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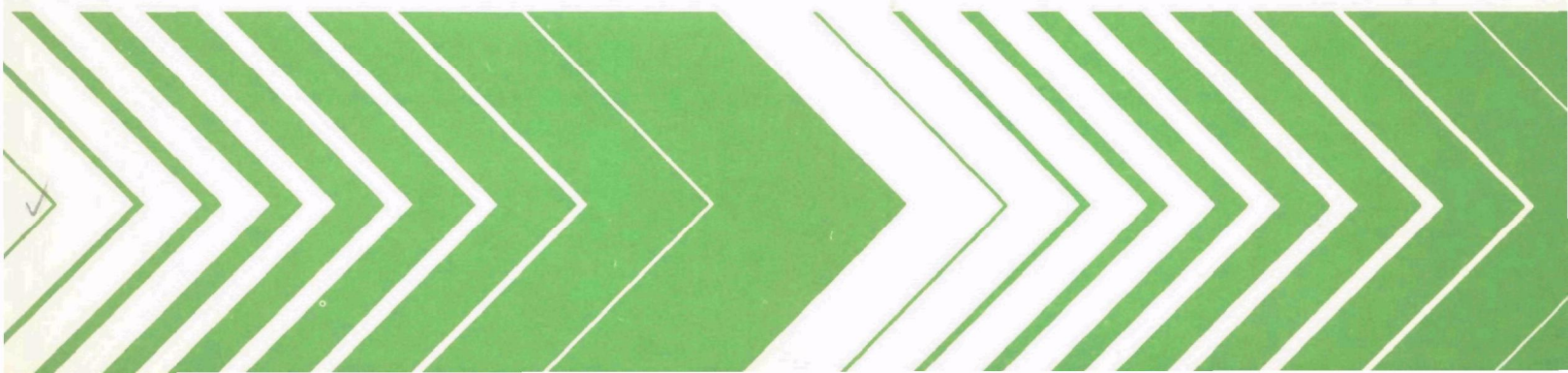
Distribution of Phytoplankton in Nevada Lakes



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DISTRIBUTION OF PHYTOPLANKTON IN NEVADA LAKES

by

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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 10 lakes sampled by the National Eutrophication Survey in the State of Nevada, 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

CONTENTS

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 1975, the Survey sampled 156 lakes in 11 States. Over 450 algal species and varieties were identified and enumerated from the 430 water samples examined.

This report presents the species and abundance of phytoplankton in the 10 lakes sampled in the State of Nevada (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 NEVADA

STORET No.	Lake Name	County
3201	Lake Mead	Clark (Mohave in Ariz.)
3202	Lahontan Reservoir	Lyon, Churchill
3204	Rye Patch Reservoir	Pershing
3205	Lake Tahoe	Washoe, Carson City, Douglas (Placer, El Dorado in Calif.)
3206	Topaz Reservoir	Douglas (Mono in Calif.)
3207	Upper Pahranagat Lake	Lincoln
3208	Washoe Lake	Washoe
3209	Wildhorse Reservoir	Elko
3210	Wilson Sink Reservoir	Elko
3211	Walker Lake	Mineral

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	$\frac{\text{Myxophyceae}}{\text{Desmideae}}$	0.0-0.4	0.1-3.0
Chlorophycean	$\frac{\text{Chlorococcales}}{\text{Desmideae}}$	0.0-0.7	0.2-9.0
Diatom	$\frac{\text{Centric Diatoms}}{\text{Pennate Diatoms}}$	0.0-0.3	0.0-1.75
Euglenophyte	$\frac{\text{Euglenophyta}}{\text{Myxophyceae + Chlorococcales}}$	0.0-0.2	0.0-1.0
Compound	$\frac{\text{Myxophyceae + Chlorococcales + Centric Diatoms + Euglenophyta}}{\text{Desmideae}}$	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 NEVADA

Actinastrum hantzschii
v. *fluviatile*
Anabaena
Ankistrodesmus falcatus
Ankistrodesmus falcatus
v. *mirabilis*
Aphanizomenon flos-aquae
Aphanothece
Asterionella formosa
Botryococcus braunii
Caloneis amphisbaena
Ceratium hirundinella
Ceratium hirundinella
f. *furcoides*
Chlamydomonas
Chroococcus
Closterium
Cocconeis pediculus
Cocconeis placentula
Coelastrum microporum
Coelastrum sphaericum
Cosmarium
Crucigenia quadrata
Crucigenia tetrapedia
Cryptomonas erosa
Crytomonas marssonii
Cyclotella meneghiniana
Cylindrotheca gracilis
Cylindrotheca spiralis
Cymatopleura solea
Cymbella affinis
Dactylococcopsis
Diatoma vulgare
Dictyosphaerium pulchellum
Dinobryon divergens
Entomoneis ornata
Epithemia turgida
Euglena acus
Eunotia pectinalis
v. *ventricosa*
Fragilaria brevistriata
Fragilaria brevistriata
v. *trigibba*
Fragilaria crotonensis
Glenodinium
Gloeocapsa
Gloeotrichia echinulata
Gomphonema olivaceum
Gomphonema truncatum
Gymnodinium ordinatum
Gyrosigma
Hantzschia amphioxys
Lyngbya
Melosira distans
Melosira granulata
Melosira granulata
v. *angustissima*
Melosira italica
Melosira varians
Merismopedia minima
Mesostigma viridis
Microcystis aeruginosa
Microcystis incerta
Mougeotia
Navicula exigua
Nitzschia filiformis
Nodularia
Oocystis
Opephora
Oscillatoria
Pandorina morum
Pediastrum boryanum
Pediastrum duplex
v. *reticulatum*
Phacus helikoides
Phormidium mucicola
Pinnularia
Quadrigula chodatii
Raphidiopsis curvata
Rhoicosphenia curvata
Rhopalodia gibba
Scenedesmus acuminatus
Scenedesmus dimorphus
Scenedesmus intermedius
v. *acaudatus*
Scenedesmus quadricauda
Schroederia setigera
Skeletonema potamos
Sphaerocystis schroeteri
Staurastrum
Stauroneis
Stephanodiscus
Surirella ovalis
Surirella ovata
Synedra ulna
Tabellaria fenestrata
Tetraedron minmum
Tetraedron minimum
v. *scrobiculatum*
Tetraedron muticum
Tetrastrum glabrum
Trachelomonas acanthostoma ?

