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Limnological Investigation of the Muskegon County, Michigan, Wastewater Storage Lagoons

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LIMNOLOGICAL INVESTIGATION OF THE MUSKEGON COUNTY, MICHIGAN, WASTEWATER STORAGE LAGOONS

by

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INTRODUCTION

The Muskegon County, Michigan, Wastewater Management System is an alternative to conventional wastewater treatment and disposal methods. It offers a technique to help clean up the waters of the world by the handling of pollutants as resources out of place.

The effluent from traditional wastewater treatment plants contains many nutrients and other components, some of which may be toxic, increasing the eutrophication rate and pollutional load of waterways. Rather than discharge this nutrient-rich and pollution causing treated wastewater to a stream, river, or lake, the Muskegon System uses it as irrigation water and allows the soil and plants to "polish" the effluent and perform the final treatment (traditionally called "Tertiary Treatment"). This enables the effluent to act as a fertilizer and a soil conditioner.

History

The idea of land treatment of wastewater is not new. In fact, the use of animal and human waste as soil conditioners and fertilizers dates back to antiquity. Stansburg (1974) reports that sewage farming extends back beyond the Roman Empire. In 1559 a project was designed to treat wastes from Bunslav, Prussia, by applying domestic sewage to the land for disposal. This land treatment continued for over 300 years (Godfrey, 1973; Thomas, 1973). During the latter part of the 19th Century, some of the most effective sewage treatment

systems were well-managed, agriculturally productive farms (Stevens, 1974). Berlin, Germany, disposed of its waste during this period on four farms, totaling 19,000 acres, on the sandy plains of northern Germany. During periods of hard frost or heavy storms, sewage was stored in ponds for later use. In the 1870's Paris, France, began using land disposal for its wastewater. Initially, the sewage was given to farmers for irrigation. Soon the wastewater was so much in demand that the city sold it to farmers. Today some several thousand acres on a sandy outwash plain near Herblay are still used for treating a portion of the wastewater from Paris. During this period several wastewater irrigation farms also served London.

A wastewater land treatment system was established for Melbourne, Austrailia in 1893. As the volume of wastewater increased, the farm was expanded. In 1963, the system comprised 26,809 acres and treated the waste from approximately 2.5 million people, or about 100 million gallons of domestic and industrial wastewater per day. This system also includes lagoons to hold peak loads of wastewater and to provide further stabilization of the wastewater.

Land treatment of wastewater began in the United States in the 1870's, but usually on a more limited scale than in other countries. The State Insane Asylum in Augusta, Maine, began the first reported attempt at land treatment in the United States in 1872 (Stevens, 1974). The first municipal farm using wastewater in the United States was near Pullman, Illinois, 14 miles south of Chicago, in 1872. The failure of this farm several years later was blamed on

poor management (too much wastewater was applied at too rapid a rate, overtaxing the soil). San Antonio, Texas, constructed lagoons and began applying sewage to the land around 1900 (Gloyna, 1971).

A survey of 15 western states showed 113 localities practicing land treatment of wastewater in 1935 (Hutchins, 1939). Of significance is the fact that most of these systems were still in operation in 1972 (Thomas, 1973). Presently about 1,000 United States municipalities are treating and disposing of their wastewater through land treatment techniques (Stansbury, 1974, and Godfrey, 1973). Most of these systems are quite small, comprising less than 1,000 acres. The largest facility of this type in the United States is the Muskegon System which utilizes 10,800 acres and is designed to treat 45 million gallons of wastewater per day (Demirjian, 1973).

In 1965, land treatment was used by over 1,300 industrial facilities. The food processing industry, specifically canneries, is the largest segment of industry using land treatment, at 23%, followed by the dairy industry and then the meat packing industry (Godfrey, 1973, and Thomas, 1973).

A common component of land treatment of wastewater systems is a lagoon or a series of lagoons. These lagoons can serve as reservoirs during periods when irrigation should be diminished or halted (i.e., during very rainy spells, or during periods when the ground is frozen), when toxic spills occur, and/or to serve as a biological system giving further treatment to the wastewater prior to disposal on the land. Lagoons, without being a component of land treatment systems,

have also been used for centuries to store and treat animal and human waste. In 1962, about 1,650 sewage lagoons were treating municipal wastewater in the United States (Porges and Mackenthun, 1963) and some 1,600 lagoons were treating industrial wastes (Porges, 1963). These studies did not specify the number of lagoons operating alone or the number of lagoons operating in conjunction with land treatment systems.

Although there has been a fair amount of experience with land treatment systems and/or wastewater lagoons, there is a noticeable dearth of information in the literature concerning the limnology of wastewater lagoons, especially lagoons which are as large and as deep as the Muskegon lagoons. There is even less information available on the biological aspects of these lagoons. Yet, these lagoons are important to the successful overall operation of a wastewater management system, with or without land treatment. As a result, to manage these lagoons, to make necessary predictions and assumptions, and in order to understand what is occurring in the facility, it is necessary to develop an understanding of the numbers, types, distribution and fluctuation of organisms (i.e., the population dynamics) within the lagoons.

This investigation was concerned with the limnology of the wastewater storage lagoons in the Muskegon System, with particular emphasis upon the biological aspects of these waters. The goal of this study was to generate basic information concerning these lagoons. Hopefully, this background information can be incorporated into more

intensive studies on the metabolism, energy relations, and trends within large wastewater storage lagoons. These studies are needed in order to gain a better understanding of the interrelationships within lagoons of this type and in order to permit a more scientific management of wastewater systems.

The Muskegon System

The Muskegon County Wastewater Management System treats municipal effluents from the greater Muskegon area and industrial effluents from various industries, including two chemical companies, a paper mill, and a machinery plant. During this study, the flow was approximately 28 million gallons per day (MGD), 65% of which was industrial wastewater.

A network of interceptor sewers, force mains and six pumping stations collect and deliver the combined municipal-industrial wastewater to a large central pumping station. From this station, four pumps with a maximum pumping capacity of 56,000 gallons per minute drive the combined wastewater 11 miles to the 10,800 acre sandy treatment site. The raw wastes are then discharged into three biological treatment cells (Fig.1, p. 8). Each cell is equipped with 12 mechanical surface aerators and six mixing units, with 1,000 combined horsepower per cell, providing a complete mix system and an average detention time of three days. The effluent from these cells, which is comparable in quality to that achieved by conventional secondary treatment, flows by gravity to either or both of two 850 acre storage

lagoons. This storage capacity of 5.1 billion gallons offers operating flexibility to the system. During periods of heavy rainfall, or when the ground is frozen, it is not necessary to irrigate. Also, in the event of a toxic material spill which could be detrimental to the biological treatment cells, the untreated wastewater can flow directly into the storage lagoons to be assimilated and biodegraded. These lagoons also provide additional waste stabilization during periods of normal operation. In order to prevent seepage from entering the ground water outside of the waste management site, a drainage or interception ditch encircles both lagoons, and seven drainage wells function at the west edge of the lagoon area. Water collected in the ditch or withdrawn from the wells is returned to the West Lagoon.

From the storage lagoons the water flows to an outlet pond and then to a chlorination chamber prior to being used as irrigation water. During periods of high demand the storage lagoons can be bypassed, with the treated wastewater flowing into a settling pond and then to an outlet pond. Further operational flexibility is provided by gates which can control the amount of wastewater flowing into either lagoon, from one lagoon to the other, and from the lagoons to the outlet pond (Fig. 1). The operating positions of these gates during the investigation are presented in the results section (Table 2, p. 23).

Further information on this system can be found in the literature (Anonymous, 1973; Bastian, 1973; Bauer Engineering, 1973; Chaiken, et. al., 1973; Demirjian, 1973; Forestell, 1973; Sheaffer,

1972; Snow, 1973; Teledyne Triple R, 1973).

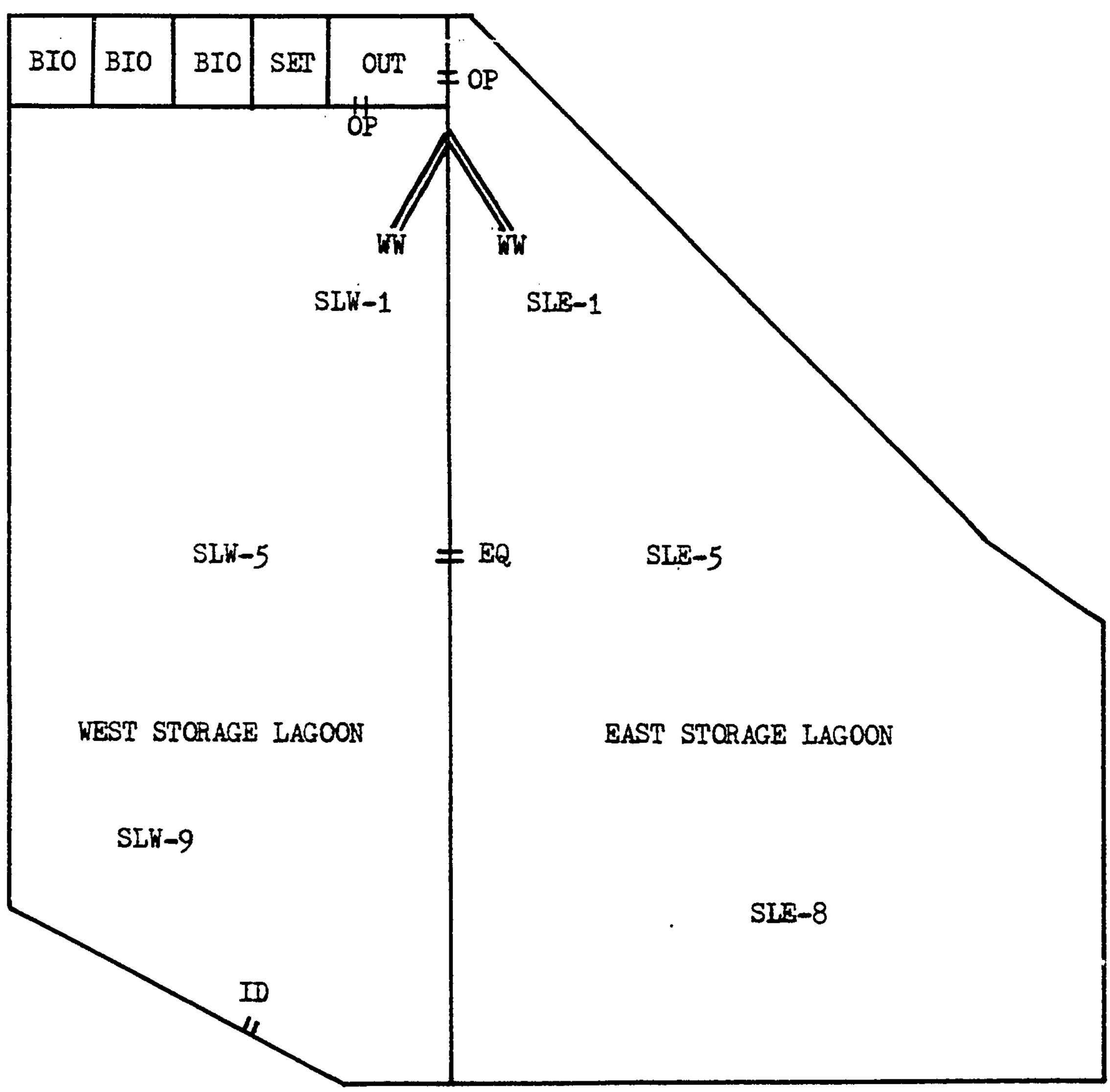
In late May, 1973, a small amount of effluent began being discharged into both lagoons. At this time there was some rainwater in the basins, but the bottoms were not yet covered. Due to evaporation and seepage, the bottom of the lagoons were not covered until August, 1973, at which time the flow had increased to 28 MGD. By this date the constituents of the paper mill's wastewater had helped to seal the bottom.

FIGURE 1

Wastewater Storage Lagoons Site

KEY TO ABBREVIATIONS

BIO = Biological treatment cell
OUT = Outlet pond
SET = Settling pond
ID = Point of discharge of interception ditch water
OP = Point of discharge from lagoon to outlet pond
WW = Point of discharge of wastewater
EQ = Equalizing gate



METHODS

This study began in August, 1973, and continued through August, 1974. Sample collection started on October 15, 1973. During the period from August to October 15, the wastewater management site was frequently visited in an attempt to establish an appropriate research scheme, procure the proper equipment and supplies, and gain a better understanding of the Muskegon System.

Three stations were established in each lagoon, as shown in Figure 1. The station locations and designations correspond to those used by the managers of the system. Each station was marked using several empty plastic gallon jugs and/or a styrofoam box tied to a rope and anchored by cement blocks. During periods of open water, all samples were taken within 50 feet of the station using an aluminum boat. For safety reasons, when the lagoons were ice-covered samples were taken 50 feet from and perpendicular to the shore and in line with the station. Stations SLE-5 and SLW-5, the stations farthest from shore in both the East and West Lagoons, were not sampled during periods of ice cover.

A 2.2 liter, horizontal, opaque, non-metallic Van Dorn bottle was used to collect samples for analysis of the following parameters: phytoplankton and protozoans; chlorophyll a and phaeophytin; primary productivity; temperature; turbidity; conductivity; pH; total organic carbon; metals, including calcium, iron, magnesium, manganese, potassium, sodium, and zinc; nutrients, including orthophosphate, nitrate,

and ammonia nitrogen; chlorides; and sulfate. The volume of sample required for these tests exceeded the capacity of the Van Dorn bottle and, therefore, two samples were drawn from the desired depth, mixed in a non-metallic bucket, and split into the required portions. This permitted analysis of the above parameters from the same batch of water. A separate sample was drawn from the same depth, again using the Van Dorn bottle, for analysis of dissolved oxygen and five-day biochemical oxygen demand.

Biological Analyses

Benthos

A six inch by six inch Ekman Dredge was used to collect replicate benthos samples. The dredge contents were washed into a pail. The samples were brought back to the lab and screened through a United States Standard No. 30 sieve (28 meshes per inch, 0.595 millimeter openings). The type of substrate was recorded and any organisms and material retained on the sieve were transferred to a jar and preserved with 70% ethanol. The samples were later hand-sorted by placing a portion of the contents of the jar into a white enamel pan filled approximately one-third full of water. Most of the small insects, worms, and crustaceans floated free of the detritus and were placed into a vial containing 70% ethanol. The debris remaining in the pan was further searched for any organisms, and after placing any more animal life into the vial, the debris was discarded. This procedure was repeated until the total sample was

picked and sorted. Qualitative and quantitative analysis of the organisms found was carried out with the aid of stereoscopic and compound microscopes. Numerous taxonomic references aided the identification of the benthic macroinvertebrates (Beck, 1968; Curry, 1962; Edmondson, 1959; Grodhaus, 1967; Johannsen, 1934-37; Mason, 1973; Pennak, 1953; Roback, 1957; Ross, 1959; Usinger, 1956).

In order to make genus and species identification of the midges, it was necessary to prepare head and body mounts of these organisms. Rather than using the conventional but very time consuming technique of clearing the midges in KOH, rinsing and then mounting (American Public Health Association, 1971; Mason, 1973; Weber, 1973), the midges were mounted directly into polyvinyl lactophenol (Meier, 1974). This substance acts as both a clearing agent and a mounting media. In order to identify the Oligochaeta, whole mounts were prepared.

Data from replicate samples were averaged, and the results were reported as number of individuals per square foot. The mean diversity, $\bar{d}$, and equitability, e, was calculated for each station, as recommended by the Environmental Protection Agency (Weber, 1973). The formulas used were:

$$\bar{d} = \frac{3.21928}{N} (N \log_{10} N - n_i \log_{10} n_i)$$

$$e = \frac{s'}{s}$$

where N = the total number of individuals at the designated station over the complete period of study

n_i = the total number of individuals in the i^{th} species

s' = a tabulated value

s = the number of taxa in the sample

Zooplankton

Samples were initially taken with a Van Dorn bottle. The contents of the bottle were emptied into a number 12 plankton net (mesh openings equal to 0.15 millimeters) and concentrated into a 30 ml vial. Due to the low concentration of zooplankton, this technique proved to be inadequate. From 12 July 1974 throughout the rest of the study, replicate vertical tows were taken from one foot off the bottom using the same plankton net. This procedure sampled a column of water with a 20.32 cm diameter. The samples were preserved in the field with Koechie's solution (saturated sugar -- 4 % formalin). A smaller mesh net, such as a number 20 which would be appropriate for capturing naupilli and other very small zooplankters, could not be used due to the large amount of suspended matter.

Several one milliliter subsamples were withdrawn from a well-mixed zooplankton sample using a Hensen-Stemple pipet. The subsamples were deposited in a nine-depression glass culture dish and quantitatively and qualitatively analyzed. Genus and species identification of calanoid copepods was based on minute anatomical details of specimens dissected between the fourth and fifth thoracic segments. Both segments of the animal were mounted, ventral side up, and examined under high dry (45X) or oil immersion (97X). Several taxonomic references were valuable aids to identification (Bousfield, 1958; Brooks, 1957; Gannon, undated; Edmondson, 1959; Pennak, 1953).

Data from replicate samples were averaged and the results were reported as the number of organisms per liter.

Phytoplankton and protozoa

Samples were initially collected at one foot and/or three feet. From 26 April 1974 throughout the rest of this investigation, sample depths were related to the transparency within each lagoon. In the West Lagoon, collection was at a depth equal to the secchi disk transparency and also at one-half this depth. Due to the very shallow transparency in the East Lagoon, samples could not be meaningfully collected at these depths, and therefore, collection was at the secchi disk transparency and at one and one-half feet.

Immediately following collection of a 390 ml sample, 10 ml of Lugol's solution was added to preserve and help settle the plankton and protozoa. Analysis was attempted in the lab without further manipulation of the samples. Due to a low concentration of planktars, however, this technique was inadequate. Centrifugation, at various speeds and for various periods of time, was also found to be a poor technique for this study, as a certain portion of the organisms were lighter than water and were not concentrated. The centrifuged samples remained cloudy and microscopic examination revealed that some species were still remaining in the supernatant. Davis (1966) has had similar results with this technique.

A two week period of settling, followed by withdrawal of the top 375 ml appeared to be the most accurate method of concentration.

This technique of concentrating the samples 16 times was used for all the reported plankton data. By eliminating the need to transfer the sample to various containers, this method reduced losses due to plankters adhering to the sides of the jar or chamber.

A Palmer-Maloney cell, rather than a Sedgwick-Rafter cell, was used for quantitative and qualitative analysis because of the higher magnification required for nannoplankton. Twenty fields were examined in each of several slide preparations, using a microscope equipped with a calibrated Whipple disk. The results from several slides were averaged. The clump count was used, as recommended by the Environmental Protection Agency (Weber, 1973). All unicellular or colonial organisms were counted as individual units.

Standard diatom mounts were made by ashing and mounting subsamples. Up to 2.5 ml were evaporated, through successive dryings, on 18 ml number one circular cover slips. This subsample was then ashed, to drive off the organic matter, on a heavy duty hot plate at over 510° C for at least one hour. Hyrax (refractive index = 1.82) was used as a mounting media and the silicious cell frustules were examined under oil immersion. The concentration of diatoms, however, was normally inadequate for this technique. The recommended 250 cells per slide (Weber, 1973) could not be examined. Further sample evaporation on the cover slip was not appropriate due to the high colloidal clay content of the samples. Crushing and masking of the diatoms occurred with any higher concentration.

References relied upon for the analysis of the phytoplankton and protozoa included American Public Health Association (1971),

Berges (1971), Edmondson (1959), Kudo (1971), Parish (1968), Patrick and Reimer (1966), Prescott (1962), and Weber (1966, and 1973).

Primary productivity

The uptake of inorganic carbon by phytoplankton during photosynthesis was measured with the carbon-14 method of Steeman-Neilson (1952), incorporating modifications of the American Public Health Association (1971), the Environmental Protection Agency (Weber, 1973), and Jordan (1970). Two clear, and one opaque, ground glass stoppered 125 ml Pyrex bottles were filled with water from the larger sample collected in a Van Dorn bottle, as described above. One micro Ci/ml carbon-14 as sodium carbonate was withdrawn from two milliliter glass ampoules that were sealed until immediately prior to use, and then injected into each 125 ml bottle. All three bottles were placed on their side in an incubation rig, clamped at their neck and lowered back to the depth from which the sample was taken. Samples were incubated from approximately 10:00 a.m. to 2:00 p.m. After retrieving the samples and adding 1 ml formalin, they were placed in a light-proof container for transfer to the lab. A well-mixed 100 ml subsample from each bottle was filtered through a separate 0.45 micron membrane filter at 0.4 atmosphere of vacuum. The filters were air dried and glued to planchets. The radioactivity on the filters was measured for ten minutes in a windowless gas flow detector. The counts from the two clear (light) bottles were averaged and the count from the opaque (dark) bottle was subtracted from the average. This result was divided by the product of the number of hours of

incubation and the number of minutes the radioactivity was counted. This answer is the cpm counted (referred to as "r") and was inserted into the formula in Table 1 in order to obtain the amount of carbon fixed per hour.

Chlorophyll a and phaeophytin

The sample analyzed for chlorophyll a and phaeophytin content was drawn from the larger sample collected in the Van Dorn bottle as described above. Five milliliters of magnesium carbonate was immediately added to the 200 ml sample. The container, an opaque, brown plastic bottle, was shaken and then placed in an insulated chest for transport back to the lab. After filtering 100 ml of each sample on a 0.45 micron membrane filter, the filters were frozen until *in vitro* analysis in acetone extracts by flourometry was accomplished.

Physical Analyses

Samples were collected in the Van Dorn bottle as described above.

Temperature

A quality grade mercury-filled centigrade thermometer was placed into a bucket containing the 4.4 liter sample. After a period of time sufficient to permit a constant reading, the temperature was recorded to the nearest one-half degree centigrade.

Turbidity

A Hach Model 2100A Turbidimeter was used for direct measurement

TABLE 1

Conversion of CPM to Carbon Fixed

Conversion equation	$P = \frac{r}{R} X C X f$ (Saunders, 1962)
P	Photosynthesis in mg C/m^3
r	cpm counted (uptake of radioactive carbon)
C	$19.2 X 10^3$ mg C/m^3 (available inorganic carbon in the lagoons)
f	1.06 (Isotope conversion factor)
R	$4.27 X 10^5$ (total available radioactive carbon in cpm: microcuries used X counter efficiency X millipore absorption factor X disintegration per minute per microcurie)
Microcuries used	$\frac{37,000}{40,290}$ (scintillation cpm/cpm per microcurie)
Counter efficiency	0.25
Millipore absorption factor	0.838
Disintegration per minute per microcurie	$2.22 X 10^6$
Final equation for lagoons	P = r X 0.0477

of turbidity by the Nephelometric method. Results were reported in Formazin Turbidity Units (equivalent to Jackson Turbidity Units).

Secchi disk transparency

A standard 20 cm diameter black and white secchi disk was used. Results were reported in centimeters.

pH

A hydrogen ion selective glass electrode in combination with a saturated calomel reference electrode was used to determine pH by the electrometric method. Results were reported in standard pH units.

Conductivity

A platinum electrode type specific conductance cell with a cell constant of 1.0 ± one per cent was used. Conductance measurements were taken at ambient temperature utilizing a Barnstead Conductance Bridge. Results were reported in micro-mhos.

Dissolved Oxygen and Biochemical Oxygen Demand

These two parameters are discussed together due to the similarities in the methods used to evaluate each.

The sample was transferred from the Van Dorn sampler to two 300 ml BOD bottles through a tube extending from the bottom of the sampler to the bottom of the bottle. The narrow, flared mouth glass stoppered BOD bottles were filled to overflowing and allowed to overflow for 10 seconds before inserting tapered ground-glass pointed

stoppers. This procedure avoids dissolution of atmospheric oxygen and prevents turbulence and the formation of bubbles. One bottle was placed in an insulated chest for later BOD analysis. The other bottle was used for determining the DO content of the lagoon by the azide modification of the iodometric method. Immediately after collection, 2 ml of manganese-sulfate solution were added to the DO sample, followed by the addition of 2 ml of alkali-iodide-azide reagent. The bottle was stoppered, mixed by inversion, and left undisturbed for several minutes to allow the floc to settle. After another period of mixing and settling, 2 ml of concentrated sulfuric acid were added. Titration was accomplished in the laboratory.

In the laboratory, a portion of the BOD sample was transferred to each of two fresh BOD bottles containing an appropriate amount of dilution water. One of these bottles was used for determination of the initial DO. The other bottle was incubated in the dark for five days at 20° C. This bottle was used for determination of the final DO. The mg per liter of BOD was calculated by dividing the difference between initial and final DO by the decimal fraction of the sample used.

Nutrients

Nitrate nitrogen

The concentration of nitrate nitrogen was determined through a copper-cadmium reduction of nitrate to nitrite. The nitrite thus produced was quantified using sulfanilamide (diazotizer) and

N-1-naphthyl-ethylenediamine (couplet). The resulting highly colored dye was measured colorimetrically and the results were reported as mg per liter NO_3^-.

Ammonia nitrogen

The concentration of ammonia nitrogen was determined by distillation followed by nesslerization. Results were reported as mg per liter NH_4^+.

Orthophosphate

The concentration of orthophosphate was determined by colorimetry, without preliminary filtration, digestion, or hydrolysis, using ammonium molybdate in the vanadomolybdophosphoric acid method. Results were reported as mg per liter $PO_4^{=}$

Anions

Sulfate

The concentration of sulfate was determined using the Barium-Methythymol Blue colorimetric procedure. Results were reported as mg per liter $SO_4^{=}$.

Chlorides

The concentration of chloride was determined by liberation of the thiocyanate ion from mercuric thiocyanate, followed by a reaction with the ferric ion. Results were reported as mg per liter $Cl^{=}$.

Total Organic Carbon

The concentration of total organic carbon (TOC) was determined using a Beckman Model 915 Total Carbon Analyzer. Results were reported as mg per liter carbon.

Metals

The concentrations of calcium (Ca), iron (Fe), magnesium (Mg), manganese (Mn), sodium (Na), potassium (K), and zinc (Zn) were determined using flame ionization photometry and atomic absorption spectroscopy. Results were reported as mg per liter.

RESULTS AND DISCUSSION

The data gathered during this investigation are presented in the appendices. Summary data only are presented in this section.

The results of each parameter will be discussed individually and the trends or relations between parameters will be discussed where appropriate.

Gate Operating Positions and Resulting Wastewater Flow Patterns

During this investigation, the operating positions of the gates controlling inflow, outflow, and mixing between lagoons were altered (Table 2). The locations of these gates in the lagoons are shown in Figure 1, page 8. The East Lagoon usually received the wastewater, while the West Lagoon always received the seepage water.

There was no noticeable effect upon any of the parameters due to the equalizing gates being open from 17 August through 26 September 1973 and from 29 March through 5 July 1974.

Ammonia nitrogen and secchi disk transparency were the only parameters noticeably affected when the gate to the outlet pond was opened in the East Lagoon. These effects are noted in the appropriate sections of this report.

Biological Parameters

Benthos

The benthic macroinvertebrate population was, surprisingly, very

TABLE 2

Gate Operating Positions and Wastewater Flow Patterns

8-13-73 through 8-17-73	Flow directly from biological treatment cells to outlet pond. Gates between biological treatment cells and East and West Lagoons (hereafter referred to as east gate or west gate) closed. Outlet gates closed.
8-18-73 through 9- 4-73	Flow into both East and West Lagoons with equalizing gate also open. Outlet gates closed.
9- 5-73 through 9- 7-73	Flow directly to outlet pond. East and west gate closed, equalizing gate open. Outlet gates closed.
9- 8-73 through 9-26-73	Flow into both lagoons, with equalizing gate also open. Outlet gates closed.
9-27-73 through 3-29-74	Flow into East Lagoon only. West gate, equalizing gate, and outlet gates closed.
3-30-74 through 4-24-74	Flow into East Lagoon, equalizing gate open, outlet gates closed.
4-30-74 through 7- 5-74	Flow into East Lagoon. Equalizing gate and west outlet gate open. East outlet gate closed.
7- 6-74 through 8-31-74	Flow into East Lagoon. East outlet ~~gate~~ open, equalizing gate and west outlet gate closed.

limited. This community comprised a small number of organisms representing only a few taxonomic groups. The quantitative and qualitative results of the benthic investigation are presented in Appendix A.

The percentage composition, by group and by station, is presented in Table 3. This table also indicates the number of samples taken at

each station and the number of samples at each station that contained no macroinvertebrates. Each station-group category contains two numbers as a percentage. The first number was obtained by dividing the number of indicated organisms at the specified station by the total number of all benthic macroinvertebrates at that station and multiplying the quotient by 100. This value is called the percentage composition. The second number was obtained by dividing the number of occasions the indicated organism was found at the specified station by the number of benthic samples taken at that station and multiplying the quotient by 100. The resultant value is called the percentage occurrence.

Immature dipterans, of the family Chironomidae (non-biting midges), almost exclusively dominated the benthic community. This family, which was represented by seven genera, accounted for 97.5% (95.0% larvae + 2.5% pupae) of all the benthic organisms. On a by-station basis, the Chironomidae comprised 100% of the benthos at two stations, over 94% at three stations, but only 63.6% at the station closest to the wastewater discharge, SLE-1. These high percentages are to be expected, as non-biting midges have dominated the benthic macroinvertebrate population in other wastewater storage-stabilization lagoons (Grodhaus, 1967 and Kimerle and Enns, 1968). The above authors also report that the Chironomidae breed prolifically in lagoons and often emerge in extremely large and troublesome numbers. This high population was not experienced during the first year of operation of the Muskegon lagoons, where in 48 out of 52 samples the benthic macroinvertebrate fauna remained well below 100 organisms per

TABLE 3

Percentage Composition and Occurrence of Benthos. The first number represents the percentage composition and the second number, in parentheses, represents the percentage occurrence. See text for further details.

TAXA	STATIONS							
	SLE-1	SLE-5	SLE-8	SLW-1	SLW-5	SLW-9	EAST, TOTAL	WEST, TOTAL
No. of samples	14	5	8	12	5	7	27	24
No. of samples with zero organisms found	6	2	2	2	0	2	10	4
I Arthropoda, Insecta	72.7 (57.1)	100.0 (60.0)	100.0 (75.0)	98.5 (83.3)	99.5 (100.0)	97.1 (71.4)	98.1 (63.0)	99.3 (83.3)
A. Diptera, Chironomidae	63.6 (50.0)	100.0 (60.0)	100.0 (75.0)	94.7 (83.3)	99.5 (100.0)	97.1 (71.7)	97.4 (59.3)	97.5 (83.3)
1. Pupae	9.1 (7.1)	0.8 (20.0)	3.2 (12.5)	0.0 (0.0)	5.0 (20.0)	0.0 (0.0)	2.6 (11.1)	2.5 (4.2)
2. Larvae	54.4 (50.0)	99.2 (60.0)	96.8 (75.0)	94.7 (83.3)	94.5 (100.0)	97.1 (71.4)	94.9 (55.5)	94.9 (83.3)
a. *Chironomus plumosus*	9.1 (7.1)	19.4 (40.0)	21.8 (37.5)	0.8 (8.3)	4.0 (40.0)	0.0 (0.0)	20.0 (22.2)	2.2 (12.5)
b. *Cricotopus* sp.	0.0 (0.0)	0.8 (20.8)	1.3 (12.5)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.0 (7.4)	0.0 (0.0)
c. *Dicrotendipes modestus*	9.1 (7.1)	0.0 (0.0)	1.3 (12.5)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.3 (7.4)	0.0 (0.0)

TABLE 3 CONTINUED

TAXA	STATIONS							
	SLE-1	SLE-5	SLE-8	SLW-1	SLW-5	SLW-9	EAST, TOTAL	WEST, TOTAL
d. Parachironomus sp.	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	2.3 (8.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.7 (4.2)
e. Glyptotendipes spp.	31.8 (28.6)	78.2 (40.0)	47.2 (75.0)	34.6 (33.3)	75.3 (80.0)	6.0 (28.6)	59.4 (44.4)	50.2 (41.7)
1) G. sp. A	0.0 (0.0)	9.8 (40.0)	11.0 (50.0)	18.8 (16.7)	28.7 (80.0)	0.0 (0.0)	9.7 (16.2)	20.6 (25.0)
2) G. sp. B	22.7 (21.4)	54.9 (40.0)	27.8 (75.0)	15.8 (25.0)	43.6 (80.0)	6.0 (28.6)	39.0 (40.7)	28.1 (37.5)
3) G. sp. C	9.1 (14.3)	13.5 (40.0)	8.4 (12.5)	0.0 (0.0)	3.0 (40.0)	0.0 (0.0)	10.6 (18.5)	1.5 (8.3)
f. Procladius culiciformus	4.5 (7.1)	0.8 (20.0)	22.6 (62.5)	57.0 (66.7)	15.2 (100.0)	85.1 (57.1)	11.9 (25.9)	40.8 (70.8)
g. Tanytarsus sp.	0.0 (0.0)	0.0 (0.0)	2.6 (12.5)	0.0 (0.0)	0.0 (0.0)	6.0 (14.3)	1.3 (3.7)	1.0 (4.2)
B. Odonata, Coenagrionidae	9.1 (7.1)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.6 (3.7)	0.0 (0.0)
C. Trichoptera	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	3.0 (14.3)	0.0 (0.0)	0.5 (4.2)
D. Ephemeroptera, Baetidae	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	2.3 (16.7)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.7 (8.3)

TABLE 3 CONTINUED

TAXA	STATIONS							
	SLE-1	SLE-5	SLE-8	SLW-1	SLW-5	SLW-9	EAST, TOTAL	WEST, TOTAL
E. Coleoptera, Elmidae	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.5 (16.7)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.5 (4.2)
II Mollusca, Gastropoda								
Physidae, <u>Physa</u>	9.1 (7.1)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.5 (20.0)	0.0 (0.0)	0.6 (3.7)	0.2 (4.2)
III Annelida, Oligochaeta								
Tubificidae, <u>Limnodrilus</u>	18.2 (7.1)	0.0 (0.0)	0.0 (0.0)	1.5 (8.3)	0.0 (0.0)	0.0 (0.0)	1.3 (7.4)	0.5 (4.2)

square foot. The greatest number of organisms was 150 per square foot, all of which were Chironomidae. Thus the number of benthic organisms remained quite low throughout this study, in sharp contrast to the more common values of from 1,000 to 16,000 Chironomidae per square foot in other wastewater storage-stabilization lagoons (Kimerle and Enns, 1968).

The dominant genera varied from station to station. Procladius culiciformus was dominant at SLW-1 and SLW-9, comprising 57.0% and 85.1%, respectively, of the benthic population, while Glyptotendipes spp. dominated SLE-5 and SLW-5, comprising 78.1% and 75.3%, respectively. The margin is not so clear at SLW-8, where Glyptotendipes spp. accounted for 47.2%, Procladius culiciformus 22.6%, and Chironomus plumosus 21.8% of the benthic macroinvertebrate population. The dearth of organisms at SLE-1 makes the percentages less meaningful than at the other stations.

These midges appear to be representative of the normal lagoon insect fauna. In a study of 18 Missouri lagoons (Kimerle and Enns, 1968), Glyptotendipes barbipes, Chironomus plumosus, and Tanypus punctipennis (in the same subfamily as Procladius, Tanypodinae) comprised more than 94% of the total number of insects collected in all lagoons. Based upon Bureau of Vector Control records of larvae collected from 22 localities, nine species of chironomids are considered to be common inhabitants of lagoons in California, including Procladius sp., Cricotopus sp., Glyptotendipes barbipes, two species of Tanypus, and four species of Chironomus (Grodhaus, 1967).

Oligochaetes were found on only two occasions, 21 December 1973 at

SLE-1 (8 per square foot), and 16 November 1973 at SLW-1 (4 per square foot). They represented only one genus, Limnodrilus, a group which is usually common in organically polluted waters. It may take longer for the oligochaetes to proliferate in this new environment.

Empty snail shells were found in seven samples, The genus Physa was the most common, but three other genera were also present, as shown in Table 4.

TABLE 4

Empty Gastropoda Shells (No. per square foot)

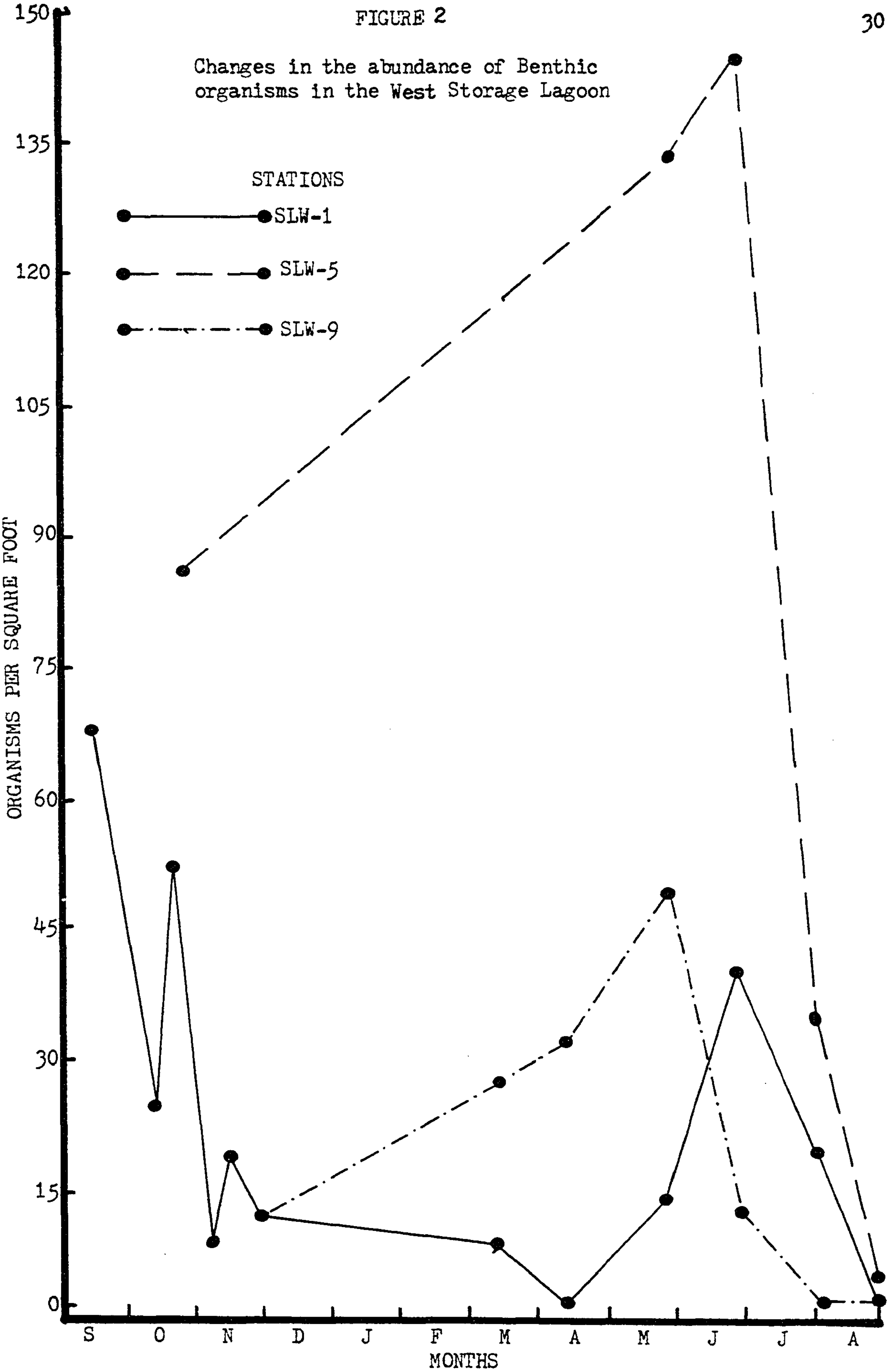
DATE	GENERA AND LOCATION
3-13-74	4 Physa (SLW-9)
5-28-74	6 Physa (SLW-1); 26 Physa (SLW-5)
6-28-74	2 Physa and 18 Gyraulus (SLW-5)
7-12-74	4 Physa (SLE-5)
8-29-74	2 Physa, 2 Campoloma, 6 Lymnaea and 6 Gyraulus (SLW-5); 2 Physa (SLW-1)

Since it is not known if these snails were living in the lagoons or if just the empty shells were washed in, they are not included in any further analysès. On only two occasions were both the snail body and shell of Physa found, 12 December 1973 at SLE-1 (4 per square foot) and 29 August 1974 at SLW-5 (2 per square foot).

The changes in the abundance of benthic organisms throughout this investigation are shown in Figures 2 and 3. Both lagoons experienced a decline in benthos from June to September, during the

FIGURE 2

Changes in the abundance of Benthic organisms in the West Storage Lagoon



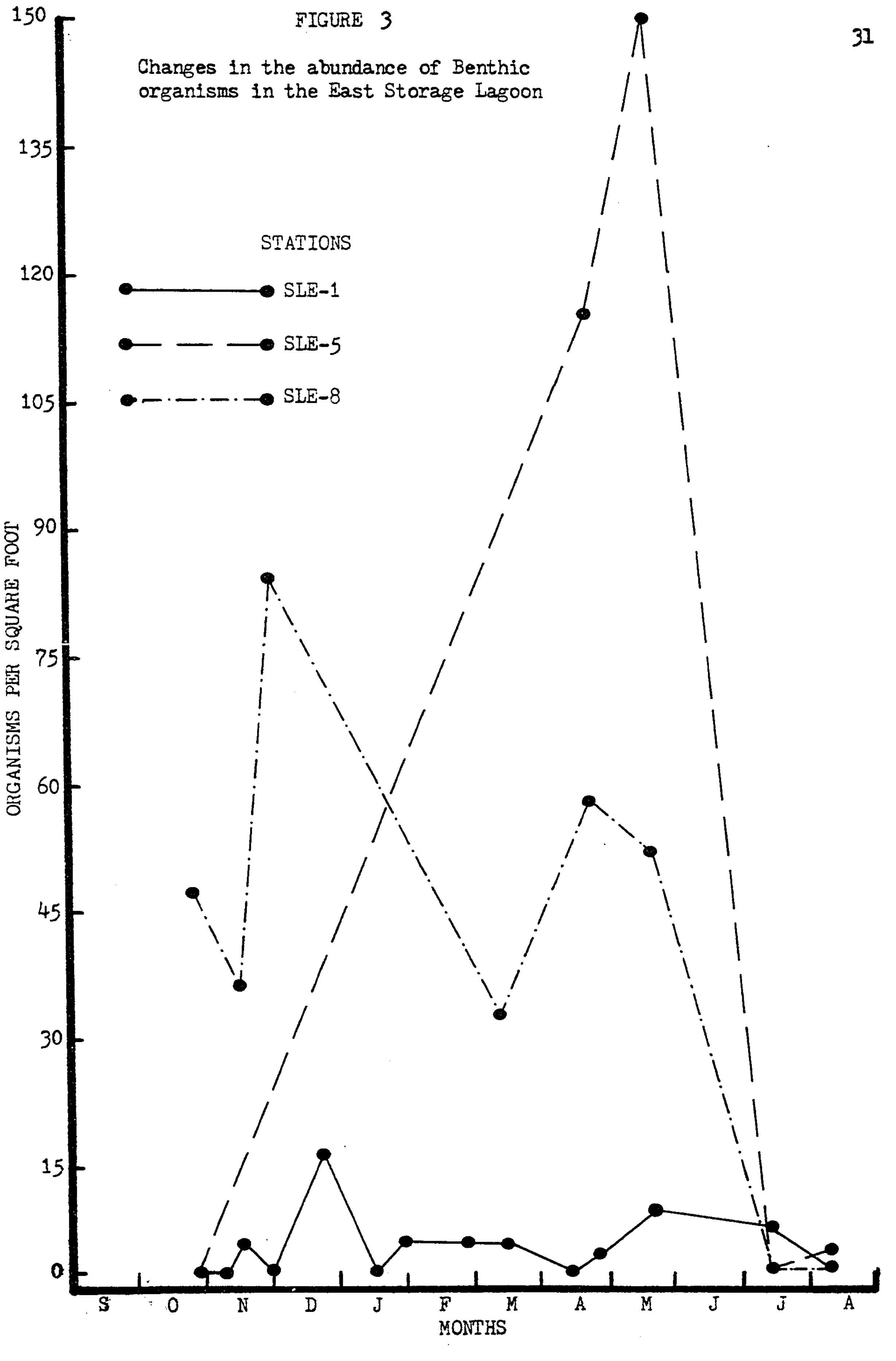


FIGURE 3

Changes in the abundance of Benthic organisms in the East Storage Lagoon

period when emergence occured.

The number of benthic macroinvertebrate organisms at SLE-1 remained very low throughout the year, and in six of the 14 samples, no organisms were found. The mean number of benthic organisms found at this site was only 3.1 per square foot. Due to this paucity of animals, no species diversity or equitability could be determined for this station. Since each of the individual samples at the other five stations contained so few benthic organisms, diversity and equitability were calculated on a per station basis rather than on a per sample basis. These results are presented in Table 5.

TABLE 5

Diversity Indices and Equitability for the Benthic Macroinvertebrate Community

	SLE-5	SLE-8	SLW-1	SLW-5	SLW-9
Diversity, $\bar{d}$	1.7623	2.4593	1.8623	1.8539	0.8351
Equitability, e	0.7298	0.9377	0.5259	0.7839	0.5122

This index of diversity, $\bar{d}$, is based on information theory and takes into account the number of species (i.e., richness of species) as well as the numerical distribution of individuals among the species (i.e., the relative importance of each species). Theoretically, it can range from zero to the log of the total number of individuals (Weber, 1973).

