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Distribution of Algae in Eastern South Dakota Wetlands

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DISTRIBUTION OF ALGAE IN EASTERN SOUTH DAKOTA WETLANDS

by

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This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable as meeting the thesis requirements for this degree but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Advisor Date

Head, Biology Department Date

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES (continued)

Table | Page

LIST OF FIGURES

APPENDICES

Appendix — Page

ABSTRACT

One hundred and forty algal samples were collected from 52 wetlands in eastern South Dakota to address the following objectives:

1) to inventory the algae occurring in eastern South Dakota wetlands.

2) to classify algal samples into wetland habitat types according to the wetland classification system of Cowardin et al. (1979).

3) to statistically determine if the composition of algal populations differed significantly among different habitat types.

4) to statistically determine if the taxa of algae obtained within the same habitat type differed according to differences in pH, conductivity, alkalinity and sampling method.

5) to determine the percent frequency of occurrence of algae in palustrine, lacustrine, and riverine habitats, and in all locations combined.

Four hundred and twenty-six taxa of algae were identified in this study. Two hundred (46.9%) of the total were not previously reported from this region. Algae of the phyla Chlorophyta, Chrysophyta and Cyanophyta were most abundant. Algae are listed according to habitat type, location, water chemistry ranges, and sampling methods to aid wetland biologists.

Each algal sample was classified into one of the 21 different wetland habitat types as defined by Cowardin et al. (1979). Seven of the 21 habitat types could be compared statistically. All but one of

the habitat type comparisons were significantly different from each other in terms of the algae present. This suggests that the wetland classification system by Cowardin et al. (1979) has implications for algal populations.

Selected water chemistry ranges and sampling methods were compared statistically within three habitat types to determine if the taxa of algae sampled within the same habitat type differed according to different water chemistry ranges and sampling methods. The taxa of algae were significantly different from each other in terms of conductivity and pH ranges, but not alkalinity ranges. Different sampling methods compared within a specific habitat type also resulted in significantly different algae collected.

The most common taxa as identified by percent frequency of occurrence, were not restricted to either lacustrine, palustrine, or riverine systems, but were found in all three. All taxa restricted to a given system had low percent frequency, even within the habitat type to which they were restricted.

INTRODUCTION

Few bodies of water or moist spots on the face of the earth are devoid of algae; they are distributed almost as widely as bacteria (Prescott 1970). Fuller and Tippo (1954) estimated that there are 1,500 genera and 17,400 species of algae.

Algae are important, having both beneficial and detrimental characteristics. Algae are part of the base of the food chain in aquatic ecosystems and through photosynthesis provide dissolved oxygen necessary for life. Algae are also indicators of water quality and can be used to monitor the trophic state or condition of lakes (Taylor 1979). Bluegreen algae form nuisance blooms when nutrients are plentiful, reducing water transparency, thus making lakes unappealing for recreational activities. Decomposition of these dense algal blooms causes a reduction in dissolved oxygen under ice and this can lead to winter fish kills.

Wetlands are lands where the water table is usually at or near the surface, or the land is covered by water (Cowardin et al. 1979). Wetland sampling sites for this study have one or more of the following attributes: 1) at least periodically the land supports predominately hydrophytes; 2) the substrate is predominately undrained hydric soil; 3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year (Cowardin et al. 1979). Although literature exists for algal distribution in lacustrine wetlands (prairie lakes, reservoirs), little research has been done on distribution and habitat preference/selection

of algae in riverine wetlands (creeks, rivers, springs) and palustrine wetlands (marshes, sloughs, ponds, fens). In this study, all sampling locations including permanent lakes and rivers were considered wetlands. The lack of information on algae in palustrine and riverine wetlands led to the initiation of this study.

In order to use algae as a water quality monitoring tool, it is necessary to identify them and have information on their distribution and habitat requirements (Taylor 1979). This study was conducted in order to simplify the work of wetland ecologists by providing listings of frequently encountered algae in the wetlands they are managing.

The objectives of this study were to:

1) Inventory the algae occurring in eastern South Dakota wetlands.
2) Classify each sample of algae collected into a wetland habitat type according to the wetland classification system by Cowardin et al. (1979).
3) Statistically determine if the taxonomic composition of algal populations differed significantly among different habitat types using the Chi-Square Test.
4) Statistically determine if the taxa of algae sampled within the same habitat type differed according to differences in pH, conductivity, alkalinity and sampling methods, using the Chi-Square Test.
5) Determine percent frequency of occurrence of algae by:
   a) locations sampled more than once pooled (n=52), and separated (n=60)

b) lacustrine habitat samples combined (n=84)

c) palustrine habitat samples combined (n=29)

d) riverine habitat samples combined (n=27)

6) Provide a listing of algae according to:

a) location

b) habitat type

c) pH range

d) alkalinity range

e) conductivity range

f) sampling method

LITERATURE REVIEW

The most comprehensive studies done on the distribution of algae in prairie lakes were by Hern et al. (1979) and Koth (1981). Hern et al. (1979) sampled 31 lakes in South Dakota as part of the National Eutrophication Survey in an effort to determine relationships between algal characteristics and trophic status of individual lakes. Koth (1981) provided a listing of algae from 100 lakes to provide a ranking system by which lakes can be evaluated for future restoration needs, and an evaluation of general water quality and/or pollution problems characterizing South Dakota lakes.

Many localized studies which were not primarily concerned with algal distribution, have listed algae found in prairie lakes of eastern South Dakota. Algae from Bitter Lake were reported by Moore and Haertel (1975), and Thoreson et al. (1976). Algae from Blue Dog Lake were listed by Moore and Haertel (1975), Thoreson et al. (1976), and Haertel (1977). Nickum (1970), Hauber (1971), Moore and Haertel (1975), and Haertel (1977, 1979) identified the algae found in Lake Enemy Swim. Algae from Pickerel Lake were listed by Moore and Haertel (1975), Thoreson et al. (1976) and Haertel (1977, 1979). Medicine Lake algae were listed by Tipton et al. (1972). Haertel (1972, 1977, 1979, 1980) listed the algae found in Lake Cochrane. Lake Hendricks algae were inventoried by Haertel (1972, 1979) and Haertel and Jongsma (1982). Algae found in Lake Herman were listed by Nickum (1970) and Hauber (1971). Oak Lake algae were listed by Haertel and Jongsma (1982).

An extensive study by Hauptman (1977, unpublished) listed the algae found in the southern Black Hills. In his study, he sampled Stockade Lake, Bismarck Lake, Legion Lake, Center Lake, Horse Thief Lake, Sheridan Lake, Sylvan Lake, Glen Erin Dam, French Creek and Iron Creek.

Sonneman et al. (1982) listed the algae found in Anderson Pond, a prairie pothole marsh in Clay County, South Dakota. Graham (1966) listed the algae found in three farm ponds located in south-central South Dakota. Griffith (1916) made a survey of all aquatic organisms in the James River near Huron, South Dakota. He included a list of the genera he identified. Bell (1961) studied the algal flora of Gavins Point Reservoir and the immediate area. He included a list of the identified species of algae.

DESCRIPTION OF THE STUDY AREA

The Coteau des Prairies is an extensive, hilly, lake-dotted glacial highland comprising all or part of 15 counties in eastern South Dakota (Figure 1). Most of the surface geology of the coteau region is the result of subadvances of the late Wisconsin ice sheet which ended 10,000-15,000 years ago. Surface deposits are till of a relatively impervious mixture of boulders, pebbles, sand, clay, and silt (Hauber 1971).

The coteau region falls into two climatic categories. The extreme southern portion of the coteau is in the humid continental "A" category which has mean temperatures of 18° F to 26° F during the winter, and 71° F to 75° F during the summer (Gab, 1979). The remainder of the coteau is in the category of humid continental "B" where the temperatures are somewhat lower and the growing season is shorter (Gab, 1979). Mean temperatures vary from 13° F to 19° F during the winter and from 68° F to 72° F in the summer.

The average annual precipitation in the Coteau region increases in a southerly direction. The total annual precipitation is 21.76 inches at Sioux Falls and 20.85 inches at Watertown (Gab 1979).

Land use in the coteau region is dominated by agriculture and to a lesser extent, mining. Principle crops grown are alfalfa, wheat and corn (Gab, 1979). Mining resources are limited to non-metallic minerals such as sand, gravel and rock (Gab, 1979).

The Minnesota River Lowland is a relatively small glacial lowland comprising part of three counties in northeastern South Dakota

(Figure 1). The surface geology is also the result of the late Wisconsin glaciation. The climate and land use are similar to that of the coteau region.

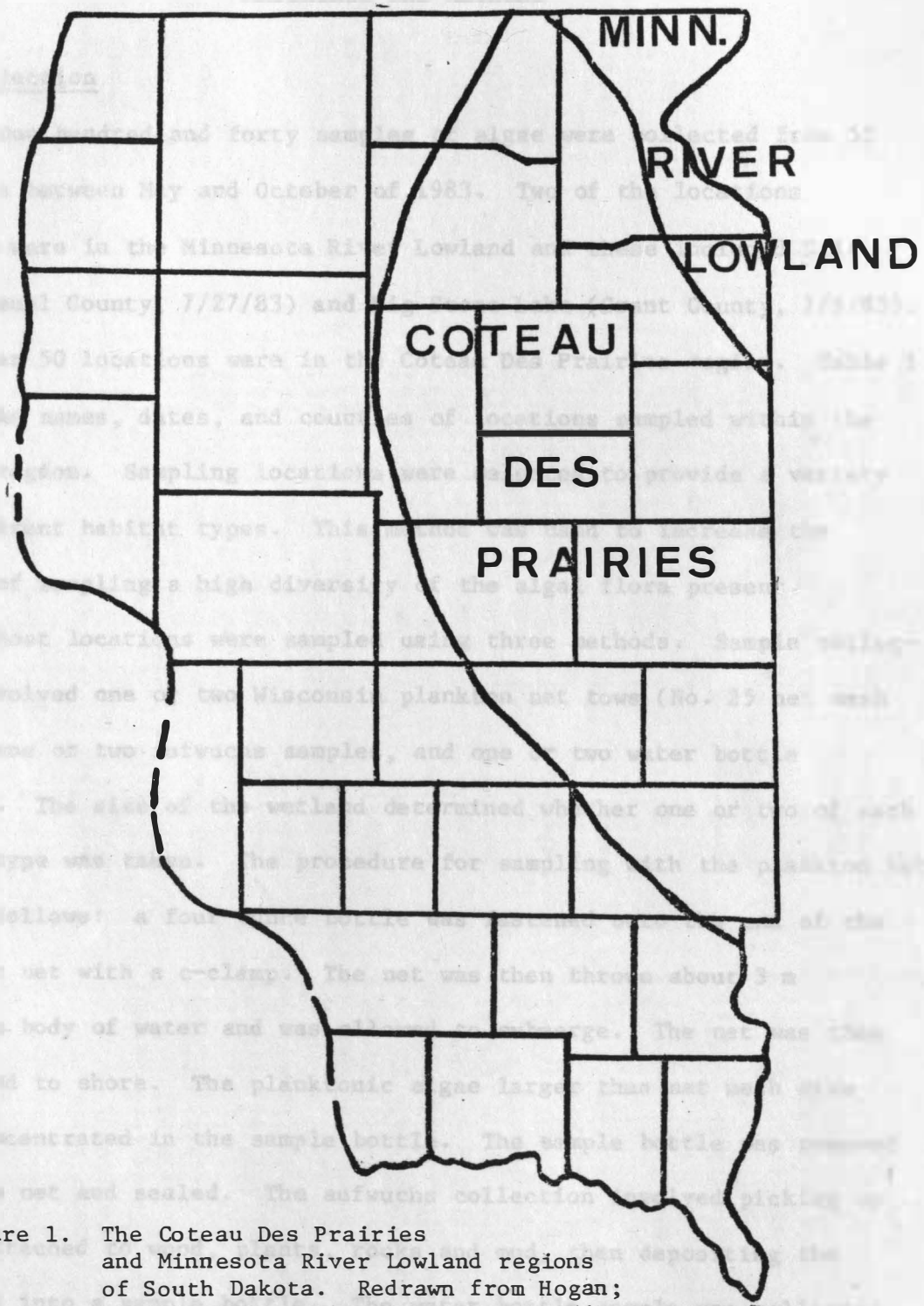

Figure 1. The Coteau Des Prairies and Minnesota River Lowland regions of South Dakota. Redrawn from Hogan; The Geography of South Dakota, 1976.

MATERIALS AND METHODS

A) Collection

One hundred and forty samples of algae were collected from 52 wetlands between May and October of 1983. Two of the locations sampled were in the Minnesota River Lowland and these included Salt Lake (Deuel County, 7/27/83) and Big Stone Lake (Grant County, 7/6/83). The other 50 locations were in the Coteau Des Prairies region. Table 1 lists the names, dates, and counties of locations sampled within the coteau region. Sampling locations were selected to provide a variety of different habitat types. This method was used to increase the chance of sampling a high diversity of the algal flora present.

Most locations were sampled using three methods. Sample collection involved one or two Wisconsin plankton net tows (No. 25 net mesh size), one or two aufwuchs samples, and one or two water bottle samples. The size of the wetland determined whether one or two of each sample type was taken. The procedure for sampling with the plankton net was as follows: a four ounce bottle was fastened onto the end of the plankton net with a c-clamp. The net was then thrown about 3 m into the body of water and was allowed to submerge. The net was then retrieved to shore. The planktonic algae larger than net mesh size were concentrated in the sample bottle. The sample bottle was removed from the net and sealed. The aufwuchs collection involved picking up algae attached to wood, plants, rocks and mud, then depositing the material into a sample bottle. The water bottle sample was collected by filling a four ounce bottle with water. This method of collection

Table 1. List of names, dates and counties of wetlands sampled within the Coteau Des Prairies Region.

Name/Date	County	Name/Date	County
1. East Oakwood Lake (5/15/83-6/16/83)	Brookings	24. Lake Agnew (6/22/83)	Kingsbury
2. Unnamed Creek (Hidewoods) (5/18/83, 6/21/83)	Brookings	25. Lake Osceola (6/22/83)	Kingsbury
3. Oak Lake (5/18/83,6/21/83, 9/22/83)	Brookings	26. Lake Pelican (7/5/83)	Codington
4. Fox Lake (5/18/83,6/21/83)	Deuel	27. Lake Kampeska (7/5/83)	Codington
5. Sediment Ponds (Lake Cochrane) (5/18/83)	Deuel	28. Goose Lake (7/5/83)	Codington
6. Lake Cochrane (5/18/83)	Deuel	29. Clear Lake (7/5/83)	Hamlin
7. Big Coulee Creek (6/4/83)	Roberts	30. Unnamed Marsh (7/5/83)	Codington
8. Unnamed Creek (6/4/83)	Roberts	31. Lake Poinsett (7/5/83, 8/16/83)	Hamlin
9. Seepage (Un. Creek) (6/4/83)	Roberts	32. Badger Lake (7/5/83)	Kingsbury
10. Unnamed Spring (6/4/83)	Roberts	33. Big Sioux River (7/27/83)	Brookings
11. Big Springs Creek (6/4/83)	Roberts	34. Lake Campbell (7/27/83, 10/7/83)	Brookings
12. Big Spring (6/4/83)	Roberts	35. Clear Lake (7/27/831)	Deuel
13. Fen (Big Springs) (6/4/83)	Roberts	36. Rush Lake (7/27/83	Deuel
14. Cobb Creek (6/8/83)	Deuel	37. Lake Alice (7/27/83)	Deuel
15. Unnamed Spring (Feeds Cobb Cr) (6/8/83)	Deuel	38. Lake Badus (8/7/83) Lake	Lake
16. West Branch Lac Qui Parle R. (6/8/83, 8/31/83)	Deuel	39. Lake Herman (8/7/83)	Lake
17. Lake Goldsmith (6/16/83)	Brookings	40. Lake Madison (8/7/83)	Lake
18. Moe Slough (6/16/83)	Brookings	41. Long Lake (8/7/83)	Lake
19. Deer Creek (6/21/83)	Brookings	42. Lake Albert (8/16/83)	Kingsbury
20. Fish Lake (6/21/83)	Deuel	43. Lake Marsh (8/16/83)	Hamlin
21. Thisted Lake (6/22/83)	Kingsbury	44. Mud Lake (8/16/83)	Clark
22. Unnamed Marsh (6/22/83)	Kingsbury	45. Unnamed Lake (Reinhart WPA) (8/16/83)	Clark
23. Spirit Lake (6/22/83)	Kingsbury	46. Cherry Lake (8/16/83	Clark
		47. School Lake (8/31/83)	Deuel
		48. Round Lake (8/31/83)	Deuel
		49. Unnamed Lake (8/31/83)	Deuel
		50. South Coteau Lake (8/31/83)	Deuel

was used to sample the algal flora smaller than the no. 25 net mesh size. Half of the samples were preserved with Lugol's solution for later identification and the other half was returned to the lab for immediate identification of algal forms that did not preserve well. The above sampling methods were used to provide a representive sample of microhabitats where algae grow.

Water chemistry data were also collected at 37 locations. Surface water samples were obtained in a one liter bottle, each sample being collected approximately 3 cm below the surface. From this one-liter sample, three 50 ml subsamples were analyzed separately for pH, conductivity and alkalinity. PH readings were measured using a Sargent Welch Model P.B.L. pH meter. Conductivity readings were measured in micromhos/cm. using a Y.S.I. Model 33 S-C-T Meter. Total alkalinity in mg/l $CaCO_3$ was determined by titration to a pH of 4.5 using 1.600 $\pm$ 0.005 N sulfuric acid and a Hach digital titrator calibrated for 100 ml samples. Most water samples were relatively high in alkalinity. In order to conserve acid, 50 ml samples were tested. Total alkalinity values based on the 50 ml samples were then doubled to adjust the values.

Values for pH, conductivity and alkalinity were divided into ranges as shown in Table 2. PH values were divided into three ranges by the author based on breaks between the 100 values measured. Conductivity values were divided into three ranges following Cowardin et al. (1979). Alkalinity values were divided into four ranges by the author, again based on breaks between the 100 values measured.

Table 2. Water chemistry ranges.

pH
1) 7.2 - 7.5 (circumneutral)
2) 7.7 - 8.3 (alkaline)
3) 8.5 - 9.2 (very alkaline)
Conductivity (micromhos/cm)
1) 630 - 768 (fresh)
2) 850 - 6,000 (oligosaline)
3) 34,000 (polysaline)
Alkalinity (mg/l $CaCO_3$)
1) 41 - 76 (very low alkalinity)
2) 140 - 195 (low alkalinity)
3) 218 - 298 (medium alkalinity)
4) 343 - 487 (high alkalinity)

Additional field notes recorded at each location to aid in wetland classification included substrate type, presence or absence of emergent vegetation, and presence or absence of submerged and floating vascular plants. Specific locations of plankton net tow, aufwuchs, and water bottle samples were also recorded.

