# LAKE GILES

## REPORT ON LIMNOLOGICAL CONDITIONS IN 1989


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POCONO COMPARATIVE LAKES PROGRAM

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**Moeller, R. E. and C. E. Williamson.** 1991. Lake Giles: Report on Limnological Conditions in 1989. Unpublished Report to the Blooming Grove Hunting and Fishing Club. Biology Department, Lehigh University, 25 March 1991.

# INTRODUCTION

Personnel from Lehigh University sampled Lake Giles on 12 dates between 1 June and 31 December, 1989 as part of a routine monitoring program of three lakes. These lakes were selected to span a trophic gradient, the somewhat acidic Lake Giles occupying the unproductive ("oligotrophic") end of the gradient. Similar reports will be submitted to the owners of Lake Lacawac, a well protected lake of intermediate productivity ("mesotrophic"), and Lake Waynewood, a nutrient-rich ("eutrophic") lake potentially affected by homes and agricultural practices within its drainage basin. Lake Lacawac has been little disturbed throughout its recent history, and is currently preserved as part of The Lacawac Sanctuary; it serves as a valuable reference lake for the region.

The monitoring of these lakes in the Pocono region of northeastern Pennsylvania is a key component of Lehigh's Pocono Comparative Lakes Program (PCLP). This program aims to better understand the natural functioning of lakes, differences in lakes that arise through natural or man-made differences in their watersheds, and long-term trends that may be occurring in northeastern Pennsylvania. Through the cooperation of lake owners, scientists from Lehigh and other institutions are obtaining basic information that provides objective documentation of current lake conditions as well as a context for more intensive studies. Financial support from the Andrew W. Mellon Foundation has made these studies possible. Additional support from the Geraldine R. Dodge Foundation funded the summer internship program at the Lacawac Sanctuary.

The present report summarizes conditions in Lake Giles during 1989. Physical or chemical data are presented as tables for each date, and are summarized in figures. The following parameters were measured: temperature, light penetration, Secchi depth, dissolved oxygen, alkalinity, pH, and algal chlorophyll-a. Zooplankton data are presented as graphs that give the concentration (number of individuals per liter) averaged over the entire water column.

We are grateful to the Blooming Grove Hunting and Fishing Club for allowing access to Lake Giles, and for providing boats. Ken Ersbak has been particularly helpful in coordinating our studies there.

The Lacawac Sanctuary plays a major role in the PCLP program as the field laboratory and summer residence for the investigators. We especially appreciate the interest and cheerful assistance of its curator, Sally Jones.

# 1989 METHODS AND RESULTS

Data included in this report are extracted from an electronic database maintained at Lehigh University by Dr. Craig Williamson. The field sampling, laboratory analysis, and computer data entry were carried out by several graduate research assistants under the supervision of Dr. Robert Moeller. John Aufderheide and Scott Carpenter carried out most of the field sampling and laboratory analyses. John counted the microzooplankton, while Scott developed and managed all aspects of the computer database including data entry and printing of zooplankton graphs. Dr. Bruce Hargreaves played a major advisory role in the development of the computerized database. Gaby Grad counted most of the macrozooplankton samples from Lake Lacawac, including all of the nighttime samples. A. McDuff Sheehy counted daytime samples from June and July. Paul Stutzman and Karen Basehore checked the zooplankton data entries. Robert Moeller and Janet Hiscock analyzed chlorophyll samples. Gina Novak entered the physical/chemical data, which Robert Moeller checked.

Although efforts have been made to assure the accuracy of data included in the database, and compiled in this report, we cannot guarantee complete accuracy and do not claim specific levels of accuracy or precision. The data have been collected as part of a lake characterization program and may not be suitable for uses not envisioned by the investigators. A brief description of sampling and analytical techniques is included here; a more complete description will be included with the 1990 report.

## SAMPLING PROGRAM

On each sampling occasion, Lake Giles was visited twice, once during the day (the nominal date) and again after dark (sometimes the previous night). The nighttime visit was required for zooplankton sampling. Usually, other parameters were measured, and samples were collected, during the day. Sampling was carried out at a fixed station (site "A") at the deepest part of the lake (about 23 meters or 75 feet). The lake was sampled twice monthly when surficial water temperature stayed above 20 °C (June through September) then once monthly during cooler times.

## TEMPERATURE AND PHYSICAL STRATIFICATION

Temperature was measured at 1-meter intervals with the thermister of a YSI™ oxygen meter. Units are degrees Celsius. Accuracy should be within 1 degree.

**Figure 1** shows the thermal stratification that develops during late spring and summer, then breaks down in the autumn. On day 186 (5 July) stratification was well developed, producing an upper warm water layer circulating in contact with the atmosphere (the **EPILIMNION**, 0-4 meters, temperature 22.5 °C); an intermediate layer of rapid temperature decrease with depth (the **METALIMNION**, 4-13 meters); and a deep layer of cold water (the **HYPOLIMNION**, 13-23 meters, temperature 7-10 °C).

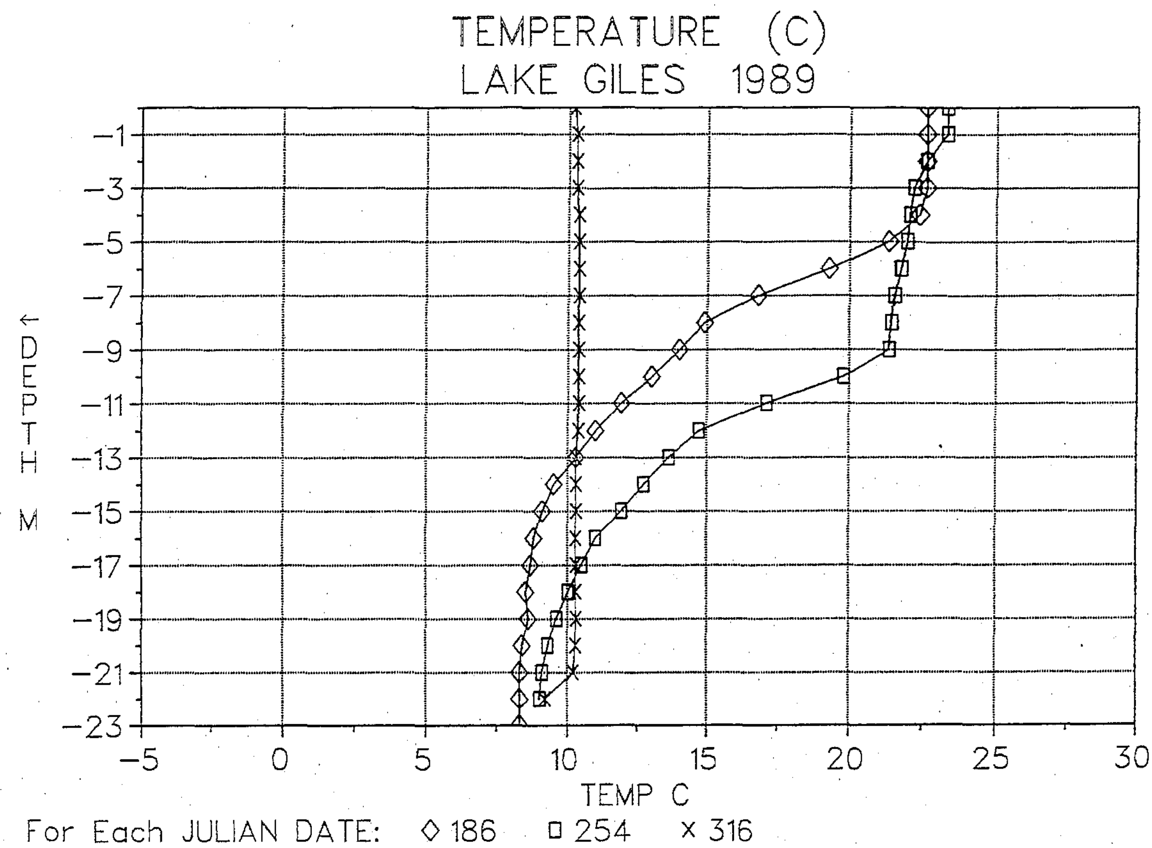



**Figure 1. Temperature (degrees Celsius) in Lake Giles, 1989.**

Values are plotted for three dates: **5 July** (day 186), **11 September** (day 254), **12 November** (day 316).

The usual course of thermal stratification is that of slow, gradual thickening of an epilimnion during the summer. By day 254 (11 September) Lake Giles' epilimnion extended to 9 meters. As the lake cooled during the autumn, the epilimnion thickened more rapidly until the lakewater was circulating from top to bottom. This period of circulation, or "turnover", was in progress by day 316 (12 November), though the bottom-most meter of the water column had not yet been advected into the mixed layer. The lake would have cooled further, close to 4 °C, before freezing.

The thermal stratification existing on any date dictated the depths from which other samples were collected. Water samples for **pH**, **alkalinity**, **chlorophyll**, and **algae** were collected from mid-depths of the three layers when thermal stratification was well developed. The selection of the metalimnetic sampling depth has been somewhat inconsistent. Our initial criterion for the metalimnetic zone was a rate of temperature change of ≥2°C/meter, as evident in Lakes Lacawac and Waynewood, but in Lake Giles, with its thick, less strongly stratified metalimnion, a criterion of ≥1°C/meter is more appropriate. During fall turnover, the lake was divided into three equal layers. Under ice-cover (e.g. 27 December), the topmost layer was 0-1m, and the remaining depths were divided at the Secchi depth (see SECCHI DEPTH below).

**LIGHT PENETRATION**

Light intensity at 1-meter intervals was calculated as a percentage of the light just below the lake surface (10 cm). Three slightly different methods were used to construct a 0-22 m profile of light penetration (method numbers correspond to codes from data tables):

**Method 9.** A Protomatic™ submersible selenium-cell photometer, with hemispheric diffusion dome, calibrated in foot-candles. Replicate profiles were obtained and averaged when the sky brightness varied because of clouds.

**Method 10.** A Licor™ submersible flat-plate sensor filtered to give a quantal response to photosynthetically available radiation ("PAR"), reading $\mu$Einsteins/m$^2$.sec. Profiles were obtained as in method 9.

**Method 12.** Two Licor quantum sensors, mounted 1-m apart on a common line, electronically computed the ratio of quantum intensities between the nominal depth and the depth above it. The percentage penetration profile was constructed from these ratios.

Light penetration is plotted on a logarithmic scale for three dates **(Figure 2)**. During the summer, depths above 9 m (i.e. all of the epilimnion) received at least 10% of the light penetrating the lake surface. The metalimnion received 2-10% of surface light, enough for at least moderate rates of algal growth. In fact the lake bottom at 23 m apparently received 0.1-1% of surface light, enough to sustain low-light adapted algae. During autumn turnover light penetration was significantly decreased, and of course the total amount of light entering the lake would have been decreasing seasonally.

**SECCHI DEPTH**

Secchi depth is the depth, in meters, at which a white-and-black quartered disk 20 cm in diameter just ceases to be visible to an observer lowering it from a boat. It is a measure of water transparency. We observed the Secchi disk with a small glass-bottomed viewing box to reduce glare from the lake surface.

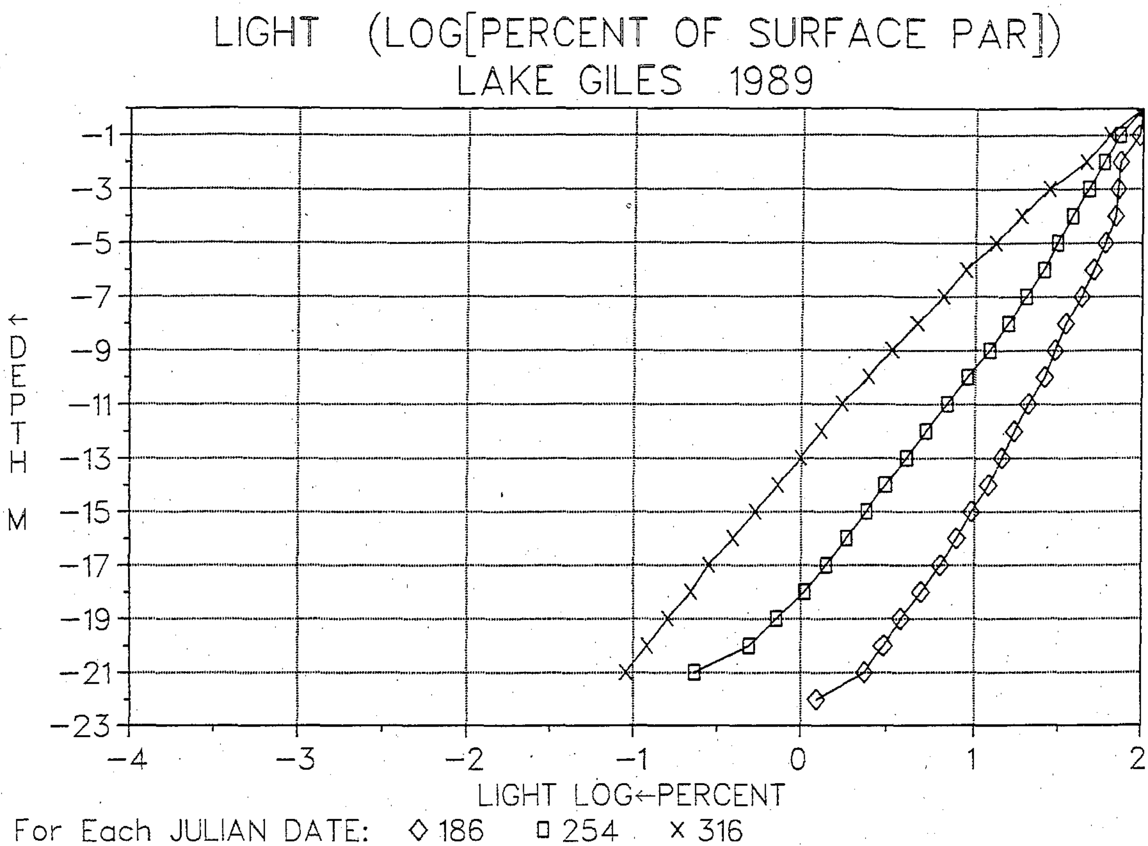



**Figure 2. Light penetration in Lake Giles, 1989.**

Values plotted for three dates: **5 July** (day 186), **11 September** (day 254), and **12 November** (day 316) are percentages of the light at 0.1 m depth and are graphed on a logarithmic scale (i.e., 100% ="2", 10% ="1", 1% ="0", etc.)

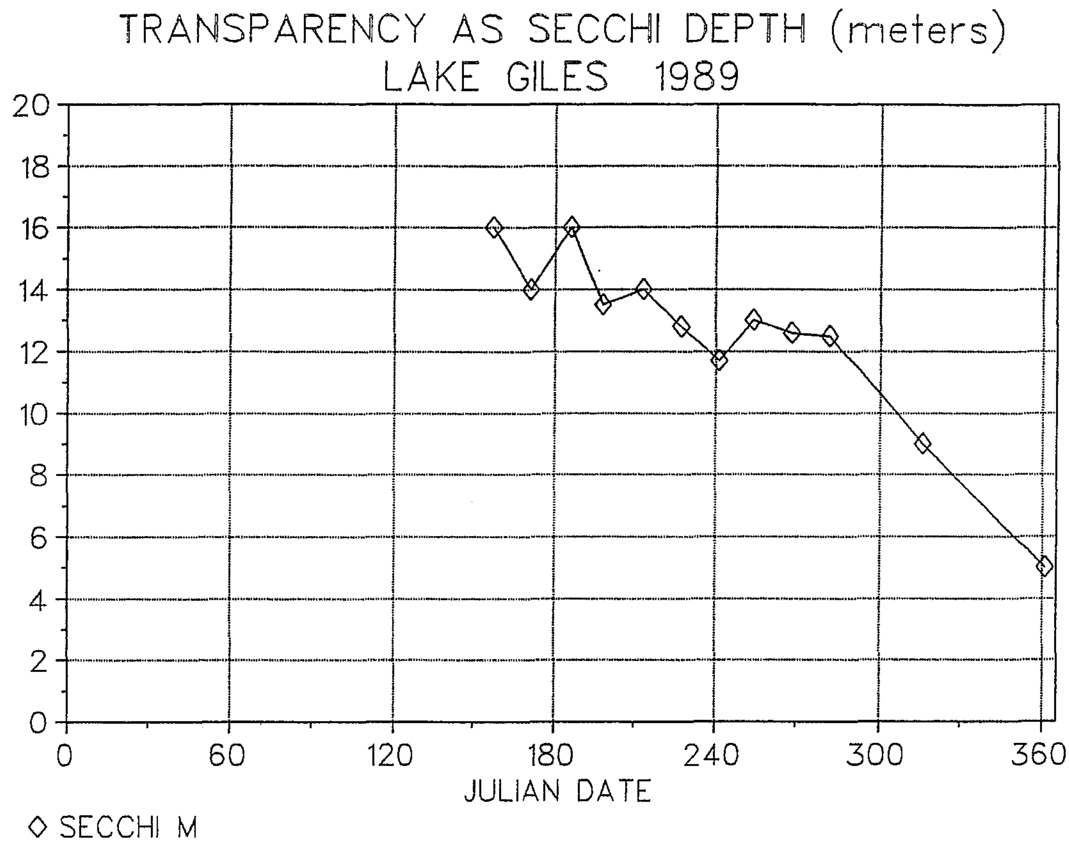



**Figure 3. Transparency in Lake Giles, 1989.**

Values plotted are the Secchi depths, in meters.

Secchi depth was typically 12-16 meters (40-50 feet) in late spring and summer (**Figure 3**), consistent with the light data (the Secchi depth usually corresponds to the 5-10% level of surficial light, as it does in Giles). This represents exceptional clarity for a small lake.

## OXYGEN CONTENT OF THE LAKEWATER

Dissolved oxygen was measured polarographically using a YSI™ submersible temperature-compensating oxygen meter. The meter was calibrated in air to 100% saturation immediately before use in the lake. The effect of Lake Giles' elevation above sea-level was not taken into account when calibrating the meter, so all compiled values are roughly 4% too high. Units are mg $O_2$ per liter.

Data from 5 July (day 186) have been flagged as doubtful, because epilimnial values are well below saturation for that temperature and systematically lower than data for adjacent dates. Presumably this was a meter malfunction or incorrect calibration.