Organic pollution usually results in the depression of diversity, $\bar{d}$, in the biotic community, while relatively undisturbed environments have a higher diversity index. Aquatic ecosystems without environ-

mental perturbations usually support communities having large numbers of species with no individual species present in overwhelming abundance. Thus if all individuals belonged to the same species, the diversity would be minimal, while if each individual belonged to a separate species, the diversity would be maximal. Wilhm (1970) and Wilhm and Dorris (1968) report that values for $\bar{d}$ of less than 1 are usually obtained in heavily polluted aquatic environments, values between 1 and 3 in areas of moderate pollution, and values above 3 in unpolluted waters.

The diversity indices calculated for each station indicate that station SLW-9 is heavily polluted, while SLE-5, SLW-1 and SLW-5 are moderately to heavily polluted, and SLE-8 is only moderately polluted to unpolluted. This is not, however, borne out by the other data gathered during this investigation. The East Lagoon received semi-treated wastewater while the West Lagoon received seepage water and had a much lower BOD, TOC, and nutrient concentration than did the East Lagoon.

Equitability, e, is calculated by evaluating the component of diversity which is due to the distribution of individuals within the species. This index is reported to be more sensitive than $\bar{d}$, and in fact very sensitive to even slight levels of degradation (Weber, 1973). Its range is normally from 0 to 1. Organic wastes reduce equitability below 0.5 and generally in the range of 0.0 to 0.3. Values between 0.6 and 0.8 are indicative of water not affected by oxygen demanding waste. Since the equitability values calculated for the lagoons were all above 0.5, this indicates that the stations are not organically

polluted. Thus the equitability values are not in agreement with the calculated diversity values, nor do they agree with the other parameters.

It may not be appropriate in this study to calcuate diversity and equitability, and compare the results to historical work, because almost all of the reported uses of $\bar{d}$ and e have been in studies with over 100 individuals per sample, in established lotic communities, and in communities receiving predominantly organic wastes. These conditions are not met in this investigation. The Muskegon lagoons receive more industrial waste, especially from a paper mill, than municipal waste. These lagoons also represent a new aquatic environment, they were man-made and were covered with terrestial vegetation prior to this study. From the beginning, the East Lagoon was a heavily stressed aquatic environment. Colonization of the benthic community may take much longer than for the development of the planktonic community, due in part to the much longer generation time in the benthic macroinvertebrates than in the plankton.

Zooplankton

The zooplankton data, arranged by station and by date, are presented in Appendix B, and are summarized in Tables 6 and 7 and in Figures 4-11.

Although there was considerable variability through time in regard to the mean number of organisms per liter in each lagoon, and in the dominant group, the number of zooplankton per liter consistently remained higher in the nutrient and organically richer East Lagoon

than in the West Lagoon (Table 6).

The mean in the East Lagoon ranged from a low of 6.3 organisms per liter on 16 November 1973 to a high of 132.3 on 9 August 1974, while the mean in the West Lagoon ranged from 5.9 organisms per liter, also on 16 November 1973, to a high of 57.3 on 15 August 1974. The greater number of zooplankton in the nutrient-richer East Lagoon is to be expected, since more eutrophic waters often support higher zooplankton populations than less eutrophic waters (Schelske and Roth, 1973). It is believed that this is partly due to the higher food supply, namely phytoplankton, in more eutrophic waters. Davis (1958) feels that the zooplankton depend more on phytoplankton than upon nonliving organic material, even in organically rich waters. It has not been determined if this is true in the Muskegon Lagoons. The zooplankton pulses (Figs. 4 and 5) do not appear to correspond to the phytoplankton pulses, and the phytoplankton counts in the West Lagoon were higher, but zooplankton counts lower, than those in the East Lagoon. This disparity could be due in part to the methods used to enumerate the zooplankton and the phytoplankton since only numbers were determined and not biomass. Another difficulty in determining a relationship between the zooplankton and the phytoplankton is the difference in the digestibility of the various algae, depending upon the thickness and other properties of the algal cell wall (Hutchinson, 1967). There is also evidence that phytoplankton do not constitute a controlling or limiting factor with respect to the overall zooplankton population (Reid, 1961 and Hutchinson, 1967).

The majority of the zooplankton were crustacean arthropods (Table

TABLE 6

Comparison of Zooplankton counts (organism/liter) in the East and in the West Lagoon. Data are given as the mean ± one standard deviation, followed by the dominant taxa and, in parentheses, the percentage of all zooplankton in the indicated collection.

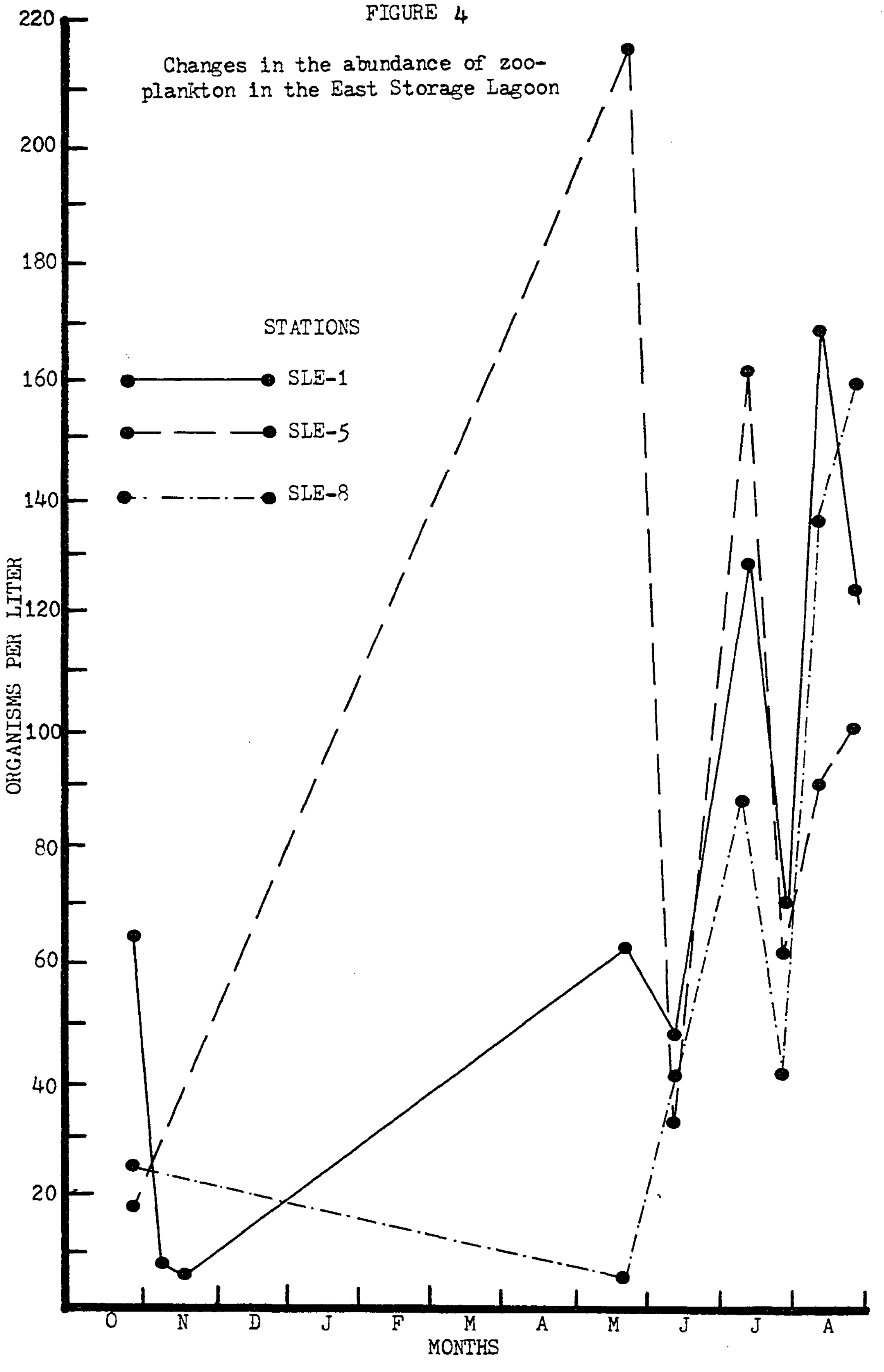
DATE	LAGOON			
	EAST		WEST	
10-26-73	36.8 ± 23.5	Daphnia (52.7%)	9.8 ± 2.9	Cyclopoid Copepods, unidentified genera** (74.1)
11- 9-73	9.9 ± *	Daphnia (68.7%)	6.6 ± 1.6	Cyclopoid Copepods, unidentified genera** (34.6%) Cyclops excilis (24.0%) Daphnia (21.0%)
11-16-73	6.3 ± *	Daphnia (65.1%)	5.9 ± *	Unidentified Rotifer (30.5%) Chydorus sphaericus (23.7%) Filinia longiseta (23.7%)
5-14-74			13.3 ± 5.9	Daphnia (47.2%) Cyclops (40.8%)
5-21-74	94.7 ± 109.8	Daphnia (92.3%)		
5-28-74			32.5 ± 13.1	Daphnia (84.3%)
6-11-74	41.6 ± 7.1	Daphnia (52.2%) Cyclopoid copepods (44.7%)		

* = only one station sampled
** see description in Appendix B

TABLE 6 (continued)

DATE	LAGOON			
	EAST		WEST	
6-28-74			22.0 ± 12.7	Daphnia (37.6%) Diaptomus (36.9%)
7-12-74	127.2 ± 37.8	Cyclopoid copepods (100%)		
7-19-74			18.6 ± 5.4	Diaptomus (66.1%)
7-26-74	57.8 ± 14.2	Cyclopoid copepods (100%) Cyclops vernalis (46.4%)		
8- 2-74			15.9 ± 5.8	Diaptomus (56.8%)
8- 9-74	132.3 ± 39.6	Cyclopoid copepods (99.8%) Cyclops vernalis (31.6%)		
8-15-74			57.3 ± 22.8	Diaptomus (61.2%)
8-20-74	129.7 ± 29.5	Cyclopoid copepods (97.5%) Cyclops vernalis (25.0%)		
8-29-74			56.4 ± 13.7	Daphnia (53.4%)

FIGURE 4



220
200
180
160
140
120
100
80
60
40
20
ORGANISMS PER LITER
Changes in the abundance of zooplankton in the East Storage Lagoon
STATIONS
SLE-1
SLE-5
SLE-8
O
N
D
J
F
M
A
M
J
J
A
MONTHS

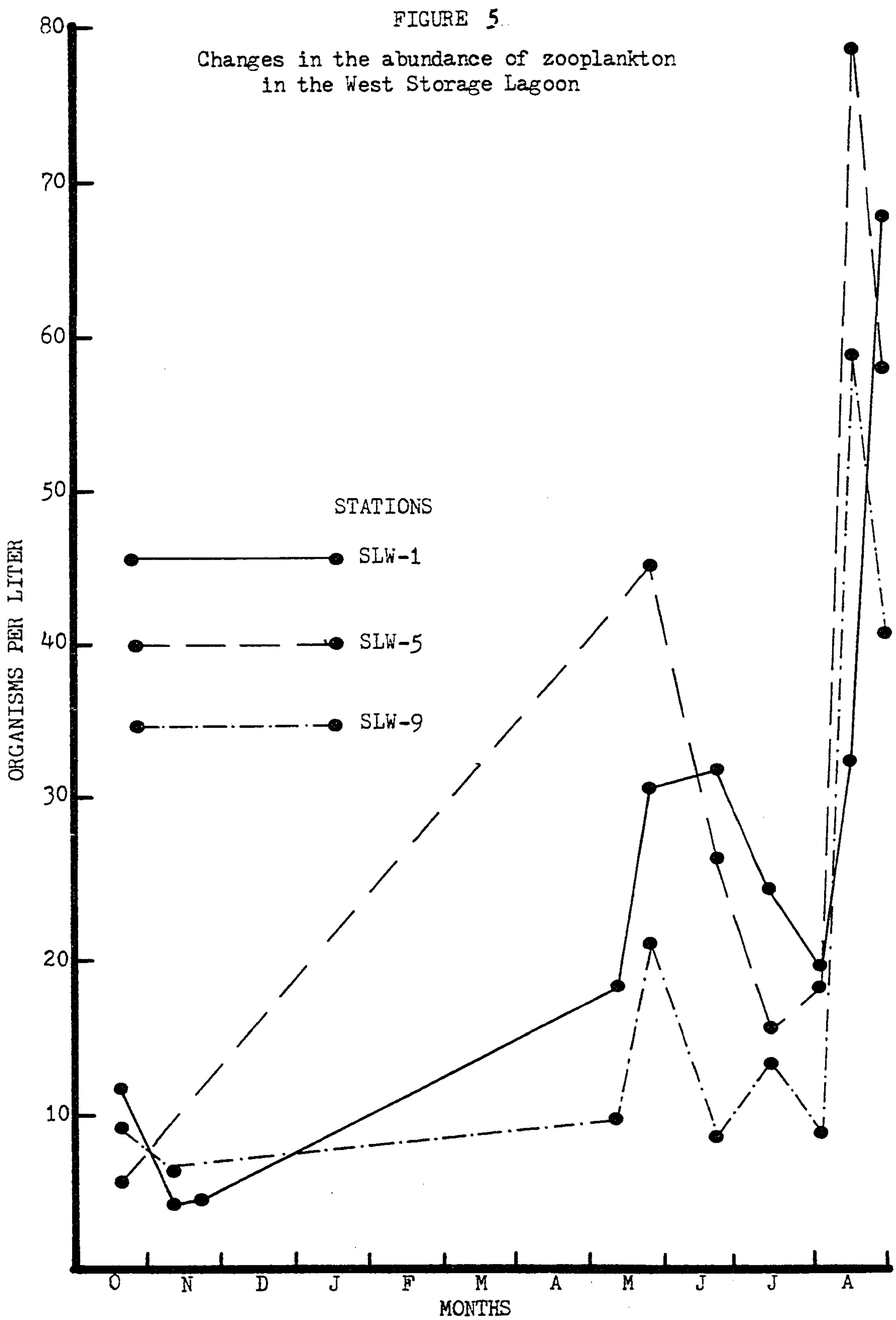


FIGURE 5
Changes in the abundance of zooplankton in the West Storage Lagoon
80
70
60
50
40
30
20
10
ORGANISMS PER LITER
STATIONS
SLW-1
SLW-5
SLW-9
O
N
D
J
F
M
A
M
J
J
A
MONTHS

7). The class Crustacea, which was represented by three orders and nine genera, accounted for 97.3% of the total zooplankton in the East Lagoon and 98.9% in the West Lagoon. On the order and genus levels, however, the similarities between lagoons disappears.

Cyclopoid copepods dominated the zooplankton in wastewater East Lagoon, representing 75.2% of the population. They comprised only a small portion of the total zooplankton population in this lagoon during the early phases of this study, a period of very small zooplankton populations, but they were dominant during the summer of 1974 when they accounted for most of the increase in the number of zooplankton (Fig. 6). Of the ten species of cyclopoid copepods present, Cyclops vernalis was the most common, representing 19.8% of all zooplankton in the East Lagoon.

In the West Lagoon, however, cyclopoid copepods accounted for only 14.1% and Cyclops vernalis for only 1.9% of the total zooplankton. The percentage of total zooplankton which were comprised of cyclopoid copepods declined in the West Lagoon throughout this study (Fig. 7). The dominant zooplankton in this lagoon were the cladocerans, which at 51.2% were more than twice the percentage of cladocerans in the East Lagoon (21.6%). Daphnia was the dominant genus in the West Lagoon zooplankton, 41.4%, followed by Diaptomus, 33.6%. In the East Lagoon, Diaptomus represented only 0.5% of the total zooplankton population. This change from calanoid copepods (Diaptomus) in the West Lagoon to cyclopoid copepods in the East Lagoon corresponds to the general trend for changing zooplankton composition as waters go from oligotrophic to eutrophic: the proportion of calanoids decreases

TABLE 7

Percentage Composition and Occurrence of Zooplankton. The first number represents the percentage composition and the second number, in parentheses, represents the percentage occurrence. See text for further details.

TAXA	STATIONS							
	SLE-1	SLE-5	SLE-8	SLW-1	SLW-5	SLW-9	EAST, TOTAL	WEST, TOTAL
No. of samples	9	7	7	10	7	9	23	26
I Arthropoda, Crustacea	95.1 (100.0)	98.3 (100.0)	100.0 (100.0)	98.0 (100.0)	100.0 (100.0)	98.2 (100.0)	97.3	98.9
A. Copepoda, Cyclopoida	76.1 (77.8)	65.1 (100.0)	89.4 (100.0)	17.0 (90.0)	11.3 (100.0)	13.6 (100.0)	75.2	14.1
1. *Cyclops*	42.8 (66.7)	29.8 (85.7)	43.1 (100.0)	5.7 (60.0)	4.4 (71.4)	5.5 (66.7)	38.1	5.2
a. *C. vernalis*	24.3 (55.6)	14.7 (85.7)	20.6 (100.0)	1.6 (40.0)	2.7 (71.4)	0.9 (44.4)	19.8	1.9
b. *C. excilis*	11.0 (44.4)	4.9 (57.1)	10.9 (71.4)	1.0 (40.0)	0.0 (0.0)	2.8 (44.4)	8.7	1.1
c. *C.* sp.	7.5 (44.4)	10.2 (85.7)	11.6 (71.4)	3.1 (30.0)	1.7 (42.9)	1.8 (33.3)	9.6	2.2
2. *Mesocyclops*	13.8 (66.7)	10.8 (85.7)	15.4 (85.7)	4.2 (50.0)	4.1 (100.0)	1.4 (66.7)	13.3	3.5

TABLE 7 CONTINUED

TAXA	STATIONS							
	SLE-1	SLE-5	SLE-8	SLW-1	SLW-5	SLW-9	EAST, TOTAL	WEST, TOTAL
a. *M. edax*	6.1 (55.6)	6.8 (85.7)	8.8 (57.1)	2.0 (40.0)	2.3 (71.4)	1.4 (66.7)	7.2	2.0
b. *M. dybowskii*	0.6 (11.1)	0.3 (14.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.4	0.0
c. *M.* sp.	7.1 (55.5)	3.7 (85.7)	6.6 (71.4)	2.2 (30.0)	1.8 (71.4)	0.0 (0.0)	5.7	1.5
3. *Paracyclops* sp.	3.7 (44.4)	5.4 (71.4)	9.6 (57.1)	* (10.0)	0.1 (14.3)	0.0 (0.0)	5.9	*
4. Unknown Genera **	15.8 (66.7)	19.0 (85.7)	21.3 (85.7)	7.1 (60.0)	2.7 (28.6)	6.7 (66.7)	17.9	5.4
a. B_9 **	6.8 (55.6)	6.5 (57.2)	4.8 (42.9)	2.2 (30.0)	1.4 (28.6)	1.0 (44.4)	5.5	1.6
b. E_6 **	1.6 (33.3)	2.1 (42.9)	3.8 (57.1)	1.4 (20.0)	0.4 (14.3)	2.4 (33.3)	2.4	1.3
c. E_7 **	7.4 (55.6)	10.4 (85.7)	12.7 (85.7)	3.5 (50.0)	0.9 (28.6)	3.3 (33.3)	10.0	2.5
B. Copepoda, Calanoida								
Diaptomus	1.1 (22.2)	0.1 (14.3)	0.1 (14.3)	24.2 (50.0)	40.4 (85.7)	37.2 (66.7)	0.5	33.6

TABLE 7 CONTINUED

TAXA	SLE-1	SLE-5	SLE-8	SLW-1	SLW-5	SLW-9	EAST, TOTAL	WEST, TOTAL
	STATIONS							
C. Cladocera	17.9 (66.7)	33.2 (57.1)	10.5 (57.1)	56.8 (100.0)	48.3 (100.0)	47.4 (100.0)	21.6	51.2
1. *Daphnia* spp.	17.6 (66.7)	33.2 (57.1)	10.4 (57.1)	43.9 (90.0)	37.8 (100.0)	42.7 (100.0)	21.5	41.4
2. *Bosmina longirostris*	0.3 (33.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.1	0.0
3. *Chydorus sphaericus*	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	12.9 (70.0)	10.5 (57.1)	4.7 (55.6)	0.0	9.8
4. *Alona* sp.	0.0 (0.0)	0.0 (0.0)	* (14.3)	* (10.0)	0.0 (0.0)	0.0 (0.0)	*	*
II Rotifera, Monogononta	4.6 (44.4)	1.6 (14.3)	0.0 (0.0)	1.8 (30.0)	0.0 (0.0)	1.7 (22.2)	2.3	1.1
A. Ploima	2.1 (44.4)	0.0 (0.0)	0.0 (0.0)	0.1 (10.0)	0.0 (0.0)	0.7 (11.1)	0.8	0.2
1. *Brachionus urceolares*	2.1 (24.4)	0.0 (0.0)	0.0 (0 0)	0.1 (10.0)	0.0 (0.0)	0.0 (0.0)	0.8	*
2. *Keratella* sp.	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.7 (11.1)	0.0	0.2

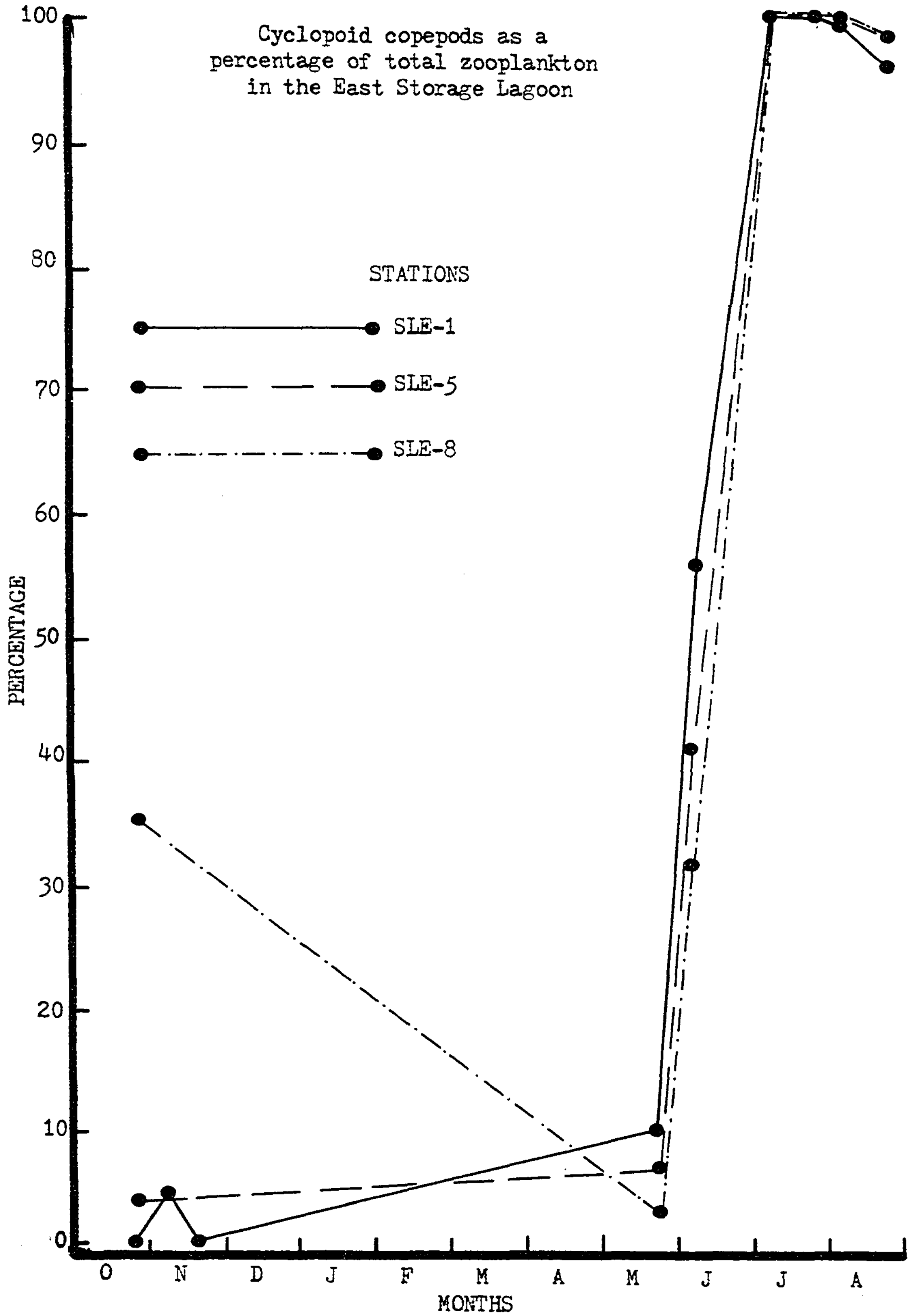
TABLE 7 CONTINUED

TAXA	STATIONS							
	SLE-1	SLE-5	SLE-8	SLW-1	SLW-5	SLW-9	EAST, TOTAL	WEST, TOTAL
B. Flosculariceae								
Filinia longiseta	2.5 (33.3)	1.6 (14.3)	0.0 (0.0)	0.6 (10.0)	0.0 (0.0)	0.2 (11.2)	1.5	0.3
C. Unidentified	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.1 (20.0)	0.0 (0.0)	0.8 (11.1)	0.0	0.6

* = less than 0.1

** described in Appendix B

FIGURE 6



Cyclopoid copepods as a
percentage of total zooplankton
in the East Storage Lagoon
STATIONS
SLE-1
SLE-5
SLE-8
PERCENTAGE
100
90
80
70
60
50
40
30
20
10
0
O
N
D
J
F
M
A
M
J
J
A
MONTHS

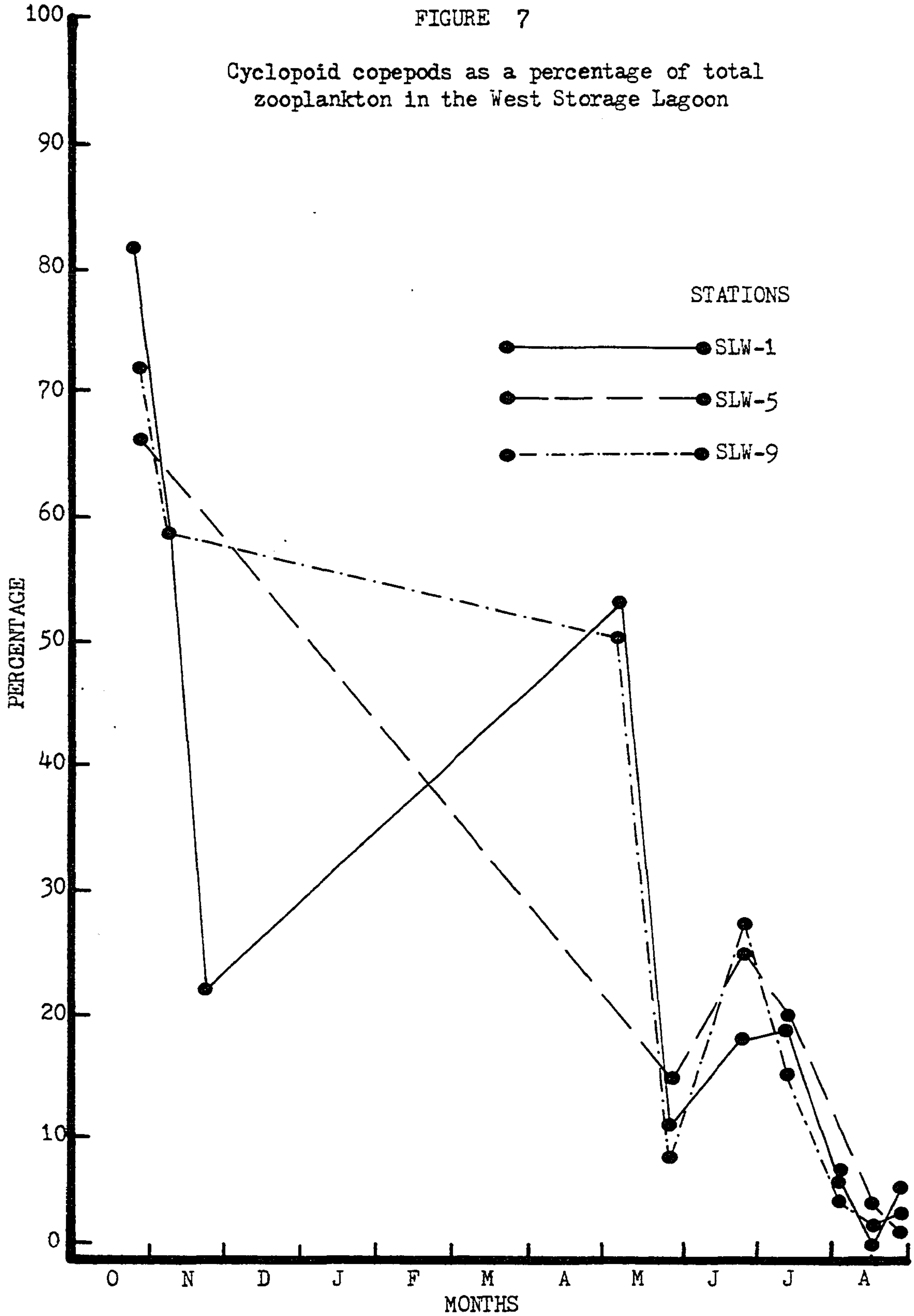


FIGURE 7
Cyclopoid copepods as a percentage of total zooplankton in the West Storage Lagoon
STATIONS
SLW-1
SLW-5
SLW-9
PERCENTAGE
100
90
80
70
60
50
40
30
20
10
0
O
N
D
J
F
M
A
M
J
J
A
MONTHS

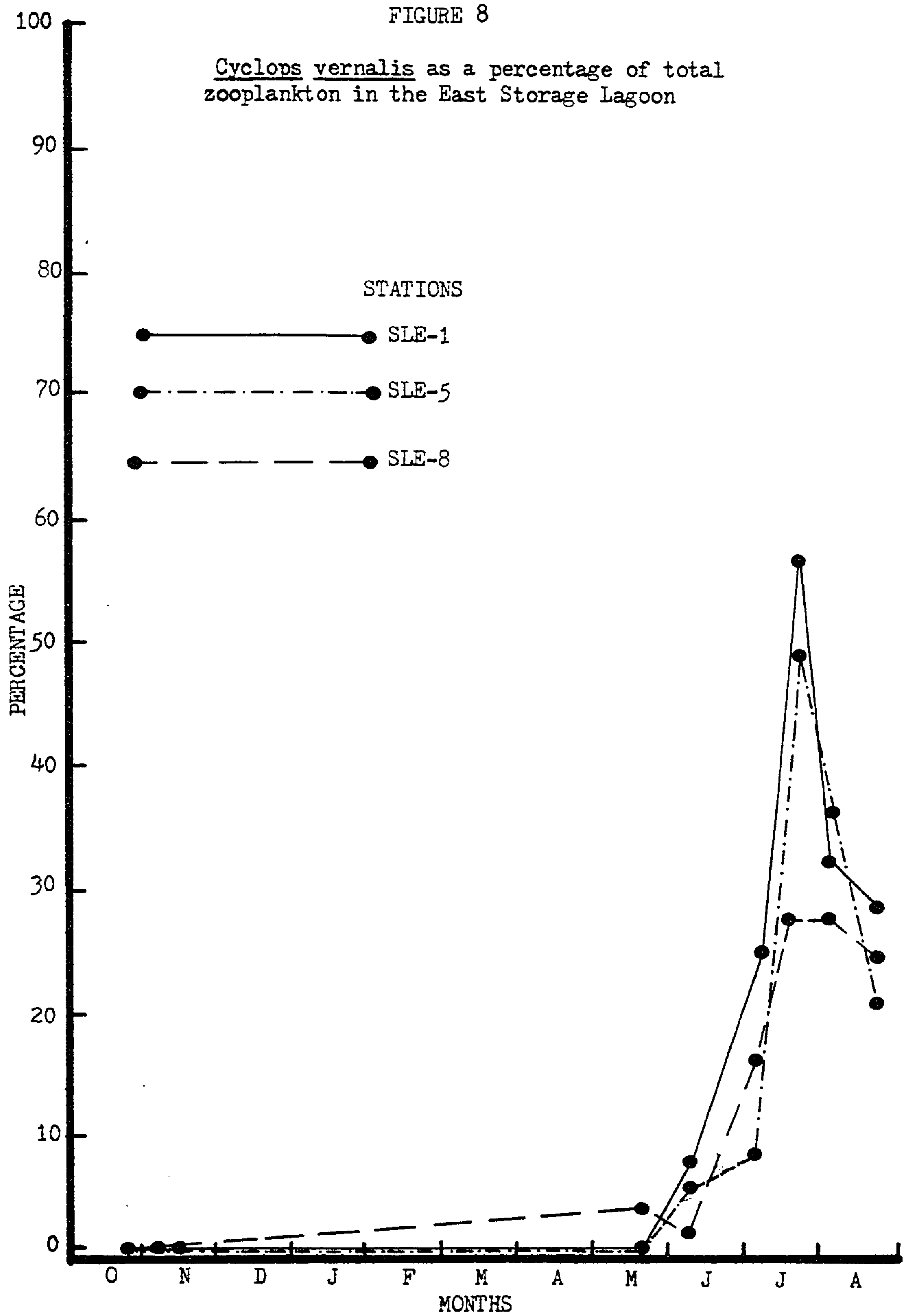


FIGURE 8

Cyclops vernalis as a percentage of total zooplankton in the East Storage Lagoon

FIGURE 9

<u>Cyclops</u> <u>vernalis</u> as a percentage of total zooplankton in the West Storage Lagoon

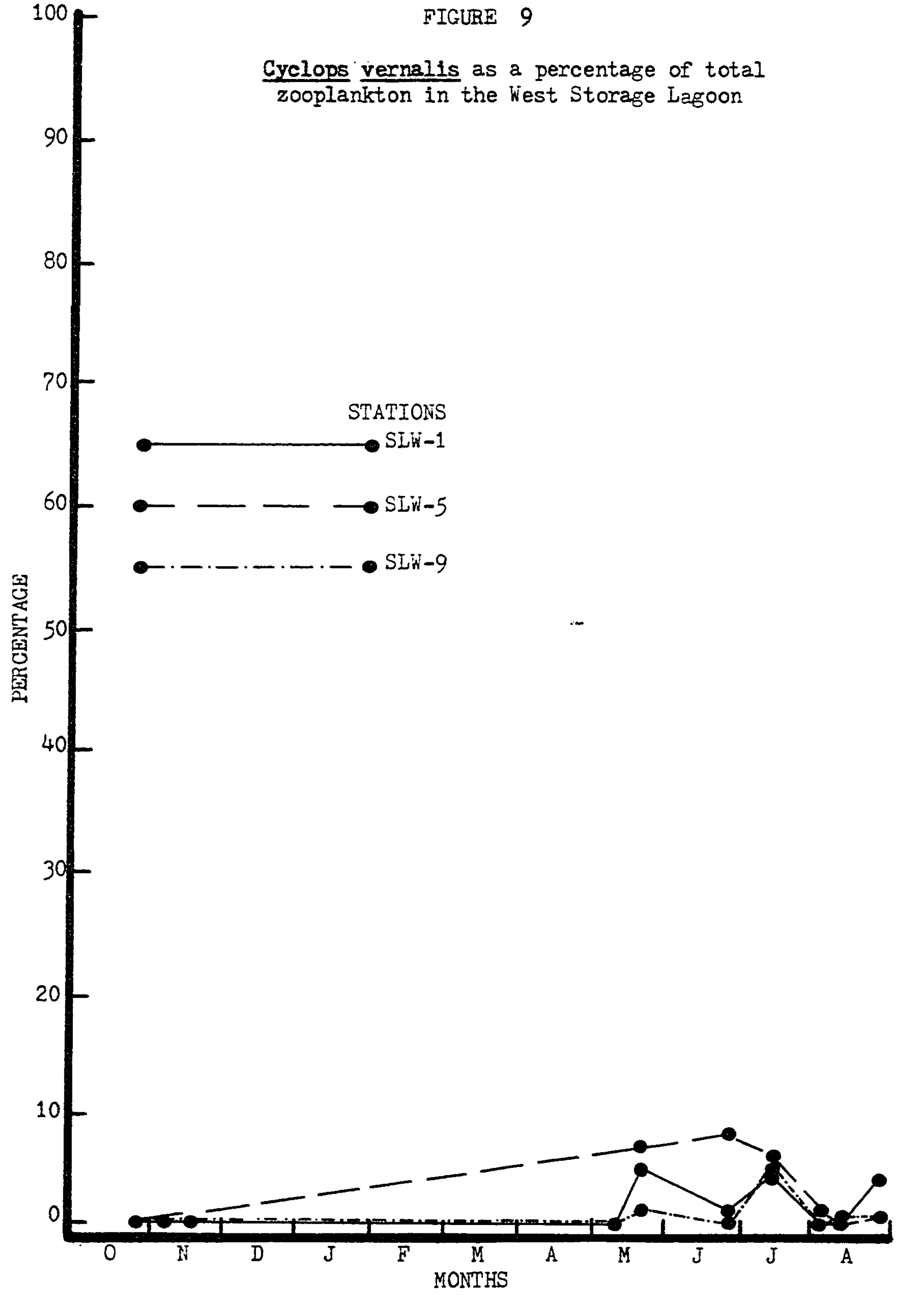


FIGURE 10

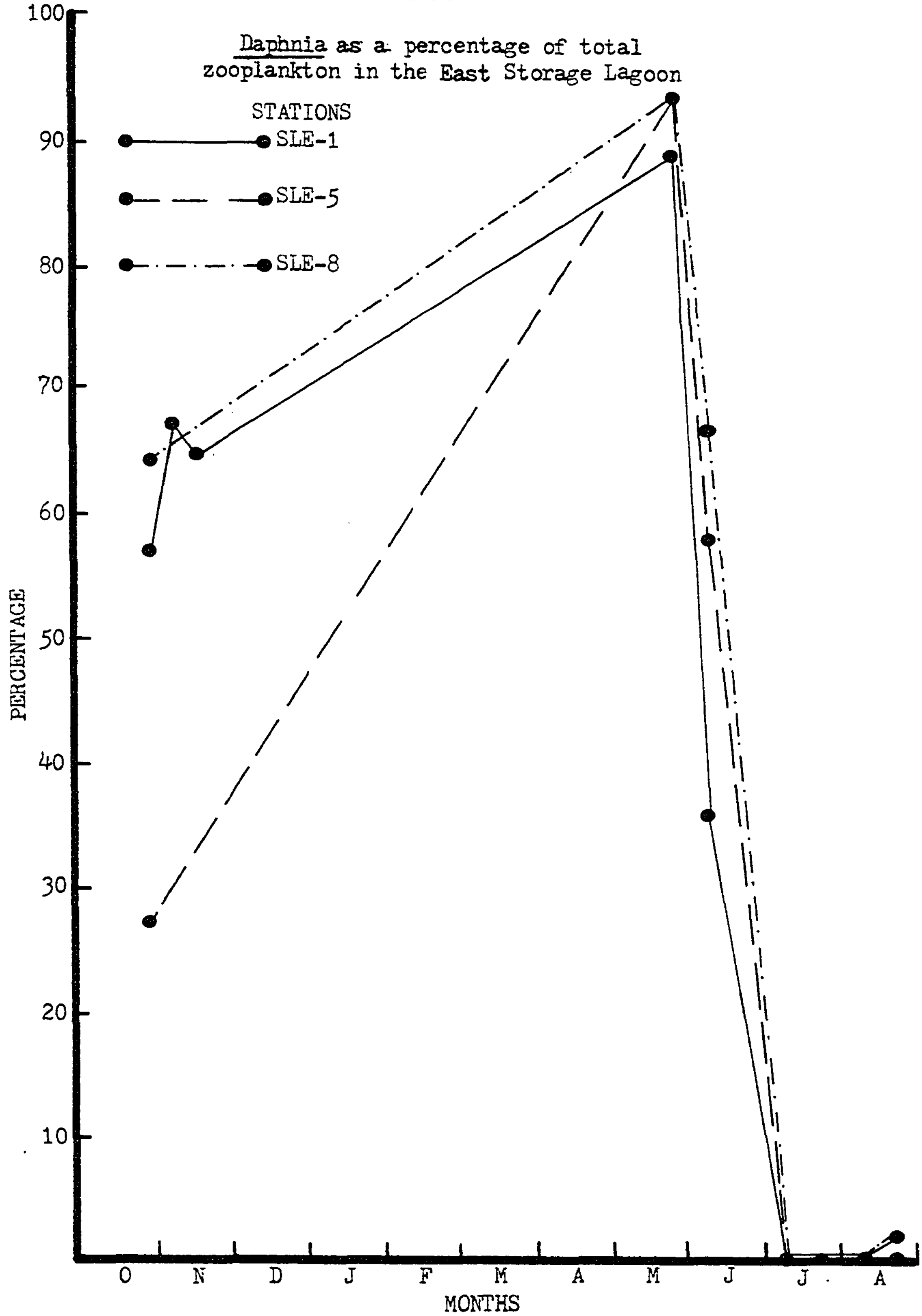
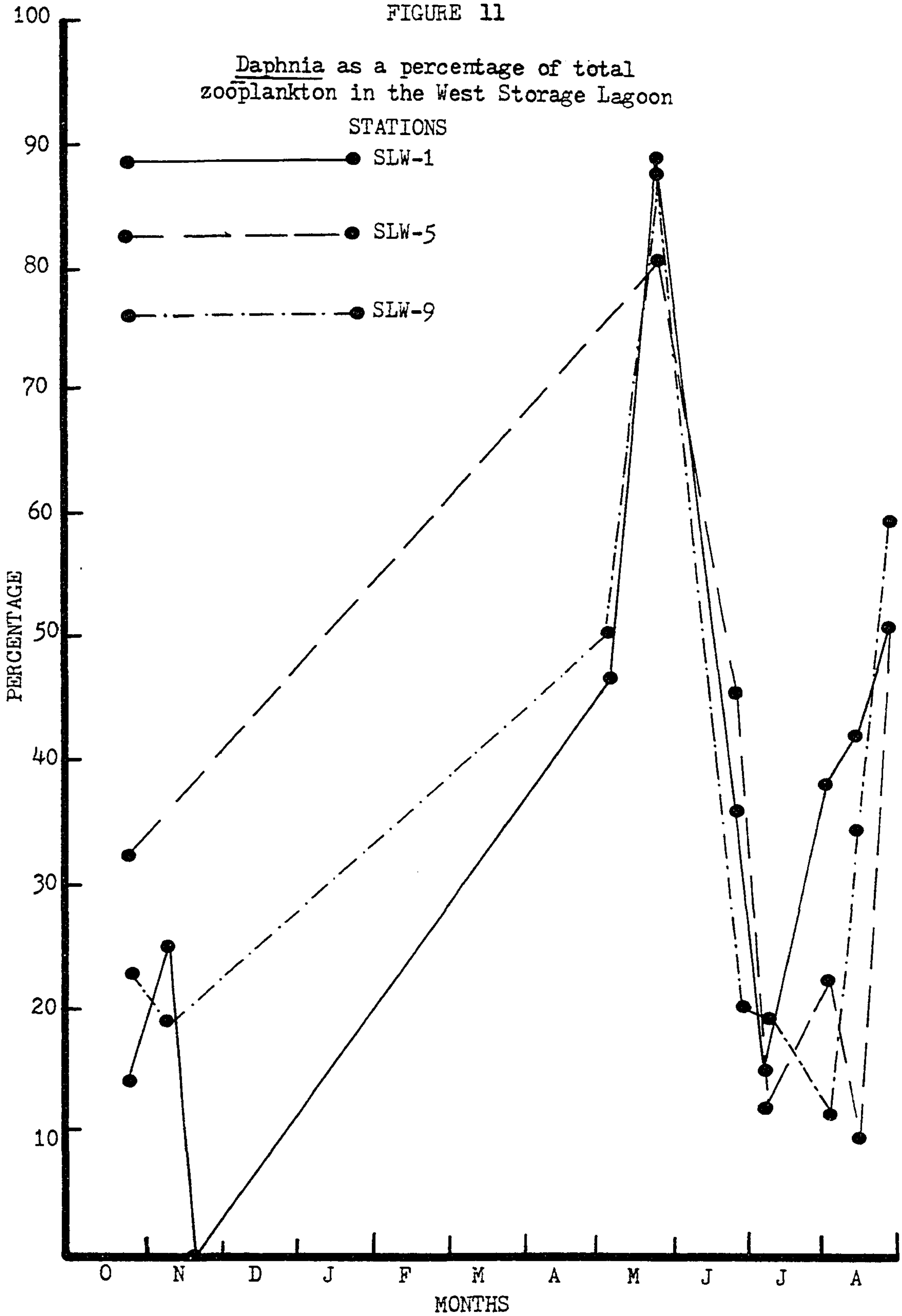

Daphnia as a percentage of total zooplankton in the East Storage Lagoon
STATIONS
SLE-1
SLE-5
SLE-8
100
90
80
70
60
50
40
30
20
10
PERCENTAGE
O
N
D
J
F
M
A
M
J
J
A
MONTHS

FIGURE 11

Daphnia as a percentage of total zooplankton in the West Storage Lagoon



while the predominance of cyclopoids increases (Patalas, 1972).

Rotifers were surprisingly scarce, accounting for only 2.3% of the zooplankton in the East Lagoon and 1.% in the West Lagoon.

