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Las Vegas NV 89114

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Distribution of Phytoplankton in North Dakota Lakes

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June 1979

DISTRIBUTION OF PHYTOPLANKTON IN NORTH DAKOTA LAKES

by

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

Water and Land Quality Branch
Monitoring Operations Division
Environmental Monitoring and Support Laboratory
Las Vegas, Nevada 89114

*Department of Biological Sciences
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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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 monitoring data base for exposure assessment through 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 14 lakes sampled by the National Eutrophication Survey in the State of North Dakota, 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 1974, the Survey sampled 179 lakes in 10 States. Over 700 algal species and varieties were identified and enumerated from the 573 water samples examined.

This report presents the species and abundance of phytoplankton in the 14 lakes sampled in the State of North Dakota (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 NORTH DAKOTA

STORET No.	Lake Name	County
3801	Lake Ashtabula	Barnes, Griggs
3802	Lake Audubon	McLean
3803	Brush Lake	McLean
3804	Lake Darling	Renville
3805	Devils Lake	Benson, Ramsey
3806	Jamestown Reservoir	Stutsman, Foster
3807	Lake La Moure	Stutsman
3808	Matejcek Lake	Walsh
3809	Lake Metigoshe	Bottineau (part in Canada)
3811	Pelican Lake	Bottineau
3812	Lake Sakakawea (Garrison Reservoir)	Mercer, McLean, Mountrail Williams, McKenzie, Dunn

(Continued)

TABLE 1. LAKES SAMPLED IN THE STATE OF NORTH DAKOTA (Continued)

STORET No.	Lake Name	County
3813	Spirit Wood Lake	Stutsman
3814	Sweet Briar Reservoir	Morton
3815	Whitman Lake	Nelson, Walsh

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

To preserve the sample 4 milliliters (ml) of Acid-Lugol's solution (Prescott 1970) were added to each 130-ml sample from each site at the time of collection. 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 ring of clear Karo® corn syrup with phenol (a few crystals of phenol were added to each 100 ml of syrup) was placed on a glass slide. A drop of superconcentrate from the bottom of the test tube was placed in the ring. This solution was 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 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

Project phycologists performed internal quality control intercomparisons regularly on 7 percent of the species identification and counts. 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

A phytoplankton species list for the State is presented in Appendix A. Appendix B summarizes all of the phytoplankton data collected from the State by the Survey. The latter is organized by lake, and includes 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 Appendix B. A question mark (?) following a calculated value in these tables was entered when that 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

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

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

TABLE 3. ALGAL GENUS POLLUTION INDEX (Palmer 1969)

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

TABLE 4. ALGAL SPECIES POLLUTION INDEX (Palmer 1969)

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

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.

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 (H) 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 ith taxon in the sample, which is calculated from n_i/N; n_i is the number of individuals per milliliter of the ith 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. This 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 milliliter or 0.008 per milliliter 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 the 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 $\log_2 S$ (Pielou 1966), while the minimum diversity (MinH), was estimated from the formula:

$$\text{MinH} = -\frac{S-1}{N}\log_2\frac{1}{N} - \frac{N-(S-1)}{N}\log_2\frac{N-(S-1)}{N}$$

given by Zand (1976). The total diversity (D) was calculated from HN (Pielou 1966). Also given in Appendix B 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).

The evenness component of diversity (J) was estimated from H/MaxH (Pielou 1966). Relative evenness (RJ) was calculated from the formula:

$$\text{RJ} = \frac{\text{H-MinH}}{\text{MaxH-MinH}}$$

given by Zand (1976). Zand suggests that RJ be used as a substitute for both J and the redundancy expression given by Wilhm and Dorris (1968). As pointed out by Zand, the redundancy expression given by Wilhm and Dorris does not properly express what it is intended to show, i.e., the position of H in the range between MaxH and MinH. RJ may range from 0 to 1; being 1 for the most even samples and 0 for the least even samples.

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 taxa. Since MaxH equals log S, the expression in sits is equal to $\log_S S$, 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 Appendix B, 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 that the species identified in the preliminary examination was in such a low concentration that it did not appear 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 A

PHYTOPLANKTON SPECIES LIST FOR THE STATE OF NORTH DAKOTA

Actinastrum gracilimum
Amphora sp.
Anabaena circinalis
Anabaena flos-aquae
Ankistrodesmus falcatus
Ankistrodesmus falcatus
v. *acicularis*
Ankistrodesmus falcatus
v. *mirabilis*
Aphanizomenon flos-aquae
Aphanothece sp.
Asterionella formosa
Asterionella formosa
v. *gracillima*
Carteria sp.
Ceratium hirundinella
Ceratium hirundinella
f. *furcoides*
Ceratium hirundinella
f. *robustum*
Ceratium hirundinella
f. *scotticum*
Chaetoceros elmorei
Chlamydomonas globosa
Chlorogonium sp.
Chroococcus dispersus
Chroococcus limneticus
Chroomonas acuta
Chroomonas reflexa
Closterium sp.
Cocconeis pediculus
Cocconeis placentula
Coelastrum microporum
Coelastrum reticulatum
Coelosphaerium kuetzingianum
Coelosphaerium naegelianum
Coscinodiscus lacustris
Cosmarium sp.
Crucigenia quadrata
Crucigenia tetrapedia
Cryptomonas erosa
Cryptomonas marssonii
Cryptomonas reflexa
Cryptomonas rostrata
Cyclotella meneghiniana
Cymatopleura elliptica
Cymatopleura solea
Cymbella triangulum ?
Dactylococcopsis fascicularis
Dactylococcopsis irregularis
Diatoma vulgare
Dictyosphaerium ehrenbergianum
Dictyosphaerium pulchellum
Dinobryon divergens
Dinobryon sertularia
Dinobryon sociale
Dinobryon sociale
v. *americanum*
Diplopsalis acuta
Elakatothrix gelatinosa
Entomoneis alata
Entomoneis ornata
Epithemia sorex
Eudorina elegans
Euglena gracilis
Euglena tripteris
Fragilaria crotonensis
Frustulia rhomboides
Glenodinium gymnodinium
Glenodinium oculatum
Glenodinium penardiforme
Gloeocystis gigas
Gloeocystis major ?
Gloeotrichia echinulata
Gomphonema sp.
Gomphosphaeria aponina ?
Gomphosphaeria lacustris
Gymnodinium albulum
Gyrosigma wormleye
Hantzschia sp.
Kirchneriella contorta
Lepocinclis sp.
Lyngbya birgei
Mallomonas acaroides
Mallomonas caudata
Mallomonas pseudocoronata
Melosira distans
Melosira granulata
Melosira granulata
v. *angustissima*
Melosira varians
Merismopedia glauca
Merismopedia minima
Merismopedia tenuissima
Microcystis aeruginosa
Microcystis incerta
Mougeotia sp.
Navicula viridula
v. *avenacea*
Nitzschia closterium
Nitzschia filiformis
Nitzschia sigmoidea

Oocystis borgei
Oocystis eremosphaeria
Oocystis parva
Ophiocytium ? sp.
Oscillatoria agardhii
Oscillatoria amphibia
Pandorina morum
Pascherina tetras
Pediastrum boryanum
Pediastrum duplex
Pediastrum duplex
v. *clathratum*
Pediastrum kawraiskyi
Pediastrum tetras
Peridinium inconspicuum
Peridinium quadridens
Peridinium willei ?
Phacus acuminatus
v. *drezepolskii*
Phacus caudatus
Phacus megalopsis
Phacus pleuronectes
Phacus pseudonordstedtii
Phacus pyrum
Phormidium mucicola
Pinnularia brevicostata
Quadrigula chodatii
Raphidiopsis sp.
Rhodomonas minuta ?
Rhoicosphenia curvata
Rhopalodia gibba
Scenedesmus abundans
Scenedesmus acuminatus
Scenedesmus bijuga
Scenedesmus dimorphus
Scenedesmus intermedius
Scenedesmus obliquus
Scenedesmus quadricauda
Scenedesmus setigera
Selenastrum sp.
Spermatozoopsis sp.
Sphaerocystis schroeteri
Spirogyra sp.
Staurastrum tetracerum
Stephanodiscus astraea
Stephanodiscus niagarae
Surirella angusta
Surirella ovalis
Surirella ovata
Synedra acus
Synedra delicatissima
Synedra ulna
Synura ? sp.
Tetraedron minimum
Tetraedron minimum
v. *scrobiculatum*
Tetraedron regulare
Tetraedron regulare
v. *granulata*
Tetraedron regulare
v. *incus*
Tetraedron trigonum
Tetrastrum staurogeniaeforme
Trachelomonas intermedia
Trachelomonas planctonica
Trachelomonas volvocina
Volvox sp.

APPENDIX B. 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, MICROCYSTIS 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.

ERRATA

Minimum and evenness are misspelled in the computer printout of the species diversity and abundance indices data.

