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Ecological Research Series

DISTRIBUTION OF PHYTOPLANKTON IN NEW JERSEY LAKES



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DISTRIBUTION OF PHYTOPLANKTON IN NEW JERSEY LAKES

by

L. R. Williams, F. A. Morris*, J. W. Hilgert*, V. W. Lambou,
F. A. Hiatt*, W. D. Taylor, M. K. Morris*,
and S. C. Hern

Monitoring Operations Division
Environmental Monitoring and Support Laboratory
Las Vegas, Nevada 89114

*Department of Biological Sciences
The University of Nevada, Las Vegas
Las Vegas, Nevada 89154

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
LAS VEGAS, NEVADA 89114

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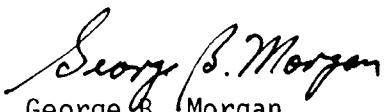
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FOREWORD

Protection of the environment requires effective regulatory actions which are based on sound technical and scientific information. This information must include the quantitative description and linking of pollutant sources, transport mechanisms, interactions, and resulting effects on man and his environment. Because of the complexities involved, assessment of specific pollutants in the environment requires a total systems approach which transcends the media of air, water, and land. The Environmental Monitoring and Support Laboratory-Las Vegas contributes to the formation and enhancement of a sound integrated monitoring data base through multi-disciplinary, multimedia programs designed to:

- develop and optimize systems and strategies for monitoring pollutants and their impact on the environment
- demonstrate new monitoring systems and technologies by applying them to fulfill special monitoring needs of the Agency's operating programs

This report presents the species and abundance of phytoplankton in the 13 lakes sampled by the National Eutrophication Survey in the State of New Jersey, along with results from the calculation of several commonly used biological indices of water quality and community structure. These data can be used to biologically characterize the study lakes, and as baseline data for future investigations. This report was written for use by Federal, State, and local governmental agencies concerned with water quality analysis, monitoring, and/or regulation. Private industry and individuals similarly involved with the biological aspects of water quality will find the document useful. For further information contact the Water and Land Quality Branch, Monitoring Operations Division.



George B. Morgan
Director

Environmental Monitoring and Support Laboratory
Las Vegas

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INTRODUCTION

The collection and analysis of phytoplankton data were included in the National Eutrophication Survey in an effort to determine relationships between algal characteristics and trophic status of individual lakes.

During spring, summer, and fall of 1973, the Survey sampled 250 lakes in 17 States. Over 700 algal species and varieties were identified and enumerated from the 743 water samples examined.

This report presents the species and abundance of phytoplankton in the 13 lakes sampled in the State of New Jersey (Table 1). The Nygaard's Trophic State (Nygaard 1949), Palmer's Organic Pollution (Palmer 1969), and species diversity and abundance indices are also included.

TABLE 1. LAKES SAMPLED IN THE STATE OF NEW JERSEY

STORET #	LAKE NAME	COUNTY
3402	Budd Lake	Morris
3403	Greenwood Lake	Passaic (Orange in N.Y.)
3406	Oradell Reservoir	Bergen
3409	Pinecliff Lake	Passaic
3410	Pompton Lake	Passaic
3412	Duhernal Lake	Middlesex
3413	Farrington Lake	Middlesex
3415	Lake Hopatcong	Morris, Sussex
3417	Lake Musconetcong	Morris, Sussex
3419	Paulinskill Lake	Sussex
3420	Spruce Run Reservoir	Hunterdon
3422	Union Lake	Cumberland
3423	Wanaque Reservoir	Passaic

MATERIALS AND METHODS

LAKE AND SITE SELECTION

Lakes and reservoirs included in the Survey were selected through discussions with State water pollution agency personnel and U.S. Environmental Protection Agency Regional Offices (U.S. Environmental Protection Agency 1975). Screening and selection strongly emphasized lakes with actual or potential accelerated eutrophication problems. As a result, the selection was limited to lakes:

- (1) impacted by one or more municipal sewage treatment plant outfalls either directly into the lake or by discharge to an inlet tributary within approximately 40 kilometers of the lake;
- (2) 40 hectares or larger in size; and
- (3) with a mean hydraulic retention time of at least 30 days.

Specific selection criteria were waived for some lakes of particular State interest.

Sampling sites for a lake were selected based on available information on lake morphometry, potential major sources of nutrient input, and on-site judgment of the field limnologist (U.S. Environmental Protection Agency 1975). Primary sampling sites were chosen to reflect the deepest portion of each major basin in a test lake. Where many basins were present, selection was guided by nutrient source information on hand. At each sampling site, a depth-integrated phytoplankton sample was taken. Depth-integrated samples were uniform mixtures of water from the surface to a depth of 15 feet (4.6 meters) or from the surface to the lower limit of the photic zone representing 1 percent of the incident light, whichever was greater. If the depth at the sampling site was less than 15 feet (4.6 meters), the sample was taken from just off the bottom to the surface. Normally, a lake was sampled three times in 1 year, providing information on spring, summer, and fall conditions.

SAMPLE PREPARATION

Four milliliters (ml) of Acid-Lugol's solution (Prescott 1970) were added to each 130-ml sample from each site at the time of collection for preservation. The samples were shipped to the Environmental Monitoring and Support Laboratory, Las Vegas, Nevada, where equal volumes from each site were mixed to form two 130-ml composite samples for a given lake. One composite sample was put into storage and the other was used for the examination.

Prior to examination, the composite samples were concentrated by the settling method. Solids were allowed to settle for at least 24 hours prior to siphoning off the supernate. The volume of the removed supernate and the volume of the remaining concentrate were measured and concentrations determined. A small (8 ml) library subsample of the concentrate was then taken. The remaining concentrate was gently agitated to resuspend the plankton and poured into a capped, graduated test tube. If a preliminary examination of a sample indicated the need for a more concentrated sample, the contents of the test tube were further concentrated by repeating the settling method. Final concentrations varied from 15 to 40 times the original.

Permanent slides were prepared from concentrated samples after analysis was complete. A drop of superconcentrate from the bottom of the test tube was placed in a ring of clear Karo® Corn Syrup with phenol (a few crystals of phenol were added to each 100 ml of syrup) on a glass slide, thoroughly mixed, and topped with a coverglass. After the syrup at the edges of the coverglass had hardened, the excess was scraped away and the mount was sealed with clear fingernail polish. Permanent diatom slides were prepared by drying sample material on a coverglass, heating in a muffle furnace at 400° C for 45 minutes, and mounting in Hyrax®. Finally, the mounts were sealed with clear fingernail polish.

Backup samples, library samples, permanent sample slides, and Hyrax®-mounted diatom slides are being stored and maintained at the U.S. Environmental Monitoring and Support Laboratory-Las Vegas.

EXAMINATION

The phytoplankton samples were examined with the aid of binocular compound microscopes. A preliminary examination was performed to precisely identify and list all forms encountered. The length of this examination varied depending on the complexity of the sample. An attempt was made to find and identify all of the forms present in each sample. Often forms were observed which could not be identified to species or to genus. Abbreviated descriptions were used to keep a record of these forms (e.g., lunate cell, blue-green filament, Navicula #1). Diatom slides were examined using a standard light microscope. If greater resolution was essential to accurately identify the diatoms, a phase-contrast microscope was used.

After the species list was compiled, phytoplankton were enumerated using a Neubauer Counting Chamber with a 40X objective lens and a 10X ocular lens. All forms within each field were counted. The count was continued until a minimum of 100 fields had been viewed, or until the dominant form had been observed a minimum of 100 times.

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QUALITY CONTROL

Internal quality control checks on species identifications and counts were performed on a regular basis between project phycologists at the rate of 7 percent. Although an individual had primary responsibility for analyzing a sample, taxonomic problems were discussed among the phycologists.

Additional quality control checks were performed on the Survey samples by Dr. G. W. Prescott of the University of Montana at the rate of 5 percent. Quality control checks were made on 75 percent of these samples to verify species identifications while checks were made on the remaining 25 percent of the samples to verify genus counts. Presently, the agreement between quality control checks for species identification and genus enumerations is satisfactory.

RESULTS

The Appendix summarizes all of the phytoplankton data collected from the State by the Survey. It is organized by lake, including an alphabetical phytoplankton species list with concentrations for individual species given by sampling date. Results from the application of several indices are presented (Nygaard's Trophic State, Palmer's Organic Pollution, and species diversity and abundance). Each lake has been assigned a four digit STORET number. [STORET (STOrage and RETrieval) is the U.S. Environmental Protection Agency's computer system which processes and maintains water quality data.] The first two digits of the STORET number identify the State; the last two digits identify the lake.

NYGAARD'S TROPHIC STATE INDICES

Five indices devised by Nygaard (1949) were proposed under the assumption that certain algal groups are indicative of levels of nutrient enrichment. These indices were calculated in order to aid in determining the surveyed lakes' trophic status. As a general rule, Cyanophyta, Euglenophyta, centric diatoms, and members of the Chlorococcales are found in waters that are eutrophic (rich in nutrients), while desmids and many pennate diatoms generally cannot tolerate high nutrient levels and so are found in oligotrophic waters (poor in nutrients).

In applying the indices to the Survey data, the number of taxa in each major group was determined from the species list for each sample. The ratios of these groups give numerical values which can be used as a biological index of water richness. The five indices and the ranges of values established for Danish lakes by Nygaard for each trophic state are presented in Table 2. The appropriate symbol, (E) eutrophic and (O) oligotrophic, follows each calculated value in the tables in the Appendix. A question mark (?) was entered in these tables when the calculated value was within the range of both classifications.

PALMER'S ORGANIC POLLUTION INDICES

Palmer (1969) analyzed reports from 165 authors and developed algal pollution indices for use in rating water samples with high organic pollution. Two lists of organic pollution-tolerant forms were prepared, one containing 20 genera, the other, 20 species (Tables 3 and 4). Each form was assigned a pollution index number ranging from 1 for moderately tolerant forms to 6 for extremely tolerant forms. Palmer based the index numbers on occurrence records and/or where emphasized by the authors as being especially tolerant of organic pollution.

TABLE 2. NYGAARD'S TROPHIC STATE INDICES ADAPTED FROM HUTCHINSON (1967)

Index	Calculation	Oligotrophic	Eutrophic
Myxophycean	<u>Myxophyceae</u> Desmideae	0.0-0.4	0.1-3.0
Chlorophycean	<u>Chlorococcales</u> Desmideae	0.0-0.7	0.2-9.0
Diatom	<u>Centric Diatoms</u> <u>Pennate Diatoms</u>	0.0-0.3	0.0-1.75
Euglenophyte	<u>Euglenophyta</u> Myxophyceae + Chlorococcales	0.0-0.3	0.0-1.0
Compound	Myxophyceae + Chlorococcales + <u>Centric Diatoms + Euglenophyta</u> Desmideae	0.0-1.0	1.2-25

TABLE 3. ALGAL GENUS POLLUTION INDEX
(Palmer 1969)

Genus	Pollution Index
<i>Anacystis</i>	1
<i>Ankistrodesmus</i>	2
<i>Chlamydomonas</i>	4
<i>Chlorella</i>	3
<i>Closterium</i>	1
<i>Cyclotella</i>	1
<i>Euglena</i>	5
<i>Gomphonema</i>	1
<i>Lepocinclis</i>	1
<i>Melosira</i>	1
<i>Micractinium</i>	1
<i>Navicula</i>	3
<i>Nitzschia</i>	3
<i>Oscillatoria</i>	5
<i>Pandorina</i>	1
<i>Phacus</i>	2
<i>Phormidium</i>	1
<i>Scenedesmus</i>	4
<i>Stigeoclonium</i>	2
<i>Synedra</i>	2

TABLE 4. ALGAL SPECIES POLLUTION INDEX (Palmer 1969)

Species	Pollution Index
<i>Ankistrodesmus falcatus</i>	3
<i>Arthrospira jenneri</i>	2
<i>Chlorella vulgaris</i>	2
<i>Cyclotella meneghiniana</i>	2
<i>Euglena gracilis</i>	1
<i>Euglena viridis</i>	6
<i>Gomphonema parvulum</i>	1
<i>Melosira varians</i>	2
<i>Navicula cryptocephala</i>	1
<i>Nitzschia acicularis</i>	1
<i>Nitzschia palea</i>	5
<i>Oscillatoria chlorina</i>	2
<i>Oscillatoria limosa</i>	4
<i>Oscillatoria princeps</i>	1
<i>Oscillatoria putrida</i>	1
<i>Oscillatoria tenuis</i>	4
<i>Pandorina morum</i>	3
<i>Scenedesmus quadricauda</i>	4
<i>Stigeoclonium tenue</i>	3
<i>Syndra ulna</i>	3

In analyzing a water sample, any of the 20 genera or species of algae present in concentrations of 50 per milliliter or more are recorded. The pollution index numbers of the algae present are totaled, providing a genus score and a species score. Palmer determined that a score of 20 or more for either index can be taken as evidence of high organic pollution, while a score of 15 to 19 is taken as probable evidence of high organic pollution. Lower figures suggest that the organic pollution of the sample is not high, that the sample is not representative, or that some substance or factor interfering with algal persistence is present and active.

