETOGNATH	1.9E+00	6.9E-01	0.0E+00	6.0E-02	3.9E-02	5.7E+00
24	CLADOCERANS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	COPEPOD	7.3E+02	9.1E+01	4.4E-01	2.0E+00	1.1E+00	2.8E+02
24	CRAB MEGALOPA	0.0E+00	0.0E+00	0.0E+00	7.4E-01	0.0E+00	0.0E+00
24	CRAB ZOEA	3.8E+00	2.0E+00	1.5E-01	0.0E+00	7.8E-02	8.4E-01
24	ECHNIODERM LARVAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.8E-01
24	EGGS (FISH)	6.7E-01	2.3E-02	4.8E-02	4.0E-02	0.0E+00	0.0E+00
24	EGGS (INVERT)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E+01	0.0E+00
24	FISH LARVAE	1.4E-01	0.0E+00	8.1E-02	4.0E-02	2.0E-02	1.7E-02
24	FLATWORMS	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	GASTROPOD LARVAE	7.4E-01	6.9E-01	3.6E-01	4.0E-02	0.0E+00	9.8E-01
24	ISOPOD	2.5E-02	1.1E-02	1.6E-02	0.0E+00	0.0E+00	0.0E+00
24	JELLYFISH	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	LARVACEANS	0.0E+00	4.6E-02	6.5E-02	0.0E+00	5.9E-02	0.0E+00
24	MEDUSAE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	OSTRACOD	1.3E-01	1.4E-01	1.6E-02	0.0E+00	0.0E+00	0.0E+00
24	POLYCHAETE LARVAE	6.7E-02	1.1E-02	0.0E+00	2.0E-02	3.9E-02	0.0E+00
24	SHRIMP JUVENILE	4.2E-02	8.0E-02	0.0E+00	0.0E+00	0.0E+00	7.0E-02
24	SHRIMP LARVAE	5.4E+00	1.5E+00	1.6E-01	7.0E-01	1.4E-01	9.8E-01
24	TINTINNID	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

FIGURES

Figure 1


3
4
Bakers Haulover
5
6
Little R.
79th St Cswy
7
8
J Tuttle Cswy
9
Venetian Cswy
Miami R.
10
Gov't Cut
11
12
Coral Gables C.
13
Snapper Creek C.
Key Biscayne
14
15
16
17
18
Soldier Key
Black Pt.
20
19
21
22
ATLANTIC OCEAN
Elliott Key
Turkey Pt.
23
Arsenicker Keys
Caesar Creek
24



TEMPERATURE
Average of all stations
degrees centigrade
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb

Figure 2

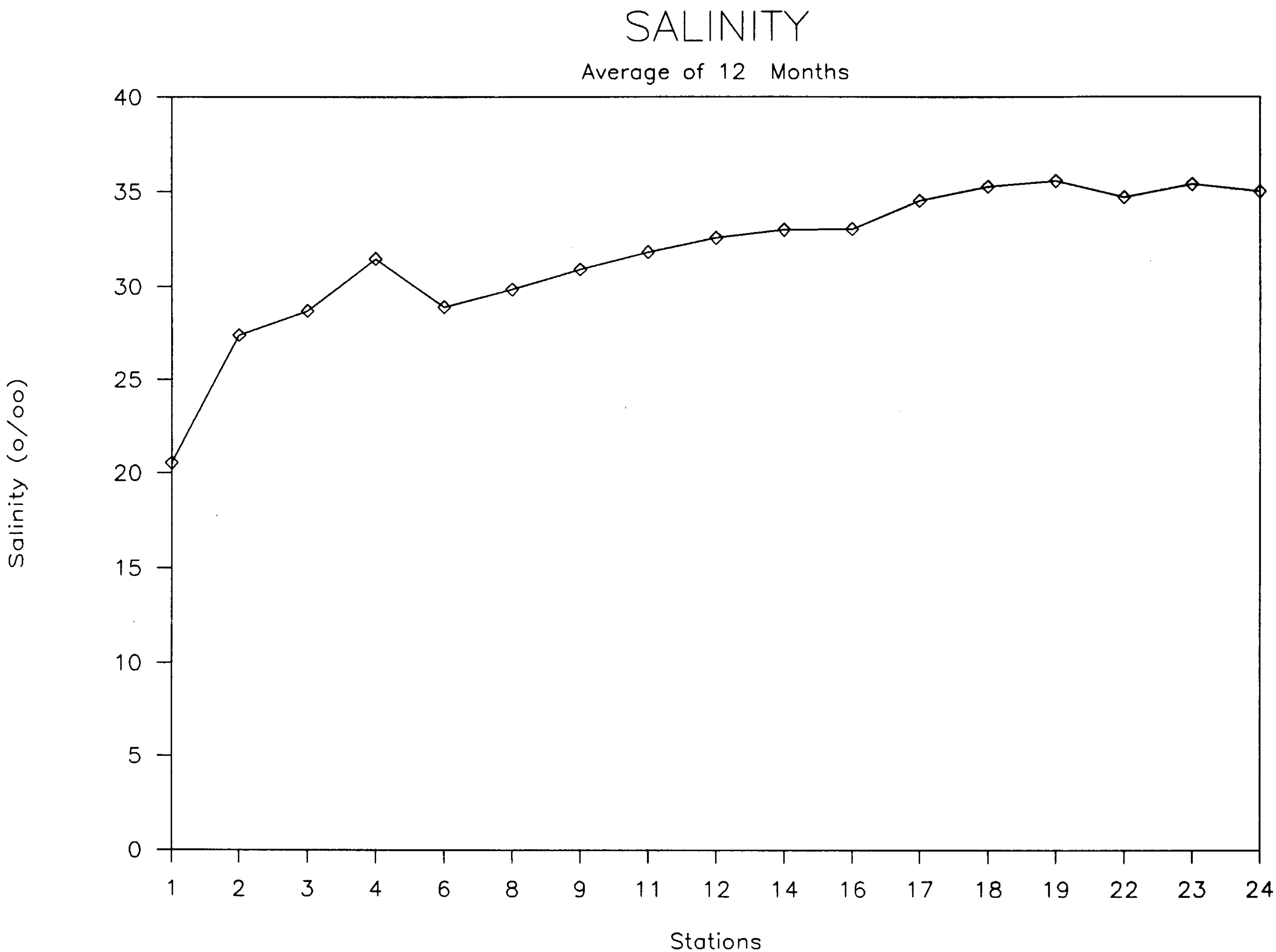
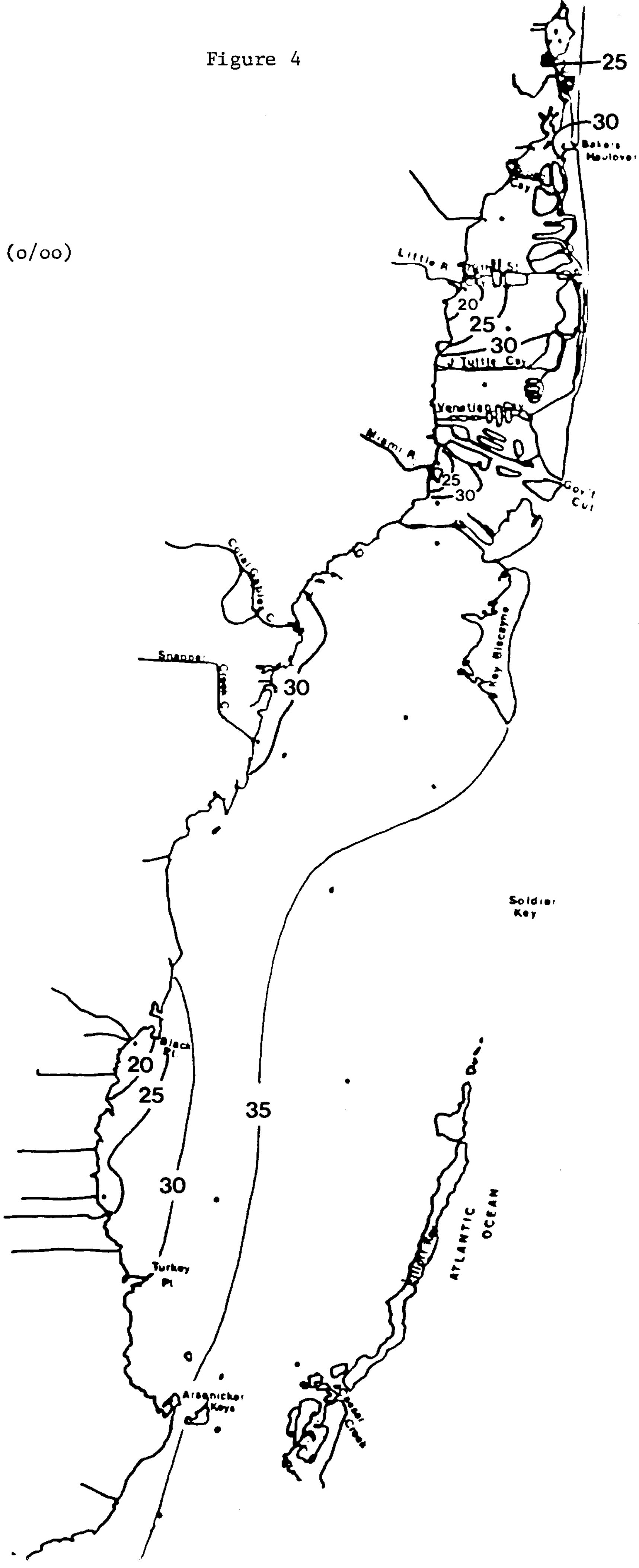

SALINITY
Average of 12 Months
Salinity (o/oo)
40
35
30
25
20
15
10
5
0
1
2
3
4
6
8
9
11
12
14
16
17
18
19
22
23
24
Stations

Figure 3

Figure 4

Salinity (o/oo)



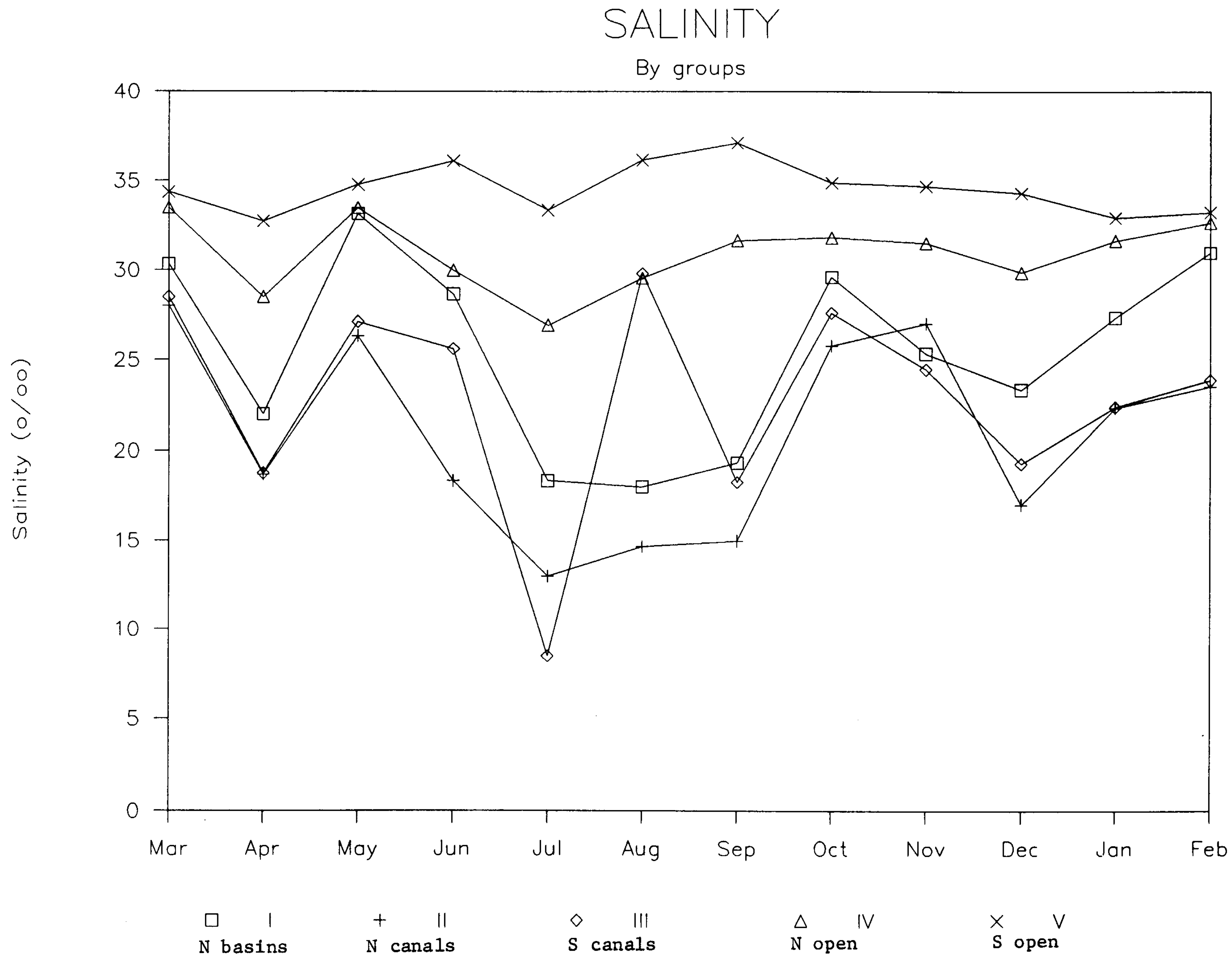

SALINITY
By groups
Salinity (o/oo)
40
35
30
25
20
15
10
5
0
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
I
N basins
II
N canals
III
S canals
IV
N open
V
S open

Figure 5

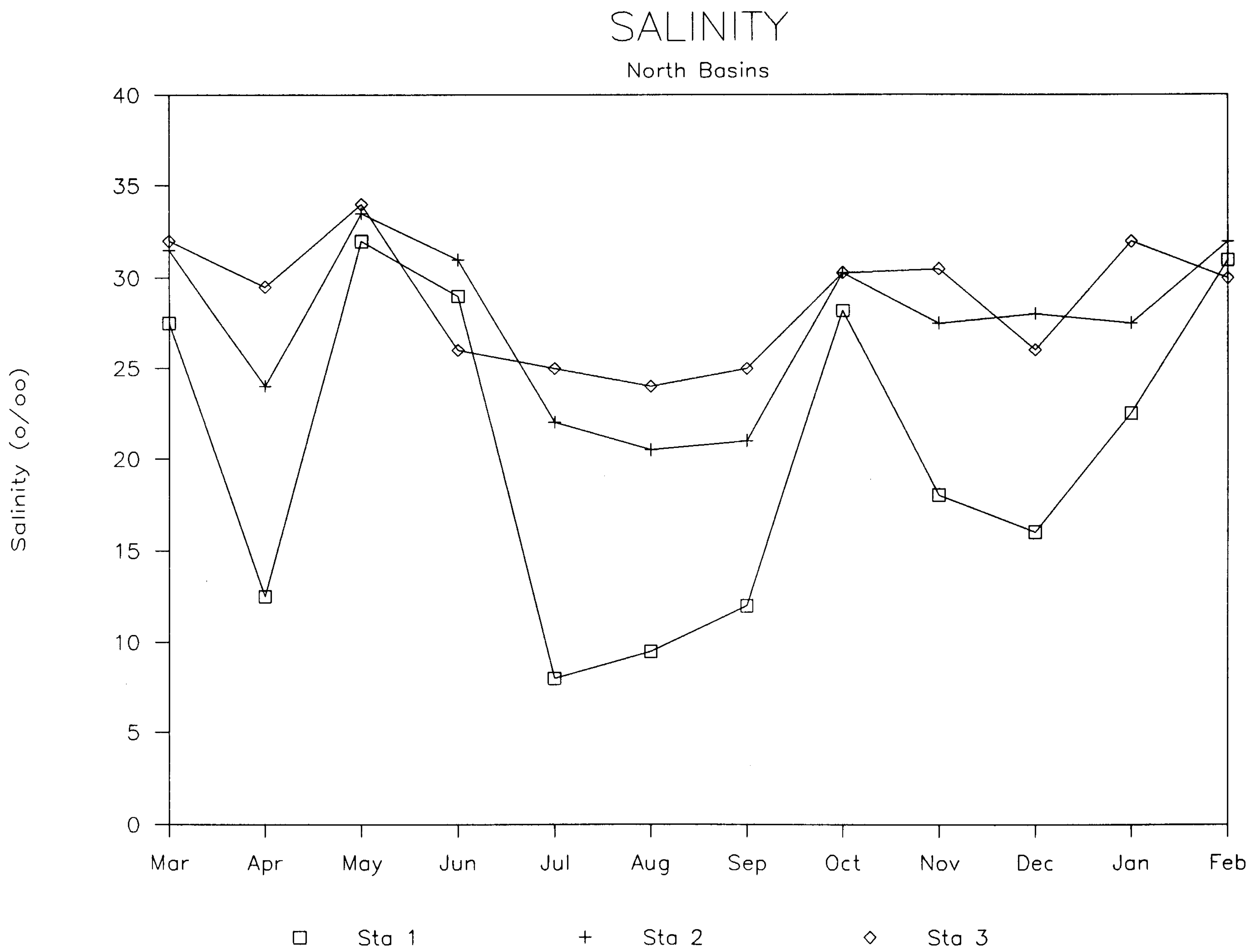

SALINITY
North Basins
Salinity (o/oo)
40
35
30
25
20
15
10
5
0
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Sta 1
Sta 2
Sta 3

Figure 6

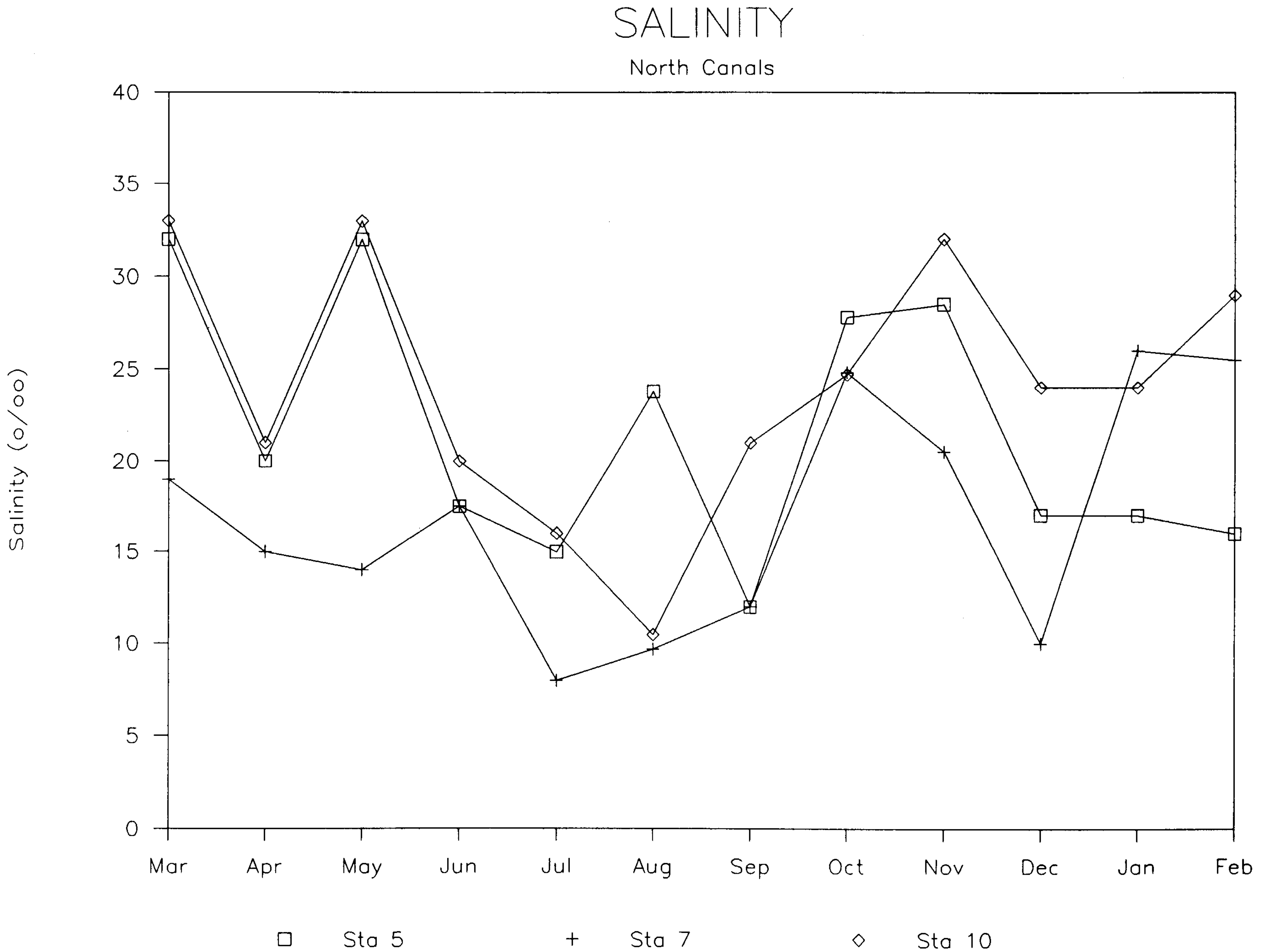

SALINITY
North Canals
Salinity (o/oo)
40
35
30
25
20
15
10
5
0
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Sta 5
Sta 7
Sta 10

Figure 7

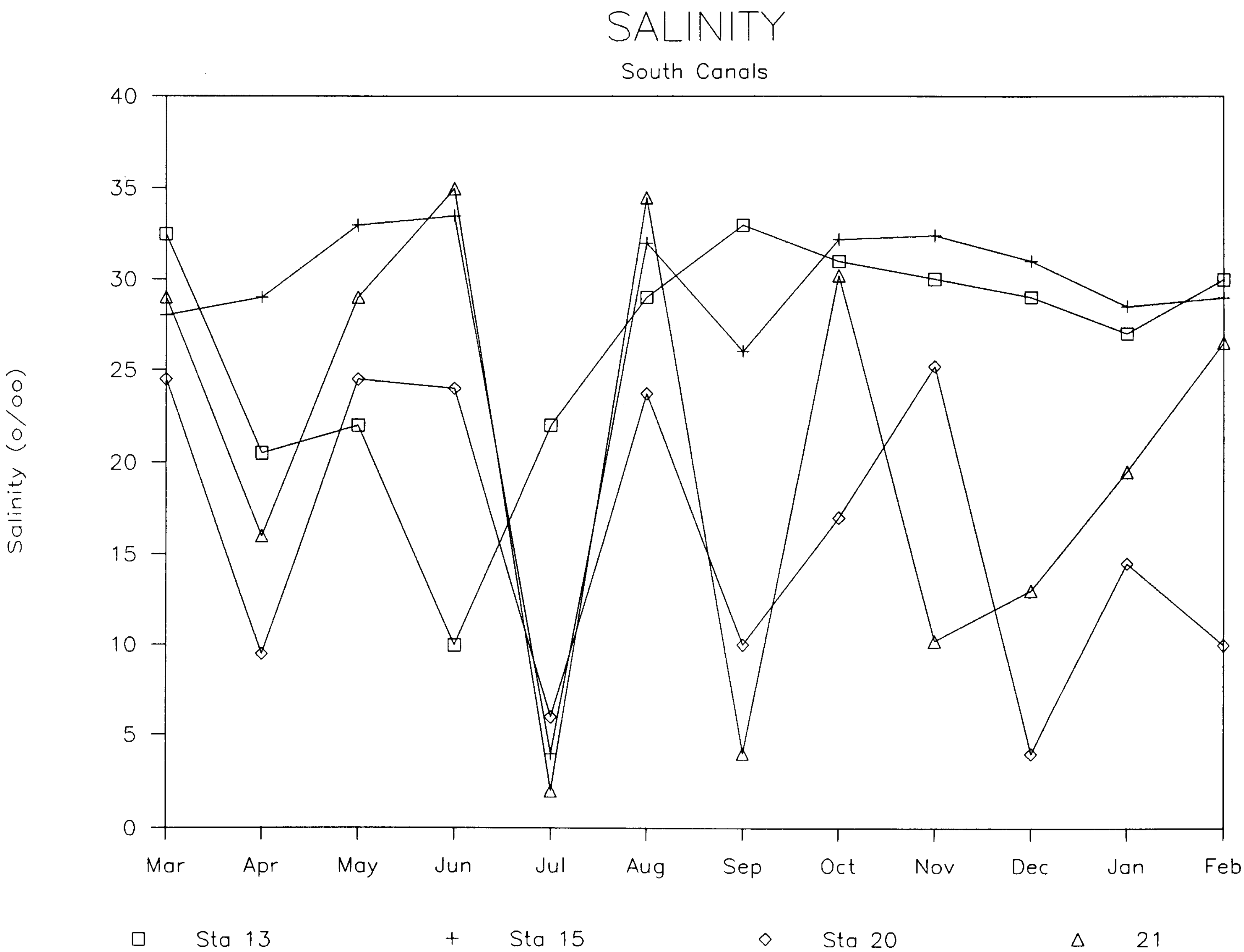
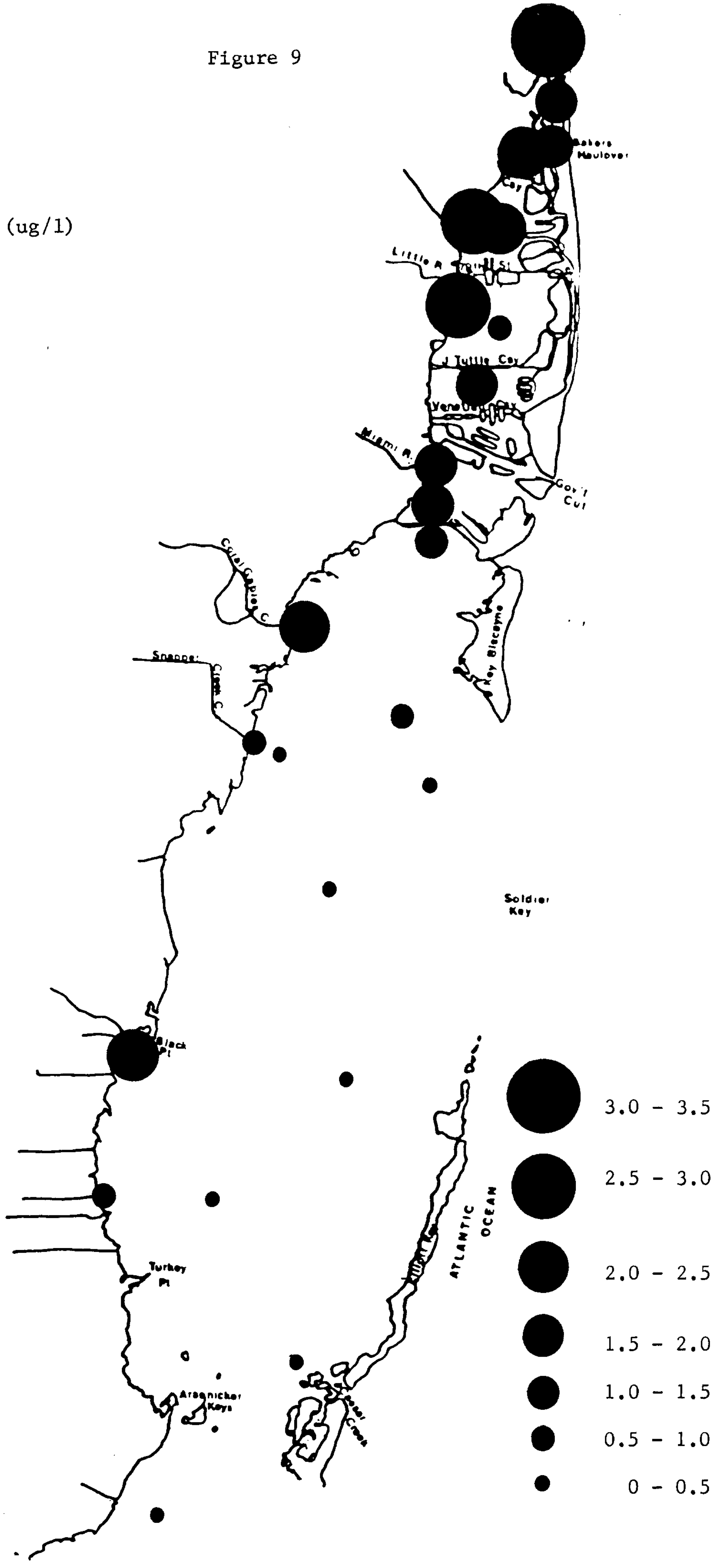
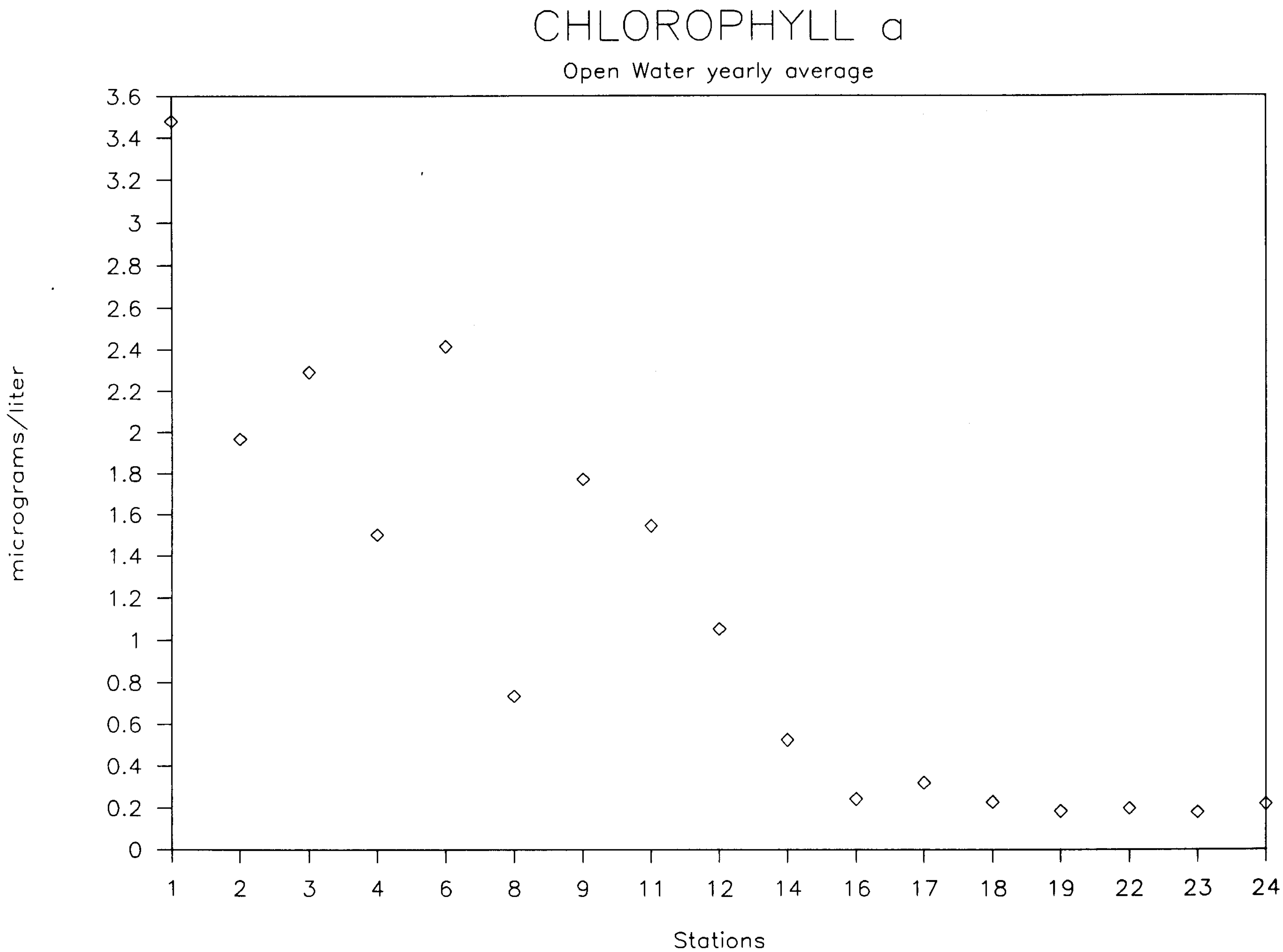

SALINITY
South Canals
Salinity (o/oo)
0
5
10
15
20
25
30
35
40
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Sta 13
Sta 15
Sta 20
21

Figure 8

Figure 9

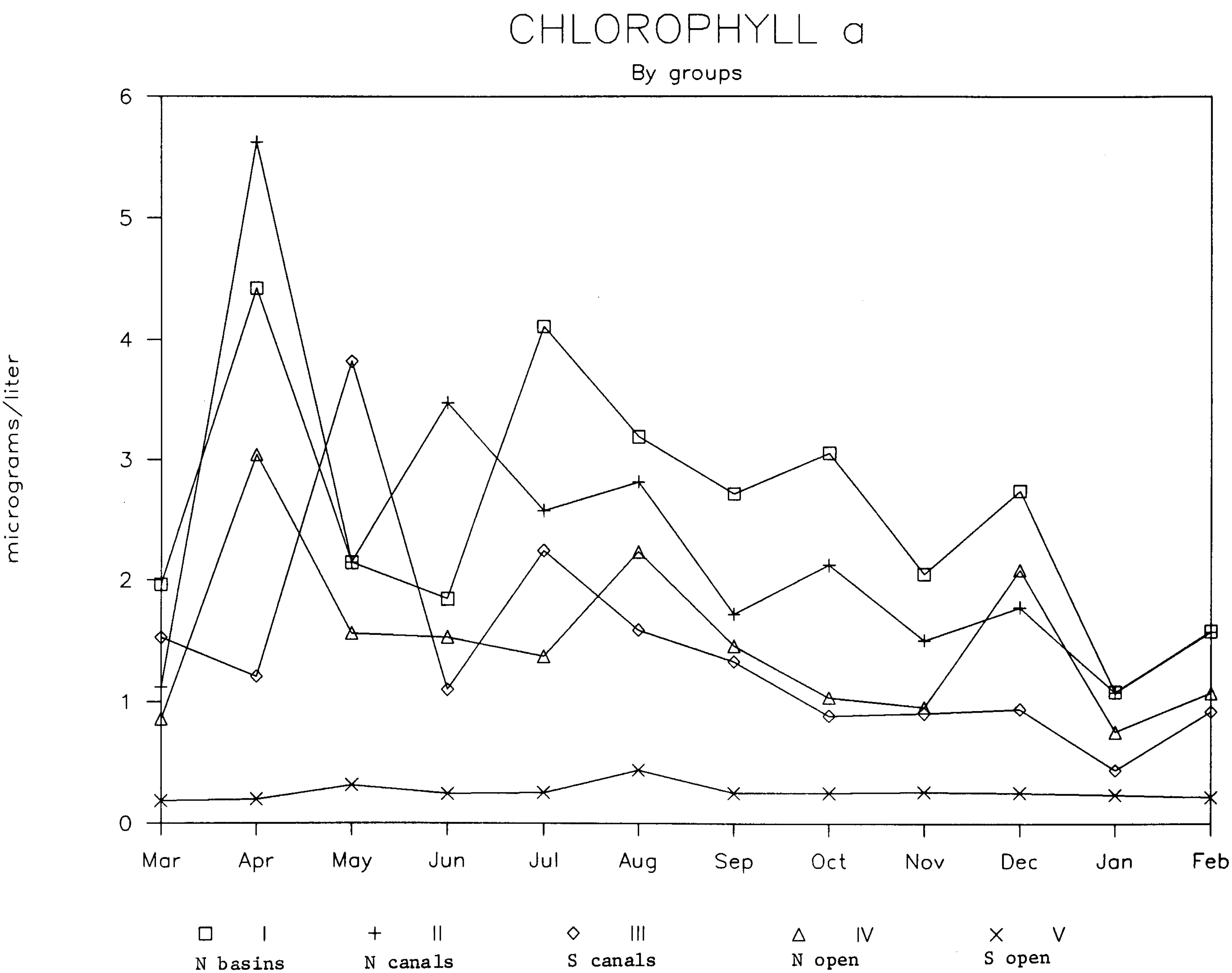
Chlorophyll (ug/l)





CHLOROPHYLL a
Open Water yearly average
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
micrograms/liter
1
2
3
4
6
8
9
11
12
14
16
17
18
19
22
23
24
Stations

Figure 10



CHLOROPHYLL a
By groups
micrograms/liter
0
1
2
3
4
5
6
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
I
N basins
II
N canals
III
S canals
IV
N open
V
S open

Figure 11

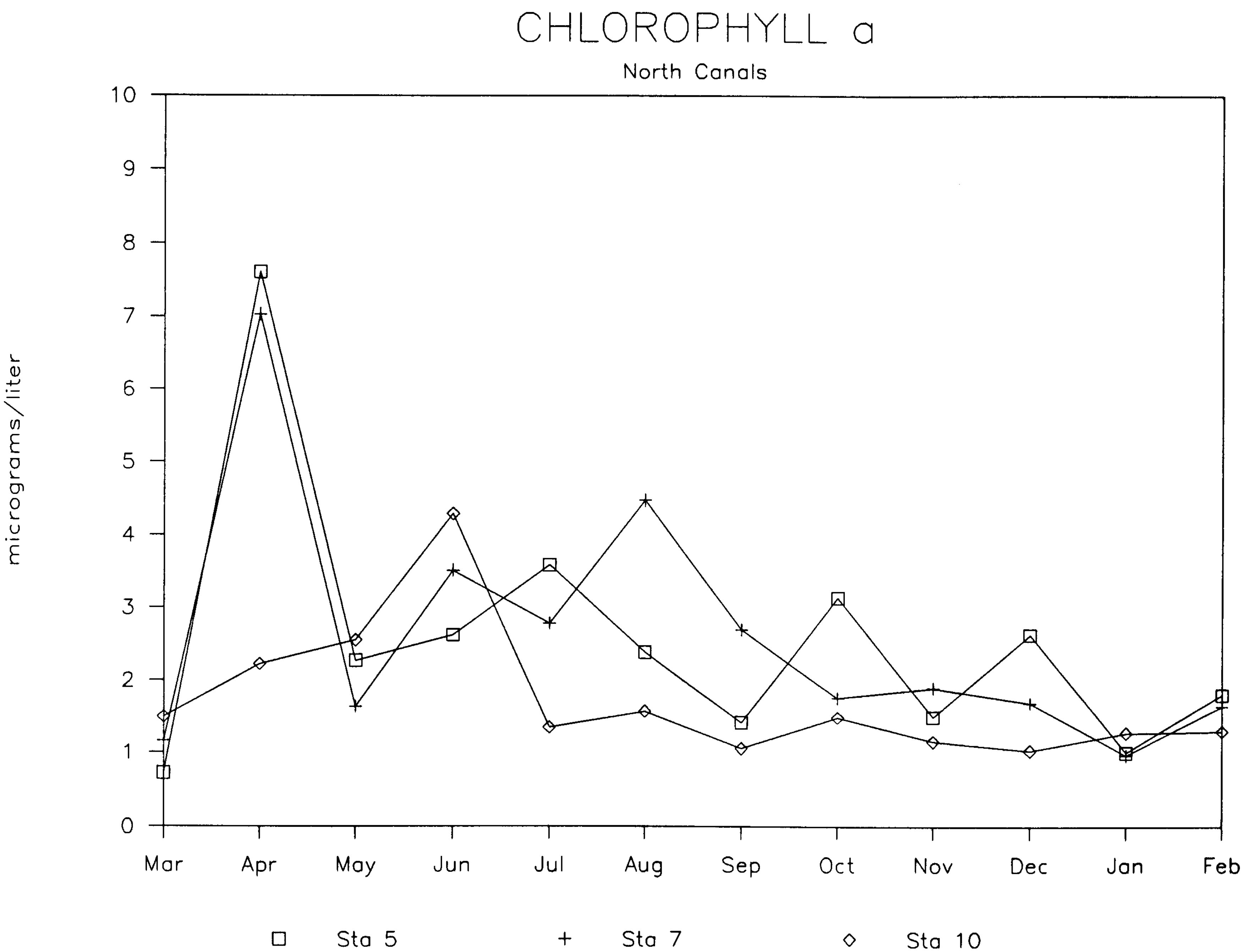
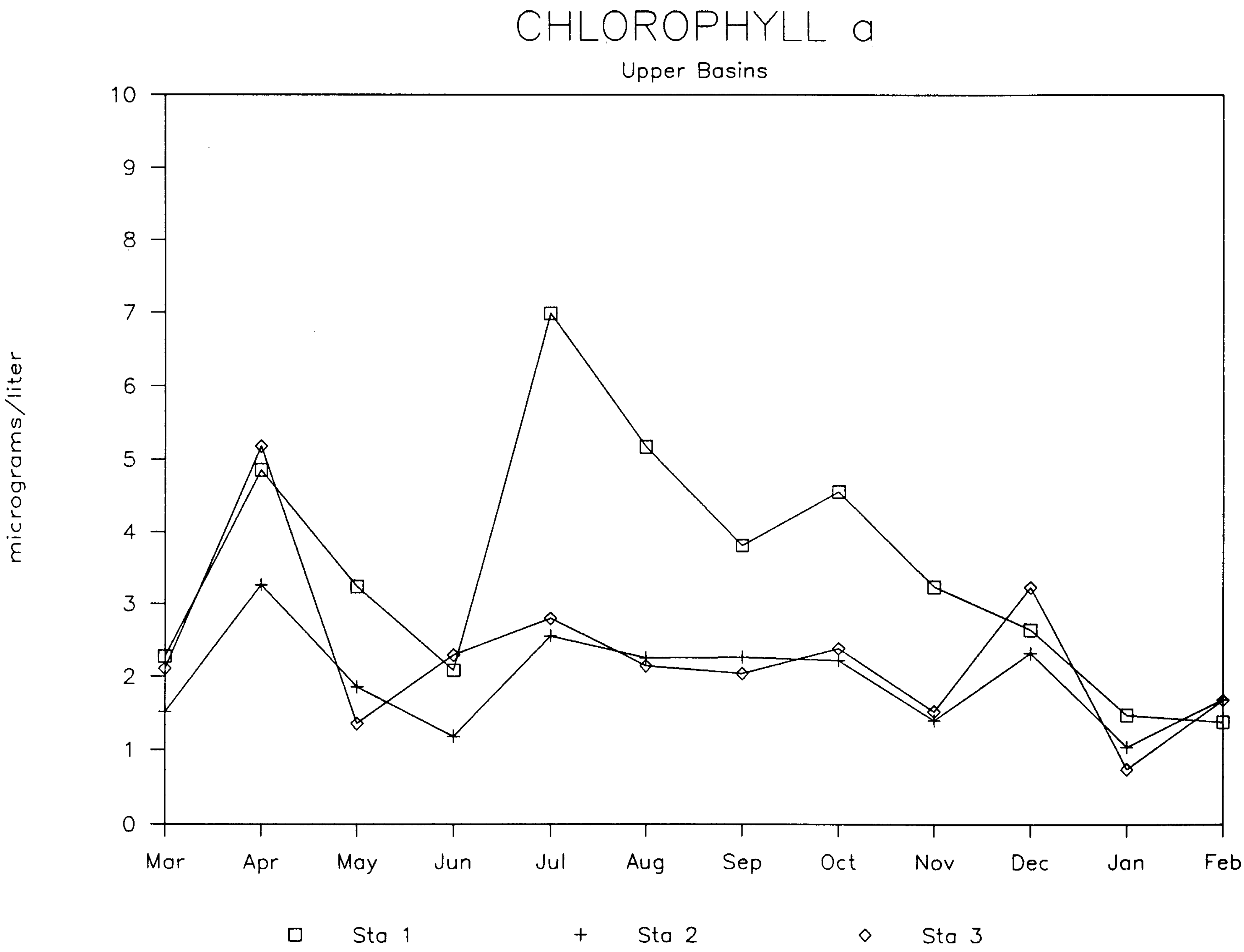

CHLOROPHYLL a
North Canals
micrograms/liter
0
1
2
3
4
5
6
7
8
9
10
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Sta 5
Sta 7
Sta 10

Figure 13



CHLOROPHYLL a
Upper Basins
micrograms/liter
0
1
2
3
4
5
6
7
8
9
10
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Sta 1
Sta 2
Sta 3

Figure 12

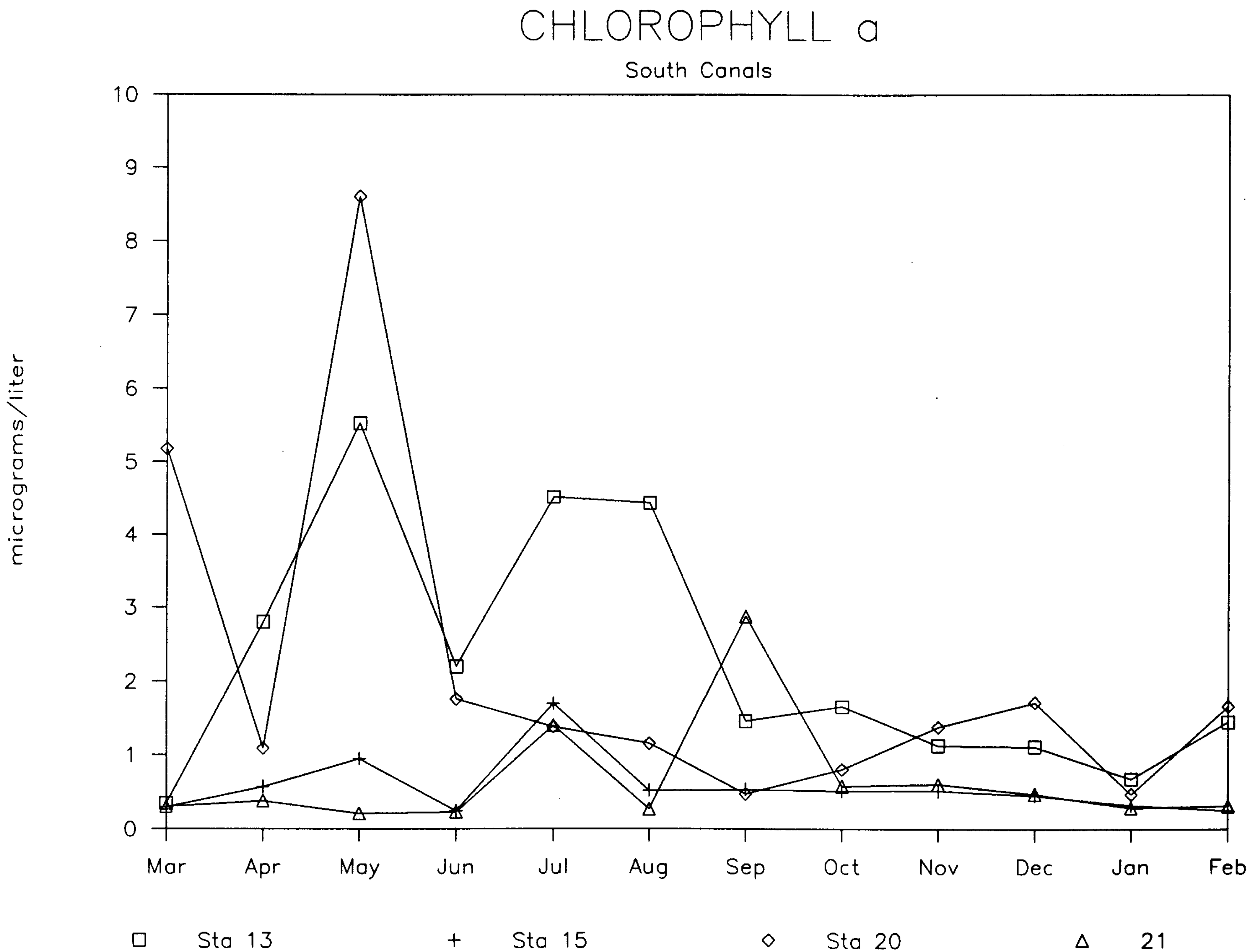

CHLOROPHYLL a
South Canals
micrograms/liter
0
1
2
3
4
5
6
7
8
9
10
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Sta 13
Sta 15
Sta 20
21

Figure 14

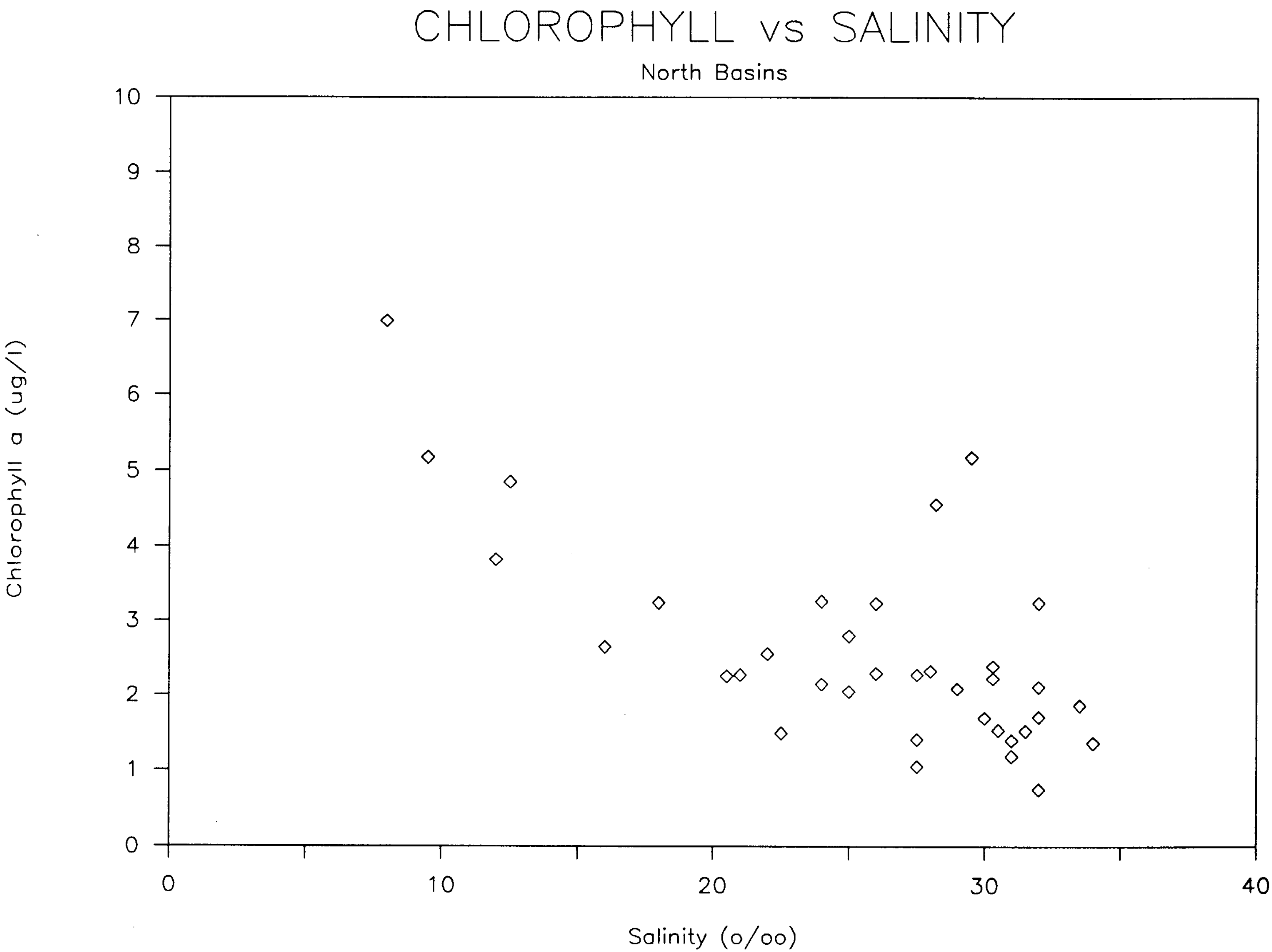

CHLOROPHYLL vs SALINITY
North Basins
Chlorophyll a (ug/l)
Salinity (o/oo)
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30
40

Figure 15

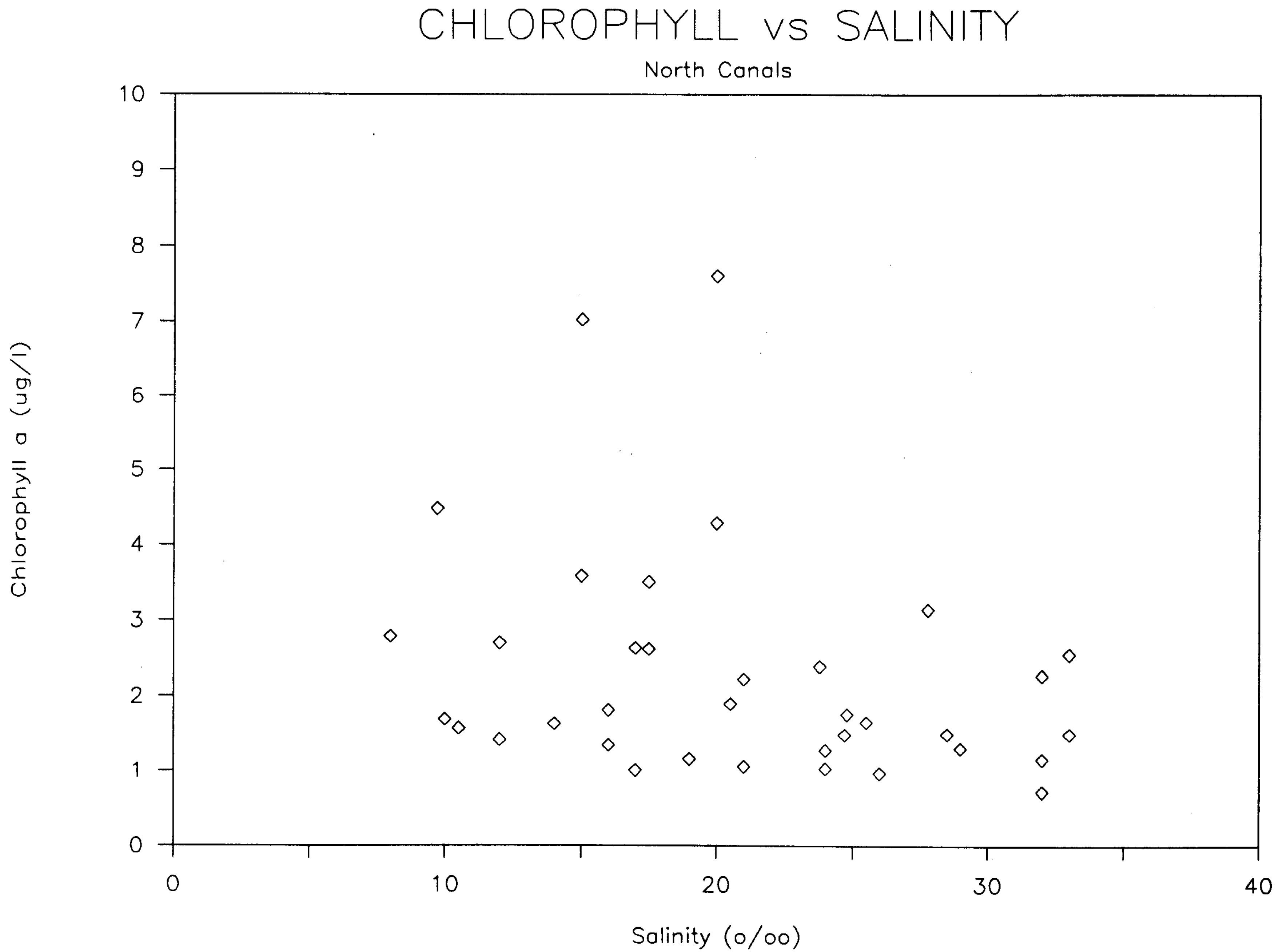
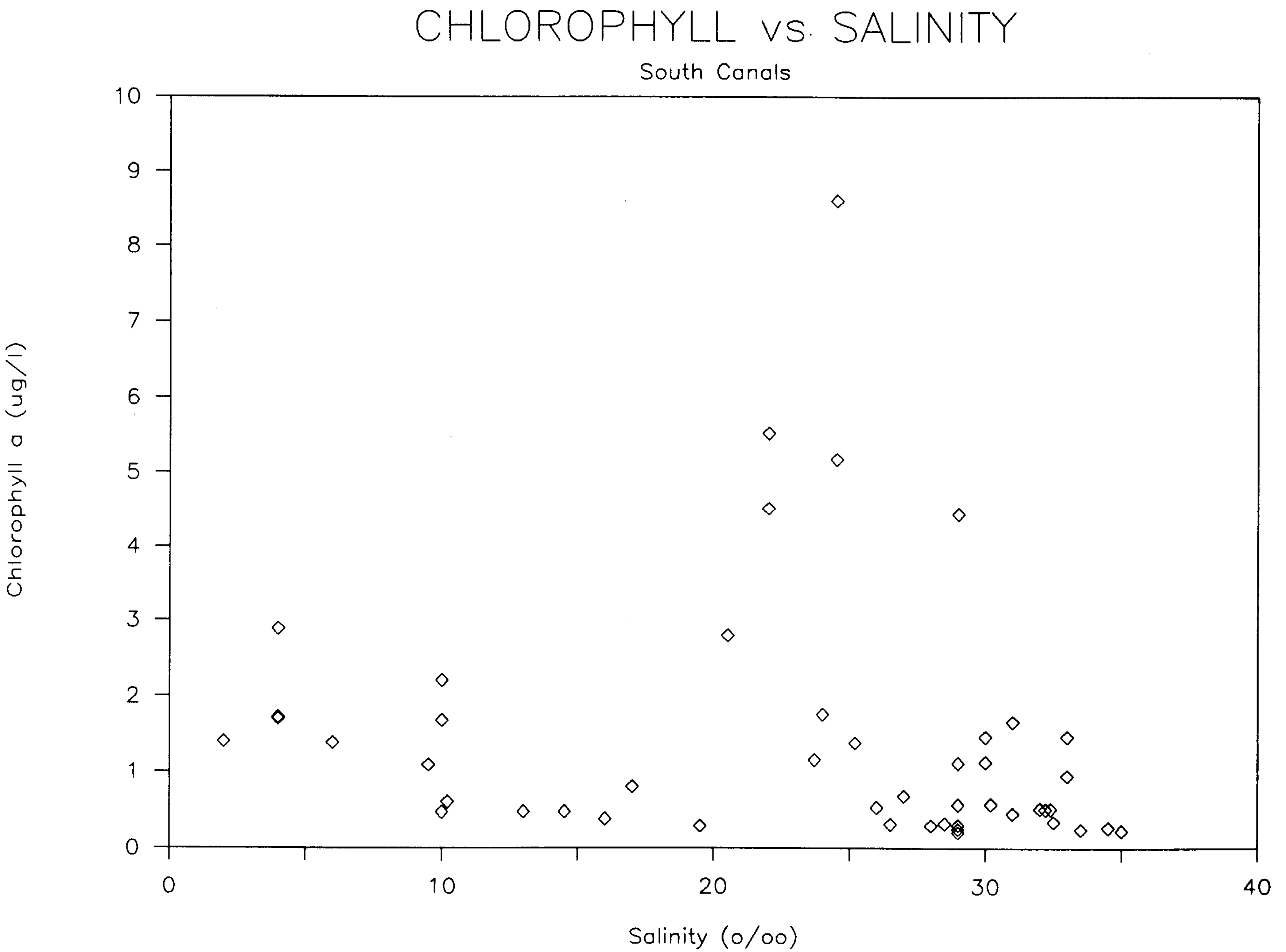

CHLOROPHYLL vs SALINITY
North Canals
Chlorophyll a (ug/l)
Salinity (o/oo)
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30
40

Figure 16



CHLOROPHYLL vs. SALINITY
South Canals
Chlorophyll a (ug/l)
Salinity (o/oo)
0
10
20
30
40
1
2
3
4
5
6
7
8
9