Trachelomonas oblonga
v. *australica*
Trachelomonas volvocina

Trachelomonas volvocina
v. *punctata*

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.

LAKE NAME: LAKE MEAD
STORET NUMBER: 3201

NYGAARD TROPHIC STATE INDICES

DATE	02 24 75	06 11 75
MYXOPHYCEAN	01/0 E	0/01 O
CHLOROPHYCEAN	02/0 E	2,00 E
EUGLENOPHYTE	0/03 ?	0/02 ?
DIATOM	1,00 E	0,33 E
COMPOUND	04/0 E	3,00 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	02 24 75	06 11 75
GENUS	00	00
SPECIES	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		02 24 75	06 11 75
AVERAGE DIVERSITY	H	1,35	0,87
NUMBER OF TAXA	S	8,00	11,00
NUMBER OF SAMPLES COMPOSITED	M	14,00	14,00
MAXIMUM DIVERSITY	MAXH	3,00	3,46
MINIMUM DIVERSITY	MINH	0,12	0,56
TOTAL DIVERSITY	D	812,70	133,98
TOTAL NUMBER OF INDIVIDUALS/ML	N	602,00	154,00
EVENNESS COMPONENT	J	0,45	0,25
RELATIVE EVENNESS	RJ	0,43	0,11
MEAN NUMBER OF INDIVIDUALS/TAXA	L	75,25	14,00
NUMBER/ML OF MOST ABUNDANT TAXON	K	417,00	110,00

LAKE NAME: LAKE MEAD
STORET NUMBER: 3201

CONTINUED

TAXA	FORM	02 24 75 IS	02 24 75 %C	02 24 75 ALGAL UNITS PER ML	06 11 75 IS	06 11 75 %C	06 11 75 ALGAL UNITS PER ML
CENTRIC DIATOM	CEL			X			
CERATIUM HIRUNDINELLA	CEL						X
CHROOMONAS ?	CEL	13	15,4	93			
CHROOMONAS ? ACUTA	CEL	11	69,3	417	11	71,4	110
CRYPTOMONAS	CEL						X
CRYPTOMONAS EROSA	CEL	12	7,6	46			
DIATOMA VULGARE	CEL						X
DINOBRYON DIVERGENS	CEL						X
FRAGILARIA CROTONENSIS	CEL			X			X
MERISMOPEDIA MINIMA	COL			X			
OOCYSTIS	COL						X
RHOICOSPHENIA CURVATA	CEL				12	28,6	44
SCHROEDERIA SETIGERA	CEL			X			
SPHAEROCYSTIS SCHROETERI	COL						X
STAURASTRUM	CEL						X
STEPHANODISCUS	CEL						X
TETRAEDRON MUTICUM	CEL	14	7,6	46			
TOTAL				602			154

LAKE NAME: LAHONTAN RES.
STORET NUMBER: 3202

NYGAARD TROPHIC STATE INDICES

DATE	03 17 75	07 09 75	11 07 75
MYXOPHYCEAN	01/0 E	01/0 E	0/0 O
CHLOROPHYCEAN	0/0 O	01/0 E	01/0 E
EUGLENOPHYTE	2.00 E	0/02 ?	0/01 ?
DIATOM	0.33 E	1.00 E	0.40 E
COMPOUND	06/0 E	04/0 E	05/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	03 17 75	07 09 75	11 07 75
GENUS	07	01	07
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		03 17 75	07 09 75	11 07 75
AVERAGE DIVERSITY	H	2.25	1.13	2.93
NUMBER OF TAXA	S	20.00	8.00	17.00
NUMBER OF SAMPLES COMPOSITED	M	4.00	4.00	4.00
MAXIMUM DIVERSITY	MAXH	4.32	3.00	4.09
MINIMUM DIVERSITY	MINH	0.12	0.02	0.16
TOTAL DIVERSITY	D	4461.75	5209.30	3395.87
TOTAL NUMBER OF INDIVIDUALS/ML	N	1983.00	4610.00	1159.00
EVENNESS COMPONENT	J	0.52	0.38	0.72
RELATIVE EVENNESS	RJ	0.51	0.38	0.71
MEAN NUMBER OF INDIVIDUALS/TAXA	L	99.15	576.25	68.18
NUMBER/ML OF MOST ABUNDANT TAXON	K	684.00	3646.00	316.00