SPECIES DIVERSITY AND ABUNDANCE INDICES

"Information content" of biological samples is being used commonly by biologists as a measure of diversity. Diversity in this connection means the degree of uncertainty attached to the specific identity of any randomly selected individual. The greater the number of taxa and the more equal their proportions, the greater the uncertainty, and hence, the diversity (Pielou 1966). There are several methods of measuring diversity, e.g., the formulas given by Brillouin (1962) and Shannon and Weaver (1963). The method which is appropriate depends on the type of biological sample on hand.

Pielou (1966) classifies the types of biological samples and gives the measure of diversity appropriate for each type. The Survey phytoplankton samples are what she classifies as larger samples (collections in Pielou's terminology) from which random subsamples can be drawn. According to Pielou, the average diversity per individual for these types of samples can be estimated from the Shannon-Wiener formula (Shannon and Weaver 1963):

$$H = -\sum_{i=1}^S p_i \log_x p_i$$

where P is the proportion of the i th taxon in the sample, which is calculated from n_i/N ; n_i is the number of individuals per milliliter of the i th taxon; N is the total number of individuals per ml; and S is the total number of taxa.

However, Basharin (1959) and Pielou (1966) have pointed out that H calculated from the subsample is a biased estimator of the sample H , and if this bias is to be accounted for, we must know the total number of taxa present in the sample since the magnitude of this bias depends on it.

Pielou (1966) suggests that if the number of taxa in the subsample falls only slightly short of the number in the larger sample, no appreciable error will result in considering S , estimated from the subsample, as being equal to the sample value. Even though considerable effort was made to find and identify all taxa, the Survey samples undoubtedly contain a fair number of rare phytoplankton taxa which were not encountered.

In the Shannon-Wiener formula, an increase in the number of taxa and/or an increase in the evenness of the distribution of individuals among taxa will increase the average diversity per individual from its minimal value of zero. Sager and Hasler (1969) found that the richness of taxa was of minor importance in determination of average diversity per individual for phytoplankton and they concluded that phytoplankton taxa in excess of the 10 to 15 most abundant ones have little effect on H, which was verified by our own calculations. Our counts are in number per milliliter and since logarithms to the base 2 were used in our calculations, H is expressed in units of bits per individual. When individuals of a taxon were so rare that they were not counted, a value of 1/130 per mililiter or 0.008 per mililiter was used in the calculations since at least one individual of the taxon must have been present in the collection.

A Survey sample for a given lake represents a composite of all phytoplankton collected at different sampling sites on a lake during a given sampling period. Since the number of samples (M) making up a composite is a function of both the complexity of the lake sampled and its size, it should affect the richness-of-taxa component of the diversity of our phytoplankton collections. The maximum diversity (MaxH) (i.e., when the individuals are distributed among the taxa as evenly as possible) was estimated from $\log_2 S$, the total diversity (D) was calculated from H_N , and the evenness component of diversity (J) was estimated from H/MaxH (Pielou 1966). Also given in the Appendix are L (the mean number of individuals per taxa per milliliter) and K (the number of individuals per milliliter of the most abundant taxon in the sample).

Zand (1976) suggests that diversity indices be expressed in units of "sits", i.e., in logarithms to base S (where S is the total number of taxa in the sample) instead of in "bits", i.e., in logarithms to base 2. Zand points out that the diversity index in sits per individual is a normalized number ranging from 1 for the most evenly distributed samples to 0 for the least evenly distributed samples. Also, it can be used to compare different samples, independent of the number of taxa in each. The diversity in bits per individual should not be used in direct comparisons involving various samples which have different numbers of species. Since MaxH equals $\log_2 S$, the expression in sits is equal to $\log_2 S$, or 1. Therefore diversity in sits per individual is numerically equivalent to J, the evenness component for the Shannon-Wiener formula.

SPECIES OCCURRENCE AND ABUNDANCE

The alphabetic phytoplankton species list for each lake, presented in the Appendix, gives the concentrations of individual species by sampling date. Concentrations are in cells, colonies, or filaments (CEL, COL, FIL) per milliliter. An "X" after a species name indicates the presence of the species on that date in such a low concentration that it did not show up in the count. A blank space indicates that the organism was not found in the sample collected on that date. Column S is used to designate the examiner's subjective opinion of the five dominant taxa in a sample, based upon relative size and concentration of the organism. The percent column (%C) presents, by abundance, the percentage composition of each taxon.

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APPENDIX. SUMMARY OF PHYTOPLANKTON DATA

This appendix was generated by computer. Because it was only possible to use upper case letters in the printout, all scientific names are printed in upper case and are not italicized.

The alphabetic phytoplankton lists include taxa without species names (e.g., EUNOTIA, EUNOTIA #1, FLAGELLATE, FLAGELLATES, MICROSYSTIS INCERTA ?, CHLOROPHYTAN COCCOID CELLED COLONY). When species determinations were not possible, symbols or descriptive phrases were used to separate taxa for enumeration purposes. Each name on a list, however, represents a unique species different from any other name on the same list, unless otherwise noted, for counting purposes.

Numbers were used to separate unidentified species of the same genus. A generic name listed alone is also a unique species. A question mark (?) is placed immediately after the portion of a name which was assigned with uncertainty. Numbered, questioned, or otherwise designated taxa were established on a lake-by-lake basis; therefore NAVICULA #2 from lake A cannot be compared to NAVICULA #2 from lake B. Pluralized categories (e.g., FLAGELLATES, CENTRIC DIATOMS, SPP.) were used for counting purposes when taxa could not be properly differentiated on the counting chamber.

LAKE NAME: BUDD LAKE
STORET NUMBER: 3402

NYGAARD TROPHIC STATE INDICES

	DATE	07 23 73	10 01 73
MYXOPHYCEAN		0.87 E	1.20 E
CHLOROPHYCEAN		2.12 E	3.60 E
EUGLENOPHYTE		0.12 ?	0/24 ?
DIATOM		0.75 E	1.50 E
COMPCUND		4.12 E	5.40 E

PALMER'S ORGANIC POLLUTION INDICES

	DATE	07 23 73	10 01 73
GENUS		08	15
SPECIES		00	04

SPECIES DIVERSITY AND ABUNCANCE INDICES

	DATE	07 23 73	10 01 73
AVERAGE DIVERSITY	H	3.80	3.64
NUMBER OF TAXA	S	57.00	38.00
NUMBER OF SAMPLES COMPOSITED	M	1.00	1.00
MAXIMUM DIVERSITY MAXH		5.83	5.25
TOTAL DIVERSITY	D	26485.00	52299.52
TOTAL NUMBER OF INDIVIDUALS/ML	N	6970.00	14368.00
EVENNESS COMPCNENT	J	0.65	0.69
MEAN NUMBER OF INDIVIDUALS/TAXA	L	122.28	379.11
NUMBER/ML OF MOST ABUNDANT TAXON	K	1750.00	3404.00

LAKE NAME: BUDD LAKE
STORET NUMBER: 3402

CONTINUED

07 23 73 10 01 73

TAXA	FORM	ALGAL UNITS PER ML			ALGAL UNITS PER ML		
		S	%C		S	%C	
ANABAFNA	FIL	0.7		49	15	3.0	435
ANKISTRODESMUS	CEL					0.5	79
APHANIZOMENON ?	FIL			X		2.8	396
ASTERICNELLA	CEL		0.3	24			
ASTERICNELLA FORMOSA	CEL			X			
CERATIUM CYSTS	CEL						X
CERATIUM HIRUNDINELLA	CEL		0.3	24			X
CHROOCOCCUS	CCL			X			
CLCSTERIUM	CEL		1.0	73			
CLCSTERIUM #1	CEL			X		1.1	158
CLCSTERIUM #2	CEL						X
CCCCCNEIS	CEL			X			
COELASTRUM RETICULATUM	COL						X
COELASTRUM SPAHERICUM	COL					0.5	79
COSMARIUM #1	CEL		0.7	49		1.4	198
COSMARIUM #2	CEL		0.7	49			
CCSMARIUM #3	CEL			X			
CRUCIGENIA APICULATA	CCL			X			
CYCLOTELLA	CEL		4.5	316			
DICTYOSPHAERIUM PULCHELLUM	COL			X			
DINOBRYON BAVARICUM	CEL			X			
DINOFLAGELLATE	CEL		1.0	73			
EUGLENA	CEL			X			
EUNOTIA NAEGELII	CEL			X			
FLAGELLATE	CEL					1.4	198
FLAGELLATE #1	CEL	3	25.1	1750			
FLAGELLATES	CEL	5	12.2	850			
FRAGILARIA CROTCHNENSIS	CEL		2.4	170		3.0	435
FRANCEIA	CEL					0.3	40
GOLENKINIA	CEL		0.3	24		0.5	79
MALLCMCNAS	CEL		2.8	194			
MELOSIRA #2	CEL	2	9.4	656		9.1	1306

LAKE NAME: BUDD LAKE
STCRET NUMBER: 3402

CONTINUED

07 23 73 10 01 73

TAXA	FORM	ALGAL UNITS			ALGAL UNITS		
		S	%C	PER ML	S	%C	PER ML
MELOSIRA DISTANS	CEL	2.8		194			
MELOSIRA GRANULATA	CEL	2.8		194	0.3		40
MERISMOPEDIA TENUISSIMA	COL	1.7		121			
MICROCYSTIS AERUGINOSA	COL			X	14.0		2018
MICROCYSTIS INCERTA	COL	4	14.3	996	2.5		356
MCUGEOETIA	FIL				4	17.5	2533
NAVICULA MINUSCULA ?	CEL			X			
OOCYSTIS	CEL			X			
CPHICCYTIUM	CEL						
OSCILLATORIA	CEL		1.0	73			
PANDORINA MORUM	CCL	0.3		24			
PEDIASTRUM BORYANUM	COL	0.7		49	2.5		356
PEDIASTRUM DUPLEX							
V. CLATIFRATUM	COL	0.3		24	0.3		40
PEDIASTRUM SIMPLEX							
V. DUODENARIUM	COL					X	
PEDIASTRUM TETRAS							
V. TETRAODON	COL			X	0.3		40
PENNATE CIATOM	CEL	0.7		49			
PHACUS PYRUM	CEL	0.3		24			
PHACUS TORTUS	CEL	0.3		24			
PHCRMIDITUM MUCICOLA	COL				5.2		752
PAPHIDIOPSIS ?	FIL	0.3		24			
RHIZOSOLENIA	CEL			X			
SCENEDESMUS	COL	0.3		24			
SCENEDESMUS #1	COL	0.3		24			
SCENEDESMUS ABUNDANS	COL	0.3		24	1.6		237
SCENEDESMUS BIJUGA	COL			X	0.3		40
SCENEDESMUS DIMORPHUS	COL					X	
SCENEDESMUS OPOLIENSIS	COL				2.2		317
SCENEDESMUS QUADRICAUDA	COL				0.8		119
SCHROEDERIA SETIGERA	CEL	1.0		73			

