LAKE WAYNEWOOD

REPORT ON LIMNOLOGICAL CONDITIONS IN 1991

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INTRODUCTION

Personnel from Lehigh University visited Lake Waynewood on 17 dates throughout 1991 as part of a routine monitoring program of three lakes. These lakes were selected to span a trophic gradient, Lake Waynewood lying at the nutrient-rich, productive ("eutrophic") end of the gradient. Similar reports will be submitted to the owners of Lake Giles, an acidic, unproductive ("oligotrophic") lake, and Lake Lacawac, a well protected lake of intermediate productivity ("mesotrophic").

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.

1991 was the fourth consecutive year of the monitoring program, and the fourth year for summer sampling. This is the second year that winter and spring data were obtained. The present report summarizes conditions in Lake Waynewood over the full twelve-month period for 1991. 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**. **ZOOPLANKTON DATA** are presented as graphs that give the concentration (number of individuals per liter) averaged over the entire water column. A few notes are added on the **DOMINANT ALGAE** in midsummer.

A chemical sampling program similar to that carried out in 1989 was also initiated, with samples collected from 6 depths on 4 occasions (in April, July, September, and November). Analyses will be carried out by Jon Cole and Nina Caraco at the Institute of Ecosystem Studies, New York Botanical Garden, Millbrook, New York. Additional phosphorus data from stream and well water samples collected by Stephen Gould during 1989 are summarized in an appendix.

We wish to acknowledge the assistance of Dave Westpfahl and of the Barron's, Bovard's, and Houk's at Lake Waynewood who provided boats and tolerated frequent visits at all hours of the day and night.

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 director, Sally Jones.

1991 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 analyses, and computer data entry were supervised by Dr. Robert Moeller and Gina Novak. Gina Novak, Timothy Vail, John Aufderheide and Scott Carpenter carried out most of the field sampling and laboratory analyses. John counted the microzooplankton through August, and trained Gina, who counted samples after August. Macrozooplankton samples through May were counted by Karen Basehore (daytime samples) and Gaby Grad (nighttime samples). After 1 June, Tim Vail counted all macrozooplankton samples. Gina managed all aspects of the computer database including data entry and printing of zooplankton graphs. Dr. Bruce Hargreaves and Scott Carpenter have played major roles in the development of the computerized database. Nataly Vinogradova and Brian Sharer verified the zooplankton data entries. Gina Novak, along with Tim Vail, Robert Moeller and Vanessa Jones analyzed chlorophyll samples. Alkalinity and pH were determined by Scott Carpenter (through April), John Aufderheide and Tim Vail (May-July), and Tim Vail and Gina Novak (August-December). Gina 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 1992 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, 1992, 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 are offered periodically at Lehigh University

SAMPLING PROGRAM

On each sampling occasion, Lake Waynewood 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 12.5 meters or 41 feet). The thermal stratification existing on any date dictated the depths from which other samples were col-

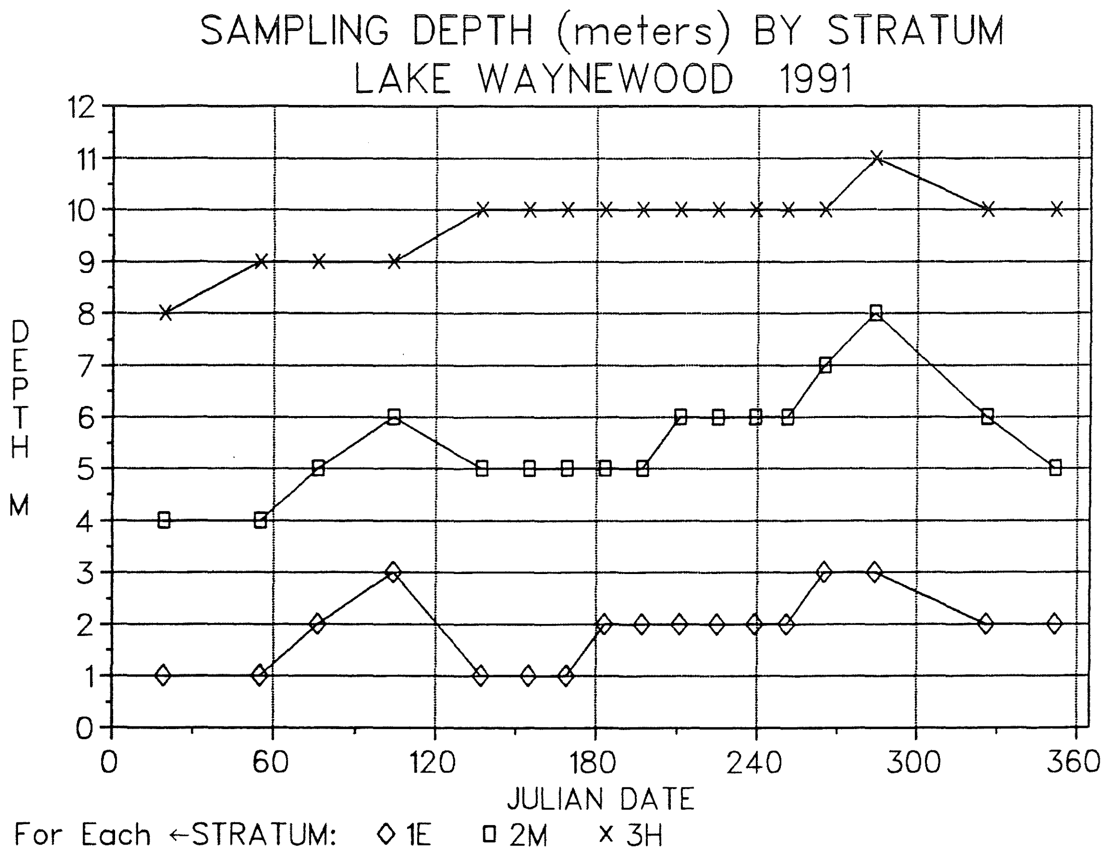


Figure 1. Depths of "EPI", "META", and "HYPO" samples from Lake Waynewood, 1991.

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

lected **(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. Nighttime zooplankton could not be collected on 18 December because the lake was in the process of freezing over.

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 2 shows the thermal stratification that develops during late spring and summer, then breaks down in the autumn. On day 19 (19 January) the lake was ice-covered, and displayed a "reverse stratification". After ice-out (sometime just before 17 March) the water column circulated from top to bottom during "spring turnover". By day 104 (14 April) the lake had warmed enough to become weakly stratified. Stratification was pronounced by day 183 (2 July), producing an upper warm water layer circulating in contact with the atmosphere (the **EPILIMNION**, 0-3 meters, temperature 24°C); an intermediate layer of rapid temperature decrease with depth (the **METALIMNION**, 3-7 meters); and a deep layer of cold water (the **HYPOLIMNION**, 7-12+ meters, temperature 7-8°C).

The usual course of thermal stratification is that of slow, gradual thickening of an epilimnion during the summer. By day 265 (22 September) Lake Waynewood's epilimnion extended to 5 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 long before day 326 (22 November). The lake continued to cool, down to 3°C, before freezing the night of 18 December. **Figure 3** presents the detailed trends of water temperature at three fixed depths (2,6,10 meters) for comparison with other years.

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. 12 weeks in 1990-91) and the completeness of spring turnover. Spring turnover was complete in 1991. During an especially warm spring, Lake Waynewood 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.

Water samples for **pH**, **alkalinity**, **chlorophyll**, and **algae** 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. 19 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 on all but one date in 1991:

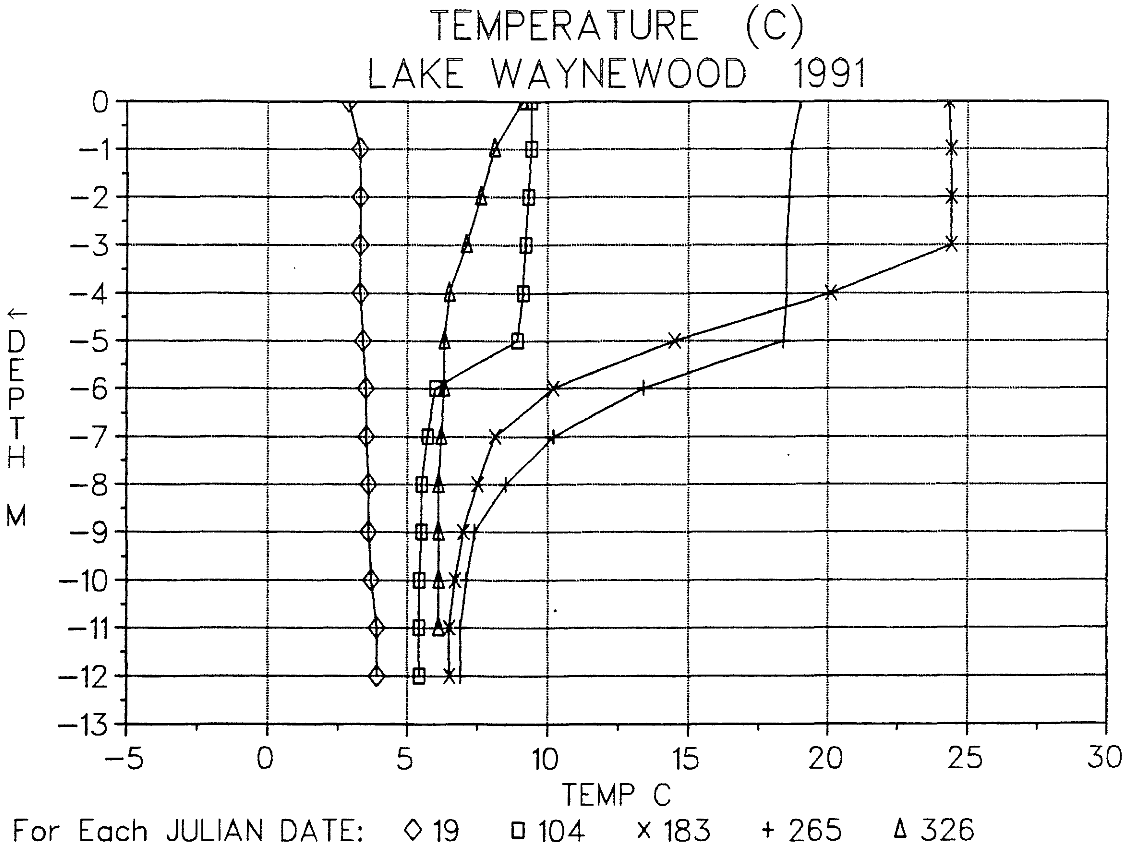


Figure 2. Temperature profiles in Lake Waynewood, 1991.

Values (°C) are plotted for five dates: **19 January** (day 19 --winter ice cover), **14 April** (day 104 --immediately following spring turnover), **2 July** (day 183 --midsummer stratification), **22 September** (day 265 --late stratification), **22 November** (day 326 --fall turnover).

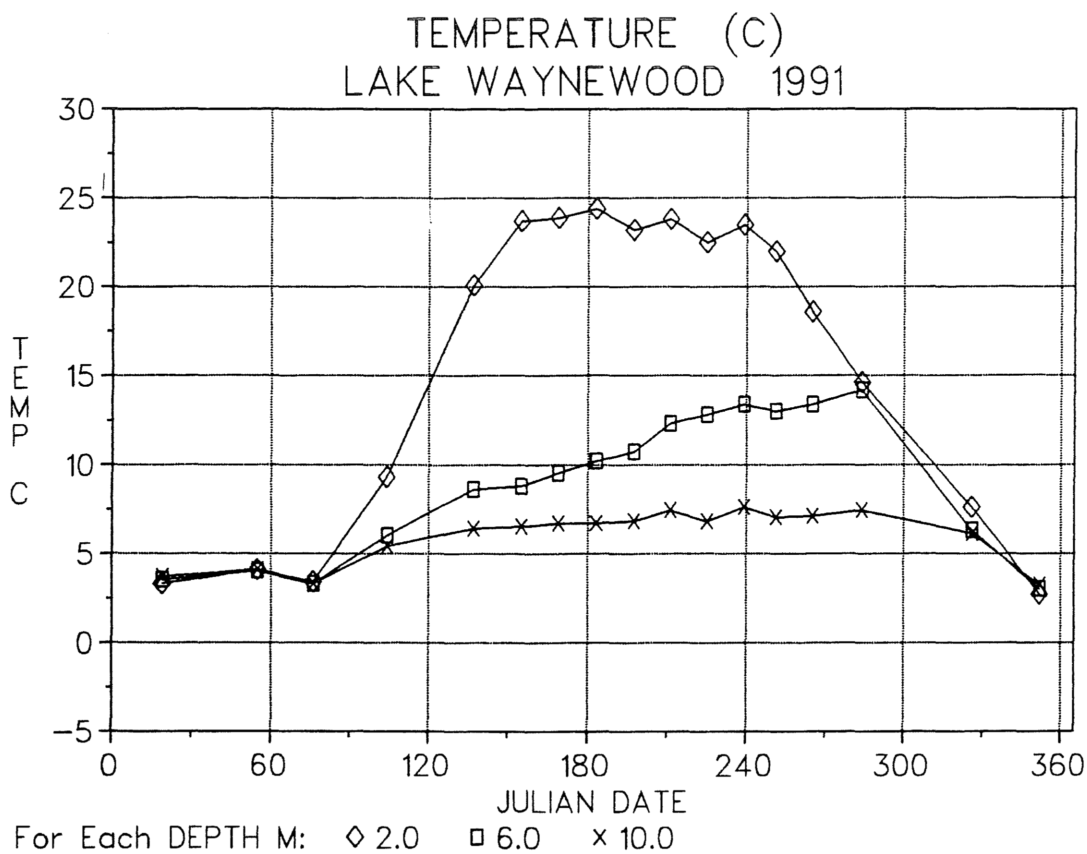


Figure 3. Temperature trends within Lake Waynewood, 1991.

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

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 five dates **(Figure 4)**. During the summer, depths above 3.5 m (i.e. all of the epilimnion) usually received 5% of the light penetrating the lake surface, though light was reduced to 2% at 3m during September. The upper portion of the metalimnion received 0.1-5% of surface light, enough for low rates of algal growth. Light penetration was not substantially decreased during autumnal circulation in 1991--unlike 1989 and 1990, apparently because of smaller fall algal populations.

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.

The pattern of transparency **(Figure 5)** followed a common pattern in eutrophic lakes. Transparency increased during spring to relatively good conditions (ca. 5 meters) as zooplankton grazed down the spring algal populations. During June and July, however, relatively inedible bluegreen algae became established, reducing light penetration. Transparency stayed greater than 2 meters, because these algae remained in th e metalimnion and distributed throughout the epilimnion rather than aggregating in the topmost meter.

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 Waynewood's elevation above sea-level (1381 feet) 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.**)

Often the meter did not give a true "zero" when dropped into definitely anoxic (oxygen-free) water. Values flagged with error code "4" in the data tables, and plotted at depths greater than 7 meters for days 183 (2 July) and 265 (22 September) in **Figure 6,** should be treated as true zeros.

During winter ice cover, oxygen was partly depleted, then recharged during spring turnover. The onset of thermal stratification in mid-spring marked the onset of rapid depletion of oxygen within the hypolimnion. By day 183 (2 July) the hypolimnion and lower portion of the metalimnion were anoxic **(Figure 6)**. Oxygen content of the epilimnion in summer was maintained slightly above atmospheric saturation, at least during the day, by algal photosynthesis (usually oxygen was sampled in late morning or early afternoon). During autumn turnover the water column was progressively recharged with oxygen; on day 326 (22 November), halfway through the turnover period, the oxygen content of 11-m water was already ca. 7.5 mg/L.

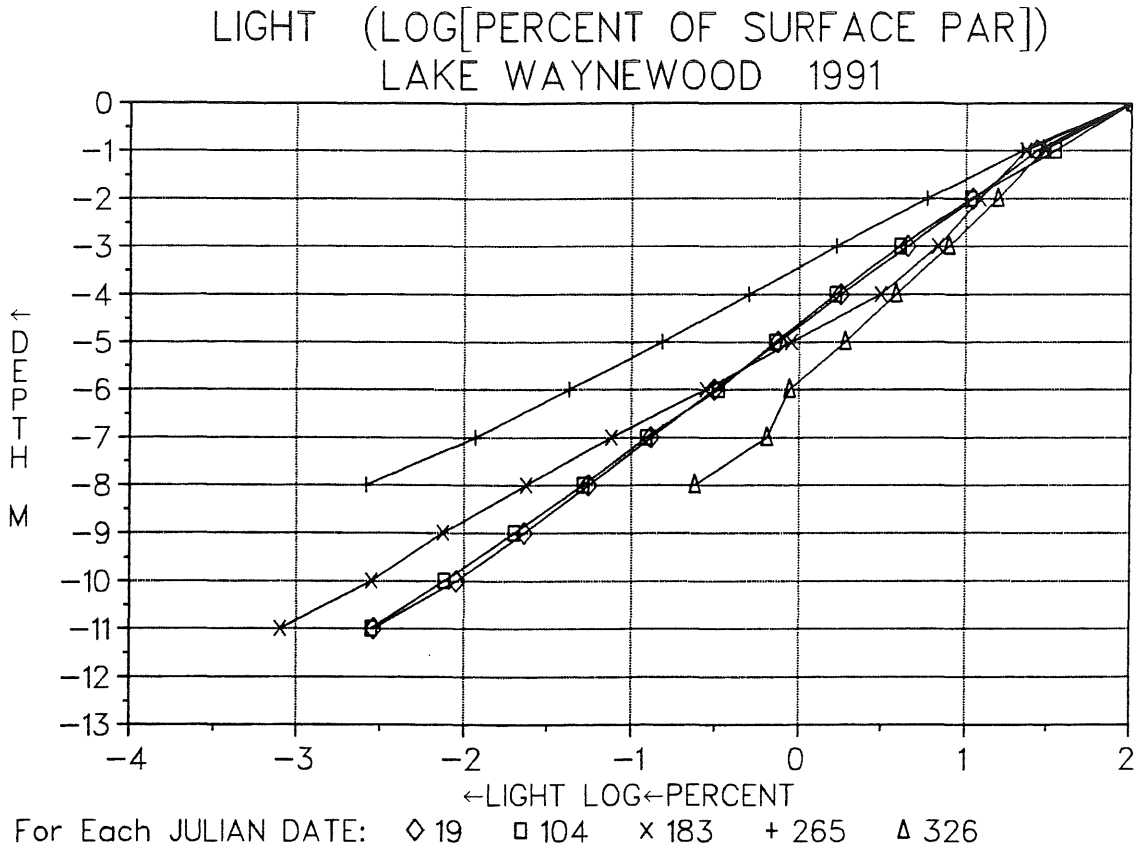


Figure 4. Light penetration in Lake Waynewood, 1991.

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: **19 January** (day 19 --winter ice cover), **14 April** (day 104 --immediately following spring turnover), **2 July** (day 183 --midsummer stratification), **22 September** (day 265 --late stratification), **22 November** (day 326 --fall turnover).