LAKE NAME: LAKE ASHTABULA
STORET NUMBER: 3801

NYGAARD TROPHIC STATE INDICES

DATE	04 30 74	07 16 74	09 17 74
MYXOPHYCEAN	03/0 E	05/0 E	05/0 E
CHLOROPHYCEAN	04/0 E	04/0 E	03/0 E
EUGLENOPHYTE	0.43 E	0.44 E	0/08 ?
DIATOM	0.44 E	0.50 E	2.00 E
COMPOUND	14/0 E	16/0 E	10/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 30 74	07 16 74	09 17 74
GENUS	07	06	02
SPECIES	05	01	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 30 74	07 16 74	09 17 74
AVERAGE DIVERSITY	H	0.28	1.95	1.63
NUMBER OF TAXA	S	35.00	29.00	14.00
NUMBER OF SAMPLES COMPOSITED	M	4.00	4.00	4.00
MAXIMUM DIVERSITY	MAXH	5.13	4.86	3.81
MINUMUM DIVERSITY	MINH	0.02	0.09	0.01
TOTAL DIVERSITY	D	7110.32	7700.55	25359.54
TOTAL NUMBER OF INDIVIDUALS/ML	N	25394.00	3949.00	15558.00
EVENESS COMPONENT	J	0.05	0.40	0.43
RELATIVE EVENESS	RJ	0.06	0.39	0.43
MEAN NUMBER OF INDIVIDUALS/TAXA	L	725.54	136.17	1111.29
NUMBER/ML OF MOST ABUNDANT TAXON	K	24617.00	2400.00	9136.00

LAKE NAME: LAKE ASHTABULA CONTINUED
STORET NUMBER: 3601

TAXA	FORM	04 30 74 IS	04 30 74 %C	04 30 74 ALGAL UNITS PER ML	07 16 74 IS	07 16 74 %C	07 16 74 ALGAL UNITS PER ML	09 17 74 IS	09 17 74 %C	09 17 74 ALGAL UNITS PER ML
ACTINASTRUM GRACILIMUM	CEL						X			
ANABAENA 01	FIL							14	2.9	446
ANABAENA CIRCINALIS	FIL				12	14.6	577			X
ANKISTRODESMUS FALCATUS V. ACICULARIS	CEL	14	0.4	111						
APHANIZOMENON FLOS-AQUAE	FIL			X	13	7.7	304	11	56.7	9136
ASTERIONELLA FORMOSA V. GRACILLIMA	CEL		0.1	37						
CENTRIC DIATOM	CEL						X			
CERATIUM HIRUNDINELLA	CEL						X			
CERATIUM HIRUNDINELLA F. PUBESTUM	CEL									X
CERATIUM HIRUNDINELLA F. SCOTTICUM	CEL						X			
CHLAMYDOMONAS GLOBOSA	CEL		0.3	74						
CHLOROPHYTAN CELL	CEL			X						
CHLOROPHYTAN COLONY	COL			X						
CHROOCOCCUS	COL								0.9	137
CHROOMONAS	CEL	13	0.9	222						
CHROOMONAS ACUTA	CEL					1.5	61		1.1	172
CHRYSOPHYTAN CELL	CEL			X						
COCCONEIS	CEL			X			X			
COLONY	COL			X						
CRYPTOMONAS EROSA	CEL	12	0.6	148		3.1	121			
CRYPTOMONAS REFLEXA	CEL			X						
CYCLOTELLA MENEGHINIANA ?	CEL	11	96.9	24617						
CYMBELLA	CEL						X			
CYST	CEL			X						
DACTYLOCOCCOPSIS	CEL						X			
DIATOMA ?	CEL			X						
DINOBRYON SOCIALE	CEL		0.1	37						
EUGLENA	CEL						X			
EUGLENA 01	CEL			X						
EUGLENA GRACILIS	CEL			X		1.5	61			
FLAGELLATE 02	CEL								2.2	343
FRAGILARIA	CEL			X			X			
FRAGILARIA CROTONENSIS	CEL				14	5.4	213	13	2.6	412
GLENODINIUM GYMNODINIUM	CEL			X						
GLENODINIUM OCULATUM	CEL			X			X			
GLENODINIUM PENARDIFORME	CEL				15	4.6	182			
LYNGBYA	FIL			X						
MELOSIRA GRANULATA	CEL			X	11	60.6	2400	12	29.8	4637
MELOSIRA VARIANS	CEL			X						
MICROCYSTIS	COL									X
MICROCYSTIS AERUGINOSA	COL						X			
MICROCYSTIS INCERTA	COL						X			
NAVICULA	CEL			X						
NITZSCHIA	CEL			X			X			
OOCYSTIS BORGEI	CEL									X
OOCYSTIS EREMOSPHAERIA	CEL						X			
OOCYSTIS PARVA	CEL						X			
OSCILLATORIA	FIL		0.1	37						
PANDORINA MORUM	CEL						X			
PEDIASTRUM DUPLEX	CEL						X			
PINNULARIA	CEL						X			
SCENEDESMUS DIMORPHUS	COL			X						
SCENEDESMUS QUADRICAUDA	COL			X						
SCHROEDERIA SETIGERA	CEL								0.7	103
STEPHANODISCUS	CEL			X				15	1.1	172
STEPHANODISCUS NIAGARAE	CEL					0.6	30			
SURIRELLA	CEL			X						
SURIRELLA OVATA	CEL	15	0.3	74						
SYNEDRA ULNA	CEL		0.1	37						
TETRAEDRON REGULARE V. GRANULATA	CEL									X
TETRASTRUM STAURODENIAEFORME	COL			X						
TRACHELOMONAS	CEL						X			
TRACHELOMONAS INTERMEDIA	CEL			X						
TRACHELOMONAS VOLVOCINA	CEL						X			
TOTAL				25394			3949			15558

LAKE NAME: LAKE AUDUBON
STORET NUMBER: 3802

NYGAARD TROPHIC STATE INDICES

DATE	04 26 74	07 18 74	09 13 74
MYXOPHYCEAN	02/0 E	03/0 E	03/0 E
CHLOROPHYCEAN	01/0 E	02/0 E	01/0 E
EUGLENOPHYTE	0/03 ?	0/05 ?	0/04 ?
DIATOM	0.33 E	1.00 E	01/0 E
COMPOUND	06/0 E	06/0 E	05/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 26 74	07 18 74	09 13 74
GENUS	04	05	00
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 26 74	07 18 74	09 13 74
AVERAGE DIVERSITY	H	2.02	0.55	0.16
NUMBER OF TAXA	S	20.00	7.00	7.00
NUMBER OF SAMPLES COMPOSITED	M	3.00	3.00	3.00
MAXIMUM DIVERSITY	MAXH	4.32	2.81	2.81
MINUMUM DIVERSITY	MINH	0.06	0.10	0.02
TOTAL DIVERSITY	D	9231.40	364.10	877.12
TOTAL NUMBER OF INDIVIDUALS/ML	N	4570.00	662.00	5482.00
EVENESS COMPONENT	J	0.47	0.20	0.06
RELATIVE EVENESS	RJ	0.47	0.17	0.06
MEAN NUMBER OF INDIVIDUALS/TAXA	L	228.50	94.57	783.14
NUMBER/ML OF MOST ABUNDANT TAXON	K	2039.00	579.00	5350.00

LAKE NAME: LAKE AUDUBON CONTINUED
STORET NUMBER: 3802

TAXA	FORM	04 26 74 IS	04 26 74 %C	04 26 74 ALGAL UNITS PER ML	07 16 74 IS	07 16 74 %C	07 16 74 ALGAL UNITS PER ML	09 13 74 IS	09 13 74 %C	09 13 74 ALGAL UNITS PER ML
ANABAENA	FIL			X						
APHANIZOMENON FLOS-AQUAE	FIL				11	87.5	579	11	97.6	5350
ASTERIONELLA FORMOSA	CEL	1	1.1	52						
CENTRIC DIATOMS	CEL	12	44.6	2039						
CHLAMYDOMONAS	CEL	11	32.8	1497						
CHLOROPHYTAN COLONY	COL	15	2.8	129						
CHROOMONAS	CEL							12	2.4	132
CHROOMONAS ACUTA	CEL	13	11.9	542						
COELASTRUM RETICULATUM	COL						X			
CRYPTOMONAS EROSA	CEL	14	4.0	181						
CRYPTOMONAS MARSSONII	CEL									X
DACTYLOCOCCOPSIS	CEL		0.6	26						
FRAGILARIA	CEL						X			
FRAGILARIA #1	CEL			X						
FRAGILARIA #2	CEL			X						
GOMPHONEMA #1	CEL		0.6	26						
GOMPHONEMA #2	CEL			X						
MELOSIRA DISTANS	CEL			X						
MICROCYSTIS AERUGINOSA	COL						X			X
NAVICULA #1	CEL			X						
OEDOGONIUM ?	CEL			X						
OSCILLATORIA	FIL				12	12.5	83			X
PEDIASTRUM DUPLEX	COL									X
RHOICOSPHENIA CURVATA	CEL			X						
SCHROEDERIA SETIGERA	CEL						X			
SELENASTRUM	CEL		1.1	52						
STEPHANODISCUS NIAGARAE	CEL		0.6	26			X			X
SURIRELLA OVALIS	CEL			X						
SURIRELLA OVATA	CEL			X						
TOTAL				4570			662			5482