LAKE NAME: BUDD LAKE
STORET NUMBER: 3402

CONTINUED

TAXA

STAURASTRUM
STAURASTRUM #1
STAURASTRUM #2
STAURASTRUM #3
STAURASTRUM APICULATUM
STEPHANODISCUS ASTRAEA
SYNEDRA
TABELLARIA FENESTRATA
TETRAEDRON CAUDATUM
V. ?
TETRAEDRON HASTATUM
TETRAEDRON LINNETICUM
TETRAEDRON MINIMUM
V. SCROBICULATUM
TETRAEDRON MUTICUM
TETRAEDRON TRIGONUM
TETRASTRUM HETERACANTHUM
TETRASTRUM STAURGENIAEFORME

07 23 73

10 01 73

FORM	ALGAL UNITS PER ML			ALGAL UNITS PER ML		
	I	S	%C	I	S	%C
CEL		0.3	24			
CEL					1.1	158
CEL		0.3	24			
CEL			X			
CEL					0.3	40
CEL		7.7	535		3.0	435
CEL					0.3	40
CEL			X			
CEL		0.3	24			
CEL						X
CEL						X
CEL						
CEL		0.7	49		0.3	40
CEL		0.3	24			
CEL						X
COL		0.3	24			
COL		0.3	24			

TOTAL

6970

14368

LAKE NAME: GREENWOOD LAKE
STORET NUMBER: 3403

NYGAARD TROPHIC STATE INDICES

DATE 04 16 73 10 01 73

MYXOPHYCEAN	03/0 E	05/0 E
CHLOROPHYCEAN	06/0 E	17/0 E
EUGLENOPHYTE	0.22 E	0.09 ?
DIATOM	0.43 E	1.00 E
COMPOUND	14/0 E	29/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE 04 16 73 10 01 73

GENUS	09	01
SPECIES	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE 04 16 73 10 01 73

AVERAGE DIVERSITY	H	3.05	3.65
NUMBER OF TAXA	S	27.00	41.00
NUMBER OF SAMPLES COMPOSITED	M	4.00	3.00
MAXIMUM DIVERSITY	MAXH	4.75	5.36
TOTAL DIVERSITY	D	27166.35	5146.50
TOTAL NUMBER OF INDIVIDUALS/ML	N	8907.00	1410.00
EVENNESS COMPONENT	J	0.64	0.68
MEAN NUMBER OF INDIVIDUALS/TAXA	L	329.99	34.39
NUMBER/ML OF MOST ABUNDANT TAXON	K	3099.00	309.00

LAKE NAME: GREENWOOD LAKE
STORET NUMBER: 3403

CONTINUED

04 16 73 10 01 73

TAXA	FORM	ALGAL UNITS PER ML			ALGAL UNITS PER ML		
		S	%C		S	%C	
ANABAENA OSCILLAROIDES	FIL				5.7	81	
ANABAENA PLANCTONICA	FIL				5.9	97	
ASTERICELLA FORMOSA	CEL	1	34.8	3099			
ATTHEYA	CEL					X	
CENTRIC DIATOM	CEL				9.2	130	
CHLOROPHYTAN CELL	CEL		1.0	85			X
CHROOCCCUS	COL		0.2	17			
CHRCCCCCUS ?	COL					X	
COELASTRUM RETICULATUM	COL				2.3	32	
COLONY	COL		0.2	17			
CYANOPHYTAN COLONY	COL				2.3	32	
CYANOPHYTAN FILAMENT	FIL					X	
CYCLOTELLA BOGDANICA	CEL		4.2	373			
CYMBELLA	CEL			X			
DICTYOSPHAERIUM EHRENBURGIANUM ?	COL					X	
DICTYOSPHAERIUM PULCHELLUM	COL		0.4	34			
DINOBRYON BAVATICUM	CEL		0.4	34			
DINCDBRYON DIVERGENS	CEL				3.5	49	
DINCDBRYON SERTULARIA	CFL		2.1	186			
DINOFLAGELLATE	CEL			X			
EUGLENA	CEL			X			
EUGLENA #1	CEL					X	
FLAGELLATE #1	CEL				5	21.9	309
FLAGELLATE #2	CEL				2	10.4	145
FLAGELLATES	CEL	3	16.2	1439			
FRAGILARIA CROTONENSIS	CEL	2	13.3	1185			
GLENKINIA	CEL					X	
COMPHONEMA CONSTRICTUM	CEL					X	
MALLCMONAS	CEL					X	
MELOSIRA #2	CEL		5.1	457			
MELOSIRA GRANULATA	CEL				1	10.4	146
MELOSIRA GRANULATA	CEL						
V. ANGSTISSIMA	CEL				3	5.7	81

LAKE NAME: GREENWOOD LAKE
STORET NUMBER: 3403

CONTINUED

TAXA	FCRM	04 15 73			10 01 73		
		S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
MERISMOPEDIA	COL						
MICRACTINIUM PUSILLUM	COL	0.4	34	1.1	16		
MOUGEOETIA	FIL					X	
NAVICULA LANCEOLATA	CEL	0.2	17				
CCCYSTIS	CEL						
OSCILLATORIA #1	FIL	0.4	34	4.6	65		
OSCILLATORIA LIMNETICA	FIL	5	4.4	389			
PANDORINA MORUM	COL					X	
PECIASTRUM ANGULOSUM ?	COL						
V. GRANULATUM	COL					X	
PEDIASTRUM BIRADIATUM	CCL					X	
PEDIASTRUM BORYANUM	COL					X	
PEDIASTRUM DUPLEX	COL					X	
PEDIASTRUM TETRAS	COL						
V. TETRAODON	COL						
PENNATE DIATOM	CEL			2.3	32		
PHACUS PYRUM	CEL					X	
QUADRIGULA ?	CEL					X	
SCENEDESMUS	COL						
SCENEDESMUS ACUMINATUS	COL					X	
SCENEDESMUS PROTUBERANS	COL			2.3	32		
SCENEDESMUS QUADRICAUDA	COL			X			
SCHREDERIA	CEL			2.3	32		
STEPHANODISCUS	CEL	3.2	288				
SYNEDRA #1	CEL	0.6	51				
SYNEDRA #2	CEL	4	9.9	880			
TABELLARIA FENESTRATA	CEL		1.5	135	4	8.1	114
TETRAECRON	CEL						
TETRAEDRON MINIMUM	CEL		0.5	51			
V. SCROBICULATUM	CEL						
TETRAECRON TRIGONUM	CEL			1.1	16		

LAKE NAME: GREENWOOD LAKE
STORET NUMBER: 3403

CONTINUED

TAXA

TETRASTRUM HETERACANTHUM
TRACHELEMENAS

18

TOTAL

04 15 73 10 01 73

FCRM	ALGAL UNITS			ALGAL UNITS		
	S	%C	PER ML	S	%C	PER ML
COL	1	1.0	85	1	1	1
CEL	1	0.2	17	1	1	1

8907

1410

LAKE NAME: ORADELL RES.
STORET NUMBER: 3406

NYGAARD TROPHIC STATE INDICES

	DATE	04 16 73	07 22 73	10 01 73
MYXOPHYCEAN		1.50 E	2.00 E	1.00 E
CHLOROPHYCEAN		4.50 E	10.0 E	3.00 E
EUGLENOPHYTE		0.08 ?	0.04 ?	0/16 ?
DIATOM		0.44 F	0.40 E	1.25 E
CCMPUND		8.50 E	14.5 E	5.25 E

PALMER'S ORGANIC POLLUTION INDICES

	DATE	04 16 73	07 22 73	10 01 73
GENUS		09	09	10
SPECIES		00	02	02

SPECIES DIVERSITY AND ABUNDANCE INDICES

	DATE	04 16 73	07 22 73	10 01 73
AVERAGE DIVERSITY	H	2.13	2.98	1.26
NUMBER OF TAXA	S	32.00	42.00	31.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	2.00	2.00
MAXIMUM DIVERSITY	MAXH	5.00	5.39	4.95
TOTAL DIVERSITY	D	49722.72	17242.28	23720.76
TOTAL NUMBER OF INDIVIDUALS/ML	N	23344.00	5786.00	18826.00
EVENNESS COMPONENT	J	0.43	0.55	0.25
MEAN NUMBER OF INDIVIDUALS/TAXA	L	729.50	137.76	607.29
NUMBER/ML OF MOST ABUNDANT TAXON	K	11445.00	2011.00	15566.00

LAKE NAME: ORADELL RES.
STORET NUMBER: 3406

CONTINUED

TAXA		04 16 73			07 22 73			10 01 73		
	FORM	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
ACHNANTHES LANCEOLATA	CEL			X						
V. DUBIA	COL			X						
ACTINASTRUM HANTZSCHII	CEL				0.4		21			
AMPHORA	FIL				0.4		21			
ANABAENA	CEL	0.2	57				X			
ANKISTRODESMUS	CEL						X			
ASTERICNELLA	CEL									
ASTERICNELLA FORMOSA	CEL	149.0	11445							
CENTRIC DIATOM	CEL				4.6		269			
CHLOROCYCALEAN COLONY	COL				0.4		21			
CHLOROPHYTAN CELL	CEL									
CLOSTERIUM	CEL			X						
COELASTRUM MICROPORUM	COL									
COELASTRUM RETICULATUM	COL				3	3.6	207			
COELASTRUM RETICULATUM ?	COL							2	5.2	986
COELASTRUM SPHAERICUM	COL				2.5		145			
CCELOSphaERIUM NAEGLIANUM	COL			X	0.4		21			
COSMARIA	CEL						X			
CRUCIGENIA APICULATA	COL									
CYCLCTELLA STELLIGERA	CEL						X			
DICTYOSphaERIUM PULCHELLUM	COL	0.2	57							
DINOBRYON SERTULARIA	CEL	0.4	85							
DINOFLAGELLATE	CEL	0.4	85							
ELAKATOTHRIX VIRIDIS ?	COL									
EUCRINA ?	COL							0.2		43
EUGLENA	CEL			X						
FLAGELLATES	CEL	219.4	4521		2.5		145			
FRAGILARIA CROTCHENSIS	CEL			X	134.8		2011			
LAGERHEIMIA LONGISETA	CEL	52.8	650					152.7		15566
MELOSIRA #2	CEL	10.8	198					0.5		86
MELOSIRA DISTANS	CEL	10.2	57							
MELOSIRA GRANULATA	CEL						X	141	1.8	343

LAKE NAME: CRADELL RES.
STCRET NUMBER: 3406

CCNTINUED

TAXA	FCRM	04 16 73			07 22 73			10 01 73				
		I	S	%C	ALGAL UNITS PER ML	I	S	%C	ALGAL UNITS PER ML	I	S	%C
MEPISMOPEDIA	CCL								X			X
NAVICULA #1	CEL				X		0.4		21			
NAVICULA #2	CEL								X			
NAVICULA #3	CEL				X							
NAVICULA CRYPTOCEPHALA	CEL				X							
NAVICULA PUPULA												
V. MUTATA ?	CEL								X			
NITZSCHIA #1	CEL				X				X			
NITZSCHIA #2	CEL								X			
OOCYSTIS	CEL					5	8.6		498		0.5	86
OSCILLATORIA #1	FIL				X							
OSCILLATORIA CHLORINA	FIL				X							
OSCILLATORIA CHLORINA ?	FIL						3.2		187		0.5	85
PEDIASTRUM DUPLEX	CCL											
V. ?	CCL				X							
PEDIASTRUM DUPLEX												
V. CLATHRATUM	COL						0.4		21			
PEDIASTRUM SIMPLEX												
V. DUODENARIUM	COL					4	1.1		62		3	2.1
PENNATE DIATOM	CEL						2.5		145			
SCENEDESMUS	COL						0.7		41			43
SCENEDESMUS ?	COL						0.4		21			
SCENEDESMUS #1	COL						0.4		21			
SCENEDESMUS #2	COL						0.4		21			
SCENEDESMUS #3	COL						0.4		21			
SCENEDESMUS #4	CCL								X			
SCENEDESMUS ABUNDANS	COL											
SCENEDESMUS ARCUATUS	CCL											
SCENEDESMUS ARCUATUS ?	COL											
SCENEDESMUS BIJUGA	COL											
SCENEDESMUS CARINATUS ?	COL											
SCENEDESMUS INTERMEDIA	COL											
V. BICALCATUS	COL				X							