B) Examination

An Olympus Model CH compound microscope was used while identifying the algae. Four hundred power (400x) was sufficient for identification in most cases. Smaller forms were identified under 1000x oil emersion. For taxonomic purposes, algal dimensions had to be measured. This was accomplished using a 1.0 mm^2 grid located within the eyepiece, which was calibrated with a 2.0 mm stage micrometer. Measurements as precise as 2 microns could be determined under oil emersion. Iodine was used to detect the presence of starch which turns purplish to black when stained. This test is usually positive for green algae.

All algae identified in this study were classified following Prescott (1970) with the exception of algae in the family Chroococcaceae which were classified following Drouet (1959). Each alga was identified to the lowest possible taxonomic level. In most cases identification was to the species level. An attempt was made to find and identify all of the algal forms in each sample bottle. Forms were often observed which could not be identified to genus. Abbreviated descriptions were used to keep record of these (e.g. pennate diatom, bluegreen alga, etc.).

A variety of taxonomic keys were used. Manuals by Prescott (1962, 1970), Smith (1950), Tiffany and Britton (1971), and Ward and Whipple (1959), proved to be most useful for Chrysophyta, Cyanophyta and Chlorophyta. The manuals of Weber (1971) and Patrick and Reimers (1966) were most useful for diatoms.

C) Classification of Wetlands

Each sample of algae was classified into a habitat type on the basis of the sampling site, according to Cowardin et al. (1979). Cowardin's system is structured around a combination of ecological, biological, hydrological and substrate characteristics which permits universal use across the United States. The system proceeds in a hierarchical manner starting with system and proceeds through subsystem, class, and subclass. Modifying terms such as water regime, water chemistry and special modifiers are used to provide additional level of detail.

Tables 3, 4 and 5 give the classification hierarchy and modifying terms used in this study for riverine, lacustrine, and palustrine systems. Table 6 lists the 21 different habitat types sampled in this study and the number of algal samples collected within each type. Table 7 lists the sampling method used, habitat type, number and water chemistry ranges for each sample collected from 60 wetlands.

Table 3. Classification hierarchy and modifying terms for riverine systems.

System	Riverine		
Subsystem	Lower Perennial	Upper Perennial	Intermittent
Class	Unconsolidated Bottom	Unconsolidated Bottom Rock Bottom	Streambed
Subclass	1) Sand/mud	1) Cobble/Gravel 2) Sand/Mud 3) Rubble 4) Bedrock	1) Rubble

Modifying Terms

Water Regime	Water Chemistry
1) Intermittently Exposed	1) Conductivity
2) Saturated	2) pH
3) Permanent	3) Total Alkalinity

Table 4. Classification hierarchy and modifying terms for lacustrine systems.

System	Lacustrine					
Subsystem	Limnetic	Littoral				
Class	Open Water	Rock Bottom	Unconsol. Bottom	Aquatic Bed	Unconsol. Shore	Open Water
Subclass	1) Unknown Bottom	1) Rubble	1) Mud 2) Cobble/ Gravel 3) Sand	1) Floating Vascular	1) Mud	1) Unknown Bottom

MODIFYING TERMS

Water Regime	Water Chemistry	Special Modifiers
1) Intermittently Exposed	1) Conductivity	1) Impounded
2) Permanent	2) pH	
	3) Total Alkalinity	

Table 5. Classification hierarchy and modifying terms for palustrine systems.

System	PALUSTRINE				
(No Subsystem)					
Class	Emergent	Unconsolidated Bottom	Moss/Lichen	Scrub/Shrub	Aquatic Bed
Subclass	1) Persistent	1) Sand/Mud	1) Moss	1) Broad Leaf Decid.	1) Floating Vascular

MODIFYING TERMS

Water Regime	Water Chemistry	Special Modifiers
1) Intermittently Exposed	1) Conductivity	1) Diked
2) Permanent	2) pH	
3) Saturated	3) Total Alk.	
4) Seasonally Flooded		

Table 6. List of 21 different habitat types classified, and the number of algal samples within each type.

Habitat #	System	Subsystem	Class	Subclass	Water Regime	Special Modifiers	# Samples
1*	Lacustrine	Littoral	Rock bottom	Rubble	Intermittently exposed	---------	20
2*	Lacustrine	Littoral	Unconsolidated bottom	Sand	Intermittently exposed	---------	17
3	Lacustrine	Limnetic	Open water	Unknown bottom	Permanent	---------	1
4	Lacustrine	Littoral	Open water	Unknown bottom	Intermittently exposed	---------	1
5*	Lacustrine	Littoral	Aquatic bed	Floating vascular	Intermittently exposed	---------	9
6*	Lacustrine	Littoral	Unconsolidated bottom	Mud	Intermittently exposed	---------	22
7*	Lacustrine	Littoral	Unconsolidated bottom	Gravel/cobble	Intermittently exposed	---------	10
8	Lacustrine	Littoral	Unconsolidated bottom	Gravel/cobble	Permanent	---------	1
9	Lacustrine	Littoral	Unconsolidated shore	Mud	Intermittently exposed	---------	3
10	Palustrine	--------	Unconsolidated bottom	Sand/mud	Intermittently exposed	Diked	2
11	Palustrine	--------	Aquatic bed	Floating vascular	Intermittently exposed	Impounded	4
12	Palustrine	--------	Scrub/schrub	Broad leaf deciduous	Seasonally flooded	---------	1
13*	Palustrine	--------	Emergent wetland	Persistent	Intermittently exposed	---------	20
14	Palustrine	--------	Emergent wetland	Persistent	Permanent	---------	1
15	Palustrine	--------	Moss/lichen	Moss	Saturated	---------	1
16	Riverine	Lower perennial	Unconsolidated bottom	Sand/mud	Permanent	---------	3
17	Riverine	Upper perennial	Unconsolidated bottom	Sand/mud	Intermittently exposed	---------	6
18*	Riverine	Upper perennial	Unconsolidated bottom	Gravel/cobble	Intermittently exposed	---------	13
19	Riverine	Intermittent	Streambed	Rubble	Saturated	---------	1
20	Riverine	Upper perennial	Rock bottom	Rubble	Permanent	---------	2
21	Riverine	Upper perennial	Rock bottom	Bedrock	Permanent	---------	2

*Habitat types analyzed statistically using Chi-square test.

Table 7. List of sampling methods used, habitat type number, and water chemistry ranges for each sample collected from 60 wetlands (See Table 2 for description of water chemistry ranges and Table 6 for description of habitat types.).

Location	Sampling Method	Habitat Type #	pH	Conductivity	Alkalinity
East Oakwood Lake	W.B.S.	13	----	----	----
Un. Cr. (Hidewoods)	Tow	17	----	----	----
	Tow	17	----	----	----
	Aufwuchs	17	----	----	----
	Aufwuchs	17	----	----	----
Oak Lake	Tow	6	----	----	----
	Aufwuchs	6	----	----	----
Fox Lake	Tow	7	----	----	----
	Aufwuchs	7	----	----	----
Sed. Ponds	Tow	10	----	----	----
(L. Cochrane)	Aufwuchs	10	----	----	----
Lake Cochrane	Tow	8	Very alkaline	Oligosaline	Med. alkalinity
	Aufwuchs	14	Very alkaline	Oligosaline	Med. alkalinity
Big Coulee Creek	Tow	18	----	----	----
	Aufwuchs	18	----	----	----
Unnamed Creek	Aufwuchs	18	----	----	----
Seepage (Un. Cr.)	Aufwuchs	19	----	----	----
Unnamed Spring	Aufwuchs	20	----	----	----
Big Springs Creek	Tow	18	----	----	----
	Aufwuchs	18	----	----	----

Table 7. (continued)

Location	Sampling Method	Habitat Type #	pH	Conductivity	Alkalinity
Big Spring	Aufwuchs	21	----	----	----
	Aufwuchs	21	----	----	----
Fen (Big Springs)	Aufwuchs	15	----	----	----
Cobb CR	Tow	18	----	----	----
	Aufwuchs	18	----	----	----
Unnamed Spring (Feeds Cobb Cr.)	Aufwuchs	20	----	----	----
W. Br. LacQui Parle River	Tow	18	----	----	----
	Aufwuchs	18	----	----	----
Lake Goldsmith	Tow	1	----	----	----
	Aufwuchs	1	----	----	----
	Tow	6	----	----	----
	Aufwuchs	13	----	----	----
E. Oakwood Lake	Tow	6	----	----	----
	Aufwuchs	13	----	----	----
Moe Slough	Tow	13	----	----	----
	Aufwuchs	13	----	----	----
Un. Cr. (Hidewoods)	Tow	17	Alkaline	Oligosaline	Med. alkalinity
	Aufwuchs	17	Alkaline	Oligosaline	Med. alkalinity
Deer Cr.	Tow	13	Circumneutral	Oligosaline	Med. alkalinity
	Aufwuchs	13	Circumneutral	Oligosaline	Med. alkalinity

Table 7. (continued)

Location	Sampling Method	Habitat Type #	pH	Conductivity	Alkalinity
Fox Lake	Tow	7	Alkaline	Fresh	Med. alkalinity
	Aufwuchs	7	Alkaline	Fresh	Med. alkalinity
Fish Lake	Tow	1	Alkaline	Oligosaline	Low alkalinity
	Aufwuch	1	Alkaline	Oligosaline	Low alkalinity
Oak Lake	Tow	6	Very alkaline	Fresh	Low alkalinity
	Aufwuchs	6	Very alkaline	Fresh	Low alkalinity
Thisted Lake	Tow	7	Very alkaline	Oligosaline	Med. alkalinity
	Aufwuchs	7	Very alkaline	Oligosaline	Med. alkalinity
Un. marsh	W.B.S.	12	Circumneutral	Oligosaline	High alkalinity
	Aufwuchs	13	Circumneutral	Oligosaline	High alkalinity
Spirit Lake	Tow	7	Very alkaline	Oligosaline	High alkalinity
	Aufwuchs	13	Very alkaline	Oligosaline	High alkalinity
Lake Agnew	Tow	11	Very alkaline	Oligosaline	Med. alkalinity
	Aufwuchs	11	Very alkaline	Oligosaline	Med. alkalinity
Lake Osceola	Tow	11	Very alkaline	Fresh	Low alkalinity
	Aufwuchs	11	Very alkaline	Fresh	Low alkalinity
Lake Pelican	Tow	6	Very alkaline	Fresh	Med. alkalinity
	Aufwuchs	6	Very alkaline	Fresh	Med. alkalinity
Lake Kampeska	Tow	2	Very alkaline	Fresh	Med. alkalinity
	Aufwuchs	2	Very alkaline	Fresh	Med. alkalinity
Goose Lake	Tow	6	Alkaline	Oligosaline	High alkalinity
	Aufwuchs	13	Alkaline	Oligosaline	High alkalinity

Table 7. (continued)

Location	Sampling Method	Habitat Type #	pH	Conductivity	Alkalinity
Clear Lake (Hamlin Co.)	Tow	2	Very alkaline	Fresh	Med. alkalinity
	Aufwuchs	2	Very alkaline	Fresh	Med. alkalinity
Un. Marsh	Tow	13	Alkaline	Oligosaline	High alkalinity
	Aufwuchs	13	Alkaline	Oligosaline	High alkalinity
Lake Poinsett	Tow	2	----	----	----
Badger Lake	Tow	1	----	----	----
	Aufwuchs	1	----	----	----
Big Stone Lake	W.B.S.	3	----	----	----
Big Sioux River	Tow	16	Alkaline	Fresh	Med. alkalinity
	Aufwuchs	16	Alkaline	Fresh	Med. alkalinity
	W.B.S.	16	Alkaline	Fresh	Med. alkalinity
Lake Campbell	Tow	2	Alkaline	Oligosaline	Low alkalinity
	Aufwuchs	2	Alkaline	Oligosaline	Low alkalinity
	W.B.S.	2	alkaline	Ologisaline	Low alkalinity
Lake Campbell	W.B.S.	4	----	----	----
Clear Lake (Deuel Co.)	Tow	7	Alkaline	Fresh	Low alkalinity
	Aufwuchs	7	Alkaline	Fresh	Low alkalinity
	W.B.S.	7	Alkaline	Fresh	Low alkalinity
Rush Lake	Tow	5	Very alkaline	Oligosaline	Very low alkalinity
	W.B.S.	5	Very alkaline	Oligosaline	Very low alkalinity
	Aufwuchs	13	Very alkaline	Oligosaline	Very low alkalinity

Table 7. (continued)

Location	Sampling Method	Habitat Type #	pH	Conductivity	Alkalinity
Salt Lake	Tow	9	Very alkaline	Polysaline	Med. alkalinity
	Aufwuchs	9	Very alkaline	Polysaline	Med. alkalinity
	W.B.S.	9	Very alkaline	Polysaline	Med. alkalinity
Lake Alice	Tow	2	Alkaline	Oligosaline	Med. alkalinity
	Aufwuchs	2	Alkaline	Oligosaline	Med. alkalinity
	W.B.S.	2	Alkaline	Oligosaline	Med. alkalinity
Lake Badus	Tow	1	Very alkaline	Oligosaline	Low alkalinity
	Aufwuchs	1	Very alkaline	Oligosaline	Low alkalinity
	W.B.S.	1	Very alkaline	Oligosaline	Low alkalinity
Lake Herman	Tow	1	Very alkaline	Oligosaline	Med. alkalinity
	Aufwuchs	1	Very alkaline	Oligosaline	Med. alkalinity
	W.B.S.	1	Very alkaline	Oligosaline	Med. alkalinity
Lake Madison	Tow	2	Very alkaline	Oligosaline	Low alkalinity
	Aufwuchs	2	Very alkaline	Oligosaline	Low alkalinity
	W.B.S.	2	Very alkaline	Oligosaline	Low alkalinity
Long Lake	Tow	5	Alkaline	Oligosaline	Low alkalinity
	Aufwuchs	5	Alkaline	Oligosaline	Low alkalinity
	W.B.S.	5	Alkaline	Oligosaline	Low alkalinity
Lake Albert	Tow	1	Very alkaline	Oligosaline	Med. alkalinity
	Aufwuchs	1	Very alkaline	Oligosaline	Med. alkalinity
	W.B.S.	1	Very alkaline	Oligosaline	Med. alkalinity

Table 7. (continued)

Location	Sampling Method	Habitat Type #	pH	Conductivity	Alkalinity
Lake Poinsett	Tow	2	Circumneutral	Oligosaline	Med. alkalinity
	Aufwuchs	2	Circumneutral	Oligosaline	Med. alkalinity
	W.B.S.	2	Circumneutral	Oligosaline	Med. alkalinity
Lake Marsh	Tow	6	Very alkaline	Oligosaline	Very low alkalinity
	Aufwuchs	6	Very alkaline	Oligosaline	Very low alkalinity
	W.B.S.	13	Very alkaline	Oligosaline	Very low alkalinity
Mud Lake	Tow	5	Alkaline	Oligosaline	High alkalinity
	Aufwuchs	5	Alkaline	Oligosaline	High alkalinity
	W.B.S.	13	Alkaline	Oligosaline	High alkalinity
Un. Lake (Reinhart W.P.A.)	Tow	5	Circumneutral	Oligosaline	Med. alkalinity
	Aufwuchs	5	Circumneutral	Oligosaline	Med. alkalinity
	W.B.S.	13	Circumneutral	Oligosaline	Med. alkalinity
Cherry Lake	Tow	6	Very alkaline	Fresh	Low alkalinity
	Aufwuchs	6	Very alkaline	Fresh	Low alkalinity
	W.B.S.	13	Very alkaline	Fresh	Low alkalinity
School Lake	Tow	6	Very alkaline	Fresh	Low alkalinity
	Tow	6	Very alkaline	Fresh	Low alkalinity
	Aufwuchs	6	Very alkaline	Fresh	Low alkalinity
	Aufwuchs	6	Very alkaline	Fresh	Low alkalinity
Round Lake	Tow	6	Very alkaline	Fresh	Low alkalinity
	Tow	6	Very alkaline	Fresh	Low alkalinity
	Aufwuchs	6	Very alkaline	Fresh	Low alkalinity
	Aufwuchs	6	Very alkaline	Fresh	Low alkalinity

Table 7. (continued)

Location	Sampling Method	Habitat Type #	pH	Conductivity	Alkalinity
Un. Lake	W.B.S.	13	Very alkaline	Fresh	Med. alkalinity
	W.B.S.	13	Very alkaline	Fresh	Med. alkalinity
	Aufwuchs	13	Very alkaline	Fresh	Med. alkalinity
So. Coteau Lake	Tow	1	Alkaline	Fresh	Low alkalinity
	Tow	1	Alkaline	Fresh	Low alkalinity
	Aufwuchs	1	Alkaline	Fresh	Low alkalinity
	Aufwuchs	1	Alkaline	Fresh	Low alkalinity
	W.B.S.	1	Alkaline	Fresh	Low alkalinity
W. Branch. Lac Qui Parle River	Tow	18	Alkaline	Fresh	Med. alkalinity
	Aufwuchs	18	Alkaline	Fresh	Med. alkalinity
	Aufwuchs	18	Alkaline	Fresh	Med. alkalinity
	W.B.S.	18	Alkaline	Fresh	Med. alkalinity
Oak Lake	Aufwuchs	6	----	----	----

D) Statistical Analysis

1) Chi-Square Test

A Chi-square test involving two-way contingency tables was used in this study. The two-way table is the most common tabular presentation of discrete data (Steel and Torrie 1980). Discrete data are concerned with the presence or absence of a character, that character, in this case, being specific taxa of algae. A minimum of five replications for each alga was required to use that alga in the contingency tables. The two-way table involved comparing the taxonomic composition of algae within various habitat types, water chemistry ranges, and sampling methods to test for significant differences. The levels of significance used in statistical tests was at the .05 and .01 levels.

Seven habitat types included sufficient replications for Chi-Square comparisons. The following habitat types were compared: 1) lacustrine, littoral, rock bottom, rubble, intermittently exposed; 2) lacustrine, littoral, unconsolidated bottom, sand, intermittently exposed; 5) lacustrine, littoral, aquatic bed, floating vascular, intermittently exposed; 6) lacustrine, littoral, unconsolidated bottom, mud, intermittently exposed; 7) lacustrine, littoral, unconsolidated bottom, gravel/cobble, intermittently exposed; 13) palustrine, emergent wetland, persistent, intermittently exposed; 18) riverine, upper perennial, unconsolidated bottom, gravel/cobble, intermittently exposed. Table 8 lists the span of dates algal samples were collected, and the number of algal samples for each habitat type that were compared statistically.

Table 8. Span of dates and number of samples for habitat types that were compared statistically.