The dominance of the zooplankton by copepods (East Lagoon) and cladocerans (West Lagoon) is similar to conditions in the surrounding Great Lakes. From varous studies of Great Lakes zooplankton, Davis (1966) concludes that dominance by either or both of these groups during various seasons of the year is quite characteristic.

Virtually no information concerning zooplankton populations in wastewater lagoons could be found in the literature.

Phytoplankton and protozoa

The complete results of the quantitative and qualitative analysis of the phytoplankton and protozoa present in the lagoons are presented in Appendix C, arranged by date, station and taxa. Throughout this paper the abbreviation nr. will be used to denote a species identification which is not positive. If it is not the indicated species, it is a closely related one.

There was a great deal of variability in both time and location in the number as well as the type of protozoa and phytoplankton in the lagoons (Figs. 12 and 13 and Table 8). Due to these large fluctuations in numbers at different stations, the standard deviation exceeded, or was very close to, the mean number of organisms on 5 out of the 19 sampling dates in the East Lagoon and on 3 out of 19 in the Lagoon. On 21 December 1973 there were 1,555.7 phytoplankton and protozoan organisms per ml at SLE-1, but only 55.6 per ml at SLE-8,

FIGURE 12

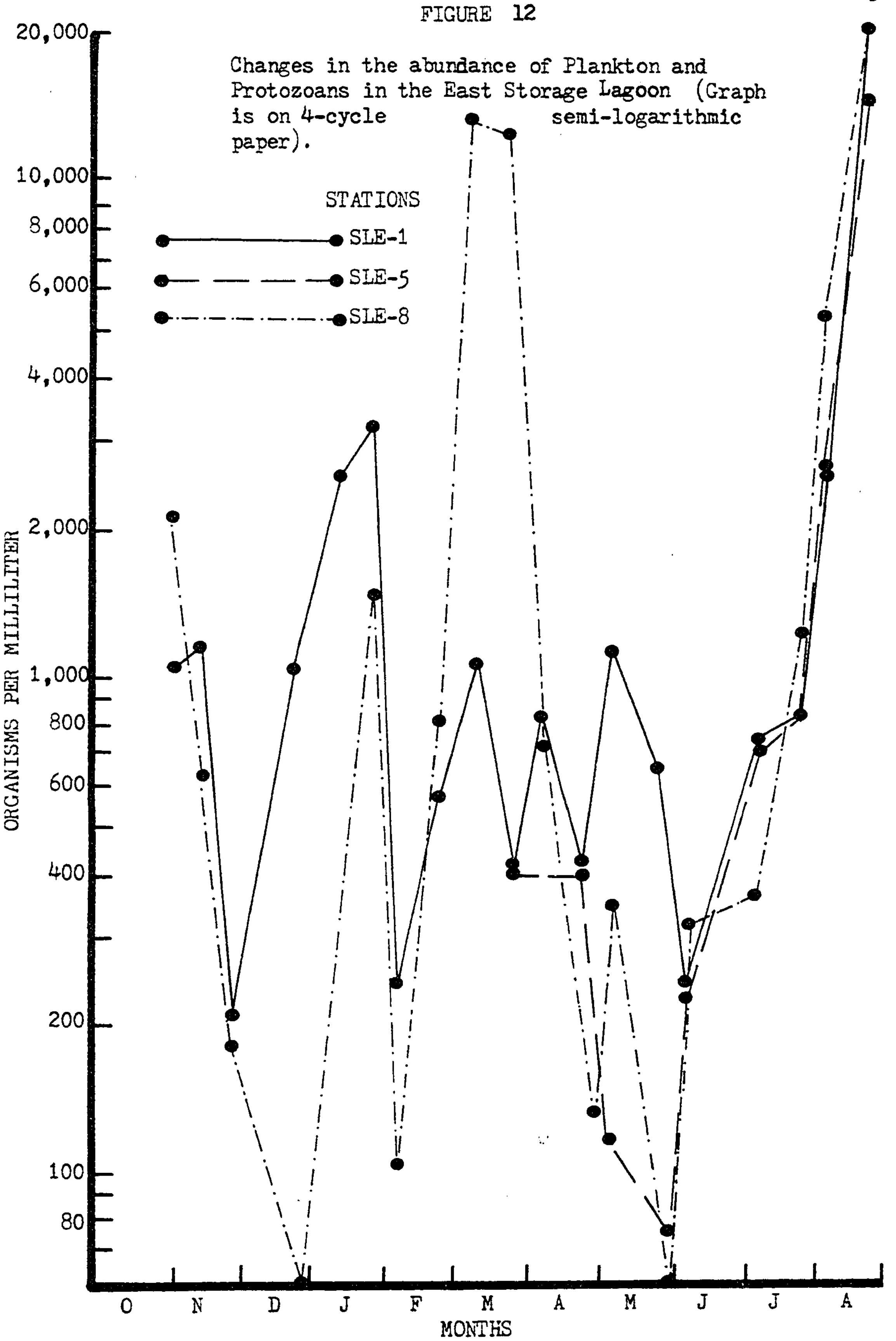

Changes in the abundance of Plankton and Protozoans in the East Storage Lagoon (Graph is on 4-cycle semi-logarithmic paper).
STATIONS
SLE-1
SLE-5
SLE-8
20,000
10,000
8,000
6,000
4,000
2,000
1,000
800
600
400
200
100
80
ORGANISMS PER MILLILITER
O
N
D
J
F
M
A
M
J
J
A
MONTHS

FIGURE 13

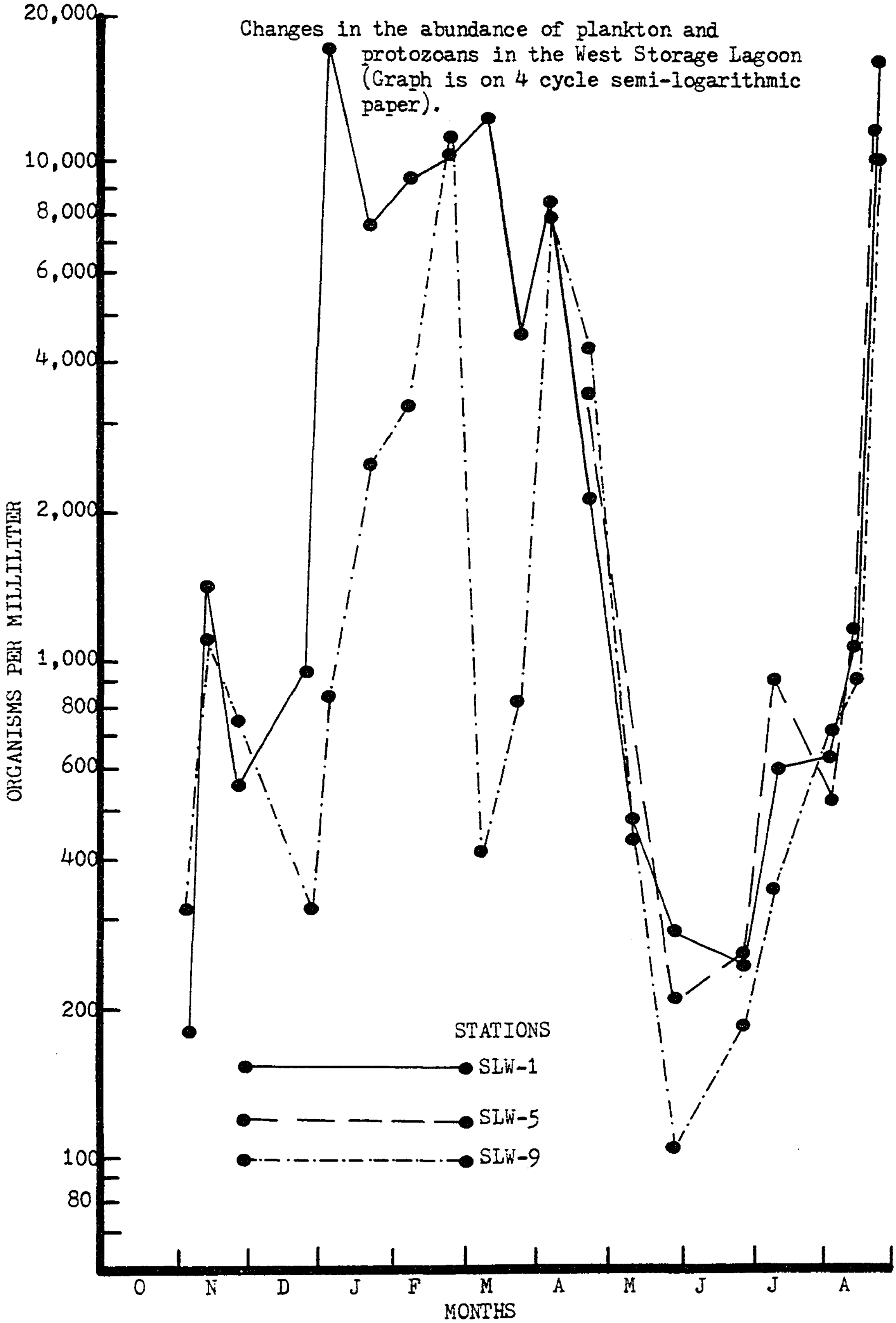

Changes in the abundance of plankton and protozoans in the West Storage Lagoon (Graph is on 4 cycle semi-logarithmic paper).
20,000
10,000
8,000
6,000
4,000
2,000
1,000
800
600
400
200
100
80
ORGANISMS PER MILLILITER
STATIONS
SLW-1
SLW-5
SLW-9
O N D J F M A M J J A
MONTHS

TABLE 8

Comparison of Phytoplankton and Protozoan counts (Organisms/ml) in the East and West Lagoons. Data are given as the mean ± one standard deviation, followed by the principal taxa and, in parenthesis, the taxa's percentage of the mean.

DATE	LAGOON	
	EAST	WEST
11- 9-73	1559.1 ± 702.4 Chlorella nr. pyrenoidosa (58.1%)	257.0 ± 108.0 Bodo (62.1%)
11-16-73	903.2 ± 372.6 Bodo (45.3%)	1319.4 ± 157.0 Bodo (59.5%)
11-30-73	201.5 ± 9.8 Melosira nr. granulata (31.8%)	680.4 ± 117.9 Chlorella nr. vulgaris (56.1%)
12-21-73	805.6 ±1060.7 Chlorella nr. vulgaris (50.9%) Chlamydomonas sp. (38.8%)	647.3 ± 479.3 Chlamydomonas sp. (42.9%)
1- 2-74		5812.6 ±7021.8 Chlorella nr. vulgaris (78.3%)
1-16-74	1972.6 ± 968.9 Chlorella nr. vulgaris (76.0%)	
1-30-74	2396.3 ±1011.9 Chlamydomonas sp. (69.3%)	5250.1 ±3731.7 Chlamydomonas sp. (83.3%)
2-13-74	180.6 ± 122.7 Chlamydomonas sp. (36.5%)	5402.8 ±3689.1 Chlorella nr. vulgaris (94.5%)

TABLE 8 CONTINUED

DATE	LAGOON			
	EAST		WEST	
2-27-74	715.2 ± 167.1	Chlorella nr. pyrenoidosa (63.1%)	10533.6 ± 618.6	Chlorella nr. vulgaris (84.9%)
3-13-74	7878.5 ±9450.7	Chlorella nr. pyrenoidosa (89.0%)	6642.4 ±7309.3	Chlorella nr. vulgaris (95.7%)
3-29-74	9402.8 ±7960.1	Chlorella nr. pyrenoidosa (78.8%)	2725.4 ±2362.1	Chlorella nr. vulgaris (83.8%)
4-12-74	786.0 ± 106.7	Chlamydomonas sp. (39.5%) Chlorella nr. pyrenoidosa (23.4%)	8329.1 ±1599.5	Chlorella nr. vulgaris (91.7%)
4-26-74	324.6 ± 182.4	Chlamydomonas sp. (57.5%)	3306.4 ±1198.4	Chlorella nr. vulgaris (89.0%)
5- 7-74	537.6 ± 501.9	Chlamydomonas sp. (43.3%) Golenkina paucispina (20.2%)		
5-14-74			482.6 ± 111.5	Cyclotella nr. meneghiniana (18.7%) Euglena sp. (18.0%)
5-21-74	255.7 ± 319.5	Trachelomonas sp. (49.0%)		
5-28-74			204.8 ± 135.7	Glaucoma sp. (39.0%)

TABLE 8 CONTINUED

DATE	LAGOON			
	EAST		WEST	
6-11-74	273.3 ± 117.4	Vorticella sp. (23.7%) Trachelomonas sp. (19.9%)		
6-28-74			235.9 ± 61.0	Phacus sp. (17.2%) Chroomonas nr. nordstedtii (11.7%) Chlamydomonas sp. (11.3%)
7-12-74	623.0 ± 194.0	Glaucoma sp. (31.2%)		
7-19-74			632.9 ± 272.1	Chlorella nr. pyrenoidosa (32.8%) Anabaena constricta (16.3%)
7-26-74	975.4 ± 209.3	Cryptomonas nr. ovata (33.3%)		
8-2-74			634.5 ± 145.2	Chlorella nr. vulgaris (32.7%)

TABLE 8 CONTINUED

DATE	LAGOON			
	EAST		WEST	
8- 9-74	3654.2 ±1742.1	Cryptomonas nr. ovata (20.0%) Chlorella nr. vulgaris (9.6%) Ankistrodesmus sp. (9.6%) Chlamydomonas sp. (9.0%)		
8-15-74			1056.6 ± 125.1	Chlorella nr. pyrenoidosa (45.3%)
8-20-74	18813.6 ±4977.8	Stephanodiscus nr. invisatatus (30.9%)		
8-29-74			13256.6 ±3098.1	Aphanizomenon flos-aquae (56.0)

resulting in a mean of 805.6 and a standard deviation of 1060.7. The two major species on this date at SLE-1 (Chlorella nr. vulgaris and Chlamydomonas sp.) were the only two species present at SLE-8. On the next sampling date, 2 January 1974, a bloom of Chlorella nr. vulgaris at SLW-1 but not at SLW-9 accounted for 10,777.7 organisms per ml at SLW-1 but only 847.4 per ml at SLW-9, resulting in a mean of 5812.6 $\pm$ 7021.8. A similar condition occurred on 13 March 1974 and also on 29 March 1974, when a bloom of Chlorella nr. vulgaris at SLW-1 but not at SLW-9 resulted in the standard deviation exceeding or being very close to the mean number of phytoplankton and protozoan organisms per ml in the West Lagoon. On these same two dates a bloom of Chlorella nr. pyrenoidosa at SLE-8 but not at SLE-1 produced the same situation in the East Lagoon.

In May the standard deviation again was close to or exceeded the mean number of phytoplankton and protozoan organisms per ml in the East Lagoon. On 7 May 1974 and again on 21 May 1974 this phenomena was not, however, due to a bloom of any one organism but rather to a general increase in several organisms at only one station. Due to higher numbers of Chlamydomonas spp., Golenkina paucispina and Glaucoma spp. at SLE-1 on 7 May 1974, this station had 1378.9 and 874.9 organisms per ml while SLE-5 had only 111.0 and 124.8 per ml and SLE-8 had only 486.0 and 249.8 per ml. Due to an increase in the number of Trachelomonas, Euglena and Glaucoma on 21 May 1974 there were 694.4 and 631.9 organisms per ml at SLE-1, but only 13.8 and 34.6 per ml at SLE-8 and 125.2 and 34.7 per ml at SLE-5.

The phytoplankton and protozoan population in both lagoons showed some similarities and yet on other occasions the populations were drastically different from one lagoon to the other. These fluctuations in terms of species composition and numbers are presented in Tables 8-11.

The phytoplankton and protozoan population in both lagoons remained relatively low during the months of May, June, and July, although it was on an upward trend during the latter two months. The highest populations in both lagoons occurred in August. On 20 August 1974 the phytoplankton and protozoan population was almost 19,000 per ml in the East Lagoon and on 29 August the population was over 13,000 per ml in the West Lagoon.

Various organisms dominated the overall phytoplankton and protozoan population in each lagoon throughout this investigation. In the West Lagoon Chlorella nr. vulgaris was the dominant organism on 10 out of the 19 sampling dates, but in the East Lagoon it was the dominant organism on only 2 out of the 19 sampling dates. Chlamydomonas was the most common form on five occasions in the East Lagoon, followed by Chlorella nr. pyrenoidosa, dominant on four sampling dates. Each of these forms was dominant on just two occasions in the West Lagoon. Out of the 19 sampling dates, 10 different organisms in the East Lagoon and 8 in the West Lagoon were the dominants on one or more dates.

Chlorella and Chlamydomonas are among the most common algae in other waste-stabilization lagoons, also. Their presence is important, since they are very significant in maintaining a desired oxygen level

TABLE 9

Percentage Composition and Occurrence of Phytoplankton and Protozoans. The first number represents the percentage composition and the second number, in parentheses, represents the percentage occurrence.

TAXA	STATIONS							
	SLE-1	SLE-5	SLE-8	SLW-1	SLW-5	SLW-9	EAST, TOTAL	WEST, TOTAL
No. of samples	32	16	31	30	14	31	79	75
A. Chlorophyta, Chlorophyceae	39.6 (100.0)	47.2 (100.0)	67.9 (100.0)	74.0 (96.7)	42.8 (100.0)	69.3 (96.8)	55.4	67.4
B. Cyanophyta, Myxophyceae	3.5 (68.8)	5.0 (50.0)	2.0 (38.7)	19.9 (53.3)	51.3 (64.3)	21.8 (58.1)	3.0	25.3
C. Chrysophyta, Bacillariophyceae	23.5 (81.2)	25.9 (75.0)	11.2 (67.8)	2.7 (93.3)	3.1 (100.0)	3.3 (83.9)	17.6	2.9
D. Euglenophyta, Euglenophyceae	6.8 (43.8)	5.8 (87.5)	3.2 (58.1)	0.6 (50.0)	1.2 (71.4)	0.6 (35.5)	4.8	0.7
E. Pyrrophyta	0.2 (9.4)	0.4 (25.0)	0.2 (12.9)	* (3.3)	0.0 (0.0)	0.0 (0.0)	0.2	*
F. Protozoa	25.1 (84.4)	13.8 (87.5)	14.7 (74.2)	3.1 (90.0)	1.6 (92.8)	4.8 (100.0)	17.7	3.3
1. Ciliophora	7.2 (71.9)	3.0 (81.2)	1.6 (54.8)	1.0 (63.3)	0.9 (71.4)	1.9 (71.0)	3.6	1.3

TABLE 9 CONTINUED

TAXA	STATIONS							
	SLE-1	SLE-5	SLE-8	SLW-1	SLW-5	SLW-9	EAST, TOTAL	WEST, TOTAL
2. Mastigophora	16.6 (50.0)	9.2 (62.5)	11.1 (54.8)	2.1 (60.0)	0.6 (78.6)	2.7 (54.8)	12.4	2.0
3. Sarcodina	1.3 (18.8)	1.6 (37.5)	2.0 (25.8)	* (6.7)	* (21.4)	0.1 (16.1)	1.7	*
G. Unidentified Taxa **	1.5 (12.5)	2.0 (25.0)	0.4 (16.1)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.0	0.0

* = less than 0.0%

** This taxon appears to be composed of one genus of light colored, spherical organisms, approximately 3-5 microns in diameter.

TABLE 10

Phytoplankton and Protozoan Trends and Dominants in the East Lagoon. Data are given as the mean number of organisms per ml, followed by the percentage of the total number this mean represents, in parentheses, and the major organism(s), arranged in order of decreasing abundance.

KEY TO ABBREVIATIONS

Anab = Anabaena
Ankf = Ankistrodesmus falcutus
Anks = Ankistrodesmus sp.
Chil = Chilomonas nr. paramecium
Chlp = Chlorella nr. pyrenoidosa
Chlv = Chlorella nr. vulgaris
Chrd = Chroococus dispersus
Chrm = Chroococus nr. minor
Chrn = Chroomonas nr. nordstedtii
Clam = Chlamydomonas
Cryp = Cryptomonas nr. ovata
Cycl = Cyclotella nr. meneghiniana
Glau = Glaucoma
Gole = Golenkina paucispina
Melg = Melosira granulata
Melv = Melosira nr. varians
Navi = Navicula
Nitz = Nitzschia nr. palae
Nost = Nostoc comminutum
Osci = Oscillatoria
Phac = Phacus
Step = Stephanodiscus nr. invisatatus
Trac = Trachelomonas
Vort = Vorticella

DATE	TOTAL NO./ML	CHLOROPHYTA	CYANOPHYTA	CHRYSOPHYTA	EUGLENOPHYTA	CILIOPHORA	MASTIGOPHORA
11- 9-73	1559.1	1391.0 (89.2%) Chlp, Clam	0.0 (0.0%)	154.1 (9.9%) Melg	13.9 (0.9%) Phac	0.0 (0.0%)	0.0 (0.0%)
11-16-73	903.2	291.7 (32.3%) Chlv, Clam	41.7 (4.6%) Osci	138.8 (15.4%) Melg	20.8 (2.3%) Phac	0.0 (0.0%)	409.7 (45.4%) Bodo
11-30-73	201.5	62.6 (31.0%) Chlv	13.9 (6.9%) Osci	104.2 (51.7%) Melg	13.9 (6.9%) Trac	0.0 (0.0%)	0.0 (0.0%)

TABLE 10 CONTINUED

DATE	TOTAL NO./ML	CHLOROPHYTA	CYANOPHYTA	CHRYSOPHYTA	EUGLENOPHYTA	CILIOPHORA	MASTIGOPHORA
12-21-73	805.6	729.2 (90.5%) Chlv, Clam	34.8 (4.3%) Chrm	20.8 (2.6%) Cycl	0.0 (0.0%)	20.8 (2.6%) Glau	0.0 (0.0%)
1-16-74	1927.6	1805.9 (93.7%) Chlv	76.4 (4.0%) Chrm, Chrd	90.3 (4.7%) Cycl	0.0 (0.0%)	0.0 (0.0%)	0.0 (0.0%)
1-30-74	2396.3	2028.3 (84.6%) Clam	62.5 (2.6%) Chrm, Chrd	211.8 (8.8%) Cycl	0.0 (0.0%)	86.8 (3.6%) Vort	7.0 (0.3%) Bodo
2-13-74	180.6	135.4 (75.0%) Clam	7.0 (3.8%) Chrm	3.5 (1.9%) Cycl	0.0 (0.0%)	20.8 (11.5%) Vort, Glau	10.4 (5.8%) Bodo
2-27-74	715.2	638.9 (89.3%) Chlp	76.4 (10.6%) Nost, Chrm	0.0 (0.0%)	0.0 (0.0%)	0.0 (0.0%)	0.0 (0.0%)
3-13-74	7878.5	7691.0 (97.6%) Chlp, Clam	10.4 (0.1%) Osci	0.0 (0.0%)	0.0 (0.0%)	170.2 (2.2%) Vort, Glau	6.9 (0.1%) Chil
3-29-74	9402.8	9194.4 (97.8%) Chlp	50.9 (0.5%) Chrm, Chrd	37.1 (0.4%) Navi	0.0 (0.0%)	0.0 (0.0%)	32.4 (0.3%) Chil

TABLE 10 CONTINUED

DATE	TOTAL NO./ML	CHLOROPHYTA	CYANOPHYTA	CHRYSOPHYTA	EUGLENOPHYTA	CILIOPHORA	MASTIGOPHORA
4-12-74	786.0	667.9 (85.0%) Clam, Chlp	0.0 (0.0%)	0.0 (0.0%)	0.0 (0.0%)	93.8 (11.9%) Glau, Vort	0.0 (0.0%)
4-26-74	324.6	258.4 (79.6%) Clam	2.3 (0.7%) Chrm, Chrd	31.2 (9.6%) Nitz	0.0 (0.0%)	25.8 (7.9%) Vort	3.4 (1.1%) Bodo
5- 7-74	537.5	382.2 (71.5%) Clam, Gole	6.9 (1.3%) Osci	10.4 (1.9%) Nitz, Melv	47.4 (8.8%) Trac	53.2 (9.9%) Glau	32.7 (6.1%) Chrn, Bodo
5-21.74	255.7	55.6 (21.7%) Clam	2.3 (0.9%) Osci, Chrm	20.8 (8.1%) Melv	134.3 (52.5%) Trac	40.5 (15.8%) Glau	2.3 (0.9%) Bodo
6-11-74	273.2	92.8 (34.0%) Chlp, Clam	4.6 (1.7%) Chrm	28.9 (10.6%) Nitz	69.4 (25.4%) Trac	77.6 (28.4%) Vort	0.0 (0.0%)
7-12-74	623.0	74.0 (11.9%) Clam, Chlp	12.7 (2.0%) Anab	18.5 (3.0%) Step	145.8 (23.4%) Trac, Phac	213.3 (34.2%) Glau	137.8 (22.1%) Cryp, Chrn
7-26-74	975.4	124.9 (12.8%) Ankf, Clam	56.7 (5.8%) Anab	20.8 (2.1%) Step, Cycl	112.2 (11.5%) Phac, Trac	142.3 (14.6%) Glau, Vort	434.0 (44.5%) Cryp

TABLE 10 CONTINUED

DATE	TOTAL NO./ML	CHLOROPHYTA	CYANOPHYTA	CHRYSOPHYTA	EUGLENOPHYTA	CILIOPHORA	MASTIGOPHORA
8- 9-74	3654.2	1297.1 (35.5%) Chlv, Anks Clam	129.6 (3.5%) Chrm, Anab	398.1 (10.9%) Step	240.7 (6.6%) Phac	177.0 (4.8%) Glau	1143.5 (31.3%) Cryp
8-20-74	18813.6	6505.9 (34.5%) Chlp, Anks	691.5 (3.7%) Anab	6126.1 (32.6%) Step	1136.6 (6.0%) Trac, Phac	274.3 (1.5%) Glau	2214.1 (11.8%) Cryp

TABLE 11

Phytoplankton and Protozoan Trends and Dominants in the West Lagoon. Data are given as the mean number of organisms per ml, followed by the percentage of the total number this mean represents, in parentheses, and the major organism(s), arranged in order of decreasing abundance.

KEY TO ABBREVIATIONS

Anab = Anabaena
Anac = Anabaena constricta
Anks = Ankistrodesmus sp.
Apha = Aphanocapsa rivularis
Aphz = Aphanizomenon flos-aquae
Chil = Chilomonas nr. paramecium
Chlp = Chlorella nr. pyrenoidosa
Chlv = Chlorella nr. vulgaris
Chrd = Chroococus dispersus
Chrm = Chroococus nr. minor
Chrn = Chroomonas nr. nordstedtii
Clam = Chlamydomonas
Cryp = Cryptomonas nr. ovata
Cycl = Cyclotella nr. meneghiniana
Cyum = Cyclidium
Eugl = Euglena
Frag = Fragilaria nr. construens
Glau = Glaucoma
Gole = Golenkina paucispina
Micr = Microcystis aeruginosa
Melg = Melosira granulata
Melv = Melosira nr. varians
Navi = Navicula
Nitz = Nitzschia nr. palae
Phac = Phacus
Scen = Scenedesmus nr. quadricauda var. parvus
Syne = Synedra ulna
Trac = Trachelomonas
Vort = Vorticella

DATE	TOTAL NO./ML	CHLOROPHYTA	CYANOPHYTA	CHRYSOPHYTA	EUGLENOPHYTA	CILIOPHORA	MASTIGOPHORA
11- 9-73	257.0	7.0 (2.7%) Scen	0.0 (0.0%)	48.6 (18.9%) Nitz, Melg	27.8 (10.8%) Phac	0.0 (0.0%)	173.6 (67.5%) Bodo
11-16-73	1319.4	118.0 (8.9%) Chlv	0.0 (0.0%)	69.5 (5.3%) Nitz	111.1 (8.4%) Eugl	7.0 (0.5%) Glau	1013.8 (76.8%) Bodo
11-30-73	680.4	465.2 (68.4%) Chlv	0.0 (0.0%)	187.4 (27.5%) Nitz, Navi	20.8 (3.1%) Trac	0.0 (0.0%)	7.0 (1.0%) Bodo

TABLE 11 CONTINUED

DATE	TOTAL NO./ML	CHLOROPHYTA	CYANOPHYTA	CHRYSOPHYTA	EUGLENOPHYTA	CILIOPHORA	MASTIGOPHORA
12-21-73	647.3	418.0 (64.6%) Clam	0.0 (0.0%)	201.4 (31.1%) Cycl	0.0 (0.0%)	0.0 (0.0%)	27.8 (4.3%) Bodo
1- 2-74	5812.6	4882.0 (84.0%) Chlv	166.7 (2.9%) Chrd	180.6 (3.1%) Cycl	0.0 (0.0%)	0.0 (0.0%)	583.4 (10.0%) Bodo
1-30-74	5250.1	4465.2 (85.0%) Clam	340.4 (6.5%) Chrd	284.8 (5.4%) Cycl	0.0 (0.0%)	62.5 (1.2%) Glau	97.2 (1.8%) Bodo, Cryp
2-13-74	5402.8	5277.7 (97.7%) Chlv	0.0 (0.0%)	27.8 (0.5%) Melg	0.0 (0.0%)	51.0 (0.9%) Cyum	46.3 (0.8%) Bodo, Cryp
2-27-74	10548.6	10284.7 (97.5%) Chlv	0.0 (0.0%)	0.0 (0.0%)	0.0 (0.0%)	263.9 (2.5%) Cyum	0.0 (0.0%)
3-13-74	6642.4	6569.4 (98.9%) Chlv	0.0 (0.0%)	90.4 (1.4%) Syne, Navi	0.0 (0.0%)	27.8 (0.4%) Glau	0.0 (0.0%)
3-29-74	2725.4	2426.7 (89.3%) Chlv	17.4 (0.6%) Anab, Chrm	7.0 (0.2%) Syne	0.0 (0.0%)	257.0 (9.4%) Glau, Vort	7.0 (0.2%) Cryp

TABLE 11 CONTINUED

DATE	TOTAL NO./ML	CHLOROPHYTA	CYANOPHYTA	CHRYSOPHYTA	EUGLENOPHYTA	CILIOPHORA	MASTIGOPHORA
4-12-74	8329.1	7957.4 (95.5%) Chlv	66.0 (0.8%) Chrm, Chrd	277.8 (3.3%) Frag	0.0 (0.0%)	10.4 (0.1%) Cyum	3.4 *
4-26-74	3306.4	3158.5 (95.5%) Chlv	5.7 (0.2%) Chrm	119.5 (3.6%) Cycl	12.7 (0.4%) Trac	2.3 (0.1%) Glau	8.7 (0.3%) Cryp
5-14-74	482.6	72.9 (15.1%) Chlv	12.2 (2.5%) Chrm	156.2 (32.4%) Cycl	93.7 (19.4%) Eugl	8.7 (1.8%) Cyum	138.9 (28.8%) Chrn, Cryp
5-28-74	204.8	19.7 (9.6%) Gole	0.0 (0.0%)	6.9 (3.4 Navi	32.4 (15.8%) Phac	101.8 (49.7%) Glau	44.0 (21.5%) Chrn
6-28-74	235.9	74.0 (31.4%) Clam, Anks	8.1 (3.4%) Apha, Anab	18.5 (7.8%) Melv	85.6 (36.3%) Phac	4.6 (2.0%) Vort, Cyum	45.1 (19.1%) Chrn, Cryp
7-19-74	632.9	353.0 (55.8%) Chlp	192.2 (30.4%) Anac, Micr	48.6 (7.7%) Melv, Nitz	6.9 (1.1%) Eugl, Trac	9.2 (1.4%) Vort	18.5 (2.9%) Cryp
8- 2-74	634.5	371.9 (58.6%) Chlv, Chlp	78.7 (12.4%) Micr	97.2 (15.3%) Nitz, Melv	15.0 (2.4%) Trac	57.8 (9.1%) Vort	3.5 (0.5%) Chil

TABLE 11 CONTINUED

DATE	TOTAL NO./ML	CHLOROPHYTA	CYANOPHYTA	CHRYSOPHYTA	EUGLENOPHYTA	CILIOPHORA	MASTIGOPHORA
8-15-74	1056.6	631.9 (59.7%) Chlp	158.5 (15.0%) Aphz, Anab	232.6 (22.6%) Melv, Melg	13.9 (1.3%) Eugl	13.7 (1.3%) Vort	4.6 (0.4%) Chil
8-29-74	13256.6	3128.2 (23.6%) Chlp	10046.3 (75.8%) Aphz	44.0 (0.3%) Melv	13.8 (0.1%) Trac	13.8 (0.1%) Vort	2.3 *

* = Less than 0.1%

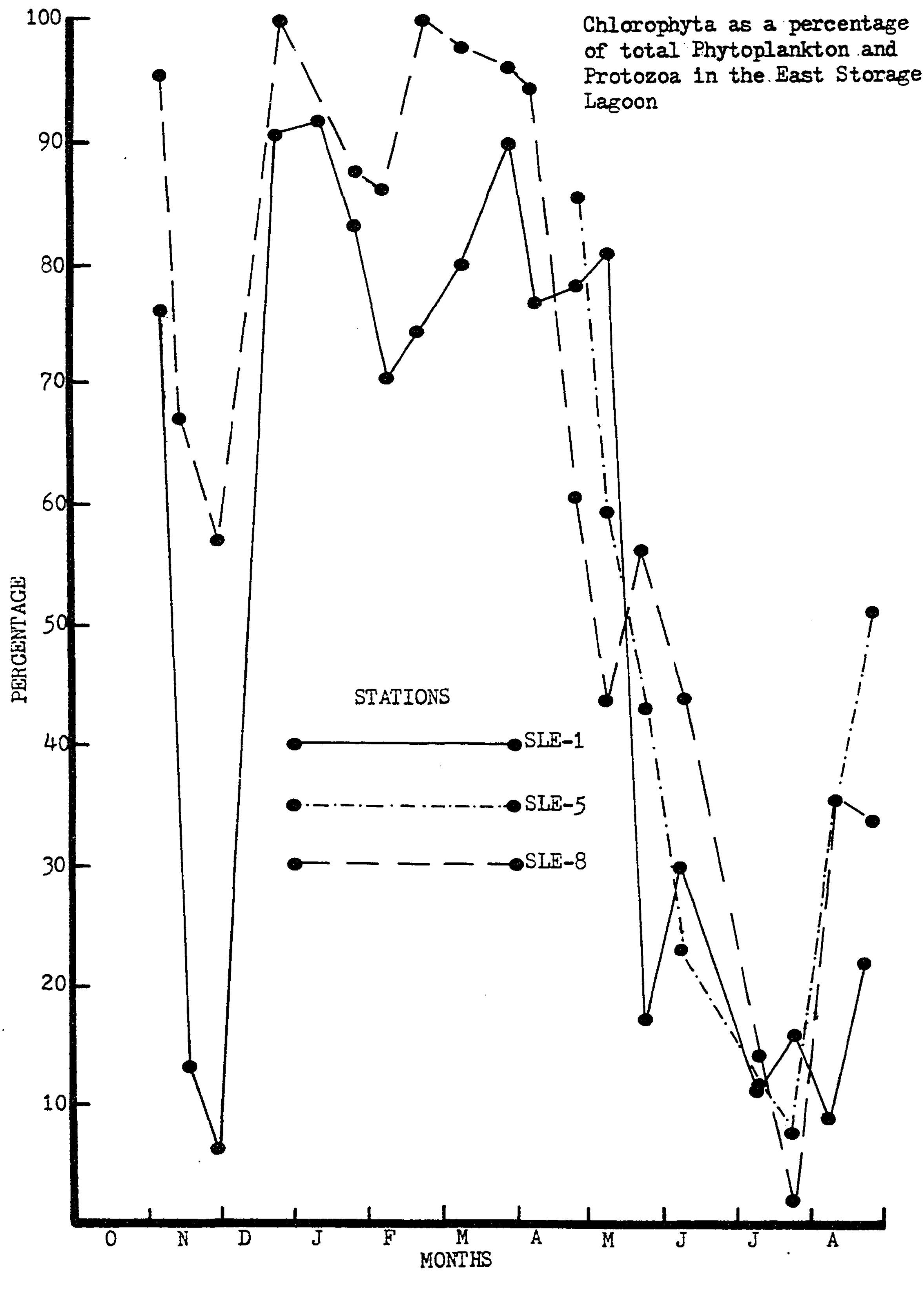
in the lagoons (Gloyna, 1971).

The percentage composition and occurrence of the phytoplankton and protozoan population, organized by station and group, is presented in Table 9, which also indicates the number of samples obtained from each lagoon and station. Calculations for determining the concentrations of phytoplankton followed the same methodologies as those utilized in the benthos Table 3, page 25.

The Chlorophyta clearly dominated the phytoplankton and protozoan population of both lagoons, comprising 55.4% in the East and 67.4% in the West. It is interesting to note that the proportion of the population of the green algae increased from a low of 39.6% at SLE-1 (station nearest to the point of wastewater discharge) to 47.2% at SLE-5, and to 67.9% at SLE-8 (station farthest away from the discharge).

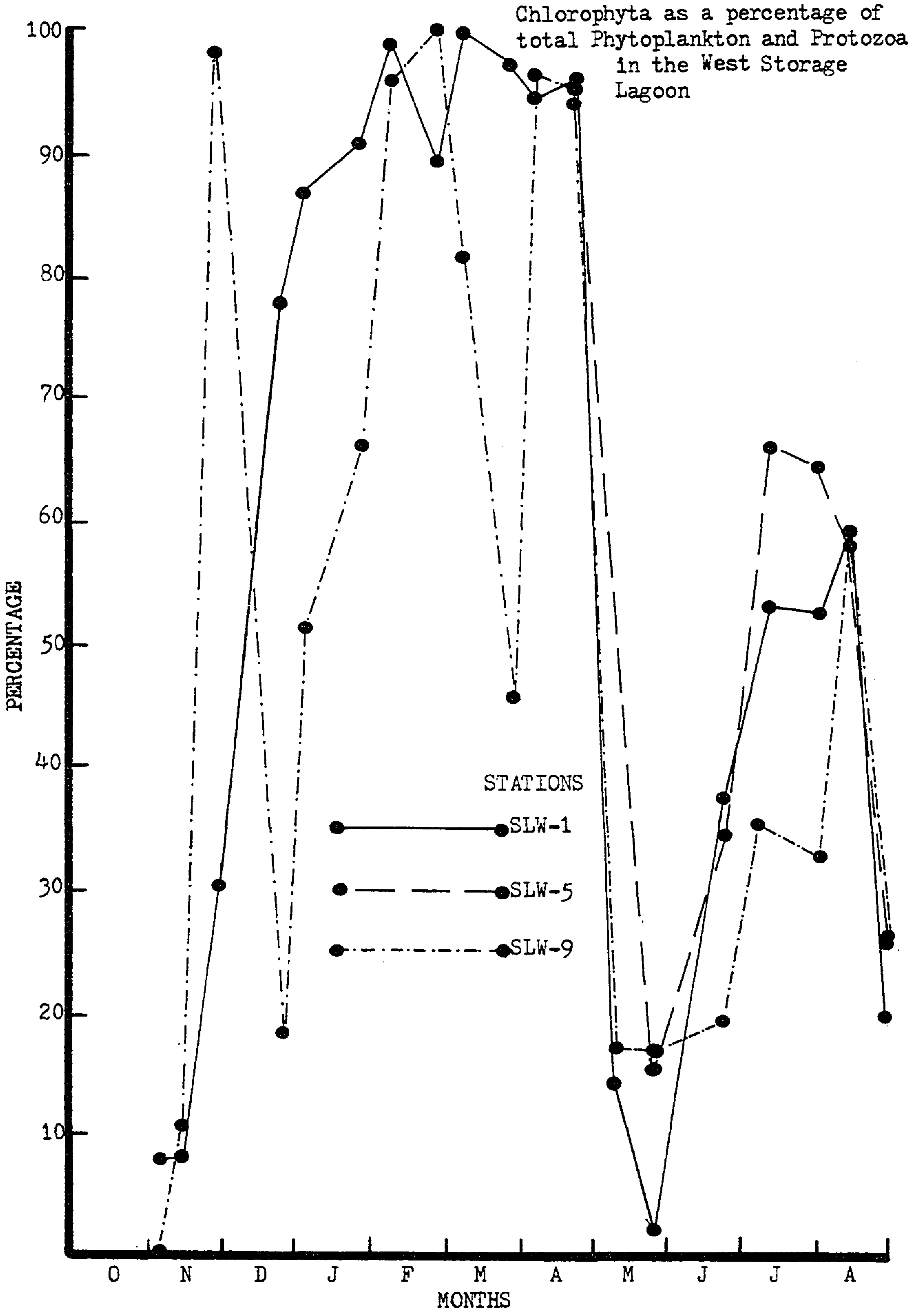
There was a major difference between the percentage of blue-green algae in the East and West Lagoons, with 25.3% of the phytoplankton and protozoan population in the West accounted for by the blue-greens but only 3.0% in the East. It should be noted, however, that the large Cyanophyta bloom (composed of Aphanizomenon flos-aquae) in the West Lagoon on 29 August 1974 accounted for most all of the blue-greens, 93.6%! On this one day 60,277.6 Cyanophyta organisms per ml were counted in the West Lagoon, while on the other 18 sampling dates a combined total of only 4,097.1 blue-green algae were observed. This type of late summer bloom is characteristic of the Cyanophyta and especially of Aphanizomenon, a genus well known for its troublesome blooms in standing bodies of water (Prescott, 1962). It is

FIGURE 14



Chlorophyta as a percentage of total Phytoplankton and Protozoa in the East Storage Lagoon
100
90
80
70
60
50
40
30
20
10
PERCENTAGE
STATIONS
SLE-1
SLE-5
SLE-8
O
N
D
J
F
M
A
M
J
J
A
MONTHS

FIGURE 15



Chlorophyta as a percentage of total Phytoplankton and Protozoa in the West Storage Lagoon
100
90
80
70
60
50
40
30
20
10
PERCENTAGE
STATIONS
SLW-1
SLW-5
SLW-9
O
N
D
J
F
M
A
M
J
J
A
MONTHS

surprising that the blue-green algae were more common in the seepage water West Lagoon than in the nutrient and organically richer wastewater East Lagoon. It may be, however, that the high amount of available nitrogen in the East Lagoon may eliminate some of the advantage that the nitrogen-fixing blue-green algae have over other algae.

A similar phenomena occurred with the diatoms, which represented 17.6% of the East Lagoon population and only 2.9% of the population in the West. A diatom pulse on the last sample date in the East Lagoon, 20 August 1974, accounted for the great majority of diatoms. On this one day a total of 36,756.6 diatoms per ml were observed at the three East Lagoon stations, while on the other 18 sampling dates a combined total of only 5,057.5 diatoms were counted.

The Euglenophyta, Ciliophora, and Mastigophora were all more common in the nutrient and organically richer East Lagoon than in the seepage water West Lagoon.

In both lagoons the green algae were the most common form during the winter and early spring (Figs. 14 and 15). During this time period, the green algae accounted for the majority of the total phytoplankton and protozoan population and for all of the pulses, while the Euglenophyta were notably absent. From a two-year study of waste-stabilization lagoons, Davis et. al. (1964) concluded that the green algae dominate during the winter months, and several pulses, rather than one peak, can be expected. They also concluded that the Euglenophyta population remains very scant during the winter months and occurs intermittently throughout the rest of the year. These

conclusions are supported by the findings in this investigation. Gloyna (1971), however, states that Euglena, together with Chlamydomonas, tend to dominate during cooler weather.

As shown by Tables 10 and 11, the dominant organisms within each phylum or class were comprised of only a few different genera throughout this study. One or more of only four genera were the major Chlorophyta on the 19 sampling dates in the East Lagoon. Chlorella nr. pyrenoidosa, Chlorella nr. vulgaris and Chlamydomonas spp. were the first dominant green algae. One or more of these two genera (three species) were the principal Chlorophyta from 9 November 1973 through 26 April 1974 and from 21 May 1974 through 12 July 1974. Chlamydomonas sp. and Golenkina paucispina were the most common algae on 7 May 1974. Ankistrodesmus falcutus and Ankistrodesmus sp., together with Chlorella spp. and Chlamydomonas spp. were the major Chlorophyta throughout the remainder of this study.

In the West Lagoon, the composition of the more abundant Chlorophyta was more varied than in the East Lagoon. Scenedesmus nr. quadricauda var. parvus was the dominant green alga on 9 November 1973 and Chlamydomonas spp. or Chlorella nr. vulgaris were the principal green algae from 16 November 1973 through 14 May 1974. Golenkina paucispina was dominant on 28 May 1974, Chlamydomonas spp. and Ankistrodesmus sp. were the most common forms on 28 June 1974, and Chlorella spp. dominated the green algae throughout the rest of this study in the West Lagoon.

Chlorella, Chlamydomonas, and Scenedesmus have been among the first genera of algae to become established in other lagoons also,

and they remain typical components of the Chlorophyta throughout the year (Gloyna, 1971). Gloyna (1971) also lists Golenkina as a typical green alga in waste-stabilization lagoons, while both Gloyna (1971) and Davis, et. al. (1964) include Ankistrodesmus as a common representative. The Chlorophyta population of the Muskegon Lagoons appears, therefore, to be quite typical of a wastewater lagoon environment.