The onset of thermal stratification in mid-spring marked the onset of gradual reduction of oxygen at the bottom of the hypolimnion. Nevertheless, oxygen levels even at a depth of 22 meters remained $\geq 2$ mg/L. Oxygen content of the epilimnion in summer was maintained near atmospheric saturation. The broad metalimnetic oxygen maximum during the summer can be attributed mainly to the absence of consumptive processes (loss to atmosphere or respiration) in the metalimnion, not to high rates of algal production. The oxygen concentration at 13 m was about 12 mg/L throughout the summer (correcting the plotted 12.6 mg/L downward for Lake Giles' elevation); this represents saturation at 5-6°C, the spring temperature at the onset of thermal stratification. During turnover the hypolimnetic water was progressively mixed with the rest of the water column and recharged with oxygen. On day 316 (12 November), early in the turnover period, the oxygen content at 20 meters (ca. 7.5 mg/L) was only 70% of the saturation level for that temperature (10.7 mg/L at 10.3°C).

## ALKALINITY AND pH

Alkalinity is a measure of the acid neutralizing, or buffering capacity. Alkalinity was determined by potentiometric titration of a 100-ml sample using 0.01 N sulfuric acid as titrant and monitoring pH change with an Orion™ model SA250 pH meter and Ross™ epoxy-body combination electrode. Alkalinity is reported in units of microequivalents per liter ($\mu$eq./L).

**Method 9.** Alkalinity was calculated from the volume of acid required to reach an a priori established pH of 5.2--established as the pH at the equivalence point for the typical Lacawac epilimnetic sample. This procedure was used for hypolimnial samples in Giles on a few dates when the titration had not been continued far enough to give points in the pH 4.4-3.7 range for method 11, and the scatter of points was too great to resolve the traditional equivalence point (Method 10).

**Method 10.** The equivalence point was estimated from the slope of pH plotted against volume of acid added. This means of identifying the equivalence point is imprecise in waters of low alkalinity. In Lake Giles it is essentially useless, since the initial pH is near or below the equivalence point (representing near-zero or negative alkalinity, respectively). A value of "0" was assigned to epilimnial and metalimnial samples from Giles that were analyzed this way (on days 198, 227, 241); this really represents $\leq 5$ ueq/L.

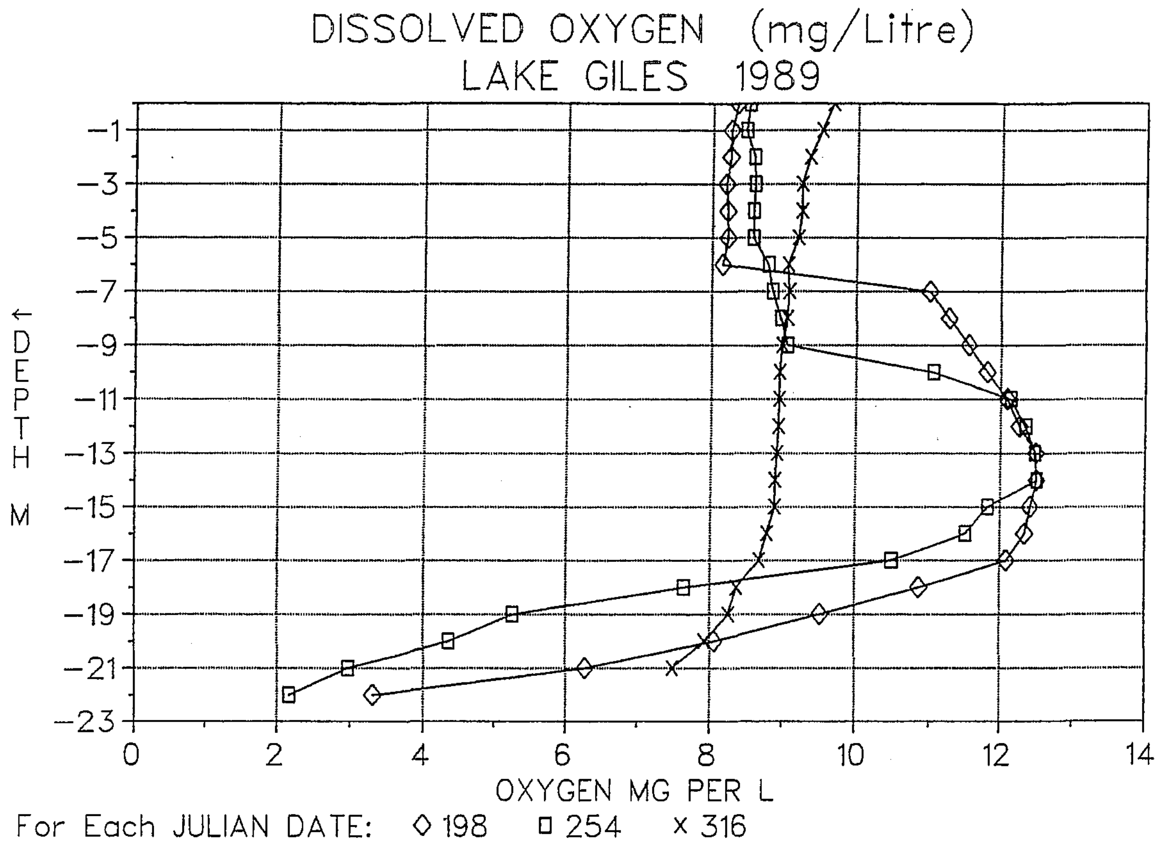



**Figure 4. Dissolved oxygen in Lake Giles, 1989.**

Values are plotted for three dates: **17 July** (day 198), **11 September** (day 254), and **12 November** (day 316). Oxygen values from 5 July (day 186) are of doubtful accuracy, so the 17 July data are substituted.

**Method 11.** Titration points between pH 4.4 and 3.7 were plotted, after Gran transformation, to give alkalinity as the regressed intercept. This is currently our most precise, preferred method, and the only one that gives reliable alkalinity values in Lake Giles.

Samples for alkalinity and pH were taken from duplicate water collections (acrylic plastic Van Dorn bottle) at three depths, designated "**E**" (epilimnion), "**M**" (metalimnion), and "**H**" (hypolimnion). Selection of these depths is described in the section **TEMPERATURE AND THERMAL STRATIFICATION**. Samples were stored in air-tight polypropylene bottles for up to 24 hr (refrigerated) before analysis. Samples were warmed to room temperature before analysis. The pH meter and electrode described above were calibrated with commercial high ionic strength buffers. Values of pH reported are averages of values in 50-ml aliquots of sample with and without mixing, which had no consistent effect on readings.

Trends of pH are plotted for each layer in **Figure 5**. In the absence of seasonal biological activity, the pH of Lake Giles would be about 5.2 with an alkalinity between zero and -5 $\mu$eq./L (**Figure 6**), judging from values in late spring and late autumn. These values portray an extremely softwater lake, without any bicarbonate buffering.

During the summer, a small amount of alkalinity was formed within the hypolimnion, presumably through biological processes. Given the oxygenated condition of the hypolimnial water column, anerobic processes such as sulfate reduction would have been restricted to the surficial sediments.

## ALGAL CHLOROPHYLL-a

Chlorophyll-a is a measure of algal mass, since all algae contain this pigment. It is a widely used parameter for comparisons of lake trophic conditions.

Chlorophyll samples came from the same Van Dorn collections used for alkalinity. Samples were stored in 1-L polyethylene bottles for 2-24 hr (refrigerated in darkness) before being filtered (Gelman™ A/E filters) and frozen. Filters were ground in 90% basic acetone, extracted overnight at 2 °C in darkness, then centrifuged and read in a Sequoia-Turner™ model 112 fluorometer equipped with F4TB/B lamp, red-sensitive photomultiplier, 5-60 excitation filter and 2-64 emission filter. The meter was calibrated with dilutions of pure chlorophyll-a or chlorophyll-a,b extracts from higher plants; these were assayed first by standard spectrophotometric techniques. Each sample was reread after acidification (to 0.03 N) to allow correction for pheopigments. Two values are presented: Chlorophyll-a corrected for pheopigments (**CHLAC** in data tables and **Figure 7**) and Chlorophyll-a including pheopigments (**CHLASUM** in data tables).

Chlorophyll levels in Lake Giles (**Figure 7**) were characteristic of a very oligotrophic lake (0.1-1 $\mu$g/L in the epilimnion during summer). Metalimnetic and hypolimnetic values were consistently somewhat higher (1-4 $\mu$g/L), but still in the "oligotrophic" range. Adequate light reached even the deepest hypolimnion to support algal growth.

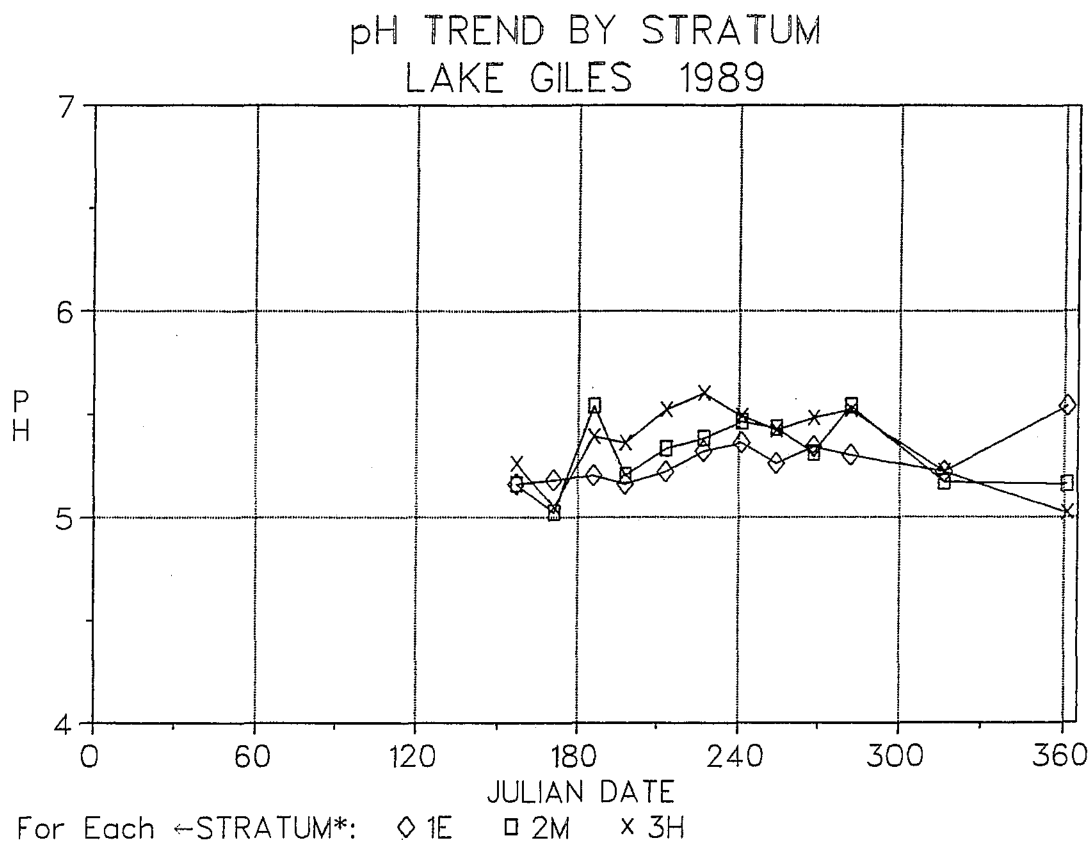



**Figure 5. Trends of pH in Lake Giles, 1989.**

Values are plotted for the mid-depths of the three layers, Epilimnion (**1E**), Metalimnion (**2M**), and Hypolimnion (**3H**). In autumn and winter, when these layers are not developed, samples are collected as described in **RESULTS AND METHODS**.

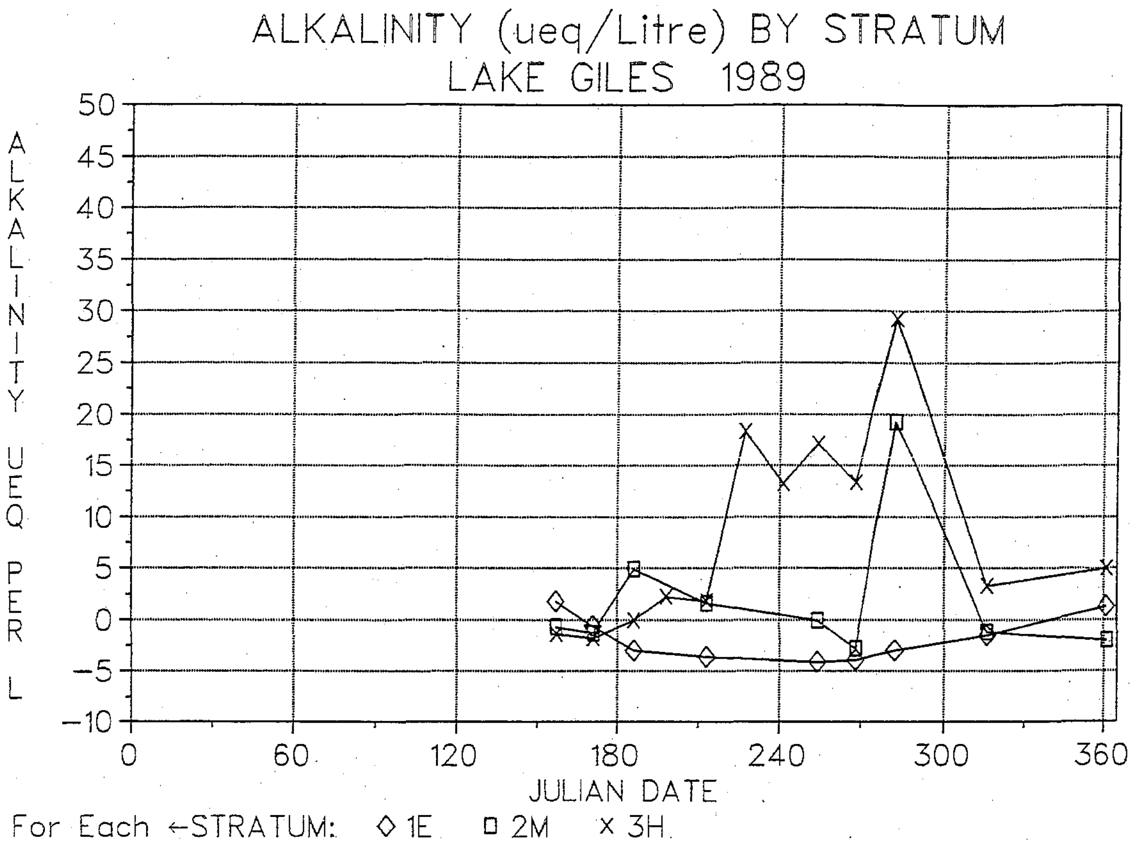



**Figure 6. Trends of Alkalinity in Lake Giles, 1989.**

Values are plotted for the mid-depths of the three layers, Epilimnion (1E), Metalimnion (2M), and Hypolimnion (3H). In autumn and winter, when these layers are not developed, samples are collected as described in **RESULTS AND METHODS**. Epilimnial and metalimnial data points are omitted for dates when the Gran-plot method could not be applied (days 198, 227, 241).

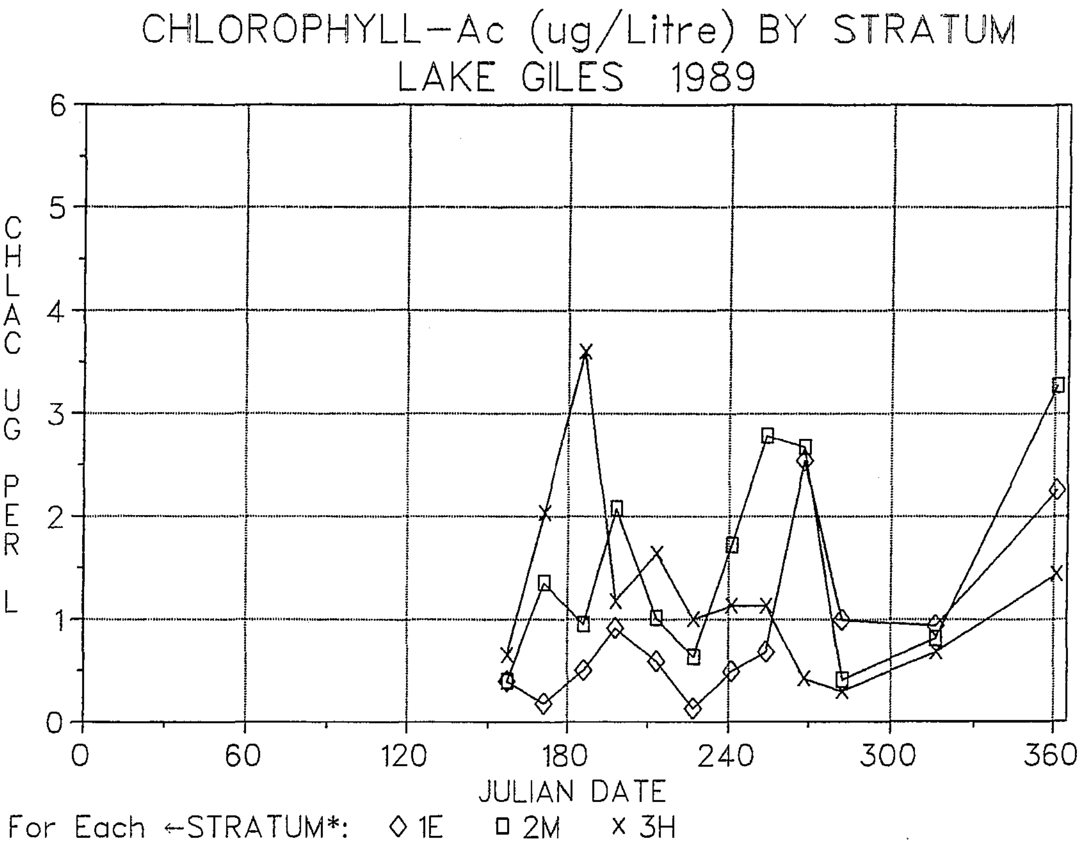



**Figure 7. Trends of Chlorophyll-a in Lake Giles, 1989.**

Values are plotted for the mid-depths of the three layers, Epilimnion (**1E**), Metalimnion (**2M**), and Hypolimnion (**3H**). In autumn and winter, when these layers are not developed, samples are collected as described in **RESULTS AND METHODS**. Chlorophyll-a values are corrected for pheopigments.