LAKE NAME: CRADELL RES.
STORET NUMBER: 3406

CONTINUED

TAXA

SCENEDESMUS OPOLIENSIS
SCENEDESMUS PROTUBERANS ?
SCHROEDERIA SETICERA
SPHAERCYSTIS ?
STAURASTRUM #1
STAURASTRUM #2
STAURASTRUM #3
STAURASTRUM TETRACERUM
STEPHANODISCUS #1
STEPHANODISCUS ASTRaea
SYNEDRA DELICATISSIMA
v. ANGLSTISSIMA
SYNEDRA ULNA
TETRAEDRON

04 15 73

07 22 73

10 01 73

FORM	ALGAL UNITS PER ML			ALGAL UNITS PER ML			ALGAL UNITS PER ML		
	S	%C		S	%C		S	%C	
COL	0.4		85			1			
COL					0.4		21		
CEL					1.1		52		
CEL				2	28.3		1638		0.5
CEL									85
CEL			X						X
CEL									X
CEL									
CEL	4	13.3	3108						
CEL	3	12.1	2826		0.7		41		0.7
CEL									125
CEL		0.7	170		0.4		21		
CEL			X						
CEL					0.4		21		

LAKE NAME: PINECLIFF LAKE
STCET NUMBER: 3409

NYGAARD TROPHIC STATE INDICES

	DATE	04 16 73	07 23 73	10 02 73
MYXOPHYCEAN	0/01 C	0.71 E	1.00 E	
CHLOROPHYCEAN	5.00 E	4.71 E	4.50 E	
EUGLENOPHYTE	0.17 ?	0.16 ?	0.05 ?	
DIATOM	0.29 ?	1.50 E	3.00 E	
COMPOUND	12.0 E	7.14 E	6.50 E	

PALMER'S ORGANIC POLLUTION INDICES

23

	DATE	04 16 73	07 23 73	10 02 73
GENUS	C3	05	05	
SPECIES	02	04	04	

SPECIES DIVERSITY AND ABUNDANCE INDICES

	DATE	04 16 73	07 23 73	10 02 73
AVERAGE DIVERSITY	H	2.90	4.16	0.79
NUMBER OF TAXA	S	35.00	66.00	36.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	1.00	2.00
MAXIMUM DIVERSITY MAXH		5.13	5.04	5.17
TOTAL DIVERSITY	D	11982.80	14564.16	28291.48
TOTAL NUMBER OF INDIVIDUALS/ML	N	4132.00	3501.00	35812.00
EVENNESS COMPONENT	J	0.57	0.59	0.15
MEAN NUMBER OF INDIVIDUALS/TAXA	L	118.06	53.05	994.78
NUMBER/ML OF MOST ABUNDANT TAXON	K	1187.00	863.00	32206.00

LAKE NAME: PINECLIFF LAKE
STORE NUMBER: 3409

CONTINUED

24

TAXA			ALGAL UNITS PER ML		ALGAL UNITS PER ML		ALGAL UNITS PER ML
	FORM	S	%C	S	%C	S	%C
ACHNANTHES LANCEOLATA							
V. CUBIA	CEL			X			
ACTINASTRUM HANTZSCHII	COL	3.6	148			X	
ANABAENA #1	FIL			4	3.3	116	
ANABAENA #2	FIL			3	7.2	253	
ANKISTRODESMUS ?	CEL	5	12.6	519			
ASTERICNELLA FORMOSA	CEL					X	
ASTERICNELLA FORMOSA V. GRACILLIMA	CEL						
ATTHEYA	CEL	2.3	93				
BOTRYOCOCCUS BRAUNII	CEL				2.1	74	
CENTRIC DIATOM	COL					X	
CERATIUM HIRUNDINELLA	CEL	0.4	18				
CHLOROPHYTAN COLONY	CEL						
CLCSTERIUM #1	COL			X			
CLCSTERIUM #2	CEL				0.9	32	
COCCONEIS	CEL			X		X	
COELASTRUM RETICULATUM	COL				0.5	21	
COELASTRUM SPHAERICUM	COL				0.9	32	
COELOSPHAERIUM NAEGELIANUM	COL						0.2
CCSMARIUM	CEL				1.2	42	64
COSMARIUM #1	CEL						
COSMARIUM #2	CEL			X		X	
CRUCIGENIA APICULATA	COL					X	
CRUCIGENIA TETRAPEDIA	COL					X	
CRYPTOMCNAS RUFESCENS	CEL					X	
CYMBELLA	CEL						1189.9
DACTYLOCYCOPSIS	CEL	0.4	18				32205
DICTYOSPHAERIUM PULCHELLUM	CEL				2.1	74	
DINOBRYON BAVARICUM	COL				3.9	137	
DINOPHAGELLATE	CEL	0.4	18				
EUDORINA ELEGANS	CEL			X	0.3	11	
	COL						

LAKE NAME: PINECLIFF LAKE
STORET NUMBER: 3409

CONTINUED

TAXA	FORM	04 16 73			07 23 73			10 02 73		
		S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
EUGLENA #1	CEL		0.9	37			X			
EUGLENA #2	CEL					0.6	21			
FLAGELLATES	CEL	2	28.7	1187		7.2	253	4	2.9	1031
FRAGILARIA	CEL		4.5	185						
FRAGILARIA CROTONENSIS	CEL				2	11.1	389			
FRANCEIA	CEL					0.3	11			
GYRCSIGMA SPENCERII	CEL				X		X			
HANTZSCHIA	CEL				X					
LAGERHEIMIA	CEL						X			
LUNATE CELLED COLONY	CEL							0.2		64
MALLOMCNAS	CEL		1.8	74						
MELOSIRA #2	CEL		3.6	148	5	5.4	189	2	2.2	773
MELOSIRA DISTANS	CEL					6.6	231			
MELOSIRA GRANULATA	CEL				X	124.7	863		0.4	129
MELOSIRA VARIANS	CEL	1	6.3	260		0.6	21			
MICROCYSTIS AERUGINOSA	COL						X			
MICROCYSTIS INCERTA	COL					0.6	21			
MOUGEOTIA ?	FIL						X			
NAVICULA	CEL									
NAVICULA #1	CEL				X					
NAVICULA #2	CEL				X					
NITZSCHIA	CEL					0.3	11			
NITZSCHIA #1	CEL				X					
NITZSCHIA #2	CEL				X					
COCYSTIS	CEL						X			
CEPHIACYTUM CAPITATUM	CEL						X			
PANDORINA MORUM	COL						X			
PEDIASTRUM BORYANUM	COL					0.3	11			
PEDIASTRUM CUPLEX	COL						X			
V. DUODENARIUM	COL									
PEDIASTRUM CUPLEX	COL									
V. RETICULATUM	COL					0.6	21	3	0.5	193

LAKE NAME: PINCLIFF LAKE
STORET NUMBER: 3409

CONTINUED

TAXA	FORM	04 15 73			07 23 73			10 02 73		
		IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML
PEDIASTRUM SIMPLEX	COL						X			X
V. DUODENARIUM										
PEDIASTRUM TETRAS	COL				0.9		32			X
V. TETRACODON										
PENNATE DIATOMS	CEL	14	9.4	389		1.2	42			
PHACUS ACUMINATUS	CEL						X			
PHACUS LONGICAUDA	CEL						X			
PHACUS TORTUS	CEL									
QUADRIGULA CLOSTERICIDES	CEL							0.2		64
SCENEDESMUS	COL			X						
SCENEDESMUS #1	COL			X	0.9		32			
SCENEDESMUS #2	COL				0.3		11			
SCENEDESMUS ABUNDANS	COL				0.3		11			
SCENEDESMUS BIJUGA	COL						X			
SCENEDESMUS DENTICULATUS	COL						X		0.5	193
SCENEDESMUS DIMORPHUS	CCL						X			X
SCENEDESMUS INTERMEDIUS ?	CCL			X						
SCENEDESMUS INTERMEDIUS										
V. BICAUDATUS	COL				0.6		21			X
SCENEDESMUS LONGUS										
V. NAEGLERII	COL									X
SCENEDESMUS OPOLIENSIS	COL				3.3		116		0.2	54
SCENEDESMUS QUADRICAUCA	COL				2.4		84		0.5	193
SCHROEDERIA SETIGERA	CEL				1.8		63			
STAURASTRUM #1	CEL						X			X
STAURASTRUM #2	CEL						X		0.4	129
STAURASTRUM #3	CEL				0.3		11			X
STAURONEIS	CEL			X						
STEPHANODISCUS	CEL	3	25.1	1038		1.2	42	5	1.3	451
SURIRELLA	CEL			X						
SURIRELLA ARGUSTATA	CEL			X						
SYNEDRA #1	CEL			X						

LAKE NAME: PINECLIFF LAKE
STOREY NUMBER: 3409

CONTINUED

TAXA	FORM	04 16 73			07 23 73			10 02 73		
		IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML
SYNEDRA #2	CEL			X						
TETRAEDRON #1	CEL						X			
TETRAEDRON HASTATUM ?	CEL									X
TETRAEDRON LIMNETICUM	CEL						X			X
TETRAEDRON MINIMUM	CEL						X			
TETRAEDRON MINIMUM	CEL									
V. SCROBICULATUM	CEL			X						
TETRAEDRON PENTAEDRICUM	CEL				0.6		21			
TETRAEDRON REGULARE	CEL				0.3		11			
V. INCLS	CEL				0.9		32			
TETRAEDRON TRIGNUM	CEL				0.9		32		0.4	129
TETRASTRUM HETERACANTHUM	COL				0.9		32			
TRACHELMONAS	CEL				2.1		74		0.4	129
TREUBARIA	CEL						X			
TOTAL					4132		3501		35812	

LAKE NAME: PEMPTON LAKE
STORET NUMBER: 3410

NYGAARD TROPHIC STATE INDICES

	DATE	04 17 73	07 22 73	10 02 73
MYXOPHYCEAN		01/0 E	02/0 E	3.00 E
CHLOROPHYCEAN		01/0 E	04/0 E	22.0 E
EUGLENOPHYTE		0.50 E	0.33 E	0/25 ?
DIATOM		0.22 ?	0.21 ?	0.45 E
COMPCUND		07/0 E	11/0 E	31.0 E

PALMER'S ORGANIC POLLUTION INDICES

28

	DATE	04 17 73	07 22 73	10 02 73
GENUS		04	11	08
SPECIES		00	04	05

SPECIES DIVERSITY AND ABUNDANCE INDICES

	DATE	04 17 73	07 22 73	10 02 73
AVERAGE DIVERSITY	H	2.99	3.21	2.22
NUMBER OF TAXA	S	28.00	26.00	50.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	2.00	2.00
MAXIMUM DIVERSITY	MAXH	4.81	4.70	5.64
TOTAL DIVERSITY	C	10180.95	8917.38	51643.86
TOTAL NUMBER OF INDIVIDUALS/ML	N	3405.00	2778.00	23263.00
EVENNESS COMPONENT	J	0.62	0.68	0.39
MEAN NUMBER OF INDIVIDUALS/TAXA	L	121.61	106.85	465.26
NUMBER/ML OF MOST ABUNDANT TAXON	K	1147.00	634.00	8489.00