Figure 17

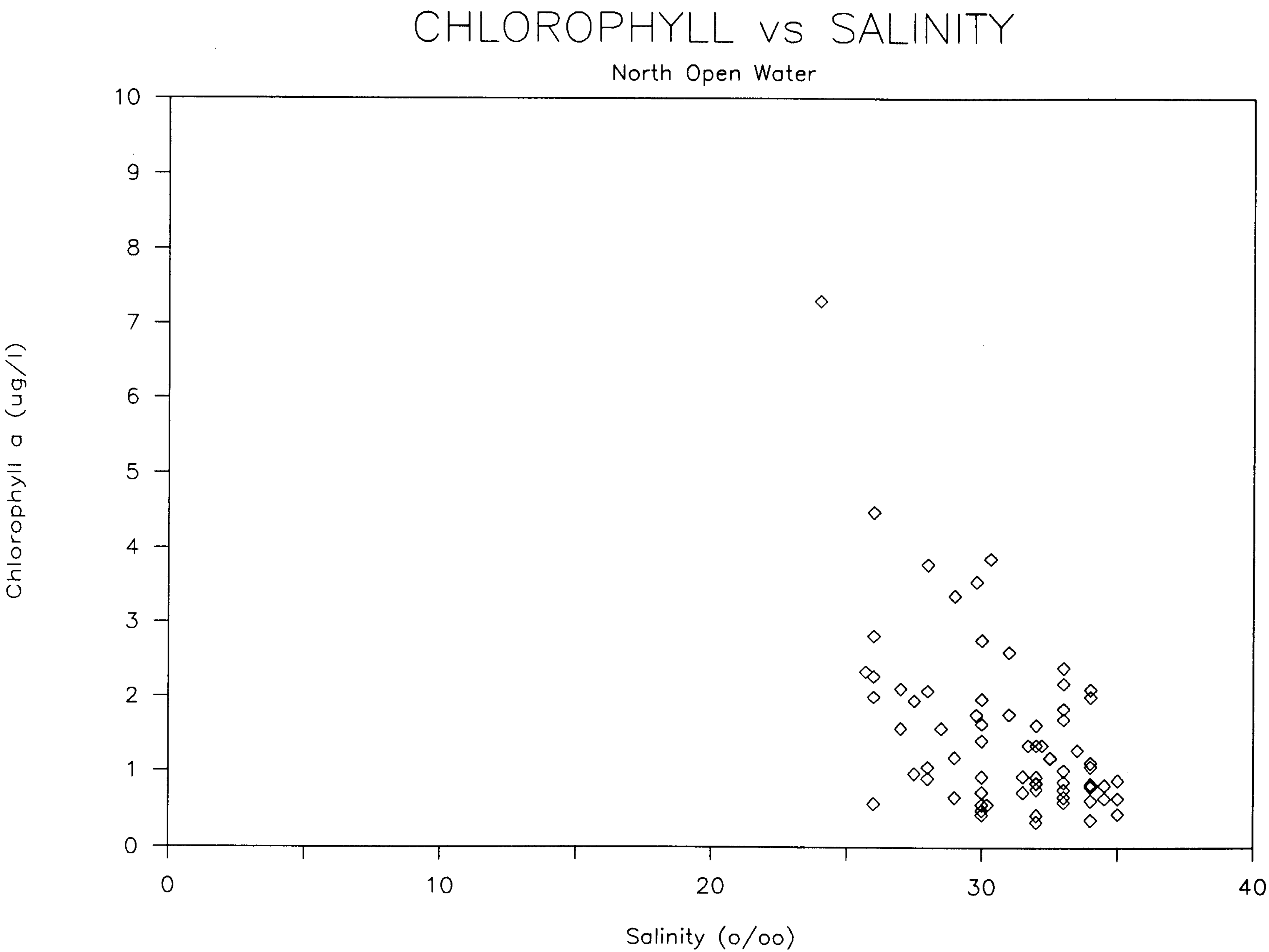

CHLOROPHYLL vs SALINITY
North Open Water
Chlorophyll a (ug/l)
Salinity (o/oo)
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30
40

Figure 18

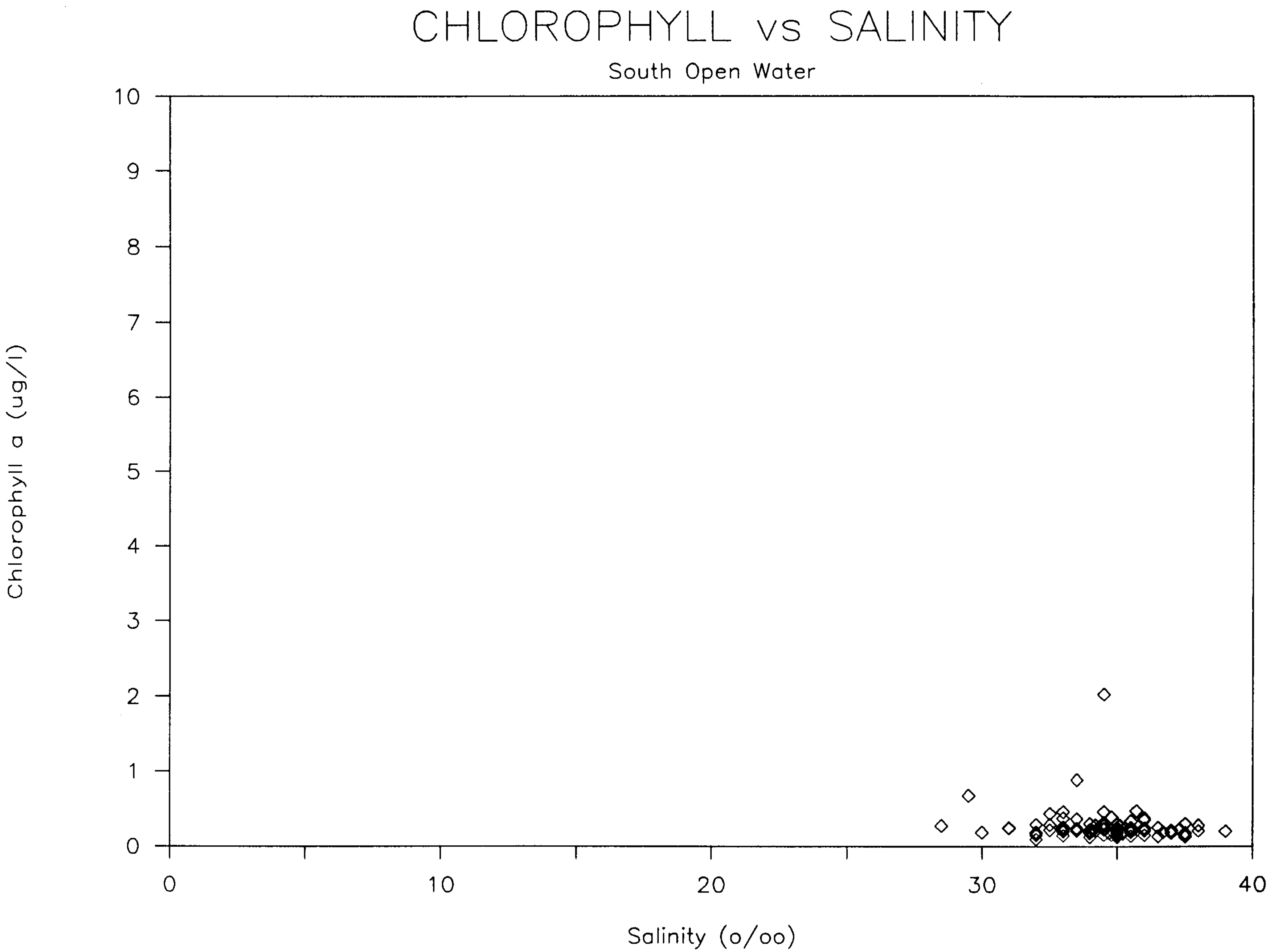

CHLOROPHYLL vs SALINITY
South Open Water
Chlorophyll a (ug/l)
0
1
2
3
4
5
6
7
8
9
10
Salinity (o/oo)
0
10
20
30
40

Figure 19

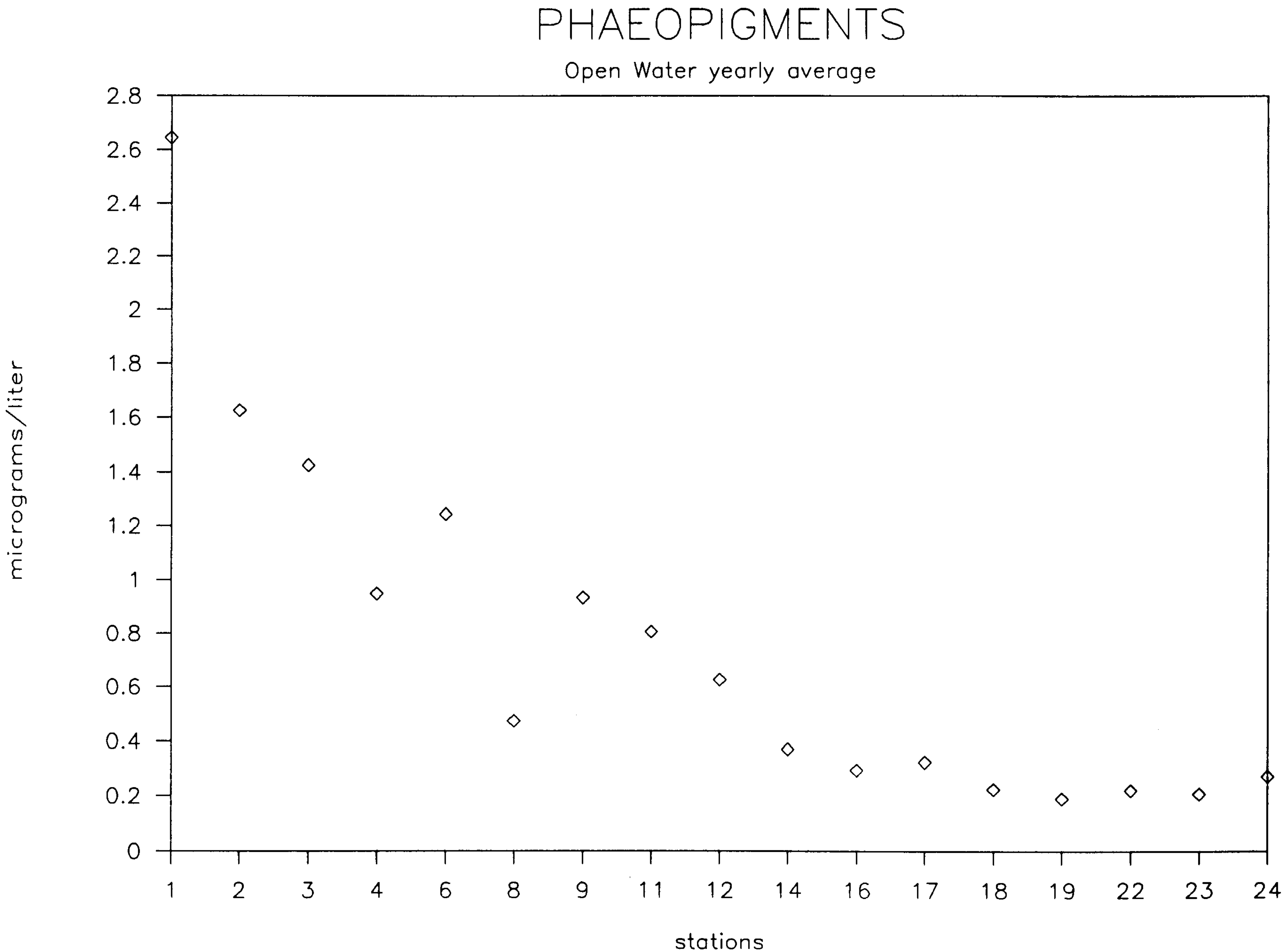

PHAEOPIGMENTS
Open Water yearly average
micrograms/liter
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1
2
3
4
6
8
9
11
12
14
16
17
18
19
22
23
24
stations

Figure 20

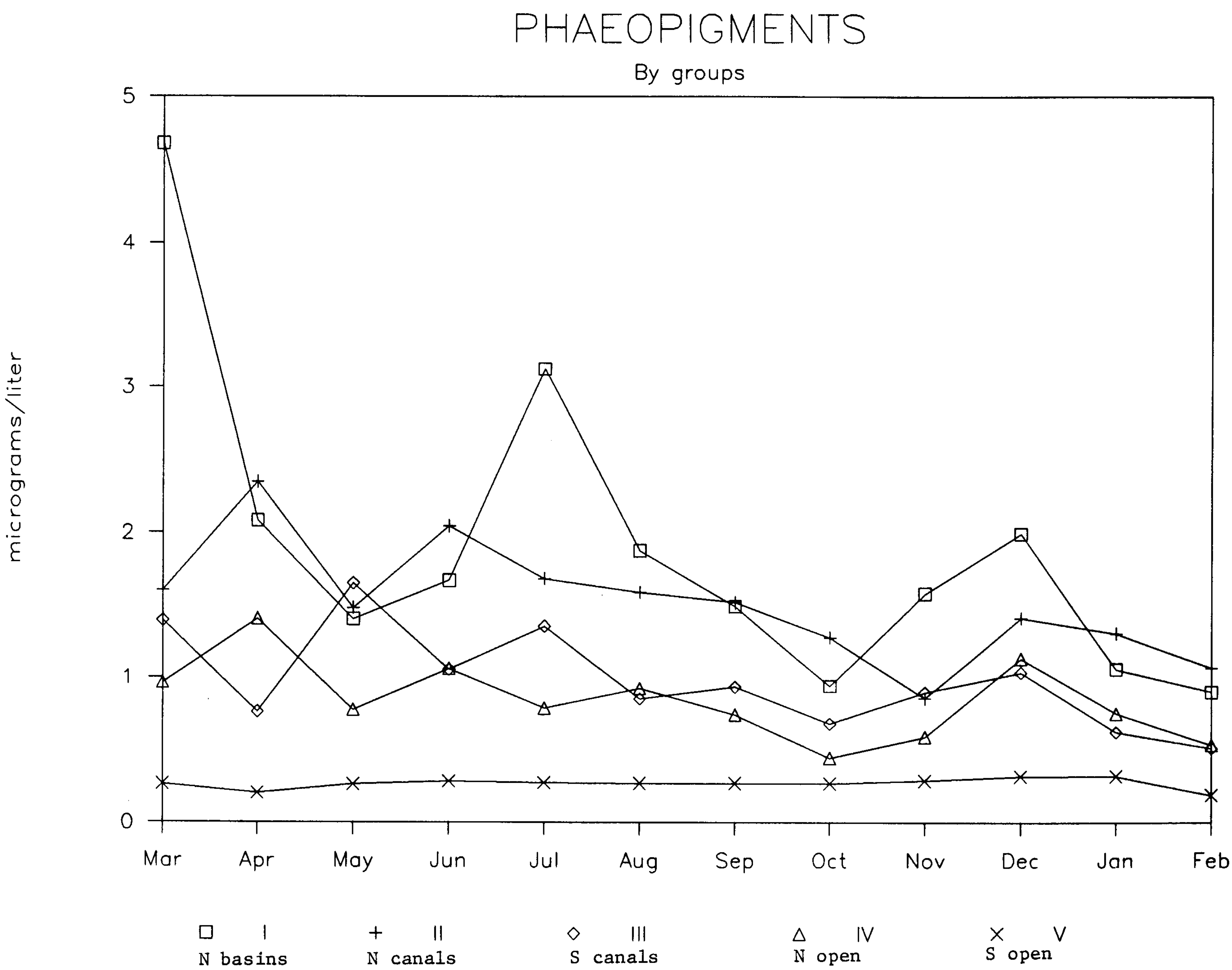

PHAEOPIGMENTS
By groups
micrograms/liter
5
4
3
2
1
0
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
I
N basins
II
N canals
III
S canals
IV
N open
V
S open

Figure 21

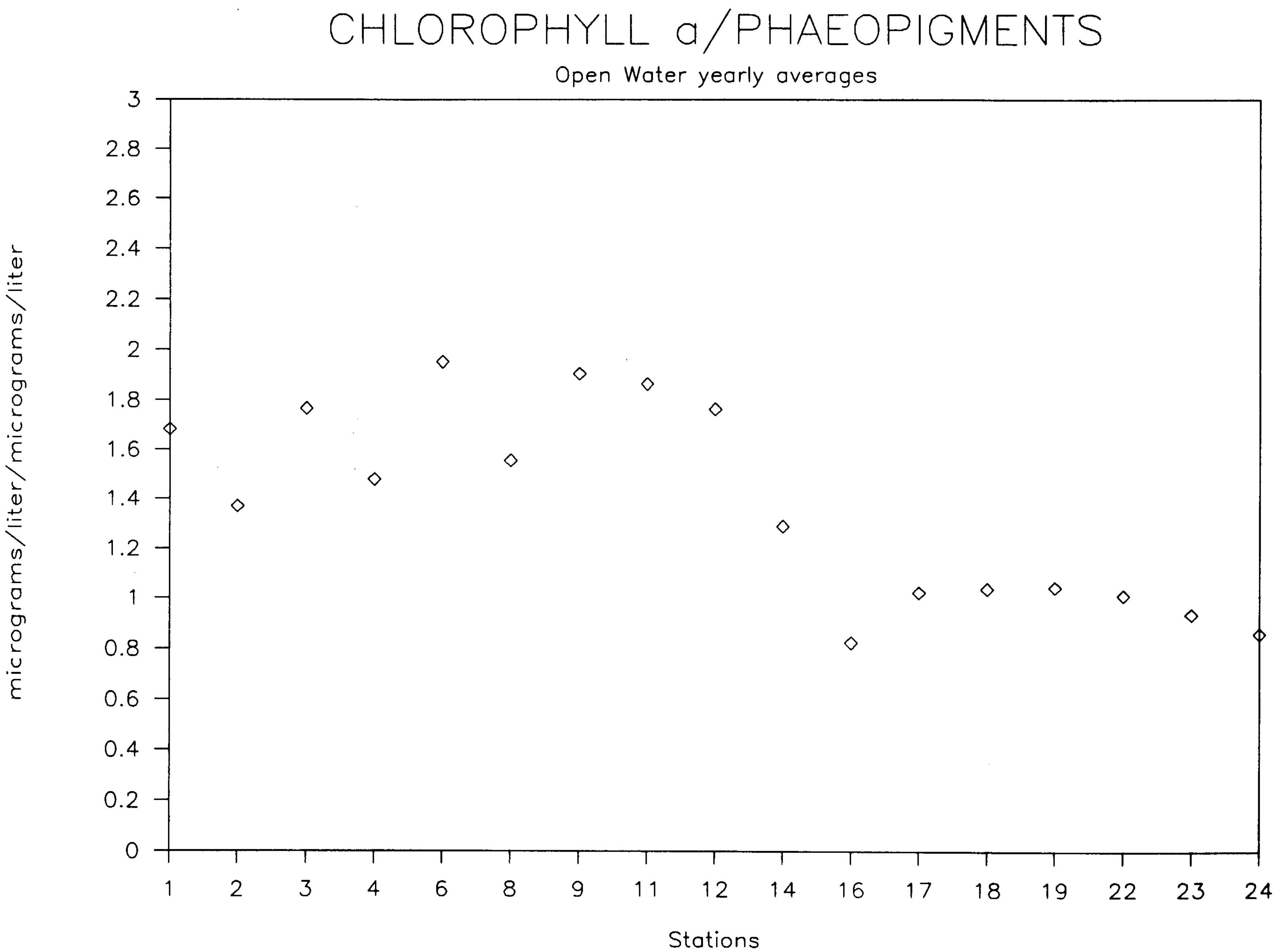
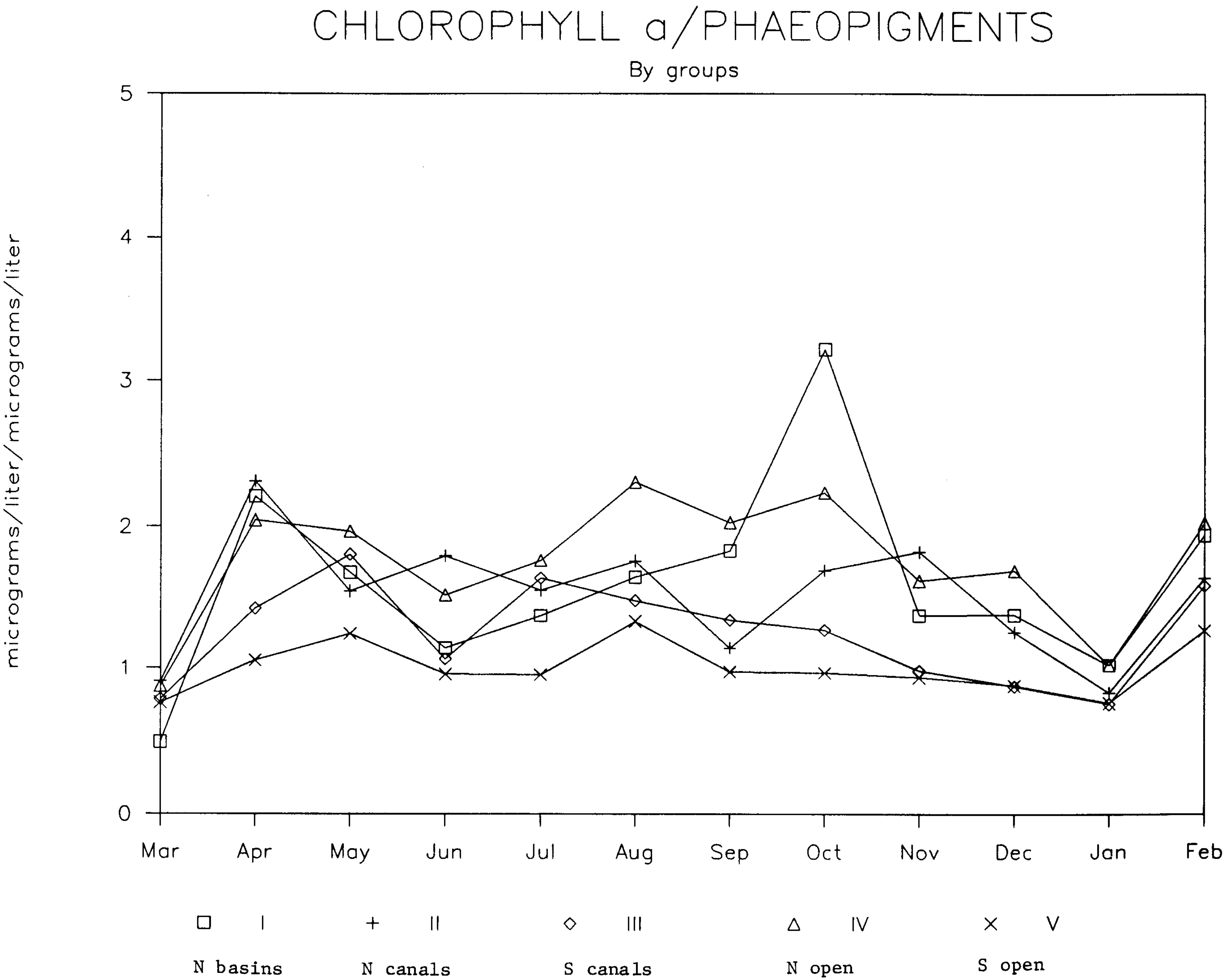

CHLOROPHYLL a/PHAEOPIGMENTS
Open Water yearly averages
micrograms/liter/micrograms/liter
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1
2
3
4
6
8
9
11
12
14
16
17
18
19
22
23
24
Stations

Figure 22



CHLOROPHYLL a/PHAEOPIGMENTS
By groups
micrograms/liter/micrograms/liter
5
4
3
2
1
0
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
I
II
III
IV
V
N basins
N canals
S canals
N open
S open

Figure 23

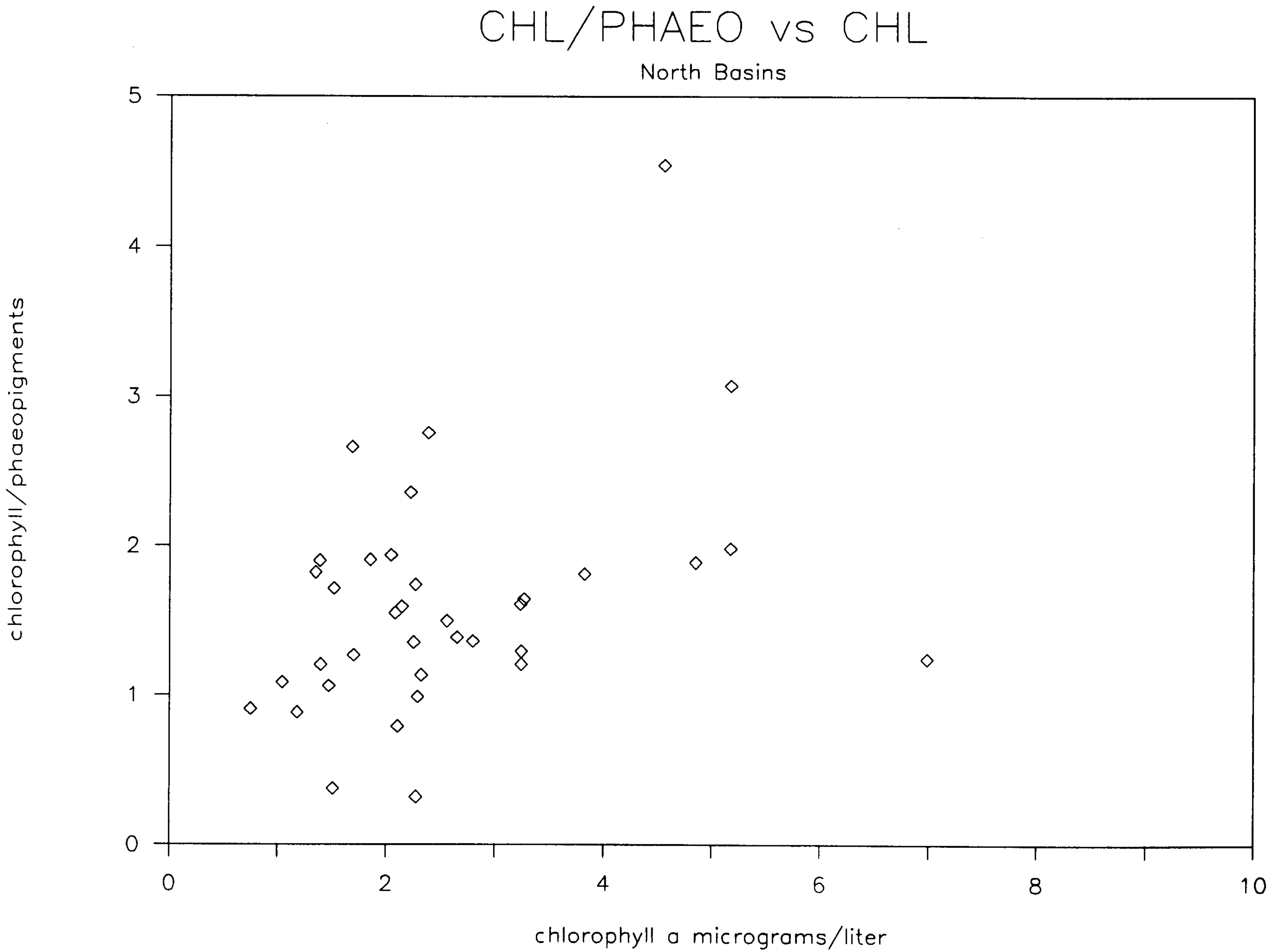

CHL/PHAEO vs CHL
North Basins
chlorophyll/phaeopigments
chlorophyll a micrograms/liter
0
1
2
3
4
5
0
2
4
6
8
10

Figure 24

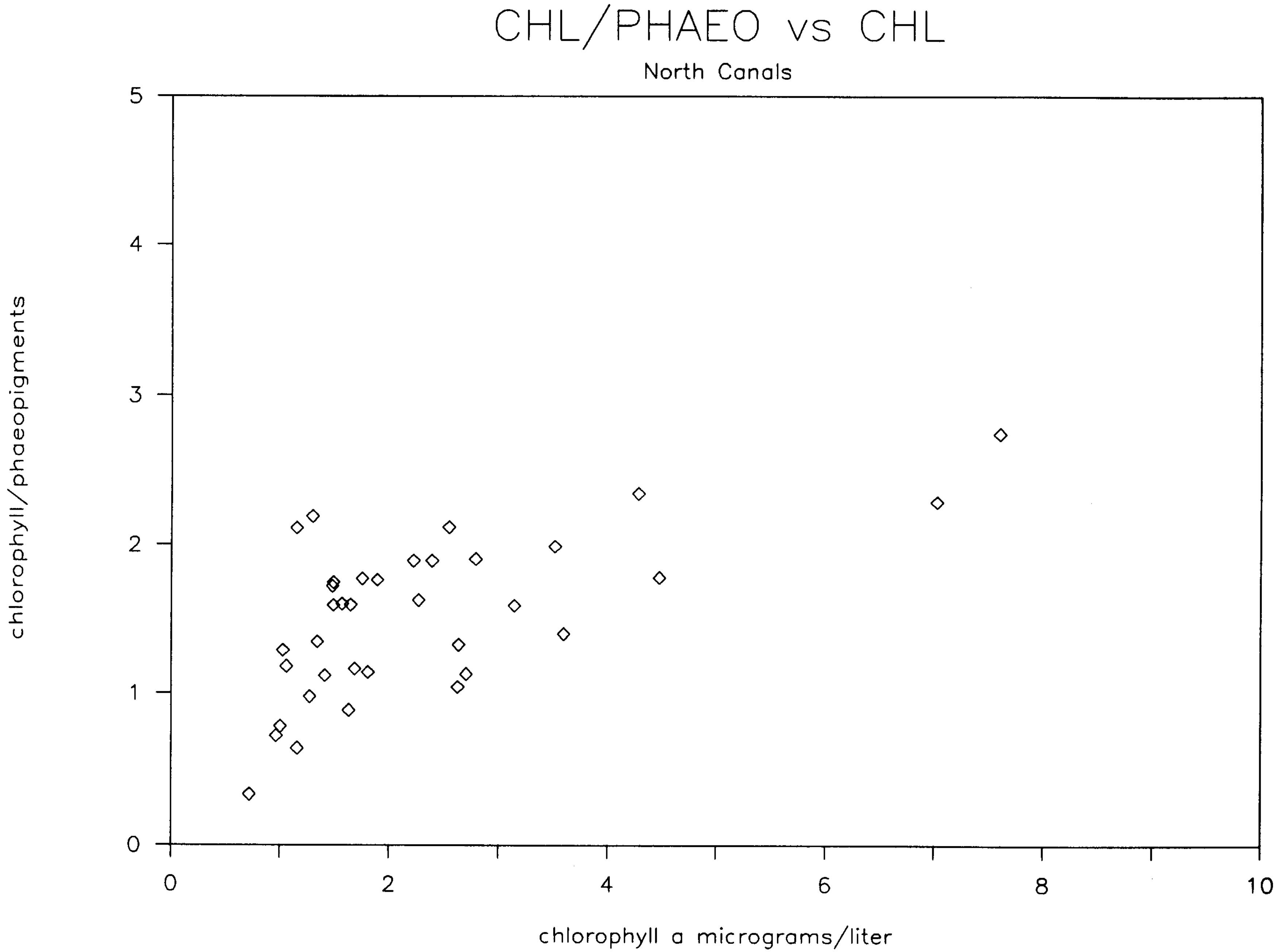

CHL/PHAEO vs CHL
North Canals
chlorophyll/phaeopigments
0
1
2
3
4
5
0
2
4
6
8
10
chlorophyll a micrograms/liter

Figure 25

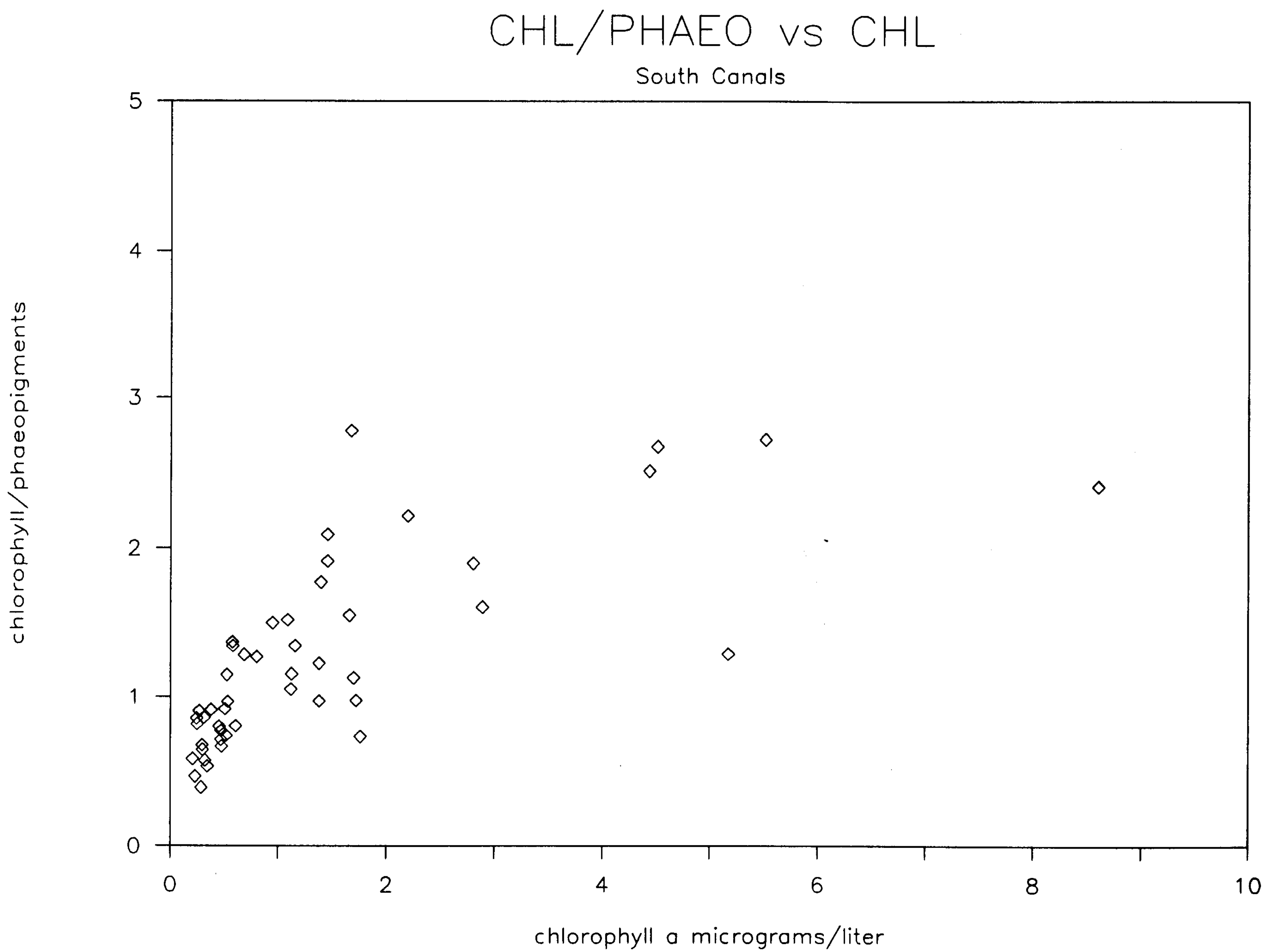
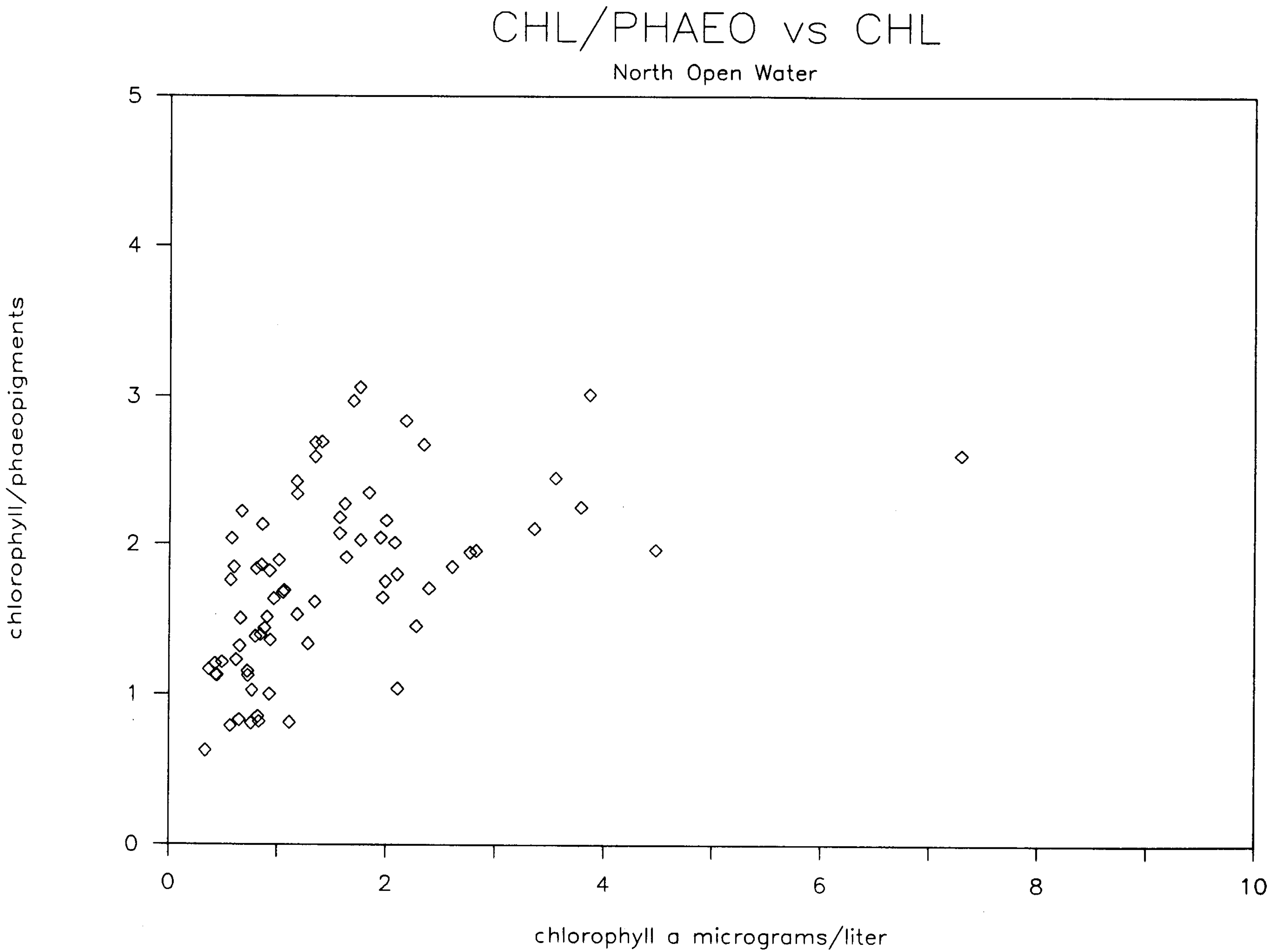

CHL/PHAEO vs CHL
South Canals
chlorophyll/phaeopigments
0
1
2
3
4
5
0
2
4
6
8
10
chlorophyll a micrograms/liter

Figure 26



CHL/PHAEO vs CHL
North Open Water
chlorophyll/phaeopigments
chlorophyll a micrograms/liter
0
1
2
3
4
5
0
2
4
6
8
10

Figure 27

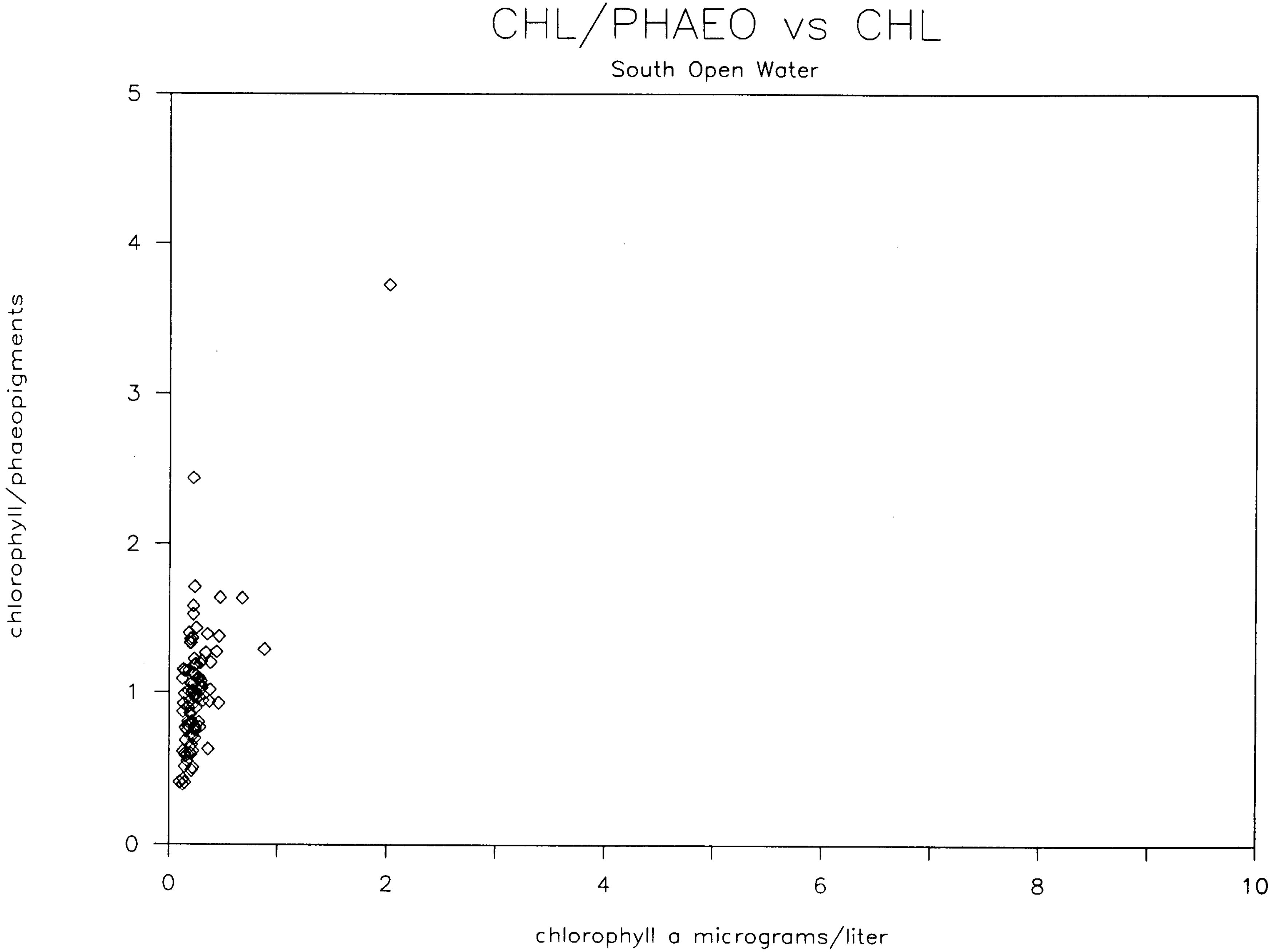

CHL/PHAEO vs CHL
South Open Water
chlorophyll/phaeopigments
chlorophyll a micrograms/liter
0
1
2
3
4
5
0
2
4
6
8
10

Figure 28

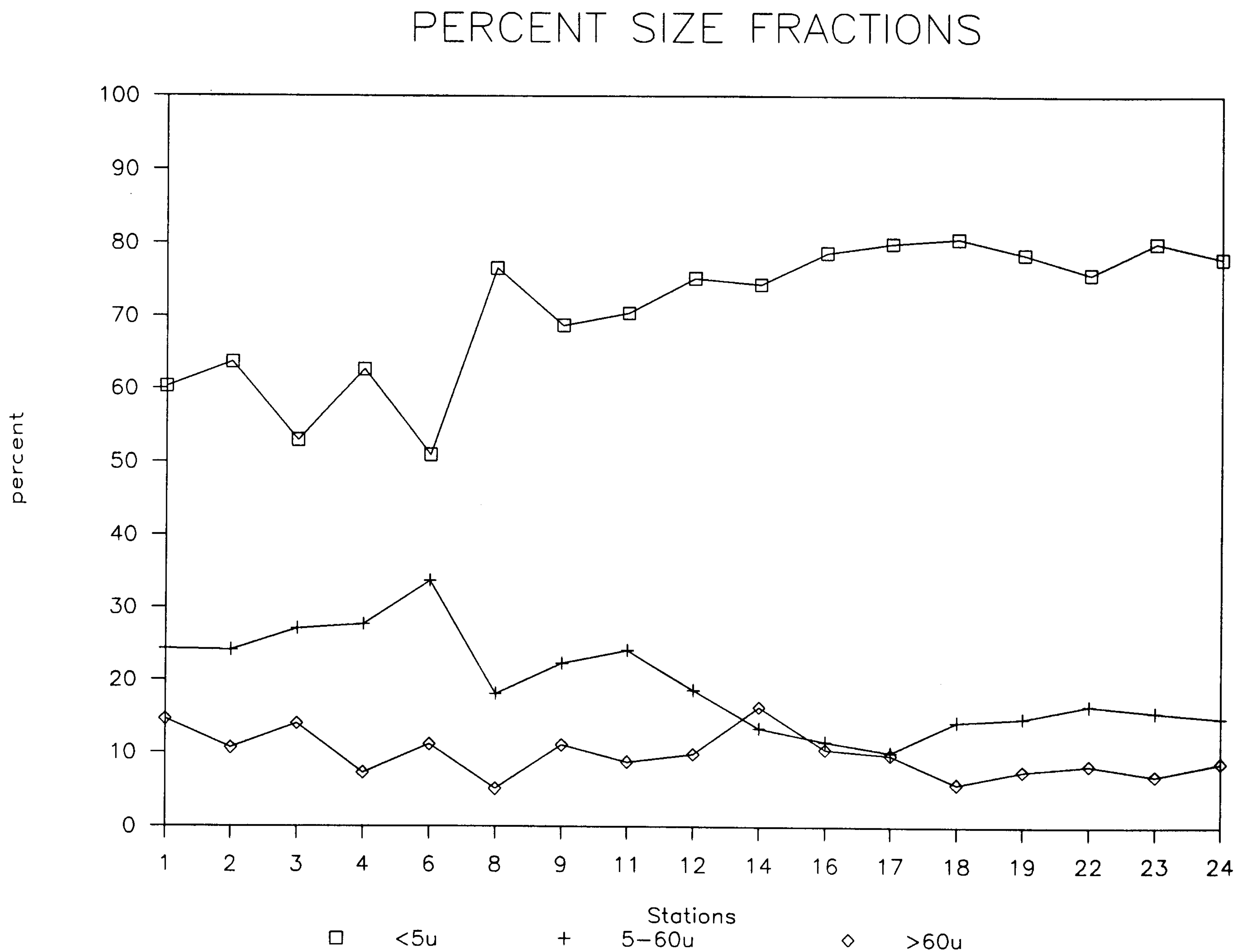

PERCENT SIZE FRACTIONS
percent
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
6
8
9
11
12
14
16
17
18
19
22
23
24
Stations
<5u
5-60u
>60u

Figure 29

PERCENT SIZE FRACTIONS

Chlorophyll a < 5 microns

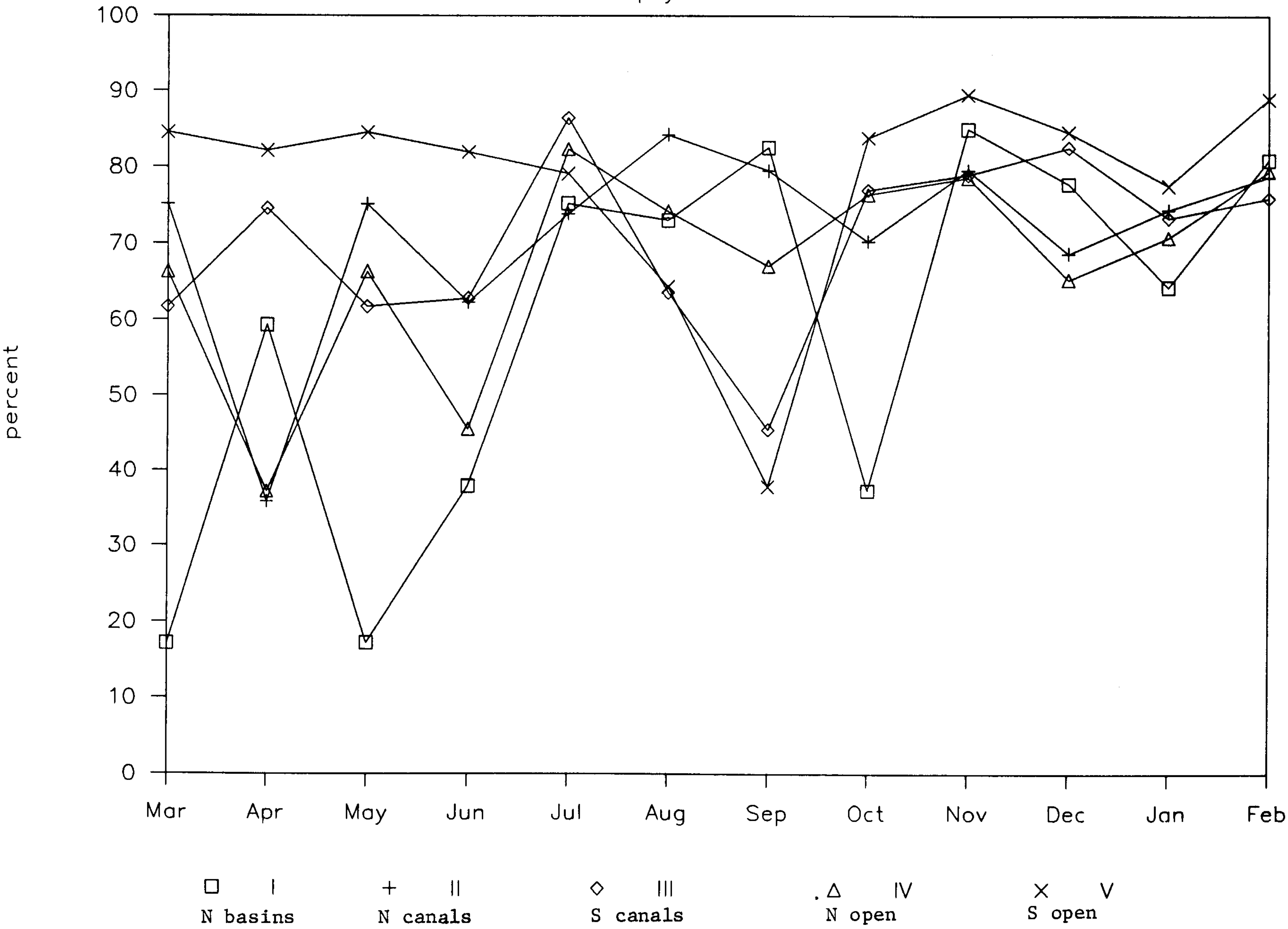


Figure 30

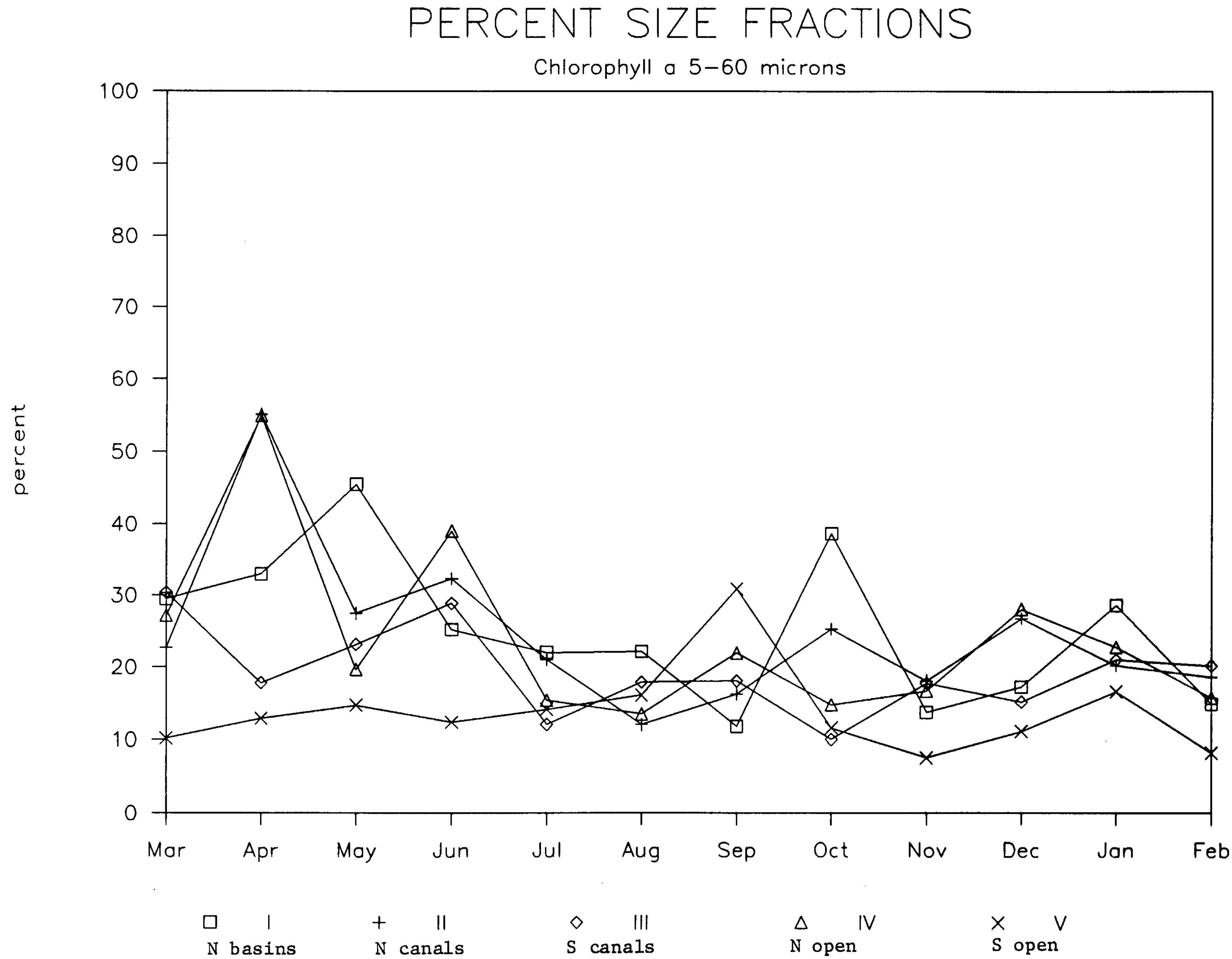

PERCENT SIZE FRACTIONS
Chlorophyll a 5–60 microns
percent
0
10
20
30
40
50
60
70
80
90
100
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
I
N basins
II
N canals
III
S canals
IV
N open
V
S open

Figure 31

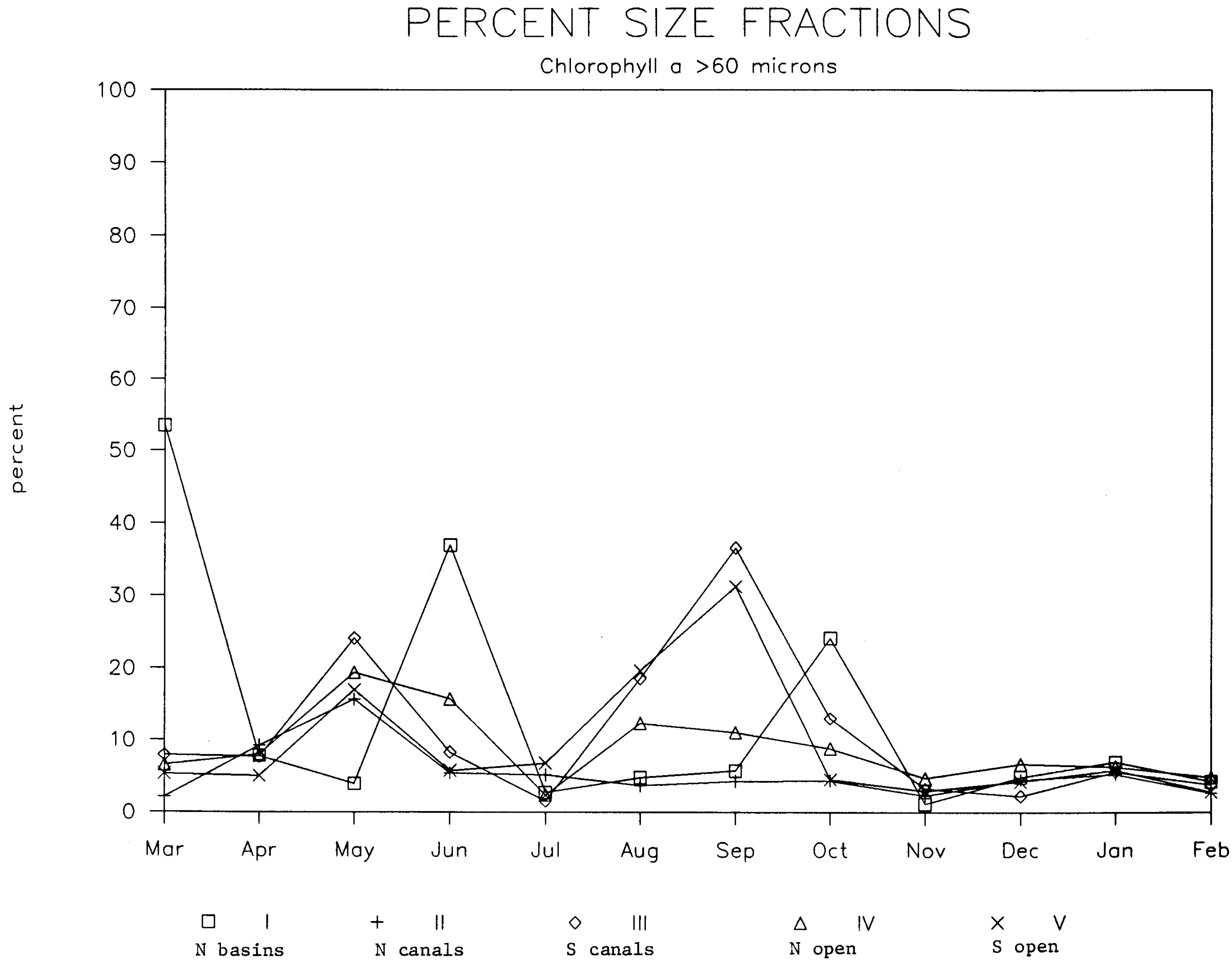

PERCENT SIZE FRACTIONS
Chlorophyll a >60 microns
percent
100
90
80
70
60
50
40
30
20
10
0
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
I
N basins
II
N canals
III
S canals
IV
N open
V
S open