**ZOOPLANKTON**

Zooplankton receive a major emphasis in the PCLP program. These animals represent the key link between algal primary producers and fish populations. The intensity of grazing by herbivorous zooplankton strongly affects the kind of algae that dominate, and potentially can control (i.e. reduce) algal populations even in the face of abundant nutrient supply. Consequently the kinds and abundances of zooplankton have important implications for the perceived recreational quality of a lake.

Zooplankton were sampled at day and night, but only the nighttime data are presented here. Some species avoid the water column during the day. Zooplankton were collected with closing-style plankton nets that could be pulled through part of the water column open, collecting animals, then closed and pulled the rest of the way to the surface. In this way the water column was sampled as the three layers defined by temperature. In the present report, data are calculated as mean concentrations (numbers of individuals per liter) over the entire 23-m water column. Details of the depth-distributions, and daily patterns of vertical movement, are still being analyzed.

Two sizes of nets were used: a 30-cm diameter net with a mesh of 202 μm, for macrozooplankton; and a 15-cm diameter Wisconsin-style net with a 48-μm mesh for microzooplankton. These were mounted side-by-side in "bongo" configuration. Microzooplankton includes mainly rotifers, but small copepods also were counted from these samples. Collections were duplicated from each depth. Mean values are presented.

Seasonal trends in abundance are presented as a series of graphs for all of the frequently encountered zooplankton, identified to genus and sometimes to species **(Figures 8-29)**. Densities are averaged over the entire water column, although many species are actually aggregated at favored depths for part or all of the day. Unlike the situation in lakes Lacawac and Waynewood, where the hypolimnia become anoxic during the summer, the entire water column is utilized by zooplankton in Lake Giles. In fact, densities are often greater in the metalimnion and in the hypolimnion than in the warmer surface layer. Several points can be highlighted:

(1) Although rotifers (included in "microzooplankton") were numerically abundant, by mass the larger "macrozooplankton" strongly predominated, with nearly equal proportions of calanoid copepods and daphniid cladocerans. *Diaptomus minutus* (typically 15 adults/L, range 8-20) was the principal calanoid, though *Diaptomus spatulocrenatus* became moderately abundant during the autumn (ca. 3 adults/L). Because of larger size, the Cladocera--principally *Daphnia catawba* in summer--were of similar importance though lower in numbers (typically 5 individuals/L, range 2-10).

(2) Rotifers averaged 150/L (range 100-300/L). The various rotifers displayed pronounced seasonalities, which differed among species. There were also pronounced differences in distribution among the three layers. Rotifers tended to be more abundant in late spring and late autumn than during the summer, but this difference was not pronounced.

(3) In general hard-bodied rotifers (e.g. *Keratella*) or rotifers with swift escape reactions (e.g. *Polyarthra*) progressively became dominant during the summer, succeeding the soft-bodied *Gastropus* that predominated in June. This pattern suggests increasing predation pressure.

(4) Several invertebrate predators occurred in Giles; most notably the large dipteran *Chaoborus*, which increased during the summer (from 0 to ca. 0.4/L). In contrast, adult cyclopoid copepods (mainly *Cyclops scutifer*) were more abundant in late spring and early summer (ca. 0.4/L) than later, though their copepodids became increasingly abundant during the autumn. These copepodids may in part have re-entered the water column from diapause at that time. The predatory cladoceran *Polyphemus pediculis* also was present in in late spring, but at very low densities (ca. 0.02/L). This species likely was more common near shore.

## DISCUSSION

The exceptional clarity of Lake Giles is its most remarkable feature. With a Secchi depth of 12-14 m in the late spring and summer, plenty of light reaches the deeper zones of the water column. The 1% depth in summer lies within the hypolimnion, and may occasionally reach bottom at 23 meters.

The lake's transparency has several important consequences:

(1) Penetration of light into the metalimnion and upper hypolimnion during the summer gradually heats the water, producing a thick epilimnion and a broad, gradual metalimnion.

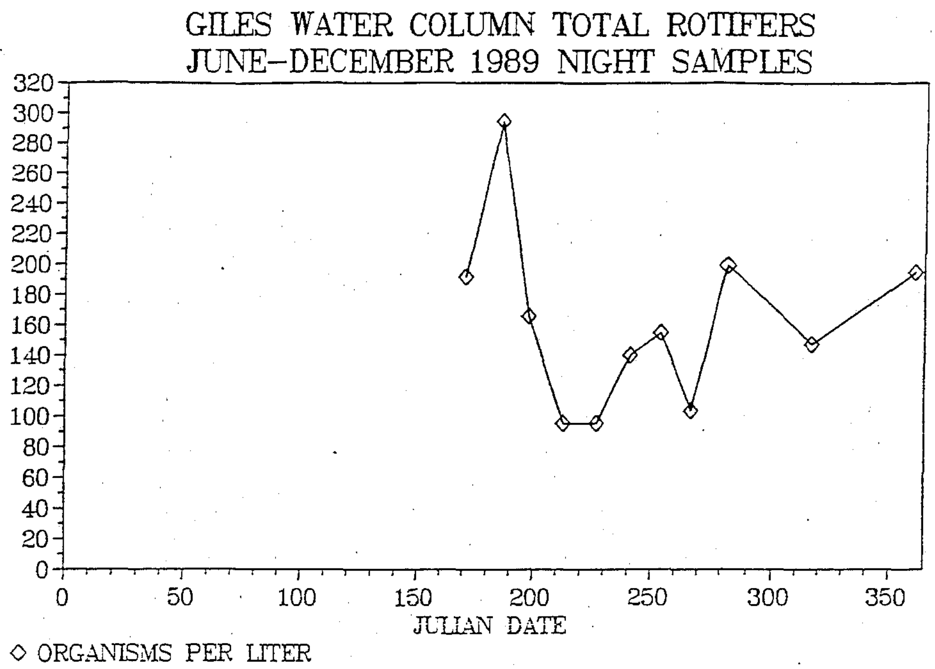
(2) Algae can grow in the metalimnion and hypolimnion. In fact levels of active (pheopigment-free) chlorophyll-a in summer tend to be higher at greater depths (1-4 $\mu$g/L) than in the epilimnion (0.1-1 $\mu$g/L).

(3) Algal growth in the hypolimnion largely offsets oxygen consumption to microbial respiration; during summer oxygen declined gradually in the deepest hypolimnion but stayed greater than 2 mg/L.

(4) Maintenance of hypolimnial oxygen above 2 mg/L means that zooplankton and fish may utilize this zone throughout the summer. The cold hypolimnial waters (8-11°C during summer) are an important zone of algal production and zooplankton consumption.

Exceptional clarity is typical of lakes acidified with strong acids--as opposed to organic acids, which stain the water. The alkalinity (zero to -5 $\mu$eq/L) and pH (5.2) of the epilimnion in summer reflects this acidity in Lake Giles.

Nevertheless, the lake supports a diverse and abundant zooplankton, dominated by herbivorous copepods (especially *Diaptomus minutus*) and Cladocera (especially *Daphnia catawba*). Although some of the species present may also characterize more strongly acidic lakes, the plankton of Lake Giles is not that of a strongly acidified lake. The abundance of zooplankton is somewhat surprising for a lake with such low chlorophyll concentrations, especially if this were judged solely from epilimnial levels. Possible interactions with the fish community will be discussed in the 1990 report.



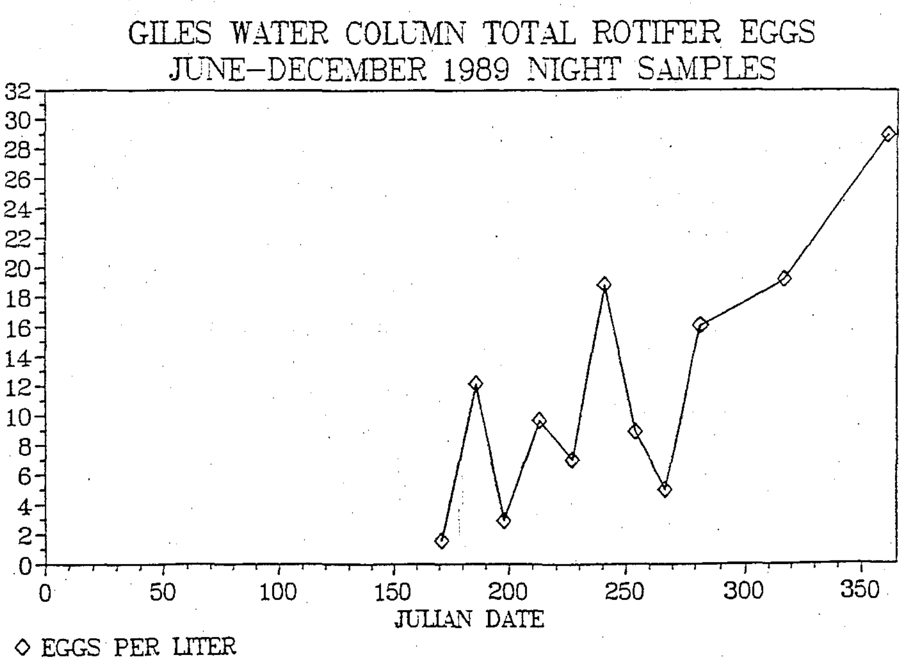




**Figure 8. Rotifers in Lake Giles, 1989.**

Nighttime net collections (48$\mu$m) from three depths have been combined to give a water column mean. **(Top)** Total individuals per liter. **(Bottom)** Rotifer eggs per liter.

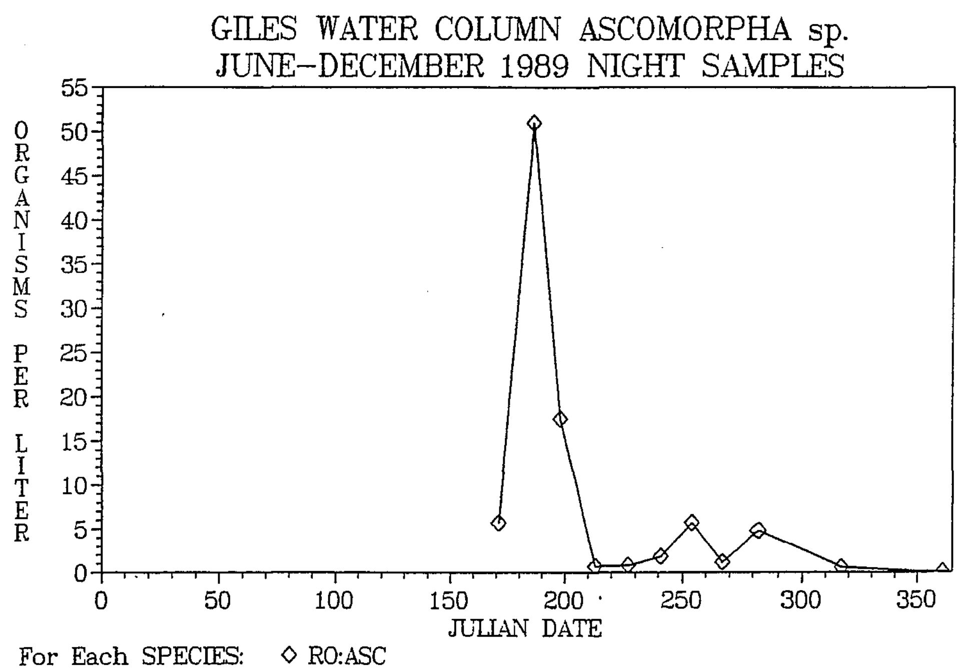



**Figure 9. The rotifer *Ascomorpha* spp. in Lake Giles, 1989.**

Nighttime net collections (48$\mu$m) from three depths have been combined to give a water column mean.

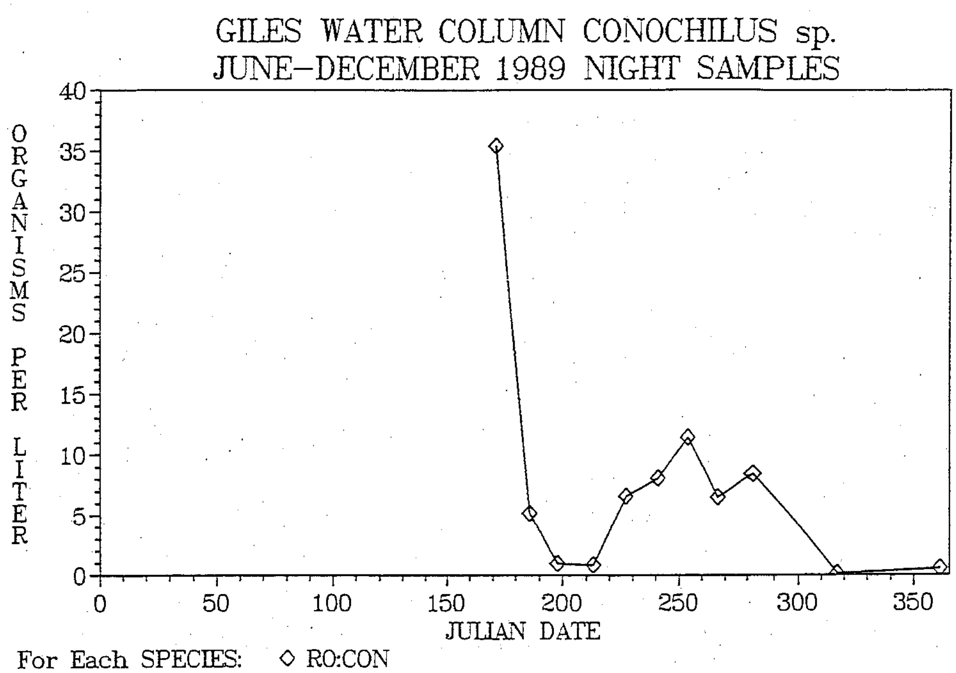



**Figure 10. The rotifer *Conochilus* spp. in Lake Giles, 1989.**

Nighttime net collections (48$\mu$m) from three depths have been combined to give a water column mean.

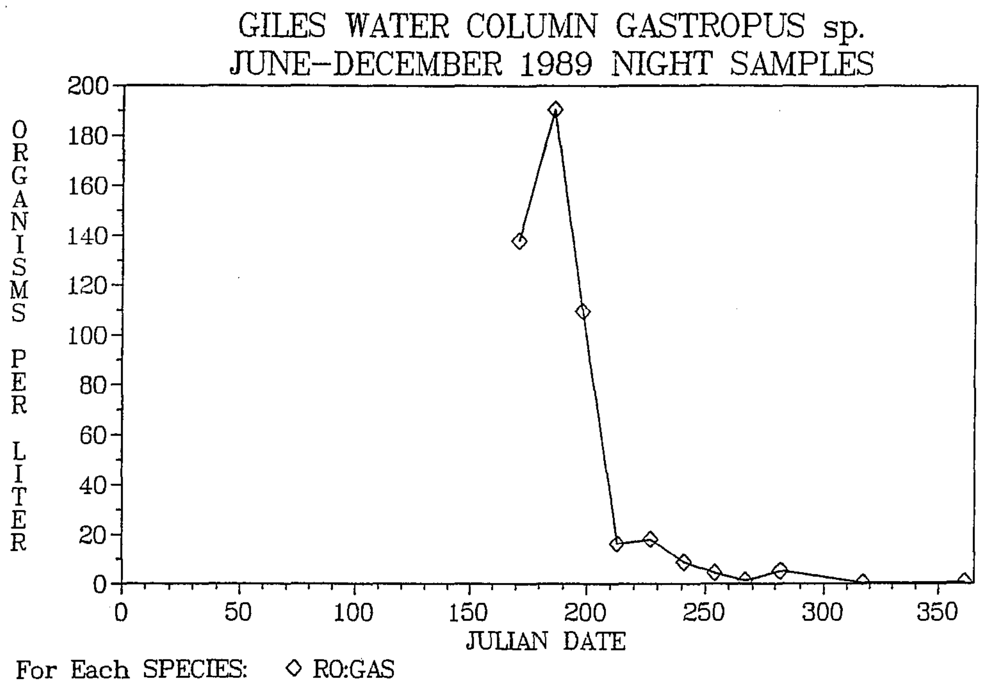



**Figure 11. The rotifer *Gastropus* in Lake Giles, 1989.**

Nighttime net collections (48$\mu$m) from three depths have been combined to give a water column mean.

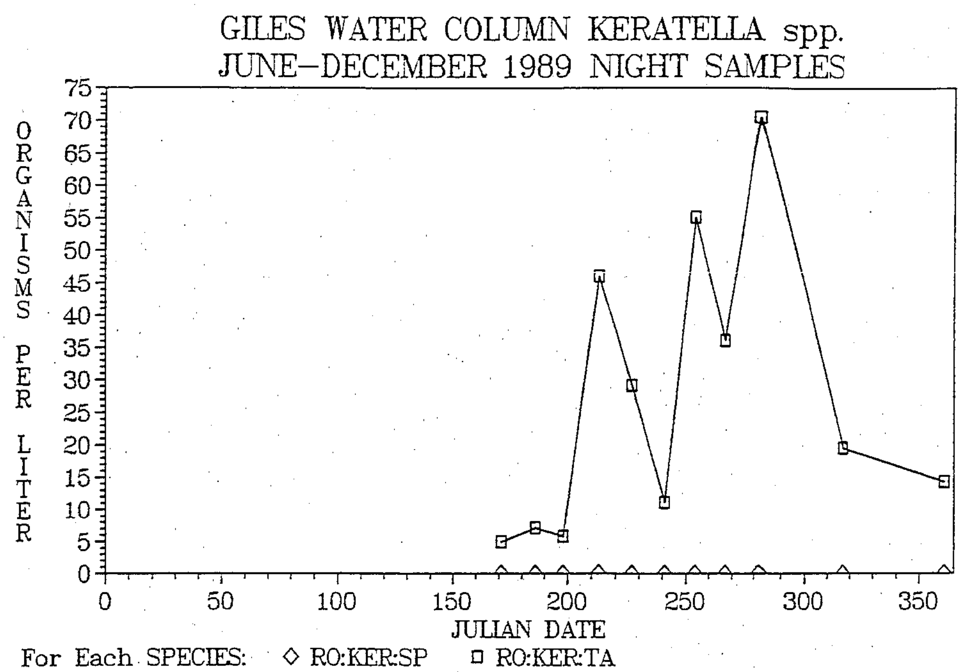



**Figure 12. The rotifer *Keratella* spp. in Lake Giles, 1989.**

Nighttime net collections (48$\mu$m) from three depths have been combined to give a water column mean. *Keratella* by species: **TA** *K. taurocephala* and **SP** undifferentiated species.