LAKE NAME: PCMPTCN LAKE
STCRET NUMBER: 3410

CONTINUED

TAXA	FORM	04 17 73			07 22 73			10 02 73		
		S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
ACTINASTRUM HANTZSCHII	COL									X
ANABAENA	FIL									
ANKISTRODESMUS	CEL				2.6	73				
APHANTOCMENON ?	CEL			1 21.9			509			X
ASTERIONELLA	CEL									X
ASTERIONELLA FORMOSA	CEL	6.0	203				X			
COCCONEIS	CEL									X
CCCCNEIS PLACENTULA	CEL									
V. EUGLYPTA	CEL				0.9	24				
COELASTRUM RETICULATUM	COL									
COELASTRUM SPHAERICUM	COL									
CYANOPHYTAN FILAMENT	FIL			X						
CYCLOTELLA MENEGHINIANA	CEL				4.4	122	3	4.3	1003	
CYCLOTELLA PSEUDOSTELLIGERA ?	CEL						X			X
CYMBELLA	CEL						X			
CYMBELLA TUMIDA	CEL	0.4	12							X
DIATOMA	CEL			X			X			X
DICTYOSPHAERIUM PULCHELLUM	COL									
DINCBRYCN SERTULARIA ?	CEL	0.7	24							
DINCFLAGELLATE	CEL			X						
EUDORINA ELEGANS	CEL									
EUGLENA	CEL	1.1	36		0.9	24		0.3	67	
FLAGELLATE #1	CEL							2 25.9	5016	
FLAGELLATE #2	CEL							4 36.5	8489	
FLAGELLATES	CEL	3 4.9	167	4 11.4			317			
FRAGILARIA	CEL	3.1	107							
FRAGILARIA CONSTRUENS	CEL				6.2	171				
FRAGILARIA CROTONENSIS	CEL	2.1	72				X			X
FRUSTULIA RHOMBOIDES	CEL			X						
V. AMPHIPLEUROIDES	CEL						X			
GYCOPHONEMA	CEL									
GYPSIGMA	CEL			X						X

LAKE NAME: POMPTON LAKE
STORET NUMBER: 3410

CONTINUED

TAXA	FORM	04 17 73			07 22 73			10 02 73		
		S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
FANTZSCHIA	CEL			X						
KIRCHNERIELLA	CEL									X
MALLOMNAS	CEL									X
MELOSIRA	CEL	2	17.2	585						
MELOSIRA #2	CEL				2	22.8	634	5	2.0	468
MELOSIRA #4	CEL				3	7.0	195	1	25.9	6016
MELOSIRA GRANULATA	CEL		1.4	48						X
MELOSIRA VARIANS	CEL		1.4	48						X
MICRACTINIUM	COL							0.3	57	
MICROCYSTIS AERUGINOSA	COL									X
NAVICULA	CEL		0.4	12						X
NAVICULA CAPITATA	CEL									X
NAVICULA PEREGRINA	CEL			X						
NAVICULA PLPULA										
V. MUTATA	CEL									X
NAVICULA SECRETA ?										
V. APICULATA	CEL	5	12.3	418		9.6	268			X
NAVICULA VIRIDULA	CEL	1	33.7	1147	5	7.0	195			X
NITZSCHIA	CEL		1.1	36		0.9	24			X
NITZSCHIA #1	CEL									X
OOCYSTIS	CEL									X
PANDCRINA MORUM	COL							0.3	67	
PEDIASTRUM DUPLEX	COL									X
V. ?	COL									X
PEDIASTRUM DUPLEX	COL									X
V. CLATHRATUM	COL									X
PEDIASTRUM SIMPLEX	COL			X						X
PEDIASTRUM TETRAS										
V. TETRAODON	COL									X
PENNATE DIATOM	CEL		0.4	12						X
QUADRIGULA	CEL									
SCENEDESMUS #1	COL							0.61	134	

LAKE NAME: POMPTON LAKE
STORET NUMBER: 3410

CONTINUED

TAXA	FORM	04 17 73			07 22 73			10 02 73		
		S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
SCENEDESMUS #2	COL							0.3		67
SCENEDESMUS #3	COL								X	
SCENEDESMUS #4	COL								X	
SCENEDESMUS ACUMINATUS	CCL								X	
SCENEDESMUS DENTICULATUS ?	CCL								X	
SCENEDESMUS DENTICULATUS V. LINEARIS	COL				0.9		24			
SCENEDESMUS DIMORPHUS	COL				1.8		49			
SCENEDESMUS CPOLIENSIS	COL				1.8		49			
SCENEDESMUS PROTUBERANS	COL								X	
SPHAEROCYSTIS SCHROETERI ?	COL								X	
STAURASTRUM	CEL									
STEPHANODISCUS	CEL									
STEPHANOCDISCUS ?	CEL	4	12.5	430				2.3		535
SURISELLA	CEL		0.7	24						
SURISELLA #1	CEL						X			
SURISELLA #2	CEL						X			
SYNEDRA	CEL			X						
SYNEDRA #1	CEL		0.7	24						
SYNEDRA #2	CEL						X			
SYNEDRA ULNA	CEL			X						
SYNEDRA ULNA V. OXYRHYNCHUS F. MEDIOCONTRACTA	CEL						X			
TETRAEDRON MINIMUM	CEL									
V. SCROBICULATUM	CEL								X	
TETRAEDRON MUTICUM	CEL						X			
TRACHELOMONAS	CEL								X	
TOTAL				3405			2778			23263

LAKE NAME: DUHERMAL LAKE
STORET NUMBER: 3412

NYGAARD TROPHIC STATE INDICES

DATE 07 22 73 10 02 73

MYXOPHYCEAN	02/0	E	1.00	E
CHLOROPHYCEAN	0/0	O	1.00	E
EUGLENOPHYTE	0.50	E	1.00	E
DIATOM	0.07	?	0/04	?
COMPCUND	04/0	E	4.00	E

PALMER'S ORGANIC POLLUTION INDICES

DATE 07 22 73 10 02 73

GENUS	05	00
SPECIES	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE 07 22 73 10 02 73

AVERAGE DIVERSITY	H	2.67	0.50
NUMBER OF TAXA	S	20.00	14.00
NUMBER OF SAMPLES COMPOSED	M	1.00	1.00
MAXIMUM DIVERSITY	MAXH	4.32	3.81
TOTAL DIVERSITY	D	624.78	1664.50
TOTAL NUMBER OF INDIVIDUALS/ML	N	234.00	3329.00
EVENNESS COMPONENT	J	0.62	0.13
MEAN NUMBER OF INDIVIDUALS/TAXA	L	11.70	237.79
NUMBER/ML OF MOST ABUNDANT TAXON	K	54.00	3058.00

LAKE NAME: DUHERAL LAKE
STORET NUMBER: 3412

CONTINUED

07 22 73

10 02 73

TAXA

ANABAENA
COCCINEIS
COELASTRUM SPHAERICUM
CACTYLOCOPCOPSIS
DINOBRYCN BAVARICUM
DINOBRYCN SERTULARIA
CINOFLAGELLATE
EUGLENA #1
EUGLENA #2
EUNOTIA
EUNOTIA ELEGANS
EUNOTIA PECTINALIS
FLAGELLATES
FRAGILARIA
FRUSTULIA RHOMBOIDES
FRUSTULIA RHOMBIDES
V. SAXNICA
MELOSIRA #2
MOGECTIA ?
NAVICULA HALOPHILA
F. TENUIROSTRIS
NITZSCHIA
OSCILLATORIA ?
PHACUS TORTUS
PINNULARIA
PINNULARIA #2
STAURASTRUM
SURIRELLA
SYNECRA
TABELLARIA
TABELLARIA FENESTRATA

FORM	ALGAL UNITS PER ML			ALGAL UNITS PER ML		
	S	%		S	%	
FIL						X
CEL			X			
CCL						X
CEL	1	7.7	18			
CEL				2	5.6	X
CEL				3	0.6	186
CEL						19
CEL	2	7.7	18			
CEL						X
CEL			X			
CEL	4	23.1	54	4	1.1	37
CEL				X		
CEL		7.7	18	1	92.2	3068
CEL	5	15.4	36			
CEL			X			X
CEL						
CEL			X			
CEL			X			
FIL						X
CEL			X			
CEL			X			
FIL	1	23.1	54			
CEL						
CEL			X			
CEL			X			X
CEL			X			X
CEL			X			
CEL			X			
CEL			X			
CEL	1	23.1	54			
CEL						
CEL			X			
CEL			X			
CEL			X			
CEL	1	15.4	36			
CEL			X			

TOTAL

234

3329

LAKE NAME: FARRINGTON LAKE
STORET NUMBER: 3413

NYGAARD TROPHIC STATE INDICES

DATE 07 22 73 10 02 73

MYXOPHYCEAN	0.67	E	0.67	E
CHLOROPHYCEAN	4.67	E	0.33	?
EUGLENOPHYTE	0.19	?	0.33	E
DIATOM	1.25	E	1.00	E
COMPOUND	8.00	E	2.33	E

PALMER'S ORGANIC POLLUTION INDICES

DATE 07 22 73 10 02 73

GENUS	17		06	
SPECIES	02		00	

34

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE 07 22 73 10 02 73

AVERAGE DIVERSITY	H	2.87	1.44
NUMBER OF TAXA	S	34.00	18.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	2.00
MAXIMUM DIVERSITY	MAXH	5.09	4.17
TOTAL DIVERSITY	D	18698.05	17091.36
TOTAL NUMBER OF INDIVIDUALS/ML	N	6515.00	11869.00
EVENNESS COMPONENT	J	0.55	0.35
MEAN NUMBER OF INDIVIDUALS/TAXA	L	191.62	659.39
NUMBER/ML OF MOST ABUNDANT TAXON	K	2660.00	8474.00

LAKE NAME: FARRINGTON LAKE
STCRET NUMBER: 3413

CONTINUED

07 22 73 10 02 73

TAXA	FORM	ALGAL UNITS			ALGAL UNITS		
		S	%C	PER ML	S	%C	PER ML
ACTINASTRUM HANTZSCHII	COL				0.2		28
ANKISTRODESMUS	CEL		1.5	99			
ASTERICNELLA FORMOSA	CEL				15	3.0	359
ASTERIONELLA FORMOSA	CEL						
V. GRACILLIMA	CEL		0.4	25			
ATTHEYA	CEL	4	9.5	621		0.5	55
CENTRIC DIATOM	CEL		0.8	50			
CERATIUM HIRUNDINELLA	CEL				0.2		28
CHLOROPHYTAN COLCNY	COL		0.8	50		0.5	55
CLOSTERIUM	CEL			X			
COCCONEIS	CEL						X
COELASTRUM SPHAERICUM	COL			X			
COELOSphaerium NAEGETIANUM	COL						X
CGSMARIA	CEL						X
CRUCIGENIA APICULATA	COL			X			
CACTYLOCoccopsis ?	CEL						X
DINGBRYON BAVARICUM	CEL						X
DINOBRYON SERTULARIA	CEL				2	16.3	1932
EUGLENA	CEL		0.4	25		0.5	55
EUNOTIA	CEL		0.4	25			
FLAGELLATES	CEL	3	13.7	895	1	71.4	8474
MELOSIRA #2	CEL			X	3	4.4	524
MELOSIRA DISTANS	CEL	1	40.8	2660			X
MELOSIRA VARIANS	CEL		0.8	50			
MICRACTINIUM PUSILLUM	COL		0.4	25			
NEPHROCYTIUM	COL		0.4	25			
NITZSCHIA	CEL		3.4	224			
CPIOCYTIUM CAPITATUM	CEL		0.8	50			
OSCILLATORIA #1	FIL	5	5.0	323			
OSCILLATORIA #2	FIL			X			
PEDIASTRUM TETRAS	COL			X			
V. TETRAODON	COL						

LAKE NAME: FARRINGTON LAKE
STCRET NUMBER: 3413

CONTINUED

07 22 73

10 02 73

TAXA

SCENEDESMUS ANOMALUS
V. ACAUCATUS
SCENEDESMUS BIJUGA
SCENEDESMUS DENTICULATUS
SCENEDESMUS DENTICULATUS
V. LINEARIS
SCENEDESMUS INTERMEDIUS
V. BICAUDATUS
SCENEDESMUS OPOLIENSIS
SCHROEDERIA
STAURASTRUM #1
STAURASTRUM #2
SYNECRA
TABELLARIA QUADRISCEPTA
TRACHELOMONAS #1
TRACHELOMONAS #2
TREUBARIA