Figure 32

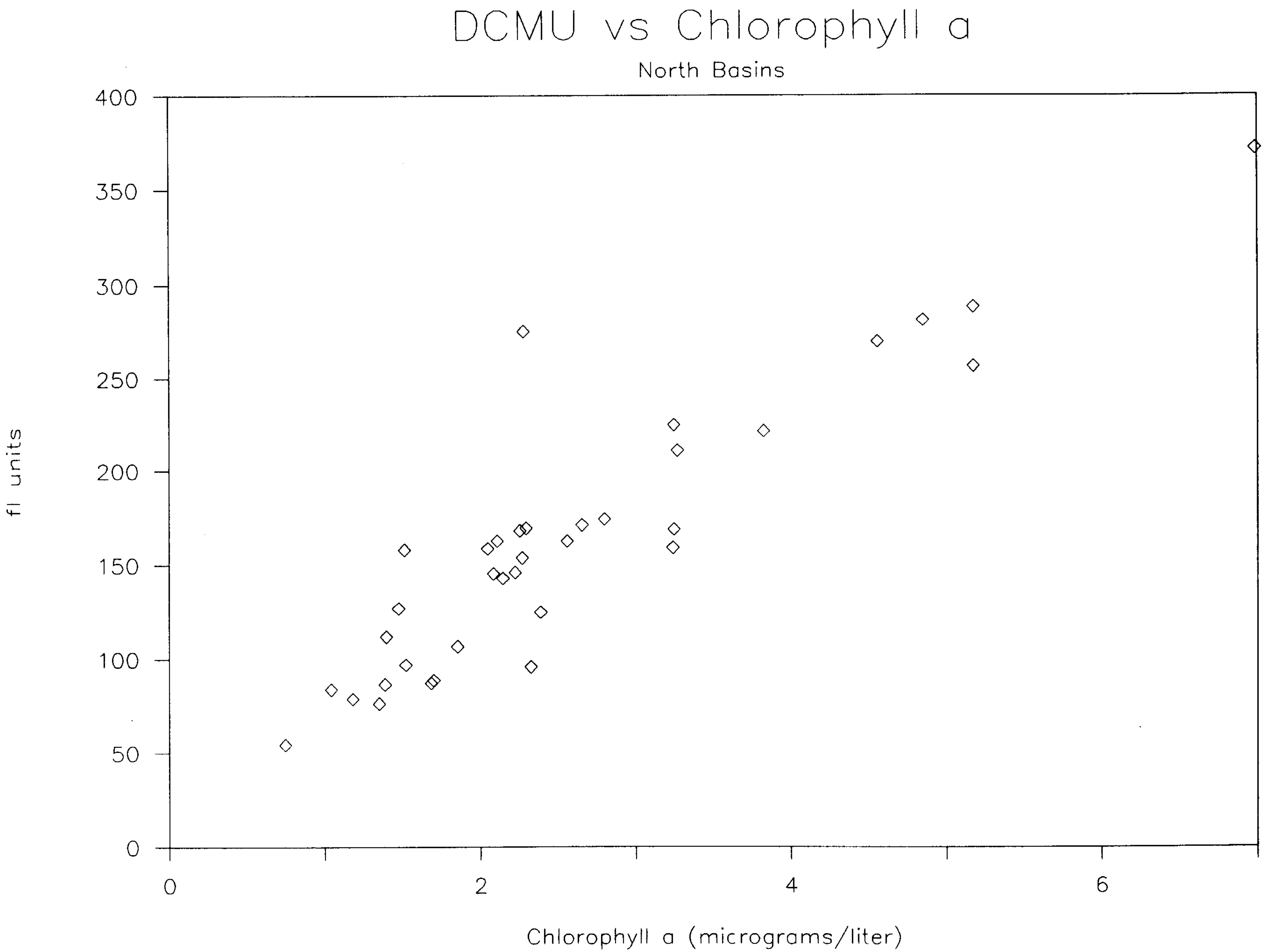

DCMU vs Chlorophyll a
North Basins
fl units
400
350
300
250
200
150
100
50
0
0
2
4
6
Chlorophyll a (micrograms/liter)

Figure 33

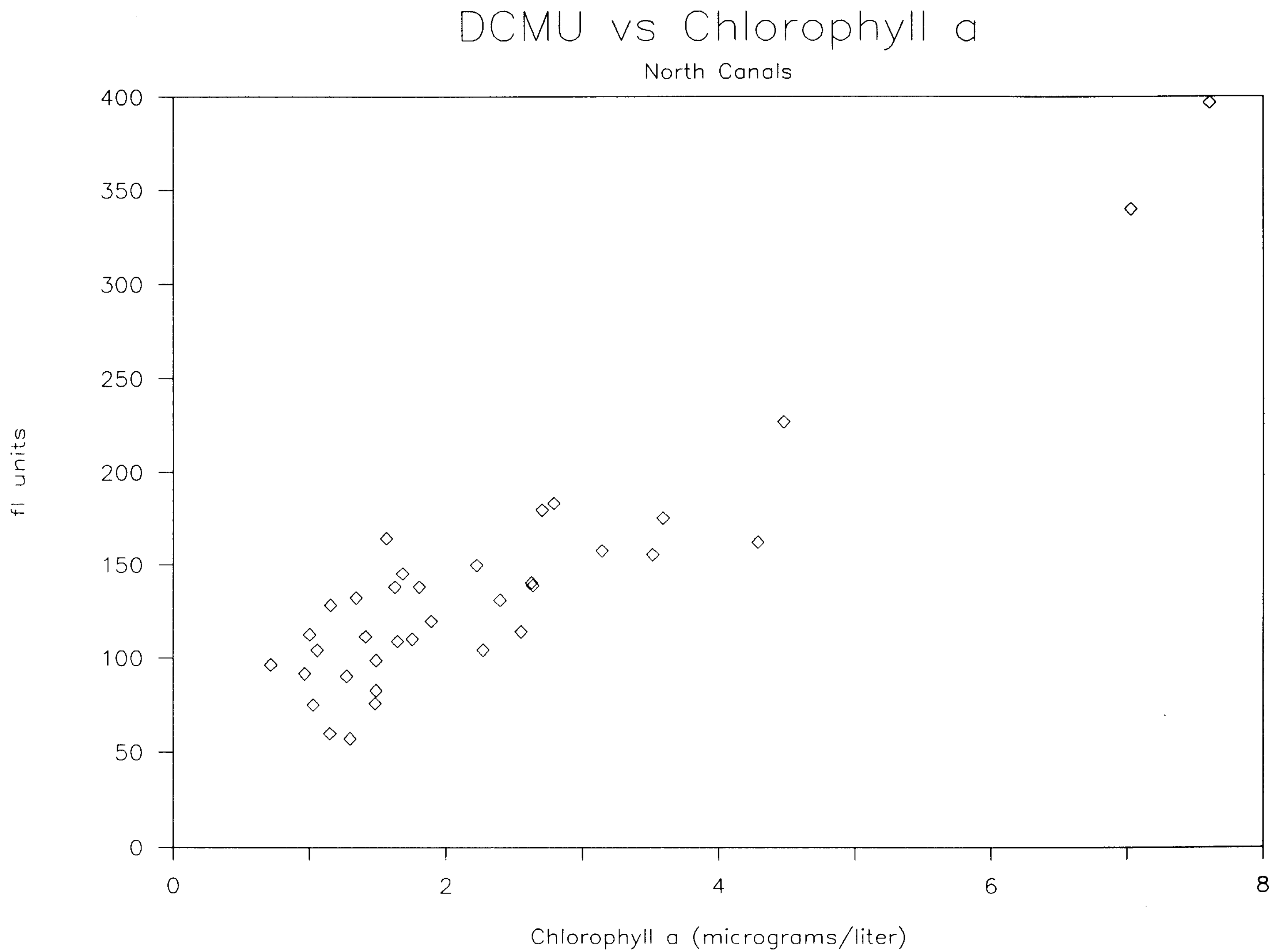

DCMU vs Chlorophyll a
North Canals
fl units
400
350
300
250
200
150
100
50
0
0
2
4
6
8
Chlorophyll a (micrograms/liter)

Figure 34

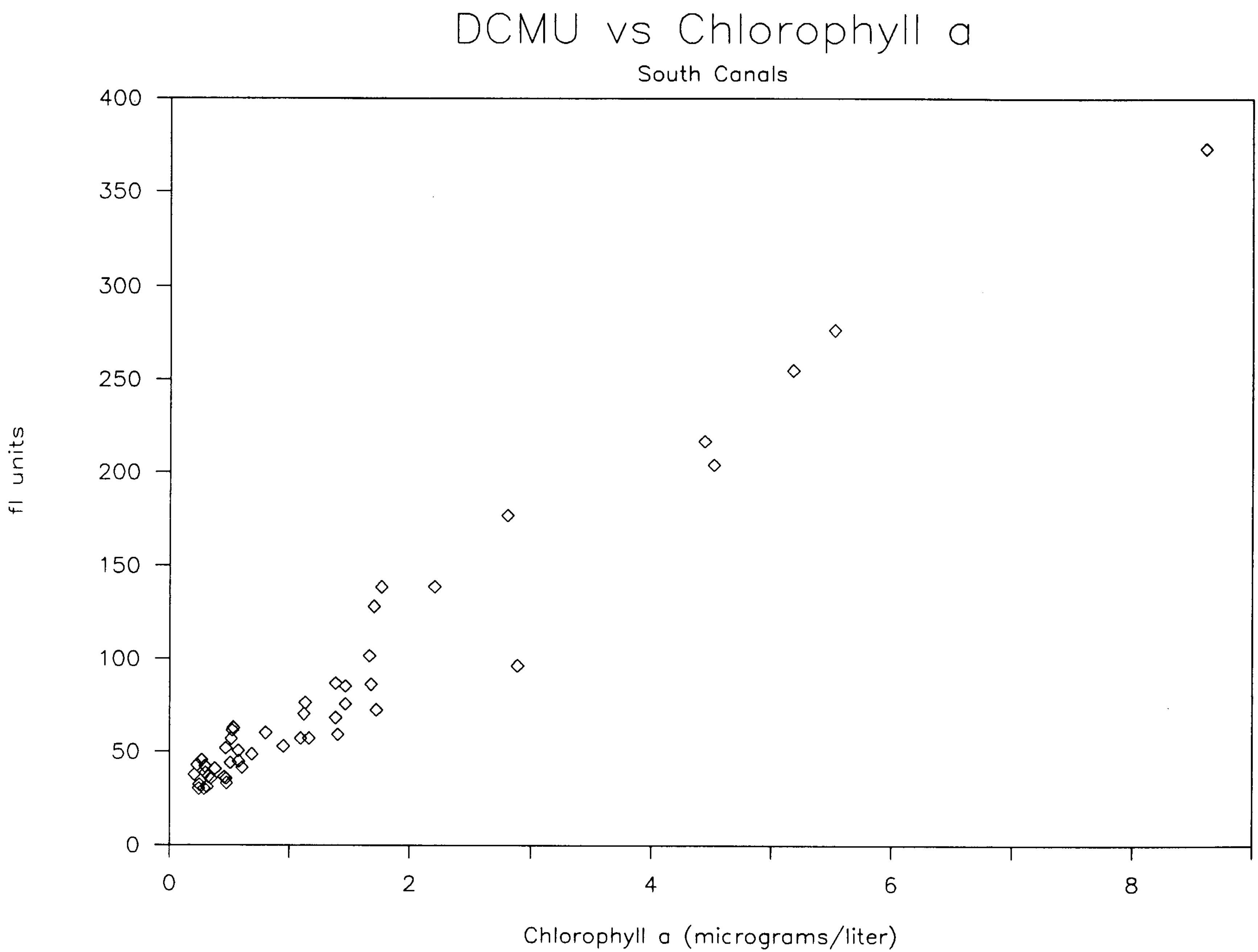
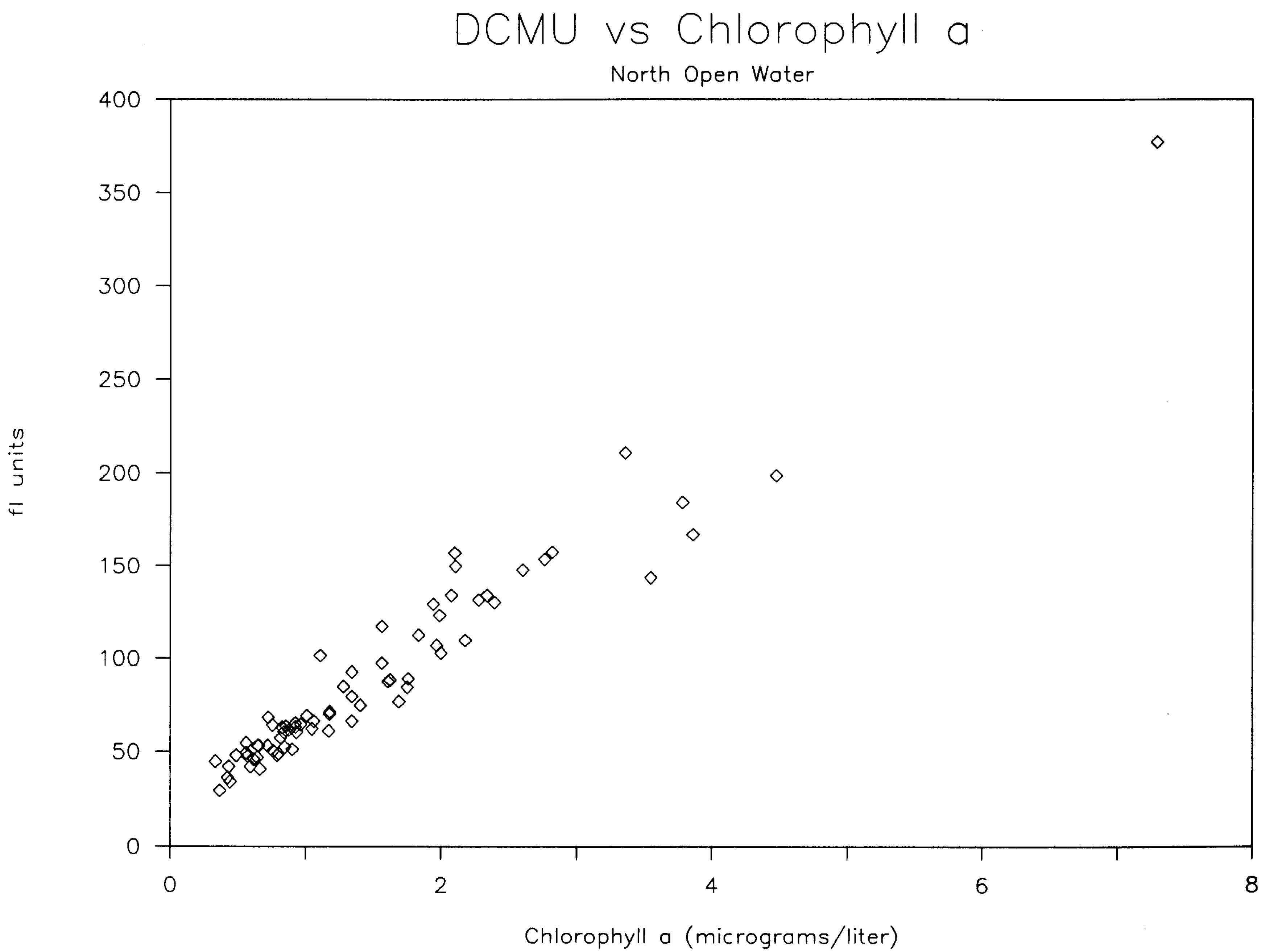

DCMU vs Chlorophyll a
South Canals
400
350
300
250
200
150
100
50
0
fl units
0
2
4
6
8
Chlorophyll a (micrograms/liter)

Figure 35



DCMU vs Chlorophyll a
North Open Water
fl units
400
350
300
250
200
150
100
50
0
0
2
4
6
8
Chlorophyll a (micrograms/liter)

Figure 36

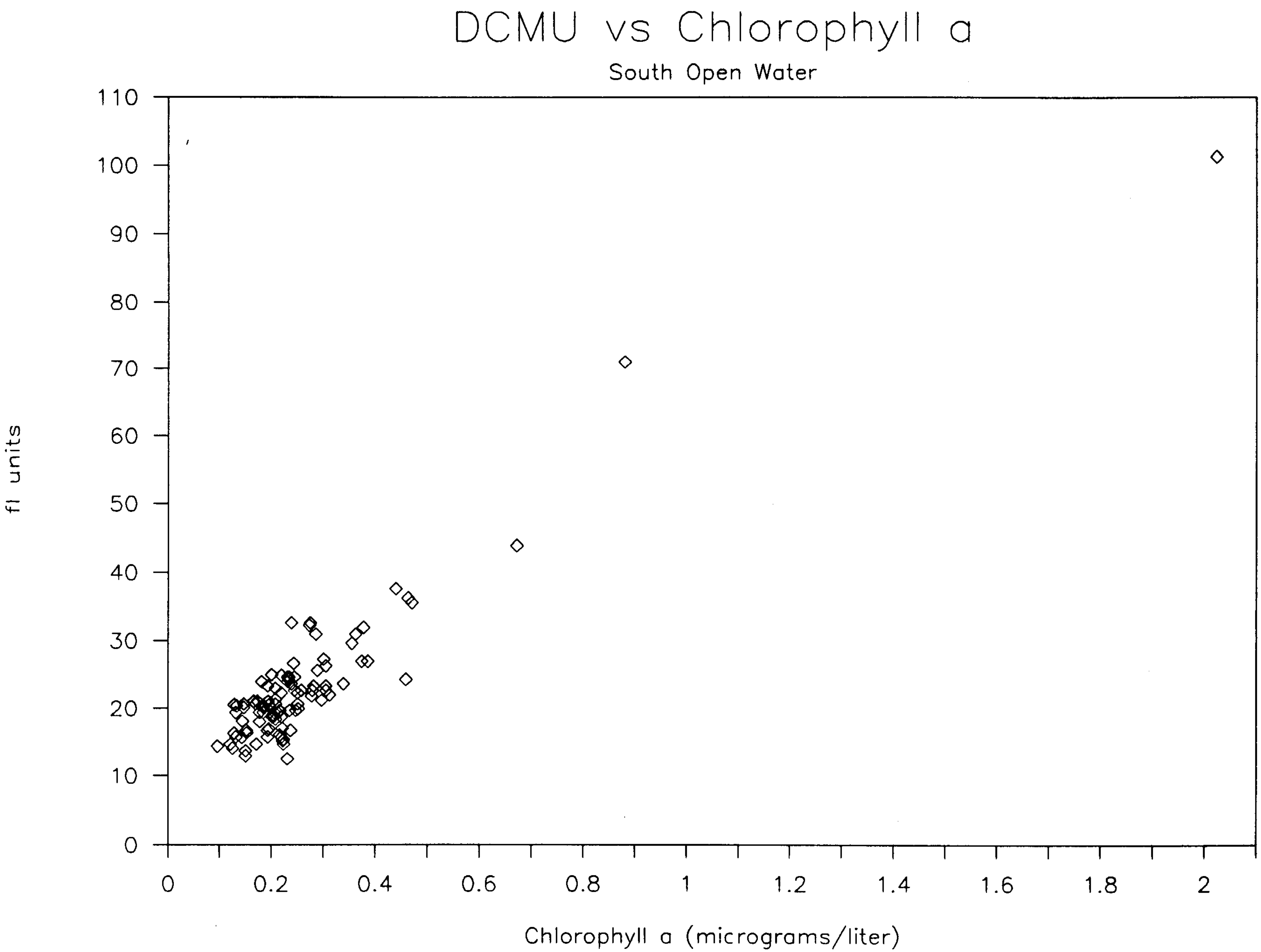

DCMU vs Chlorophyll a
South Open Water
fl units
Chlorophyll a (micrograms/liter)
110
100
90
80
70
60
50
40
30
20
10
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2

Figure 37

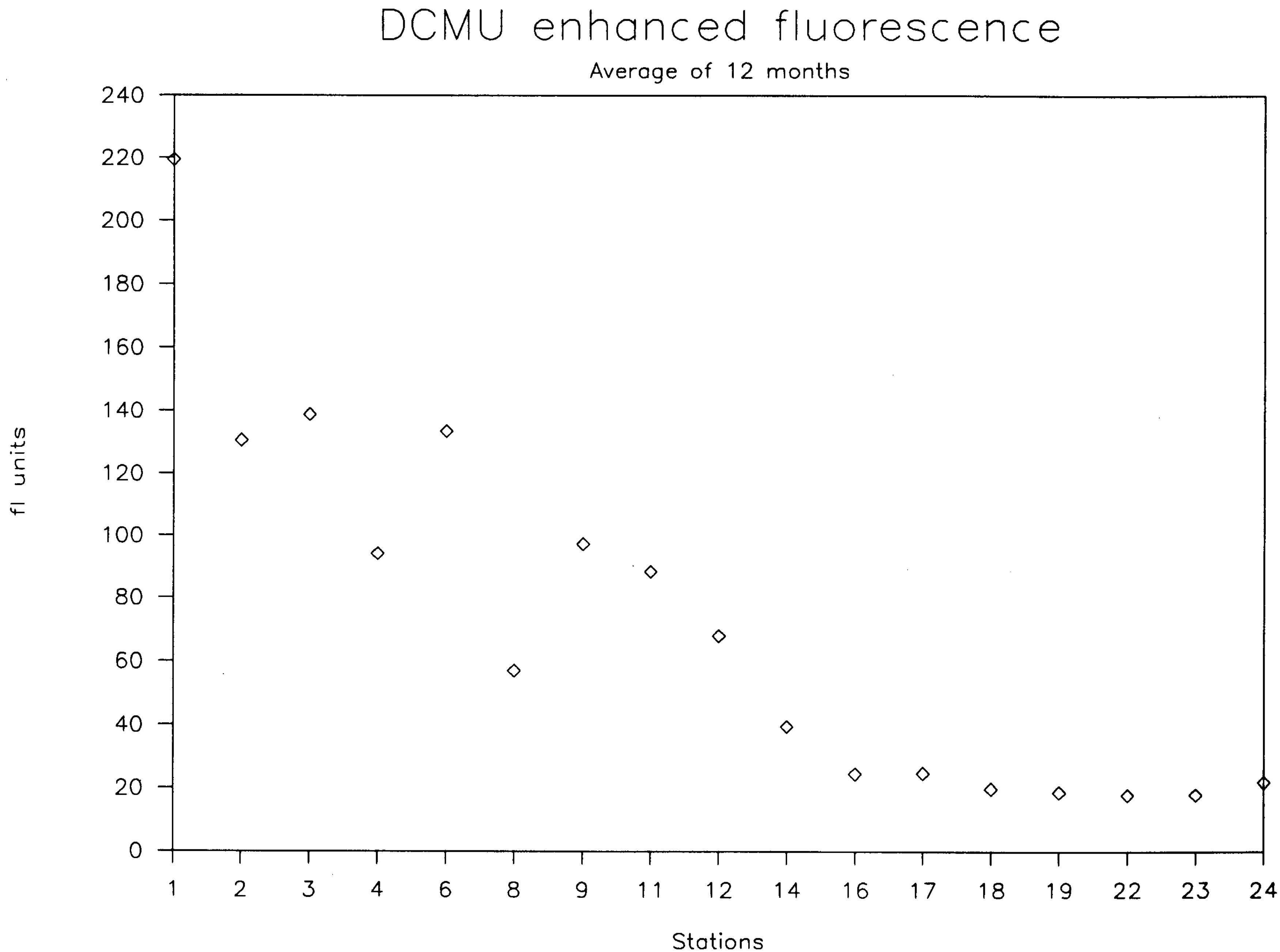

DCMU enhanced fluorescence
Average of 12 months
fl units
240
220
200
180
160
140
120
100
80
60
40
20
0
1
2
3
4
6
8
9
11
12
14
16
17
18
19
22
23
24
Stations

Figure 38

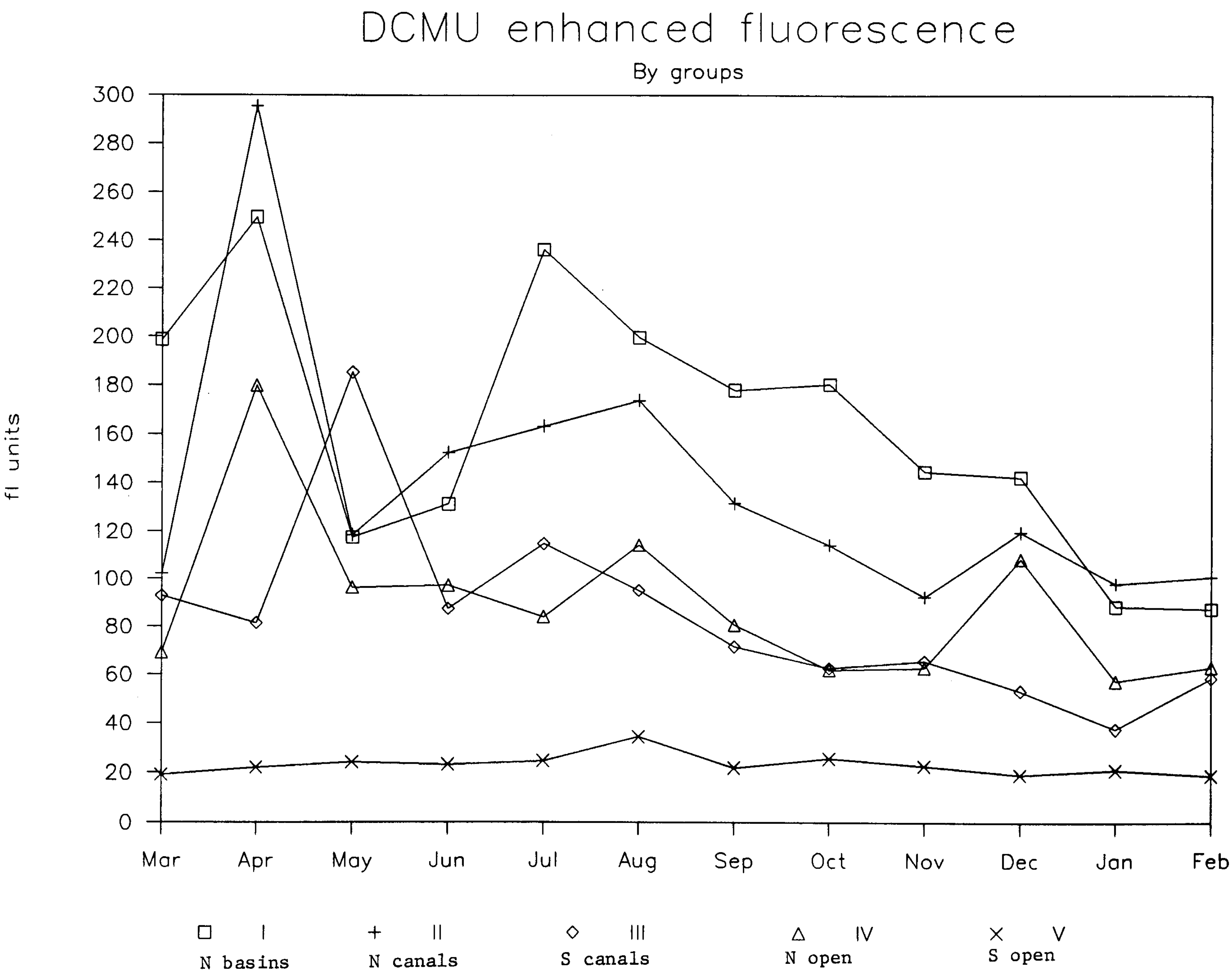

DCMU enhanced fluorescence
By groups
fl units
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
I
N basins
II
N canals
III
S canals
IV
N open
V
S open

Figure 39

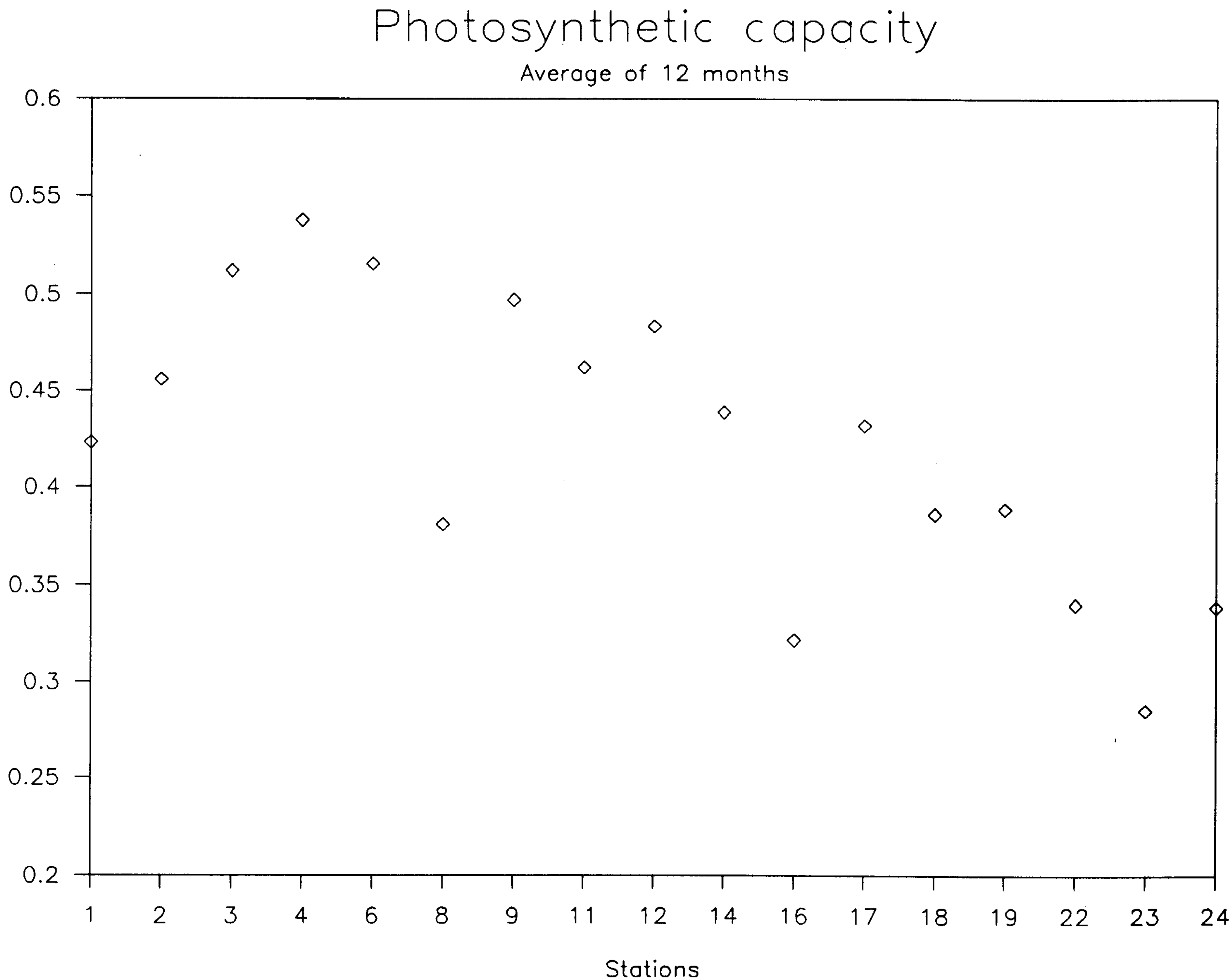

Photosynthetic capacity
Average of 12 months
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
1
2
3
4
6
8
9
11
12
14
16
17
18
19
22
23
24
Stations

Figure 40

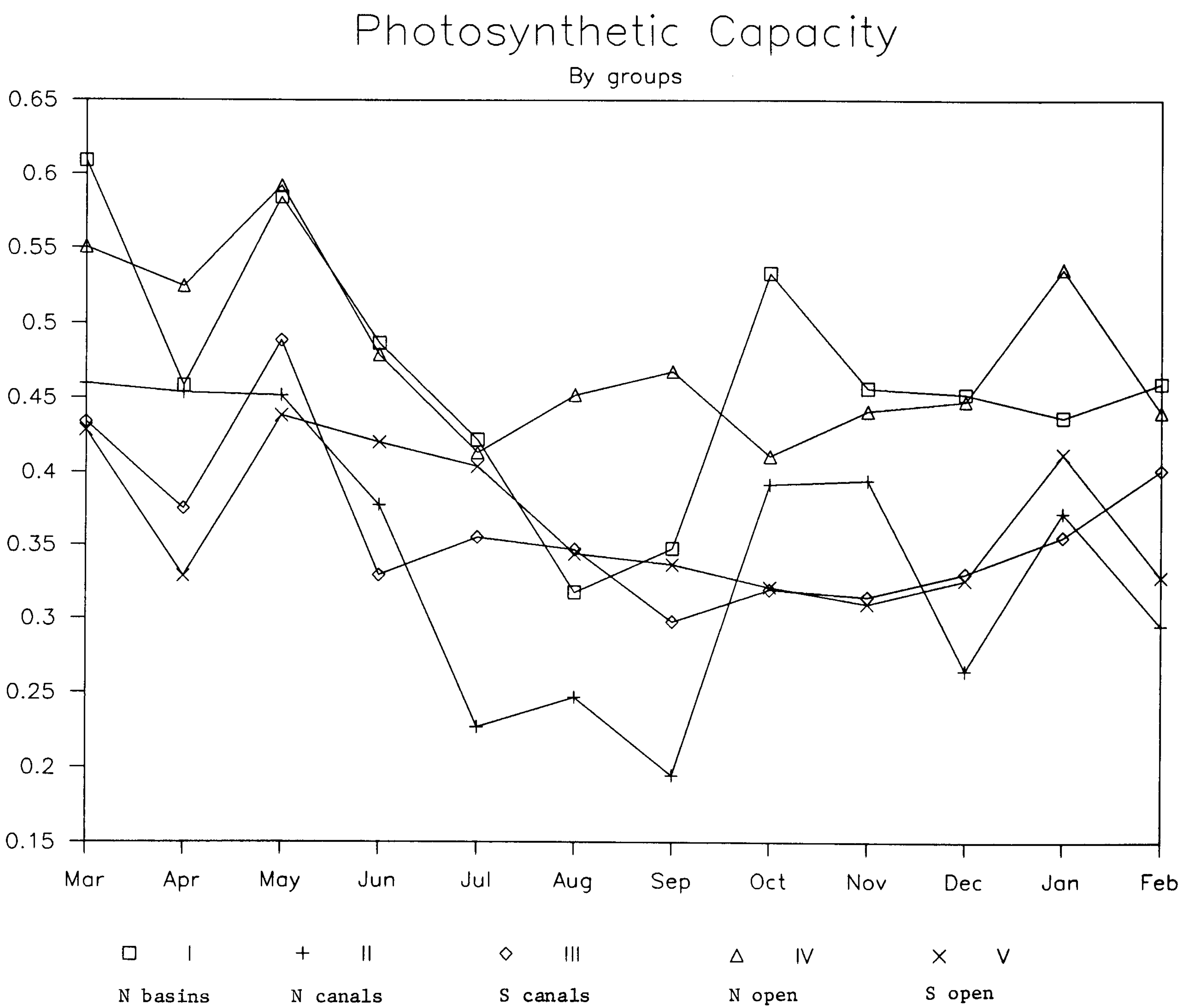

Photosynthetic Capacity
By groups
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
I
N basins
II
N canals
III
S canals
IV
N open
V
S open

Figure 41

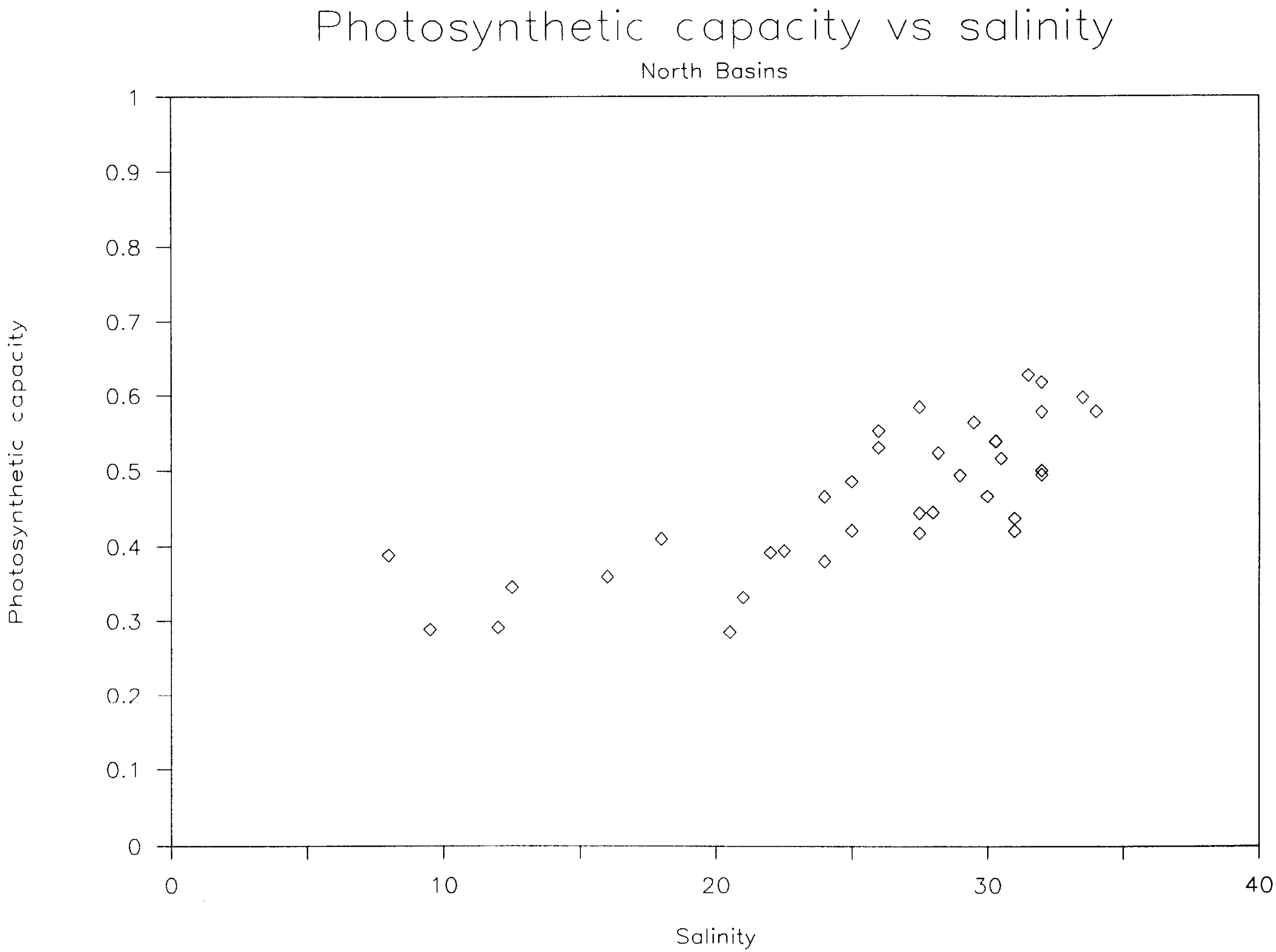
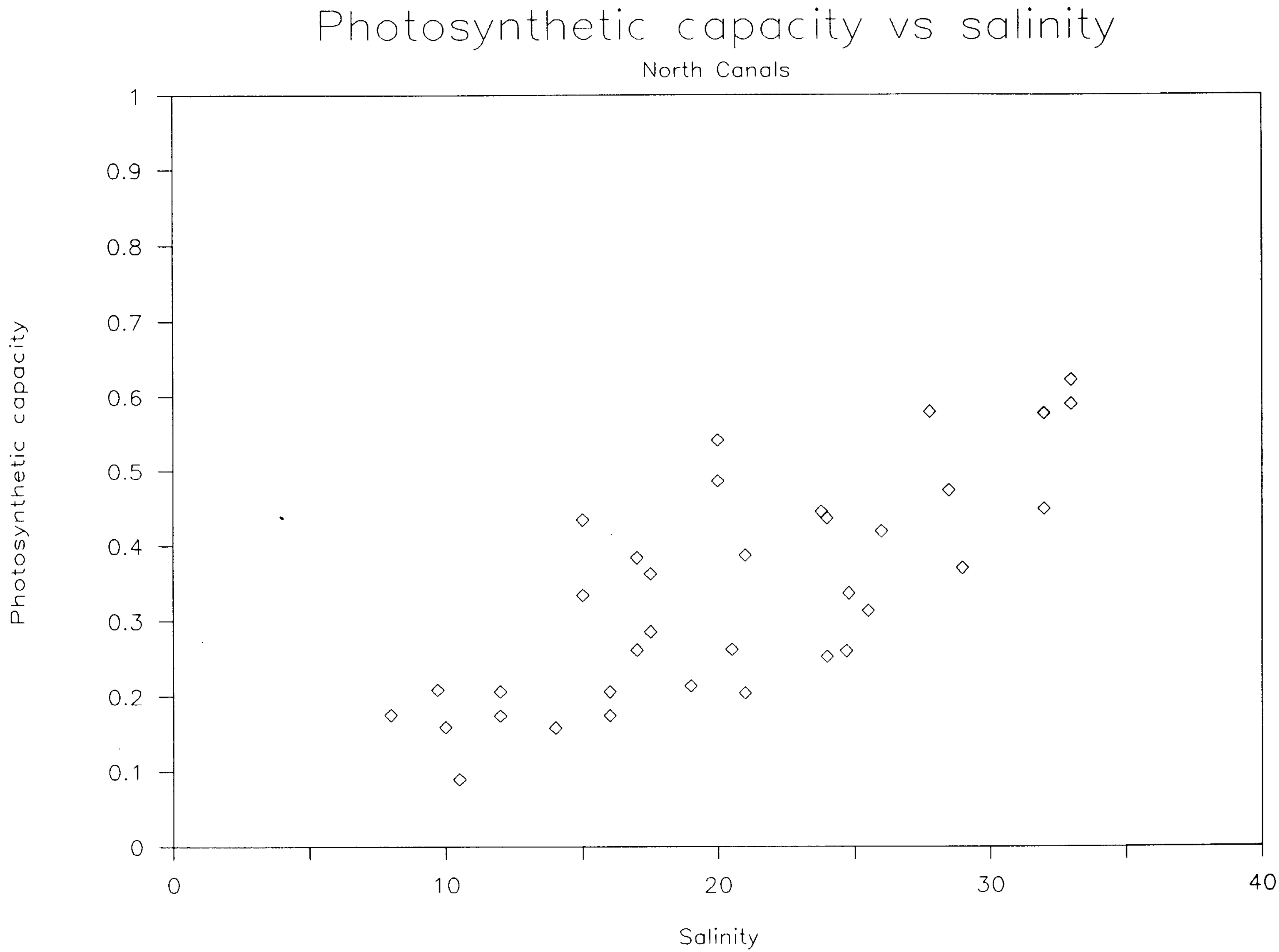

Photosynthetic capacity vs salinity
North Basins
Photosynthetic capacity
Salinity
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
10
20
30
40

Figure 42



Photosynthetic capacity vs salinity
North Canals
Photosynthetic capacity
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
10
20
30
40
Salinity

Figure 43

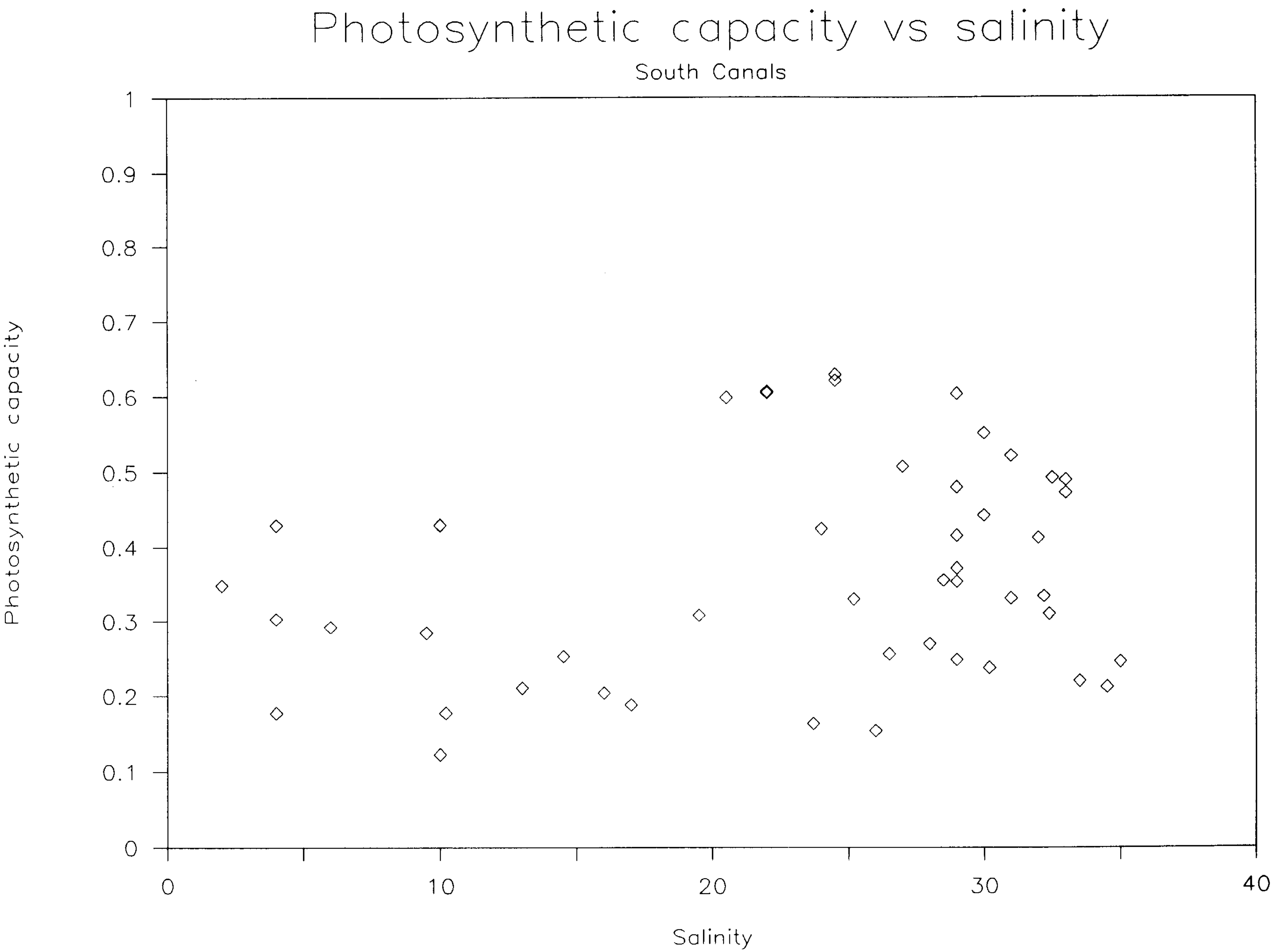

Photosynthetic capacity vs salinity
South Canals
Photosynthetic capacity
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
10
20
30
40
Salinity

Figure 44

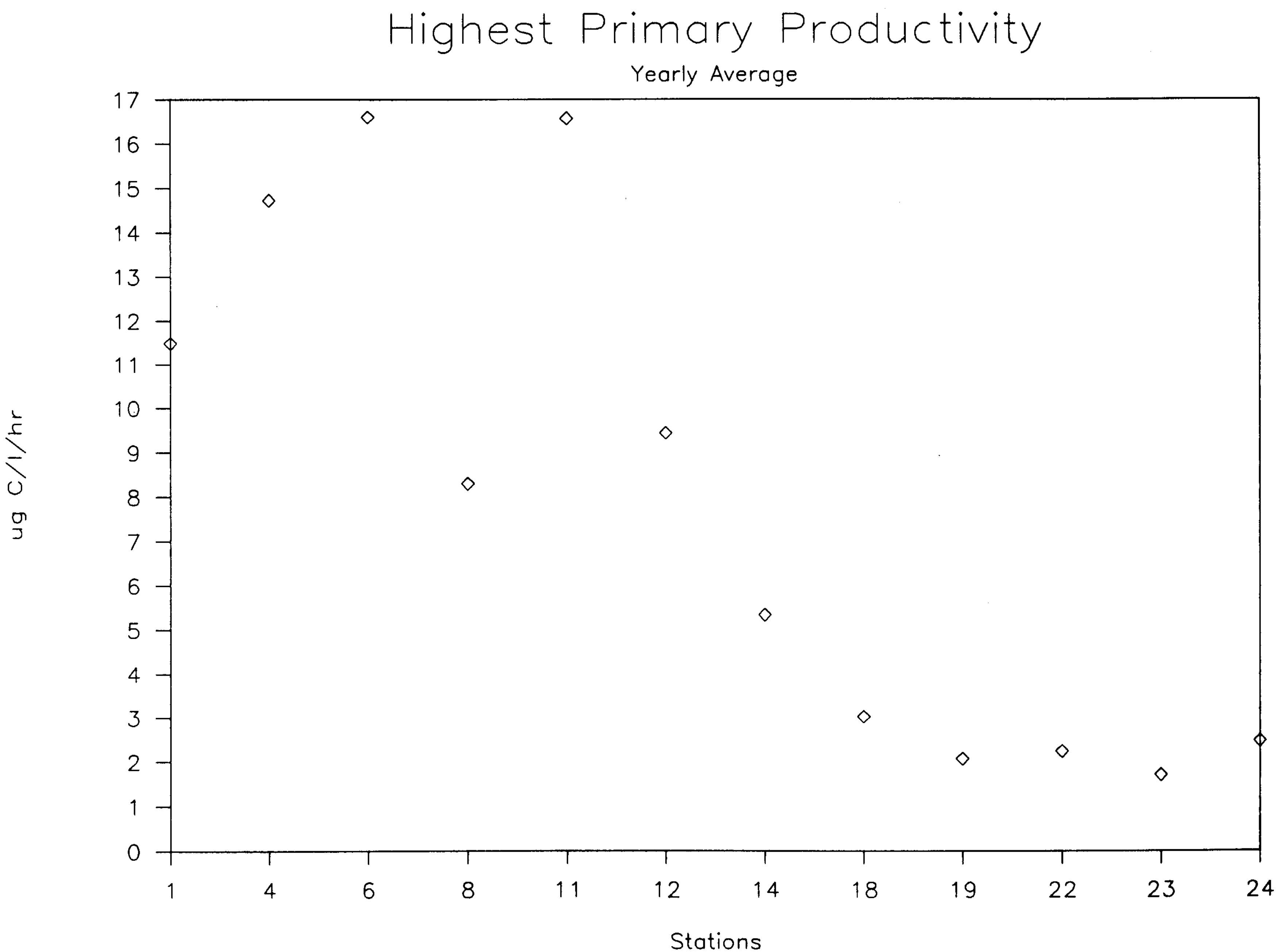
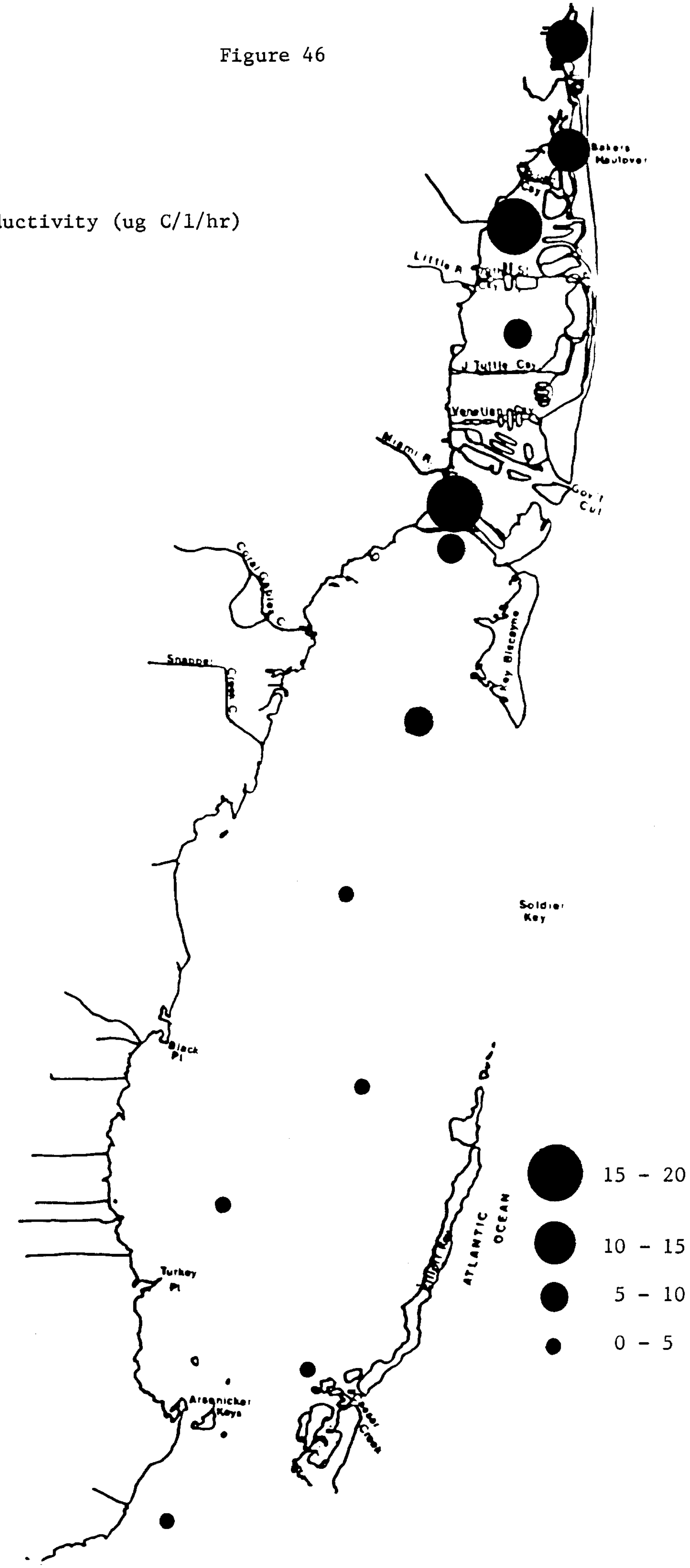

Highest Primary Productivity
Yearly Average
ug C/l/hr
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 45

Figure 46

Primary productivity (ug C/l/hr)



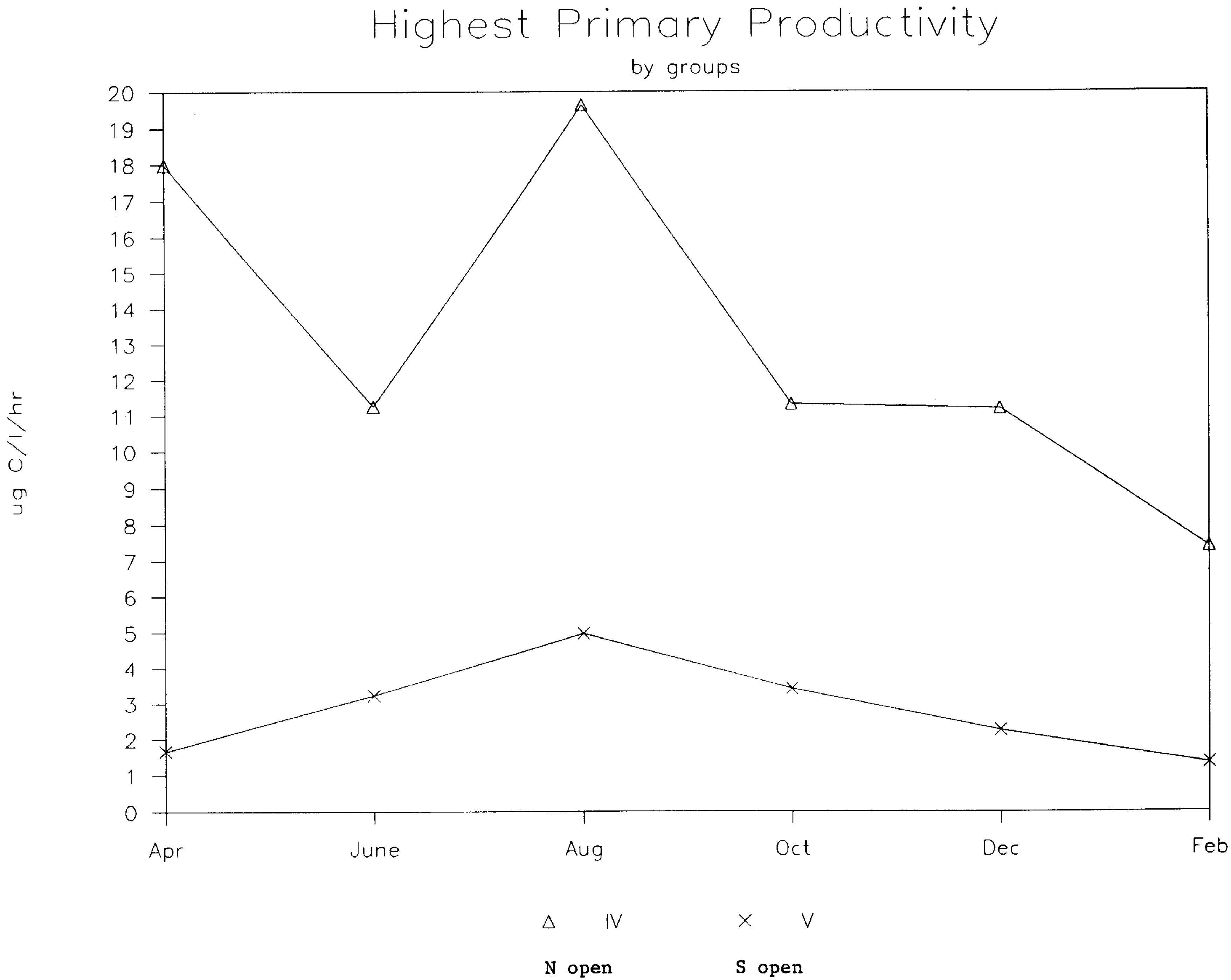

Highest Primary Productivity
by groups
ug C/l/hr
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Apr
June
Aug
Oct
Dec
Feb
IV
V
N open
S open

Figure 47

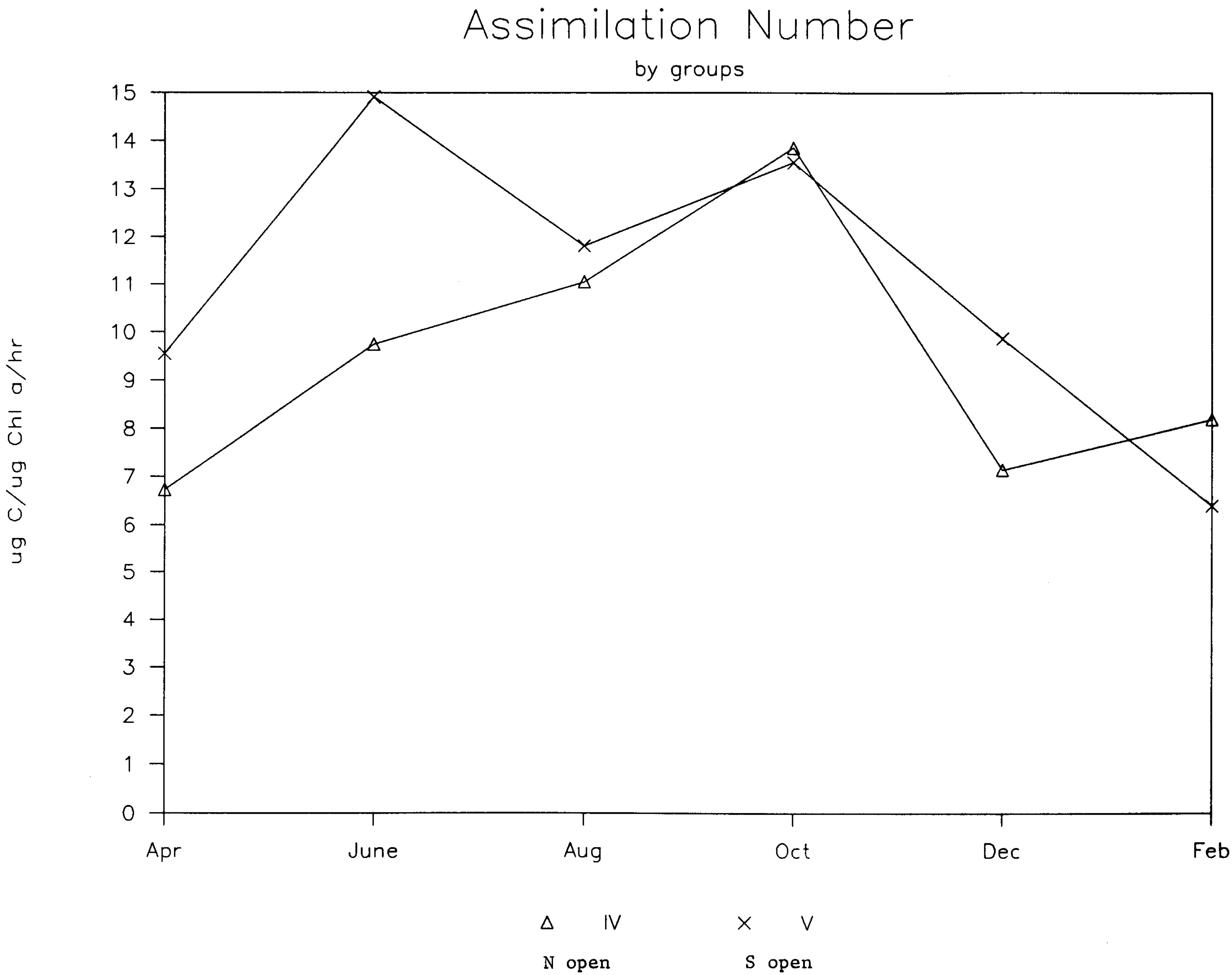

Assimilation Number
by groups
ug C/ug Chl a/hr
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Apr
June
Aug
Oct
Dec
Feb
IV
V
N open
S open