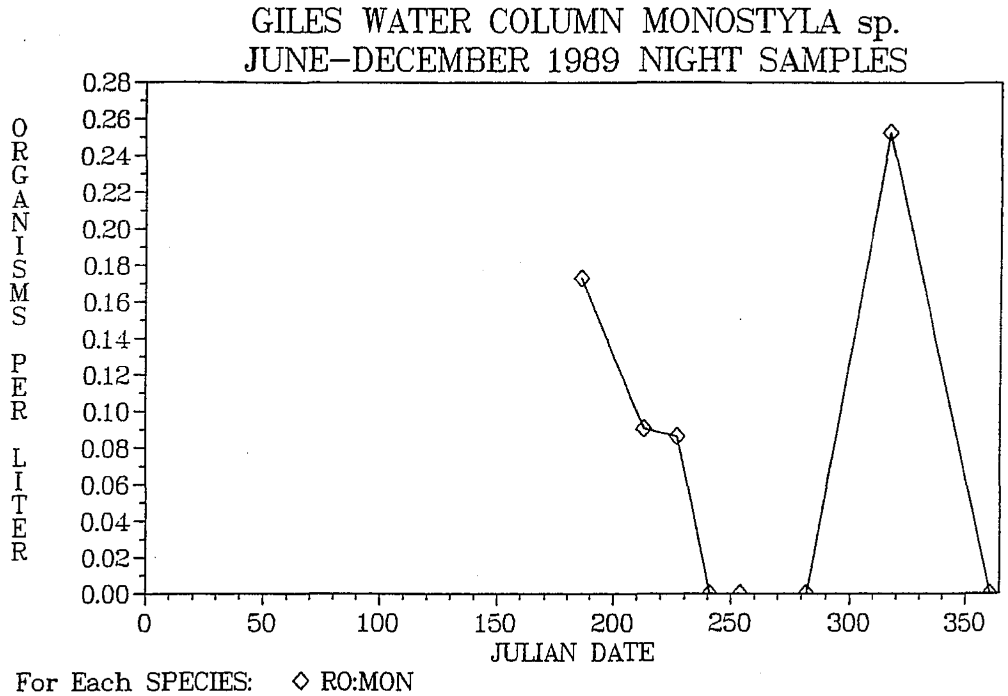



**Figure 13. The rotifer *Monostyla* spp. in Lake Giles, 1989.**

Nighttime net collections (48$\mu$m) from three depths have been combined to give a water column mean.

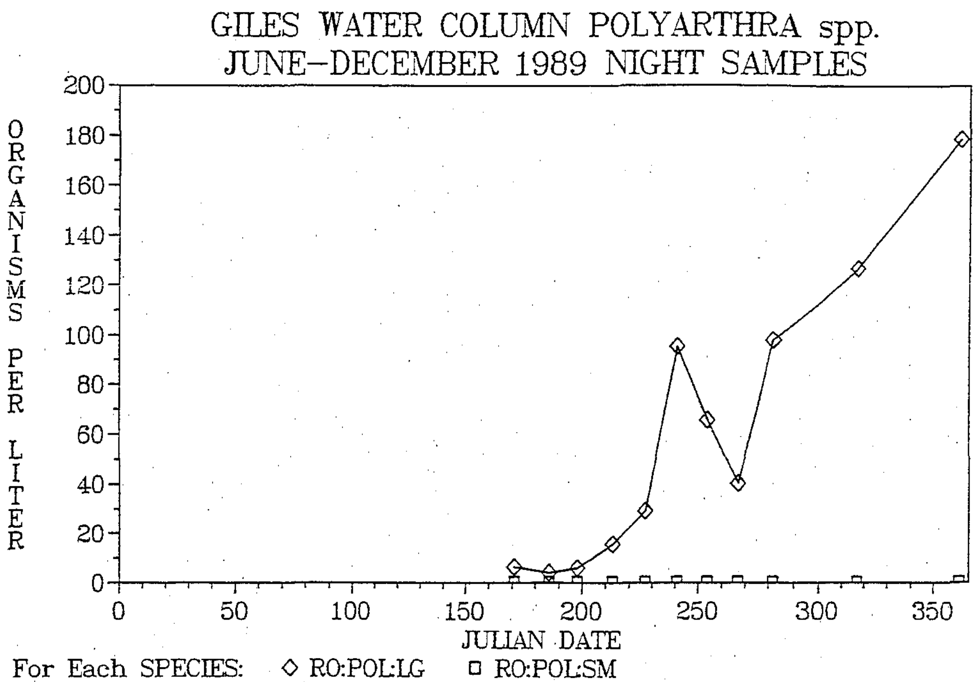



**Figure 14. The rotifer *Polyarthra* spp. in Lake Giles, 1989.**

Nighttime net collections (48$\mu$m) from three depths have been combined to give a water column mean for two size classes: **LG** large and **SM** small.

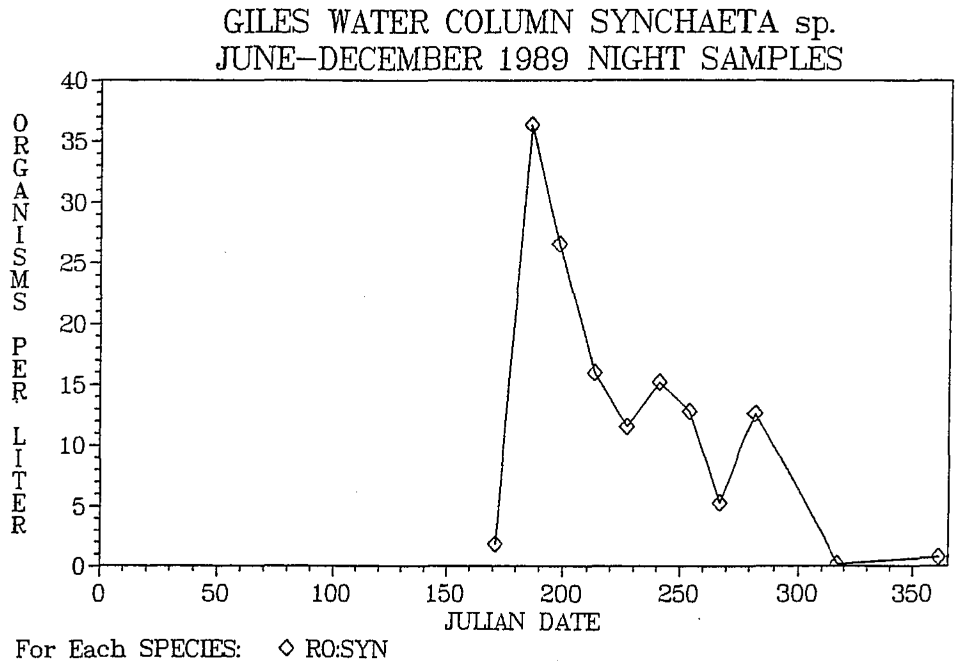



**Figure 15. The rotifer *Synchaeta* spp. in Lake Giles, 1989.**

Nighttime net collections (48$\mu$m) from three depths have been combined to give a water column mean.

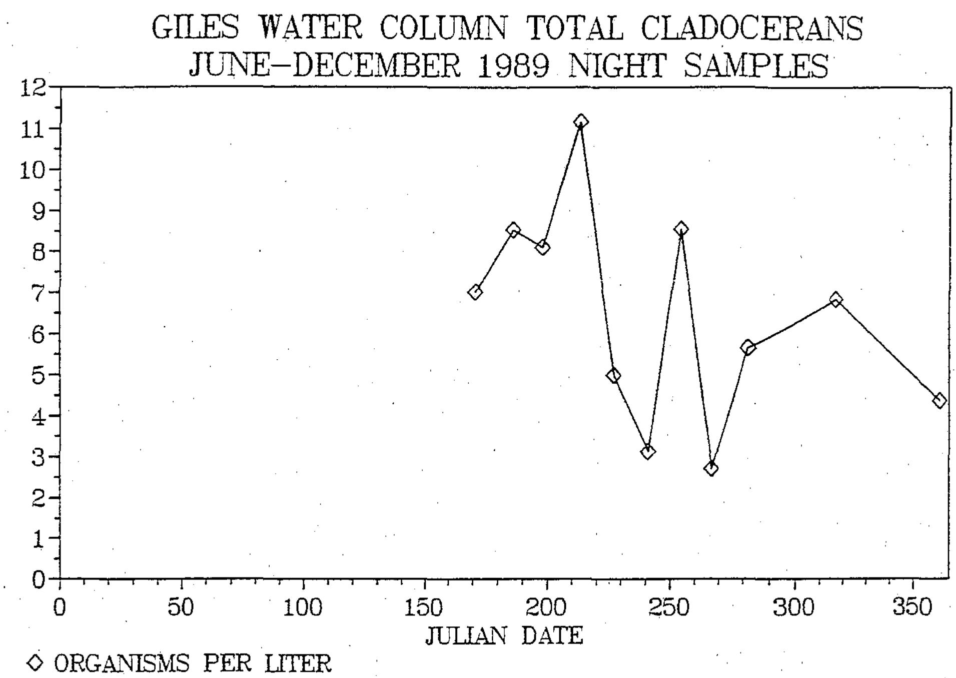
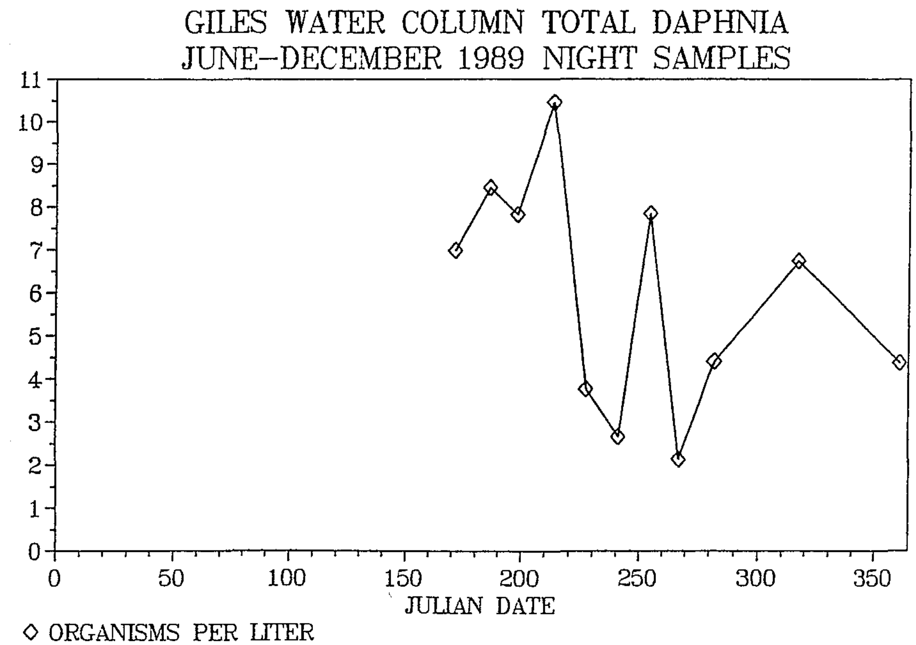



**Figure 16. Cladocera in Lake Giles, 1989.**

Nighttime net collections (202$\mu$m) from three depths have been combined to give a water column mean.



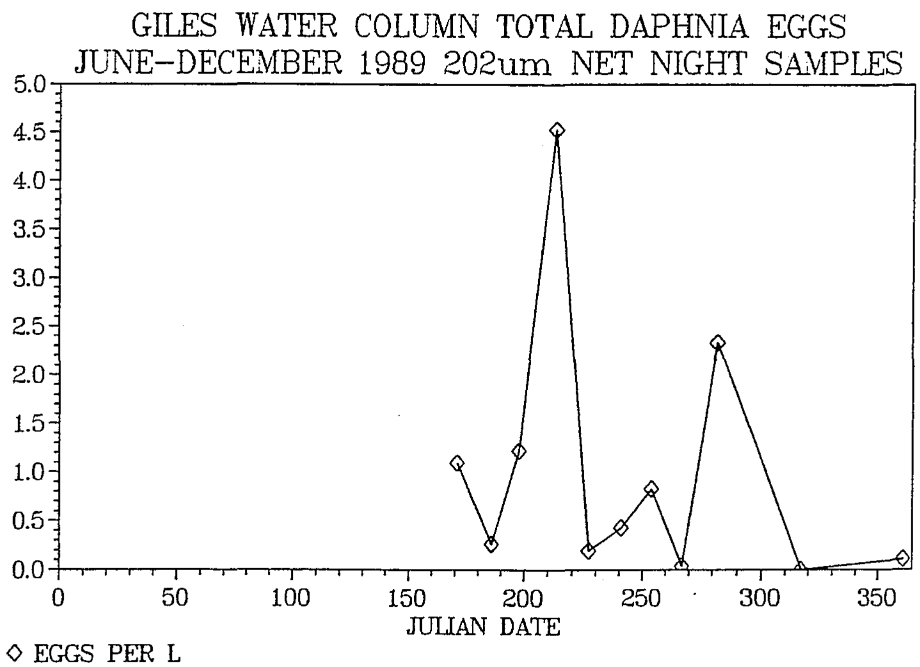




**Figure 17. The cladoceran *Daphnia* spp. in Lake Giles, 1989.**

Nighttime net collections (202$\mu$m) from three depths have been combined to give a water column mean. **(Top)** Total individuals per liter. **(Bottom)** Total eggs per liter.

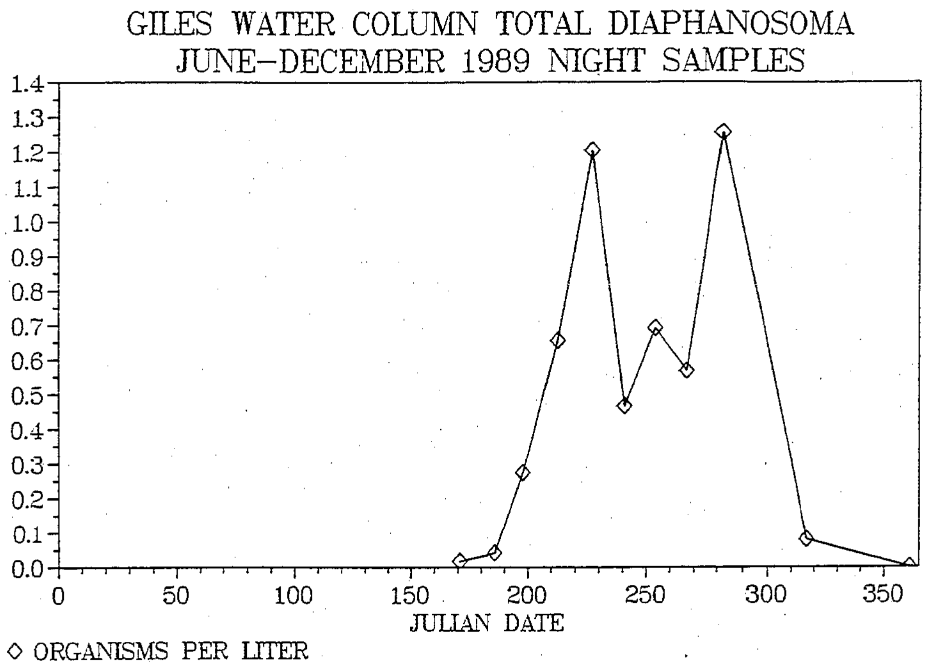



**Figure 18. The cladoceran *Diaphanosoma* sp. in Lake Giles, 1989.**

Nighttime net collections (202$\mu$m) from three depths have been combined to give a water column mean.

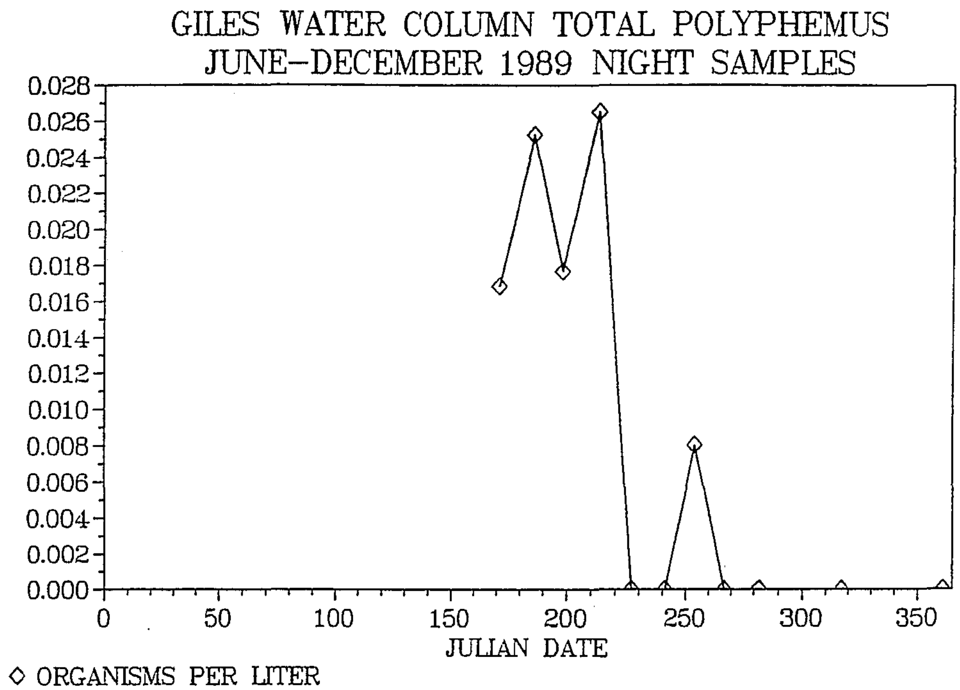



**Figure 19. The cladoceran *Polyphemus pediculus* in Lake Giles, 1989.**

Nighttime net collections (202$\mu$m) from three depths have been combined to give a water column mean.