FORM	ALGAL UNITS PER ML			ALGAL UNITS PER ML		
	I	S	%C	I	S	%C
CCL		1.2		75		
COL				X		
COL		0.4		25		
COL		0.4		25		
COL		0.8		50		
COL		1.5		99		
CEL		0.4		25		
CEL				X	0.2	28
CEL				X		X
CEL		0.8		50		
CEL				4	2.8	331
CEL	2	15.6		1019		
CEL				X		
CEL				X		

TOTAL

6515

11869

LAKE NAME: LAKE HOPATCONG
STORET NUMBER: 3415

NYGAARD TROPHIC STATE INDICES

	DATE	04 18 73	07 23 73	10 02 73
MYXOPHYCEAN		02/0 E	1.67 E	0.57 E
CHLOROPHYCEAN		03/0 E	3.33 E	3.67 E
EUGLENOPHYTE		0/05 ?	0.07 ?	0.15 ?
DIATOM		0.33 E	1.00 E	0.57 E
COMPCUND		08/0 E	6.33 E	5.67 E

PALMER'S ORGANIC POLLUTION INDICES

	DATE	04 18 73	07 23 73	10 02 73
GENUS		14	01	10
SPECIES		00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

	DATE	04 18 73	07 23 73	10 02 73
AVERAGE DIVERSITY	H	2.64	2.79	3.29
NUMBER OF TAXA	S	21.00	34.00	28.00
NUMBER OF SAMPLES COMPOSED	M	5.00	5.00	5.00
MAXIMUM DIVERSITY MAXH		4.39	5.09	4.81
TOTAL DIVERSITY	C	112698.96	10403.91	13215.93
TOTAL NUMBER OF INDIVIDUALS/ML	N	42689.00	3729.00	4017.00
EVENNESS COMPONENT	J	0.60	0.55	0.68
MEAN NUMBER OF INDIVIDUALS/TAXA	L	2032.81	109.68	143.46
NUMBER/ML OF MOST ABUNDANT TAXON	K	17638.00	1054.00	1240.00

LAKE NAME: LAKE HOPATCONG
STORET NUMBER: 3415

CONTINUED

TAXA	FORM	04 18 73			07 23 73			10 02 73		
		IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML
ANABAENA	FIL							2.2		87
APHANOCAPSIA	COL				0.7		27			
ASTERICNELLA	CEL							0.9		35
ASTERICNELLA FORMOSA	CEL	2	19.8	8435	3.6		135			
ATTHEYA	CEL						X			
CENTRIC DIATOM	CEL		0.6	256						
CERATIUM HIRUNDINELLA	CEL						X		0.4	18
CHROOCOCCUS	COL		0.2	85			X			
CLOSTERIUM	CEL						X			
COCCINEIS	CEL									
COELASTRUM MICROPORUM	COL						X			
COELASTRUM RETICULATUM	COL									X
COELOSPHAERIUM NAEGLIANUM	COL						X		0.4	18
CRUCIGENIA RECTANGULARIS ?	CCL									X
CRUCIGENIA TETRAPEDIA	COL				0.7		27		3.9	157
CYCLCTELLA BODANICA ?	CEL	4	8.4	3579						
DICTYOSPHAERIUM PULCHELLUM	CCL						X			
DINOBRYCN BAVARICUM	CEL		2.2	937						
DINOBRYCN DIVERGENS	CEL				4	9.0	297			
DINOBRYON SOCIALE	CEL		0.8	341						
DINOBRYON SCCIALE ?	CEL						X			X
DINOBRYON SPP.	CEL							3	10.0	401
CINOFLAGELLATE	CEL								0.4	18
EPIPHYTIC FLAGELLATE	CEL				5	6.5	243			
EUDORINA	CEL					1.4	54			
EUDORINA ELEGANS	CEL						X			
EUGLENA	CEL								1.3	52
FLAGELLATES	CEL		5.4	2301	3	23.9	892	2	17.8	717
FRAGILARIA	CEL								4.4	175
FRAGILARIA CROTCHNENSIS	CEL	5	7.2	3067	2	19.6	730			
GCLENKINIA	CEL						X			
KIRCHNERIELLA	CEL							1	6.1	245

LAKE NAME: LAKE KOPATCENG
STORET NUMBER: 3415

CONTINUED

TAXA	FORM	04 18 73			07 23 73			10 02 73		
		IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML
LUNATE CELLED COLONY	COL						X			
MELOSIRA #2	CEL		1.6	682			X	1	30.9	1240
MICROCYSTIS INCERTA	COL					2.2	81			
CCCYSTIS	CEL						X			
OOCYSTIS #1	CEL								0.4	18
OOCYSTIS #2	CEL								0.9	35
CSCILLATORIA LIMNETICA	FIL		1.6	682			X			
PANDORINA MORUM	COL					0.7	27			
PEDIASTRUM BORYANUM	COL						X		0.4	18
PEDIASTRUM DUPLEX										
V. CLATHRATUM	COL						X			
PEDIASTRUM DUPLEX										
V. GRACILIMUM	COL									X
PENNATE DIATOMS	CEL							5	5.1	205
PHACUS	CEL							0.4		18
PHACUS PYRUM ?	CEL						X			
QUADIGULA CLOSTERIOIDES	CEL						X			
SCENEDESmus	COL								1.3	52
SCENEDESmus #1	COL		0.2	85						
SCENEDESmus #2	COL		0.2	85						
SCENEDESmus OPOLIENSIS	COL						X			
SPHAEROCYSTIS	COL						81			
STAURASTRUM #1	CEL						X		1.3	52
STAURASTRUM #2	CEL						X			X
STAURASTRUM #3	CEL								0.4	18
STAURONEIS	CEL									
STEPHANO-DISCUS	CEL							4	9.6	384
STEPHANO-DISCUS ASTRaea	CEL									
SUPIRELLA ANGSTATA	CEL									
SYNEDRA #1	CEL	3	9.8	4175						
SYNEDRA #2	CEL						X			
TABELLARIA FENESTRATA	CEL	1	41.3	17638	1	28.3	1054			

LAKE NAME: LAKE HOPATCONG
STORET NUMBER: 3415

CONTINUED

04
TAXA

TABELLARIA FLOCCULOSA
TETRAEDRON REGULARE
V. GRANULATA
TETRAEDRON REGULARE
V. INCUS

TOTAL

FORM	04 18 73			07 23 73			10 02 73					
	I	S	%C	ALGAL UNITS PER ML	I	S	%C	ALGAL UNITS PER ML	I	S	%C	ALGAL UNITS PER ML
CEL			0.8	341								
CEL											0.9	35
CEL											0.4	18
				42689				3729				4017

LAKE NAME: LAKE MUSCNETCONG
STORET NUMBER: 3417

NYGAARD TROPHIC STATE INDICES

	DATE	07 23 73	10 01 73
MYXOPHYCEAN		0.60 E	3.00 E
CHLOROPHYCEAN		3.80 F	8.00 E
EUGLENOPHYTE		0.05 ?	0.09 ?
DIATOM		1.00 E	0.25 ?
COMPOUND		5.00 E	13.0 E

PALMER'S ORGANIC POLLUTION INDICES

	DATE	07 23 73	10 01 73
GENUS		02	04
SPECIES		00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

	DATE	07 23 73	10 01 73
AVERAGE DIVERSITY	H	1.90	1.84
NUMBER OF TAXA	S	40.00	19.00
NUMBER OF SAMPLES COMPOSITED	M	1.00	1.00
MAXIMUM DIVERSITY MAXH		5.32	4.25
TOTAL DIVERSITY	D	8365.70	1815.08
TOTAL NUMBER OF INDIVIDUALS/ML	N	4403.00	987.00
EVENNESS COMPONENT	J	0.36	0.43
MEAN NUMBER OF INDIVIDUALS/TAXA	L	110.08	51.95
NUMBER/ML OF MOST ABUNDANT TAXON	K	3190.00	581.00

LAKE NAME: LAKE MUSCNETCONG
STCET NUMBER: 3417

CONTINUED

07 23 73 10 01 73

TAXA	FORM	ALGAL UNITS PER ML			ALGAL UNITS PER ML		
		S	%C		S	%C	
ACTINASTRUM HANTZSCHII	COL	5	1.0	44			
ANABAENA	FIL		0.5	22			
ANKISTRODESMUS	CEL		2.0	88			X
CERATIUM HIRUNDINELLA	CEL		0.5	22			
CHROOCOCCUS	COL				0.8	8	
CLCSTERIUM #1	CEL		0.5	22			
CLCSTERIUM #2	CEL		0.5	22			X
COCCONEIS	CEL						X
COELASTRUM MICROPORUM	COL		1.0	44			
COELOSPHAERIUM	COL			X			
COSMARIUM	CEL			X			
CRUCIGENIA TETRAPEDIA	COL				1.7	17	
DACTYLOCOPCOPSIS	CEL				1.7	17	
DICTYOSPHAERIUM PULCHELLUM	COL		0.5	22			
DINCBRYN DIVERGENS	CEL			X			
DINCBRYN SERTULARIA ?	CEL						X
EUDORINA ELEGANS	COL			X			
EUGLENA	CEL			X	5	1.7	17
FLAGELLATES	CEL	2	72.5	3190	1	58.8	580
FRAGILARIA	CEL			X			X
FRAGILARIA CROTENENSIS	CEL	3	5.0	220			
GOLENKINIA	CEL		0.5	22			
KIRCHNERIELLA	CEL				2	22.7	224
MELOSIRA	CEL			X			X
MICRACTINIUM PUSILLUM	COL			X			
MICRCYSTIS INCERTA	COL		1.0	44	4	2.5	25
MOUGEOTIA #1	FIL	11	5.5	242			
MCUGEOTIA #2	FIL		0.5	22			
DOCYSTIS	CEL	4	3.6	157			
PANDORINA MORUM	COL			X			
PEDIASTRUM BORYANUM	COL			X			
PEDIASTRUM DUPLEX	COL						
V. CLATHRATUM	COL			X			

LAKE NAME: LAKE MUSCNETCONG
STORET NUMBER: 3417

CONTINUED

43

TAXA

PEDIASTRUM DUPLEX
V. RETICULATUM
PEDIASTRUM CBTUSUM
PEDIASTRUM SIMPLEX
V. DUODENARIUM
PEDIASTRUM TETRAS
V. TETRAODON
PINNULARIA
SCENEDESMUS DENTICULATUS
SCENEDESMUS DIMORPHUS
SCENEDESMUS OPOLIENSIS
SCENEDESMUS QUADRICAUDA
SCENEDESMUS spp.
SCHRCEDERIA SETIGERA
SPHAEROCYSTIS
STAURASTRUM #1
STAURASTRUM #2
STAURASTRUM FURCIGERUM
STEPHANODISCUS
SYNEDRA
TETRAEDRON MUTICUM
TETRAEDRON REGULARE
TREUBARIA
VOLVOX

TOTAL

07 23 73 10 01 73

FORM	ALGAL UNITS PER ML			ALGAL UNITS PER ML		
	IS	%C		IS	%C	
COL						X
COL			X			
COL			X			
COL						
COL			X			
COL			X			
COL	1	0.5	22			
COL	1	0.5	22			
CCL				3	8.4	83
CEL	0.5		22			
CEL	1.0		44			
CEL	0.5		22			
CEL	0.5		22			
CEL	1.0		44			
CEL				0.8		8
CEL			X			
CEL				0.8		8
CEL	0.5		22			
COL			X			

4403

987

LAKE NAME: PAULINSKILL LAKE
STCRET NUMBER: 3419

NYGAARD TROPHIC STATE INDICES

DATE	04 18 73	07 22 73	10 02 73
MYXOPHYCEAN	2.00 E	1.00 E	1.00 E
CHLOROPHYCEAN	2.00 E	2.50 E	4.33 E
EUGLENOPHYTE	0.50 E	0/07 ?	0/16 ?
DIATOM	0.32 E	0.27 ?	0.80 E
COMPUND	12.0 E	5.50 E	6.67 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 18 73	07 22 73	10 02 73
GENUS	17	10	07
SPECIES	03	04	02