Habitat type		
Habitat #1	6/16/83 6/21/83 7/5/83 8/7/83 8/16/83 8/31/83	20
Habitat #2	7/5/83 7/27/83 8/7/83 8/16/83	17
Habitat #5	7/27/83 8/7/83 8/16/83	9
Habitat #6	5/18/83 6/16/83 6/21/83 7/5/83 8/16/83 8/31/83 9/22/83	22
Habitat #7	5/18/83 6/21/83 6/22/83 7/27/83	10
Habitat #13	5/15/83 6/16/83 6/21/83 6/22/83 7/5/83 7/27/83 8/16/83 8/31/83	20
Habitat #18	6/4/83 6/8/83 8/31/83	13

Legend:

Habitat #	System	Subsystem	Class	Subclass
1	Lacustrine	Littoral	Rock bottom	Rubble
2	Lacustrine	Littoral	Unconsolidated bottom	Sand
5	Lacustrine	Littoral	Aquatic bed	Floating vascular
6	Lacustrine	Littoral	Unconsolidated bottom	Mud
7	Lacustrine	Littoral	Unconsolidated bottom	Gravel/ cobble
13	Palustrine	--------	Emergent wetland	Persistent
18	Riverine	Upper perennial	Unconsolidated bottom	Gravel/ cobble

Habitat #	Water regime	Special modifier
1	Intermittently exposed	-----
2	Intermittently exposed	-----
5	Intermittently exposed	-----
6	Intermittently exposed	-----
7	Intermittently exposed	-----
13	Intermittently exposed	-----
18	Intermittently exposed	-----

Two habitat types contained sufficient replications for Chi-Square comparison of water chemistry parameters within specific habitat types. Habitat types 1 (lacustrine, littoral, rubble) and 2 (lacustrine, littoral, sand) were pooled as previous Chi-Square comparisons by habitat indicated they were not significantly different. Six chemical parameters could be compared within these pooled habitats (Table 9). Habitat type 13 (palustrine, emergent wetland, persistent) included sufficient replication for comparison of two chemical parameters (Table 9).

Two habitat types contained sufficient replication for Chi-Square comparison of sampling methods within specific habitat types. In habitat types 1 and 2 pooled, all three methods were compared (Table 9), and in habitat type 6 (lacustrine, littoral, mud), two sampling methods could be compared (Table 9).

2) Percent Frequency of Occurrence

The percent frequency of occurrence of all algal taxa was determined to provide information on which taxa were common or rare. The percent frequency of algae was determined by locations combined using two methods. Locations sampled more than once were pooled (n=52) and separated (n=60). Percent frequency was also determined for lacustrine habitat samples combined (n=84); for palustrine habitat samples combined (n=29); and for riverine habitat samples combined (n=27). An example of how percent frequency was calculated for Synedra ulna by locations combined is as follows: Synedra ulna was found in 54 out of 60 locations, thus it occurred in 90.0% of all locations sampled.

Table 9. Span of dates and number of samples for water chemistry parameters and sampling methods that were compared statistically within habitat types (see table 2 for definition of water chemistry parameters and table 6 for complete description of habitat types.).

Habitat 1 and 2 pooled (lacustrine, littoral; rubble and sand bottom pooled).

Parameter	Dates	# Samples
Tow Sample	6/16/83, 6/21/83, 7/5/83, 7/27/83, 8/16/83, 8/31/83	15
Aufwuchs 1	6/16/83, 6/21/83, 7/5/83, 7/27/83, 8/7/83, 8/16/83, 8/31/83	14
Water Bottle 1	7/27/83, 8/7/83, 8/16/83, 8/31/83	8
Cond. 1 (Fresh)	7/5/83, 8/31/83	9
Cond. 2 (Oligosaline)	6/21/83, 7/27/83, 8/7/83, 8/16/83	23
pH 2 (Alkaline)	6/21/83, 7/27/83, 8/31/83	13
pH 3 (Very alkaline)	7/5/83, 8/7/83, 8/16/83	16
Alkalinity 2 (Low)	6/21/83, 7/27/83, 8/7/83, 8/31/83	16
Alkalinity 3 (Medium)	7/5/83, 7/27/83, 8/7/83, 8/16/83	16

Habitat 13 (Palustrine, emergent wetland, persistent).

Parameter	Dates	# Samples
Alkalinity 3 (Medium)	6/22/83, 7/5/83, 8/16/83	6
Alkalinity 4 (High)	6/21/83, 8/31/83	6

Table 9. (continued)

Habitat 6 (lacustrine, littoral, mud).

Parameter	Dates	# Samples
Tow Sample	5/18/83, 6/16/83, 6/21/83, 7/5/83, 8/16/83, 8/31/83	12
Aufwuchs	5/18/83, 6/21/83, 7/5/83, 8/31/83, 9/22/83	7

3) Sorensen's Index of Similarity

Sorensen's Index of Similarity was used to express mathematically the degree of change in algal floras from the same location sampled on more than one date. The Index of Similarity was calculated from the following formula (source: Mueller-Dombois and Ellenberg, 1974):

$$IS = \frac{C}{\frac{1}{2}(A+B)} \times 100 \text{ or } \frac{2C}{A+B} \times 100$$

C = number of taxa common to the two dates sampled.

A = total number of taxa found on date 1.

B = total number of taxa found on date 2.

Percent values closer to zero indicate dissimilarity or a greater change and percent values closer to 100% indicate similarity or little change.

RESULTS

A) Description of the algal flora

1) Taxonomic groups encountered

A total of 426 taxa of algae were identified in this study. Representatives of all phyla were found excluding the phyla Rhodophyta (red algae) and Phaeophyta (brown algae). The phyla Chlorophyta (green algae), Chrysophyta (yellow brown algae), and Cyanophyta (bluegreen algae) dominated the algal flora in this region.

Of the total taxa encountered, 97.6% belonged to only three phyla. These phyla include Chlorophyta (44.6%), Chrysophyta (39.2%) and Cyanophyta (13.8%). Other phyla encountered included Euglenophyta (1.2%), Pyrrophyta (0.7%), Cryptophyta (0.2%), and Chloromonadophyta (0.2%).

The order Chlorococcales were the predominant group within phylum Chlorophyta (63.1%). This order was primarily represented by the genera Tetraedron, Ankistrodesmus, Oocystis, Scenedesmus, and Pediastrum. The order Zygnematales was also well represented and was dominated by the desmids, primarily Closterium, Cosmarium, and Staurastrum.

The diatoms (orders Centrales, Pennales) were the predominant group within phylum Chrysophyta (95.2%). These were represented primarily by the genera Melosira, Fragilaria, Synedra, Caloneis, Navicula, Gomphonema, Cymbella, Nitzschia, and Surirella.

The order Oscillatoriales were the predominant group within the phylum Cyanophyta (59.3%). This order was primarily represented by the

genera Lyngbya, Oscillatoria, and Spirulina. The order Chroococcales was also abundant and represented by the genera Agmenellum, Anacystis, and Gomphosphaeria.

Table 10 summarizes the numbers of taxa encountered within the algal divisions. Appendix A lists the taxa of algae identified in this survey following the classification systems of Prescott (1970) and Drouet (1959). Appendix B lists the algae identified in this study by the author who previously identified the same taxa in South Dakota.

2) Percent frequency of occurrence

a) In all locations combined

The most common taxa found in all locations combined (n=52 or n=60), depending on whether locations sampled more than once were pooled or separated) were as follows: Synedra ulna (96.1%, 90.0%), Gomphonema olivaceum (92.3%, 83.3%), Oscillatoria spp. (75.0%, 71.6%), Amphora ovalis (73.08%, 66.6%), Nitzschia spp. (71.0%, 63.3%), Fragilaria spp. (67.3%, 63.3%), Navicula spp. (67.3%, 61.6%), Anabaena spp. (67.3%, 60.0%), Pinnularia spp. (63.5%, 60.0%), Scenedesmus quadricauda var. longispina (63.5%, 56.6%), Epithemia turgida (63.5%, 55.0%), Rhoicosphenia curvata (59.6%, 51.6%), Pediastrum boryanum (57.7%, 56.6%), Ankistrodesmus falcatus (55.8%, 56.6%), Cymbella spp. (55.89%, 53.3%), Scenedesmus bijuga (55.8%, 48.3%), Euglena spp. (53.8%, 50.0%), Phacus spp. (53.8%, 48.3%), Rhopalodia gibba (53.8%, 48.3%), Anacystis cyanea (53.8%, 55.0%), Gomphosphaeria spp. (51.9%, 48.3%), Sphaerocystis Schroeteri (50.0%, 46.6%), and Cymbella ventricosa (50.0%, 46.6%). Appendix C lists the percent frequency of occurrence of all taxa by locations combined (both pooled and separated).

Table 10. Summary of the taxa encountered within the algal divisions.

Phylum	Classes	Orders	Families	Genera	Species	Varieties	Forms
Chlorophyta	2	10	23	58	116	28	2
Englenophyta	1	1	1	3	2	-	-
Pyrrophyta	1	1	2	2	1	-	-
Cryptophyta	1	1	1	1	-	-	-
Chloromonadophyta	1	1	1	1	1	-	-
Chrysophyta	3	6	17	44	116	58	2
Cyanophyta	1	4	5	15	46	1	-
Total	7	22	50	124	282	87	4

b) In lacustrine habitats combined

The most common taxa found in lacustrine habitats (n=84) were Synedra ulna (75.0%), Gomphonema olivaceum (61.9%), Anacystis cyanea (57.1%), Melosira granulata (52.4%), Oocystis spp. (50.0%). All taxa occurring in more than 30.0% of samples are compared with palustrine and riverine taxa in table 11. One hundred and twenty-two taxa were found only in the lacustrine habitat types (Appendix C). Appendix C lists the percent frequency of all taxa found in lacustrine habitat types.

c) In palustrine habitats combined

The most common taxa found in palustrine habitats (n=29) were Synedra ulna (82.8%), Gomphonema olivaceum (79.3%), Epithemia turgida (58.6%), Fragilaria spp. (58.6%), Pinnularia spp. (58.6%), Nitzschia spp. (55.2%), Scenedesmus quadricauda var. longispina (55.2%), Rhopalodia gibba (55.2%), Ankistrodesmus falcatus (51.7%), Anabaena spp. (51.7%), and Phacus spp. (51.7%). All taxa occurring in more than 30.0% of samples are compared with lacustrine and riverine taxa in table 11. Thirty-nine taxa were only found in palustrine habitat types (Appendix C). Appendix C lists the percent frequency of all taxa found in palustrine habitat types.

d) In riverine habitats combined

The most common taxa found in riverine habitats (n=27) were Synedra ulna (85.2%), Gomphonema olivaceum (70.4%), Oscillatoria spp. (66.0%), Rhoicosphenia curvata (51.8%), and Fragilaria spp. (51.8%). All taxa occurring in more than 30.0% of samples are compared with

Table 11. Taxa found in at least 30% of lacustrine, palustrine, and riverine habitat type samples (percent frequency of taxa in habitat sampled).

Taxa	Lacustrine %	Palustrine %	Riverine %
Synedra ulna	75.0	82.8	85.2
Gomphonema olivaceum	61.9	79.3	70.4
Anacystis cyanea	57.1	31.0	
Pediastrum boryanum	57.1	44.8	
Melosira granulata	52.4		
Oocystis spp.	50.0		
Agmenellum quadruplicatum	48.8		
Ankistrodesmus falcatus	47.6	51.7	
Amphora ovalis	46.4		44.4
Oscillatoria spp.	44.0	48.3	66.0
Nitzschia spp.	44.0	55.2	37.0
Anabaena spp.	42.8	51.7	
Scenedesmus quadricauda var. longispina	40.5	55.2	
Rhopaloidia gibba	39.3	55.2	
Pediastrum duplex	38.1		
Cyclotella meneghiniana	36.9		33.3
Scenedesmus quadricauda	36.9		
Lyngbya contorta	35.7		
Rhoicosphenia curvata	34.5		51.8
Phacus spp.	34.5	51.7	
Epithemia turgida	33.3	58.6	37.0
Fragilaria spp.	32.1	58.6	51.8
Cosmarium spp.	30.9		
Pinnularia spp.		58.6	48.1
Cocconeis pendiculus		48.3	40.7
Closterium spp.		44.8	48.1
Scenedesmus bijuga		44.8	
Euglena spp.		44.8	
Oscillatoria limnetica		44.8	
Spirogyra spp.		41.4	33.3
Synedra acus		41.4	
Navicula cuspidata var. cuspidata		37.9	
Amphora spp.		36.8	
Rhizoclonium spp.		34.5	
Eunotia curvata var. curvata		34.5	
Gomphenema constrictum		34.5	48.1
Gomphosphaeria spp.		34.5	
Sphaerocystis Schroeteri		31.0	33.3
Cymbella ventricosa		31.0	44.4
Navicula spp.		31.0	48.1

Table 11. (continued)

Taxa	Lacustrine %	Palustrine %	Riverine %
Fragilaria crotonensis var. crotonensis			44.4
Cymbella turgida			40.7
Meridion circulare			40.7
Navicula tripunctata var. tripunctata			40.7
Nitzschia linearis			40.7
Cymbella spp.			37.0
Gyrosigma spp.			33.3

lacustrine and palustrine taxa in table 11. Twenty-eight taxa were only found in riverine habitats (Appendix C). Appendix C lists the percent frequency for all taxa found in the riverine habitat types.

3) Number of Taxa Encountered

a) By habitat type

Habitat type 13 (palustrine, emergent wetland, persistent, intermittently exposed) had the highest number of taxa containing 226 (53.0%) of all 426 taxa identified in this study. Other habitat types with high numbers of taxa in decreasing order include the following: habitat type 6 (lacustrine, littoral, unconsolidated bottom, mud), 193 (45.3%); habitat type 1 (lacustrine, littoral, rock bottom, rubble), 178 (41.7%); habitat type 7 (lacustrine, littoral, unconsolidated bottom, gravel/cobble), 173 (40.6%); habitat type 2 (lacustrine, littoral, unconsolidated bottom, sand) 148 (34.7%); habitat type 5 (lacustrine, littoral, aquatic bed, floating vascular), 140 (32.8%); and habitat type 18 (riverine, upper perennial, unconsolidated bottom, gravel/cobble), 131 (30.7%). Appendix D lists the algae identified by the 21 different habitat types.

b) By individual location

Certain individual locations also included many taxa. South Coteau Lake in Deuel County sampled on 8/31/83 contained 102 taxa and was the most diverse location sampled. Other locations with many taxa included Fox Lake, sampled on 6/21/83 (94); Mud Lake, sampled on 8/16/83 (92); Long Lake, sampled on 8/7/83 (91); Lake Goldsmith, sampled on 6/16/83 (88); Rush Lake, sampled on 7/27/83 (87); Clear Lake

(Deuel), sampled on 7/27/83 (79); Big Sioux River, sampled on 7/27/83 (77); School Lake, sampled on 8/31/83 (74); Lake Madison, sampled on 8/7/83 (70); Oak Lake, sampled on 6/21/83 (69); and West Branch of the Lac Qui Parle River, sampled on 8/31/83 (67).

Seven locations were sampled on more than one date. Sorensen's Index of Similarity (Mueller-Dumbois and Ellenberg 1974) was used to compare the change in the taxonomic composition of the algal floras at locations sampled more than once (Table 12). Algal floras changed most at East Oakwood Lake (8.9%), and least at the West Branch of the Lac Qui Parle River (50.0%). Appendix E lists the taxa found at each individual location and shows the taxonomic change in the algal floras at locations sampled on more than one date.

4) Distribution by pH, conductivity, alkalinity ranges, and by sampling method.

Although many taxa of algae were tolerant of all ranges of pH, conductivity and alkalinity, some were found in restricted ranges. Also, certain taxa were collected only by a specific sampling method. Appendix F lists all taxa identified in this survey by specific water chemistry range and sampling method.

Only four taxa were found to be restricted to circumneutral pH range (7.2-7.5). These were Ankistrodesmus spiralis, Hantzschia amphioxys, Nedium affine var. undulatum, and Synedra dorsoventralis. Seventy-five taxa were only found in the alkaline pH range (7.7-8.3) and 78 taxa were restricted to very alkaline pH range (8.5-9.2). These taxa are shown in Appendix F.

Table 12. Results of Sorensen's Index of Similarity test for locations sampled more than once.

Location	A	B	C	I.S.s
East Oakwood Lake	16 (5/15/83)	51 (6/16/83)	3	8.9%
Unnamed Creek (Hidewoods)	26 (5/18/83)	45 (6/21/83)	9	25.3%
Oak Lake	50 (5/18/83)	22 (9/22/83)	13	36.1%
Oak Lake	50 (5/18/83	69 (6/21/83)	23	38.6%
Oak Lake	69 (6/21/83)	22 (9/22/83)	14	30.8%
Fox Lake	50 (5/18/83)	93 (6/21/83)	27	37.8%
W. Br. Lac Qui Parle River	41 (6/8/83)	69 (8/31/83)	27	50.0%
Lake Poinsett	16 (7/5/83)	42 (8/16/83)	7	24.1%
Lake Campbell	58 (7/27/83)	44 (10/7/83)	17	33.3%

$$IS_S = \frac{C}{1/2(A+B)} \times 100 \text{ or } \frac{2C}{A+B} \times 100$$

A = total number of taxa found on date 1.
B = total number of taxa found on date 2.
C = total number of taxa common to the two dates sampled.

Seventy-two taxa were only found in freshwater (630-768 mmhos/cm) and 102 were restricted to oligosaline waters (850-6000 mmhos/cm). Salt Lake in Deuel County was the only location where the water was polysaline (34,000 mmhos/cm). Taxa found only in polysaline waters included Navicula gastrum var. gastrum, Oscillatoria formosa, and an unidentified species of Campylodiscus. Additional taxa found in this range were not restricted to it. These include Synedra spp., Synedra ulna, Synedra acus, Amphora ovalis, Navicula spp., Epithemia sorex, Oocystis spp., Oocystis eremosphaeria, Nitzschia spp., Anabaena spp., Gomphonema olivaceum var. calcarea, Mougeotia spp., Anomoeoneis costata var. costata, Chaetoceros elmorei, and Nostoc spp. Appendix F lists the taxa restricted to the above ranges.

Eleven taxa of algae were found only in waters of very low alkalinity (41-76 mg/l $CaCO_3$). Fifty-three were restricted to low alkalinity surface waters (140-195 mg/l $CaCO_3$). Eighty-two taxa were restricted to medium alkalinity (218-298 mg/l $CaCO_3$) and 18 were found only in high alkalinity (343-487 mg/l $CaCO_3$) surface waters. Appendix F lists the algae restricted to these ranges.

Fifty-four taxa were only collected by the Wisconsin plankton net. Ninety-five taxa were restricted to Aufwuchs collections, and 20 taxa were only collected by water bottle. Appendix F lists the taxa collected by the above sampling methods.