LAKE NAME: BRUSH LAKE
STORET NUMBER: 3603

NYGAARD TROPHIC STATE INDICES

DATE	04 26 74	07 16 74	09 13 74
MYXOPHYCEAN	070 O	4.00 E	2.67 E
CHLOROPHYCEAN	0570 E	5.00 E	2.67 E
EUGLENOPHYTE	0.20 ?	0.06 ?	0.12 ?
DIATOM	0.43 E	0.25 ?	0.33 E
COMPOUND	0970 E	10.5 E	6.67 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 26 74	07 16 74	09 13 74
GENUS	00	07	06
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 26 74	07 16 74	09 13 74
AVERAGE DIVERSITY	H	1.61	1.51	2.12
NUMBER OF TAXA	S	21.00	39.00	36.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	3.00	2.00
MAXIMUM DIVERSITY	MAXH	4.39	5.29	5.17
MINUMUM DIVERSITY	MINH	0.16	0.06	0.07
TOTAL DIVERSITY	D	2348.99	13819.52	15291.56
TOTAL NUMBER OF INDIVIDUALS/ML	N	1459.00	9152.00	7213.00
EVENESS COMPONENT	J	0.37	0.29	0.41
RELATIVE EVENESS	RJ	0.35	0.28	0.41
MEAN NUMBER OF INDIVIDUALS/TAXA	L	69.48	234.67	200.36
NUMBER/ML OF MOST ABUNDANT TAXON	K	711.00	6944.00	3680.00

LAKE NAME: BRUSH LAKE
STORET NUMBER: 3803

CONTINUED

TAXA	FORM	04 26 74 IS	04 26 74 %C	04 26 74 ALGAL UNITS PER ML	07 16 74 IS	07 16 74 %C	07 16 74 ALGAL UNITS PER ML	09 13 74 IS	09 13 74 %C	09 13 74 ALGAL UNITS PER ML
AMPHORA	CEL			X						
ANABAENA	FIL									X
ANABAENA 01	FIL								1.0	73
ANABAENA 02	FIL				13	4.7	431			
APHANIZOMENON FLOS-AQUAE	FIL					0.6	54	14	2.5	182
APHANOTHECE	COL						X			
ASTERIONELLA FORMOSA	CEL	13	5.1	75						
CERATIUM HIRUNDINELLA	CEL					0.6	54			
CERATIUM HIRUNDINELLA F. FURCOIDES	CEL						X			
CHLOROPHYTAN CELL	CEL									X
CHLOROPHYTAN COLONY	COL					0.6	54			X
CHROOCOCCUS LIMNETICUS	COL									X
CHROOMONAS ACUTA	CEL	12	38.5	561		3.5	323		3.5	255
CLOSTERIUM 01	CEL									X
CLOSTERIUM 02	CEL						X			
COELASTRUM	COL						X			
COELASTRUM MICROPORUM	COL									X
COELOSPHAERIUM KUETZINGIANUM	COL						X			
COSMARIUM	CEL									X
CRYPTOMONAS	CEL	11	48.7	711						
CRYPTOMONAS EROSA	CEL						X	15	2.5	182
CRYPTOMONAS MARSSONII	CEL						X			
CRYPTOMONAS REFLEXA	CEL								0.5	36
CRYPTOMONAS RUSTRATA	CEL						X			
CYCLOTELLA	CEL			X						
CYMATOPLEURA ELLIPTICA	CEL						X			
CYMATOPLEURA SOLEA	CEL									X
CYMBELLA	CEL			X						
DICTYOSPHAERIUM EHRENBERGIANUM	COL									X
DINOBRYON SERTULARIA	CEL			X						
ELAKATOTHRIX GELATINOSA	CEL	15	5.1	75						
EPITHEMIA	FIL						X			
EPITHEMIA SOREX	CEL									X
EUGLENA	CEL			X			X			
EUGLENA GRACILIS	CEL									X
FRAGILARIA	CEL			X	14	2.9	269			
FRAGILARIA CROTONENSIS	CEL			X	12	5.9	538	12	27.3	1968
FRUSTULIA RHOMBOIDES	CEL						X			
GLENODINIUM OCULATUM	CEL									X
GOMPHOSPHAERIA APONINA ?	COL								0.5	36
MELOSIRA GRANULATA	CEL				11	75.9	6944		1.0	73
MELOSIRA GRANULATA V. ANGUSTISSIMA	CEL			X						
MERISMOPEDIA GLAUCA	COL						X			
MICROCYSTIS AERUGINOSA	COL						X			X
MICROCYSTIS INCERTA	COL					0.6	54	11	51.0	3680
NOUGEOTIA	FIL						X			X
NITZSCHIA SIGMOIDEA	CEL						X			X
OOCYSTIS	COL			X			X	13	7.6	547
OSCILLATORIA	FIL					1.2	108			
PEDIASTRUM BORYANUM	COL						X			X
PEDIASTRUM DUPLEX	COL						X			X
PEDIASTRUM KAWRAISKYI	COL			X			X			
PERIDINIUM QUADRIDENS	CEL			X						
PHORMIDIUM MUCICOLA	FIL									X
PINNULARIA BREVICOSTATA	CEL						X			X
QUADRIGULA CHODATII	CEL						X			
RHOICOSPHENIA CURVATA	CEL			X						
RHOPALODIA GIBBA	CEL						X			
SCENEDESMUS BIJUGA	COL						X		0.5	36
SCENEDESMUS QUADRICAUDA	COL			X			X		0.5	36
SCHROEDERIA SETIGERA	CEL				15	2.9	269			
STAURASTRUM	CEL						X			X
STEPHANODISCUS	CEL			X						
STEPHANODISCUS ASTRAEA	CEL						X		0.5	36
SURIRELLA 09	CEL									X
SURIRELLA OVATA	CEL			X						
SYNURA ?	CEL	14	2.5	37						
TETRAEDRON MINIMUM	CEL			X						
TETRAEDRON MINIMUM V. SCROBICULATUM	CEL								1.0	73
TETRAEDRON REGULARE	CEL					0.6	54			
TRACHELOMONAS VOLVOCINA	CEL									X
TOTAL				1459			9152			7213

LAKE NAME: LAKE DARLING
STORET NUMBER: 3804

NYGAARD TROPHIC STATE INDICES

DATE	04 30 74	07 17 74	09 13 74
MYXOPHYCEAN	2.00 E	5.00 E	0470 E
CHLOROPHYCEAN	15.0 E	1.00 E	0170 E
EUGLENOPHYTE	0.12 ?	0706 ?	0705 ?
DIATOM	0.50 E	0170 E	0170 E
COMPOUND	22.0 E	7.00 E	0670 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 30 74	07 17 74	09 13 74
GENUS	05	02	01
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 30 74	07 17 74	09 13 74
AVERAGE DIVERSITY	H	1.15	1.73	0.65
NUMBER OF TAXA	S	36.00	14.00	8.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	3.00	3.00
MAXIMUM DIVERSITY	MAXH	5.17	3.81	3.00
MINUMUM DIVERSITY	MINH	0.05	0.02	0.01
TOTAL DIVERSITY	D	12751.20	13865.95	10056.75
TOTAL NUMBER OF INDIVIDUALS/ML	N	11088.00	8015.00	15475.00
EVENESS COMPONENT	J	0.22	0.45	0.22
RELATIVE EVENESS	RJ	0.22	0.46	0.22
MEAN NUMBER OF INDIVIDUALS/TAXA	L	308.00	572.50	1934.38
NUMBER/ML OF MOST ABUNDANT TAXON	K	9068.00	3959.00	13933.00

LAKE NAME: LAKE DARLING CONTINUED
STORET NUMBER: 3814

TAXA	FORM	05 30 74 IS	05 30 74 %C	05 30 74 ALGAL UNITS PER ML	07 17 74 IS	07 17 74 %C	07 17 74 ALGAL UNITS PER ML	09 13 74 IS	09 13 74 %C	09 13 74 ALGAL UNITS PER ML
ACTINASTRUM GRACILIMUM	CEL			X						
ANABAENA	FIL						X	14	4.5	691
ANKISTRODESMUS FALCATUS										
V. ACICULARIS	CEL		0.3	33						
ANKISTRODESMUS FALCATUS										
V. MIRABILIS	CEL			X						
APHANIZOMENON FLOS-AQUAE	FIL			X	11	49.4	3959	11	90.0	13933
ASTERIONELLA FORMOSA	CEL			X						
CHLAMYDOMONAS	CEL	14	4.4	488		0.6	49			
CHLOROGONIUM	CEL						X			
CHROOCOCCUS DISPERSUS	COL				12	11.1	891			
CHROOMONAS	CEL	13	5.3	585						
CHROOMONAS ACUTA	CEL				14	3.1	247		1.7	266
CLOSTERIUM	CEL			X			X			
COELOSPHAERIUM NAEGELIANUM	COL									X
CRYPTOMONAS	CEL				15	0.6	49			
CRYPTOMONAS EROSA	CEL	12	5.0	553						
CRYPTOMONAS MARSSONII	CEL							15	0.3	53
CRYPTOMONAS REFLEXA	CEL			X						
CYCLOTELLA	CEL	11	81.8	9.66						
CYMATOPLEURA SOLEA	CEL			X						
CYST	CEL						X			
DACTYLOCOCCOPSIS IRREGULARIS	CEL		0.3	33						
DICTYOSPHAERIUM PULCHELLUM	COL			X						
EUGLENA GRACILIS	CEL			X						
FLAGELLATE #2	CEL					1.0	148			
GLOEOCYSTIS MAJOR ?	COL			X						
GYMNODINIUM ALBULUM	CEL		0.3	33						
GYROSIGMA ?	CEL			X						
KEROSIRA	CEL			X						
MICROCYSTIS AERUGINOSA	COL							13	0.3	53
NAVICULA	CEL		0.3	33						
NITZSCHIA	CEL			X						
OOCYSTIS	COL		0.3	33						
PEDIASTRUM DURYANUM	COL			X						X
PEDIASTRUM DUPLEX	COL						X			
PEDIASTRUM DUPLEX										
V. CLATHRATUM	COL			X						
PERIDINIUM QUADRIDENS	CEL			X						
PHOXRIDIUM	FIL				13	33.3	2672			
PHOXRIDIUM MUCICOLA	FIL						X			
SCENEDESMUS ACUMINATUS	COL			X						
SCENEDESMUS BIJUGA	COL			X						
SCENEDESMUS DIMORPHUS	COL			X						
SCENEDESMUS QUADRICAUDA	COL		0.3	33						
SCHROEDERIA SETIGERA ?	CEL			X						
SPHAEROCYSTIS SCHROETERI	COL			X						
STEPHANODISCUS	CEL	15	1.2	130			X			
STEPHANODISCUS NIAGARAE	CEL							12	3.1	479
SURIRELLA #5	CEL			X						
TETRAEDRON TRIGONUM	CEL		0.3	33						
TETRASTRUM STAUROGENIAEFORME	COL		0.3	33						
TRACHELOMONAS PLANCTONICA	CEL			X						
TOTAL				11.88			8015			15475