LAKE NAME: LAMONTAN RES.
STORET NUMBER: 3203

CONTINUED

TAXA	FORM	02 17 75			07 09 75			11 07 75		
		%S	%C	ALGAL UNITS PER ML	%S	%C	ALGAL UNITS PER ML	%S	%C	ALGAL UNITS PER ML
ANABAENA	FIL						X			
ASTERIONELLA FORMOSA	CEL		1.7	34	4	1.5	69			X
CENTRIC DIATOM	CEL	1	34.5	684					13.6	188
CHLAMYDOMONAS	CEL	3	0.4	171						
CHLOROPHYTAN LUNATE CELL	CEL			X						
CHROOMONAS ? ACUTA	CEL	4	15.5	308	3	9.0	413	2	13.6	188
COCCONEIS PLACENTULA	CEL			X						X
CRYPTOMONAS EROSA	CEL	5	1.7	34				4	4.6	83
CYLINDROTHECA GRACILIS	CEL									X
CYMBELLA	CEL									X
DACTYLOCOCCOPSIS	CEL		3.4	68						
DIATOMA VULGARE	CEL			X						
EUGLENA	CEL		1.7	34						
FRAGILARIA CROTONENSIS	CEL				11	79.1	3646			X
GLENODINIUM	CEL						X			
MELOSIRA #1	CEL			X						
MELOSIRA DISTANS	CEL							9	9.1	105
MELOSIRA GRANULATA	CEL				2	7.5	344			
MELOSIRA GRANULATA V. ANGUSTISSIMA	CEL				1	1.5	69			
MELOSIRA VARIANS	CEL			X						
NAVICULA	CEL								13.6	158
NITZSCHIA #1	CEL			X						
NITZSCHIA #2	CEL			X						
NITZSCHIA #3	CEL							1	27.3	316
NITZSCHIA SPP.	CEL	2	12.8	650						
RHOICOSPHENIA CURVATA	CEL			X						X
SCHROEDERIA SETIGERA	CEL				1	1.5	69			
SKELETONEMA POTAMOS	CEL								9.1	105
STEPHANODISCUS	CEL									X
SURIRELLA OVATA	CEL			X					4.6	83
SYNEDRA ULNA	CEL			X						
TABELLARIA FENESTRATA	CEL			X				3	4.6	83
TETRAEDRON MINIMUM	CEL									X
TRACHELOMONAS	CEL			X						
TOTAL				1983			4610			1159

LAKE NAME: RYE PATCH RES.
STORET NUMBER: 3204

NYGAARD TROPHIC STATE INDICES

DATE	06 01 75	07 11 75	11 07 75
MYXOPHYCEAN	01/0 E	1.00 E	01/0 E
CHLOROPHYCEAN	0/0 O	1.00 E	04/0 E
EUGLENOPHYTE	1.00 E	0.50 E	0.20 ?
DIATOM	0.50 E	0.50 E	0.67 E
COMPOUND	04/0 E	4.00 E	08/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	06 01 75	07 11 75	11 07 75
GENUS	00	00	05
SPECIES	00	00	03

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		06 01 75	07 11 75	11 07 75
AVERAGE DIVERSITY	H	0.02	1.01	2.35
NUMBER OF TAXA	S	8.00	8.00	15.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	5.00	9.00
MAXIMUM DIVERSITY	MAXH	3.00	3.00	3.91
MINIMUM DIVERSITY	MINH	1.41	0.76	0.07
TOTAL DIVERSITY	D	0.60	68.68	6457.80
TOTAL NUMBER OF INDIVIDUALS/ML	N	30.00	68.00	2748.00
EVENNESS COMPONENT	J	0.01	0.34	0.60
RELATIVE EVENNESS	RJ	-0.87	0.12	0.60
MEAN NUMBER OF INDIVIDUALS/TAXA	L	3.75	8.50	183.20
NUMBER/ML OF MOST ABUNDANT TAXON	K	30.00	34.00	889.00

LAKE NAME: RYE PATCH RES, CONTINUED
STORET NUMBER: 3204

TAXA	FORM	06 01 76 IS	06 01 76 %C	06 01 76 ALGAL UNITS PER ML	07 11 76 IS	07 11 76 %C	07 11 76 ALGAL UNITS PER ML	11 07 76 IS	11 07 76 %C	11 07 76 ALGAL UNITS PER ML
ANABAENA	FIL			X			X			
CENTRIC DIATOM	CEL	1	100.0	30						
CHLAMYDOMONAS	CEL							14	20.6	566
CHROOMONAS ? ACUTA	CEL							11	32.4	889
CLOSTERIUM	CEL						X			
CRYPTOMONAS EROSA	CEL				11	80.0	34	1	2.9	81
CYANOPHYTAN FILAMENT	FIL									X
CYCLOTELLA	CEL									X
CYMATOPLEURA	CEL			X						
CYMBELLA	CEL			X						
EUGLENA	CEL			X						
GOMPHONEMA	CEL			X						
GYROSIGMA	CEL						X			
MELOSIRA GRANULATA	CEL			X			X			X
NAVICULA	CEL									X
NITZSCHIA	CEL				2	80.0	34			
OOCYSTIS	COL							16	8.8	242
PANDORINA MORUM	COL							3	5.9	162
PENNATE DIATOM	CEL									X
PHACUS	CEL						X			
RHOPALODIA GIBBA	CEL			X						
SCENEDESMUS QUADRICAUDA	COL									X
SCHROEDERIA SETIGERA	CEL							2	26.5	727
SPHAEROCYSTIS SCHROETERI	COL						X			
SURIRELLA OVATA	CEL							1	2.9	81
TETRASTRUM GLABRUM	COL									X
TRACHELOMONAS ACANTHOSTOMA ?	CEL									X
TOTAL				30			68			2748