The characteristic blue-green algae in the East Lagoon initially consisted of Oscillatoria spp., followed by Chroococcus nr. minor, Chroococcus dispersus and Nostoc comminutum, and in July and August, Anabaena spp. Chroococcus nr. minor, Chroococcus dispersus, and Anabaena spp. were also dominant in the West Lagoon, along with Aphanocapsa rivularis, Microcystis aeruginosa, and Aphanizomenon flos-aquae. Oscillatoria spp. was never a dominant in the West Lagoon. These species are not as typical of a wastewater lagoon as are the species of Chlorophyta. The only principal blue-green algae Gloyna (1971) listed were Oscillatoria and Anabaena, while Davis, et. al. (1964), listed four genera dominating the Cyanophyta, Anacystis, Oscillatoria, Phormidium and Spirulina.

With the exception of Chroococcus spp., the principal blue-green algae in the West Lagoon are quite characteristic of eutrophic waters. In a study of Lakes Michigan, Superior, Huron, and Erie, Scheleske and Roth (1973) found Aphanizomenon, Microcystis, and Anabaena to be the blue-green genera characteristic of the most eutrophic zones. Hutchinson (1967) listed the same three genera as dominant blue-green algae in eutrophic waters, especially in the temperate zone during the

summer months.

The diatoms in the West Lagoon were comprised mostly of six genera, Melosira nr. granulata, Melosira nr. varians, Nitzschia nr. palae, Navicula spp., Cyclotella nr. meneghiniana, Synedra ulna, and Fragilaria nr. construens. The latter two were never dominant diatoms in the wastewater East Lagoon, but the other four species, along with Stephanodiscus nr. invisitatus were the dominant diatoms in the East Lagoon. The only organism mentioned in the literature as typical of the diatom population in wastewater lagoons is Nitzschia (Gloyna, 1971). Nitzschia nr. palae, a species found in the Muskegon lagoons, was the only diatom present in a composite list of over 200 trickling filter organisms (Cooke, 1967).

Melosira granulata and Stephanodiscus spp. are very common representatives of the diatom population in eutrophic waters, with Melosira granulata very rarely occurring in oligotrophic waters. Cyclotella spp., which was often a common diatom in both lagoons, is listed by Hutchinson (1967) as an oligotrophic diatom, a fact which does not agree with the findings of this study. Other authors, however, report that Cyclotella meneghiniana is common in waters tending toward eutrophic conditions (Scheleske and Roth, 1973).

Phacus, Euglena, and Trachelomonas were the principal Euglenophyta in the West Lagoon, while only Phacus and Trachelomonas were the common Euglenophyta in the wastewater East Lagoon. The lack of Euglena as a dominant in the East Lagoon is surprising, for they, along with Phacus, are common dominants of the Euglenophyta in other wastewater lagoons (Gloyna, 1971 and Davis, et. al., 1964). Gloyna (1971) describes

Euglena as having the highest degree of adaptability to various lagoon conditions of any of the common lagoon inhabitants. The three genera of euglenophytes which were found in the Muskegon lagoons are all common in polluted waters rich in nitrogenous organic compounds (Hutchinson, 1967).

The Ciliophora in the East Lagoon were dominated by Glaucoma and Vorticella, whereas Glaucoma, Vorticella and Cyclidium were dominant in the West Lagoon. Vorticella is often the dominant protozoan present in secondary wastewater effluent (Yarma, et. al., 1975). Since the quality of the water discharged into the lagoons is equivalent to wastewater undergoing secondary treatment, this genera was expected to be present. All three genera found are common components of the Ciliophora in trickling filters (Cooke, 1967).

The dominant Mastigophora present in both lagoons were the same, Bodo spp., Chilomonas nr. paramecium, Chroomonas nr. nordstedtii, and Cryptomonas nr. ovata. Bodo spp. is a common representative of the Mastigophora in trickling filters (Cooke, 1967).

Chlorophyll a

In aquatic plants, as in terrestial plants, chlorophyll is the critical agent and initiator in a series of physical-chemical changes which are responsible for and culminate in the fauna. Due to chlorophyll's importance in photosynthesis, chlorophyll measurements may be used as indirect indices of potential productivity (Prescott, 1951, and Odum, 1971). Since the amount of chlorophyll increases in bodies of water as the waters become more eutrophic, chlorophyll measurements

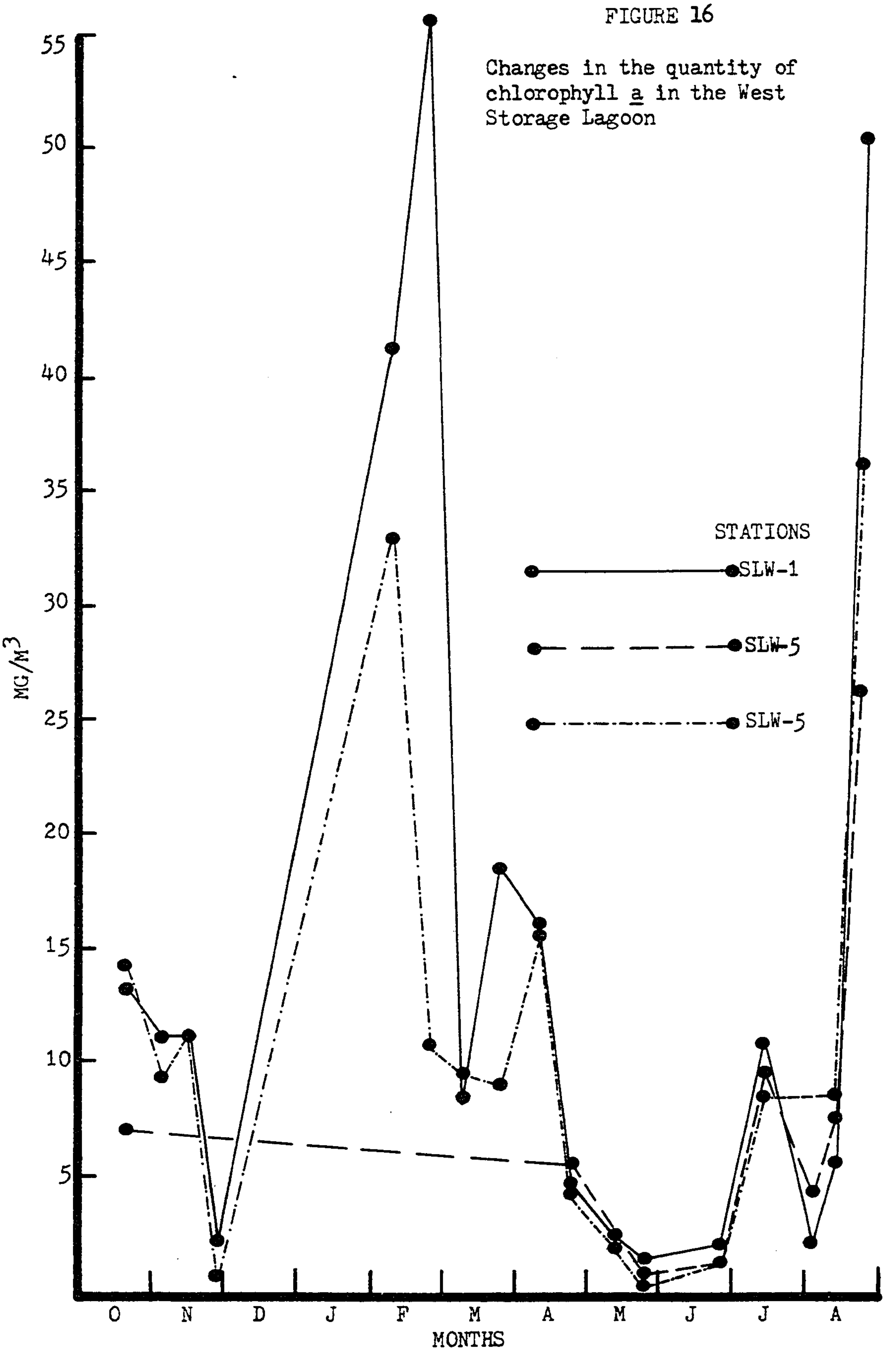
also provide comparative data on eutrophication (Mackenthun, 1973). All algae contain chlorophyll a and thus it is usually the specific pigment measured in chlorophyll determinations (Weber, 1973).

The chlorophyll a data are presented in Appendix D and are summarized in this section. Figure 16 shows the variability in the quantity of chlorophyll a at each station throughout the year in the West Storage Lagoon. Two major peaks in the quantity of chlorophyll a appeared, one during February and one in late August, 1974. The peak in February does not show a good correlation with the number of phytoplankton. On 13 February 1974, 42.99 mg chlorophyll a/m^3 was present at SLW-1 and 57.84 at SLW-9. The phytoplankton counts on this day were approximately 9400 organisms/ml at SLW-1 but only 4400 at SLW-9. On 27 February 1974 the quantity of chlorophyll a increased to 56.16 mg/m^3 at SLW-1 and decreased sharply to 9.7 at SLW-9, yet the phytoplankton remained fairly constant at SLW-1 and increased sharply to 11,277.7 organisms/ml at SLW-9. Since the environmental conditions did not fluctuate greatly, and the same species, Chlorella nr. vulgaris was dominant in all these cases, it appears that the viability of the algal cells varied during this period. On 29 August 1974 the quantity of chlorophyll a in the shallow sample at SLW-1 and SLW-9 was over 50 mg/m^3, and the phytoplankton counts were over 14,000 and 11,000 organisms/ml, respectively, at each station.

Unfortunately, the East Lagoon chlorophyll samples from 26 April 1974 through 2 August 1974 were misplaced and cannot be included in these results. Due to this large block of missing data, a meaningful

FIGURE 16

Changes in the quantity of chlorophyll a in the West Storage Lagoon



graph of chlorophyll a could not be made for the East Lagoon.

A comparison of the mean quantity of chlorophyll a by depth and lagoon is presented in Table 12. This table also indicates the large variability of this parameter.

The chlorophyll a concentrations for both lagoons are not exceedingly high compared to natural waters. Caution must be exercised, however, in making comparisons since the quantity of chlorophyll a per unit of algae present is influenced by various environmental and nutritional factors, as well as the species and age or viability of the algal cells (Weber, 1973). Lake Kinneret, Israel, has had some of the highest reported concentrations of chlorophyll a, over 300 mg/m^3 (Berman and Pollingher, 1974). Concentrations in the Great Lakes are much lower, ranging from a low of 0.66 mg/m^3 in Lake Superior to a high of 12.1 mg/m^3 in Lake Erie (Scheleske and Roth, 1973).

Primary productivity

The rate of uptake of inorganic carbon by phytoplankton during photosynthesis is known as primary productivity. The basic aim of these measurements was to provide an estimate of the quantity of organic matter which was produced from inorganic substances within the lagoons. It is assumed that during photosynthesis one molecule of oxygen is released for each atom of carbon assimilated (American Public Health Association, 1971). These measurements, therefore, also provide information concerning the rate of oxygen production, an important consideration in the heavily stressed lagoon environment.

The primary productivity data are presented in Appendix E and

TABLE 12

Comparison of the Quantity of Chlorophyll a in the East and West Lagoons. Data are given as the mean (mg/m3) ± one standard deviation.

KEY TO ABBREVIATIONS

S = shallow samples D = deep samples B = both depths

DATE	LAGOON					
	EAST			WEST		
	S	D	B	S	D	B
10-26-73	4.22 ± 2.84			11.61 ± 3.88		
11- 9-73	1.67 ± 1.24			10.18 ± 1.79		
11-16-73	0.73 ± 0.07			11.56 ± 0.08		
11-30-73	0.42 ± 0.05			1.46 ± 0.84		
2-13-74	0.34 ± 0.10	0.24 ± 0.03	0.29 ± 0.09	50.41 ± 10.50		
2-27-74	0.24 ± 0.05	0.51 ± 0.34	0.38 ± 0.25	32.93 ± 32.84	34.55 ± 30.56	33.74 ± 25.92
3-13-74	0.16 ± 0.15	0.25 ± 0.00	0.20 ± 0.10	10.54 ± 0.43	6.61 ± 2.41	8.57 ± 2.67
3-29-74	0.12 ± 0.08	0.15 ± 0.11	0.14 ± 0.08	10.66 ± 8.31	16.56 ± 17.03	13.61 ± 10.58
4-12-74	0.08 ± *	0.16 ± 0.12	0.13 ± 0.09	19.69 ± 2.13	13.37 ± 1.19	16.53 ± 3.91
4-26-74				5.60 ± 0.95	4.71 ± 0.66	5.15 ± 0.89

TABLE 12 CONTINUED

DATE	LAGOON					
	EAST			WEST		
	S	D	B	S	D	B
5-14-74				2.30 ± 0.06	2.75 ± 0.16	2.53 ± 0.28
5-28-74				1.13 ± 0.63	0.91 ± 0.48	1.00 ± 0.38
6-28-74				1.45 ± 0.15	2.13 ± 0.77	1.79 ± 0.62
7-10-74				9.95 ± 2.36	9.23 ± 0.56	9.29 ± 1.60
8- 2-74				5.32 ± 1.25	1.85 ± 0.58	3.59 ± 2.15
8- 9-74	9.10 ± 7.16	6.80 ± 2.69	7.95 ± 5.00			
8-15-74				9.28 ± 1.03	5.59 ± 3.36	7.53 ± 3.08
8-20-74	22.88 ± 5.16	24.01 ± 15.21	23.45 ± 9.30			
8-29-74				43.98 ± 14.98	33.96 ± 14.07	38.97 ± 14.11

* = only one sample

are summarized in this section. There was a general increase in the primary productivity in the East Lagoon during the summer (Fig. 17). The rates of carbon fixation in this lagoon ranged from a low of 3.47 mg $C/m^3/hr$ on 11 June 1974 to an extremely high value of 1,476.55 on 20 August, 1974 (Table 13).

There was also a general increase in primary productivity in the West Lagoon during the summer (Fig. 18). The rates of carbon fixation ranged from a low of 11.06 mg $C/m^3/hr$ on 28 May 1974 in the deep sample (a depth equal to the secchi disk transparency) to an extremely high value of 1,649.31 on 29 August 1974 in the shallow sample (a depth equal to one-half the secchi disk transparency). These highs and lows in the West Lagoon correspond with the summer highs and lows for the concentrations of chlorophyll a. Due to missing data, the same comparison cannot be made for the East Lagoon.

Physical Parameters

The data from the physical parameters are presented in Appendix F. The direction of flow of the wastewater, as controlled in the various gates, had an apparent effect upon only one parameter, secchi disk transparency.

Turbidity

With the exception of SLE-1, turbidity was fairly constant at each station and depth, and the only apparent major trend was higher turbidity in the East than in the West Lagoon. In the West Lagoon, the mean turbidity was 3.5 ± 1.5 Formazin Turbidity Units (FTU).

FIGURE 17

Changes in primary productivity in the East Storage Lagoon (Ordinate is a partial 4 cycle logarithmic scale)

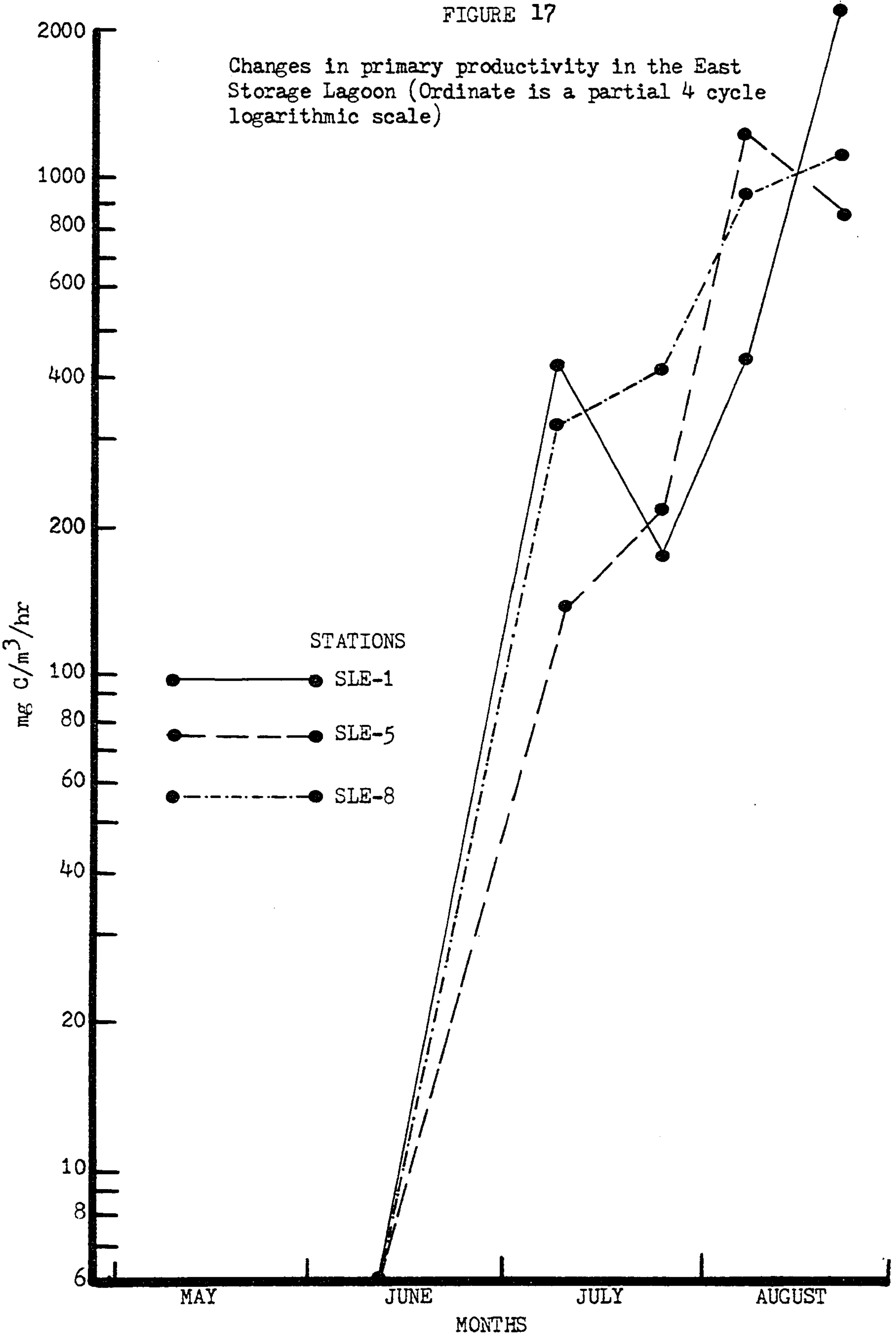


FIGURE 18

Changes in primary productivity in the West Storage Lagoon (Ordinate is a partial 4 cycle logarithmic scale)

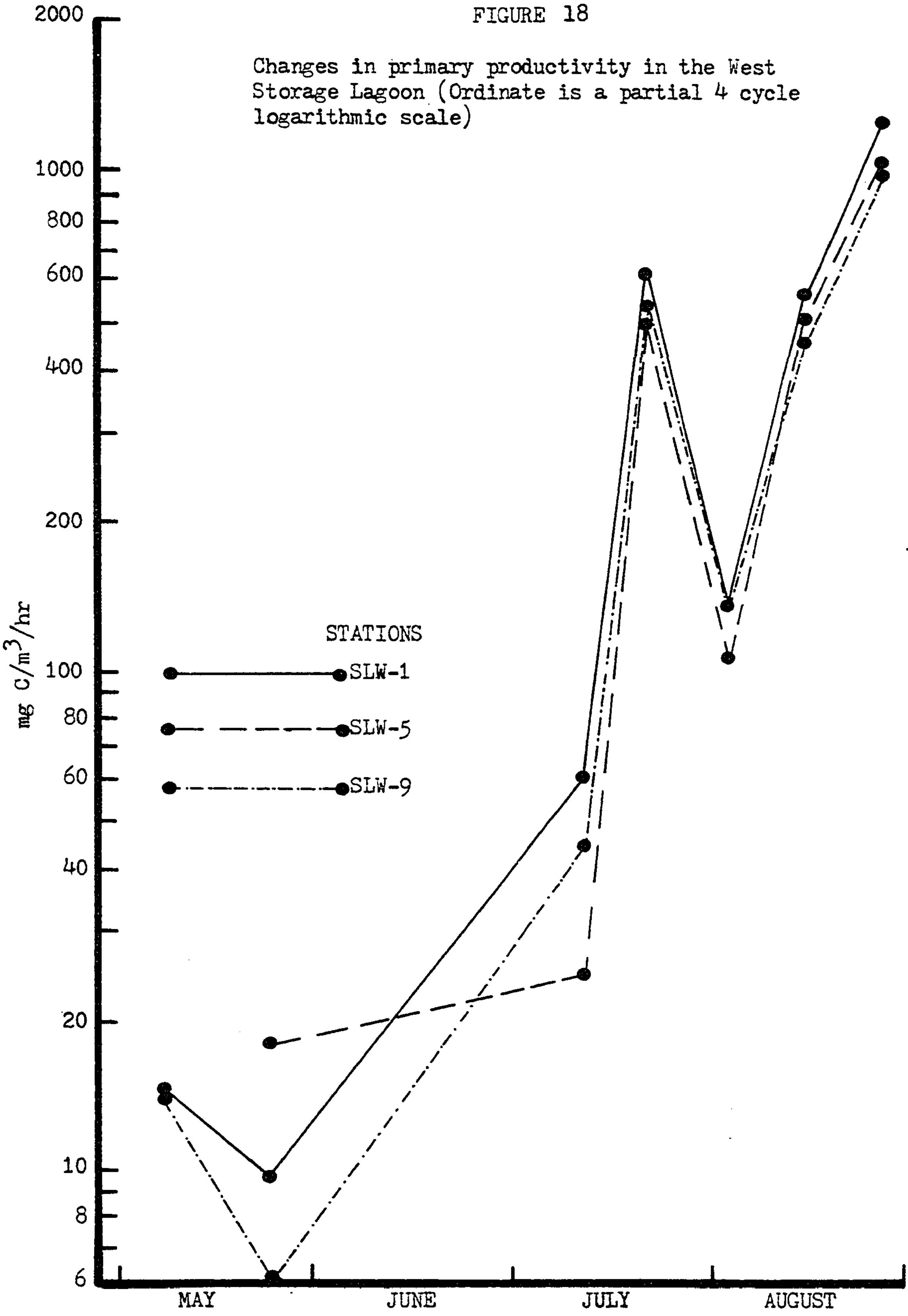


TABLE 13

Comparison of Primary Productivity in the East and West Lagoons. Data are given as the mean (mg C/m^3/hr) ± one standard deviation.

KEY TO ABBREVIATIONS

S = shallow samples D = deep samples B = both depths

DATE	LAGOON			
	EAST	WEST		
	S	S	D	B
5-14-74			14.96 ± 0.09	
5-28-74			11.06 ± 5.76	
6-11-74	3.47 ± 2.78			
7-12-74	289.00 ± 134.46		44.56 ± 17.38	
7-19-74		759.54 ± 130.70	347.55 ± 29.00	553.55 ± 241.02
7-26-74	267.70 ± 119.73			
8- 2-74		154.15 ± 10.87	121.70 ± 19.55	137.96 ± 22.72
8- 9-74	884.10 ± 427.18			
8-15-74		587.01 ± 73.39	464.76 ± 42.02	525.90 ± 85.69
8-20-74	1476.55 ± 787.60			
8-29-74		1649.31 ± 60.90	579.17 ± 228.58	1114.24 ± 604.94

The range was from a low of 1.7 FTU at SLW-1 and SLW-5 on 15 August 1974 to a high of 7.4 FTU at SLW-1 on 2 August 1974. Only minor differences in turbidity were apparent between the two depths at each station.

In the East Lagoon, the mean turbidity was 11.7 ± 6.5 FTU. The turbidity at station SLE-5 was always close to the turbidity at SLE-8. At SLE-1, closest station to the inflow of the semi-treated wastewater, the turbidity was consistently much higher, and was more variable between the two depths. The range at SLW-1 was from a low of 4.2 FTU on 12 July 1974 to a high of 34 on 21 May 1974, while the range at the other two stations was from a low of 3.7 FTU at SLW-5 on 12 July 1974 to a high of 16 at SLE-8 on 26 April 1974.

Since turbidity did not correspond with the fluctuating plankton population, and since turbidity at SLE-1 was much greater than at any other station, it appears that suspended matter such as clay, silt, and finely divided organic and inorganic detritus, rather than aquatic organisms, accounts for the majority of the turbidity.

Secchi disk transparency

The transparency in the East Lagoon was very small and consistently remained much lower than in the West Lagoon. The mean in the East Lagoon, 17.0 cm ± 3.3, was only 17.6% of the mean in the West Lagoon, 96.3 cm ± 18.5. The lowest values were at SLE-1 on all but one occasion, 9 August 1974. On this date, the exit to the outlet lagoon was open (Fig. 1) and it is quite possible that the incoming wastewater was not mixing completely with the lagoon wastewater but rather

was short-circuiting directly to the outlet. This outlet gate was open from 5 July through 29 August 1974, and during this time the maximum transparencies at SLE-1 were recorded. There was no appreciable difference during the period when the equalizing gate was open and water flowed from the East into the West Lagoon.

pH

The pH in the East Lagoon had a mean of 7.7 ± 0.2, while the mean in the West Lagoon was more alkaline, 8.1 ± 0.3. Periods of high photosynthetic activity did not appear to elevate the pH in either lagoon, indicating a good buffering capacity in these waters.

Conductivity

The conductivity at each station in the East Lagoon consistently remained higher than at each station in the West Lagoon, except on 21 December 1973. There were minor variations between stations and depths within each lagoon, and an overall increase in conductivity throughout this investigation. The mean conductivity in each lagoon is given in Table 14.

Temperature

The mean temperature ± one standard deviation for each lagoon and sampling date is presented in Table 15. There was very little variation in water temperature between stations and between the two depths sampled on the same date, except for slight elevation in temperature at SLE-1 in the winter months due to the incoming waste-

water. There was, of course, a great deal of seasonal variation.

TABLE 14

Comparison of Turbidity, Secchi Disk Transparency, pH, and Conductivity in the East and West Lagoons. Data are given as the mean ± one standard deviation.

PARAMETER	LAGOON	
	EAST	WEST
Turbidity, FTU	11.7 ± 6.5	3.5 ± 1.5
Secchi Disk Transparency, cm	17 ± 3	96 ± 18
pH	7.7 ± 0.2	8.1 ± 0.3
Conductivity, micro-mhos	970 ± 221	711 ± 196

Dissolved Oxygen and Biochemical Oxygen Demand

The data from these parameters are presented in Appendix F. The mean dissolved oxygen (DO) and biochemical oxygen demand (BOD) ± one standard deviation for each lagoon and sampling date is presented in Table 15. The direction of flow of the wastewater, as controlled by the various gates, had little apparent effect upon these parameters.

Dissolved oxygen

With the exception of 9 November 1973, and immediately after the ice broke up on 29 March 1974, the mean DO levels consistently remained very low in the East Lagoon, and much below the DO levels in the West Lagoon. During the first several months of this investigation, there was a large difference in the DO levels between stations in the East Lagoon, as evidenced by the large standard deviations

TABLE 15

Comparison of Temperature, Dissolved Oxygen, and Biochemical Oxygen Demand in the East and West Lagoons. Data are given as the mean ± one standard deviation.

KEY TO ABBREVIATIONS

TEMP = Temperature, °C DO = Dissolved Oxygen, mg/l BOD = Five Day Biochemical Oxygen Demand, mg/l

DATE	LAGOON					
	EAST			WEST		
	TEMP	DO	BOD	TEMP	DO	BOD
10-26-73	10.3 ± 0.3	3.1 ± 1.9	14.7 ± 13.3	10.0 ± 0.0	8.4 ± 0.2	3.7 ± 2.5
11- 9-73	9.3 ± 0.4	8.1 ± 4.5	19.2 ± 16.8	9.3 ± 0.4	11.8 ± 0.1	4.4 ± 0.2
11-16-73	9.0 ± 0.0	5.2 ± 3.5	19.5 ± 22.0	9.0 ± 0.0	10.5 ± 0.4	1.6 ± 0.5
11-30-73	7.8 ± 0.4	7.0 ± 4.0	32.5 ± 30.4	7.5 ± 0.0	11.6 ± 0.4	0.5 ± 0.7
12-21-73	0.8 ± 0.3	3.7 ± 2.4	34.5 ± 27.6	0.5 ± 0.0	14.2 ± 1.1	6.5 ± 0.7
1- 2-74	0.5 ± *	3.9 ± *	**	0.0 ± 0.0	13.6 ± 0.3	**
1-16-74	2.0 ± 0.0	0.2 ± 0.1	16.0 ± 4.2			
1-30-74	2.4 ± 0.8	1.4 ± 2.3	15.3 ± 5.5	1.0 ± 0.0	10.8 ± 1.3	7.0 ± 0.0
2-13-74	2.2 ± 0.3	0.3 ± 0.2	14.0 ± 2.3	0.8 ± 0.3	12.9 ± 2.5	5.6 ± 3.2
2-27-74	1.5 ± 0.6	0.0 ± 0.0	19.8 ± 3.3	0.8 ± 0.3	11.2 ± 1.8	6.8 ± 4.1

TABLE 15 CONTINUED

DATE	LAGOON					
	EAST			WEST		
	TEMP	DO	BOD	TEMP	DO	BOD
3-13-74	3.8 ± 0.3	2.6 ± 0.8	17.2 ± 2.6	3.1 ± 0.2	12.8 ± 0.1	4.5 ± 0.6
3-29-74	3.0 ± 0.6	7.6 ± 1.6	14.2 ± 0.5	1.5 ± 0.6	14.5 ± 1.2	5.2 ± 0.9
4-12-74	8.8 ± 0.4	3.0 ± 0.8	15.5 ± 7.6	6.0 ± 0.0	10.2 ± 0.3	8.0 ± 3.1
4-26-74	12.3 ± 0.5	2.9 ± 0.6	11.5 ± 6.2	12.6 ± 0.9	8.9 ± 0.4	4.7 ± 0.5
5- 7-74	14.1 ± 0.9	2.6 ± 1.1	19.8 ± 9.7			
5-14-74				11.0 ± 0.0	8.6 ± 0.4	4.2 ± 1.2
5-21-74	17.5 ± 0.8	1.4 ± 0.7	5.1 ± 2.8			
5-28-74				16.0 ± 0.0	7.2 ± 0.2	2.6 ± 0.6
6-11-74	20.0 ± 0.0	2.1 ± 0.9	31.3 ± 3.0			
6-28-74				22.3 ± 0.7	5.4 ± 0.2	7.2 ± 1.2
7-12-74	27.0 ± 0.8	0.1 ± 0.1	17.8 ± 5.7			
7-19-74				25.6 ± 0.2	6.4 ± 0.5	3.6 ± 1.0
7-26-74	24.2 ± 0.3	0.0 ± 0.0	17.0 ± 3.5			

TABLE 15 CONTINUED

DATE	LAGOON					
	EAST			WEST		
	TEMP	DO	BOD	TEMP	DO	BOD
8- 2-74				23.4 ± 0.2	6.8 ± 0.2	3.5 ± 0.0
8- 9-74	24.9 ± 0.2	1.6 ± 1.1	16.0 ± 2.7			
8-15-74				23.0 ± 0.0	8.5 ± 0.2	2.6 ± 1.9
8-20-74	25.0 ± 0.0	2.4 ± 1.8	***			
8-29-74				23.0 ± 0.0	11.9 ± 1.0	****

* = only one sample
** = bad dilution water
*** = DO consumed
**** = incubator broken

(Table 15). The DO at SLE-1 was quite a bit lower than at SLW-8. By 2 January 1974, however, the DO had dropped at SLE-8 and it remained more uniform within the lagoon on all subsequent sampling dates. There were two periods of especially low DO in the East Lagoon, one during ice-cover and the other during July and August, when the water temperatures were at their maximum (Fig. 19). The DO levels in the West Lagoon did not experience a similar decline during the ice-cover, but did experience an early summer decline, with recovery in August (Fig. 20).

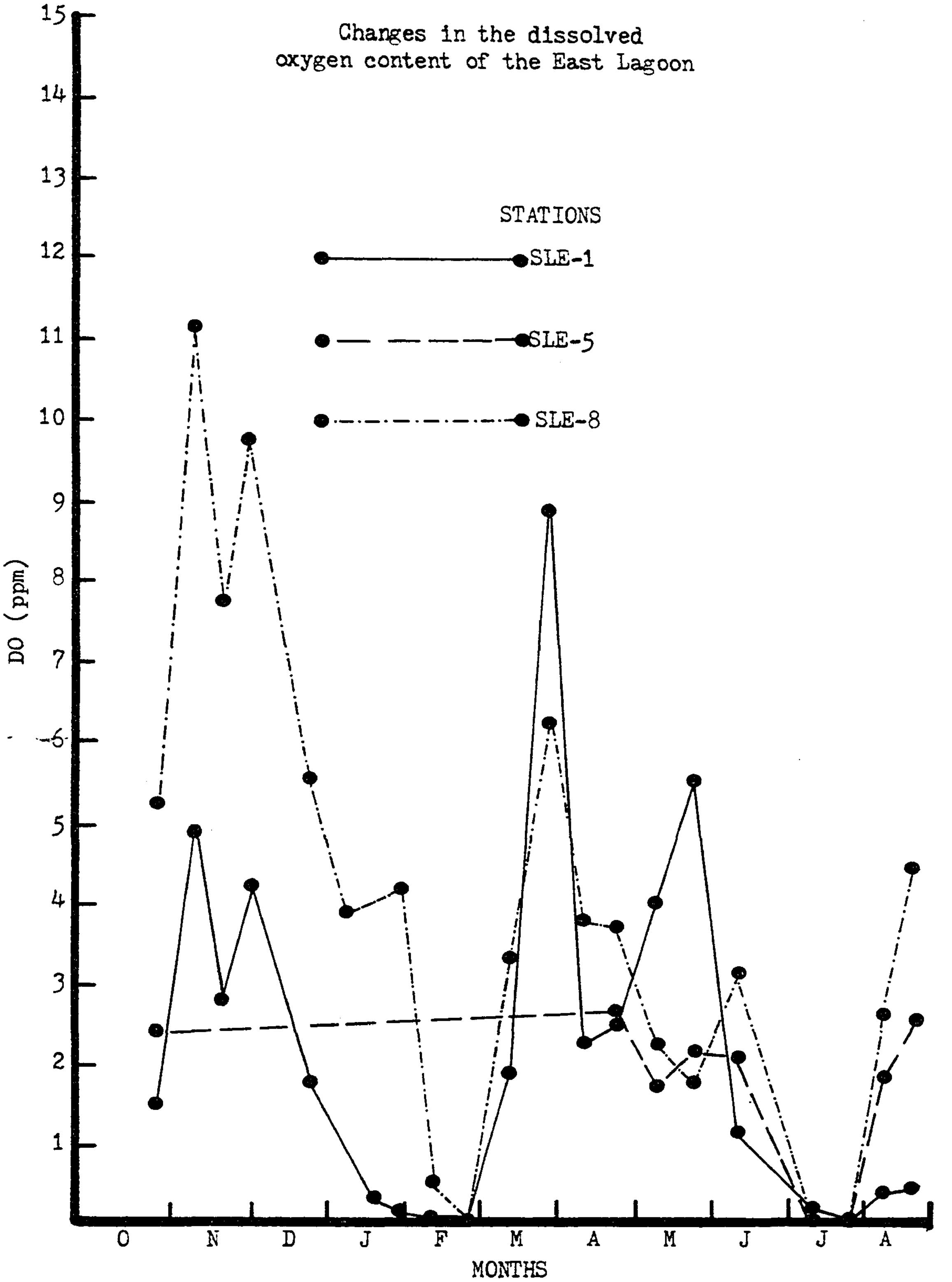
On only one occasion, 29 August 1974 in the West Lagoon, did a phytoplankton bloom coincide with a peak in DO. The other phytoplankton peaks are not evident by observing the DO values. This suggests that there may be a significant heterotrophic algae growth occurring in both lagoons, a common situation in waste lagoons (Zajic and Chiu, 1970, and Wiedeman, 1970).

Biochemical oxygen demand

The biochemical oxygen demand (BOD) was consistently higher in the East Lagoon, due to the nature of the wastewater, than in the West Lagoon. This, in part, accounts for the lower DO levels in the East Lagoon. Similar to the situation for DO, during the first several months of this investigation, there was a large difference in the BOD levels between stations in the East Lagoon, as evidenced by the large standard deviations. By January, however, the wastewater constituents had obtained a more homogeneous distribution within this lagoon and the BOD at SLE-1 was close to the BOD at SLE-8 (Fig. 21).

FIGURE 19

Changes in the dissolved oxygen content of the East Lagoon



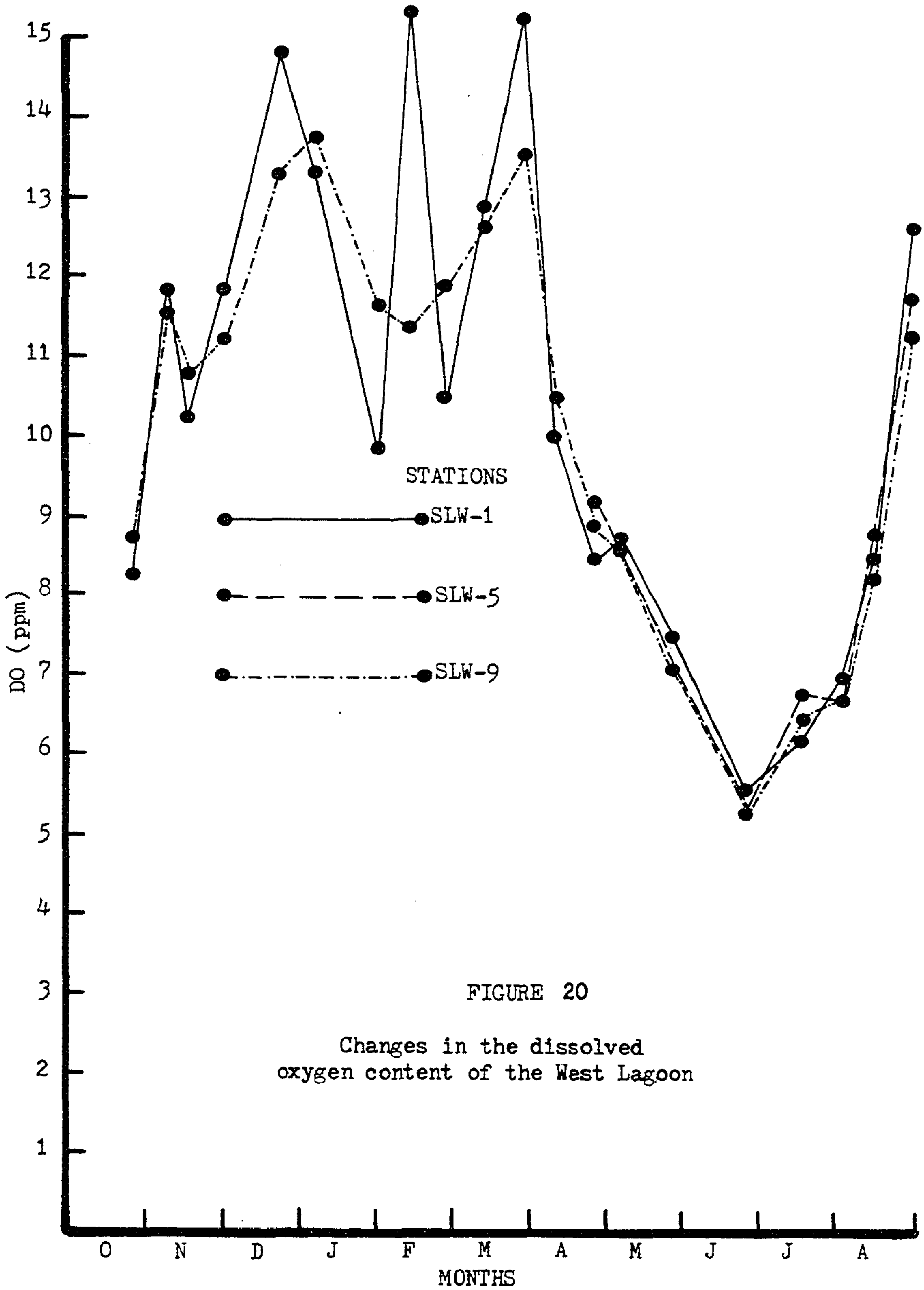


FIGURE 20

Changes in the dissolved oxygen content of the West Lagoon

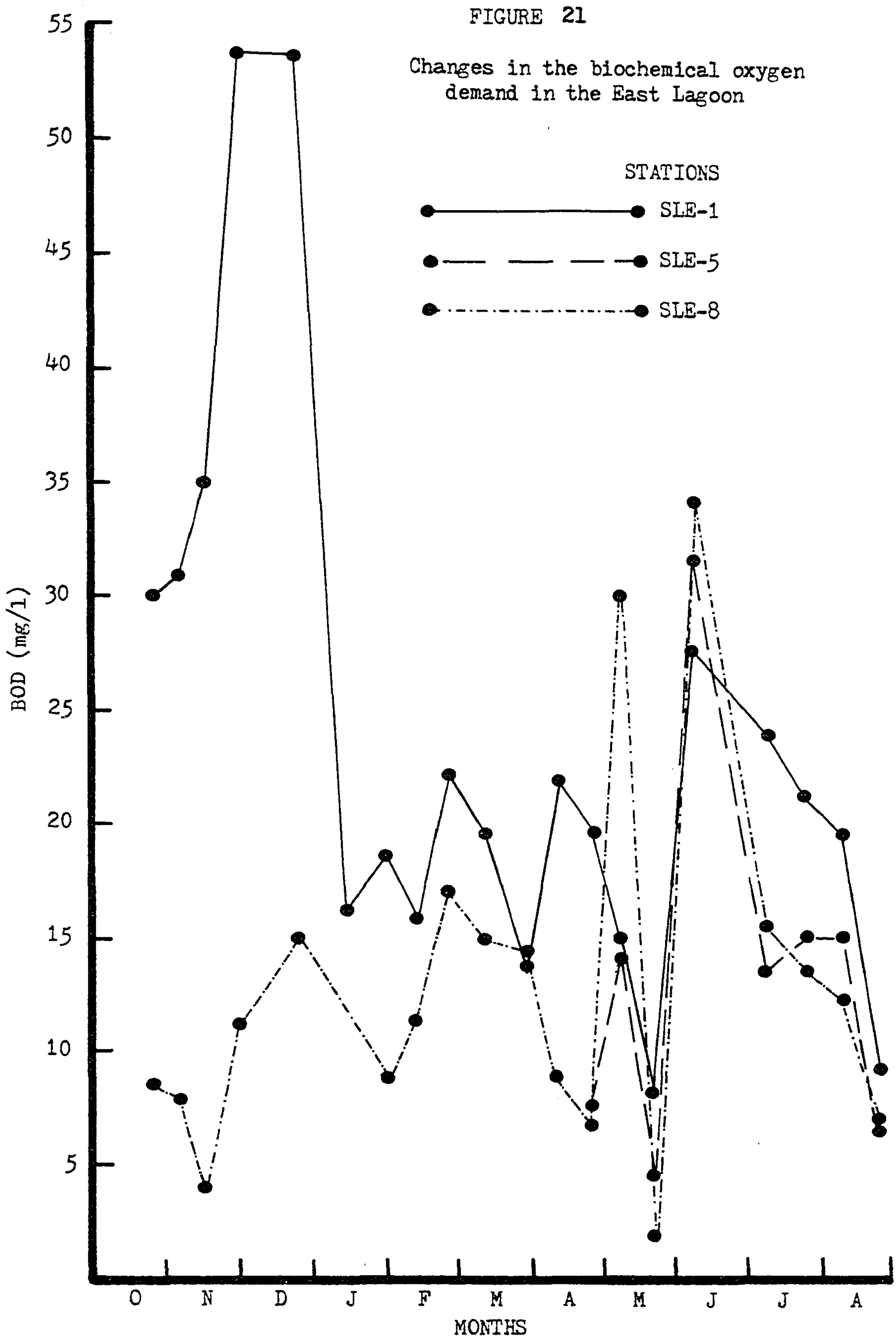
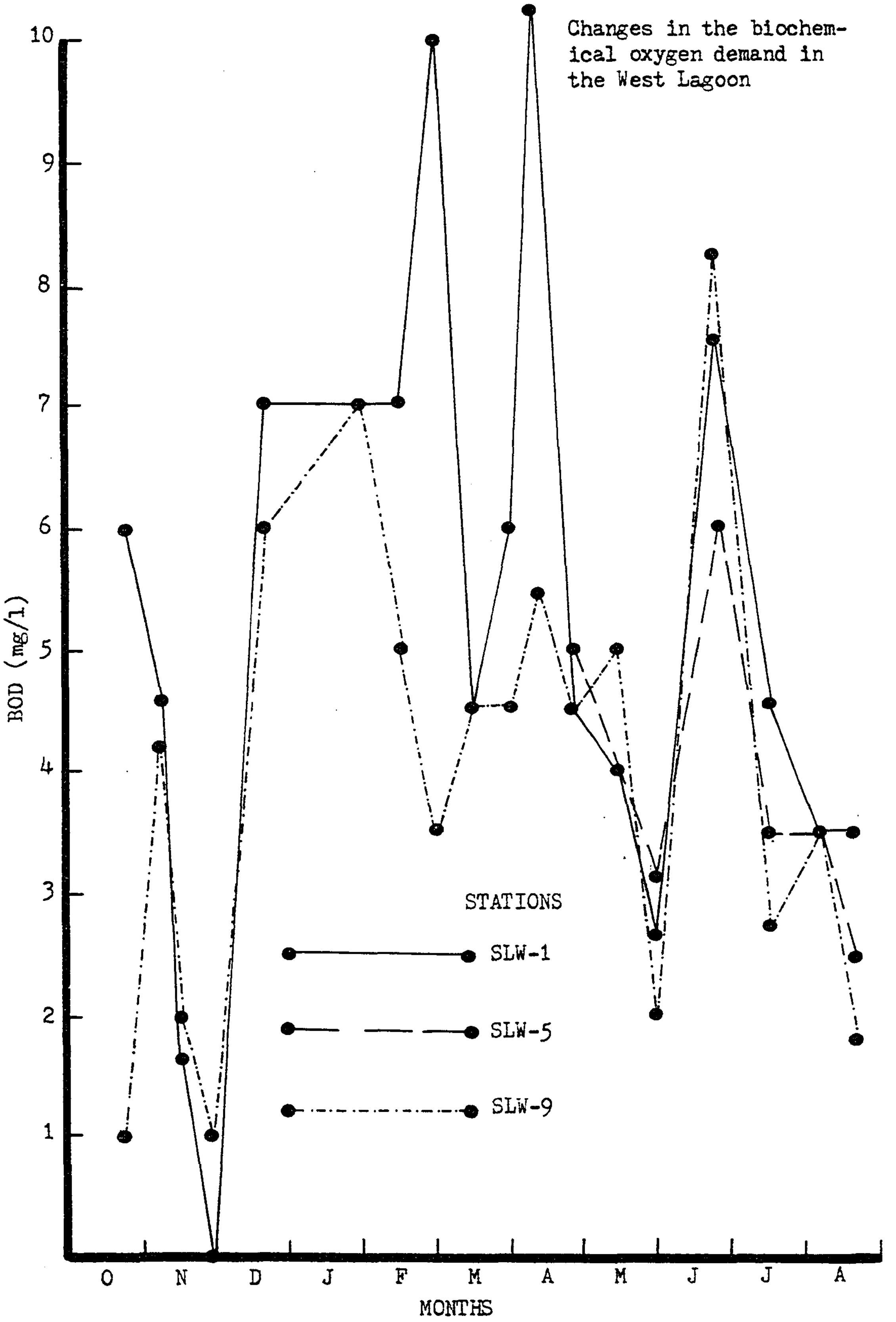


FIGURE 21
Changes in the biochemical oxygen demand in the East Lagoon
STATIONS
SLE-1
SLE-5
SLE-8
BOD (mg/l)
55
50
45
40
35
30
25
20
15
10
5
O
N
D
J
F
M
A
M
J
J
A
MONTHS

FIGURE 22



Changes in the biochemical oxygen demand in the West Lagoon

Total Organic Carbon

The total organic carbon (TOC) data are presented along with the data from the physical parameters in Appendix F. The overall mean concentration of total organic carbon in the East Lagoon, 41.6 mg of carbon/l ± 12.9 was much greater than the overall mean in the West Lagoon, 26.2 ± 17.6. On two occasions, however, the West Lagoon did have a greater amount of total organic carbon. These pulses, on 29 March 1974 and 14 May 1974, do not correspond to any phytoplankton bloom and are unexplainable with the present data. Total organic carbon was more homogeneous in the West Lagoon than in the East Lagoon.

