LAKE GILES

REPORT ON LIMNOLOGICAL CONDITIONS IN 1990

Robert E. Moeller
Craig E. Williamson

POCONO COMPARATIVE LAKES PROGRAM

Lehigh University

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Bethlehem, Pennsylvania 18015

18 May 1991

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Moeller, R. E. and C. E. Williamson. 1991. Lake Giles: Report on Limnological Conditions in 1990. Unpublished Report to the Blooming Grove Hunting and Fishing Club. Biology Department, Lehigh University, 18 May 1991.

INTRODUCTION

Personnel from Lehigh University visited Lake Giles on 16 dates throughout 1990 as part of a routine monitoring program of three lakes. These lakes were selected to span a trophic gradient, Lake Giles occupying the unproductive ("oligotrophic") end of the gradient. Similar reports will be submitted to the owners of Lake Waynewood, a nutrient-rich ("eutrophic") lake potentially affected by homes and agricultural practices within its drainage basin, and Lake Lacawac, a well protected lake of intermediate productivity ("mesotrophic"). Because 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.

1990 was the third consecutive year of the monitoring program, and the third year for summer sampling. This is the first year that winter and spring data were obtained, however. The present report summarizes conditions in Lake Giles over the full twelve-month period for 1990. Physical/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**. Samples for **TOTAL PHOSPHORUS** were obtained during spring turnover and again in midsummer. **ZOOPLANKTON DATA** are presented as graphs that give the concentration (number of individuals per liter) averaged over the entire water column.

The report includes some information that will be acquired only irregularly from the core lakes, not as part of the routine monitoring:

BROAD CHEMICAL CHARACTERIZATION OF THE LAKE --A suite of chemical data from the lake on four dates in 1989, collected by Dr. Jonathan Cole and Dr. Nina Caraco of the Institute of Ecosystem Studies, New York Botanical Garden (Millbrook, NY), funded in part by a grant from the Pocono Comparative Lakes Program.

FISH SURVEY --The results of gill- and trap-netting undertaken in July by Aquatic Resource Consulting (Saylorsburg, PA), directed by Kenneth Ersbak and funded by the Pocono Comparative Lakes Project.

The Lacawac Sanctuary plays a major role in this program as the field laboratory and summer residence for the investigators. We especially appreciate the interest and cheerful assistance of its curator, Sally Jones. We wish to thank the members and management at the Blooming Grove Hunting and Fishing Club, and most particularly Ken Ersbak, for encouraging the inclusion of Lake Giles in this study of regional limnology.

1990 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. Gabriella Grad counted the macrozooplankton from Lake Giles. John Aufderheide identified and counted the microzooplankton. Paul Stutzman and Karen Basehore checked the zooplankton data entries. Vanessa Jones and Robert Moeller analyzed chlorophyll and phosphorus samples. Scott Carpenter and Steve Gould measured pH and alkalinity. Gina Novak entered the physical/chemical data, which Robert Moeller checked and abstracted as tables and graphs.

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 issued later in 1991 as a special report.

Information acquired through the Pocono Comparative Lakes Program is to be shared among scientists desiring to make broad comparative studies or considering research projects in these lakes. Inquiries to examine or use the data are invited. Of course, the primary right to publish extensive extracts from the database, or from this unpublished report to the lake owners, resides with the PCLP cooperating investigators and students who generated the data. As of May, 1991, most of the existing information is accessible through the software program Reflex™ (version 2, Borland International, copyright 1989) running on IBM PC-type microcomputers. Instructional workshops on how to use the database are offered periodically at Lehigh University.

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 night-time 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 80 feet). The thermal stratification existing on any date dictated the depths from which other samples were collected **(Figure 1)**. 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, in degrees Celsius. Accuracy should be within 1 degree. (This is **Method #10.**)

Figure 2a shows the thermal stratification that develops during late spring and summer, then breaks down in the autumn. On day 26 (26 January) the lake was ice-covered, and displayed a "reverse stratification". After ice-out (sometime near 10 March) the water column circulated from top to bottom during "spring turnover" (e.g. day 84--25 March). By day 200 (19 July) the lake had warmed and become strongly stratified, producing an upper warm water layer circulating in contact with the atmosphere (the **EPILIMNION**, 0-8 meters, temperature 21-24°C); an intermediate layer of rapid temperature decrease with depth (the **METALIMNION**, 8-15 meters); and a deep layer of cold water (the **HYPOLIMNION**, 15-23 meters, temperature 7-11°C). In Lake Giles, the metalimnion is thick and grades smoothly into the hypolimnion. The lake's transparency allows appreciable absorptive heating of the deeper part of the water column, creating a broad metalimnion, which can be defined as the zone with temperature change of greater than 1°C per meter (in the other, less transparent PCLP lakes, a criterion of greater than 2°C/m is more useful).

The usual course of thermal stratification is that of slow, gradual thickening of an epilimnion during the summer. By day 257 (14 September) Lake Giles' epilimnion extended to 10 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 full circulation, or "fall turnover", was in progress by day 323 (19 November). The lake continued to cool, down to 4°C, before freezing soon after day 347 (13 December).

The temperature pattern in the lake is controlled by climate, and will differ only slightly from year to year. Two major variables are the durations of winter ice-cover (ca. 10-12 weeks in 1990-91) and the completeness of spring turnover. Spring turnover was complete in 1990 and probably lasted at least 2 weeks. During an especially warm spring, Lake Giles might stratify quickly without a thorough mixing of deep and surficial layers. This might lead to some differences in the biology and chemistry of the summer plankton community, although the effect might be smaller than in lakes where more profundal oxygen is consumed during winter ice cover. **Figure 2b** presents the detailed trends of water temperature at three fixed depths (2,11,21 meters) for comparison with other years.

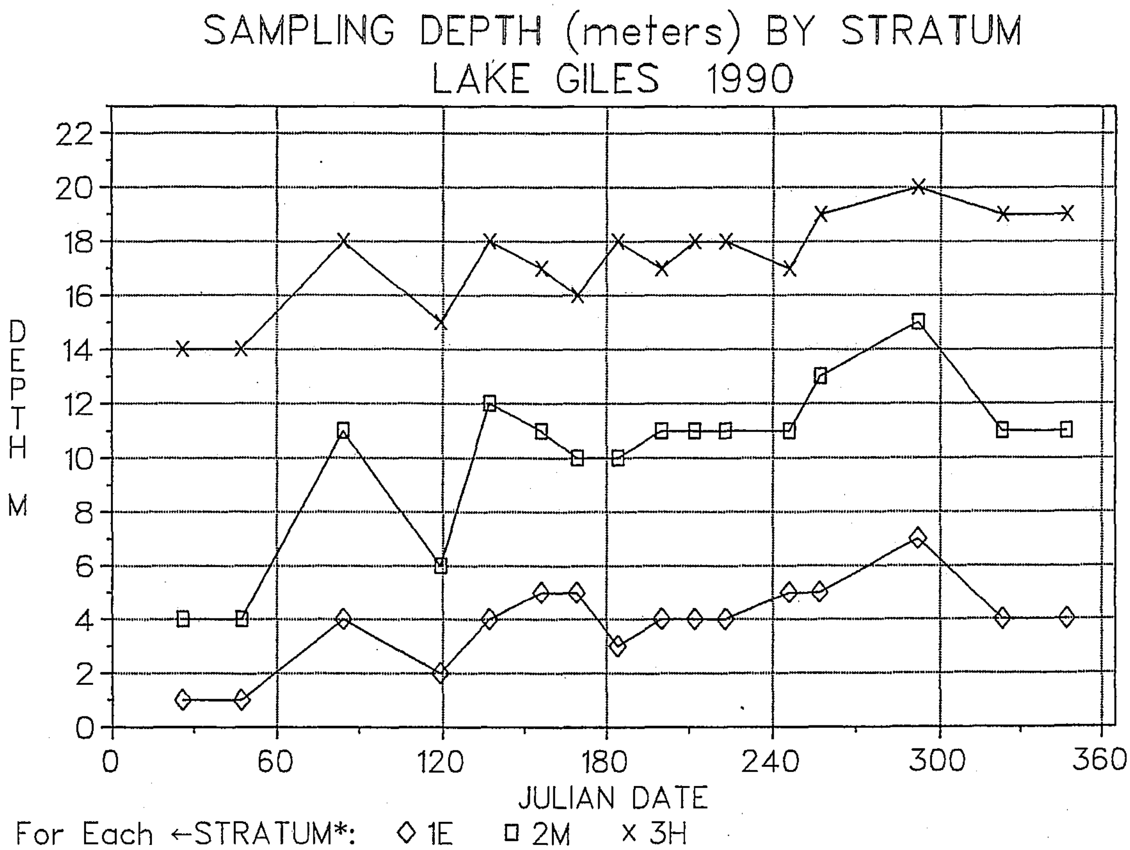


Figure 1. Depths of "EPI", "META", and "HYPO" samples from Lake Giles, 1990.

Sampling depths were selected by the field sampling crew based on the temperature profile on each date (see text for discussion).

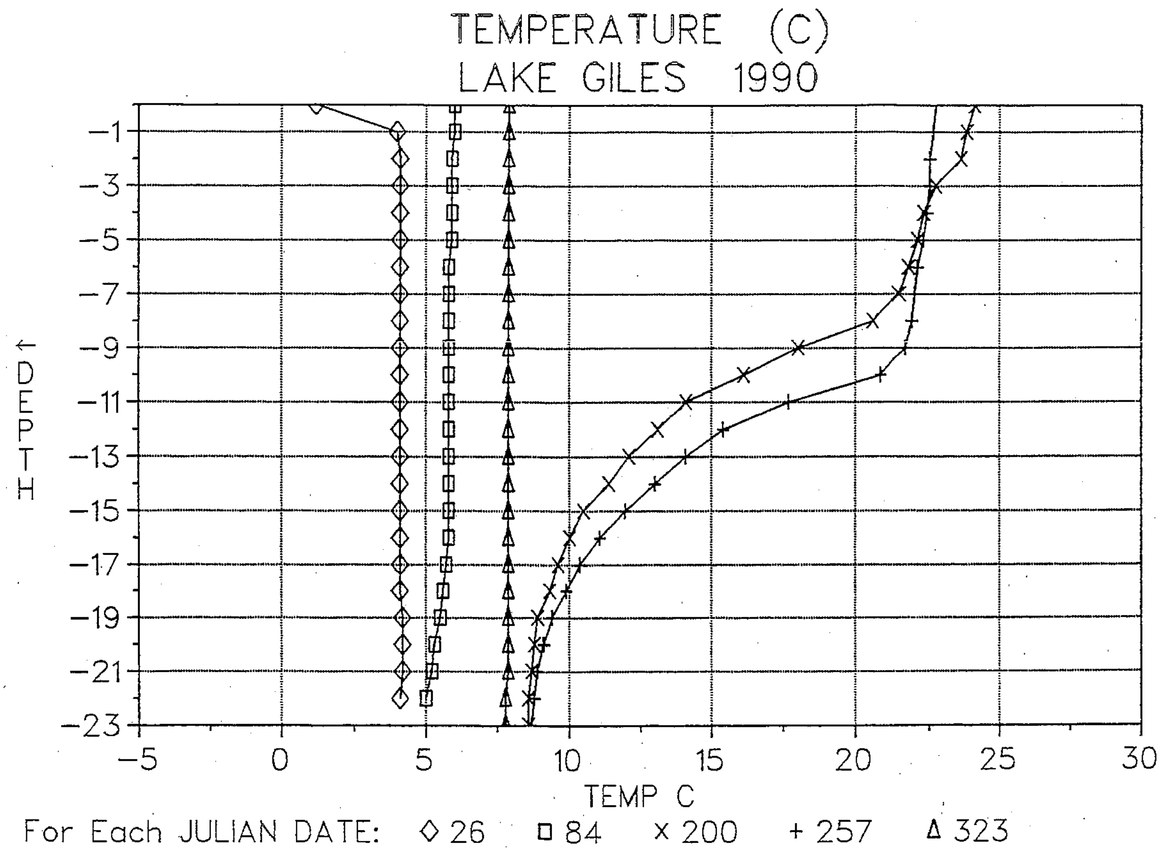


Figure 2a. Temperature profiles in Lake Giles, 1990.

Values (°C) are plotted for five dates: **26 January** (day 26 --winter ice cover), **25 March** (day 84 --spring turnover), **19 July** (day 200 --midsummer stratification), **14 September** (day 257 --late stratification), **19 November** (day 323 --early fall turnover).

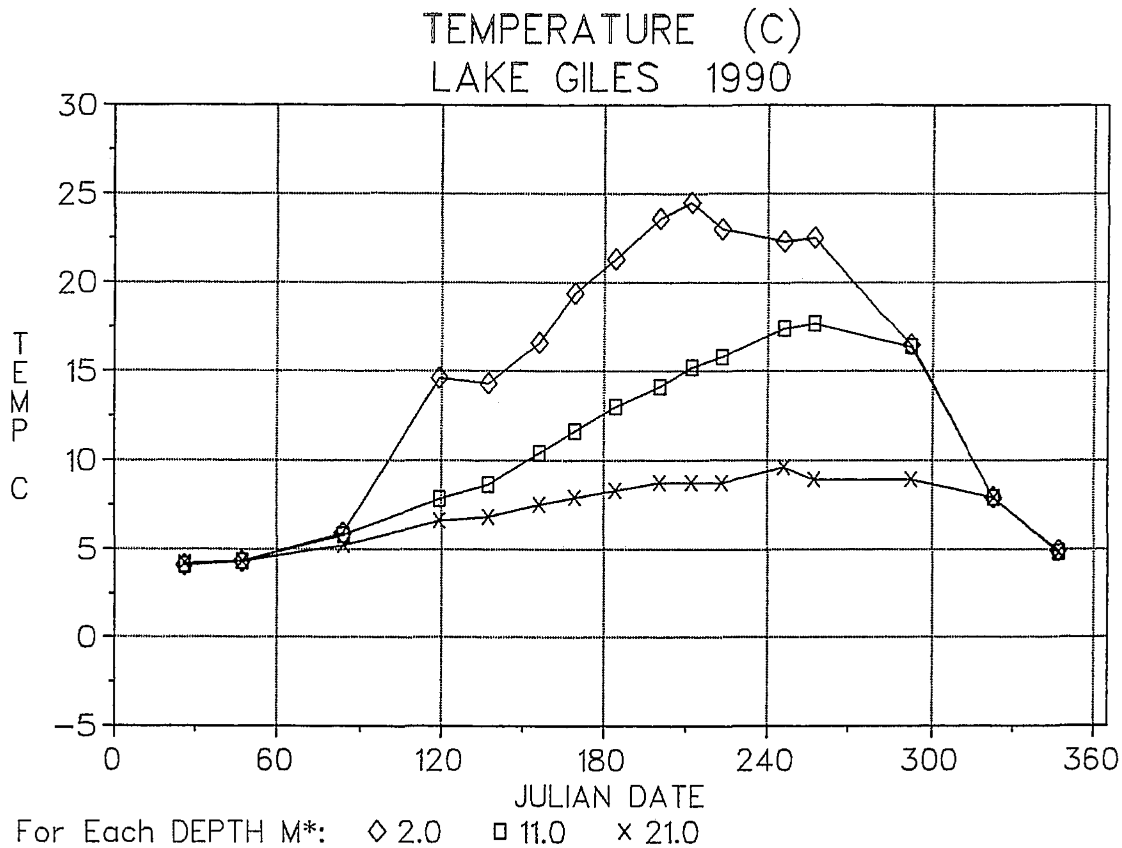


Figure 2b. Temperature trends within Lake Giles, 1990.

Values (°C) are plotted for three fixed depths.

Water samples for **pH**, **alkalinity**, **chlorophyll**, **algae**, and **total phosphorus** were collected from mid-depths of the three layers when thermal stratification was well developed. During turnover periods, the lake was divided into three equal layers. Under ice-cover (e.g. 26 January), 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). Since 1988, three slightly different methods have been used to construct a 0-12 m profile of light penetration; method #12 (numbers correspond to codes from data tables) was used exclusively in 1990:

Method 12. Two sensors, mounted 1-m apart on a common line, electronically computed the ratio of light intensities between the nominal depth and the depth above it. The percentage penetration profile was constructed from these ratios. The sensors are Licor™ submersible flat-plate sensors filtered to give a quantum response to photosynthetically available radiation ("PAR"). Units are microeinsteins per meter square per second (μEin./m^2.sec).

Light penetration is plotted on a logarithmic scale for five dates (**Figure 3**). During the summer, depths above 10 m (i.e. all of the epilimnion) received at least 5-10% of the light penetrating the lake surface. The metalimnion received 1-5% of surface light, enough for moderate rates of algal growth. Enough light reached the deepest waters to allow slow growth of low-light adapted algae. During spring and autumn turnover light penetration was somewhat decreased; in the case of spring turnover, reduced transparency was in part attributable to relatively high algal biomass.

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.

Secchi transparency was typically greater than 10 meters (**Figure 4**). A strong oscillation in the range of 6-16 m occurred during the year, driven apparently by changes in algal biomass (see chlorophyll data in **Figure 8**). Clearest conditions occurred in late spring, shortly following the least clear conditions during spring turnover; as in many other lakes, this change was probably driven by zooplankton grazing.

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 5% too high. Units are mg O_2 per liter. (This is **Method #10.**)

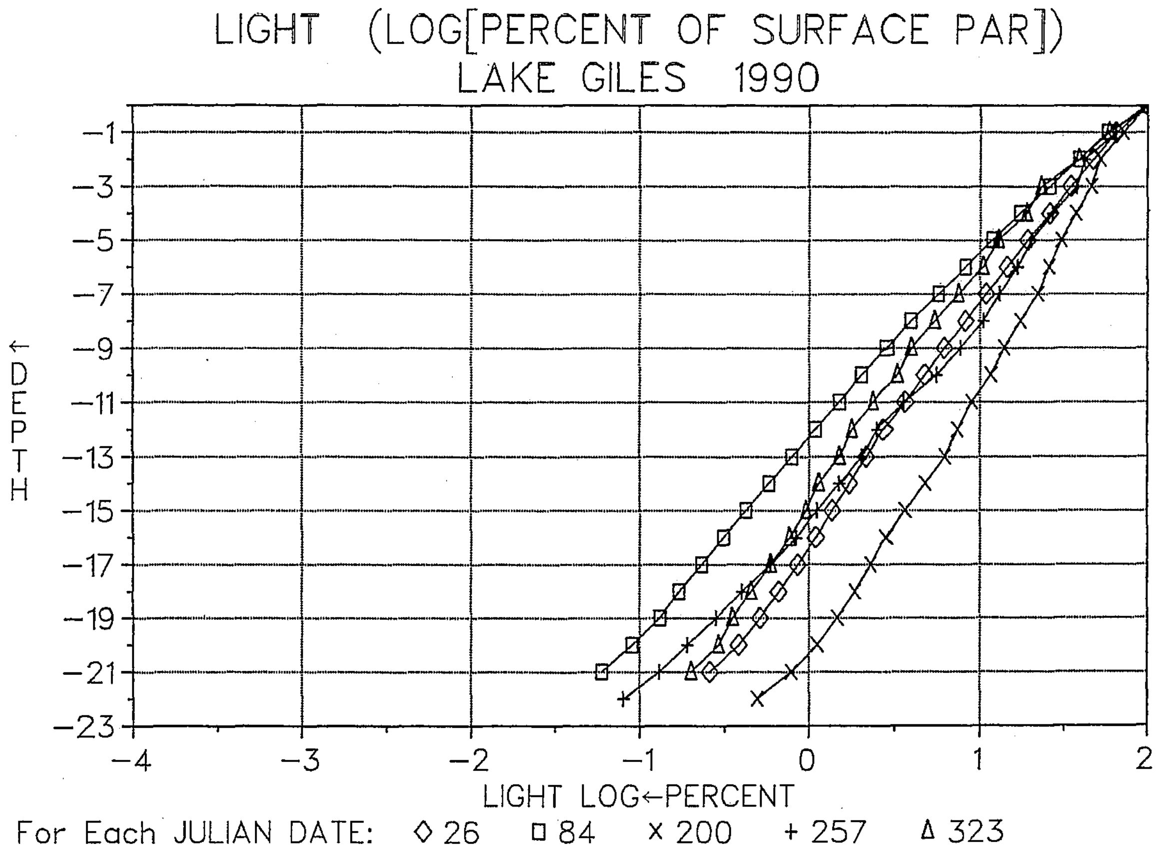


Figure 3. Light penetration in Lake Giles, 1990.