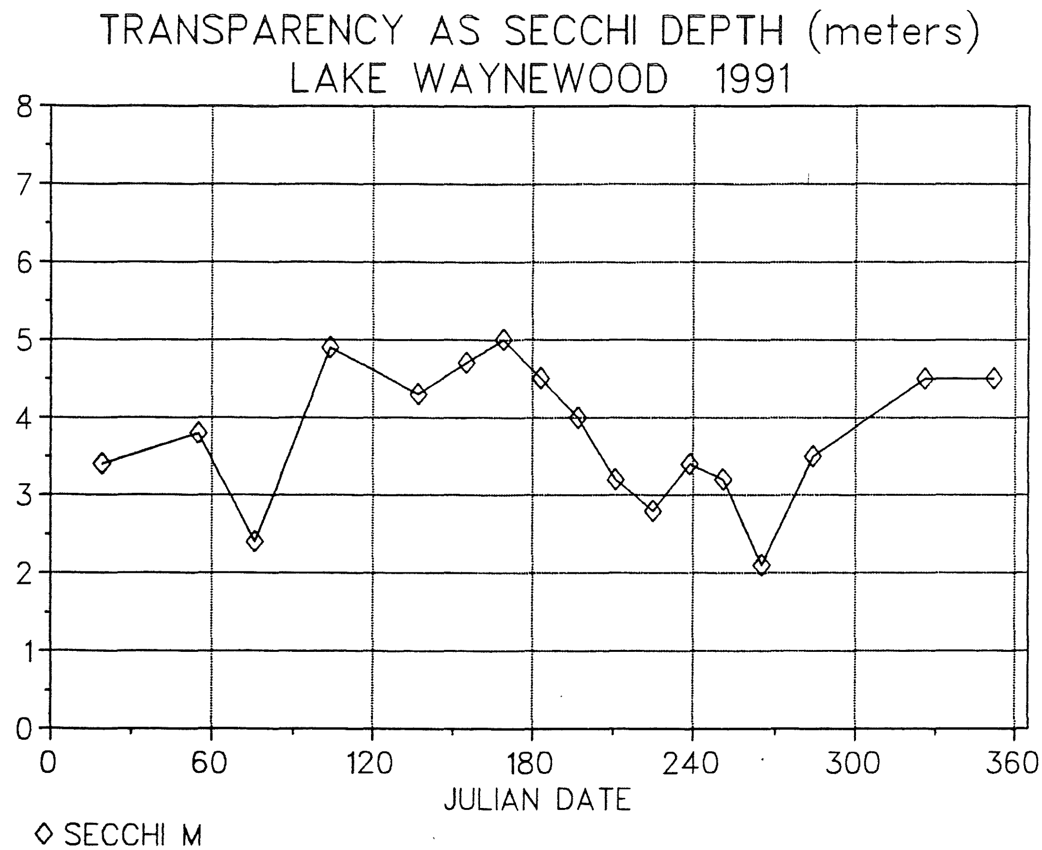


Figure 5. Transparency in Lake Waynewood, 1991.

Values plotted are the Secchi depths, in meters.

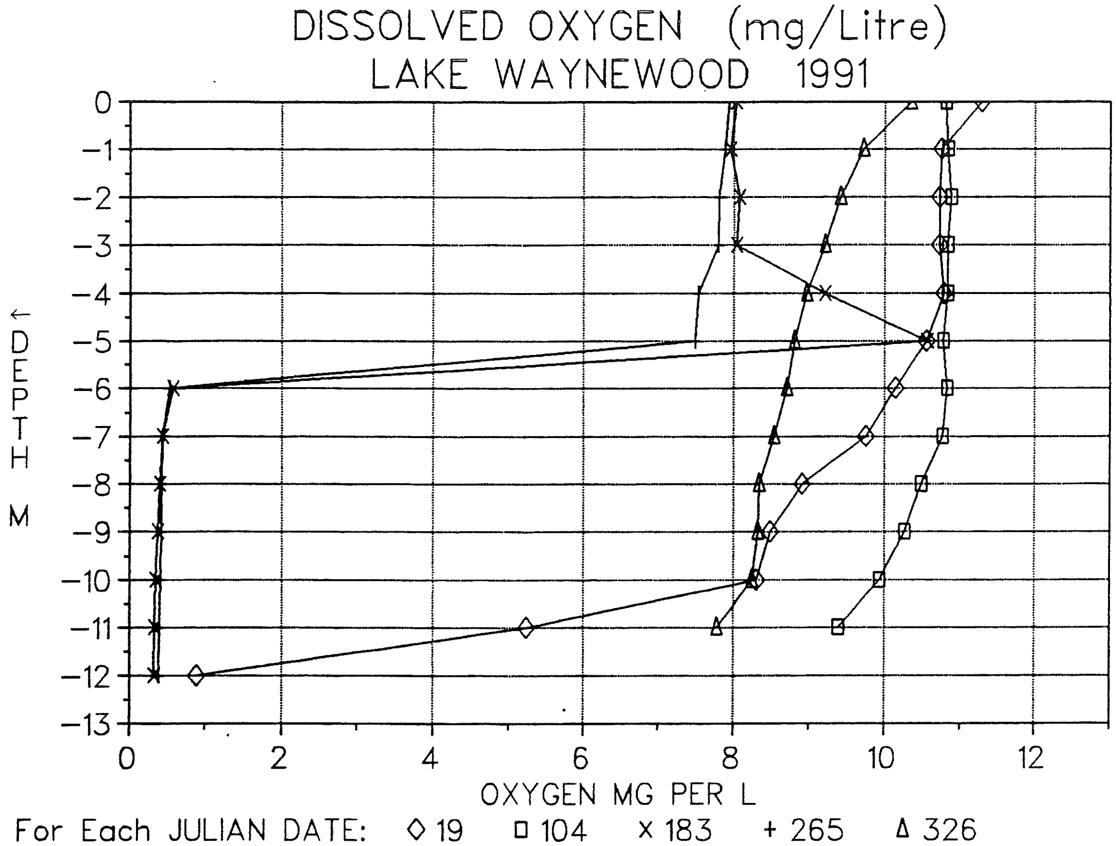


Figure 6. Dissolved oxygen in Lake Waynewood, 1991.

Values (mg oxygen per liter) are plotted for five dates: **19 January** (day 19 --winter ice cover), **14 April** (day 104 --immediately following spring turnover), **2 July** (day 183 --midsummer stratification), **22 September** (day 265 --late stratification), **22 November** (day 326 --fall turnover). Values of <0.7 mg/L on days 183 and 265 represent anoxic conditions (oxygen = 0 mg/L).

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 0.100 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 with gently mixing. Two variants of the method were employed:

Method 11. (A) As above, with a quality assurance protocol to verify electrode performance in distilled water and to check stability of the calibration. (B) As in (A) but 0.5 ml salt solution (Orion™ pHix/pHisa™ 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 7**. In the absence of intense biological activity, the pH of Waynewood would be about 6.5-7 with an alkalinity of about 300 ueq/L **(Figure 8)**, judging from values in late spring and late autumn. These values portray a relatively softwater lake.

Algal photosynthesis during the summer drove the epilimnial pH much higher. At the same time, intense microbial activities drove the hypolimnial alkalinity much higher, with a slight increasing effect on pH. Algal photosynthesis drove pH above 8, and this is a minimal estimate, since our collections are from about noon--not late afternoon--and were sometimes stored 24 hr before analysis. Microbial metabolism generated substantial alkalinity in the anoxic hypolimnion **(Figure 8)**, but this was lost upon reoxidation of the water column during fall turnover.

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 pH and alkalinity. Samples were stored in 1-L polyethylene bottles for 2-24 hr (refrigerated in darkness) before being filtered (0.5 L onto Gelman™ A/E filters) and frozen. Two samples were analyzed from each depth: a whole-water sample (for total chlorophyll-a) and a sample fractionated with a 22-um nitex net. Often the sum of fractions was less than the total. This sum was only treated as a replicate for total chlorophyll-a if it was greater than or equal to 85% of the whole sample. The percentage of chlorophyll passing the 22um net (percent of the summed fractions) is presented in the data tables **(CHLAC P)**. **Method 12** was used for all chlorophyll extractions:

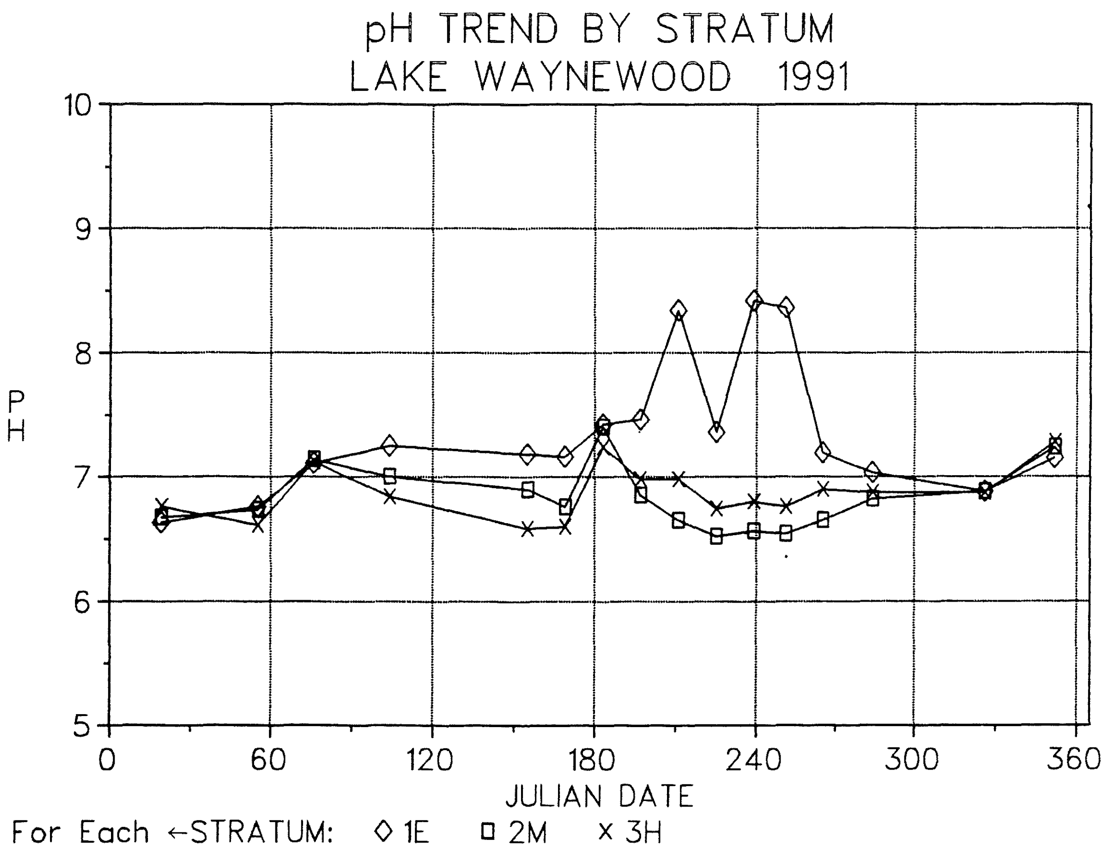


Figure 7. Trends of pH in Lake Waynewood, 1991.

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**.

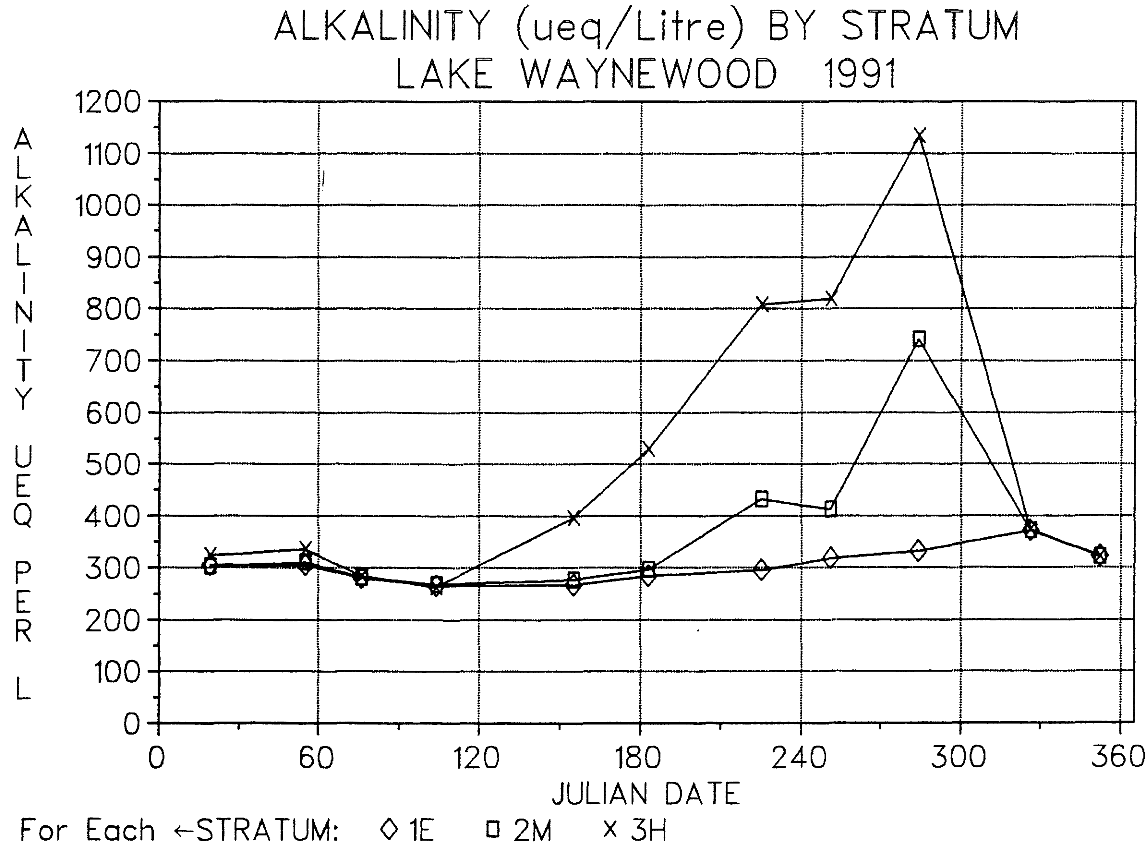


Figure 8. Trends of Alkalinity in Lake Waynewood, 1991.

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.**

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. Extracts were 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. We verified that chlorophyll behaves virtually the same in the mixed solvent as in 90% acetone alone, 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).

Chlorophyll trends in Lake Waynewood **(Figure 9)** reveal the high summer levels characteristic of a moderately eutrophic lake. Chlorophyll was much higher in the metalimnion than in the epilimnion throughout the period of summer stratification. Although epilimnetic algae concentrations had a pronounced peak in mid-September, levels were generally lower than during 1991.

ALGAE

Although algal samples were taken from the same Van Dorn collections used for pH and alkalinity, and were preserved with acid Lugol's solution (at ca. 2%), they have not been analyzed. As part of a study of zooplankton nutrition, however, algae were counted from 1m and 5m samples collected 8 July 1991. These counts give cell concentrations and biovolumes of the most important algae **(Table 1)**. Biovolume is the volume of cell contents.

The epilimnetic algae was strongly dominated by *Ceratium*, a large dinoflagellate that is too big to be eaten by most zooplankton. The bluegreen alga *Aphanizomenon flos-aquae* was also abundant. In addition to these two species, the metalimnetic (5m) sample contained a large amount of *Gonyostomum semen*, a large flagellate that proved to be a main food source for zooplankton.

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 12.5-m water column. Details of the depth-distributions, and daily patterns of vertical movement, are still being analyzed.

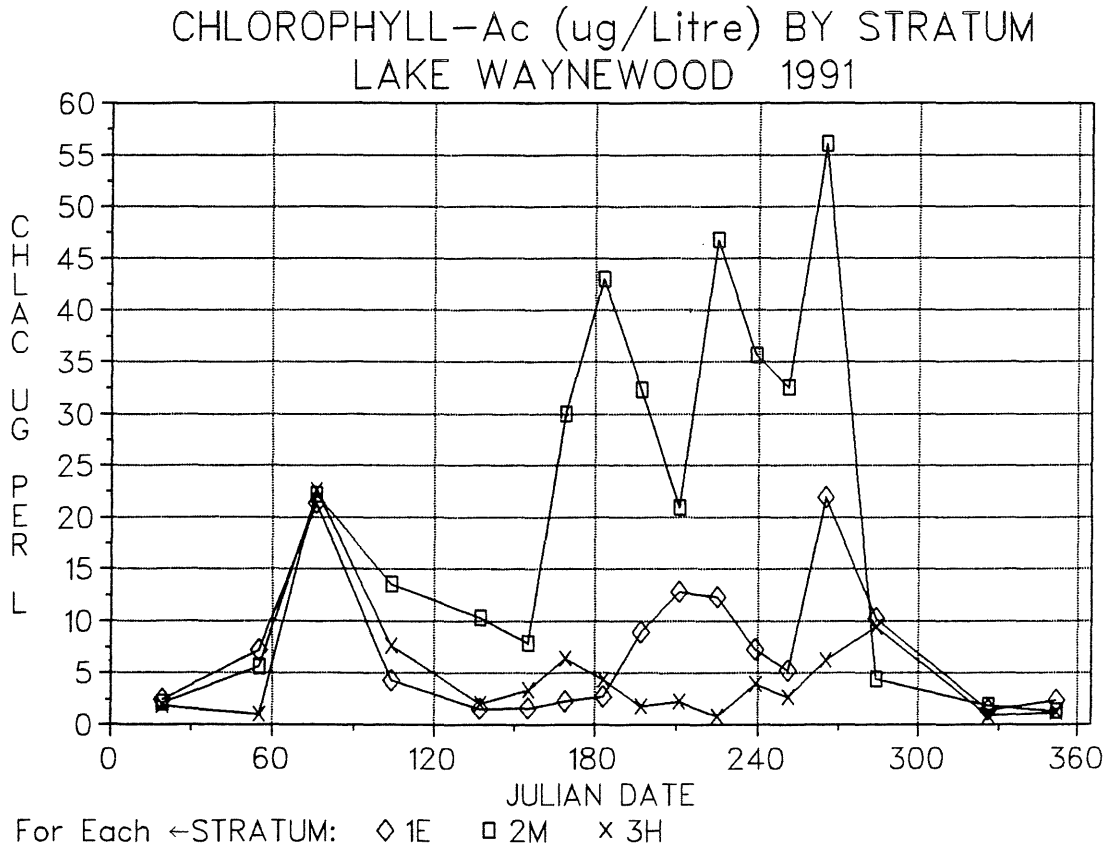


Figure 9. Trends of Chlorophyll-a in Lake Waynewood, 1991.

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. Algae and protozoa from epilimnion and metalimnion water samples of Lake Waynewood. The samples were unscreened water used for a grazing experiment during the first week of July, 1991.

Species	Cell Volume um^3	Epilimnion (1m) Conc. no./ml	Epilimnion (1m) Biovolume $10^3 um^3/ml$	Metalimnion (5m) Conc. no./ml	Metalimnion (5m) Biovolume $10^3 um^3/ml$
Large Unicells					
Ceratium hirundinella	87000	3.1	270.	26.	2800.
Staurastrum sp.	17000	0.2	6.8	0.9	24.
Cosmarium sp.	4200	0.7	2.9		
Colonial Cyanobacteria					
Anabaena planktonica	180	23.	4.1		
Gomphosphaeria nageliana	22	614.	14.	1500.	33.
Aphanizomenon flos-aquae		12.	147.	20.	250.
Aphanothece/Aphanocapsa	0.3	3100.	0.93	47000.	14.
Possibly Edible Algae					
Tabellaria fenestrata	760	88.	67.	71.	54.
Fragilaria crotonensis	450	0.8	0.35	8.1	3.7
Melosira sp.	330			11.	3.7
Dinobryon bavaricum	66	14.	0.90		
Sphaerocystis schroeteri	34	69.	2.3	29.	0.99
Gonium/Eudorina/Pandorina	34	31.	1.0	35.	1.2
Oocystis lacustris	110	1.8	0.2	0.5	0.06
Scenedesmus brasiliensis	34	30.	1.0	13.	0.45
Ankyra judayi	22	0.6	0.01	9.2	0.31
Oocystis parva	22			99.	2.2
Flagellated Algal Unicells					
Gonyostomum semen	34000			60.	2000.
Cryptomonas erosa	1800	0.3	0.46		
Cryptomonas erosa/reflexa	270	2.2	0.59	13.	3.6
Cryptomonas marssonii	220	1.0	0.23	12.	2.7
Rhodomonas lacustris	110	6.7	0.75	110.	12.
Katablepharis ovalis	34	2.9	0.10		
Gymnodinium ordinatum	180	4.2	0.76		
Gymnodinium uberrimum	3600	0.9	3.2	0.5	1.8
Glenodinium sp.	520	0.6	0.33	1.5	0.80
Trachelomonas sp.	48	37.	1.8		
Colacium sp.	1400			8.7	12.

continued . . .

Table 1. Continued

Other Unidentified Algae					
Algae <2.5um	3	340.	1.0	420.	1.3
Algae 2.5-5um	22	600.	13.	300.	6.6
Algae 5-10um	180	30.	5.4	9.9	1.8
Flagellates (Autotrophic and Heterotrophic)					
Flagellates <2.5um	3	119.	0.36	1200.	3.45
Flagellates 2.5-5um	22	298.	6.6	820.	18.
Flagellates 5-10um	180	37.	6.7	50.	8.9
Protozoa					
Ciliates 5-10um	270			6.7	1.8
Ciliates 10-20um	1800	9.5	17.	20.	36.
Ciliates 20-30um	8200	1.8	15.	8.2	67.
Ciliates >30um	34000			5.1	170.
Heliozoa	270	3.2	0.86		

Cell volume is the volume of cell contents of a single cell.
Conc. is the concentration or number of cells per milliliter.
Biovolume is the volume of all cells of a species per milliliter.