B) Statistical comparisons between habitat types

The algal communities within seven habitat types could be compared statistically (Table 13). All the habitats which could be com-

pared contained significantly different algal floras measured at the .01 and .05 levels with the exception of habitat type 1 (lacustrine, littoral, rubble) and habitat type 2 (lacustrine, littoral, sand). These two habitats were not shown to be significantly different from each other.

C) Statistical comparisons within habitat types

1) Habitat type 1 (lacustrine, rubble) and habitat type 2 (lacustrine, sand) pooled.

Within lacustrine rubble and sand bottom habitats pooled, all sampling method comparisons were shown to be significantly different based on the algae present except for plankton net tow and plankton water bottle samples (Table 14).

All water chemistry comparisons which could be made were shown to be significantly different except for low and medium alkalinity ranges (Table 14). The algae present within fresh water were significantly different from those within oligosaline water, therefore, it can be assumed that these two ranges are different. The comparison of alkaline pH and very alkaline pH showed that the algae within these ranges were significantly different. The composition of algae present within the low alkalinity range were not significantly different from those in the medium alkalinity range, therefore, it can be assumed that these ranges are not different.

2) Habitat type 6 (lacustrine, littoral, mud)

Comparisons within lacustrine, mud bottom habitats, only involved plankton net tows and aufwuchs samples. The algae did not

Table 13. Determination of significant differences in the taxonomic composition of algae between habitat types (Chi-Square Test).

Habitat #	1	2	5	6	7	13	18
1	------	.0621	------	.0018**	------	.0001**	.0001**
2	------	------	.0201*	.0003**	.0057**	------	.0001**
5	------	------	------	------	.0452*	------	.0001**
6	------	------	------	------	------	.0001**	------
7	------	------	------	------	------	------	.0001**
13	------	------	------	------	------	------	.0001**

* - significant
** - highly significant

	Habitat 1	Habitat 2	Habitat 5	Habitat 6
System	Lacustrine	Lacustrine	Lacustrine	Lacustrine
Subsystem	Littoral	Littoral	Littoral	Littoral
Class	Rock bottom	Uncon. bottom	Aqua. bed	Uncon. bottom
Subclass	Rubble	Sand	Float. vas.	Mud
Water regime	Inter. exposed	Inter. exposed	Inter. exposed	Inter. exposed

	Habitat 7	Habitat 13	Habitat 18
System	Lacustrine	Palustrine	Riverine
Subsystem	Littoral	----------	Upper per.
Class	Uncon. bottom	Emer. wet.	Uncon. bottom
Subclass	Gravel/cobble	Persistent	Gravel/cobble
Water regime	Inter. exposed	Inter. exposed	Inter. exposed

Table 14. Determination of significant differences in the taxonomic composition of algae between specific pH ranges, conductivity ranges, alkalinity ranges, and sampling methods, within habitat types 1 and 2 pooled (Chi-Square Test).+

	Oligosaline	Very Alkaline	Medium Alkalinity	Aufwuchs	Water Bottle
Fresh	.0411*	------	------	------	------
Alkaline	------	.0001**	------	------	------
Low alkalinity	------	------	.0748	------	------
Tow	------	------	------	.0153*	.8794
Water bottle	------	------	------	.0377*	------

* - significantly different
** - highly significantly different
\+ - Conductivity, pH and alkalinity ranges are shown in Table 2. Habitat type descriptions are shown in Table 6.

differ significantly (Chi-Square = .9821).

3) Habitat type 13 (palustrine, emergent wetland, persistent)

Comparisons within palustrine, emergent wetland, only involved medium and high alkalinities. The algae did not differ significantly between these two ranges (Chi-Square Test = .3620).

DISCUSSION

A) Description of the algal flora

Out of the 426 different taxa of algae identified in this study, 200 (46.9%) are thought to be newly reported for this region (Appendix B). There are a number of possible reasons for the large percentage of new forms. Prior studies dealt primarily with prairie lakes (lacustrine habitats) and planktonic forms. Many authors did not identify algae past the genus level. Also, many authors were interested only in the bluegreen bloom formers and ignored identifying others.

The most common taxa identified were not restricted to either lacustrine, palustrine or riverine habitat types, but were found in all three (Appendix C). Most taxa restricted to a given system had low percent frequency of occurrence, even within the habitat type to which they were restricted (Appendix C). Perhaps if these taxa were more abundant they might be found in all three systems. The similarity of common algal taxa between different habitats should aid wetland ecologists and aquatic biologists by minimizing the number of common algal taxa they need to identify. Identification should be easier having a list of the more common taxa they may encounter as a reference. Identification of the less common taxa should also be simplified by the habitat and location lists generated in this study. The listing of taxa found at individual locations should also provide a frame of reference by which future changes in algal species composition can be monitored. Changes in water quality can lead to a different assemblage of algal flora which can indicate if the change was beneficial or

detrimental.

Haertel (1976, 1980) documented such a change in the algal flora at Lake Cochrane. That lake changed from being primarily a dinoflagellate lake (Peridium bipes, Ceratium hirundinella) with some Anacystis cyanea in 1970, to a bluegreen lake (Anacystis incerta, Gomphosphaeria spp., Coccochloris peniocystis, Lyngbya contorta, Agmenellum thermale) in 1971-79. Hutchinson (1967) considers the change from dinoflagellate to bluegreen flora as indicative of an increase in eutrophication.

Many taxa of algae that were restricted to specific ranges of pH, alkalinity, and conductivity had low percent frequency of occurrence, and in many cases were only found once. Perhaps if these taxa were found more often they might occupy other water chemistry ranges. Most taxa with greater frequency of occurrence were found in more than one range of pH, alkalinity, and conductivity (Appendix F).

B) Statistical comparisons between habitat types

Based on the statistical analysis of habitat types compared (Table 13), it appears the classification system by Cowardin et al. (1979) used in this study has some application to algal populations. All but one of the habitat comparisons were assumed to be different from each other because the algae present within each habitat were significantly different. However, only 7 of the 21 habitat types sampled could be compared statistically. Perhaps if more of the habitat types were compared, more of the comparisons may have proved to be non-significant.

C) Statistical comparisons within habitat types

1) Habitat type 1 (lacustrine, rubble) and habitat type 2 (lacustrine, sand) pooled.

The chemical variables pH and conductivity appear to have the greatest influence on presence or absence of algae based on statistical tests (Table 14). The taxonomic composition of algae was significantly different between the ranges compared so it can be assumed that the water chemistry ranges selected are of significance to algal populations.

Alkalinity may not be an important factor influencing the presence or absence of algae in this region. The taxonomic composition of algae was not significantly different between the two alkalinity ranges compared (Table 14). It can be assumed that these ranges of alkalinity are no different in terms of the algae present. Ellis (1955) stated that alkalinity values greater than 83 mg/l $CaCO_3$ were considered high. Most of the algae that were restricted to certain alkalinity ranges were found in waters with values greater than 140 mg/l $CaCO_3$, so the breakdown of alkalinity values used in this study may not be necessary. Sletten (1984) also stated that most wetlands of the northern Great Plains are subject to daily, seasonal, and yearly fluctuations in alkalinity. If these statements are true, most algae in this region are found in high alkalinity surface waters and must be tolerant to changes in order to survive.

The results show there may be selectivity in sampling methods (Table 14). The tow and water bottle collections tend to select for planktonic forms while the aufwuchs collections select for

benthic or periphytic forms. This indicates that it is essential to use more than one type of sampling method.

2) Habitat 6 (lacustrine, littoral, mud)

The results show that there was no selectivity in sampling methods (tow vs. Aufwuchs) in this particular habitat type. One would expect that there should be a difference, because the two sampling methods sample different microhabitats. Perhaps the mud substrate is not suitable for establishing a dominant aufwuchs community and so a difference was not detected.

3) Habitat 13 (palustrine, emergent wetland, persistent)

The results of the alkalinity range comparisons show that they were not significantly different. Again this shows that alkalinity may not be a factor influencing the distribution of algae in this region.

SUMMARY AND CONCLUSIONS

This study listed algae found in eastern South Dakota wetlands by percent frequency of occurrence, habitat type, location, specific water chemistry ranges, and sampling methods.

Four hundred and twenty-six taxa of algae were found in eastern South Dakota wetlands. Two hundred (46.9%) of the algae identified were not previously reported in this region. The phyla Chlorophyta, Chrysophyta, and Cyanophyta dominated the total.

Algal distribution appeared to follow the wetland classification system by Cowardin et al. (1979). All but one of the habitat comparisons that could be compared statistically were found to be different because the algal composition within the habitat types compared were significantly different from each other.

The most common taxa identified were not restricted to either lacustrine, palustrine, or riverine habitat types, but were found in all three. Most taxa restricted to a given system had low percent frequency of occurrence, even within the habitat type to which they were restricted.

Many of the algae were tolerant of all ranges of pH, conductivity and alkalinity. Based on statistical tests, conductivity and pH appear to have the greatest influence on the presence or absence of algae because the taxonomic composition was significantly different. Alkalinity may not be much of a factor because the ranges compared were not assumed to be different.

Distribution of algae occurring in riverine and palustrine

wetlands is an area of wetland ecology that has been neglected in the past. The information gathered in this study should aid wetland ecologists who need more complete information on the distribution of algae in wetlands. Changes in algal flora at locations sampled can also be monitored.

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APPENDIX A

List of Algae Identified Following the classification systems of Prescott (1970) and Drouet (1959).

I. Phylum Chlorophyta
  A. Sub-Phylum Chlorophyceae
    1) Order Volvocales
      Family Chlamydomonadaceae
        Chlamydomonas spp.
        Polytoma spp.
      Family Phacotaceae
        Dymsorphococcus variabilis
      Family Volvocaceae
        Eudorina spp.
        Eudorina elegans
        Pandorina spp.
        Pandorina morum
        Volvox spp.
    2) Order Tetrasporales
      Family Gloeocystaceae
        Gloeocystis spp.
        Gloeocystis major
        Gloeocystis versiculosa
    3) Order Chlorococcales
      Family Chlorococcaceae
        Characium spp.
        Characium ambiguum
        Characium falcatum
        Characium gracilipes
        Characium limneticum
        Characium ornithocephalum
        Polyedriopsis spinulosa
        Schroederia spp.
        Schroederia Judayi
        Schroederia setigera
        Tetraedron spp.
        Tetraedron caudatum
        Tetraedron enorme
        Tetraedron hastatum
        Tetraedron limneticum
        Tetraedron minimum
        Tetraedron muticum
        Tetraedron muticum fa. *punctulatum*
        Tetraedron regulare
        Tetraedron regulare var. *torsum*
        Tetraedron trigonum
        Tetraedron trigonum var. *gracile*

Family Palmellaceae
- Palmella mucosa
- Sphaerocystis spp.
- Sphaerocystis Schroeteri

Family Oocystaceae
- Ankistrodesmus spp.
- Ankistrodesmus convolutus
- Ankistrodesmus falcatus
- Ankistrodesmus falcatus var. acicularis
- Ankistrodesmus falcatus var. mirabilis
- Ankistrodesmus spiralis
- Closteriopsis spp.
- Closteriopsis longissima
- Closteriopsis longissima var. tropica
- Franceia Droescheri
- Kirchneriella spp.
- Kirchneriella contorta
- Kirchneriella subsolitaria
- Lagerheimia spp.
- Lagerheimia longiseta
- Lagerheimia quadriseta
- Lagerheimia subsalsa
- Nephrocytium spp.
- Nephrocytium Agardhianum
- Oocystis spp.
- Oocystis Borgei
- Oocystis crassa
- Oocystis elliptica
- Oocystis Eremosphaeria
- Oocystis parva
- Oocystis pusilla
- Oocystis solitaria
- Oocystis submarina
- Quadrigula spp.
- Quadrigula chodatii
- Selenastrum spp.
- Selenastrum minutum
- Selenastrum Westii
- Treubaria setigerum

Family Micractiniaceae
- Golenkinia spp.
- Micractinium spp.
- Micractinium pusillum

Family Dictyosphaeriaceae
- Botryococcus spp.
- Botryococcus protuberans
- Botryococcus sudeticus
- Dictyosphaerium spp.
- Dictyosphaerium pulchellum

Family Scenedesmaceae
- Actinastrum spp.
- Actinastrum gracilimum
- Actinastrum Hantzschii
- Coelastrum spp.
- Coelastrum microporum
- Coelastrum sphaericum
- Crucigenia spp.
- Crucigenia apiculata
- Crucigenia tetrapedia
- Crucigenia quadrata
- Scenedesmus spp.
- Scenedesmus abundans
- Scenedesmus abundans var. asymmetrica
- Scenedesmus abundans var. brevicauda
- Scenedesmus abundans var. longicauda
- Scenedesmus acuminatus
- Scenedesmus acuminatus var. minor
- Scenedesmus acutiformis
- Scenedesmus arcuatus
- Scenedesmus arcuatus var. capitatus
- Scenedesmus arcuatus var. platydisca
- Scenedesmus armatus
- Scenedesmus brasiliensis
- Scenedesmus Bernardii
- Scenedesmus bijuga
- Scenedesmus bijuga var. alternans
- Scenedesmus bijuga var. flexuosus
- Scenedesmus dimorphus
- Scenedesmus incrassatulus
- Scenedesmus longus var. ellipticus
- Scenedesmus obliquus
- Scenedesmus opoliensis
- Scenedesmus opoliensis var. contracta
- Scenedesmus quadricauda
- Scenedesmus quadricauda var. longispina
- Scenedesmus quadricauda var. maximus
- Scenedesmus quadricauda var. parvus
- Scenedesmus quadricauda var. quadrispina
- Scenedesmus quadricauda var. Westii
- Tetrastrum staurogeniaeforme

Family Hydrodictyaceae
- Euastropsis Richteri
- Pediastrum spp.
- Pediastrum biradiatum var. emarginatum fa. convexum
- Pediastrum boryanum
- Pediastrum duplex
- Pediastrum duplex var. clathratum
- Pediastrum duplex var. gracilimum

Pediastrum duplex var. reticulatum
Pediastrum integrum var. priva
Pediastrum simplex var. duodenarium
Pediastrum tetras
Pediastrum tetras var. tetraodon
Family Coccomyxaceae
Elakotothrix viridis
4) Order Ulotrichales
Family Ulotrichaceae
Ulothrix spp.
Ulothrix subtilissima
Family Microsporaceae
Microspora spp.
Microspora pachyderma
Family Cylindrocapsaceae
Cylindrocapsa spp.
Cylindrocapsa conferta
5) Order Chaetophorales
Family Chaetophoraceae
Chaetophora spp.
Chaetophora incrassata
Chaetophora elegans
Desmococcus viridis
Draparnaldia spp.
Microthamnion strictissimum
Protoderma viride
Stigeoclonium spp.
Stigeoclonium lubricum
Stigeoclonium polymorphum
Stigeoclonium subsecundum
Family Coleochaetaceae
Coleochaetae spp.
Coleochaetae divergens
Coleochaetae orbicularis
6) Order Trentepohliales
Family Trentepohliaceae
Trentepohlia spp.
7) Order Oedegoniales
Family Oedogoniaceae
Bulbochaetae spp.
Oedogonium spp.
8) Order Siphonocladales
Family Cladophoraceae
Cladophora spp.
Cladophora glomerata
Pithophora spp.
Rhizoclonium spp.
Rhizoclonium hieroglyphicum
Rhizoclonium Hookeri

9) Order Zygnematales
Family Zygnemataceae
Mougeotia spp.
Spirogyra spp.
Zygnema spp.
Family Desmidiaceae
Closterium spp.
Closterium acerosum
Closterium acerosum var. *elongatum*
Closterium acutum
Closterium dianae
Closterium ehrenbergii
Closterium moniliferum
Closterium leibleinii
Closterium venus
Cosmarium spp.
Cosmarium constrictum
Cosmarium formosulum
Cosmarium granatum
Cosmarium meneghinii
Cosmarium nitidulum
Cosmarium protractum
Cosmarium sexangulare
Cosmarium subcostatum
Spondylosium spp.
Staurastrum spp.
Staurastrum alternans
Staurastrum gracile
Staurastrum margaritaceum
Staurastrum paradoxum
Staurastrum polymorphum
Staurastrum punctulatum

B) Sub-Phylum Charophyceae
1) Order Charales
Family Characeae
Chara spp.

II. Phylum Euglenophyta
1) Order Euglenales
Family Euglenaceae
Euglena spp.
Euglena acus
Euglena Ehrenbergii
Phacus spp.
Trachelomonas spp.

III. Phylum Pyrrophyta
Class Dinophyceae
1) Order Dinokontae
Family Peridiniaceae
Peridinium spp.

Family Ceratiaceae
Ceratium spp.
Ceratium hirundinella

IV. Phylum Cryptophyta
Family Cryptomonadaceae
Cryptomonas spp.

V. Phylum Chloromonadophyta
Family Chloromonadaceae
Vacuolaria virescens

VI. Phylum Chrysophyta
A. Sub-phylum Xanthophyceae
1) Order Mishococcales
Family Characiopsidaceae
Characiopsis spp.
Family Sciadaceae
Ophiocytium spp.
Ophiocytium capitatum var. *longispinum*
2) Order Tribonematales
Family Tribonemataceae
Tribonema spp.
3) Order Vaucheriales
Family Vaucheriaceae
Vaucheria spp.
B. Sub-phylum Chrysophyceae
1) Order Ochromonadales
Family Dinobryaceae
Dinobryon spp.
Dinobryon sertularia
Dinobryon Vanhoeffenii
C. Sub-phylum Bacillariophyceae
1) Order Centrales
Family Coscinodiscaceae
Coscinodiscus spp.
Coscinodiscus lacustris
Cyclotella spp.
Cyclotella bodanica
Cyclotella meneghiniana
Melosira spp.
Melosira islandica
Melosira granulata
Stephanodiscus spp.
Stephanodiscus astraea
Stephanodiscus niagarae
Family Chaetoceraceae
Chaetoceros Elmorei
Family Rhizosoleniaceae
Rhizosolenia spp.