Nutrients, Anions, and Metals

The data from these parameters are presented in Appendix G. Table 16 is a summary of this data, and presents for each parameter, the mean ± one standard deviation. Only one parameter, ammonia nitrogen, was noticeably affected by a change in flow due to gate positions.

Ammonia nitrogen

The concentration of ammonia nitrogen was much higher in the East Lagoon than in the West Lagoon due to the high levels of ammonia in domestic and industrial wastes. The mean concentration of ammonia nitrogen in the West Lagoon was only 4.3% of the mean in the East Lagoon, and the concentration was very often below 0.1 mg/l.

In the East Lagoon from 2 January 1974 through 11 June 1974 there was an overall general rise in the amount of ammonia, from a low of 1.0 mg/l to a high of 5.6. Throughout the remainder of this study, however, the ammonia levels decreased in the East Lagoon to a low of 0.3 mg/l on 20 August 1974. Just prior to this period of rapid decline in ammonia levels, the wastewater flow pattern was altered in the East Lagoon. The gate to the outlet cell was opened, thus allowing the incoming wastewater to enter the East Lagoon, but instead of mixing with the lagoon water, immediately flow back out to be used for irrigation water. It appeared, from the flow of surface foam, that this short-circuiting was occurring. However, secchi disk transparency was the only other parameter to bear this out. This could possibly be due to the fact that ammonia is rapidly oxidized to nitrite and nitrate nitrogen, and therefore, in order to maintain the high levels of ammonia which were present, a continual influx was required. Without continual replenishment, the ammonia levels plummetted. Most of the other parameters do not change form so rapidly, and thus the levels could not drop quickly. This fluctuation accounts for a great deal of the rather large standard deviation.

Nitrate nitrogen

The difference between the concentration of nitrate nitrogen in the two lagoons was much less than for ammonia. There was a great deal of fluctuation in the nitrate levels, as evidenced by the large standard deviations. The standard deviation was larger than

the mean in the East Lagoon and was over 50% of the mean in the West Lagoon.

Orthophosphate

Due to the high amount of phosphate in domestic sewage, the mean concentration of orthophosphate in the East Lagoon was quite high, 4.47 mg/l ± 1.23, and 5.5 times greater than the mean of 0.80 ± 0.97 in the West Lagoon. Unlike the situation in many natural waters, phosphorous does not seem to limit phytoplankton growth or control standing crops, at least in the East Lagoon.

The great fluctuations in the concentrations of orthophosphate in the West Lagoon is puzzling. In January 1974 the concentration was 2.3 and 3.8 mg/l, yet on the next four consecutive samples, during February and March 1974, it was less than 0.1 mg/l! This fluctuation accounts for the very large standard deviation.

Sulfate

Sulfate levels were not high and were quite homogeneous within each lagoon. The mean concentration in the West Lagoon, 71.5 mg/l ± 14.6, was 76.7% of the mean in the East Lagoon, 93.2 mg/l ± 13.9.

Chloride

The concentration of chloride in each lagoon was high and very evenly distributed between the three stations in each lagoon. There was only minor variation in the chloride levels during this investigation. The concentration of this ion was consistently higher in

the East Lagoon. This is as expected, since chloride is usually higher in sewage than in raw water because sodium chloride passes unchanged through the digestive system. The mean in the East Lagoon, 159.2 mg/l ± 12.9 was 59.2% higher than the mean in the West Lagoon, 100.0 ± 16.2.

Metals

With the exception of magnesium, a common constituent of natural waters, the concentration of each of these parameters was higher in the East Lagoon than in the West Lagoon. The means ± one standard deviation for the metals are presented in Table 16. Sodium levels were much higher in the East than in the West Lagoon for the same reason that chloride was much higher.

TABLE 16

Comparison of Nutrient, Anion, and Metal Data in the East and West Lagoons. Data are given as the mean (mg/l) ± one standard deviation.

DATE	LAGOON	
	EAST	WEST
Ammonia Nitrogen, NH_4-N	2.89 ± 1.81	0.12 ± 0.16
Nitrate Nitrogen, NO_3-N	1.00 ± 1.03	0.64 ± 0.33
Orthophosphate, PO_4	4.47 ± 1.23	0.80 ± 0.97
Sulfate, SO_4	93.2 ± 13.9	71.5 ± 14.6
Chloride, Cl	159.2 ± 12.9	100.0 ± 16.2
Calcium	63.3 ± 8.4	53.4 ± 7.2
Magnesium	15.80 ± 1.51	17.25 ± 1.31
Sodium	145.3 ± 9.7	90.1 ± 13.4
Potassium	12.05 ± 1.21	5.44 ± 0.84
Manganese	0.234 ± 0.036	0.043 ± 0.021
Zinc	0.206 ± 0.041	0.081 ± 0.039
Iron	0.920 ± 0.166	0.788 ± 0.394

SUMMARY AND CONCLUSIONS

The limnology of two 850 acre lagoons, with special emphasis on the biological aspects, was investigated from September 1973, shortly after the initial filling of the lagoons, through August 1974. The water quality and benthic and planktonic population in the West Lagoon was different than in the East Lagoon due to the different waters in each lagoon. Semi-treated municipal and industrial wastewater was discharged predominantly into the East Lagoon, while usually only seepage water and ground water were discharged into the West Lagoon.

The East Lagoon was slightly less alkaline than the West Lagoon. Turbidity, BOD, total organic carbon, nutrients, anions, and metals, except for magnesium, were all appreciably higher in the East Lagoon than in the West Lagoon. Due to the high turbidity, the transparency in the East Lagoon was very small, 17 cm. The high BOD content in the East Lagoon was a major reason for the very low DO levels.

The benthic fauna was very limited. This community comprised a small number of organisms representing only a few taxomonic groups. Chironomids, represented by seven genera and nine species, accounted for virtually all, 97.5%, of this scant population. Glyptotendipes spp. was the most common midge in both lagoons. Procladius culiciformus occurred in higher numbers in the seepage water West Lagoon than in the East Lagoon, while Chironomus plumosus was more common in the wastewater East Lagoon than in the West Lagoon. The oligochaetes have not yet flourished in this environment. They appeared

on only one occasion in each lagoon. Limnodrilus, the only genus found, is usually common in organically polluted water. It appears that the lagoons will support benthic organisms and that a more dense and diverse benthic community will develop in the future. Several more generation times are needed to allow the benthic macroinvertebrates to reach their potential density in this relatively large new habitat.

Although there was considerable variability through time in regard to the mean number of zooplanktonic organisms per liter in each lagoon, and in the major groups, the number of zooplankton per liter consistently remained higher in the nutrient and organically richer East Lagoon than in the seepage water West Lagoon.

In the East Lagoon, cyclopoid copepods accounted for 75.2% of the total zooplankton population during this investigation. Of the 10 species of calanoid copepods present, Cyclops vernalis was the most common.

In the West Lagoon the cladocerans accounted for 51.2% of the total zooplankton population. Daphnia was the dominant genus, with Diaptomus, a calanoid copepod, a sub-dominant. Rotifers were scarce in both lagoons. The zooplankton pulses do not appear to correspond with the phytoplankton pulses.

There was also a great deal of variability through both time and location in the number and types of phytoplankton and protozoans in both lagoons. The green algae clearly dominated this population in both lagoons, comprising 55.4% of the phytoplankton and protozoan population in the East Lagoon and 67.4% in the West Lagoon. It is

interesting to note that in the East Lagoon the proportion of green algae steadily increased with the distance from the source of wastewater discharge -- 39.6% at SLE-1, 47.2% at SLE-5, and 67.9% at SLE-8.

The blue-green algae accounted for 25.3% of the phytoplankton and protozoan population in the West Lagoon, but only 3.0% in the East. The large Cyanophyta bloom (comprised of *Aphanizomenon flos-aquae*) in the West Lagoon on 29 August 1974 accounted for nearly all of the blue-greens, 93.6%, during this study.

A similar phenomena occurred with the diatoms. Their numbers were quite low throughout this study, except for a pulse in the East Lagoon on 20 August 1974. Due to this one bloom, diatoms accounted for 17.6% of the total population in the East Lagoon and only 2.9% in the West Lagoon.

The Euglenophyta, Ciliophora, and Mastigophora were all more common in the nutrient and organically richer East Lagoon than in the West Lagoon.

The concentration of chlorophyll *a* in the West Lagoon peaked in the winter as well as in the summer. The winter peak does not show a good correlation with the number of phytoplankton, but the summer peak correlates well with both the number of phytoplankton and the rate of primary productivity. Cell viability, as well as various environmental factors, appeared to influence the chlorophyll *a* concentration.

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APPENDIX A

BENTHIC MACROINVERTEBRATE DATA

TABLE 17

Benthic Macroinvertebrate data (No. per square foot) -- SLE-1

DATE	Glyptotendipes sp A	Glyptotendipes sp B	Glyptotendipes sp C	Procladius culiciformus	Chironomus plumosa	Other	TOTAL
10-26-73							0
11- 9-73							0
11-16-73		4					4
11-30-73							0
12-21-73						4 *Dicrotendipes modestus*, 4 *Physa* 8 Oligochaeta (*Limnodrilus*)	16
1-16-74							0
1-30-74		4					4
2-27-74						4 Odonata (Coenogrionidae)	4
3-13-74					4		4
4-12-74							0
4-26-74			2				2
5-21-74		2	2				4
7-12-74				2		4 Pupae	6
8- 9-74							0

TABLE 18

Benthic Macroinvertebrate data (No. per square foot) --SLE-5

DATE	Glyptotendipes sp A	Glyptotendipes sp B	Glyptotendipes sp C	Procladius culiciformus	Chironomus plumosa	Other	TOTAL
10-26-73							0
4-26-74	10	78	10	2	12	2 Cricotopus	114
5-21-74	16	68	26		40		150
7-12-74							0
8- 9-74						2 Pupae	2

TABLE 19

Benthic Macroinvertebrate data (No. per square foot) -- SLW-5

DATE	Glyptotendipes sp A	Glyptotendipes sp B	Glyptotendipes sp C	Procladius culiciformus	Chironomus plumosa	Other	TOTAL
10-26-73	16	28		28	12		84
5-28-74	36	50	6	18	4	20 Pupae	134
6-28-74	60	74	6	6			146
8- 2-74	4	24		8			36
8-29-74				2		2 Physa	4

TABLE 20

Benthic Macroinvertebrate data (No. per square foot) -- SLE-8

DATE	Glyptotendipes sp A	Glyptotendipes sp B	Glyptotendipes sp C	Procladius culiciformus	Chironomus plumosa	Other	TOTAL
10-26-73	8	4		4	32		48
11-16-73		24			12		36
11-30-73	12	32		16	24		84
3-13-74	4	12		4		4 *Dicrotendipes modestus* 8 *Tanytarsus* sp.	32
4-26-74	10	8	26	10		4 *Cricotopus* sp.	58
5-21-74		6		36		10 Pupae	52
7-12-74							0
8- 9-74							0

TABLE 21

Benthic Macroinvertebrate data (No. per square foot) -- SLW-1

DATE	Glyptotendipes sp A	Glyptotendipes sp B	Glyptotendipes sp C	Procladius culiciformus	Chironomus plumosa	Other	TOTAL
9-15-73	48	20					68
10-19-73		20				4 Coleoptera (Elmidae)	24
10-26-73				48		4 Ephemeroptera (Baetidae)	52
11- 9-73				8			8
11-16-73				16		4 Oligochaeta (Limnodrilus)	20
11-30-73				12			12
3-13-74				8			8
4-12-74							0
5-28-74	2			12			14
6-28-74		2		30		6 Parachironomus sp. 2 Ephemeroptera (Baetidae)	40
8- 2-74				18	2		20
8-29-74							0

TABLE 22

Benthic Macroinvertebrate data (No. per square foot) -- SLW-9

DATE	Glyptotendipes sp A	Glyptotendipes sp B	Glyptotendipes sp C	Procladius culiciformus	Chironomus plumosa	Other	TOTAL
11-30-73		4				8 Tantytarsus sp.	12
3-13-74				24		4 Tricoptera (Hydropsychidae)	28
4-12-74		4		28			32
5-28-74				50			50
6-28-74				12			12
8- 2-74							0
8-29-74							0

APPENDIX B

ZOOPLANKTON DATA

FIGURE 23

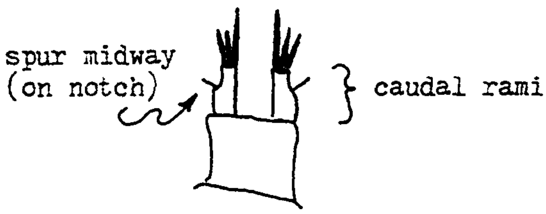
Key for unidentified cyclopoid copepods

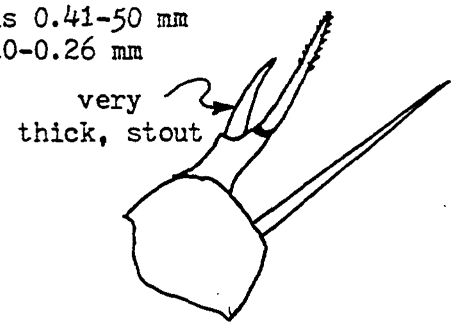
$\underline{E_6 \text{ and } E_7}$: E_6 has 6 segmented antenna, E_7 has 7 segmented antenna
The rest of the characteristics are identical

Legs 1-3 have 2 segmented rami

Leg 4 has a 1 segmented rami (and therefore doesn't fit key)

Size: head to caudal rami is 0.41-50 mm
terminal setea is 0.20-0.26 mm





5th leg, under oil lens

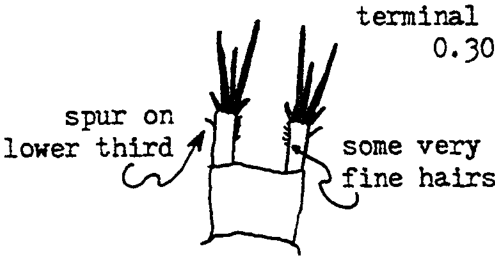
$\underline{B_8 \text{ and } B_9}$: B_8 has 8 segmented antenna, B_9 has 9 segmented antenna

The rest of the characteristics are identical

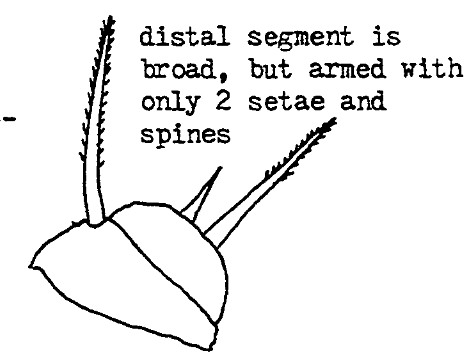
Legs 1-3 have 2 segmented rami

Leg 4 has a 1 segmented rami

Size: head to caudal rami is 0.65-0.75mm
terminal setea is 0.26-0.30mm



Caudal rami



5th leg, under oil lens

TABLE 23

Zooplankton Data (organisms/liter) -- SLE-1

KEY TO ABBREVIATIONS

Par = <u>Paracyclops</u>   CALA = Calanoid Copepods

DATE	CYCLOPOID COPEPODS									CALA	CLADOCERA		ROTIFER			TOTAL
	Cyclops			Mesocyclops		Unidentified			Par							
	vernalis	*excilis*	sp.	*edax*	sp.	B_9	E_6	E_7		*Diaptomus*	*Daphnia*	*Chydorus sphaericus*	unidentified	*Brachionus urceolares*	*Filinia longiseta*	
10-26-73											35.4			11.4	15.9	62.7
11- 9-73							0.4				6.8			1.4	0.4	9.0
11-16-73											4.1			0.9	0.9	5.9
5-21-74			1.6	0.7	4.1						54.3					60.7
6-11-74	3.7		5.9	3.4	4.6	3.0	2.5	4.3		3.4	17.8					48.6
7-12-74	32.4	26.3			3.2	22.5	6.4	29.2	9.8							129.8
7-26-74	38.7	8.4		1.6	6.8	8.1			6.5							70.1
8- 9-74	54.4	32.6	26.1	17.4	21.0	4.3	2.2	7.4	2.6					0.9		168.9
8-20-74	36.4	7.8	17.8	18.6	13.0	8.7		9.1	6.5	4.3	1.7					123.9

TABLE 24

Zooplankton Data (organisms/liter) -- SLE-5

KEY TO ABBREVIATIONS

Par = Paracyclops CALA = Calanoid Copepods

DATE	CYCLOPOID COPEPODS									CALA	CLADOCERA		ROTIFER			TOTAL
	Cyclops			Mesocyclops		Unidentified			Par							
	vernalis	excilis	sp.	edax	sp.	B_9	E_6	E_7		Diaptomus	Daphnia	Chydorus sphaericus	uniden-tified	Brachionus urceolares	Filinia longiseta	
10-26-73							0.4	2.7			5.4				11.4	19.9
5-21-74	0.2		5.0	1.8	7.5				0.4		202.4					217.3
6-11-74	2.3		3.2	1.4	0.2	1.8		1.2	4.1	0.7	19.6					34.5
7-12-74	14.6	13.7	13.7	12.5	5.8	26.2	11.6	49.2	16.4							163.7
7-26-74	29.7	2.8	10.5	4.0	1.6			7.0	5.4							61.0
8- 9-74	32.6	15.2	17.4	14.4	3.0	1.9	2.3	3.4								90.0
8-20-74	22.1	2.1	20.8	13.0	9.5	14.8		8.2	11.3		1.7					103.5

TABLE 25

Zooplankton Data (organisms/liter) -- SLE-8

KEY TO ABBREVIATIONS

Par = Paracyclops   CALA = Calanoid Copepods

DATE	CYCLOPOID COPEPODS									CALA	CLADOCERA		ROTIFER			TOTAL
	Cyclops			Mesocyclops		Unidentified			Par							
	vernalis	excilis	sp.	edax	sp.	B_9	E_6	E_7		Diaptomus	Daphnia	Chydorus sphaericus	uniden-tified	Brachionus urceolares	Filinia longiseta	
10-26-73		2.7			0.4	3.2		3.2			17.3					26.8
5-21-74	0.2										5.5	0.2				5.9
6-11-74	0.4		2.9	1.1	3.6		2.1	3.4		0.5	27.7					41.7
7-12-74	13.6	13.6	6.8		6.8		6.8	20.3	20.3							88.2
7-26-74	12.0	9.0	3.5	0.8			2.8	8.3	5.9							42.3
8- 9-74	38.6	20.5	18.2	16.7	13.6	7.6	7.6	9.5	5.6							137.9
8-20-74	39.0	9.1	26.9	26.0	9.1	13.4		19.5	16.5		2.2					161.7

TABLE 26

Zooplankton Data (organisms/liter) -- SLW-1

KEY TO ABBREVIATIONS

Par = <u>Paracyclops</u> CALA = Calanoid Copepods

DATE	CYCLOPOID COPEPODS									CALA	CLADOCERA		ROTIFER			TOTAL
	Cyclops			Mesocyclops		Unidentified			Par							
	vernalis	*excilis*	sp.	*edax*	sp.	B_9	E_6	E_7		*Diaptomus*	*Daphnia*	*Chydorus sphaericus*	unidentified	*Brachionus urceolares*	*Filinia longiseta*	
10-26-73						3.6	2.7	4.1			1.8	0.4				12.6
11- 9-73		0.9						2.3			1.4		0.9			5.5
11-16-73							0.9	0.4				1.4	1.8		1.4	5.9
5-14-74		0.5	6.5		2.5						7.9					17.4
5-28-74	1.2		0.9	0.7	0.7						27.2					30.7
6-28-74	0.2			2.5	2.3			0.7	0.2	15.0	11.6	0.2				32.7
7-19-74	0.6	0.3	0.3	0.8		1.1		1.4		16.0	3.6	0.6				24.7
8- 2-74				1.1						9.1	7.4	2.4				20.0
8-15-74						0.6				13.1	14.1	6.1		0.3		34.2
8-29-74	2.1	0.9								7.8	35.6	21.4				67.8

TABLE 27

Zooplankton Data (organisms/liter) -- SLW-5

KEY TO ABBREVIATIONS

Par = Paracyclops   CALA = Calanoid Copepods

DATE	CYCLOPOID COPEPODS									CALA	CLADOCERA		ROTIFER			TOTAL
	Cyclops			Mesocyclops		Unidentified			Par							
	vernalis	excilis	sp.	edax	sp.	B_9	E_6	E_7		Diaptomus	Daphnia	Chydorus sphaericus	uniden-tified	Brachionus urceolares	Filinia longiseta	
10-26-73					0.4	1.4	0.9	1.8			2.3					6.8
5-28-74	2.9		2.5	1.4	1.8					0.7	37.2					46.5
6-28-74	2.1			0.9	0.9	2.1		0.4		6.6	11.6	0.7				25.3
7-19-74	1.1		1.4	0.8						11.3	1.9					16.5
8- 2-74	0.3		0.3	0.6						11.2	5.0	1.0				18.4
8-15-74				2.1	1.1					58.1	7.1	10.6				79.0
8-29-74	0.3				0.3				0.3	13.8	30.1	14.0				58.8

TABLE 28

Zooplankton Data (organisms/liter) -- SLW-9

KEY TO ABBREVIATIONS

Par = Paracyclops   CALA = Calanoid Copepods

DATE	CYCLOPOID COPEPODS									CALA	CLADOCERA		ROTIFER			TOTAL
	Cyclops			Mesocyclops		Unidentified			Par							
	vernalis	excilis	sp.	edax	sp.	B_9	E_6	E_7		Diaptomus	Daphnia	Chydorus sphaericus	uniden-tified	Brachionus urceolares	Filinia longiseta	
10-26-73						0.4	2.7	4.1			2.3	0.4				9.9
11- 9-73		2.3					0.9	1.4			1.4		1.4		0.4	7.8
5-14-74		1.8	2.0	0.7							4.6					9.1
5-28-74	0.2		0.5	0.4			0.7			0.7	17.9					20.4
6-28-74				0.9		0.9		0.4		2.7	1.6	0.2	1.2			7.9
7-19-74	0.6	0.6	0.8	0.2						9.5	2.8					14.5
8- 2-74				0.2		0.2				6.8	1.1	1.0				9.3
8-15-74	0.4			0.2						34.0	20.4	4.3				59.3
8-29-74	0.5	0.3				0.3				13.3	24.6	2.6				41.6

APPENDIX C

PHYTOPLANKTON AND PROTOZOAN DATA

PLANKTON SUMMARY -- (Organisms/ml)

11-9-73 — SLE-1 @ 1 ft. TOTAL = 1062.4/ml

DIATOMS — 83.3 Pennate -- 83.3 Nitzschia nr. palae
169.3 Centric -- 27.7 Cyclotella nr. meneghiniana; 141.6 Melosira granulata

CHLOROPHYTA — 809.8 -- 13.9 Chlamydomonas sp. A.; 782.0 Chlorella nr. pyrenoidosa; 13.9 C. nr. vulgaris

SLE-8 @ 1 ft. TOTAL = 2055.7/ml

DIATOMS — 55.6 Pennate -- 41.7 Nitzschia nr. palae; 13.9 Navicula sp. B.

CHLOROPHYTA — 1,972.3 -- 27.8 Chlamydomonas sp. A.; 902.8 C. sp. B.; 1,027.8 Chlorella nr. pyrenoidosa; 13.9 Scenedesmus nr. quadricauda var. parvus

EUGLENOPHYTA — 27.8 -- 27.8 Phacus sp. C.

SLW-1 @ 1 ft. TOTAL = 180.6/ml

DIATOMS — 13.9 Pennate -- 13.9 Nitzschia nr. palae
13.9 Centric -- 13.9 Melosira granulata

CHLOROPHYTA — 13.9 -- 13.9 Scenedesmus nr. quadricauda var. parvus

EUGLENOPHYTA — 27.8 -- 27.8 Phacus sp. C.

MASTIGOPHORA — 111.1 -- 69.4 Bodo sp. A.; 41.7 B. sp. B.

SLW-9 @ 1 ft. TOTAL = 333.3/ml

DIATOMS — 41.7 Pennate -- 41.7 Nitzschia nr. palae
27.8 Centric -- 27.8 Melosira granulata

EUGLENOPHYTA — 27.8 -- 27.8 Phacus sp. C.

MASTIGOPHORA — 236.0 -- 152.7 Bodo sp. A.; 55.5 B. sp. B.; 27.8 Cryptomonas nr. ovata

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11-16-73 — SLE-1 @ 1 ft. TOTAL = 1166.7/ml

DIATOMS — 27.8 Pennate -- 13.9 Nitzschia nr. palae; 13.9 Synedra ulna
152.7 Centric -- 69.4 Cyclotella nr. meneghiniana; 83.3 Melosira granulata

CHLOROPHYTA — 152.8 -- 13.9 Chlamydomonas sp. A.; 111.1 C. sp. D.; 27.8 Chlorella nr. vulgaris

PLANKTON SUMMARY -- (Organisms/ml)

11-16-73	SLE-1 @ 1 ft. cont....
CYANOPHYTA	69.5 -- 13.9 Oscillatoria nr. limosa; 55.6 O. tenuis
EUGLENOPHYTA	27.8 -- 27.8 Phacus sp. C.
MASTIGOPHORA	736.1 -- 736.1 Bodo sp. A.
	SLE-8 @ 1 ft. TOTAL = 638.8/ml
DIATOMS	83.4 Pennate -- 55.6 Nitzschia nr. palae; 27.8 Fragilaria nr. construens 13.8 Centric -- 13.8 Melosira granulata
CHLOROPHYTA	430.6 -- 277.8 Chlorella nr. vulgaris; 83.3 Chlamydomonas sp. D.; 13.9 Scenedesmus nr. quadricauda var. parvus; 13.9 Closterium sp. A.; 13.9 Pediastrum nr. integrum; 27.8 Oocystis nr. elliptica var. minor
CYANOPHYTA	13.9 -- 13.9 Oscillatoria tenuis
EUGLENOPHYTA	13.9 -- 13.9 Phacus sp. C.
MASTIGOPHORA	83.3 -- 83.3 Bodo sp. A.
	SLW-1 @ 1 ft. TOTAL = 1430.5/ml
DIATOMS	27.8 Pennate -- 27.8 Nitzschia nr. palae
CHLOROPHYTA	111.1 -- 111.1 Chlorella nr. vulgaris
EUGLENOPHYTA	222.2 -- 13.9 Phacus sp. C.; 208.3 Euglena sp. C.
MASTIGOPHORA	1069.4 -- 597.2 Bodo sp. A.; 166.7 B. sp. B.; 305.5 Chroomonas nordstedtii
	SLW-9 @ 1 ft. TOTAL = 1208.4/ml
DIATOMS	55.6 Pennate -- 27.8 Nitzschia nr. palae; 27.8 Fragilaria nr. construens 55.6 Centric -- 13.9 Melosira granulata; 41.7 Gomphonema nr. olivaceum
CHLOROPHYTA	125.0 -- 69.4 Chlorella nr. vulgaris; 55.6 Chlamydomonas sp. D.
MASTIGOPHORA	958.3 -- 694.4 Bodo sp. A.; 111.1 B. sp. B.; 152.8 Chroomonas nordstedtii
CILIOPHORA	13.9 -- 13.9 Glaucoma sp.

PLANKTON SUMMARY -- (Organisms/ml)

11-30-73	SLE-1 @ 1 ft. TOTAL = 208.4/ml
DIATOMS	83.4 Pennate -- 41.7 Nitzschia nr. palae; 41.7 Fragilaria nr. construens 69.4 Centric -- 69.4 Melosira granulata
CHLOROPHYTA	13.9 -- 13.9 Oocystis nr. elliptica var. minor
CYANOPHYTA	27.8 -- 27.8 Oscillatoria nr. limosa
ROTIFERA	13.9 -- 13.9 Brachionus urceolares
	SLE-8 @ 1 ft. TOTAL = 194.6/ml
DIATOMS	55.6 Centric -- 55.6 Melosira granulata
CHLOROPHYTA	111.2 -- 55.6 Chlorella nr. vulgaris; 27.8 Chlamydomonas sp. D.; 13.9 Scenedesmus nr. quadricauda var. parvus; 13.9 Oocystis nr. elliptica var. minor
EUGLENOPHYTA	27.8 -- 27.8 Trachelomonas sp. D.
	SLE-1 @ 1 ft. TOTAL = 597.1/ml
DIATOMS	305.5 Pennate -- 125.0 Nitzschia nr. palae; 69.4 Gomphonema nr. olivaceum; 111.1 Navicula nr. cryptocephala 69.4 Centric -- 69.4 Cyclotella nr. meneghiniana
CHLOROPHYTA	180.5 -- 13.9 Chlorella nr. vulgaris; 69.4 Scenedesmus nr. abundans; 83.3 S. nr. quadricauda var. parvus; 13.9 Oocystis nr. elliptica var. minor
EUGLENOPHYTA	41.7 -- 27.8 Trachelomonas sp. D.; 13.9 Phacus sp.C.
	SLE-9 @ 1 ft. TOTAL = 763.8/ml
CHLOROPHYTA	749.9 -- 749.9 Chlorella nr. vulgaris
MASTIGOPHORA	13.9 -- 13.9 Bodo sp. A.
12-21-73	SLE-1 @ 1 ft. TOTAL = 1555.7/ml
DIATOMS	41.7 Centric -- 41.7 Cyclotella nr. meneghiniana
CHLOROPHYTA	1402.8 -- 805.6 Chlorella nr. vulgaris; 583.3 Chlamydomonas sp. C.; 13.9 Oocystis nr. elliptica var. minor
CYANOPHYTA	69.5 -- 41.7 Chroococus nr. minor; 13.9 Spirulina laxa

PLANKTON SUMMARY -- (Organisms/ml)

12-21-73 SLE-1 @ 1 ft. cont....

CILIOPHORA 41.7 -- 41.7 Glaucoma sp.

SLE-8 @ 1 ft. TOTAL = 55.6/ml

CHLOROPHYTA 55.6 -- 41.7 Chalmydomonas sp. A.; 13.9 Chlorella nr. vulgaris

SLW-1 @ 1 ft. TOTAL = 986.2/ml

DIATOMS 55.6 Pennate -- 41.7 Navicula nr. cryptocephala; 13.9 Synedra ulna
152.8 Centric -- 138.9 Cyclotella nr. meneghiniana; 13.9 Melosira granulata

CHLOROPHYTA 777.8 -- 555.6 Chlamydomonas sp. A.; 208.3 Chlorella nr. vulgaris; 13.9 Ankistrodesmus convulutus

SLE-9 @ 1 ft. TOTAL = 308.4/ml

DIATOMS 69.5 Pennate -- 41.7 Navicula nr. dryptocephala; 27.8 Nitzschia nr. palae
125.0 Centric -- 69.4 Cyclotella nr. meneghiniana; 55.6 Stephanodiscus nr. invisatatus

CHLOROPHYTA 58.3 -- 27.8 Chlorella nr. pyrenoidosa; 13.9 C. nr. vulgaris; 27.8 Ankistrodesmus falcutus; 13.9 A. convulutus

MASTIGOPHORA 55.6 -- 55.6 Bodo sp. A.

1-2-74 SLW-1 @ 1 ft. TOTAL = 10777.7/ml

DIATOMS 305.5 Centric -- 305.5 Cyclotella nr. meneghiniana

CHLOROPHYTA 9333.3 -- 611.1 Chlamydomonas sp. A.; 8722.2 Chlorella nr. vulgaris

CYANOPHYTA 263.0 -- 55.6 Chroococus nr. minor; 208.3 C. dispersus

MASTIGOPHORA 875.0 -- 430.6 Bodo sp. A.; 208.3 Cryptomonas nr. ovata; 236.1 Chilomonas nr. paramecium

SLW-9 @ 1 ft. TOTAL = 847.4/ml

DIATOMS 55.6 Centric -- 55.6 Cyclotella nr. meneghiniana

CHLOROPHYTA 430.6 -- 388.9 Chlorella nr. vulgaris; 41.7 Chlamydomonas sp. C.

PLANKTON SUMMARY -- (Organisms/ml)

1-2-74	SLW-9 @ 1 ft. cont....
CYANOPHYTA	69.5 -- 55.6 Chroococus nr. minor; 13.9 C. dispersus
MASTIGOPHORA	291.7 -- 166.7 Bodo sp. A.; 83.3 Cryptomonas nr. ovata; 41.7 Chilomonas nr. paramecium

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1-16-74	SLE-1 @ 1 ft. TOTAL = 2657.8/ml
DIATOMS	41.7 Centric -- 41.7 Cyclotella nr. meneghiniana
CHLOROPHYTA	2532.8 -- 366.1 Chlamydomonas sp. A.; 111.1 C. sp. D.; 2055.6 Chlorella nr. vulgaris
CYANOPHYTA	83.3 -- 69.4 Chroococus nr. minor; 13.9 C. dispersus
	SLE-1 @ 3 ft. TOTAL = 1287.5/ml
DIATOMS	138.9 Centric -- 138.9 Cyclotella nr. meneghiniana
CHLOROPHYTA	1079.1 -- 134.7 Chlamydomonas sp. A.; 944.4 Chlorella nr. vulgaris
CYANOPHYTA	69.5 -- 41.7 Chroococus nr. minor; 27.8 C. dispersus

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1-30-74	SLE-1 @ 1 ft. TOTAL = 3543.8/ml
DIATOMS	250.0 Centric -- 152.0 Cyclotella nr. meneghiniana; 97.2 Stephanodiscus nr. astrea
CHLOROPHYTA	3071.5 -- 2502.0 Chlamydomonas sp. A.; 41.7 C. sp. C.; 347.2 Chlorella nr. vulgaris; 180.6 C. nr. pyrenoidosa
CYANOPHYTA	97.3 -- 41.7 Chroococus nr. minor; 55.6 C. dispersus
MASTIGOPHORA	27.8 -- 27.8 Bodo sp. A.
CILIOPHORA	97.2 -- 97.2 Vorticella sp.
	SLE-1 @ 3 ft. TOTAL = 2930.5/ml
DIATOMS	486.1 Centric -- 236.1 Cyclotella nr. meneghiniana; 125.0 Stephanodiscus nr. astrea
CHLOROPHYTA	2319.4 -- 1972.2 Chlamydomonas sp. A.; 69.4 C. sp. D.; 277.8 Chlorella nr. vulgaris
CILIOPHORA	125.0 -- 111.1 Vorticella sp.; 13.9 Glaucoma sp.

PLANKTON SUMMARY -- (Organisms/ml)

1-30-74 cont..	SLE-8 @ 1 ft. TOTAL = 1388.6/ml
DIATOMS	83.3 Centric -- 83.3 Cyclotella nr. meneghiniana
CHLOROPHYTA	1152.7 -- 944.4 Chlamydomonas sp. A.; 13.9 C. sp. C.; 194.4 Chlorella nr. vulgaris
CYANOPHYTA	152.6 -- 83.3 Chroococus nr. minor; 13.7 C. dispersus; 27.8 Nostoc nr. comminutum; 27.8 N. nr. caeruleum
	SLE-8 @ 3 ft. TOTAL = 1722.3/ml
DIATOMS	27.8 Centric -- 27.8 Cyclotella nr. meneghiniana
CHLOROPHYTA	1569.5 -- 1222.2 Chlamydomonas sp. A.; 27.8 C. sp. C.; 27.8 C. sp. D.; 291.7 Chlorella nr. vulgaris
CILIOPHORA	125.0 -- 97.2 Vorticella sp.; 27.8 Glaucoma sp.
	SLW-1 @ 1 ft. TOTAL = 7888.8/ml
DIATOMS	430.6 Centric -- 430.6 Cyclotella nr. meneghiniana
CHLOROPHYTA	7194.4 -- 7083.3 Chlamydomonas sp. A.; 111.1 Chlorella nr. vulgaris
MASTIGOPHORA	152.7 -- 69.4 Bodo sp. A.; 83.3 Cryptomonas nr. ovata
CILIOPHORA	111.1 -- 27.8 Vorticella sp.; 83.3 Glaudoma sp.
	SLW-9 @ 1 ft. TOTAL = 2611.4/ml
DIATOMS	138.9 Centric -- 138.9 Cyclotella nr. meneghiniana
CHLOROPHYTA	1736.0 -- 1666.6 Chlamydomonas sp. A.; 69.4 Chlorella nr. vulgaris
CYANOPHYTA	680.9 -- 250.0 Chroococus nr. minor; 430.9 C. dispersus
MASTIGOPHORA	41.7 -- 27.8 Bodo sp. A.; 13.9 B. sp. B.
CILIOPHORA	13.9 -- 13.9 Cyclidium sp.

2-13-74	SLE-1 @ 1 ft. TOTAL = 361.2/ml
CHLOROPHYTA	263.9 -- 138.9 Chlamydomonas sp. A.; 27.8 C. sp. C.; 97.2 C. sp. D.
CYANOPHYTA	13.9 -- 13.9 Chroococus nr. minor

PLANKTON SUMMARY -- (Organisms.ml)

2-13-74		SLE-1 @ 1 ft. cont....
MASTIGOPHORA	41.7 -- 41.7 Bodo sp. A.	
CILIOPHORA	41.7 -- 27.8 Vorticella sp.; 13.9 Glaucoma sp.	
	SLE-1 @ 3 ft. TOTAL = 152.8/ml	
DIATOMS	13.9 Centric -- 13.9 Cyclotella nr. meneghiniana	
CHLOROPHYTA	97.2 -- 97.2 Chlamydomonas sp. C.	
CILIOPHORA	27.8 -- 27.8 Glaucoma sp.	
ROTIFERA	13.9 -- 13.9 Notholca sp.	
	SLE-8 @ 1 ft. TOTAL = 111.1/ml	
CHLOROPHYTA	83.3 -- 69.4 Chlamydomonas sp. A.; 13.9 Chlorella nr. vulgaris	
CYANOPHYTA	13.9 -- 13.9 Chroococus nr. minor	
CILIOPHORA	13.9 -- 13.9 Vorticella sp.	
	SLE-8 @ 3 ft. TOTAL = 97.3/ml	
CHLOROPHYTA	97.3 -- 55.6 Chlamydomonas sp. A.; 13.9 C. sp. D.; 27.8 Chlorella nr. vulgaris	
	SLW-1 @ 1 ft. TOTAL = 9472.3/ml	
DIATOMS	13.9 Pennate -- 13.9 Nitzschia nr. palae	
CHLOROPHYTA	9319.4 -- 222.2 Chlamydomonas sp. A.; 9083.3 Chlorella nr. vulgaris; 13.9 Oocystis nr. elliptica var. minor	
MASTIGOPHORA	97.3 -- 41.7 Bodo sp. A.; 27.8 B. sp. B.; 27.8 Cryptomonas nr. ovata	
CILIOPHORA	41.7 -- 27.8 Cyclidium sp.; 13.9 Glaucoma sp.	
	SLW-9 @ 1 ft. TOTAL = 4458.4/ml	
DIATOMS	41.7 Centric -- 41.7 Melosira granulata	
CHLOROPHYTA	4333.3 -- 125.0 Chlamydomonas sp. A.; 4208.3 Chlorella nr. vulgaris	
CILIOPHORA	83.4 -- 55.6 Cyclidium sp.; 27.8 Glaucoma sp.	

PLANKTON SUMMARY -- (Organisms/ml)

2-13-74 cont.. SLW-9 @ 3 ft. TOTAL = 2277.8/ml

DIATOMS	27.8 Centric -- 27.8 Melosira granulata
CHLOROPHYTA	2180.5 -- 152.8 Chlamydomonas sp. A.; 2027.7 Chlorella nr. vulgaris
MASTIGOPHORA	41.7 -- 41.7 Cryptomonas nr. ovata
CILIOPHORA	27.8 -- 27.8 Cyclidium sp.

2-27-74 SLE-1 @ 1 ft. TOTAL = 597.1/ml

CHLOROPHYTA	444.4 -- 83.3 Chlamydomonas sp. A.; 83.3 C. sp. C.; 27.8 C. sp. D.; 138.9 Chlorella nr. pyrenoidosa; 13.9 Cosmarium sp.; 97.2 Oocystis nr. elliptica var. minor
CYANOPHYTA	152.7 -- 69.4 Chroococus nr. minor; 83.3 Nostoc comminutum

SLE-8 @ 1 ft. TOTAL = 833.4/ml

CHLOROPHYTA	833.4 -- 41.7 Chlamydomonas sp. A.; 13.9 C. sp. C.; 763.9 Chlorella nr. pyrenoidosa; 13.9 Cosmarium sp.

SLW-1 @ 1 ft. TOTAL = 10402.8/ml

CHLOROPHYTA	9291.7 -- 805.6 Chalmydomonas sp. A.; 8402.8 Chlorella nr. vulgaris; 83.3 C. nr. pyrenoidosa
CILIOPHORA	527.8 -- 527.8 Cyclidium sp.

SLW-9 @ 1 ft. TOTAL = 11277.7/ml

CHLOROPHYTA	11277.7 -- 972.2 Chlamydomonas sp. A.; 69.4 C. sp. C.; 41.7 C. sp. D.; 9998.8 Chlorella nr. vulgaris; 182.6 C. nr. pyrenoidosa; 13.9 Oocystis nr. elliptica var. minor

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3-13-74 SLE-1 @ 1 ft. TOTAL = 1013.8/ml

CHLOROPHYTA	833.3 -- 583.3 Chlamydomonas sp. A.; 111.1 C. sp. C.; 138.9 C. sp. D.
CYANOPHYTA	13.9 -- 13.9 Oscillatoria nr. rubescans

PLANKTON SUMMARY -- (Organisms/ml)

3-13-74	SLE-1 @ 1 ft. cont....	
CILIOPHORA	166.6 -- 83.3 Vorticella sp.; 83.3 Glaucoma sp.	
	SLE-1 @ 3 ft. TOTAL = 1152.9/ml	
CHLOROPHYTA	916.7 -- 666.7 Chlamydomonas sp. A.; 111.1 C. sp. C.; 83.3 C. sp. D.; 55.6 Chlorella nr. vulgaris	
CYANOPHYTA	27.8 -- 27.8 Oscillatoria nr. rubescans	
CILIOPHORA	208.4 -- 13.9 Strombidium sp.; 138.9 Vorticella sp.; 55.6 Glaucoma sp.	
	SLE-8 @ 1 ft. TOTAL = 21125.0/ml (Sample milky colored due to Chlorella bloom)	
CHLOROPHYTA	21013.9 -- 138.9 Chlamydomonas sp. A.; 41.7 C. sp. C.; 20833.3 Chlorella nr. pyrenoidosa	
CILIOPHORA	111.1 -- 111.1 Glaucoma sp.	
	SLE-8 @ 3 ft. TOTAL = 8222.2/ml	
CHLOROPHYTA	7999.9 -- 499.9 Chlamydomonas sp. A.; 55.6 C. sp. C.; 222.2 Chlorella nr. vulgaris; 7222.2 Chlorella nr. pyrenoidosa	
MASTIGOPHORA	27.8 -- 27.8 Chilomonas nr. paramecium	
CILIOPHORA	194.5 -- 138.9 Vorticella sp.; 55.6 Glaucoma sp.	
	SLW-1 @ 1 ft. TOTAL = 14388.9/ml	
DIATOMS	27.8 Pennate -- 27.8 Navicula sp. A.	
CHLOROPHYTA	14333.3 -- 194.4 Chlamydomonas sp. A.; 41.7 C. sp. D.; 13888.0 Chlorella nr. vulgaris; 208.3 C. nr. pyrenoidosa	
CILIOPHORA	27.8 -- 27.8 Cyclidium sp.	
	SLW-1 @ 3 ft. TOTAL = 11375.0/ml	
DIATOMS	69.5 Pennate -- 41.7 Navicula sp. A.; 27.8 Synedra ulna 13.9 Centric -- 13.9 Melosira nr. varians	
CHLOROPHYTA	11277.7 -- 277.8 Chlamydomonas sp. A.; 10916.6 Chlorella nr. vulgaris; 83.3 C. nr. pyrenoidosa	
CILIOPHORA	13.9 -- 13.9 Glaucoma sp.	