Two sizes of nets were used: a 30-cm diameter net with a mesh of 202 μm, for some macrozooplankton; and a 15-cm diameter Wisconsin-style net with a 48-μm mesh for microzooplankton as well as other macrozooplankton. These were mounted side-by-side in "bongo" configuration. Microzooplankton includes mainly rotifers, but some copepods and small Cladocera also were counted from these samples. Our counting strategy was somewhat different in 1991 from 1989 or 1990, with *Chaoborus* and some copepods (including *Diaptomus oregonensis*) being counted from the 48-μm sample that had been counted from 202-μm samples in previous years. This change was made to increase collection efficiency of forms (e.g. small instar *Chaoborus*, copepodids, male copepods, etc.) that were going through the 202-μm mesh net. Collections were duplicated for each depth range. 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 11-35**). **Table 2** lists the zooplankton identified to date. Several points can be highlighted:

(1) The cladoceran *Daphnia* (several species) was apparently the dominant grazer during spring and fall (5-20/L), but was reduced to lower levels (2-6/L) during summer. The calanoid copepod *Diaptomus oregonensis* was relatively common throughout the year (0.5-2 adult females/L), especially during the late summer.

(2) The various rotifers displayed pronounced seasonalities, which differed among species. There were also pronounced differences in distribution among the three layers. Densities were quite high: 800-1000/L in summer, which imply densities of twice this in the upper water layers where they mainly occurred.

(3) In general hard-bodied rotifers (e.g. *Keratella*, esp. *K. cochlearis*), those with swift escape reactions (e.g. *Polyarthra*), those forming large colonies (e.g. *Conochilus*) or individual gelatinous tubes (e.g. *Collotheca*) were most common during the summer, perhaps implying heavy predation pressure. Several potential predators were quite common in summer: the large dipteran *Chaoborus* (ca. 0.4/L) and the cyclopoid copepod *Mesocyclops edax* (1-2 adult females/L). In spring and autumn two different cyclopoids were common: *Diacyclops thomasi* (ca. 1/L in spring) and *Tropocyclops prasinus* (up to 40/L in spring and autumn).

(5) As in 1990, populations of many macrozooplankton remained at moderate or high levels during autumn turnover. Rotifers decreased strongly during the autumn (to < 100/L), perhaps following the strong decline in algal biomass (see chlorophyll graph). This pattern was different from autumn 1990, when high algal mass coincided with relatively high rotifer concentrations (400-800/L). In 1989, concentrations of autumn rotifers and chlorophyll-a were both intermediate to 1990 and 1991 extremes.

CLIMATE IN 1991

Weather data from Hawley, PA (20 km NE of Lake Waynewood) have been compiled for 1991 and the previous 30 years (**Figure 10**). These data are from a NOAA cooperator's station. 1991 was relatively warm and dry compared to the 30-year monthly averages. Rainfall was only 60% of normal for spring through summer.

Table 2. Zooplankton species recorded from open-water samples in Lake Waynewood 1988-1991. Seasons of especially high or low abundance in 1991 are indicated.

	Taxon	Seasonal Abundance in 1991 High	Low
Diptera			
**	*Chaoborus* spp.	Su	[Sp,W]
	C. flavicans		
	C. punctipennis		
Cyclopoid Copepoda			
*	*Diacyclops thomasi*	Sp,F	[W,Su]
	Cyclops scutifer		
	Macrocyclops albidus (rare)		
*	*Mesocyclops edax*	Su	[F,W,Sp]
**	*Tropocyclops prasinus*	F,W	[Su]
Calanoid Copepoda			
**	*Diaptomus oregonensis*		
Cladocera			
*	*Bosmina*	late Su	
	Ceriodaphnia spp.		
*	*Chydorus* spp.		
**	*Daphnia* spp.	Sp,F	[W, Su]
	D. pulex/pulicaria		
	D. laevis		
	Diaphanosoma spp.		
	Holopedium gibberum		
	Leptodora kindtii		
Rotifera			
	Anuraeopsis spp.		
	Ascomorpha spp.		
*	*A. ovalis*	Su	[F,W,Sp]
*	*Asplanchna* spp.	mid Su	
*	*Collotheca* spp.	late Su	[F,W,Sp]
*	*C. mutabilis*	late Su	[F,W,Sp,early Su]
**	*Conochilus* spp.	Su	[F,W,Sp]
*	*Filinia longiseta*	late Su	[F,W,Sp]
	Gastropus spp.		
*	*G. hyptopus*	Sp	[Su,F,W]
*	*G. stylifer*	late Su	[Sp,F,W]

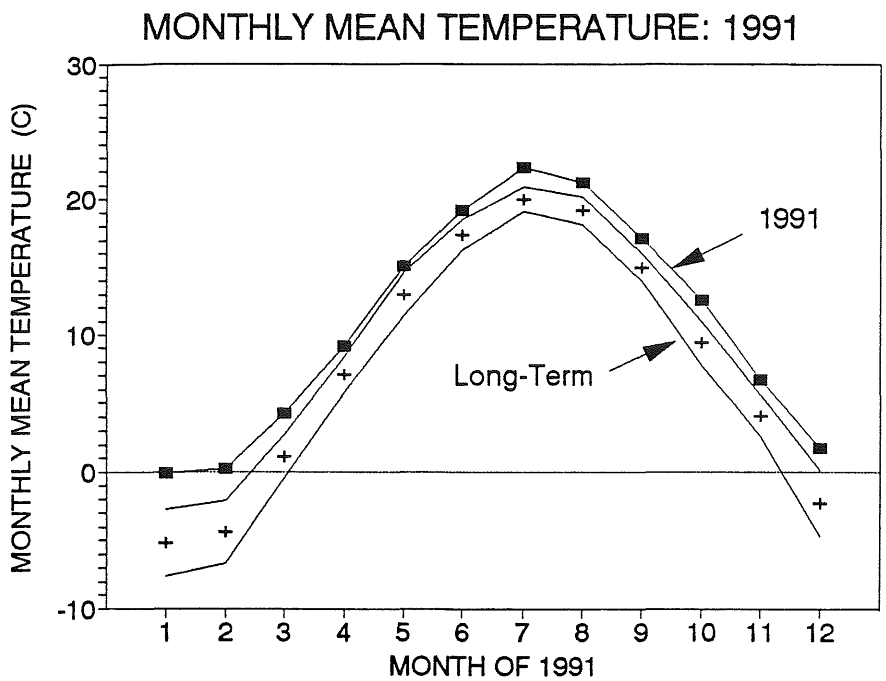
continued next page

Table 2. Zooplankton in Lake Waynewood, 1991 (continued)

	Taxon	Seasonal Abundance in 1991 High	Low
	Kellicottia spp.		
*	*K. bostoniensis*	early F	[Sp,Su,W]
*	*K. longispina*	Sp	[late Su,F]
	Keratella spp.		
**	*K. cochlearis*	late Su	[F,W]
*	*K. crassa*		[W,Sp]
*	*K. earlinae*	late Su	[F]
*	*K. hiemalis*	Sp	[Su,F]
	K. serrulata f. *curvicornis*		
	K. taurocephala		
	Lecane spp.		
	L. luna		
	Monostyla spp.		
	Notholca spp.		
	N. acuminata		
	Ploesoma spp.		
*	*P. truncatum*	late Su	[F,W,Sp]
	Polyarthra spp.		
	P. dolichoptera		
*	*P. euryptera*	late Su	[F,W,Sp]
	P. remata		
	P. vulgaris		
**	*Polyarthra* ("large")		
**	*Polyarthra* ("small")	Su	
	Pompholyx spp.		
*	*Synchaeta* spp.		
*	*Trichocerca* spp.		
	Trichocerca ("small")		
*	*T. cylindrica*	late Su	[W,Sp]
	T. lophoessa		
*	*T. multicrinus*	mid Su	[W,Sp,F]
*	*T. rousseleti*		[W,Sp]
*	*T. similis*	Su	[W,Sp]
	Trichotria spp.		
	Wolga spp.		

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

** Dominant species included in Figures
* Other common species included in Figures



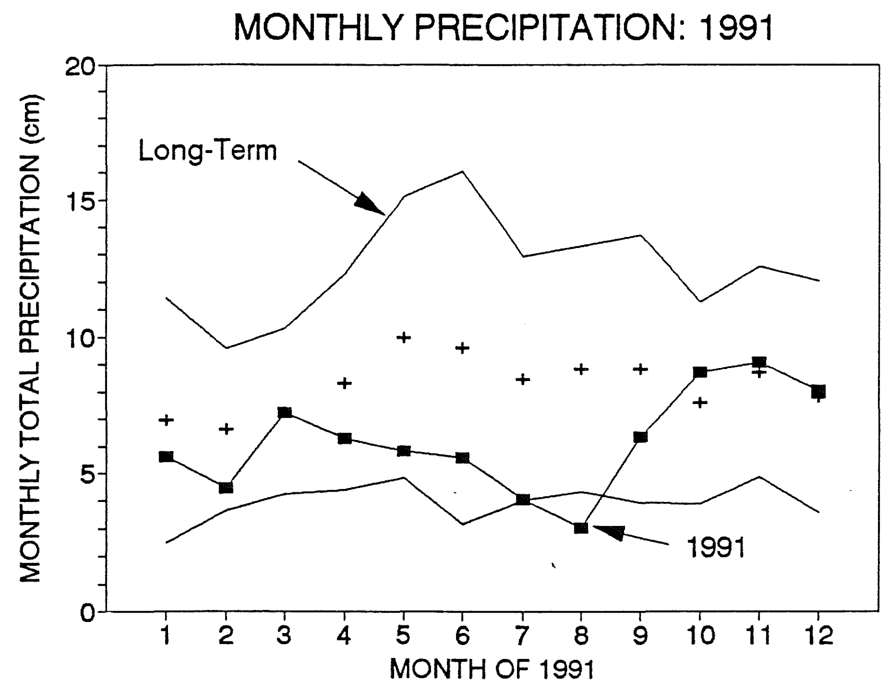


Figure 10. Monthly climate in 1991 compared to the 30-year averages.

(Top) Mean temperature (degrees Celsius). **(Bottom)** Monthly mean precipitation (cm rain or thawed snow). Data are from the NOAA cooperator's station at Hawley, PA. Long-term values (+) are enclosed in an envelope defined by one standard deviation of the monthly values.

DISCUSSION

Lake Waynewood in 1991 was similar to the lake in 1989 and 1990, though epilimnetic algae were somewhat less dense. Transparency and light attenuation were correspondingly greater. These data confirm the impression of relatively better water quality in 1991 than in 1989 or 1990. Chlorophyll reached levels of 10-40 ug/L, as in earlier years, but the highest levels were restricted to the metalimnion. Only in early September did chlorophyll concentration in the epilimnion exceed 15 ug/L. The bluegreen alga *Aphanizomenon flos-aquae* was apparently less abundant in 1991 than in 1990 and did not erupt from the metalimnion into the epilimnion as it had in 1990. Secchi disk transparency dropped in late summer, but stayed greater than 2m. There was not a large autumn algal population in 1991. In 1990, abundant fall algae (notably the diatom *Melosira*) may have supported relatively high zooplankton populations into the winter.

Greater light penetration in 1991 favored metalimnetic algae. A large population of the algal flagellate *Gonyostomum semen* occupied the 4-5 m zone in early July. Nevertheless the lower water column was too dark for algal growth, and rapidly became anoxic, as in 1989 and 1990. The less intense algal growth in the epilimnion in 1991 induced smaller pH rises (to 8.5 instead of 9.5) and lower oxygen supersaturation than in 1990.

1991 was a relatively warm year. An especially warm spring caused a rapid temperature rise in the epilimnion. So although the maximum summer epilimnial water temperatures were the same in 1990 and 1991 (ca. 24°C), this warmth occurred over a longer interval in 1991. Moreover, the epilimnion was about 1m deeper in summer 1991 than in 1990, representing a higher heat content of the lake in midsummer of 1991.

1991 also was a relatively dry year, especially compared to 1990. Phosphorus inflow to the lake from the main inlet was probably reduced (note that Steve Gould's inlet samples had relatively high phosphorus concentrations in 1990). When lake samples collected for phosphorus analyses have been analyzed, we can test the idea that lower phosphorus content in the epilimnion in 1991 may have been a cause of lower algal biomass.

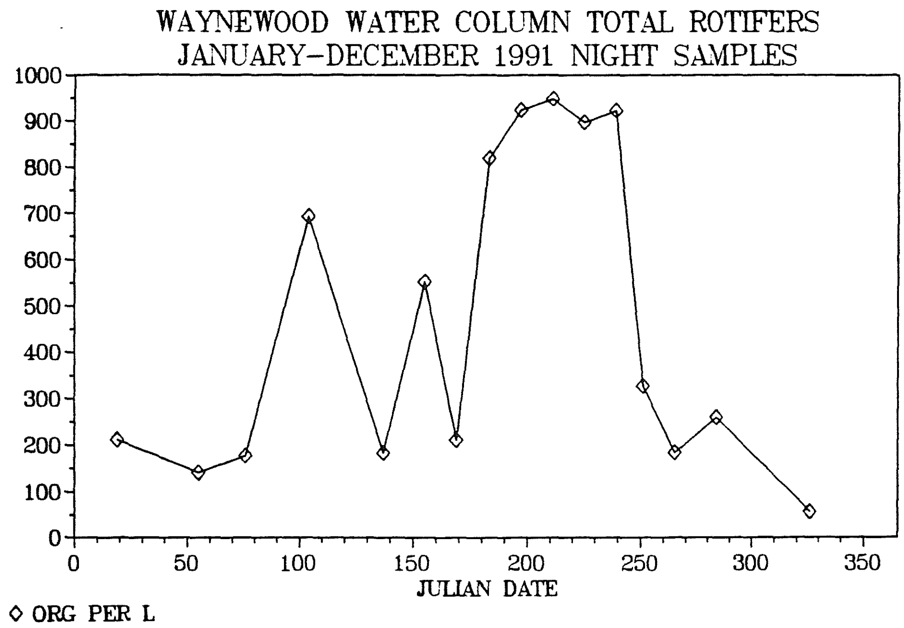
Although large herbivorous zooplankton, in particular *Daphnia*, are relatively abundant, their numbers were reduced during midsummer. This pattern was less clear than in 1990, when the bluegreen algae peak of late summer coincided with very low *Daphnia* concentrations. Since *Daphnia* are thought to be more effective than most other zooplankton in controlling (i.e eating) these algae, higher summer *Daphnia* concentrations, perhaps caused by lower fish predation, might be an alternative explanation for lower epilimnial algal concentrations in 1991.

The stocking of walleye in Lake Waynewood in mid-September (2,500 fingerlings (D. Westpfahl, pers. comm.)) will need to be kept in mind when evaluating zooplankton populations in the future. This species was not present in the lake until the stocking.

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.



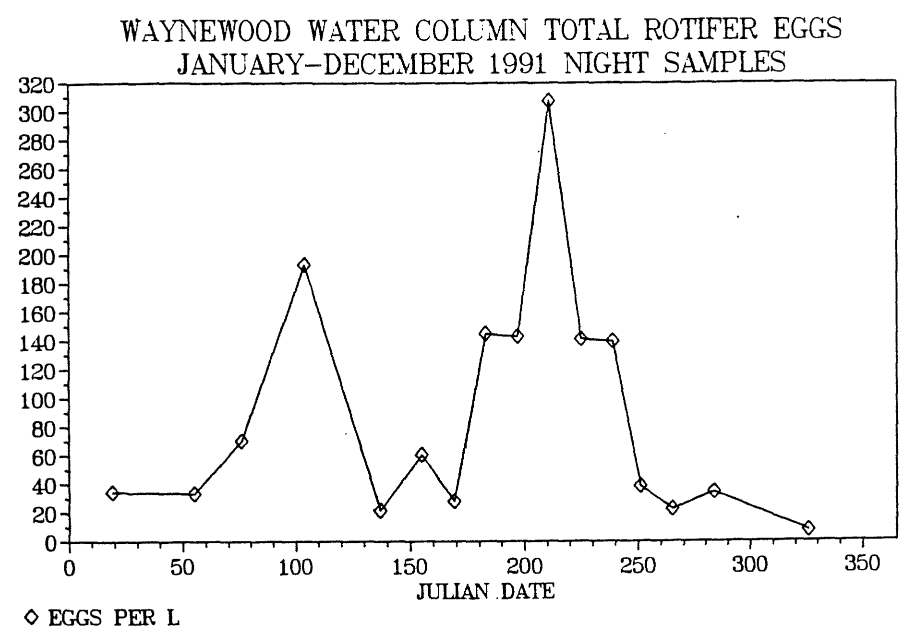
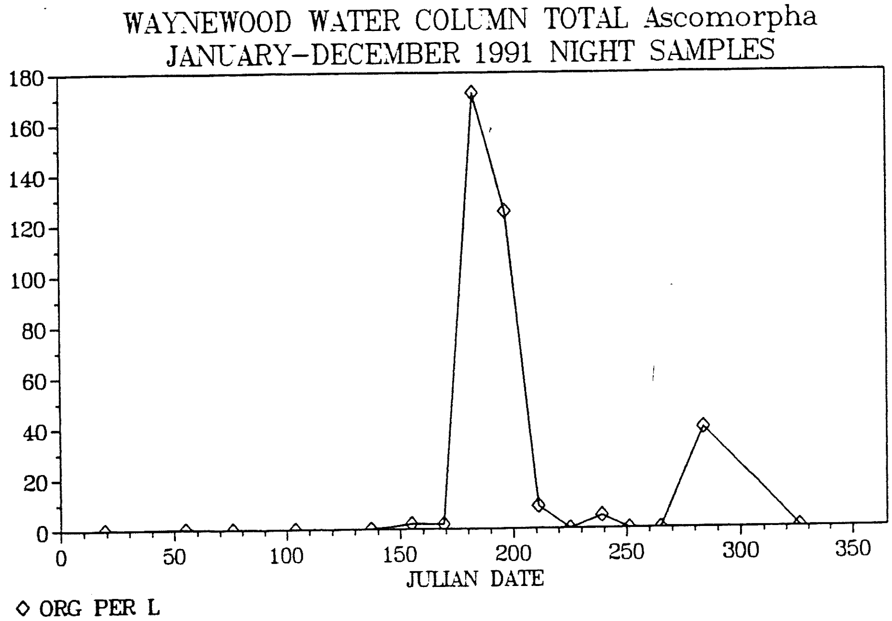


Figure 11. Rotifers in Lake Waynewood, 1991.

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.