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE	04 18 73	07 22 73	10 02 73
AVERAGE DIVERSITY	H	3.34	3.06
NUMBER OF TAXA	S	34.00	31.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	2.00
MAXIMUM DIVERSITY	MAXH	5.09	4.95
TOTAL DIVERSITY	D	8784.20	7206.30
TOTAL NUMBER OF INDIVIDUALS/ML	N	2630.00	2355.00
EVENNESS COMPONENT	J	0.66	0.62
MEAN NUMBER OF INDIVIDUALS/TAXA	L	77.35	75.97
NUMBER/ML OF MOST ABUNDANT TAXON	K	610.00	1013.00
			5840.00

LAKE NAME: PAULINSKILL LAKE
STCRET NUMBER: 3419

CONTINUED

TAXA	FORM	04 18 73			07 22 73			10 02 73				
		I	S	%C	ALGAL UNITS PER ML	I	S	%C	ALGAL UNITS PER ML	I	S	%C
ACHNANTHES ?	CEL								X			
ACHNANTHES LANCEOLATA	CEL											
V. DUBIA	CEL				X							
ACHNANTHES LANCEOLATA	CEL								X			
V. DUBIA ?	FIL								0.9	22		
ANABAENA	CEL								X			
ANKISTRODESMUS	CEL		3.0		80							
AFHANIZCMENON	CCL											
ASTERICHELLA FORMOSA	CEL		4.0		106				0.9	22		
CERATIUM HIRUNDINELLA	CEL								X			
CLCSTERIUM #1	CEL				X				0.9	22		
CLCSTERIUM #2	CEL								0.9	22		
CLCSTERIUM LEIBBLEINII	CEL											
COCCONEIS PEDICULUS	CEL								0.9	22		
COCCNEIS PLACENTULA	CEL											
V. EUGLYPTA	CEL				X				5.6	132		
COELASTRUM CAMBRICUM	COL									X		
COELASTRUM MICRCOPORUM	COL											
COELOSPHAERIUM NAECELIANUM	COL											
CYCLOTELLA MENEGHINIANA	CEL	4	5.1		133	13	9.3		220			
CYMBELLA	CEL				X					X		
CYMBELLA #1	CEL		2.0		53		0.9		22			
DIATOMA ELCNGATUM	CEL		1.0		27							
DINOBRYCN DIVERGENS	CEL								0.9	22		
CINOFLAGELLATE	CEL											
EUDCRINA ELEGANS	COL											
EUGLENA	CEL		1.0		27							
FLAGELLATES	CEL	2	21.2		557	11	43.0		1013			
FRAGILARIA	CEL		4.0		106							
FRAGILARIA #1	CEL								X			
FRAGILARIA #2	CEL								X			
FRAGILARIA CROTCHENSIS	CEL											X

LAKE NAME: PAULINSKILL LAKE
STORET NUMBER: 3419

CONTINUED

TAXA	FORM	04 18 73			07 22 73			10 02 73			
		I	S	%C	I	S	%C	ALGAL UNITS PER ML	I	S	%C
HANTZSCHIA	CEL				X						
MELOSIRA #2	CEL		2.0		53		0.9		22		
MELOSIRA #7	CEL		1.0		27					3	2.1
MELOSIRA VARIANS	CEL		1.0		27	5	3.7		98		
NAVICULA	CEL										
NAVICULA #1	CEL				X						
NAVICULA #2	CEL				X						
NAVICULA #3	CEL				X						
NAVICULA SALINARUM											
V. INTERMEDIA	CEL				X						
NAVICULA SPP.	CEL	1	23.2		510		5.6		132		
NITZSCHIA	CEL		1.0		27		6.5		154		
NITZSCHIA ACICULARIS	CEL		4.0		106				X		
OCCYSTIS	CEL										X
OSCILLATORIA #1	FIL	15	4.0		106		0.9		22		
OSCILLATORIA #2	FIL									0.5	38
CSCILLATORIA AMPHIBIA	FIL				X						
PANDORINA MORUM	COL										X
PEDIASTRUM BORYANUM	COL										X
PEDIASTRUM DUPLEX	COL										X
PEDIASTRUM DUPLEX	COL										X
V. RETICULATUM	COL										X
PEDIASTRUM SIMPLEX	COL										X
V. DUODENARIUM	COL										X
PEDIASTRUM TETRAS	COL										X
V. TETRAODON	COL										X
PHACUS	CEL		1.0		27						
RHOICCSPIENIA	CEL				X		2.8		66		
SCENEDESMUS #1	COL									2.1	152
SCENEDESMUS BIJUGA	COL								X		X
SCENEDESMUS DENTICULATUS	COL								X		
SCENEDESMUS DIMORPHUS	COL						0.9		22		

LAKE NAME: PAULINSKILL LAKE
STCRET NUMBER: 3419

CONTINUED

TAXA		04 18 73			07 22 73			10 C2 73				
	FORM	I	S	%C	I	S	%C	ALGAL UNITS PER ML	I	S	%C	ALGAL UNITS PER ML
SCENEDESMUS PROTUBERANS ?	COL											X
SCENEDESMUS QUADRICAUDA	COL		1.0			27					0.5	38
SCENEDESMUS QUADRICAUDA	COL											
V. QUACRISPINA	CEL											X
SCHROEDERIA SETIGERA	CEL											X
STAURASTRUM	CEL											X
STEPHANODISCUS	CEL	3	18.2			478	14	7.5		176	2	7.21
STEPHANODISCUS DUBIUS	CEL					X						
SURIRELLA	CEL					X						
SYNECRA ? #1	CEL		2.0			53						
SYNEDRA #2	CEL					X						
SYNEDRA DELICATISSIMA	CEL						2	6.5		154	1	1
SYNEDRA RUMPENS	CEL					X					1	1
TOTAL						2630				2355		7397

LAKE NAME: SPRUCE RUN RES.
STCRET NUMBER: 3420

NYGAARD TROPHIC STATE INDICES

	DATE	04 18 73	07 22 73	10 02 73
MYXOPHYCEAN		01/0 E	1.25 E	2.50 E
CHLOROPHYCEAN		03/0 E	2.50 E	5.50 E
EUGLENOPHYTE		0.25 E	0.20 ?	0.31 E
DIATOM		0.60 E	0.86 E	0.52 E
COMPOUND		08/0 E	6.00 E	13.0 E

PALMER'S ORGANIC POLLUTION INDICES

	DATE	04 18 73	07 22 73	10 02 73
GENUS		09	05	09
SPECIES		00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

	DATE	04 18 73	07 22 73	10 02 73
AVERAGE DIVERSITY	H	2.02	2.05	2.74
NUMBER OF TAXA	S	15.00	39.00	40.00
NUMBER OF SAMPLES COMPOSED	M	2.00	2.00	2.00
MAXIMUM DIVERSITY	MAXH	3.91	5.29	5.32
TOTAL DIVERSITY	D	49079.94	18144.55	8420.02
TOTAL NUMBER OF INDIVIDUALS/ML	N	24297.00	8851.00	3073.00
EVENNESS COMPONENT	J	0.52	0.39	0.52
MEAN NUMBER OF INDIVIDUALS/TAXA	L	1619.80	226.95	76.83
NUMBER/ML OF MOST ABUNDANT TAXON	K	13519.00	5711.00	951.00

LAKE NAME: SPRUCE RUN RES.
STCRET NUMBER: 3420

CONTINUED

TAXA	FORM	04 18 73			07 22 73			10 02 73		
		S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
ANABAENA	FIL						X	5	1.9	59
ANKISTRODESMUS	CEL				0.3		26		0.7	20
APHANIZOMENON	FIL								0.7	20
ASTERIONELLA FORMOSA	CEL	2	20.4	4953		0.3	26			
ATTHEYA	CEL						X			X
CERATIUM HIRUNDINELLA	CEL									X
CHROOCOCCUS	COL						X			
CLADSTERIUM	CEL				1.5		131			
COELASTRUM CAMBRICUM	COL						X			X
COELASTRUM RETICULATUM	COL					1	5.3	471		X
COELOSPHAERIUM NAEGETIANUM	COL				0.3		26			X
COSMARIUM #1	CEL									
COSMARIUM #2	CEL				2	64.5	5711	1	30.9	951
CYCLOTELLA STELLIGERA	CEL		0.3	62			X			
DINOBYRON BAVARICUM	CEL					1.8	157			X
DINOBRYON DIVERGENS	CEL						X			X
DIPLONEIS PUELLA ?	CEL						X			
EUGLENA	CEL						X			
EUGLENA #1	CEL									X
EUGLENA #2	CEL									X
FLAGELLATES	CEL	4	7.3	1775	3	13.3	1179	3	27.7	852
FRAGILARIA	CEL					0.6	52			
FRAGILARIA #1	CEL		1.5	374						
FRAGILARIA CROTCHNENSIS	CEL		0.8	187			X			X
FRANCEIA	CEL					1.5	131		0.7	20
LAGERHEIMIA	CEL					0.3	26			
MELOSIRA #2	CEL	3	7.7	1859		1.2	105	2	13.5	416
MELOSIRA DISTANS	CEL						X			
MELOSIRA GRANULATA	CEL									X
MICRACТИUM ?	COL		0.3	62						X
MICROCYSTIS INCERTA	COL									
MICROCYSTIS PULVEREA ?	COL									
V. INCERTA	COL									X

LAKE NAME: SPRUCE RUN RES.
STORET NUMBER: 3420

CONTINUED

TAXA	FORM	04 18 73			07 22 73			10 02 73		
		S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
NAVICULA	CEL							3.2		99
NAVICULA #1	CEL									X
NAVICULA #2	CEL									X
NITZSCHIA	CEL						X	0.7		20
OSCILLATORIA #1	FIL				0.3		26			
CSCILLATORIA #2	FIL						X			
CSCILLATORIA LIMNETICA	FIL	5	4.1	997						
PANDORINA MORUM	COL									X
PEDIASTRUM CUPLEX	COL									
V. RETICULATUM	COL			X			X	0.7		20
PEDIASTRUM SIMPLEX	COL									
V. DUDDENARIUM	COL							0.7		20
PENNATE DIATOM	CEL				0.3		26			
PERIDINIUM ELAPTEWSKY	CEL						X			
PHACUS	CEL			X	0.3		26			
PHACUS ACUMINATUS	CEL									X
PHACUS TORTUS	CEL				0.3		26			X
RHIZOSOLENIA LONGISETA	CEL				4	3.0	262			
SCENEDESMUS #1	COL						X	3.2		99
SCENEDESMUS #2	COL				0.3		26			
SCENEDESMUS DENTICULATUS	COL						X	1.3		40
SCENEDESMUS INTERMEDIUS	COL									
V. BICAUDATUS	COL							0.7		20
SCENEDESMUS PROTUBERANS ?	COL						X			
STAURASTRUM #1	CEL					0.3	26			
STAURASTRUM #2	CEL						X			
STAURASTRUM TETRACERUM	CEL									X
STEPHANODISCUS #1	CEL		1.4	343						
STEPHANODISCUS ASTRAEA	CEL		0.1	31						X
STEPHANODISCUS ASTRAEA ?	CEL				0.3		26			
SYNECRA	CEL	1	55.6	13519						

LAKE NAME: SPRUCE RUN RES.
STORET NUMBER: 3420

CONTINUED

TAXA	FORM	04 18 73			07 22 73			10 02 73			
		I	S	%C	I	S	%C	I	S	%C	ALGAL UNITS PER ML
SYNEDRA #1	CEL			X		0.31		26			X
SYNEDRA #2	CEL								0.71		20
TETRAEDRCN ? MINIMUM	CEL		0.5		125						
TETRAEDRCN HASTATUM	CEL										X
TETRAECRON MINIMUM	CEL										
V. SCROBICULATUM	CEL					5	3.8	340	4	12.31	377
TRACHELEMONAS	CEL										X
TREUBARIA	CEL								1	0.71	20
TOTAL					24297			8851			3073