PLANKTON SUMMARY -- (Organisms/ml)

3-13-74 cont.. SLW-9 @ 1 ft. TOTAL = 333.4/ml

DIATOMS	13.9 Pennate -- 13.9 Synedra ulna
CHLOROPHYTA	277.8 -- 263.9 Chlorella nr. vulgaris; 13.9 Closterium sp.
CILIOPHORA	41.7 -- 41.7 Glaucoma sp.

SLW-9 @ 3 ft. TOTAL = 472.3/ml

DIATOMS	55.6 Pennate -- 27.8 Nitzschia nr. palae; 27.8 Synedra ulna
CHLOROPHYTA	388.9 -- 13.9 Chlamydomonas sp. C.; 347.2 Chlorella nr. vulgaris; 27.8 C. nr. pyrènoidosa
CILIOPHORA	27.8 -- 27.8 Glaucoma sp.

3-29-74 SLE-1 @ 1 ft. TOTAL = 416.7/ml

DIATOMS	13.9 Pennate -- 13.9 Navicula sp. A.
CHLOROPHYTA	375.0 -- 194.4 Chlamydomonas sp. A.; 55.6 C. sp. C.; 27.8 C. sp. D.; 27.8 Chlorella nr. vulgaris; 69.4 C. nr. pyrenoidosa
MASTIGOPHORA	27.8 -- 27.8 Chilomonas nr. paramecium

SLE-8 @ 1 ft. TOTAL = 15569.3/ml

DIATOMS	27.8 Pennate -- 27.8 Navicula sp. A. 13.9 Centric -- 13.9 Melosira nr. varians
CHLOROPHYTA	15347.0 -- 2833.3 Chlamydomonas sp. A.; 12499.9 Chlorella nr. pyrenoidosa; 13.8 Scenedesmus nr. quadricauda var. parvus
CYANOPHYTA	152.8 -- 83.3 Chroococus nr. minor; 55.6 C. dispersus; 13.9 Oscillatoria tenuis
MASTIGOPHORA	27.8 -- 27.8 Bodo sp. A.

SLE-8 @ 3 ft. TOTAL = 12222.4/ml

DIATOMS	41.7 Pennate -- 13.9 Navicula sp. A.; 27.8 Synedra ulna 13.9 Centric -- 13.9 Melosira nr. varians
CHLOROPHYTA	11861.2 -- 1833.3 Chlamydomonas sp. A.; 13.9 C. sp. D.; 9666.7 Chlorella nr. pyrenoidosa;

PLANKTON SUMMARY -- (Organisms/ml)

3-29-74 SLE-8 @ 3 ft. cont.....

CHLOROPHYTA cont... 291.7 C. nr. vulgaris; 41.7 Ankistrodesmus falcutus; 13.9 Cosmarium sp.

MASTIGOPHORA 41.7 -- 13.9 Cryptomonas nr. ovata; 27.8 Chilomonas nr. paramecium

CILIOPHORA 13.9 -- 13.9 Glaucoma sp.

SLW-1 @ 1 ft. TOTAL = 3527.8/ml

CHLOROPHYTA 3444.4 -- 69.4 Chlamydomonas sp. A.; 27.8 C. sp. C.; 3333.3 Chlorella nr. vulgaris; 13.9 Scenedesmus nr. abundans

CYANOPHYTA 41.7 -- 13.9 Chroococus nr. minor; 27.8 C. dispersus

CILIOPHORA 41.7 -- 27.8 Cyclidium sp.; 13.9 Glaucoma sp.

SLW-1 @ 3 ft. TOTAL = 5708.4/ml

DIATOMS 27.8 Pennate -- 27.8 Synedra ulna

CHLOROPHYTA 5513.9 -- 83.3 Chlamydomonas sp. A.; 5416.7 Chlorella nr. vulgaris; 13.9 Scenedesmus nr. abundans

CYANOPHYTA 27.8 -- 27.8 Anabaena sp.

MASTIGOPHORA 27.8 -- 27.8 Cryptomonas nr. ovata

CILIOPHORA 111.1 -- 111.1 Glaucoma sp.

SLW-9 @ 1 ft. TOTAL = 957.0/ml

CHLOROPHYTA 457.0 -- 125.0 Chlamydomonas sp. C.; 41.7 C. sp. D.; 291.7 Chlorella nr. vulgaris; 69.4 C. nr. pyrenoidosa; 41.7 Oocystis nr. elliptica var. minor

CYANOPHYTA 27.8 -- 27.8 Chroococus nr. minor

CILIOPHORA 472.2 -- 111.1 Vorticella sp.; 138.9 Glaucoma sp.; 222.2 unidentified genera of family Holophryidae

SLW-9 @ 3 ft. TOTAL = 708.3/ml

CHLOROPHYTA 291.6 -- 97.2 Chlamydomonas sp. C.; 69.4 C. sp. D.; 97.2 Chlorella nr. vulgaris. 27.8 C. nr. pyrenoidosa

CYANOPHYTA 13.9 -- 13.9 Anabaena sp.

PLANKTON SUMMARY -- (Organisms/ml)

3-29-74 SLW-9 @ 3 ft. cont....

CILIOPHORA 402.8 -- 166.7 Vorticella sp.; 83.3 Glaucoma sp.; 152.8 unidentified genera of family Holophryidae

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4-12-74 SLE-1 @ 1 ft. TOTAL = 819.4/ml

CHLOROPHYTA 555.5 -- 250.0 Chlamydomonas sp. A.; 111.1 C. sp. C.; 27.8 C. sp. D.; 83.3 Chlorella nr. vulgaris; 83.3 C. nr. pyrenoidosa

PYRROPHYTA 13.9 -- 13.9 Peridinium nr. cinctum

SARCODINA 83.3 -- 83.3 Assulina nr. muscorum

CILIOPHORA 166.7 -- 13.9 Vorticella sp.; 13.9 Glaucoma sp.; 138.9 unidentified genera of family Holophryidae

SLE-1 @ 3 ft. TOTAL = 907.7/ml

CHLOROPHYTA 768.8 -- 366.1 Chlamydomonas sp. A.; 138.9 C. sp. C.; 83.3 C. sp. D.; 69.4 Chlorella nr. vulgaris; 111.1 C. nr. pyrenoidosa

CILIOPHORA 138.9 -- 138.9 Glaucoma sp.

SLE-8 @ 1 ft. TOTAL = 652.8/ml

CHLOROPHYTA 583.3 -- 208.3 Chlamydomonas sp. A.; 69.4 Chlorella nr. vulgaris; 291.7 C. nr. pyrenoidosa; 13.9 Scenedesmus nr. abundans

CILIOPHORA 69.5 -- 55.6 Vorticella sp.; 13.9 Cyclidium sp.

SLE-8 @ 3 ft. TOTAL = 764.0/ml

CHLOROPHYTA 764.0 -- 416.7 Chlamydomonas sp. A.; 41.7 C. sp. D.; 55.6 Chlorella nr. vulgaris; 250.0 C. nr. pyrenoidosa

SLW-1 @ 1 ft. TOTAL = 10487.6/ml

DIATOMS 500.1 Pennate -- 83.3 Navicula nr. cryptocephala; 166.7 Fragilaria nr. construens; 138.9 Nitzschia nr. palae; 41.7 Synedra ulna; 64.5 Nitzschia sp.

55.6 Centric -- 55.6 Cyclotella nr. meneghiniana

PLANKTON SUMMARY -- (Organisms/ml)

4-12-74	SLW-1 @ 1 ft. cont....
CHLOROPHYTA	9862.4 -- 305.5 Chlamydomonas sp. A.; 9556.9 Chlorella nr. vulgaris
CYANOPHYTA	69.5 -- 41.7 Chroococus nr. minor; 27.8 C. dispersus
	SLW-1 @ 3 ft. TOTAL = 6736.2/ml
DIATOMS	83.4 Pennate -- 13.9 Navicula nr. cryptocephala; 13.9 Fragilaria nr. construens; 27.8 Nitzschia nr. palae; 13.9 N. sp.; 13.9 Synedra ulna 27.8 Centrie -- 27.8 Cyclotella nr. meneghiniana
CHLOROPHYTA	6486.1 -- 222.2 Chlamydomonas sp. A.; 27.8 C. sp. C.; 6222.2 Chlorella nr. vulgaris; 13.9 Closterium sp. A.
CYANOPHYTA	125.0 -- 69.4 Chroococus nr. minor; 55.6 C. dispersus
CILIOPHORA	13.9 -- 13.9 Vorticella sp.
	SLW-9 @ 1 ft. TOTAL = 7646.8/ml
DIATOMS	83.4 Pennate -- 55.6 Fragilaria nr. construens; 13.9 Nitzschia nr. palae; 13.9 Synedra ulna
CHLOROPHYTA	7480.0 -- 305.5 Chlamydomonas sp. A.; 7174.5 Chlorella nr. vulgaris
CYANOPHYTA	55.6 -- 27.8 Chroococus nr. minor; 27.8 C. dispersus
CILIOPHORA	27.8 -- 27.8 Cyclidium sp.
	SLW-9 @ 3 ft. TOTAL = 8445.8/ml
DIATOMS	361.1 Pennate -- 41.7 Navicula nr. cryptocephala; 180.6 Fragilaria nr. construens; 69.4 Nitzschia nr. palae 55.6 Centric -- 41.7 Cyclotella nr. meneghiniana; 13.9 Melosira nr. varians
CHLOROPHYTA	8001.3 -- 347.2 Chlamydomonas sp. A.; 7612.4 Chlorella nr. vulgaris; 13.9 Scenedesmus nr. abundans; 13.9 S. nr. quadricauda var. parvus; 13.9 Closterium sp. A.
CYANOPHYTA	13.9 -- 13.9 Anabaena sp.
MASTIGOPHORA	13.9 -- 13.9 Chilomonas nr. paramecium

PLANKTON SUMMARY -- (Organisms/ml)

4-26-74 — SLE-1 @ ½ ft. TOTAL = 493.0/ml

DIATOMS — 20.8 Pennate -- 6.9 Navicula nr. cryptocephala; 13.9 Nitzschia nr. palae
20.8 Centric -- 13.9 Cyclotella nr. meneghiniana; 6.9 Melosira nr. granulata

CHLOROPHYTA — 451.5 -- 416.7 Chlamydomonas sp. A.; 27.8 C. sp. C.; 6.9 Scenedesmus nr. abundans

SLE-1 @ 1½ ft. TOTAL = 360.8/ml

DIATOMS — 41.7 Pennate -- 13.9 Navicula nr. cryptocephala; 27.8 Nitzschia nr. palae
27.7 Centric -- 20.8 Cyclotella nr. meneghiniana; 6.9 Melosira granulata

CHLOROPHYTA — 222.1 -- 187.5 Chlamydomonas sp. A.; 6.9 C. sp. C.; 13.9 Chlorella nr. vulgaris. 6.9 Scenedesmus nr. abundans; 6.9 S. nr. quadricauda var. parvus

CYANOPHYTA — 13.8 -- 6.9 Chroococus nr. minor; 6.9 C. dispersus

PYRROPHYTA — 6.9 -- 6.9 Peridinium nr. cinctum

MASTIGOPHORA — 6.9 -- 6.9 Chroomonas nr. nordstedtii

CILIOPHORA — 41.7 -- 41.7 Vorticella sp.

SLE-5 @ ½ ft. TOTAL = 555.3/ml

DIATOMS — 6.9 Pennate -- 6.9 Navicula nr. cryptocephala

CHLOROPHYTA — 520.7 -- 319.4 Chlamydomonas sp. A.; 145.8 C. sp. C.; 13.9 C. sp. D.; 34.7 Chlorella nr. vulgaris; 6.9 Scened4smus nr. quadricauda var. parvus

CILIOPHORA — 27.7 -- 20.8 Vorticella sp.; 6.9 Glaucoma sp.

SLE-5 @ 1½ ft. TOTAL = 270.8/ml

DIATOMS — 13.9 Pennate -- 13.9 Navicula sp. B.
6.9 Centric -- 6.9 Cyclotella nr. meneghiniana

CHLOROPHYTA — 194.4 -- 104.2 Chlamydomonas sp. A.; 62.5 C. sp. C.; 13.9 Chlorella nr. vulgaris; 6.9 Scenedesmus nr. quadricauda var. parvus; 6.9 S. nr. incrassatulus

CILIOPHORA — 55.6 -- 55.6 Vorticella sp.

PLANKTON SUMMARY -- (Organisms/ml)

4-26-74 cont.. SLE-8 @ ½ ft. TOTAL = 196.2/ml

DIATOMS	34.7 Pennate -- 13.9 Navicula sp. B.; 6.9 Fragilaria nr. construens; 13.9 Nitzschia nr. palae
CHLOROPHYTA	124.9 -- 69.4 Chlamydomonas sp. A.; 41.7 C. sp. D.; 6.9 Scenedesmus nr. quadricauda var. parvus; 6.9 Gomphosphaeria nr. aponina var. gelatinosa
EUGLENOPHYTA	6.9 -- 6.9 Trachelomonas sp. D.
MASTIGOPHORA	6.9 -- 6.9 Bodo sp. A.
CILIOPHORA	22.8 -- 22.8 Vorticella sp.

SLE-8 @ ½ ft. TOTAL = 71.3/ml

DIATOMS	20.8 Pennate -- 20.8 Nitzschia nr. palae
CHLOROPHYTA	36.7 -- 22.8 Chlamydomonas sp. A.; 13.9 C. sp. C.
MASTIGOPHORA	6.9 -- 6.9 Bodo sp. A.
CILIOPHORA	6.9 -- 6.9 Vorticella sp.

SLW-1 @ 1 ft. TOTAL = 2340.0/ml

DIATOMS	13.8 Pennate -- 6.9 Navicula nr. cryptocephala; 6.9 Nitzschia nr. palae 34.7 Centric -- 34.7 Cyclotella nr. meneghiniana
CHLOROPHYTA	2277.7 -- 34.7 Chlamydomonas sp. C.; 2222.2 Chlorella nr. vulgaris; 6.9 Ankistrodesmus sp.; 13.9 A. convulutus
CYANOPHYTA	13.8 -- 6.9 Chroococus nr. minor; 6.9 C. sp.

SLW-1 @ 2½ ft. TOTAL = 1666.5/ml

DIATOMS	6.9 Pennate -- 6.9 Nitzschia nr. palae 48.6 Centric -- 27.8 Cyclotella nr meneghiniana; 20.8 C. nr. michiganiana
CHLOROPHYTA	1590.2 -- 13.9 Chlamydomonas sp. C.; 1562.5 Chlorella nr. vulgaris; 6.9 Ankistrodesmus falcutus; 6.9 A. sp.; 6.9 Cosmarium
EUGLENOPHYTA	13.9 -- 13.9 Trachelomonas sp. D.
MASTIGOPHORA	6.9 -- 6.9 Bodo sp. B.

PLANKTON SUMMARY -- (Organisms/ml)

4-26-74 cont.. SLW-5 @ 1 ft. TOTAL = 3080.2/ml

DIATOMS 34.7 Pennate -- 6.9 Navicula sp. A.; 13.9 Nitzschia nr. palae; 13.9 Fragilaria nr. construens
69.5 Centric -- 27.8 Stephanodiscus nr. invisitatus; 41.7 Cyclotella nr. meneghiniana

CHLOROPHYTA 2923.5 -- 97.2 Chlamydomonas sp. A.; 62.5 C. sp. C.; 2743.0 Chlorella nr. vulgaris; 13.9 Ankistrodesmus falcutus; 6.9 Scenedesmus nr. incrassatulus

EUGLENOPHYTA 62.5 -- 62.5 Trachelomonas sp. D.

SLW-5 @ 2½ ft. TOTAL = 4120.1/ml

DIATOMS 85.3 Pennate -- 13.3 Navicula nr. cryptocephala; 34.7 Fragilaria nr. construens; 13.9 Nitzschia nr. palae; 22.8 Synedra ulna
138.9 Centric -- 41.7 Stephanodiscus nr. invisitatus; 62.5 Cyclotella nr. meneghiniana; 34.7 C. nr. michiganiana

CHLOROPHYTA 3861.2 -- 201.4 Chlamydomonas sp. A.; 62.5 C. sp. C.; 3527.8 Chlorella nr. vulgaris; 13.9 Ankistrodesmus falcutus; 55.6 A. sp.

MASTIGOPHORA 34.7 -- 34.7 Cryptomonas nr. ovata

SLW-9 @ 1 ft. TOTAL = 4951.1/ml

DIATOMS 27.7 Pennate -- 6.9 Navicula nr. cryptocephala; 20.8 Fragilaria nr. construens
111.1 Centric -- 69.4 Cyclotella nr. meneghiniana; 41.7 C. nr. michiganiana

CHLOROPHYTA 4791.6 -- 208.3 Chlamydomonas sp. A.; 4437.5 Chlorella nr. vulgaris; 97.2 C. nr. pyrenoidosa; 41.7 Ankistrodesmus sp.; 6.9 Cosmarium

CYANOPHYTA 6.9 -- 6.9 Chroococus nr. minor

MASTIGOPHORA 6.9 -- 6.9 Chilomonas nr. paramecium

CILIOPHORA 6.9 -- 6.9 Glaucoma sp.

SLW-9 @ 3 ft. TOTAL = 3680.4/ml

DIATOMS 34.7 Pennate -- 6.9 Navicula sp. B.;

PLANKTON SUMMARY -- (Organisms/ml)

4-26-74 SLW-9 @ 3 ft. cont....

DIATOMS cont....	27.8 Fragillaria nr. construens 111.1 Centric -- 69.4 Cyclotella nr. meneghiniana; 41.7 C. nr. michiganiana
CHLOROPHYTA	3506.9 -- 250.0 Chlamydomonas sp. A.; 3159.7 Chlorella nr. vulgaris; 90.3 Ankistrodesmus sp.; 6.9 Cosmarium
CYANOPHYTA	13.9 -- 13.9 Chroococcus nr. minor
MASTIGOPHORA	6.9 -- 6.9 Chilomonas nr. paramecium
CILIOPHORA	6.9 -- 6.9 Glaucoma sp.

5-7-74 SLE-1 @ $\frac{1}{2}$ ft. TOTAL = 1378.9/ml

DIATOMS	27.8 Pennate -- 27.8 Nitzschia nr. palae 27.7 Centric -- 6.9 Cyclotella nr. meneghiniana; 13.9 Melosira nr. varians; 6.9 M. granulata
CHLOROPHYTA	1154.8 -- 770.8 Chlamydomonas sp. A.; 22.8 C. sp. C.; 55.6 Chlorella nr. pyrenoidosa; 305.6 Golenkina paucispina
CYANOPHYTA	20.8 -- 20.8 Oscillatoria nr. subbrevis
EUGLENOPHYTA	13.9 -- 13.9 Trachelomonas sp. D.
MASTIGOPHORA	36.7 -- 13.9 Bodo sp. A.; 22.8 Chroomonas nr. nordstedtii
CILIOPHORA	97.2 -- 97.2 Glaucoma sp.

SLE-1 @ $1\frac{1}{2}$ ft. TOTAL = 874.9/ml

DIATOMS	20.8 Centric -- 6.9 Cyclotella nr. meneghiniana; 13.9 Melosira nr. varians
CHLOROPHYTA	680.5 -- 486.1 Chlamydomonas sp. A.; 13.9 C. sp. C.; 13.9 S. sp. D.; 6.9 Ankistrodesmus sp.; 159.7 Golenkina paucispina
CYANOPHYTA	6.9 -- 6.9 Oscillatoria nr. subbrevis
MASTIGOPHORA	48.6 -- 13.9 Bodo sp. A.; 13.9 B. sp. B.; 20.8 Chroomonas nr. nordstedtii
CILIOPHORA	118.1 -- 118.8 Glaucoma sp.

PLANKTON SUMMARY -- (Organisms/ml)

5-7-74 cont.. SLE-5 @ ½ ft. TOTAL = 111.0/ml

CHLOROPHYTA	62.4 -- 34.7 Chlamydomonas sp. A.; 6.9 C. sp. D.; 13.9 Golenkina paucispina; 6.9 Tetraedron sp.
EUGLENOPHYTA	48.6 -- 48.6 Trachelomonas sp. D.

SLE-5 @ 1½ ft. TOTAL = 124.8/ml

CHLOROPHYTA	76.3 -- 20.8 Chlamydomonas sp. A.; 13.9 C. sp. C.; 6.9 Scenedesmus nr. abundans; 34.7 Golenkina paucispina
EUGLENOPHYTA	6.9 -- 6.9 Trachelomonas sp. D.
MASTIGOPHORA	6.9 -- 6.9 Bodo sp. A.;
CILIOPHORA	34.7 -- 34.7 Glaucoma sp.

SLE-8 @ ½ ft. TOTAL = 486.0/ml

DIATOMS	13.9 Centric -- 13.9 Cyclotella nr. michiganiana
CHLOROPHYTA	187.4 -- 69.4 Chalmydomonas sp. A.; 20.8 C. sp. C.; 13.9 Chlorella nr. vulgaris; 83.3 Golenkina paucispina
EUGLENOPHYTA	201.4 -- 48.6 Trachelomonas sp. D.; 41.7 T. sp. A.; 13.9 T. sp. B.; 13.9 T. sp. C.; 69.4 Euglena sp. A.; 13.9 Phacus sp. C.
MASTIGOPHORA	76.4 -- 76.4 Chroomonas nr. nordstedtii
CILIOPHORA	6.9 -- 6.9 Glaucoma sp.

SLE-8 @ 1½ ft. TOTAL = 249.8/ml

CHLOROPHYTA	131.9 -- 13.9 Chlamydomonas sp. A.; 34.7 Chlorella nr. vulgaris; 20.8 C. nr. pyrenoidosa; 6.9 Scenedesmus nr. quadricauda var. parvus; 55.6 Golenkina paucispina
CYANOPHYTA	13.9 -- 6.9 Chroococus nr. minor; 6.9 Anabaena sp.
EUGLENOPHYTA	13.9 -- 13.9 Trachelomonas sp. C.
MASTIGOPHORA	27.7 -- 20.8 Chroomonas nr. nordstedtii; 6.9 Cryptomonas nr. ovata
CILIOPHORA	62.5 -- 41.7 Vorticella sp.; 20.8 Glaucoma sp.

PLANKTON SUMMARY -- (Organisms/ml)

5-14-74 SLW-1 @ 1 ft. TOTAL = 562.3/ml

DIATOMS	13.8 Pennate -- 6.9 Nitzschia sp.; 6.9 Fragilaria nr. construens 194.4 Centric -- 131.9 Cyclotella nr. meneghiniana; 62.5 C. nr. michiganiana
CHLOROPHYTA	76.3 -- 69.4 Chlorella nr. vulgaris; 6.9 Phacotus nr. lenticularis
EUGLENOPHYTA	83.3 -- 83.3 Euglena sp. B.
MASTIGOPHORA	194.5 -- 13.9 Bodo sp. A.; 90.3 Chroomonas nr. nordstedtii; 90.3 Cryptomonas nr. ovata

SLW-1 @ 3 ft. TOTAL = 437/6/ml

DIATOMS	34.7 Pennate -- 20.8 Nitzschia nr. palae; 13.9 Gomphonema sp. 166.7 Centric -- 104.2 Cyclotella nr. meneghiniana; 62.5 C. nr. michiganiana
CHLOROPHYTA	62.5 -- 34.7 Chlorella nr. vulgaris; 27.8 Ankistrodesmus sp.
EUGLENOPHYTA	41.7 -- 41.7 Euglena sp. B.
MASTIGOPHORA	118.1 -- 62.5 Chroomonas nr. nordstedtii; 55.6 Cryptomonas nr. ovata
CILIOPHORA	13.9 -- 13.9 Holophrya sp.

SLW-9 @ 1 ft. TOTAL = 326.3/ml

DIATOMS	48.6 Centric -- 34.7 Cyclotella nr. meneghiniana; 13.9 C. nr. michiganiana
CHLOROPHYTA	104.1 -- 83.3 Chlorella nr. vulgaris; 13.9 Chlamydomonas sp. C.; 6.9 Cosmarium
EUGLENOPHYTA	83.3 -- 20.8 Euglena sp. B.; 62.5 E. sp. C.
MASTIGOPHORA	90.3 -- 27.8 Chroomonas nr. nordstedtii; 55.6 Cryptomonas nr. ovata; 6.9 Chilomonas nr. paramecium

SLW-9 @ 3 ft. TOTAL = 604.1/ml

DIATOMS	13.9 Pennate -- 13.9 Gomphonema sp. 152.8 Centric -- 97.2 Cyclotella nr. meneghiniana; 55.6 C. nr. michiganiana
CHLOROPHYTA	48.6 -- 48.6 Chlorella nr. vulgaris

PLANKTON SUMMARY -- (Organisms/ml)

5-14-74	SLW-9 @ 3 ft. cont....	
EUGLENOPHYTA	166.6 -- 83.3 Euglena sp. B.; 62.5 E. sp. C.; 20.8 Phacus sp. B.	
MASTIGOPHORA	152.8 -- 97.2 Chroomonas nr. nordstedtii; 41.7 Cryptomonas nr. ovata; 13.9 Bodo sp. B.	
CYANOPHYTA	48.6 -- 48.6 Chroococus nr. minor	
CILIOPHORA	20.8 -- 20.8 Cyclidium sp.	

5-21-74	SLE-1 @ ½ ft. TOTAL = 631.9	NOTE: sample extremely turbid
DIATOMS	27.8 Centric -- 6.9 Melosira granulata; 20.9 M. nr. varians	
CHLOROPHYTA	138.9 -- 76.4 Chlamydomonas sp. A.; 55.6 C. sp. D.; 6.9 C. sp. C.	
EUGLENOPHYTA	333.3 -- 277.8 Trachelomonas sp. D.; 48.6 Euglena sp. A.; 6.9 Trachelomonas sp. B.	
CILIOPHORA	131.9 -- 131.9 Glaucoma sp.	
	SLE-1 @ 1½ ft. TOTAL = 694.4/ml	
DIATOMS	83.3 Centric -- 13.9 Cyclotella nr. meneghiniana; 34.7 C. nr. michiganiana; 20.8 Melosira nr. varians; 13.9 M. granulata	
CHLOROPHYTA	90.3 -- 90.3 Chlamydomonas sp. A.	
CYANOPHYTA	13.8 -- 6.9 Chroococus nr. minor; 6.9 Oscillatoria nr. limosa	
EUGLENOPHYTA	402.8 -- 340.3 Trachelomonas sp. B.; 20.8 Phacus sp. B.; 41.7 Euglena sp. A.:	
CILIOPHORA	104.2 -- 90.3 Glaucoma sp.; 13.9 Holophrya sp.	
	SLE-5 @ ½ ft. TOTAL = 34.7/ml	
DIATOMS	13.9 Pennate -- 13.9 Navicula sp. A.	
CHLOROPHYTA	13.9 -- 13.9 Chlamydomonas sp. A.	
EUGLENOPHYTA	6.9 -- 6.9 Trachelomonas sp. D.	

PLANKTON SUMMARY -- (Organisms/ml)

5-21-74 cont.. SLE-5 @ 1½ ft. TOTAL = 113.2/ml

CHLOROPHYTA 62.5 --27.8 Chlamydomonas sp. A.; 27.8 C. sp. C.; 6.9 Chlorella nr. vulgaris

EUGLENOPHYTA 48.8 -- 48.8 Trachelomonas sp. D.

MASTIGOPHORA 13.9 -- 13.9 Bodo sp. A.

SLE-8 @ ½ ft. TOTAL = 34.6/ml

CHLOROPHYTA 20.8 -- 20.8 Chlamydomonas sp. A.

EUGLENOPHYTA 6.9 -- 6.9 Trachelomonas sp. D.

CILIOPHORA 6.9 -- 6.9 Glaucoma sp.

SLE @ 1½ ft. TOTAL = 13.8/ml

CHLOROPHYTA 6.9 -- 6.9 Chlamydomonas sp. A.

EUGLENOPHYTA 6.9 -- 6.9 Trachelomonas sp. D.

5-28-74 SLW-1 @ 1 ft. TOTAL = 458.2/ml

DIATOMS 6.9 Pennate -- 6.9 Navicula sp. A.

CHLOROPHYTA 20.8 -- 13.9 Golenkina paucispina; 6.9 Cosmarium sp.

EUGLENOPHYTA 55.5 -- 6.9 Trachelomonas sp. D.; 6.9 T. sp. E.; 41.7 Phacus sp. B.

CILIOPHORA 250.0 -- Holophyra sp.; 27.8 Cyclidium sp.; 194.5 Glaucoma sp.

SLW-1 @ 3 ft. TOTAL = 131.8/ml

DIATOMS 6.9 Pennate -- 6.9 Navicula sp. A.

EUGLENOPHYTA 13.9 -- 13.9 Phacus sp. B.

MASTIGOPHORA 69.4 -- 69.4 Chroomonas nr. nordstedtii

CILIOPHORA 41.6 -- 6.9 Holophyra sp.; 34.7 Glaucoma sp.

SLE-5 @ 1 ft. TOTAL = 229.3/ml

DIATOMS 13.9 Pennate -- 13.9 Navicula sp. A.

Chlorophyta 41.7 -- 13.9 Chlamydomonas sp. A.; 27.8 Golenkina paucispina

EUGLENOPHYTA 41.7 -- 41.7 Phacus sp. B.

PLANKTON SUMMARY -- (Organisms/ml)

5-28-74	SLW-5 @ 1 ft. cont....
MASTIGOPHORA	27.8 -- 27.8 Chroomonas nr. nordstedtii
CILIOPHORA	104.2 -- 90.3 Glaucoma sp.; 13.9 Holophrya sp.

	SLW-5 @ 3 ft. TOTAL = 194.3/ml
DIATOMS	6.9 Pennate -- 6.9 Navicula nr. cryptocephala
CHLOROPHYTA	20.8 -- 20.8 Chlamydomonas sp. A.
EUGLENOPHYTA	48.6 -- 13.9 Trachelomonas sp. D.; 34.7 Phacus sp. B.
MASTIGOPHORA	34.7 -- 13.9 Chroomonas nr. nordstedtii; 20.8 Cryptomonas nr. ovata
CILIOPHORA	83.3 -- 76.4 Glaucoma sp.; 6.9 Holophrya sp.

	SLW-9 @ 1 ft. TOTAL = 145.7/ml
DIATOMS	6.9 Pennate -- 6.9 Nitzschia nr. palae
CHLOROPHYTA	27.8 -- 6.9 Chlamydomonas sp. A.; 20.8 Golenkina paucispina
EUGLENOPHYTA	20.8 -- 6.9 Phacus sp. B.; 13.9 P. sp. A.
MASTIGOPHORA	6.9 -- 6.9 Chilomonas nr. paramecium
CILIOPHORA	83.3 -- 55.5 Glaucoma sp.; 27.8 Holophrya sp.

	SLW-9 @ 3 ft. TOTAL = 69.4/ml
CHLOROPHYTA	6.9 -- 6.9 Golenkina paucispina
EUGLENOPHYTA	13.9 -- 13.9 Phacus sp. B.
CILIOPHORA	48.6 -- 27.8 Glaucoma sp.; 20.8 Holophrya sp.

6-11-74	SLE-1 @ ½ ft. TOTAL = 265.6/ml
DIATOMS	27.7 Pennate -- 6.9 Navicula nr. cryptocephala; 20.8 Nitzschia nr. palae
CHLOROPHYTA	71.4 -- 22.8 Chlamydomonas sp. A.; 13.9 C. sp. C.; 34.7 Chlorella nr. vulgaris
CYANOPHYTA	6.9 -- 6.9 Oscillatoria tenuis
EUGLENOPHYTA	76.3 -- 69.4 Trachelomonas sp. D.; 6.9 Phacus sp. B.
CILIOPHORA	83.3 -- 76.4 Vorticella sp.; 6.9 Glaucoma sp.

PLANKTON SUMMARY -- (Organisms/ml)

6-11-74 cont..		SLE-1 @ 1½ ft. TOTAL = 250.0/ml
DIATOMS		6.9 Pennate -- 6.9 Nitzschia nr. palae
CHLOROPHYTA		83.3 -- 27.8 Chlamydomonas sp. A.; 20.8 Chlorella nr. vulgaris; 34.7 Golenkina paucispina
EUGLENOPHYTA		27.8 -- 27.8 Trachelomonas sp. D.
CILIOPHORA		132.0 -- 104.2 Vorticella sp.; 27.8 Glaucoma sp.

SLE-5 @ ½ ft. TOTAL = 76.3/ml

DIATOMS	6.9 Pennate -- 6.9 Fragillaria nr. construens
CHLOROPHYTA	6.9 -- 6.9 Chlamydomonas sp. A.
EUGLENOPHYTA	48.6 -- 13.9 Trachelomonas sp. D.; 27.8 T. sp. B.; 6.9 Euglena sp. C.
CILIOPHORA	13.9 -- 13.9 Vorticella sp.

SLE-5 @ 1½ ft. TOTAL = 416.6/ml

DIATOMS	83.3 Pennate -- 83.3 Nitzschia nr. palae
CHLOROPHYTA	118.0 -- 48.6 Chlamydomonas sp. A.; 27.8 C. sp. C.; 34.7 Chlorella nr. vulgaris; 6.9 C. nr. pyrenoidosa
EUGLENOPHYTA	138.9 -- 62.5 Trachelomonas sp. D.; 76.4 T. sp. B.
CILIOPHORA	76.4 -- 62.5 Vorticella sp.; 13.9 Glaucoma sp.

SLE-8 @ ½ ft. TOTAL = 367.8/ml

DIATOMS	6.9 Pennate -- 6.9 Nitzschia nr. palae
CHLOROPHYTA	173.4 -- 13.9 Chlamydomonas sp. A.; 20.8 Chlorella nr. vulgaris; 131.8 C. nr. pyrenoidosa; 6.9 Cosmarium sp.
CYANOPHYTA	20.8 -- 20.8 Chroococus nr. minor
EUGLENOPHYTA	76.4 -- 48.6 Trachelomonas sp. B.; 27.8 Phacus sp. B.
CILIOPHORA	90.3 -- 76.4 Vorticella sp.; 13.9 Cyclidium sp.

SLE-8 @ 1½ ft. TOTAL = 263.7/ml

DIATOMS	41.6 Pennate -- 6.9 Navicula nr. cryptocephala; 34.7 Nitzschia nr. palae

PLANKTON SUMMARY -- (Organisms/ml)

6-11-74	SLE-8 @ $1\frac{1}{2}$ ft. cont....
CHLOROPHYTA	1041. -- 34.7 Chlämydomonas sp. A.; 69.4 Chlorella nr. pyrenoidosa
EUGLENOPHYTA	48.6 -- 13.9 Trachelomonas sp. D.; 34.7 T. sp. B.
CILIOPHORA	69.4 -- 55.6 Vorticella sp.; 6.9 Glaucoma sp.; 6.9 Holophrya sp.

6-28-74	SLW-1 @ 1 ft. TOTAL = 166.5/ml
DIATOMS	6.9 Pennate -- 6.9 Nitzschia nr. palae 20.8 Centric -- 6.9 Cyclotella nr. meneghiniana; 13.9 Melosira nr. varians
CHLOROPHYTA	41.7 -- 13.9 Ankistrodesmus falcutus; 27.8 A. sp.
CYANOPHYTA	6.9 -- 6.9 Anabaena sp.
EUGLENOPHYTA	62.4 -- 48.6 Phacus sp. A.; 6.9 Euglena sp. B.; 6.9 E. sp. C.
MASTIGOPHORA	27.8 -- 27.8 Chroomonas nr. nordstedtii
	SLW-1 @ 3 ft. TOTAL = 333.1/ml
DIATOMS	13.8 Centric -- 6.9 Cyclotella nr. meneghiniana; 6.9 Melosira nr. varians
CHLOROPHYTA	145.7 -- 83.3 Chlamydomonas sp. A.; 20.8 C. sp. D.; 20.8 Chlorella nr. pyrenoidosa; 13.9 Ankistrodesmus sp.; 6.9 Phacotus nr. lenticularis
CYANOPHYTA	6.9 -- 6.9 Anabaena sp.
EUGLENOPHYTA	132.0 -- 118.1 Phacus sp.; A.; 13.9 Euglena sp. C.
MASTIGOPHORA	34.7 -- 34.7 Chroomonas nr. nordstedtii
	SLW-5 @ 1 ft. TOTAL = 249.9/ml
DIATOMS	6.9 Centric -- 6.9 Melosira granulata
CHLOROPHYTA	104.1 -- 48.6 Chlamydomonas sp. A.; 6.9 C. sp. C.; 6.9 Chlorella nr. vulgaris; 41.7 C. nr. pyrenoidosa; 20.8 Cosmarium sp.
CYANOPHYTA	20.8 -- 13.9 Chroococus nr. minor; 6.9 Aphanocapsa rivularis
EUGLENOPHYTA	104.2 -- 27.8 Trachelomonas sp. D.; 27.8 Phacus sp. B.; 27.8 P. sp. A.; 6.9 Euglena sp. B.;

PLANKTON SUMMARY -- (Organisms/ml)

6-28-74 SLW-5 @ 1 ft. cont....

EUGLENOPHYTA cont.... 13.9 E. sp. C.

MASTIGOPHORA 13.9 -- 13.9 Cryptomonas nr. ovata

SLW-5 @ 3 ft. TOTAL = 270.6/ml

DIATOMS 6.9 Pennate -- 6.9 Nitzschia nr. palae
20.8 Centric -- 13.9 Melosira granulata; 6.9 M. nr. varians

CHLOROPHYTA 76.3 -- 20.8 Chlamydomonas sp. A.; 13.9 Chlorogonium sp.; 34.7 Ankistrodesmus sp.; 6.9 Cosmarium sp.

EUGLENOPHYTA 90.2 -- 6.9 Trachelomonas sp. D.; 48.6 Phacus sp. A.; 6.9 P. sp. B.; 13.9 Euglena sp. B.; 13.9 E. sp. C.

MASTIGOPHORA 76.4 -- 41.7 Chroomonas nr. nordstedtii; 34.7 Cryptomonas nr. ovata

SLW-9 @ 1 ft. TOTAL = 194.3/ml

DIATOMS 6.9 Centric -- 6.9 Melosira granulata

CHLOROPHYTA 27.7 -- 20.8 Ankistrodesmus sp.; 6.9 Golenkina paucispina

EUGLENOPHYTA 41.6 -- 6.9 Trachelomonas sp. D.; 6.9 Euglena sp. B.; 27.8 E. sp. C.

MASTIGOPHORA 90.3 -- 41.7 Chroomonas nr. nordstedtii; 41.7 Cryptomonas nr. ovata; 6.9 Chilomonas nr. paramecium

CILIOPHORA 27.8 -- 13.9 Vorticella sp. B.; 13.9 Cyclidium sp.

SLW-9 @ 3 ft. TOTAL = 201.2/ml

DIATOMS 13.9 Pennate -- 13.9 Nitzschia nr. palae
13.9 Centric -- 13.9 Melosira nr. varians

CHLOROPHYTA 48.5 -- 6.9 Chlamydomonas sp. A.; 6.9 Chlorogonium sp.; 27.8 Ankistrodesmus sp.; 6.9 Cosmarium sp.

CYANOPHYTA 13.9 -- 13.9 Aphanocapsa rivularis

EUGLENOPHYTA 83.3 -- 34.7 Trachelomonas sp. D.; 13.9 Phacus sp. B.; 13.9 Euglena sp. B.; 20.8 E. sp. C.

PLANKTON SUMMARY -- (Organisms/ml)

6-28-74	SLW-9 @ 3 ft. cont....	
MASTIGOPHORA	27.7 -- 20.8 Chroomonas nr. nordstedtii; 6.9 Cryptomonas nr. ovata	

7-12-74	SLE-1 @ ½ ft. TOTAL = 791.6/ml
DIATOMS	6.9 Centric -- 6.9 Cyclotella nr. meneghiniana
CHLOROPHYTA	41.6 -- 20.8 Chlamydomonas sp. A.; 20.8 Chlorella nr. pyrenoidosa
EUGLENOPHYTA	159.8 -- 90.3 Trachelomonas sp. D.; 13.9 Phacus sp. C.; 55.6 Euglena nr. acus
MASTIGOPHORA	76.4 -- 27.8 Bodo sp. A.; 48.6 Chroomonas nr. nordstedtii
CILIOPHORA	506.9 -- 6.9 Vorticella sp.; 13.9 Holophrya sp.; 486.1 Glaucoma sp.
	SLE-1 @ 1½ ft. TOTAL = 758.8/ml
DIATOMS	13.9 Pennate -- 13.9 Synedra ulna 13.9 Centric -- 13.9 Melosira nr. varians
CHLOROPHYTA	131.9 -- 34.7 Chlamydomonas sp. A.; 97.2 Chlorella nr. pyrenoidosa
CYANOPHYTA	34.7 -- 13.9 Chroococus sp.; 20.8 Anabaena sp.
EUGLENOPHYTA	62.5 -- 48.6 Trachelomonas sp. D.; 13.9 Phacus sp. D.
MASTIGOPHORA	20.8 -- 20.8 Bodo sp. A.
CILIOPHORA	439.5 -- 22.8 Vorticella sp.; 416.7 Glaucoma sp.
ROTIFERA	41.6 -- 6.9 Brachionus urceolares; 34.7 Filinia longiseta
	SLE-5 @ ½ ft. TOTAL = 764.1/ml
CHLOROPHYTA	6.9 -- 6.9 Golenkina paucispina
CYANOPHYTA	41.7 -- 41.7 Anabaena sp.
EUGLENOPHYTA	409.6 -- 138.9 Trachelomonas sp. D.; 159.7 Phacus sp. B.; 97.2 P. sp. A.; 6.9 Euglena nr. acus; 6.9 E. sp. C.
MASTIGOPHORA	167.0 -- 6.9 Bodo sp. B.; 55.9 Chroomonas nr. nordstedtii; 104.2 Cryptomonas nr. ovata

PLANKTON SUMMARY -- (Organisms/ml)

7-12-74	SLE-5 @ ½ ft. cont....
CILIOPHORA	138.9 -- 138.9 Glaucoma sp.
	SLE-5 @ 1½ ft. TOTAL = 666.5/ml
DIATOMS	13.9 Pennate -- 13.9 Navicula sp. B.
CHLOROPHYTA	159.6 -- 34.7 Chlamydomonas sp. A.; 34.7 C. sp. E.; 13.9 Chlorella nr. pyrenoidosa; 69.4 Ankistrodesmus sp.; 6.9 Golenkina paucispina
EUGLENOPHYTA	83.3 -- 34.7 Trachelomonas sp. A.; 41.7 Phacus sp. B.; 6.9 Euglena sp. C.
MASTIGOPHORA	326.4 -- 48.6 Bodo sp. A.; 27.8 B. sp. B.; 104.2 Chroomonas nr. nordstedtii; 145.8 Cryptomonas nr. ovata
CILIOPHORA	76.4 -- 20.8 Holophrya sp.; 62.5 Glaucoma sp.
	SLE-8 @ ½ ft. TOTAL = 367.9/ml
DIATOMS	13.9 Pennate -- 13.9 Nitzschia nr. palae 27.8 Centric -- 27.8 Stephanodiscus nr. invisitatus
UNIDENTIFIED	41.7 -- 41.7 spheres, light colored, granular surface, dark spot
CHLOROPHYTA	48.5 -- 20.8 Chlamydomonas sp. A.; 20.8 Chlorella nr. pyrenoidosa; 6.9 Golenkina paucispina
EUGLENOPHYTA	69.4 -- 27.8 Trachelomonas sp. D.; 34.7 Phacüs sp. B.; 6.9 Euglena nr. acus
MASTIGOPHORA	104.2 -- 55.6 Chroomonas nr. nordstedtii; 48.6 Cryptomonas nr. ovata
SARCODINA	20.8 -- 20.8 Trimastigamoeba sp.
CILIOPHORA	41.6 -- 20.8 Vorticella sp.; 6.9 Cyclidium sp.; 34.7 Glaucoma sp.
	SLE-8 @ 1½ ft. TOTAL = 388.8/ml
DIATOMS	20.8 Centric -- 20.8 Stephanodiscus nr. invisitatus
UNIDENTIFIED	69.4 -- 69.4 spheres, light colored, granular surface, dark spot
CHLOROPHYTA	55.6 -- 55.6 Chlamydomonas sp. A.
EUGLENOPHYTA	90.3 -- 62.5 Trachelomonas sp. D.; 27.8 Phacus sp. B.