Figure 48

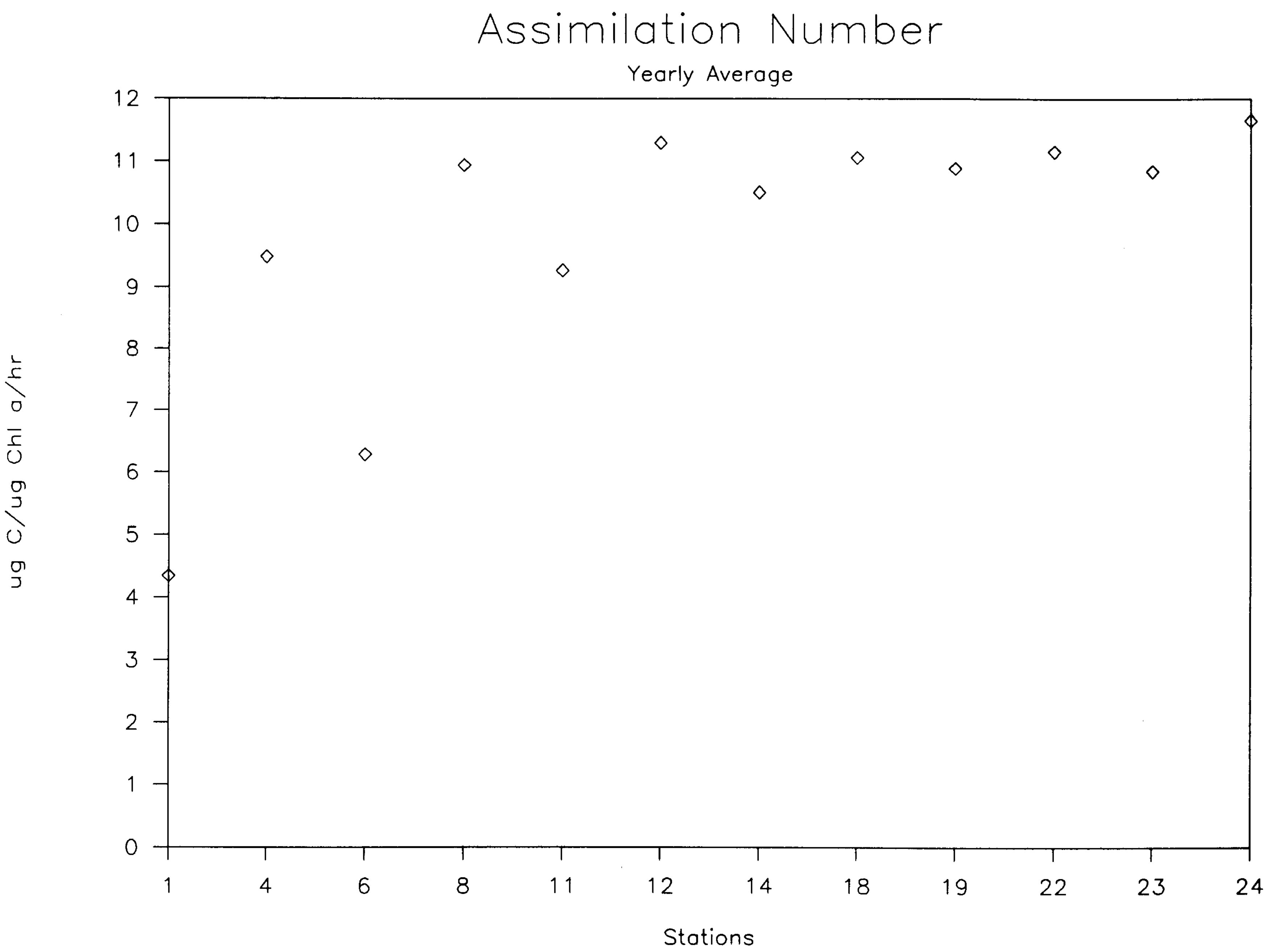

Assimilation Number
Yearly Average
ug C/ug Chl a/hr
0
1
2
3
4
5
6
7
8
9
10
11
12
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 49

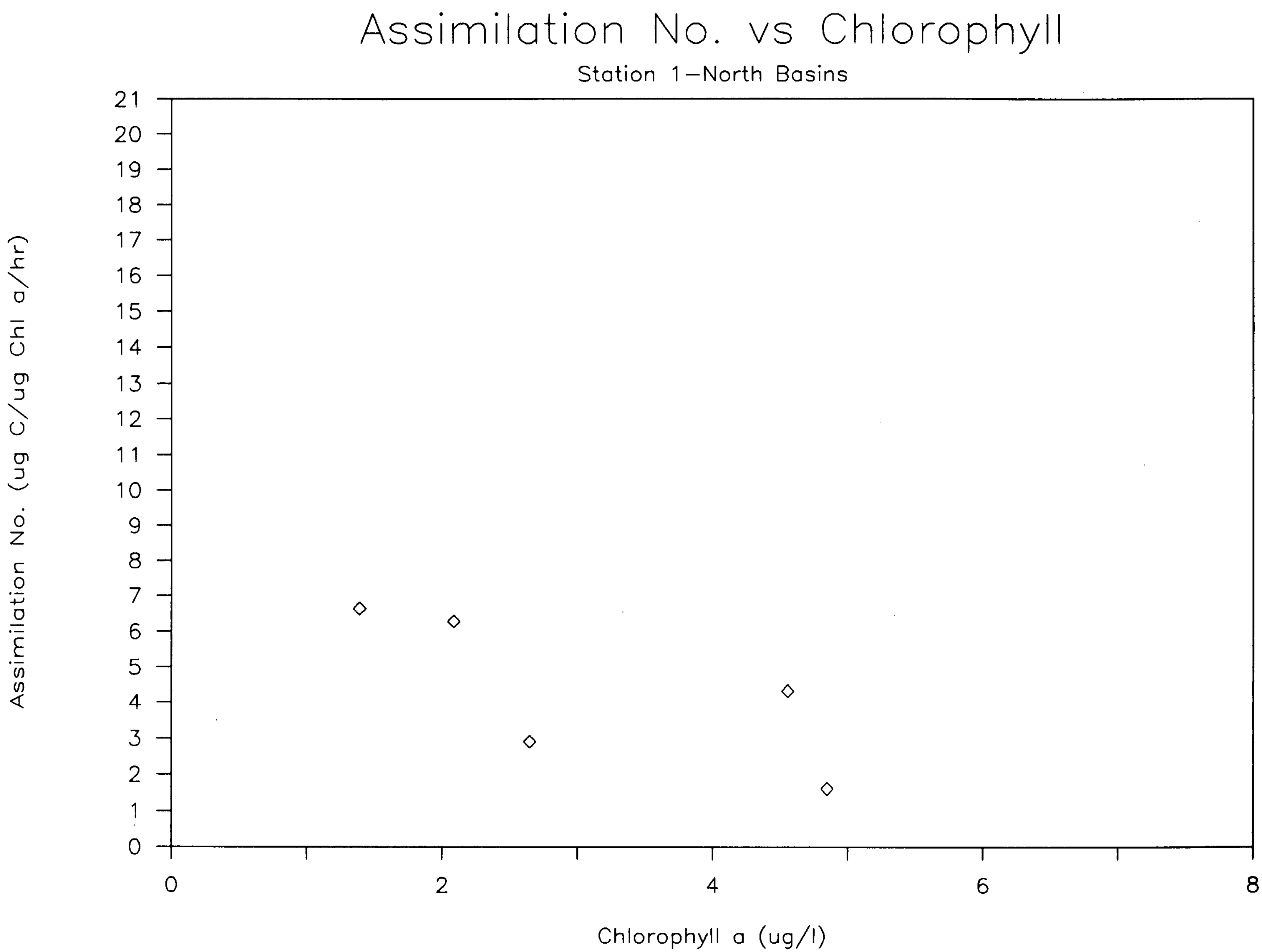

Assimilation No. vs Chlorophyll
Station 1—North Basins
Assimilation No. (ug C/ug Chl a/hr)
Chlorophyll a (ug/l)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
0
2
4
6
8

Figure 50

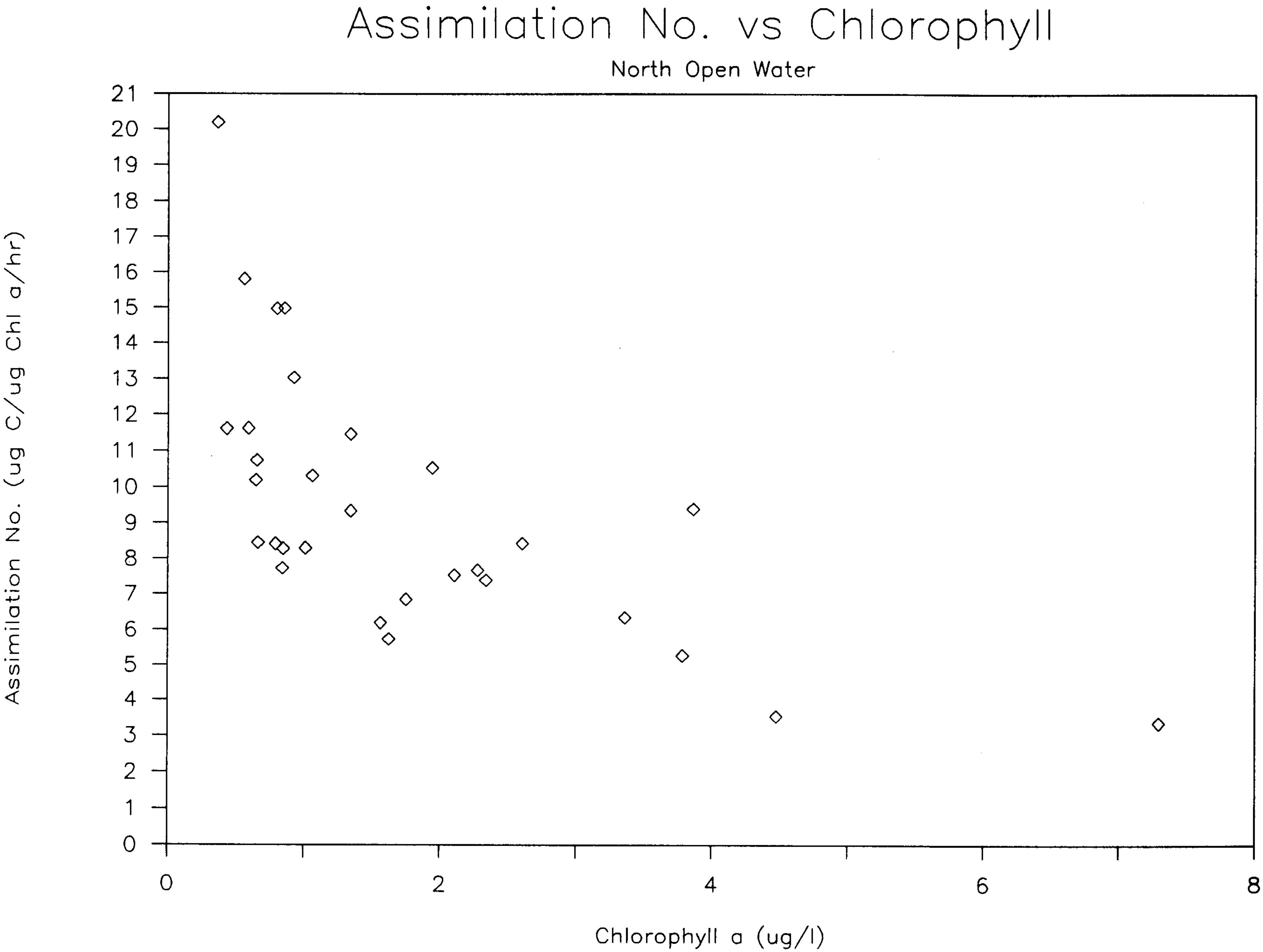

Assimilation No. vs Chlorophyll
North Open Water
Assimilation No. (ug C/ug Chl a/hr)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
0
2
4
6
8
Chlorophyll a (ug/l)

Figure 51

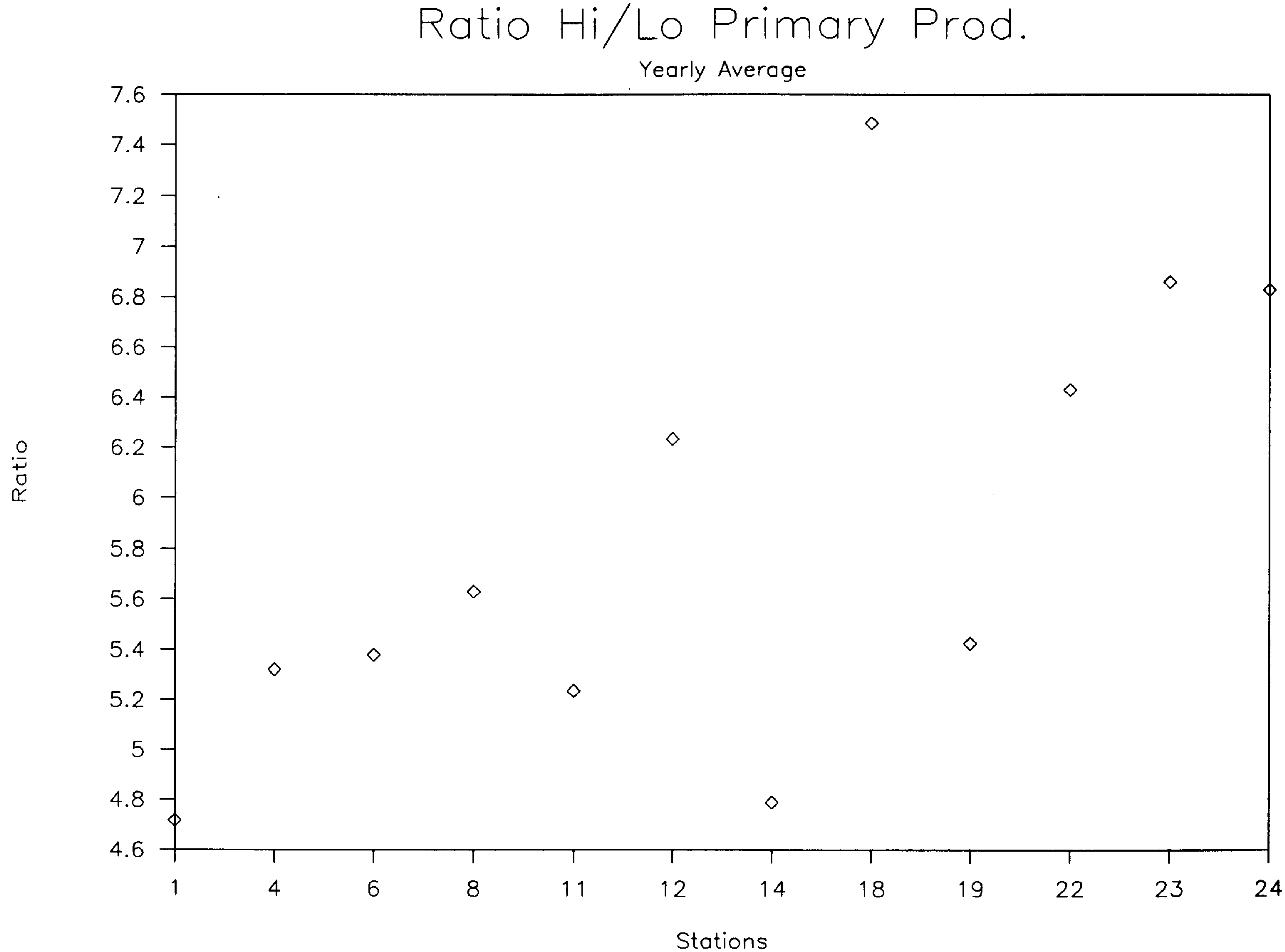

Ratio Hi/Lo Primary Prod.
Yearly Average
Ratio
Stations
7.6
7.4
7.2
7
6.8
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
5
4.8
4.6
1
4
6
8
11
12
14
18
19
22
23
24

Figure 52

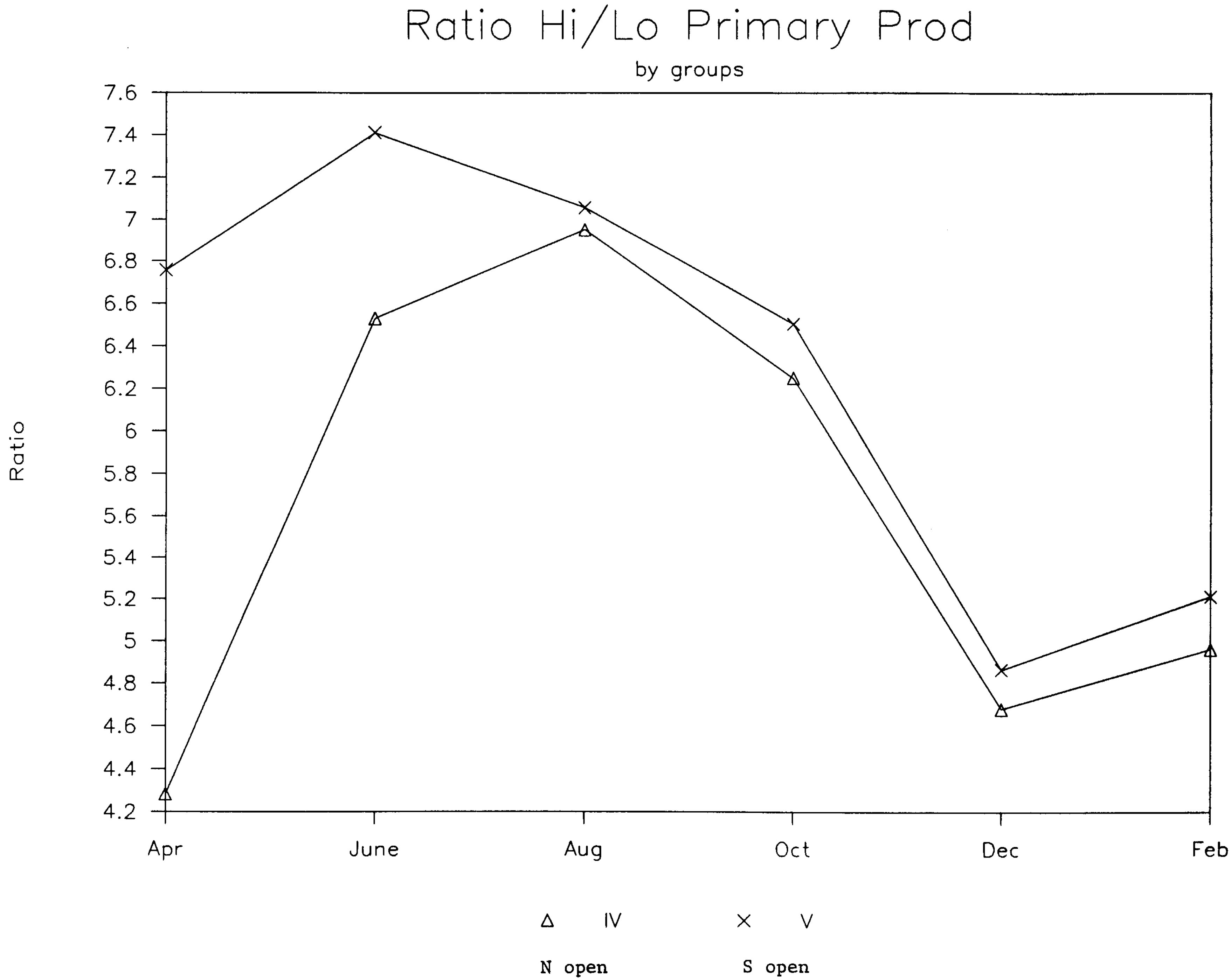

Ratio Hi/Lo Primary Prod
by groups
Ratio
7.6
7.4
7.2
7
6.8
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
Apr
June
Aug
Oct
Dec
Feb
IV
V
N open
S open

Figure 53

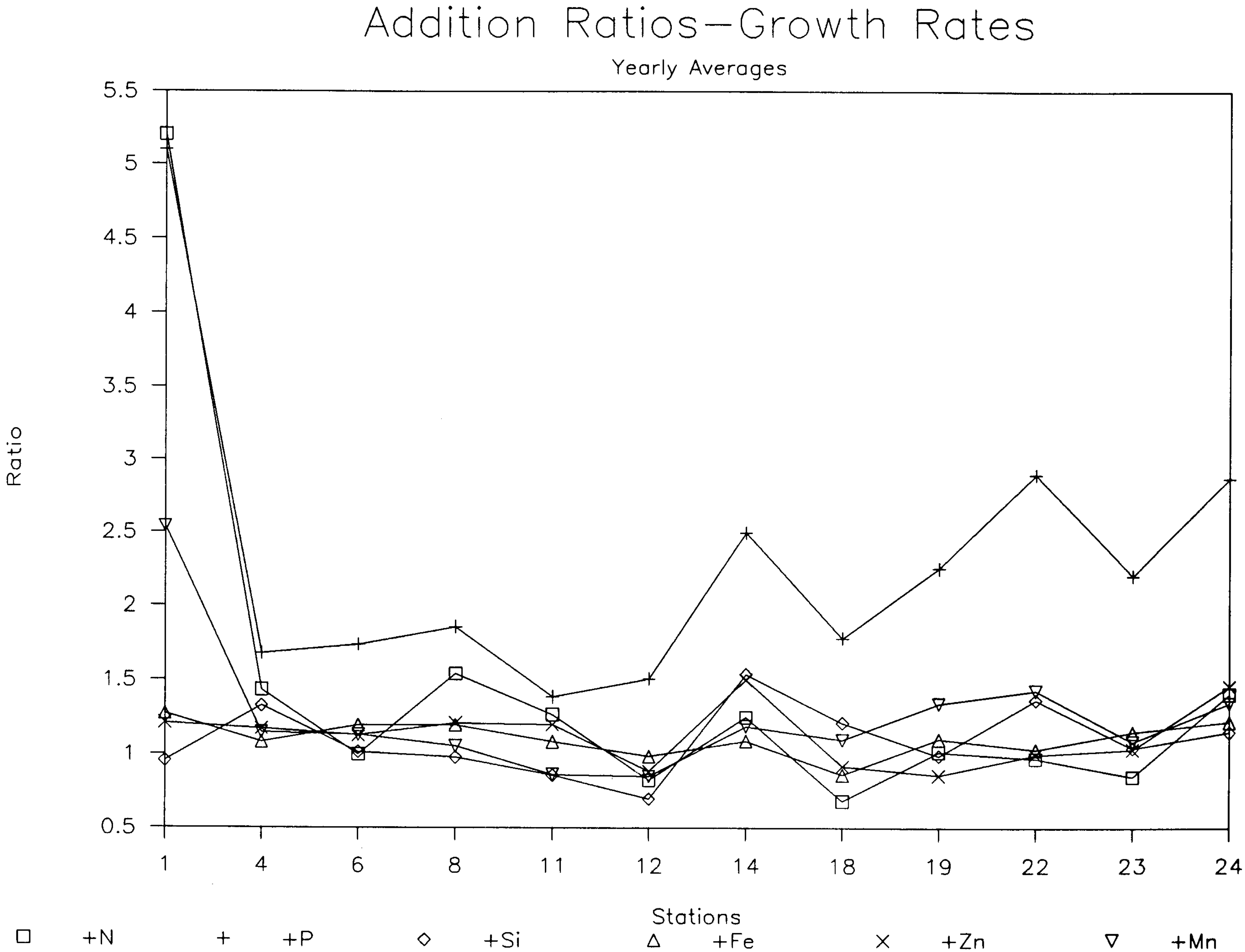

Addition Ratios—Growth Rates
Yearly Averages
Ratio
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
1
4
6
8
11
12
14
18
19
22
23
24
Stations
+N
+P
+Si
+Fe
+Zn
+Mn

Figure 54

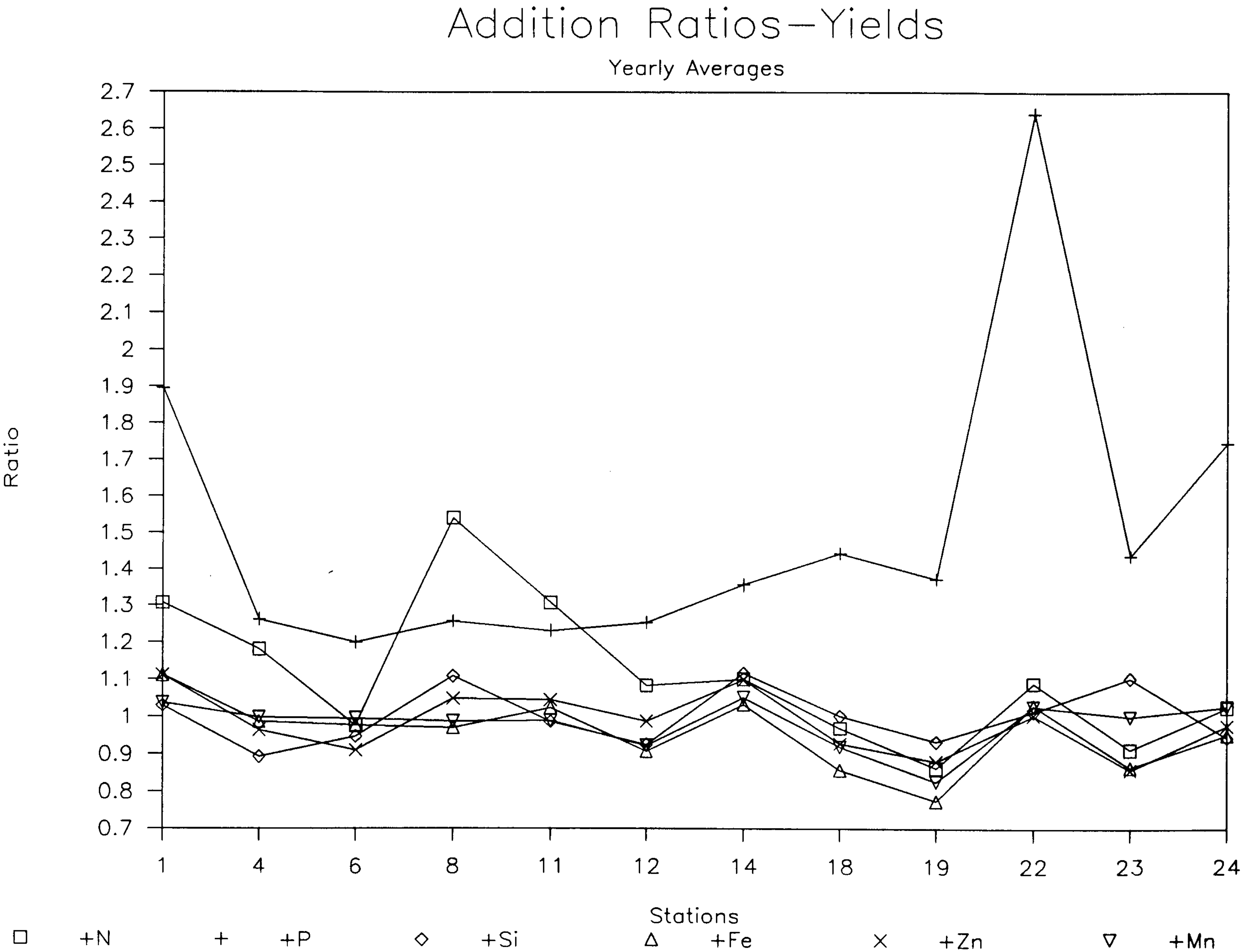

Addition Ratios—Yields
Yearly Averages
Ratio
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
1
4
6
8
11
12
14
18
19
22
23
24
Stations
+N
+P
+Si
+Fe
+Zn
+Mn

Figure 55

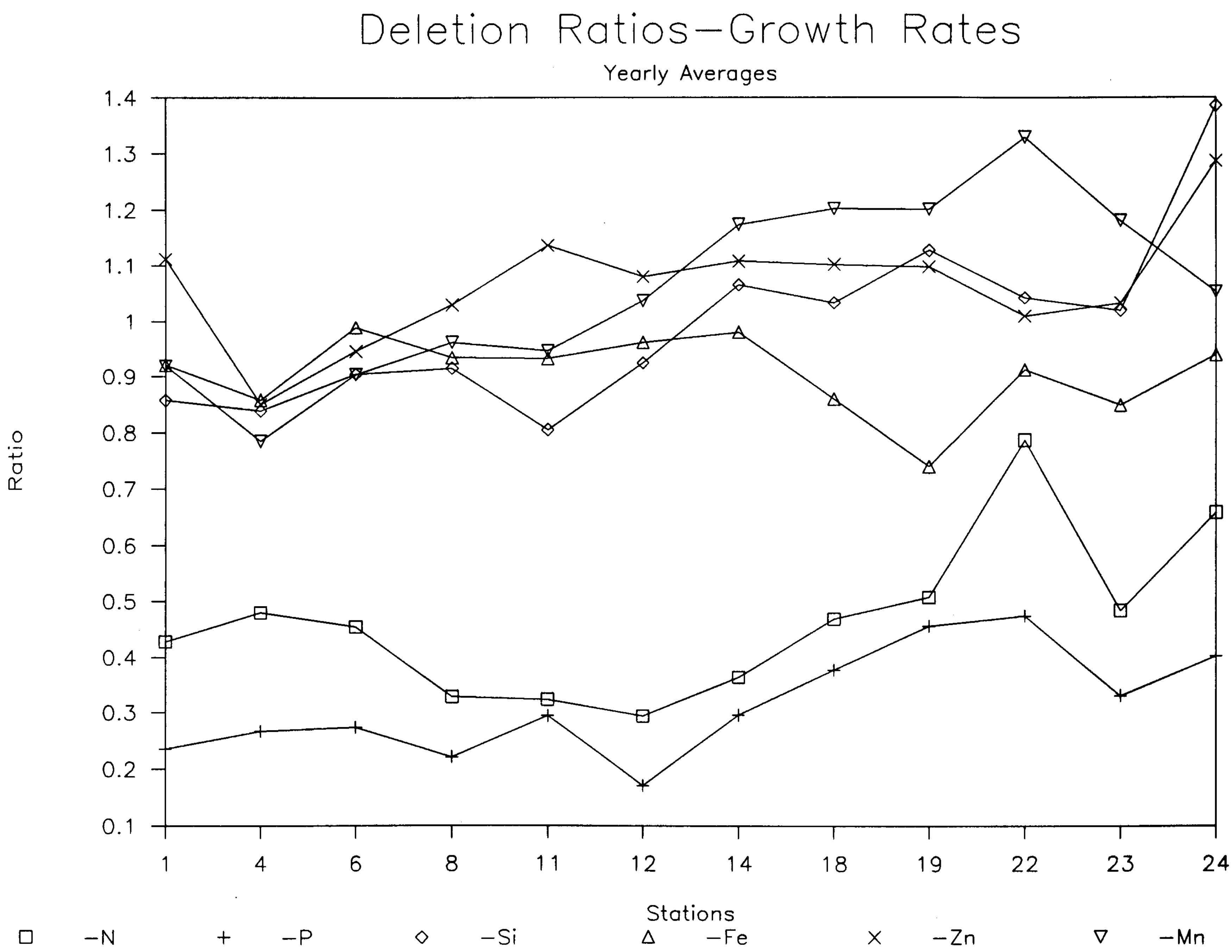
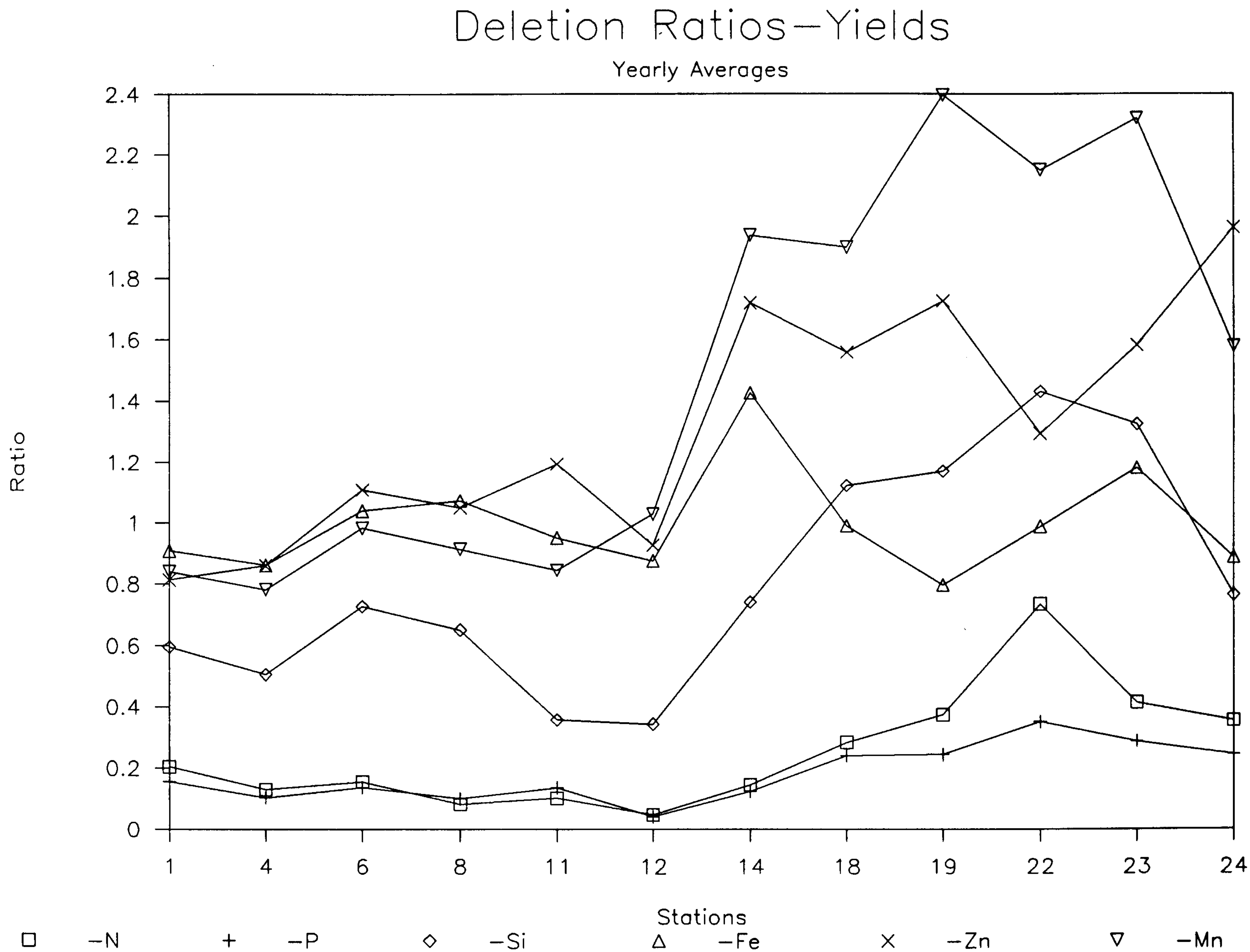

Deletion Ratios—Growth Rates
Yearly Averages
Ratio
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
1
4
6
8
11
12
14
18
19
22
23
24
Stations
□ —N
+ —P
◇ —Si
△ —Fe
× —Zn
▽ —Mn

Figure 56



Deletion Ratios—Yields
Yearly Averages
Ratio
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations
—N
—P
—Si
—Fe
—Zn
—Mn

Figure 57

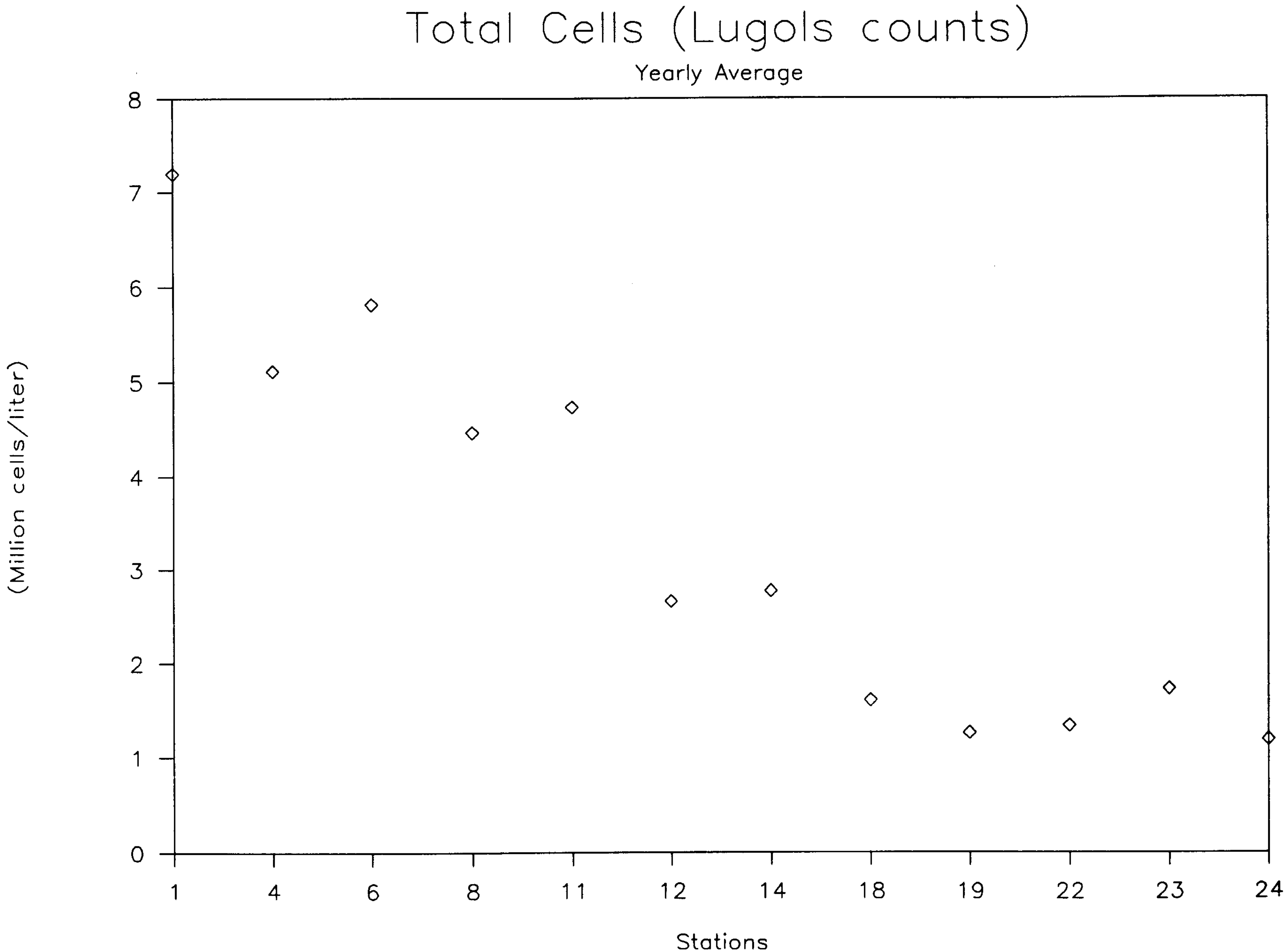

Total Cells (Lugols counts)
Yearly Average
(Million cells/liter)
0
1
2
3
4
5
6
7
8
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 58

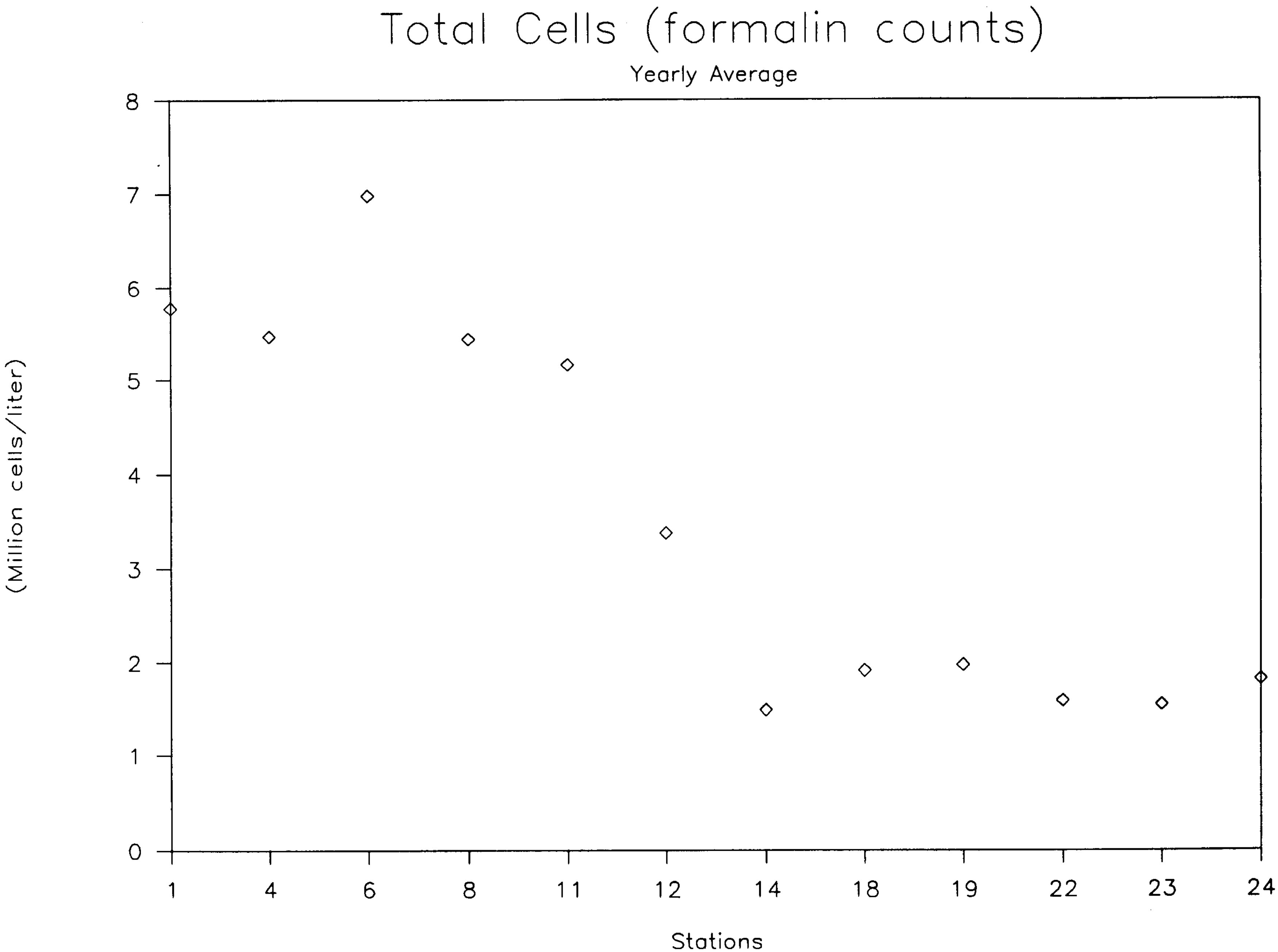
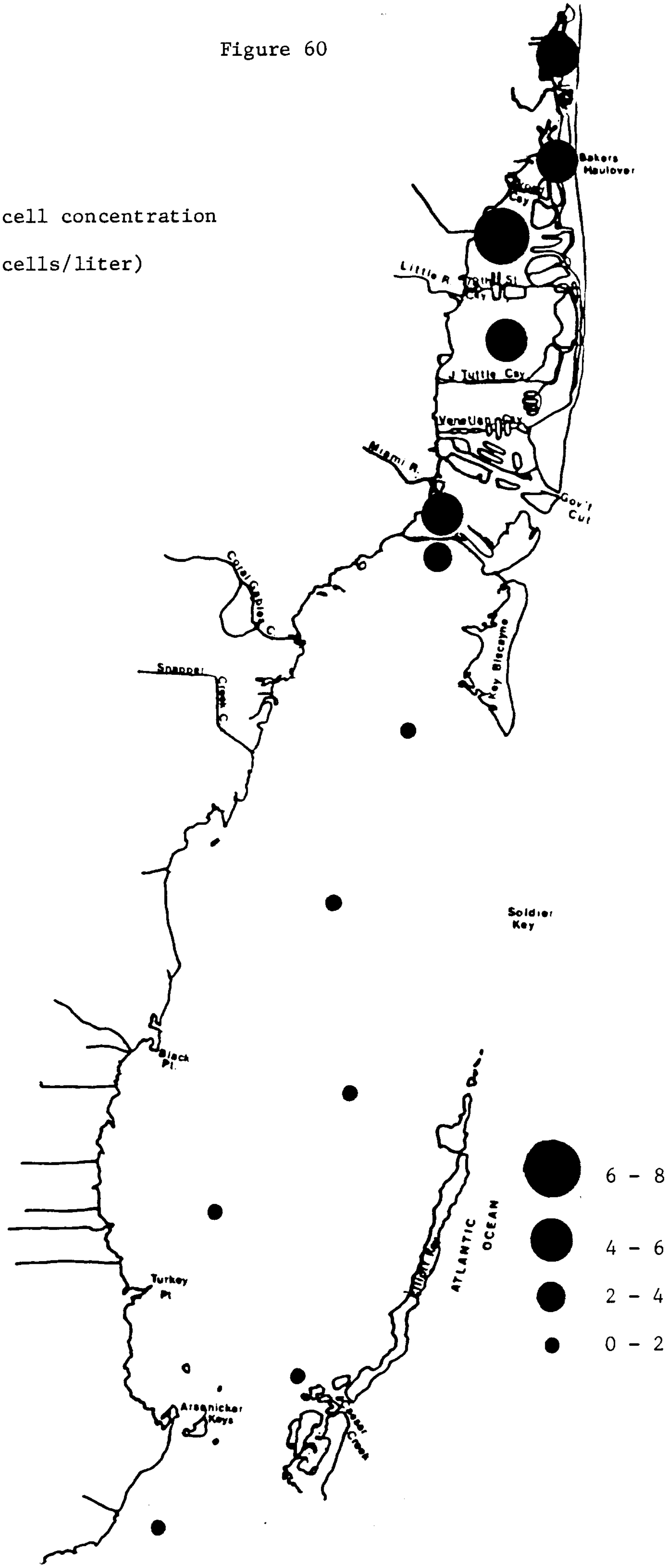

Total Cells (formalin counts)
Yearly Average
(Million cells/liter)
0
1
2
3
4
5
6
7
8
1
4
6
8
11
12
14
18
19
22
23
24
Stations

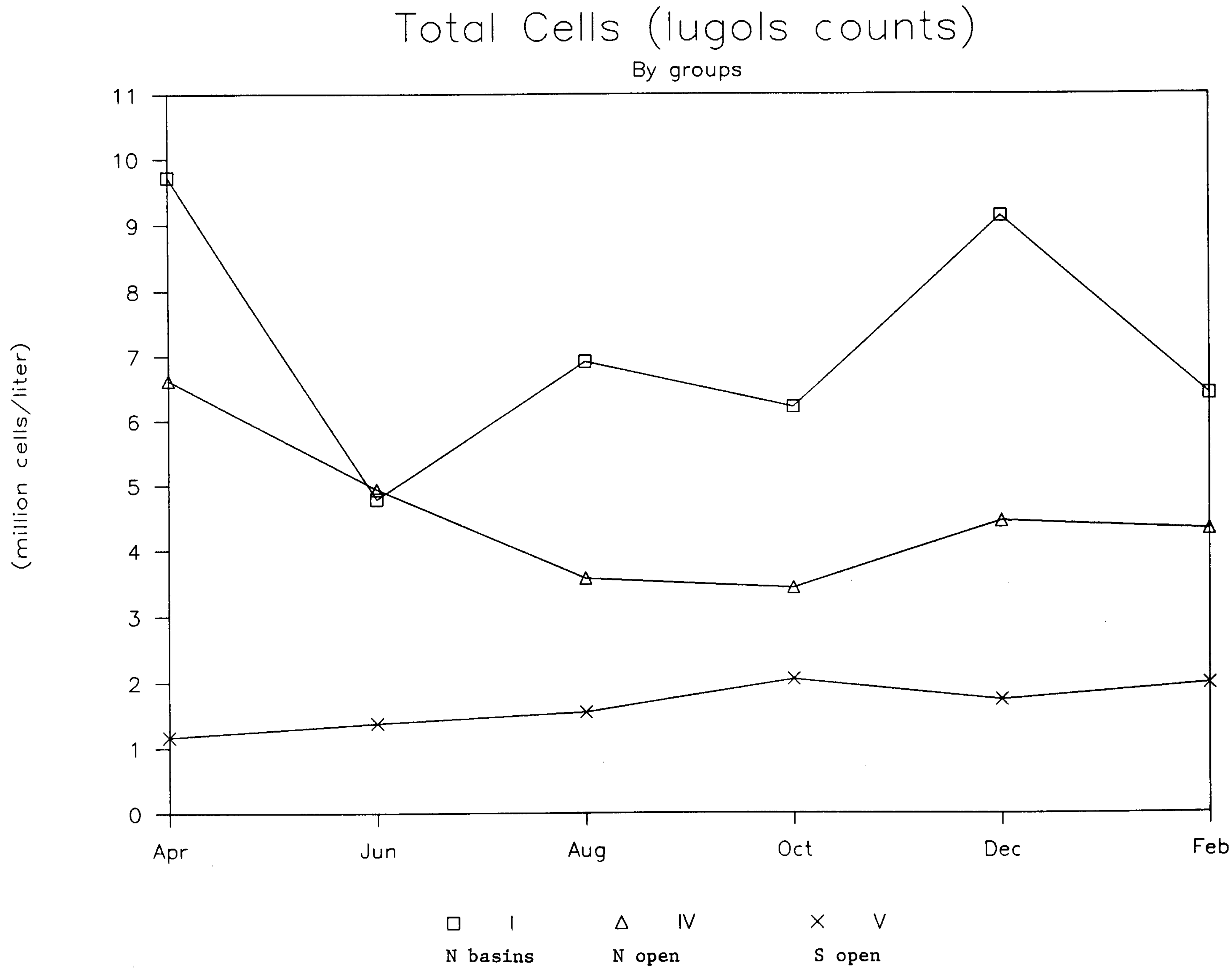
Figure 59

Figure 60

Phytoplankton cell concentration

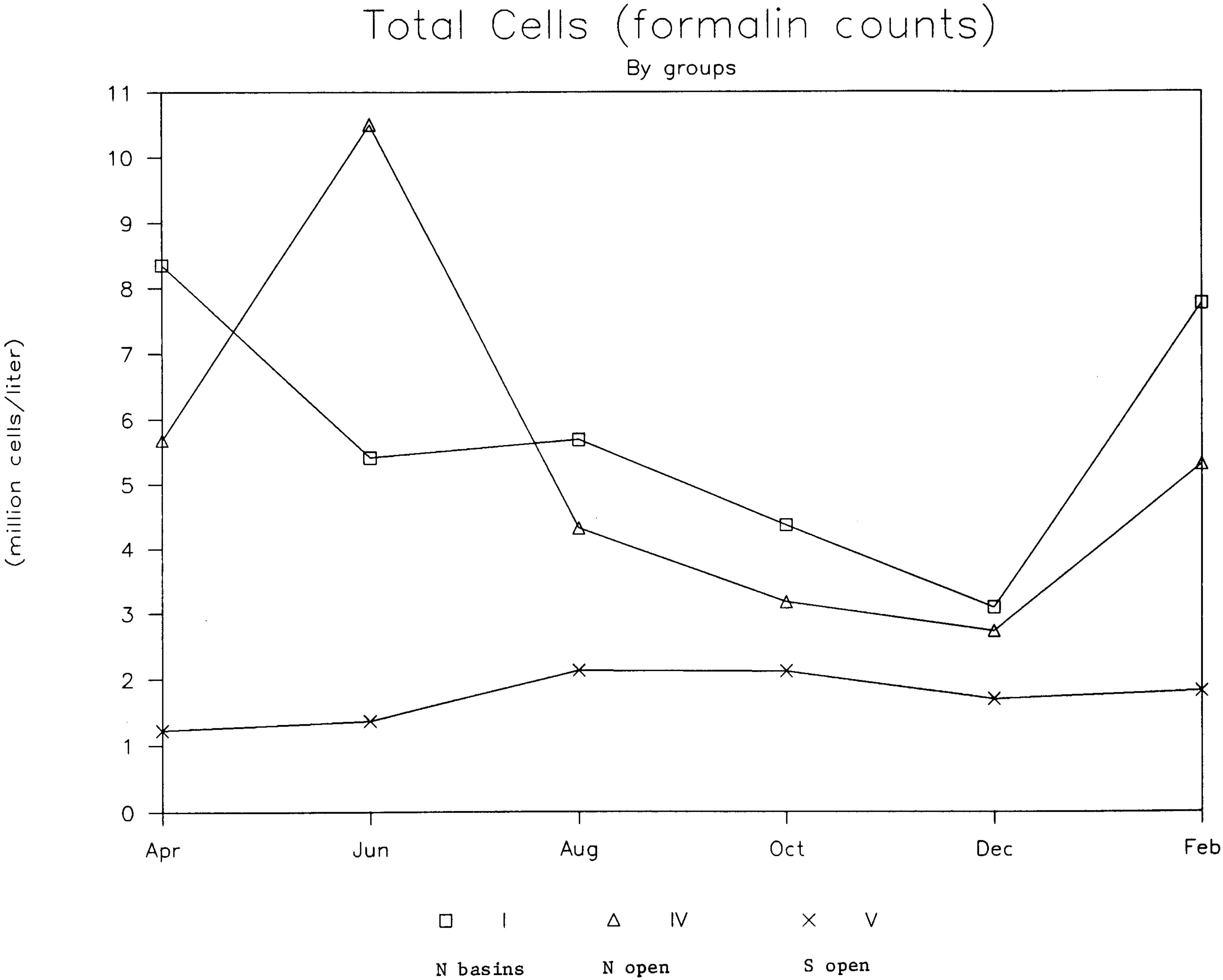
(million cells/liter)





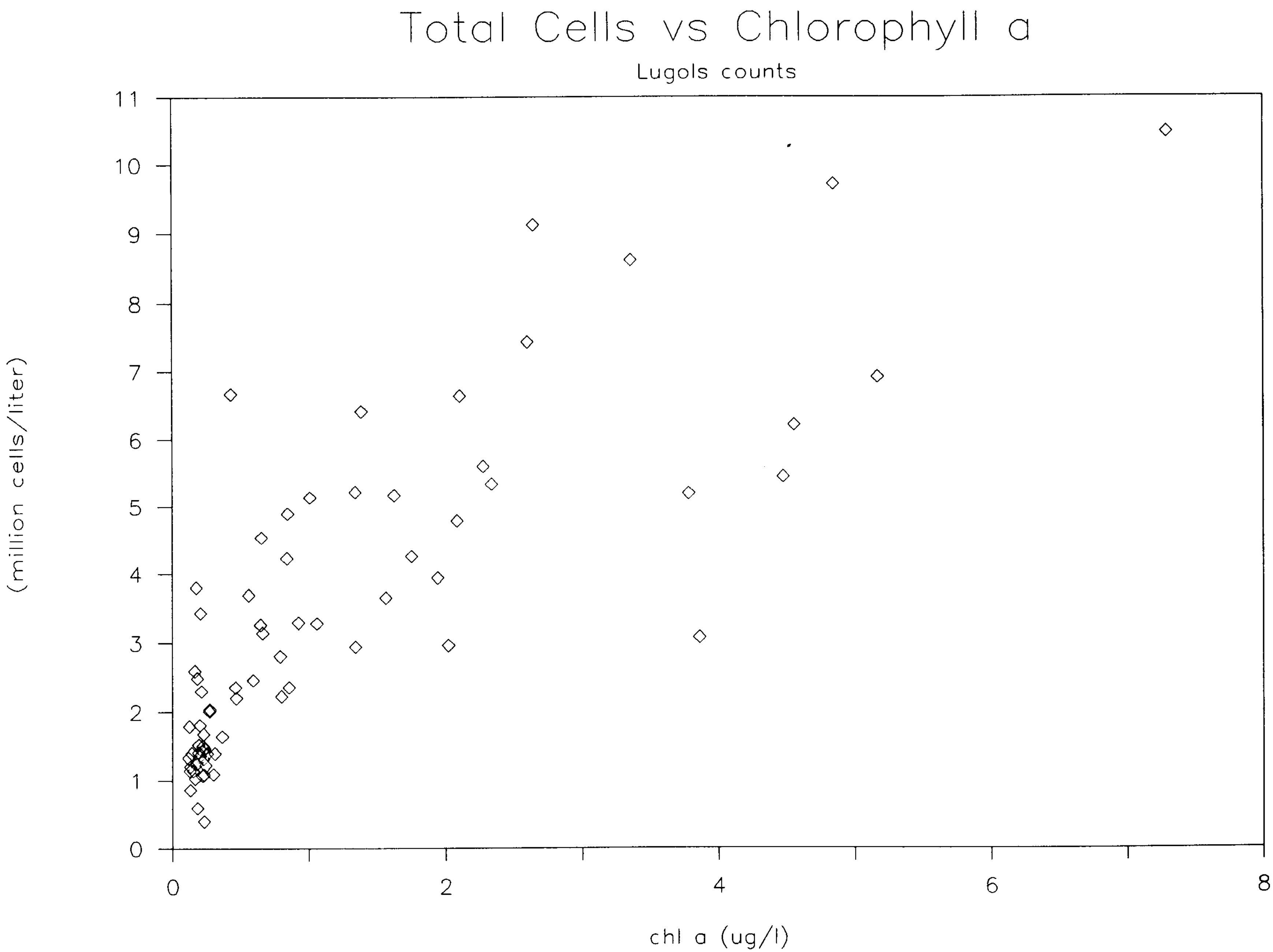
Total Cells (lugols counts)
By groups
(million cells/liter)
0
1
2
3
4
5
6
7
8
9
10
11
Apr
Jun
Aug
Oct
Dec
Feb
I
N basins
IV
N open
V
S open

Figure 61



Total Cells (formalin counts)
By groups
(million cells/liter)
0
1
2
3
4
5
6
7
8
9
10
11
Apr
Jun
Aug
Oct
Dec
Feb
I
IV
V
N basins
N open
S open

Figure 62



Total Cells vs Chlorophyll a
Lugols counts
(million cells/liter)
0
1
2
3
4
5
6
7
8
9
10
11
0
2
4
6
8
chl a (ug/l)