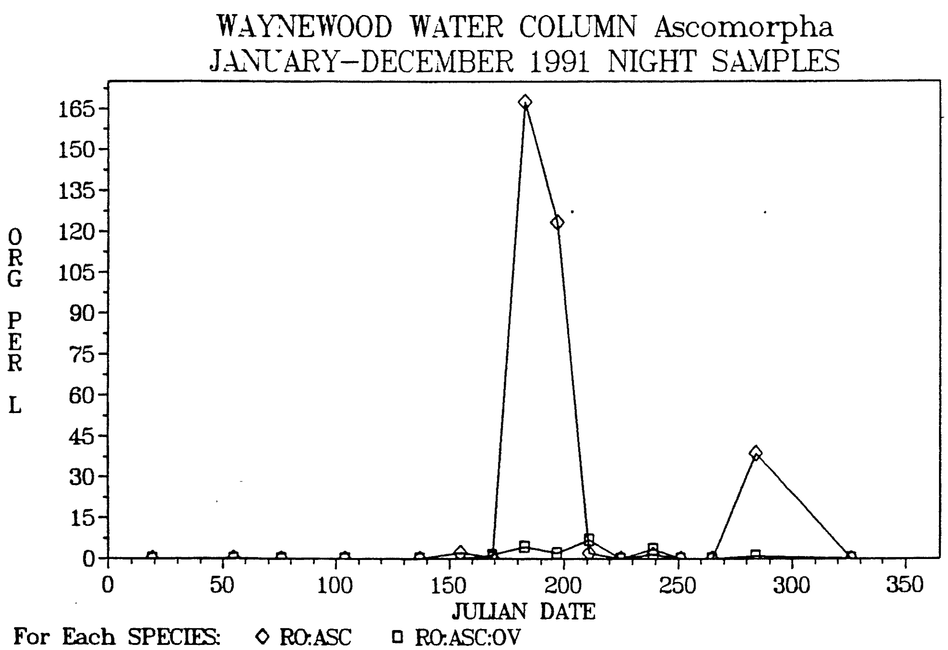
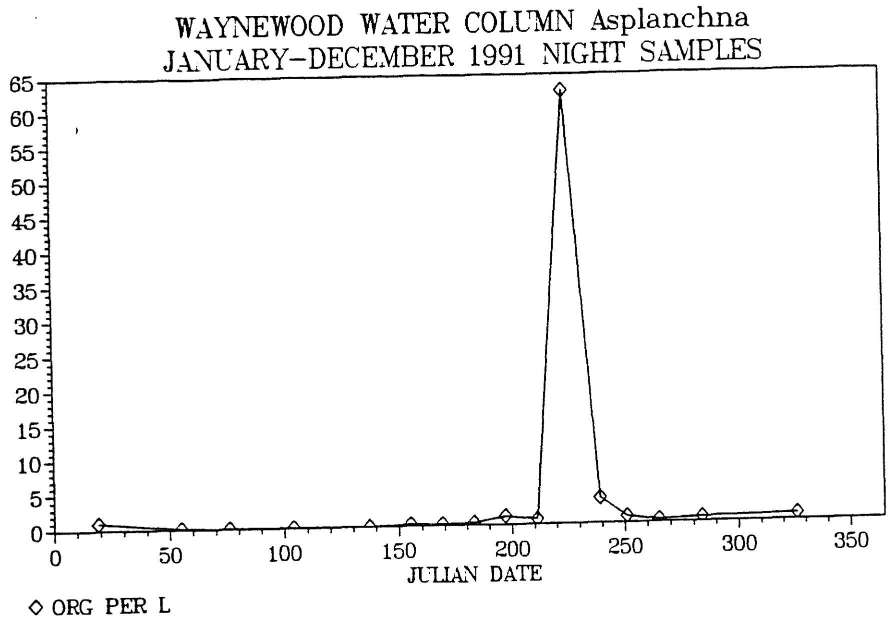


Figure 12. The rotifer *Ascomorpha* in Lake Waynewood, 1991.

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



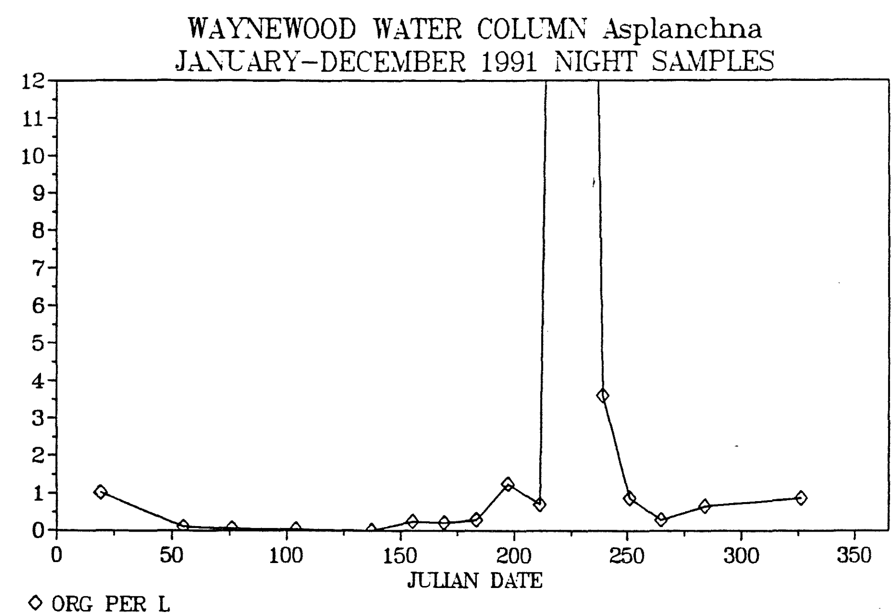


Figure 13. The rotifer *Asplanchna* in Lake Waynewood, 1991.

Nighttime net collections from three depths (48μm net) have been combined to give a water column mean. The lower graph has an expanded scale.

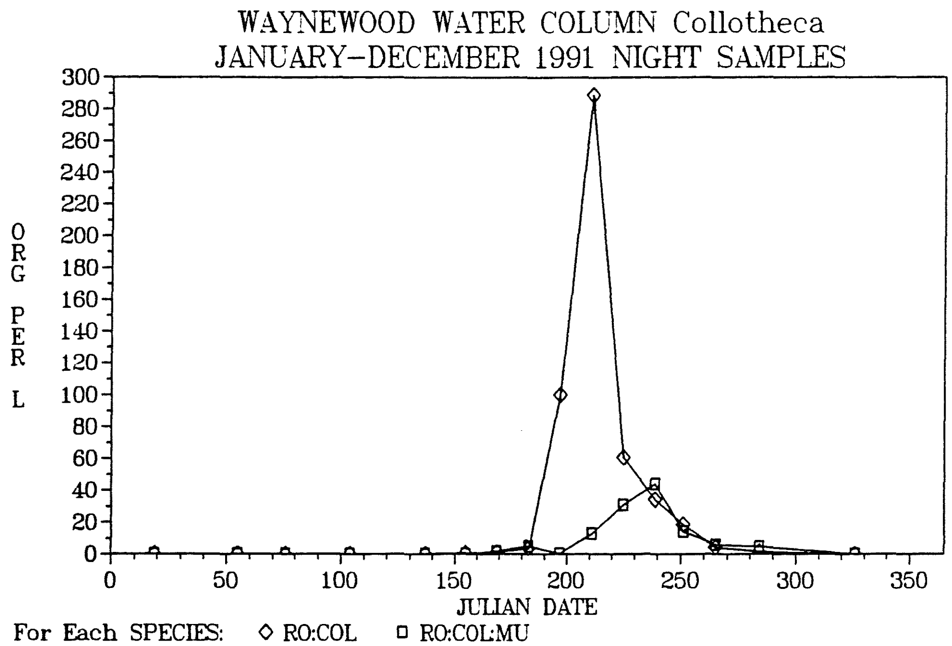
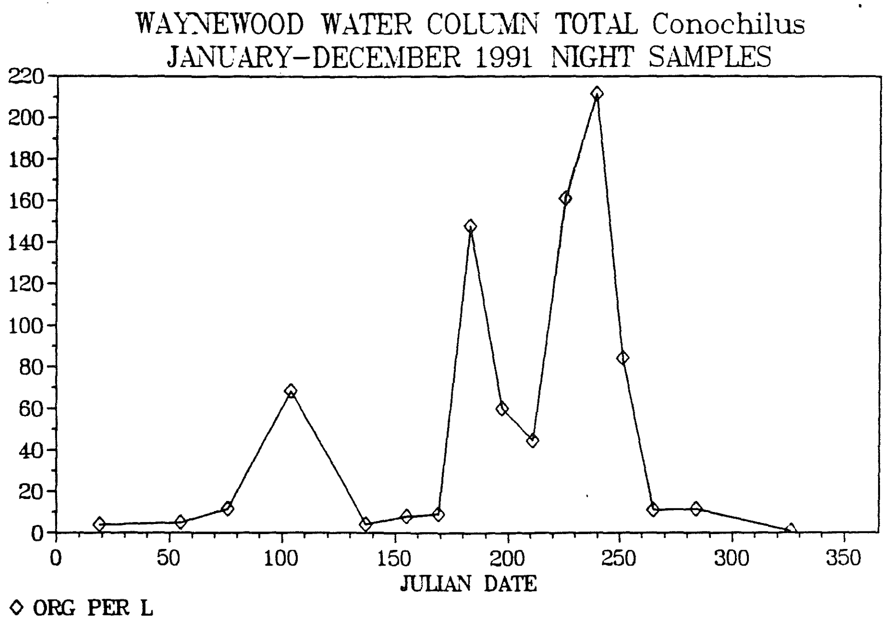


Figure 14. The rotifer *Collotheca* in Lake Waynewood, 1991.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. **COL** undifferentiated *Collotheca*, **MI** *C. mutabilis*.



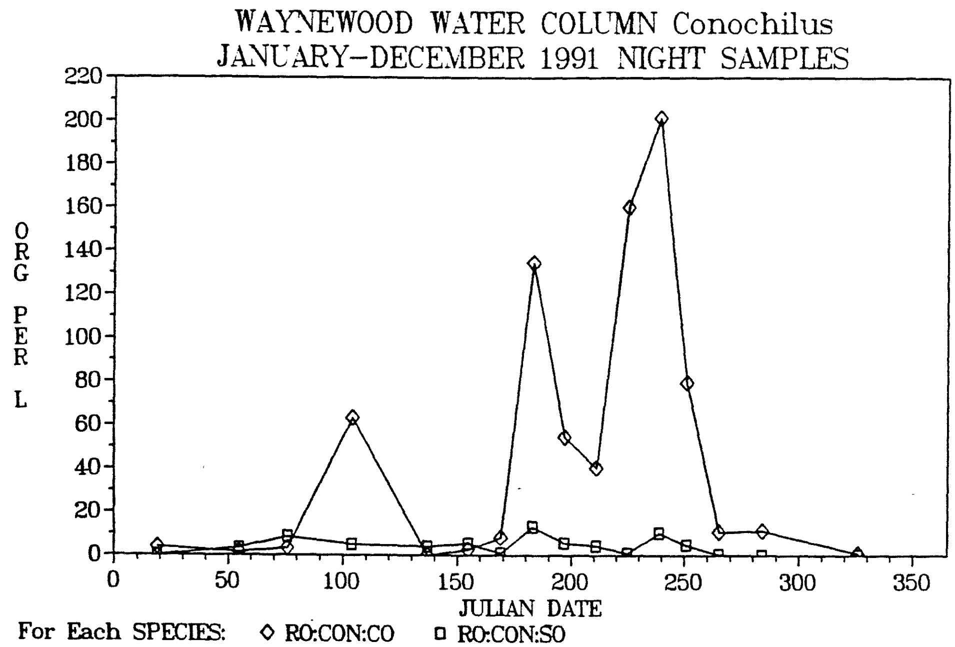


Figure 15. The rotifer *Conochilus* in Lake Waynewood, 1991.

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

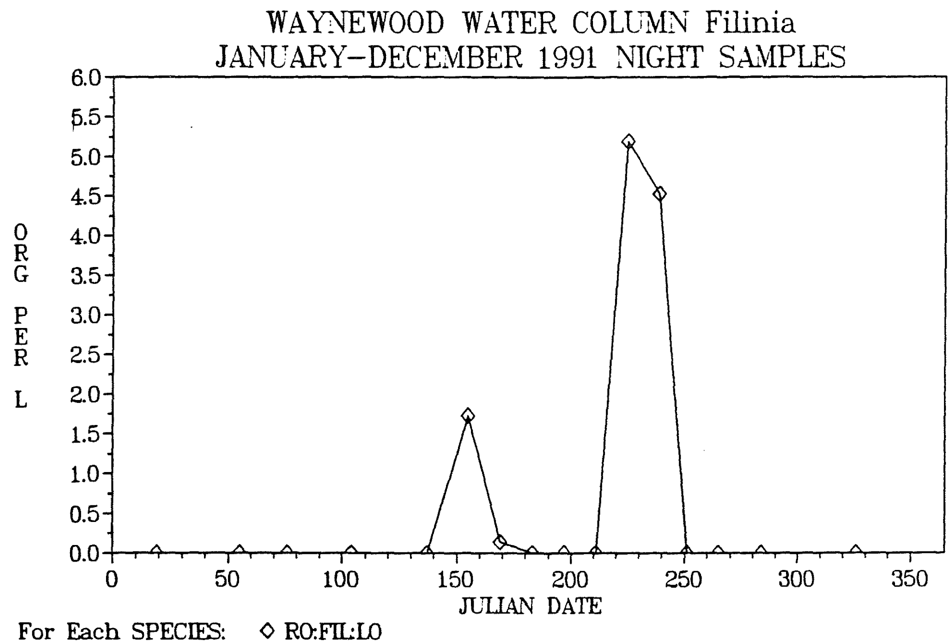
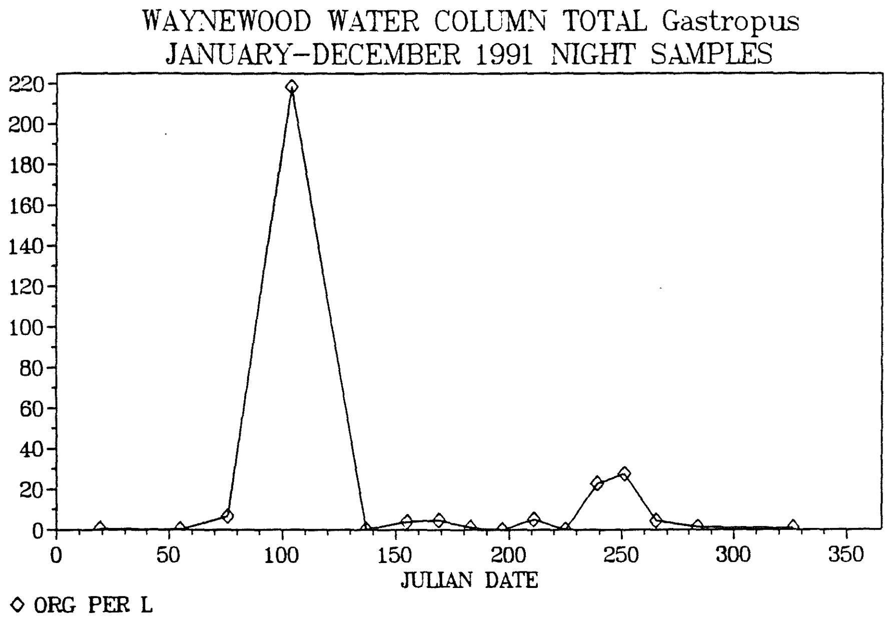


Figure 16. The rotifer *Filinia longiseta* in Lake Waynewood, 1991.

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



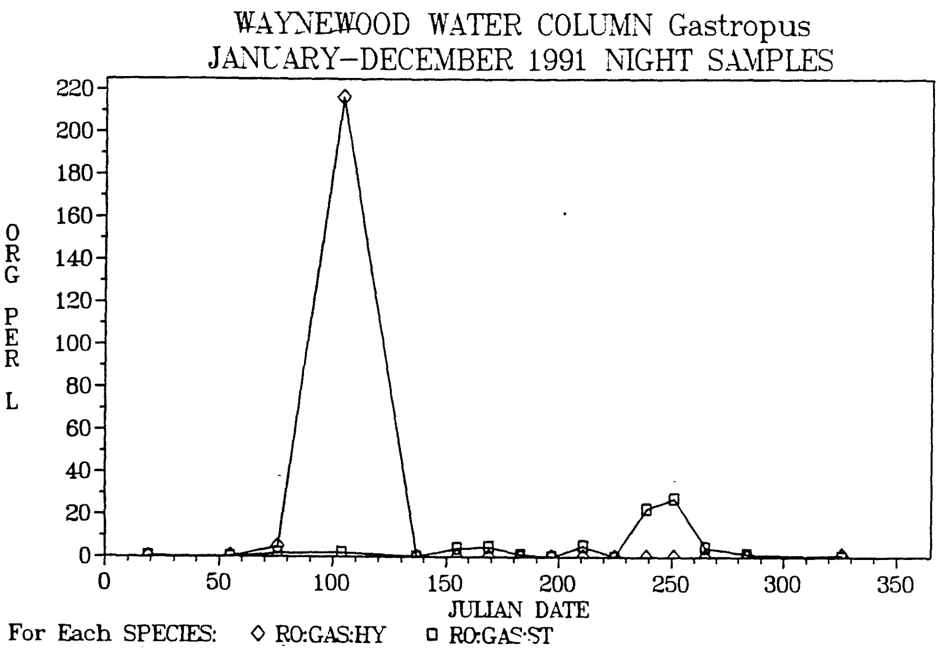
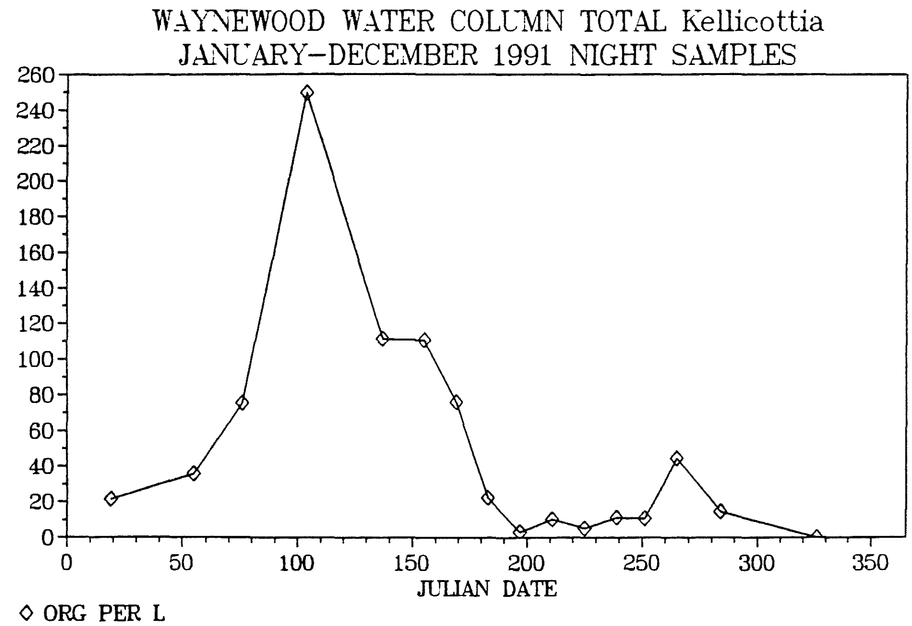


Figure 17. The rotifer *Gastropus* in Lake Waynewood, 1991.

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



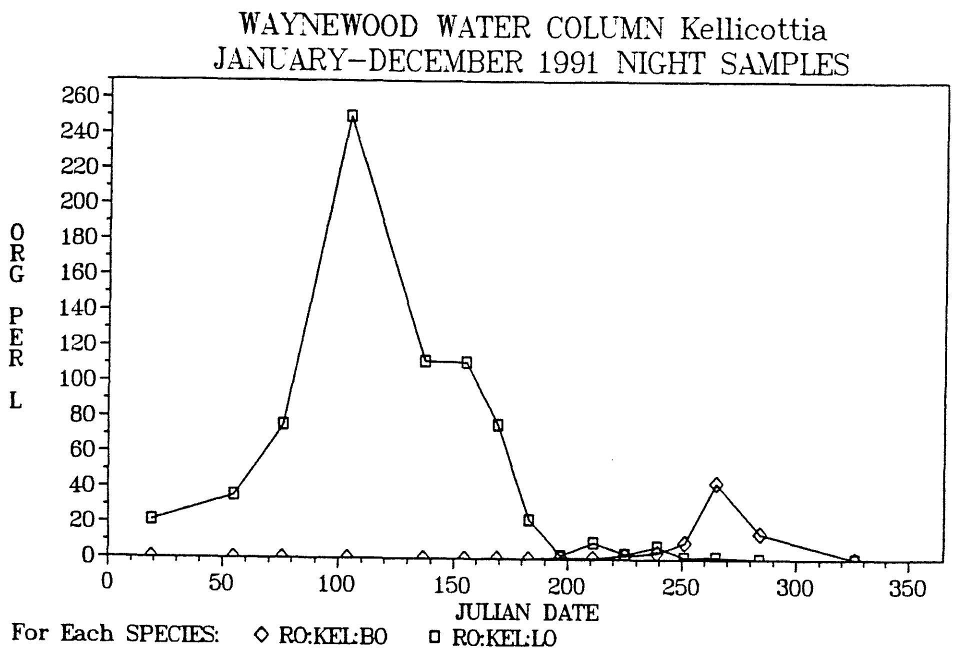


Figure 18. The rotifer *Kellicottia* in Lake Waynewood, 1991.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. **(Top)** Total individuals per liter. **(Bottom) BO** *K. bostoniensis* and **LO** *K. longispina*.