LAKE NAME: DEVILS LAKE
STORET NUMBER: 3805

NYGAARD TROPHIC STATE INDICES

DATE	04 29 74	07 16 74	09 16 74
MYXOPHYCEAN	01/0 E	06/0 E	03/0 E
CHLOROPHYCEAN	02/0 E	03/0 E	03/0 E
EUGLENOPHYTE	0.67 E	0.11 ?	0/06 ?
DIATOM	0.25 ?	1.00 E	0.50 E
COMPOUND	06/0 E	12/0 E	07/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 29 74	07 16 74	09 16 74
GENUS	03	01	01
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 29 74	07 16 74	09 16 74
AVERAGE DIVERSITY	H	2.66	2.07	0.40
NUMBER OF TAXA	S	20.00	14.00	9.00
NUMBER OF SAMPLES COMPOSITED	M	4.00	4.00	4.00
MAXIMUM DIVERSITY	MAXH	4.32	3.81	3.17
MINUMUM DIVERSITY	MINH	0.09	0.06	0.02
TOTAL DIVERSITY	D	7123.48	4313.88	2686.00
TOTAL NUMBER OF INDIVIDUALS/ML	N	2678.00	2084.00	6715.00
EVENESS COMPONENT	J	0.62	0.54	0.13
RELATIVE EVENESS	RJ	0.61	0.54	0.13
MEAN NUMBER OF INDIVIDUALS/TAXA	L	133.90	148.86	746.11
NUMBER/ML OF MOST ABUNDANT TAXON	K	1004.00	748.00	6330.00

LAKE NAME: DEVILS LAKE CONTINUED
STORET NUMBER: 3605

TAXA	FORM	04 29 74 IS	04 29 74 %C	04 29 74 ALGAL UNITS PER ML	07 16 74 IS	07 16 74 %C	07 16 74 ALGAL UNITS PER ML	09 16 74 IS	09 16 74 %C	09 16 74 ALGAL UNITS PER ML
ANABAENA	FIL						X			
ANKISTRODESMUS FALCATUS	CEL			X						
APHANIZOMENON FLOS-AQUAE	FIL				82	34.0	721	11	94.3	6330
CHAETOCEROS ELMOREI	CEL				15	1.2	27			
CHLOROPHYTAN FLAGELLATE	CEL	15	37.5	1004						
CHLOROPHYTAN LUNATE CELL	CEL	1	15.3	409						
CHROOMONAS ACUTA	CEL	14	6.9	186						
COCCOID CELLED COLONY	COL	1	6.9	186						
COCCONEIS	CEL									X
CRYPTOMONAS	CEL	13	4.2	112						
DACTYLOCOCCOPSIS IRREGULARIS	CEL	12	19.5	521						
DINOFLAGELLATE	CEL			X						
ENTOMONEIS	CEL			X						
EUDORINA ELEGANS	COL	11	4.2	112						
EUGLENA	CEL			X						
GOMPHOSPHAERIA	COL						X			X
MICROCYSTIS AERUGINOSA	COL				14	2.5	53	12	3.6	245
MICROCYSTIS INCERTA	COL				13	2.5	427			
NAVICULA	CEL			X						
NITZSCHIA	CEL		1.4	37						
NITZSCHIA CLOSTERIUM	CEL		1.4	37						
OOCYSTIS	CEL									X
OOCYSTIS EREMOSPHAERIA	CEL							14	0.5	35
PASCHERINA TETRAS	COL		1.4	37						
PEDIASTRUM DUPLEX V. CLATHRATUM	COL						X			
PHACUS	CEL						X			
PHORMIDIUM MUCICOLA	COL					1.3	27			
RHOICOSPHENIA CURVATA	CEL					1.3	27			
SCENEDESMUS INTERMEDIUS	COL			X						
SCHROEDERIA SETIGERA	CEL					1.3	27	15	1.0	70
SPERMATOZOOPSIS	CEL		1.4	37						
SPHAEROCYSTIS SCHROETERI	COL					1.3	27			
STEPHANODISCUS ASTRAEA	CEL			X	11	35.9	748	13	0.5	35
SURIRELLA	CEL			X			X			
SURIRELLA OVATA	CEL									X
TRACHELOMONAS VOLVOCINA	CEL			X						
TOTAL				2078			2084			6715

LAKE NAME: JAMESTOWN RES.
STORET NUMBER: 3806

NYGAARD TROPHIC STATE INDICES

DATE	04 26 74	07 17 74	09 17 74
MYXOPHYCEAN	1.50 E	0770 E	1.67 E
CHLOROPHYCEAN	3.50 E	0570 E	4.67 E
EUGLENOPHYTE	0.20 ?	0.17 ?	0.21 E
DIATOM	0.50 E	0.67 E	2.50 E
COMPOUND	7.50 E	1670 E	9.33 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 26 74	07 17 74	09 17 74
GENUS	09	07	02
SPECIES	07	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 26 74	07 17 74	09 17 74
AVERAGE DIVERSITY	H	2.34	1.82	3.65
NUMBER OF TAXA	S	35.00	25.00	42.00
NUMBER OF SAMPLES COMPOSITED	M	3.00	3.00	3.00
MAXIMUM DIVERSITY	MAXH	5.13	4.64	5.39
MINUMUM DIVERSITY	MINH	0.04	0.05	0.18
TOTAL DIVERSITY	D	29540.16	11360.44	11001.10
TOTAL NUMBER OF INDIVIDUALS/ML	N	12624.00	6242.00	3014.00
EVENESS COMPONENT	J	0.46	0.39	0.68
RELATIVE EVENESS	RJ	0.46	0.39	0.67
MEAN NUMBER OF INDIVIDUALS/TAXA	L	360.69	249.68	71.76
NUMBER/ML OF MOST ABUNDANT TAXON	K	7179.00	4335.00	680.00