2) Order Pennales
Family Fragilariaceae
Asterionella spp.
Asterionella formosa
Diatoma spp.
Diatoma vulgare
Fragilaria spp.
Fragilaria capucina var. *capucina*
Fragilaria construens var. *construens*
Fragilaria construens var. *binodis*
Fragilaria crotonensis var. *crotonensis*
Fragilaria pinnata var. *pinnata*
Meridion circulare
Opephora spp.
Opephora martyi
Synedra spp.
Synedra acus
Synedra capitata var. *capitata*
Synedra dorsoventralis
Synedra fasciculata var. *fasciculata*
Synedra incisa var. *incisa*
Synedra pulchella var. *pulchella*
Synedra rumpens var. *rumpens*
Synedra ulna
Synedra ulna var. *longissima*
Family Eunotiaceae
Eunotia spp.
Eunotia curvata var. *curvata*
Eunotia pectinalis
Family Achnanthaceae
Achnanthes spp.
Achnanthes lanceolata var. *lanceolata*
Cocconeis spp.
Cocconeis pendiculus
Cocconeis placentula
Rhoicosphenia curvata
Family Naviculaceae
Amphipleura pellucida var. *pellucida*
Amphiprora spp.
Amphiprora alata
Amphiprora ornata
Anomoeoneis costata var. *costata*
Caloneis spp.
Caloneis amphisbaena var. *amphisbaena*
Caloneis bacillum var. *bacillum*
Caloneis lewisii var. *lewisii*
Caloneis limosa var. *limosa*
Caloneis ventricosa var. *ventricosa*
Diploneis spp.

Diploneis smithii
Frustulia spp.
Gyrosigma spp.
Gyrosigma macrum
Gyrosigma spenceri var. spenceri
Mastogloia spp.
Mastogloia smithii
Navicula spp.
Navicula accomoda var. accomoda
Navicula bacillum var. bacillum
Navicula capitata var. capitata
Navicula capitata var. hungarica
Navicula cincta var. cincta
Navicula cryptocephala var. cryptocephala
Navicula cuspidata var. cuspidata
Navicula elginensis var. elginensis
Navicula exigua var. capitata
Navicula gastrum var. gastrum
Navicula halophila fa. tenuirostris
Navicula pupula var. pupula
Navicula pupula var. capitata
Navicula pupula var. rectangularis
Navicula radiosa var. radiosa
Navicula radiosa var. tenella
Navicula reinhardhii var. reinhardhii
Navicula reinhardhii var. elliptica
Navicula salinarum var. salinarum
Navicula salinarum var. intermedia
Navicula tripunctata var. tripunctata
Nedium spp.
Nedium affine var. undulatum
Nedium iridis var. iridis
Pinnularia spp.
Pinnularia gibba
Pinnularia maior var. maior
Pinnularia mesolepta var. mesolepta
Pinnularia microstauron var. microstauron
Pinnularia viridis var. viridis
Stauroneis spp.
Stauroneis anceps var. anceps
Stauroneis anceps fa. gracilis
Stauroneis smithii var. smithii
Stauroneis phoenicenteron var. phoenicenteron
Tropidoneis lepidoptera

Family Gomphonemataceae

Gomphonema spp.
Gomphonema acuminatum
Gomphonema acuminatum var. coronatum
Gomphonema angustatum

Gomphonema constrictum
Gomphonema gracile var. dichotoma
Gomphonema montanum var. subclavatum
Gomphonema olivaceum
Gomphonema olivaceum var. calcarea
Gomphonema parvulum

Family Cymbellaceae
Amphora spp.
Amphora ovalis
Cymbella spp.
Cymbella affinis
Cymbella aspera
Cymbella cuspidata
Cymbella cymbiformis
Cymbella gracilis
Cymbella lanceolata
Cymbella mexicanum
Cymbella parva
Cymbella prostrata
Cymbella triangulum
Cymbella tumida
Cymbella turgida
Cymbella ventricosa

Family Epithemiaceae
Epithemia spp.
Epithemia turgida
Epithemia sorex
Rhopalodia gibba
Rhopalodia gibberula
Rhopalodia ventricosa

Family Nitzschiaceae
Hantzschia spp.
Hantzschia amphioxys
Hantzschia amphioxys var. vivax
Nitzschia spp.
Nitzschia amphibia
Nitzschia commutata
Nitzschia linearis
Nitzschia linearis var. tenuis
Nitzschia lorenziana
Nitzschia palea
Nitzschia sigmoidea
Nitzschia vermicularus

Family Surirellaceae
Campylodiscus spp.
Campylodiscus noricus
Cymatopleura spp.
Cymatopleura elliptica
Cymatopleura elliptica var. spiralis
Cymatopleura solea
Surirella spp.

Surirella angustata
Surirella elegans
Surirella linearis
Surirella ovalis
Surirella spiralis
Surirella splendida
Surirella striatula

VIII. Phylum Cyanophyta
1) Order Chroococcales
Family Chroococcaceae -- classified according to F. Drouet (1959)
Agmenellum spp. (Merismopedia spp.)
Agmenellum thermale (Merismopedia glauca)
Agmenellum thermale (Merismopedia elegans var. major)
Agmenellum quadruplicatum (Merismopedia tenuissima)
Anacystis spp.
Anacystis spp. (Gloeocapsa spp.)
Anacystis spp. (Gloeocapsa punctata)
Anacystis spp. (Gloeocapsa rupestris)
Anacystis spp. (Chroococcus spp.)
Anacystis cyanea (Microcystis aeruginosa)
Anacystis cyanea (Chroococcus minor)
Anacystis cyanea (Chroococcus dispersus)
Anacystis dimidiata (Chroococcus limneticus)
Anacystis incerta (Microcystis incerta)
Coccochloris spp.
Coccochloris spp. (Aphanothece spp.)
Coccochloris spp. (Dactylococcopsis fascicularis)
Coccochloris spp. (Gloeothece rupestris)
Coccochloris spp. (Synechocystis aquatilis)
Gomphosphaeria spp.
Gomphosphaeria spp. (Coelosphaerium spp.)
Gomphosphaeria aponina
Gomphosphaeria lacustris var. compacta
2) Order Chamaesiphonales
Family Pleurocapsaceae
Pleurocapsa minor (Entophysalis spp.)
3) Order Oscillatoriales
Family Oscillatoriaceae
Arthrospira spp.
Arthrospira gomontiana
Arthrospira Jenneri
Lyngbya spp.
Lyngbya aerugineo-caerulea
Lyngbya aestuari
Lyngbya contorta
Lyngbya Diguetii
Lyngbya limnetica
Lyngbya Nordgaardi
Lyngbya versicolor

Oscillatoria spp.
Oscillatoria acutissima
Oscillatoria agardhii
Oscillatoria amphibia
Oscillatoria anguina
Oscillatoria angusta
Oscillatoria angustissima
Oscillatoria articulata
Oscillatoria chalybea
Oscillatoria formosa
Oscillatoria granulata
Oscillatoria limnetica
Oscillatoria limosa
Oscillatoria nigra
Oscillatoria prolifica
Oscillatoria subbrevis
Oscillatoria splendida
Oscillatoria tenuis
Oscillatoria terebriformis
Spirulina spp.
Spirulina laxa
Spirulina major
Spirulina princeps
Spirulina subsalsa

4) Order Nostocales
Family Nostocaceae
Anabaena spp.
Anabaena affinis
Anabaena circinalis
Anabaena spiroides
Aphanizomenon spp.
Aphanizomenon flos-aquae (*Aphanizomenon holsaticum*)
Aphanizomenon ovalisporum
Nostoc spp.
Family Rivulariaceae
Calothrix spp.
Gloeotrichia echinulata
Gloeotrichia natans
Rivularia minutula

APPENDIX B

List of algae identified in this study by the authors who previously identified the same taxa in South Dakota

	Author # (See footnotes for author name.)
I. Chlorophyta	
A) Chlorophyceae	
Actinastrum spp.	
Actinastrum gracilimum	1
Actinastrum Hantzschii	1, 2
Ankistrodesmus spp.	15
Ankistrodesmus convolutus	
Ankistrodesmus falcatus	1, 2, 12, 16
Ankistrodesmus falcatus var. acicularis	1
Ankistrodesmus falcatus var. mirabilis	1
Ankistrodesmus spiralis	
Botryococcus spp.	15
Botryococcus protuburans var. minor	
Botryococcus sudeticus	
Bulbochaetae spp.	
Chaetophora spp.	15
Chaetophora elegans	
Chaetophora incrassata	
Characium spp.	1, 2
Characium ambiguum	
Characium falcatum	
Characium gracilipes	
Characium limneticum	2
Characium ornithocephalum	
Chlamydomonas spp.	2, 10, 13
Cladophora spp.	15

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Cladophora glomerata	10, 16
Closteriopsis spp.	1
Closteriopsis longissima	2
Closteriopsis longissima var. tropica	
Closterium spp.	1, 2, 13, 15
Closterium acerosum	16
Closterium acerosum var. elongatum	
Closterium acutum	
Closterium dianae	
Closterium ehrenbergii	
Closterium moniliferum	
Closterium leibleinii	
Closterium venus	
Coelastrum spp.	
Coelastrum microporum	1, 2
Coelastrum sphaericum	
Coleochatae spp.	13
Coleochaete divergens	
Coleochaete orbicularis	
Cosmarium spp.	2, 13, 16
Cosmarium constrictum	
Cosmarium formosulum	
Cosmarium granatum	
Cosmarium meneghinii	
Cosmarium nitidulum	
Cosmarium protractum	
Cosmarium sexangulare	
Cosmarium subcostatum	
Crucigenia spp.	2, 15

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Crucigenia apiculata	1
Crucigenia tetrapedia	1, 2
Crucigenia quadrata	1, 2, 10
Cylindrocapsa spp.	
Cylindrocapsa conferta	
Desmococcus viridis	16
Dictyosphaerium spp.	2, 15
Dictyosphaerium pulchellum	1, 2
Draparnaldia spp.	
Dysmorphococcus variabilis	
Elakatotrix viridis	
Euastropsis Richteri	
Eudorina spp.	
Eudorina elegans	1, 2
Franceia Droescheri	2
Gloeocystis spp.	1, 13
Gloeocystis major	
Gloeocystis versiculosa	16
Golenkinia spp.	2, 13
Kirchneriella spp.	10
Kirchneriella contorta	1
Kirchneriella subsolitaria	1
Lagerheimia spp.	
Lagerheimia longiseta	
Lagerheimia quadriseta	2
Lagerheimia subsalsa	2
Micractinium spp.	
Micractinium pusillum	1, 2
Microspora spp.	13

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Microspora pachyderma	
Microthamnion strictissimum	
Mougeotia spp.	1, 2, 13, 15
Nephrocytium spp.	
Nephrocytium Agardhianum	
Oedogonium spp.	2, 13, 16
Oocystis spp.	2, 10
Oocystis Borgei	1, 2
Oocystis crassa	2
Oocystis elliptica	
Oocystis Eremosphaeria	
Oocystis parva	
Oocystis pusilla	
Oocystis solitaria	
Oocystis submarina	
Palmella mucosa	
Pandorina spp.	
Pandorina morum	
Pediastrum spp.	2, 7, 10, 13, 14, 15
Pediastrum biradiatum v. emarginatum fa. convexum	
Pediastrum boryanum	1
Pediastrum duplex	1, 2, 16
Pediastrum duplex var. clathratum	1, 2
Pediastrum duplex var. gracilimum	
Pediastrum duplex var. reticulatum	1, 2
Pediastrum integrum var. priva	
Pediastrum simplex var. duodenarium	1, 2
Pediastrum tetras	2

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Pediastrum tetras	2
Pediastrum tetras var. tetraodon	1, 2
Pithophora spp.	
Polyedriopsis spinulosa	
Polytoma spp.	2
Protoderma viride	
Quadrigula spp.	
Quadrigula chodatii	
Rhizoclonium spp.	13
Rhizoclonium hieroglyphicum	
Rhizoclonium Hookeri	
Scenedesmus spp.	2, 9, 10, 13, 15
Scenedesmus abundans	1, 2
Scenedesmus abundans var. asymmetrica	
Scenedesmus abundans var. brevicauda	2
Scenedesmus abundans var. longicauda	2
Scenedesmus acuminatus	1
Scenedesmus acuminatus var. minor	
Scenedesmus acutiformis	
Scenedesmus arcuatus	1, 2
Scenedesmus arcuatus var. capitatus	1
Scenedesmus arcuatus var. platydisca	1
Scenedesmus armatus	2
Scenedesmus brasiliensis	
Scenedesmus Bernardii	1
Scenedesmus bijuga	1, 2
Scenedesmus bijuga var. alternans	1, 2
Scenedesmus bijuga var. flexuosus	1
Scenedesmus dimorphus	1, 2

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Scenedesmus incrassatulus	2
Scenedesmus longus var. ellipticus	2
Scenedesmus obliquus	
Scenedesmus opoliensis	1, 2
Scenedesmus opoliensis var. contracta	
Scenedesmus quadricauda	1, 2, 16
Scenedesmus quadricauda var. longispina	2
Scenedesmus quadricauda var. maximus	
Scenedesmus quadricauda var. parvus	1, 2
Scenedesmus quadricauda var. quadrispina	
Scenedesmus quadricauda var. Westii	
Schroederia spp.	2
Schroederia Judayi	1, 2
Schroederia setigera	1, 2
Selenastrum spp.	1, 13, 15
Selenastrum minutum	2
Selenastrum Westii	
Spirogyra spp.	1, 2, 13, 15
Spondylosium spp.	
Sphaerocystis spp.	13
Sphaerocystis Schroeteri	1, 2, 10
Staurastrum spp.	2, 13
Staurastrum alternans	
Staurastrum gracile	
Staurastrum margaritaceum	
Staurastrum paradoxum	13
Staurastrum polymorphum	
Staurastrum punctulatum	

	Author # (See footnotes for author name.)
Stigeoclonium spp.	
Stigeoclonium lubricum	
Stigeoclonium polymorphum	
Stigeoclonium subsecundum	
Tetraedron spp.	2, 13
Tetraedron caudatum	2
Tetraedron enorme	
Tetraedron hastatum	1, 2
Tetraedron limneticum	1
Tetraedron minimum	1, 2
Tetraedron muticum	1, 2
Tetraedron muticum fa. *punctulatum*	
Tetraedron regulare	2
Tetraedron regulare var. *torsum*	
Tetraedron trigonum	1, 2
Tetraedron trigonum var. *gracile*	1, 2
Tetrastrum staurogeniaeforme	1, 2
Treubaria setigerum	1
Trentepohlia spp.	
Ulothrix spp.	1, 14, 15
Ulothrix subtilissima	
Volvox spp.	
Zygnema spp.	15
B) Charophyceae	
Chara spp.	4, 16
II. Euglenophyta	
Euglena spp.	13
Euglena acus	1

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Euglena Ehrenbergii	1, 2, 16
Phacus spp.	
Trachelomonas spp.	2
III. Pyrrophyta	
A) Dinophyceae	
Ceratium spp.	7, 13, 14
Ceratium hirundinella	1, 2, 5, 6, 16
Peridinium spp.	2, 14
IV. Cryptophyta	
Cryptomonas spp.	1, 2, 6
V. Chloromonadophyta	
Vacuolaria virescens	
VI. Chrysophyta	
A) Xanthophyceae	
Characiopsis spp.	10
Ophiocytium spp.	
Ophiocytium capitatum var. *longispinum*	
Tribonema spp.	13, 15
Vaucheria spp.	13, 15, 16
B) Chrysophyceae	
Dinobryon spp.	7, 10, 13
Dinobryon sertularia	1, 2
Dinobryon Vanhoeffenii	

APPENDIX B (continued)

	Author # (See footnotes for author name.)
C) Bacillariophyceae	
1) Centrales	
Chaetoceros Elmorei	1, 6
Coscinodiscus spp.	15
Coscinodiscus lacustris	
Cyclotella spp.	2, 6, 10, 16
Cyclotella bodanica	
Cyclotella meneghiniana	1, 2
Melosira spp.	2, 7, 10, 13, 15
Melosira islandica	2
Melosira granulata	1, 2
Rhizosolenia spp.	
Stephanodiscus spp.	2, 6, 7, 10, 13
Stephanodiscus astraea	1, 2
Stephanodiscus niagarae	1,2
2) Pennales	
Achnanthes spp.	
Achnanthes lanceolata var. lanceolata	
Amphipleura pellucida var. pellucida	
Amphiprora spp.	6, 13
Amphiprora alata	
Amphiprora ornata	
Amphora spp.	
Amphora ovalis	2
Anomoeoneis costata var. costata	
Asterionella spp.	2, 7, 13, 15
Asterionella formosa	1, 2, 6, 10, 12
Caloneis spp.	
Caloneis amphisbaena var. amphisbaena	1

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Caloneis bacillum var. bacillum	
Caloneis lewisii var. lewisii	1
Caloneis limosa var. limosa	
Caloneis ventricosa var. ventricosa	
Campylodiscus spp.	
Campylodiscus noricus	
Cocconeis spp.	13
Cocconeis pendiculus	
Cocconeis placentula	1, 2
Cymatopleura spp.	
Cymatopleura elliptica	1
Cymatopleura elliptica var. spiralis	
Cymatopleura solea	1
Cymbella spp.	2, 10, 13, 15, 16
Cymbella affinis	2
Cymbella aspera	
Cymbella cuspidata	
Cymbella cymbiformis	1
Cymbella gracilis	
Cymbella lanceolata	
Cymbella mexicanum	1
Cymbella parva	
Cymbella prostrata	2
Cymbella triangulum	1
Cymbella tumida	
Cymbella turgida	2
Cymbella ventricosa	1
Diatoma spp.	13, 15
Diatoma vulgare	

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Diploneis spp.	
Diploneis smithii	
Epithemia spp.	
Epithemia sorex	1
Epithemia turgida	1
Eunotia spp.	15
Eunotia curvata var. curvata	
Eunotia pectinalis	
Fragilaria spp.	7, 10, 13, 15
Fragilaria capucina var. capucina	1, 2
Fragilaria construens var. contruens	1, 2
Fragilaria construens var. binodis	
Fragilaria crotonensis var. crotonensis	1, 2, 6, 12, 16
Fragilaria pinnata var. pinnata	
Frustulia spp.	
Gomphonema spp.	2, 10, 13, 15, 16
Gomphonema acuminatum	
Gomphonema acuminatum var. coronatum	
Gomphonema angustatum	1
Gomphonema constrictum	2
Gomphonema gracile var. dichotoma	
Gomphonema montanum var. subclavatum	
Gomphonema olivaceum	1
Gomphonema olivaceum var. calcarea	
Gomphonema parvulum	1
Gyrosigma spp.	2, 13, 15
Gyrosigma macrum	
Gyrosigma spenceri var. spenceri	
Hantzschia spp.	6, 10

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Hantzschia amphioxys	1
Hantzschia amphioxys var. vivax	
Mastogloia spp.	
Mastogloia smithii	
Meridion circulare	2, 13, 15
Navicula spp.	2, 13, 14, 15, 16
Navicula accomoda var. accomoda	
Navicula bacillum var. bacillum	
Navicula capitata var. capitata	1
Navicula capitata var. hungarica	
Navicula cincta var. cincta	
Navicula cryptocephala var. cryptocephala	
Navicula cuspidata var. cuspidata	1, 2
Navicula elginensis var. elginensis	
Navicula exigua var. capitata	2
Navicula gastrum var. gastrum	1, 2
Navicula halophila var. tenuirostris	
Navicula pupula var. pupula	
Navicula pupula var. capitata	
Navicula pupula var. rectangularis	
Navicula radiosa var. radiosa	
Navicula radiosa var. tenella	
Navicula reinhardhii var. reinhardhii	1
Navicula reinhardhii var. elliptica	
Navicula salinarum var. salinarum	
Navicula salinarum var. intermedia	
Navicula tripunctata var. tripunctata	
Nedium spp.	1
Nedium affine var. undulatum	