Figure 63

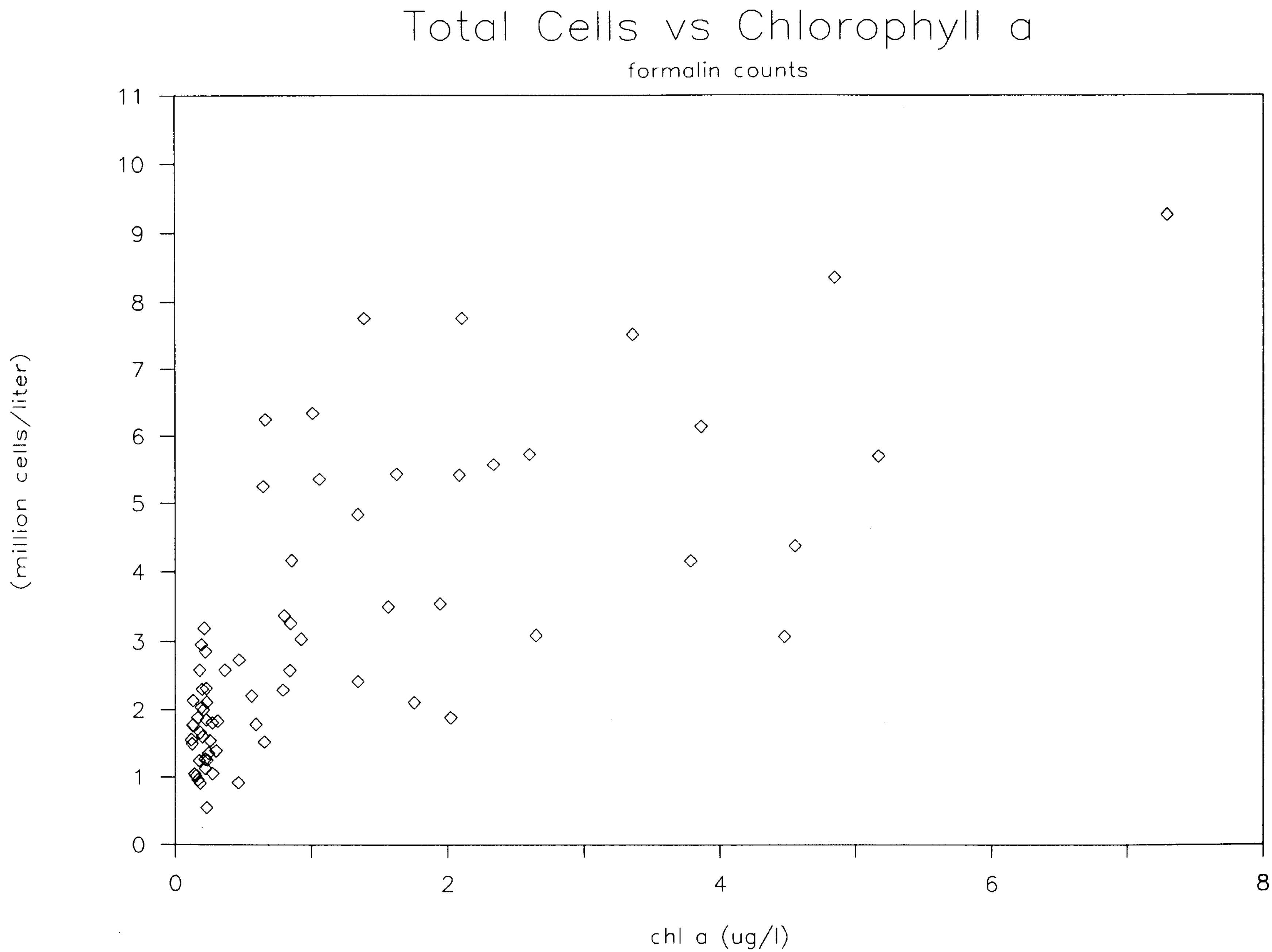
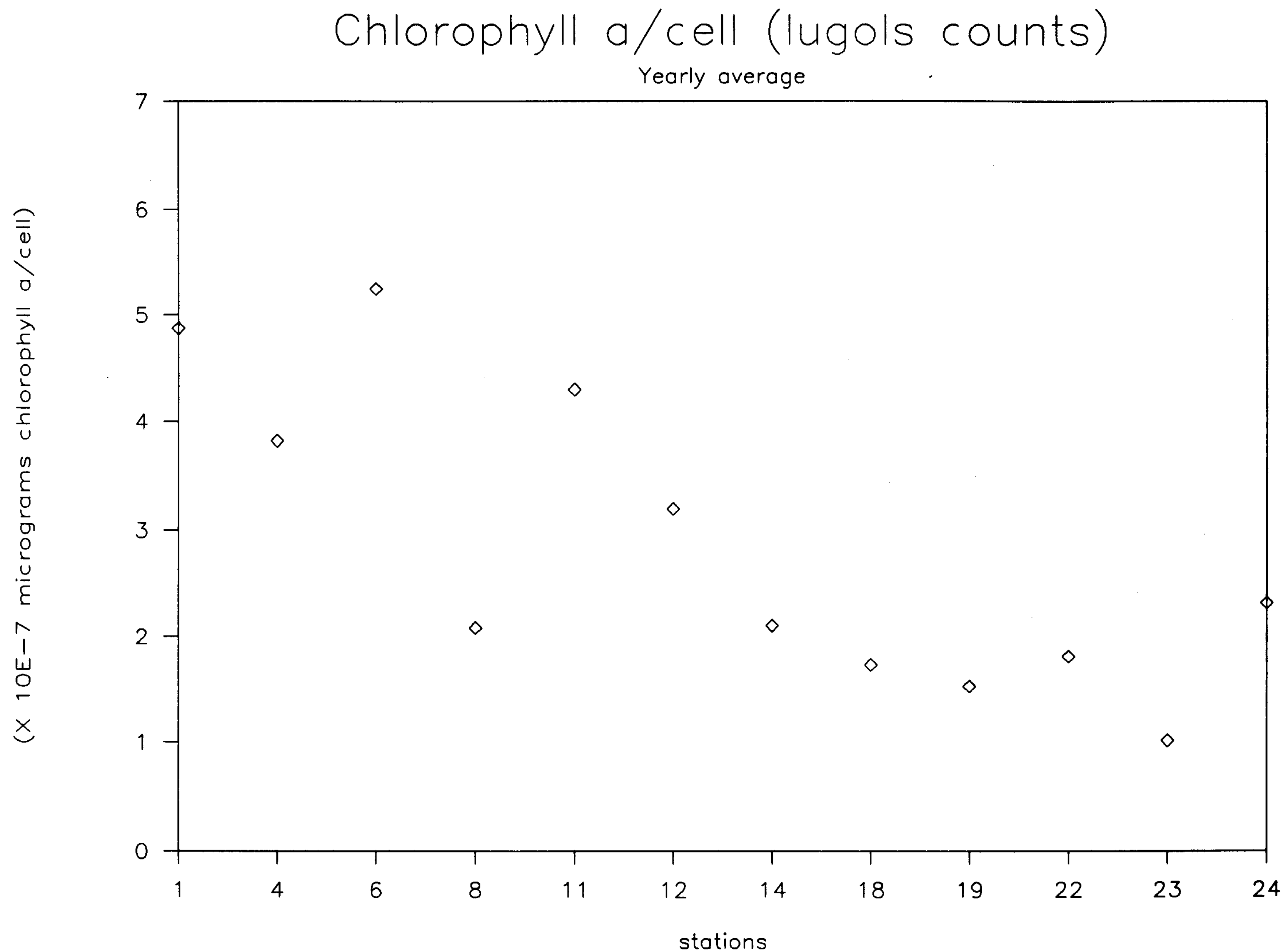
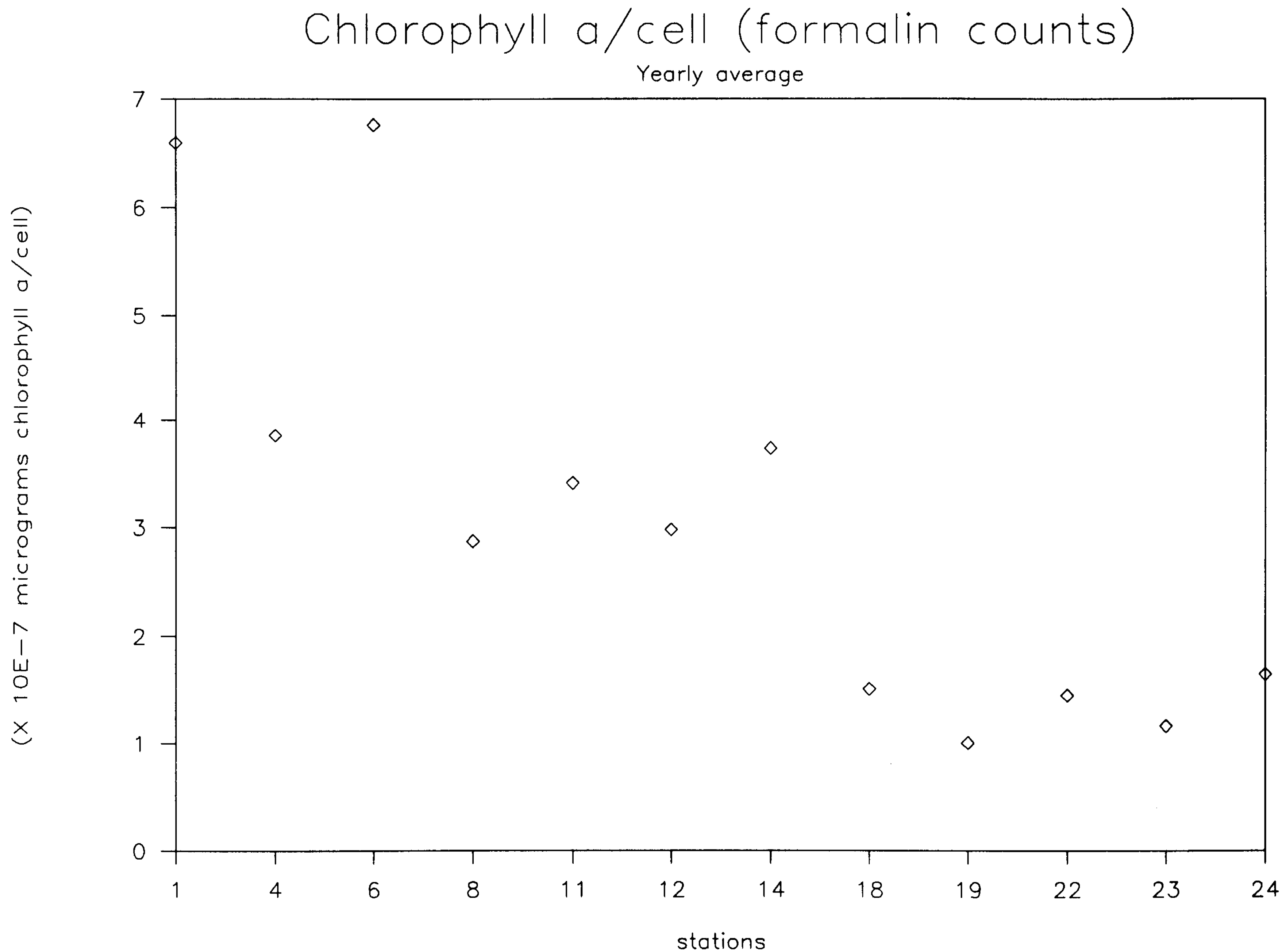

Total Cells vs Chlorophyll a
formalin counts
(million cells/liter)
chl a (ug/l)
0
1
2
3
4
5
6
7
8
9
10
11
0
2
4
6
8

Figure 64



Chlorophyll a/cell (lugols counts)
Yearly average
(X 10E-7 micrograms chlorophyll a/cell)
0
1
2
3
4
5
6
7
1
4
6
8
11
12
14
18
19
22
23
24
stations

Figure 65



Chlorophyll a/cell (formalin counts)
Yearly average
(X 10E-7 micrograms chlorophyll a/cell)
0
1
2
3
4
5
6
7
1
4
6
8
11
12
14
18
19
22
23
24
stations

Figure 66

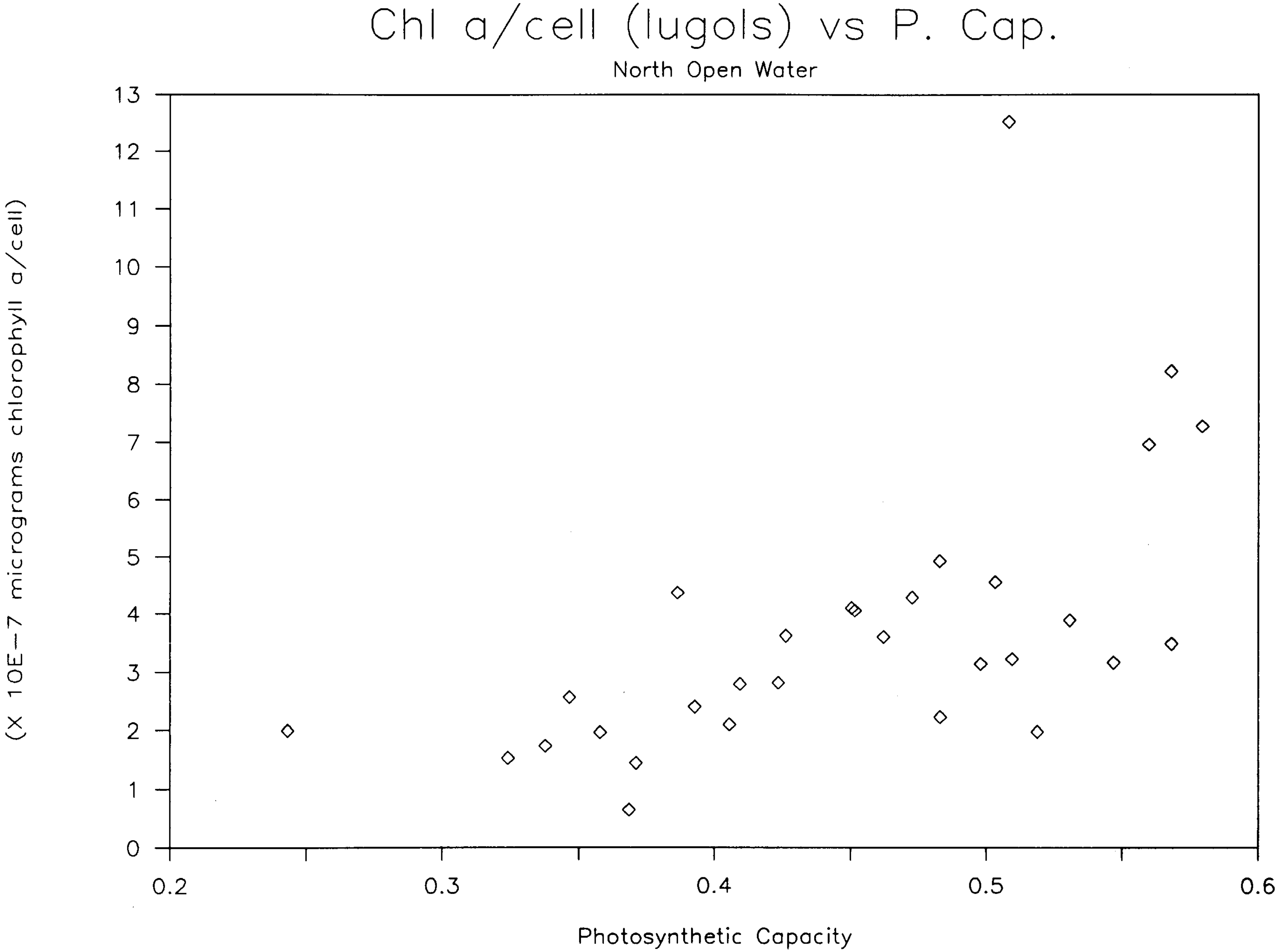

Chl a/cell (lugols) vs P. Cap.
North Open Water
(X 10E−7 micrograms chlorophyll a/cell)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
0.2
0.3
0.4
0.5
0.6
Photosynthetic Capacity

Figure 67

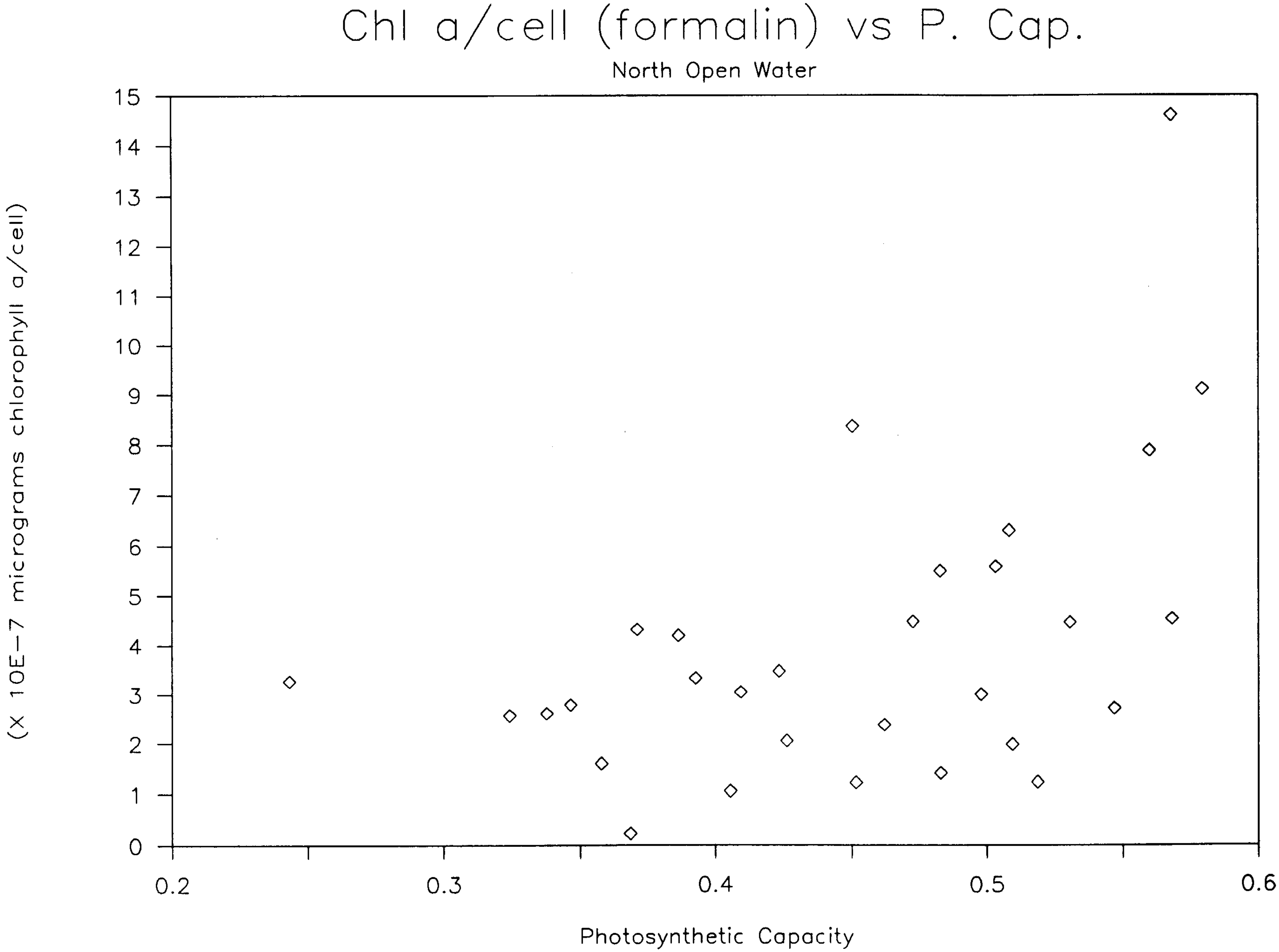

Chl a/cell (formalin) vs P. Cap.
North Open Water
(X 10E-7 micrograms chlorophyll a/cell)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
0.2
0.3
0.4
0.5
0.6
Photosynthetic Capacity

Figure 68

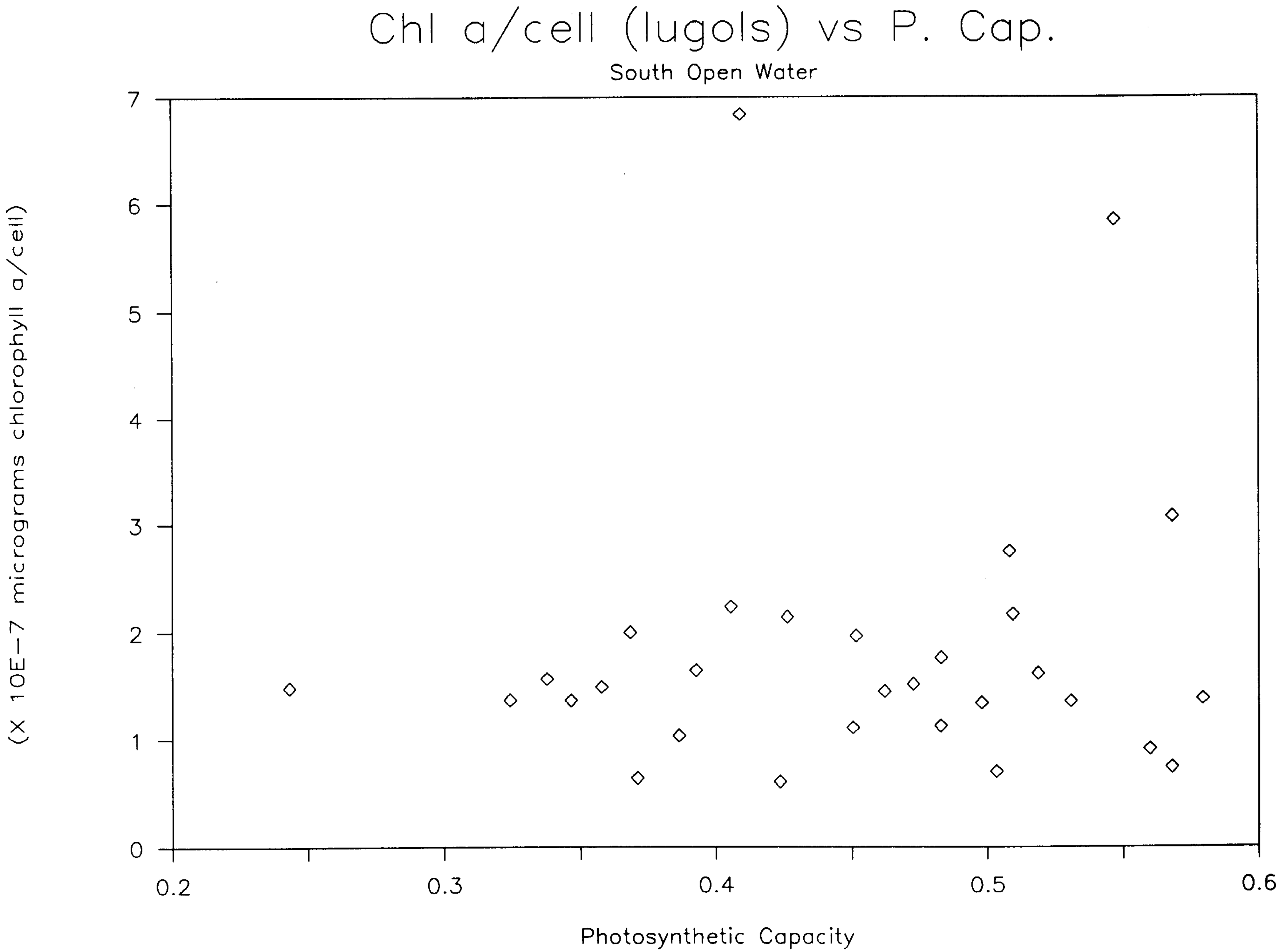

Chl a/cell (lugols) vs P. Cap.
South Open Water
(X 10E-7 micrograms chlorophyll a/cell)
7
6
5
4
3
2
1
0
0.2
0.3
0.4
0.5
0.6
Photosynthetic Capacity

Figure 69

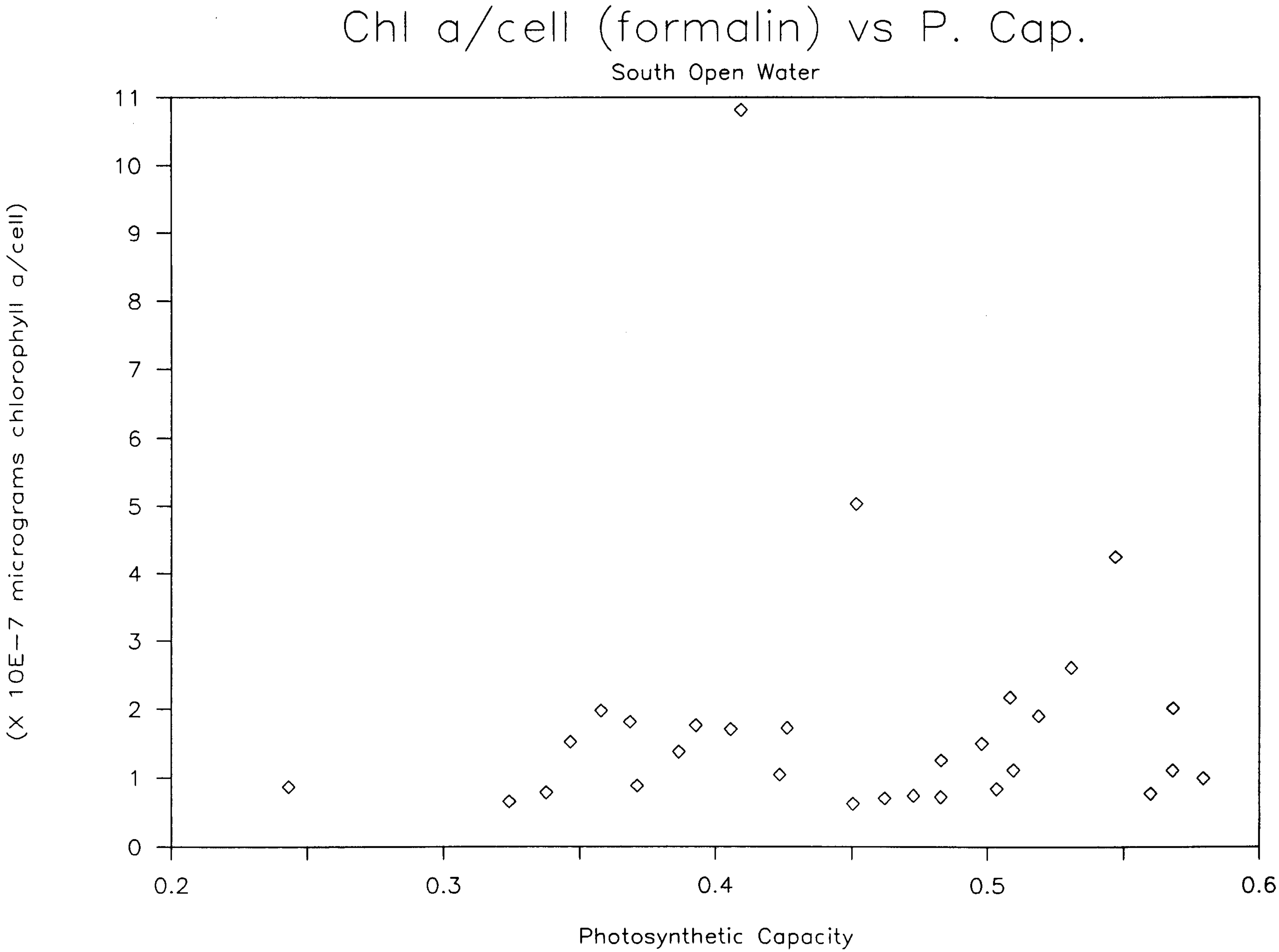

Chl a/cell (formalin) vs P. Cap.
South Open Water
(X 10E-7 micrograms chlorophyll a/cell)
0
1
2
3
4
5
6
7
8
9
10
11
0.2
0.3
0.4
0.5
0.6
Photosynthetic Capacity

Figure 70

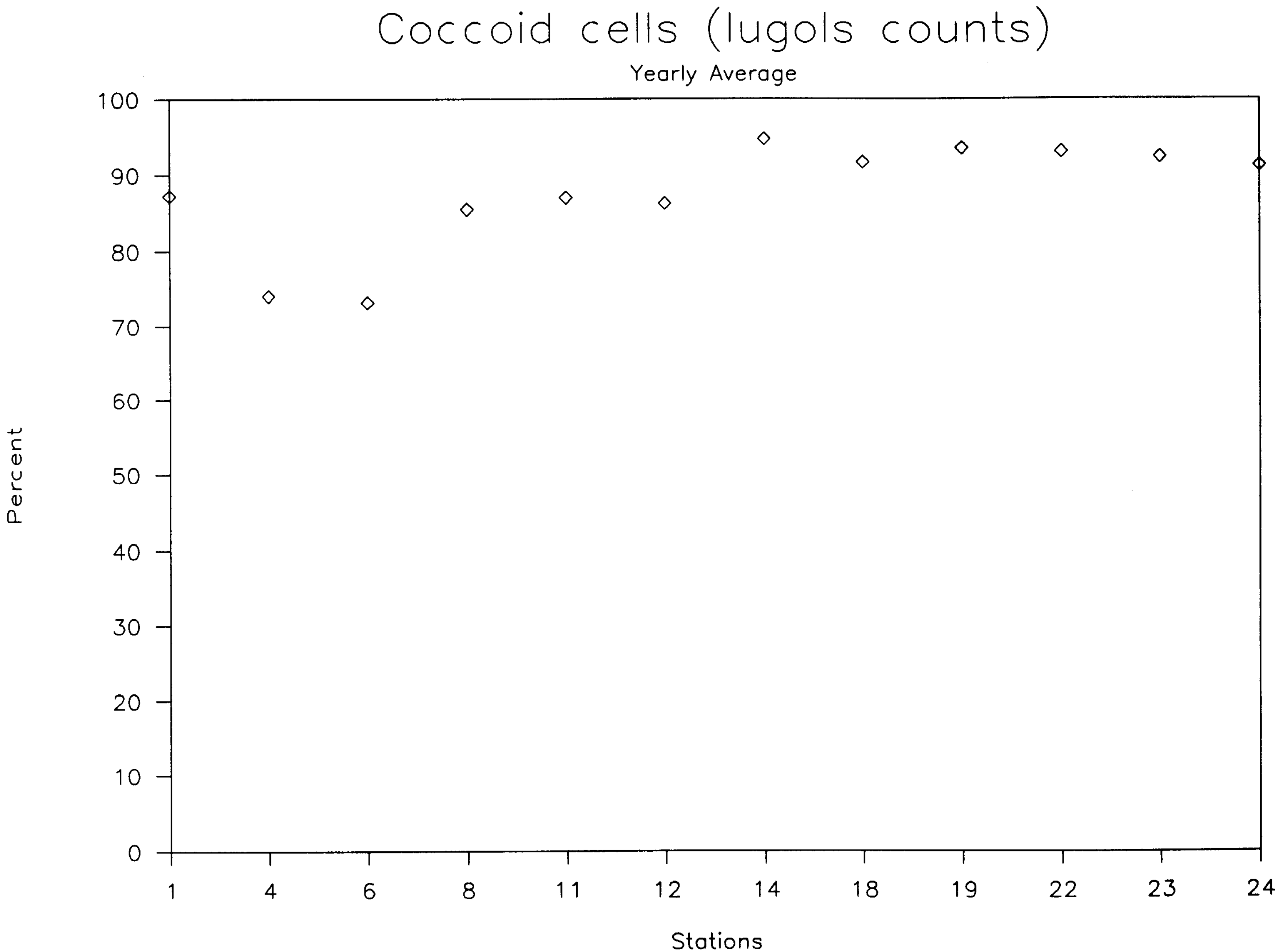

Coccoid cells (lugols counts)
Yearly Average
100
90
80
70
60
50
40
30
20
10
0
Percent
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 71

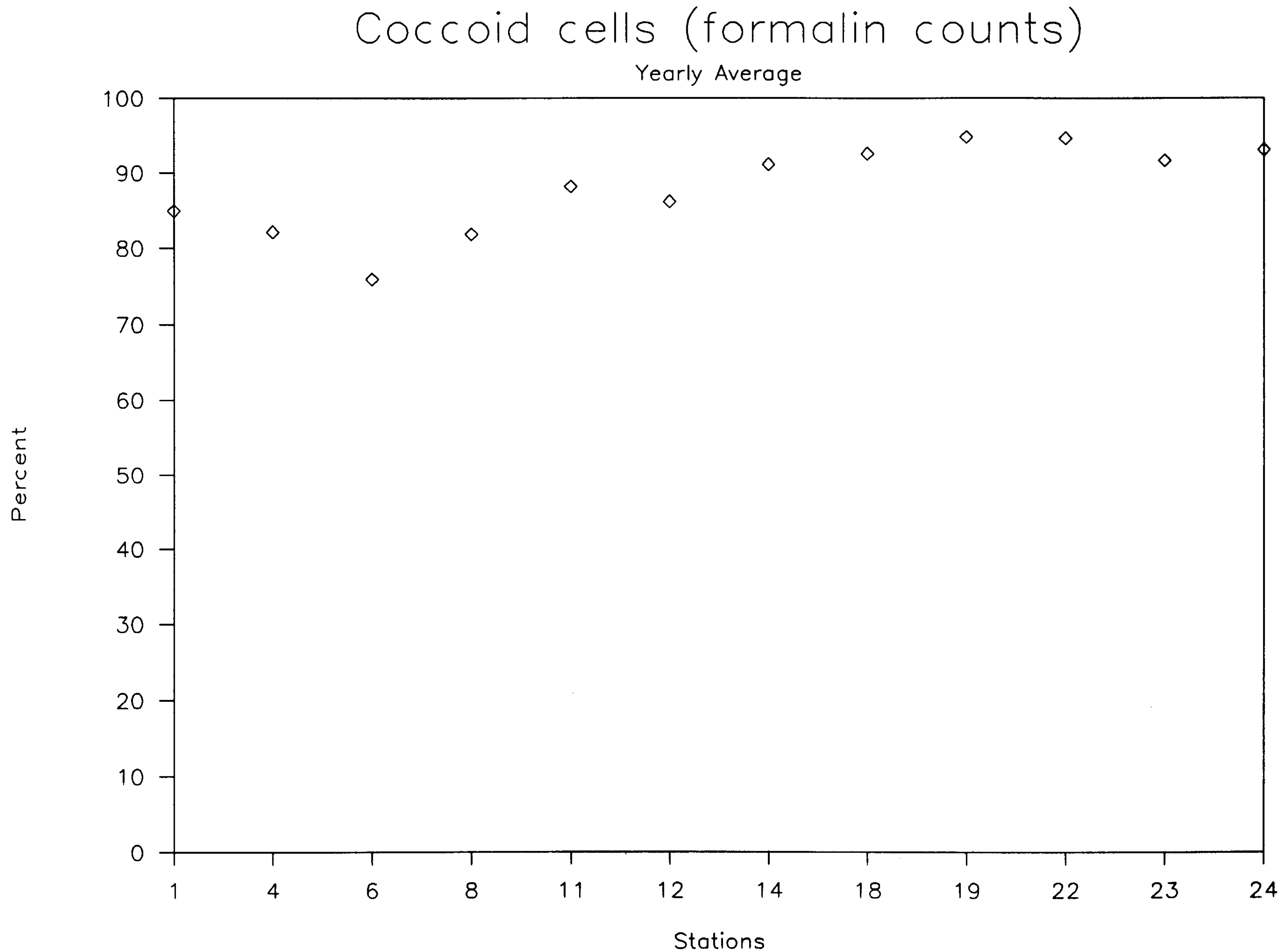

Coccoid cells (formalin counts)
Yearly Average
Percent
100
90
80
70
60
50
40
30
20
10
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 72

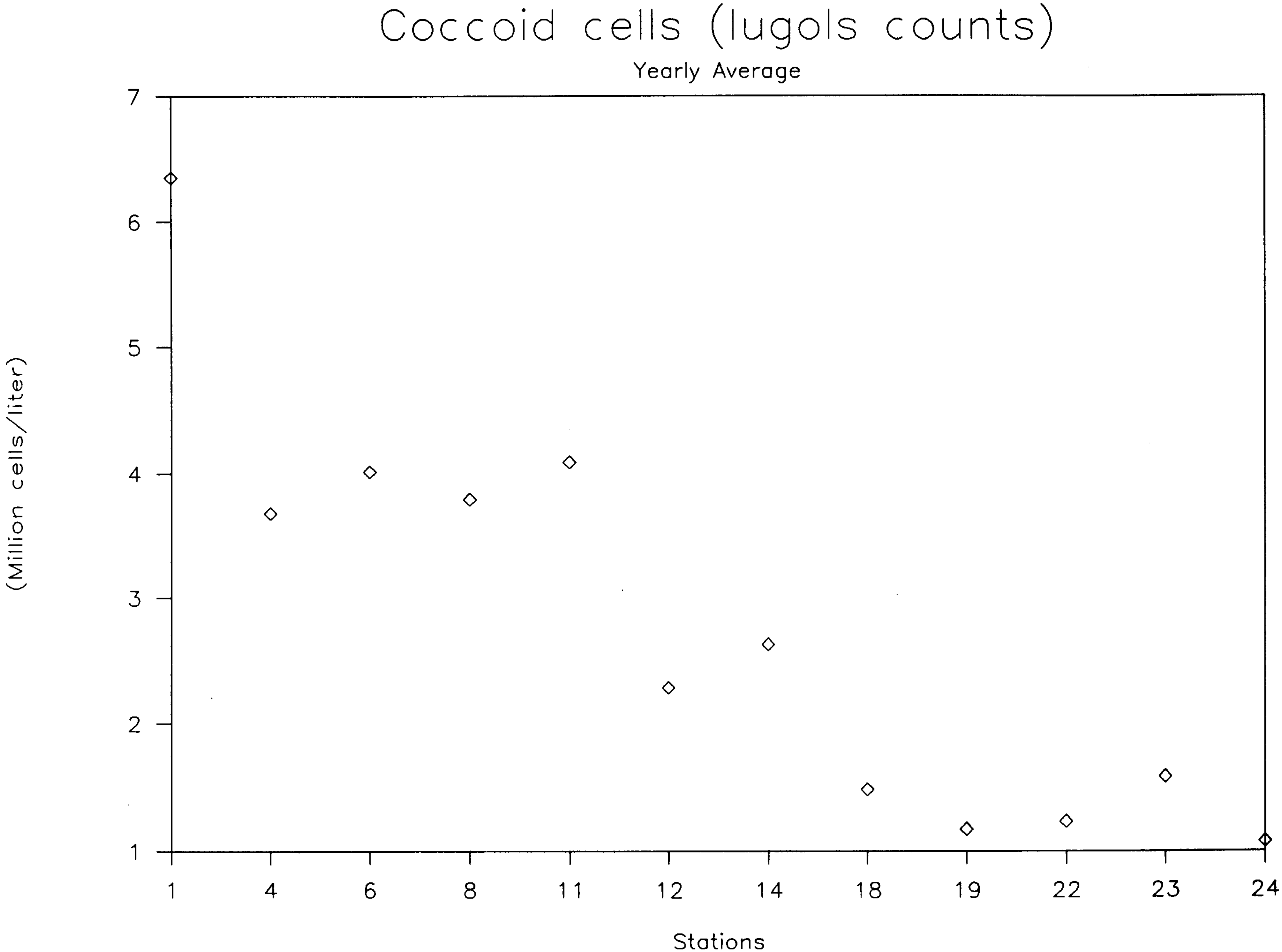

Coccoid cells (lugols counts)
Yearly Average
(Million cells/liter)
7
6
5
4
3
2
1
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 73

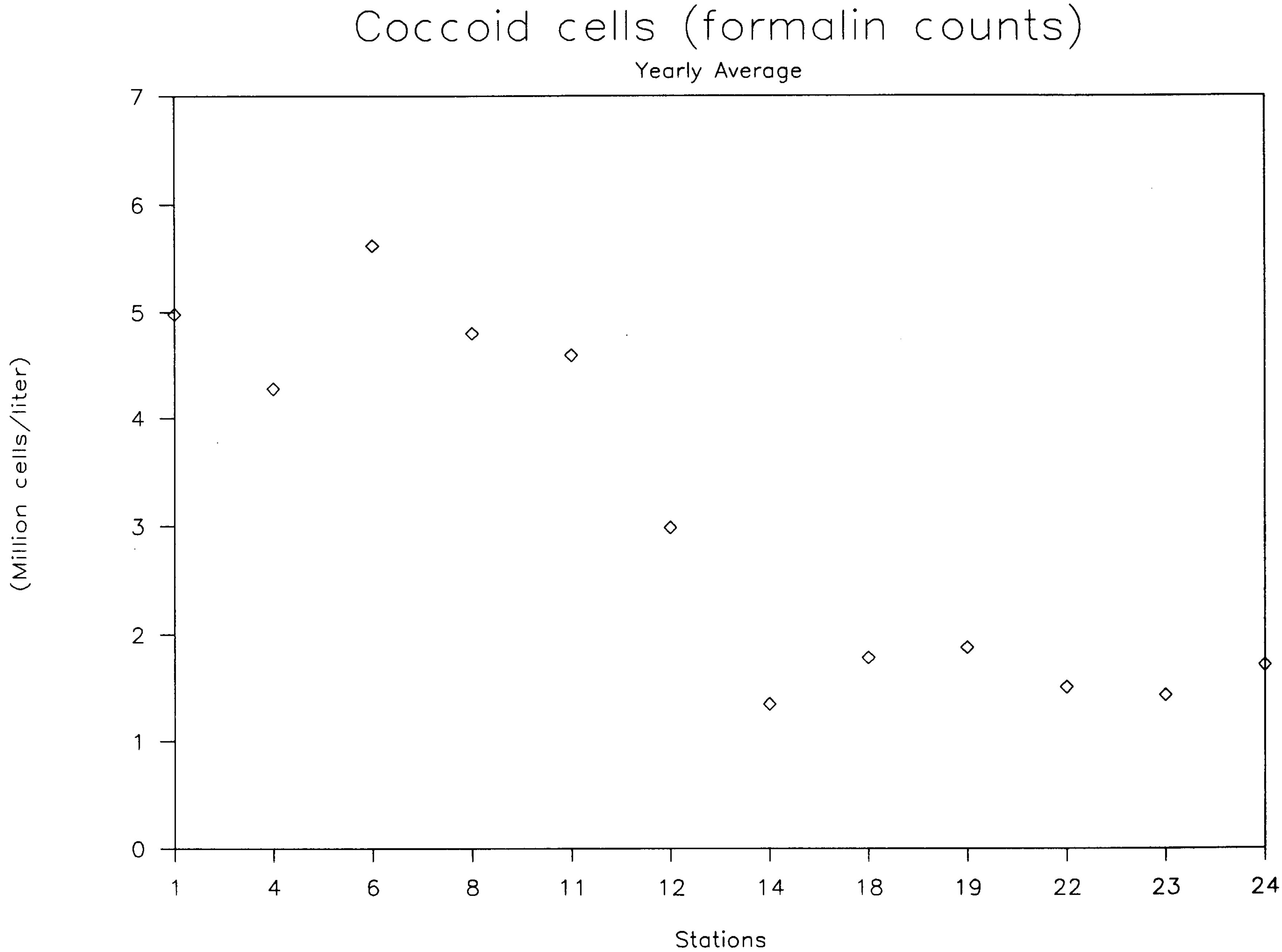

Coccoid cells (formalin counts)
Yearly Average
(Million cells/liter)
0
1
2
3
4
5
6
7
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 74

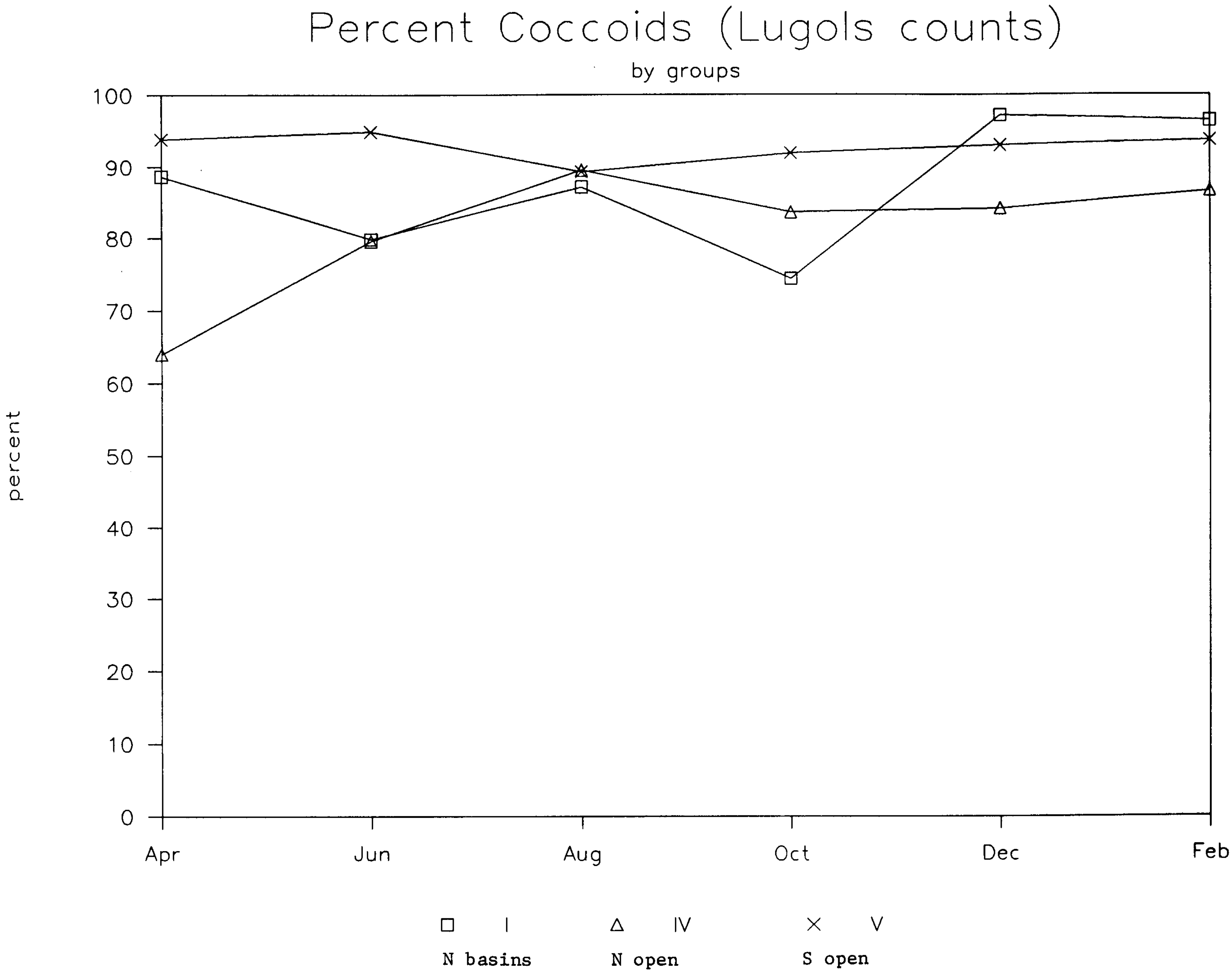

Percent Coccoids (Lugols counts)
by groups
percent
100
90
80
70
60
50
40
30
20
10
0
Apr
Jun
Aug
Oct
Dec
Feb
I
IV
V
N basins
N open
S open

Figure 75

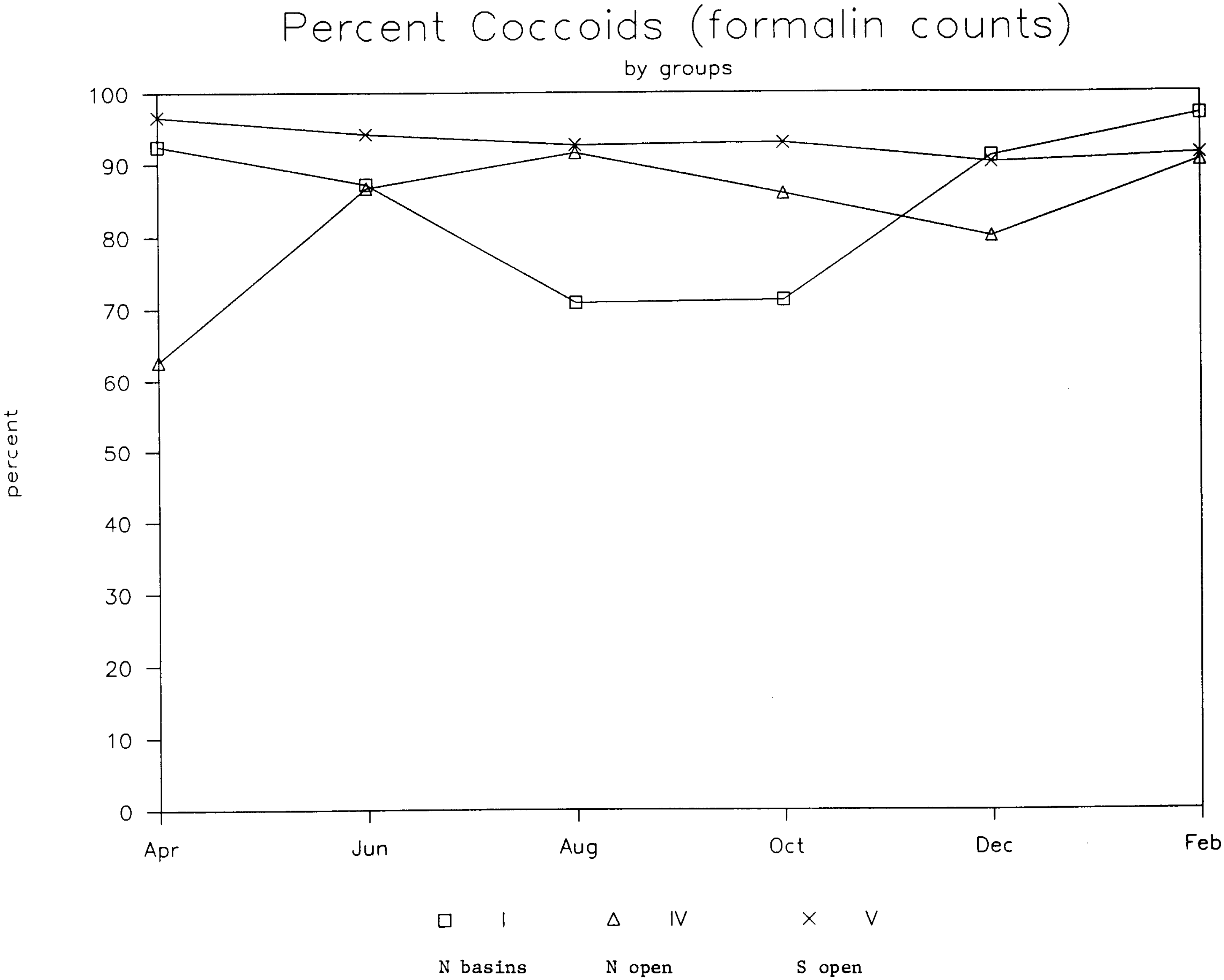

Percent Coccoids (formalin counts)
by groups
percent
100
90
80
70
60
50
40
30
20
10
0
Apr
Jun
Aug
Oct
Dec
Feb
I
IV
V
N basins
N open
S open

Figure 76

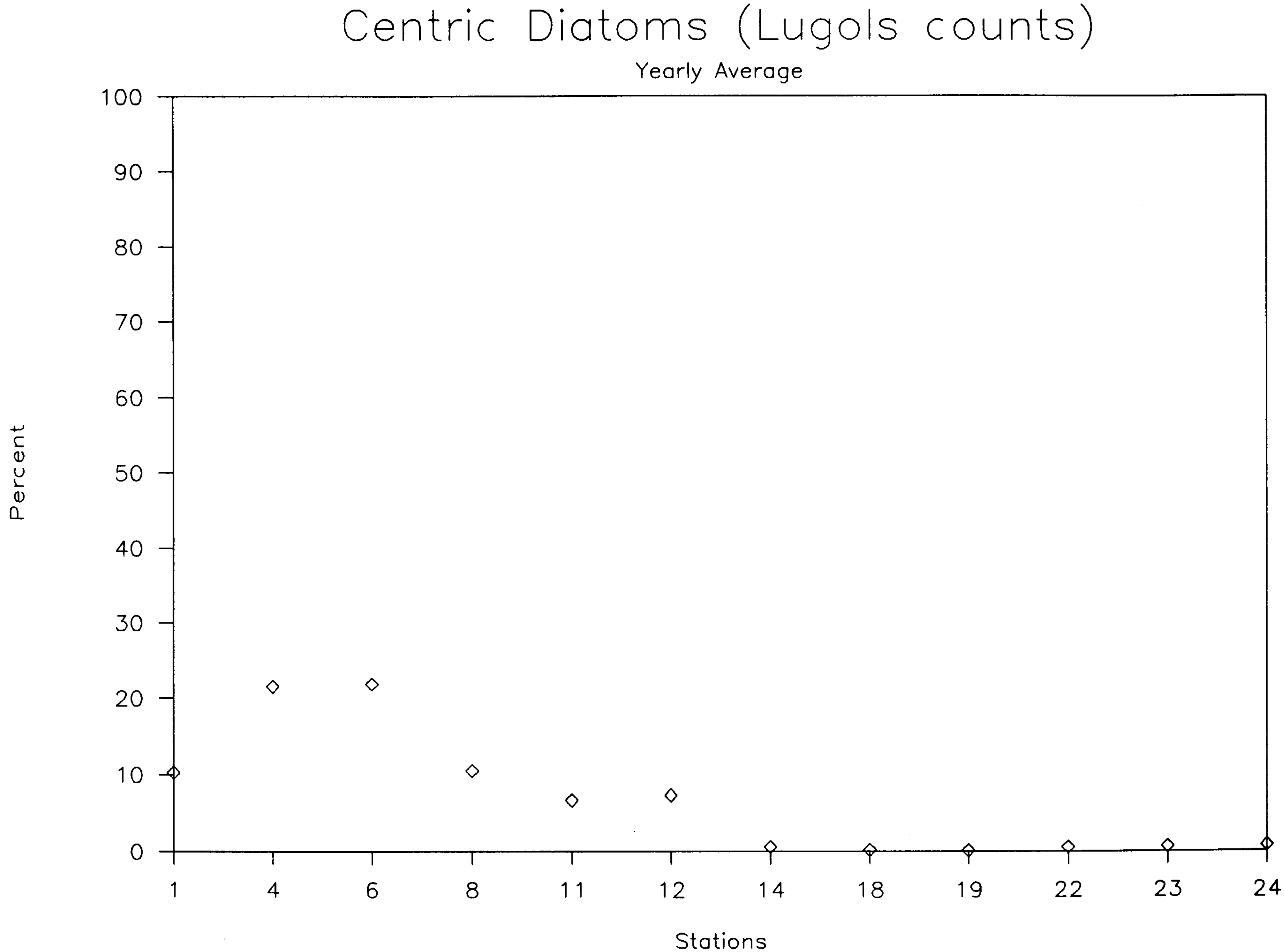

Centric Diatoms (Lugols counts)
Yearly Average
Percent
100
90
80
70
60
50
40
30
20
10
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 77

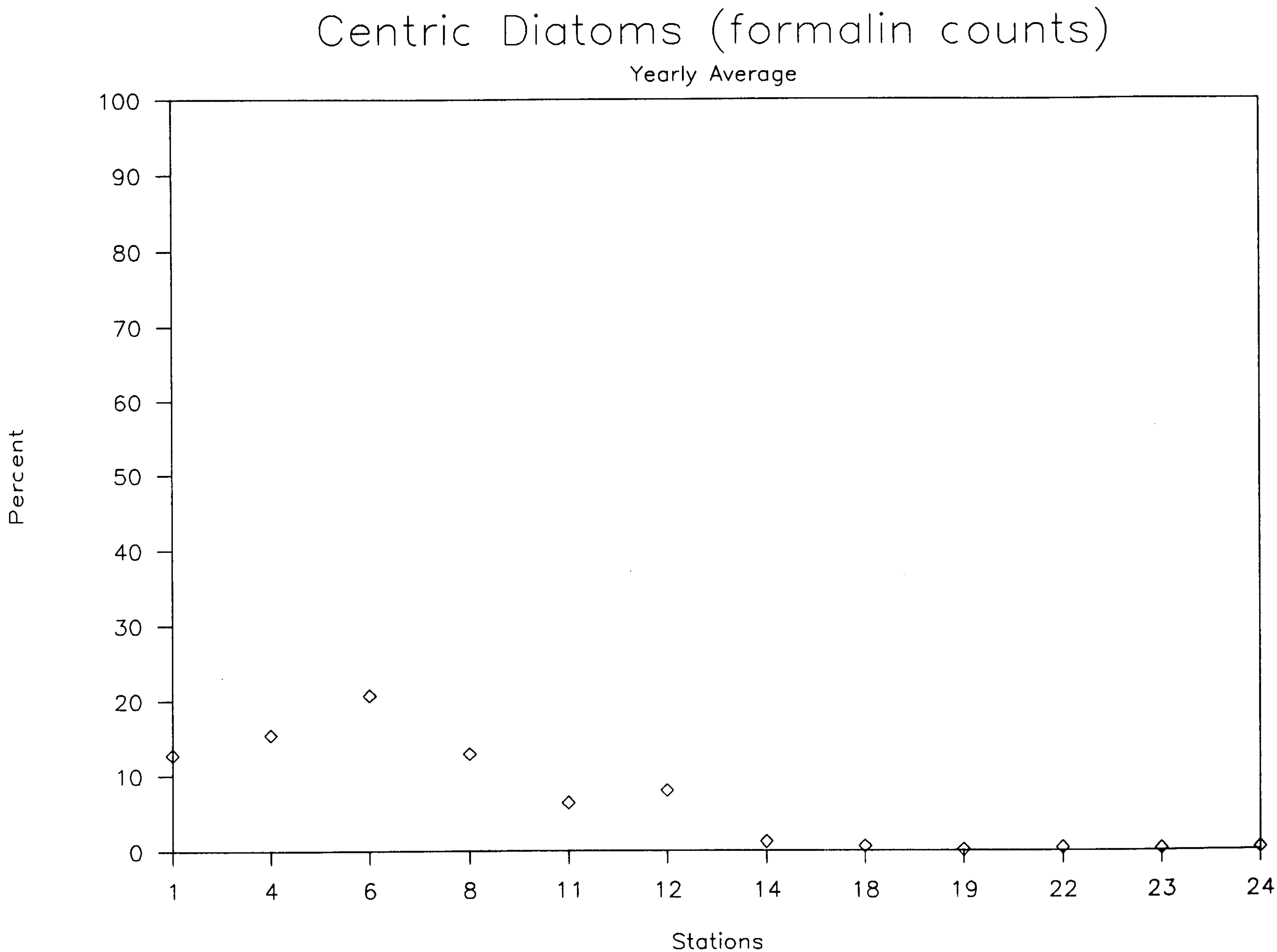
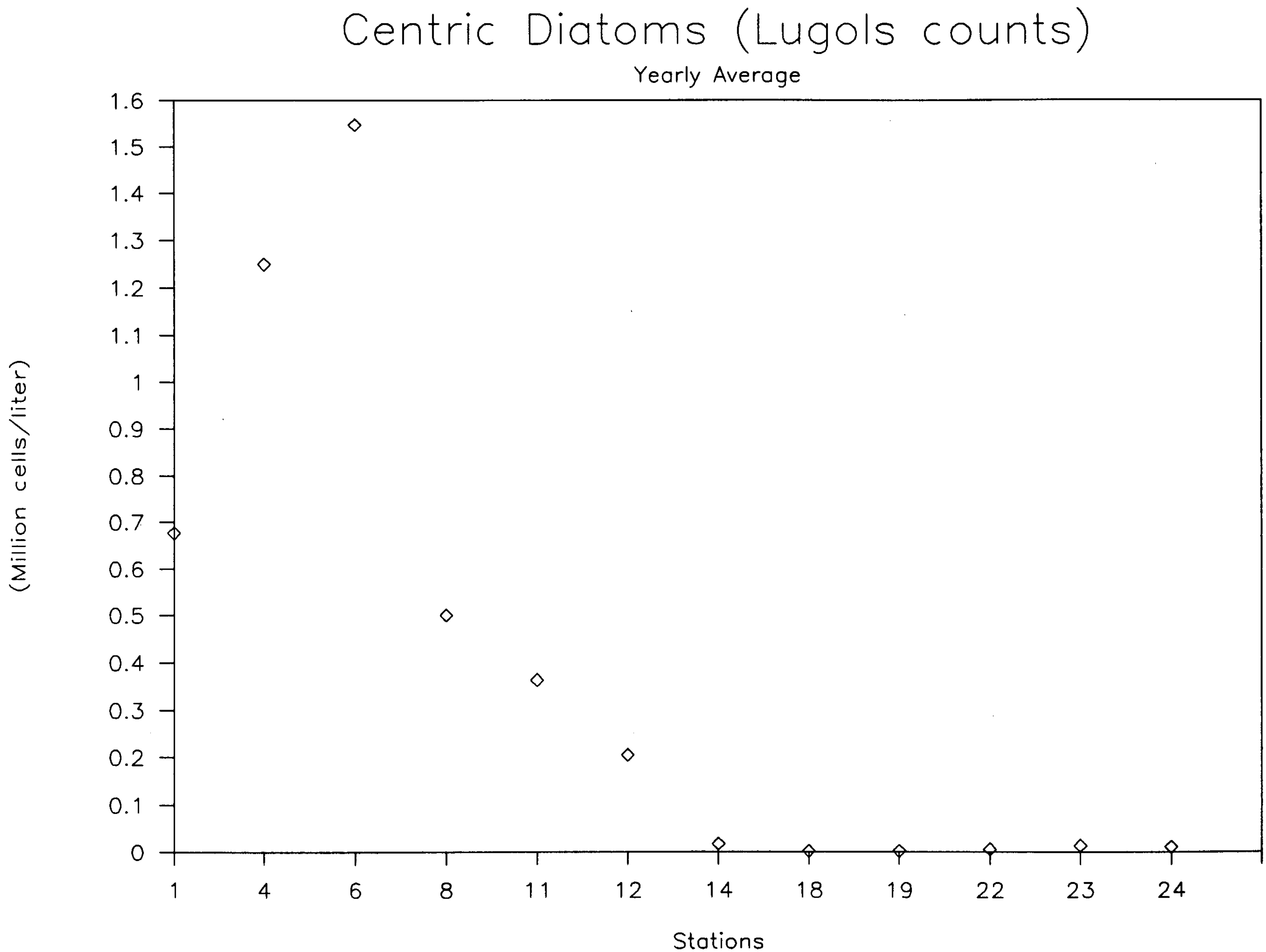