PLANKTON SUMMARY -- (Organisms/ml)

7-12-74	SLE-8 @ $1\frac{1}{2}$ ft. cont....	
MASTIGOPHORA	131.9 -- 6.9 Bodo sp. A.; 69.4 Chroomonas nr. nordstedtii; 55.6 Cryptomonas nr. ovata	
SARCODINA	13.9 -- 13.9 Trimastigamoeba sp.	
CILIOPHORA	76.3 -- 20.8 Vorticella sp.; 20.8 Cyclidium sp.; 6.9 Holophrya sp.; 27.8 Glaucoma sp.	
7-19-74	SLW-1 @ $1\frac{1}{2}$ ft.	TOTAL = 750.0/ml
DIATOMS	27.8 Pennate -- 27.8 Nitzschia nr. palae 34.7 Centric -- 27.8 Melosira nr. varians; 6.9 M. granulata	
CHLOROPHYTA	381.9 -- 55.6 Chlamydomonas sp. A.; 319.4 Chlorella nr. pyrenoidosa; 6.9 Ankistrodesmus falcutus	
CYANOPHYTA	264.0 -- 55.6 Chroococus nr. minor; 13.9 C. dispersus; 34.7 Aphanacapsa rivularis; 41.7 Nicrocystis aeruginosa; 118.5 Anabaena constricta	
MASTIGOPHORA	34.7 -- 13.9 Bodo sp. B.; 6.9 Chroomonas nr. nordstedtii; 13.9 Cryptomonas nr. ovata	
CILIOPHORA	6.9 -- 6.9 Glaucoma sp.	
	SLW-1 @ 3 ft.	TOTAL = 465.1/ml
DIATOMS	6.9 Pennate -- 6.9 Nitzschia nr. palae 41.7 Centric -- 41.7 Melosira nr. varians	
CHLOROPHYTA	263.9 -- 20.8 Chlamydomonas sp. A.; 173.6 Chlorella nr. pyrenoidosa; 27.8 Ankistrodesmus falcutus; 41.7 A. sp.	
CYANOPHYTA	131.9 -- 27.8 Chroococus nr. minor; 6.9 C. dispersus; 20.8 Aphanacapsa rivularis; 13.9 Microcystis aeruginosa; 62.5 Anabaena constricta	
EUGLENOPHYTA	6.9 -- 6.9 Trachelomonas sp. D.	
MASTIGOPHORA	6.9 -- 6.9 Cryptomonas nr. ovata	
CILIOPHORA	6.9 -- 6.9 Cyclidium sp.	

PLANKTON SUMMARY -- (Organisms/ml)

7-19-74 cont.. SLW-5 @ 1½ ft. TOTAL = 888.9/ml

DIATOMS	20.8 Pennate -- 20.8 Nitzschia nr. palae 27.8 Centric -- 27.8 Melosira nr. varians
CHLOROPHYTA	604.2 -- 55.6 Chlamydomonas sp. A.; 222.2 Chlorella nr. pyrenoidosa; 34.7 Chlamydomonas sp. E.; 13.9 Ankistrodesmus falcutus; 277.8 A. sp.
CYANOPHYTA	208.3 -- 27.8 Chroococus nr. minor; 13.9 Aphanacapsa rivularis; 20.8 Nicrocystis aeruginosa; 145.8 Anabaena constricta
MASTIGOPHORA	13.9 -- 13.9 Cryptomonas nr. ovata
CILIOPHORA	13.9 -- 13.9 Vorticella sp.

SLW-5 @ 3 ft. TOTAL = 971.8/ml

DIATOMS	13.9 Pennate -- 13.9 Nitzschia nr. palae 27.7 Centric -- 6.9 Stephanodiscus nr. invisitatus; 6.9 Melosira granulata; 13.9 M. nr. varians
CHLOROPHYTA	611.0 -- 20.8 Chlamydomonas sp. A.; 312.5 Chlorella nr. pyrenoidosa; 20.8 Ankistrodesmus falcutus; 256.9 A. sp.
CYANOPHYTA	284.7 -- 13.9 Chroococus nr. minor; 6.9 C. dispersus; 20.8 Aphanacapsa rivularis; 27.8 Microcystis aeruginosa; 215.3 Anabaena constricta
EUGLENOPHYTA	6.9 -- 6.9 Trachelomonas sp. E.
MASTIGOPHORA	13.8 -- 6.9 Cryptomonas nr. ovata; 6.9 Chilomonas nr. paramecium
SARCODINA	6.9 -- 6.9 Trimastigamoeba sp.
CILIOPHORA	6.9 -- 6.9 Vorticella sp.

SLW-9 @ 1½ ft. TOTAL = 360.9/ml

DIATOMS	6.9 Pennate -- 6.9 Nitzschia nr. palae 27.8 Centric -- 27.8 Melosira nr. varians
CHLOROPHYTA	125.0 -- 27.8 Chlamydomonas sp E.; 97.2 Chlorella nr. pyrenoidosa
CYANOPHYTA	125.1 -- 41.7 Chroococus nr. minor; 13.9 C. dispersus; 27.8 Aphanacapsa rivularis; 41.7 Nicrocystis aeruginosa

PLANKTON SUMMARY -- (Organisms/ml)

7-19-74	SLW-9 @ 1½ ft. cont....	
EUGLENOPHYTA	13.8 -- 6.9 Trachelomonas sp. D.; 6.9 Euglena sp. C.	
MASTIGOPHORA	34.6 -- 6.9 Bodo sp. A.; 20.8 Cryptomonas nr. ovata; 6.9 Chilomonas nr. paramecium	
SARCODINA	6.9 -- 6.9 Trimastigamoeba sp.	
CILIOPHORA	20.8 -- 13.9 Vorticella sp.; 6.9 Glaucoma sp.	
	SLW-9 @ 3 ft. TOTAL = 361.0/ml	
DIATOMS	6.9 Pennate -- 6.9 Nitzschia nr. palae 48.6 Centric -- 34.7 Nelosira nr. varians; 13.9 M. granulata	
CHLOROPHYTA	131.9 -- 6.9 Chlamydomonas sp. C.; 104.2 Chlorella nr. pyrenoidosa; 13.9 Ankistrodesmus falcutus; 6.9 A. sp.	
CYANOPHYTA	138.9 -- 55.6 Chroococus nr. minor; 13.9 C. dispersus; 34.7 Aphanacapsa rivularis; 34.7 Microcystis aeruginosa	
EUGLENOPHYTA	13.9 -- 13.9 Euglena sp. C.	
MASTIGOPHORA	6.9 -- 6.9 Cryptomonas nr. ovata	
SARCODINA	13.9 -- 13.9 Trimastigamoeba sp.	

7-26-74	SLE-1 @ ½ ft. TOTAL = 812.2/ml
DIATOMS	27.7 Centric -- 20.8 Stephanodiscus nr. invisitatus; 6.9 Cyclotella nr. meneghiniana
CHLOROPHYTA	138.7 -- 69.4 Chlamydomonas sp. A.; 6.9 Chlorella nr. pyrenoidosa; 34.7 Ankistrodesmus falcutus; 6.9 A. sp.; 6.9 Kirchneriella nr. lunaris; 13.9 Golenkina paucispina
EUGLENOPHYTA	27.7 -- 6.9 Trachelomonas sp. D.; 13.9 Phacus sp. B.; 6.9 Euglena sp. C.
PYRROPHYTA	41.7 -- 41.7 Gymnodinium sp.
MASTIGOPHORA	277.8 -- 13.9 Bodo sp. A.; 55.6 Chroomonas nr. nordstedtii; 208.3 Cryptomonas nr. ovata
SARCODINA	20.8 -- 20.8 Trimastigamoeba sp.
CILIOPHORA	277.8 -- 131.9 Vorticella sp.; 41.7 Glaucoma sp.; 48.6 Holophrya sp.; 55.6 Euplotes sp.

PLANKTON SUMMARY -- (Organisms/ml)

7-26-74 cont.. SLE-1 @ 1½ ft. TOTAL = 888.6/ml

DIATOMS	27.8 Centric -- 13.9 Stephanodiscus nr. invisitatus; 13.9 Cyclotella nr. meneghiniana
CHLOROPHYTA	145.8 -- 55.6 Chlamydomonas sp. A.; 6.9 Chlorella nr. vulgaris; 27.8 C. nr. pyrenoidosa; 48.6 Ankistrodesmus falcutus; 6.9 A. sp.; 27.8 Kirchneriella nr. lunaris
CYANOPHYTA	27.8 -- ;3.9 Spirulina laxa; 13.9 Anabaena sp.
EUGLENOPHYTA	62.4 -- 6.9 Trachelomonas sp. D.; 20.8 Phacus sp. B.; 13.9 P. longicauda; 20.8 Euglena sp. C.
PYRROPHYTA	48.6 -- 48.6 Gymnodinium sp.
MASTIGOPHORA	236.0 -- 13.9 Bodo sp. B.; 6.9 Chroomonas nr. nordstedtii; 194.4 Cryptomonas nr. ovata; 20.8 Chilomonas nr. paramecium
SARCODINA	27.8 -- 27.8 Trimastigamoeba sp.
CILIOPHORA	298.5 -- 173.6 Vorticella sp.; 69.4 Glaucoma sp.; 20.8 Holophrya sp.; 34.7 Euplotes sp.
ROTIFERA	13.9 -- 13.9 Syncheta sp.

SLE-5 @ ½ ft. TOTAL = 978.8/ml

DIATOMS	13.8 Centric -- 6.9 Cyclotella nr. meneghiniana; 6.9 C. nr. michiganiana
CHLOROPHYTA	124.9 -- 20.8 Chlamydomonas sp. A.; 13.9 C. sp. D.; 48.6 Ankistrodesmus falcutus; 6.9 A. sp.; 27.8 Kirchneriella nr. lunaris; 6.9 Scenedesmus nr. abundans
CYANOPHYTA	166.7 -- 27.8 Chroococus nr. minor; 138.9 Anabaena sp.
EUGLENOPHYTA	166.6 -- 48.6 Trachelomonas sp. A.; 111.1 Phacus sp. B.; 6.9 P. longicauda
PYRROPHYTA	27.8 -- 27.8 Gymnodinium sp.
MASTIGOPHORA	368.0 -- 69.4 Chroomonas nr. nordstedtii; 298.6 Cryptomonas nr. ovata
SARCODINA	6.9 -- 6.9 Trimastigamoeba sp.
CILIOPHORA	104.1 -- 104.1 Glaucoma sp.

PLANKTON SUMMARY -- (Organisms/ml)

7-26-74 cont.. SLE-5 @ 1½ ft. TOTAL = 728.8/ml

DIATOMS	20.8 Pennate -- 20.8 Navicula sp. B. 6.9 Centric -- 6.9 Cyclotella nr. michiganiana
CHLOROPHYTA	124.9 -- 62.5 Chlamydomonas sp. A.; 48.6 Ankistrodesmus falcutus; 6.9 Scenedesmus nr. abundans; 6.9 Cosmarium sp.
CYANOPHYTA	55.5 -- 6.9 Chroococus nr. minor; 6.9 Chlorococcum humicola; 41.7 Anabaena sp.
EUGLENOPHYTA	62.5 -- 62.5 Phacus sp.
PYRROPHYTA	13.9 -- 13.9 Gymnodinium sp.
MASTIGOPHORA	374.9 -- 69.4 Chroomonas nr. nordstedtii; 298.6 Cryptomonas nr. ovata; 6.9 Chilomonas nr. paramecium
SARCODINA	20.8 -- 20.8 Trimastigamoeba sp.
CILIOPHORA	48.6 -- 13.9 Vorticella sp.; 34.7 Glaucoma sp.

SLE-8 @ 10 inches TOTAL = 1187.1

DIATOMS	13.8 Centric -- 6.9 Stephanodiscus nr. invisitatus; 6.9 Cyclotella nr. michiganiana
UNIDENTIFIED	13.9 -- 13.9 spheres, light colored, granular surface, dark spot
CHLOROPHYTA	166.7 --- 48.6 Chlorella nr. vulgaris; 55.6 Ankistrodesmus falcutus; 13.9 A. convulutus; 27.8 Kirchneriella nr. lunaris; 6.9 Scenedesmus nr. abundans; 13.9 S. nr. quadricauda var. parvus
CYANOPHYTA	76.4 -- 76.4 Anabaena sp.
EUGLENOPHYTA	249.9 -- 34.7 Trachelomonas sp. A.; 83.3 T. sp. D.; 41.7 Phacus sp. B.; 27.8 P. sp. C.; 20.8 P. longicauda; 20.8 Euglena sp. C.; 20.8 E. nr. acus
PYRROPHYTA	97.2 -- 97.2 Gymnodinium sp.
MASTIGOPHORA	437.5 -- 145.8 Chroomonas nr. nordstedtii; 291.7 Cryptomonas nr. ovata
SARCODINA	76.4 -- 76.4 Trimastigamoeba sp.
CILIOPHORA	55.3 -- 55.3 Glaucoma sp.

PLANKTON SUMMARY -- (Organisms/ml)

7-26-74 cont.. SLE-8 @ 1½ ft. TOTAL = 1256.8/ml

DIATOMS	6.9 Pennate -- 6.9 Nitzschia nr. palae 6.9 Centric -- 6.9 Cyclotella nr. meneghiniana
UNIDENTIFIED	62.5 -- 62.5 spheres, light colored, granular surface, dark spot
CHLOROPHYTA	48.6 -- 6.9 Chlamydomonas sp. D.; 27.8 Ankistrodesmus falcutus; 13.9 Kirchneriella nr. lunaris
CYANOPHYTA	13.9 -- 13.9 Anabaena sp.
EUGLENOPHYTA	104.2 -- 55.6 Trachelomonas sp. D.; 6.9 T. sp. B.; 13.9 Phacus sp. B.; 13.9 P. longicauda; 13.9 Euglena sp. C.
PYRROPHYTA	20.8 -- 20.8 Gymnodinium sp.
MASTIGOPHORA	909.7 -- 250.0 Chroomonas nr. nordstedtii; 659.7 Cryptomonas nr. ovata
SARCODINA	13.9 -- 13.9 Trimastigamoeba sp.
CILIOPHORA	69.4 -- 69.4 Glaucoma sp.

8-2-74 SLW-1 @ 1½ ft. TOTAL = 722.2/ml

DIATOMS	20.8 Pennate -- 20.8 Nitzschia nr. palae 76.4 Centric -- 55.7 Melosira nr. varians; 20.7 M. granulata
CHLOROPHYTA	305.6 -- 27.8 Chlamydomonas sp. A.; 34.7 C. sp. E.; 111.1 Chlorella nr. vulgaris; 104.2 C. nr. pyrenoidosa; 13.9 Closterium sp. B.; 13.9 Oocystis nr. elliptica var. minor
CYANOPHYTA	104.1 -- 13.9 Aphanacapsa rivularis; 83.3 Microcystis aeruginosa; 6.9 Anabaena sp.
EUGLENOPHYTA	48.6 -- 48.6 Trachelomonas sp. D.
PYRROPHYTA	13.9 -- 13.9 Gymnodinium sp.
MASTIGOPHORA	13.9 -- 13.9 Chilomonas nr. paramecium
SARCODINA	13.9 -- 13.9 Trimastigamoeba sp.
CILIOPHORA	125.0 -- 104.2 Vorticella sp.; 20.8 Glaucoma sp.

SLW-1 @ 3 ft. TOTAL = 569.1/ml

DIATOMS	6.9 Pennate -- 6.9 Nitzschia nr. palae

PLANKTON SUMMARY -- (Organisms/ml)

8-2-74 SLW-1 @ 3 ft. cont....

DIATOMS cont.... 62.5 Centric -- 34.7 Melosira nr. varians; 27.8 M. granulata

CHLOROPHYTA 374.9 -- 20.8 Chlamydomonas sp. A.; 13.9 C. sp. C.; 27.8 C. sp. D.; 215.3 Chlorella nr. vulgaris; 69.4 C. nr. pyrenoidosa; 20.8 Ankistrodesmus falcutus; 6.9 A. sp.

CYANOPHYTA 48.6 -- 6.9 Aphanacapsa rivularis; 41.7 Microcystis aeruginosa

EUGLENOPHYTA 27.7 -- 20.8 Trachelomonas sp. D.; 6.9 Euglena sp. A.

SARCODINA 6.9 -- 6.9 Trimastigamoeba sp.

CILIOPHORA 41.6 -- 27.8 Vorticella sp.; 6.9 Cyclidium sp.; 6.9 Glaucoma sp.

SLW-5 @ 1½ ft. TOTAL - 388.6/ml

DIATOMS 6.9 Pennate -- 6.9 Nitzschia nr. palae
34.7 Centric -- 6.9 Melosira granulata; 27.8 M. nr. varians

CHLOROPHYTA 236.1 -- 13.9 Chlamydomonas sp. A.; 159.7 Chlorella nr. vulgaris; 55.6 C. nr. pyrenoidosa; 13.9 Ankistrodesmus sp.; 6.9 Scenedesmus nr. incrassatulus

CYANOPHYTA 34.7 -- 34.7 Microcystis aeruginosa

EUGLENOPHYTA 13.8 -- 6.9 Trachelomonas sp. D.; 6.9 Phacus sp. C.

MASTIGOPHORA 6.9 -- 6.9 Bodo sp. B.

SARCODINA 6.9 -- 6.9 Trimastigamoeba sp.

CILIOPHORA 48.6 -- 27.8 Vorticella sp.; 20.8 Glaucoma sp.

SLW-5 @ 3 ft. TOTAL = 668.7/ml

DIATOMS 41.7 Pennate -- 41.7 Nitzschia nr. palae
62.5 Centric -- 6.9 Stephanodiscus nr. invisatatus; 27.8 Melosira granulata; 27.8 M. nr. varians

CHLOROPHYTA 446.5 -- 20.8 Chlamydomonas sp. A.; 34.7 C. sp. D.; 286.8 Chlorella nr. vulgaris; 55.6 C. nr. pyrenoidosa; 13.9 Ankistrodesmus falcutus; 27.8 A. sp.; 6.9 Scenedesmus nr. incrassatulus

PLANKTON SUMMARY -- (Organisms/ml)

8-2-74	SLW-5 @ 3 ft. cont....
CYANOPHYTA	76.4 -- 13.9 Aphanacapsa rivularis; 55.6 Microcystis aeruginosa; 6.9 Anabaena sp.
MASTIGOPHORA	20.8 -- 6.9 Chroomonas nr. nordstedtii; 13.9 Cryptomonas nr. ovata
CILIOPHORA	20.8 -- 20.8 Vorticella sp.
	SLW-9 @ $1\frac{1}{2}$ ft. TOTAL = 646.2/ml
DIATOMS	111.1 Pennate -- 111.1 Nitzschia nr. palae 69.4 Centric -- 6.9 Cyclotella nr. meneghiniana; 41.7 Melosira nr. varians; 20.7 M. granulata
CHLOROPHYTA	389.4 -- 55.6 Chlamydomonas sp. A.; 139.4 Chlorella nr. vulgaris; 194.4 C. nr. pyrenoidosa
CYANOPHYTA	55.5 -- 20.8 Chroococus nr. minor; 6.9 Aphanacapsa rivularis; 13.9 Microcystis aeruginosa; 13.9 Anabaena sp.
CILIOPHORA	20.8 -- 13.9 Vorticella sp.; 6.9 Glaucoma sp.
	SLW-9 @ 3 ft. TOTAL = 812.4/ml
DIATOMS	69.4 Pennate -- 62.5 Nitzschia nr. palae; 6.9 Fragilaris nr. construens 20.8 Centric -- 6.9 Melosira nr. varians; 13.9 M. granulata
CHLOROPHYTA	479.1 -- 20.8 Chlamydomonas sp. A.; 20.8 C. sp. D.; 333.3 Chlorella nr. vulgaris; 104.2 C. nr. pyrenoidosa
CYANOPHYTA	152.8 -- 27.8 Chroococus nr. minor; 118.1 Microcystis aeruginosa; 6.9 Anabaena sp.
CILIOPHORA	90.3 -- 55.6 Vorticella sp.; 13.9 Cyclidium sp.; 20.8 Glaucoma sp.

8-9-74	SLE-1 @ $\frac{1}{2}$ ft. TOTAL = 3076.5/ml
DIATOMS	13.9 Pennate -- 13.9 Nitzschia nr. palae 229.2 Centric -- 229.2 Stephanodiscus nr. invisatatus
UNIDENTIFIED	55.6 -- 55.6 spheres, light colored, granular surface, dark spot

PLANKTON SUMMARY -- (Organisms/ml)

8-9-74 SLE-1 @ ½ ft. cont....

CHLOROPHYTA 895.8 -- 243.0 Chlamydomonas sp. A.; 104.2 Chlorella nr. vulgaris; 104.2 Ankistrodesmus falcutus; 138.9 A. sp.; 69.4 Kirchneriella nr. lunaris; 48.6 Scenedesmus nr. abundans; 90.3 S. nr. quadricauda var. parvus; 90.3 S. nr. incrassatulus; 6.9 Actinastrum nr. Hantzschii

CYANOPHYTA 138.9 -- 111.1 Chroococus nr. minor; 27.8 Anabaena sp.

EUGLENOPHYTA 152.8 -- 34.7 Trachelomonas sp. D.; 27.8 Phacus sp. B.; 90.3 Euglena sp. C.

MASTIGOPHORA 1298.6 -- 215.3 Bodo sp. A.; 152.8 Chroomonas nr. nordstedtii; 930.5 Cryptomonas nr. ovata

SARCODINA 138.9 -- 138.9 Trimastigamoeba sp.

CILIOPHORA 97.2 -- 34.7 Vorticella sp.; 62.5 Glaucoma sp.

SLE-1 @ 1½ ft. TOTAL = 2212.2/ml

DIATOMS 208.3 Centric -- 201.4 Stephanodiscus nr. invisatatus; 6.9 Cyclotella nr. meneghiniana

UNIDENTIFIED 62.5 -- 62.5 spheres, light colored, granular surface, dark spot

CHLOROPHYTA 520.9 -- 138.9 Chlamydomonas sp. A.; 111.1 Ankistrodesmus falcutus; 152.8 A. sp.; 27.8 Scenedesmus nr. abundans; 55.6 S. nr. quadricauda var. parvus; 13.9 Closterium sp. B.; 20.8 Golenkina paucispina

CYANOPHYTA 76.4 -- 76.4 Chlorococcum humicola

EUGLENOPHYTA 104.2 -- 55.6 Trachelomonas sp. D.; 13.9 Phacus longicauda; 34.7 P. sp. B.

MASTIGOPHORA 1173.6 -- 180.6 Bodo sp. A.; 173.6 Chroomonas nr. nordstedtii; 819.4 Cryptomonas nr. ovata

SARCODINA 6.9 -- 6.9 Trimastigamoeba sp.

ROTIFERA 6.9 -- 6.9 Brachionus urceolares

SLE-5 @ ½ ft. TOTAL = 1284.5/ml

DIATOMS 6.9 Pennate -- 6.9 Nitzschia nr. palae
173.6 Centric -- 173.6 Stephanodiscus nr. invisata-

PLANKTON SUMMARY -- (Organisms/ml)

8-9-74 SLE-5 @ ½ ft. cont....

DIATOMS cont.. tus; 27.8 Cyclotella nr. meneghiniana

UNIDENTIFIED 125.0 -- 125.0 spheres, light colored, granular surface, dark spot

CHLOROPHYTA 2020.8 -- 222.2 Chlamydomonas sp. A.; 90.3 Chlorella nr. vulgaris; 131.9 Ankistrodesmus falcutus; 493.1 A. sp.; 569.4 Kirchneriella nr. lunaris; 145.8 Scenedesmus nr. abundans; 90.3 S. nr. quadricauda var. parvus; 187.5 S. nr. incrassatulus; 48.6 Golenkina paucispina; 41.7 Phacotus nr. lenticularis

CYANOPHYTA 118.0 -- 34.7 Chroococus nr. minor; 83.3 Chlorococcum humicola

EUGLENOPHYTA 319.4 -- 90.3 Trachelomonas sp. D.; 145.8 Phacus sp. B.; 48.6 Euglena sp. C.; 34.7 E. nr. acus

PYRROPHYTA 62.5 -- 62.5 Gymnodinium sp.

MASTIGOPHORA 826.4 -- 41.7 Bodo sp. A.; 131.9 Chroomonas nr. nordstedtii; 541.7 Cryptomonas nr. ovata; 111.1 Chilomonas nr. paramecium

SARCODINA 236.1 -- 236.1 Trimastigamoeba sp.

CILIOPHORA 236.1 -- 27.8 Vorticella sp.; 208.3 Glaucoma sp.

SLE-8 @ ½ ft. TOTAL = 5499.7/ml

DIATOMS 27.8 Pennate -- 27.8 Nitzschia nr. palae
243.0 Centric -- 243.0 Stephanodiscus nr. invisatatus

UNIDENTIFIED 76.4 -- 76.4 spheres, light colored, granular surface, dark spot

CHLOROPHYTA 1569.3 -- 270.8 Chlamydomonas sp. A.; 652.7 Chlorella nr. vulgaris; 152.8 Ankistrodesmus falcutus; 187.5 A. sp.; 145.8 Kirchneriella nr. lunaris; 90.3 Scenedesmus nr. incrassatulus; 34.7 Golenkina paucispina; 34.7 Phacotus nr. lenticularis

CYANOPHYTA 90.2 -- 20.8 Chroococus nr. minor; 69.4 Spirulina nr. laxa

PLANKTON SUMMARY -- (Organisms/ml)

8-9-74	SLE-8 @ $\frac{1}{2}$ ft. cont....	
EUGLENOPHYTA	527.8 -- 48.6 Trachelomonas sp. D.; 375.0 Phacus sp. B.; 27.8 P. sp. C.; 76.4 P. longicauda	
MASTIGOPHORA	2125.1 -- 215.3 Bodo sp. A.; 326.4 Chroomonas nr. nordstedtii; 1277.8 Cryptomonas nr. ovata; 305.6 Chilomonas nr. paramecium	
SARCODINA	229.1 -- 229.1 Trimastigamoeba sp.	
CILIOPHORA	590.2 -- 83.3 Vorticella sp.; 159.7 Cyclidium sp.; 347.2 Glaucoma sp.	
ROTIFERA	20.8 -- 20.8 Brachionus urceolares	
	SLE-8 @ $1\frac{1}{2}$ ft. TOTAL = 5428.5/ml	
DIATOMS	138.9 Pennate -- 138.9 Nitzschia nr. palae 868.0 Centric -- 798.6 Stephanodiscus nr. invisatatus; 69.4 Cyclotella nr. meneghiniana	
UNIDENTIFIED	34.7 -- 34.7 spheres, light colored, granular surface, dark spot	
CHLOROPHYTA	2317.4 -- 777.7 Chlamydomonas sp. A.; 177.2 Chlorella nr. vulgaris; 27.8 Ankistrodesmus nr. falcutus; 173.6 A. sp.; 34.7 Kirchneriella nr. lunaris; 201.4 Scenedesmus nr. abundans; 34.7 S. nr. quadricauda var. parvus; 48.6 S. nr. incrassatulus; 41.7 Golenkina paucispina	
CYANOPHYTA	173.6 -- 76.4 Chroococus nr. minor; 97.2 Anabaena sp.	
EUGLENOPHYTA	138.9 -- 62.5 Trachelomonas sp. D.; 76.4 Phacus sp. B.	
MASTIGOPHORA	1368.1 -- 388.9 Chroomonas nr. nordstedtii; 798.0 Cryptomonas nr. ovata; 180.6 Chilomonas nr. paramecium	
SARCODINA	312.5 -- 312.5 Trimastigamoeba sp.	
CILIOPHORA	76.4 -- 76.4 Glaucoma sp.	

8-15-74	SLW-1 @ $1\frac{1}{2}$ ft. TOTAL = 1124.8/ml
DIATOMS	222.2 Centric -- 13.9 Cyclotella ne. meneghiniana;

PLANKTON SUMMARY -- (Organisms/ml)

8-15-74 SLW-1 @ $1\frac{1}{2}$ ft. cont....

DIATOMS cont..	83.3 Melosira granulata; 125.0 M. nr. varians
CHLOROPHYTA	722.1 -- 138.7 Chlamydomonas sp. A.; 166.7 Chlorella nr. vulgaris; 416.7 C. nr. pyrenoidosa
CYANOPHYTA	173.6 -- 55.6 Chroococus nr. minor; 6.9 C. dispersus; 20.8 Aphanocapsa rivularis; 27.8 Microcystis aeruginosa; 34.7 Aphanizomenon flos-aquae; 13.9 Anabaena sp.; 13.9 Oscillatoria nr. limosa
CILIOPHORA	6.9 -- 6.9 Vorticella sp.

SLW-1 @ 3 ft. TOTAL = 1027.6/ml

DIATOMS	326.3 Centric -- 6.9 Cyclotella nr. meneghiniana; 166.7 Melosira granulata; 152.7 M. nr. varians
CHLOROPHYTA	548.6 -- 90.3 Chlamydomonas sp. A.; 104.2 Chlorella nr. vulgaris; 354.1 C. nr. pyrenoidosa
CYANOPHYTA	118.0 -- 20.8 Chroococus nr. minor; 13.9 Aphanocapsa rivularis; 6.9 Microcystis aeruginosa; 62.5 Aphanizomenon flos-aquae; 13.9 Anabaena sp.
MASTIGOPHORA	20.8 -- 6.9 Cryptomonas nr. ovata; 13.9 Chilomonas nr. paramecium
CILIOPHORA	13.9 -- 13.9 Vorticella sp.

SLW-5 @ $1\frac{1}{2}$ ft. TOTAL = 1201.0/ml

DIATOMS	250.0 Centric -- 97.2 Melosira granulata; 152.8 M. nr. varians
CHLOROPHYTA	652.8 -- 69.4 Chlamydomonas sp. A.; 90.3 Chlorella nr. vulgaris; 430.6 C. nr. pyrenoidosa; 13.9 Chlamydomonas sp. D.; 27.8 C. sp. E.; 20.8 Ankistrodesmus falcutus
CYANOPHYTA	187.2 -- 20.8 Chroococus nr. minor; 6.9 C. nr. dispersus; 27.8 Aphanocapsa rivularis; 90.0 Aphanizomenon flos-aquae; 13.9 Anabaena sp.; 27.8 Oscillatoris nr. limosa
EUGLENOPHYTA	83.3 -- 83.3 Euglena sp. B.;

PLANKTON SUMMARY -- (Organisms/ml)

8-15-74		SLW-5 @ $1\frac{1}{2}$ ft. cont....
CILIOPHORA	27.7	-- 6.9 Vorticella sp.; 13.9 Cyclidium sp.; 6.9 Glaucoma sp.
		SLW-5 @ 3 ft. TOTAL = 1152.7/ml
DIATOMS	277.8	Centric -- 119.1 Melosira granulata; 158.7 M. nr. varians
CHLOROPHYTA	715.3	-- 41.7 Chlamydomonas sp. A.; 62.5 Chlorella nr. vulgaris; 611.1 C. nr. pyrenoidosa
CYANOPHYTA	138.8	-- 20.8 Aphanocapsa rivularis; 76.4 Aphanizomenon flos-aquae; 6.9 Anabaena constricta; 6.9 A. sp.; 27.8 Oscillatoria nr. limosa
MASTIGOPHORA	6.9	-- 6.9 Cryptomonas nr. ovata
CILIOPHORA	13.9	-- 13.9 Cyclidium sp.
		SLW-9 @ $1\frac{1}{2}$ ft. TOTAL = 958.2/ml
DIATOMS	180.6	Centric -- 62.5 Melosira granulata; 118.1 M. nr. varians
CHLOROPHYTA	152.7	-- 20.8 Chlamydomonas sp. A.; 27.8 Chlorella nr. vulgaris; 569.4 C. nr. pyrenoidosa
CYANOPHYTA	152.7	-- 20.8 Aphanocapsa rivularis; 83.3 Aphanizomenon flos-aquae; 34.7 Anabaena sp.; 13.9 Oscillatoria nr. limosa
CILIOPHORA	6.9	-- 6.9 Vorticella sp.
		SLW-9 @ 3 ft. TOTAL = 875.0/ml
DIATOMS	138.9	Centric -- 55.5 Melosira granulata; 83.4 M. nr. varians
CHLOROPHYTA	534.7	-- 13.9 Chlamydomonas sp. A.; 27.8 Chlorella nr. vulgaris; 493.0 C. nr. pyrenoidosa
CYANOPHYTA	180.6	-- 20.8 Aphanocapsa rivularis; 90.3 Aphanizomenon flos-aquae; 41.7 Anabaena sp.; 27.8 Oscillatoria nr. limosa
SARCODINA	6.9	-- 6.9 Trimastigamoeba sp.
CILIOPHORA	13.9	-- 13.9 Vorticella sp.

PLANKTON SUMMARY -- (Organisms/ml)

8-20-74	SLE-1 @ ½ ft. TOTAL = 22809.9/ml	
DIATOMS	69.4 Pennate -- 69.4 Nitzschia nr. palae 8062.5 Centric -- 7930.6 Stephanodiscus nr. invisatatus; 131.9 Cyclotella nr. michiganiana	
UNIDENTIFIED	569.4 -- 569.4 spheres, light colored, granular surface, dark spot	
CHLOROPHYTA	5299.7 -- 312.5 Chlamydomonas sp. A.; 513.9 Chlorella nr. vulgaris; 659.7 C. nr. pyrenoidosa; 187.5 Ankistrodesmus falcutus; 2229.2 A. sp.; 277.8 Kirchneriella nr. lunaris; 472.2 Scenedesmus nr. abundans; 166.7 S. nr. quadricauda var. parvus; 826.4 S. nr. incrassatulus; 166.7 Tetraedron sp.	
CYANOPHYTA	364.4 -- 104.2 Chlorococcum humicola; 62.5 Anabaena sp.; 194.4 Oscillatoria tenuis	
EUGLENOPHYTA	1791.7 -- 472.2 Trachelomonas sp. A.; 354.2 T. sp. D.; 236.1 T. sp. E.; 354.2 Phacus sp. B.; 222.2 P. sp. A.; 152.8 P. longicauda	
MASTIGOPHORA	4895.8 -- 138.9 Bodo sp. A.; 472.2 B. sp. B.; 1652.8 Chroomonas nr. nordstedtii; 2361.1 Cryptomonas nr. ovata; 125.0 Chilomonas nr. paramecium; 145.8 Cryptomonas nr. erosa	
SARCODINA	708.3 -- 708.3 Trimastigamoeba sp.	
CILIOPHORA	1048.7 -- 250.0 Vorticella sp.; 104.2 Cyclidium sp.; 590.3 Glaucoma sp.; 104.2 Holophrya sp.	

SLE-1 @ 1½ ft. TOTAL = 17756.8/ml

DIATOMS	6958.3 Centric -- 6875.0 Stephanodiscus nr. invisatatus; 27.8 Cyclotella nr. michiganiana; 34.7 C. nr. glomerata; 20.8 Melosira nr. varians
UNIDENTIFIED	409.7 -- 409.7 spheres, light colored, granular surface, dark spot
CHLOROPHYTA	3819.5 -- 277.8 Chlamydomonas sp. A.; 145.8 C. sp. C.; 138.9 Chlorella nr. vulgaris; 8681. C. nr. pyrenoidosa; 118.1 Ankistrodesmus falcutus; 1805.6 A. sp.; 48.6 Kirchneriella nr. lunaris; 69.4 Scenedesmus nr. abundans; 194.4 S. nr. quadricauda var. parvus; 97.2 S. nr. incrassa-

PLANKTON SUMMARY -- (Organisms/ml)

8-20-74 SLE-1 @ 1½ ft. cont....

CHLOROPHYTA cont.. tulus; 55.6 Chlorogonium sp.

CYANOPHYTA 500.0 -- 138.9 Chroococus nr. minor; 104.2 Chlorococcum humicola; 208.3 Anabaena sp.; 48.6 Oscillatoria tenuis

EUGLENOPHYTA 1791.6 -- 444.4 Trachelomonas sp. A.; 138.9 T. sp. D.; 326.4 Phacus sp. B.; 104.2 P. sp. A.; 20.8 P. sp. C.; 20.8 P. longicauda; 666.7 Euglena sp. B.; 69.4 E. nr. acus

MASTIGOPHORA 3374.9 -- 812.5 Chroomonas nr. nordstedtii; 2222.2 Cryptomonas nr. ovata; 208.3 C. nr. erosa; 131.9 Chilomonas nr. paramecium

CILIOPHORA 902.8 -- 215.3 Vorticella sp.; 666.7 Glaucoma sp.; 20.8 Strombidium sp.

SLE-5 @ ½ ft. TOTAL = 17020.7/ml

DIATOMS 90.3 Pennate -- 90.3 Nitzschia nr. palae
6444.4 Centric -- 5819.4 Stephanodiscus nr. invisatatus; 548.6 Cyclotella nr. meneghiniana; 76.4 C. nr. michiganiana

UNIDENTIFIED 145.8 -- 145.8 spheres, light colored, granular surface, dark spot

CHLOROPHYTA 8256.8 -- 125.0 Chlamydomonas sp. A.; 131.9 C. sp. C.; 284.7 Chlorella nr. vulgaris; 5569.4 C. nr. pyrenoidosa; 27.8 Ankistrodesmus falcutus; 1236.1 A. sp.; 69.4 Kirchneriella nr. lunaris; 222.2 Scenedesmus nr. abundans; 173.6 S. nr. quadricauda var. parvus; 138.9 S. incrassatulus; 222.2 Tetraheadron sp.; 55.6 Cosmarium sp.

CYANOPHYTA 680.6 -- 34.7 Chroococus nr. minor; 118.1 Chlorococcum humicola; 486.1 Anabaena sp.; 41.7 Oscillatoria tenuis

EUGLENOPHYTA 361.1 -- 62.5 Phacus longicauda; 159.7 P. sp. B.; 27.8 P. sp. C.; 111.1 Euglena nr. acus

MASTIGOPHORA 805.6 -- 69.4 Bodo sp. B.; 180.6 Chroomonas nr. nordstedtii; 513.9 Cryptomonas nr. ovata; 41.7 C. nr. erosa

PLANKTON SUMMARY -- (Organisms/ml)

8-20-74	SLE-5 @ ½ ft. cont....
SARCODINA	152.8 -- 152.8 Trimastigamoeba sp.
CILIOPHORA	83.3 -- 13.9 Vorticella sp.; 69.4 Glaucoma sp.
	SLE-5 @ 1½ ft. TOTAL = 13833.1/ml
DIATOMS	3347.2 Centric -- 3131.9 Stephanodiscus nr. invisatatus; 97.2 Cyclotella nr. meneghiniana; 90.3 C. nr. michiganiana; 27.8 Melosira nr. varians
UNIDENTIFIED	527.8 -- 527.8 spheres, light colored, granular surface, dark spot
CHLOROPHYTA	7333.3 -- 159.7 Chlamydomonas sp. A.; 159.7 C. sp. C.; 125.0 C. sp. D.; 472.2 Chlorella nr. vulgaris; 4034.7 C. nr. pyrenoidosa; 256.9 Ankistrodesmus falcutus; 1305.6 A. sp.; 340.3 Scenedesmus nr. abundans; 215.3 S. nr. quadricauda var. parvus; 104.2 S. nr. incrassatulus; 125.0 Tetraheadron sp.; 34.7 Closteridium nr. lunula
CYANOPHYTA	826.4 -- 145.8 Chroococus nr. minor; 173.6 Chlorococcum humicola; 465.3 Anabaena sp.; 41.7 Oscillatoria tenuis
EUGLENOPHYTA	493.0 -- 6.9 Trachelomonas sp. A.; 152.8 T. sp. D.; 34.7 Phacus sp. A.; 83.3 P. sp. B.; 97.2 P. sp. C.; 13.9 P. longicuada; 104.2 Euglena nr. acus
PYRROPHYTA	48.6 -- 48.6 Gymnodinium sp.
MASTIGOPHORA	847.1 -- 194.4 Bodo sp. B.; 131.9 Chroomonas nr. nordstedtii; 500.0 Cryptomonas nr. ovata; 20.8 C. nr. erosa
SARCODINA	145.8 -- 145.8 Trimastigamoeba sp.
CILIOPHORA	263.9 -- 55.6 Borticella sp.; 97.2 Glaucoma sp.; 111.1 Holophrya sp.
	SLE-8 @ ½ ft. TOTAL = 26706.8/ml
DIATOMS	76.4 Pennate -- 76.4 Nitzschia nr. palae 6819.4 Centric -- 6388.9 Stephanodiscus nr. invisatatus; 256.9 Cyclotella nr. meneghiniana; 138.9 C. nr. mich-

PLANKTON SUMMARY -- (Organisms/ml)

8-20-74 SLE-8 @ ½ ft. cont....

DIATOMS cont.. iganiana; 34.7 Melosira nr. varians

UNIDENTIFIED 255.6 -- 255.6 spheres, light colored, granular surface, dark spot

CHLOROPHYTA 10736.1 -- 90.3 Chlamydomonas sp. A.; 326.4 C. sp. D.; 625.0 Chlorella nr. vulgaris; 5562.5 C. nr. pyrenoidosa; 41.7 Ankistrodesmus falcutus; 2069.4 A. sp.; 69.4 Kirchneriella nr. lunaris; 1187.5 Scenedesmus nr. abundans; 263.9 S. nr. quadricauda var. parvus; 291.7 S. nr. incrassatulus; 20.8 Actinastrum Hantzschii; 187.5 Tetraheadron sp.

CYANOPHYTA 1236.1 -- 159.7 Chroococus nr. minor; 97.3 Chlorococcum humicola; 979.2 Anabaena sp.

EUGLENOPHYTA 1402.7 -- 284.7 Trachelomonas sp. A.; 520.8 T. sp. D.; 222.2 Phacus sp. B.; 62.5 P. sp. C.; 76.4 P. longicauda; 159.7 Euglena sp. C.; 76.4 E. nr. acus

PYRROPHYTA 111.1 -- 111.1 Gymnodinium sp.

MASTIGOPHORA 4944.4 -- 861.1 Bodo sp. B.; 1368.0 Chroomonas nr. nordstedtii; 2715.3 Cryptomonas nr. ovata

SARCODINA 937.5 -- 137.5 Trimastigamoeba sp.

CILIOPHORA 187.5 -- 125.0 Cyclidium sp.; 62.5 Glaucoma sp.

SLE-8 @ 1½ ft. TOTAL = 14757.0/ml

DIATOMS 4889.0 Centric -- 4777.8 Stephanodiscus nr. invisatatus; 55.6 Cyclotella nr. meneghiniana; 271.8 C. nr. michiganiana; 27.8 Melosira nr. varians

CHLOROPHYTA 3590.2 -- 76.4 Chlamydomonas sp. A.; 97.2 C. sp. D.; 513.9 Chlorella nr. vulgaris; 13.9 Ankistrodesmus falcutus; 1458.3 A. sp.; 222.2 Kirchneriella nr. lunaris; 652.8 Scenedesmus nr. abundans; 368.0 S. nr. quadricauda var. parvus; 111.1 S. nr. incrassatulus; 76.4 Tetraheadron sp.

CYANOPHYTA 541.7 -- 152.8 Chroococus nr. minor; 388.9 Anabaena sp.

PLANKTON SUMMARY -- (Organisms/ml)

8-20-74	SLE-8 @ 1½ ft. cont....
EUGLENOPHYTA	979.0 -- 173.6 Trachelomonas sp. A.; 340.3 T. sp. D.; 180.6 Phacus sp. B.; 131.4 P. sp. D.; 152.8 P. longicauda
PYRROPHYTA	34.7 -- 34.7 Gymnodinium sp.
MASTIGOPHORA	3312.5 -- 631.9 Bodo sp. B.; 590.3 Chroomonas nr. nordstedtii; 2090.3 Cryptomonas nr. ovata
SARCODINA	847.2 -- 847.2 Trimastigamoeba sp.
CILIOPHORA	208.3 -- 83.3 Cyclidium sp.; 125.0 Glaucoma sp.

8-29-74	SLW-1 @ 1½ ft. TOTAL = 14270.5/ml
DIATOMS	20.8 Centric -- 13.9 Melosira granulata; 6.9 M. nr. varians
CHLOROPHYTA	3083.3 -- 3076.4 Chlorella nr. pyrenoidosa; 6.9 Closterium sp.
CYANOPHYTA	11131.8 -- 83.3 Chroococus nr. minor; 6.9 Aphanocapsa rivularis; 11006.9 Aphanizomenon flos-aquae; 34.7 Anabaena sp.
EUGLENOPHYTA	20.8 Trachelomonas sp. D.
MASTIGOPHORA	6.9 -- 6.9 Chroomonas nr. nordstedtii
CILIOPHORA	6.9 -- 6.9 Vorticella sp.
	SLW-1 @ 3 ft. TOTAL = 18319.2/ml
DIATOMS	48.6 Centric -- 20.8 Melosira granulata; 27.8 M. nr. varians
CHLOROPHYTA	3444.4 -- 90.3 Chlorella nr. vulgaris; 3333.3 C. nr. pyrenoidosa; 13.9 Ankistrodesmus falcutus; 6.9 Closterium sp.
CYANOPHYTA	14805.4 -- 256.9 Chroococus nr. minor; 13.9 Microcystis aeruginosa; 14499.9 Aphanizomenon flos-aquae; 34.7 Anabaena sp.
EUGLENOPHYTA	13.9 -- 13.9 Trachelomonas sp. D.;
CILIOPHORA	6.9 -- 6.9 Vorticella sp.
	SLW-5 @ 1½ ft. TOTAL = 13103.9/ml
DIATOMS	6.9 Pennate -- 6.9 Navicula nr. cryptocephala

PLANKTON SUMMARY -- (Organisms/ml)

8-29-74 SLW-5 @ 1½ ft. cont....