Values 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.) for five dates: **26 January** (day 26 --winter ice cover), **25 March** (day 84 --spring turnover), **19 July** (day 200 --midsummer stratification), **14 September** (day 257 --late stratification), **19 November** (day 323 --early fall turnover).

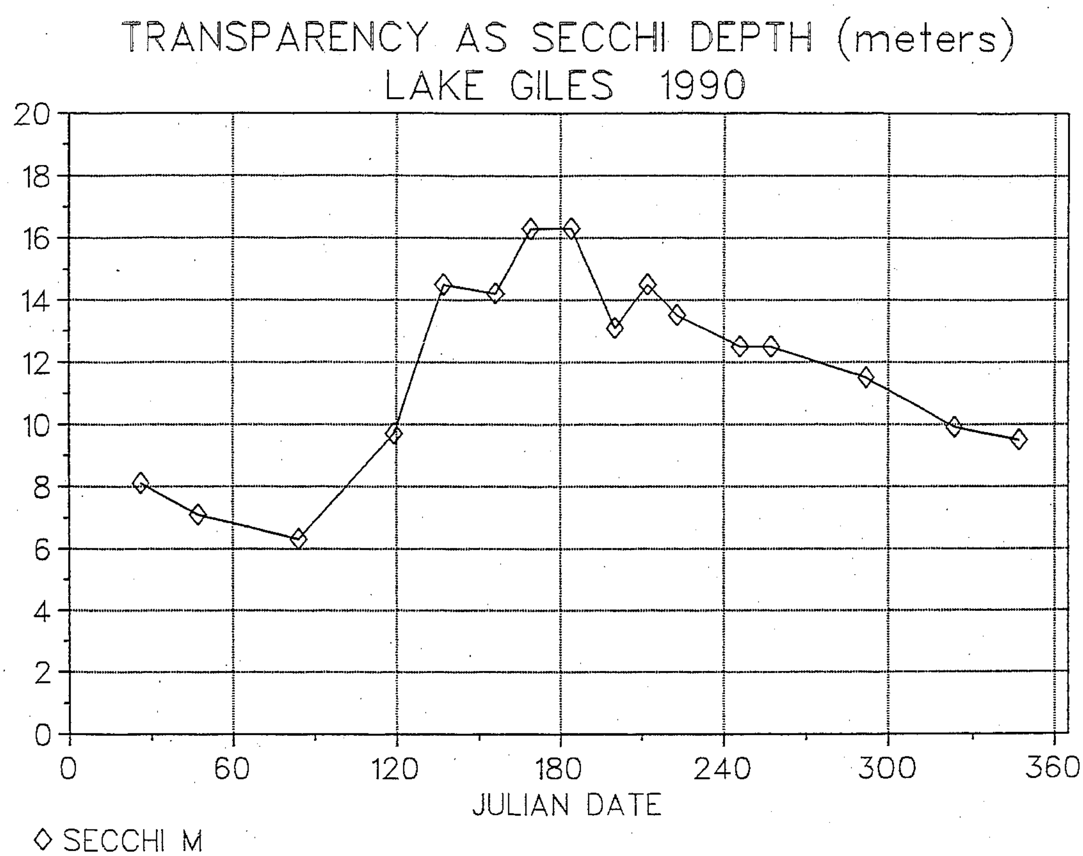


Figure 4. Transparency in Lake Giles, 1990.

Values plotted are the Secchi depths, in meters.

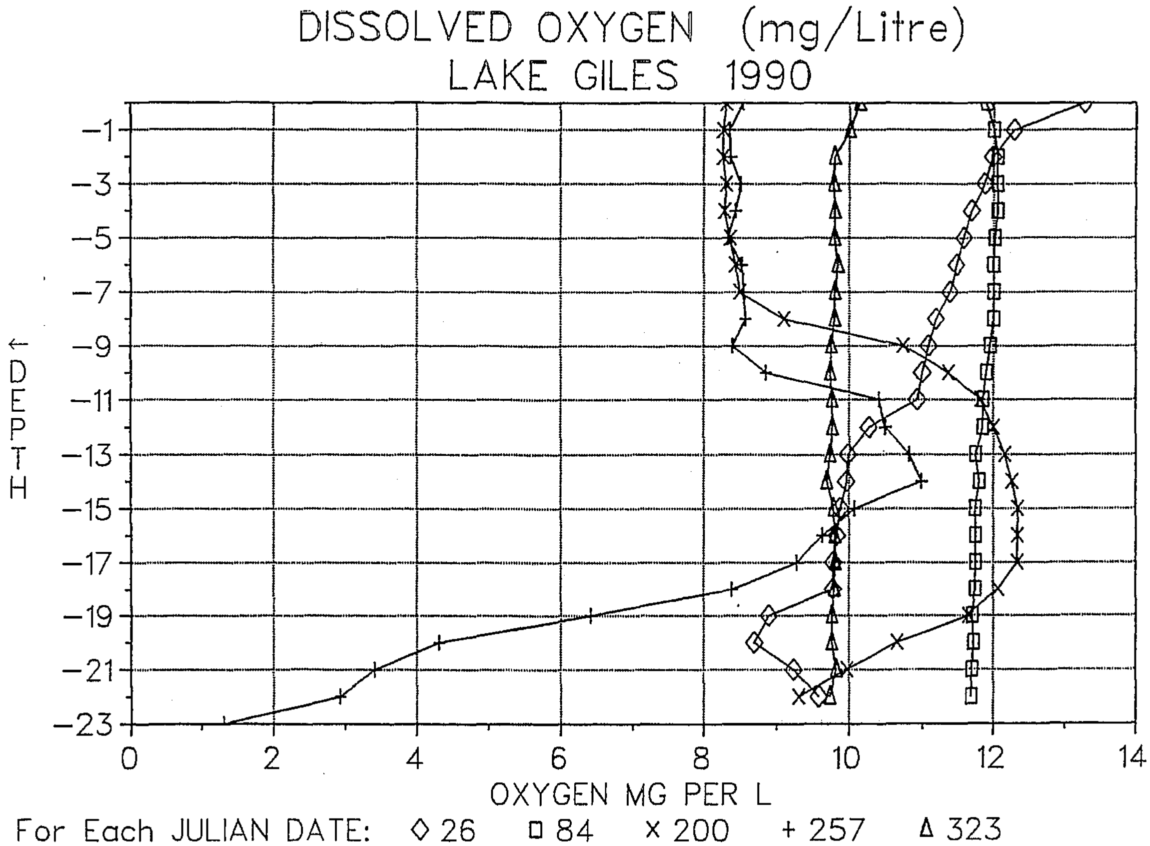


Figure 5. Dissolved oxygen in Lake Giles, 1990.

Values (mg oxygen per liter) are plotted for five dates: **26 January** (day 26 --winter ice cover), **25 March** (day 84 --spring turnover), **19 July** (day 200 --midsummer stratification), **14 September** (day 257 --late stratification), **19 November** (day 323 --early fall turnover).

Under winter ice cover, oxygen was not appreciably depleted. A small dip in the oxygen curve of day 26 at depths of 19-22m may represent oxygen consumption by aquatic mosses and their periphyton. Oxygen concentration was set at atmospheric saturation during spring turnover, when the lake was still cold. During summer stratification, oxygen was slowly consumed within the hypolimnion, and lost from the warming epilimnion via outgassing to the atmosphere. These processes created the metalimnetic oxygen maximum that persisted throughout the summer (**Figure 5**). Oxygen was maintained at concentrations greater than 2 mg/L, except for the bottommost meter of the lake in late summer.

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. Titration points between pH 4.4 and 3.7 were plotted, after Gran transformation, to give alkalinity in microequivalents per liter (μeq./L). (This is **Method #11.**) Alkalinity was analyzed monthly, on alternate sampling dates during summer.

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. The pH was measured in 50-ml aliquots of sample, usually with gentle mixing. Three variants of the method were employed:

Method 10. The basic procedure outlined above.
Method 11. As above, but a quality assurance protocol was followed, verifying electrode performance in distilled water and stability of calibration.
Method 12. As above, but 0.5 ml salt solution (Orion™ pHix™ solution) was added to increase ionic strength. Usually, this had little or no effect on the sample (pH change <0.1 unit).

Trends of pH are plotted for each layer in **Figure 6**. In the absence of intense biological activity, the pH of Lake Giles would be about 5.3 with an alkalinity of 0 to -5 μeq./L (**Figure 7**), judging from values in late spring and late autumn. The lowest pH of near surface water was about 5.1, at 0.5 m below the ice in late winter. These values represent a lake without bicarbonate buffering. There was a modest within-lake generation of alkalinity in the hypolimnion during late summer and early fall; the metabolic processes responsible for this increase in alkalinity were probably located at the sediment surface.

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.

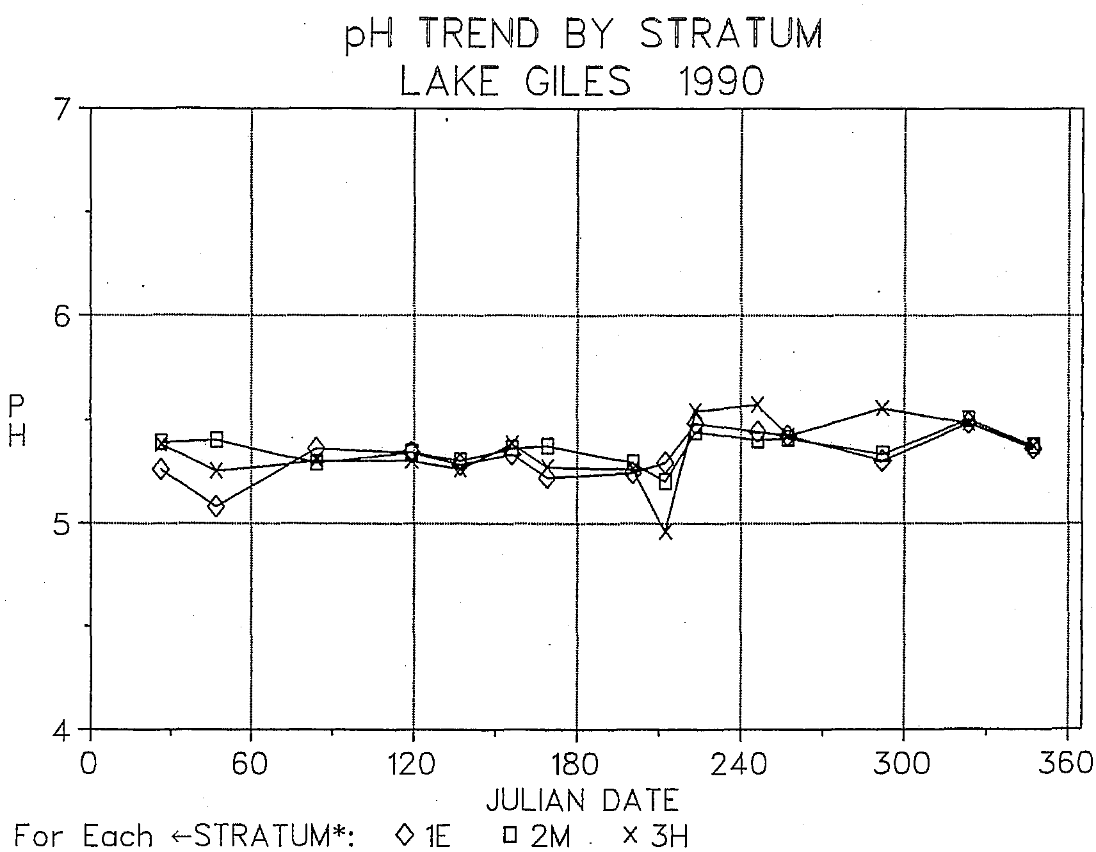


Figure 6. Trends of pH in Lake Giles, 1990.

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.**

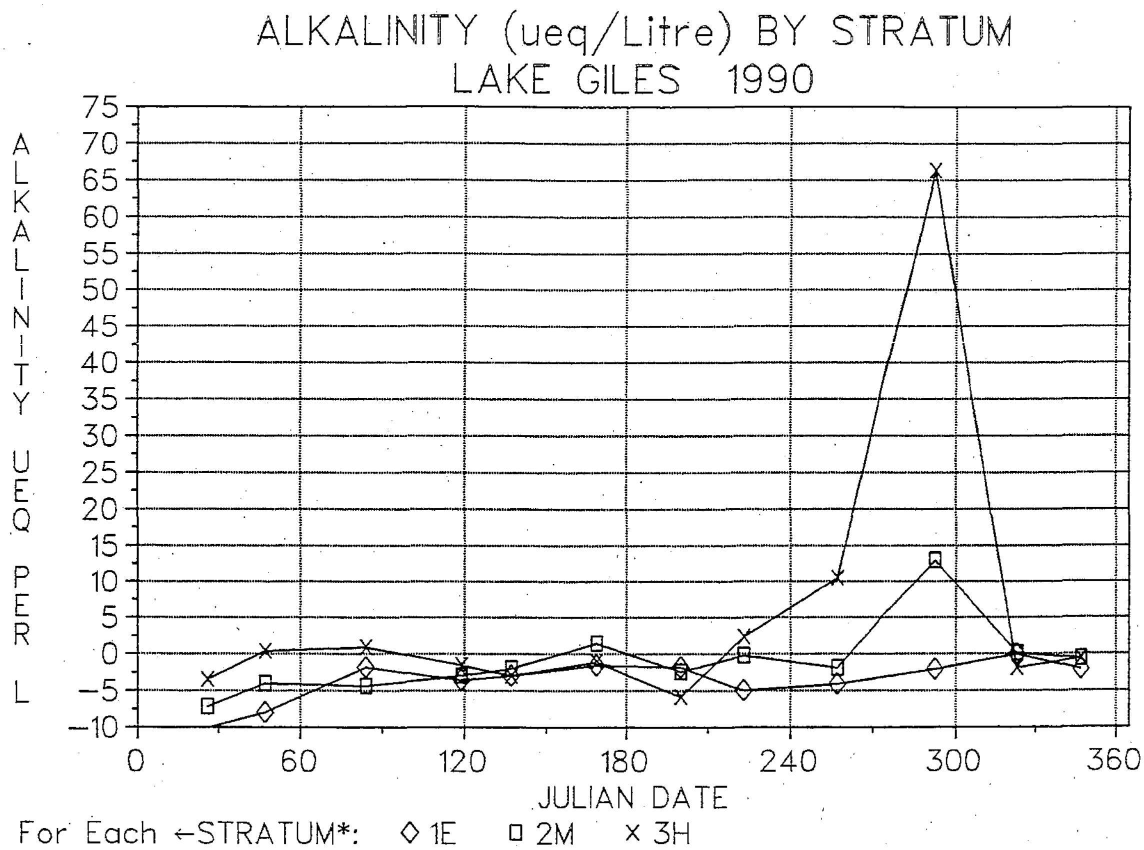


Figure 7. Trends of Alkalinity in Lake Giles, 1990.

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 samples came from the same Van Dorn collections used for pH and alkalinity. Samples were stored in 1-L polyethylene bottles for 2-24 hr (refrigerated in darkness) before being filtered (0.5-1 L onto Gelman™ A/E filters) and frozen. Two extraction methods were used:

Method 11. Filters were ground in 90% basic acetone, then extracted overnight at 2-4°C, in darkness, in 12 ml of the solvent.
Method 12. Intact filters were extracted overnight at 2-4°C, in darkness, in 12 ml of a 5:1 (vol/vol) mixture of 90% basic acetone and methanol.

In both methods the extracts were centrifuged and read in a Sequoia-Turner™ model 112 fluorometer equipped with F4T5/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. We verified that chlorophyll behaves virtually the same in both solvents, and that the extractions gave similar results. Two values are presented: Chlorophyll-a corrected for pheopigments (**CHLAC** in data tables and **Figure 8**) and Chlorophyll-a including pheopigments (**CHLASUM** in data tables).

In Lake Giles there was a very strong seasonal pattern of chlorophyll-a. Values were surprisingly high throughout the water column under the ice in winter and, especially, during spring turnover (3-8 ug/L). The period of maximal algal biomass in early spring was succeeded by very low epilimnial chlorophyll-a concentrations throughout most of the summer (0.1-0.5 ug/L). During summer stratification, higher concentrations of algae were present in the metalimnion and the hypolimnion than in the near-surface waters.

CHEMISTRY INCLUDING TOTAL PHOSPHORUS

Table G.A.1 (Appendix I) lists data on 13 chemical parameters not routinely included in the lake sampling. These include major cations (Ca,Mg,K,Na), anions (SO4--Cl not yet available), dissolved inorganic carbon (DIC), methane (CH4), sulfide (S2-), and conductivity, as well as total dissolved iron and phosphorus (tdFe, tdP), and total iron and phosphorus (tFe, tP).

These data were obtained by Dr. Jonathan Cole and Dr. Nina Caraco of the Institute of Ecosystem Studies, New York Botanical Garden, during the summer stratification period of 1989. The analyses are part of a broader geochemical study of North American lakes that is not yet completed. The data are included here to provide a better chemical characterization of Lake Giles. These data should not be cited or used for critical comparisons without first consulting Jon Cole or Nina Caraco.

In addition to the total phosphorus values listed in **Table G.A.1**, total phosphorus was determined in aliquots of the regular samples from 25 March 1990 (during spring turnover) and 11 August (during summer stratification). Unfiltered samples were stored frozen, then thawed and analyzed for molybdate reactive phosphorus following acid persulfate digestion **(Table 1)**.

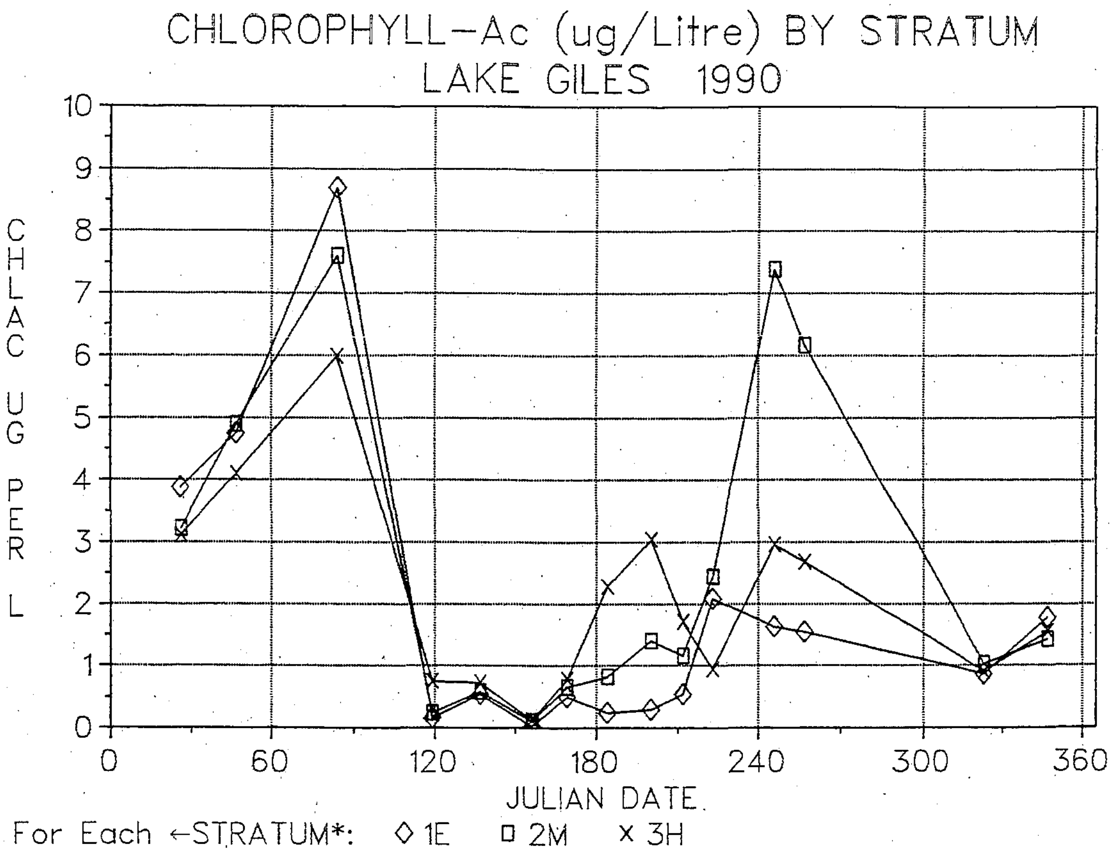


Figure 8. Trends of Chlorophyll-a in Lake Giles, 1990.