LAKE NAME: JAMESTOWN RES.
STORET NUMBER: 3806

CONTINUED

TAXA	FORM	04 26 74 IS	04 26 74 %C	04 26 74 ALGAL UNITS PER ML	07 17 74 IS	07 17 74 %C	07 17 74 ALGAL UNITS PER ML	09 17 74 IS	09 17 74 %C	09 17 74 ALGAL UNITS PER ML
ACTINASTRUM GRACILIMUM	CEL			X					3.2	97
ANABAENA	FIL								1.6	49
ANKISTRODESMUS	CEL									
ANKISTRODESMUS FALCATUS V. ACICULARIS	CEL	15	5.0	631						
ANKISTRODESMUS FALCATUS V. MIRABILIS	CEL	14	5.0	631				12	11.3	340
APHANIZOMENON FLOS-AQUAE	FIL				14	0.5	33			
CARTERIA	CEL						X			X
CERATIUM HIRUNDINELLA	CEL									
CHLAMYDOMONAS	CEL					1.1	67			
CHLOROPHYTAN COCCOID CELL	CEL							14	9.7	291
CHLOROPHYTAN COCCOID CELLED COLONY	COL									X
CHLOROPHYTAN COLONY	COL									X
CHROOCOCCUS	COL			3.6	79					
CHROOMONAS	CEL				12	2.1	133			
CHROOMONAS ACUTA	CEL								3.2	97
CLOSTERIUM #1	CEL	13	10.6	1341	13	9.1	567			
CLOSTERIUM #2	CEL			X						X
COELASTRUM MICROPORUM	CEL			X						X
CRUCIGENIA QUADRATA	COL									X
CRUCIGENIA TETRAPEDIA	COL									X
CRYPTOMONAS	CEL			1.9	237			15	16.1	480
CRYPTOMONAS EROSA	CEL				X		2.1	133		
CRYPTOMONAS REFLEXA	CEL	12	7.5	947				11	22.6	660
CYCLOTELLA	CEL			X						
CYRATOPLEURA SOLEA	CEL	11	56.9	7179					3.2	97
CYST	CEL			X						
DACTYLOCOCCOPSIS IRREGULARIS	CEL			X						X
DINOBRYON SOCIALE	CEL		5.6	710						
DIPLOPSALIS ACUTA	CEL			X						X
ENTOMONEIS ORNATA	CEL									
EUDORINA ELEGANS	CEL						X			
EUGLENA	CEL			X						
EUGLENA TRIPTERIS	CEL						X			X
FLAGELLATE #2	CEL						X			
FRAGILARIA	CEL									X
GLENODINIUM OCULATUM	CEL			1.9	237				3.2	97
GOMPHOSPHAERIA LACUSTRIS	COL									
KIRCHNERIELLA	CEL						X			
KIRCHNERIELLA CONTORTA	COL								3.2	97
MALLOMONAS ACAROIDES	CEL			X						X
MALLOMONAS PSEUDOCORONATA	CEL									X
MELOSIRA GRANULATA	CEL			X	11	69.4	4335			
MELOSIRA GRANULATA V. ANGUSTISSIMA	CEL								1.6	49
MELOSIRA VARIANS	CEL									X
MERISMOPEDIA MINIMA	COL					1.1	67			
MERISMOPEDIA TENUISSIMA	COL			0.6	79	0.5	33			
MICROCYSTIS	COL					1.6	100			
MICROCYSTIS INCERTA	COL								4.8	146
NAVICULA	CEL						X			
NITZSCHIA	CEL						X			
OOCYSTIS	COL			X				15	3.2	97
OSCILLATORIA	FIL									
PANDORINA MORUM	COL			X						X
PASCHERINA TETRAS	COL			0.6	79					X
PEDIASTRUM BORYANUM	COL									X
PEDIASTRUM DUPLEX	COL			X						
PEDIASTRUM DUPLEX V. CLATHRATUM	COL									
PERIDINIUM ?	CEL			X			X			
PHACUS ACUMINATUS V. DELZEPOLSKII	CEL								1.6	49
PHACUS MEGALOPSIS	CEL			X						X
PHACUS PSEUDONORDSTEDTII	CEL									
PHORMIDIUM MUCICOLA	FIL					1.6	100			
RAPHIDIOPSIS	FIL					0.5	33			
RHOPALODIA GIBBA	CEL			X						X
SCENEDESMUS BIJUGA	COL					0.6	37			
SCENEDESMUS DIMORPHUS	COL								1.6	49
SCENEDESMUS INTERMEDIUS	COL			1.9	237				1.6	49
SCENEDESMUS QUADRICAUDA	COL								1.6	49
SCHROEDERIA SETIGERA	COL			0.6	79				1.6	49
STAURASTRUM	CEL					8.1	500			X
STEPHANODISCUS NIAGARAE	CEL									X
SURIRELLA #9	CEL			X	15	1.1	67			
SURIRELLA ANGUSTA	CEL			X						
SYNEDRA	CEL			1.3	158					X
TETRAEDRON REGULARE V. INCUS	CEL									
TETRASTRUM STAURODENISEFORME	COL						X			
TRACHELOMONAS	CEL					0.6	37			
TRACHELOMONAS INTERMEDIA ?	CEL								4.8	146
TRACHELOMONAS VOLVOCINA	CEL			X						
TOTAL				12624			6242			3014

LAKE NAME: LAKE LAMOURE
STORET NUMBER: 3807

NYGAARD TROPHIC STATE INDICES

DATE	04 29 74	07 10 74	09 17 74
MYXOPHYCEAN	02/0 E	03/0 E	2.00 E
CHLOROPHYCEAN	07/0 E	02/0 E	1.00 E
EUGLENOPHYTE	0.11 ?	0/05 ?	0/03 ?
DIATOM	0.25 ?	0/0 ?	0/0 ?
COMPOUND	11/0 E	05/0 E	3.00 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 29 74	07 10 74	09 17 74
GENUS	10	07	00
SPECIES	05	03	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 29 74	07 10 74	09 17 74
AVERAGE DIVERSITY	H	2.38	1.79	0.41
NUMBER OF TAXA	S	20.00	9.00	8.00
NUMBER OF SAMPLES COMPOSITED	M	1.00	2.00	2.00
MAXIMUM DIVERSITY	MAXH	4.32	3.17	3.00
MINIMUM DIVERSITY	MINH	0.02	0.04	0.03
TOTAL DIVERSITY	D	28100.66	5076.44	1055.34
TOTAL NUMBER OF INDIVIDUALS/ML	N	11807.00	2836.00	2574.00
EVENESS COMPONENT	J	0.55	0.56	0.14
RELATIVE EVENESS	RJ	0.55	0.56	0.13
MEAN NUMBER OF INDIVIDUALS/TAXA	L	590.35	315.11	321.75
NUMBER/ML OF MOST ABUNDANT TAXON	K	5208.00	1772.00	2402.00

LAKE NAME: LAKE LANDURE CONTINUED
STORET NUMBER: 3807

TAXA	FORM	04 29 74 IS	04 29 74 %C	04 29 74 ALGAL UNITS PER ML	07 10 74 IS	07 10 74 %C	07 10 74 ALGAL UNITS PER ML	09 17 74 IS	09 17 74 %C	09 17 74 ALGAL UNITS PER ML
ACTINASTRUM GRACILIMUM	COL		0.2	22						
ANABAENA FLOS-AQUAE	FIL				14	3.0	101			
ANKISTRODESMUS FALCATUS	CEL					1.8	51			
ANKISTRODESMUS FALCATUS V. ACICULARIS	CEL	12	21.7	2559						
ANKISTRODESMUS FALCATUS V. MIRABILIS	CEL			X						
APHANIZOMENON FLOS-AQUAE	FIL				12	12.5	354	11	93.3	2402
ASTERIONELLA FORMOSA V. GRACILLIMA	CEL	15	3.0	359						
CHLOMONAS ACUTA	CEL		7.2	853				13	5.0	129
CHROOMONAS REFLEXA	CEL									X
CLOSTERIUM	CEL									X
CRYPTOMONAS #1	CEL							12	1.7	43
CRYPTOMONAS EROSA	CEL	14	4.6	539						
CRYPTOMONAS MARSSONII	CEL									X
CRYPTOMONAS REFLEXA	CEL		0.2	22	11	14.5	405			
CYCLOTELLA MENEGHINIANA	CEL	11	44.1	5208						
DICTYOSPHAERIUM PULCHELLUM	COL		0.6	67						
DINOBRYON SOCIALE	CEL		0.4	45						
GLENODINIUM OCULATUM	CEL			X						
LYNGBYA	FIL		3.4	404						
MALLOMONAS	CEL					1.8	51			
MICROCYSTIS AERUGINOSA	CEL									X
NITZSCHIA	CEL			X						
OSCILLATORIA	FIL		0.8	90		1.8	51			
RHODOMONAS MINUTA ?	CEL				13	62.5	1772			
SCENEDESMUS DIMORPHUS	CEL			X						
SCENEDESMUS QUADRICAUDA	COL			X						
SCHROEDERIA SETIGERA	CEL						X			X
SYNEDRA ACUS	CEL	13	13.5	1594						
SYNEDRA ULNA	CEL			X						
TETRASTRUM STAUROGENIAEFORME	COL		0.4	45						
TRACHELOMONAS VOLVOCINA	CEL			X						
VOLVOX ANTHERIDIAL PACKET	COL				15	1.8	51			
TOTAL				11807			2836			2574

LAKE NAME: MATEJCEK LAKE
STORET NUMBER: 3808

NYGAARD TROPHIC STATE INDICES

DATE	04 29 74	07 16 74	09 16 74
MYXOPHYCEAN	01/0 E	03/0 E	02/0 E
CHLOROPHYCEAN	02/0 E	04/0 E	0/0 O
EUGLENOPHYTE	0.67 E	0.29 E	0.50 E
DIATOM	0.33 E	0.25 ?	0.50 E
COMPOUND	06/0 E	10/0 E	04/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 29 74	07 16 74	09 16 74
GENUS	04	00	00
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 29 74	07 16 74	09 16 74
AVERAGE DIVERSITY	H	1.79	1.61	1.50
NUMBER OF TAXA	S	13.00	16.00	8.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	2.00	2.00
MAXIMUM DIVERSITY	MAXH	3.70	4.00	3.00
MINIMUM DIVERSITY	MINH	0.41	1.92	0.25
TOTAL DIVERSITY	D	499.41	86.94	406.50
TOTAL NUMBER OF INDIVIDUALS/ML	N	279.00	54.00	271.00
EVENESS COMPONENT	J	0.48	0.40	0.50
RELATIVE EVENESS	RJ	0.42	-0.14	0.46
MEAN NUMBER OF INDIVIDUALS/TAXA	L	21.46	3.38	33.88
NUMBER/ML OF MOST ABUNDANT TAXON	K	116.00	18.00	135.00