LAKE NAME: UNION LAKE
STCRET NUMBER: 3422

NYGAARD TROPHIC STATE INDICES

	DATE	04 15 73	07 20 73	09 28 73
MYXOPHYCEAN		1.00 E	4.00 E	10.0 E
CHLOROPHYCEAN		1.00 E	14.0 E	15.0 E
EUGLENOPHYTE		0/02 ?	0/18 ?	0.08 ?
DIATOM		0.50 E	0.67 E	0.75 E
COMPOUND		5.00 E	22.0 E	30.0 E

PALMER'S ORGANIC POLLUTION INDICES

	DATE	04 15 73	07 20 73	09 28 73
GENUS		01	06	17
SPECIES		00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

	DATE	04 15 73	07 20 73	09 28 73
AVERAGE DIVERSITY	H	1.89	1.81	3.39
NUMBER OF TAXA	S	13.00	31.00	38.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	2.00	1.00
MAXIMUM DIVERSITY	MAXH	3.70	4.95	5.25
TOTAL DIVERSITY	D	1695.33	12995.80	31601.58
TOTAL NUMBER OF INDIVIDUALS/ML	N	897.00	7180.00	9322.00
EVENNESS COMPONENT	J	0.51	0.37	0.65
MEAN NUMBER OF INDIVIDUALS/TAXA	L	69.00	231.61	245.32
NUMBER/ML OF MOST ABUNDANT TAXON	K	576.00	4868.00	2077.00

LAKE NAME: UNION LAKE
STORE NUMBER: 3422

CONTINUED

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TAXA		04 16 73			07 20 73			09 28 73		
	FORM	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
ACHNANTHES PERAGALLI	CEL						X			
ACTINASTRUM GRACILIMUM	COL						X			
ANABAENA	FIL						X		0.5	44
ANKISTRODES MUS	CEL						X		0.5	44
APHANIZCMENON	COL							5	8.5	795
APHANO THECE SAXICOLA ?	COL							1	22.3	2077
ASTERICNELLA	CEL						0.4	30		
ASTERICNELLA FORMOSA	CEL	5	2.8	25						
CENTRIC DIATOM	CEL		3.7	33						
CHLOROPHYTAN FILAMENT	FIL									X
CHROOCCCCUS	COL								1.9	177
CHROOCOCCUS #2	COL									X
CLOSTERIUM	CEL						0.4	30		
COELASTRUM CAMBRICUM	COL									X
v. INTERMEDIUM	CEL									
CYCLOTELLA	CEL								1.9	177
CYCLOTELLA MENEGHINIANA	CEL			X						
CYCLOTELLA STELLIGERA	CEL						0.4	30		
CICTYOSPHAERIUM PULCHELLUM	COL								0.5	44
DINCBRYCN BAVARICUM	CEL									X
EUGLENA	CEL								0.9	88
EUNOTIA PECTINALIS	CEL			X						
FLAGELLATES	CEL	1	64.2	576		0.4	30	4	16.6	1547
FRAGILARIA	CEL	3	11.9	107	2	13.0	931			
FRAGILARIA #1	CEL							3	15.6	1458
FRAGILARIA CROTCHNENSIS	CEL									X
MELCSIRA	CEL						X			
MELCSIRA #2	CEL	2	8.2	74	1	67.8	4868	2	12.3	1149
MERISMOPEDIA	COL						0.8	60		
MERISMOPEDIA TENUISSIMA	COL								0.9	88
MICRACTINIUM PUSILLUM	COL									X
MICRACTINIUM PUSILLUM	COL									
v. LONGISETUM	COL						0.4	30		

LAKE NAME: UNION LAKE
STORET NUMBER: 3422

CONTINUED

TAXA	FORM	04 16 73			07 20 73			09 28 73		
		S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
MICROCYSTIS AERUGINOSA	COL						X		0.9	88
MICROCYSTIS INCERTA	COL								2.8	265
MICROCYSTIS PULVEREA										
V. INCERTA										
NAVICULA	COL				3	5.9	421			X
NEIDIUM ?	CEL									X
NITZSCHIA	CEL									X
OSCILLATORIA LIMNETICA	FIL						X			
PEDIASTRUM DUPLEX									6.2	575
V. ?										
PEDIASTRUM CUPLEX	COL									
V. GRACILIMUM	COL									
PEDIASTRUM TETRAS										
V. TETRAOCON	COL									
PENNATE DIATOM	CEL	3.7		33						
POLYEDRIOPSIS SPINULOSA	CEL									
RAPHIDICPSIS ?	FIL			X						
SCENEDESMUS	COL	0.9		8	5	1.7	120			
SCENEDESMUS #1	COL						30			
SCENEDESMUS #2	COL								0.5	44
SCENEDESMUS #3	COL								0.5	44
SCENEDESMUS #4	CCL								0.5	44
SCENEDESMUS ABUNDANS	COL									X
SCENEDESMUS BI JUGA	COL									
V. ALTERNANS	COL									X
SCENEDESMUS DENTICULATUS										
V. LINEARIS	COL									X
SCENEDESMUS DIMORPHUS	COL									
SCENEDESMUS DIMORPHUS ?	COL									
F. TORTUS	CCL									
SCENEDESMUS OPOLIENSIS	COL									
SCENEDESMUS PROTUBERANS	COL								1.4	133

Lake Name: UNION LAKE
Storet Number: 3422

CONTINUED

TAXA		04 16 73			07 20 73			09 28 73		
	FORM	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
SCHREDERIA SETIGERA	CEL								0.51	44
STAUROSTRUM	CEL									X
STAUROSTRUM PUNCTULATUM	CEL	1	0.9	8						
STEPHANODISCUS	CEL									
STIPITOCOCCUS VASIFORMIS	CEL					2.5	180		3.3	309
SYNEDRA	CEL					0.4	30			
SYNEDRA #1	CEL	1	0.9	8						
TABELLARIA FENESTRATA ?	CEL				4	4.2	300			
TABELLARIA FLOCCULOSA	CEL	4	2.8	25						
TETRAEDRON	CEL						X			
TETRAEDRON TRIGONUM	CEL									X
V. GRACILE	CEL									
TRACHELOMONAS	CEL									X
TOTAL				897			7180		9322	

LAKE NAME: WANAQUE RES.
STCRET NUMBER: 3423

NYGAARD TROPHIC STATE INDICES

	DATE	04 07 73	07 22 73	10 01 73
MYXOPHYCEAN		0.50 E	5.00 E	1.67 E
CHLOROPHYCEAN		1.50 E	10.0 E	2.00 E
EUGLENOPHYTE		0.25 E	0/15 ?	0/11 ?
DIATOM		0.56 E	1.00 E	1.40 E
COMPOUND		5.00 E	18.0 E	6.00 E

PALMER'S ORGANIC POLLUTION INDICES

	DATE	04 07 73	07 22 73	10 01 73
GENUS		08	01	01
SPECIES		00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

	DATE	04 07 73	07 22 73	10 01 73
AVERAGE DIVERSITY	H	3.41	2.48	2.80
NUMBER OF TAXA	S	27.00	30.00	34.00
NUMBER OF SAMPLES COMPOSITED	M	3.00	3.00	3.00
MAXIMUM DIVERSITY	MAXH	4.75	4.91	5.09
TOTAL DIVERSITY	D	22611.71	5160.88	6577.20
TOTAL NUMBER OF INDIVIDUALS/ML	N	6531.00	2081.00	2345.00
EVENNESS COMPONENT	J	0.72	0.51	0.55
MEAN NUMBER OF INDIVIDUALS/TAXA	L	245.59	69.37	69.09
NUMBER/ML OF MOST ABUNDANT TAXON	K	1178.00	701.00	980.00

LAKE NAME: WANAQUE RES.
STORET NUMBER: 3423

CONTINUED

TAXA	04 07 73			07 22 73			10 01 73			
	FCRM	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML	S	%C	ALGAL UNITS PER ML
ANABAENA #1	FIL				1.0		20			X
ANABAENA #2	FIL							0.9		22
APHANIZOMENON ?	COL						X	0.5		11
APHANOCAPSA	COL						132	4.3		100
ASTERIONELLA FORMOSA	CEL	15	16.6	1103	5	6.3				X
ATTHEYA	CEL									
CENTRIC DIATOM	CEL		0.8	50		0.5	10			X
CERATIUM HIRUNDINELLA	CEL					0.5	10			
CHLOROPHYTAN FILAMENT	FIL		0.6	38						X
CHROOCOCCUS	COL									X
CLADSTERIUM	CEL									X
COCCINEIS	CEL									X
COELASTRUM RETICULATUM	CCL						X			X
COELOSPHAERIUM NAEGLIANUM	COL						X	0.9		22
CRUCIGENIA TETRAPEDIA	COL						X			
CYMBELLA	CEL			X			X			X
DICTYOSPHAERIUM PULCHELLUM	COL						X			X
DINOBRYON BAVARICUM	CEL		0.6	38			X			X
DINOBRYON DIVERGENS	CEL		1.3	88		2.0	41			X
DINOFLAGELLATE	CEL					0.5	10			X
DINOFLAGELLATE #1	CEL			X						
EPIPHYTE ON FRAGILARIA	CEL					0.5	10			X
EUDORINA ELEGANS	COL					0.5	10	0.9		22
FILAMENT	FIL						X			
FLAGELLATES	CEL		8.5	564	2	33.7	701	1	41.7	980
FRAGILARIA CROTONENSIS	CEL	4	9.8	652	3	15.6	325	5	9.5	223
GOLENKINIA	CEL						X			
LUNATE CELL	CEL			X						X
MALLOMCNAS PSEUDOCORONATA	CEL						X	4	4.7	111
MELOSIRA #2	CEL								1.9	45
MELOSIRA #8	CEL									
MELOSTRA DISTANS	CEL			X	1	31.7	660	2	15.2	357

LAKE NAME: WANAQUE RES.
STORY NUMBER: 3423

CONTINUED

TAXA	FORM	04 07 73			07 22 73			10 01 73				
		I	S	%C	ALGAL UNITS PER ML	I	S	%C	ALGAL UNITS PER ML	I	S	%C
MELOSIRA ITALICA	CEL	3	17.2		1141							
MICRACHTINUM PUSTILLUM	COL		0.6		38				X			
MICROCYSTIS AERUGINOSA	COL								X			
NITZSCHIA	CEL		0.2		12							
NITZSCHIA #1	CEL				X							X
OSCILLATORIA LIMNETICA	FIL		4.0		263		0.5		10			
PEDIASTRUM DUPLEX												
V. RETICULATUM	COL								X			
PENNATE DIATOMS	CEL		4.2		276							
PERIODINUM WISCONSINENSE	CEL					4	4.9		102			
PHACLIS TURTUS	CEL		0.2		12							
PHORMIDIUM MULTICOLA	COL								X			
RHIZOSOLENIA	CEL		4.3		288							
SCENEDESMUS #1	COL						0.5		10			
SCENEDESMUS #2	COL						0.5		10			
SCENEDESMUS #4	COL								X			
SCENEDESMUS BIJUGA ?	COL				X							
SPONDYLOPSIUM PLANUM	CEL		1.9		125							
STAURASTRUM	CEL				X							
STAURASTRUM CUSPIDATUM												
V. ?	CEL								X			
STAURASTRUM OPHIURA	CEL											
STEPHANODISCUS	CEL											
STEPHANODISCUS DUBIUS	CEL	1	6.6		439					3	12.8	301
SYNEDRA	CEL											
SYNEDRA #1	CEL		4.5		301							
TABELLARIA FENESTRATA	CEL	2	17.8		1178							
TABELLARIA FLOCCULOSA	CEL		0.4		25							
TETRAEDRON ?	CEL				X							
TETRAEDRON #1	CEL											
TETRAEDRON MINIMUM	CEL								X			
TETRAEDRON MINIMUM												
V. SCROBICULATUM	CEL										0.91	22

LAKE NAME: WANACUE RES.
STORE NUMBER: 3423

CONTINUED

TAXA	FORM	04 07 73			07 22 73			10 01 73			
		IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	
TETRAEDRON MUTICUM	CEL	1	1	1	1	1	1	1	0.51	11	1
TOTAL				6631			2081		2349		

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