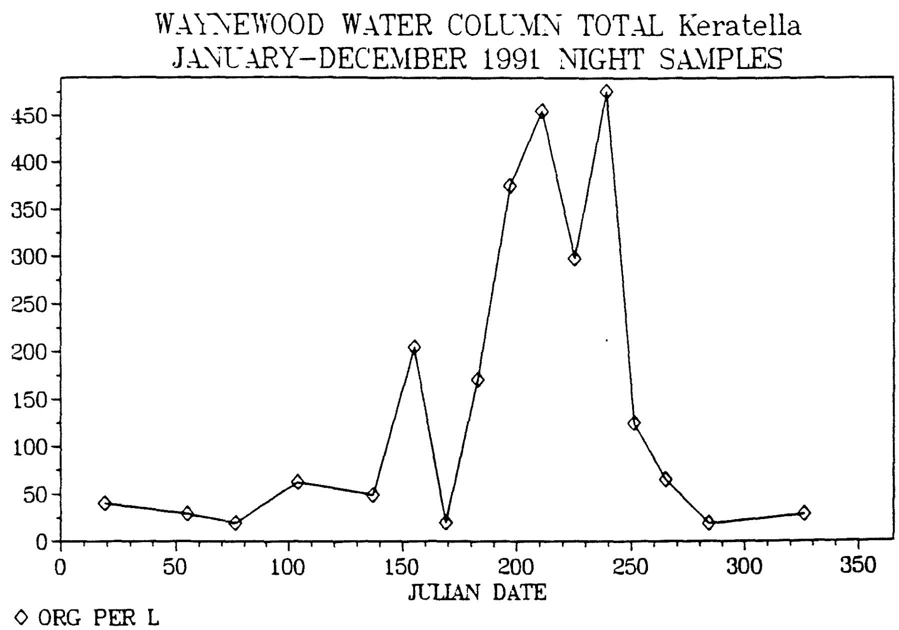
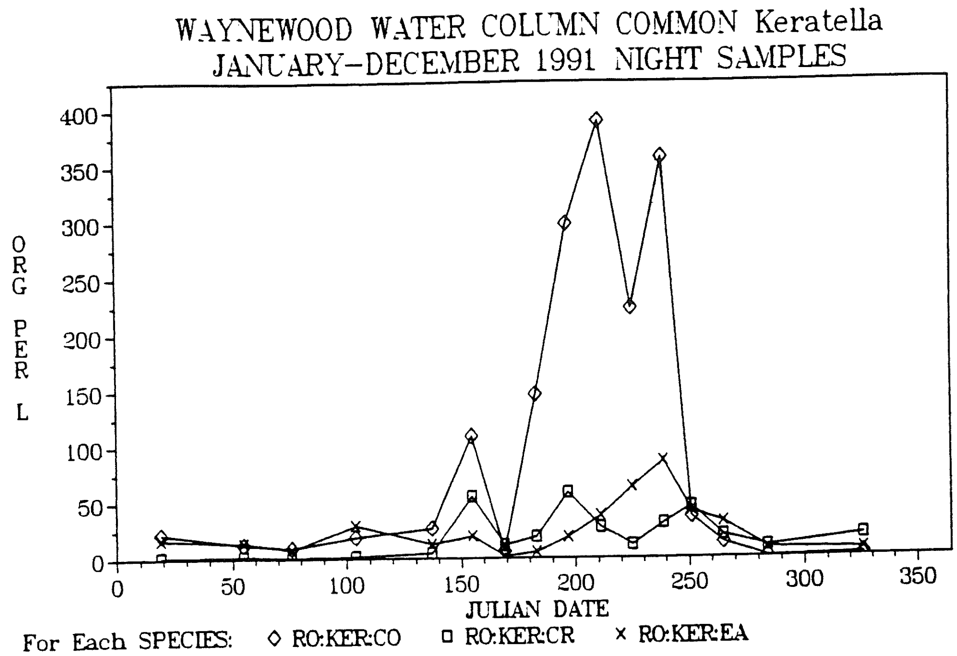


Figure 19. The rotifer *Keratella* in Lake Waynewood, 1991.

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



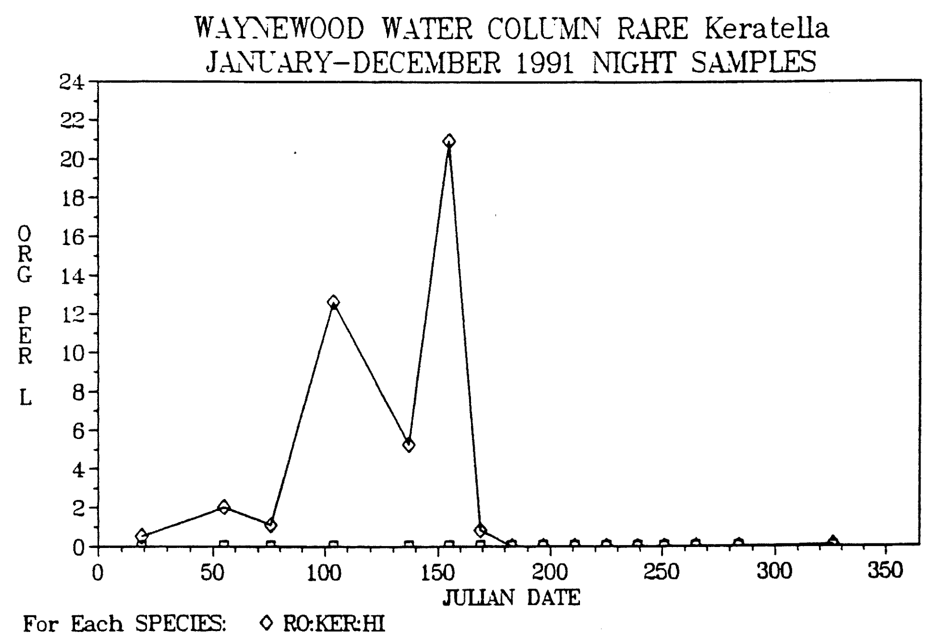


Figure 20. The rotifer *Keratella* (by species) in Lake Waynewood, 1991.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. **(Top) CO** *K. cochlearis*, **CR** *K. crassa*, and **EA** *K. earlinae*. **(Bottom) HI** *K. hiemalis*.

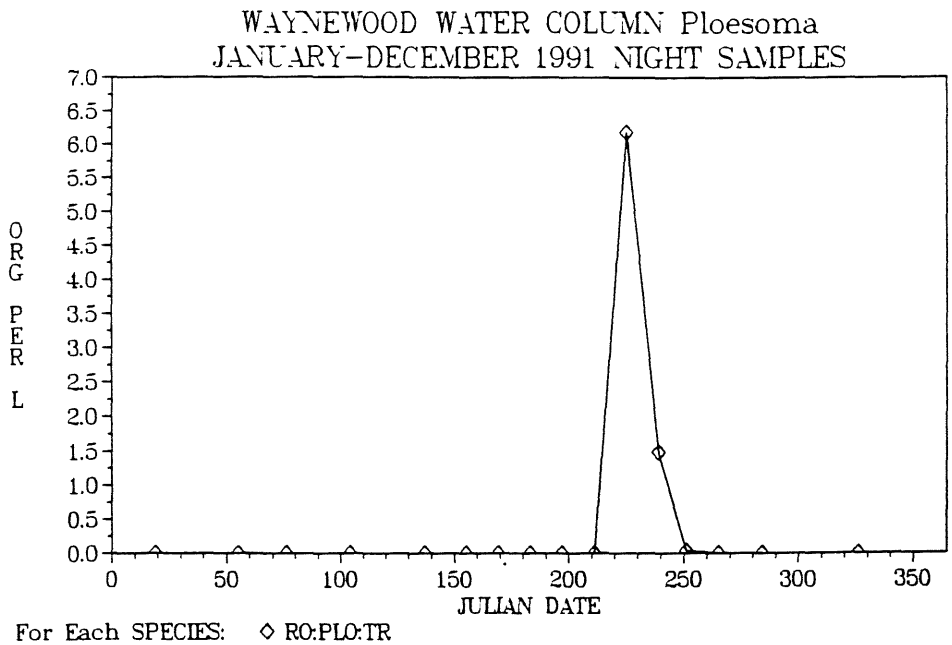
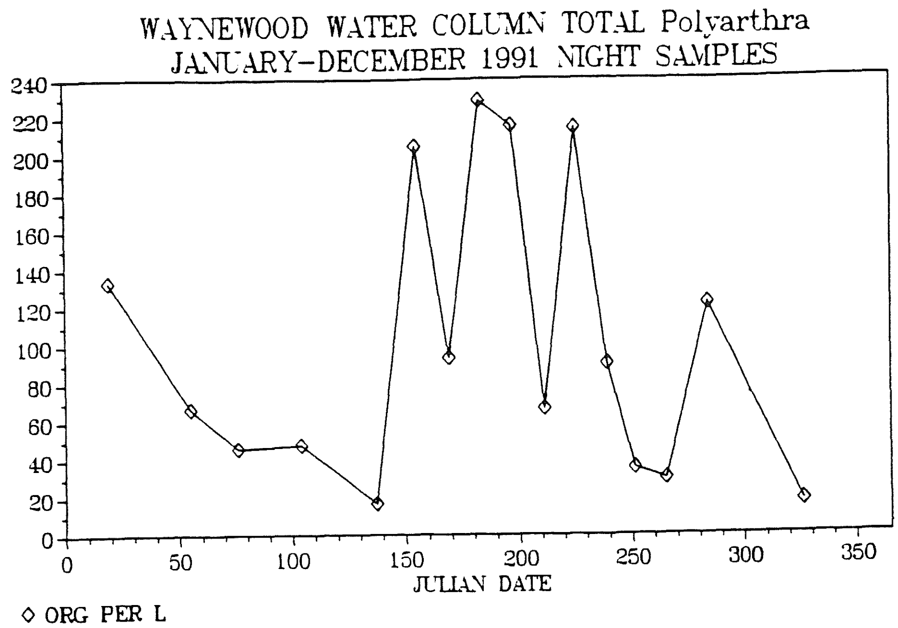


Figure 21. The rotifer *Ploesoma truncatum* in Lake Waynewood, 1991.

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



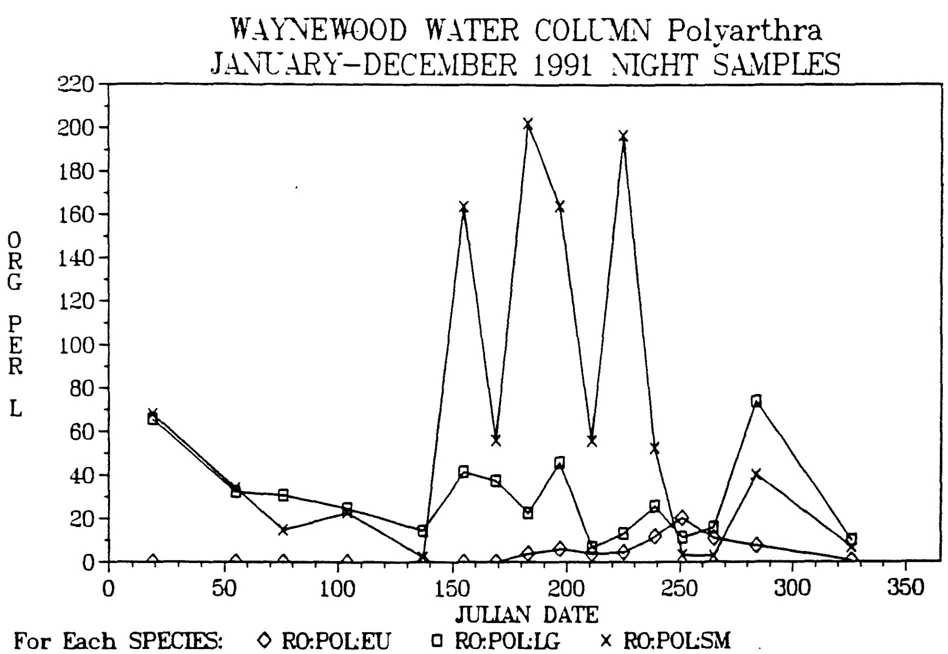


Figure 22. The rotifer *Polyarthra* in Lake Waynewood, 1991.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. **(Top)** Total individuals per liter. **(Bottom)** *Polyarthra* by species: **EU** *P. euryptera* **LG** large spp., and **SM** small spp.

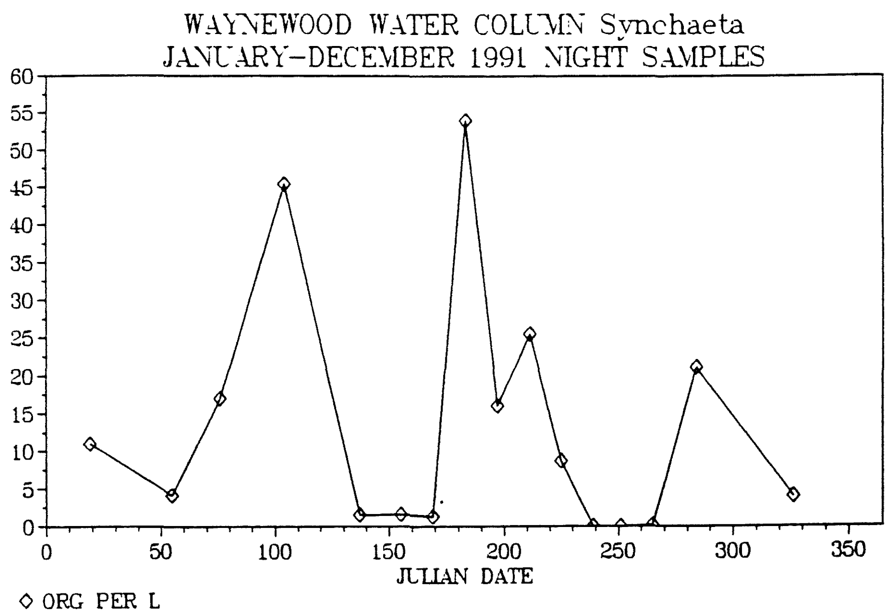
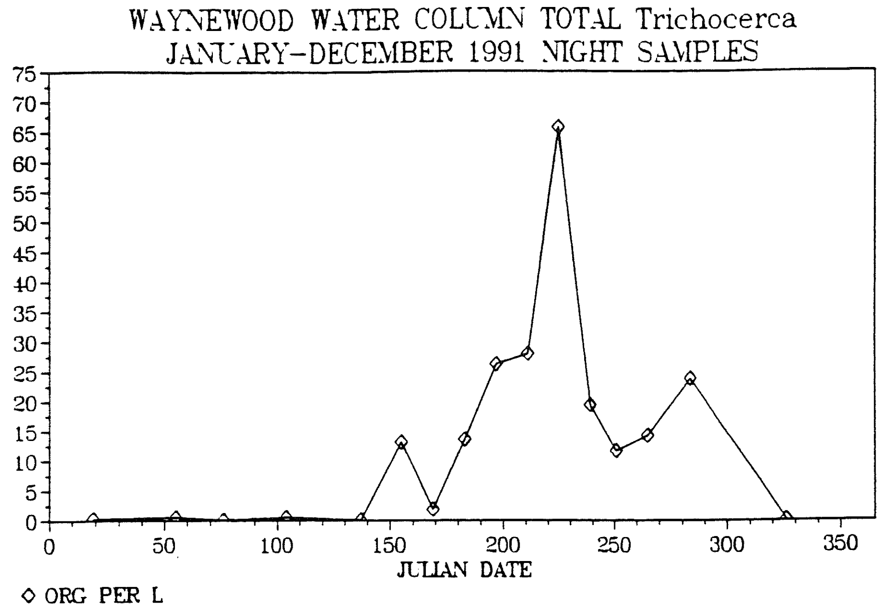


Figure 23. The rotifer *Synchaeta* in Lake Waynewood, 1991.

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



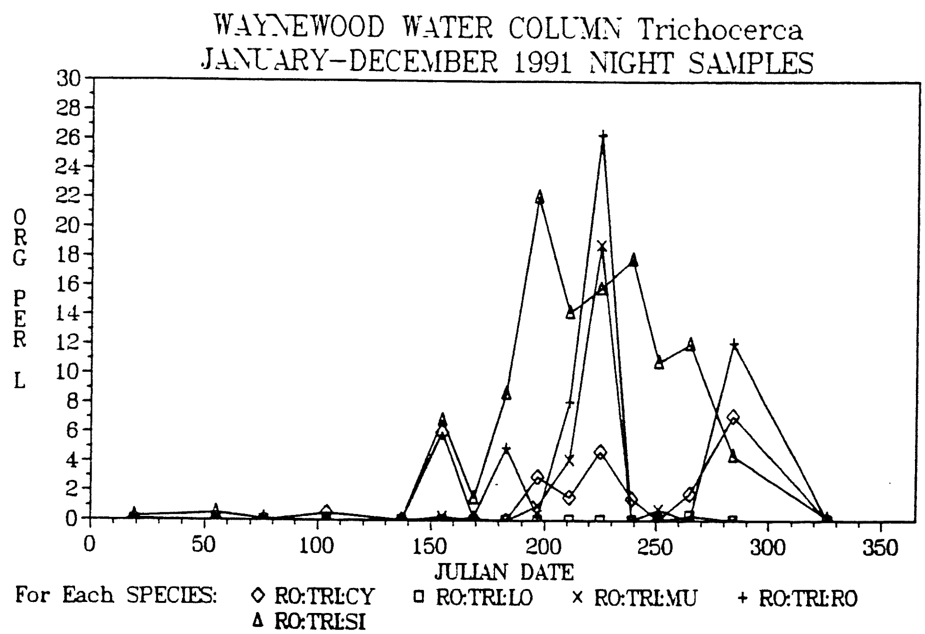


Figure 24. The rotifer *Trichocerca* in Lake Waynewood, 1991.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. **(Top)** Total individuals per liter. **(Bottom)** *Trichocerca* by species: **CY** *T. cylindrica*, **LO** *T. lophoessa*, **MU** *T. multicrinus*, **RO** *T. rousseleti* and **SI** *T. similis*.

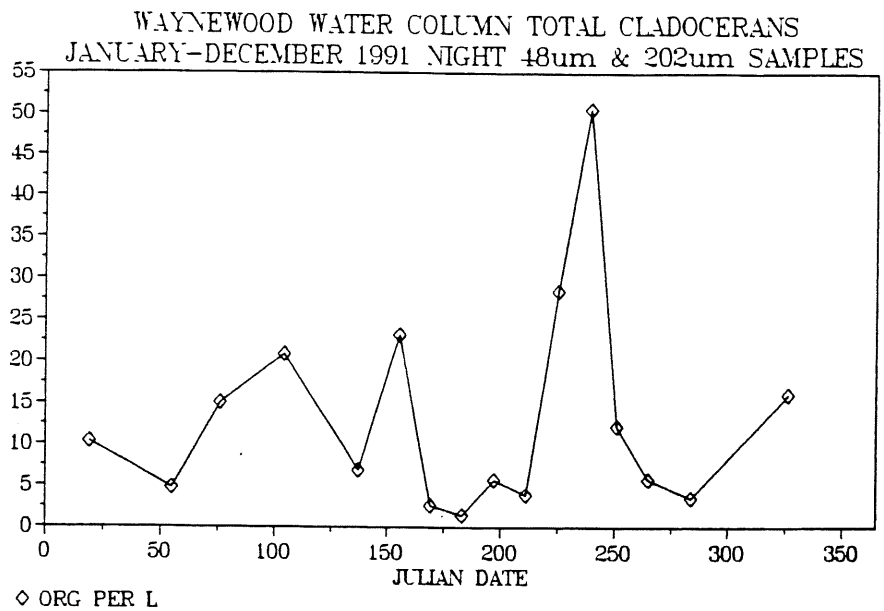
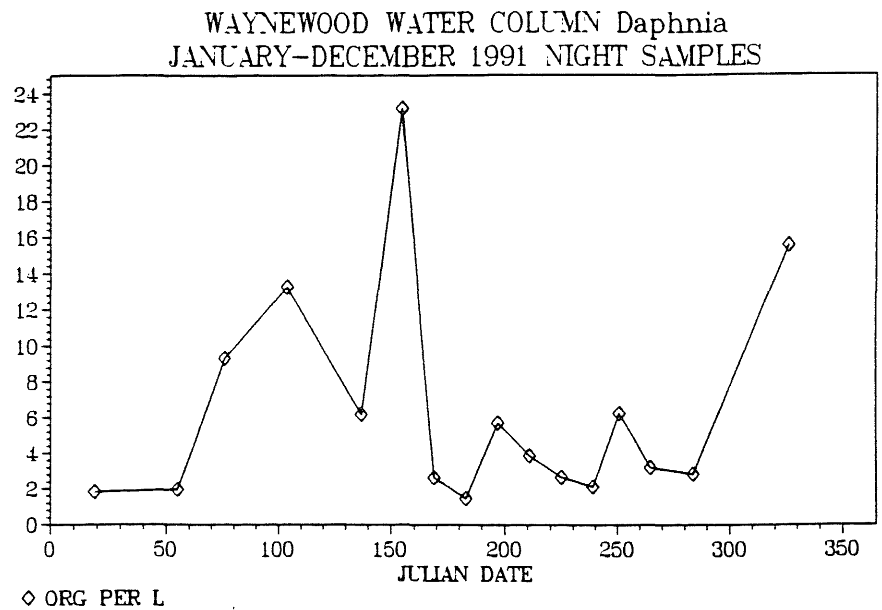


Figure 25. Cladocera in Lake Waynewood, 1991.