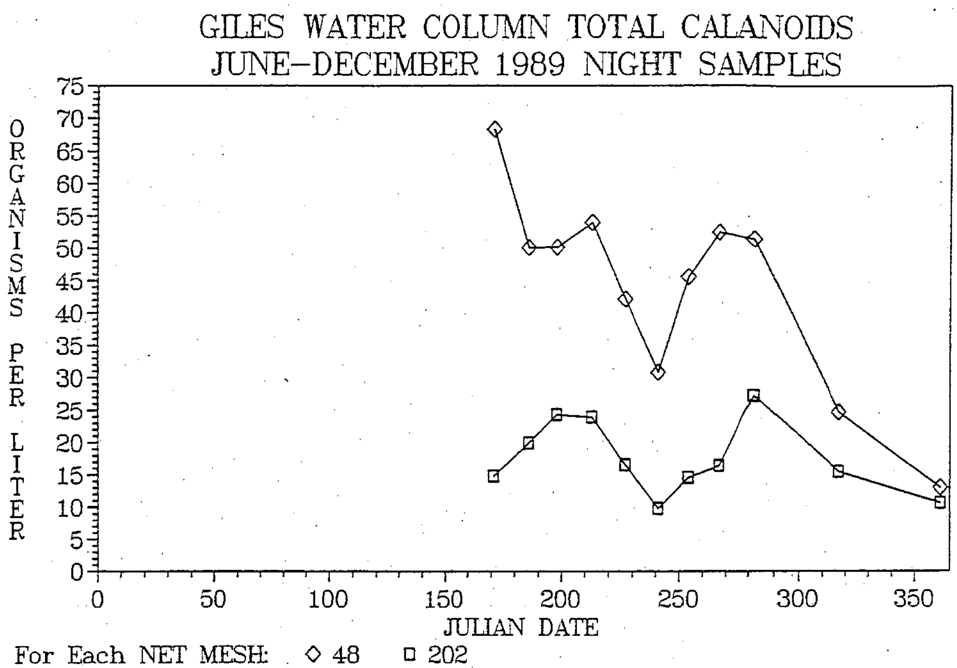



**Figure 20. Calanoid copepods in Lake Giles, 1989.**

Nighttime net collections from three depths have been combined to give a water column mean. The 48$\mu$m mesh net collects copepodids effectively, which the 202$\mu$m net does not.

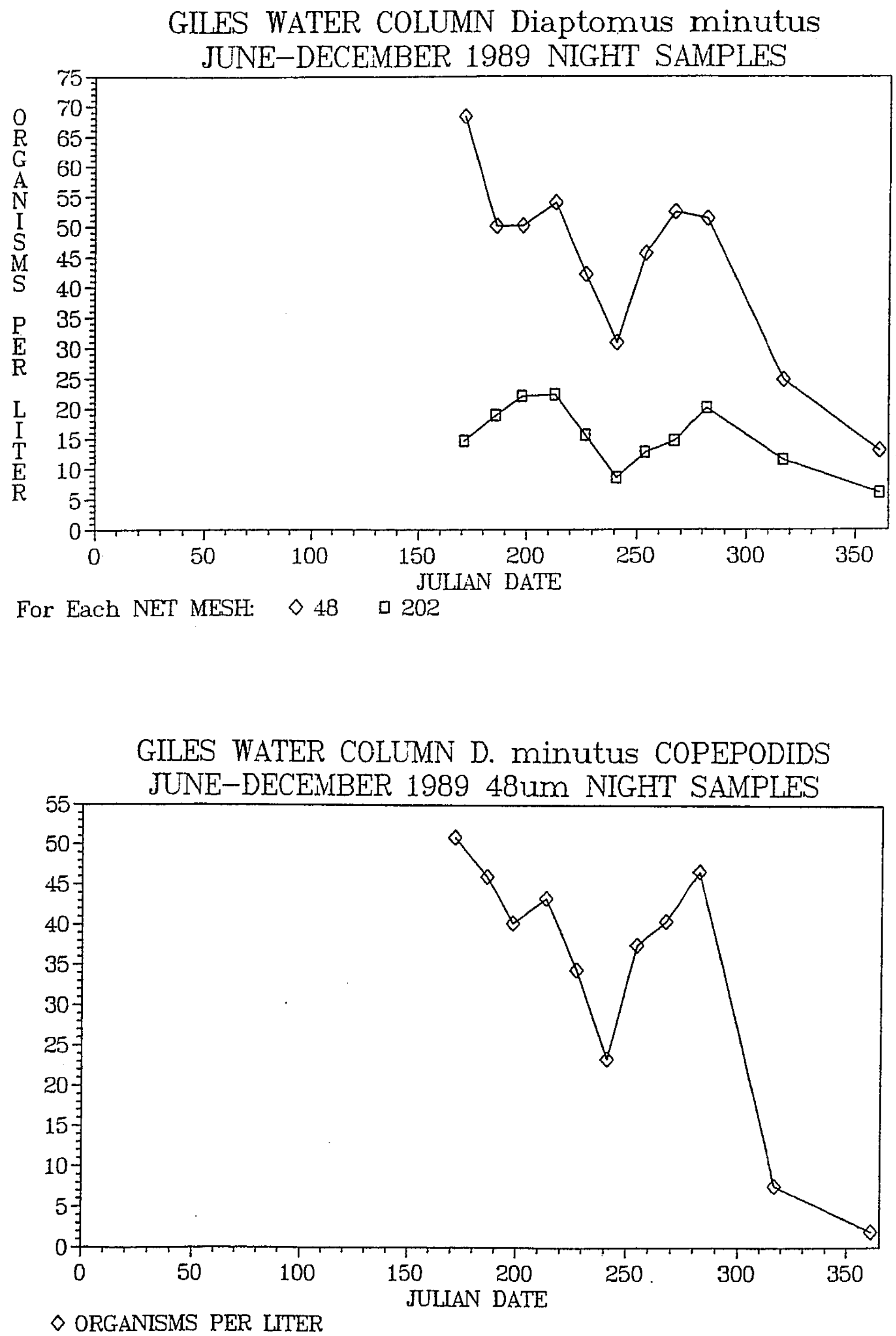
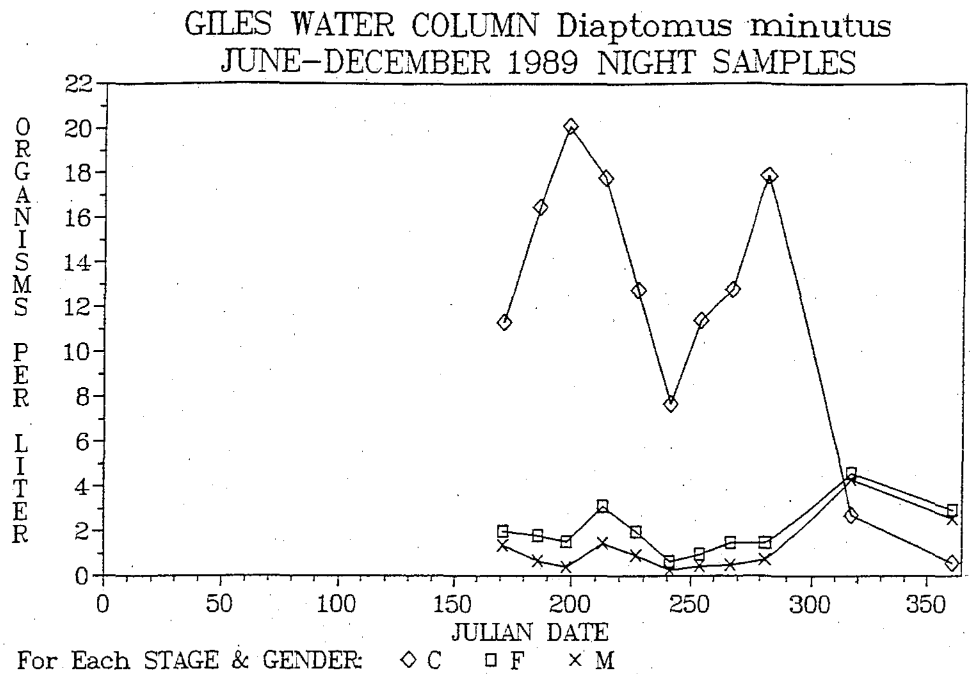



**Figure 21. The calanoid copepod *Diaptomus minutus* in Lake Giles, 1989.**

Nighttime net collections from three depths have been combined to give a water column mean. **(Top)** Total individuals per liter; the 48$\mu$m mesh net collects copepodids effectively, which the 202$\mu$m net does not. **(Bottom)** *D. minutus* total copepodids from the 48um net.



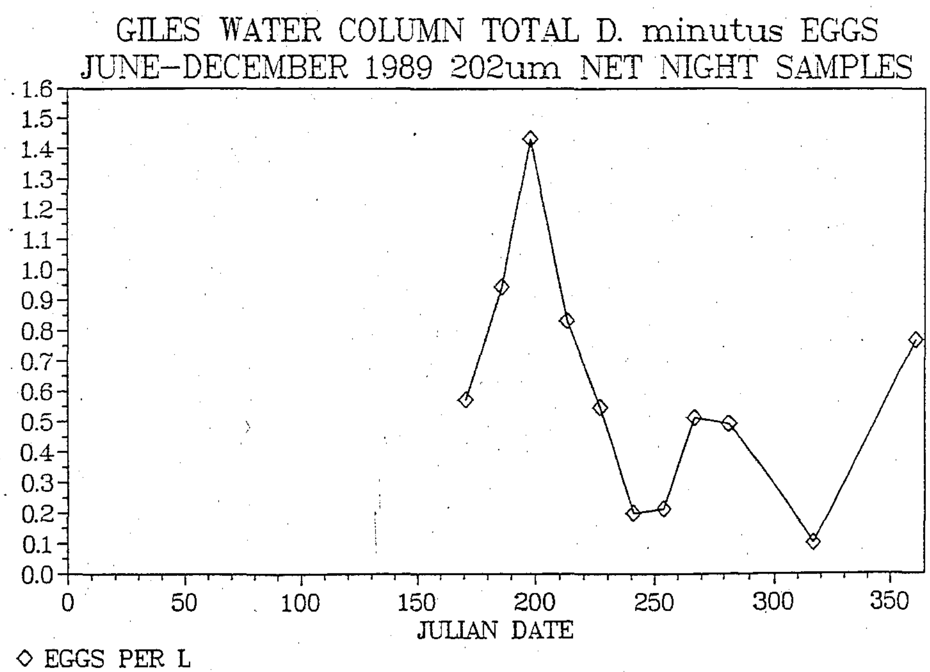




**Figure 22. The calanoid copepod *Diaptomus minutus* in Lake Giles, 1989, by stage and gender.**

Nighttime net collections (202$\mu$m) from three depths have been combined to give a water column mean. **(Top)** Adults (males and females separately) and some copepodids from the 202$\mu$m net. **(Bottom)** *D. minutus* eggs per liter (202$\mu$m).

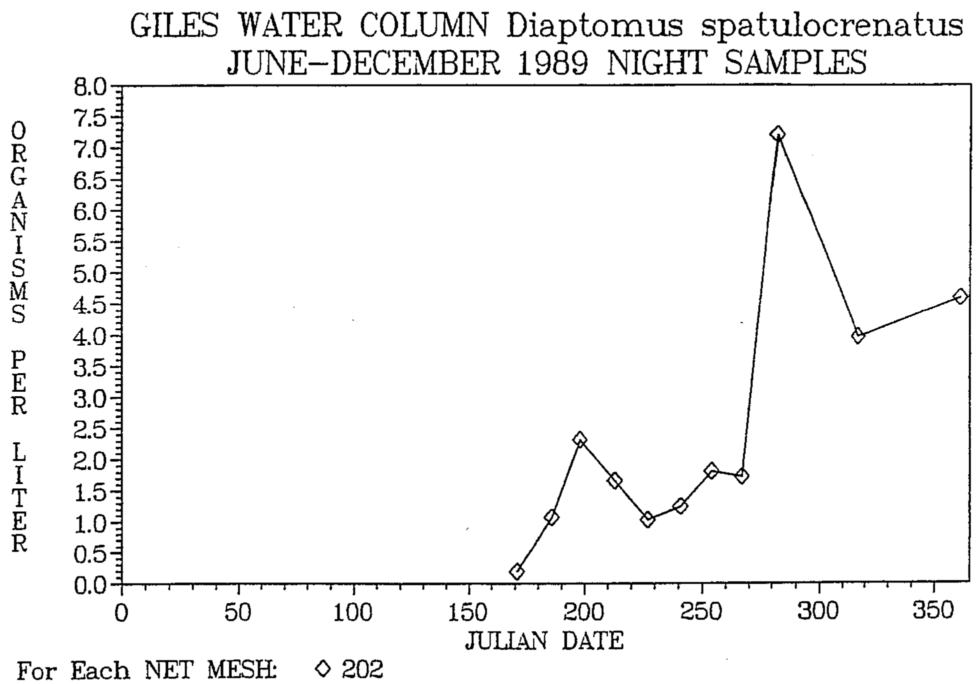
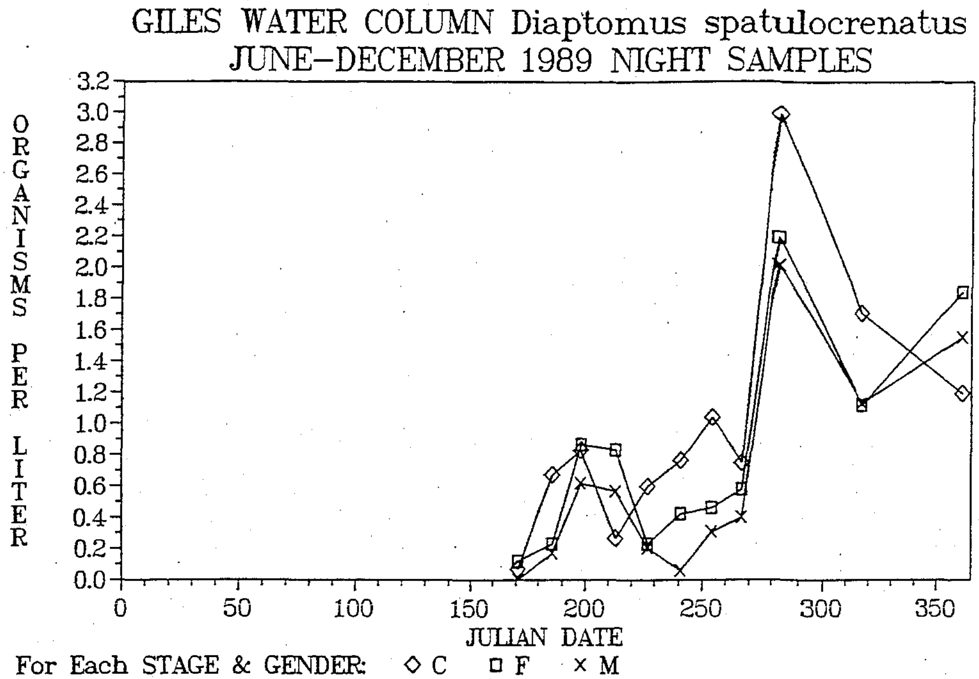



**Figure 23. The calanoid copepod *Diaptomus spatulocrenatus* in Lake Giles, 1989.**

Nighttime net collections (202$\mu$m) from three depths have been combined to give a water column mean.



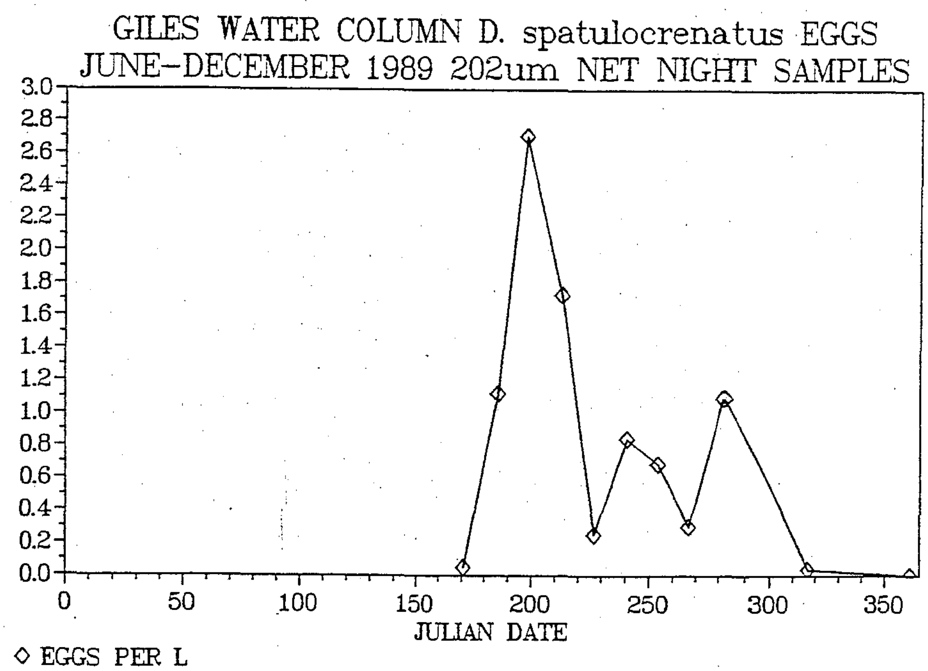
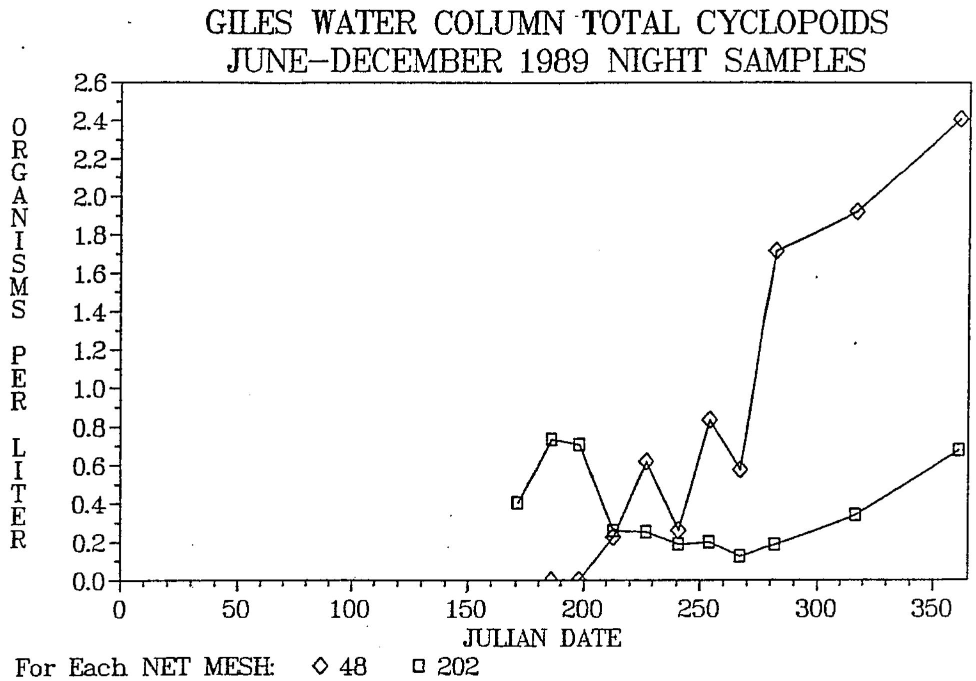




**Figure 24. The calanoid copepod *Diaptomus spatulocrenatus* in Lake Giles, 1989, by stage and gender.**

Nighttime net collections (202$\mu$m) from three depths have been combined to give a water column mean. **(Top)** Adults (males and females separately) and copepodids from the 202$\mu$m net. **(Bottom)** *D. spatulocrenatus* eggs per liter (202$\mu$m).