LAKE NAME: LAKE TAHOE
STORET NUMBER: 3205

NYGAARD TROPHIC STATE INDICES

DATE	03 18 75	07 02 75	11 04 75
MYXOPHYCEAN	0/01 O	0/01 O	0/01 O
CHLOROPHYCEAN	0/01 O	0/01 O	0/01 O
EUGLENOPHYTE	0/0 ?	01/0 E	0/0 ?
DIATOM	2,00 E	1,00 E	0,50 E
COMPOUND	2,00 E	2,00 E	1,00 O

PALMER'S ORGANIC POLLUTION INDICES

DATE	03 18 75	07 02 75	11 04 75
GENUS	00	03	00
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		03 18 75	07 02 75	11 04 75
AVERAGE DIVERSITY	H	1,00	0,00	1,58
NUMBER OF TAXA	S	5,00	4,00	5,00
NUMBER OF SAMPLES COMPOSITED	M	10,00	8,00	10,00
MAXIMUM DIVERSITY	MAXH	2,32	2,00	2,32
MINIMUM DIVERSITY	MINH	0,43	0,10	1,75
TOTAL DIVERSITY	D	70,00	0,00	12,64
TOTAL NUMBER OF INDIVIDUALS/ML	N	70,00	302,00	8,00
EVENNESS COMPONENT	J	0,43	0,00	0,68
RELATIVE EVENNESS	RJ	0,31	-0,05	-0,29
MEAN NUMBER OF INDIVIDUALS/TAXA	L	14,00	75,50	1,60
NUMBER/ML OF MOST ABUNDANT TAXON	K	35,00	302,00	3,00

LAKE NAME: LAKE TAHOE
STORET NUMBER: 3205

CONTINUED

TAXA	FORM	03 18 75 IS	03 18 75 %C	03 18 75 ALGAL UNITS PER ML	07 02 75 IS	07 02 75 %C	07 02 75 ALGAL UNITS PER ML	11 04 75 IS	11 04 75 %C	11 04 75 ALGAL UNITS PER ML
CENTRIC DIATOM	CEL								37,5	3
CHROOMONAS 7 ACUTA	CEL			X						
COSMARIUM	CEL			X			X			X
CYMBELLA	CEL								37,5	3
GYMNODINIUM OBDINATUM	CEL								25,0	2
MELOSIRA ITALICA	CEL			X						
NITZSCHIA	CEL	1	50,0	35	1	100,0	302			
STEPHANODISCUS	CEL	1	50,0	35			X			
SYNEDRA ULNA	CEL									X
TRACHELOMONAS	CEL						X			
TOTAL				70			302			8

LAKE NAME: TOPAZ RES.
STORET NUMBER: 3206

NYGAARD TROPHIC STATE INDICES

DATE	03 19 75	06 30 75	11 05 75
MYXOPHYCEAN	0/01 O	04/0 E	2.00 E
CHLOROPHYCEAN	2.00 E	02/0 E	2.00 E
EUGLENOPHYTE	0/02 ?	0/06 ?	0/04 ?
DIATOM	1.00 E	0.40 E	2.00 E
COMPOUND	5.00 E	08/0 E	6.00 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	03 19 75	06 30 75	11 05 75
GENUS	01	06	01
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		03 19 75	06 30 75	11 05 75
AVERAGE DIVERSITY	H	2.44	1.29	2.29
NUMBER OF TAXA	S	11.00	17.00	11.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	2.00	2.00
MAXIMUM DIVERSITY	MAXH	3.46	4.09	3.46
MINIMUM DIVERSITY	MINH	0.15	0.02	0.19
TOTAL DIVERSITY	D	1742.16	16829.34	1284.69
TOTAL NUMBER OF INDIVIDUALS/ML	N	714.00	13046.00	561.00
EVENNESS COMPONENT	J	0.71	0.32	0.66
RELATIVE EVENNESS	RJ	0.70	0.32	0.65
MEAN NUMBER OF INDIVIDUALS/TAXA	L	64.91	767.41	51.00
NUMBER/ML OF MOST ABUNDANT TAXON	K	198.00	9825.00	224.00

LAKE NAME: TOPAZ RES.
STORET NUMBER: 3206

CONTINUED

TAXA	FORM	03 19 75			06 30 75			11 05 75		
		IB	%C	ALGAL UNITS PER ML	IB	%C	ALGAL UNITS PER ML	IB	%C	ALGAL UNITS PER ML
ANABAENA	FIL						X			X
APHANIZOMENON FLOS-AQUAE	FIL				13	8.2	01075	15	3.4	19
ASTERIONELLA FORMOSA	CEL			X	13	9.1	01191			
CENTRIC DIATOM #1	CEL	15	27.7	198						
CERATIUM HIRUNDINELLA	CEL									X
CHROOMONAS ? ACUTA	CEL		11.1	79	15	5.0	00655		3.4	19
COCCONEIS	CEL			X						
CRYPTOMONAS	CEL	14	5.6	40	15	0.2	30	12	39.9	224
CRYPTOMONAS EROSA	CEL						X			
CRYPTOMONAS MARSSONII	CEL						X			
DIATOMA VULGARE	CEL						X			
DICTYOSPHAERIUM PULCHELLUM	COL	1	16.7	119						
EPITHEMIA	CEL						X			
FRAGILARIA CROTONENSIS	CEL	12	22.3	159	11	75.3	09925	13	20.0	112
MELOSIRA	CEL	13	16.7	119	14	1.2	160	1	10.0	56
OOCYSTIS	COL						X			
OSCILLATORIA	FIL					0.8	00110			
PHORMIDIUM MUCICOLA	FIL						X			
SCHROEDERIA SETIGERA	CEL			X						X
SPHAEROCYSTIS SCHROETERI	COL						X			X
STAURASTRUM	CEL			X				1	20.0	112
STEPHANODISCUS	CEL			X			X	14	3.4	19
SURIRELLA OVATA	CEL						X			
TOTAL				714			13046			861