Nighttime net collections from three depths have been combined to give a water column mean. Different organisms were counted from the 202μm net (mainly *Daphnia* spp.) and the 48μm net (mainly *Bosmina* spp.).



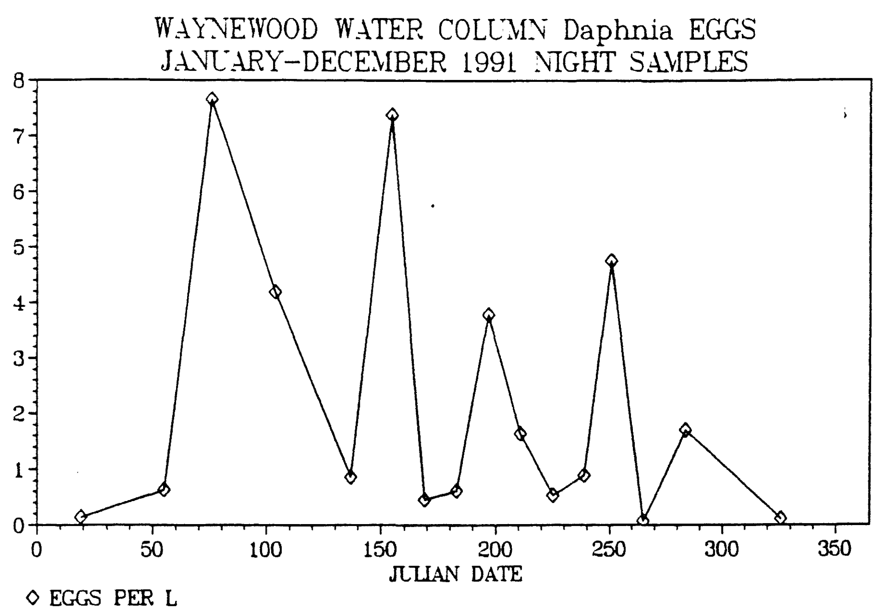


Figure 26. The cladoceran *Daphnia* in Lake Waynewood, 1991.

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

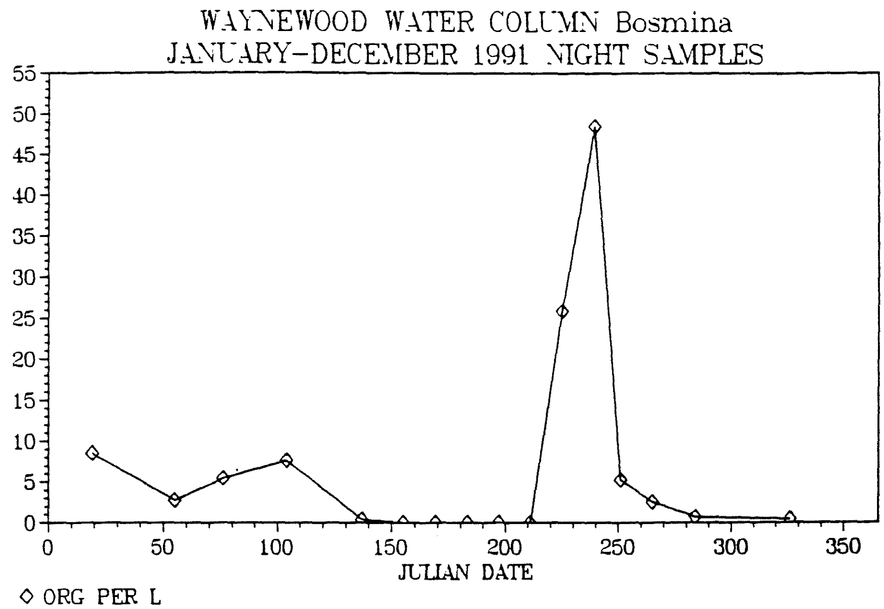


Figure 27. The cladoceran *Bosmina* in Lake Waynewood, 1991.

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

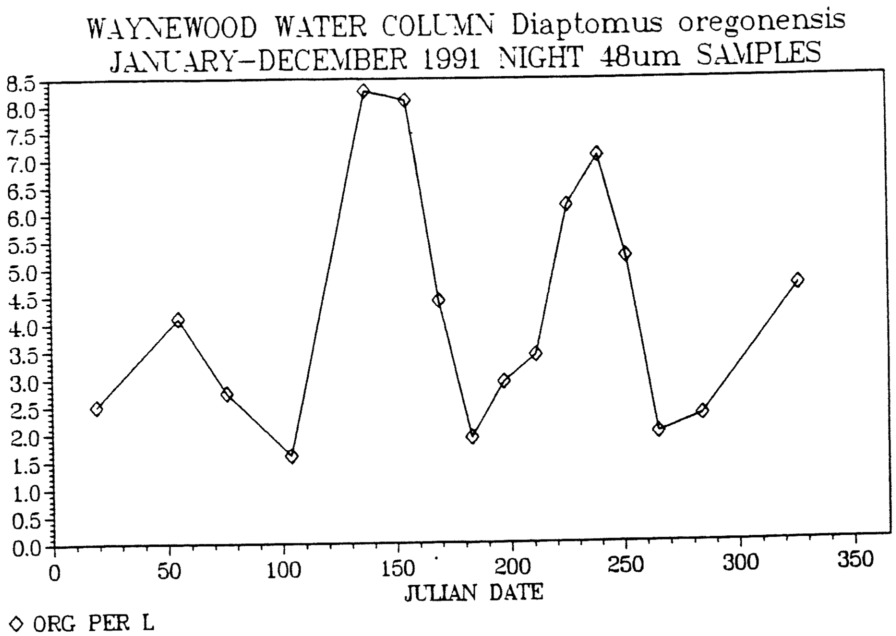
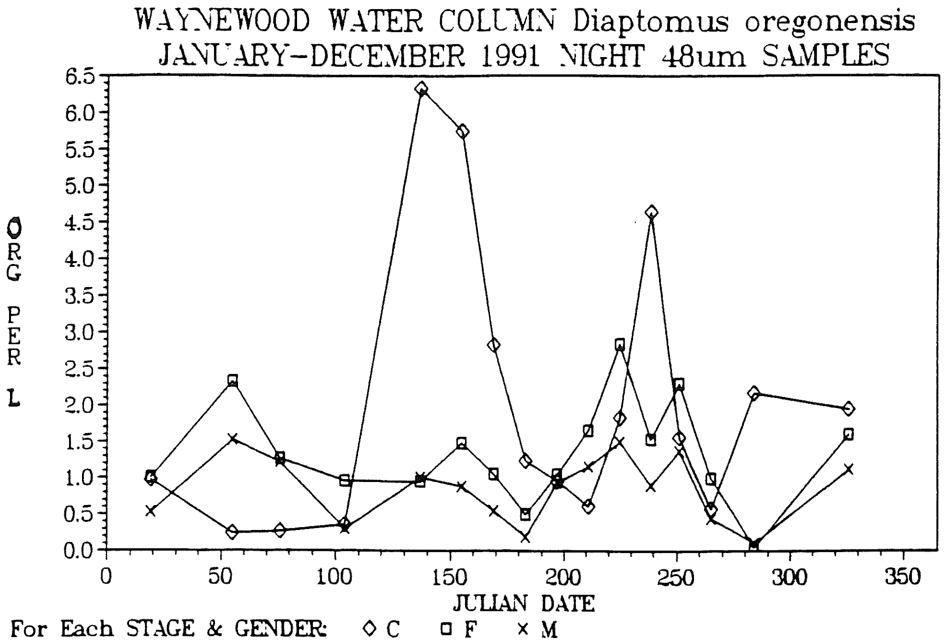


Figure 28. Calanoid copepods (*Diaptomus oregonensis*) in Lake Waynewood, 1991.

Nighttime net collections from three depths have been combined to give a water column mean. Counts of adults and copepodids were all made from the 48μm-net samples.



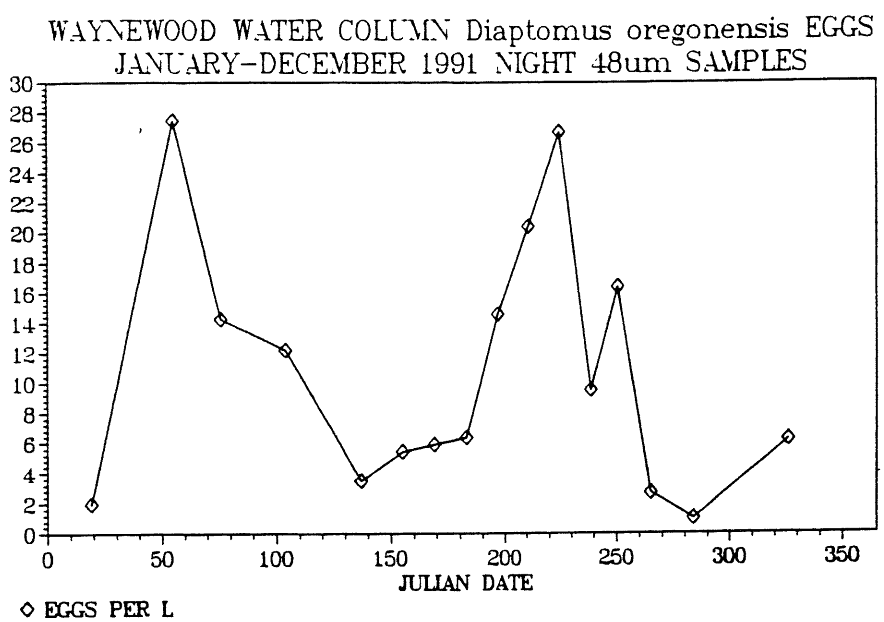
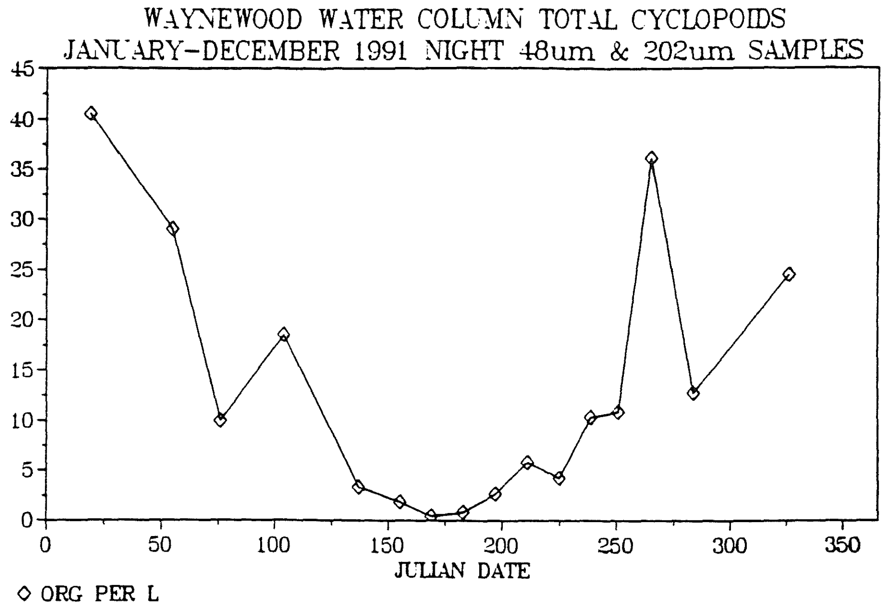


Figure 29. The calanoid copepod *Diaptomus oregonensis* in Lake Waynewood, 1991.

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



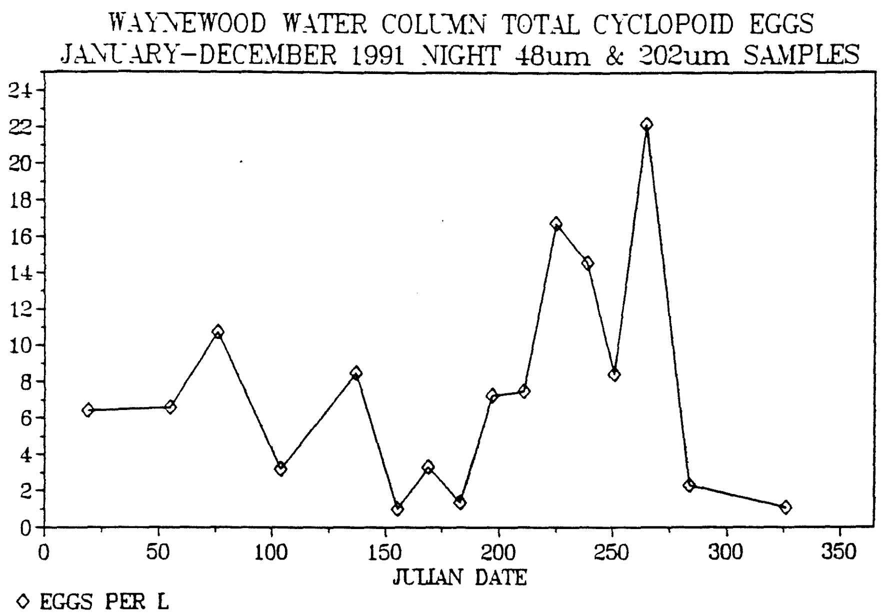
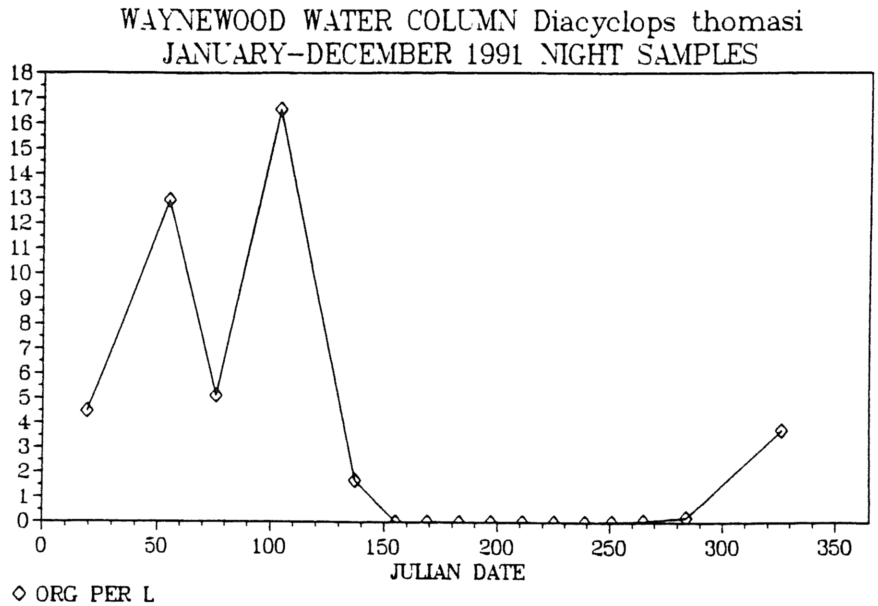


Figure 30. Cyclopoid copepods in Lake Waynewood, 1991.

Nighttime net collections from three depths have been combined to give a water column mean. Several species, collected variously with the 48μm or 202μm net, are included. **(Top)** Total individuals, including copepodids. **(Bottom)** Total cyclopoid eggs.



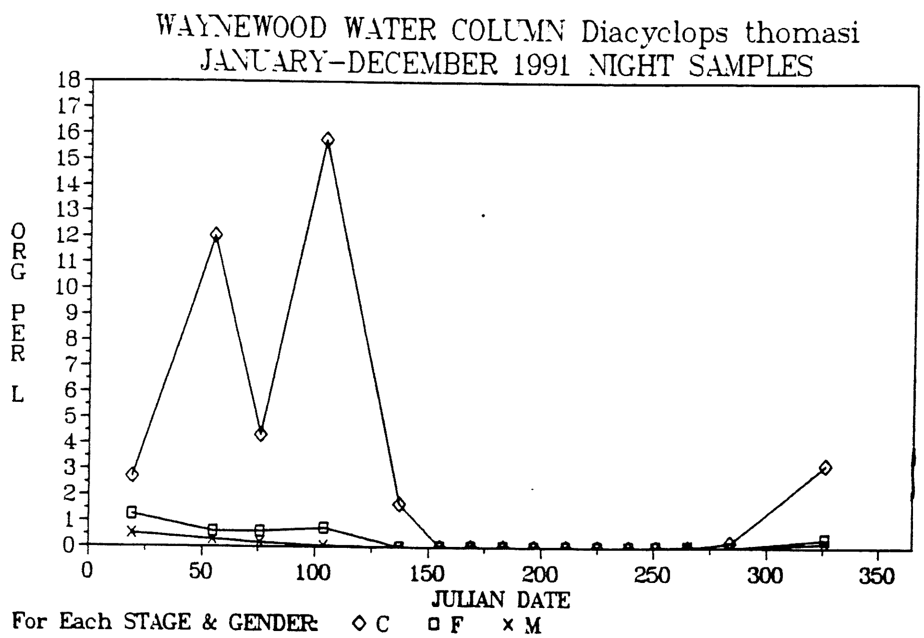
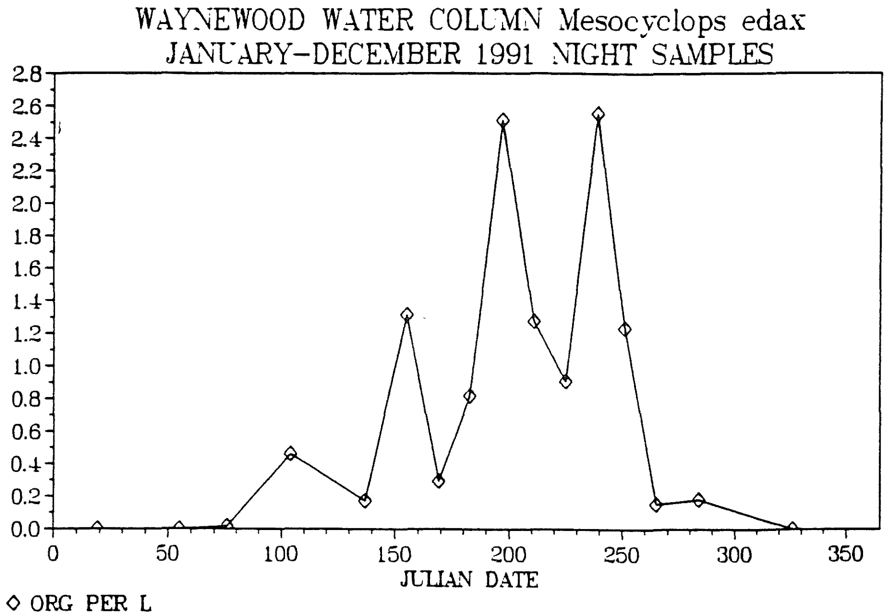


Figure 31. The cyclopoid copepod *Diayclops thomasi* in Lake Waynewood, 1991.