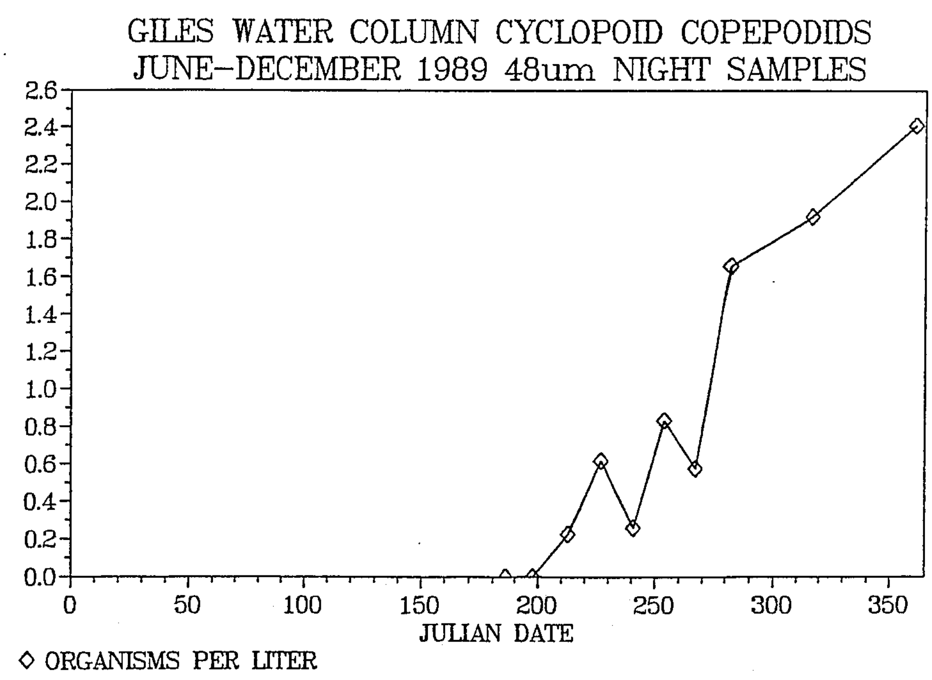




**Figure 25. Cyclopoid copepods in Lake Giles, 1989.**

Nighttime net collections from three depths have been combined to give a water column mean. **(Top)** Total individuals per liter. The 48$\mu$m net collects *Cyclops* and copepodids at a higher efficiency than the 202$\mu$m net. **(Bottom)** Total cyclopoid copepodids per liter (48$\mu$m).

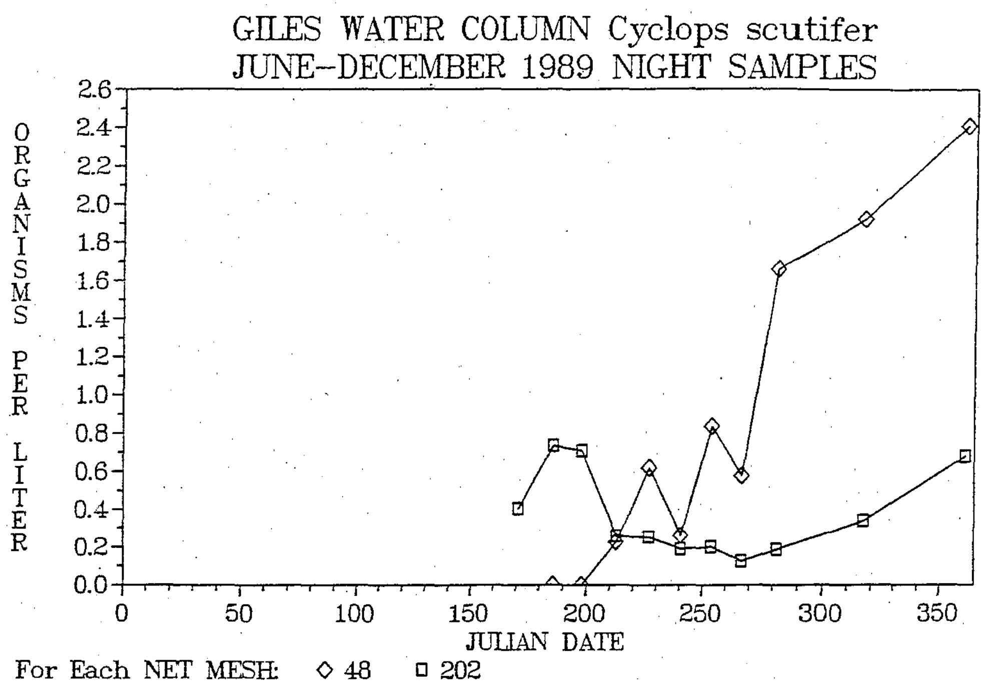
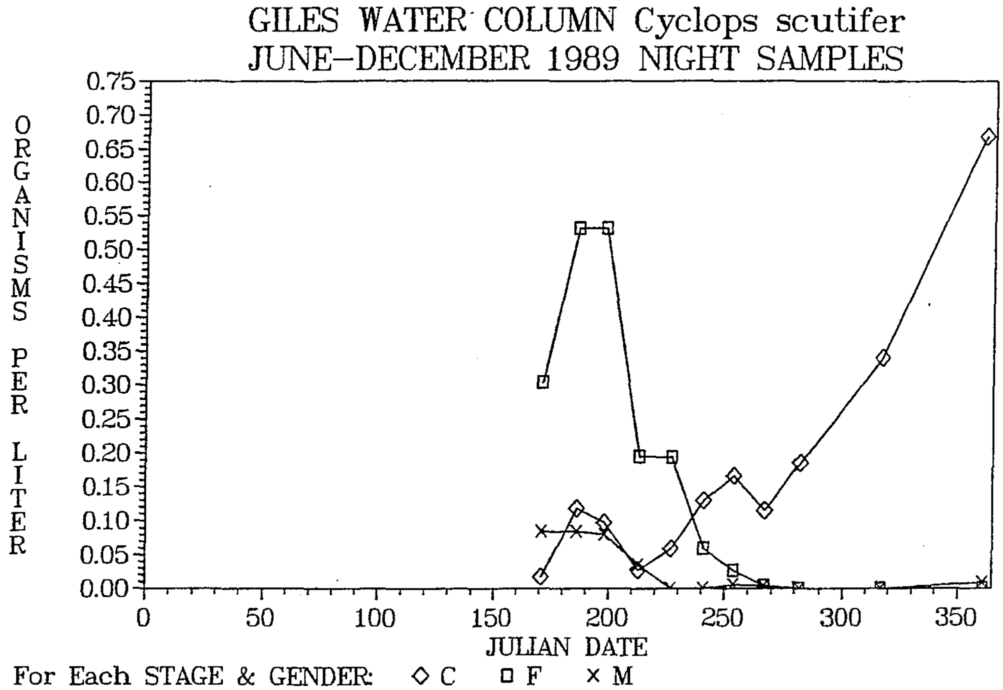



**Figure 26. The cyclopoid copepod *Cyclops scutifer* in Lake Giles, 1989.**

Nighttime net collections from three depths have been combined to give a water column mean. The 48$\mu$m net collects copepodids at a higher efficiency than the 202$\mu$m net.



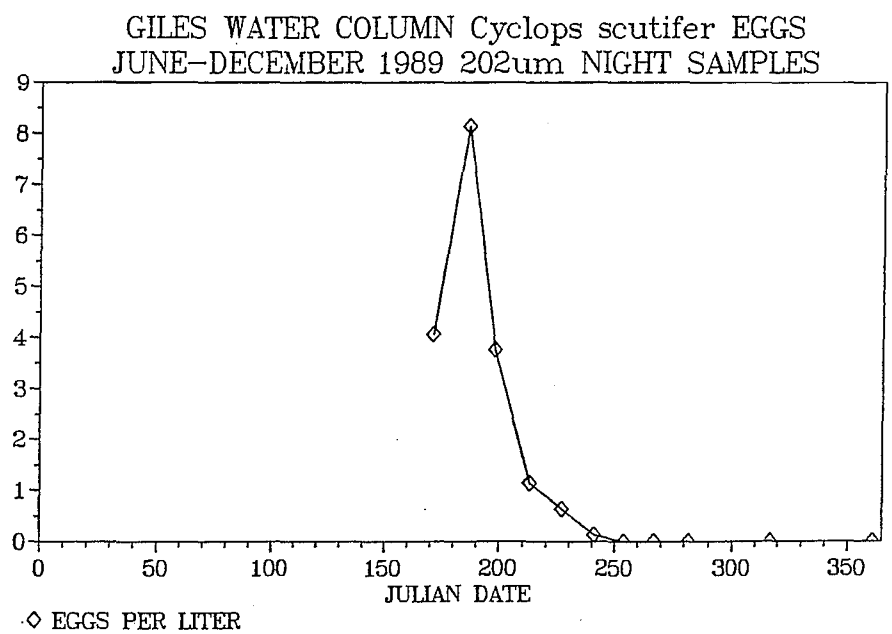




**Figure 27. The cyclopoid copepod *Cyclops scutifer* in Lake Giles, 1989, by stage and gender.**

Nighttime net collections from three depths have been combined to give a water column mean. **(Top)** Adults (males and females separately) and some copepodids from the 202$\mu$m net. **(Bottom)** *C. scutifer* eggs per liter (202 $\mu$m net).

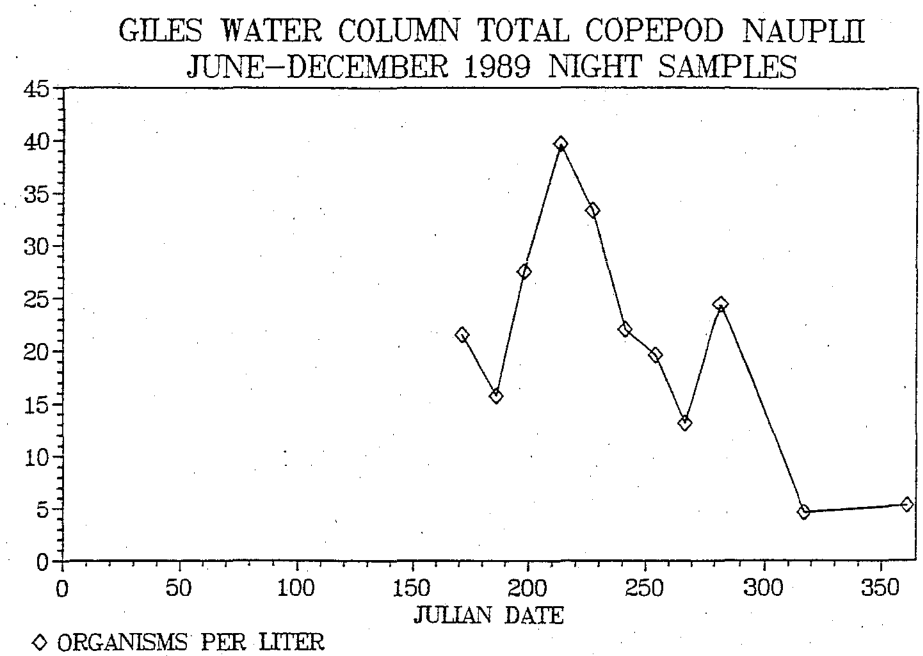



**Figure 28. Total copepod nauplii in Lake Giles, 1989.**

Nighttime net collections (48$\mu$m) from three depths have been combined to give a water column mean. Nauplii of calanoid and cyclopoid species were not differentiated.

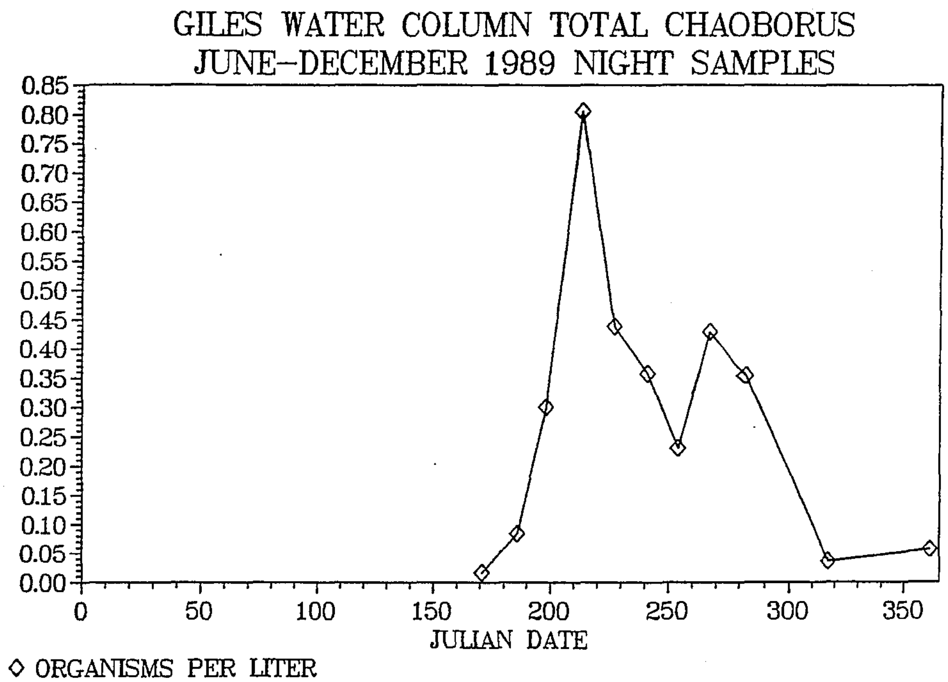



**Figure 29. The dipteran *Chaoborus* spp. in Lake Giles, 1989.**

Nighttime net collections (202$\mu$m) from three depths have been combined to give a water column mean.

## EXPLANATION OF DATA TABLES

The following 12 tables present the physical/chemical information acquired on each date in 1989. The headings, abbreviations, and analytical units are explained here.

**DATE OF SAMPLE:** Date of the daytime visit, as month/day/year.

**JULIAN DATE:** Day of the year, from 1-365.

**TIME:** Approximate mid-time of sampling, 24-hr clock in decimal format (e.g. 1:30 PM is "13.50").

**SECCHI M:** Secchi depth in meters (m).

**WEATHER:** Brief comments on weather, especially cloudiness.

**PERSONNEL:** Initials of sampling crew (see names below).

**TMETHOD:** Temperature method #10 (see **METHODS AND RESULTS**).

**LMETHOD:** Light methods (#9,10,12 see **METHODS AND RESULTS**).

**AMETHOD:** Alkalinity method #10, 11 (see **METHODS AND RESULTS**).

**OMETHOD:** Oxygen method #10 (see **METHODS AND RESULTS**).

**PHMETHOD:** pH method #10 (see **METHODS AND RESULTS**).

**CAMETHOD:** Chlorophyll-a method #11 (see **METHODS AND RESULTS**).

**COMMENTS:** Notes on unusual procedures, also ice thickness.

**DATE OF:** Date of sample (month/day/year).

**JULIAN:** Julian date.

**STRA:** Stratum or layer: **S** (air above surface), **E** (epilimnion), **M**(metalimnion), **H** (hypolimnion).

**REP:** Replicate (1 or 2); Replicates were usually analyzed for pH, alkalinity--other data are merely repeated on rep 2 line for convenience in graphing.

**DEPTH:** Depth of sample (meters); **-1** for air above surface.

**TEMP C:** Temperature in degrees Celsius (°C).

**OXYGEN:** Dissolved oxygen (mg per liter).

**OFLAG:** Error flag for oxygen. "2" means the results were judged to be questionable when examined later, probably because of meter malfunction or incorrect calibration.