LAKE NAME: UPPER PAHRANAGAT LAKE
STORET NUMBER: 3207

NYGAARD TROPHIC STATE INDICES

DATE	05 06 75	08 21 75	11 21 75
MYXOPHYCEAN	0/0 D	03/0 E	2.00 E
CHLOROPHYCEAN	04/0 E	13/0 E	3.00 E
EUGLENOPHYTE	0.25 E	0.25 E	0.40 E
DIATOM	0/03 ?	0.14 ?	0.12 ?
COMPOUND	05/0 E	22/0 E	9.00 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	05 06 75	08 21 75	11 21 75
GENUS	02	15	12
SPECIES	03	05	02

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		05 06 75	08 21 75	11 21 75
AVERAGE DIVERSITY	H	2.13	0.74	2.85
NUMBER OF TAXA	S	11.00	39.00	28.00
NUMBER OF SAMPLES COMPOSITED	M	3.00	2.00	2.00
MAXIMUM DIVERSITY	MAXH	3.46	5.29	4.81
MINIMUM DIVERSITY	MINH	0.12	0.02	0.13
TOTAL DIVERSITY	D	2017.11	30936.44	7623.75
TOTAL NUMBER OF INDIVIDUALS/ML	N	947.00	41806.00	2675.00
EVENNESS COMPONENT	J	0.62	0.14	0.59
RELATIVE EVENNESS	RJ	0.61	0.14	0.59
MEAN NUMBER OF INDIVIDUALS/TAXA	L	86.09	1071.95	95.54
NUMBER/ML OF MOST ABUNDANT TAXON	K	425.00	37834.00	899.00

LAKE NAME: UPPER PAHRANAGAT LAKE CONTINUED
STORET NUMBER: 3207

TAXA	FORM	05 06 75			08 21 75			11 21 75		
		IB	%C	ALGAL UNITS PER ML	IB	%C	ALGAL UNITS PER ML	IB	%C	ALGAL UNITS PER ML
ACTINASTRUM HANTZSCHII V. FLUVIATILE	COL					0,2	63			
ANKISTRODESMUS FALCATUS	CEL	5	6,9	65						
ANKISTRODESMUS FALCATUS V. MIRABILIS	CEL					0,9	378			
BOTRYOCOCCUS BRAUNII	COL						X			
CALONEIS AMPHISBAENA	CEL						X		0,9	23
CERATIUM HIRUNDINELLA	CEL						X			
CERATIUM HIRUNDINELLA F. FURCOIDES	CEL						X			
CHROOMONAS ? ACUTA	CEL	2	44,9	425				9	9,5	254
COCCONEIS	CEL						X			
COSMARIUM	CEL									X
CRUCIGENIA QUADRATA	COL					0,6	252			
CRUCIGENIA TETRAPEDIA	COL						X			
CRYPTOMONAS	CEL					0,2	63			
CRYPTOMONAS EROSA	CEL			X						
CRYPTOMONAS MARSSONII	CEL	11	17,2	163						
CYCLOTELLA MENEGHINIANA	CEL				14	2,1	883	5	5,2	138
CYLINDROTHECA GRACILIS	CEL							2	8,6	231
CYMATOPLEURA #1	CEL						X			
CYMATOPLEURA SOLEA	CEL						X			X
CYMBELLA	CEL									X
CYMBELLA SPP.	CEL						X			
DACTYLOCOCCOPSIS	CEL							1	1,7	46
EPITHEMIA	CEL						X			
EUGLENA	CEL				13	2,3	946			X
GYROSIGMA	CEL						X			X
MELOSIRA VARIANS	CEL						X		0,9	23
MERISMOPEDIA MINIMA	COL				11	90,5	37834			
MESOSTIGMA VIRIDIS	CEL						X		0,9	23
MICROCYSTIS AERUGINOSA	COL						X			
MICROCYSTIS INCERTA	COL					0,2	63			
NAVICULA #1	CEL									X
NAVICULA #2	CEL							3	23,3	623
NITZSCHIA	CEL									X
NITZSCHIA SPP.	CEL							4	8,6	231
OOCYSTIS	CEL					0,6	252			
OSCILLATORIA	FIL								2,6	69
PEDIASTRUM BORYANUM	COL						X			X
PEDIASTRUM DUPLEX V. RETICULATUM	COL								0,9	23
PENNATE DIATOMS	CEL				5	1,4	568	11	33,6	899
PHACUS HELIKOIDES	CEL				2	0,6	252			
PINNULARIA #1	CEL									X
PINNULARIA #2	CEL						X			
QUADRIGULA CHODATII	CEL	4	6,9	65						
RHOICOSPHENIA CURVATA	CEL						X			
RHOPALODIA GIBBA	CEL			X			X			X
SCENEDESMUS ACUMINATUS	COL									X
SCENEDESMUS DIMORPHUS	COL						X			
SCENEDESMUS INTERMEDIUS V. ACAUDATUS	COL					0,6	252			
SCENEDESMUS QUADRICAUDA	COL						X			
SCHROEDERIA SETIGERA	CEL	13	20,7	196			X			
APHAEROCYSTIS SCHROETERI	COL		3,5	33						
SURIRELLA	CEL			X						
SURIRELLA OVALIS	CEL									X
SURIRELLA OVATA	CEL						X	5	1,7	46
SYNEDRA	CEL									X
SYNEDRA ULNA	CEL			X			X		1,7	46
TETRAEDRON MINIMUM V. SCROBICULATUM	CEL						X			
TETRASTRUM GLABRUM	COL						X			
TRACHELOMONAS	CEL						X			
TRACHELOMONAS OBLONGA V. AUSTRALICA	CEL			X						
TRACHELOMONAS VOLVOCINA	CEL						X			X
TOTAL				947			41806			2675