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Nedium iridis var. iridis	
Nitzschia spp.	2, 15
Nitzschia amphibia	1
Nitzschia commutata	1
Nitzschia linearis	2
Nitzschia linearis var. tenuis	
Nitzschia lorenziana	2
Nitzschia palea	1, 2
Nitzschia sigmoidia	1, 2, 6
Nitzschia vermicularis	1
Opephora spp.	
Opephora martyi	
Pinnularia spp.	
Pinnularia gibba	
Pinnularia maior var. maior	
Pinnularia mesolepta var. mesolepta	
Pinnularia microstauron var. microstauron	1
Pinnularia viridis var. viridis	
Rhoicosphenia curvata	1, 2
Rhopalodia gibba	1,2
Rhopalodia gibberula	
Rhopalodia ventricosa	
Stauroneis spp.	
Stauroneis anceps var. anceps	1
Stauroneis anceps fa. gracilis	1
Stauroneis smithii var. smithii	
Stauroneis phoenicenteron var. phoenicenteron	
Surirella spp.	2, 7, 10, 15

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Surirella angustata	1
Surirella elegans	
Surirella linearis	1
Surirella ovalis	
Surirella spiralis	1
Surirella splendida	
Surirella striatula	
Synedra spp.	6, 13, 14
Synedra acus	1, 2,
Synedra capitata var. capitata	
Synedra dorsoventralis	
Synedra fasciculata var. fasciculata	
Synedra incisa var. incisa	
Synedra pulchella var. pulchella	
Synedra rumpens var. rumpens	1
Synedra ulna	1, 16
Synedra ulna var. longissima	
Tropidoneis lepidoptera	
VII. Cyanophyta	
A) Cyanophyceae	
Agmenellum spp. (Merismopedia spp.)	3, 4, 10, 12, 15
Agmenellum thermale (Merismopedia glauca)	1, 2, 5, 6, 8
Agmenellum thermale (Merismopedia elegans var. major)	5, 6, 8
Agmenellum quadruplicatum (Merismopedia tenuissima)	1, 2, 6
Anabaena spp.	2, 7, 9, 10, 11, 12, 13, 15, 16

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Anabaena affinis	2
Anabaena circinalis	1, 2
Anabaena spiroides	
Anacystis spp.	3, 4, 6, 10, 11, 13, 14
Anacystis spp. (Gloeocapsa spp.)	
Anacystis spp. (Gloeocapsa punctata)	
Anacystis spp. (Gloeocapsa rupestris)	
Anacystis spp. (Chroococcus spp.)	2, 6, 13
Anacystis cyanea (Microcystis aeruginosa)	2, 5, 6, 10
Anacystis cyanea (Chroococcus minor)	2
Anacystis cyanea (Chroococcus dispersus)	1, 2
Anacystis dimidiata (Chroococcus limneticus)	1, 2, 5, 10
Anacystis incerta (Microcystis incerta)	1, 2, 5, 8, 10, 12
Aphanizomenon spp.	3, 7, 10, 11, 13, 15
Aphanizomenon flos-aquae (A. holsaticum)	1, 2, 6, 8, 10, 12
Aphanizomenon ovalisporum	
Arthrospira spp.	
Arthrospira gomontiana	
Arthrospira Jenneri	1
Calothrix spp.	13
Coccochloris spp.	10
Coccochloris spp. (Aphanothece spp.)	
Coccochloris spp. (Dactylococcopsis fascicularis)	13
Coccochloris spp. (Gloeothece rupestris)	
Coccochloris spp. (Synechocystis aquatilis)	13
Gloeotrichia echinulata	1, 2, 10, 11, 12
Gloeotrichia natans	

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Gomphosphaeria spp.	3, 4, 5, 6, 10, 12
Gomphosphaeria spp. (Coelosphaerium spp.)	13
Gomphosphaeria aponina	1, 2, 6
Gomphosphaeria lacustris var. compacta	6
Lyngbya spp.	2, 7, 10, 13
Lyngbya aerugineo-caerulea	
Lyngbya aestuarii	16
Lyngbya contorta	1, 2, 5, 10
Lyngbya Diguetii	
Lyngbya limnetica	2
Lyngbya Nordgaardi	
Lyngbya versicolor	
Nostoc spp.	1, 13
Oscillatoria spp.	13
Oscillatoria acutissima	
Oscillatoria agardhii	1, 2
Oscillatoria amphibia	
Oscillatoria anguina	
Oscillatoria angusta	
Oscillatoria angustissima	1
Oscillatoria articulata	
Oscillatoria chalybea	
Oscillatoria formosa	
Oscillatoria granulata	
Oscillatoria limnetica	1, 2,
Oscillatoria limosa	16
Oscillatoria nigra	
Oscillatoria prolifica	2
Oscillatoria subbrevis	

APPENDIX B (continued)

	Author # (See footnotes for author name.)
Oscillatoria splendida	
Oscillatoria tenuis	2, 16
Oscillatoria terebriformis	
Pleurocapsa minor (Endophysalis spp.)	
Rivularia minutula	
Spirulina spp.	1
Spirulina laxa	
Spirulina major	
Spirulina princeps	2
Spirulina subsalsa	
Unid. Flagellate	
Unid. Green	
Unid. Bluegreen	
Pennate diatom	

Footnotes for Appendix B

1 - Hern et al. (1979)
2 - Koth (1981)
3 - Moore and Haertel (1975)
4 - Tipton et al. (1972)
5 - Haertel (1980)
6 - Haertel (1972)
7 - Nickum (1970)
8 - Haertel and Jongsma (1982)
9 - Sonneman et al. (1982)
10 - Haertel (1979)
11 - Haertel (1977)
12 - Thoreson et al. (1976)
13 - Hauptman (1977)
14 - Graham (1966)
15 - Griffith (1916)
16 - Bell (1961)

APPENDIX C

Percent frequency of occurrence of algae identified by locations combined [both pooled (n=52), and separated (N=60)]; lacustrine habitat samples combined (n=84); palustrine habitat samples combined (n=29); and riverine habitat samples combined (n=27).

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
I. Chlorophyta					
A) Chlorophyceae					
Actinastrum spp.	13.5	13.3	8.3	0.0	11.1
Actinastrum gracilimum	1.92	1.6	2.4	0.0	0.0
Actinastrum Hantzschii	13.5	13.3	11.9	6.9	3.7
Ankistrodesmus spp.	1.92	1.6	0.0	0.0	3.7
Ankistrodesmus convolutus	38.5	35.0	28.6	20.7	22.2
Ankistrodesmus falcatus	55.8	56.6	47.6	51.7	25.9
Ankistrodesmus falcatus var. acicularis	15.4	13.3	13.09	0.0	3.7
Ankistrodesmus falcatus var. mirabilis	15.4	13.3	11.9	0.0	3.7
Ankistrodesmus spiralis	1.92	1.6	0.0	3.4	0.0
Botryococcus spp.	7.7	6.6	3.6	3.4	0.0
Botryococcus protuburans var. minor	1.92	1.6	2.4	0.0	0.0
Botryococcus sudeticus	1.92	1.6	1.2	0.0	0.0
Bulbochaetae spp.	1.92	1.6	1.2	0.0	0.0
Chaetophora spp.	7.7	8.3	1.2	6.9	7.4
Chaetophora elegans	11.5	10.0	3.6	6.9	3.7
Chaetophora incrassata	5.8	5.0	1.2	3.4	3.7
Characium spp.	28.8	25.0	8.3	20.7	11.1
Characium ambiguum	1.92	1.6	0.0	3.4	0.0
Characium falcatum	1.92	1.6	1.2	0.0	0.0
Characium gracilipes	1.92	1.6	1.2	0.0	0.0
Characium limneticum	1.92	1.6	1.2	0.0	0.0

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Characium ornithocephalum	1.92	1.6	0.0	3.4	0.0
Chlamydomonas spp.	38.5	33.3	19.0	17.2	18.5
Cladophora spp.	30.8	28.3	15.5	10.3	22.2
Cladophora glomerata	5.8	5.0	1.2	0.0	7.4
Closteriopsis spp.	1.92	1.6	0.0	3.4	0.0
Closteriopsis longissima	3.8	3.3	2.4	0.0	0.0
Closteriopsis longissima var. tropica	11.5	10.0	9.5	0.0	3.7
Closterium spp.	50.0	45.0	11.9	44.8	48.1
Closterium acerosum	5.8	5.0	3.6	0.0	0.0
Closterium acerosum var. elongatum	1.92	1.6	0.0	0.0	3.7
Closterium acutum	1.92	1.6	1.2	0.0	0.0
Closterium dianae	1.92	1.6	0.0	3.4	0.0
Closterium ehrenbergii	1.92	1.6	0.0	0.0	3.7
Closterium moniliferum	1.92	1.6	0.0	0.0	7.4
Closterium leibleinii	3.8	3.3	2.4	3.4	3.7
Closterium venus	5.8	5.0	3.6	3.4	0.0
Coelastrum spp.	11.5	10.0	5.9	3.4	0.0
Coelastrum microporum	23.0	20.0	17.8	6.9	3.7
Coelastrum sphaericum	3.8	3.3	1.2	3.4	0.0
Coleochaete spp.	1.92	1.6	0.0	3.4	0.0
Coleochaete divergens	1.92	1.6	1.2	0.0	0.0
Coleochaete orbicularis	1.92	1.6	0.0	3.4	0.0
Cosmarium spp.	38.5	38.3	30.9	27.6	0.0
Cosmarium constrictum	3.8	3.3	2.4	0.0	0.0
Cosmarium formosulum	19.2	16.6	9.5	17.2	0.0
Cosmarium granatum	3.8	3.3	2.4	0.0	0.0
Cosmarium meneghinii	1.92	1.6	1.2	0.0	0.0
Cosmarium nitidulum	1.92	1.6	1.2	0.0	0.0
Cosmarium protractum	1.92	1.6	0.0	3.4	0.0

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Cosmarium sexangulare	1.92	1.6	1.2	0.0	0.0
Cosmarium subcostatum	3.8	3.3	1.2	3.4	0.0
Crucigenia spp.	9.6	8.3	5.9	0.0	0.0
Crucigenia apiculata	5.8	5.0	1.2	3.4	3.7
Crucigenia tetrapedia	1.92	1.6	1.2	0.0	0.0
Crucigenia quadrata	5.8	5.0	5.9	0.0	0.0
Cylindrocapsa spp.	9.6	8.3	1.2	0.0	14.8
Cylindrocapsa conferta	3.8	3.3	1.2	3.4	0.0
Desmococcus viridis	3.8	3.3	0.0	3.4	3.7
Dictyosphaerium spp.	11.5	10.0	10.7	0.0	0.0
Dictyosphaerium pulchellum	19.2	16.6	11.9	6.9	3.7
Draparnaldia spp.	1.92	11.6	0.0	0.0	7.4
Dysmorphococcus variabilis	3.82	3.3	3.4	3.7	0.0
Elakatotrix viridis	1.92	1.6	1.2	0.0	0.0
Euastropsis Richteri	1.92	1.6	1.2	0.0	0.0
Eudorina spp.	1.92	1.6	2.4	0.0	0.0
Eudorina elegans	1.92	1.6	2.4	0.0	0.0
Franceia Droescheri	1.92	1.6	1.2	0.0	0.0
Gloeocystis spp.	5.8	5.0	3.6	0.0	0.0
Gloeocystis major	3.8	3.3	1.2	3.4	0.0
Gloeocystis versiculosa	1.92	1.6	1.2	0.0	0.0
Golenkinia spp.	5.8	5.0	2.4	0.0	7.4
Kirchneriella spp.	19.2	16.6	14.3	3.4	3.7
Kirchneriella contorta	7.7	6.6	5.9	0.0	0.0
Kirchneriella subsolitaria	1.92	1.6	0.0	0.0	11.1
Lagerheimia spp.	1.92	1.6	2.4	0.0	0.0
Lagerheimia longiseta	1.92	1.6	1.2	0.0	0.0
Lagerheimia quadriseta	3.8	3.3	2.4	0.0	0.0

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Lagerheimia subsalsa	7.7	6.6	4.8	0.0	0.0
Micractinium spp.	3.8	5.0	3.6	0.0	0.0
Micractinium pusillum	3.8	3.3	2.4	0.0	0.0
Microspora spp.	11.5	10.0	0.0	10.3	11.1
Microspora pachyderma	3.8	3.3	1.2	0.0	3.7
Microthamnion strictissimum	1.92	1.6	0.0	0.0	3.7
Mougeotia spp.	13.5	11.6	1.2	20.7	3.7
Nephrocytium spp.	11.5	10.0	9.5	3.4	0.0
Nephrocytium Agardhianum	3.8	3.3	2.4	3.4	0.0
Oedogonium spp.	5.8	5.0	2.4	3.4	0.0
Oocystis spp.	50.0	45.0	50.0	20.7	7.4
Oocystis Borgei	21.1	18.3	10.7	6.9	7.4
Oocystis crassa	7.7	6.6	7.1	0.0	0.0
Oocystis elliptica	1.92	1.6	0.0	0.0	3.7
Oocystis Eremosphaeria	17.3	15.0	11.9	6.9	0.0
Oocystis parva	3.8	3.3	2.4	0.0	0.0
Oocystis pusilla	3.8	3.3	1.2	3.4	0.0
Oocystis solitaria	1.92	1.6	1.2	0.0	0.0
Oocystis submarina	3.8	3.3	3.6	0.0	0.0
Palmella mucosa	5.8	5.0	2.4	3.4	0.0
Pandorina spp.	7.7	6.6	4.8	6.9	3.7
Pandorina morum	3.8	3.3	1.2	3.4	0.0
Pediastrum spp.	9.6	8.3	5.9	3.4	0.0
Pediastrum biradiatum v. emarginatum fa. convexum	1.92	1.6	1.2	0.0	0.0
Pediastrum boryanum	57.7	56.6	57.1	44.8	7.4
Pediastrum duplex	36.5	33.3	38.09	10.3	11.1
Pediastrum duplex var. clathratum	3.8	3.3	1.2	6.9	0.0
Pediastrum duplex var. gracilimum	5.8	5.0	2.4	0.0	7.4

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Pediastrum duplex var. reticulatum	3.8	3.3	2.4	0.0	0.0
Pediastrum integrum var. priva	1.92	1.6	1.2	0.0	0.0
Pediastrum simplex var. duodenarium	1.92	1.6	2.4	0.0	0.0
Pediastrum tetras	11.5	10.0	11.9	3.4	7.4
Pediastrum tetras var. tetraodon	5.8	5.0	4.8	0.0	0.0
Pithophora spp.	5.8	5.0	1.2	3.4	3.7
Polyedriopsis spinulosa	1.92	1.6	0.0	0.0	3.7
Polytoma spp.	1.92	1.6	1.2	0.0	0.0
Protoderma viride	1.92	1.6	0.0	3.4	0.0
Quadrigula spp.	7.7	6.6	3.6	0.0	3.7
Quadrigula chodatii	1.92	1.6	1.2	0.0	0.0
Rhizoclonium spp.	42.3	36.6	13.09	34.5	7.4
Rhizoclonium hieroglyphicum	19.2	16.6	7.1	13.8	3.7
Rhizoclonium Hookeri	5.8	5.0	1.2	3.4	3.7
Scenedesmus spp.	36.5	31.6	14.3	17.2	14.8
Scenedesmus abundans	17.3	15.0	14.3	3.4	7.4
Scenedesmus abundans var. asymmetrica	3.8	3.3	1.2	3.4	0.0
Scenedesmus abundans var. brevicauda	9.6	8.3	3.6	6.9	0.0
Scenedesmus abundans var. longicauda	1.92	1.6	1.2	3.4	0.0
Scenedesmus acuminatus	25.0	25.0	19.04	3.4	11.1
Scenedesmus acuminatus var. minor	17.3	15.0	9.5	6.9	14.8
Scenedesmus acutiformis	1.92	1.6	1.2	0.0	0.0
Scenedesmus arcuatus	1.92	1.6	1.2	0.0	0.0
Scenedesmus arcuatus var. capitatus	3.8	3.3	2.4	0.0	0.0
Scenedesmus arcuatus var. platydisca	21.1	18.3	14.3	6.9	3.7
Scenedesmus armatus	3.8	3.3	1.2	3.4	0.0
Scenedesmus brasiliensis	1.92	1.6	0.0	3.4	0.0
Scenedesmus Bernardii	9.6	10.0	4.8	17.2	0.0
Scenedesmus bijuga	55.8	50.0	28.6	44.8	7.4

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Scenedesmus bijuga var. alternans	3.8	3.3	1.2	3.4	0.0
Scenedesmus bijuga var. flexuosus	17.3	15.0	10.7	10.3	0.0
Scenedesmus dimorphus	28.8	25.0	23.8	20.7	3.7
Scenedesmus incrassatulus	3.8	3.3	2.4	3.4	0.0
Scenedesmus longus var. ellipticus	1.92	1.6	0.0	3.4	0.0
Scenedesmus obliquus	15.4	15.0	10.7	6.9	3.7
Scenedesmus opoliensis	5.8	5.0	3.6	3.4	0.0
Scenedesmus opoliensis var. contracta	3.8	3.3	0.0	6.9	0.0
Scenedesmus quadricauda	44.2	41.6	36.9	20.7	11.1
Scenedesmus quadricauda var. longispina	63.5	56.6	40.5	55.2	22.2
Scenedesmus quadricauda var. maximus	11.5	10.0	4.8	6.9	3.7
Scenedesmus quadricauda var. parvus	3.8	3.3	2.4	3.4	0.0
Scenedesmus quadricauda var. quadrispina	13.5	13.3	8.3	10.3	0.0
Scenedesmus quadricauda var. Westii	9.6	8.3	4.8	6.9	0.0
Schroederia spp.	5.8	5.0	3.6	0.0	0.0
Schroederia Judayi	11.5	10.0	4.8	10.3	0.0
Schroederia setigera	7.7	6.6	3.6	6.9	0.0
Selenastrum spp.	15.4	13.3	8.3	3.4	3.7
Selenastrum minutum	5.8	5.0	2.4	6.9	0.0
Selenastrum Westii	5.8	5.0	3.6	0.0	0.0
Spirogyra spp.	32.7	30.0	5.9	41.4	33.3
Spondylosium spp.	1.92	1.6	1.2	3.4	0.0
Sphaerocystis spp.	3.8	3.3	2.4	0.0	0.0
Sphaerocystis Schroeteri	50.0	46.6	25.0	31.03	33.3
Staurastrum spp.	28.8	26.6	19.05	17.2	7.4
Staurastrum alternans	1.92	1.6	2.4	0.0	0.0
Staurastrum gracile	7.7	6.6	7.1	0.0	0.0
Staurastrum margaritaceum	1.92	1.6	1.2	0.0	0.0
Staurastrum paradoxum	1.92	1.6	1.2	0.0	0.0