Centric Diatoms (formalin counts)
Yearly Average
Percent
100
90
80
70
60
50
40
30
20
10
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 78



Centric Diatoms (Lugols counts)
Yearly Average
(Million cells/liter)
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 79

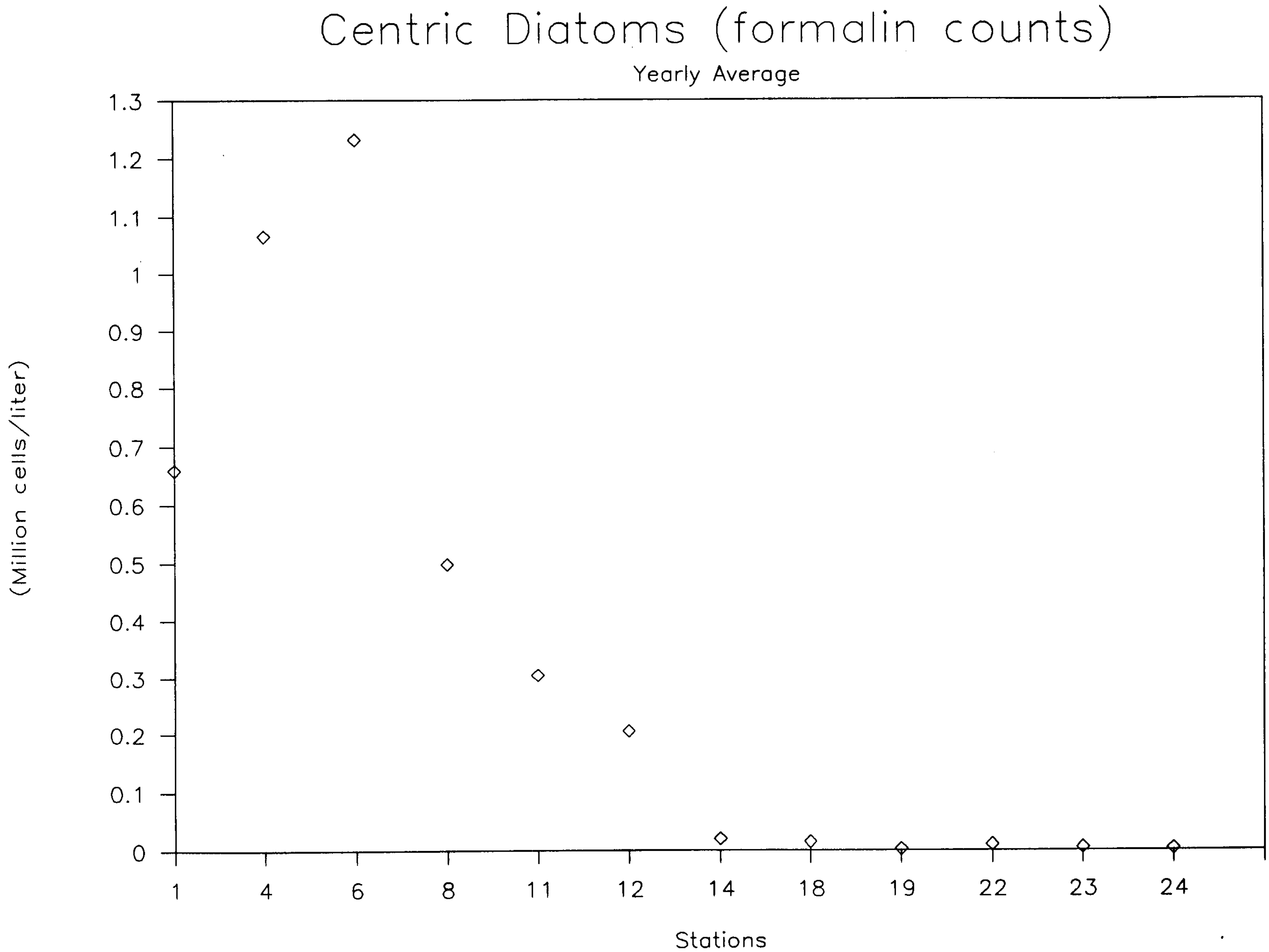
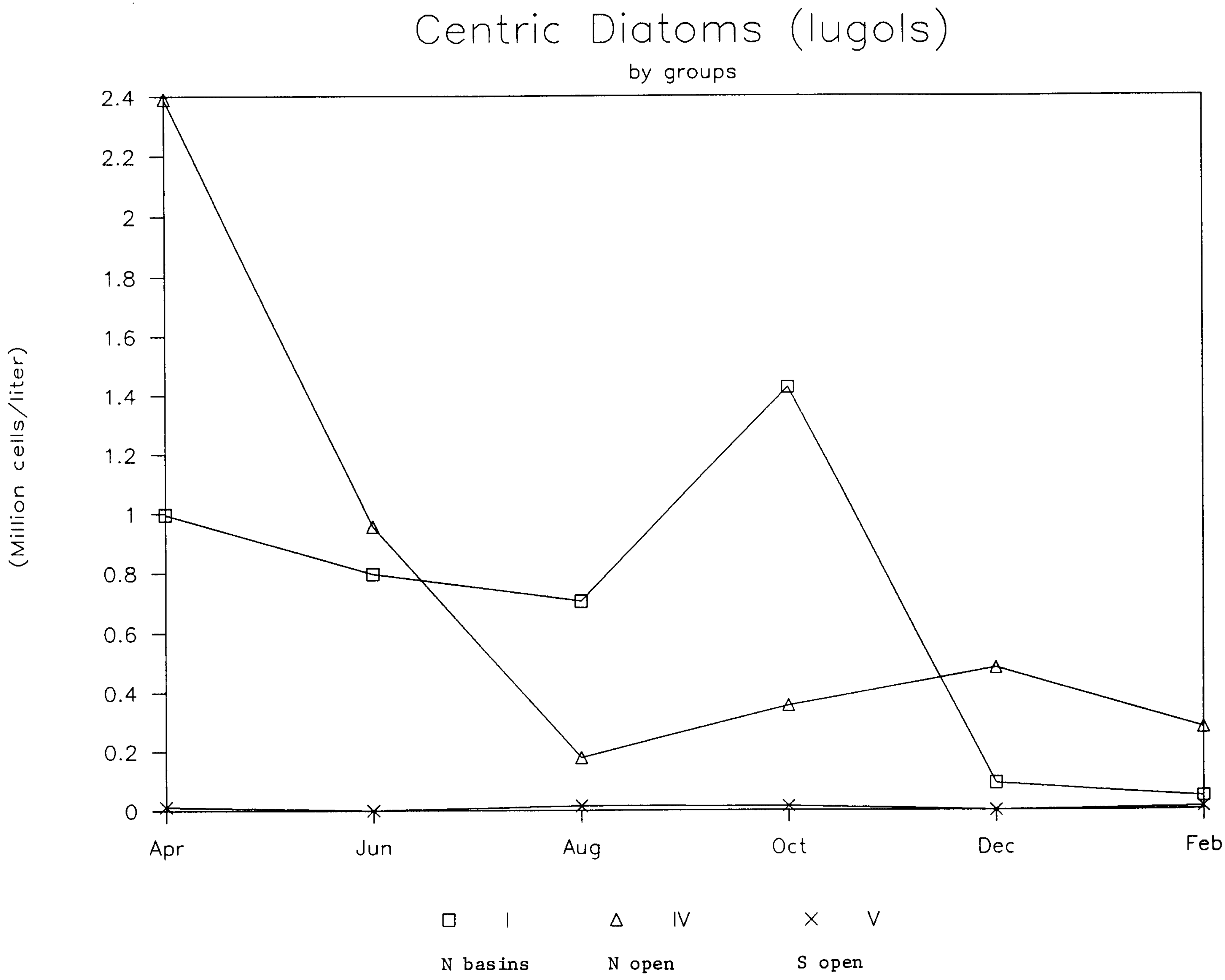

Centric Diatoms (formalin counts)
Yearly Average
(Million cells/liter)
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 80



Centric Diatoms (lugols)
by groups
(Million cells/liter)
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Apr
Jun
Aug
Oct
Dec
Feb
I
IV
V
N basins
N open
S open

Figure 81

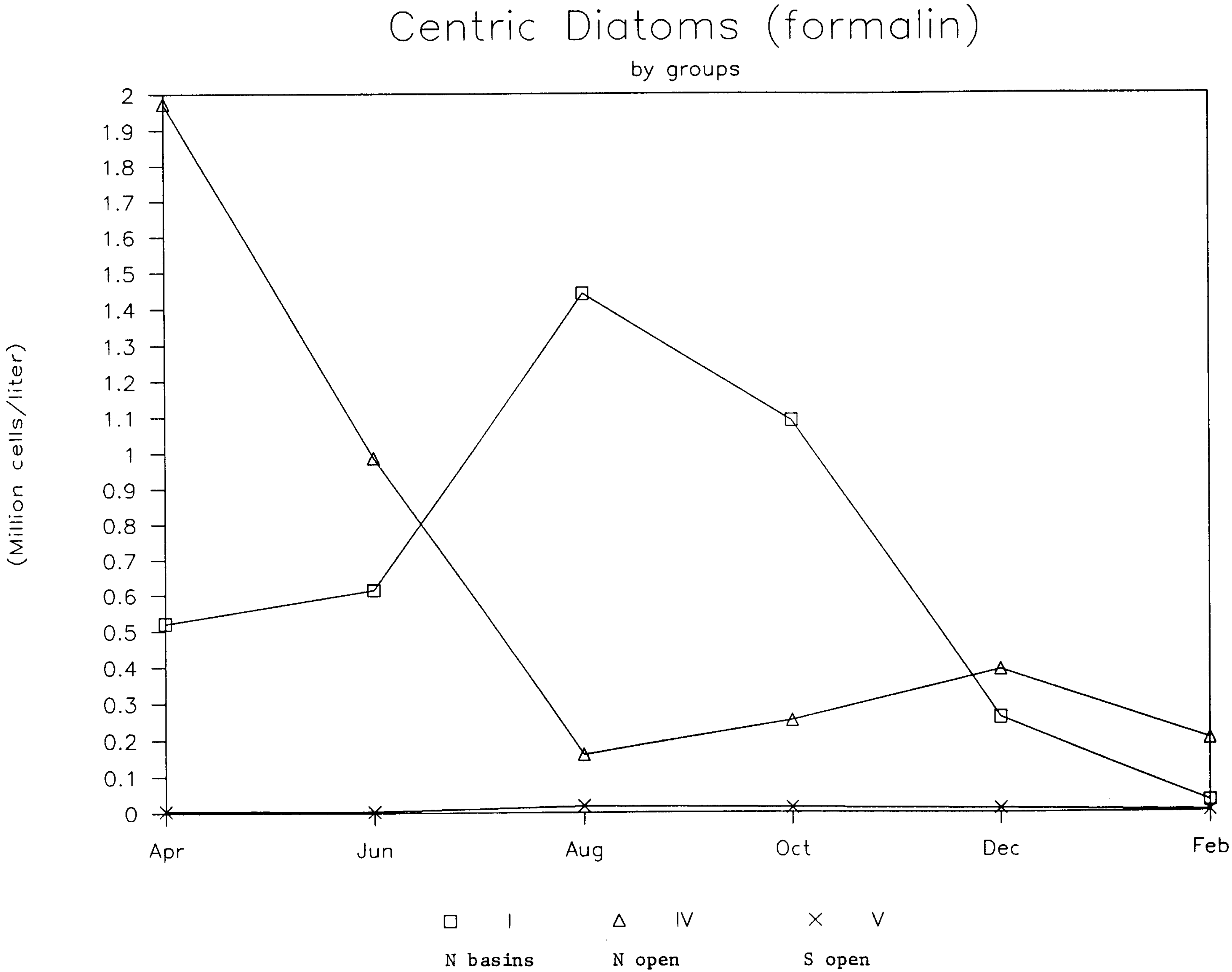

Centric Diatoms (formalin)
by groups
(Million cells/liter)
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Apr
Jun
Aug
Oct
Dec
Feb
I
IV
V
N basins
N open
S open

Figure 82

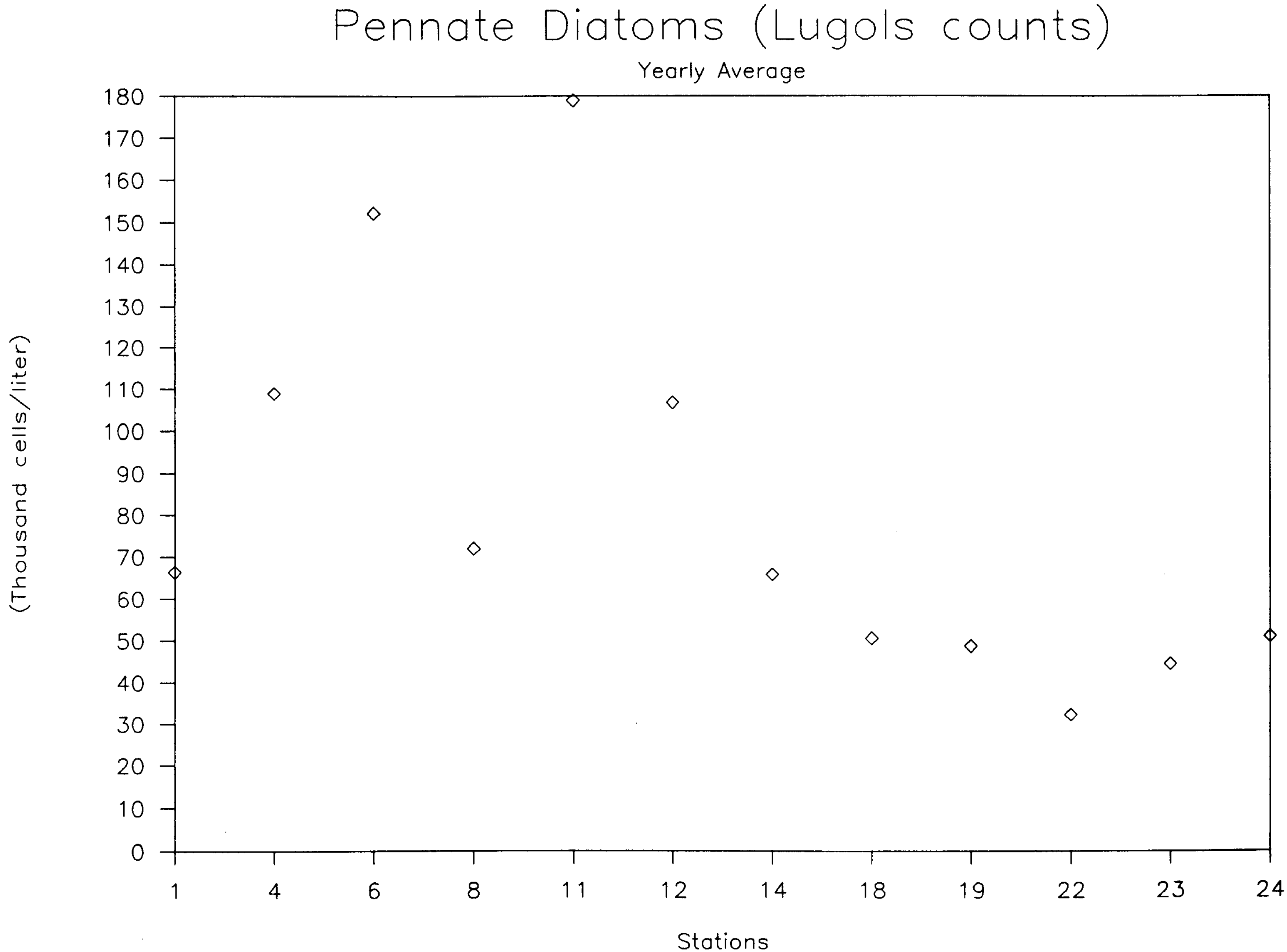

Pennate Diatoms (Lugols counts)
Yearly Average
(Thousand cells/liter)
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 83

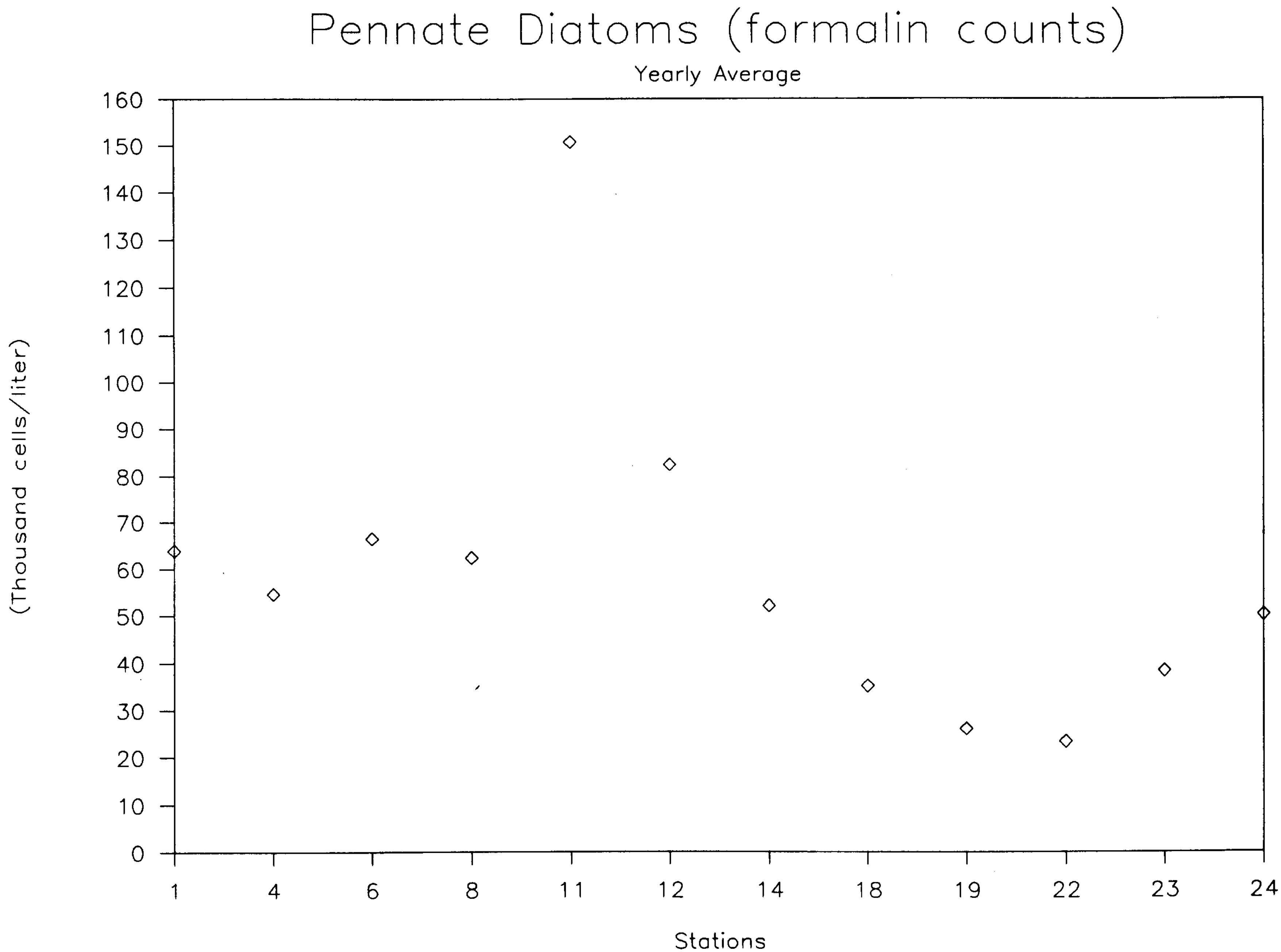

Pennate Diatoms (formalin counts)
Yearly Average
(Thousand cells/liter)
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 84

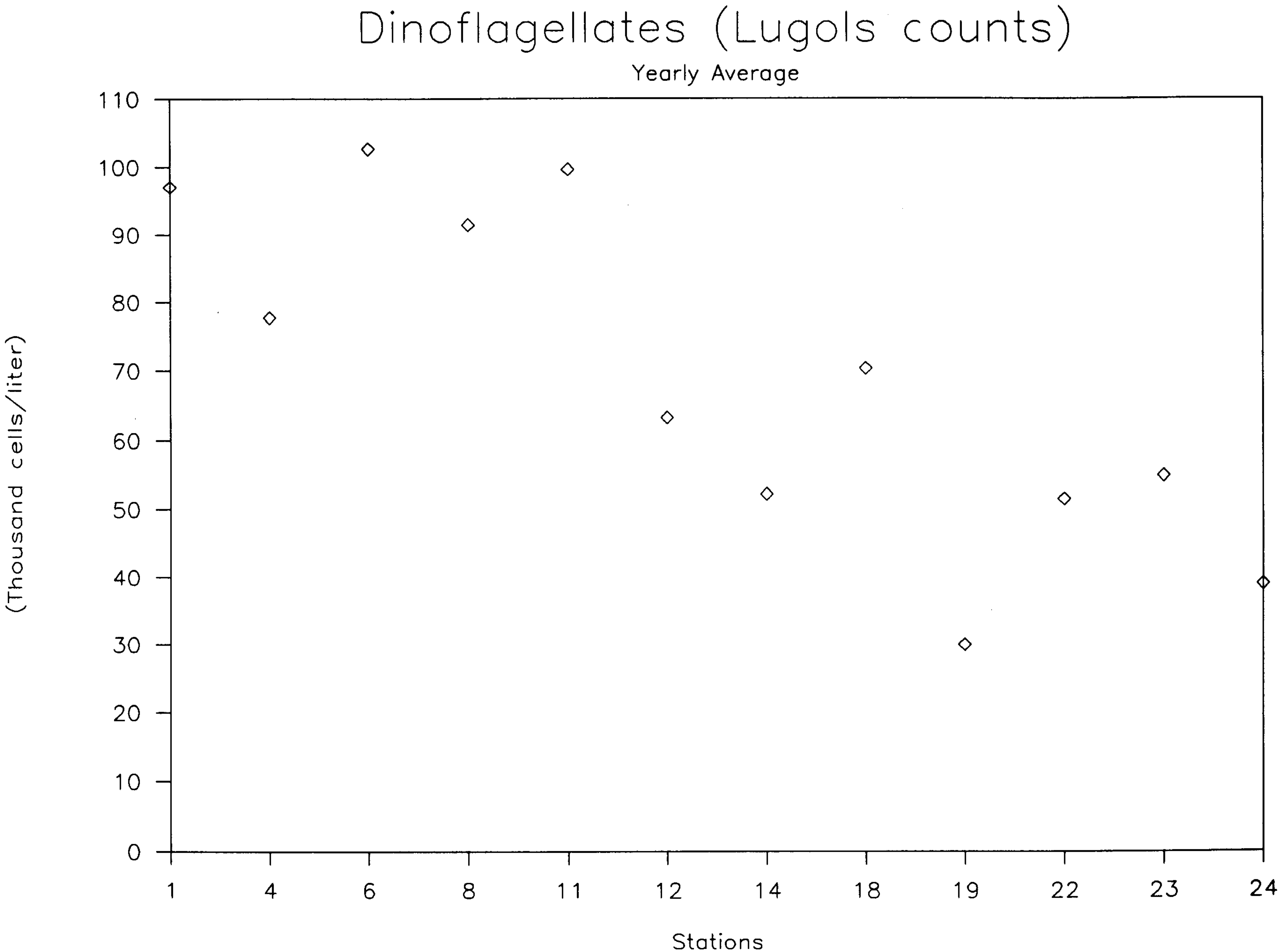
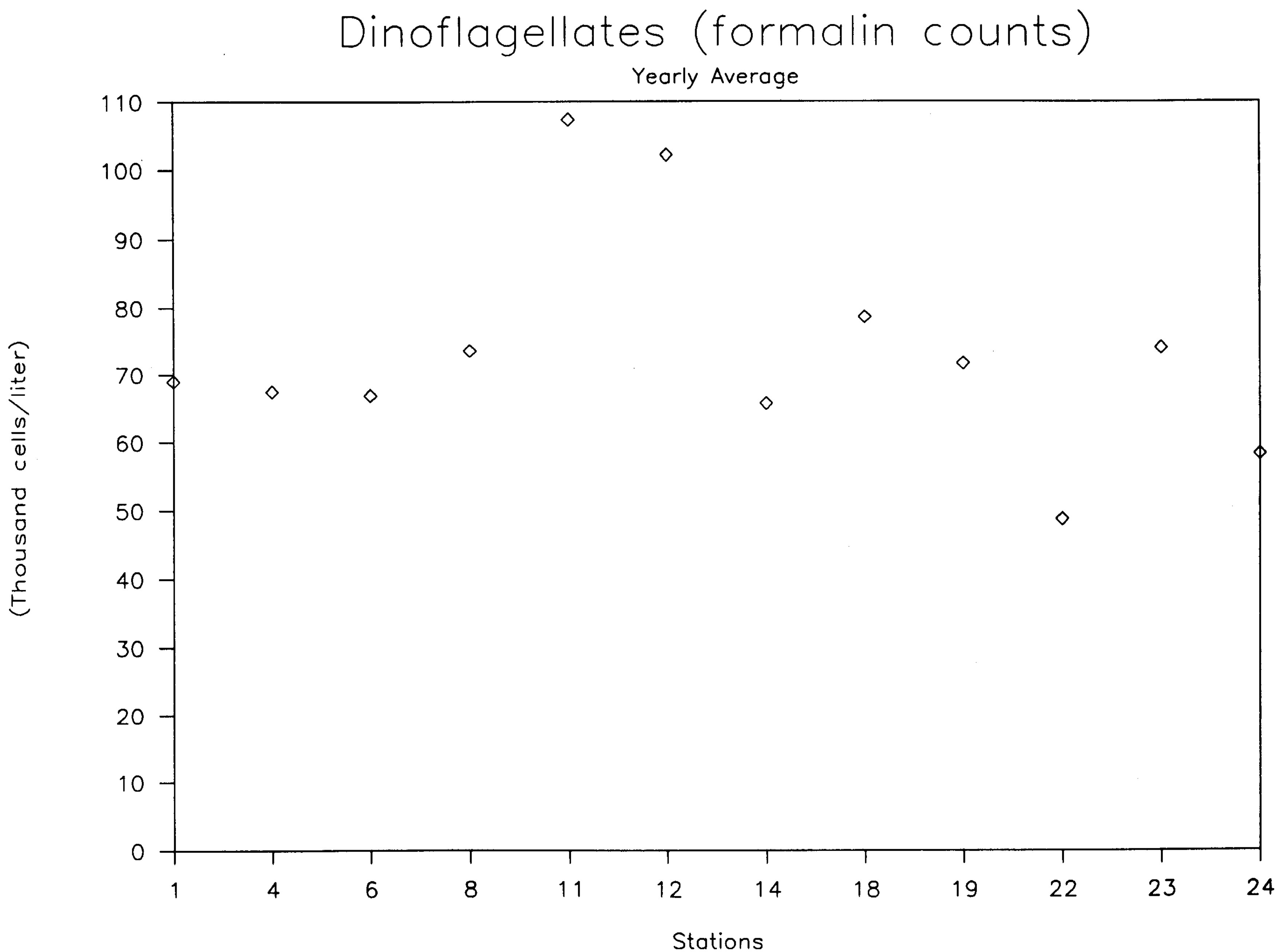
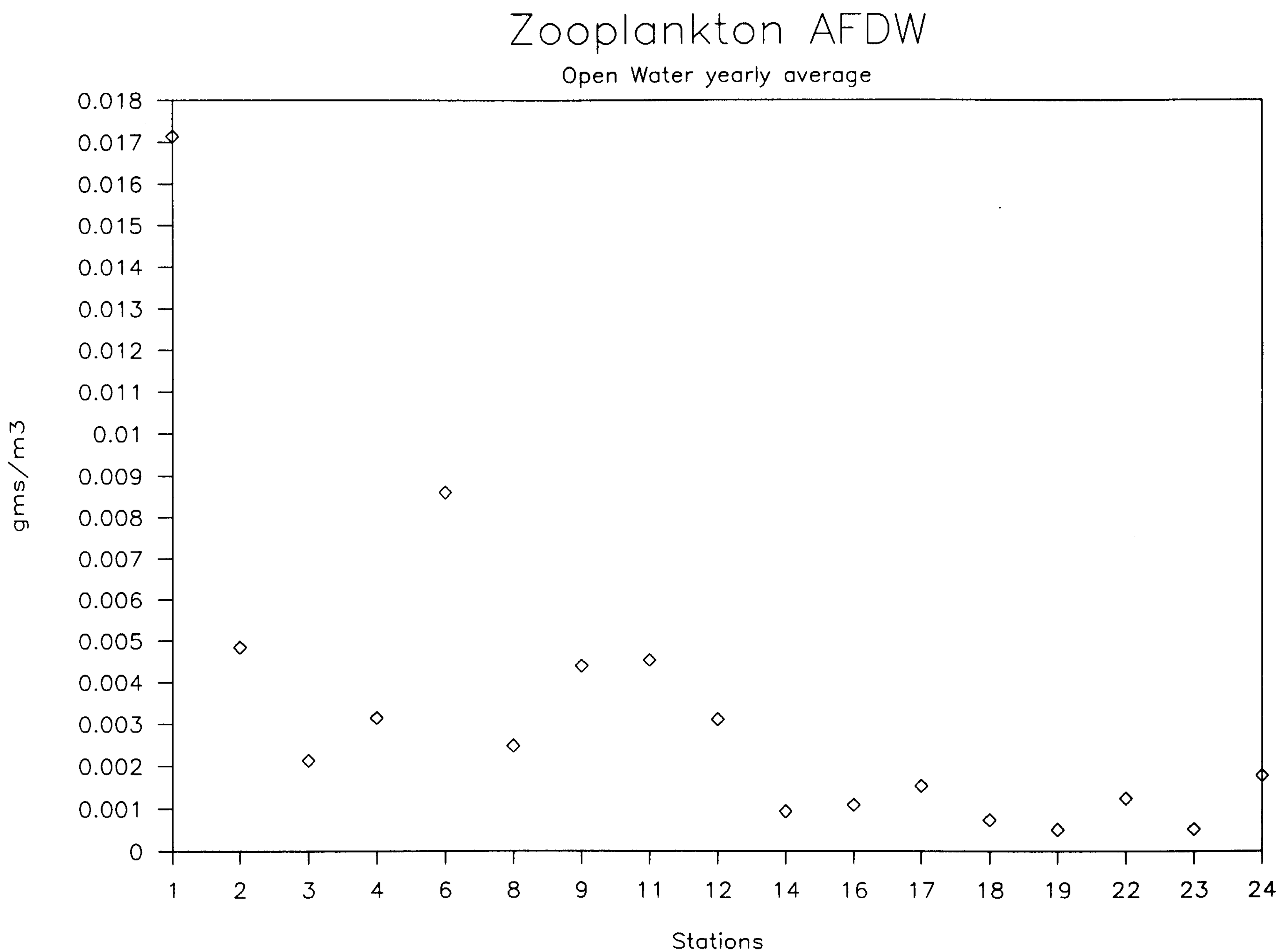

Dinoflagellates (Lugols counts)
Yearly Average
(Thousand cells/liter)
0
10
20
30
40
50
60
70
80
90
100
110
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 85



Dinoflagellates (formalin counts)
Yearly Average
(Thousand cells/liter)
110
100
90
80
70
60
50
40
30
20
10
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 86

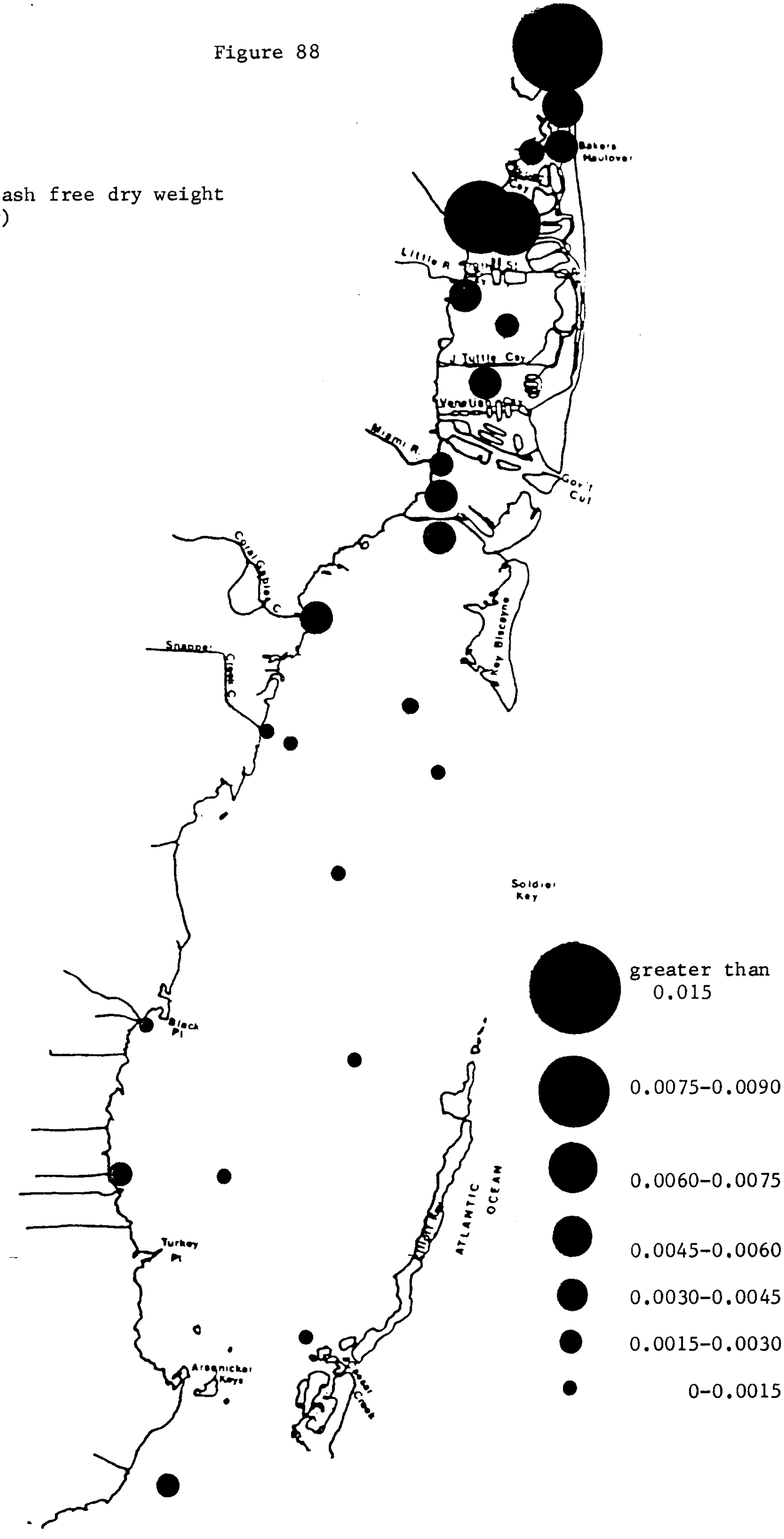


Zooplankton AFDW
Open Water yearly average
gms/m3
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
1
2
3
4
6
8
9
11
12
14
16
17
18
19
22
23
24
Stations

Figure 87

Figure 88

Zooplankton ash free dry weight
(grams/m^3)



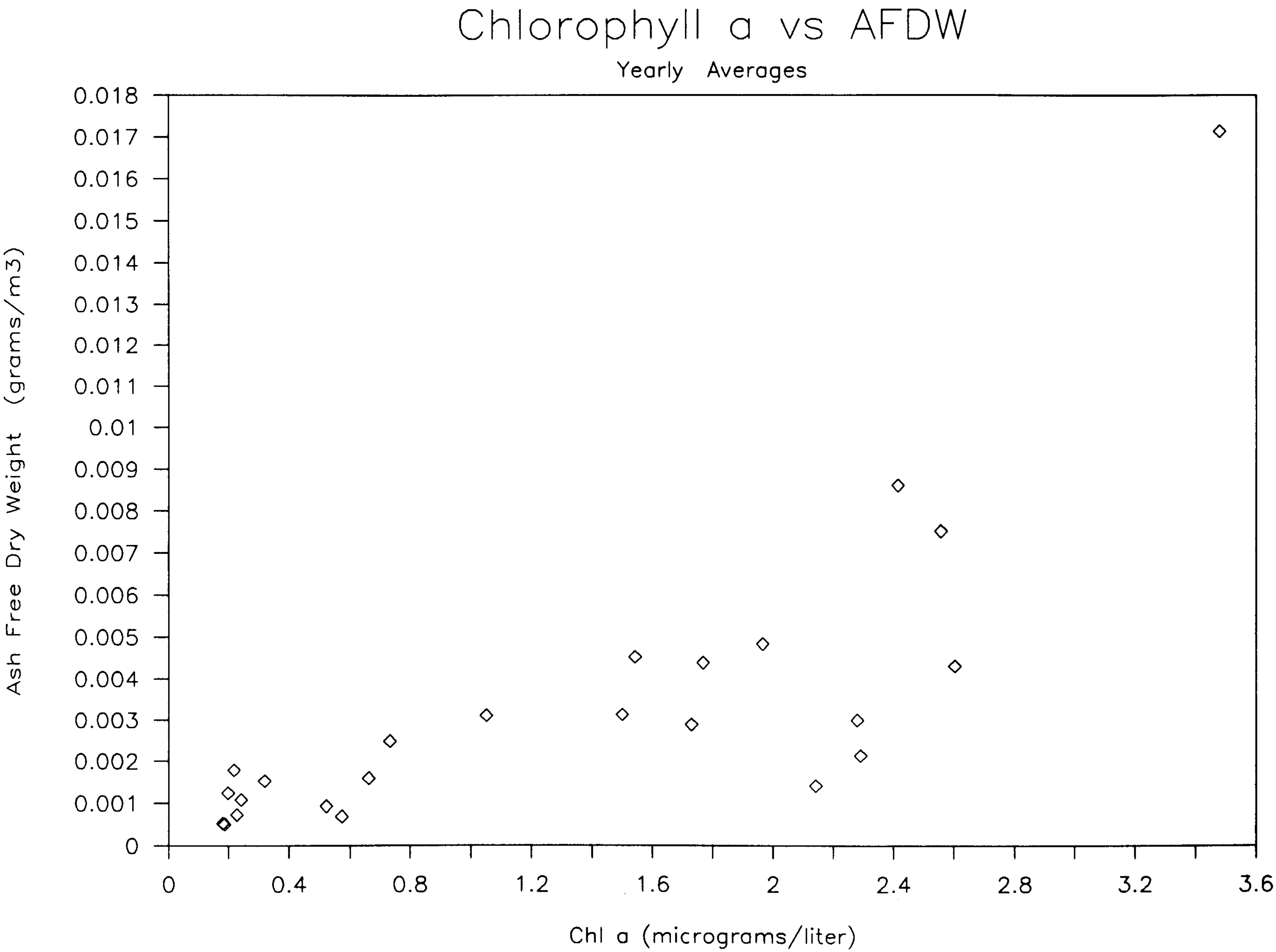

Chlorophyll a vs AFDW
Yearly Averages
Ash Free Dry Weight (grams/m3)
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
0.4
0.8
1.2
1.6
2
2.4
2.8
3.2
3.6
Chl a (micrograms/liter)

Figure 89

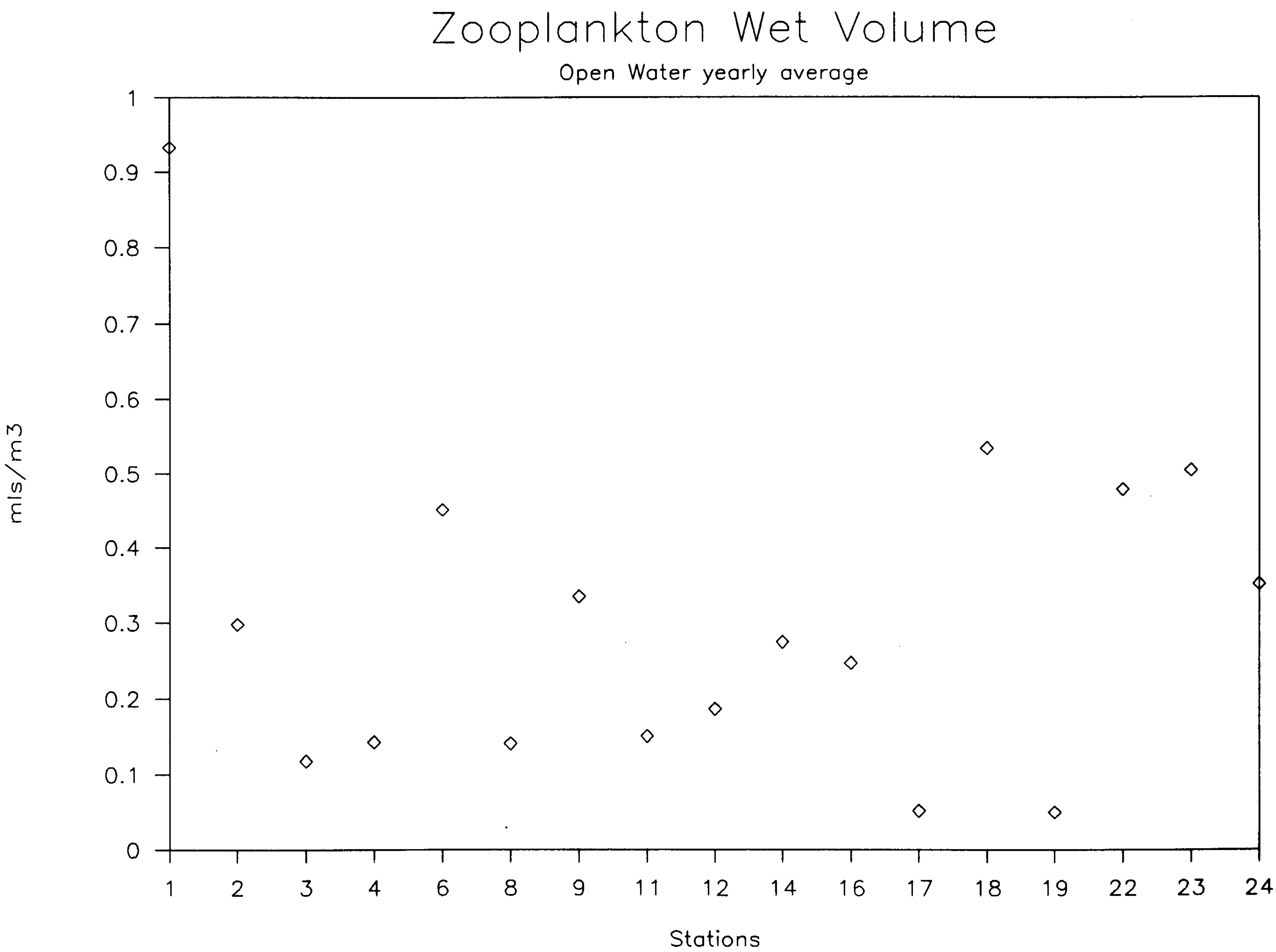

Zooplankton Wet Volume
Open Water yearly average
mls/m3
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
2
3
4
6
8
9
11
12
14
16
17
18
19
22
23
24
Stations

Figure 90

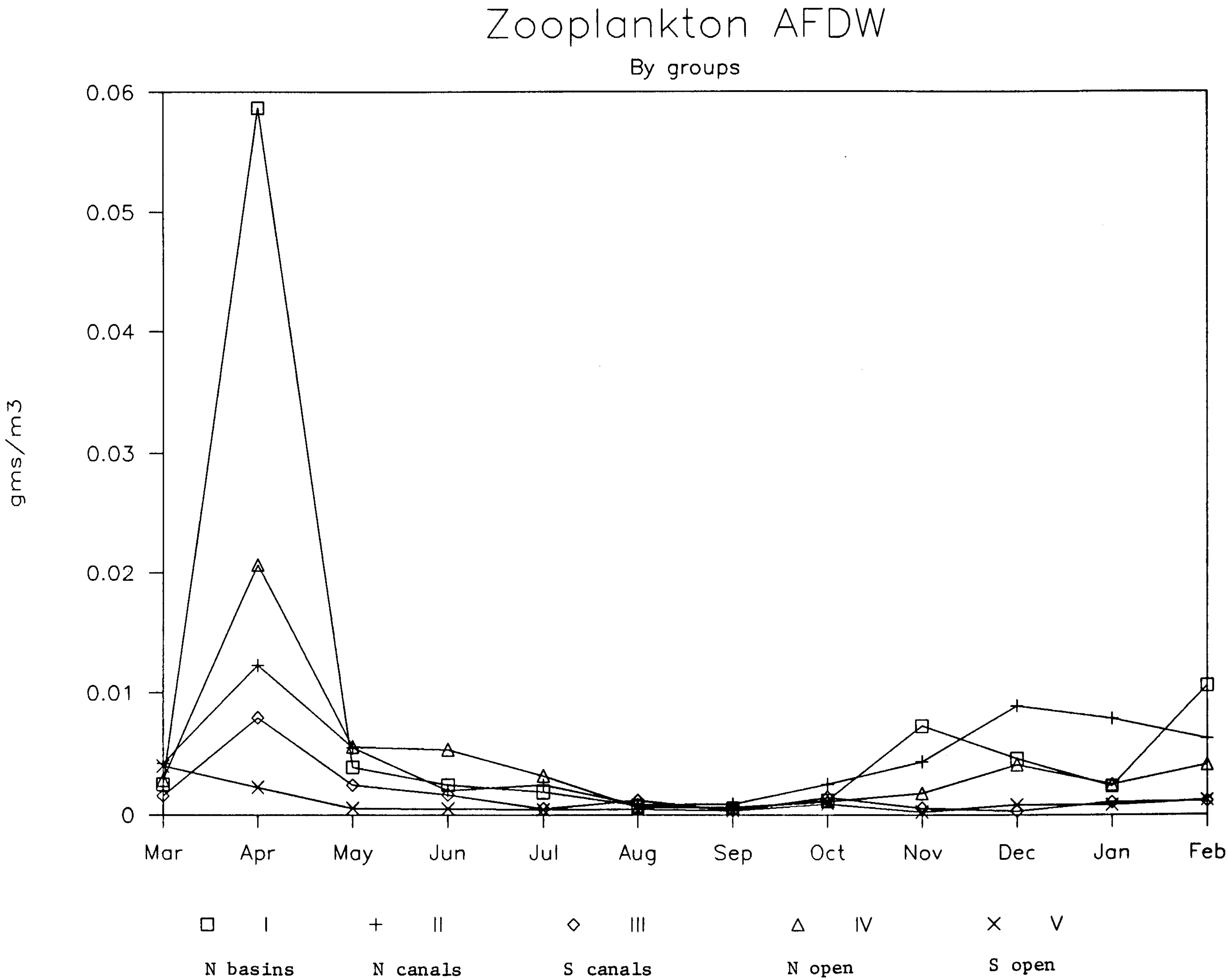
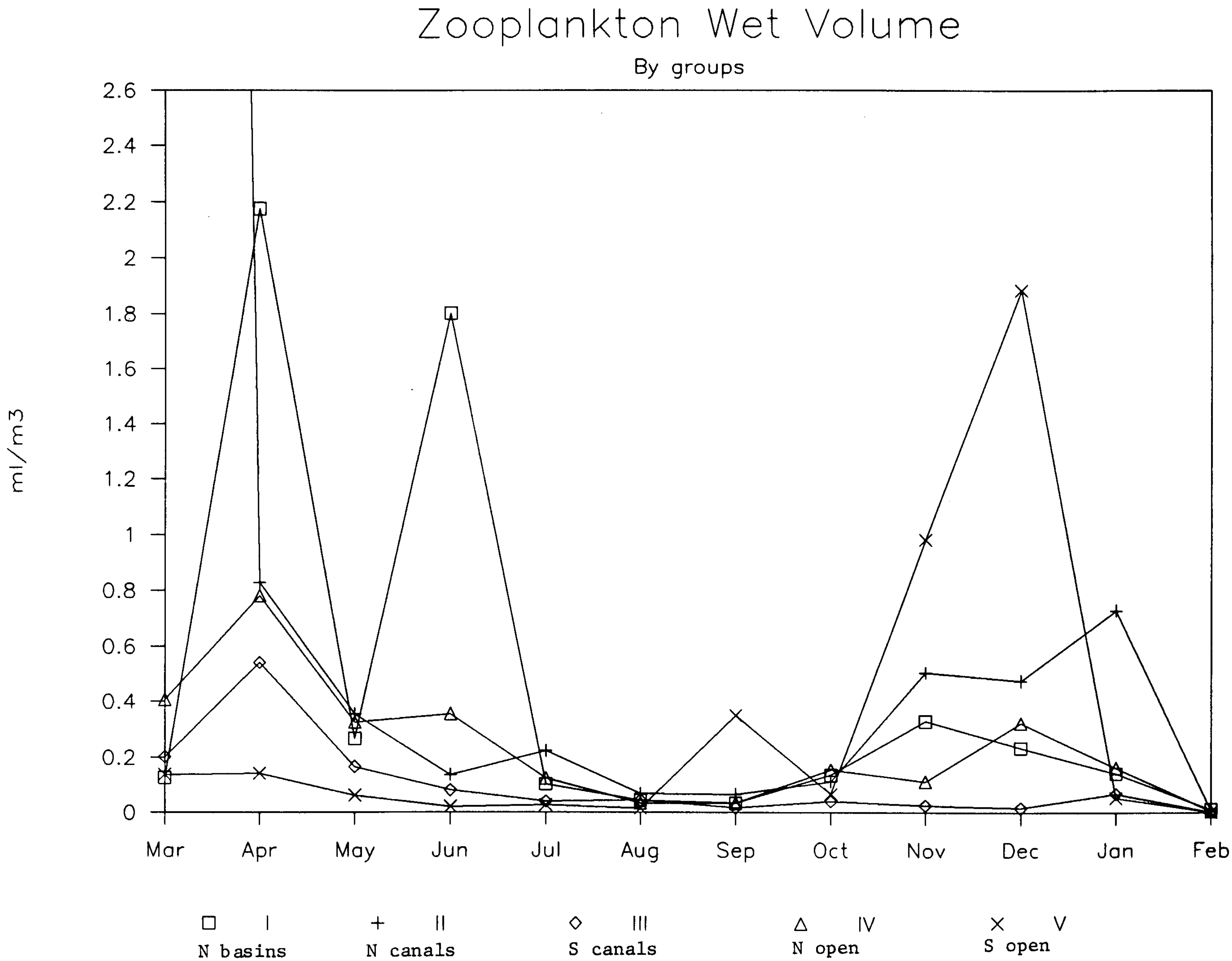

Zooplankton AFDW
By groups
gms/m3
0.06
0.05
0.04
0.03
0.02
0.01
0
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
I
II
III
IV
V
N basins
N canals
S canals
N open
S open

Figure 91



Zooplankton Wet Volume
By groups
ml/m3
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
I
N basins
II
N canals
III
S canals
IV
N open
V
S open

Figure 92

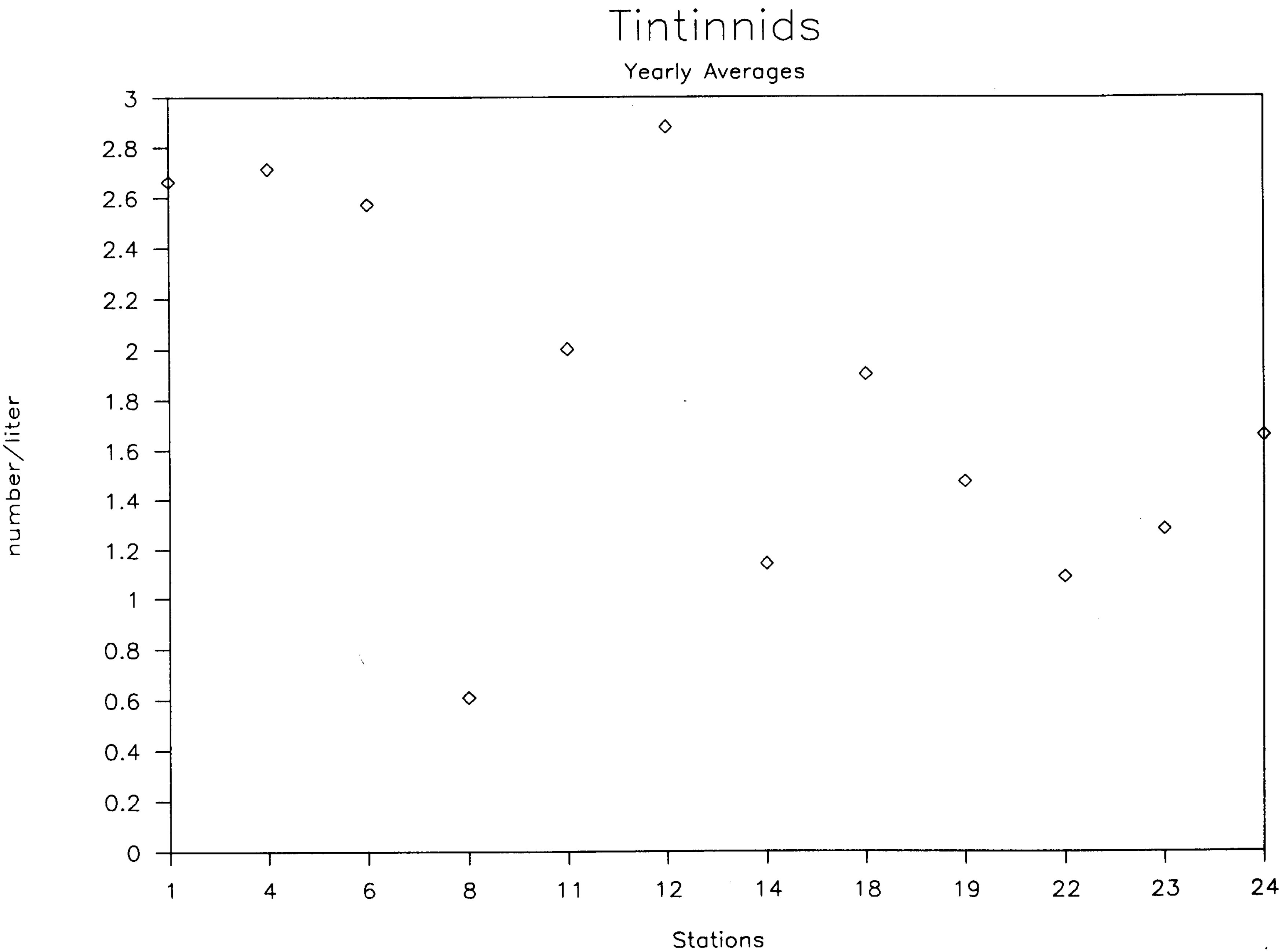
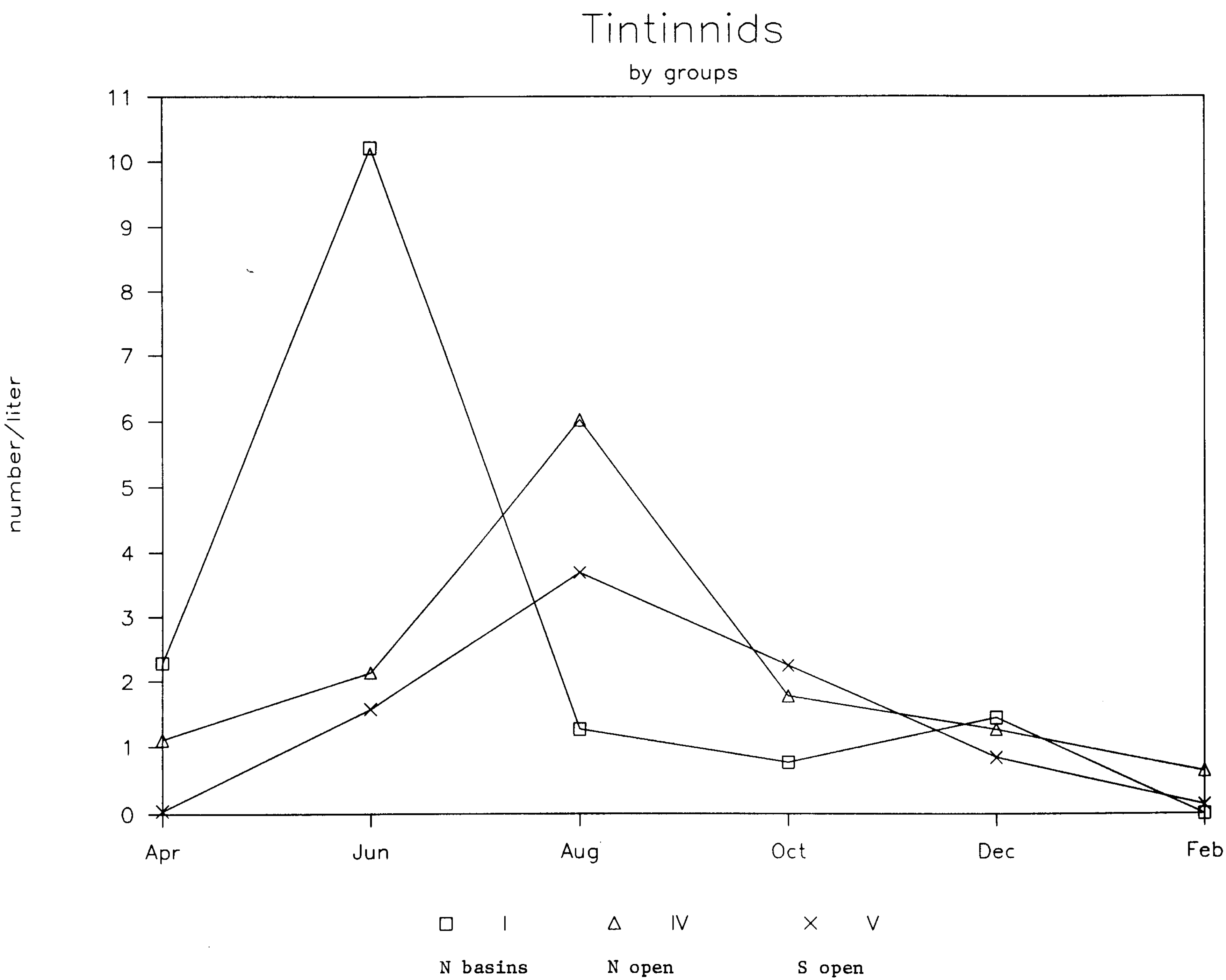

Tintinnids
Yearly Averages
number/liter
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 93



Tintinnids
by groups
number/liter
11
10
9
8
7
6
5
4
3
2
1
0
Apr
Jun
Aug
Oct
Dec
Feb
I
IV
V
N basins
N open
S open