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.

Table 1. TOTAL PHOSPHORUS IN LAKE GILES, 1990

		Day 84 (3/25/90) Depth (m)	tP (uM)	Day 223 (8/11/90) Depth (m)	tP (uM)
EPI a		+	0.23	4	0.18
EPI b			0.21		0.19
	average		0.22		0.18
META		11	0.31	11	0.18
HYPO		18	0.21	18	0.40

These phosphorus values are consistent with Lake Giles' oligotrophic character. The buildup of phosphorus in the hypolimnion during summer reflects phosphorus released during decomposition of settling detritus or released from sediment. Only the deepest 2-3 m of the hypolimnion undergo notable chemical changes as summer stratification proceeds; there is considerable buildup of carbon dioxide, as well as slight accumulation of phosphorus and iron, but methane and sulfide remain undetectible **(Table G.A.1)**.

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 the most frequently encountered zooplankton, identified to genus and sometimes to species (**Figures 9-25**). **Table 2** lists the zooplankton identified to date. Several points can be highlighted:

(1) The herbivorous zooplankton were dominated by the cladoceran *Daphnia* (ca. 4/L in summer) and the calanoid copepod *Diaptomus minutus* (ca. 10 adults/L in summer). Another cladoceran, *Diaphanosoma*, was briefly abundant (2-6/L in August). An additional calanoid, *Diaptomus spatulocrenatus*, was present in low numbers throughout the year (1-3 adults/L). These two subordinate macrozooplankton, but not the dominants, increased conspicuously during August, possibly as a response to increasing algal biomass (see **Figure 8**).

(2) Rotifers were present at low-to-moderate densities throughout the year (40-240/L). They were most abundant during the winter and spring, during and immediately following the high winter and spring algal populations. Rotifers crashed during June, then rebounded somewhat in August. The July rotifer minimum (ca. 40/L) was much more strongly expressed in 1990 than in 1989, when rotifers were 100-200/L throughout the summer. Individual species showed pronounced seasonality. The winter-spring rotifer maximum was dominated by *Polyarthra* and *Keratella taurocephala*. *Conochilus* was briefly abundant in late spring. Several other types contributed significantly to the lower rotifer abundance in late summer and fall.

(3) Predatory macrozooplankton included *Cyclops scutifer*, which was mainly a late spring species (adults at 0.5-2/L in April-May, though copepodids were common in fall through spring), and *Chaoborus punctipennis*, which was caught in largest numbers during August and September (ca. 0.5/L). The period of maximal feeding and reproduction of *Cyclops scutifer* in late spring coincided with the decline of rotifers. A cause-and-effect relationship is strengthened by the recovery of rotifer populations as *Cyclops* adults declined during the summer. *Chaoborus*, by this argument, apparently had less impact on rotifer densities, which were increasing during the late summer maximum of *Chaoborus*.

(4) The winter-spring period of high algal biomass, which coincided with relatively high rotifer concentrations, was a time of low *Daphnia* density (1-2/L). The sharp increase in *Daphnia* during April coincided with the dramatic seasonal decrease in chlorophyll-a. If *Daphnia* grazing caused the algal crash, it may be that the somewhat later decline in rotifers was a secondary effect of food shortage or loss of nauplii to *Daphnia*.

Table 2. Zooplankton species recorded from open-water samples in Lake Giles 1988-1990.

	Taxon	Seasonal Abundance in 1990 High	Low
	Diptera		
**	*Chaoborus punctipennis*	late Su	[F,W]
	Cyclopoid Copepoda		
*	*Cyclops scutifer*	Sp	[F,W]
	Orthocyclops modestus		
	Calanoid Copepoda		
	Diaptomus spp.		
**	*D. minutus*	late F,W,Sp	
*	*D. spatulocrenatus*	late Su,F	
	Cladocera		
	Chydorus sp.		
**	*Daphnia* spp.	Sp, late F	
	D. catawba		
*	*Diaphanosoma* sp.	late Su	[F,W,Sp]
	Leptodora kindtii		
	Polyphemus pediculus		
	Rotifera		
*	*Ascomorpha* spp.	Su	[F,W,Sp]
	Collotheca spp.		
*	*Conochilus* spp.		
	Euchlanis parva		
*	*Gastropus* spp.		
	G. hyptopus (?)		
	G. stylifer		
	Kellicottia sp.		
	K. longispina		
	Keratella spp.		
	K. hiemalis		
**	*K. taurocephala*	W,Sp	[Su,F]
	Lecane spp.		
	L. ligona		
	L. luna		
	L. mira		
	L. tenuiseta		

Continued next page

Table 2. Zooplankton species recorded from open-water samples in Lake Giles 1988-1990.

	Taxon	Seasonal Abundance in 1990	
		High	Low
	Monommata spp.		
	Monostyla spp		
	M. copeis		
	Ploesoma spp.		
**	*Polyarthra* spp. ("large")	F,W	[early Su]
*	*Synchaeta* spp.	late Su	
	Testudinella spp.		
	Trichocerca spp.		
	T. similis		

Abbreviations for seasons of maximal or [minimal] abundance:
W (winter), Sp (spring), Su (summer), F (fall).

** Dominant species included in Figures.
* Other species included in Figures.

FISH

The fish survey of 18-20 July 1990 was undertaken to provide a comparative idea of the species and their abundances in Lake Giles and the other core lakes. This survey was designed and carried out by Kenneth Ersbak and Aquatic Resource Consulting (Saylorsburg, PA). Data summarized in **Table 3** and listed in detail in **Appendix II** are taken from their final report (25 September 1990: "Fishery Survey of the Three 'Core' Lakes of the Pocono Comparative Lakes Program"). The sampling strategy was to set gill and trap nets at several sites around the lake, with equal day and night sampling. Details of the nets are available in the original report.

Net surveys in general are difficult to relate to absolute population sizes, and are known to preferentially collect some species. The fish caught clearly do illustrate the dual status of Lake Giles, which supports naturally reproducing populations of centrarchids (sunfish and bass) as well as several species of salmonids (especially brook trout). The trout are periodically stocked for a "put-and-take" fishery, and are not thought to maintain reproducing populations. Several species not caught during the census, but known to be present, include yellow perch (*Perca flavescens*), lake trout (*Salvelinus namaycush*), and American eel (*Anguilla rostrata*).

Table 3. SUMMARY OF FISH COLLECTED IN LAKE GILES (42.1 kg total)[1]

FISH SPECIES	NUMBER	LENGTH (mm)		MASS (g)		% of TOTAL MASS
		Mean	STD	Mean	STD	
Brook trout	38	381	27	595	129	54
Bluegill	30	178	56	127	93	9
Smallmouth bass	19	251	66	233	254	11
Pumpkinseed	12	149	31	70	49	2
Brown bullhead	5	357	11	668	97	8
Brown trout	4	358	22	392	59	4
Rainbow trout	4	333	31	389	211	4
Largemouth bass	2	452	80	1386	767	7
Chain pickerel	1	433		540		1
Tiger trout	1	420		678		2

[1] Total Effort: 12 12-hr gill nets and 4 12-hr trap nets
Masses are fresh weight in grams.

ZOOPLANKTON GRAPHS

The following graphs present water-column mean nighttime concentrations of the common zooplankton at the main sampling station. Each data point is calculated by weighting concentrations in the three layers (EPI, META, HYPO) on each date by the relative thickness of the layer at the station, which is in the deepest part of the lake. Two replicate samples were taken in quick succession.

The electronic database contains the component concentrations within the three layers, separate counts for the two replicates, and similarly complete data from the comparable daytime sampling.

On day 47, several species that were not recorded in the sample counts were treated as "missing" rather than "zero", resulting in graph lines directly connecting adjacent data points, rather than passing to "0" in between. In general, missing data points mean "zero" when they occur within a suite of defined, plotted values for a taxon (see Figures 12,15,21,25).

For a few zooplankton species, the taxonomic resolution has been increased part way through the year. This will be evident from the plotted data (see Figures 10,11,12,).

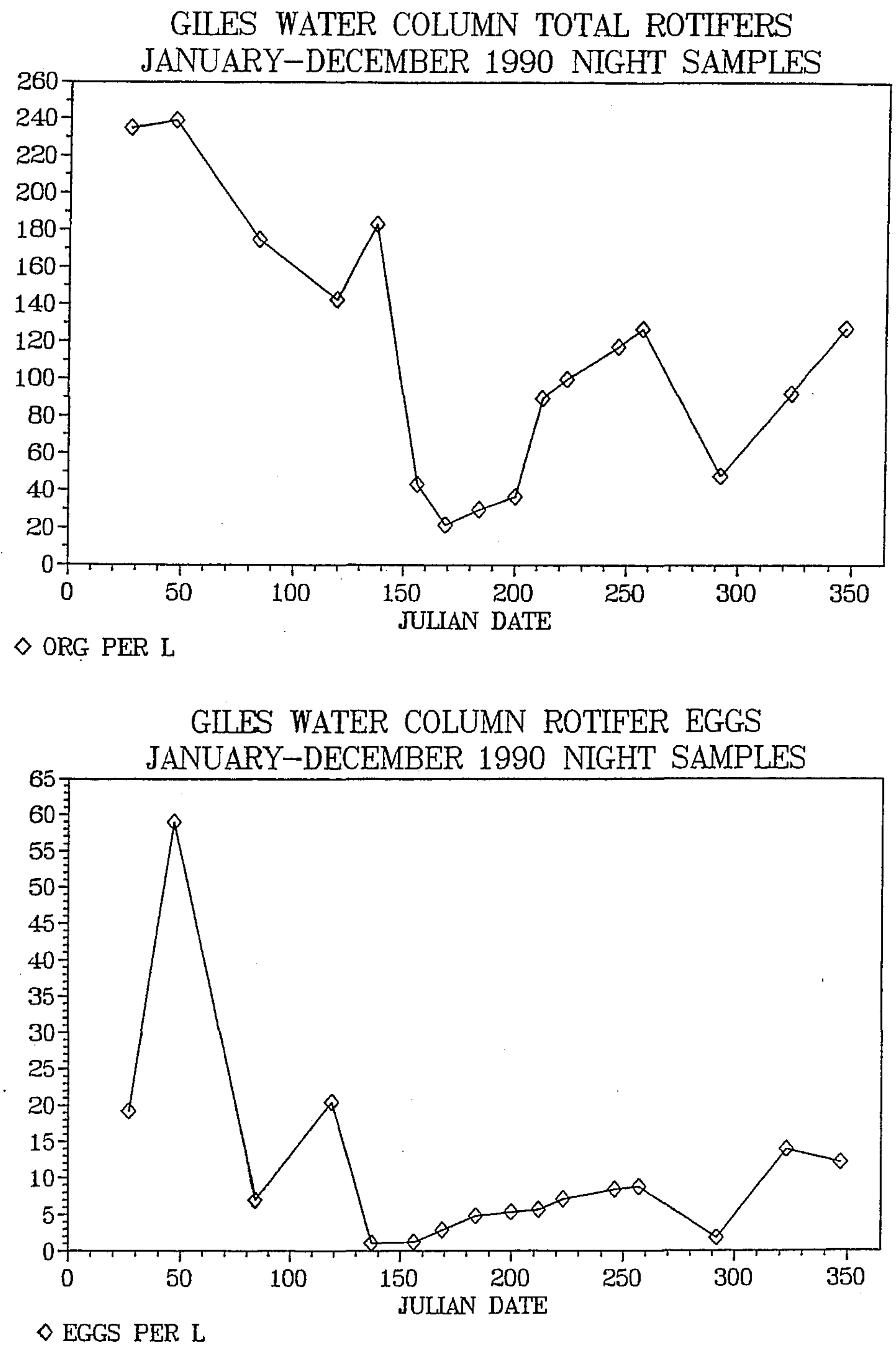


Figure 9. Rotifers in Lake Giles, 1990.

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

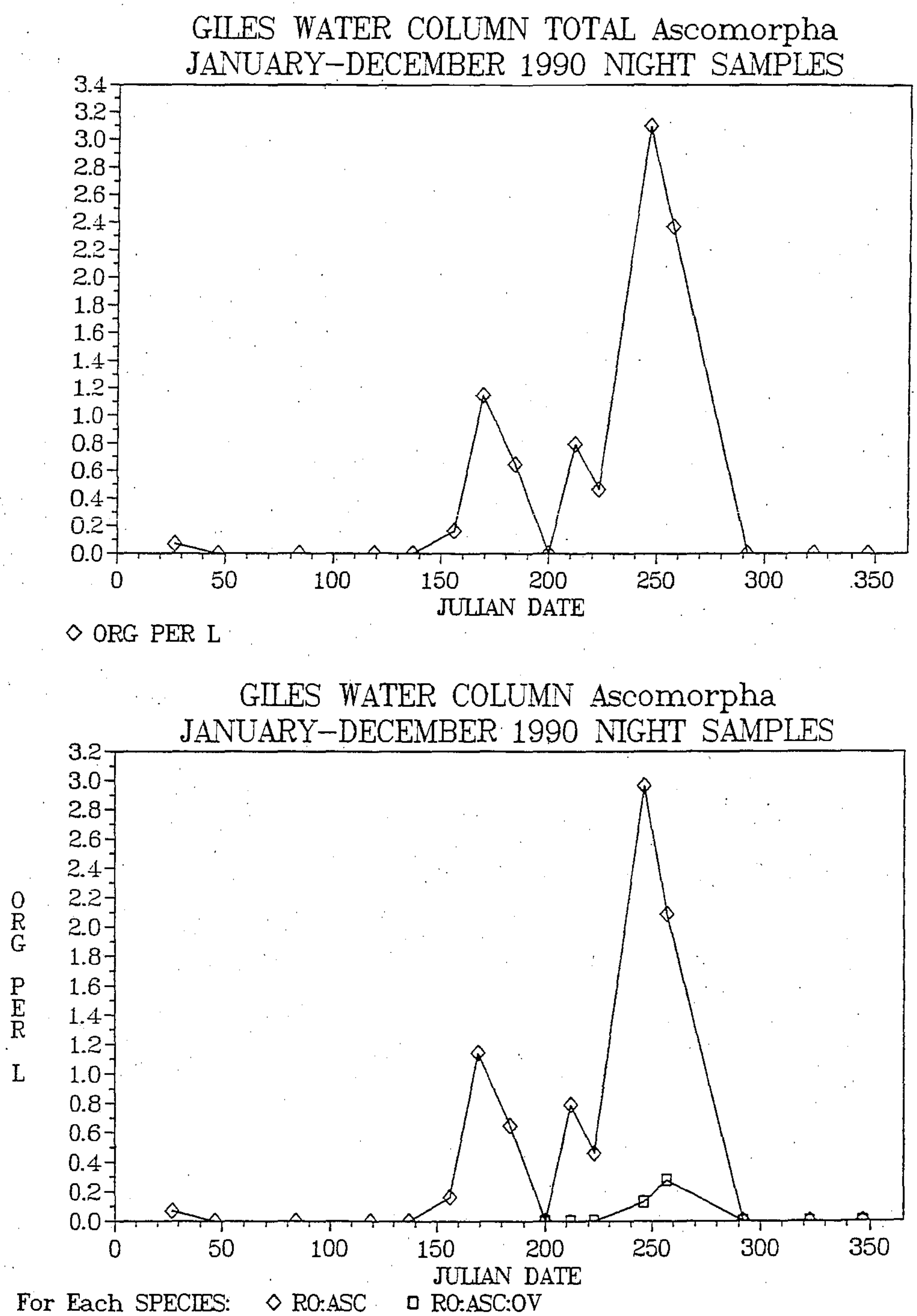
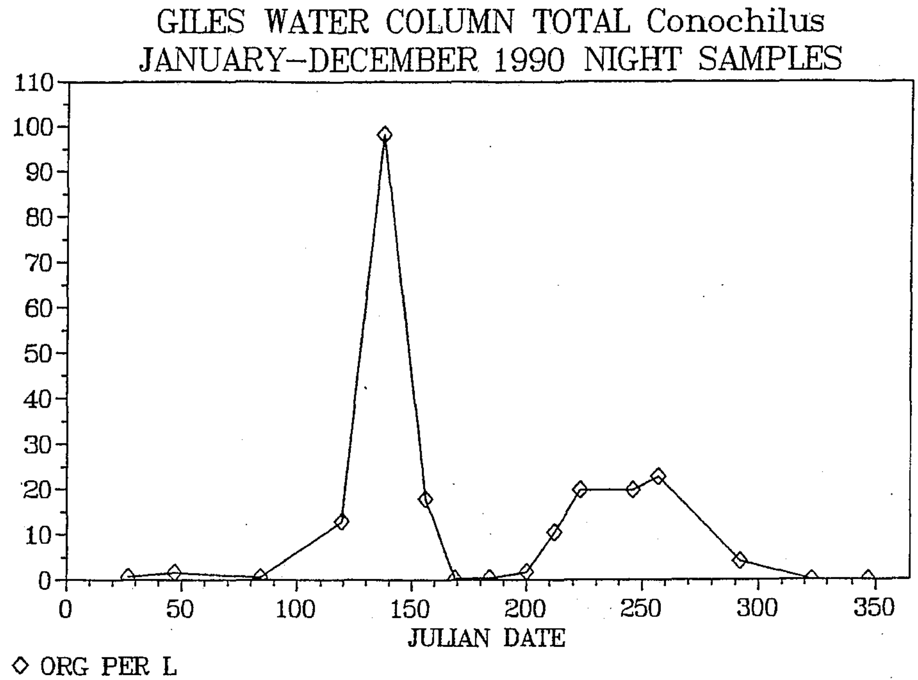


Figure 10. The rotifer *Ascomorpha* in Lake Giles, 1990.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. **(Top)** Total of all species per liter. **(Bottom)** *Ascomorpha* by species: **ASC** undifferentiated spp., **OV** *A. ovalis*.