Nighttime net collections from three depths have been combined to give a water column mean. (Top) Total individuals per liter. **(Bottom)** Separated into adults (males and females separately) and copepodids. Females were counted from the 202μm samples, males and copepodids from the 48μm samples. This species was referred to *Cyclops bicuspidatus* in the 1990 report.



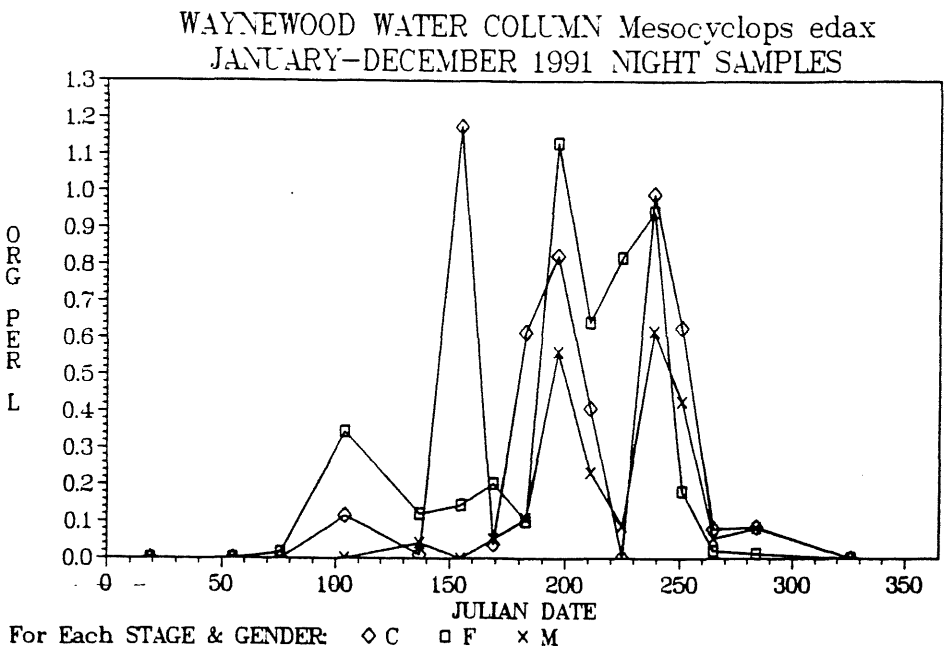
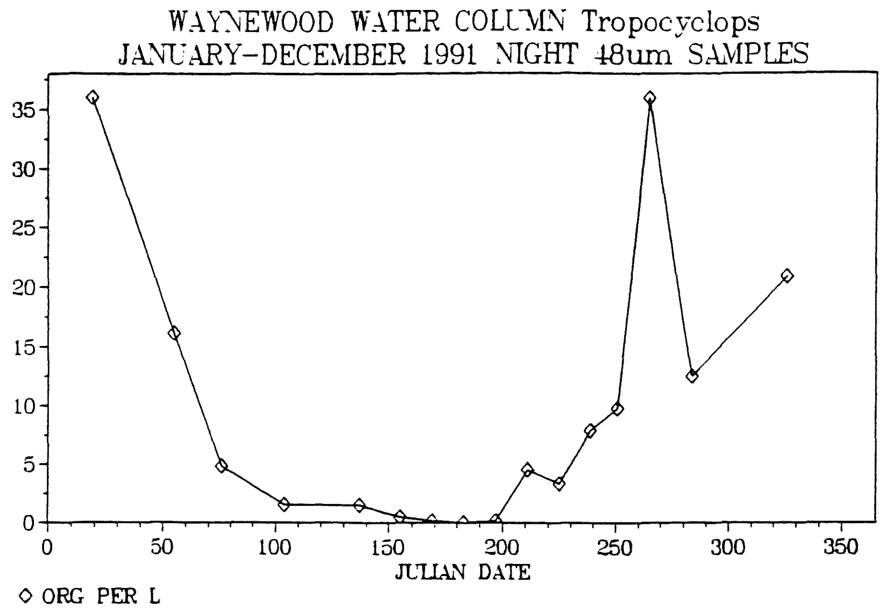


Figure 32. The cyclopoid copepod *Mesocyclops edax* in Lake Waynewood, 1991.

Nighttime net collections from three depths have been combined to give a water column mean. (Top) Total individuals per liter. **(Bottom)** Separated into adults (males and females separately) and copepodids. Females were counted from the 202μm samples, males and copepodids from the 48μm samples.



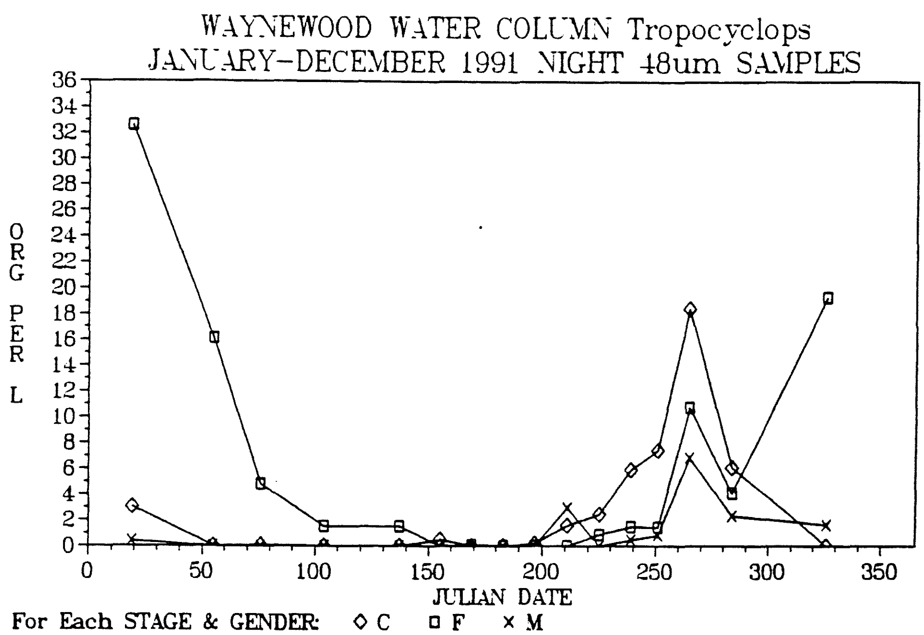


Figure 33. The cyclopoid copepod *Tropocyclops* in Lake Waynewood, 1991.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. **(Top)** Total individuals per liter. **(Bottom)** Adults (males and females separately) and copepodids.

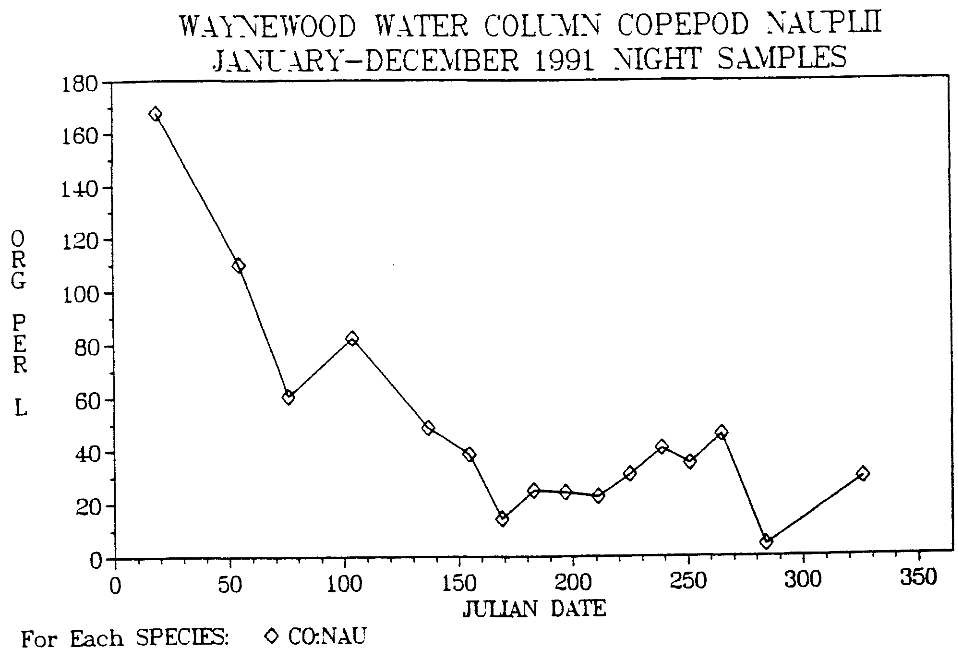


Figure 34. Copepod nauplii in Lake Waynewood, 1991.

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.

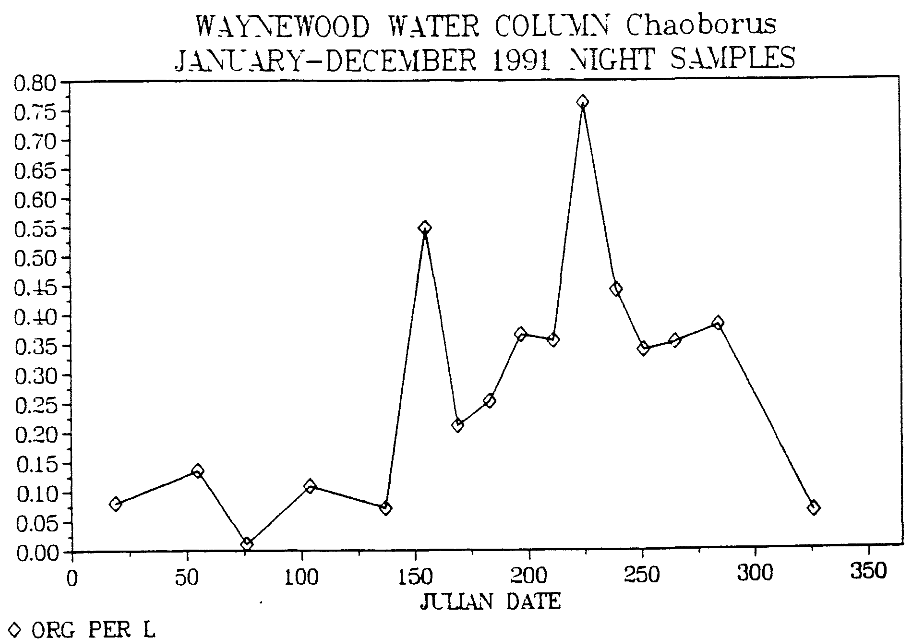


Figure 35. The dipteran *Chaoborus* in Lake Waynewood, 1991.

Nighttime net collections (48μm) from three depths have been combined to give a water column mean. The 48μm net apparently collected small instars with greater efficiency than the 202μm net used for *Chaoborus* counts in 1988-90.

EXPLANATION OF DATA TABLES

The following 17 tables present the physical/chemical information acquired on each date in 1991. 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 method #12 (see **METHODS AND RESULTS**).

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

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

PHMETHOD: pH method 11 (see **METHODS AND RESULTS**).

CAMETHOD: Chlorophyll-a method #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.

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

OXYGEN: Dissolved oxygen (mg per liter--not corrected for elevation).

OFLAG: Error flag for oxygen; "4" means reported value should be interpreted as a true "zero".

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).

CHLAC P: Percentage of CHLAC passing 22-μm net.

Names of Sampling Personnel:

JAA	John Aufderheide
GLB	Greg Brockway
SRC	Scott Carpenter
PRG	Pat Gorski
SLM	Shawna McConnell
REM	Robert Moeller
EMN	Gina Novak
AMS	Alice Shumate
PLS	Paul Stutzman
TLV	Tim Vail

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 1/19/91 JULIAN DATE: 19 TIME: 12.00

SECCHI M: 3.4 WEATHER: Sunny, 12% cloud cover, sl. wind

PERSONNEL: JAA SRC EMN

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

COMMENTS: 4 1/2" candled ice, no snow cover

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
1/19/91	19	S	1	-1.0	1.0								
1/19/91	19		1	0.0	2.9	11.28		100.0000					
1/19/91	19	E	1	1.0	3.3	10.74		27.0490	6.61	309	2.39	3.16	
1/19/91	19	E	2	1.0	3.3	10.74		27.0490	6.65	302	1.57	1.92	31
1/19/91	19		1	2.0	3.3	10.72		11.0539					
1/19/91	19		1	3.0	3.3	10.72		4.4971					
1/19/91	19	M	1	4.0	3.3	10.78		1.7810	6.60	302	2.02	2.79	
1/19/91	19	M	2	4.0	3.3	10.78		1.7810	6.74	313	2.18	3.11	50
1/19/91	19		1	5.0	3.4	10.55		0.7449					
1/19/91	19		1	6.0	3.5	10.14		0.3132					
1/19/91	19		1	7.0	3.5	9.75		0.1317					
1/19/91	19	H	1	8.0	3.6	8.91		0.0555	6.78	332	1.87	2.72	
1/19/91	19	H	2	8.0	3.6	8.91		0.0555	6.72	313	1.21	2.56	37
1/19/91	19		1	9.0	3.6	8.48		0.0229					
1/19/91	19		1	10.0	3.7	8.30		0.0090					
1/19/91	19		1	11.0	3.9	5.24		0.0029					
1/19/91	19		1	12.0	3.9	0.89		0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 2/24/91 JULIAN DATE: 55 TIME: 12.50

SECCHI M: 3.8 WEATHER: Overcast, partly sunny, sl. wind

PERSONNEL: JAA SRC EMN

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

COMMENTS: 6" translucent ice, <1% snow cover

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
2/24/91	55	S	1	-1.0	4.8								
2/24/91	55		1	0.0	4.3	10.77		100.0000					
2/24/91	55	E	1	1.0	4.2	10.42		41.2712	6.77	307	7.07	7.08	
2/24/91	55	E	2	1.0	4.2	10.42		41.2712	6.74	303	7.35	7.79	22
2/24/91	55		1	2.0	4.1	10.10		15.2743					
2/24/91	55		1	3.0	4.1	10.03		5.7726					
2/24/91	55	M	1	4.0	4.1	10.12		2.3192	6.72	308	5.80	6.72	
2/24/91	55	M	2	4.0	4.1	10.12		2.3192	6.74	313	5.31	6.21	21
2/24/91	55		1	5.0	4.0	10.11		0.9509					
2/24/91	55		1	6.0	4.0	9.09		0.3926					
2/24/91	55		1	7.0	4.0	8.63		0.1641					
2/24/91	55		1	8.0	4.0	8.69		0.0650					
2/24/91	55	H	1	9.0	4.0	6.53		0.0260	6.62	334	1.01	1.96	
2/24/91	55	H	2	9.0	4.0	6.53		0.0260	6.60	336	1.02	2.18	27
2/24/91	55		1	10.0	4.1	3.02		0.0078					
2/24/91	55		1	11.0	4.1	3.02		0.0016					
2/24/91	55		1	12.0	4.2	0.47		0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 3/17/91 JULIAN DATE: 76 TIME: 13.62

SECCHI M: 2.4 WEATHER: Clear, sunny, breezy

PERSONNEL: JAA EMN TLV

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
3/17/91	76	S	1	-1.0	12.9								
3/17/91	76		1	0.0	3.6	13.49		100.0000					
3/17/91	76		1	1.0	3.4	13.48		39.5726					
3/17/91	76	E	1	2.0	3.4	13.38		17.8335	7.16	278	22.33	23.29	
3/17/91	76	E	2	2.0	3.4	13.38		17.8335	7.05	284	20.41	21.22	9
3/17/91	76		1	3.0	3.3	13.35		5.5957					
3/17/91	76		1	4.0	3.3	13.34		2.0282					
3/17/91	76	M	1	5.0	3.3	13.28		0.7932	7.17	278	22.78	22.78	
3/17/91	76	M	2	5.0	3.3	13.28		0.7932	7.10	286	21.58	22.33	10
3/17/91	76		1	6.0	3.3	13.19		0.2652					
3/17/91	76		1	7.0	3.3	13.17		0.0881					
3/17/91	76		1	8.0	3.3	13.22		0.0278					
3/17/91	76	H	1	9.0	3.3	13.18		0.0088	7.17	283	22.68	22.68	
3/17/91	76	H	2	9.0	3.3	13.18		0.0088	7.07	286	22.54	23.28	10
3/17/91	76		1	10.0	3.3	13.30		0.0018					
3/17/91	76		1	11.0	3.3	13.18		0.0000					
3/17/91	76		1	12.0				0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 4/14/91 JULIAN DATE: 104 TIME: 13.50

SECCHI M: 4.9 WEATHER: Partly cloudy, cool, windy

PERSONNEL: JAA GLB EMN

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

COMMENTS: Chemistry samples taken at 0.5, 3, 6, 7, 9, 11 m

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
4/14/91	104	S	1	-1.0	11.5								
4/14/91	104		1	0.0	9.4	10.80		100.0000					
4/14/91	104		1	1.0	9.4	10.83		34.9773					
4/14/91	104		1	2.0	9.3	10.87		10.7128					
4/14/91	104	E	1	3.0	9.2	10.83		4.0610	7.22	265	4.49	5.89	
4/14/91	104	E	2	3.0	9.2	10.83		4.0610	7.28	267	4.08	5.47	47
4/14/91	104		1	4.0	9.1	10.83		1.6408					
4/14/91	104		1	5.0	8.9	10.77		0.7144					
4/14/91	104	M	1	6.0	6.0	10.82		0.3313	7.02	268	13.51	13.51	
4/14/91	104	M	2	6.0	6.0	10.82		0.3313	6.98	268	9.41	12.18	28
4/14/91	104		1	7.0	5.7	10.76		0.1223					
4/14/91	104		1	8.0	5.5	10.48		0.0512					
4/14/91	104	H	1	9.0	5.5	10.26		0.0199	6.82	265	7.92	9.78	
4/14/91	104	H	2	9.0	5.5	10.26		0.0199	6.86	262	7.37	9.31	21
4/14/91	104		1	10.0	5.4	9.93		0.0076					
4/14/91	104		1	11.0	5.4	9.39		0.0028					
4/14/91	104		1	12.0	5.4								

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 5/17/91 JULIAN DATE: 137 TIME: 17.37

SECCHI M: 4.3 WEATHER: Windy, partly cloudy, hazy

PERSONNEL: JAA EMN

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

COMMENTS: pH, Alkalinity data misplaced

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
5/17/91	137	S	1	-1.0	24.5								
5/17/91	137		1	0.0	23.0	8.96		100.0000					
5/17/91	137	E	1	1.0	23.0	8.90		40.5680			1.56	1.77	
5/17/91	137	E	2	1.0	23.0	8.90		40.5680			1.37	1.57	47
5/17/91	137		1	2.0	20.1	10.20		18.6863					
5/17/91	137		1	3.0	15.2	11.34		7.4240					
5/17/91	137		1	4.0	12.6	10.92		2.7578					
5/17/91	137	M	1	5.0	10.6	8.87		1.1129			9.02	9.44	
5/17/91	137	M	2	5.0	10.6	8.87		1.1129			11.62	11.62	30
5/17/91	137		1	6.0	8.6	6.73		0.4258					
5/17/91	137		1	7.0	7.4	4.96		0.1688					
5/17/91	137		1	8.0	6.7	4.52		0.0675					
5/17/91	137		1	9.0	6.5	4.10		0.0233					
5/17/91	137	H	1	10.0	6.4	3.65		0.0063			2.06	3.32	
5/17/91	137	H	2	10.0	6.4	3.65		0.0063			1.70	3.05	34
5/17/91	137		1	11.0	6.2	2.86		0.0000					
5/17/91	137		1	12.0	6.1	1.11		0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 6/04/91 JULIAN DATE: 155 TIME: 11.50