LAKE NAME: WASHOE LAKE
STORET NUMBER: 3208

NYGAARD TROPHIC STATE INDICES

DATE	03 17 75	06 27 75	11 11 75
MYXOPHYCEAN	1,00 E	02/0 E	0/0 O
CHLOROPHYCEAN	2,00 E	01/0 E	01/0 E
EUGLENOPHYTE	0,67 E	0,67 E	0/01 ?
DIATOM	0,23 ?	0,18 ?	0,50 E
COMPOUND	8,00 E	07/0 E	06/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	03 17 75	06 27 75	11 11 75
GENUS	01	07	01
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		03 17 75	06 27 75	11 11 75
AVERAGE DIVERSITY	H	1,89	2,59	2,39
NUMBER OF TAXA	S	25,00	19,00	16,00
NUMBER OF SAMPLES COMPOSITED	M	3,00	3,00	3,00
MAXIMUM DIVERSITY	MAXH	4,64	4,25	4,00
MINIMUM DIVERSITY	MINH	0,30	0,13	0,11
TOTAL DIVERSITY	D	1716,12	4330,48	4029,54
TOTAL NUMBER OF INDIVIDUALS/ML	N	908,00	1672,00	1686,00
EVENNESS COMPONENT	J	0,41	0,61	0,60
RELATIVE EVENNESS	RJ	0,37	0,60	0,59
MEAN NUMBER OF INDIVIDUALS/TAXA	L	36,32	88,00	105,38
NUMBER/ML OF MOST ABUNDANT TAXON	K	474,00	859,00	881,00

LAKE NAME: WASHOE LAKE
STORET NUMBER: 3208

CONTINUED

TAXA	FORM	03 17 75 BS	03 17 75 %C	03 17 75 ALGAL UNITS PER ML	06 27 75 BS	06 27 75 %C	06 27 75 ALGAL UNITS PER ML	11 11 75 BS	11 11 75 %C	11 11 75 ALGAL UNITS PER ML
CHROOMONAS ? ACUTA	CEL	51	8,7	79						
CLOSTERIUM	CEL			X						
COCCONEIS	CEL							1	4,6	77
COCCONEIS PLACENTULA	CEL				1	2,7	45			
COELASTRUM SPHAERICUM	COL									X
CRYPTOMONAS EROSA	CEL	14	8,7	79	5	8,1	136			
CYCLOTELLA	CEL									X
CYMATOPLEURA	CEL			X						
CYMBELLA	CEL			X						X
DACTYLOCOCCOPSIS	CEL			X						
ENTOMONEIS ORNATA	CEL			X						
EPITHEMIA	CEL							12	6,8	115
EPITHEMIA #1	CEL			X						
EPITHEMIA #2	CEL				1	2,7	45			
EUGLENA ACUS	CEL				2	8,1	136			
EUNOTIA	CEL									X
FRAGILARIA	CEL				1	5,4	90	1	6,8	115
GLOEOCAPSA	COL				1	2,7	45			
GOMPHONEMA	CEL									X
GOMPHONEMA #1	CEL			X						
GOMPHONEMA #2	CEL						X			
GOMPHONEMA TRUNCATUM	CEL			X						
HANTZSCHIA	CEL								2,3	38
HANTZSCHIA AMPHIOXIS	CEL			X						
MELOSIRA GRANULATA	CEL	12	21,7	197			X	11	52,3	881
MELOSIRA GRANULATA V. ANGUSTISSIMA	CEL	11	52,2	474	11	51,4	859	1	13,6	230
MELOSIRA ITALICA	CEL							13	4,6	77
MELOSIRA VARIANS	CEL			X						
MICROCYSTIS INCERTA	COL				1	2,7	45			
NAVICULA #1	CEL			X						
NAVICULA #2	CEL						X			
NITZSCHIA FILIFORMIS	CEL									X
OOCYSTIS	COL			X						
PHACUS	CEL			X						
PINNULARIA	CEL			X	1	2,7	45			
RHOICOSPHENIA CURVATA	CEL						X			
RHOPALODIA GIBBA	CEL	13	8,7	79	13	8,1	136			
SCHROEDERIA SETIGERA	CEL			X			X			
STAURONEIS	CEL							15	4,6	77
STEPHANODISCUS	CEL							1	2,3	38
SURIRELLA	CEL							14	2,3	38
SURIRELLA #1	CEL			X						
SURIRELLA OVATA	CEL			X	1	2,7	45			
SYNEDRA ULNA	CEL			X	1	2,7	45			
TABELLARIA FENESTRATA	CEL			X						
TRACHELOMONAS OBLONGA V. AUSTRALICA	CEL			X						
TRACHELOMONAS VOLVOCINA	CEL						X			
TOTAL				908			1672			1686