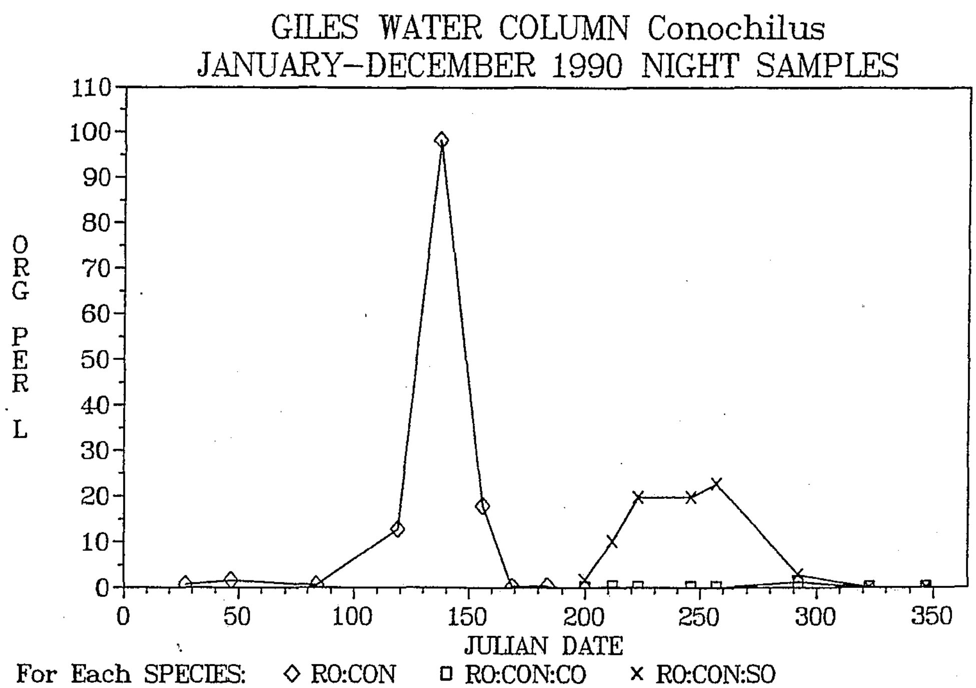
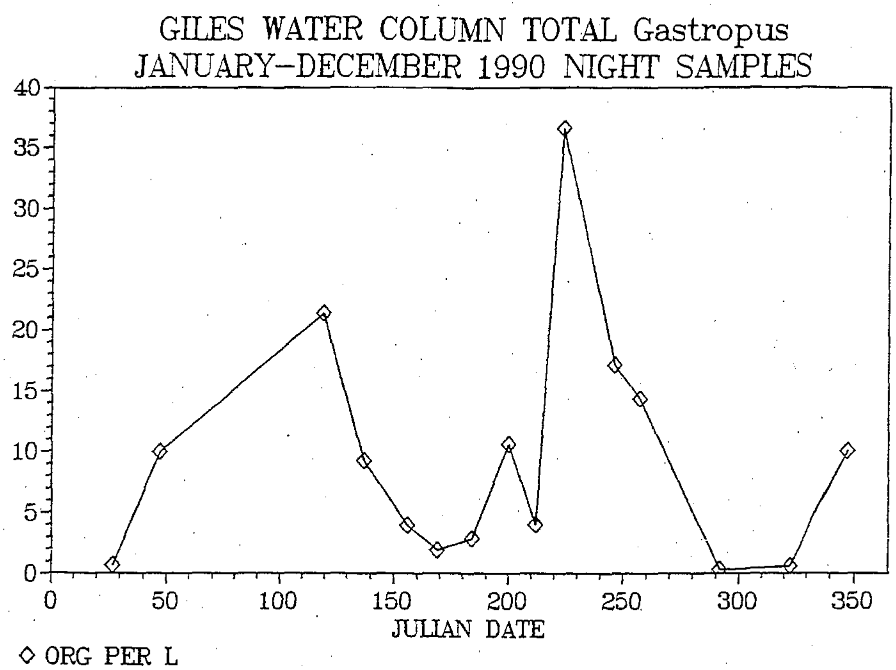


Figure 11. The rotifer *Conochilus* in Lake Giles, 1990.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. **(Top)** Total of all species per liter. **(Bottom)** *Conochilus* by species: **CON** undifferentiated species (before day 190), **CO** colonial spp, **SO** solitary spp.



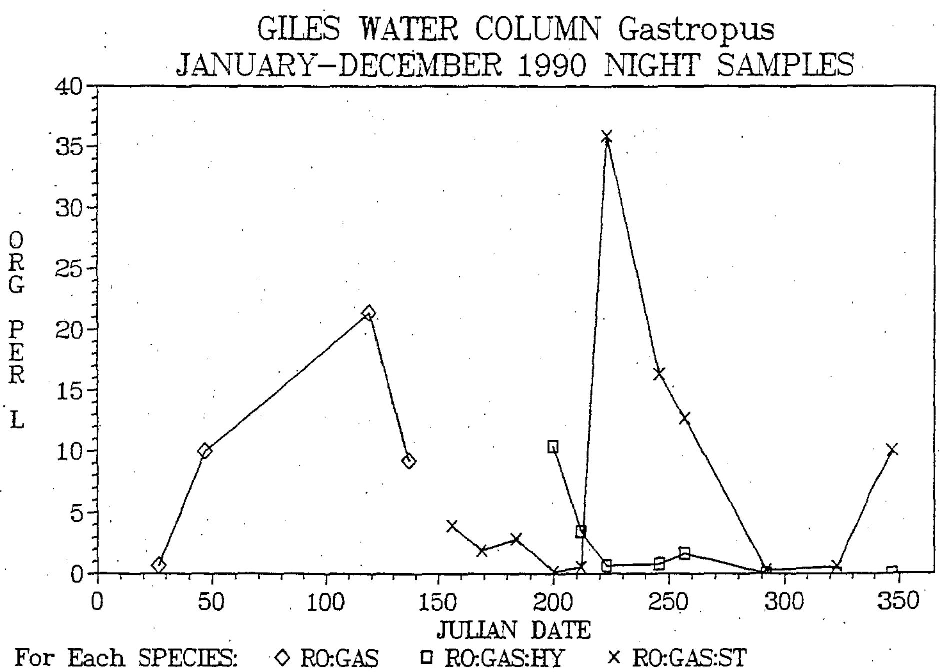


Figure 12. The rotifer *Gastropus* in Lake Giles, 1990.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. **(Top)** Total of all species per liter. **(Bottom)** *Gastropus* by species: **GAS** undifferentiated species (before day 150), **HY** *G. hyptopus*, **ST** *G. stylifera*.

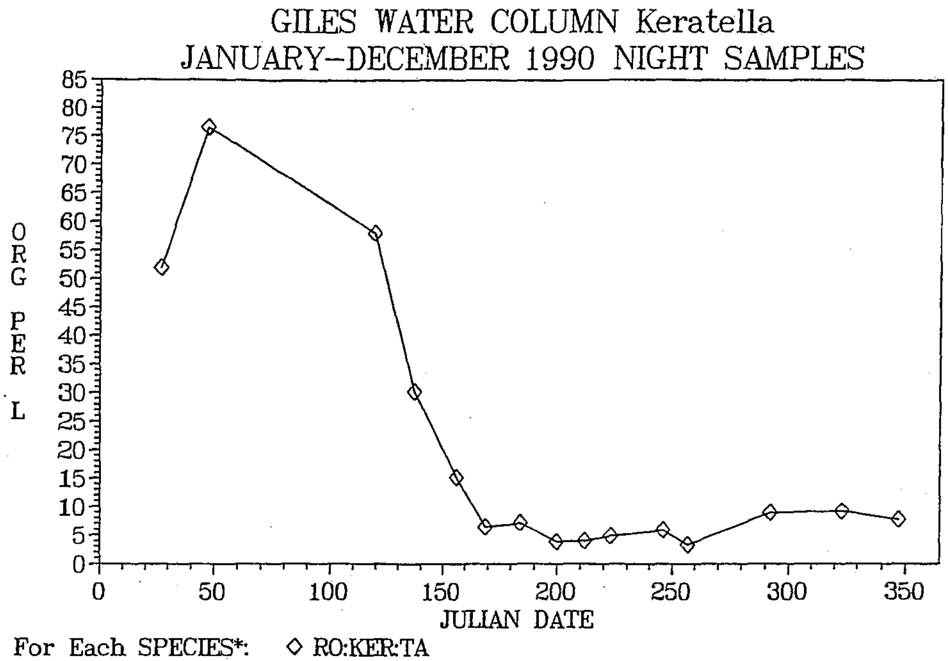


Figure 13. The rotifer *Keratella* in Lake Giles, 1990.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. *Keratella taurocephala* **TA** was the only common species.

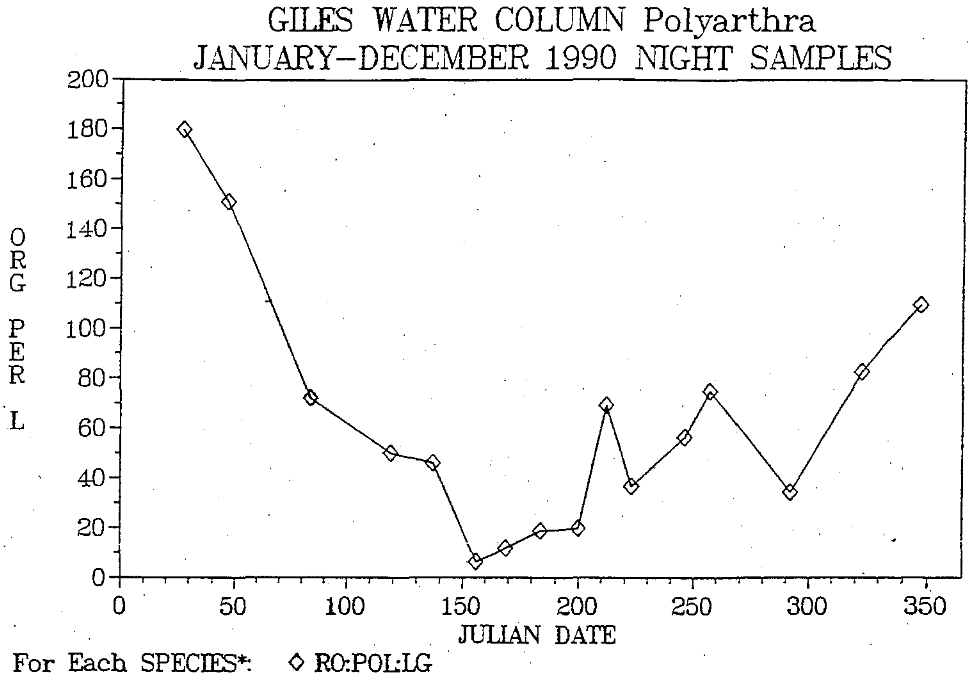


Figure 14. The rotifer *Polyarthra* in Lake Giles, 1990.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. The large size class, **LG**, included almost all of the individuals counted.

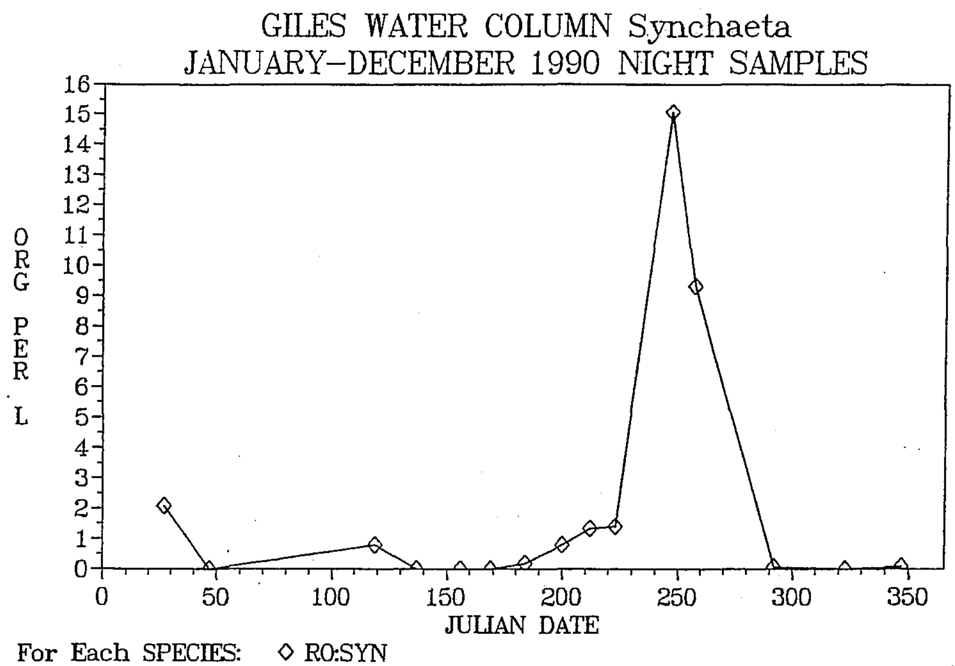


Figure 15. The rotifer *Synchaeta* in Lake Giles, 1990.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean.

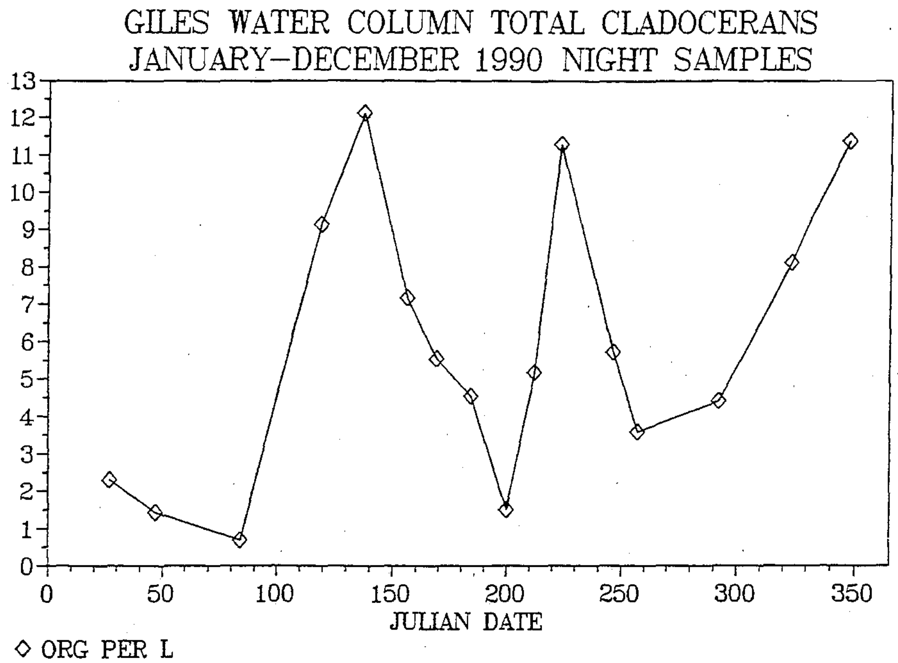


Figure 16. Cladocera in Lake Giles, 1990.

Nighttime net collections (202μm) from three depths have been combined to give a water column mean.

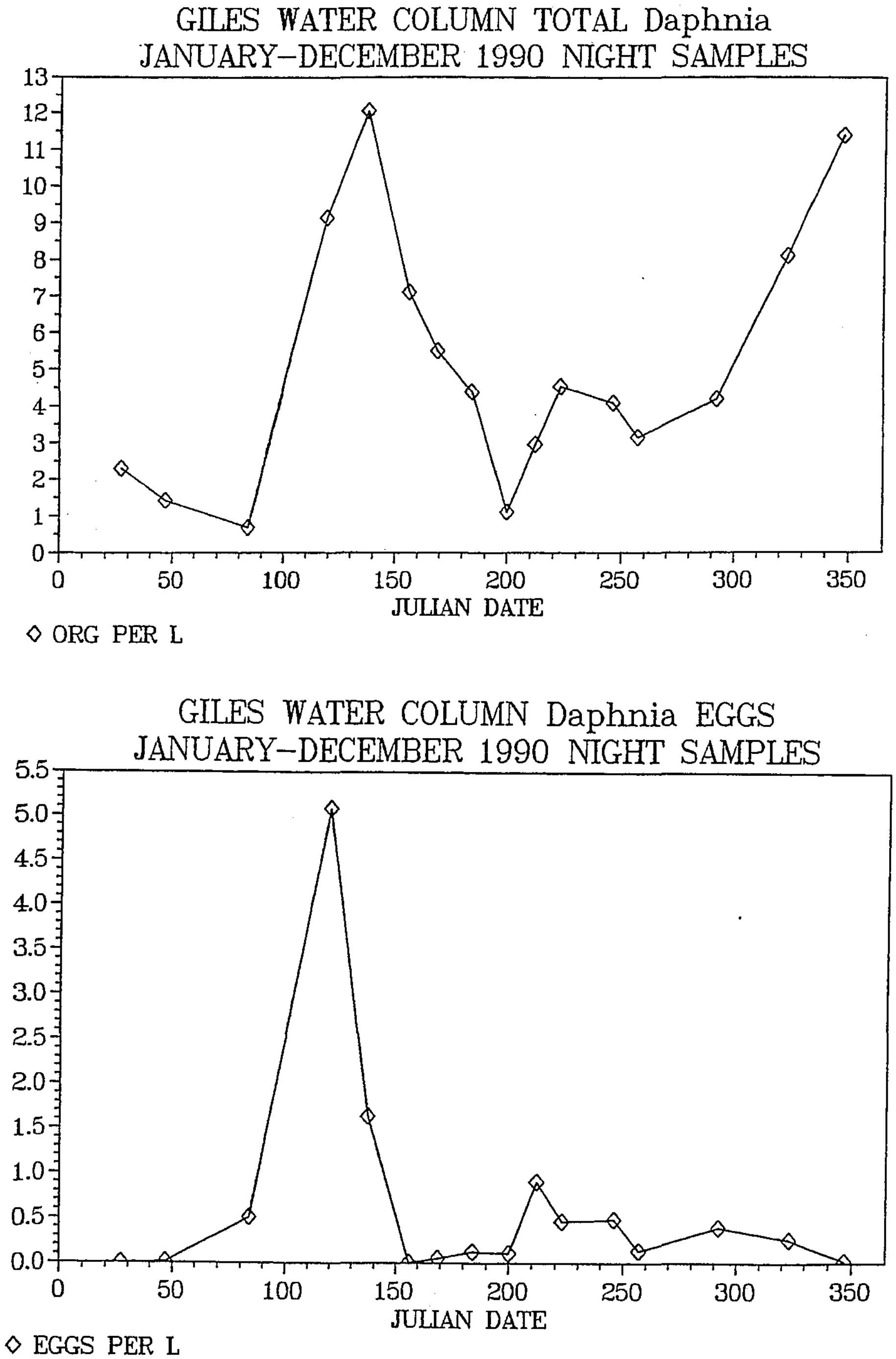


Figure 17. The cladoceran *Daphnia* in Lake Giles, 1990.

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

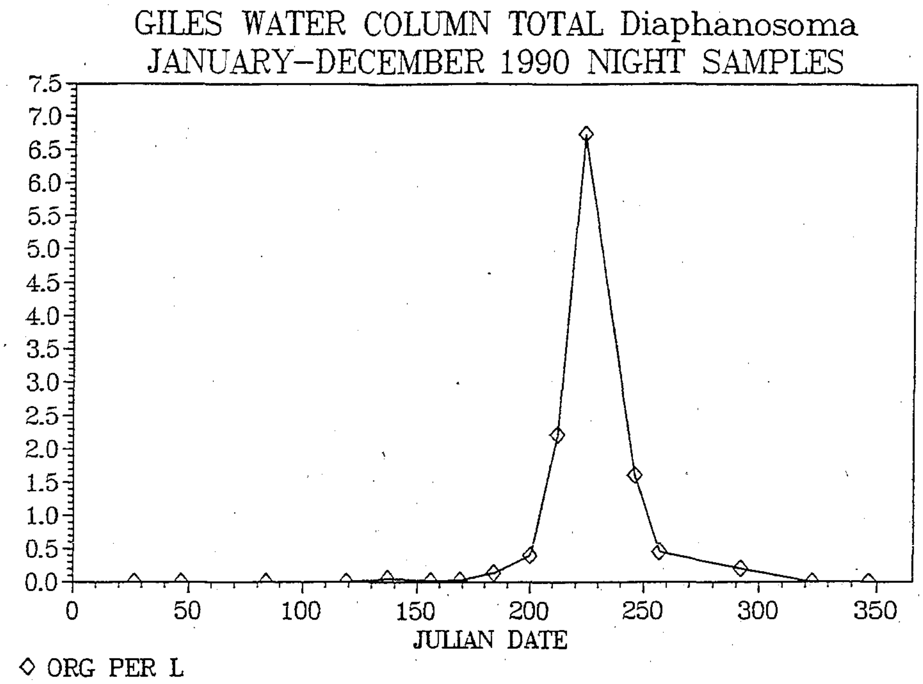


Figure 18. The cladoceran *Diaphanosoma* in Lake Giles, 1990.

Nighttime net collections (202μm) from three depths have been combined to give a water column mean.