Figure 94

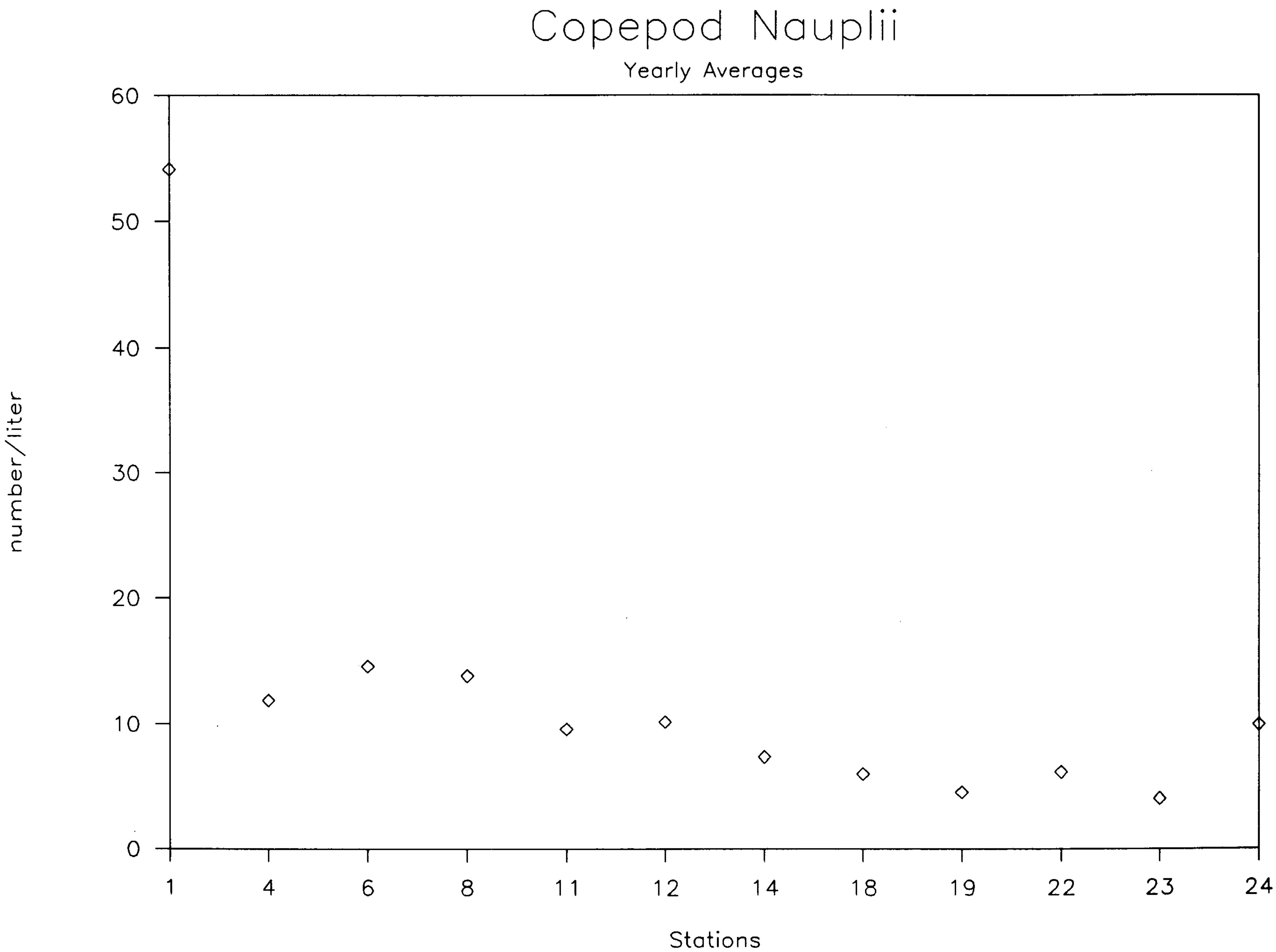

Copepod Nauplii
Yearly Averages
number/liter
Stations
60
50
40
30
20
10
0
1
4
6
8
11
12
14
18
19
22
23
24

Figure 95

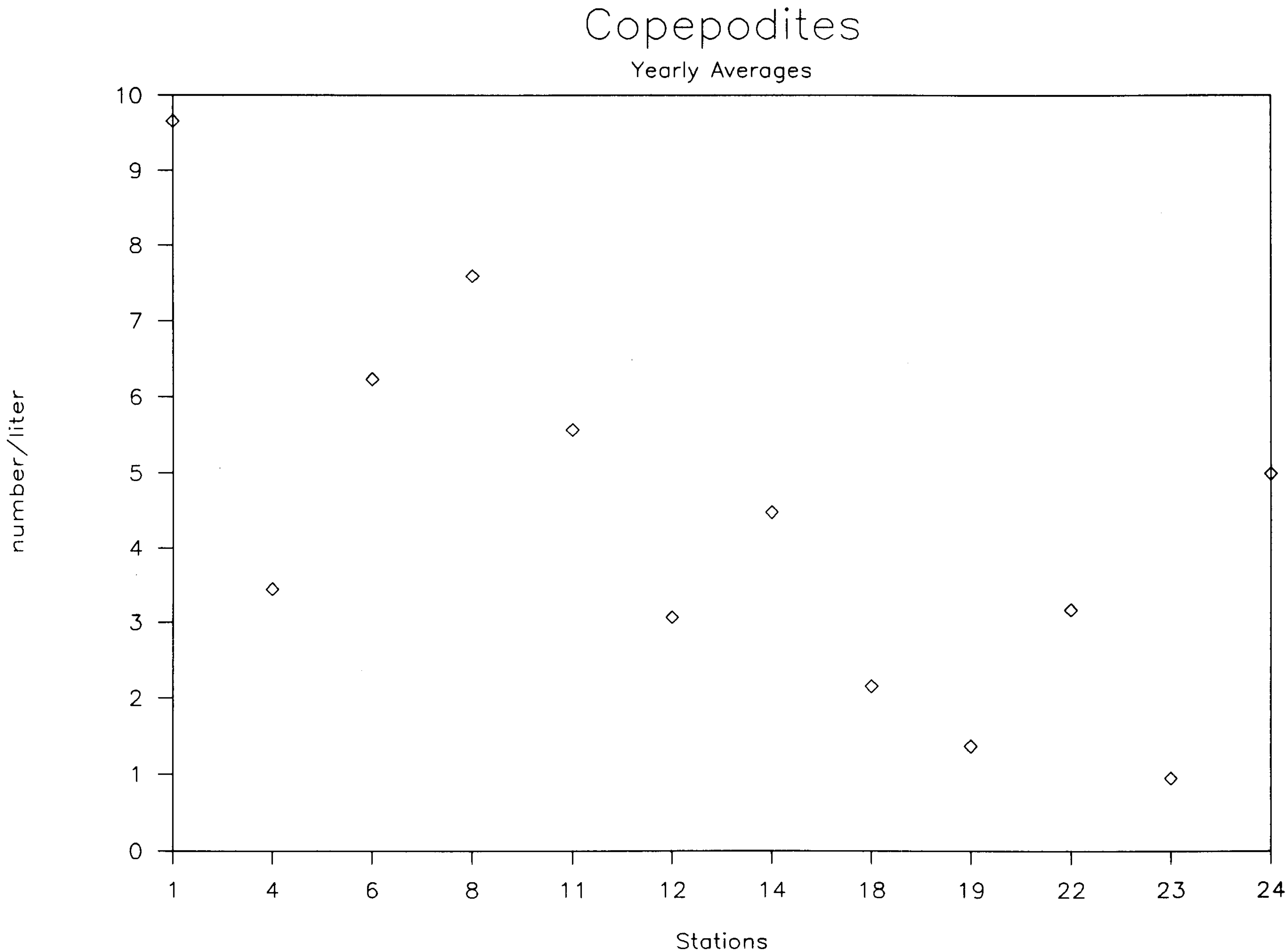

Copepodites
Yearly Averages
number/liter
0
1
2
3
4
5
6
7
8
9
10
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 96

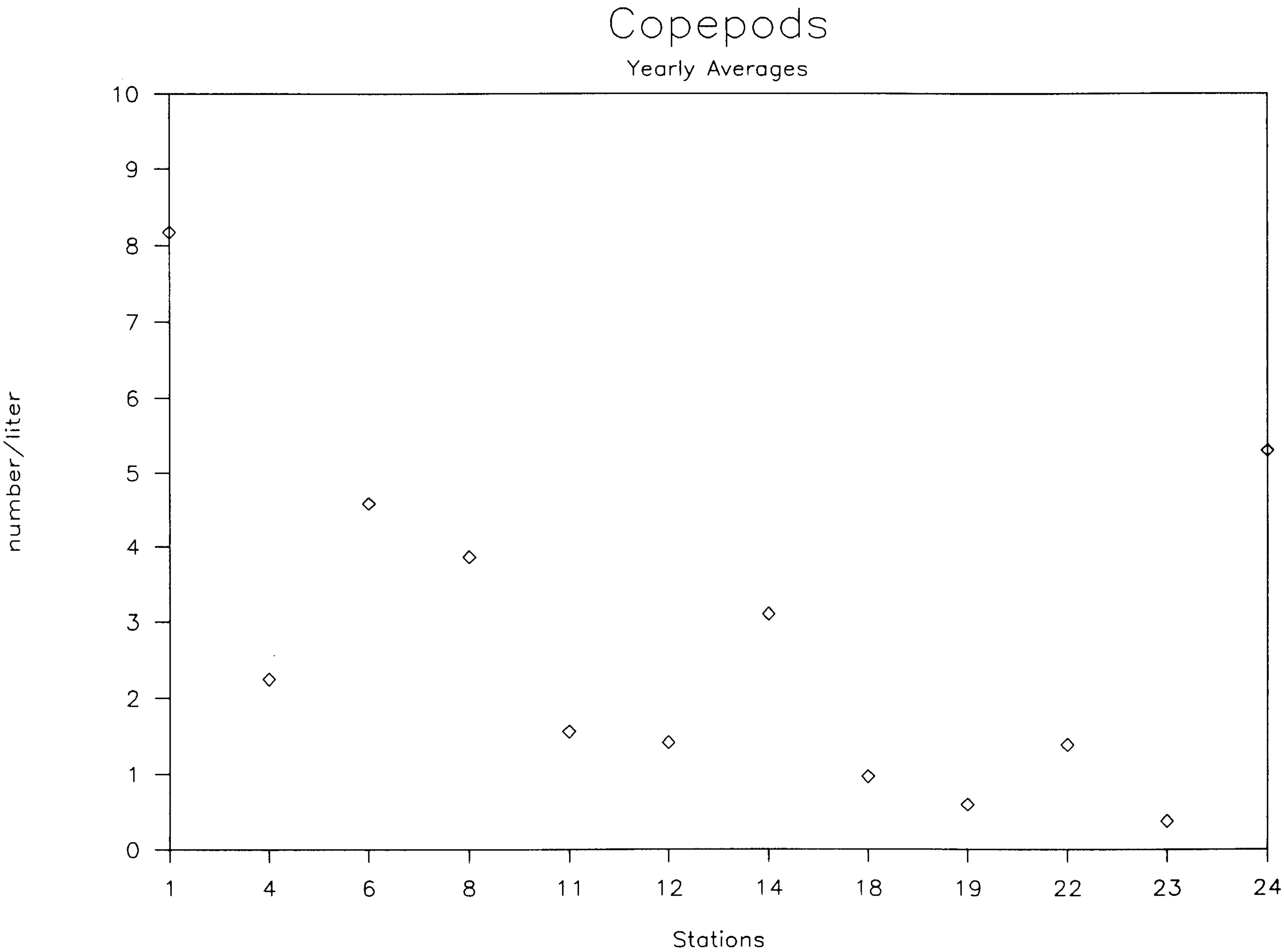

Copepods
Yearly Averages
10
9
8
7
6
5
4
3
2
1
0
number/liter
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 97

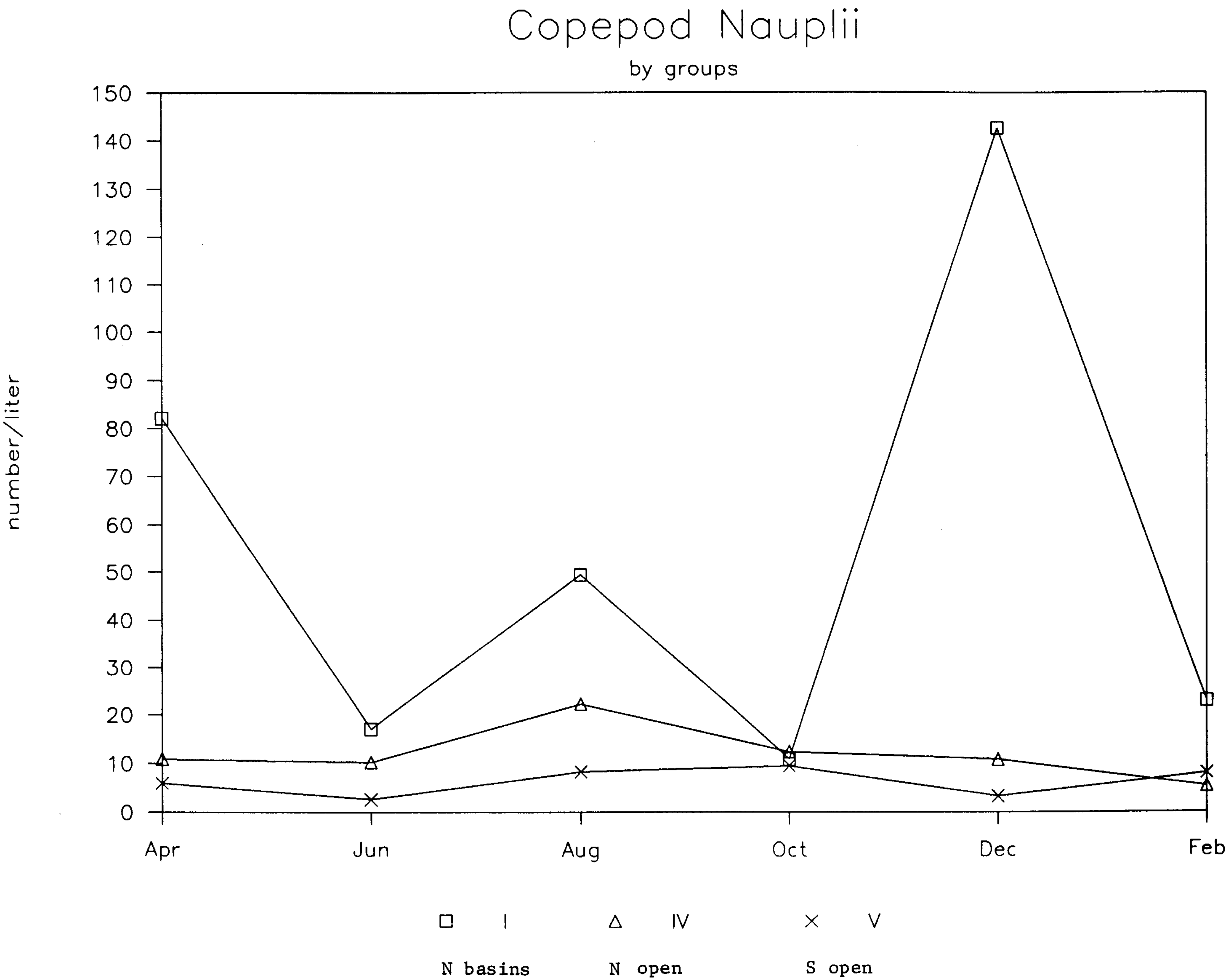

Copepod Nauplii
by groups
number/liter
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Apr
Jun
Aug
Oct
Dec
Feb
I
IV
V
N basins
N open
S open

Figure 98

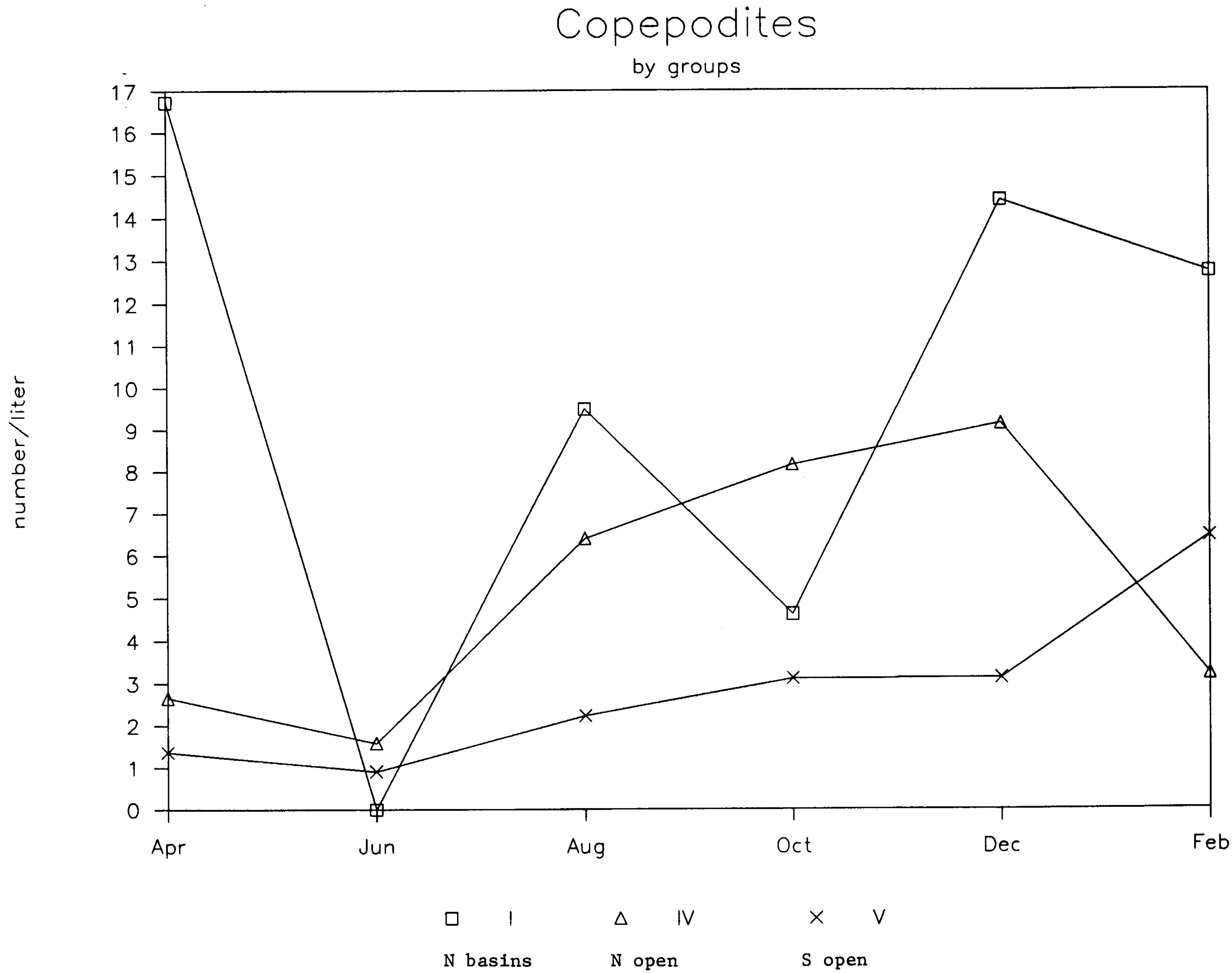

Copepodites
by groups
number/liter
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Apr
Jun
Aug
Oct
Dec
Feb
I
IV
V
N basins
N open
S open

Figure 99

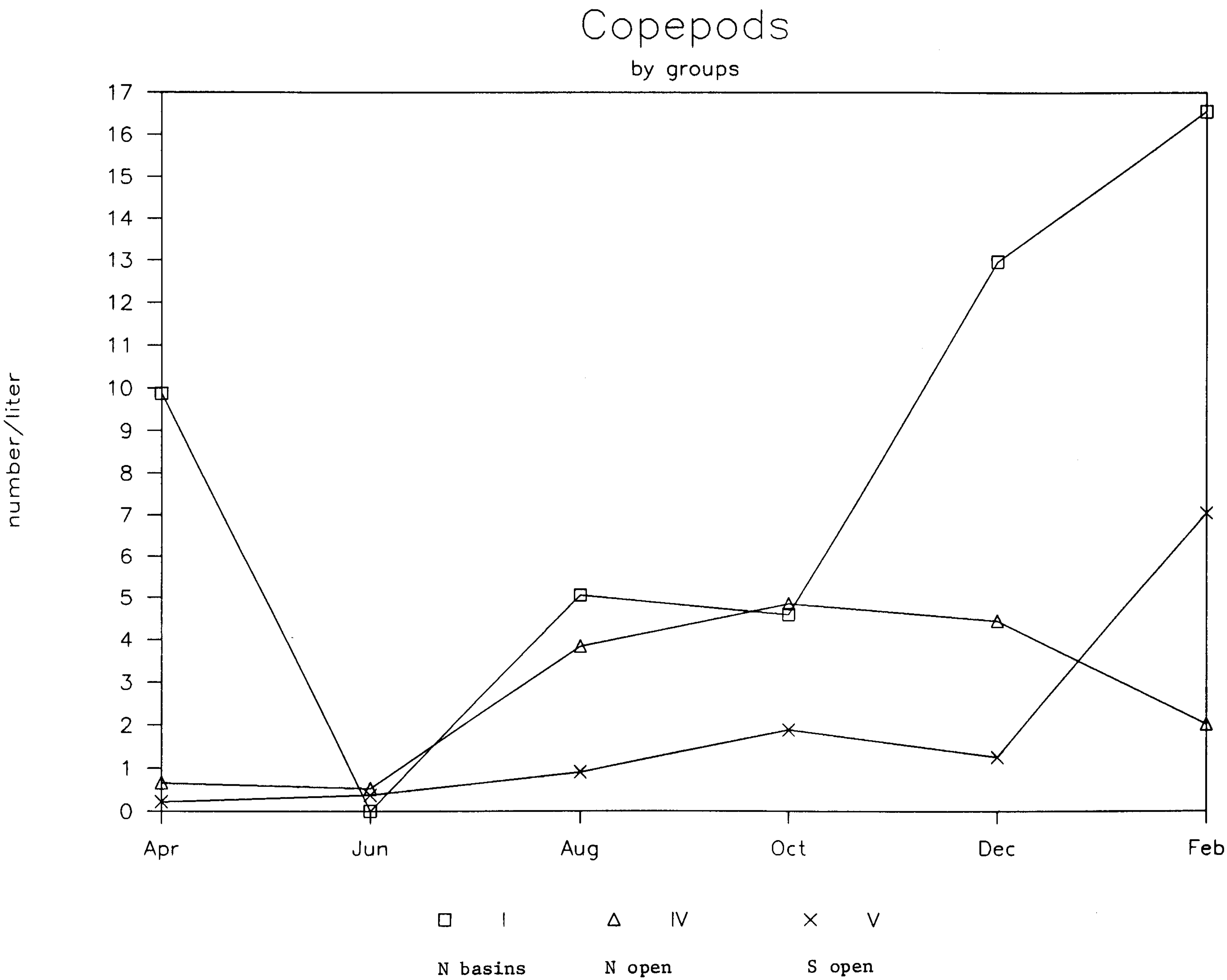
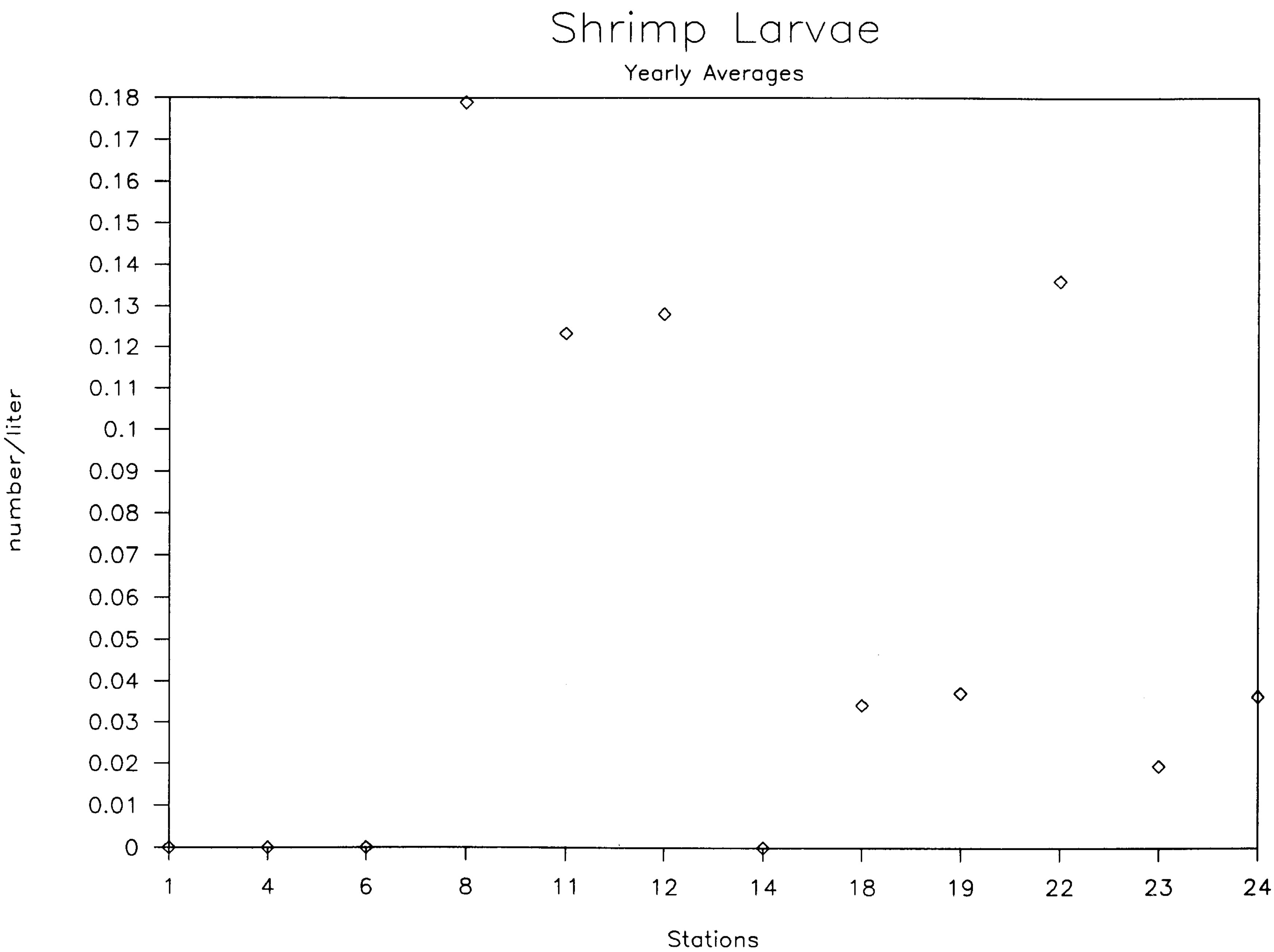

Copepods
by groups
number/liter
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Apr
Jun
Aug
Oct
Dec
Feb
I
IV
V
N basins
N open
S open

Figure 100



Shrimp Larvae
Yearly Averages
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
number/liter
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 101

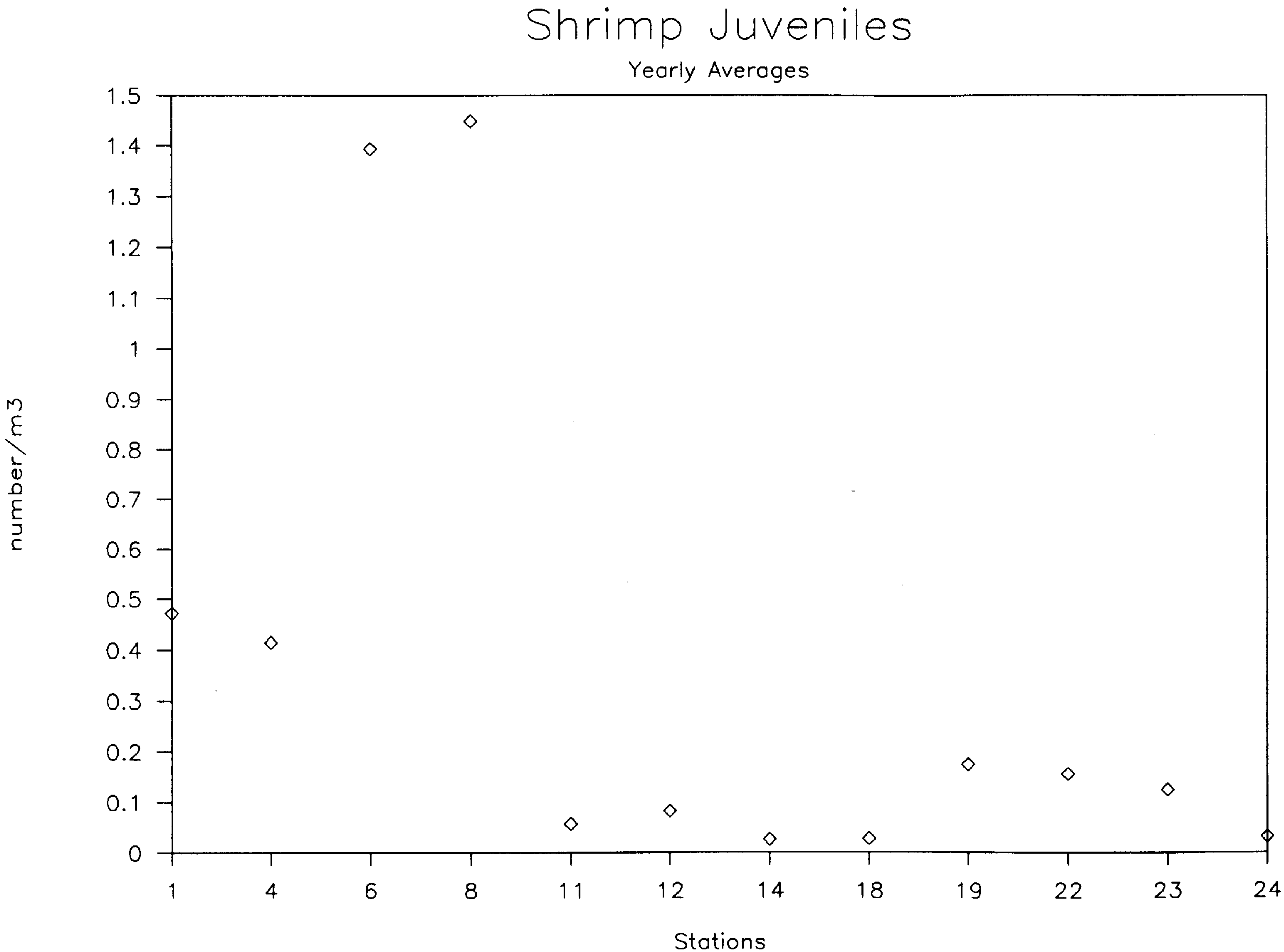

Shrimp Juveniles
Yearly Averages
number/m3
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 102

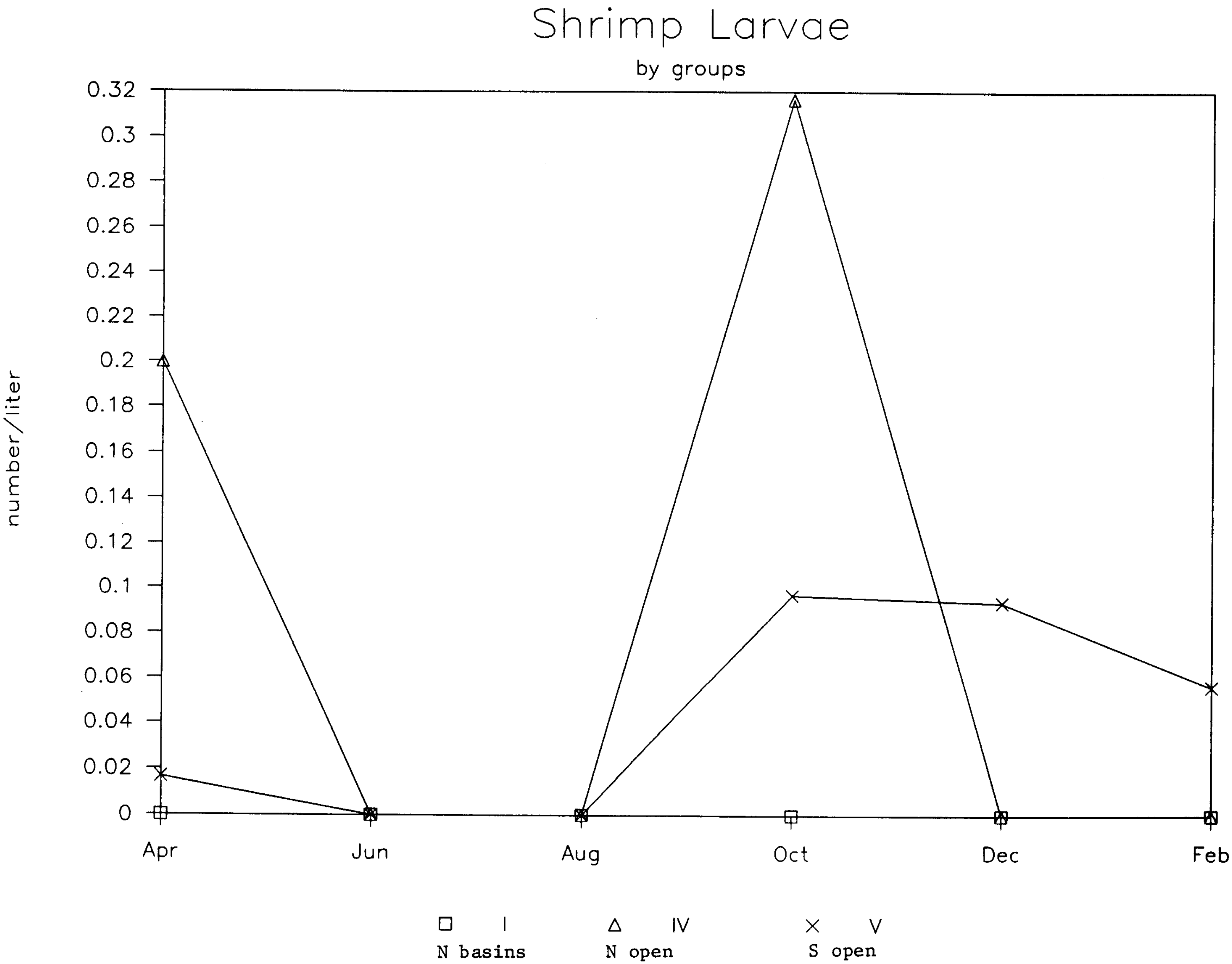
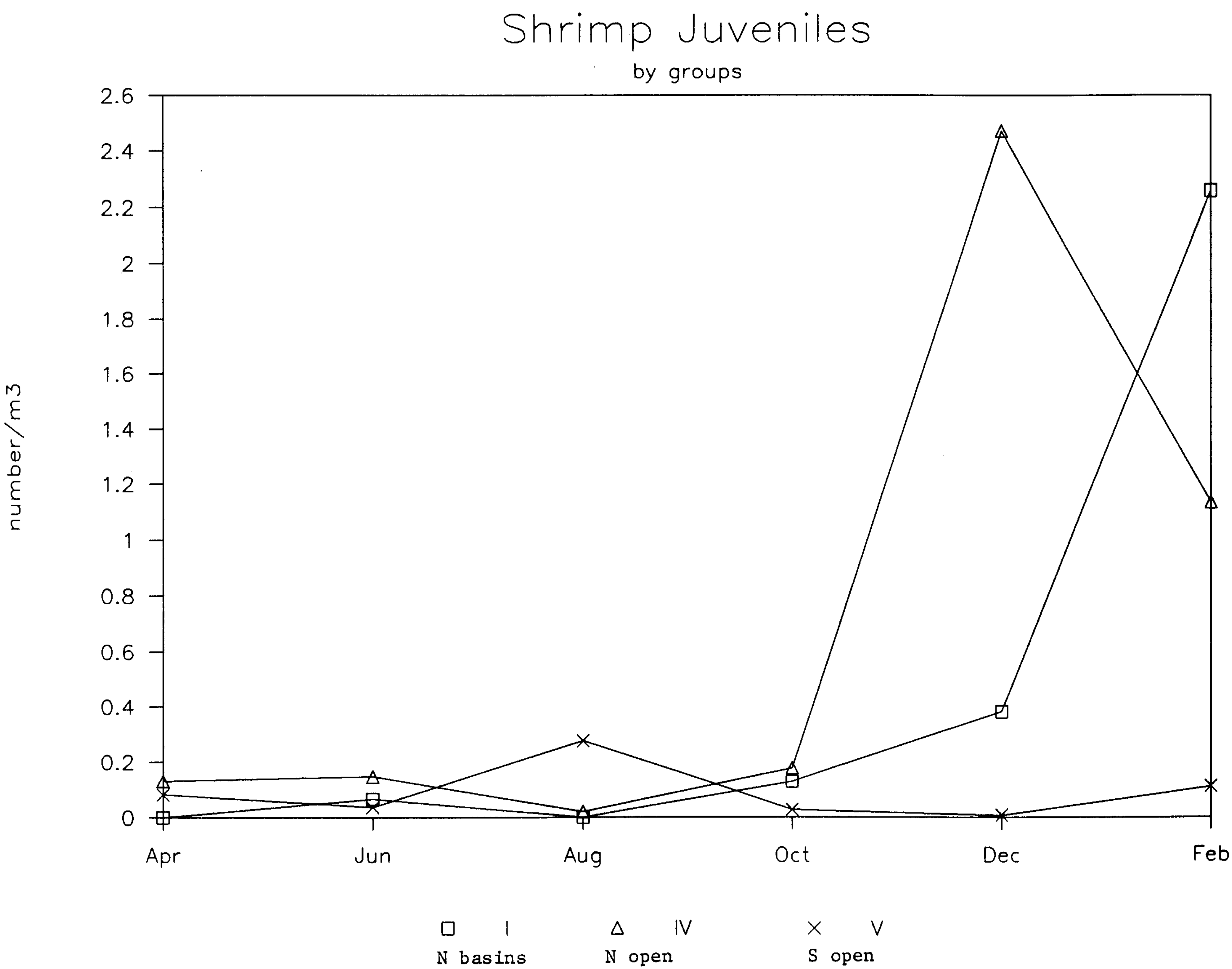

Shrimp Larvae
by groups
number/liter
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Apr
Jun
Aug
Oct
Dec
Feb
I
N basins
IV
N open
V
S open

Figure 103



Shrimp Juveniles
by groups
number/m3
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Apr
Jun
Aug
Oct
Dec
Feb
I
N basins
IV
N open
V
S open

Figure 104

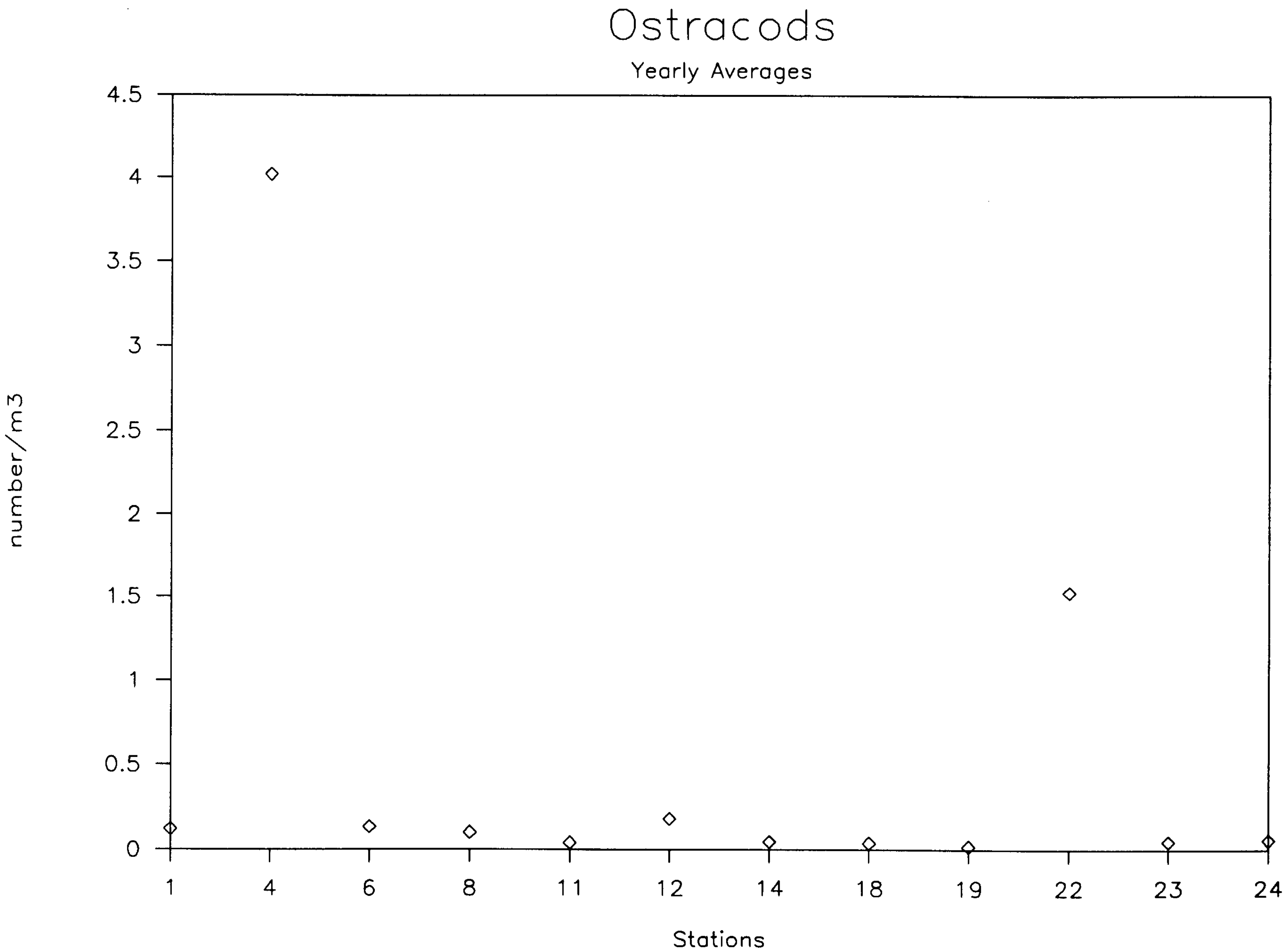

Ostracods
Yearly Averages
number/m3
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 105

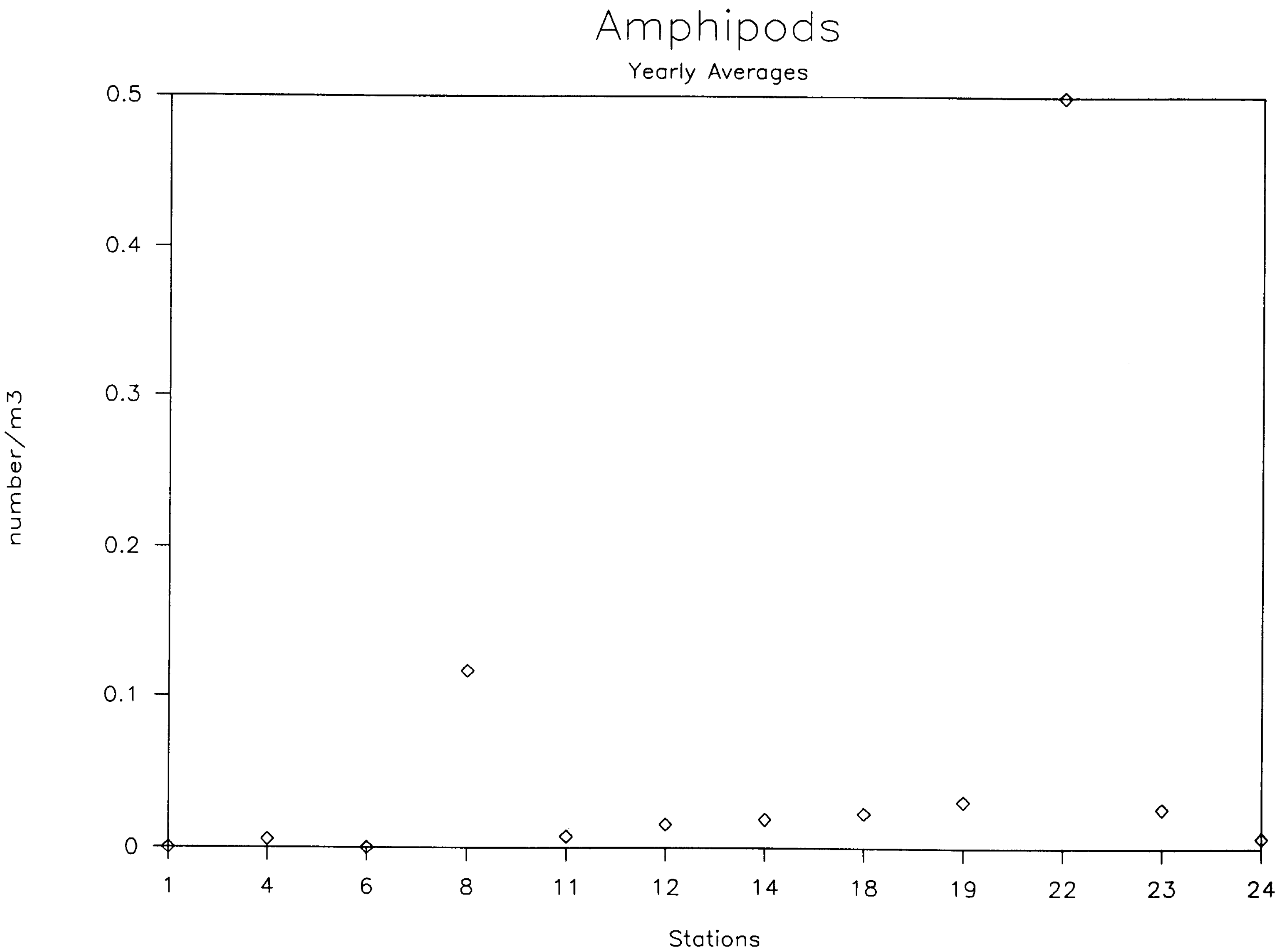
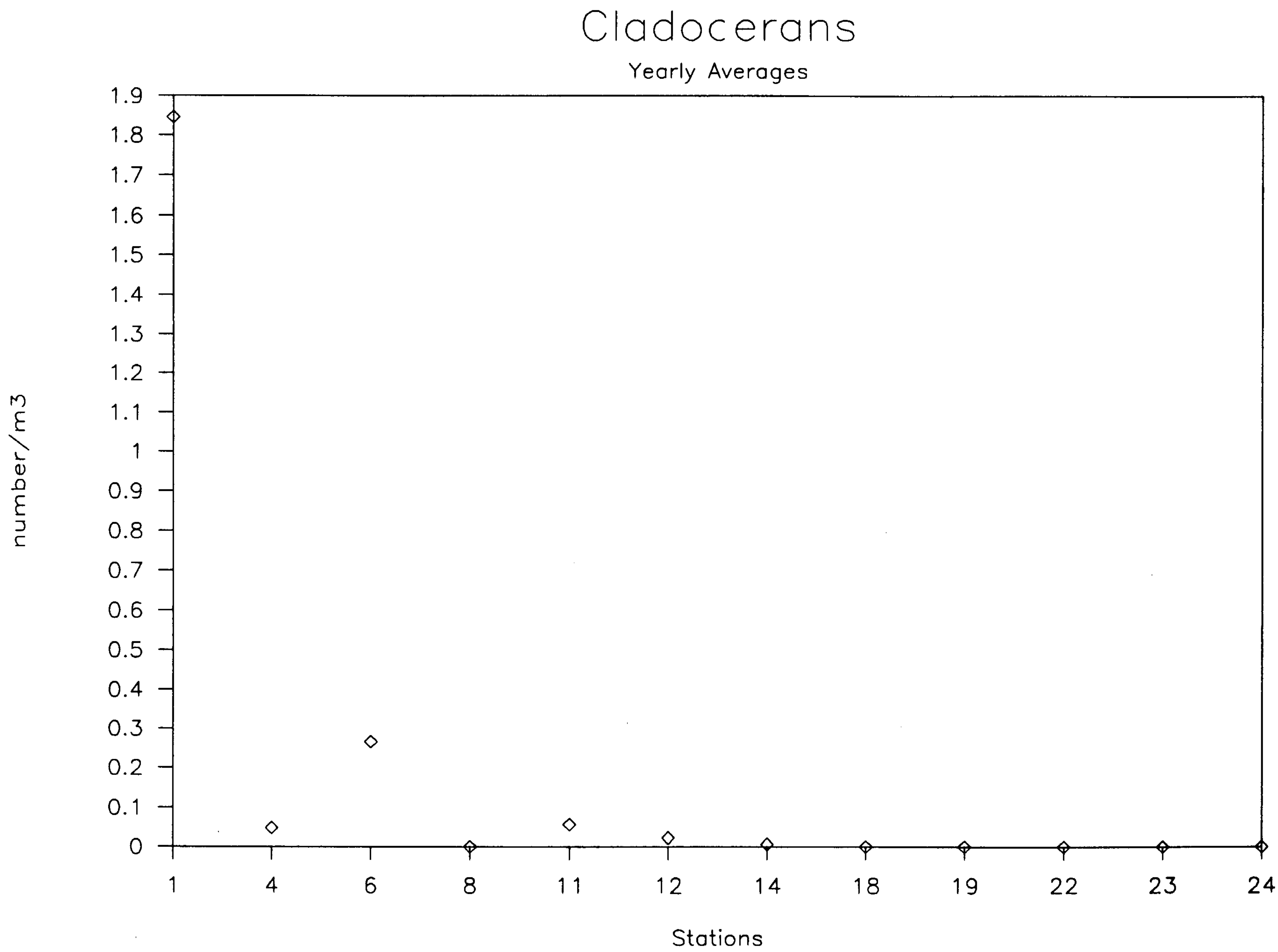

Amphipods
Yearly Averages
number/m3
0.5
0.4
0.3
0.2
0.1
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 106



Cladocerans
Yearly Averages
number/m3
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 107

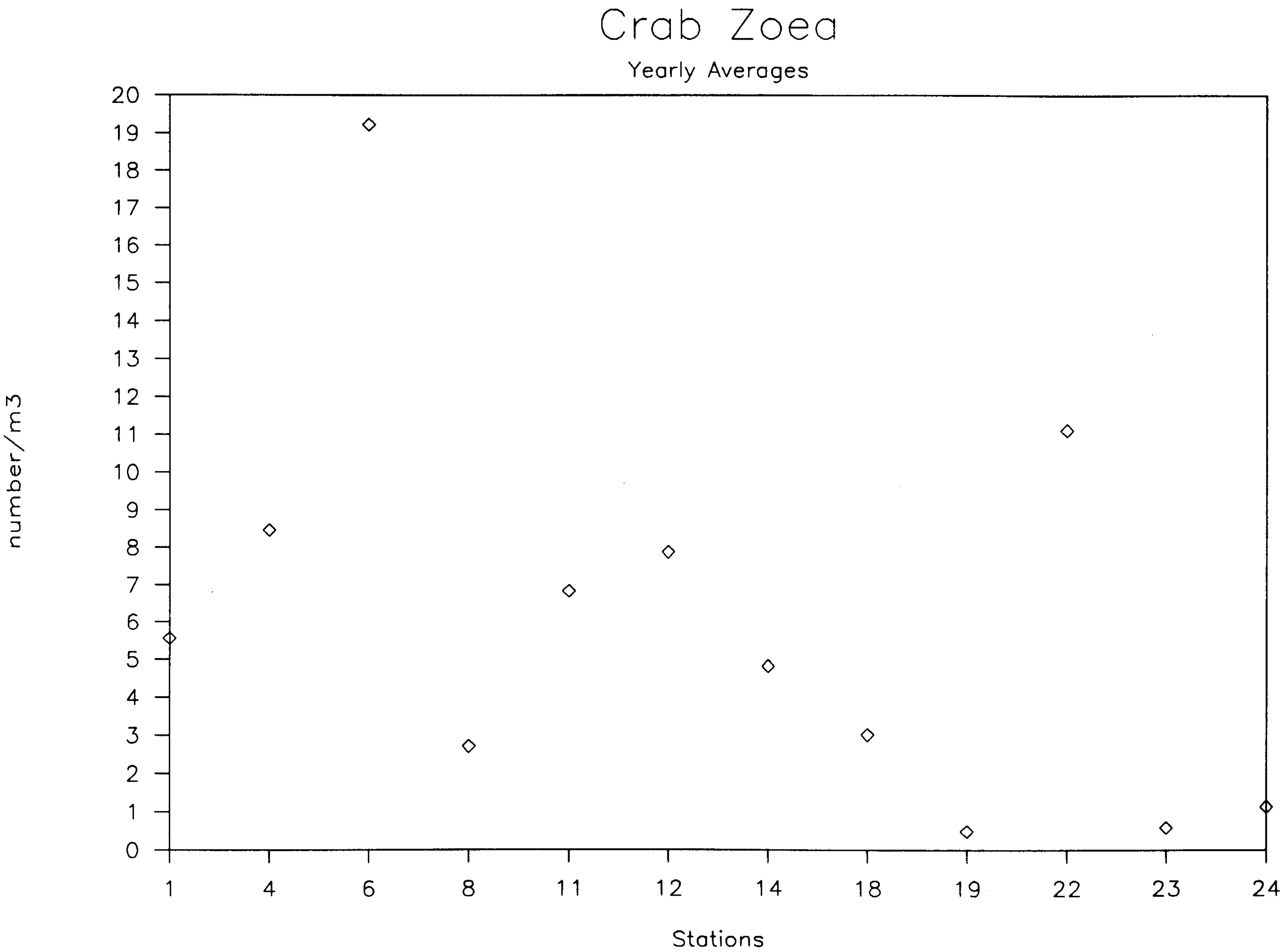

Crab Zoea
Yearly Averages
number/m3
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 108

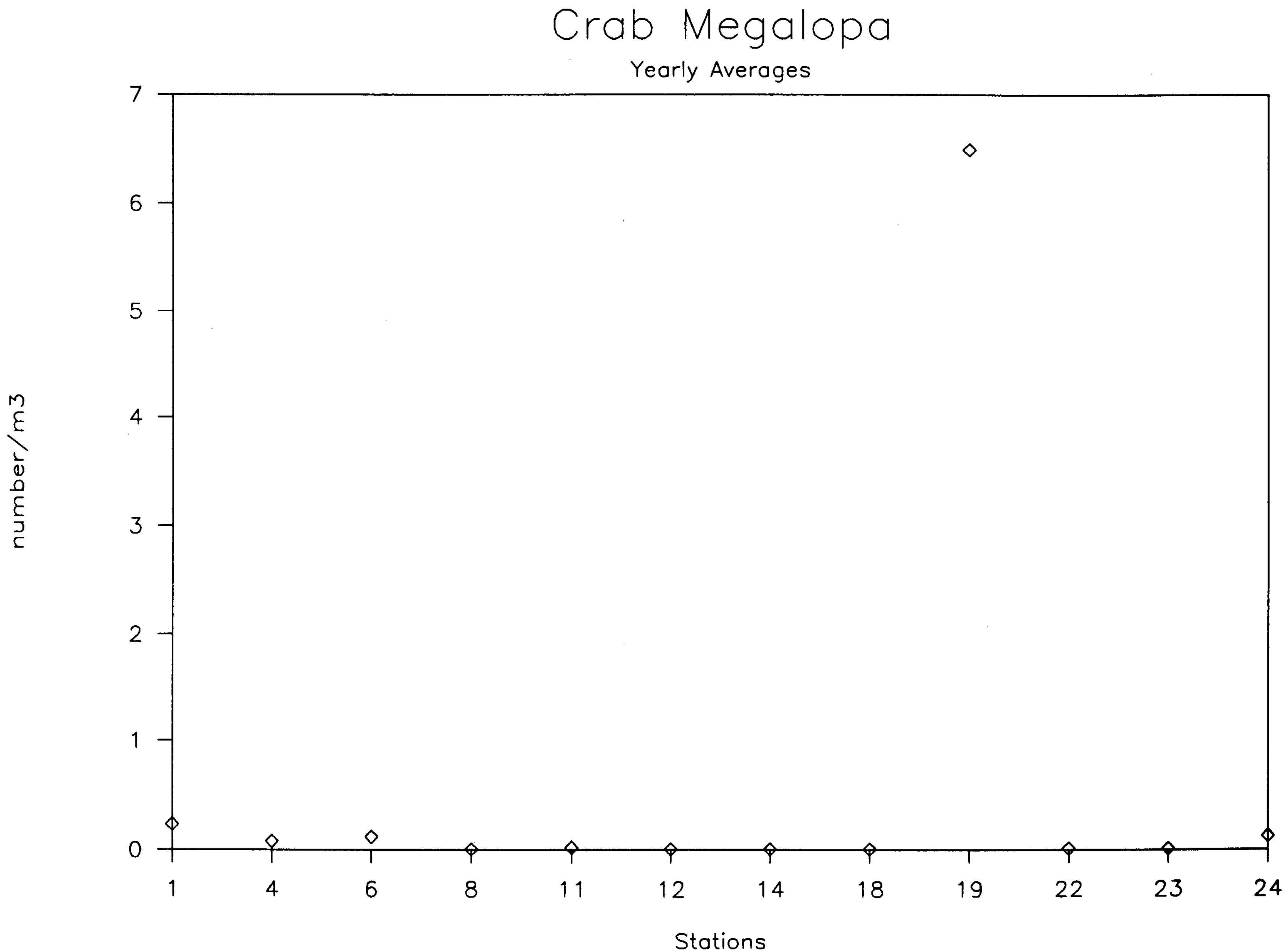

Crab Megalopa
Yearly Averages
number/m3
0
1
2
3
4
5
6
7
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 109

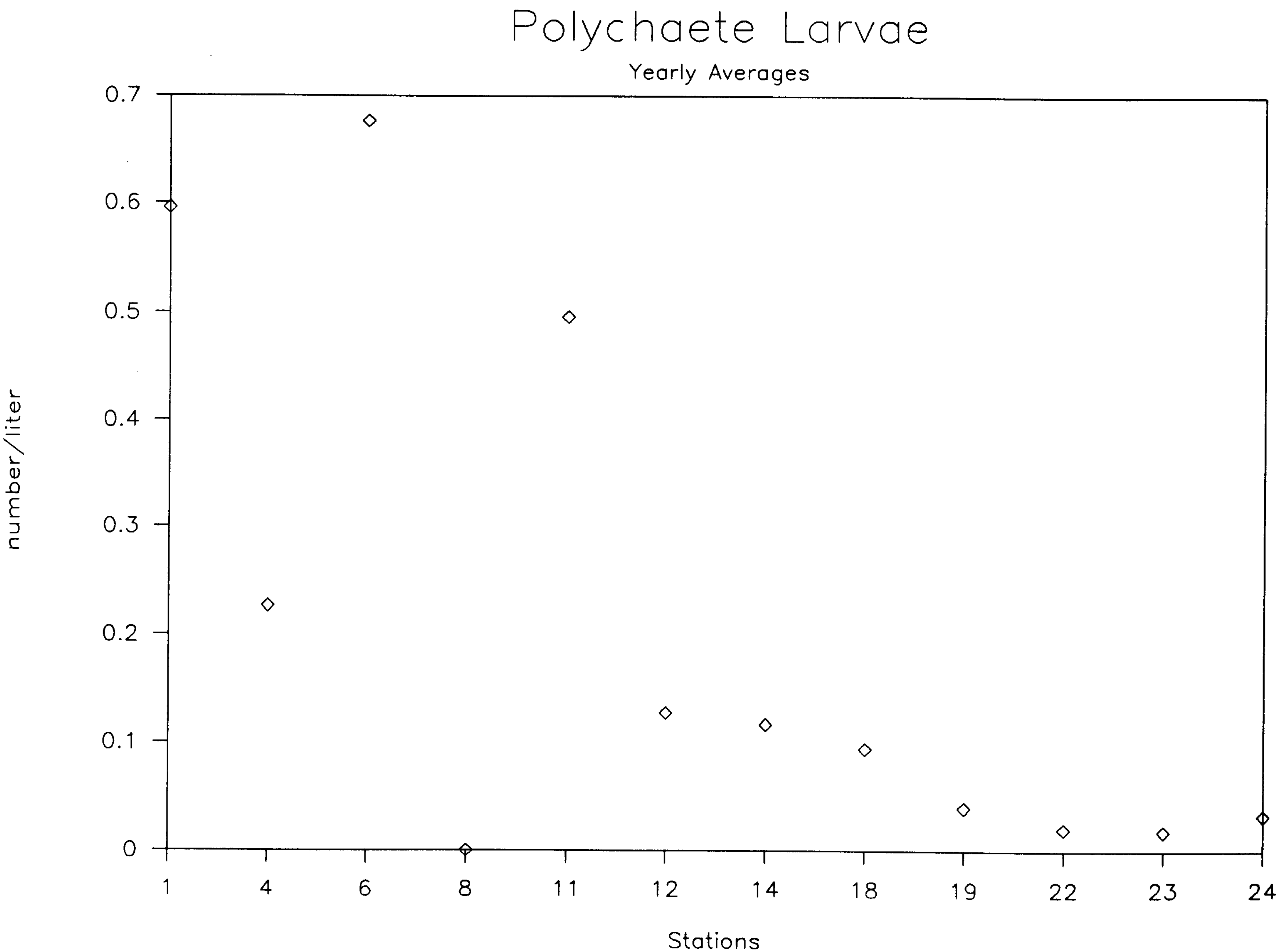

Polychaete Larvae
Yearly Averages
number/liter
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 110