LAKE NAME: MATEJCEK LAKE
STORET NUMBER: 3808

CONTINUED

TAXA	FORM	09 29 74 IS	09 29 74 SC	09 29 74 ALGAL UNITS PER ML	07 16 74 IS	07 16 74 SC	07 16 74 ALGAL UNITS PER ML	09 16 74 IS	09 16 74 SC	09 16 74 ALGAL UNITS PER ML
ANABAENA	FIL						X			X
ANKISTRODESMUS	CEL	341	8.21	23						
APHANIZOMENON FLOS-AQUAE	FIL				12	33.33	18	11	25.11	68
CHLAMYDOMONAS GLOBOSA	CEL	12	33.33	93						
CRYPTOMONAS	CEL	11	41.67	116				12	25.11	68
CRYPTOMONAS EROSA	CEL						X			
CYCLOTELLA MENEGHINIANA	CEL			X						
CYMATOPLEURA SOLEA	CEL						X			
CYMBELLA TRIANGULUM ?	CEL						X			
EUDORINA ELEGANS	CEL			X						
EUGLENA	CEL			X						
EUGLENA TRIPTERIS ?	CEL						X			
FLAGELLATE	CEL							13	49.81	135
GYMNODINIUM	CEL	13	36.61	47						
GYMNODINIUM ALBULUM	CEL						X			
GYROSIGMA ?	CEL			X						
NAVICULA	CEL						X			
NAVICULA #1	CEL			X						
NAVICULA #2	CEL			X						X
NITZSCHIA #1	CEL						X			
NITZSCHIA #2	CEL									X
OSCILLATORIA #1	FIL			X						
OSCILLATORIA #2	FIL						X			
PHACUS CAUDATES	CEL						X			
SCENEDESMUS BIJUGA	COL				33	33.33	18			
SCENEDESMUS OBLIQUUS	COL			X						
SCHROEDERIA SETIGERA	CEL						X			
SPHAEROCYSTIS SCHROETERI	COL				11	33.33	18			
STEPHANODISCUS NIAGARAE	CEL						X			X
TETRAEDRON ?	CEL						X			
TRACHELOMONAS	CEL									X
TRACHELOMONAS INTERMEDIA	CEL			X						
TOTAL				279			54			273

LAKE NAME: LAKE METIGOSHE
STORET NUMBER: 3809

NYGAARD TROPHIC STATE INDICES

DATE	07 17 74	09 13 74
MYXOPHYCEAN	03/0 E	04/0 E
CHLOROPHYCEAN	08/0 E	04/0 E
EUGLENOPHYTE	0.27 E	0/08 ?
DIATOM	0.25 ?	0.50 E
COMPOUND	16/0 E	10/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	07 17 74	09 13 74
GENUS	04	07
SPECIES	00	04

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		07 17 74	09 13 74
AVERAGE DIVERSITY	H	3.04	3.42
NUMBER OF TAXA	S	34.00	17.00
NUMBER OF SAMPLES COMPOSITED	M	3.00	3.00
MAXIMUM DIVERSITY	MAXH	5.09	4.09
MINUMUM DIVERSITY	MINH	0.22	0.10
TOTAL DIVERSITY	D	5704.12	7117.02
TOTAL NUMBER OF INDIVIDUALS/ML	N	1878.00	2081.00
EVENESS COMPONENT	J	0.60	0.84
RELATIVE EVENESS	RJ	0.58	0.84
MEAN NUMBER OF INDIVIDUALS/TAXA	L	55.24	122.41
NUMBER/ML OF MOST ABUNDANT TAXON	K	797.00	489.00

LAKE NAME: LAKE METIGOSHE
STORET NUMBER: 3809

CONTINUED

TAXA	FORM	07 17 74 IS	07 17 74 %C	07 17 74 ALGAL UNITS PER ML	09 13 74 IS	09 13 74 %C	09 13 74 ALGAL UNITS PER ML
ANABAENA	FIL	15	3.5	65	13	4.4	92
ANKISTRODESMUS FALCATUS	CEL			X			
APHANOTHECE	COL			X			
CENTRIC DIATOM	CEL		4.6	86			X
CHROOMONAS ACUTA	CEL	13	6.9	129		10.3	214
COCCONEIS PLACENTULA	CEL			X			
COCCONEIS PLACENTULA V. ?	CEL					1.5	31
CRUCIGENIA	COL		1.2	22			
CRYPTOMONAS EROSA	CEL	11	13.7	258	11	11.8	245
DINOBRYON DIVERGENS	CEL			X			
DINOBRYON SOCIALE	CEL					7.4	153
DINOBRYON SOCIALE V. AMERICANUM	CEL			X			
DINOBRYON SPP.	CEL		4.6	86			
EUGLENA	CEL		1.2	22			
EUGLENA #1	CEL			X			
FLAGELLATE #2	CEL	4	5.8	108			
FRAGILARIA	CEL			X			
FRAGILARIA CROTONENSIS	CEL	12	42.4	797	15	5.9	122
GOMPHONEMA	CEL			X			
MALLOMONAS #2	CEL			X			
MALLOMONAS CAUDATA	CEL			X			
MALLOMONAS SPP.	CEL		1.2	22			
MELOSIRA	CEL					4.4	92
MELOSIRA GRANULATA	CEL			X			
MERISMOPEDIA MINIMA	CEL					1.5	31
MERISMOPEDIA TENUISSIMA	COL		1.2	22			
MICROCYSTIS #1	COL				12	23.5	489
NAVICULA	CEL			X			X
NAVICULA #2	CEL		1.2	22			
NITZSCHIA	CEL			X			
OOCYSTIS #1	CEL			X			X
OOCYSTIS BORGEI	CEL		1.2	22			
PERIDINIUM INCONSPICUUM	CEL			X			
PHACUS PEGALOPSIS	CEL		1.2	22			
PHORMIDIUM	FIL					4.4	92
SCENEDESMUS ABUNDANS	COL			X			
SCENEDESMUS BIJUGA	COL		5.8	108		5.9	122
SCENEDESMUS QUADRICAUDA	COL					5.9	122
SYNEDRA	CEL		2.3	43		1.5	31
TETRAEDRON MINIMUM	CEL		1.2	22			
TETRAEDRON MINIMUM V. SCHROETELLATUM	CEL				14	11.8	245
TETRAEDRON TRIGONUM	CEL		1.2	22			
TOTAL				1678			2084

LAKE NAME: PELICAN LAKE
STORET NUMBER: 3811

NYGAARD TROPHIC STATE INDICES

DATE	07 17 74	09 13 74
MYXOPHYCEAN	2.00 E	9.00 E
CHLOROPHYCEAN	2.50 E	5.00 E
EUGLENOPHYTE	0.22 E	0.07 ?
DIATOM	0.33 E	0.29 ?
COMPOUND	6.00 E	17.0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	07 17 74	09 13 74
GENUS	06	02
SPECIES	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		07 17 74	09 13 74
AVERAGE DIVERSITY	H	1.80	1.77
NUMBER OF TAXA	S	21.00	32.00
NUMBER OF SAMPLES COMPOSITED	M	1.00	1.00
MAXIMUM DIVERSITY	MAXH	4.39	5.00
MINUMUM DIVERSITY	MINH	0.14	0.11
TOTAL DIVERSITY	D	3033.00	6495.90
TOTAL NUMBER OF INDIVIDUALS/ML	N	1685.00	3670.00
EVENESS COMPONENT	J	0.41	0.35
RELATIVE EVENESS	RJ	0.40	0.34
MEAN NUMBER OF INDIVIDUALS/TAXA	L	80.24	114.69
NUMBER/ML OF MOST ABUNDANT TAXON	K	883.00	2526.00

LAKE NAME: PELICAN LAKE CONTINUED
STORET NUMBER: 3811

TAXA	FORM	07 17 74 BS	07 17 74 %C	07 17 74 ALGAL UNITS PER ML	09 13 74 BS	09 13 74 %C	09 13 74 ALGAL UNITS PER ML
ANABAENA	FIL			X		2.8	104
APHANIZOMENON FLOS-AQUAE	FIL			X	12	4.7	173
ASTERIONELLA FORMOSA	CEL			X			X
CERATIUM HIRUNDINELLA	CEL			X			X
CHROOCOCCUS DISPERSUS	COL						X
CHRUDOMONAS	CEL					1.[illegible]	35
CLOSTERIUM	CEL			X			
COCCONEIS	CEL						X
COELOSPHAERIUM KUETZINGIANUM	COL				14	2.8	104
CRYPTOMONAS MARSSONII	CEL	13	19.1	321		2.8	104
DACTYLOCOCCOPSIS IRREGULARIS	CEL						X
FRAGILARIA	CEL						X
FRAGILARIA CROTONENSIS	CEL	11	52.4	883	11	66.[illegible]	2526
GLOEOCYSTIS	CEL			X			
GLOEOCYSTIS GIGAS	COL						X
GOMPHOSPHAERIA APONINA ?	COL						X
GYROSIGMA ?	CEL						X
MALLOMONAS ACAROIDES	CEL						X
MALLOMONAS PSEUDOCORONATA ?	CEL						X
MELOSIRA GRANULATA	CEL				13	2.8	104
MICROCYSTIS AERUGINOSA	COL					1.[illegible]	35
MICROCYSTIS INCERTA	COL	14	7.1	12[illegible]	15	11.3	415
NITZSCHIA	CEL	15	2.4	4[illegible]			
OOCYSTIS	COL			X		1.[illegible]	35
OSCILLATORIA	FIL	12	19.1	321		1.[illegible]	35
PEDIASTRUM BORYANUM	COL						X
PEDIASTRUM DUPLEX	COL			X			
PEDIASTRUM TETRAS	COL						X
PENNATE DIATOM	CEL						X
PERIDINIUM WILLEI ?	CEL			X			
PHACUS PLEURONECTES	CEL			X			
SCENEDESMUS BIJUGA	COL			X			
SCENEDESMUS QUADRICAUDA	COL						X
SCHROEDERIA SETIGERA	CEL			X			
SPIROGYRA	CEL						X
STAURASTRUM	CEL			X			X
STEPHANODISCUS ASTRAEA	CEL			X			X
SYNEDRA ULNA	CEL						X
TETRAEDRON MINIMUM							
V. SCROBICULATUM	CEL			X			X
TRACHELOMONAS VOLVOCINA	CEL			X			X
TOTAL				1665			3870