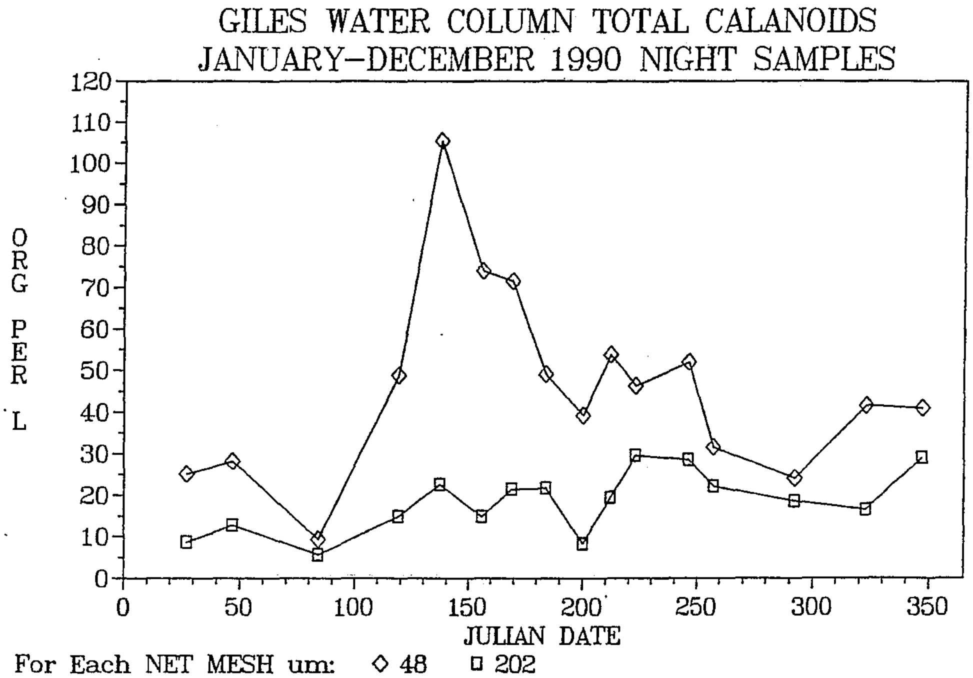
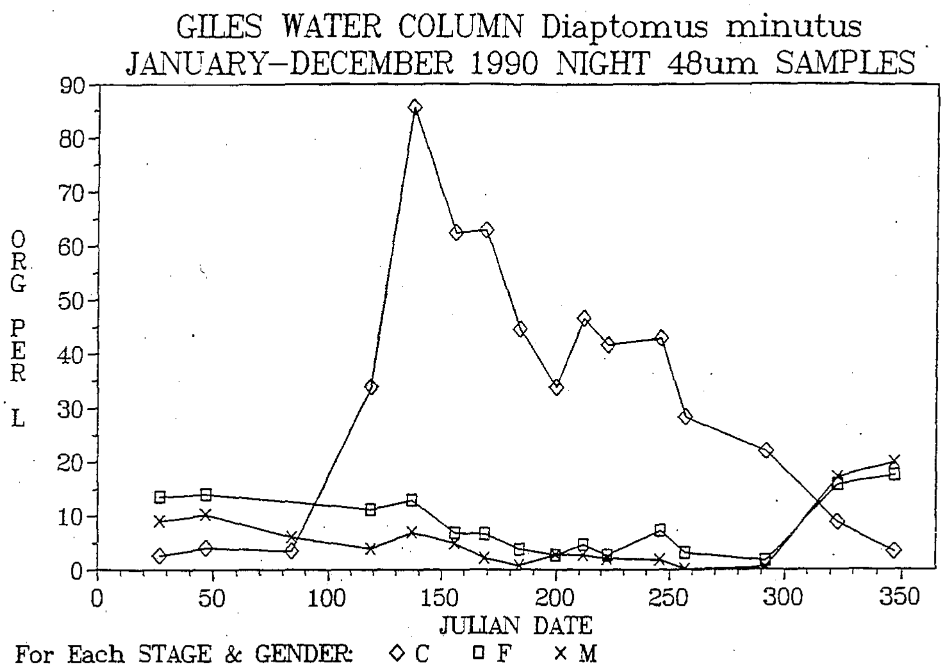


Figure 19. Calanoid copepods in Lake Giles, 1990.

Nighttime net collections from three depths have been combined to give a water column mean. The 48μm mesh net collects copepodids effectively, which the 202μm net does not. Note that adult *Diaptomus oregonensis* were not included in the 48μm counts, although adult *D. minutus* were.



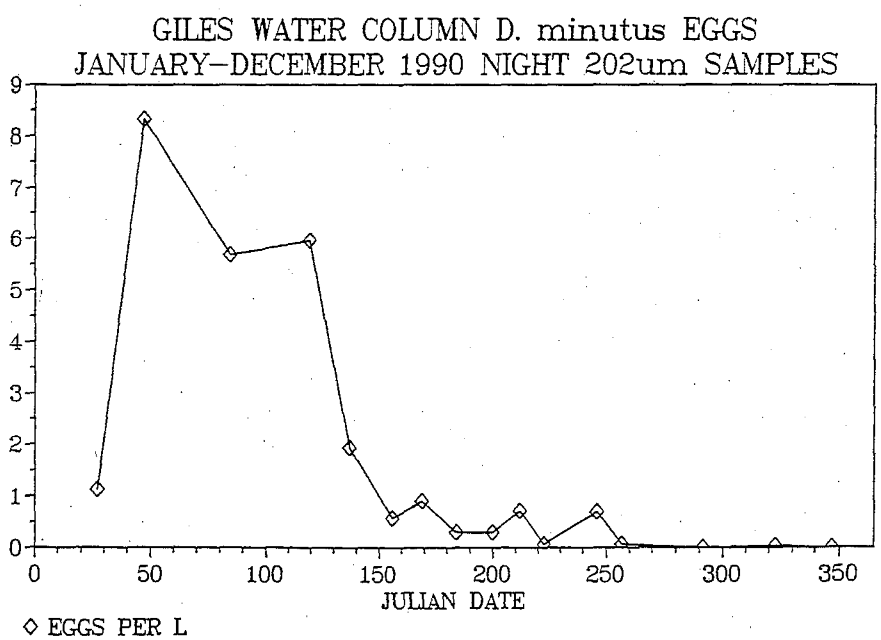
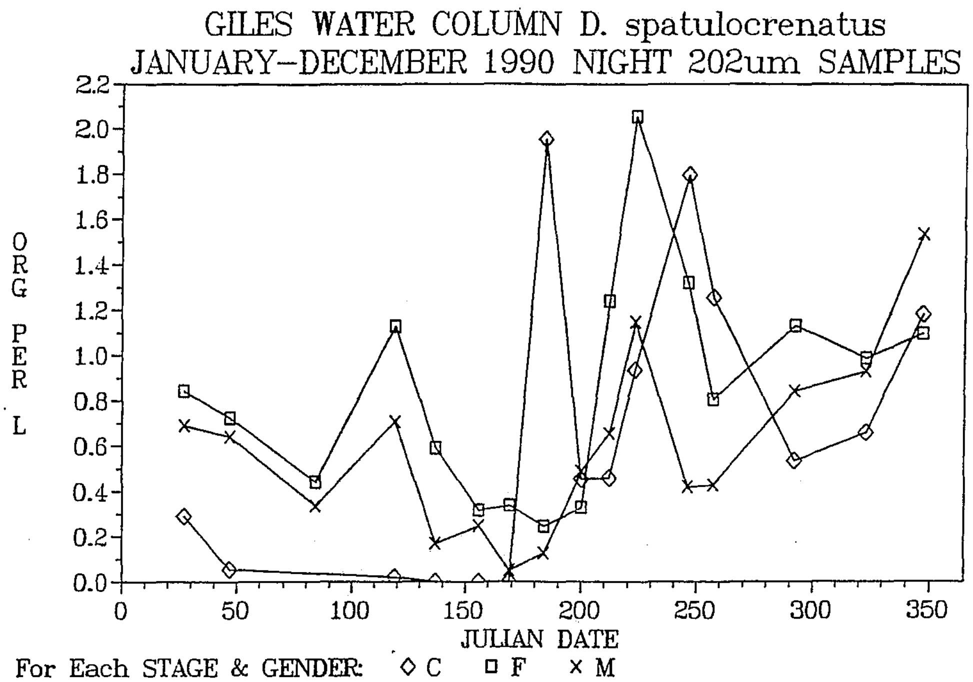


Figure 20. The calanoid copepod *Diaptomus minutus* in Lake Giles, 1990.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. **(Top)** Adults (males and females separately) and copepodids from the 48μm net. **(Bottom)** *D. minutus* eggs per liter from the 202μm sample.



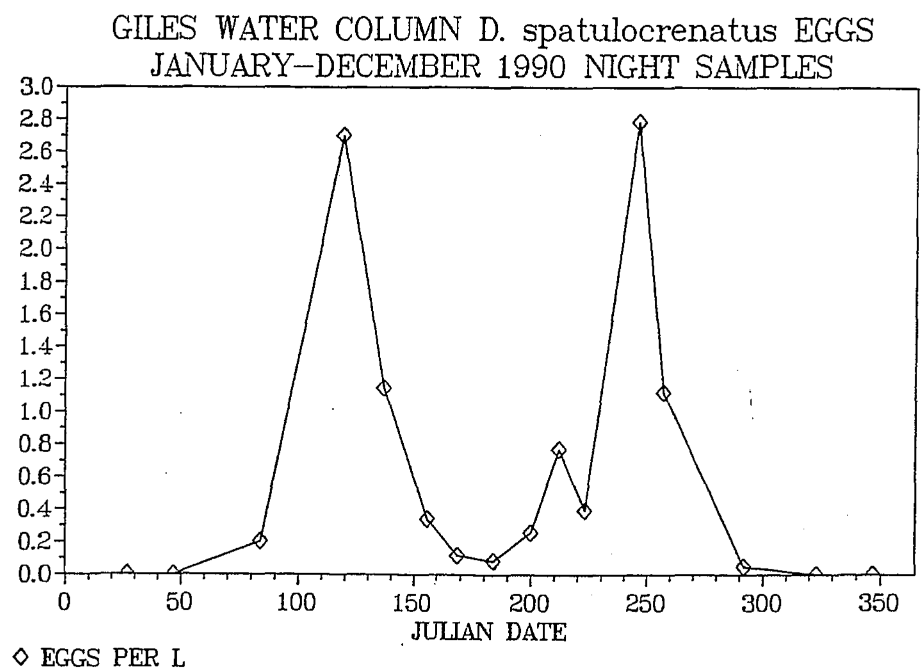
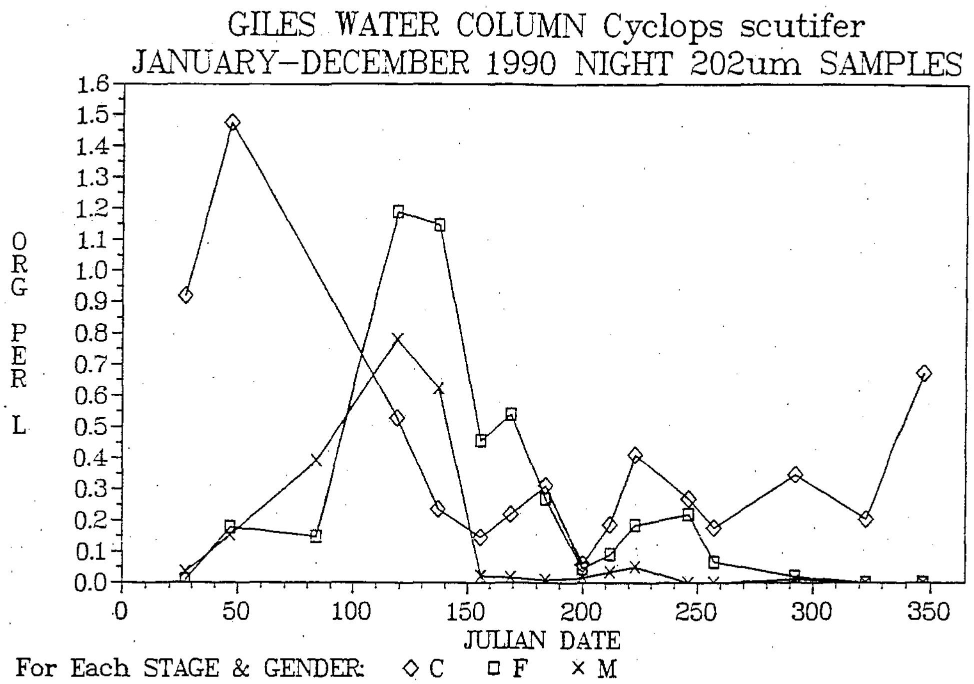


Figure 21. The calanoid copepod *Diaptomus spatulocrenatus* in Lake Giles, 1990.

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



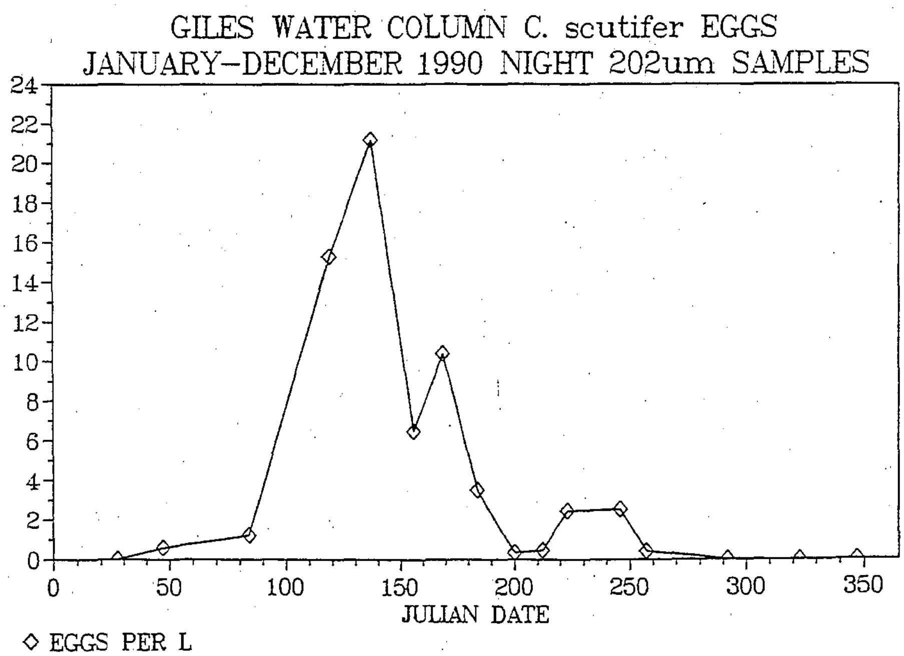


Figure 22. The cyclopoid copepod *Cyclops scutifer* in Lake Giles, 1990.

Nighttime net collections (202μm) from three depths have been combined to give a water column mean. **(Top)** Adults (males and females separately) and some copepodids. **(Bottom)** *C. scutifer* eggs per liter (202 μm net). Note that copepodids are collected with only ca. 25% efficiency with the 202μm net (compare copepodid data from 48μm net in **Figure 23**).

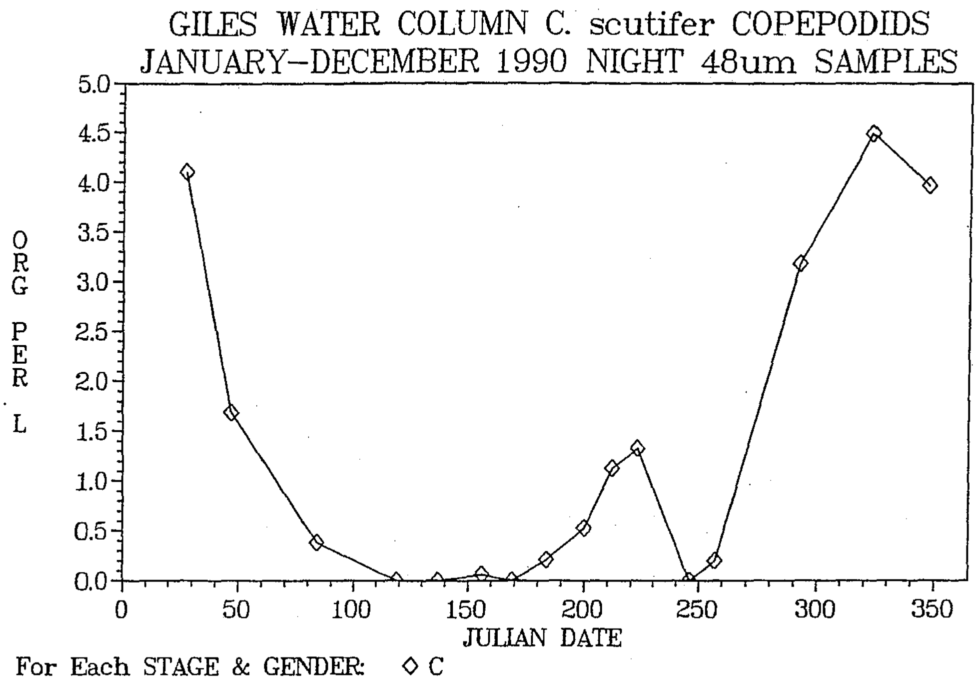


Figure 23. Copepodids of *Cyclops scutifer* in Lake Giles, 1990.

Nighttime net collections (48 μm) from three depths have been combined to give a water column mean.

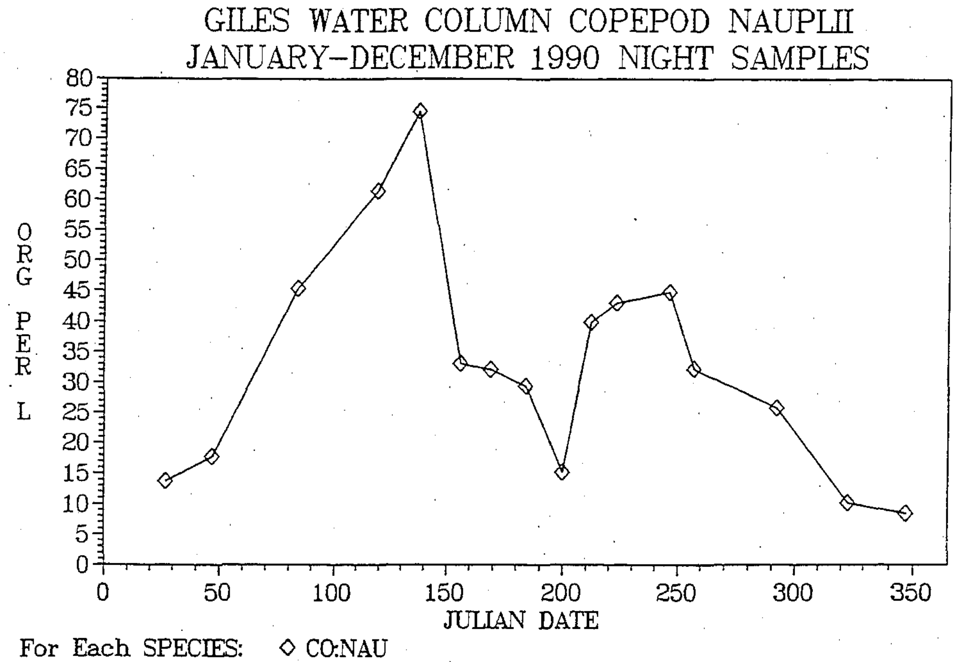


Figure 24. Total copepod nauplii in Lake Giles, 1990.

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

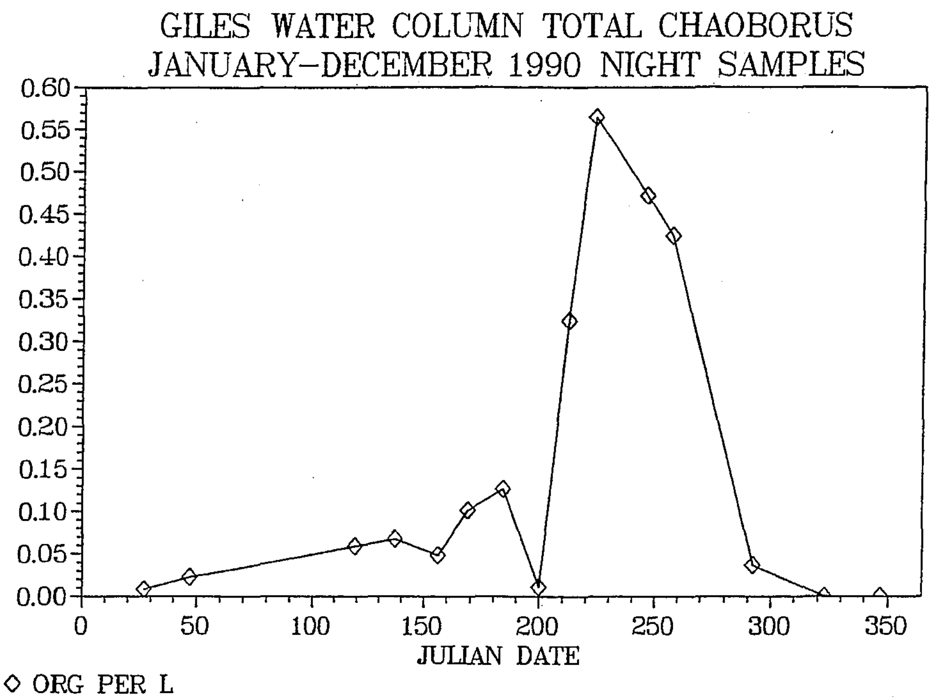


Figure 25. The dipteran *Chaoborus* in Lake Giles, 1990.