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Staurastrum polymorphum	7.7	6.6	3.6	3.4	0.0
Staurastrum punctulatum	1.92	1.6	1.2	0.0	0.0
Stigeoclonium spp.	32.7	30.0	11.9	13.8	14.8
Stigeoclonium lubricum	1.92	1.6	1.2	0.0	0.0
Stigeoclonium polymorphum	11.5	10.0	3.6	3.4	7.4
Stigeoclonium subsecundum	1.92	1.6	0.0	0.0	3.7
Tetraedron spp.	5.8	5.0	4.8	0.0	0.0
Tetraedron caudatum	9.6	8.3	4.8	6.9	7.4
Tetraedron enorme	1.92	1.6	0.0	3.4	0.0
Tetraedron hastatum	1.92	1.6	1.2	0.0	0.0
Tetraedron limneticum	1.92	1.6	1.2	0.0	0.0
Tetraedron minimum	21.1	20.0	11.9	24.1	7.4
Tetraedron muticum	15.4	15.0	9.5	17.2	7.4
Tetraedron muticum fa. punctulatum	3.8	3.3	1.2	3.40	0.0
Tetraedron regulare	7.7	6.6	4.8	0.0	0.0
Tetraedron regulare var. torsum	1.92	1.6	1.2	0.0	0.0
Tetraedron trigonum	5.8	5.0	2.4	3.4	0.0
Tetraedron trigonum var. gracile	7.7	6.6	2.4	3.4	3.7
Tetrastrum staurogeniaeforme	11.5	10.0	7.1	0.0	7.4
Treubaria setigerum	7.7	6.6	4.8	0.0	3.7
Trentepohlia spp.	1.92	1.6	1.2	0.0	0.0
Ulothrix spp.	21.1	18.3	7.1	17.2	7.4
Ulothrix subtilissima	1.92	1.6	0.0	3.4	0.0
Volvox spp.	3.8	3.3	0.0	3.4	3.7
Zygnema spp.	1.92	1.6	0.0	3.4	0.0
B) Charophyceae					
Chara spp.	5.8	5.0	1.2	6.9	3.7

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
II. Euglenophyta					
Euglena spp.	53.8	50.0	22.6	44.8	11.1
Euglena acus	1.92	1.6	0.0	0.0	3.7
Euglena Ehrenbergii	1.92	1.6	1.2	0.0	0.0
Phacus spp.	53.8	48.3	34.5	51.7	11.1
Trachelomonas spp.	15.4	13.3	9.5	3.4	0.0
III. Pyrrophyta					
A) Dinophyceae					
Ceratium spp.	3.8	3.3	2.4	0.0	0.0
Ceratium hirundinella	3.8	3.3	3.6	0.0	0.0
Peridinium spp.	3.8	3.3	2.4	0.0	0.0
IV. Cryptophyta					
Cryptomonas spp.	13.5	11.6	9.5	3.4	0.0
V. Chloromonadophyta					
Vacuolaria virescens	3.85	3.3	1.2	3.4	0.0
VI. Chrysophyta					
A) Xanthophyceae					
Characiopsis spp.	1.92	1.6	0.0	3.45	0.0
Ophiocytium spp.	11.5	10.0	2.4	13.8	0.0
Ophiocytium capitatum var. *longispinum*	3.8	3.3	1.2	0.0	3.7
Tribonema spp.	11.5	10.0	5.9	10.3	0.0
Vaucheria spp.	15.4	13.3	0.0	6.9	22.2
B) Chrysophyceae					
Dinobryon spp.	11.5	11.6	4.8	3.4	7.4
Dinobryon sertularia	7.7	6.6	4.8	0.0	0.0
Dinobryon Vanhoeffenii	1.92	1.6	1.2	0.0	0.0

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
C) Bacillariophyceae					
1) Centrales					
Chaetoceros Elmorei	3.8	3.3	2.4	0.0	0.0
Coscinodiscus spp.	1.92	1.6	0.0	3.4	0.0
Coscinodiscus lacustris	1.923	1.6	2.4	0.0	0.0
Cyclotella spp.	36.5	33.3	15.5	24.1	18.5
Cyclotella bodanica	1.92	1.6	0.0	3.4	0.0
Cyclotella meneghiniana	46.1	40.0	36.9	20.7	33.3
Melosira spp.	36.5	31.6	10.7	27.6	14.8
Melosira islandica	3.8	3.3	2.4	3.4	0.0
Melosira granulata	51.9	50.0	52.4	20.7	14.8
Rhizosolenia spp.	3.8	3.3	2.4	0.0	0.0
Stephanodiscus spp.	13.5	11.6	5.9	6.9	3.7
Stephanodiscus astraea	9.6	8.3	9.5	0.0	0.0
Stephanodiscus niagarae	1.92	1.6	1.2	0.0	0.0
2) Pennales					
Achnanthes spp.	13.5	11.6	1.2	10.3	14.8
Achnanthes lanceolata var. lanceolata	3.8	3.3	0.0	3.4	3.7
Amphipleura pellucida var. pellucida	3.8	3.3	2.4	3.4	0.0
Amphiprora spp.	3.8	3.3	1.2	3.4	3.7
Amphiprora alata	7.7	6.6	4.8	0.0	0.0
Amphiprora ornata	13.5	11.6	10.7	3.4	3.7
Amphora spp.	30.8	26.6	19.05	36.8	7.4
Amphora ovalis	73.08	66.6	46.4	24.1	44.4
Anomoeoneis costata var. costata	3.8	3.3	5.9	0.0	0.0
Asterionella spp.	1.92	1.6	0.0	3.4	0.0
Asterionella formosa	1.92	1.6	1.2	0.0	0.0
Caloneis spp.	15.4	13.3	2.4	6.9	14.8
Caloneis amphisbaena var. amphisbaena	1.92	1.6	0.0	0.0	11.1

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Caloneis bacillum var. bacillum	3.8	3.3	0.0	6.9	0.0
Caloneis lewisii var. lewisii	11.5	10.0	3.6	3.4	11.1
Caloneis limosa var. limosa	7.7	6.6	4.8	3.4	0.0
Caloneis ventricosa var. ventricosa	15.4	13.3	7.1	3.4	7.4
Campylodiscus spp.	1.92	1.6	2.4	0.0	0.0
Campylodiscus noricus	1.92	1.6	0.0	3.4	0.0
Cocconeis spp.	21.1	18.3	8.3	10.3	14.8
Cocconeis pendiculus	55.8	48.3	25.0	48.3	40.7
Cocconeis placentula	17.3	16.6	8.3	17.2	14.8
Cymatopleura spp.	3.8	3.3	1.2	0.0	3.7
Cymatopleura elliptica	25.0	21.6	20.2	3.4	7.4
Cymatopleura elliptica var. spiralis	1.92	1.6	1.2	0.0	0.0
Cymatopleura solea	30.8	31.6	25.0	6.9	18.5
Cymbella spp.	55.8	53.3	29.8	27.6	37.04
Cymbella affinis	3.8	3.3	1.2	3.4	0.0
Cymbella aspera	1.92	1.6	1.2	0.0	0.0
Cymbella cuspidata	1.92	1.6	0.0	3.4	0.0
Cymbella cymbiformis	11.5	10.0	1.2	13.8	7.4
Cymbella gracilis	1.92	1.6	1.2	0.0	0.0
Cymbella lanceolata	1.92	1.6	0.0	0.0	3.7
Cymbella mexicanum	1.92	1.6	1.2	0.0	0.0
Cymbella parva	3.8	3.3	1.2	0.0	3.7
Cymbella prostrata	15.4	15.0	10.7	0.0	22.2
Cymbella triangulum	5.8	5.0	4.8	0.0	0.0
Cymbella tumida	5.8	5.0	0.0	3.4	11.1
Cymbella turgida	40.4	36.6	16.6	13.8	40.7
Cymbella ventricosa	50.0	46.6	26.2	31.03	44.4
Diatoma spp.	3.8	3.3	1.2	3.4	0.0
Diatoma vulgare	13.5	11.6	7.1	3.4	3.7

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Diploneis spp.	1.92	1.6	0.0	3.4	0.0
Diploneis smithii	1.92	1.6	0.0	0.0	3.7
Epithemia spp.	23.08	20.0	13.09	6.9	0.0
Epithemia sorex	23.08	20.0	16.6	13.8	7.4
Epithemia turgida	63.5	55.0	33.3	58.6	37.03
Eunotia spp.	7.7	6.6	1.2	3.4	11.1
Eunotia curvata var. curvata	26.9	23.3	4.7	34.5	14.8
Eunotia pectinalis	5.8	5.0	2.4	3.4	7.4
Fragilaria spp.	67.3	63.3	32.1	58.6	51.8
Fragilaria capucina var. capucina	11.5	11.6	3.6	10.3	11.1
Fragilaria construens var. contruens	15.4	15.0	9.5	6.9	14.8
Fragilaria construens var. binodis	1.92	1.6	0.0	0.0	3.7
Fragilaria crotonensis var. crotonensis	46.1	41.6	20.2	27.6	44.4
Fragilaria pinnata var. pinnata	3.8	3.3	1.2	6.9	0.0
Frustulia spp.	1.92	1.6	0.0	3.4	0.0
Gomphonema spp.	19.2	16.6	5.9	13.8	14.8
Gomphonema acuminatum	15.4	16.6	1.2	10.3	22.2
Gomphonema acuminatum var. coronatum	7.7	6.6	2.4	3.4	11.1
Gomphonema angustatum	1.92	1.6	0.0	3.4	0.0
Gomphonema constrictum	40.4	38.3	11.9	34.5	48.1
Gomphonema gracile var. dichotoma	1.92	1.6	0.0	3.4	0.0
Gomphonema montanum var. subclavatum	1.92	1.6	0.0	3.4	0.0
Gomphonema olivaceum	92.3	83.3	61.9	79.3	70.4
Gomphonema olivaceum var. calcarea	34.6	30.0	19.05	24.01	0.0
Gomphonema parvulum	32.7	28.3	11.9	20.7	22.2
Gyrosigma spp.	21.1	21.6	13.09	0.0	33.3
Gyrosigma macrum	11.5	10.0	9.5	0.0	11.1
Gyrosigma spenceri var. spenceri	1.92	1.6	0.0	0.0	3.7
Hantzschia spp.	11.5	10.0	0.0	6.9	14.8

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Hantzschia amphioxys	1.92	1.6	1.2	0.0	0.0
Hantzschia amphioxys var. vivax	1.92	1.6	0.0	3.4	0.0
Mastogloia spp.	1.92	1.6	0.0	3.4	0.0
Mastogloia smithii	1.92	1.6	1.2	0.0	0.0
Meridion circulare	23.07	20.0	3.7	13.8	40.7
Navicula spp.	67.3	61.6	29.8	31.03	48.1
Navicula accomoda var. accomoda	1.92	1.6	1.2	0.0	0.0
Navicula bacillum var. bacillum	3.8	3.3	2.4	0.0	0.0
Navicula capitata var. capitata	25.0	21.6	25.0	6.9	0.0
Navicula capitata var. hungarica	1.92	1.6	1.2	0.0	0.0
Navicula cincta var. cincta	1.92	1.6	2.4	0.0	0.0
Navicula cryptocephala var. cryptocephala	7.7	6.6	3.6	0.0	11.1
Navicula cuspidata var. cuspidata	40.4	36.6	26.2	37.9	14.8
Navicula elginensis var. elginensis	3.8	3.3	1.2	0.0	3.7
Navicula exigua var. capitata	1.92	1.6	1.2	0.0	0.0
Navicula gastrum var. gastrum	1.92	1.6	2.4	0.0	0.0
Navicula halophila var. tenuirostris	1.92	1.6	0.0	3.4	0.0
Navicula pupula var. pupula	1.92	1.6	1.2	3.4	0.0
Navicula pupula var. capitata	3.8	3.3	1.2	3.4	0.0
Navicula pupula var. rectangularis	1.92	1.6	1.2	0.0	0.0
Navicula radiosa var. radiosa	11.5	13.3	7.1	3.4	25.9
Navicula radiosa var. tenella	1.92	1.6	1.2	0.0	0.0
Navicula reinhardhii var. reinhardhii	13.5	11.6	5.9	0.0	7.4
Navicula reinhardhii var. elliptica	1.92	1.6	0.0	0.0	3.7
Navicula salinarum var. salinarum	1.92	1.6	1.2	0.0	0.0
Navicula salinarum var. intermedia	5.8	5.0	2.4	3.4	0.0
Navicula tripunctata var. tripunctata	25.0	23.3	4.8	13.8	40.7
Nedium spp.	17.3	16.6	5.9	13.8	7.4
Nedium affine var. undulatum	1.92	1.6	0.0	3.4	0.0

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Nedium iridis var. iridis	3.8	3.3	1.2	3.4	0.0
Nitzschia spp.	71.1	63.3	44.04	55.2	37.04
Nitzschia amphibia	3.8	3.3	2.4	0.0	0.0
Nitzschia commutata	1.92	1.6	1.2	0.0	0.0
Nitzschia linearis	40.4	36.6	11.9	20.7	40.7
Nitzschia linearis var. tenuis	1.92	1.6	0.0	0.0	3.7
Nitzschia lorenziana	1.92	1.6	0.0	0.0	3.7
Nitzschia palea	5.8	5.0	2.4	3.4	3.7
Nitzschia sigmoidia	26.9	25.0	21.4	17.2	22.2
Nitzschia vermicularis	1.92	1.6	0.0	0.0	3.7
Opephora spp.	1.92	1.6	0.0	0.0	3.7
Opephora martyi	3.8	3.3	0.0	3.4	3.7
Pinnularia spp.	63.5	60.0	25.0	58.6	48.1
Pinnularia gibba	5.8	5.0	1.2	3.4	3.7
Pinnularia maior var. maior	1.92	1.6	1.2	3.4	0.0
Pinnularia mesolepta var. mesolepta	1.92	1.6	0.0	0.0	3.7
Pinnularia microstauron var. microstauron	3.8	3.3	1.2	3.4	0.0
Pinnularia viridis var. viridis	1.92	1.6	1.2	0.0	0.0
Rhoicosphenia curvata	59.6	51.6	34.5	20.7	51.8
Rhopalodia gibba	53.8	48.3	39.3	55.2	29.6
Rhopalodia gibberula	1.92	1.6	0.0	0.0	3.7
Rhopalodia ventricosa	3.8	3.3	0.0	3.4	3.7
Stauroneis spp.	15.4	13.3	5.9	10.3	3.7
Stauroneis anceps var. anceps	11.5	10.0	7.1	3.4	0.0
Stauroneis anceps fa. gracilis	13.5	11.6	0.0	13.8	22.2
Stauroneis smithii var. smithii	5.7	5.0	0.0	0.0	11.1
Stauroneis phoenicenteron var. phoenicenteron	21.1	20.0	2.4	13.8	29.6
Surirella spp.	42.3	38.3	21.4	24.1	7.4

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Surirella angustata	21.1	20.0	7.1	10.3	14.8
Surirella elegans	3.8	3.3	1.2	0.0	3.7
Surirella linearis	9.6	8.3	8.3	3.4	0.0
Surirella ovalis	48.08	41.6	21.4	13.8	25.9
Surirella spiralis	1.92	3.3	0.0	0.0	14.8
Surirella splendida	7.7	6.6	7.1	0.0	3.7
Surirella striatula	7.7	6.6	4.8	0.0	0.0
Synedra spp.	44.2	40.0	22.6	24.1	11.1
Synedra acus	55.8	50.0	29.8	41.4	29.6
Synedra capitata var. capitata	3.8	3.3	2.4	0.0	0.0
Synedra dorsoventralis	1.92	1.6	1.2	0.0	0.0
Synedra fasciculata var. fasciculata	3.8	3.3	1.2	3.4	0.0
Synedra incisa var. incisa	3.8	3.3	1.2	0.0	3.7
Synedra pulchella var. pulchella	3.8	3.3	1.2	3.4	0.0
Synedra rumpens var. rumpens	25.0	21.6	7.1	13.8	18.5
Synedra ulna	96.15	90.0	75.0	82.8	85.2
Synedra ulna var. longissima	3.8	3.3	2.4	0.0	3.7
Tropidoneis lepidoptera	1.92	1.6	1.2	0.0	0.0
VII. Cyanophyta					
A) Cyanophyceae					
Agmenellum spp. (Merismopedia spp.)	21.1	20.0	9.5	17.2	3.7
Agmenellum thermale (Merismopedia glauca)	30.8	28.3	29.8	17.2	3.7
Agmenellum thermale (Merismopedia elegans var. major)	1.92	1.6	1.2	3.4	0.0
Agmenellum quadruplicatum (Merismopedia tenuissima)	50.0	45.0	48.8	20.7	11.1
Anabaena spp.	67.3	60.0	42.8	51.7	22.2

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Anabaena affinis	13.5	11.6	2.4	13.8	11.1
Anabaena circinalis	15.4	15.0	16.6	0.0	0.0
Anabaena spiroides	1.92	1.6	1.2	0.0	0.0
Anacystis spp.	38.5	35.0	25.0	24.1	7.4
Anacystis spp. (Gloeocapsa spp.)	1.92	1.6	1.2	0.0	0.0
Anacystis spp. (Gloeocapsa punctata)	1.92	1.6	0.0	0.0	3.7
Anacystis spp. (Gloeocapsa rupestris)	1.92	1.6	1.2	0.0	0.0
Anacystis spp. (Chroococcus spp.)	19.2	20.0	16.6	0.0	7.4
Anacystis cyanea (Microcystis aeruginosa)	53.8	55.0	57.1	31.03	0.0
Anacystis cyanea (Chroococcus minor)	3.8	3.3	1.2	3.4	0.0
Anacystis cyanea (Chroococcus dispersus)	1.92	1.6	2.4	0.0	0.0
Anacystis dimidiata (Chroococcus limneticus)	5.7	6.6	5.9	0.0	0.0
Anacystis incerta (Microcystis incerta)	34.6	31.6	27.4	17.2	0.0
Aphanizomenon spp.	26.9	26.6	23.8	10.3	0.0
Aphanizomenon flos-aquae (A. holsaticum)	5.8	5.0	4.8	0.0	0.0
Aphanizomenon ovalisporum	1.92	1.6	2.4	0.0	0.0
Arthrospira spp.	1.92	1.6	1.2	0.0	0.0
Arthrospira gomontiana	1.92	1.6	0.0	3.4	0.0
Arthrospira Jenneri	11.5	10.0	9.5	10.3	0.0
Calothrix spp.	3.8	3.3	2.4	3.4	0.0
Coccochloris spp.	3.8	3.3	2.4	0.0	3.7
Coccochloris spp. (Aphanothece spp.)	1.92	1.6	1.2	0.0	0.0
Coccochloris spp. (Dactylococcopsis fascicularis)	1.92	1.6	1.2	0.0	0.0
Coccochloris spp. (Gloeothece rupestris)	1.92	1.6	1.2	0.0	0.0
Coccochloris spp. (Synechocystis aquatilis)	1.92	1.6	1.2	0.0	0.0
Gloeotrichia echinulata	1.92	1.6	0.0	3.4	0.0
Gloeotrichia natans	1.92	1.6	1.2	0.0	0.0