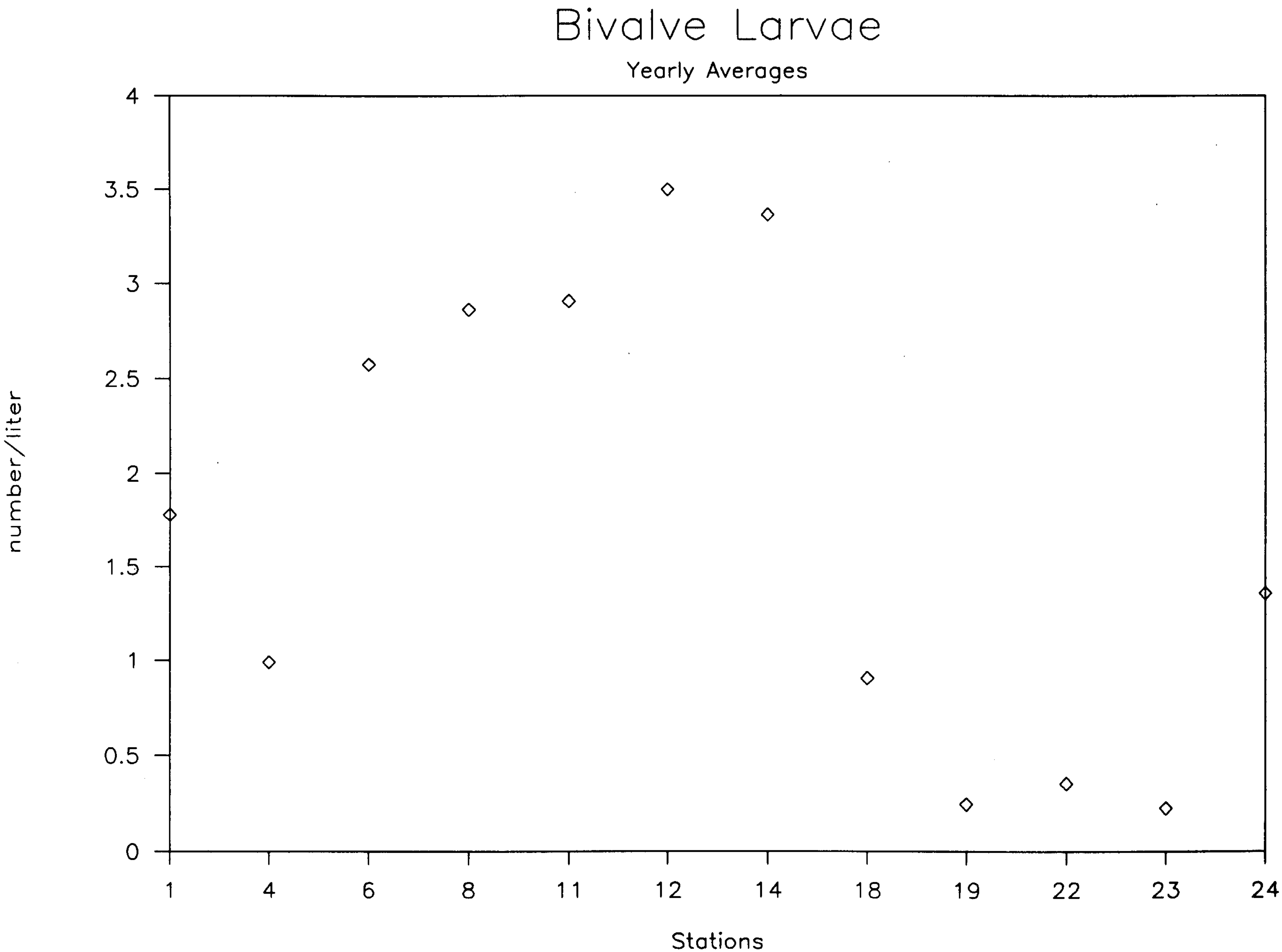
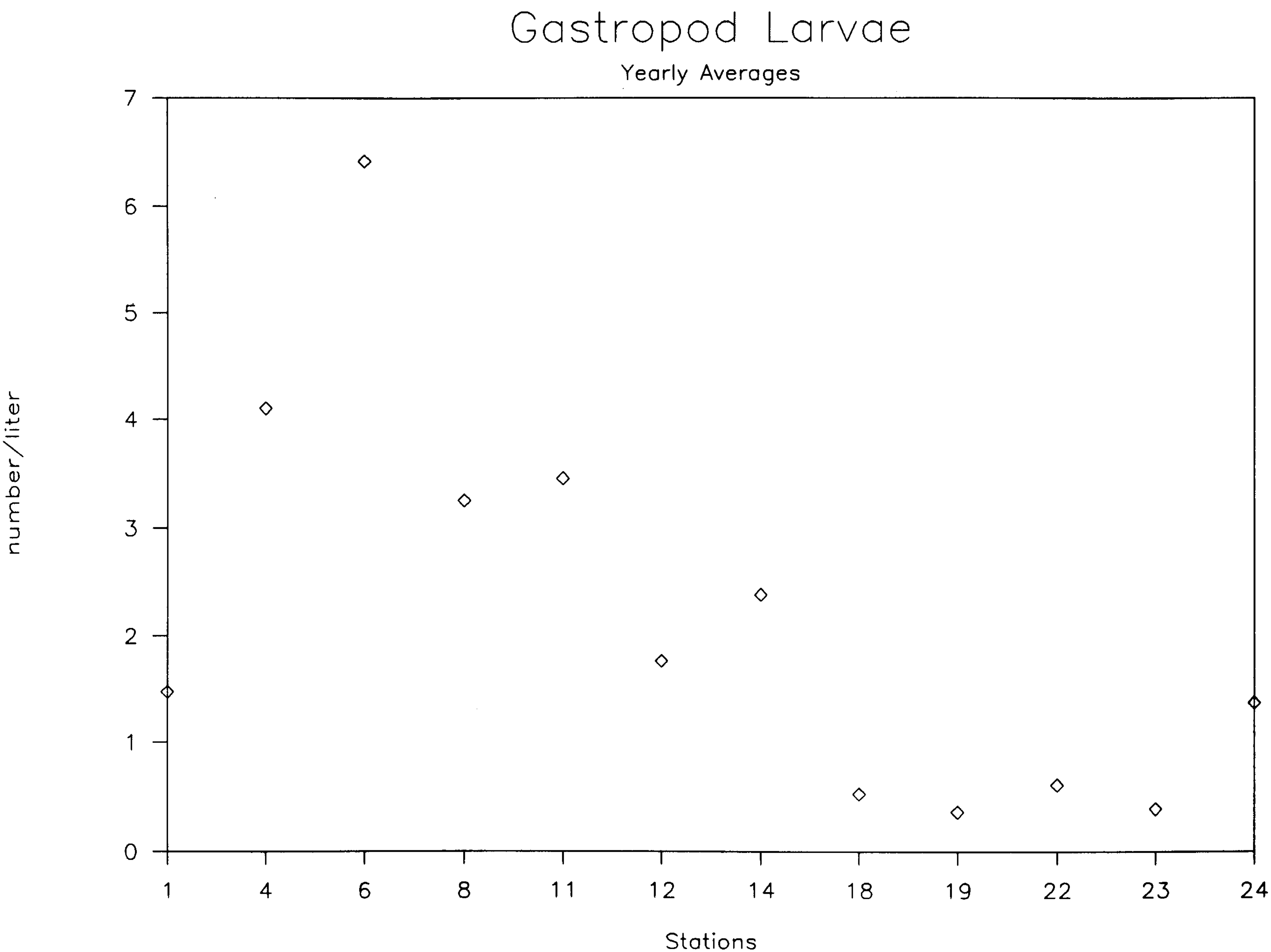

Bivalve Larvae
Yearly Averages
number/liter
4
3.5
3
2.5
2
1.5
1
0.5
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 111



Gastropod Larvae
Yearly Averages
number/liter
0
1
2
3
4
5
6
7
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 112

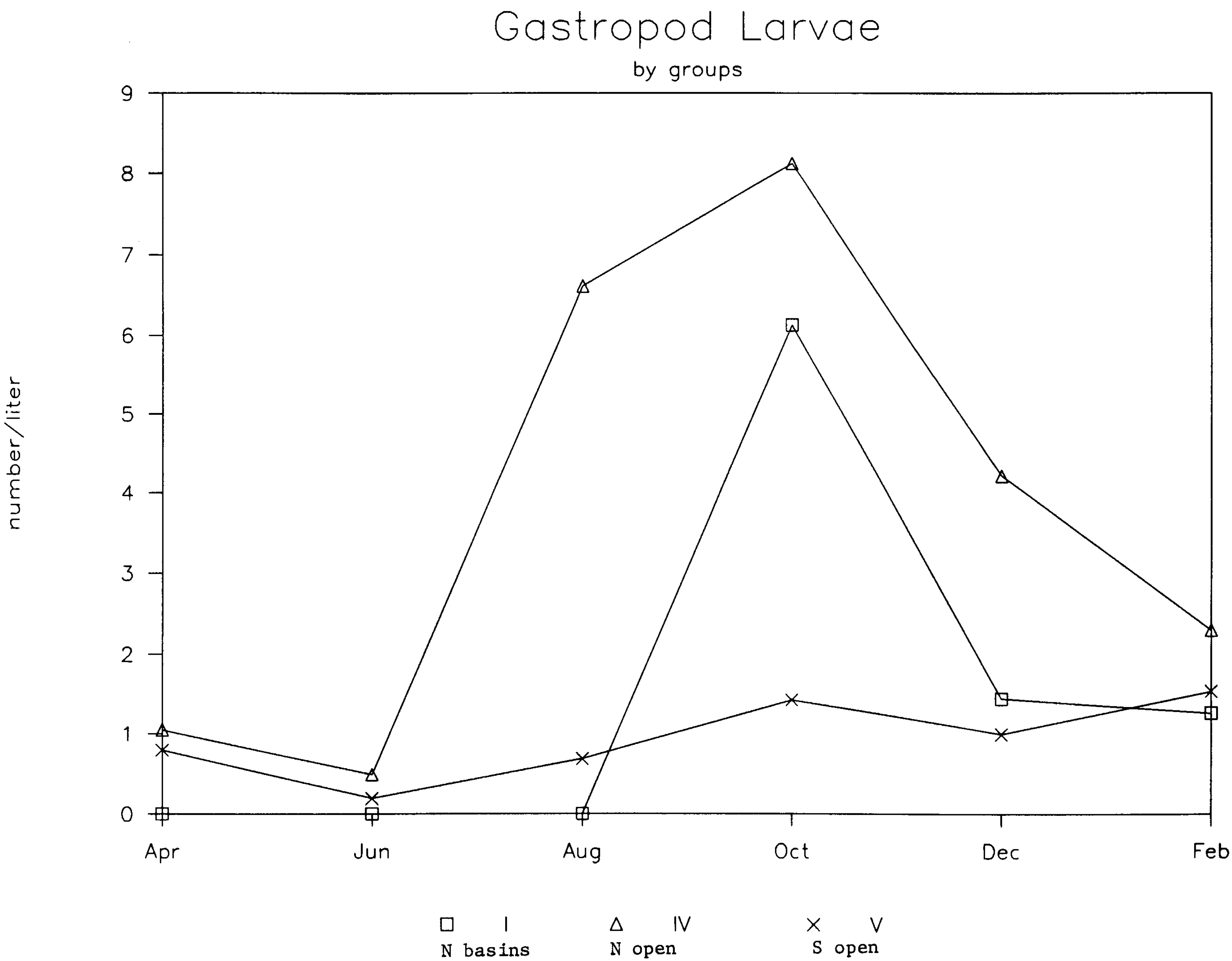

Gastropod Larvae
by groups
number/liter
0
1
2
3
4
5
6
7
8
9
Apr
Jun
Aug
Oct
Dec
Feb
I
N basins
IV
N open
V
S open

Figure 113

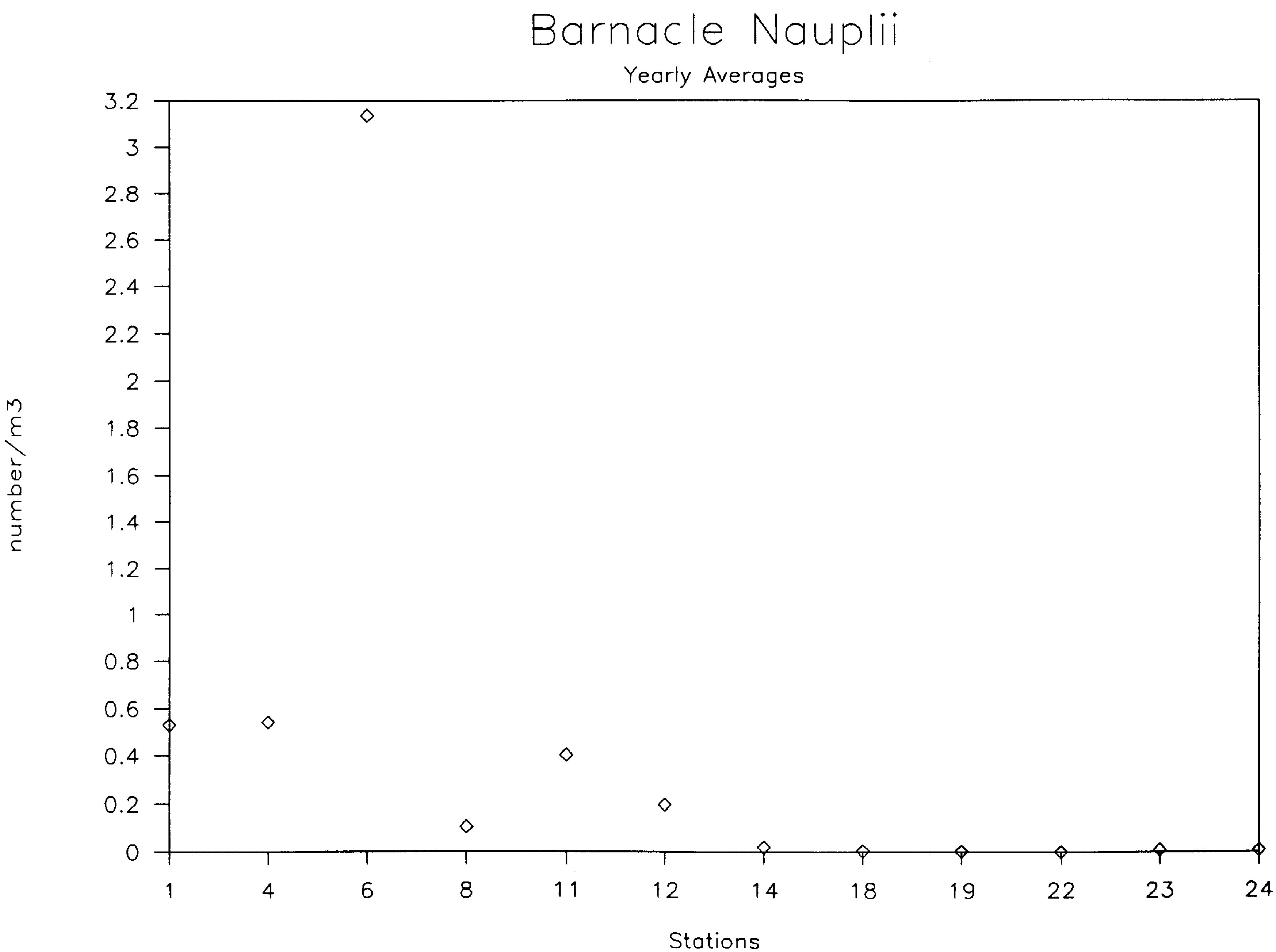
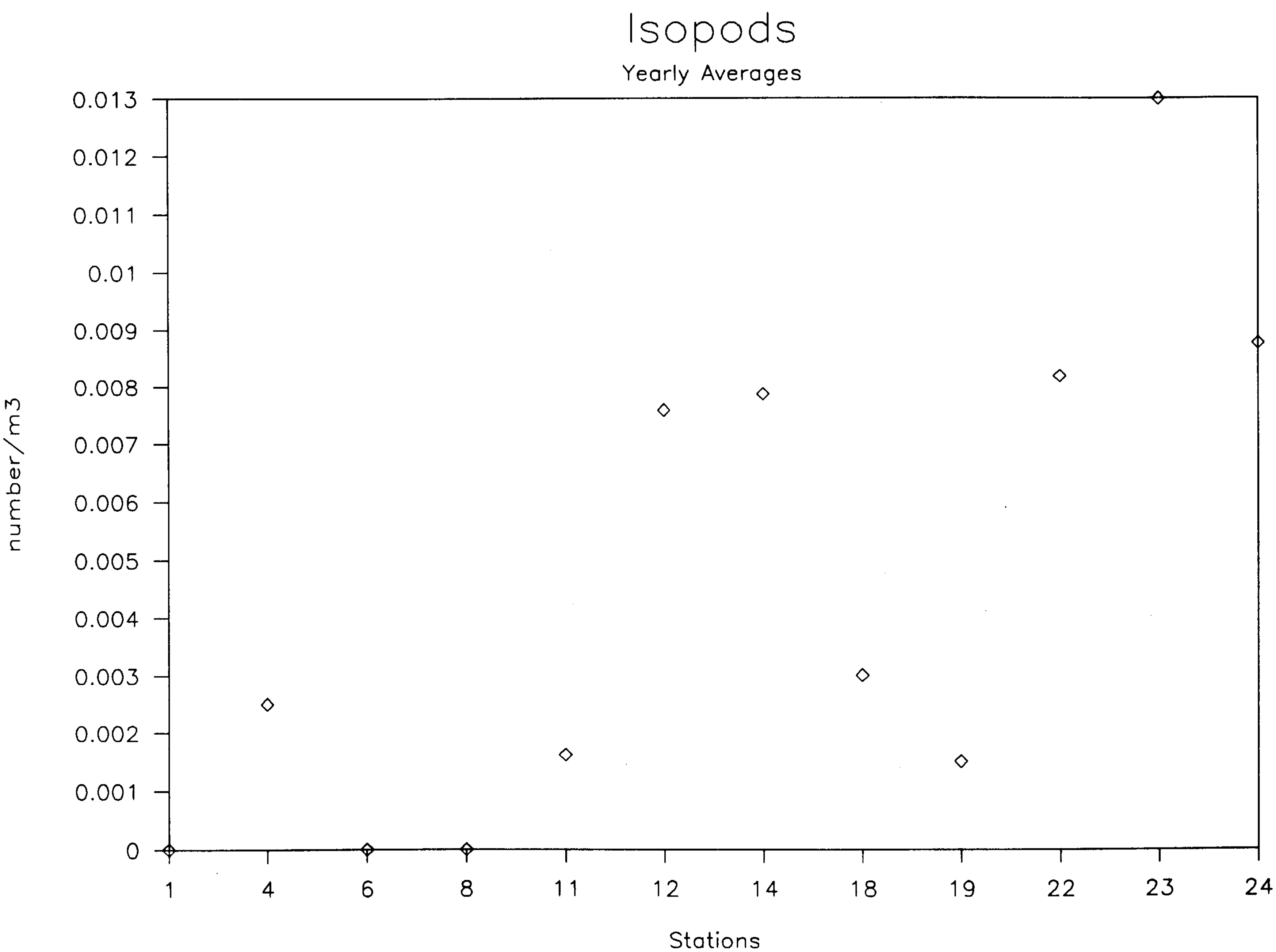
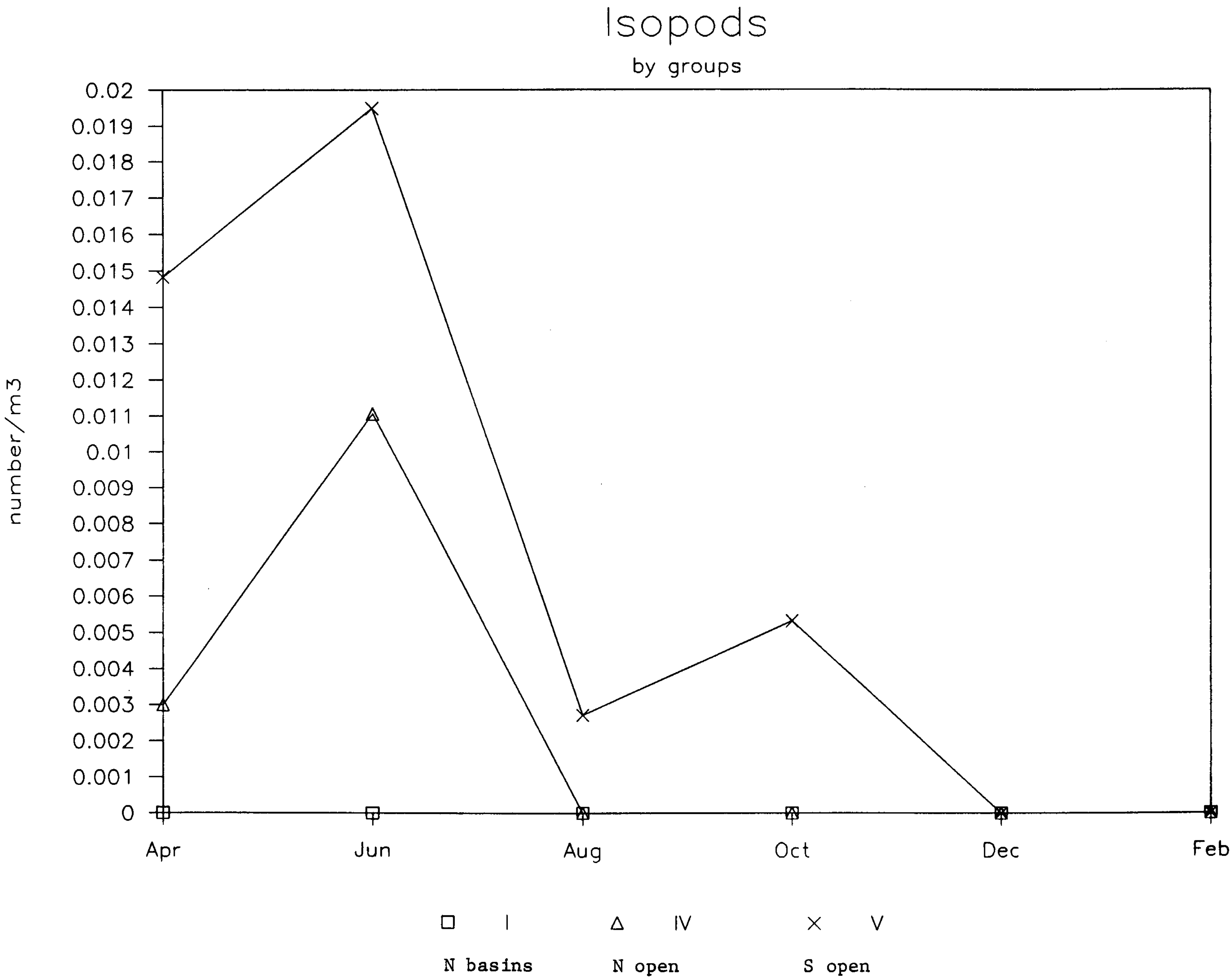

Barnacle Nauplii
Yearly Averages
number/m3
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 114



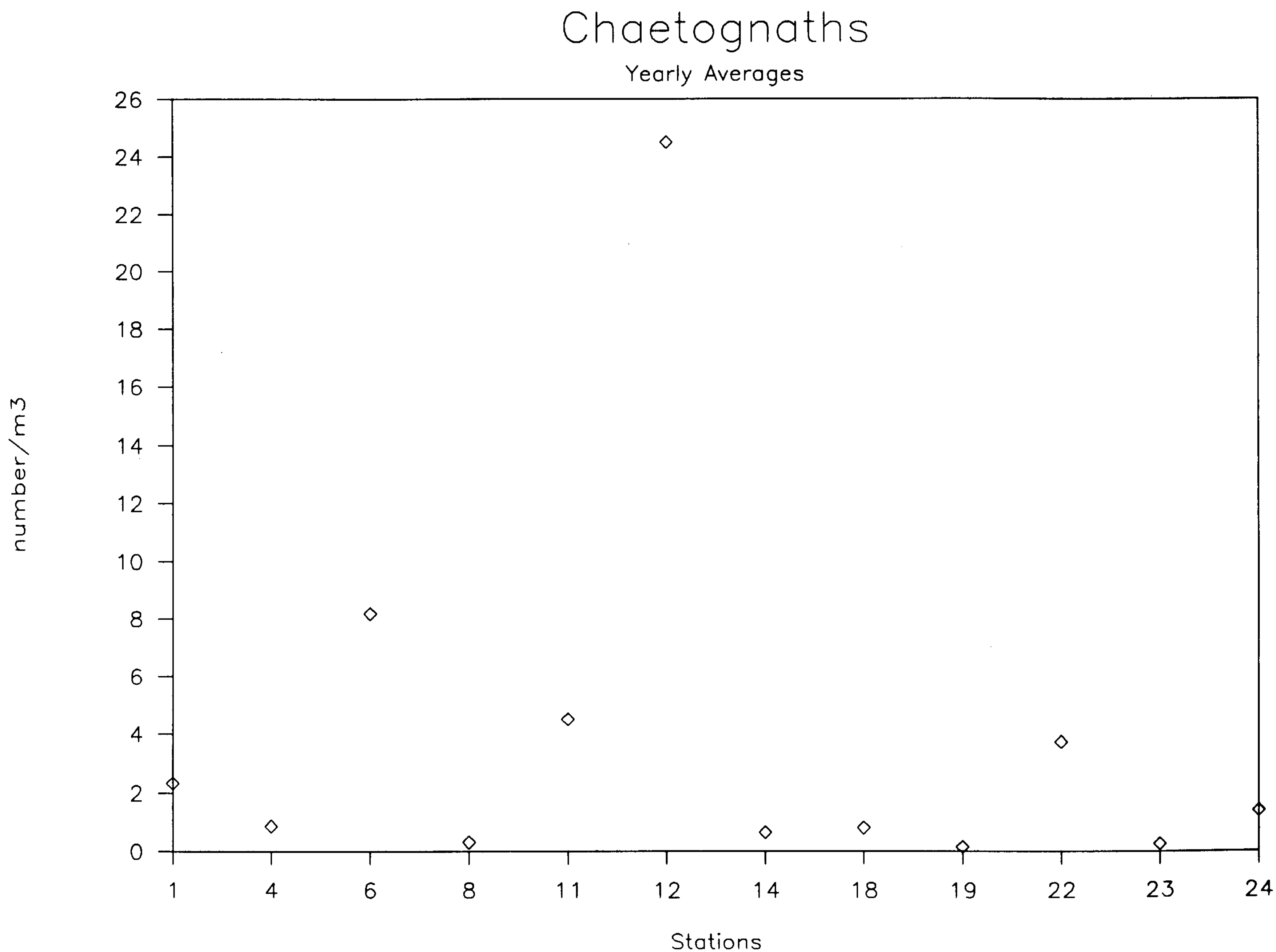
Isopods
Yearly Averages
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
number/m3
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 115



Isopods
by groups
number/m3
0.02
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
Apr
Jun
Aug
Oct
Dec
Feb
I
IV
V
N basins
N open
S open

Figure 116



Chaetognaths
Yearly Averages
number/m3
Stations
0
2
4
6
8
10
12
14
16
18
20
22
24
26
1
4
6
8
11
12
14
18
19
22
23
24

Figure 117

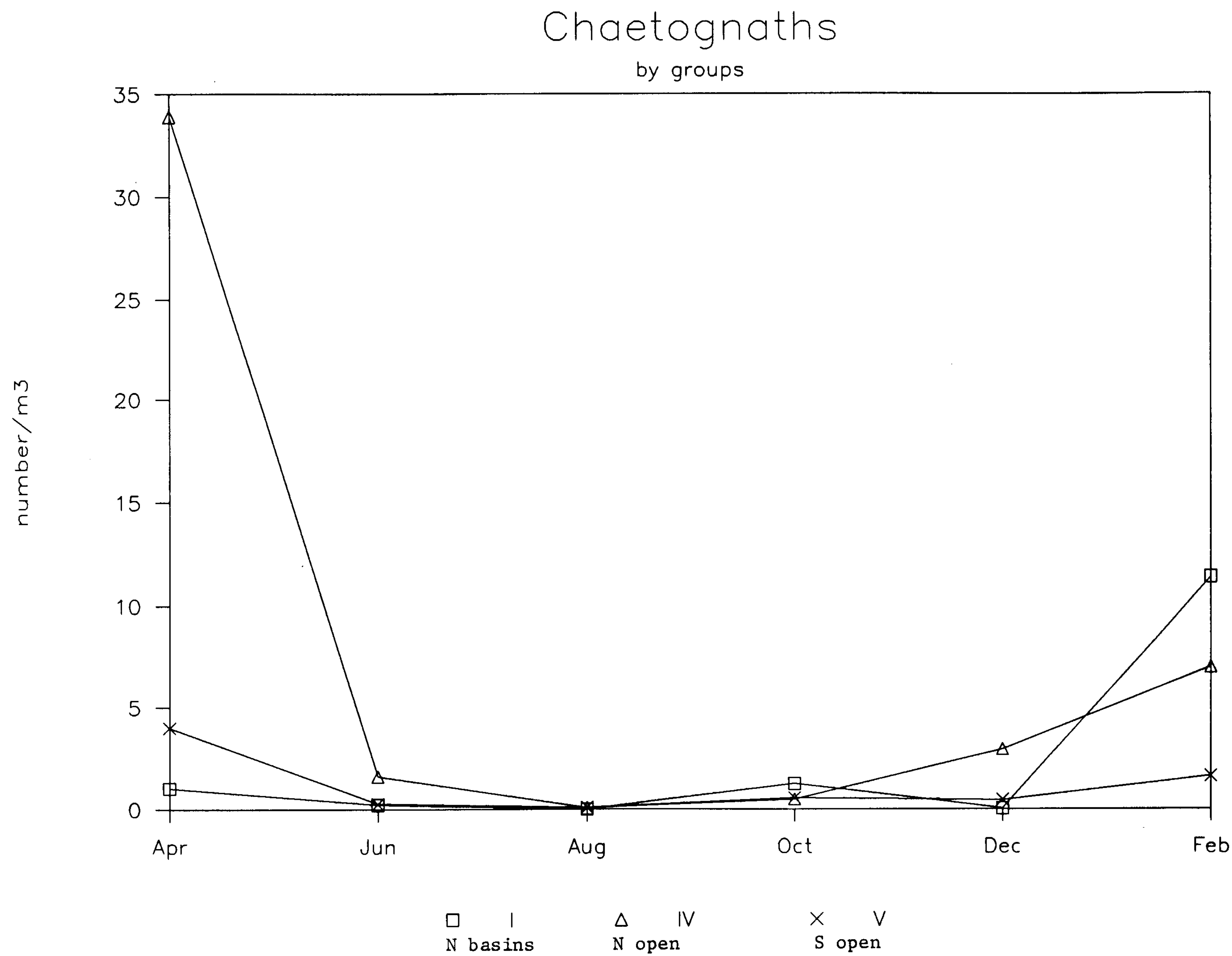

Chaetognaths
by groups
number/m3
35
30
25
20
15
10
5
0
Apr
Jun
Aug
Oct
Dec
Feb
I
N basins
IV
N open
V
S open

Figure 118

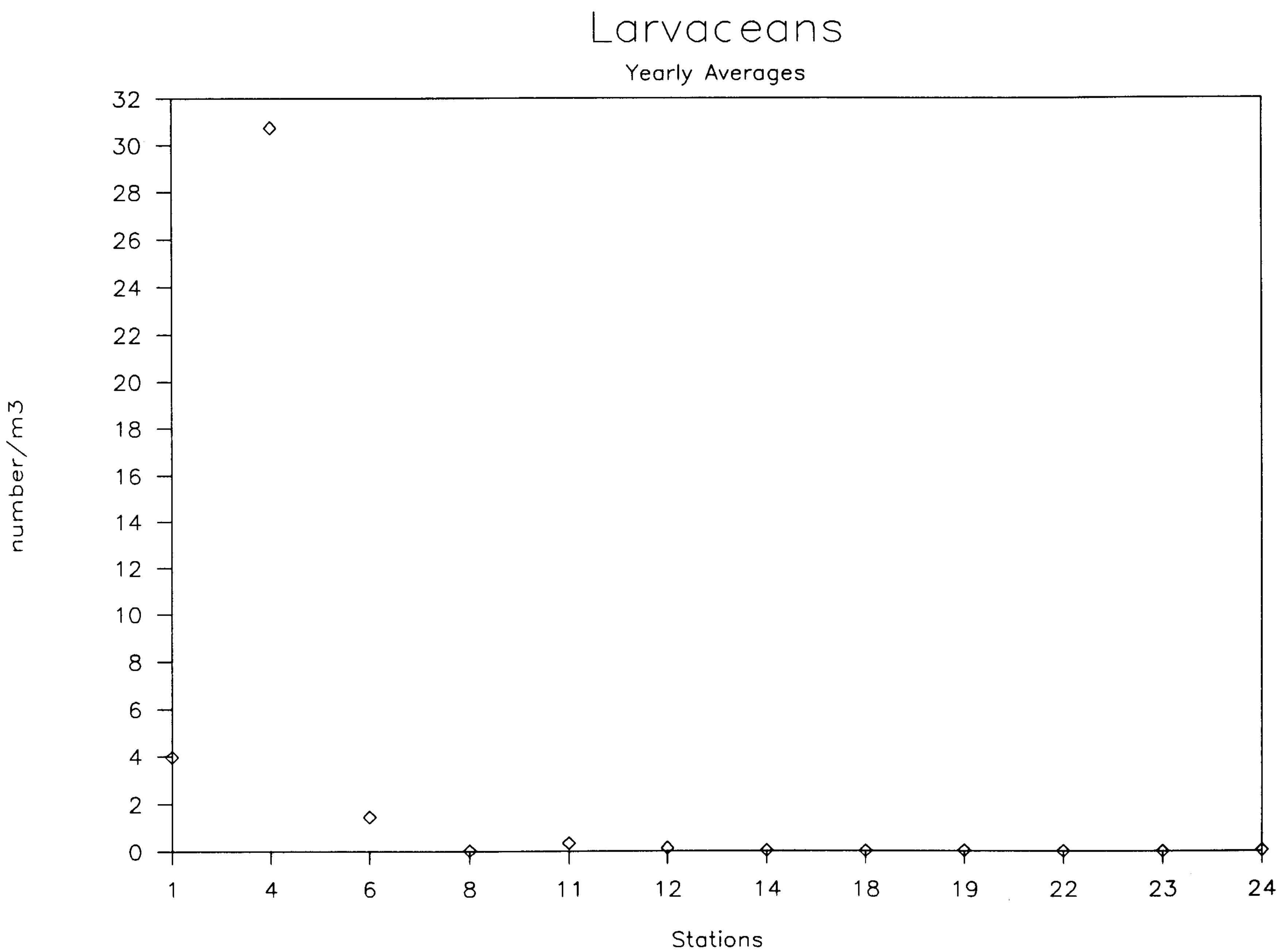

Larvaceans
Yearly Averages
number/m3
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 119

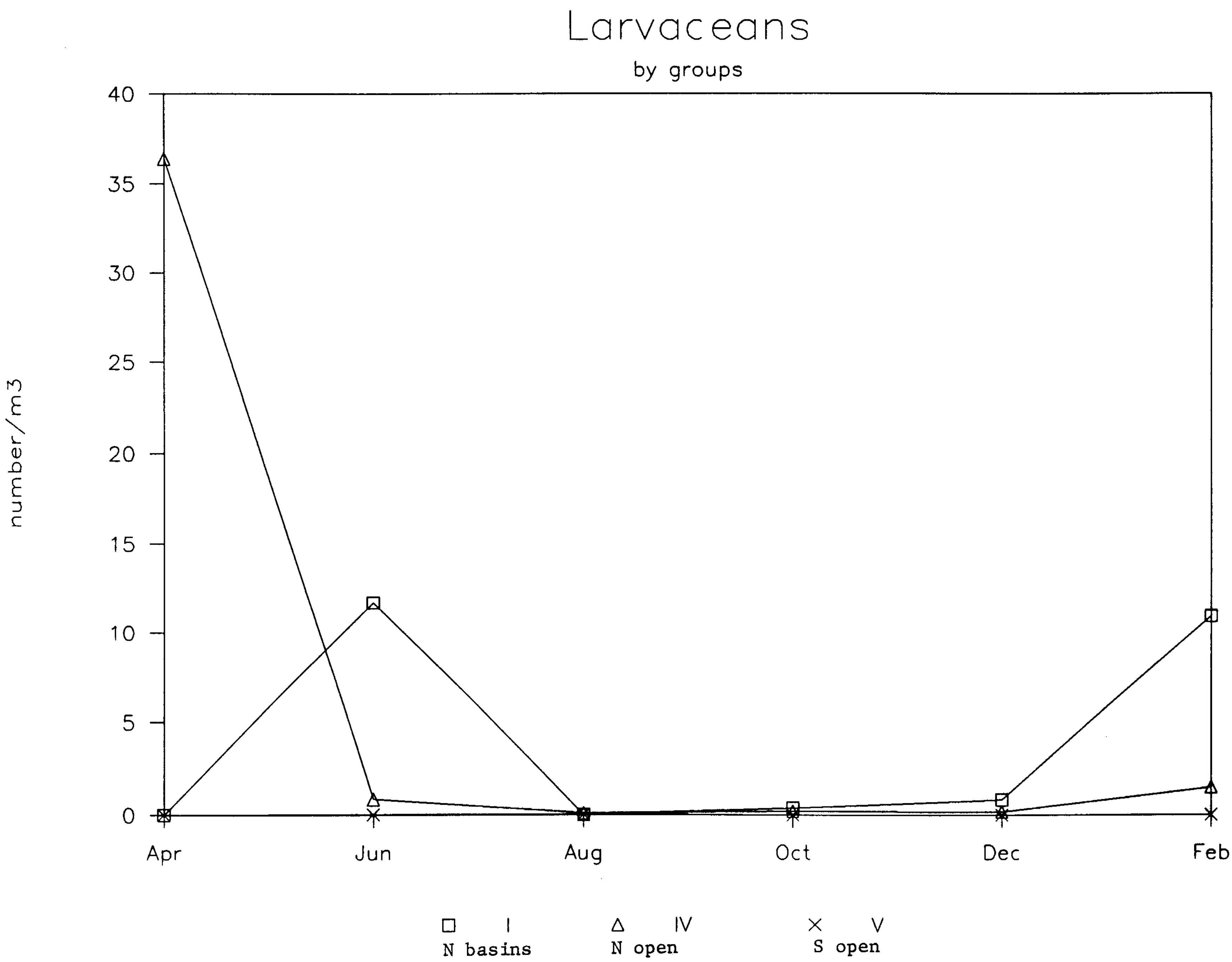
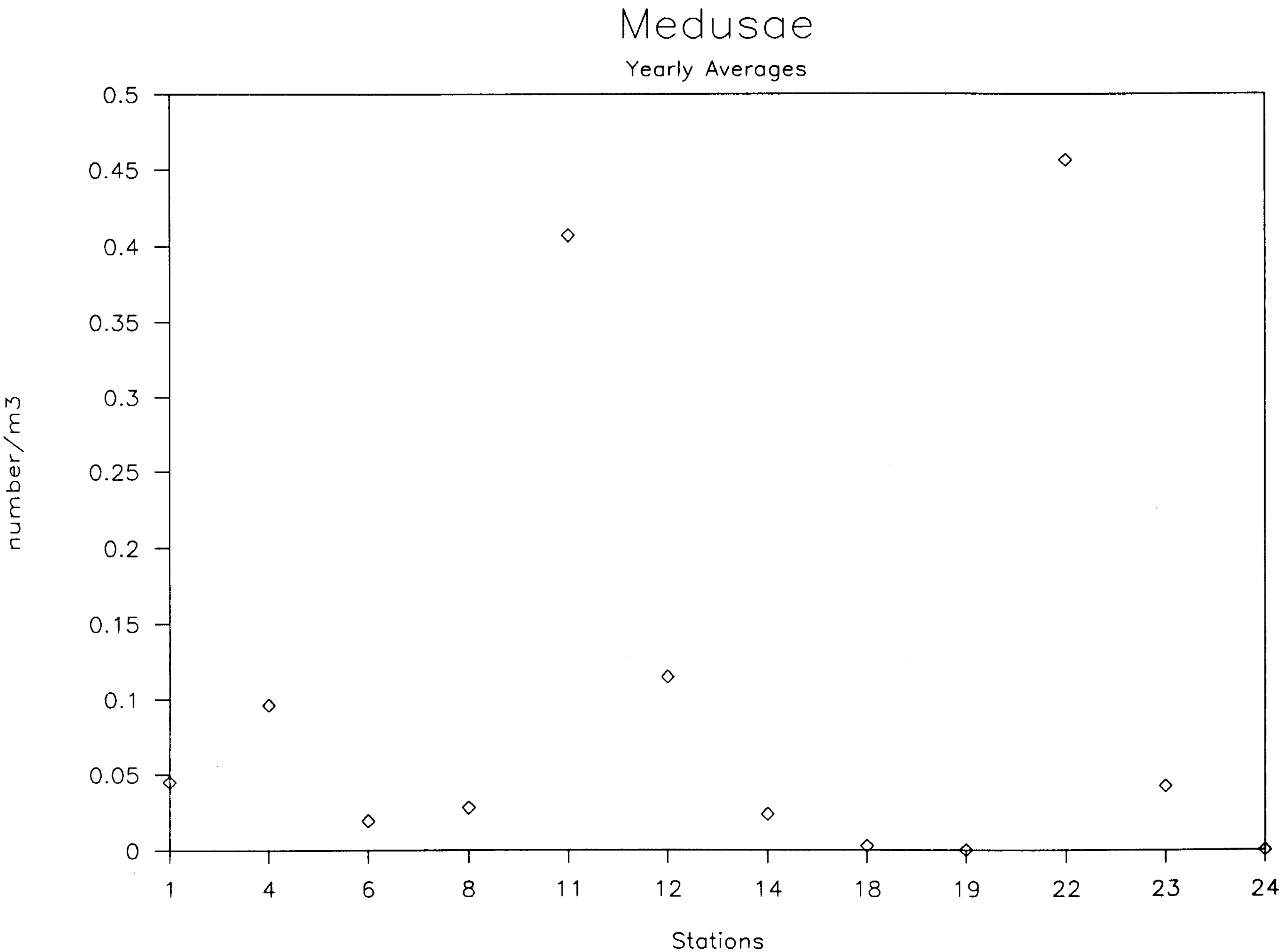

Larvaceans
by groups
number/m3
0
5
10
15
20
25
30
35
40
Apr
Jun
Aug
Oct
Dec
Feb
I
N basins
IV
N open
V
S open

Figure 120



Medusae
Yearly Averages
number/m3
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 121

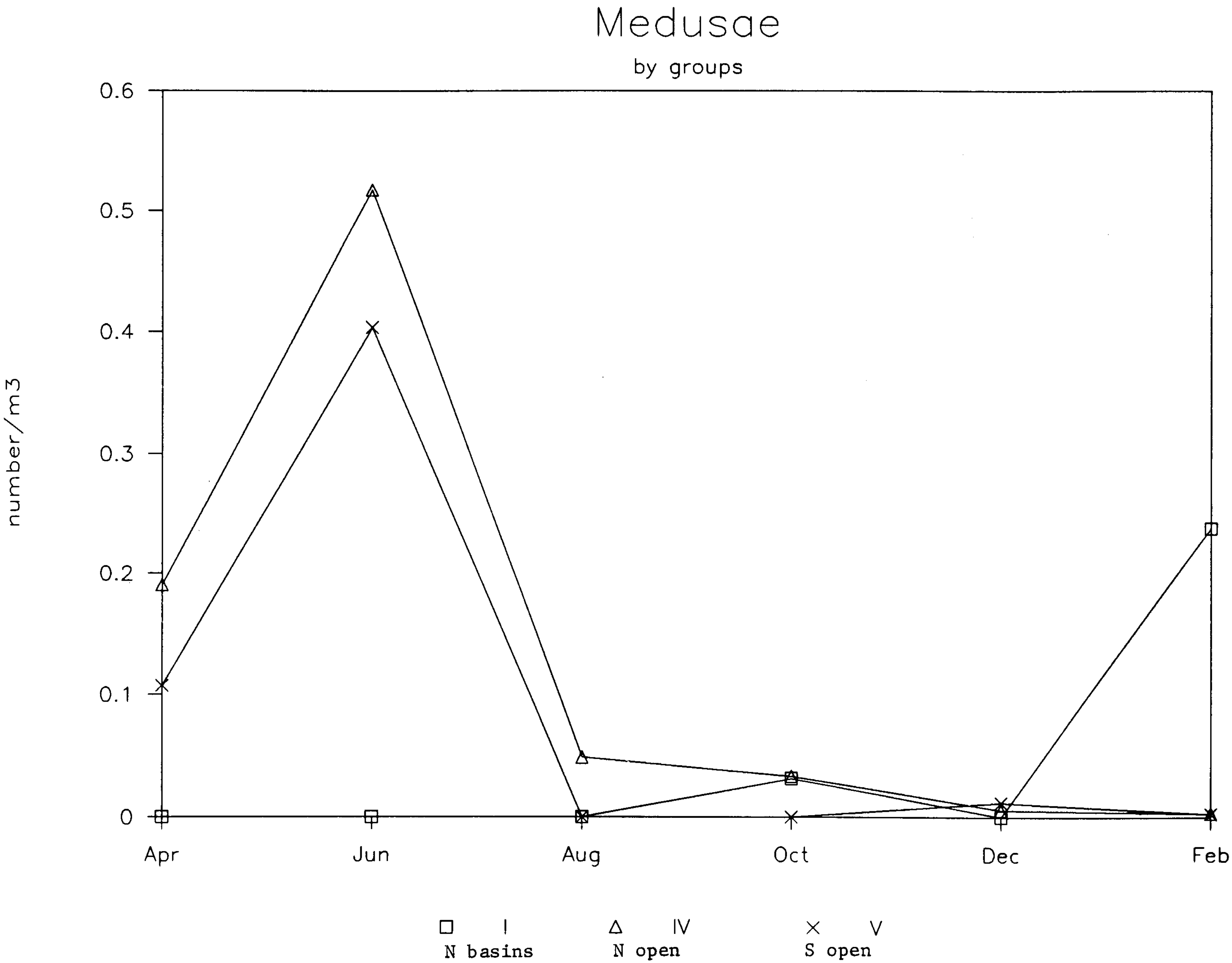

Medusae
by groups
number/m3
0.6
0.5
0.4
0.3
0.2
0.1
0
Apr
Jun
Aug
Oct
Dec
Feb
I
N basins
IV
N open
V
S open

Figure 122

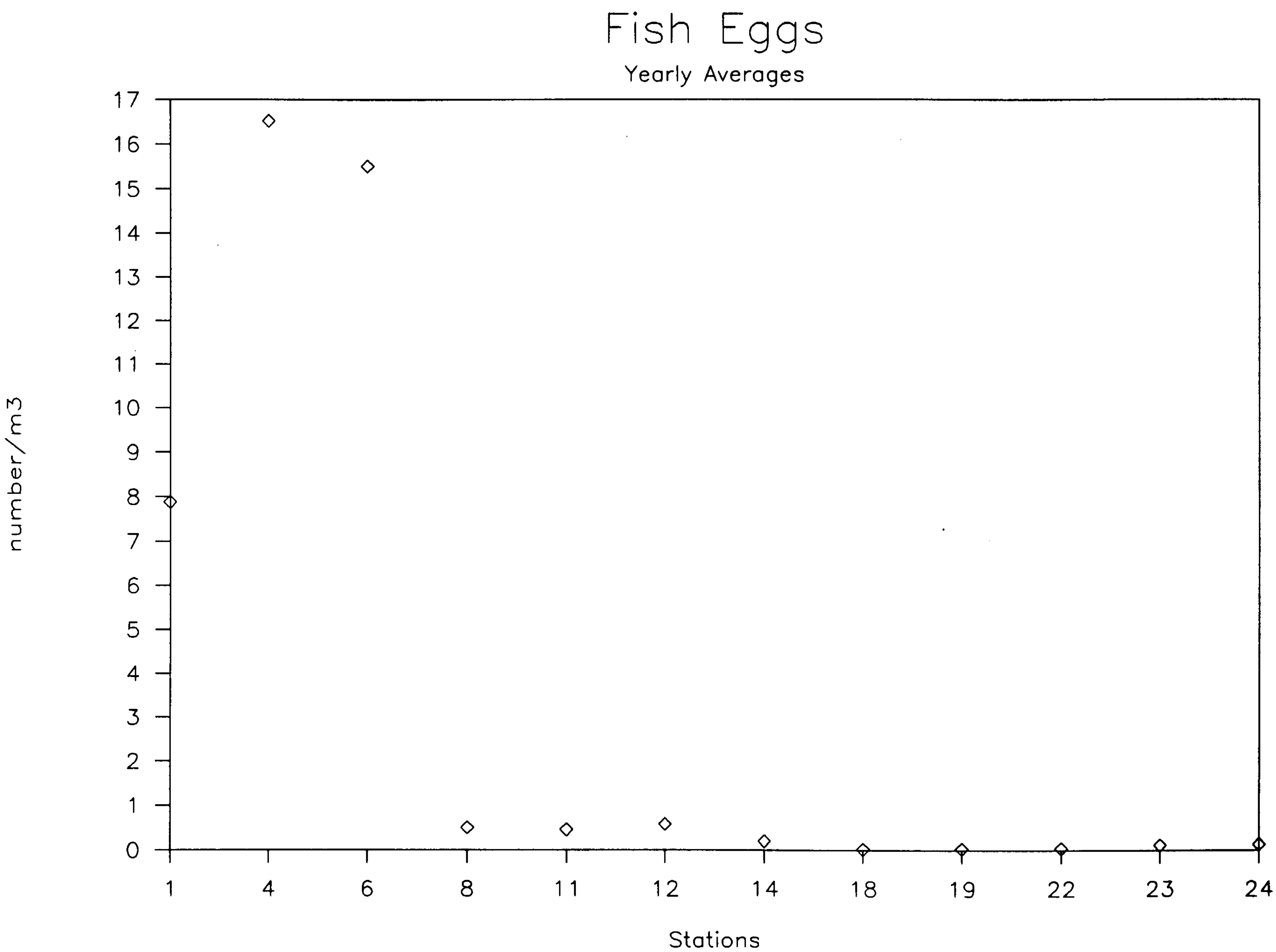

Fish Eggs
Yearly Averages
number/m3
Stations
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1
4
6
8
11
12
14
18
19
22
23
24

Figure 123

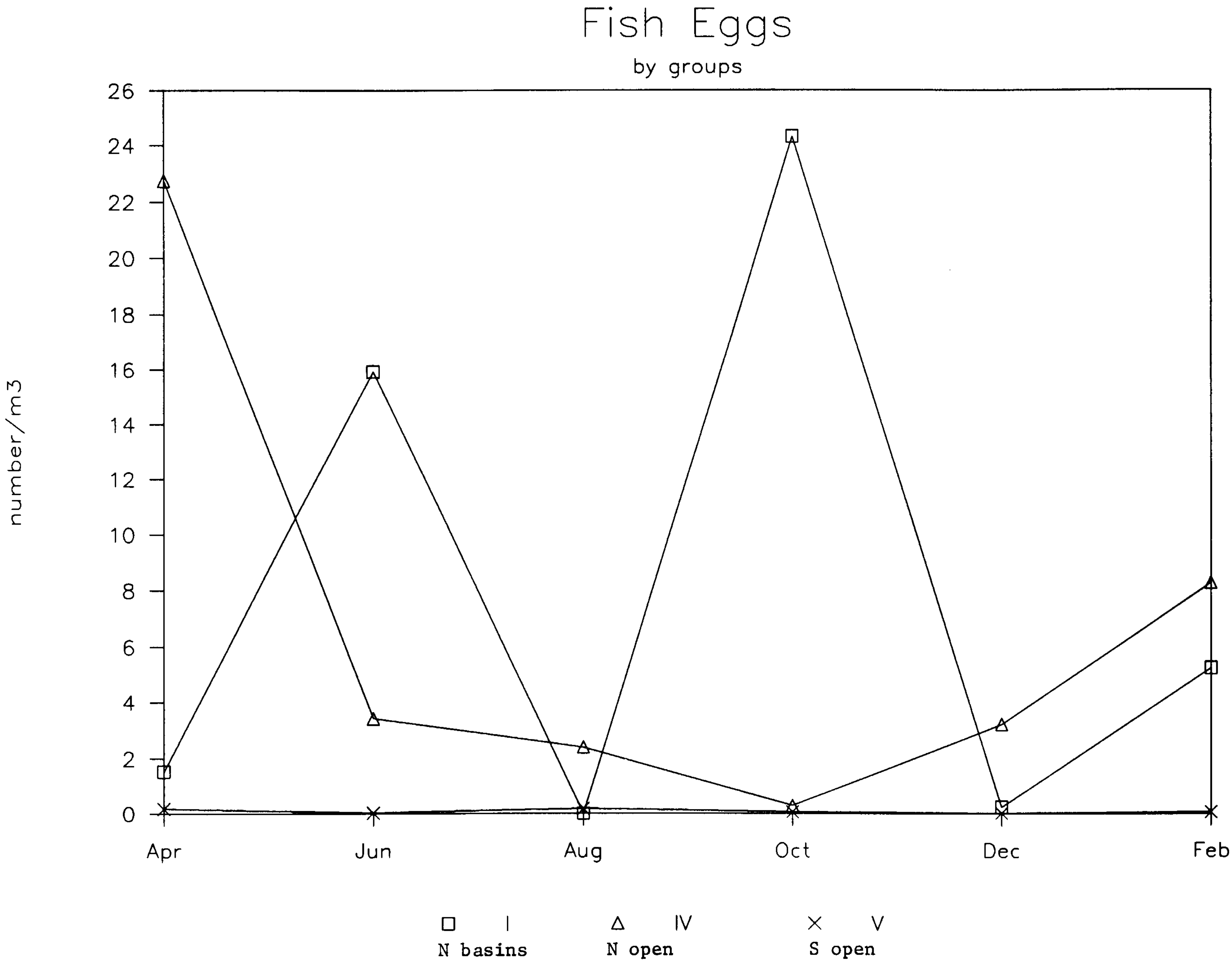

Fish Eggs
by groups
number/m3
0
2
4
6
8
10
12
14
16
18
20
22
24
26
Apr
Jun
Aug
Oct
Dec
Feb
I
N basins
IV
N open
V
S open

Figure 124

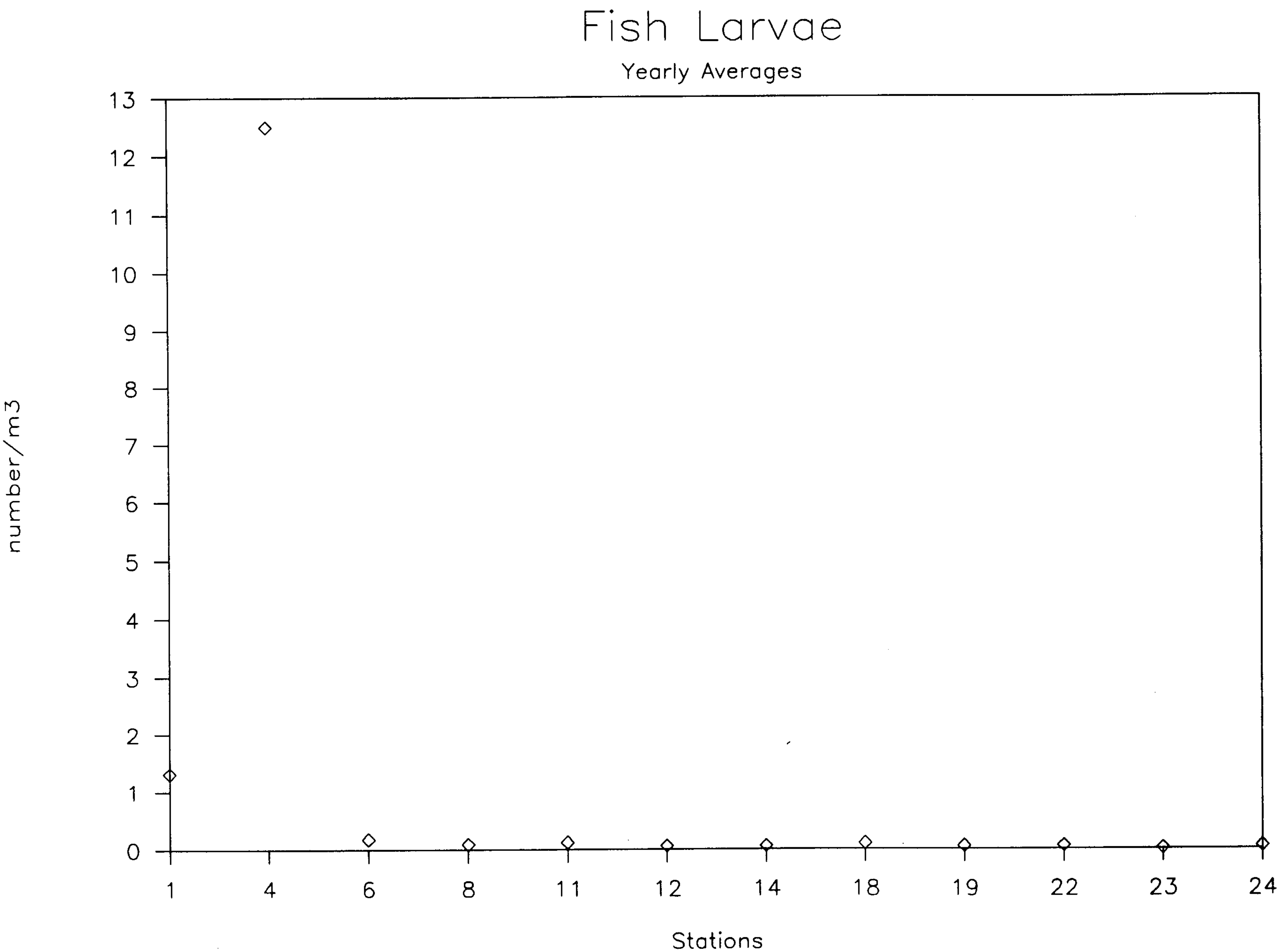

Fish Larvae
Yearly Averages
13
12
11
10
9
8
7
6
5
4
3
2
1
0
number/m3
1
4
6
8
11
12
14
18
19
22
23
24
Stations

Figure 125