Nighttime net collections (202μm) from three depths have been combined to give a water column mean.

EXPLANATION OF DATA TABLES

The following 16 tables present the physical/chemical information acquired on each date in 1990. 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 #10,12 (see **METHODS AND RESULTS**).

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

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

PHMETHOD: pH methods #10,11,12 (see **METHODS AND RESULTS**).

CAMETHOD: Chlorophyll-a methods #11,12 (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, chlorophyll--other data are merely repeated on rep 2 line for convenience in graphing.

DEPTH:	Depth of sample (meters); -1 for air above surface.
OFLAG:	Error flag for oxygen.
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
SRC,SC	Scott Carpenter
KG	Kevin Gould
GG	Gaby Grad
SJJ,SJ	Sally Jones
DAM	Donna Mensching
REM,RM	Robert Moeller
MR	Miriam Rappelt
JS	John Slotterback
PS	Paul Stutzman

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 1/26/90 JULIAN DATE: 26 TIME: 9.75

SECCHI M: 8.1 WEATHER: Overcast PERSONNEL: RM SJ SC

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

COMMENTS: 9" ice cover, candled ice, no snow

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
1/26/90	26	S	1	9.75	-1.0	0.0							
1/26/90	26		1	9.75	0.0	1.2	13.28		100.0000				
1/26/90	26	E	1	9.75	1.0	4.0	12.28		64.1900	5.19	-11	4.16	4.91
1/26/90	26	E	2	9.75	1.0	4.0	12.28		64.1900	5.34	-9	3.61	4.46
1/26/90	26		1	9.75	2.0	4.1	11.99		47.3300				
1/26/90	26		1	9.75	3.0	4.1	11.88		34.8800				
1/26/90	26	M	1	9.75	4.0	4.1	11.69		26.0300	5.38	-5	3.49	4.49
1/26/90	26	M	2	9.75	4.0	4.1	11.69		26.0300	5.40	-9	2.95	4.00
1/26/90	26		1	9.75	5.0	4.1	11.58		19.1800				
1/26/90	26		1	9.75	6.0	4.1	11.48		14.5000				
1/26/90	26		1	9.75	7.0	4.1	11.38		10.8500				
1/26/90	26		1	9.75	8.0	4.1	11.18		8.2000				
1/26/90	26		1	9.75	9.0	4.1	11.08		6.1400				
1/26/90	26		1	9.75	10.0	4.1	10.99		4.6700				
1/26/90	26		1	9.75	11.0	4.1	10.93		3.6000				
1/26/90	26		1	9.75	12.0	4.1	10.28		2.7700				
1/26/90	26		1	9.75	13.0	4.1	9.98		2.1600				
1/26/90	26	H	1	9.75	14.0	4.1	9.96		1.7200	5.41	-3	2.75	4.02
1/26/90	26	H	2	9.75	14.0	4.1	9.96		1.7200	5.35	-4	3.47	4.65
1/26/90	26		1	9.75	15.0	4.1	9.88		1.3700				
1/26/90	26		1	9.75	16.0	4.1	9.83		1.0900				
1/26/90	26		1	9.75	17.0	4.1	9.78		0.8500				
1/26/90	26		1	9.75	18.0	4.1	9.78		0.6600				
1/26/90	26		1	9.75	19.0	4.2	8.89		0.5100				
1/26/90	26		1	9.75	20.0	4.2	8.69		0.3800				
1/26/90	26		1	9.75	21.0	4.2	9.24		0.2600				
1/26/90	26		1	9.75	22.0	4.1	9.58						

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 2/16/90 JULIAN DATE: 47 TIME: 10.50

SECCHI M: 7.1 WEATHER: Overcast PERSONNEL: SRC REM SJ

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

COMMENTS: 4-5" ice cover

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
2/16/90	47	S	1	10.50	-1.0								
2/16/90	47		1	10.50	0.0	1.9	13.70		100.0000				
2/16/90	47	E	1	10.50	1.0	4.2	13.55		49.4800	5.12	-11	4.75	5.74
2/16/90	47	E	2	10.50	1.0	4.2	13.55		49.4800	5.04	-5		
2/16/90	47		1	10.50	2.0	4.3	13.48		43.8300				
2/16/90	47		1	10.50	3.0	4.3	13.48		34.9800				
2/16/90	47	M	1	10.50	4.0	4.3	13.48		26.1400	5.34	-6	4.89	5.78
2/16/90	47	M	2	10.50	4.0	4.3	13.48		26.1400	5.47	-2		
2/16/90	47		1	10.50	5.0	4.3	13.46		19.3790				
2/16/90	47		1	10.50	6.0	4.3	13.42		14.3440				
2/16/90	47		1	10.50	7.0	4.3	13.39		10.6170				
2/16/90	47		1	10.50	8.0	4.3	13.06		7.9000				
2/16/90	47		1	10.50	9.0	4.3	12.76		6.0770				
2/16/90	47		1	10.50	10.0	4.3	12.36		4.5550				
2/16/90	47		1	10.50	11.0	4.3	12.17		3.4330				
2/16/90	47		1	10.50	12.0	4.2	11.44		2.5730				
2/16/90	47		1	10.50	13.0	4.2	11.30		1.8950				
2/16/90	47	H	1	10.50	14.0	4.2	10.88		1.4400	5.24	0	4.09	4.54
2/16/90	47	H	2	10.50	14.0	4.2	10.88		1.4400	5.26	1		
2/16/90	47		1	10.50	15.0	4.2	10.86		1.0840				
2/16/90	47		1	10.50	16.0	4.2	10.80		0.7860				
2/16/90	47		1	10.50	17.0	4.2	10.80		0.5710				
2/16/90	47		1	10.50	18.0	4.2	10.62		0.4270				
2/16/90	47		1	10.50	19.0	4.2	10.65		0.3200				
2/16/90	47		1	10.50	20.0	4.2	10.36		0.2400				
2/16/90	47		1	10.50	21.0	4.3	9.90		0.1730				
2/16/90	47		1	10.50	22.0	4.4	8.20		0.1140				
2/16/90	47		1	10.50	23.0	4.4	7.24						

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 3/25/90 JULIAN DATE: 84 TIME: 10.50

SECCHI M: 6.3 WEATHER: Mostly sunny, calm PERSONNEL: JAA SRC REM

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	CHLAC U	CHLASUM
3/25/90	84	S	1	10.50	-1.0							
3/25/90	84		1	10.50	0.0	6.0	11.90		100.0000			
3/25/90	84		1	10.50	1.0	6.0	12.00		57.0800			
3/25/90	84		1	10.50	2.0	5.9	12.05		38.7500			
3/25/90	84		1	10.50	3.0	5.9	12.05		26.0600			
3/25/90	84	E	1	10.50	4.0	5.9	12.05		17.2400	5.33	8.70	8.70
3/25/90	84	E	2	10.50	4.0	5.9	12.05		17.2400	5.40		
3/25/90	84		1	10.50	5.0	5.9	12.02		11.8800			
3/25/90	84		1	10.50	6.0	5.8	12.00		8.1600			
3/25/90	84		1	10.50	7.0	5.8	12.00		5.6000			
3/25/90	84		1	10.50	8.0	5.8	12.00		3.8800			
3/25/90	84		1	10.50	9.0	5.8	11.95		2.8800			
3/25/90	84		1	10.50	10.0	5.8	11.90		2.0200			
3/25/90	84	M	1	10.50	11.0	5.8	11.85		1.5000	5.30	7.60	8.02
3/25/90	84	M	2	10.50	11.0	5.8	11.85		1.5000	5.28		
3/25/90	84		1	10.50	12.0	5.8	11.85		1.0800			
3/25/90	84		1	10.50	13.0	5.8	11.75		0.7800			
3/25/90	84		1	10.50	14.0	5.8	11.80		0.5700			
3/25/90	84		1	10.50	15.0	5.8	11.75		0.4200			
3/25/90	84		1	10.50	16.0	5.8	11.75		0.3100			
3/25/90	84		1	10.50	17.0	5.7	11.75		0.2300			
3/25/90	84	H	1	10.50	18.0	5.6	11.75		0.1700	5.30	5.99	6.26
3/25/90	84	H	2	10.50	18.0	5.6	11.75		0.1700	5.30		
3/25/90	84		1	10.50	19.0	5.5	11.70		0.1300			
3/25/90	84		1	10.50	20.0	5.3	11.72		0.0900			
3/25/90	84		1	10.50	21.0	5.2	11.70		0.0600			
3/25/90	84		1	10.50	22.0	5.0	11.68					

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 4/29/90 JULIAN DATE: 119 TIME: 13.25

SECCHI M: 9.7 WEATHER: Overcast, breezy PERSONNEL: JAA SJJ SRC PS

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
4/29/90	119	S	1	13.25	-1.0	14.5							
4/29/90	119		1	13.25	0.0	14.6	10.63		100.0000				
4/29/90	119		1	13.25	1.0	14.6	10.68		86.8800				
4/29/90	119	E	1	13.25	2.0	14.6	10.99		66.0200	5.36	-5	0.15	0.24
4/29/90	119	E	2	13.25	2.0	14.6	10.99		66.0200	5.33	-3	0.15	0.24
4/29/90	119		1	13.25	3.0	14.6	11.76		63.9700				
4/29/90	119		1	13.25	4.0	11.3	11.84		57.1700				
4/29/90	119		1	13.25	5.0	10.4	11.93		48.4900				
4/29/90	119	M	1	13.25	6.0	9.8	12.09		41.1600	5.34	-4	0.28	0.41
4/29/90	119	M	2	13.25	6.0	9.8	12.09		41.1600	5.34	-2	0.19	0.30
4/29/90	119		1	13.25	7.0	9.4	12.21		34.8000				
4/29/90	119		1	13.25	8.0	8.7	12.27		28.8500				
4/29/90	119		1	13.25	9.0	8.5	12.26		23.8800				
4/29/90	119		1	13.25	10.0	8.1	12.26		19.7600				
4/29/90	119		1	13.25	11.0	7.8	12.24		16.3500				
4/29/90	119		1	13.25	12.0	7.5	12.16		13.4300				
4/29/90	119		1	13.25	13.0	7.3	12.16		10.9900				
4/29/90	119		1	13.25	14.0	7.1	12.10		8.9300				
4/29/90	119	H	1	13.25	15.0	7.0	12.09		7.2300	5.30	-1	0.73	1.22
4/29/90	119	H	2	13.25	15.0	7.0	12.09		7.2300	5.30	-2	0.76	1.30
4/29/90	119		1	13.25	16.0	7.0	12.03		5.8800				
4/29/90	119		1	13.25	17.0	6.8	11.92		4.6900				
4/29/90	119		1	13.25	18.0	6.7	11.79		3.7300				
4/29/90	119		1	13.25	19.0	6.7	11.54		2.9600				
4/29/90	119		1	13.25	20.0	6.6	11.46		2.3400				
4/29/90	119		1	13.25	21.0	6.6	11.14		1.8100				
4/29/90	119		1	13.25	22.0	6.5	10.78		0.7700				
4/29/90	119		1	13.25	23.0	6.5	2.80						

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 5/17/90 JULIAN DATE: 137 TIME: 17.25

SECCHI M: 14.5 WEATHER: Cloudy, windy, downpour! PERSONNEL: JAA REM

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
5/17/90	137	S	1	17.25	-1.0	20.1							
5/17/90	137		1	17.25	0.0	14.6	10.30		100.0000				
5/17/90	137		1	17.25	1.0	14.5	10.30		50.8900				
5/17/90	137		1	17.25	2.0	14.3	10.30		35.5100				
5/17/90	137		1	17.25	3.0	14.1	10.35		28.8000				
5/17/90	137	E	1	17.25	4.0	13.7	10.35		23.9600	5.27	-4	0.61	0.91
5/17/90	137	E	2	17.25	4.0	13.7	10.35		23.9600	5.30	-2	0.46	0.68
5/17/90	137		1	17.25	5.0	13.5	10.40		19.9700				
5/17/90	137		1	17.25	6.0	13.2	10.45		17.2600				
5/17/90	137		1	17.25	7.0	12.6	10.50		14.6900				
5/17/90	137		1	17.25	8.0	12.5	11.90		12.1100				
5/17/90	137		1	17.25	9.0	9.5	12.25		10.0200				
5/17/90	137		1	17.25	10.0	9.1	12.35		8.3400				
5/17/90	137		1	17.25	11.0	8.6	12.40		7.0900				
5/17/90	137	M	1	17.25	12.0	8.3	12.35		5.8900	5.30	-1	0.62	0.94
5/17/90	137	M	2	17.25	12.0	8.3	12.35		5.8900	5.30	-4	0.53	0.88
5/17/90	137		1	17.25	13.0	8.0	12.35		4.8900				
5/17/90	137		1	17.25	14.0	7.6	12.20		4.0300				
5/17/90	137		1	17.25	15.0	7.4	12.20		3.3100				
5/17/90	137		1	17.25	16.0	7.3	11.95		2.7300				
5/17/90	137		1	17.25	17.0	7.2	12.00		2.2100				
5/17/90	137	H	1	17.25	18.0	7.1	11.85		1.7900	5.26	-5	0.86	1.40
5/17/90	137	H	2	17.25	18.0	7.1	11.85		1.7900	5.26	-1	0.57	0.92
5/17/90	137		1	17.25	19.0	7.0	11.60		1.2900				
5/17/90	137		1	17.25	20.0	6.9	11.40		1.1400				
5/17/90	137		1	17.25	21.0	6.8	11.00		0.9100				
5/17/90	137		1	17.25	22.0	6.8	10.50		0.7000				
5/17/90	137		1	17.25	23.0								

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 6/05/90 JULIAN DATE: 156 TIME: 11.75

SECCHI M: 14.2 WEATHER: Mostly sunny, windy PERSONNEL: JAA SRC

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

COMMENTS: Algae lost

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
6/05/90	156	S	1	11.75	-1.0	15.9							
6/05/90	156		1	11.75	0.0	16.6	9.41		100.0000				
6/05/90	156		1	11.75	1.0	16.6	9.33		86.5800				
6/05/90	156		1	11.75	2.0	16.6	9.30		73.2500				
6/05/90	156		1	11.75	3.0	16.5	9.31		55.1200				
6/05/90	156		1	11.75	4.0	16.5	9.23		46.6700				
6/05/90	156	E	1	11.75	5.0	15.8	9.51		38.9600	5.32		0.02	0.07
6/05/90	156	E	2	11.75	5.0	15.8	9.51		38.9600	5.34			
6/05/90	156		1	11.75	6.0	15.6	9.58		32.6800				
6/05/90	156		1	11.75	7.0	15.1	9.62		27.2600				
6/05/90	156		1	11.75	8.0	14.8	9.86		19.4300				
6/05/90	156		1	11.75	9.0	12.4	11.39		16.6200				
6/05/90	156		1	11.75	10.0	11.4	11.66		15.6900				
6/05/90	156	M	1	11.75	11.0	10.4	11.81		11.6000	5.36		0.10	0.26
6/05/90	156	M	2	11.75	11.0	10.4	11.81		11.6000	5.37			
6/05/90	156		1	11.75	12.0	9.7	11.78		10.2900				
6/05/90	156		1	11.75	13.0	9.1	12.01		8.9900				
6/05/90	156		1	11.75	14.0	9.0	12.06		7.0600				
6/05/90	156		1	11.75	15.0	8.6	12.08		5.8300				
6/05/90	156		1	11.75	16.0	8.4	11.94		5.0300				
6/05/90	156	H	1	11.75	17.0	8.1	11.92		4.3300	5.38		0.12	0.28
6/05/90	156	H	2	11.75	17.0	8.1	11.92		4.3300	5.38			
6/05/90	156		1	11.75	18.0	8.0	11.74		3.3600				
6/05/90	156		1	11.75	19.0	7.7	11.31		2.6500				
6/05/90	156		1	11.75	20.0	7.6	10.98		2.0400				
6/05/90	156		1	11.75	21.0	7.5	10.65		1.7000				
6/05/90	156		1	11.75	22.0	7.5	10.25		1.1900				
6/05/90	156		1	11.75	23.0	7.5	8.89						

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 6/18/90 JULIAN DATE: 169 TIME: 11.00

SECCHI M: 16.3 WEATHER: Overcast, breezy PERSONNEL: JAA JS MR

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
6/18/90	169	S	1	11.00	-1.0								
6/18/90	169		1	11.00	0.0	20.1	9.04		100.0000				
6/18/90	169		1	11.00	1.0	20.3	9.43		70.8700				
6/18/90	169		1	11.00	2.0	19.4	9.32		66.8600				
6/18/90	169		1	11.00	3.0	18.9	9.42		54.5900				
6/18/90	169		1	11.00	4.0	18.6	9.48		46.4800				
6/18/90	169	E	1	11.00	5.0	18.5	9.71		38.6400	5.18	-3	0.56	0.86
6/18/90	169	E	2	11.00	5.0	18.5	9.71		38.6400	5.26	-1	0.43	0.69
6/18/90	169		1	11.00	6.0	18.2	9.70		32.1400				
6/18/90	169		1	11.00	7.0	17.4	9.92		28.5500				
6/18/90	169		1	11.00	8.0	16.4	10.41		24.7800				
6/18/90	169		1	11.00	9.0	13.7	11.65		21.2200				
6/18/90	169	M	1	11.00	10.0	12.6	12.09		17.4100	5.50	5	0.75	0.97
6/18/90	169	M	2	11.00	10.0	12.6	12.09		17.4100	5.24	-2	0.55	0.87
6/18/90	169		1	11.00	11.0	11.6	12.27		14.6300				
6/18/90	169		1	11.00	12.0	11.0	12.47		12.5300				
6/18/90	169		1	11.00	13.0	10.4	12.59		10.0300				
6/18/90	169		1	11.00	14.0	9.9	12.64		8.2300				
6/18/90	169		1	11.00	15.0	9.4	12.66		6.8900				
6/18/90	169	H	1	11.00	16.0	9.0	12.55		5.6500	5.26	-2	0.87	1.11
6/18/90	169	H	2	11.00	16.0	9.0	12.55		5.6500	5.28	-1	0.70	1.01
6/18/90	169		1	11.00	17.0	8.6	12.49		4.5100				
6/18/90	169		1	11.00	18.0	8.5	12.42		3.7100				
6/18/90	169		1	11.00	19.0	8.1	11.61		2.9400				
6/18/90	169		1	11.00	20.0	8.0	10.92		2.3100				
6/18/90	169		1	11.00	21.0	7.9	10.12		1.7600				
6/18/90	169		1	11.00	22.0	7.8	9.50		1.3100				
6/18/90	169		1	11.00	23.0	7.8	8.40						

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 7/03/90 JULIAN DATE: 184 TIME: 11.00