LAKE NAME: SAKAKAWEA
STORET NUMBER: 3812

NYGAARD TROPHIC STATE INDICES

DATE	04 30 74	07 18 74	09 17 74
MYXOPHYCEAN	0170 E	0470 E	0270 E
CHLOROPHYCEAN	0470 E	0270 E	0370 E
EUGLENOPHYTE	0.60 E	0.33 E	0.20 ?
DIATOM	0.33 E	0.43 E	0.80 E
COMPOUND	1270 E	1170 E	1070 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 30 74	07 18 74	09 17 74
GENUS	15	08	06
SPECIES	04	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 30 74	07 18 74	09 17 74
AVERAGE DIVERSITY	H	3.06	2.77	2.56
NUMBER OF TAXA	S	29.00	21.00	18.00
NUMBER OF SAMPLES COMPOSITED	M	9.00	11.00	10.00
MAXIMUM DIVERSITY	MAXH	4.86	4.39	4.17
MINIMUM DIVERSITY	MINH	0.12	0.17	0.11
TOTAL DIVERSITY	D	9173.88	3963.87	4881.92
TOTAL NUMBER OF INDIVIDUALS/ML	N	2998.00	1431.00	1907.00
EVENESS COMPONENT	J	0.63	0.63	0.61
RELATIVE EVENESS	RJ	0.63	0.62	0.61
MEAN NUMBER OF INDIVIDUALS/TAXA	L	103.38	68.14	105.94
NUMBER/ML OF MOST ABUNDANT TAXON	K	785.00	376.00	786.00

LAKE NAME: SAKAKAWEA
STORET NUMBER: 3812

CONTINUED

TAXA	FORM	04 30 74 IS	04 30 74 %C	04 30 74 ALGAL UNITS PER ML	07 16 74 IS	07 16 74 %C	07 16 74 ALGAL UNITS PER ML	09 17 74 IS	09 17 74 %C	09 17 74 ALGAL UNITS PER ML
ACTINASTRUM	CEL									X
ANABAENA	FIL					2.7	38			
ASTERIONELLA FORMOSA	CEL		6.3	250			X			X
CENTRIC DIATOM	CEL				3	21.1	301			
CENTRIC DIATOMS	CEL		4.8	143						
CHROOCOCCUS	COL						X			
COCCONEIS PEDICULUS	CEL			X						
COSCINODISCUS LACUSTRIS	COL									X
CRUCIGENIA TETRAPEDIA	COL					2.7	38			
CRYPTOMONAS	CEL						X			
CRYPTOMONAS EROSA	CEL	11	5.9	178				12	9.8	187
CRYPTOMONAS REFLEXA	CEL				4	2.7	38			
CYCLOTELLA MENEGHINIANA	CEL			X						
CYMATOPLEURA ? SOLEA	CEL						X			
CYMBELLA	CEL			X						
DACTYLOCOCCOPSIS IRREGULARIS	CEL					2.7	38		1.9	37
DIATOMA VULGARE	CEL			X						
EUDORINA ELEGANS	CEL			X						
EUGLENA	CEL			X						
EUGLENA #1	CEL	2	3.6	107			X			
FLAGELLATE	CEL	14	26.2	785						
FLAGELLATE #1	CEL					5.2	75			
FLAGELLATES	CEL							15	41.2	786
GLENODINIUM GYMNODINIUM	CEL			X						
GLENODINIUM OCULATUM	CEL		1.2	36						
GOMPHONEMA	COL		2.4	71						
GYROSIGMA ?	CEL			X						
GYROSIGMA WORMLEYE	CEL						X			
HANTZSCHIA	CEL			X						
LUNATE CELL	CEL								1.9	37
MELOSIRA #4	CEL				2	26.3	376			
MELOSIRA DISTANS	CEL									X
MELOSIRA GRANULATA										
V. ANGUSTISSIMA	CEL							3	3.9	75
NAVICULA	CEL			X		2.7	38			
NAVICULA VIRIDULA										
V. AVENACEA	CEL	3	4.8	143						
NITZSCHIA	CEL			X						X
NITZSCHIA #1	CEL						X			
NITZSCHIA #2	CEL						X			
OOCYSTIS BORGEI	CEL						X			
OSCILLATORIA ?	FIL			X						
OSCILLATORIA AGARDHII	FIL							11	17.7	337
OSCILLATORIA AMPHIBIA	FIL				5	5.2	75			
PEDIASTRUM BORYANUM	COL			X						
PENNATE DIATOMS	CEL		10.7	321					5.9	112
PHACUS	CEL		1.2	36						
PHACUS PSEUDONORDSTEDTII	CEL								1.9	37
PHACUS PYRUM	CEL					2.7	38			
SCENEDESMUS BIJUGA	COL			X						
SCENEDESMUS DIMORPHUS	COL			X					1.9	37
SCENEDESMUS QUADRICAUDA	COL		2.4	71						
SCHROEDERIA SETIGERA	CEL									X
STEPHANODISCUS	CEL							14	13.7	262
STEPHANODISCUS #1	CEL		25.0	750						
STEPHANODISCUS #2	CEL	5	3.6	107						
STEPHANODISCUS ASTRAEA	CEL						X			
SURIRELLA	CEL			X						
SYNEDRA	CEL				11	26.3	376			
SYNEDRA ACUS	CEL									X
SYNEDRA DELICATISSIMA	CEL									X
TOTAL				2998			1431			1907

LAKE NAME: SPIRIT WOOD LAKE
STORET NUMBER: 3813

NYGAARD TROPHIC STATE INDICES

DATE	04 26 74	07 17 74	09 17 74
MYXOPHYCEAN	0270 E	0470 E	0370 E
CHLOROPHYCEAN	070 D	070 D	070 D
EUGLENOPHYTE	0702 ?	0704 ?	0703 ?
DIATOM	0.50 E	070. ?	1.00 E
COMPOUND	0470 E	0470 E	0470 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 26 74	07 17 74	09 17 74
GENUS	13	01	01
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 26 74	07 17 74	09 17 74
AVERAGE DIVERSITY	H	2.05	0.15	2.10
NUMBER OF TAXA	S	14.00	4.00	7.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	2.00	2.00
MAXIMUM DIVERSITY	MAXH	3.81	2.00	2.81
MINUMUM DIVERSITY	MINH	0.03	0.00	0.07
TOTAL DIVERSITY	D	14313.10	1567.05	1974.00
TOTAL NUMBER OF INDIVIDUALS/ML	N	6982.00	10447.00	940.00
EVENESS COMPONENT	J	0.54	0.06	0.75
RELATIVE EVENESS	RJ	0.54	0.06	0.75
MEAN NUMBER OF INDIVIDUALS/TAXA	L	498.71	2611.75	134.29
NUMBER/ML OF MOST ABUNDANT TAXON	K	3738.00	10245.00	376.00

LAKE NAME: SPIRIT WOOD LAKE
STORET NUMBER: 3813

CONTINUED

TAXA	FORM	04 26 74 IS	04 26 74 %C	04 26 74 ALGAL UNITS PER ML	07 17 74 IS	07 17 74 %C	07 17 74 ALGAL UNITS PER ML	09 17 74 IS	09 17 74 %C	09 17 74 ALGAL UNITS PER ML
APHANIZOMENON FLOS-AQUAE	FIL				11	98.1	3,245	12	12.0	113
CHLAMYDOMONAS	CEL	11	53.5	3738						
CHLOROGONIUM	CEL		0.5	35						
CHLOROPHYTAN COLONY	COL		1.0	71						
CHROOMONAS ACUTA	CEL	13	5.1	353				15	40.0	376
COCCONEIS	CEL									X
CRYPTOMONAS	CEL	12	2.0	141				14	16.0	150
DACTYLOCOCCOPSIS	CEL		2.5	176						
FLAGELLATE #2	CEL	15	2.5	176						
FRAGILARIA	CEL		2.0	141						
LYNGBYA	FIL				33	0.4	40			
LYNGBYA BIRGEI	FIL									X
MELOSIRA DISTANS	CEL	14	26.6	1869						
MICROCYSTIS AERUGINOSA	COL				12	1.6	162	33	8.0	75
NAVICULA	CEL		0.5	35						
NITZSCHIA	CEL		1.5	106						
OSCILLATORIA	FIL		2.0	141						
PHORMIDIUM MUCICOLA	FIL						X			
STEPHANODISCUS ASTRAEA	CEL			X						
STEPHANODISCUS NIAGARAE ?	CEL							11	24.0	226
SURIRELLA	CEL			X						
TOTAL				6982			3,447			940