DIATOMS cont..	62.5 Centric -- 6.9 Melosira granulata; 55.6 M. nr. varians
CHLOROPHYTA	2979.1 -- 104.2 Chlamydomonas sp. A.; 6.9 C. sp. C.; 3847.2 Chlorella nr. pyrenoidosa; 13.9 Ankistrodesmus sp.; 6.9 Closterium sp.
CYANOPHYTA	10013.8 -- 277.8 Chroococus nr. minor; 69.4 Chlorococcum humicola; 6.9 Aphanocapsa rivularis; 13.9 Microcystis aeruginosa; 9618.0 Aphanizomenon flos-aquae; 27.8 Anabaena sp.
EUGLENOPHYTA	13.9 -- 13.9 Trachelomonas sp. D.;
MASTIGOPHORA	6.9 -- 6.9 Chroomonas nr. nordstedtii
CILIOPHORA	20.8 -- 6.9 Vorticella sp.; 13.9 Glaucoma sp.

SLW-5 @ 3 ft. TOTAL = 13576.1/ml

DIATOMS	41.6 Centric -- 20.8 Melosira granulata; 20.8 M. nr. varians
CHLOROPHYTA	3888.6 -- 27.8 Chlamydomonas sp. A.; 3853.9 Chlorella nr. pyrenoidosa; 6.9 Closterium sp. B.
CYANOPHYTA	9604.4 -- 104.2 Chroococus nr. minor; 9444.4 Aphanizomenon flos-aquae; 55.8 Anabaena sp.
EUGLENOPHYTA	20.8 -- 13.9 Trachelomonas sp. D.; 6.9 Euglena sp. B.
SARCODINA	13.9 -- 13.9 Trimastigamoeba sp.
CILIOPHORA	6.9 -- 6.9 Glaucoma sp.

(NOTE: sample also included 1 midge larvae, Glyptotendipes)

SLW-9 @ 1½ ft. TOTAL = 11061.5/ml

DIATOMS	41.7 Centric -- 6.9 Melosira granulata; 34.8 M. nr. varians
CHLOROPHYTA	2679.6 -- 6.9 Chlamydomonas sp. A.; 20.8 Chlorella nr. vulgaris; 2638.0 C. nr. pyrenoidosa; 13.9 Closterium sp. B.
CYANOPHYTA	8270.8 -- 20.8 Chlorococcum humicola; 8194.4 Aphanizomenon flos-aquae; 55.6 Anabaena sp.

PLANKTON SUMMARY -- (Organisms/ml)

8-29-74	SLW-9 @ 1½ ft. cont....	
EUGLENOPHYTA	13.9 -- 13.9 Trachelomonas sp. D.	
SARCODINA	27.8 -- 27.8 Trimastigamoeba sp.	
CILIOPHORA	27.7 -- 20.8 Vorticella sp.; 6.9 Holophrya sp.	
	SLW-9 @ 3 ft. TOTAL = 9208.2/ml	
DIATOMS	41.7 Centric -- 41.7 Melosira nr. varians	
CHLOROPHYTA	2694.4 -- 13.9 Chlorella nr. vulgaris; 2673.6 C. nr. pyrenoidosa; 6.9 Closterium sp. B.	
CYANOPHYTA	6451.4 -- 41.7 Chroococus nr. minor; 20.8 Chlorococcum humicola; 13.9 Aphanocapsa rivularis; 6305.6 Aphanizomenon flos-aquae; 69.4 Anabaena sp.	
SARCODINA	6.9 -- 6.9 Trimastigamoeba sp.	
CILIOPHORA	13.8 -- 6.9 Vorticella sp.; 6.9 Holophrya sp.	

APPENDIX D

CHLOROPHYLL a AND PHAEOPHYTIN DATA

TABLE 29

Chlorophyll a and Phaeophytin Data

KEY TO ABBREVIATIONS

CHL = Chlorophyll a PHAE = Phaeophytin C/P = Chlorophyll to Phaeophytin Ratio

DATE	LAGOON							
	EAST				WEST			
	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P
10-26-73	SLE-1 (1)	2.095	3.542	0.59	SLW-1 (1)	13.185	4.154	3.17
	SLE-5 (1)	7.452	4.698	1.59	SLW-5 (1)	7.192	1.594	4.52
	SLE-8 (1)	3.132	3.380	0.93	SLW-9 (1)	14.449	3.432	4.21
11- 9-73	SLE-1 (1)	0.799	1.747	0.46	SLW-1 (1)	11.439	5.087	2.25
	SLE-8 (1)	2.549	6.082	0.42	SLW-9 (1)	8.910	3.552	1.64
11-16-73	SLE-1 (1)	0.648	2.171	0.30	SLW-1 (1)	11.499	2.860	4.02
	SLE-8 (1)	0.778	3.888	0.20	SLW-9 (1)	11.619	4.094	2.84
11-30-73	SLE-1 (1)	0.454	1.918	0.24	SLW-1 (1)	2.052	4.829	0.42
	SLE-8 (1)	0.389	3.071	0.13	SLW-9 (1)	0.864	2.596	0.33
2-13-74	SLE-1 (1)	0.416	1.130	0.37	SLW-1 (1)	42.986	-9.609	****
	SLE-1 (3)	0.216	0.843	0.26	SLW-9 (1)	57.841	-12.124	****
	SLE-8 (1)	0.270	0.751	0.36				
	SLE-8 (3)	0.259	0.771	0.34				

TABLE 29 CONTINUED

DATE	LAGOON							
	EAST				WEST			
	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P
2-27-74	SLE-1 (1)	0.205	0.728	0.28	SLW-1 (1)	56.155	-15.193	****
	SLE-1 (3)	0.270	0.712	0.38	SLW-1 (3)	56.155	-18.985	****
	SLE-8 (1)	0.281	0.730	0.38	SLW-9 (1)	9.708	-0.849	****
	SLE-8 (3)	0.753	1.144	0.66	SLW-9 (3)	12.944	-1.294	****
3-13-74	SLE-1 (1)	0.259	0.625	0.41	SLW-1 (1)	10.235	-1.023	****
	SLE-1 (3)	0.254	0.577	0.44	SLW-1 (3)	4.903	-0.015	****
	SLE-8 (1)	0.054	1.039	0.05	SLW-9 (1)	10.837	-0.474	****
	SLE-8 (3)	0.248	0.578	0.43	SLW-9 (3)	8.308	1.391	5.97
3-29-74	SLE-1 (1)	0.065	0.761	0.09	SLW-1 (1)	8.308	1.987	4.18
	SLE-1 (3)	0.226	0.316	0.71	SLW-1 (3)	28.597	-4.756	****
	SLE-8 (1)	0.178	0.405	0.44	SLW-9 (1)	13.004	2.235	5.82
	SLE-8 (3)	0.070	0.732	0.10	SLW-9 (3)	4.514	0.346	13.06
4-12-74	SLE-1 (3)	0.075	1.008	0.07	SLW-1 (1)	21.192	3.191	6.64
	SLE-8 (1)	0.075	0.873	0.09	SLW-1 (3)	12.522	18.362	0.68
	SLE-8 (3)	0.243	0.632	0.38	SLW-9 (1)	18.182	-1.385	****
					SLW-9 (3)	14.208	4.973	2.86

TABLE 29 CONTINUED

DATE	LAGOON							
	EAST				WEST			
	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P
4-26-74					SLW-1 (1)	4.997	0.860	5.81
					SLW-1 (2½)	4.997	0.860	5.81
					SLW-5 (1)	6.695	1.560	4.29
					SLW-5 (2½)	5.178	0.770	6.72
					SLW-9 (1)	5.097	5.633	0.90
					SLW-9 (3)	3.958	3.749	1.06
5-14-74					SLW-1 (1½)	2.348	3.328	0.71
					SLW-1 (3)	2.860	3.669	0.78
					SLW-9 (1½)	2.258	3.161	0.71
					SLW-9 (3)	2.634	2.649	0.99
5-28-74					SLW-1 (1½)	1.571	0.951	1.65
					SLW-1 (3)	1.458	0.792	1.84
					SLW-5 (1½)	0.680	0.870	0.78
					SLW-5 (3)	0.572	0.817	0.70
					SLW-9 (1½)	0.713	0.259	2.75

TABLE 29 CONTINUED

DATE	LAGOON							
	EAST				WEST			
	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P
6-28-74					SLW-1 (1½)	1.479	0.732	2.02
					SLW-1 (3)	3.010	1.392	2.16
					SLW-5 (1½)	1.582	0.697	2.27
					SLW-5 (3)	1.614	0.587	2.75
					SLW-9 (1½)	1.296	0.721	1.80
					SLW-9 (3)	1.755	0.748	2.35
7-19-74					SLW-1 (1½)	12.462	1.734	7.19
					SLW-1 (3)	9.873	1.017	9.70
					SLW-5 (1½)	9.633	0.391	24.62
					SLW-5 (3)	8.850	1.174	7.54
					SLW-9 (1½)	7.766	0.686	11.32
					SLW-9 (3)	8.970	1.054	8.51
8- 2-74					SLW-1 (1½)	4.440	16.010	0.28
					SLW-1 (3)	1.445	9.446	0.15
					SLW-5 (1½)	6.201	0.680	9.12
					SLW-5 (3)	2.258	13.659	0.17

TABLE 29 CONTINUED

DATE	LAGOON							
	EAST				WEST			
	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P
8- 9-74	SLE-1 (½)	4.515	15.749	0.29				
	SLE-1 (1½)	3.688	12.635	0.29				
	SLE-5 (½)	17.349	16.226	1.07				
	SLE-5 (1½)	8.310	5.642	1.47				
	SLE-8 (½)	5.443	11.133	0.49				
	SLE-8 (1½)	8.398	20.617	0.41				
8-15-74					SLW-1 (1½)	10.310	1.814	5.68
					SLW-1 (3)	2.228	8.230	0.27
					SLW-5 (1½)	9.287	3.615	2.57
					SLW-5 (3)	5.599	5.671	0.99
					SLW-9 (1½)	8.248	-0.175	****
					SLW-9 (3)	8.955	0.391	22.88
8-20-74	SLE-1 (½)	26.531	18.958	1.39				
	SLE-1 (1½)	34.768	21.556	1.61				
	SLE-8 (½)	19.235	30.749	0.63				
	SLE-8 (1½)	13.251	25.474	0.52				

TABLE 29 CONTINUED

DATE	LAGOON							
	EAST				WEST			
	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P	STATION DEPTH (FT.)	CHL (MG/M3)	PHAE (MG/M3)	C/P
8-29-74					SLW-1 (1½)	53.100	-1.043	****
					SLW-1 (3)	49.939	51.046	0.98
					SLW-5 (1½)	26.686	39.392	0.68
					SLW-5 (3)	28.522	-1.972	****
					SLW-9 (1½)	52.152	-6.191	****
					SLW-9 (3)	23.434	0.217	****

**** = due to lack of significant amount of phaeophytin, ratio is meaningless

APPENDIX E

PRODUCTIVITY DATA

TABLE 30

Productivity Results

DATE	LAGOON			
	EAST		WEST	
	STATION DEPTH (FT.)	PRODUCTIVITY mg C/m^2/hr	STATION DEPTH (FT.)	PRODUCTIVITY mg C/m^2/hr
5-14-74			SLW-1 (3)	15.02
			SLW-9 (3)	14.89
5-28-74			SLW-1 (3)	9.70
			SLW-5 (3)	17.37
			SLW-9 (3)	6.10
6-11-74	SLE-1 (½)	3.92		
	SLE-5 (½)	0.50		
	SLE-8 (½)	6.00		
7-12-74	SLE-1 (½)	410.73	SLW-1 (3)	61.51
	SLE-5 (½)	144.47	SLW-5 (3)	26.78
	SLE-8 (½)	311.81	SLW-9 (3)	45.38
7-19-74			SLW-1 (1½)	903.59
			SLW-1 (3)	314.13
			SLW-5 (1½)	648.53
			SLW-5 (3)	362.42
			SLW-9 (1½)	726.49
			SLW-9 (3)	366.11
7-26-74	SLE-1 (½)	184.78		
	SLE-5 (½)	213.36		
	SLE-8 (½)	404.97		
8- 2-74			SLW-1 (1½)	165.60
			SLW-1 (3)	124.41
			SLW-5 (1½)	143.97
			SLW-5 (3)	100.94

TABLE 30 CONTINUED

DATE	LAGOON			
	EAST		WEST	
	STATION DEPTH (FT.)	PRODUCTIVITY mg $C/m^2/hr$	STATION DEPTH (FT.)	PRODUCTIVITY mg $C/m^2/hr$
8- 2-74 cont...			SLW-9 (1½)	152.87
			SLW-9 (3)	139.75
8- 9-74	SLE-1 (½)	427.63		
	SLE-5 (½)	1274.22		
	SLE-8 (½)	950.46		
8-15-74			SLW-1 (1½)	666.98
			SLW-1 (3)	508.38
			SLW-5 (1½)	571.32
			SLW-5 (3)	461.46
			SLW-9 (1½)	522.73
			SLW-9 (3)	424.54
8-20-74	SLE-1 (½)	2372.01		
	SLE-5 (½)	891.24		
	SLE-8 (½)	1166.38		
8-29-74			SLW-1 (1½)	1717.65
			SLW-1 (3)	823.39
			SLW-5 (1½)	1600.78
			SLW-5 (3)	543.77
			SLW-9 (1½)	1629.51
			SLW-9 (3)	370.35

APPENDIX F

PHYSICAL PARAMETERS

AND

TOC DATA

TABLE 31

Data for Physical Parameters and Total Organic Carbon

KEY TO ABBREVIATIONS

(S) = Shallow sample
(D) = Deep sample
TEMP = Temperature, °C
DO = Dissolved Oxygen, mg/l
BOD = Biochemical Oxygen Demand, mg/l
COND = Conductivity, micro-mhos
DISK = Secchi Disk, cm
TURB = Turbidity, Formazin Turbidity Units
TOC = Total Organic Carbon, mg C/l

DATE STATION	TEMP	DO	BOD	pH	COND	DISK	TURB	TOC
10-26-73								
SLE-1 (S)	10.5	1.6	30.0					
5 (S)	10.5	2.4	6.0					
8 (S)	10.0	5.2	8.0					
SLW-1 (S)	10.0	8.3	6.0					
5 (S)	10.0	8.3	4.0					
9 (S)	10.0	8.7	1.0					
11- 9-73								
SLE-1 (S)	9.5	4.9	31.0			10		
8 (S)	9.0	11.2	7.3			30		
SLW-1 (S)	9.5	11.9	4.6			51		
9 (S)	9.0	11.7	4.3			81		
11-16-73								
SLE-1 (S)	9.0	2.7	35.0			5		
8 (S)	9.0	7.7	4.0			25		
SLW-1 (S)	9.0	10.3	1.3			92		
9 (S)	9.0	10.8	2.0			104		
11-30-73								
SLE-1 (S)	8.0	4.2	54.0			5		
8 (S)	7.5	9.8	11.0			23		
SLW-1 (S)	7.5	11.9	0.0			81		
9 (S)	7.5	11.4	1.0			104		

TABLE 31 CONTINUED

DATE STATION	TEMP	DO	BOD	pH	COND	DISK	TURB	TOC
12-21-73								
SLE-1 (S)	1.0	1.9	54.0	7.9	792	6		
8 (S)	0.5	5.5	15.0	8.2	903	18		
SLW-1 (S)	0.5	14.9	7.0	8.0	1023	112		
9 (S)	0.5	13.4	6.0	8.3	692	91		
1- 2-74								
SLE-8 (S)	0.5	3.9		7.9	977	23		
SLW-1 (S)	0.0	13.4		9.5	271	117		
9 (S)	0.0	13.8		8.2	686			
1-16-74								
SLE-1 (S)	2.0	0.3	13.0	7.7	860			
(D)	2.0	0.2	19.0	7.7	869	8		
1-30-74								
SLE-1 (S)	3.0	0.2	18.0	7.5	885			
(D)	3.0	0.0	19.0	7.6	879	14		
8 (S)	1.5	4.1	9.0	7.8	323			
(D)	2.0			7.7	746	25		
SLW-1 (S)	1.0	9.9	7.0	7.9	535	108		
9 (S)	1.0	11.7	7.0	8.1	461	107		
2-13-74								
SLE-1 (S)	2.5	0.1	16.0	7.6	721			36.0
(D)	2.5	0.1	16.0	7.4	690	13		37.0
8 (S)	2.0	0.5	11.5	7.6	715			43.0
(D)	2.0	0.4	12.5	7.6	680	23		40.0
SLW-1 (S)	0.5	15.7	7.0	8.5	502	117		12.0
9 (S)	1.0	11.9	8.0	8.0	526			14.0
(D)	1.0	11.0	2.0	7.8	529	105		12.0
2-27-74								
SLE-1 (S)	2.0	0.0	22.0	7.5	960			105.0

TABLE 31 CONTINUED

DATE STATION	TEMP	DO	BOD	pH	COND	DISK	TURB	TOC
2-27-74								
SLE-1 (D)	2.0	0.0	23.0	7.5	969	10		45.0
8 (S)	1.0	0.0	16.0	7.5	978			62.0
(D)	1.0	0.0	18.0	7.5	983	27		41.0
SLW-1 (S)	0.5	12.4	12.0	7.8	647			20.0
(D)	0.5	8.5	8.0	7.5	669	112		16.0
9 (S)	1.0	12.1	4.0	7.8	715			15.0
(D)	1.0	11.8	3.0	7.8	729	114		15.0
3-13-74								
SLE-1 (S)	4.0	1.9	20.0	7.6	854			28.0
(D)	4.0	2.0	19.0	7.6	850	10		34.0
8 (S)	3.5	3.3	15.0	7.6	887			31.0
(D)	3.5	3.2	15.0	7.6	856	17		37.0
SLW-1 (S)	3.0	13.0	5.0	8.2	562			12.0
(D)	3.0	12.9	4.0	8.2	570	93		14.0
9 (S)	3.5	12.7	5.0	8.2	571			12.0
(D)	3.0	12.8	4.0	8.2	577	101		12.0
3-29-74								
SLE-1 (S)	3.5	9.3	14.0	7.8	728			38.0
(D)	3.5	8.6	14.0	7.8	729	8		29.0
8 (S)	2.5	6.3	15.0	7.7	760			42.0
(D)	2.5	6.1	14.0	7.7	762	14		51.0
SLW-1 (S)	1.0	15.8	6.0	8.1	506			64.0
(D)	1.0	15.4	6.0	8.1	498	76		68.0
9 (S)	2.0	13.4	4.0	8.0	512			64.0
(D)	2.0	13.5	5.0	8.0	524	104		67.0
4-12-74								
SLE-1 (S)	7.0	2.4	23.0	7.7	743			75.0
(D)	6.5	2.2	21.0	7.7	742	13		38.0

TABLE 31 CONTINUED

DATE STATION	TEMP	DO	BOD	pH	COND	DISK	TURB	TOC
4-12-74								
SLE-8 (S)	6.5	3.9	9.0	7.7	760			37.5
(D)	6.5	3.6	9.0	7.7	773	15		38.0
SLW-1 (S)	6.0	10.0	9.0	7.9	558			27.0
(D)	6.0	10.0	12.0	7.7	565	84		25.0
9 (S)	6.0	10.4	6.0	7.9	561			21.5
(D)	6.0	10.5	5.0	8.0	566	66		30.0
4-26-74								
SLE-1 (S)	13.0	2.3	19.0	7.9	950		28.0	105.0
(D)	13.0	2.6	20.0	7.8	953	9	27.0	58.0
5 (S)	12.0	2.5	8.0	7.8	918		15.0	35.0
(D)	12.0	2.6	8.0	7.8	919	16	15.0	85.0
8 (S)	12.0	3.7	7.0	7.9	929		15.0	44.0
(D)	12.0	3.7	7.0	7.8	921	15	16.0	36.0
SLW-1 (S)	13.5	8.4	4.0	8.0	660		5.5	17.0
(D)	13.0	8.5	5.0	8.0	644	81	5.0	18.5
5 (S)	13.0	9.1	5.0	8.1	660		5.0	20.0
(D)	13.0	9.3	5.0	8.1	653	76	5.0	38.5
9 (S)	12.0	9.0	4.0	8.1	653		5.0	18.5
(D)	11.0	8.9	5.0	8.1	648	84	5.5	27.0
5- 7-74								
SLE-1 (S)	13.0	4.1	15.0	7.8	1002		14.0	41.0
(D)	13.0	3.9	15.0	7.7	973	13	14.5	37.0
5 (S)	14.5	1.7	15.0	7.7	984		9.9	30.0
(D)	14.0	1.7	14.0	7.5	985	20	10.0	31.0
8 (S)	15.0	2.1	39.0	7.8	998		9.0	28.0
(D)	15.0	2.3	21.0	7.6	977	20	8.5	25.0
5-14-74								
SLW-1 (S)	11.0	8.8	4.0	7.8	631		3.0	56.0

TABLE 31 CONTINUED

DATE STATION	TEMP	DO	BOD	pH	COND	DISK	TURB	TOC
5-14-74								
SLW-1 (D)	11.0	8.9	4.0	7.8	635	91	3.0	57.0
9 (S)	11.0	8.7	6.0	7.8	627		3.0	51.0
(D)	11.0	8.8	3.0	7.8	640	91	3.0	57.0
5-21-74								
SLE-1 (S)	18.0	0.7	8.2	7.3	1010		34.0	41.0
(D)	18.5	0.4	8.2	7.5	1000	13	29.0	37.0
5 (S)	18.0	2.1	6.1	7.6	975		11.0	30.0
(D)	17.0	2.0	3.8	7.7	973	23	10.0	31.0
8 (S)	17.0	1.7	1.6	7.6	986		10.0	28.0
(D)	16.5	1.8	2.6	7.6	981	20	10.0	25.0
5-28-74								
SLW-1 (S)	16.0	7.5	2.3	7.7	825		2.5	18.0
(D)	16.0	7.4	3.0	7.6	831	94	2.3	19.0
5 (S)	16.0	7.2	3.6	7.7	836		2.4	21.0
(D)	16.0	7.0	2.6	7.6	835	94	2.9	20.0
9 (S)	16.0	7.1	2.0	7.6	813		2.8	20.0
(D)	16.0	7.2	2.0	7.7	802	122	3.0	21.0
6-11-74								
SLE-1 (S)	20.0	1.1	28.0					
(D)	20.0	1.1	27.0			15		
5 (S)	20.0	2.0	32.0					
(D)	20.0	2.1	33.0			18		
9 (S)	20.0	3.1	34.0					
(D)	20.0	3.0	34.0			18		
6-28-74								
SLW-1 (S)	23.5	5.6	7.0	7.9	922			
(D)	23.0	5.7	8.0	7.9	917	107		
5 (S)	22.5	5.2	5.5	7.9	903			

TABLE 31 CONTINUED

DATE STATION	TEMP	DO	BOD	pH	COND	DISK	TURB	TOC
6-28-74								
SLW-5 (D)	22.0	5.3	6.5	7.7	901	99		
9 (S)	22.0	5.3	9.0	7.9	908			
(D)	21.0	5.3	7.5	7.8	901	104		
7-12-74								
SLE-1 (S)	28.0	0.3	20.0	7.4	1350		4.2	27.5
(D)	27.0	0.0	28.5	7.5	1400	20	9.5	26.2
5 (S)	28.0	0.0	13.5	7.5	1420		3.7	56.0
(D)	27.0	0.0	14.5	7.6	1410	20	3.8	29.7
8 (S)	26.0	0.0	15.0	7.5	1370		4.2	31.5
(D)	26.0	0.0	15.5	7.5	1380	20	4.1	26.1
SLW-1 (D)						105		
5 (D)						104		
9 (D)						105		
7-19-74								
SLW-1 (S)	25.5	6.6	4.0	8.0	1052			6.0
(D)	25.5	5.7	5.0	8.2	1053	74		20.9
5 (S)	25.5	7.3	4.0	8.2	1061			20.2
(D)	25.5	6.1	3.0	8.2	1053	76		20.3
9 (S)	26.0	6.6	3.5	8.2	1038			20.4
(D)	25.5	6.2	2.0	8.2	1026	81		20.7
7-26-74								
SLE-1 (S)	25.0	0.0	21.0	7.7	1340			51.3
(D)	24.5	0.0	22.0	7.8	1340	18		43.2
5 (S)	24.0	0.0	15.0	7.9	1300			40.6
(D)	24.0	0.0	15.0	7.9	1300	25		38.1
8 (S)	24.0	0.0	14.0	7.9	1300			35.3
(D)	24.0	0.0	15.0	7.9	1300	25		37.4

TABLE 31 CONTINUED

DATE STATION	TEMP	DO	BOD	pH	COND	DISK	TURB	TOC
8- 2-74								
SLW-1 (S)	23.5	6.9	3.5	8.3	974		7.4	19.3
(D)	23.5	7.1	3.5	8.5	966	81	5.2	23.1
5 (S)	23.5	6.7	3.5	8.5	965		4.6	19.4
(D)	23.5	6.8	3.5	8.5	962	86	4.1	20.2
9 (S)	23.5	6.7	3.5	8.5	969		4.5	28.3
(D)	23.0	6.7	3.5	8.5	973	76	4.0	20.3
8- 9-74								
SLE-1 (S)	25.0	0.3	18.5	7.8	1210		8.2	38.6
(D)	24.5	0.3	20.0	7.9	1200	23	7.1	28.1
5 (S)	25.0	2.0	15.5	8.1	1139		4.6	31.0
(D)	25.0	1.8	14.5	8.0	1186	15	4.4	33.3
8 (S)	25.0	2.6	13.0	7.9	1110		6.6	25.6
(D)	25.0	2.6	14.5	8.0	1197	15	4.0	24.7
8-15-74								
SLW-1 (S)	23.0	8.5	6.0	8.6	929		1.7	18.3
(D)	23.0	8.5	1.0	8.6	934	142	1.9	17.0
5 (S)	23.0	8.6	3.5	8.6	944		1.9	16.5
(D)	23.0	8.8	1.5	8.5	951	152	1.7	16.7
9 (S)	23.0	8.4	2.0	8.6	953		1.9	16.3
(D)	23.0	8.3	1.5	8.6	959	152	2.3	17.4
8-29-74								
SLE-1 (S)	25.0	0.4		7.7	1280			32.0
(D)	25.0	0.3		7.7	1280	15		31.9
5 (S)	25.0	2.6	6.2	7.9	1260			30.4
(D)	25.0	2.5	6.8	7.9	1250	15		30.5
8 (S)	25.0	4.5	6.8	8.1	1240			30.8
(D)	25.0	4.3	7.0	8.2	1240	23		35.0

TABLE 31 CONTINUED

DATE STATION	TEMP	DO	BOD	pH	COND	DISK	TURB	TOC
8-29-74								
SLW-1 (S)	23.0	13.6						
(D)	23.0	11.6				45		
5 (S)	23.0	12.3						
(D)	23.0	11.3				91		
9 (S)	23.0	10.8						

APPENDIX G

NUTRIENT, ANIONS,

AND METAL DATA

TABLE 32

Data for Nutrients, Anions, and Metals

KEY TO ABBREVIATIONS

(S) = Shallow sample
(D) = Deep sample
NH4 = Ammonia Nitrogen, mg/l, NH_4-N
NO3 = Nitrate Nitrogen, mg/l, NO_3-N
PO4 = Orthophosphate, mg/l, PO_4
SO4 = Sulfate, mg/l, SO_4
CL = Chloride, mg/l , Cl
CA = Calcium, mg/l
MG = Magnesium, mg/l
NA = Sodium, mg/l
K = Potassium, mg/l
MN = Manganese, mg/l
ZN = Zinc, mg/l
FE = Iron, mg/l

DATE STATION	NH4	NO3	PO4	SO4	CL	CA	MG	NA	K	MN	ZN	FE
12-21-73												
SLE-1 (S)	13.0	0.72	3.9	113	184	84	12.9	175	16.2	0.20	0.24	0.61
8 (S)	0.9	2.50	2.4	114	184	78	13.7	163	14.8	0.18	0.19	1.13
SLW-1 (S)	*	0.65	0.4	99	142	67	15.4	121	8.1	0.05	0.11	0.90
9 (S)	0.1	0.47	0.2	89	.28	68	14.4	108	6.7	0.04	0.06	1.03
1- 2-74												
SLE-8 (S)	1.0	2.50	2.5	127	177	75	11.7	153	14.2	0.17	0.17	1.02
SLW-1 (S)	0.4	1.00	2.2	44	35	28	15.1	20	5.0	0.04	0.05	0.40
9 (S)	0.8	0.68	2.4	103	110	56	15.7	97	6.8	0.04	0.08	0.93
1-16-74												
SLE-1 (S)	2.8	0.40	0.2	103	160	67	16.4	157	13.8	0.22	0.26	0.98

TABLE 32 CONTINUED

DATE STATION	NH4	NO3	PO4	SO4	CL	CA	MG	NA	K	MN	ZN	FE
1-16-74												
SLE-1 (D)	1.4	2.00	2.5	102	163	64	16.4	156	14.0	0.23	0.27	1.07
1-30-74												
SLE-1 (S)	2.2	0.03	4.2	104	162	68	15.6	155	12.8	0.25	0.19	0.98
(D)	2.2	0.03	3.5	104	158	60	15.8	153	12.9	0.24	0.17	0.95
8 (S)	1.9	0.09	0.5	44	152	63	15.0	156	11.1	0.24	0.26	0.93
(D)	0.4	0.33	1.0	100	62	57	14.7	145	11.8	0.23	0.21	0.92
SLW-1 (S)	0.1	0.42	4.1	80	85	26	17.5	87	4.9	0.07	0.05	1.14
9 (D)	*	0.37	3.5	68	71	26	13.7	70	3.9	0.04	0.04	0.93
2-13-74												
SLE-1 (S)	2.3	0.05	3.7	114	155	77	15.6	147	12.4	0.28	0.26	1.24
(D)	2.8	0.05	3.8	113	155	74	15.8	146	12.1	0.29	0.22	1.27
8 (S)	3.0	0.05	4.0	113	162	74	15.3	144	12.0	0.26	0.23	1.14
(D)	3.1	0.05	4.1	113	165	70	15.5	140	12.2	0.27	0.27	1.16
SLW-1 (S)	0.1	0.56	*	95	104	62	16.7	83	6.0	0.12	0.05	1.40
9 (S)	*	0.39	*	99	105	65	18.5	87	4.7	0.08	0.07	1.42
(D)	*	0.39	*	98	108	64	18.1	83	4.4	0.07	0.03	1.34
2-27-74												
SLE-1 (S)	0.3	0.04	4.5		159	61	15.5	148	12.1	0.25	0.24	0.93

TABLE 32 CONTINUED

DATE STATION	NH4	NO3	PO4	SO4	CL	CA	MG	NA	K	MN	ZN	FE
2-27-74												
SLE-1 (D)	3.0		4.9		161	61	15.3	150	12.0	0.26	0.25	0.99
8 (S)	2.1		4.6		151	64	15.1	150	11.9	0.26	0.19	0.93
(D)	1.7		4.7		147	62	15.3	152	12.1	0.27	0.25	0.92
SLW-1 (S)	*	0.39	*		100	56	18.4	89	4.7	0.05	0.05	1.35
(D)	*	0.39	*		101	56	18.5	86	4.6	0.05	0.05	1.39
9 (S)	*	0.56	*		100	53	16.0	80	5.6	0.05	0.11	1.76
(D)	0.1	0.65	*		91	55	16.5	80	5.0	0.05	0.09	2.05
3-13-74												
SLE-1 (S)	2.3	0.03	3.9	83	150	62	15.4	135	11.6	0.26	0.25	1.08
(D)	2.3	0.03	4.1	84	159	63	15.7	139	11.7	0.24	0.25	0.95
8 (S)	1.3	0.07	4.0	84	152	63	15.2	136	11.5	0.26	0.27	0.98
(D)	2.0	0.03	4.1	84	153	63	15.7	135	11.5	0.24	0.28	1.25
SLW-1 (S)	*	0.27	*	71	89	55	17.2	75	3.8	0.03	0.06	1.25
(D)	*	0.29	*	72	89	55	17.9	74	3.7	0.04	0.10	0.19
9 (S)	*	0.29	*	75	80	54	17.1	75	3.8	0.03	0.06	1.19
(D)	*	0.30	*	68	87	54	18.0	75	3.7	0.06	0.14	1.56
3-29-74												
SLE-1 (S)	3.1	0.11	4.6	80	146	59	16.3	136	11.5		0.22	

TABLE 32 CONTINUED

DATE STATION	NH4	NO3	PO4	SO4	CL	CA	MG	NA	K	MN	ZN	FE
3-29-74												
SLE-1 (D)	3.2	0.11	4.6	81	147	61	16.5	135	11.4		0.22	
8 (S)	2.7	0.09	4.0	81	145	62	16.0	136	11.6		0.20	
(D)	2.9	0.07	4.6	82	147	60	16.3	138	11.8		0.21	
SLW-1 (S)	*	0.31	0.1	68	82	54	17.9	73	4.1		0.04	
(D)	*	0.27	0.3	69	86	52	17.0	73	4.2		0.13	
9 (S)	*	0.24	*	69	87	53	19.9	76	3.9		0.06	
(D)	*	0.25	*	70	88	53	18.7	77	3.0		0.09	
4-12-74												
SLE-1 (S)	3.7	0.11	5.2	73	148	63	16.5	132	11.5	0.25	0.24	
(D)	3.7	0.10	5.2	71	149	66	16.5	131	11.6	0.27	0.24	
8 (S)	2.8	0.12	4.5	78	147	60	16.3	134	11.5	0.25	0.21	
(D)	3.1	0.13	4.7	61	151	60	16.4	135	11.6	0.27	0.20	
SLW-1 (S)	0.2	0.40	0.7	55	97	54	17.5	85	5.1	0.10	0.10	
(D)	0.2	0.43	0.9	63	97	53	17.5	86	5.2	0.14	0.11	
9 (S)	0.2	0.39	0.8	53	97	55	16.8	85	5.0	0.06	0.05	
(D)	0.2	0.44	0.8	67	97	56	16.5	85	5.0	0.09	0.05	
4-26-74												
SLE-1 (S)	4.3	0.20	4.4	86	152	51	16.7	147	12.6	0.27	0.23	0.96

TABLE 32 CONTINUED

DATE STATION	NH4	NO3	PO4	SO4	CL	CA	MG	NA	K	MN	ZN	FE
4-26-74												
SLE-1 (D)	3.7	0.25	5.0	79	153	56	16.8	144	12.7	0.27	0.29	1.02
5 (S)	3.7	0.29	4.9	75	154	49	16.1	136	11.9	0.25	0.19	1.01
(D)	3.5	0.25	3.8	80	145	56	16.7	140	11.6	0.25	0.21	1.10
8 (S)	4.0	0.40	4.9	71	144	47	16.7	135	11.7	0.27	0.19	1.01
(D)	4.0	0.34	5.1	133	146	51	16.1	140	11.9	0.28	0.25	1.09
SLW-1 (S)	*	0.88	0.5	62	96	45	17.2	87	5.3	0.04	0.12	0.77
(D)	*	0.89	0.5	62	97	51	17.0	88	5.4	0.04	0.14	0.67
5 (S)	*	0.71	0.6	67	98	54	17.4	90	5.3	0.04	0.06	0.80
(D)	*	0.78	0.5	63	98	52	17.8	93	5.3	0.07	0.11	0.80
9 (S)	0.2	0.71	0.5	73	98	47	17.1	91	5.2	0.06	0.04	0.99
(D)	0.2	0.82	0.6	66	99	52	17.4	92	5.1	0.04	0.02	0.73
5- 7-74												
SLE-1 (S)	3.4	0.29	3.5	75	153	60	14.7	135	11.5	0.26	0.17	0.95
(D)	3.6	0.28	3.7	77	162	61	15.6	139	11.5	0.26	0.16	0.98
5 (S)	4.6	0.27	4.1	77	152	61	15.5	139	11.5	0.26	0.17	1.01
(D)	4.2	0.23	5.2	77	150	61	15.5	139	11.7	0.26	0.17	1.01
8 (S)	4.6	0.33	4.6	81	150	62	15.4	139	11.5	0.25	0.40	1.11
(D)	4.3	0.32	4.1	65	147	59	13.3	139	12.0	0.27	0.15	1.06

TABLE 32 CONTINUED

DATE STATION	NH4	NO3	PO4	SO4	CL	CA	MG	NA	K	MN	ZN	FE
5-14-74												
SLW-1 (S)	0.0	0.85	0.5	69	92	55	18.3	87	5.1	0.02	0.05	0.63
(D)	0.1	0.70	0.6	96	92	54	18.3	86	5.2	0.02	0.09	0.84
9 (S)	0.0	0.66	0.5	69	92	51	18.3	86	5.3	0.03	0.04	0.65
(D)	0.0	0.62	0.5	72	90	49	18.3	86	5.2	0.03	0.06	0.70
5-21-74												
SLE-1 (S)	4.1	0.48	4.9			60	16.5	143	11.4	0.24	0.23	0.95
(D)	4.1	0.49	5.2			69	16.3	141	11.6	0.27	0.19	0.92
5 (S)	3.8	0.72	4.0			58	16.4	134	11.2	0.25	0.16	0.92
(D)	4.2	0.60	4.7			66	16.8	134	11.2	0.26	0.17	0.94
8 (S)	4.0	0.58	5.0			56	16.7	133	11.1	0.27	0.18	0.93
(D)	4.2	0.67	5.1			64	17.0	133	11.2	0.27	0.23	1.03
5-28-74												
SLW-1 (S)	0.2	0.62	0.6	57	94	51	18.4	86	4.7	0.05	0.08	0.52
(D)	0.2	0.84	0.6	59	94	51	17.6	86	5.1	0.06	0.04	0.63
5 (S)	0.2	0.66	0.5	58	94	51	17.3	86	4.7	0.05	0.04	0.68
(D)	0.2	0.61	0.6	58	94	51	17.0	86	4.8	0.05	0.09	0.66
9 (S)	0.2	0.61	0.5	58	92	48	17.0	86	4.7	0.05	0.03	0.65
(D)	0.2	0.62	0.5	59	94	51	16.9	87	4.9	0.03	0.02	0.61

TABLE 32 CONTINUED

DATE STATION	NH4	NO3	PO4	SO4	CL	CA	MG	NA	K	MN	ZN	FE
6-11-74												
SLE-1 (S)	5.6		5.0	139	163	55	17.3	134	11.0	0.23	0.18	1.11
(D)	5.4		4.7	93	168	60	17.2	136	11.5	0.24	0.16	1.17
5 (S)	5.5		5.5	95	170	54	17.4	133	11.6	0.25	0.24	1.10
(D)	5.5		5.3	84	174	55	17.3	133	11.6	0.26	0.21	1.06
8 (S)	5.5		5.5	101	175	53	17.2	133	11.8	0.25	0.23	1.04
(D)	5.1		5.1	83	172	56	17.7	133	11.7	0.26	0.29	1.03
6-28-74												
SLW-1 (S)	0.2		0.8	57	104	53	17.6	94	6.1	0.02	0.20	0.57
(D)	0.2		0.9	32	104	48	17.9	93	6.0	*	0.10	0.57
5 (S)	0.3		0.9	24	105	54	17.0	97	6.0	*	0.73	0.57
(D)	0.4		1.0	26	105	51	17.0	97	6.1	*	0.15	0.57
9 (S)	0.4		0.8	24	105	51	17.1	94	5.4	0.02	0.17	0.60
(D)	0.4		0.8	48	104	51	17.0	94	5.8	0.03	0.12	0.57
7-12-74												
SLE-1 (S)						66	15.2	138	11.9	0.25	0.10	0.81
(D)	2.1	2.88	5.9	92	164	65	15.4	141	11.9	0.21	0.10	0.76
5 (S)	1.2	3.36	5.8	132	146	64	15.9	141	11.0	0.24	0.12	0.91
(D)	1.4	3.60	5.9	92	166	62	15.5	139	11.9	0.22	0.11	0.88

TABLE 32 CONTINUED

DATE STATION	NH4	NO3	PO4	SO4	CL	CA	MG	NA	K	MN	ZN	FE
7-12-74												
SLE-8 (S)	1.7	2.64	5.7	85	137	64	15.6	141	11.8	0.21	0.17	0.86
(D)	1.9	3.20	6.1	99	166	59	15.5	140	11.8	0.22	0.12	0.83
7-19-74												
SLW-1 (S)	*	1.42	1.3	71	126	59	17.9	96	6.3	0.04	0.10	0.63
(D)	*	1.51	1.1	72	127	64	18.0	104	6.3	0.05	0.07	0.67
5 (S)	*	1.31	0.9	71	123	55	17.0	103	5.8	0.05	0.05	0 53
(D)	*	1.32	0.9	69	124	55	17.9	103	6.3	0.05	0.05	0.60
9 (S)	*	1.34	0.8	70	124	58	17.9	105	6.4	0.04	0.04	0.48
(D)	*	1.37	0.9	71	124	57	18.0	132	6.9	0.07	0.10	0.63
7-26-74												
SLE-1 (S)	1.6	1.88	6.1	109	174	69	16.9	150	10.1		0.19	0.79
(D)	1.5	1.75	6.1	96	176	68	17.2	155	11.0		0.16	0.85
5 (S)	0.7	2.53	6.5	97	175	66	17.3	155	11.4		0.10	0.78
(D)	0.8	2.27	6.5	94	175	66	17.4	149	10.9		0.11	0.79
8 (S)	0.4	2.59	6.9	100	174	60	17.0	148	11.2		0.10	0.75
(D)	0.2	2.58	5.1	93	179	64	17.4	151	10.9		0.12	0.76
8- 2-74												
SLW-1 (S)	0.1	1.03	0.7	79	110	56	18.5	100	6.7	0.04		0.42

TABLE 32 CONTINUED

DATE STATION	NH4	NO3	PO4	SO4	CL	CA	MG	NA	K	MN	ZN	FE
8- 2-74												
SLW-1 (D)	0.1	1.52	0.8	80	109	56	17.1	100	6.6	0.03		0.43
5 (S)	0.1	0.95	0.8	74	108	57	18.1	99	7.1	0.03		0.43
(D)	0.1	0.78	0.7	78	109	56	18.0	99	6.7	0.01		0.43
9 (S)	0.1	0.77	0.8	78	109	56	18.1	99	6.6	0.02		0.45
(D)	0.1	1.02	0.7	82	110	57	18.5	98	6.6	0.03		0.44
8- 9-74												
SLE-1 (S)	1.0	2.07	6.0	90	169	51	17.2	154	10.6	0.23		0.58
(D)	1.0	1.99	6.0	90	169	52	17.3	158	10.7	0.21		0 58
5 (S)	0.5	2.12	5.8	87	168	53	17.6	152	11.4	0.20		0.64
(D)	0.5	1.90	6.1	86	168	54	18.1	149	11.5	0.21		0.66
8 (S)	1.0	2.14	6.2	88	168	54	18.0	153	11.2	0.21		9.65
(D)	0.5	1.82	6.2	87	168	57	17.6	146	11.0	0.21		0.73
8-15-74												
SLW-1 (S)	0.1	0.90	0.8	74	112	52	17.7	97	6.1	0.03		0.46
(D)	0.1	0.92	0.7	69	115	56	18.1	99	5.8	0.02		0.49
5 (S)	0.1	1.04	0.6	69	110	56	18.2	103	5.8	0.04		0.42
(D)	*	1.11	0.6	86	112	54	17.7	102	5.6	0.04		0.33

TABLE 32 CONTINUED

DATE STATION	NH4	NO3	PO4	SO4	CL	CA	MG	NA	K	MN	ZN	FE
8-15-74												
SLW-9 (S)	*	1.20	0.6	72	112	53	17.8	100	5.7	0.02		0.27
(D)	*	0.96	0.7	69	112	54	18.2	100	5.4	0.01		0.36
8-20-74												
SLE-1 (S)	0.7	2.56	5.2	102	166	60	16.7	153	9.2	0.16		0.69
(D)	0.8	2.43	5.0	91	166	60	17.0	153	9.0	0.17		0.72
5 (S)	0.1	2.16	5.2	94	165	59	17.1	150	9.0	0.16		0.63
(D)	*	2.15	5.1	89	165	58	17.1	150	10.5	0.17		0.59
8 (S)	*	1.93	5.9	112	165	61	17.0	150	10.5	0.18		0.66
(D)	0.1	2.12	4.8	84	162	60	17.5	149	10.5	0.17		0.57
8-29-74												
SLW-1 (S)	*	0.28	0.5	62	109	54	18.3	96	6.5	0.02		0.36
(D)	*	0.14	0.6	90	109	57	18.4	96	6.5	*		0.32
5 (S)	*	0.23	0.7	72	109	57	17.6	96	6.6	0.01		0.35
(D)	*	0.28	0.5	72	109	58	18.2	96	6.6	0.02		0.25
9 (S)	*	0.24	0.7	81	108	57	18.6	95	6.6	0.03		0.33
(D)	*	0.28	0.7	70	109	58	18.5	96	6.5	0.03		0.29

* = less than 0.1