SECCHI M: 16.3 WEATHER: Mostly sunny PERSONNEL: MR JA

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

COMMENTS: No alkalinity or pH data

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
7/03/90	184	S	1	11.00	-1.0								
7/03/90	184		1	11.00	0.0	21.1	9.02		100.0000				
7/03/90	184		1	11.00	1.0	21.3	8.80		81.4300				
7/03/90	184		1	11.00	2.0	21.3	8.77		76.6800				
7/03/90	184	E	1	11.00	3.0	21.3	8.72		71.2600			0.23	0.29
7/03/90	184	E	2	11.00	3.0	21.3	8.72		71.2600			0.26	0.29
7/03/90	184		1	11.00	4.0	21.3	8.60		60.7000				
7/03/90	184		1	11.00	5.0	21.1	8.80		55.5400				
7/03/90	184		1	11.00	6.0	20.3	9.44		48.0400				
7/03/90	184		1	11.00	7.0	19.2	9.94		42.5200				
7/03/90	184		1	11.00	8.0	17.6	10.53		40.1800				
7/03/90	184		1	11.00	9.0	15.9	11.44		38.0200				
7/03/90	184	M	1	11.00	10.0	14.0	12.13		34.7800			0.96	1.16
7/03/90	184	M	2	11.00	10.0	14.0	12.13		34.7800			0.69	0.78
7/03/90	184		1	11.00	11.0	13.0	12.42		34.1700				
7/03/90	184		1	11.00	12.0	11.8	12.50		30.5300				
7/03/90	184		1	11.00	13.0	11.0	12.61		27.8300				
7/03/90	184		1	11.00	14.0	10.3	12.64		24.2900				
7/03/90	184		1	11.00	15.0	10.0	12.52		23.8400				
7/03/90	184		1	11.00	16.0	9.3	12.41		23.1600				
7/03/90	184		1	11.00	17.0	9.1	12.29		20.9200				
7/03/90	184	H	1	11.00	18.0	8.8	12.00		17.0400			2.36	2.84
7/03/90	184	H	2	11.00	18.0	8.8	12.00		17.0400			2.20	2.65
7/03/90	184		1	11.00	19.0	8.5	11.88		15.9600				
7/03/90	184		1	11.00	20.0	8.4	11.20		13.8900				
7/03/90	184		1	11.00	21.0	8.3	10.66		11.4600				
7/03/90	184		1	11.00	22.0	8.2	7.52		7.8900				
7/03/90	184		1	11.00	23.0	8.1	1.98						

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 7/19/90 JULIAN DATE: 200 TIME: 15.50

SECCHI M: 13.1 WEATHER: Partly sunny PERSONNEL: DAM JAA

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
7/19/90	200	S	1	15.50	-1.0								
7/19/90	200		1	15.50	0.0	24.1	8.30		100.0000				
7/19/90	200		1	15.50	1.0	23.8	8.26		70.6200				
7/19/90	200		1	15.50	2.0	23.6	8.26		51.7000				
7/19/90	200		1	15.50	3.0	22.7	8.30		46.2000				
7/19/90	200	E	1	15.50	4.0	22.3	8.28		36.9600	5.27	-6	0.26	0.33
7/19/90	200	E	2	15.50	4.0	22.3	8.28		36.9600	5.22	2	0.32	0.40
7/19/90	200		1	15.50	5.0	22.1	8.36		30.4500				
7/19/90	200		1	15.50	6.0	21.8	8.43		25.6700				
7/19/90	200		1	15.50	7.0	21.5	8.48		22.0200				
7/19/90	200		1	15.50	8.0	20.6	9.10		17.3900				
7/19/90	200		1	15.50	9.0	18.0	10.74		13.9200				
7/19/90	200		1	15.50	10.0	16.1	11.35		11.5400				
7/19/90	200	M	1	15.50	11.0	14.1	11.82		8.9600	5.28	-3	1.69	1.69
7/19/90	200	M	2	15.50	11.0	14.1	11.82		8.9600	5.30	-2	1.10	1.39
7/19/90	200		1	15.50	12.0	13.1	12.00		7.3100				
7/19/90	200		1	15.50	13.0	12.1	12.15		6.1200				
7/19/90	200		1	15.50	14.0	11.4	12.25		4.7200				
7/19/90	200		1	15.50	15.0	10.5	12.33		3.6000				
7/19/90	200		1	15.50	16.0	10.0	12.32		2.8400				
7/19/90	200	H	1	15.50	17.0	9.6	12.32		2.3100	5.14	-9	3.48	3.88
7/19/90	200	H	2	15.50	17.0	9.6	12.32		2.3100	5.37	-3	2.61	3.36
7/19/90	200		1	15.50	18.0	9.3	12.06		1.8700				
7/19/90	200		1	15.50	19.0	8.9	11.64		1.4600				
7/19/90	200		1	15.50	20.0	8.8	10.66		1.1100				
7/19/90	200		1	15.50	21.0	8.7	9.97		0.7800				
7/19/90	200		1	15.50	22.0	8.6	9.30		0.4900				
7/19/90	200		1	15.50	23.0	8.6							

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 7/31/90 JULIAN DATE: 212 TIME: 11.05

SECCHI M: 14.5 WEATHER: Cloudy PERSONNEL: JAA KG

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

COMMENTS: No alkalinities; no pHix for pH

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
7/31/90	212	S	1	11.05	-1.0								
7/31/90	212		1	11.05	0.0	24.6	7.60		100.0000				
7/31/90	212		1	11.05	1.0	24.5	7.80		65.3600				
7/31/90	212		1	11.05	2.0	24.5	7.83		52.5800				
7/31/90	212		1	11.05	3.0	24.5	7.83		47.5900				
7/31/90	212	E	1	11.05	4.0	24.5	7.85		41.8900	5.29		0.58	0.71
7/31/90	212	E	2	11.05	4.0	24.5	7.85		41.8900			0.49	0.64
7/31/90	212		1	11.05	5.0	24.4	7.85		35.7400				
7/31/90	212		1	11.05	6.0	24.0	8.15		30.0400				
7/31/90	212		1	11.05	7.0	23.3	8.55		24.8200				
7/31/90	212		1	11.05	8.0	22.2	9.05		19.6200				
7/31/90	212		1	11.05	9.0	19.4	10.70		14.8900				
7/31/90	212		1	11.05	10.0	16.7	11.48		11.1200				
7/31/90	212	M	1	11.05	11.0	15.2	11.70		8.7900	5.20		1.26	1.56
7/31/90	212	M	2	11.05	11.0	15.2	11.70		8.7900			1.06	1.46
7/31/90	212		1	11.05	12.0	13.7	12.00		6.9700				
7/31/90	212		1	11.05	13.0	12.6	11.95		5.6300				
7/31/90	212		1	11.05	14.0	11.9	12.07		4.4700				
7/31/90	212		1	11.05	15.0	11.4	12.07		3.5000				
7/31/90	212		1	11.05	16.0	10.6	12.10		2.6900				
7/31/90	212		1	11.05	17.0	10.1	12.10		2.0300				
7/31/90	212	H	1	11.05	18.0	9.6	11.65		1.5100	4.96		1.70	2.59
7/31/90	212	H	2	11.05	18.0	9.6	11.65		1.5100			1.72	2.49
7/31/90	212		1	11.05	19.0	9.2	11.02		1.0900				
7/31/90	212		1	11.05	20.0	8.9	9.40		0.7700				
7/31/90	212		1	11.05	21.0	8.7	7.50		0.5400				
7/31/90	212		1	11.05	22.0	8.6	6.50		0.3300				
7/31/90	212		1	11.05	23.0	8.6							

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 8/11/90 JULIAN DATE: 223 TIME: 11.25

SECCHI M: 13.5 WEATHER: Cloudy PERSONNEL: JAA SRC

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
8/11/90	223	S	1	11.25	-1.0	22.7							
8/11/90	223		1	11.25	0.0	23.1	8.05		100.0000				
8/11/90	223		1	11.25	1.0	23.1	8.06		51.2800				
8/11/90	223		1	11.25	2.0	23.0	8.04		41.8000				
8/11/90	223		1	11.25	3.0	23.0	8.02		38.8800				
8/11/90	223	E	1	11.25	4.0	23.0	8.03		32.4000	5.56	-5	2.18	2.54
8/11/90	223	E	2	11.25	4.0	23.0	8.03		32.4000	5.40	-5	1.97	2.23
8/11/90	223		1	11.25	5.0	23.0	8.08		24.4700				
8/11/90	223		1	11.25	6.0	23.0	8.00		20.0400				
8/11/90	223		1	11.25	7.0	23.0	8.00		15.6600				
8/11/90	223		1	11.25	8.0	22.8	8.00		12.1900				
8/11/90	223		1	11.25	9.0	20.6	10.15		9.0900				
8/11/90	223		1	11.25	10.0	18.1	11.06		6.5200				
8/11/90	223	M	1	11.25	11.0	15.8	11.52		5.0100	5.44	-1	2.57	2.89
8/11/90	223	M	2	11.25	11.0	15.8	11.52		5.0100	5.44	1	2.32	2.70
8/11/90	223		1	11.25	12.0	14.3	11.65		3.8000				
8/11/90	223		1	11.25	13.0	13.1	11.87		2.9200				
8/11/90	223		1	11.25	14.0	12.2	12.03		2.2700				
8/11/90	223		1	11.25	15.0	11.3	12.12		1.7400				
8/11/90	223		1	11.25	16.0	10.7	12.18		1.3300				
8/11/90	223		1	11.25	17.0	10.2	12.27		0.9900				
8/11/90	223	H	1	11.25	18.0	9.6	11.42		0.7100	5.52	3	1.15	2.03
8/11/90	223	H	2	11.25	18.0	9.6	11.42		0.7100	5.55	2	0.73	1.49
8/11/90	223		1	11.25	19.0	9.1	9.63		0.4870				
8/11/90	223		1	11.25	20.0	8.9	7.75		0.3300				
8/11/90	223		1	11.25	21.0	8.7	5.95		0.1960				
8/11/90	223		1	11.25	22.0	8.6	4.33		0.0700				
8/11/90	223		1	11.25	23.0	8.6	3.85						

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 9/03/90 JULIAN DATE: 246 TIME: 12.55

SECCHI M: 12.5 WEATHER: Sunny, a few clouds PERSONNEL: SRC REM

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

COMMENTS: No alkalinity

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
9/03/90	246	S	1	12.55	-1.0	21.4							
9/03/90	246		1	12.55	0.0	21.8	8.58		100.0000				
9/03/90	246		1	12.55	1.0	22.1	8.40		76.9200				
9/03/90	246		1	12.55	2.0	22.3	8.50		62.9000				
9/03/90	246		1	12.55	3.0	22.1	8.53		60.1300				
9/03/90	246		1	12.55	4.0	22.4	8.51		44.3800				
9/03/90	246	E	1	12.55	5.0	22.4	8.40		29.7600	5.44		1.62	1.72
9/03/90	246	E	2	12.55	5.0	22.4	8.40		29.7600	5.45			
9/03/90	246		1	12.55	6.0	22.5	8.48		24.1400				
9/03/90	246		1	12.55	7.0	22.5	8.48		18.4800				
9/03/90	246		1	12.55	8.0	22.4	8.55		14.1900				
9/03/90	246		1	12.55	9.0	21.8	8.68		10.7300				
9/03/90	246		1	12.55	10.0	19.5	10.97		7.5800				
9/03/90	246	M	1	12.55	11.0	17.4	11.22		5.4000	5.40		7.36	7.36
9/03/90	246	M	2	12.55	11.0	17.4	11.22		5.4000	5.40		7.39	7.61
9/03/90	246		1	12.55	12.0	15.1	11.47		4.2600				
9/03/90	246		1	12.55	13.0	14.1	11.74		3.3100				
9/03/90	246		1	12.55	14.0	13.2	11.76		2.3500				
9/03/90	246		1	12.55	15.0	12.2	11.58		1.7100				
9/03/90	246		1	12.55	16.0	11.4	11.02		1.2200				
9/03/90	246	H	1	12.55	17.0	10.8	10.64		0.8600	5.56		3.59	4.09
9/03/90	246	H	2	12.55	17.0	10.8	10.64		0.8600	5.58		2.33	2.79
9/03/90	246		1	12.55	18.0	10.4	8.38		0.6100				
9/03/90	246		1	12.55	19.0	10.1	6.93		0.4300				
9/03/90	246		1	12.55	20.0	9.8	4.81		0.2900				
9/03/90	246		1	12.55	21.0	9.6	3.64		0.1900				
9/03/90	246		1	12.55	22.0	9.3	3.02		0.1200				

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 9/14/90 JULIAN DATE: 257 TIME: 14.25

SECCHI M: 12.5 WEATHER: Cloudy, wind SSE PERSONNEL: JAA GG

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

COMMENTS: Date may have been 9/15/90

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
9/14/90	257	S	1	14.25	-1.0								
9/14/90	257		1	14.25	0.0	22.7	8.53		100.0000				
9/14/90	257		1	14.25	1.0	22.6	8.35		64.4800				
9/14/90	257		1	14.25	2.0	22.5	8.37		41.8400				
9/14/90	257		1	14.25	3.0	22.5	8.50		37.6900				
9/14/90	257		1	14.25	4.0	22.4	8.43		26.8100				
9/14/90	257	E	1	14.25	5.0	22.3	8.33		20.3100	5.44	-5	1.23	1.35
9/14/90	257	E	2	14.25	5.0	22.3	8.33		20.3100	5.40	-4	1.85	1.88
9/14/90	257		1	14.25	6.0	22.1	8.52		16.7300				
9/14/90	257		1	14.25	7.0	22.0	8.54		12.9600				
9/14/90	257		1	14.25	8.0	21.9	8.56		10.4600				
9/14/90	257		1	14.25	9.0	21.7	8.39		7.6100				
9/14/90	257		1	14.25	10.0	20.9	8.84		5.4400				
9/14/90	257		1	14.25	11.0	17.7	10.42		3.5400				
9/14/90	257		1	14.25	12.0	15.4	10.50		2.5300				
9/14/90	257	M	1	14.25	13.0	14.1	10.82		2.0300	5.42	-4	6.94	7.74
9/14/90	257	M	2	14.25	13.0	14.1	10.82		2.0300	5.40	0	5.37	5.45
9/14/90	257		1	14.25	14.0	13.0	10.98		1.4900				
9/14/90	257		1	14.25	15.0	12.0	10.08		1.1100				
9/14/90	257		1	14.25	16.0	11.1	9.63		0.8300				
9/14/90	257		1	14.25	17.0	10.4	9.28		0.5900				
9/14/90	257		1	14.25	18.0	9.9	8.38		0.4000				
9/14/90	257	H	1	14.25	19.0	9.4	6.42		0.2800	5.42	12	2.64	3.36
9/14/90	257	H	2	14.25	19.0	9.4	6.42		0.2800	5.41	10	2.72	3.23
9/14/90	257		1	14.25	20.0	9.1	4.32		0.1900				
9/14/90	257		1	14.25	21.0	8.9	3.42		0.1300				
9/14/90	257		1	14.25	22.0	8.8	2.93		0.0800				
9/14/90	257		1	14.25	23.0	8.7	1.31						

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 10/19/90 JULIAN DATE: 292 TIME: 10.75

SECCHI M: 11.5 WEATHER: Mostly sunny PERSONNEL: JAA GG

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

COMMENTS: Chlorophylls lost; no pHix for pH

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
10/19/90	292	S	1	10.75	-1.0								
10/19/90	292		1	10.75	0.0	16.4	8.10		100.0000				
10/19/90	292		1	10.75	1.0	16.5	7.96		74.0700				
10/19/90	292		1	10.75	2.0	16.5	7.96		54.5100				
10/19/90	292		1	10.75	3.0	16.5	7.80		46.0800				
10/19/90	292		1	10.75	4.0	16.5	7.92		39.6900				
10/19/90	292		1	10.75	5.0	16.5	7.93		32.8500				
10/19/90	292		1	10.75	6.0	16.5	7.93		27.5600				
10/19/90	292	E	1	10.75	7.0	16.5	7.88		23.1800	5.31	-4		
10/19/90	292	E	2	10.75	7.0	16.5	7.88		23.1800	5.29	-1		
10/19/90	292		1	10.75	8.0	16.5	7.75		19.6300				
10/19/90	292		1	10.75	9.0	16.5	7.64		16.6300				
10/19/90	292		1	10.75	10.0	16.4	7.75		13.9900				
10/19/90	292		1	10.75	11.0	16.4	7.83		10.8000				
10/19/90	292		1	10.75	12.0	16.3	7.75		8.7400				
10/19/90	292		1	10.75	13.0	16.4	7.72		7.4300				
10/19/90	292		1	10.75	14.0	13.6	7.45		6.0300				
10/19/90	292	M	1	10.75	15.0	12.0	6.95		4.8300	5.33	12		
10/19/90	292	M	2	10.75	15.0	12.0	6.95		4.8300	5.33	14		
10/19/90	292		1	10.75	16.0	10.9	6.56		3.7200				
10/19/90	292		1	10.75	17.0	10.3	6.22		2.8500				
10/19/90	292		1	10.75	18.0	9.8	4.62		2.0100				
10/19/90	292		1	10.75	19.0	9.3	2.63		1.3100				
10/19/90	292	H	1	10.75	20.0	9.1	1.26		0.7600	5.60	75		
10/19/90	292	H	2	10.75	20.0	9.1	1.26		0.7600	5.50	58		
10/19/90	292		1	10.75	21.0	8.9	0.58		0.3600				
10/19/90	292		1	10.75	22.0	8.8	0.26		0.0900				
10/19/90	292		1	10.75	23.0	8.8							

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 11/19/90 JULIAN DATE: 323 TIME: 11.75

SECCHI M: 9.9 WEATHER: Sunny, slight breeze PERSONNEL: JAA SRC

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
11/19/90	323	S	1	11.75	-1.0								
11/19/90	323		1	11.75	0.0	7.9	10.14		100.0000				
11/19/90	323		1	11.75	1.0	7.9	10.01		58.5100				
11/19/90	323		1	11.75	2.0	7.9	9.80		38.6000				
11/19/90	323		1	11.75	3.0	7.9	9.79		23.0900				
11/19/90	323	E	1	11.75	4.0	7.9	9.80		18.8800	5.48	-1	1.02	1.38
11/19/90	323	E	2	11.75	4.0	7.9	9.80		18.8800	5.48	1	0.71	1.05
11/19/90	323		1	11.75	5.0	7.9	9.80		12.8200				
11/19/90	323		1	11.75	6.0	7.9	9.84		10.4500				
11/19/90	323		1	11.75	7.0	7.9	9.80		7.4000				
11/19/90	323		1	11.75	8.0	7.9	9.80		5.3400				
11/19/90	323		1	11.75	9.0	7.9	9.75		3.8900				
11/19/90	323		1	11.75	10.0	7.9	9.74		3.2400				
11/19/90	323	M	1	11.75	11.0	7.9	9.76		2.3800	5.49	2	1.06	1.45
11/19/90	323	M	2	11.75	11.0	7.9	9.76		2.3800	5.50	-1	0.97	1.16
11/19/90	323		1	11.75	12.0	7.9	9.77		1.7900				
11/19/90	323		1	11.75	13.0	7.9	9.74		1.5000				
11/19/90	323		1	11.75	14.0	7.9	9.69		1.1300				
11/19/90	323		1	11.75	15.0	7.9	9.79		0.9500				
11/19/90	323		1	11.75	16.0	7.9	9.80		0.7600				
11/19/90	323		1	11.75	17.0	7.9	9.81		0.5900				
11/19/90	323		1	11.75	18.0	7.9	9.80		0.4500				
11/19/90	323	H	1	11.75	19.0	7.9	9.76		0.3500	5.48	-2	0.99	1.23
11/19/90	323	H	2	11.75	19.0	7.9	9.76		0.3500	5.49	-2	0.80	0.99
11/19/90	323		1	11.75	20.0	7.9	9.76		0.2900				
11/19/90	323		1	11.75	21.0	7.9	9.83		0.2000				
11/19/90	323		1	11.75	22.0	7.8	9.74						
11/19/90	323		1	11.75	23.0	7.8							

LAKE GILES: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 12/13/90 JULIAN DATE: 347 TIME: 10.75

SECCHI M: 9.5 WEATHER: Overcast, windy PERSONNEL: JAA SRC

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

COMMENTS: pH, alkalinities 48 hrs old

DATE OF	JULIAN	STRA	REP	TIME	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM
12/13/90	347	S	1	10.75	-1.0	12.8							
12/13/90	347		1	10.75	0.0	4.9	12.09		100.0000				
12/13/90	347		1	10.75	1.0	4.9	11.93		77.1000				
12/13/90	347		1	10.75	2.0	4.9	11.93		58.7200				
12/13/90	347		1	10.75	3.0	4.9	11.90		47.0100				
12/13/90	347	E	1	10.75	4.0	4.9	11.92		34.7500	5.34	-3	1.82	2.33
12/13/90	347	E	2	10.75	4.0	4.9	11.92		34.7500	5.38	-1	1.72	2.16
12/13/90	347		1	10.75	5.0	4.9	11.87		26.3200				
12/13/90	347		1	10.75	6.0	4.9	11.90		19.4300				
12/13/90	347		1	10.75	7.0	4.9	11.87		14.5300				
12/13/90	347		1	10.75	8.0	4.8	11.89		10.8300				
12/13/90	347		1	10.75	9.0	4.8	11.95		8.0800				
12/13/90	347		1	10.75	10.0	4.8	11.92		6.0100				
12/13/90	347	M	1	10.75	11.0	4.8	11.87		4.5000	5.36	-1	1.32	1.72
12/13/90	347	M	2	10.75	11.0	4.8	11.87		4.5000	5.38	-0	1.52	1.86
12/13/90	347		1	10.75	12.0	4.8	11.86		3.4000				
12/13/90	347		1	10.75	13.0	4.8	11.93		2.5900				
12/13/90	347		1	10.75	14.0	4.8	11.86		1.9360				
12/13/90	347		1	10.75	15.0	4.8	11.95		1.4520				
12/13/90	347		1	10.75	16.0	4.8	11.99		1.0900				
12/13/90	347		1	10.75	17.0	4.8	11.90		0.8250				
12/13/90	347		1	10.75	18.0	4.8	11.97		0.6260				
12/13/90	347	H	1	10.75	19.0	4.8	11.98		0.4770	5.37	-1	1.59	1.89
12/13/90	347	H	2	10.75	19.0	4.8	11.98		0.4770	5.37	-0	1.49	1.82
12/13/90	347		1	10.75	20.0	4.8	11.80		0.3590				
12/13/90	347		1	10.75	21.0	4.8	11.89		0.2800				
12/13/90	347		1	10.75	22.0	4.8	11.97		0.2140				

APPENDIX I: CHEMISTRY

Table G.A.1 was compiled from unpublished data generated by Nina Caraco and Jon Cole at the Institute of Ecosystem Studies, New York Botanical Garden, Millbrook, New York. Note that the sampling dates were in 1989.