LAKE NAME: WILDHORSE RES,
STORET NUMBER: 3209

NYGAARD TROPHIC STATE INDICES

DATE	05 30 75	08 01 75	11 06 75
MYXOPHYCEAN	03/0 E	04/0 E	02/0 E
CHLOROPHYCEAN	01/0 E	0/0 O	01/0 E
EUGLENOPHYTE	0,50 E	0/04 ?	0,33 E
DIATOM	0,14 ?	0,11 ?	0/02 ?
COMPOUND	07/0 E	05/0 E	04/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	05 30 75	08 01 75	11 06 75
GENUS	04	01	00
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		05 30 75	08 01 75	11 06 75
AVERAGE DIVERSITY	H	0,60	2,55	1,45
NUMBER OF TAXA	S	16,00	15,00	7,00
NUMBER OF SAMPLES COMPOSITED	M	5,00	1,00	5,00
MAXIMUM DIVERSITY	MAXH	4,00	3,91	2,81
MINIMUM DIVERSITY	MINH	0,02	0,10	0,20
TOTAL DIVERSITY	D	5883,00	4365,60	427,75
TOTAL NUMBER OF INDIVIDUALS/ML	N	9805,00	1712,00	295,00
EVENNESS COMPONENT	J	0,15	0,65	0,52
RELATIVE EVENNESS	RJ	0,15	0,65	0,48
MEAN NUMBER OF INDIVIDUALS/TAXA	L	612,81	114,13	42,14
NUMBER/ML OF MOST ABUNDANT TAXON	K	8958,00	541,00	196,00

LAKE NAME: WILDHORSE RES.
STORET NUMBER: 3209

CONTINUED

TAXA	FORM	05 30 75 IS	05 30 75 %C	05 30 75 ALGAL UNITS PER ML	08 01 75 IS	08 01 75 %C	08 01 75 ALGAL UNITS PER ML	11 06 75 IS	11 06 75 %C	11 06 75 ALGAL UNITS PER ML
APHANIZOMENON FLOS-AQUAE	FIL				2	15,9	270	1	11,2	33
APHANOTHECE	COL				3	5,3	90			
CENTRIC DIATOM	CEL	1	91,4	8958						
CHROOMONAS ? ACUTA	CEL							2	66,4	196
COCCONEIS PEDICULUS	CEL				5	5,3	90			
COELOSPHAERIUM ?	COL									X
CRYPTOMONAS	CEL				1	2,6	45			
CRYPTOMONAS EROSA	CEL	3	1,2	121						
CYMATOPLEURA	CEL				1		X			
CYMBELLA	CEL				1	2,6	45			
EPITHEMIA TURGIDA	CEL						X			
EUGLENA ACUS	CEL			X						
EUNOTIA PECTINALIS V. VENTRICOSA	CEL			X						
FLAGELLATE	CEL			X						
FRAGILARIA	CEL									X
FRAGILARIA BREVISTRIATA	CEL				14	29,0	496			
FRAGILARIA BREVISTRIATA V. TRIGIBBA	CEL	2	4,5	444						
GLOEOTRICHIA ECHINULATA	COL				1	31,6	541			
GOMPHONEMA	CEL			X						
GOMPHONEMA OLIVACEUM	CEL						X			
LYNGBYA	FIL	4	0,8	81						
MELOSIRA VARIANS	CEL	1					X			
NAVICULA EXIGUA	CEL						X			
NITZSCHIA	CEL		0,4	40						
NITZSCHIA FILIFORMIS	CEL		0,4	40		2,6	45			
PHORMIDIUM	FIL	5	1,2	121			X			
RAPHIDIOPSIS CURVATA	FIL			X						
RHOICOSPHENIA CURVATA	CEL			X		5,3	90			
SCHROEDERIA SETIGERA	CEL			X				4	11,2	33
SYNEDRA	CEL									X
SYNEDRA ULNA	CEL			X						
TRACHELOMONAS	CEL							3	11,2	33
TRACHELOMONAS VOLVOCINA V. PUNCTATA	CEL			X						
TOTAL				9805			1712			295

LAKE NAME: WILSON SINK RES.
STORET NUMBER: 3210

NYGAARD TROPHIC STATE INDICES

DATE	05 31 75	08 01 75	11 06 75
MYXOPHYCEAN	01/0 E	01/0 E	1.00 E
CHLOROPHYCEAN	0/0 O	03/0 E	0.33 ?
EUGLENOPHYTE	1.00 E	0/04 ?	0.25 E
DIATOM	0/06 ?	0/0 ?	0/07 ?
COMPOUND	02/0 E	04/0 E	1.67 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	05 31 75	08 01 75	11 06 75
GENUS	05	00	05
SPECIES	03	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		05 31 75	08 01 75	11 06 75
AVERAGE DIVERSITY	H	1.47	1.66	2.57
NUMBER OF TAXA	S	10.00	7.00	19.00
NUMBER OF SAMPLES COMPOSITED	M	1.00	1.00	3.00
MAXIMUM DIVERSITY	MAXH	3.32	2.81	4.25
MINIMUM DIVERSITY	MINH	0.05	0.16	0.14
TOTAL DIVERSITY	D	3739.68	627.48	4055.46
TOTAL NUMBER OF INDIVIDUALS/ML	N	2544.00	378.00	1578.00
EVENNESS COMPONENT	J	0.44	0.59	0.60
RELATIVE EVENNESS	RJ	0.44	0.57	0.60
MEAN NUMBER OF INDIVIDUALS/TAXA	L	254.40	54.00	83.05
NUMBER/ML OF MOST ABUNDANT TAXON	K	1609.00	210.00	446.00