LAKE NAME: SWEET BRIAR RES.
STORET NUMBER: 3814

NYCAARC TROPHIC STATE INDICES

DATE	04 30 74	07 16 74	09 17 74
MYXOPHYCEAN	02/0 E	04/0 E	05/0 E
CHLOROPHYCEAN	0/0 U	01/0 E	01/0 E
EUGLENOPHYTE	0/02 ?	0/05 ?	0/06 ?
DIATOM	0/03 ?	0/01 ?	0/0 ?
COMPOUND	02/0 E	05/0 E	06/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 30 74	07 16 74	09 17 74
GENUS	00	02	00
SPECIES	00	03	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 30 74	07 16 74	09 17 74
AVERAGE DIVERSITY	H	2.81	1.12	0.89
NUMBER OF TAXA	S	7.00	9.00	8.00
NUMBER OF SAMPLES COMPOSITED	M	1.00	2.00	2.00
MAXIMUM DIVERSITY	MAXH	2.81	3.17	3.00
MINUMUM DIVERSITY	MINH	0.03	0.02	0.02
TOTAL DIVERSITY	D	0.00	4935.84	4375.24
TOTAL NUMBER OF INDIVIDUALS/ML	N	0.00	4407.00	4916.00
EVENESS COMPONENT	J	1.00	0.35	0.30
RELATIVE EVENESS	RJ	0.54	0.35	0.30
MEAN NUMBER OF INDIVIDUALS/TAXA	L	0.00	489.67	614.50
NUMBER/ML OF MOST ABUNDANT TAXON	K	0.01	3415.00	3997.00

LAKE NAME: SWEET BRIAR RES. CONTINUED
STORET NUMBER: 3814

TAXA	FORM	04 30 74 IS	04 30 74 %C	04 30 74 ALGAL UNITS PER ML	07 18 74 IS	07 18 74 %C	07 18 74 ALGAL UNITS PER ML	09 17 74 IS	09 17 74 %C	09 17 74 ALGAL UNITS PER ML
ANABAENA	FIL						X			
ANKISTRODESMUS FALCATUS	CEL				15	1.8	79			
APHANIZOMENON FLOS-AQUAE	FIL				11	77.5	3415	12	81.3	3997
ASTERIONELLA FORMOSA										
V. GRACILLIMA	CEL			X						
CHROOCOCCUS	COL			X						
CHROOMONAS ACUTA	CEL			X	13	12.6	556	14	15.0	735
COELOSPHAERIUM NAEGELIANUM	COL							13	0.9	46
CRYPTOMONAS EROSA	CEL				14	1.8	79			
CRYPTOMONAS MARSSONII	CEL			X	12	6.3	276			X
DACTYLOCOCCOPSIS	CEL			X						
GLOEOTRICHIA ECHINULATA	COL							11	1.9	92
GOMPHOSPHAERIA	COL						X			
MICROCYSTIS AERUGINOSA	COL						X			X
NAVICULA	CEL			X						
NITZSCHIA FILIFORMIS	CEL			X						
PENNATE DIATOM	CEL						X			
PHORMIDIUM MUCICOLA	FIL									X
SCHROEDERIA SETIGERA	CEL							15	0.9	46
TOTAL				0			4457			4936

LAKE NAME: WHITMAN LAKE
STORET NUMBER: 3815

NYGAARD TROPHIC STATE INDICES

DATE	04 27 74	07 16 74	09 16 74
MYXOPHYCEAN	4.00 E	4.00 E	7.00 E
CHLOROPHYCEAN	3.00 E	6.00 E	5.00 E
EUGLENOPHYTE	0.43 E	0.30 E	0/12 ?
DIATOM	1.00 E	0.75 E	2.00 E
COMPOUND	12.0 E	16.0 E	14.0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 27 74	07 16 74	09 16 74
GENUS	13	01	02
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 27 74	07 16 74	09 16 74
AVERAGE DIVERSITY	H	3.02	3.00	1.07
NUMBER OF TAXA	S	21.00	28.00	18.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	2.00	2.00
MAXIMUM DIVERSITY	MAXH	4.39	4.81	4.17
MINUMUM DIVERSITY	MINH	0.30	0.08	0.02
TOTAL DIVERSITY	D	2222.72	12960.00	12154.13
TOTAL NUMBER OF INDIVIDUALS/ML	N	736.00	4320.00	11359.00
EVENESS COMPONENT	J	0.69	0.62	0.26
RELATIVE EVENESS	RJ	0.67	0.62	0.26
MEAN NUMBER OF INDIVIDUALS/TAXA	L	35.05	154.29	631.06
NUMBER/ML OF MOST ABUNDANT TAXON	K	163.00	1096.00	9542.00

LAKE NAME: WHITMAN LAKE CONTINUED
STORET NUMBER: 3835

TAXA	FORM	04 27 74 IS	04 27 74 %C	04 27 74 ALGAL UNITS PER ML	07 16 74 IS	07 16 74 %C	07 16 74 ALGAL UNITS PER ML	09 16 74 IS	09 16 74 %C	09 16 74 ALGAL UNITS PER ML
ACTINASTRUM	CEL									X
ACTINASTRUM GRACILIMUM	COL		5.6	41						
ANABAENA #1	FIL				1	23.3	1006			
ANABAENA #2	FIL							12	5.2	585
ANKISTRODESMUS FALCATUS V. MIRABILIS	CEL			X						
APHANIZOMENON FLOS-AQUAE	FIL			X	12	21.6	931	11	84.0	9542
CHLAMYDOMONAS GLOBOSA	CEL	12	22.1	163						
CHLOROPHYTAN FLAGELLATE	CEL					6.9	298			
CHROOMONAS ACUTA	CEL				15	12.1	522		1.5	176
CLOSTERIUM	CEL			X						X
COELASTRUM	COL					0.9	37			
COELOSPHAERIUM NAEGELIANUM	COL							13	1.0	117
CRYPTOMONAS	CEL				13	18.1	782			X
CRYPTOMONAS MARSSONII	CEL	13	16.6	122						
DACTYLOCOCCOPSIS FASCICULARIS	CEL								1.5	176
DICTYOSPHAERIUM PULCHELLUM	COL						X			X
DIPLOPSALIS ACUTA	CEL					0.9	37			
ENTOMONEIS	CEL			X						
ENTOMONEIS ALATA	CEL						X			
EUDORINA ELEGANS	CEL			X						
EUGLENA	CEL		5.6	41						
EUGLENA GRACILIS	CEL			X						
GLENODINIUM OCULATUM	CEL			X						
LEPOCINCLIS	CEL					0.9	37			
MALLOMONAS	CEL					0.9	37			
MELOSIRA GRANULATA	CEL	14	11.1	82			X			
MELOSIRA GRANULATA V. ANGUSTISSIMA	CEL						X			X
MERISMOPEDIA MINIMA	COL								0.5	59
MERISMOPEDIA TENUISSIMA	COL		5.6	41						
MICROCYSTIS AERUGINOSA	COL			X		0.9	37			
MICROCYSTIS INCERTA	COL					1.7	75	15	0.5	59
NAVICULA #1	CEL						X			
NAVICULA #2	CEL						X			
NITZSCHIA	CEL		11.1	82						
NITZSCHIA #1	CEL						X			
NITZSCHIA #2	CEL						X			
OOCYSTIS	CEL					0.9	37		3.6	410
OSCILLATORIA	FIL	15	11.1	82						
PANDORINA MORUM	COL			X						
PEDIASTRUM DUPLEX V. CLATHRATUM	CEL					0.9	37			
PHORMIDIUM MUCICOLA	COL								0.5	59
RHOICOSPHENIA CURVATA	CEL									X
SCHROEDERIA SETIGERA	CEL			X		4.5	186			X
STAURASTRUM TETRACERUM	CEL						X			
STEPHANODISCUS	CEL							14	1.5	176
STEPHANODISCUS ASTRAEA	CEL	1	11.1	82						
STEPHANODISCUS NIAGARAE	CEL						X			
SURIRELLA #9	CEL			X						
TETRAEDRON ?	CEL						X			
TETRASTRUM STAUROGENIAEFORME	COL									X
TRACHELOMONAS	CEL						X			
TRACHELOMONAS INTERMEDIA	CEL			X						
TRACHELOMONAS SPP.	CEL				14	6.0	261			
TRACHELOMONAS VOLVOCINA	CEL						X			
TOTAL				736			4320			11359

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(Please read Instructions on the reverse before completing)

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15. SUPPLEMENTARY NOTES

16. ABSTRACT

This is a data report presenting the species and abundance of phytoplankton in the 14 lakes sampled by the National Eutrophication Survey in the State of North Dakota. Results from the calculation of several water quality indices are also included (Nygaard's Trophic State Index, Palmer's Organic Pollution Index, and species diversity and abundance indices).

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
*aquatic microbiology lakes *phytoplankton water quality	North Dakota lake eutrophication Nygaard's trophic indices Palmer's organic pollution indices Species diversity and abundance indices	06 C, M 08 H 13 B

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