The analyses were not complete when this report was prepared, and all data may be subject to revision.

Table G.A.1. CHEMICAL CHARACTERIZATION OF LAKE GILES (1989)

Date	Depth m	Temp C	O2 mg/L	DIC uM	CH4 uM	S2- uM	Cond umho/ cm	pH	Ca mg/L	Mg mg/L	K mg/L	Na mg/L	Cl uM	SO4 uM	Fe tdFe uM	N tdN uM	P tdP uM	Fe tFe uM	N tN uM	P tP uM
06/20/89	0.5	20.0	9.8	13	<LD	--	41	5.27	2.28	0.75	0.50	3.33	--	83.2	1.0	--	0.08	1.1	--	0.13
06/20/89	6.2	16.2	12.5	10	<LD	--	42	5.44	--	--	--	--	--	84.0	0.6	--	0.08	1.7	--	0.15
06/20/89	15.4	12.3	13.0	17	<LD	--	42	5.61	--	--	--	--	--	83.2	0.9	--	0.10	2.3	--	0.15
06/20/89	20.3	7.9	11.4	67	<LD	--	46	5.74	--	--	--	--	--	87.9	0.6	--	0.19	1.3	--	0.40
08/03/89	0.5	23.3	8.2	24	<LD	<LD	41	5.44	2.01	0.69	0.45	3.06	--	105.0	0.6	--	0.09	0.8	--	0.13
08/03/89	15.0	15.5	11.7	22	<LD	<LD	42	5.49	--	--	--	--	--	105.0	0.5	--	0.08	0.4	--	0.15
08/03/89	21.0	8.4	6.6	147	<LD	<LD	45	5.47	--	--	--	--	--	100.0	--	--	0.19	2.5	--	0.66
09/14/89	0.5	22.0	8.4	11	<LD	0.1	41	5.73	2.24	0.75	0.52	3.31	--	89.4	0.4	--	0.11	0.7	--	0.14
09/14/89	11.0	14.1	12.0	36	<LD	0.1	42	5.71	--	--	--	--	--	99.5	1.5	--	0.14	4.9	--	0.30
09/14/89	21.0	8.8	4.0	106	<LD	0.1	45	5.62	--	--	--	--	--	82.4	1.0	--	0.24	5.3	--	1.01
10/06/89	0.5	15.8	9.9	18	<LD	<LD	41	5.56	2.03	0.72	0.50	3.10	--	98.7	1.1	--	0.08	1.5	--	0.17
10/06/89	14.0	12.6	11.0	63	<LD	<LD	43	5.65	2.17	0.75	0.50	2.99	--	97.2	0.6	--	0.11	1.8	--	0.22
10/06/89	20.0	9.0	3.7	222	<LD	<LD	46	5.63	2.22	0.74	0.57	3.01	--	94.8	1.3	--	0.18	2.5	--	0.69
10/06/89	21.0	8.7	1.8	312	<LD	<LD	47	5.57	2.28	0.74	0.59	3.15	--	82.4	1.3	--	0.26	6.5	--	2.23

Sampling and analyses supervised by Jon Cole and Nina Caraco of the Institute of Ecosystem Studies (Millbrook, NY).
Abbreviations: LD--limit of detection, td--total dissolved, t--total (particulate plus dissolved).

APPENDIX II: FISH SURVEY

The census of fish captured in Lake Giles in July 1990 that follows on the next three pages is reformatted from an electronic file provided by Kenneth Ersbak. It is a complete record of the fish collected by Aquatic Resource Consulting of Saylorsburg, PA. More details of this survey are contained in the final report:

Ersbak, K. 1990. Fishery Survey on the three "core" lakes of the Pocono Comparative Lakes Program. Aquatic Resources Consulting, Unpublished Report, 25 September 1990, 27 pp.

The modified electronic file will be maintained with the PCLP database. Currently it is a Quattro-Pro (vers. 1, Borland International, 1989) file called "FSH90G01.WQ1".

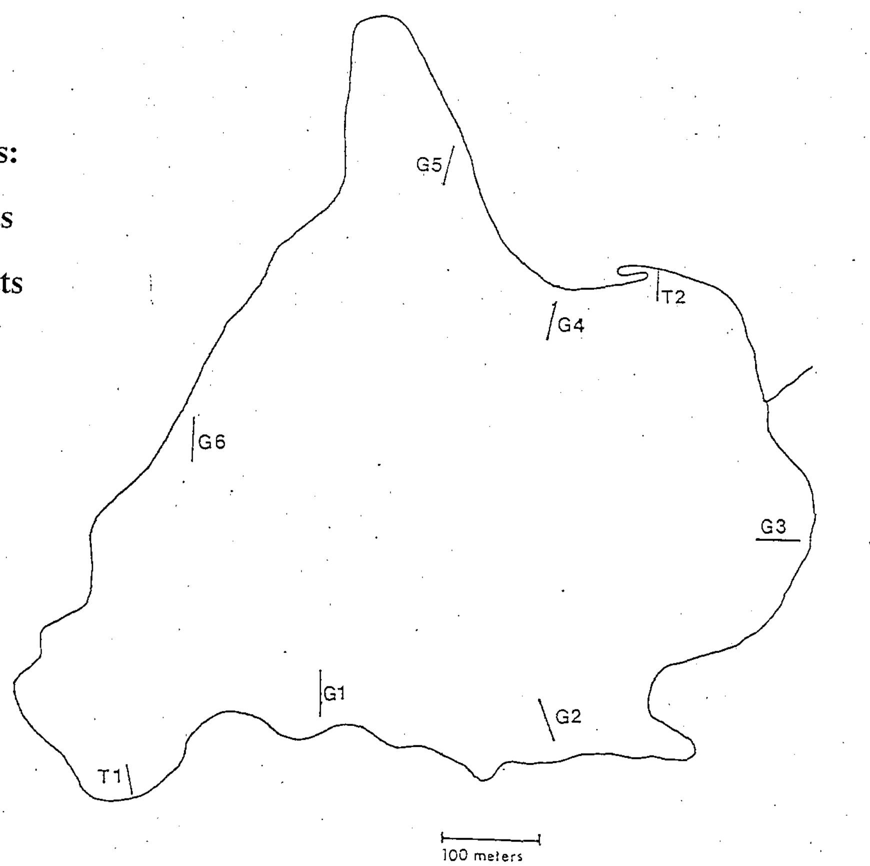
A sketch showing sampling sites is inserted below.

LAKE GILES

Location of Survey Sites:

G1-G6 --Gill Nets

T1-T2 --Trap Nets



POCONO COMPARATIVE LAKES PROGRAM FISH SURVEY - DATA SHEET

<FSH90G01.WQ1> -- Quattro Pro File for Giles fish survey of July 1990

<4/29/91> [modified by EMN 4/29/91]

OWNER OF DATA:	PCLP PROJECT (for general use)
QUESTIONS TO:	Kenneth Ersbak, Craig Williamson

GEAR: Gill Nets or Trap Nets
SET: Day (8am-8pm) or night (7pm-7am) deployment
SITE: Sampling location; see original Report

FISH CODE:

BB	Brown bullhead (Ictalurus nebulosus)
BG	Bluegill sunfish (Lepomis macrochirus)
BT	Brown trout (Salmo trutta)
CP	Chain pickerel (Esox niger)
LMB	Largemouth bass (Micropterus salmoides)
PS	Pumpkinseed sunfish (Lepomis gibbosus)
RT	Rainbow trout (Oncorhynchus mykiss)
SMB	Smallmouth bass (Micropterus dolomieui)
ST	Brook trout (Salvelinus fontinalis)
TT	Tiger trout (hybrid)

LENGTH: Length of fish in millimeters (1 inch = 25.4 mm)
WEIGHT: Weight of freshly caught fish in grams (1 pound = 454 g)
COND. Condition according to Carlander's scale

LAKE	DATE	GEAR	SET	SITE	FISH CODE	LENGTH (mm)	WEIGHT (g wet)	COND.
GILES	7/18/90	GILL	NIGHT	NET 1	LMB	395	844	1.37
GILES	7/18/90	GILL	NIGHT	NET 1	BB	366	718	1.46
GILES	7/18/90	GILL	NIGHT	NET 1	BB	366	718	1.46
GILES	7/18/90	GILL	NIGHT	NET 1	SMB	221	114	1.06
GILES	7/18/90	GILL	NIGHT	NET 1	SMB	256	162	0.97
GILES	7/18/90	GILL	NIGHT	NET 1	ST	382	602	1.08
GILES	7/18/90	GILL	NIGHT	NET 3	BG	235	238	1.83
GILES	7/18/90	GILL	NIGHT	NET 3	PS	198	186	2.40
GILES	7/18/90	GILL	NIGHT	NET 3	BB	360	750	1.61
GILES	7/18/90	GILL	NIGHT	NET 3	SMB	433	944	1.16
GILES	7/18/90	GILL	NIGHT	NET 3	CP	433	540	0.67
GILES	7/18/90	GILL	NIGHT	NET 3	ST	350	484	1.13
GILES	7/18/90	GILL	NIGHT	NET 3	ST	382	554	0.99
GILES	7/18/90	GILL	NIGHT	NET 3	ST	382	708	1.27
GILES	7/18/90	TRAP	NIGHT	NET 1	BG	112	25	1.78
GILES	7/18/90	TRAP	NIGHT	NET 1	BG	113	25	1.73
GILES	7/18/90	TRAP	NIGHT	NET 1	BG	115	27	1.78
GILES	7/18/90	TRAP	NIGHT	NET 1	BG	149	58	1.75
GILES	7/18/90	TRAP	NIGHT	NET 1	BG	156	68	1.79
GILES	7/18/90	TRAP	NIGHT	NET 1	BG	157	74	1.91
GILES	7/18/90	TRAP	NIGHT	NET 1	BG	162	74	1.74
GILES	7/18/90	TRAP	NIGHT	NET 1	BG	184	114	1.83
GILES	7/18/90	TRAP	NIGHT	NET 1	BG	201	138	1.70
GILES	7/18/90	TRAP	NIGHT	NET 1	PS	105	18	1.55

POCONO COMPARATIVE LAKES PROGRAM FISH SURVEY - DATA SHEET

GILES	7/18/90	TRAP	NIGHT	NET 1	PS	114	25	1.69
GILES	7/18/90	TRAP	NIGHT	NET 1	PS	126	35	1.75
GILES	7/18/90	TRAP	NIGHT	NET 1	PS	141	54	1.93
GILES	7/18/90	TRAP	NIGHT	NET 1	PS	144	53	1.77
GILES	7/18/90	TRAP	NIGHT	NET 1	PS	150	51	1.51
GILES	7/18/90	TRAP	NIGHT	NET 1	PS	187	114	1.74
GILES	7/18/90	TRAP	NIGHT	NET 1	BB	339	508	1.30
GILES	7/18/90	TRAP	NIGHT	NET 1	SMB	234	156	1.22
GILES	7/18/90	GILL	DAY	NET 1	BG	241	296	2.11
GILES	7/18/90	GILL	DAY	NET 1	BG	344	332	0.82
GILES	7/18/90	GILL	DAY	NET 1	SMB	219	130	1.24
GILES	7/18/90	GILL	DAY	NET 1	ST	450	882	0.97
GILES	7/18/90	GILL	DAY	NET 3	SMB	206	106	1.21
GILES	7/18/90	GILL	DAY	NET 3	SMB	235	140	1.08
GILES	7/18/90	GILL	DAY	NET 3	ST	349	490	1.15
GILES	7/18/90	GILL	DAY	NET 3	ST	350	424	0.99
GILES	7/18/90	GILL	DAY	NET 3	ST	375	532	1.01
GILES	7/18/90	TRAP	DAY	NET 1	BG	179	118	2.06
GILES	7/18/90	TRAP	DAY	NET 1	BG	184	106	1.70
GILES	7/18/90	TRAP	DAY	NET 1	BG	194	142	1.94
GILES	7/18/90	TRAP	DAY	NET 1	BG	219	202	1.92
GILES	7/18/90	TRAP	DAY	NET 1	PS	147	61	1.92
GILES	7/18/90	TRAP	DAY	NET 1	PS	172	94	1.85
GILES	7/18/90	TRAP	DAY	NET 1	PS	184	120	1.93
GILES	7/20/90	GILL	NIGHT	NET 4	SMB	199	84	1.07
GILES	7/20/90	GILL	NIGHT	NET 4	SMB	209	105	1.15
GILES	7/20/90	GILL	NIGHT	NET 4	SMB	211	104	1.11
GILES	7/20/90	GILL	NIGHT	NET 4	ST	370	480	0.95
GILES	7/20/90	GILL	NIGHT	NET 4	ST	370	544	1.07
GILES	7/20/90	GILL	NIGHT	NET 4	ST	375	476	0.90
GILES	7/20/90	GILL	NIGHT	NET 4	ST	395	694	1.13
GILES	7/20/90	GILL	NIGHT	NET 4	ST	403	660	1.01
GILES	7/20/90	GILL	NIGHT	NET 4	ST	405	645	0.97
GILES	7/20/90	GILL	NIGHT	NET 4	ST	449	1018	1.12
GILES	7/20/90	GILL	NIGHT	NET 4	RT	325	323	0.94
GILES	7/20/90	GILL	NIGHT	NET 4	RT	376	694	1.31
GILES	7/20/90	GILL	NIGHT	NET 5	BB	352	648	1.49
GILES	7/20/90	GILL	NIGHT	NET 5	ST	358	490	1.07
GILES	7/20/90	GILL	NIGHT	NET 6	BG	209	158	1.73
GILES	7/20/90	GILL	NIGHT	NET 6	BG	222	249	2.28
GILES	7/20/90	GILL	NIGHT	NET 6	SMB	207	104	1.17
GILES	7/20/90	GILL	NIGHT	NET 6	SMB	211	106	1.13
GILES	7/20/90	GILL	NIGHT	NET 6	SMB	212	156	1.64
GILES	7/20/90	GILL	NIGHT	NET 6	ST	312	604	1.99
GILES	7/20/90	GILL	NIGHT	NET 6	ST	360	552	1.18
GILES	7/20/90	GILL	NIGHT	NET 6	ST	368	528	1.06
GILES	7/20/90	GILL	NIGHT	NET 6	ST	372	498	0.97
GILES	7/20/90	GILL	NIGHT	NET 6	ST	373	514	0.99
GILES	7/20/90	GILL	NIGHT	NET 6	ST	379	508	0.93
GILES	7/20/90	GILL	NIGHT	NET 6	ST	381	608	1.10
GILES	7/20/90	GILL	NIGHT	NET 6	ST	395	658	1.07
GILES	7/20/90	GILL	NIGHT	NET 6	ST	432	936	1.16
GILES	7/20/90	GILL	NIGHT	NET 6	TT	420	678	0.92
GILES	7/20/90	TRAP	NIGHT	NET 2	BG	90	12	1.65
GILES	7/20/90	TRAP	NIGHT	NET 2	BG	95	14	1.63

GILES	7/20/90	TRAP	NIGHT	NET 2	BG	106	20	1.68
GILES	7/20/90	TRAP	NIGHT	NET 2	BG	121	31	1.75
GILES	7/20/90	TRAP	NIGHT	NET 2	BG	126	32	1.60
GILES	7/20/90	TRAP	NIGHT	NET 2	BG	160	76	1.86
GILES	7/20/90	TRAP	NIGHT	NET 2	BG	175	121	2.26
GILES	7/20/90	TRAP	NIGHT	NET 2	BG	209	175	1.92
GILES	7/20/90	TRAP	NIGHT	NET 2	BG	214	194	1.98
GILES	7/20/90	TRAP	NIGHT	NET 2	PS	119	32	1.90
GILES	7/20/90	GILL	DAY	NET 4	BG	216	201	1.99
GILES	7/20/90	GILL	DAY	NET 4	BG	221	187	1.73
GILES	7/20/90	GILL	DAY	NET 4	SMB	226	127	1.10
GILES	7/20/90	GILL	DAY	NET 4	SMB	343	480	1.19
GILES	7/20/90	GILL	DAY	NET 5	BG	240	288	2.08
GILES	7/20/90	GILL	DAY	NET 5	LMB	508	1928	1.47
GILES	7/20/90	GILL	DAY	NET 5	SMB	245	174	1.18
GILES	7/20/90	GILL	DAY	NET 5	SMB	262	205	1.14
GILES	7/20/90	GILL	DAY	NET 5	SMB	392	878	1.46
GILES	7/20/90	GILL	DAY	NET 6	ST	410	652	0.95
GILES	7/20/90	GILL	DAY	NET 6	ST	346	480	1.16
GILES	7/20/90	GILL	DAY	NET 6	ST	360	452	0.97
GILES	7/20/90	GILL	DAY	NET 6	ST	370	496	0.98
GILES	7/20/90	GILL	DAY	NET 6	ST	370	476	0.94
GILES	7/20/90	GILL	DAY	NET 6	ST	376	566	1.06
GILES	7/20/90	GILL	DAY	NET 6	ST	380	548	1.00
GILES	7/20/90	GILL	DAY	NET 6	ST	383	624	1.11
GILES	7/20/90	GILL	DAY	NET 6	ST	385	624	1.09
GILES	7/20/90	GILL	DAY	NET 6	ST	389	608	1.03
GILES	7/20/90	GILL	DAY	NET 6	ST	392	644	1.07
GILES	7/20/90	GILL	DAY	NET 6	ST	393	656	1.08
GILES	7/20/90	GILL	DAY	NET 6	ST	408	678	1.00
GILES	7/20/90	GILL	DAY	NET 6	RT	302	208	0.76
GILES	7/20/90	GILL	DAY	NET 6	RT	330	330	0.92
GILES	7/20/90	GILL	DAY	NET 6	BT	335	335	0.89
GILES	7/20/90	GILL	DAY	NET 6	BT	347	352	0.84
GILES	7/20/90	GILL	DAY	NET 6	BT	365	422	0.87
GILES	7/20/90	GILL	DAY	NET 6	BT	385	460	0.81
GILES	7/20/90	TRAP	DAY	NET 2	SMB	247	158	1.05