LAKE NAME: WILSON SINK RES. CONTINUED
STORET NUMBER: 3210

TAXA	FORM	05 31 75 LB	05 31 75 %C	05 31 75 ALGAL UNITS PER ML	08 01 75 LB	08 01 75 %C	08 01 75 ALGAL UNITS PER ML	11 06 75 LB	11 06 75 %C	11 06 75 ALGAL UNITS PER ML
ANABAENA	FIL						X			X
APHANIZOMENON FLOS-AQUAE	FIL							11	8,7	137
CERATIUM HIRUNDINELLA	CEL						X			
CHROOMONAS ? ACUTA	CEL	12	24,5	623				4	21,7	343
CLOSTERIUM	CEL									X
COCCONEIS PLACENTULA	CEL							5	6,5	103
COELASTRUM MICROPORUM	COL									X
COSMARIUM	CEL								2,2	34
CRYPTOMONAS EROSA	CEL	11	63,2	1609						X
CRYPTOMONAS MARSSONII	CEL									X
CYMBELLA	CEL									X
CYMBELLA AFFINIS	CEL			X						
EPITHEMIA	CEL								4,4	69
EUGLENA	CEL			X						X
FLAGELLATES	CEL				12	55,6	210			
FRAGILARIA	CEL							2	23,9	377
GOMPHONEMA OLIVACEUM	CEL			X						
GYMNODINIUM	CEL				11	22,2	84			
MOUGEOTIA	FIL									X
NITZSCHIA #1	CEL	5	4,1	104						
NITZSCHIA #2	CEL	4	6,1	156						
OPEPHORA	CEL			X						
OSCILLATORIA	FIL			X					4,4	69
PENNATE DIATOM	CEL							3	28,3	446
RHOPALODIA GIBBA	CEL									X
SCENEDESMUS	COL				4	11,1	42			
SCHROEDERIA SETIGERA	CEL						X			
STAURASTRUM	CEL									X
SYNEDRA ULNA	CEL	3	2,0	52						X
TETRALDRON MINIMUM V. SCROBICULATUM	CEL				3	11,1	42			
TOTAL				2544			378			1578

LAKE NAME: WALKER LAKE
STORET NUMBER: 3211

NYGAARD TROPHIC STATE INDICES

DATE	03 17 75	07 11 75	11 06 75
MYXOPHYCEAN	0/0 O	02/0 E	0/01 O
CHLOROPHYCEAN	01/0 E	0/0 O	0/01 O
EUGLENOPHYTE	0/01 ?	0/02 ?	0/0 ?
DIATOM	0/01 ?	0/0 ?	0/01 ?
COMPOUND	01/0 E	02/0 E	0/01 O

PALMER'S ORGANIC POLLUTION INDICES

DATE	03 17 75	07 11 75	11 06 75
GENUS	00	00	00
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		03 17 75	07 11 75	11 06 75
AVERAGE DIVERSITY	H	1.34	0.01	0.03
NUMBER OF TAXA	S	3.00	2.00	2.00
NUMBER OF SAMPLES COMPOSITED	M	3.00	3.00	3.00
MAXIMUM DIVERSITY	MAXH	1.58	1.00	1.00
MINIMUM DIVERSITY	MINH	0.29	0.44	0.53
TOTAL DIVERSITY	D	64.32	0.10	0.09
TOTAL NUMBER OF INDIVIDUALS/ML	N	48.00	10.00	3.00
EVENNESS COMPONENT	J	0.85	0.01	0.03
RELATIVE EVENNESS	RJ	0.82	-0.76	-1.06
MEAN NUMBER OF INDIVIDUALS/TAXA	L	16.00	5.00	1.50
NUMBER/ML OF MOST ABUNDANT TAXON	K	27.00	10.00	3.00

LAKE NAME: WALKER LAKE
STORET NUMBER: 3211

CONTINUED

TAXA	FORM	03 17 75 IS	03 17 75 %C	03 17 75 ALGAL UNITS PER ML	07 11 75 IS	07 11 75 %C	07 11 75 ALGAL UNITS PER ML	11 04 75 IS	11 04 75 %C	11 04 75 ALGAL UNITS PER ML
CHROOCOCCUS	COL					100.	10			
CHROOMONAS ?	CEL		33.3	16						
NAVICULA	CEL								100.	3
NODULARIA	FIL						X			
PENNATE DIATOM	CEL		66.2	27						
STAURASTRUM	CEL									X
TETRAEDRON MINIMUM	CEL		10.4	5						
TOTAL				48			10			3

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-600/3-79-117		

4. TITLE AND SUBTITLE	5. REPORT DATE
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7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
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15. SUPPLEMENTARY NOTES

16. ABSTRACT

This is a data report presenting the species and abundance of phytoplankton in the 10 lakes sampled by the National Eutrophication Survey in the State of Nevada. 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	Nevada lake eutrophication Nygaard's trophic indices Palmer's organic pollution indices Species diversity and abundance	06 C, M 08 H 13 B

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