**LIGHT PC:** Light as percent of intensity at 0.1-m depth.

**pH:** pH.

**ALKAL:** Alkalinity as microequivalents per liter (μeq/L).

**CHLAC:** Chlorophyll-a, corrected for pheopigments (μg/L).

**CHLASUM:** Chlorophyll-a, including pheopigments (μg/L).

Names of Sampling Personnel:

| | |
|---|---|
| JAA, JA | John Aufderheide |
| AC, ADC | Andy Chapman |
| SC, SRC | Scott Carpenter |
| JF, JMF | Janet Fischer |
| TH, TWH | Timothy Houck |
| SJJ, SJN | Sally Jones |
| DL | Donna Lesch |
| REM | Robert Moeller |
| AMS,MS | Marc Stifelman |
| CEW, CW | Craig Williamson |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 6/06/89 JULIAN DATE: 157 TIME: 9.50

SECCHI M: 16.0 WEATHER: Steady rain, heavy overcast, no wind PERSONNEL: CEW ADC SRC

TMETHOD: 10 LMETHOD: 9 AMETHOD: 11
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS:

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6/06/89 | 157 | S | 1 | 9.50 | -1.0 | 16.3 | | | 269.6000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 0.0 | 19.1 | 8.80 | | 100.0000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 1.0 | 19.3 | 8.80 | | 76.5000 | | | | |
| 6/06/89 | 157 | E | 1 | 9.50 | 2.0 | 19.4 | 9.00 | | 76.7000 | 5.16 | 0 | 0.40 | 0.46 |
| 6/06/89 | 157 | E | 2 | 9.50 | 2.0 | 19.4 | 9.00 | | 76.7000 | 5.16 | 3 | | |
| 6/06/89 | 157 | | 1 | 9.50 | 3.0 | 19.4 | 9.20 | | 67.8000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 4.0 | 17.9 | 9.70 | | 66.8000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 5.0 | 15.3 | 10.80 | | 60.1000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 6.0 | 13.8 | 11.10 | | 54.0000 | | | | |
| 6/06/89 | 157 | M | 1 | 9.50 | 7.0 | 13.0 | 11.10 | | 47.0000 | 5.16 | -4 | 0.40 | 0.50 |
| 6/06/89 | 157 | M | 2 | 9.50 | 7.0 | 13.0 | 11.10 | | 47.0000 | 5.16 | 2 | | |
| 6/06/89 | 157 | | 1 | 9.50 | 8.0 | 12.4 | 11.10 | | 41.2000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 9.0 | 11.6 | 11.00 | | 35.1000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 10.0 | 11.0 | 11.00 | | 29.9000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 11.0 | 10.3 | 11.00 | | 25.4000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 12.0 | 9.5 | 11.30 | | 22.4000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 13.0 | 9.1 | 11.30 | | 19.8000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 14.0 | 8.7 | 11.30 | | 17.0000 | | | | |
| 6/06/89 | 157 | H | 1 | 9.50 | 15.0 | 8.5 | 11.10 | | 13.8000 | 5.26 | -3 | 0.65 | 0.92 |
| 6/06/89 | 157 | H | 2 | 9.50 | 15.0 | 8.5 | 11.10 | | 13.8000 | 5.26 | 0 | | |
| 6/06/89 | 157 | | 1 | 9.50 | 16.0 | 8.3 | 11.00 | | 12.1000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 17.0 | 8.0 | 10.90 | | 10.1000 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 18.0 | 7.9 | 10.70 | | 8.0600 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 19.0 | 7.8 | 10.60 | | 6.1900 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 20.0 | 7.6 | 9.70 | | 4.9900 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 21.0 | 7.5 | 9.40 | | 3.9700 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 22.0 | 7.5 | 9.00 | | 2.7600 | | | | |
| 6/06/89 | 157 | | 1 | 9.50 | 23.0 | | | | | | | | |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 6/20/89 JULIAN DATE: 171 TIME: 10.25

SECCHI M: 14.0 WEATHER: Partly cloudy, strong gusty wind PERSONNEL: SRC JAA AC AMS MS

TMETHOD: 10 LMETHOD: 9 AMETHOD: 11
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS:

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6/20/89 | 171 | S | 1 | 10.25 | -1.0 | 19.8 | | | 111.0000 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 0.0 | 20.2 | 8.80 | | 100.0000 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 1.0 | 20.2 | 8.80 | | 45.3000 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 2.0 | 19.3 | 8.60 | | 37.0000 | | | | |
| 6/20/89 | 171 | E | 1 | 10.25 | 3.0 | 19.0 | 8.50 | | 30.4000 | 5.26 | -0 | 0.18 | 0.24 |
| 6/20/89 | 171 | E | 2 | 10.25 | 3.0 | 19.0 | 8.50 | | 30.4000 | 5.10 | -1 | | |
| 6/20/89 | 171 | | 1 | 10.25 | 4.0 | 18.7 | 8.40 | | 26.5000 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 5.0 | 18.2 | 8.80 | | 21.2000 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 6.0 | 16.6 | 10.20 | | 16.5200 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 7.0 | 14.3 | 10.60 | | 14.4200 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 8.0 | 13.1 | 10.90 | | 13.4300 | | | | |
| 6/20/89 | 171 | M | 1 | 10.25 | 9.0 | 12.4 | 10.90 | | 11.9900 | 5.09 | -1 | 1.35 | 1.67 |
| 6/20/89 | 171 | M | 2 | 10.25 | 9.0 | 12.4 | 10.90 | | 11.9900 | 4.96 | -2 | | |
| 6/20/89 | 171 | | 1 | 10.25 | 10.0 | 11.6 | 11.00 | | 9.6100 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 11.0 | 10.9 | 10.90 | | 7.7900 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 12.0 | 10.1 | 11.50 | | 7.0200 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 13.0 | 9.5 | 11.50 | | 6.1900 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 14.0 | 9.0 | 11.70 | | 5.4100 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 15.0 | 8.7 | 11.30 | | 4.3100 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 16.0 | 8.3 | 11.40 | | 3.5900 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 17.0 | 8.2 | 11.30 | | 3.2000 | | | | |
| 6/20/89 | 171 | H | 1 | 10.25 | 18.0 | 8.0 | 10.90 | | 2.7600 | 5.06 | -2 | 2.03 | 2.67 |
| 6/20/89 | 171 | H | 2 | 10.25 | 18.0 | 8.0 | 10.90 | | 2.7600 | 5.04 | -2 | | |
| 6/20/89 | 171 | | 1 | 10.25 | 19.0 | 7.9 | 10.40 | | 2.2200 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 20.0 | 7.9 | 10.20 | | 1.6900 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 21.0 | 7.8 | 7.40 | | 1.3200 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 22.0 | 7.8 | 7.80 | | 1.2300 | | | | |
| 6/20/89 | 171 | | 1 | 10.25 | 23.0 | | | | | | | | |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 7/05/89 JULIAN DATE: 186 TIME:

SECCHI M: 16.0 WEATHER: Overcast, light rain PERSONNEL: SRC AC JF

TMETHOD: 10 LMETHOD: 9 AMETHOD: 11
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS: Oxygens out of line (low!)

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/05/89 | 186 | S | 1 | | -1.0 | 21.8 | | 2 | | | | | |
| 7/05/89 | 186 | | 1 | | 0.0 | 22.6 | 6.60 | 2 | 100.0000 | | | | |
| 7/05/89 | 186 | | 1 | | 1.0 | 22.6 | 6.46 | 2 | 94.7900 | | | | |
| 7/05/89 | 186 | | 1 | | 2.0 | 22.6 | 6.31 | 2 | 73.7100 | | | | |
| 7/05/89 | 186 | E | 1 | | 3.0 | 22.6 | 6.28 | 2 | 70.6700 | 5.21 | -1 | 0.50 | 0.50 |
| 7/05/89 | 186 | E | 2 | | 3.0 | 22.6 | 6.28 | 2 | 70.6700 | 5.20 | -5 | | |
| 7/05/89 | 186 | | 1 | | 4.0 | 22.4 | 6.30 | 2 | 68.4100 | | | | |
| 7/05/89 | 186 | | 1 | | 5.0 | 21.4 | 6.96 | 2 | 59.4000 | | | | |
| 7/05/89 | 186 | | 1 | | 6.0 | 19.3 | 7.96 | 2 | 50.3800 | | | | |
| 7/05/89 | 186 | | 1 | | 7.0 | 16.8 | 8.68 | 2 | 42.8600 | | | | |
| 7/05/89 | 186 | | 1 | | 8.0 | 14.9 | 8.78 | 2 | 34.3600 | | | | |
| 7/05/89 | 186 | | 1 | | 9.0 | 14.0 | 8.94 | 2 | 29.6200 | | | | |
| 7/05/89 | 186 | M | 1 | | 10.0 | 13.0 | 9.06 | 2 | 25.7100 | 5.31 | 5 | 0.95 | 1.34 |
| 7/05/89 | 186 | M | 2 | | 10.0 | 13.0 | 9.06 | 2 | 25.7100 | 5.77 | 19 | | |
| 7/05/89 | 186 | | 1 | | 11.0 | 11.9 | 9.27 | 2 | 20.6800 | | | | |
| 7/05/89 | 186 | | 1 | | 12.0 | 11.0 | 9.51 | 2 | 17.0700 | | | | |
| 7/05/89 | 186 | | 1 | | 13.0 | 10.3 | 9.62 | 2 | 14.3600 | | | | |
| 7/05/89 | 186 | | 1 | | 14.0 | 9.5 | 9.64 | 2 | 12.0300 | | | | |
| 7/05/89 | 186 | | 1 | | 15.0 | 9.1 | 9.48 | 2 | 9.6200 | | | | |
| 7/05/89 | 186 | | 1 | | 16.0 | 8.8 | 9.46 | 2 | 7.8200 | | | | |
| 7/05/89 | 186 | | 1 | | 17.0 | 8.7 | 9.38 | 2 | 6.3200 | | | | |
| 7/05/89 | 186 | | 1 | | 18.0 | 8.5 | 8.85 | 2 | 4.8900 | | | | |
| 7/05/89 | 186 | H | 1 | | 19.0 | 8.6 | 9.03 | 2 | 3.7600 | 5.42 | 0 | 3.60 | 6.05 |
| 7/05/89 | 186 | H | 2 | | 19.0 | 8.6 | 9.03 | 2 | 3.7600 | 5.36 | -0 | | |
| 7/05/89 | 186 | | 1 | | 20.0 | 8.4 | 8.89 | 2 | 3.0500 | | | | |
| 7/05/89 | 186 | | 1 | | 21.0 | 8.3 | 8.52 | 2 | 2.3800 | | | | |
| 7/05/89 | 186 | | 1 | | 22.0 | 8.3 | 2.15 | 2 | 1.2300 | | | | |
| 7/05/89 | 186 | | 1 | | 23.0 | 8.3 | | | | | | | |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 7/17/89 JULIAN DATE: 198 TIME: 11.75

SECCHI M: 13.5 WEATHER: Windy, cool, cloudy PERSONNEL: CEW SRC AC SJN

TMETHOD: 10 LMETHOD: 10 AMETHOD: 10
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS: Light affected by clouds

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/17/89 | 198 | S | 1 | 11.75 | -1.0 | 18.6 | | | | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 0.0 | 22.0 | 8.34 | | 100.0000 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 1.0 | 22.0 | 8.26 | | 129.5810 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 2.0 | 22.0 | 8.25 | | 60.2180 | | | | |
| 7/17/89 | 198 | E | 1 | 11.75 | 3.0 | 22.0 | 8.20 | | 50.1390 | 5.18 | 0 | 0.91 | 0.91 |
| 7/17/89 | 198 | E | 2 | 11.75 | 3.0 | 22.0 | 8.20 | | 50.1390 | 5.14 | 0 | | |
| 7/17/89 | 198 | | 1 | 11.75 | 4.0 | 22.0 | 8.21 | | 43.0910 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 5.0 | 22.0 | 8.22 | | 36.8980 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 6.0 | 22.0 | 8.15 | | 34.5560 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 7.0 | 19.2 | 10.99 | | 26.5670 | | | | |
| 7/17/89 | 198 | M | 1 | 11.75 | 8.0 | 17.0 | 11.26 | | 21.0280 | 5.22 | 0 | 2.07 | 2.28 |
| 7/17/89 | 198 | M | 2 | 11.75 | 8.0 | 17.0 | 11.26 | | 21.0280 | 5.18 | 0 | | |
| 7/17/89 | 198 | | 1 | 11.75 | 9.0 | 15.4 | 11.54 | | 16.4850 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 10.0 | 13.9 | 11.80 | | 13.6190 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 11.0 | 12.6 | 12.09 | | 11.1270 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 12.0 | 11.5 | 12.26 | | 9.0840 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 13.0 | 10.7 | 12.49 | | 7.5660 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 14.0 | 10.2 | 12.50 | | 6.2620 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 15.0 | 9.8 | 12.41 | | 5.0840 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 16.0 | 9.4 | 12.34 | | 4.2130 | | | | |
| 7/17/89 | 198 | H | 1 | 11.75 | 17.0 | 9.1 | 12.09 | | 4.5650 | 5.40 | 2 | 1.17 | 1.60 |
| 7/17/89 | 198 | H | 2 | 11.75 | 17.0 | 9.1 | 12.09 | | 4.5650 | 5.32 | 2 | | |
| 7/17/89 | 198 | | 1 | 11.75 | 18.0 | 8.6 | 10.87 | | 2.6900 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 19.0 | 8.4 | 9.53 | | 1.9850 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 20.0 | 8.2 | 8.06 | | 1.6870 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 21.0 | 8.2 | 6.27 | | 0.8940 | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 22.0 | 8.1 | 3.30 | | | | | | |
| 7/17/89 | 198 | | 1 | 11.75 | 23.0 | | | | | | | | |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 8/01/89 JULIAN DATE: 213 TIME: 11.25

SECCHI M: 14.0 WEATHER: Overcast PERSONNEL: SRC TWH AC DL

TMETHOD: 10 LMETHOD: 10 AMETHOD: 11
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS: Clouds affect light data

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8/01/89 | 213 | S | 1 | 11.25 | -1.0 | 19.8 | | | | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 0.0 | 22.7 | 8.71 | | 100.0000 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 1.0 | 22.7 | 8.63 | | 65.3300 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 2.0 | 22.7 | 8.56 | | 57.9800 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 3.0 | 22.7 | 8.49 | | 47.8600 | | | | |
| 8/01/89 | 213 | E | 1 | 11.25 | 4.0 | 22.7 | 8.56 | | 46.0400 | 5.20 | -4 | 0.59 | 0.82 |
| 8/01/89 | 213 | E | 2 | 11.25 | 4.0 | 22.7 | 8.56 | | 46.0400 | 5.25 | -4 | | |
| 8/01/89 | 213 | | 1 | 11.25 | 5.0 | 22.7 | 8.45 | | 40.4500 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 6.0 | 22.7 | 8.40 | | 34.7100 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 7.0 | 22.5 | 8.35 | | 33.4300 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 8.0 | 19.8 | 11.55 | | 25.2700 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 9.0 | 16.8 | 11.96 | | 18.3500 | | | | |
| 8/01/89 | 213 | M | 1 | 11.25 | 10.0 | 15.0 | 12.22 | | 14.4700 | 5.34 | 2 | 1.01 | 1.74 |
| 8/01/89 | 213 | M | 2 | 11.25 | 10.0 | 15.0 | 12.22 | | 14.4700 | 5.32 | 2 | | |
| 8/01/89 | 213 | | 1 | 11.25 | 11.0 | 13.4 | 12.58 | | 7.8800 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 12.0 | 12.3 | 12.89 | | 10.0500 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 13.0 | 11.4 | 13.05 | | 8.0800 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 14.0 | 10.7 | 13.09 | | 6.9600 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 15.0 | 10.2 | 13.13 | | 5.5100 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 16.0 | 9.7 | 12.98 | | 4.5900 | | | | |
| 8/01/89 | 213 | H | 1 | 11.25 | 17.0 | 9.3 | 12.53 | | 3.4900 | 5.52 | 1 | 1.64 | 3.10 |
| 8/01/89 | 213 | H | 2 | 11.25 | 17.0 | 9.3 | 12.53 | | 3.4900 | 5.51 | 3 | | |
| 8/01/89 | 213 | | 1 | 11.25 | 18.0 | 8.9 | 11.38 | | 2.5200 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 19.0 | 8.7 | 9.81 | | 1.7300 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 20.0 | 8.5 | 8.25 | | 1.3500 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 21.0 | 8.4 | 7.52 | | 1.0800 | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 22.0 | 8.3 | 0.80 | | | | | | |
| 8/01/89 | 213 | | 1 | 11.25 | 23.0 | | | | | | | | |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 8/15/89 JULIAN DATE: 227 TIME: 11.25

SECCHI M: 12.8 WEATHER: Partly cloudy, slight breeze PERSONNEL: JMF TH SRC

TMETHOD: 10 LMETHOD: 12 AMETHOD: 10
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS:

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8/15/89 | 227 | S | 1 | 11.25 | -1.0 | 26.3 | | | | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 0.0 | 22.8 | 8.35 | | 100.0000 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 1.0 | 22.5 | 8.45 | | 68.8700 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 2.0 | 22.4 | 8.25 | | 49.6200 | | | | |
| 8/15/89 | 227 | E | 1 | 11.25 | 3.0 | 22.4 | 8.33 | | 39.8900 | 5.34 | 0 | 0.13 | 0.25 |
| 8/15/89 | 227 | E | 2 | 11.25 | 3.0 | 22.4 | 8.33 | | 39.8900 | 5.30 | 0 | | |
| 8/15/89 | 227 | | 1 | 11.25 | 4.0 | 22.3 | 8.25 | | 35.8400 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 5.0 | 22.3 | 8.33 | | 27.4000 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 6.0 | 22.3 | 8.33 | | 22.4200 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 7.0 | 22.2 | 8.24 | | 19.5000 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 8.0 | 21.9 | 8.41 | | 15.4100 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 9.0 | 18.5 | 11.47 | | 12.3800 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 10.0 | 16.4 | 11.55 | | 8.9200 | | | | |
| 8/15/89 | 227 | M | 1 | 11.25 | 11.0 | 14.1 | 12.20 | | 7.2800 | 5.40 | 0 | 0.63 | 1.04 |
| 8/15/89 | 227 | M | 2 | 11.25 | 11.0 | 14.1 | 12.20 | | 7.2800 | 5.37 | 0 | | |
| 8/15/89 | 227 | | 1 | 11.25 | 12.0 | 12.8 | 12.62 | | 6.0300 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 13.0 | 11.9 | 12.74 | | 4.4600 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 14.0 | 11.1 | 12.87 | | 3.5900 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 15.0 | 10.3 | 12.64 | | 2.8700 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 16.0 | 9.8 | 12.18 | | 2.0600 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 17.0 | 9.5 | 11.50 | | 1.5200 | | | | |
| 8/15/89 | 227 | H | 1 | 11.25 | 18.0 | 9.1 | 9.98 | | 1.1000 | 5.60 | 24 | 1.00 | 1.89 |
| 8/15/89 | 227 | H | 2 | 11.25 | 18.0 | 9.1 | 9.98 | | 1.1000 | 5.60 | 12 | | |
| 8/15/89 | 227 | | 1 | 11.25 | 19.0 | 8.8 | 8.80 | | 0.8100 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 20.0 | 8.6 | 6.69 | | 0.5900 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 21.0 | 8.5 | 5.27 | | 0.4400 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 22.0 | 8.4 | 2.50 | | 0.2800 | | | | |
| 8/15/89 | 227 | | 1 | 11.25 | 23.0 | | | | | | | | |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 8/29/89 JULIAN DATE: 241 TIME: 10.75