SECCHI M: 4.7 WEATHER: Mostly cloudy, sl. wind

PERSONNEL: JAA TLV SLM AMS PRG

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
6/04/91	155	S	1	-1.0	21.3								
6/04/91	155		1	0.0	23.9	7.60		100.0000					
6/04/91	155	E	1	1.0	23.9	7.67		31.1139	7.08	270	1.51	1.80	
6/04/91	155	E	2	1.0	23.9	7.67		31.1139	7.27	264	1.77	1.77	70
6/04/91	155		1	2.0	23.7	7.63		14.2724					
6/04/91	155		1	3.0	19.5	9.63		7.9823					
6/04/91	155		1	4.0	14.6	8.76		4.0851					
6/04/91	155	M	1	5.0	11.9	6.89		1.7186	6.96	267	7.64	7.64	
6/04/91	155	M	2	5.0	11.9	6.89		1.7186	6.84	287	8.06	8.27	17
6/04/91	155		1	6.0	8.8	3.18		0.6318					
6/04/91	155		1	7.0	7.6	2.03		0.2422					
6/04/91	155		1	8.0	7.1	1.98		0.0866					
6/04/91	155		1	9.0	6.6	1.43		0.0257					
6/04/91	155	H	1	10.0	6.5	0.96		0.0066	6.58	399	3.51	5.12	
6/04/91	155	H	2	10.0	6.5	0.96		0.0066	6.59	394	3.23	3.32	51
6/04/91	155		1	11.0	6.3	0.43	4	0.0002					
6/04/91	155		1	12.0	6.2	0.35	4	0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 6/18/91 JULIAN DATE: 169 TIME: 10.50

SECCHI M: 5.0 WEATHER: Overcast, windy

PERSONNEL: AMS EMN TLV

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

COMMENTS: No pH, Alkalinity this date

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
6/18/91	169	S	1	-1.0	24.3								
6/18/91	169		1	0.0	24.2	8.56		100.0000					
6/18/91	169	E	1	1.0	24.2	8.52		39.9840	7.10		2.35	2.35	
6/18/91	169	E	2	1.0	24.2	8.52		39.9840	7.22		2.23	2.23	47
6/18/91	169		1	2.0	23.9	8.40		21.4047					
6/18/91	169		1	3.0	22.1	8.91		10.6069					
6/18/91	169		1	4.0	18.6	10.80		5.0533					
6/18/91	169	M	1	5.0	12.1	6.76		1.8138	6.78		29.76	29.76	
6/18/91	169	M	2	5.0	12.1	6.76		1.8138	6.73		30.14	30.14	38
6/18/91	169		1	6.0	9.5	2.20		0.6733					
6/18/91	169		1	7.0	8.3	0.87		0.2312					
6/18/91	169		1	8.0	7.5	0.36	4	0.0726					
6/18/91	169		1	9.0	7.0	0.19	4	0.0218					
6/18/91	169	H	1	10.0	6.7	0.16	4	0.0060	6.59		6.50	6.61	
6/18/91	169	H	2	10.0	6.7	0.16	4	0.0060	6.60		6.26	6.45	53
6/18/91	169		1	11.0	6.4	0.14	4	0.0013					
6/18/91	169		1	12.0	6.4	0.13	4	0.0000					
6/18/91	169		1	13.0	6.4			0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 7/02/91 JULIAN DATE: 183 TIME: 11.63

SECCHI M: 4.5 WEATHER: Overcast, sl. breeze

PERSONNEL: JAA AMS EMN

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
7/02/91	183	S	1	-1.0	21.2								
7/02/91	183		1	0.0	24.3	8.03		100.0000					
7/02/91	183		1	1.0	24.4	7.95		23.1965					
7/02/91	183	E	1	2.0	24.4	8.07		12.1766	7.36	293	2.70	2.87	
7/02/91	183	E	2	2.0	24.4	8.07		12.1766	7.47	276	2.33	2.41	64
7/02/91	183		1	3.0	24.4	8.03		6.7836					
7/02/91	183		1	4.0	20.1	9.21		3.1175					
7/02/91	183	M	1	5.0	14.5	10.56		0.8897	7.40	294	42.98	42.98	
7/02/91	183	M	2	5.0	14.5	10.56		0.8897	7.39	298	30.33	32.78	38
7/02/91	183		1	6.0	10.2	0.57		0.2768					
7/02/91	183		1	7.0	8.1	0.43	4	0.0755					
7/02/91	183		1	8.0	7.5	0.40	4	0.0235					
7/02/91	183		1	9.0	7.0	0.37	4	0.0075					
7/02/91	183	H	1	10.0	6.7	0.35	4	0.0028	7.23	546	4.55	11.54	
7/02/91	183	H	2	10.0	6.7	0.35	4	0.0028	7.26	511	4.18	11.02	49
7/02/91	183		1	11.0	6.5	0.33	4	0.0008					
7/02/91	183		1	12.0	6.5	0.32	4	0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 7/16/91 JULIAN DATE: 197 TIME: 11.00

SECCHI M: 4.0 WEATHER: Sunny, calm

PERSONNEL: JAA SLM TLV

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
7/16/91	197	S	1	-1.0	23.5								
7/16/91	197		1	0.0	25.0	8.37		100.0000					
7/16/91	197		1	1.0	23.5	8.43		41.5763					
7/16/91	197	E	1	2.0	23.2	8.52		22.0373	7.36		8.95	8.95	
7/16/91	197	E	2	2.0	23.2	8.52		22.0373	7.56		5.02	5.41	79
7/16/91	197		1	3.0	23.1	8.37		10.8949					
7/16/91	197		1	4.0	21.7	8.58		4.5729					
7/16/91	197	M	1	5.0	15.6	4.46		1.5698	6.78		33.91	38.38	
7/16/91	197	M	2	5.0	15.6	4.46		1.5698	6.92		30.69	35.58	29
7/16/91	197		1	6.0	10.7	0.37	4	0.5923					
7/16/91	197		1	7.0	8.4	0.31	4	0.1983					
7/16/91	197		1	8.0	7.5	0.26	4	0.0779					
7/16/91	197		1	9.0	7.1	0.24	4	0.0339					
7/16/91	197	H	1	10.0	6.8	0.22	4	0.0150	6.94		1.80	10.31	
7/16/91	197	H	2	10.0	6.8	0.22	4	0.0150	7.02		1.38	9.19	27
7/16/91	197		1	11.0	6.7	0.21	4	0.0050					
7/16/91	197		1	12.0	6.5	0.19	4	0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 7/30/91 JULIAN DATE: 211 TIME: 11.23

SECCHI M: 3.2 WEATHER: Mostly cloudy

PERSONNEL: JAA TLV SLM EMN

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

COMMENTS: No Alkalinity; Temp. & O2 taken at 8:45 am

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
7/30/91	211	S	1	-1.0	17.7								
7/30/91	211		1	0.0	23.6	8.64		100.0000					
7/30/91	211		1	1.0	23.7	8.67		52.2466					
7/30/91	211	E	1	2.0	23.8	8.51		24.2556	8.21		13.03	13.03	
7/30/91	211	E	2	2.0	23.8	8.51		24.2556	8.48		12.51	13.65	38
7/30/91	211		1	3.0	23.9	8.37		14.1680					
7/30/91	211		1	4.0	22.5	9.33		6.3420					
7/30/91	211		1	5.0	17.2	0.39	4	2.3550					
7/30/91	211	M	1	6.0	12.3	0.20	4	1.1775	6.69		21.27	33.07	
7/30/91	211	M	2	6.0	12.3	0.20	4	1.1775	6.61		20.54	26.13	53
7/30/91	211		1	7.0	9.7	0.19	4	0.4353					
7/30/91	211		1	8.0	8.6	0.18	4	0.1985					
7/30/91	211		1	9.0	8.0	0.17	4	0.0989					
7/30/91	211	H	1	10.0	7.4	0.15	4	0.0371	6.94		2.25	13.56	
7/30/91	211	H	2	10.0	7.4	0.15	4	0.0371	7.03		1.92	14.68	70
7/30/91	211		1	11.0	7.1	0.15	4	0.0000					
7/30/91	211		1	12.0	7.0	0.15	4	0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 8/13/91 JULIAN DATE: 225 TIME: 11.50

SECCHI M: 2.8 WEATHER: Sunny

PERSONNEL: EMN AMS TLV

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
8/13/91	225	S	1	-1.0	25.8								
8/13/91	225		1	0.0	23.8	9.04		100.0000					
8/13/91	225		1	1.0	22.6	9.11		37.3832					
8/13/91	225	E	1	2.0	22.5	9.09		13.7844	7.41	295	11.58	11.80	
8/13/91	225	E	2	2.0	22.5	9.09		13.7844	7.24	296	12.95	13.23	41
8/13/91	225		1	3.0	22.4	8.85		5.5204					
8/13/91	225		1	4.0	22.2	8.33		2.1898					
8/13/91	225		1	5.0	17.2	0.46	4	0.7430					
8/13/91	225	M	1	6.0	12.8	0.52	4	0.3265	6.50	467	36.93	43.69	
8/13/91	225	M	2	6.0	12.8	0.52	4	0.3265	6.53	396	56.67	59.87	68
8/13/91	225		1	7.0	9.2	0.65	4	0.1148					
8/13/91	225		1	8.0	8.0	0.67	4	0.0324					
8/13/91	225		1	9.0	7.3	0.66	4	0.0137					
8/13/91	225	H	1	10.0	6.8	0.67	4	0.0052	6.73	817	0.79	7.77	
8/13/91	225	H	2	10.0	6.8	0.67	4	0.0052	6.76	799	0.79	9.21	77
8/13/91	225		1	11.0	6.7	0.67	4	0.0000					
8/13/91	225		1	12.0	6.7	0.64	4	0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 8/27/91 JULIAN DATE: 239 TIME: 14.25

SECCHI M: 3.4 WEATHER: Sunny, breezy

PERSONNEL: EMN TLV

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

COMMENTS: No Alkalinity this date

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
8/27/91	239	S	1	-1.0	28.0								
8/27/91	239		1	0.0	24.6	10.11		100.0000					
8/27/91	239		1	1.0	24.3	9.05		46.6200					
8/27/91	239	E	1	2.0	23.5	8.62		23.2056	8.36		7.29	7.91	
8/27/91	239	E	2	2.0	23.5	8.62		23.2056	8.47		6.79	7.46	66
8/27/91	239		1	3.0	23.2	8.49		12.3895					
8/27/91	239		1	4.0	22.4	7.12		6.0348					
8/27/91	239		1	5.0	19.1	0.72		1.8666					
8/27/91	239	M	1	6.0	13.4	0.62		0.6589	6.57		34.51	39.62	
8/27/91	239	M	2	6.0	13.4	0.62		0.6589	6.55		36.71	42.61	57
8/27/91	239		1	7.0	10.6	0.59		0.1313					
8/27/91	239		1	8.0	9.0	0.58		0.0275					
8/27/91	239		1	9.0	8.2	0.56		0.0077					
8/27/91	239	H	1	10.0	7.6	0.55		0.0013	6.79		3.90	23.47	
8/27/91	239	H	2	10.0	7.6	0.55		0.0013	6.80		3.26	24.16	78
8/27/91	239		1	11.0	7.2	0.52		0.0000					
8/27/91	239		1	12.0	7.2	0.53		0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 9/08/91 JULIAN DATE: 251 TIME: 14.70

SECCHI M: 3.2 WEATHER: Sunny, breezy

PERSONNEL: EMN TLV

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
9/08/91	251	S	1	-1.0	26.3								
9/08/91	251		1	0.0	23.5	9.86		100.0000					
9/08/91	251		1	1.0	22.4	10.19		40.7332					
9/08/91	251	E	1	2.0	22.0	10.20		16.4712	8.31	326	3.14	3.14	
9/08/91	251	E	2	2.0	22.0	10.20		16.4712	8.41	309	7.25	7.25	49
9/08/91	251		1	3.0	21.8	9.96		7.3565					
9/08/91	251		1	4.0	21.6	9.13		3.1723					
9/08/91	251		1	5.0	18.6	0.62		0.9190					
9/08/91	251	M	1	6.0	13.0	0.35	4	0.3450	6.57	411	32.51	33.80	
9/08/91	251	M	2	6.0	13.0	0.35	4	0.3450	6.52	414	22.98	27.01	53
9/08/91	251		1	7.0	9.9	0.38	4	0.0659					
9/08/91	251		1	8.0	8.3	0.39	4	0.0092					
9/08/91	251		1	9.0	7.5	0.40	4	0.0010					
9/08/91	251	H	1	10.0	7.0	0.40	4	0.0000	6.75	813	2.66	6.80	
9/08/91	251	H	2	10.0	7.0	0.40	4	0.0000	6.78	826	1.82	4.68	79
9/08/91	251		1	11.0	6.7	0.40	4	0.0000					
9/08/91	251		1	12.0	6.8	0.36	4	0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 9/22/91 JULIAN DATE: 265 TIME: 10.60

SECCHI M: 2.1 WEATHER: Sunny

PERSONNEL: TLV EMN GLB

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

COMMENTS: No Alkalinity this date

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
9/22/91	265	S	1	-1.0	13.1								
9/22/91	265		1	0.0	19.0	7.93		100.0000					
9/22/91	265		1	1.0	18.7	7.88		21.9010					
9/22/91	265		1	2.0	18.6	7.80		5.9048					
9/22/91	265	E	1	3.0	18.5	7.79		1.6780	7.19		22.64	22.64	
9/22/91	265	E	2	3.0	18.5	7.79		1.6780	7.19		21.13	21.13	35
9/22/91	265		1	4.0	18.5	7.53		0.5007					
9/22/91	265		1	5.0	18.4	7.49		0.1526					
9/22/91	265		1	6.0	13.4	0.52	4	0.0427					
9/22/91	265	M	1	7.0	10.2	0.43	4	0.0118			54.85	83.22	
9/22/91	265	M	2	7.0	10.2	0.43	4	0.0118	6.65		57.20	87.42	71
9/22/91	265		1	8.0	8.5	0.42	4	0.0026					
9/22/91	265		1	9.0	7.4	0.42	4	0.0000					
9/22/91	265	H	1	10.0	7.1	0.41	4	0.0000	6.90		6.18	38.50	
9/22/91	265	H	2	10.0	7.1	0.41	4	0.0000	6.90		4.77	37.67	72
9/22/91	265		1	11.0	6.9	0.40	4	0.0000					
9/22/91	265		1	12.0	6.9	0.39	4	0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 10/11/91 JULIAN DATE: 284 TIME: 14.17

SECCHI M: 3.5 WEATHER: Overcast

PERSONNEL: EMN TLV

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

COMMENTS: Chlorophyll samples taken on 10/22/91 from depths: 4, 8, 11 m

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
10/11/91	284	S	1	-1.0	10.0								
10/11/91	284		1	0.0	14.6	8.51		100.0000					
10/11/91	284		1	1.0	14.6	8.36		30.1841					
10/11/91	284		1	2.0	14.6	8.37		13.0554					
10/11/91	284	E	1	3.0	14.6	8.32		5.4694	6.98	318	10.58	10.58	
10/11/91	284	E	2	3.0	14.6	8.32		5.4694	7.08	343	9.87	10.70	14
10/11/91	284		1	4.0	14.6	8.31		2.3770					
10/11/91	284		1	5.0	14.6	7.88		1.0949					
10/11/91	284		1	6.0	14.2	5.20		0.4781					
10/11/91	284		1	7.0	12.1	0.26	4	0.2020					
10/11/91	284	M	1	8.0	9.1	0.21	4	0.0503	6.82	740	4.42	6.19	
10/11/91	284	M	2	8.0	9.1	0.21	4	0.0503	6.81	799	3.81	5.29	24
10/11/91	284		1	9.0	7.9	0.19	4	0.0000					
10/11/91	284		1	10.0	7.4	0.18	4	0.0000					
10/11/91	284	H	1	11.0	7.0	0.18	4	0.0000	6.88	1116	9.99	26.72	
10/11/91	284	H	2	11.0	7.0	0.18	4	0.0000	6.86	1154	8.91	25.83	90
10/11/91	284		1	12.0	6.9	0.17	4	0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 11/22/91 JULIAN DATE: 326 TIME: 15.75

SECCHI M: 4.5 WEATHER: Overcast, rain

PERSONNEL: EMN, TLV, PLS

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

COMMENTS:

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
11/22/91	326	S	1	-1.0	12.2								
11/22/91	326		1	0.0	9.1	10.35		100.0000					
11/22/91	326		1	1.0	8.1	9.72		29.6472					
11/22/91	326	E	1	2.0	7.6	9.42		15.7113	6.87	376	0.97	0.97	
11/22/91	326	E	2	2.0	7.6	9.42		15.7113	6.90	368	1.85	1.85	34
11/22/91	326		1	3.0	7.1	9.21		7.8714					
11/22/91	326		1	4.0	6.5	8.97		3.8322					
11/22/91	326		1	5.0	6.3	8.80		1.8990					
11/22/91	326	M	1	6.0	6.3	8.70		0.8731	6.88	372	1.89	1.89	
11/22/91	326	M	2	6.0	6.3	8.70		0.8731	6.89	368	1.41	1.45	35
11/22/91	326		1	7.0	6.2	8.53		0.6434					
11/22/91	326		1	8.0	6.1	8.33		0.2394					
11/22/91	326		1	9.0	6.1	8.32		0.0000					
11/22/91	326	H	1	10.0	6.1	8.24		0.0000	6.86	372	0.72	0.72	
11/22/91	326	H	2	10.0	6.1	8.24		0.0000	6.88	375	0.98	1.29	17
11/22/91	326		1	11.0	6.1	7.78		0.0000					

LAKE WAYNEWOOD: SUMMARY OF PHYSICAL/CHEMICAL DATA

DATE OF SAMPLE: 12/18/91 JULIAN DATE: 352 TIME: 12.00

SECCHI M: 4.5 WEATHER: Overcast, snow, wind

PERSONNEL: EMN TLV PLS

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

COMMENTS: Ice near shore; no night samples because of freezing

DATE OF	JULIAN	STRA	REP	DEPTH	TEMP C	OXYGEN	OFLAG	LIGHT PC	PH	ALKAL	CHLAC U	CHLASUM	CHLAC P
12/18/91	352	S	1	-1.0	-3.1								
12/18/91	352		1	0.0	2.7	11.38		100.0000					
12/18/91	352		1	1.0	2.7	11.13		21.6638					
12/18/91	352	E	1	2.0	2.7	10.98		8.5492	7.15	323	2.33	2.79	
12/18/91	352	E	2	2.0	2.7	10.98		8.5492	7.15	323	0.98	1.28	65
12/18/91	352		1	3.0	2.7	10.85		3.6411					
12/18/91	352		1	4.0	2.9	10.68		1.6019					
12/18/91	352	M	1	5.0	3.0	10.53		0.7010	7.23	321	1.32	1.75	
12/18/91	352	M	2	5.0	3.0	10.53		0.7010	7.24	320	0.93	1.36	46
12/18/91	352		1	6.0	3.0	10.49		0.3080					
12/18/91	352		1	7.0	3.1	10.28		0.1347					
12/18/91	352		1	8.0	3.1	10.12		0.0592					
12/18/91	352		1	9.0	3.1	9.98		0.0257					
12/18/91	352	H	1	10.0	3.2	9.96		0.0102	7.28	321	1.15	1.71	
12/18/91	352	H	2	10.0	3.2	9.96		0.0102	7.28	322	0.92	1.54	60
12/18/91	352		1	11.0	3.2	9.74		0.0032					

Appendix 1. Total Phosphorus from Lake Waynewood streams and wells. All values are micromoles per liter of phosphorus.

Site	1990			1991	
	21 Aug	9 Sep	4 Nov	25 Jan	17 Mar
Outlet Stream		0.83	0.81		0.81
Siphon			1.02		1.51
Wells:					
Westpfahl		0.91	0.66	1.34	1.01
Hinckelman		0.49	0.24		
Park		1.38	1.09		
Main Inlet Watershed:					
Inlet at Lake (0 km)	4.14	2.97	0.97	1.91	1.09
Rt. 590 (0.75 km)	5.85	2.29	0.93	1.55	3.20
Farmland (2.3 km)	1.46	3.54	0.60	0.50	1.20
Intermittent Inlet to SW of Main Inlet:					
Inlet at Lake (0 km)	1.54	0.82	0.80	0.66	0.59
Rt. 590 (1.0 km)	5.68	5.77	1.51		

Samples were collected by Steve Gould as part of a larger hydrogeochemical characterization of the watershed, which is part of a master's thesis:

Gould, S. E. 1991. The hydrogeochemistry of two small catchments in the Pocono Mountains of northeastern Pennsylvania. M.S. Thesis, Department of Earth and Environmental Sciences, Lehigh Univ., Bethlehem, PA. 124 pp.

The analysis includes particulate as well as dissolved phosphorus, subjected to an acid persulfate digestion:

Eisenreich, S.J., R.T. Bannerman and D.E. Armstrong. 1975. A simplified phosphorus analysis technique. Environ. Letters 9(1):43-53.