SECCHI M: 11.7 WEATHER: Overcast, light rain PERSONNEL: TWH REM SJJ

TMETHOD: 10 LMETHOD: 10 AMETHOD: 10
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS:

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8/29/89 | 241 | S | 1 | 10.75 | -1.0 | 21.6 | | | | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 0.0 | 22.3 | 8.54 | | 100.0000 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 1.0 | 22.4 | 8.47 | | 50.5800 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 2.0 | 22.4 | 8.43 | | 48.4200 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 3.0 | 22.4 | 8.45 | | 45.7700 | | | | |
| 8/29/89 | 241 | E | 1 | 10.75 | 4.0 | 22.4 | 8.40 | | 40.8900 | 5.38 | 0 | 0.49 | 0.70 |
| 8/29/89 | 241 | E | 2 | 10.75 | 4.0 | 22.4 | 8.40 | | 40.8900 | 5.34 | 0 | | |
| 8/29/89 | 241 | | 1 | 10.75 | 5.0 | 22.4 | 8.36 | | 35.9500 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 6.0 | 22.3 | 8.38 | | 30.2500 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 7.0 | 22.3 | 8.30 | | 25.0800 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 8.0 | 22.1 | 8.35 | | 20.6000 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 9.0 | 21.4 | 9.47 | | 16.3400 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 10.0 | 17.9 | 11.80 | | 12.2000 | | | | |
| 8/29/89 | 241 | M | 1 | 10.75 | 11.0 | 15.2 | 12.19 | | 9.2700 | 5.40 | 0 | 1.72 | 2.44 |
| 8/29/89 | 241 | M | 2 | 10.75 | 11.0 | 15.2 | 12.19 | | 9.2700 | 5.51 | 0 | | |
| 8/29/89 | 241 | | 1 | 10.75 | 12.0 | 13.9 | 12.38 | | 7.3800 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 13.0 | 12.5 | 12.60 | | 5.9400 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 14.0 | 11.6 | 12.58 | | 4.7300 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 15.0 | 10.8 | 12.30 | | 3.6300 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 16.0 | 10.2 | 12.10 | | 2.8300 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 17.0 | 9.7 | 10.85 | | 2.1400 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 18.0 | 9.4 | 9.41 | | 1.5700 | | | | |
| 8/29/89 | 241 | H | 1 | 10.75 | 19.0 | 9.0 | 7.63 | | 1.1600 | 5.49 | 13 | 1.13 | 1.93 |
| 8/29/89 | 241 | H | 2 | 10.75 | 19.0 | 9.0 | 7.63 | | 1.1600 | 5.49 | 13 | | |
| 8/29/89 | 241 | | 1 | 10.75 | 20.0 | 8.8 | 5.73 | | 0.8300 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 21.0 | 8.6 | 4.63 | | 0.5700 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 22.0 | 8.6 | 3.93 | | 0.3600 | | | | |
| 8/29/89 | 241 | | 1 | 10.75 | 23.0 | | | | | | | | |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 9/11/89 JULIAN DATE: 254 TIME: 9.25

SECCHI M: 13.0 WEATHER: Hazy PERSONNEL: JAA SRC SJN

TMETHOD: 10 LMETHOD: 12 AMETHOD: 11
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS:

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9/11/89 | 254 | S | 1 | 9.25 | -1.0 | 23.3 | | | | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 0.0 | 23.3 | 8.51 | | 100.0000 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 1.0 | 23.3 | 8.46 | | 72.1500 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 2.0 | 22.6 | 8.58 | | 57.9500 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 3.0 | 22.2 | 8.59 | | 46.9300 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 4.0 | 22.1 | 8.57 | | 37.2100 | | | | |
| 9/11/89 | 254 | E | 1 | 9.25 | 5.0 | 22.0 | 8.57 | | 30.4500 | 5.26 | -5 | 0.68 | 0.81 |
| 9/11/89 | 254 | E | 2 | 9.25 | 5.0 | 22.0 | 8.57 | | 30.4500 | 5.25 | -4 | | |
| 9/11/89 | 254 | | 1 | 9.25 | 6.0 | 21.8 | 8.79 | | 25.3800 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 7.0 | 21.6 | 8.85 | | 19.8000 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 8.0 | 21.5 | 8.96 | | 15.5400 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 9.0 | 21.4 | 9.05 | | 12.0800 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 10.0 | 19.8 | 11.04 | | 8.9200 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 11.0 | 17.1 | 12.13 | | 6.8500 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 12.0 | 14.7 | 12.34 | | 5.1200 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 13.0 | 13.6 | 12.47 | | 4.0200 | | | | |
| 9/11/89 | 254 | M | 1 | 9.25 | 14.0 | 12.7 | 12.50 | | 3.1100 | 5.44 | 0 | 2.78 | 3.12 |
| 9/11/89 | 254 | M | 2 | 9.25 | 14.0 | 12.7 | 12.50 | | 3.1100 | 5.42 | -1 | | |
| 9/11/89 | 254 | | 1 | 9.25 | 15.0 | 11.9 | 11.82 | | 2.4300 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 16.0 | 11.0 | 11.50 | | 1.8500 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 17.0 | 10.5 | 10.50 | | 1.4000 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 18.0 | 10.0 | 7.64 | | 1.0400 | | | | |
| 9/11/89 | 254 | H | 1 | 9.25 | 19.0 | 9.6 | 5.26 | | 0.7100 | 5.43 | 18 | 1.13 | 2.43 |
| 9/11/89 | 254 | H | 2 | 9.25 | 19.0 | 9.6 | 5.26 | | 0.7100 | 5.42 | 16 | | |
| 9/11/89 | 254 | | 1 | 9.25 | 20.0 | 9.3 | 4.36 | | 0.4900 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 21.0 | 9.1 | 2.96 | | 0.2300 | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 22.0 | 9.0 | 2.16 | | | | | | |
| 9/11/89 | 254 | | 1 | 9.25 | 23.0 | | | | | | | | |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 9/25/89 JULIAN DATE: 268 TIME: 10.75

SECCHI M: 12.6 WEATHER: Clear, breezy PERSONNEL: JAA SRC SJN

TMETHOD: 10 LMETHOD: 12 AMETHOD: 11
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS: Temp. & Oxygen reading were taken at night

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9/25/89 | 268 | S | 1 | 10.75 | -1.0 | 7.9 | | | | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 0.0 | 18.8 | 7.76 | | 100.0000 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 1.0 | 19.0 | 7.72 | | 74.3500 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 2.0 | 19.0 | 7.76 | | 58.5800 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 3.0 | 19.0 | 7.75 | | 46.0200 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 4.0 | 19.0 | 7.74 | | 34.6100 | | | | |
| 9/25/89 | 268 | E | 1 | 10.75 | 5.0 | 19.0 | 7.68 | | 26.0400 | 5.32 | -5 | 2.54 | 2.82 |
| 9/25/89 | 268 | E | 2 | 10.75 | 5.0 | 19.0 | 7.68 | | 26.0400 | 5.36 | -3 | | |
| 9/25/89 | 268 | | 1 | 10.75 | 6.0 | 19.0 | 7.66 | | 20.5500 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 7.0 | 19.0 | 7.63 | | 15.6600 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 8.0 | 19.0 | 7.69 | | 12.1900 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 9.0 | 19.0 | 7.66 | | 9.6700 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 10.0 | 19.0 | 7.62 | | 7.4600 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 11.0 | 18.7 | 7.69 | | 5.5800 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 12.0 | 14.3 | 10.16 | | 4.1600 | | | | |
| 9/25/89 | 268 | M | 1 | 10.75 | 13.0 | 13.2 | 10.32 | | 3.1700 | 5.33 | -3 | 2.67 | 3.03 |
| 9/25/89 | 268 | M | 2 | 10.75 | 13.0 | 13.2 | 10.32 | | 3.1700 | 5.29 | -2 | | |
| 9/25/89 | 268 | | 1 | 10.75 | 14.0 | 12.0 | 10.69 | | 2.3700 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 15.0 | 11.3 | 10.21 | | 1.8200 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 16.0 | 10.4 | 9.58 | | 1.3900 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 17.0 | 10.0 | 8.88 | | 1.0100 | | | | |
| 9/25/89 | 268 | H | 1 | 10.75 | 18.0 | 9.6 | 8.08 | | 0.7100 | 5.48 | 14 | 0.42 | 1.05 |
| 9/25/89 | 268 | H | 2 | 10.75 | 18.0 | 9.6 | 8.08 | | 0.7100 | 5.49 | 13 | | |
| 9/25/89 | 268 | | 1 | 10.75 | 19.0 | 9.3 | 5.08 | | 0.4600 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 20.0 | 9.0 | 3.70 | | 0.3200 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 21.0 | 8.7 | 2.56 | | 0.0900 | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 22.0 | 8.6 | 0.97 | | | | | | |
| 9/25/89 | 268 | | 1 | 10.75 | 23.0 | 8.7 | | | | | | | |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 10/09/89 JULIAN DATE: 282 TIME: 9.00

SECCHI M: 12.5 WEATHER: Cool, cloudy, rain PERSONNEL: SRC SJN

TMETHOD: 10 LMETHOD: 12 AMETHOD: 11
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS:

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/09/89 | 282 | S | 1 | 9.00 | -1.0 | 11.7 | | | | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 0.0 | 15.2 | 9.09 | | 100.0000 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 1.0 | 15.2 | 9.03 | | 57.7700 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 2.0 | 15.2 | 9.09 | | 45.8100 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 3.0 | 15.2 | 9.18 | | 36.6500 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 4.0 | 15.2 | 9.18 | | 29.3700 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 5.0 | 15.2 | 9.17 | | 23.0500 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 6.0 | 15.2 | 9.15 | | 16.9100 | | | | |
| 10/09/89 | 282 | E | 1 | 9.00 | 7.0 | 15.2 | 9.14 | | 12.1100 | 5.36 | -2 | 0.99 | 1.46 |
| 10/09/89 | 282 | E | 2 | 9.00 | 7.0 | 15.2 | 9.14 | | 12.1100 | 5.23 | -4 | | |
| 10/09/89 | 282 | | 1 | 9.00 | 8.0 | 15.2 | 9.10 | | 8.8600 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 9.0 | 15.2 | 9.02 | | 6.2810 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 10.0 | 15.2 | 9.05 | | 5.1740 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 11.0 | 15.2 | 9.05 | | 4.3400 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 12.0 | 15.2 | 9.06 | | 3.1910 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 13.0 | 15.2 | 9.09 | | 2.6890 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 14.0 | 15.2 | 9.09 | | 2.0180 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 15.0 | 14.3 | 9.52 | | 1.5120 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 16.0 | 11.6 | 8.75 | | 1.0790 | | | | |
| 10/09/89 | 282 | M | 1 | 9.00 | 17.0 | 10.0 | 7.00 | | 0.6880 | 5.52 | 19 | 0.41 | 2.02 |
| 10/09/89 | 282 | M | 2 | 9.00 | 17.0 | 10.0 | 7.00 | | 0.6880 | 5.56 | 20 | | |
| 10/09/89 | 282 | | 1 | 9.00 | 18.0 | 10.0 | 5.63 | | 0.4000 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 19.0 | 9.2 | 3.88 | | 0.2690 | | | | |
| 10/09/89 | 282 | H | 1 | 9.00 | 20.0 | 8.9 | 2.70 | | 0.1790 | 5.53 | 29 | 0.30 | 1.83 |
| 10/09/89 | 282 | H | 2 | 9.00 | 20.0 | 8.9 | 2.70 | | 0.1790 | 5.52 | 29 | | |
| 10/09/89 | 282 | | 1 | 9.00 | 21.0 | 8.8 | 1.64 | | 0.0920 | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 22.0 | 8.7 | | | | | | | |
| 10/09/89 | 282 | | 1 | 9.00 | 23.0 | | | | | | | | |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 11/12/89 JULIAN DATE: 316 TIME: 10.55

SECCHI M: 9.0 WEATHER: No notes on weather PERSONNEL: SC JA SJN

TMETHOD: 10 LMETHOD: 12 AMETHOD: 11
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS:

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/12/89 | 316 | S | 1 | 10.55 | -1.0 | 6.1 | | | | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 0.0 | 10.2 | 9.66 | | 100.0000 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 1.0 | 10.3 | 9.51 | | 62.2700 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 2.0 | 10.3 | 9.35 | | 45.0900 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 3.0 | 10.3 | 9.24 | | 27.1500 | | | | |
| 11/12/89 | 316 | E | 1 | 10.55 | 4.0 | 10.4 | 9.24 | | 18.3900 | 5.30 | -2 | 0.94 | 1.42 |
| 11/12/89 | 316 | E | 2 | 10.55 | 4.0 | 10.4 | 9.24 | | 18.3900 | 5.15 | -1 | | |
| 11/12/89 | 316 | | 1 | 10.55 | 5.0 | 10.4 | 9.20 | | 13.0600 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 6.0 | 10.4 | 9.06 | | 8.7100 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 7.0 | 10.4 | 9.08 | | 6.4700 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 8.0 | 10.4 | 9.05 | | 4.5800 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 9.0 | 10.4 | 8.98 | | 3.3400 | | | | |
| 11/12/89 | 316 | M | 1 | 10.55 | 10.0 | 10.4 | 8.95 | | 2.4700 | 5.18 | -1 | 0.81 | 1.25 |
| 11/12/89 | 316 | M | 2 | 10.55 | 10.0 | 10.4 | 8.95 | | 2.4700 | 5.16 | -2 | | |
| 11/12/89 | 316 | | 1 | 10.55 | 11.0 | 10.4 | 8.95 | | 1.7300 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 12.0 | 10.4 | 8.94 | | 1.3000 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 13.0 | 10.3 | 8.92 | | 0.9800 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 14.0 | 10.3 | 8.89 | | 0.7200 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 15.0 | 10.3 | 8.89 | | 0.5300 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 16.0 | 10.3 | 8.79 | | 0.3900 | | | | |
| 11/12/89 | 316 | H | 1 | 10.55 | 17.0 | 10.3 | 8.68 | | 0.2800 | 5.26 | 3 | 0.68 | 1.19 |
| 11/12/89 | 316 | H | 2 | 10.55 | 17.0 | 10.3 | 8.68 | | 0.2800 | 5.18 | 3 | | |
| 11/12/89 | 316 | | 1 | 10.55 | 18.0 | 10.3 | 8.37 | | 0.2200 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 19.0 | 10.3 | 8.26 | | 0.1600 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 20.0 | 10.3 | 7.93 | | 0.1200 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 21.0 | 10.2 | 7.48 | | 0.0900 | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 22.0 | 9.2 | | | | | | | |
| 11/12/89 | 316 | | 1 | 10.55 | 23.0 | | | | | | | | |

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 12/27/89 JULIAN DATE: 361 TIME: 10.75

SECCHI M: 5.0 WEATHER: Sunny, clear, cold PERSONNEL: SRC SJJ

TMETHOD: 10 LMETHOD: 12 AMETHOD: 11
OMETHOD: 10 PHMETHOD: 10 CAMETHOD: 11

COMMENTS: Approx. 10" ice cover

| DATE OF | JULIAN | STRA | REP | TIME | DEPTH | TEMP C | OXYGEN | OFLAG | LIGHT PC | PH | ALKAL | CHLAC U | CHLASUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/27/89 | 361 | S | 1 | 10.75 | -1.0 | | | | | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 0.0 | 1.5 | 12.90 | | 100.0000 | | | | |
| 12/27/89 | 361 | E | 1 | 10.75 | 1.0 | 1.5 | 12.60 | | 73.2100 | 5.70 | 2 | 2.25 | 2.69 |
| 12/27/89 | 361 | E | 2 | 10.75 | 1.0 | 1.5 | 12.60 | | 73.2100 | 5.37 | 1 | | |
| 12/27/89 | 361 | | 1 | 10.75 | 2.0 | 1.5 | 12.10 | | 53.2400 | | | | |
| 12/27/89 | 361 | M | 1 | 10.75 | 3.0 | 1.5 | 11.50 | | 38.9800 | 5.17 | -2 | 3.27 | 3.92 |
| 12/27/89 | 361 | M | 2 | 10.75 | 3.0 | 1.5 | 11.50 | | 38.9800 | 5.14 | -2 | | |
| 12/27/89 | 361 | | 1 | 10.75 | 4.0 | 1.5 | 11.10 | | 27.2400 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 5.0 | 1.5 | 10.40 | | 19.3900 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 6.0 | 1.5 | 10.20 | | 14.1900 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 7.0 | 1.5 | 10.20 | | 10.1700 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 8.0 | 1.5 | 10.00 | | 7.1800 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 9.0 | 3.5 | 10.00 | | 5.1900 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 10.0 | 4.0 | 10.00 | | 4.1100 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 11.0 | 4.0 | 10.00 | | 3.2900 | | | | |
| 12/27/89 | 361 | H | 1 | 10.75 | 12.0 | 4.0 | 10.00 | | 2.5200 | 5.06 | 4 | 1.44 | 2.17 |
| 12/27/89 | 361 | H | 2 | 10.75 | 12.0 | 4.0 | 10.00 | | 2.5200 | 4.97 | 6 | | |
| 12/27/89 | 361 | | 1 | 10.75 | 13.0 | 4.0 | 10.00 | | 2.0300 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 14.0 | 4.0 | 10.00 | | 1.6000 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 15.0 | 4.0 | 10.00 | | 1.2700 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 16.0 | 4.0 | 9.80 | | 1.0000 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 17.0 | 4.0 | 9.80 | | 0.8100 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 18.0 | 4.0 | 9.80 | | 0.6600 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 19.0 | 4.0 | 9.80 | | 0.6600 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 20.0 | 4.0 | 9.80 | | 0.4000 | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 21.0 | 4.0 | 9.80 | | | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 22.0 | 4.0 | 9.80 | | | | | | |
| 12/27/89 | 361 | | 1 | 10.75 | 23.0 | | | | | | | | |