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Gomphosphaeria spp.	51.9	48.3	26.2	34.5	14.8
Gomphosphaeria spp. (Coelosphaerium spp.)	1.92	1.6	1.2	0.0	0.0
Gomphosphaeria aponina	23.08	20.0	16.6	6.9	0.0
Gomphosphaeria lacustris var. compacta	1.92	1.6	1.2	0.0	0.0
Lyngbya spp.	36.5	33.3	25.0	13.8	3.7
Lyngbya aerugineo-caerulea	3.8	3.3	1.2	0.0	3.7
Lyngbya aestuarii	1.92	1.6	0.0	6.9	0.0
Lyngbya contorta	28.8	25.0	35.7	17.2	0.0
Lyngbya Diguetii	3.8	3.3	1.2	0.0	3.7
Lyngbya limnetica	3.8	3.3	2.4	0.0	0.0
Lyngbya Nordgaardi	5.8	5.0	0.0	10.3	0.0
Lyngbya versicolor	1.92	1.6	1.2	0.0	0.0
Nostoc spp.	5.8	5.0	1.2	3.4	0.0
Oscillatoria spp.	75.0	71.6	44.05	48.3	66.0
Oscillatoria acutissima	11.5	10.0	2.4	20.7	0.0
Oscillatoria agardhii	7.7	6.6	2.4	0.0	7.4
Oscillatoria amphibia	1.92	1.6	0.0	3.4	0.0
Oscillatoria anguina	9.6	8.3	2.4	13.8	0.0
Oscillatoria angusta	9.6	8.3	3.6	6.9	0.0
Oscillatoria angustissima	3.8	3.3	1.2	3.4	0.0
Oscillatoria articulata	1.92	1.6	0.0	3.4	0.0
Oscillatoria chalybea	9.6	8.3	1.2	24.1	0.0
Oscillatoria formosa	3.8	3.3	1.2	3.4	0.0
Oscillatoria granulata	7.7	6.6	2.4	6.9	0.0
Oscillatoria limnetica	48.08	41.6	22.6	44.8	7.4
Oscillatoria limosa	9.6	8.3	2.4	13.8	3.7
Oscillatoria nigra	11.5	10.0	5.9	6.9	0.0
Oscillatoria prolifica	3.8	3.3	1.2	3.4	3.7
Oscillatoria subbrevis	26.9	25.0	10.7	27.6	14.8

APPENDIX C (continued)

	Locations Combined n=52	Locations Combined n=60	Lacus-trine n=84	Palus-trine n=29	River-ine n=27
Oscillatoria splendida	3.8	3.3	0.0	6.9	0.0
Oscillatoria tenuis	15.4	13.3	7.1	20.7	0.0
Oscillatoria terebriformis	1.9	1.6	0.0	0.0	3.7
Pleurocapsa minor (*Endophysalis* spp.)	1.92	1.6	0.0	0.0	3.7
Rivularia minutula	1.92	1.6	1.2	0.0	0.0
Spirulina spp.	25.0	21.6	8.3	20.7	7.4
Spirulina laxa	1.92	1.6	1.2	0.0	0.0
Spirulina major	7.7	6.6	3.6	13.8	0.0
Spirulina princeps	1.92	1.6	1.2	0.0	0.0
Spirulina subsalsa	15.4	13.3	7.1	17.2	3.7
Unid. Flagellate	34.6	33.3	23.8	10.3	11.1
Unid. Green	1.92	1.6	0.0	3.4	0.0
Unid. Bluegreen	19.2	16.6	10.7	10.3	0.0
Pennate diatom	23.08	20.0	9.5	10.3	3.7

APPENDIX D

List of algae identified by habitat type #1-21
(See Table 6 for habitat type description).

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
I. Chlorophyta																					
A) Chlorophyceae																					
Actinastrum spp.	x	x	x	x		x	x									x		x			
Actinastrum gracilimum						x															
Actinastrum Hantzschii	x				x	x							x			x					
Ankistrodesmus spp.																		x			
Ankistrodesmus convolutus	x	x		x	x	x	x				x		x			x	x	x			
Ankistrodesmus falcatus	x	x	x	x	x	x	x				x	x	x			x		x			
Ankistrodesmus falcatus var. acicularis	x	x			x	x	x									x x					
Ankistrodesmus falcatus var. mirabilis	x	x					x									x					
Ankistrodesmus spiralis													x								
Botryococcus spp.			x			x							x								
Botryococcus protuburans var. minor		x																			
Botryococcus sudeticus						x															
Bulbochaetae spp.					x																
Chaetophora spp.							x						x				x				
Chaetophora elegans	x					x	x				x		x					x			
Chaetophora incrassata							x						x					x			
Characium spp.	x	x			x	x	x				x		x		x			x			x
Characium ambiguum													x								
Characium falcatum							x														
Characium gracilipes						x															
Characium limneticum						x															
Characium ornithocephalum													x								
Chlamydomonas spp.	x	x	x	x	x	x	x						x		x		x	x		x	x
Cladophora spp.	x	x				x	x	x		x			x	x			x	x			

APPENDIX D (continued)

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Cladophora glomerata	x															x		x			
Closteriopsis spp.													x								
Closteriopsis longissima					x	x															
Closteriopsis longissima var. tropica	x	x		x		x	x									x					
Closterium spp.	x	x					x			x	x	x	x		x		x	x		x	x
Closterium acerosum	x				x		x														
Closterium acerosum var. elongatum																		x			
Closterium acutum		x																			
Closterium dianae															x						
Closterium ehrenbergii																			x		
Closterium moniliferum																	x				
Closterium leibleinii					x								x					x			
Closterium venus					x	x							x								
Coelastrum spp.		x				x							x								
Coelastrum microporum	x				x	x	x				x					x					
Coelastrum sphaericum	x												x								
Coleochaete spp.													x								
Coleochaete divergens							x														
Coleochaete orbicularis													x								
Cosmarium spp.	x	x			x	x	x	x			x		x	x							
Cosmarium constrictum							x														
Cosmarium formosulum	x				x	x	x				x		x								
Cosmarium granatum	x						x														
Cosmarium meneghinii							x														
Cosmarium nitidulum					x																
Cosmarium protractum											x										
Cosmarium sexangulare							x														
Cosmarium subcostatum					x						x										
Crucigenia spp.		x			x		x														

APPENDIX D (continued)

	Habitat type #																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Crucigenia apiculata			x										x			x					
Crucigenia tetrapedia	x																				
Crucigenia quadrata	x	x					x														
Cylindrocapsa spp.						x											x	x			x
Cylindrocapsa conferta						x							x								
Desmococcus viridis													x			x					
Dictyosphaerium spp.	x			x	x	x	x														
Dictyosphaerium pulchellum	x	x			x	x	x						x			x					
Draparnaldia spp.																	x				
Dysmorphococcus variabilis													x					x			
Elakatotrix viridis	x																				
Euastropsis Richteri							x														
Eudorina spp.		x																			
Eudorina elegans	x																				
Franceia Droescheri						x															
Gloeocystis spp.	x	x					x														
Gloeocystis major							x						x								
Gloeocystis versiculosa					x																
Golenkinia spp.		x			x											x					
Kirchneriella spp.	x	x		x	x	x	x						x			x					
Kirchneriella contorta	x	x				x															
Kirchneriella subsolitaria																x					
Lagerheimia spp.					x																
Lagerheimia longiseta																x					
Lagerheimia quadriseta			x	x																	
Lagerheimia subsalsa	x				x	x	x														
Micractinium spp.	x	x		x																	
Micractinium pusillum		x	x																		
Microspora spp.													x				x		x	x	

APPENDIX D (continued)

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Microspora pachyderma		x																	x		
Microthamnion strictissimum																		x			
Mougeotia spp.									x				x					x			
Nephrocytium spp.	x				x	x	x						x								
Nephrocytium agardhianum		x											x								
Oedogonium spp.	x	x											x								
Oocystis spp.	x	x			x	x	x	x	x		x		x			x					
Oocystis Borgei	x		x	x	x	x	x						x			x					
Oocystis crassa		x			x																
Oocystis elliptica																x					
Oocystis Eremosphaeria	x	x				x	x		x		x		x								
Oocystis parva						x	x														
Oocystis pusilla						x							x								
Oocystis solitaria							x														
Oocystis submarina	x	x																			
Palmella mucosa	x					x							x								
Pandorina spp.					x	x							x					x			
Pandorina morum						x							x								
Pediastrum spp.	x			x		x							x								
Pediastrum biradiatum v. emarginatum fa. convexum							x														
Pediastrum boryanum	x	x			x	x	x			x	x	x	x			x					
Pediastrum duplex	x	x	x		x	x	x				x	x	x			x					
Pediastrum duplex var. clathratum							x				x		x								
Pediastrum duplex var. gracilimum						x										x					
Pediastrum duplex var. reticulatum	x	x																			
Pediastrum integrum var. priva							x														
Pediastrum simplex var. duodenarium						x															
Pediastrum tetras	x				x	x	x						x			x					

APPENDIX D (continued)

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Pediastrum tetras var. tetraodon					x		x														
Pithophora spp.							x						x				x				
Polyedriopsis spinulosa																x					
Polytoma spp.			x																		
Protoderma viride											x										
Quadrigula spp.	x	x			x											x					
Quadrigula chodatii						x															
Rhizoclonium spp.	x	x			x		x			x	x		x				x	x			
Rhizoclonium hieroglyphicum	x					x	x				x		x					x			
Rhizoclonium Hookeri	x										x							x			
Scenedesmus spp.	x		x		x	x	x				x		x			x	x	x			
Scenedesmus abundans	x	x			x	x					x					x					
Scenedesmus abundans var. asymmetrica			x										x								
Scenedesmus abundans var. brevicauda		x			x	x							x								
Scenedesmus abundans var. longicauda					x								x								
Scenedesmus acuminatus	x	x	x		x	x	x						x					x			
Scenedesmus acuminatus var. minor		x	x		x	x	x						x				x				
Scenedesmus acutiformis							x														
Scenedesmus arcuatus						x															
Scenedesmus arcuatus var. capitatus		x				x															
Scenedesmus arcuatus var. platydisca	x	x	x		x	x	x	x					x			x					
Scenedesmus armatus						x							x								
Scenedesmus brasiliensis													x								
Scenedesmus Bernardii						x	x					x	x								
Scenedesmus bijuga	x	x	x		x	x	x	x			x		x	x		x					
Scenedesmus bijuga var. alternans					x						x										
Scenedesmus bijuga var. flexuosus	x	x				x	x				x		x								
Scenedesmus dimorphus	x	x		x	x	x	x				x		x				x				

APPENDIX D (continued)

	Habitat type #																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Scenedesmus incrassatulus						x	x						x								
Scenedesmus longus var. ellipticus													x								
Scenedesmus obliquus	x				x	x	x						x					x			
Scenedesmus opoliensis						x								x							
Scenedesmus opoliensis var. contract													x								
Scenedesmus quadricauda	x	x		x	x	x	x	x			x		x			x	x	x			
Scenedesmus quadricauda var. longispina	x	x	x			x	x				x	x	x	x		x		x			
Scenedesmus quadricauda var. maximus	x	x				x							x					x			
Scenedesmus quadricauda var. parvus						x							x								
Scenedesmus quadricauda var. quadrispina						x	x						x								
Scenedesmus quadricauda var. Westii					x		x						x								
Schroederia spp.		x	x																		
Schroederia Judayi	x	x					x						x								
Schroederia setigera		x				x	x						x								
Selenastrum spp.					x	x	x				x							x			
Selenastrum minutum							x						x								
Selenastrum Westii	x				x																
Spirogyra spp.			x		x		x			x	x		x				x	x	x	x	
Spondylosium spp.					x								x								
Sphaerocystis spp.				x			x														
Sphaerocystis Schroeteri	x	x	x		x	x	x	x			x		x	x	x	x		x	x		
Staurastrum spp.	x			x	x	x	x				x		x			x					
Staurastrum alternans					x																
Staurastrum gracile		x				x	x														
Staurastrum margaritaceum	x																				
Staurastrum paradoxum	x																				
Staurastrum polymorphum					x								x								
Staurastrum punctulatum							x														

APPENDIX D (continued)

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Stigeoclonium spp.	x	x			x	x							x		x			x	x	x	
Stigeoclonium lubricum	x																				
Stigeoclonium polymorphum	x					x							x					x			
Stigeoclonium subsecundum																			x		
Tetraedron spp.	x				x	x															
Tetraedron caudatum					x								x			x					
Tetraedron enorme										x											
Tetraedron hastatum							x														
Tetraedron limneticum						x															
Tetraedron minimum	x	x					x				x		x			x					
Tetraedron muticum	x				x		x				x		x			x					
Tetraedron muticum fa. punctulatum						x							x								
Tetraedron regulare	x				x	x	x														
Tetraedron regulare var. torsum							x														
Tetraedron trigonum						x	x						x								
Tetraedron trigonum var. gracile	x				x								x			x					
Tetrastrum staurogeniaeforme	x	x	x	x		x										x					
Treubaria setigerum		x			x	x										x					
Trentepohlia spp.						x															
Ulothrix spp.				x	x		x	x		x			x					x		x	
Ulothrix subtilissima										x											
Volvox spp.													x				x				
Zygnema spp.													x								
B) Charophyceae																					
Chara spp.					x						x		x					x			
II. Euglenophyta																					
Euglena spp.	x	x	x		x	x	x						x			x		x			
Euglena acus																x					

APPENDIX D (continued)

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Euglena Ehrenbergii					x																
Phacus spp.	x	x			x	x	x				x	x	x			x	x				
Trachelomonas spp.	x	x		x	x	x							x								
III. Pyrrophyta																					
A) Dinophyceae																					
Ceratium spp.				x			x														
Ceratium hirundinella	x	x																			
Peridinium spp.				x			x														
IV. Cryptophyta																					
Cryptomonas spp.	x	x		x	x								x								
V. Chloromonadophyta																					
Vacuolaria virescens							x						x								
VI. Chrysophyta																					
A) Xanthophyceae																					
Characiopsis spp.													x								
Ophiocytium spp.	x						x				x	x	x								
Ophiocytium capitatum var. longispinum					x											x					
Tribonema spp.		x				x	x				x		x								
Vaucheria spp.													x		x		x	x	x	x	
B) Chrysophyceae																					
Dinobryon spp.	x						x	x							x			x			x
Dinobryon sertularia		x			x	x	x														
Dinobryon Vanhoeffenii						x															

APPENDIX D (continued)

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
C) Bacillariophyceae																					
1) Centrales																					
Chaetoceros Elmorei		x							x												
Coscinodiscus spp.													x								
Coscinodiscus lacustris		x																			
Cyclotella spp.	x			x		x	x			x	x		x				x	x			
Cyclotella bodanica													x								
Cyclotella meneghiniana	x	x	x		x	x	x						x			x		x			
Melosira spp.	x	x	x	x	x	x	x			x			x				x	x			x
Melosira islandica						x							x								
Melosira granulata	x	x	x		x	x	x			x			x			x		x	x		
Rhizosolenia spp.				x			x														
Stephanodiscus spp.		x	x	x									x					x			
Stephanodiscus astraea		x				x	x														
Stephanodiscus niagarae						x															
2) Pennales																					
Achnanthes spp.							x						x				x	x			
Achnanthes lanceolata var. lanceolata													x								x
Amphipleura pellucida var. pellucida							x						x			x					
Amphiprora spp.														x				x			
Amphiprora alata	x	x				x	x														
Amphiprora ornata	x					x							x					x			
Amphora spp.	x	x		x	x	x	x		x	x			x	x			x	x			
Amphora ovalis	x	x	x		x	x	x				x		x			x	x	x		x	x
Anomoeoneis costata var. costata		x							x												
Asterionella spp.														x							
Asterionella formosa	x																				
Caloneis spp.		x				x							x		x		x	x			
Caloneis amphisbaena var. amphisbaena																x					

APPENDIX D (continued)

	Habitat type #																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Caloneis bacillum var. bacillum												x	x								
Caloneis lewisii var. lewisii		x				x							x				x	x		x	
Caloneis limosa var. limosa	x				x	x							x								
Caloneis ventricosa var. ventricosa	x	x				x							x					x			
Campylodiscus spp.									x												
Campylodiscus noricus													x								
Cocconeis spp.		x			x	x	x						x	x			x	x			x
Cocconeis pendiculus	x	x	x		x	x	x	x			x		x	x		x	x	x			
Cocconeis placentula	x	x			x	x							x		x			x			
Cymatopleura spp.	x																x				
Cymatopleura elliptica	x	x	x			x							x					x			
Cymatopleura elliptica var. spiralis		x																			
Cymatopleura solea	x	x				x	x						x			x	x	x			
Cymbella spp.	x	x			x	x	x			x	x		x		x	x	x	x	x		x
Cymbella affinis	x											x									
Cymbella aspera		x																			
Cymbella cuspidata													x								
Cymbella cymbiformis						x							x					x			
Cymbella gracilis	x																				
Cymbella lanceolata																		x			
Cymbella mexicanum							x														
Cymbella parva	x																	x			
Cymbella prostrata	x	x				x	x											x			
Cymbella triangulum	x					x	x														
Cymbella tumida													x				x	x			
Cymbella turgida	x	x			x	x	x						x		x	x	x	x		x	
Cymbella ventricosa	x	x				x	x	x					x	x			x	x		x	
Diatoma spp.						x								x							
Diatoma vulgare	x	x				x					x							x			

APPENDIX D (continued)

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Diploneis spp.													x								
Diploneis smithii																			x		
Epithemia spp.	x	x			x	x	x						x								
Epithemia sorex	x				x	x	x	x	x		x		x	x		x		x			
Epithemia turgida	x	x			x	x	x				x		x		x		x	x	x	x	x
Eunotia spp.							x			x								x			
Eunotia curvata var. curvata		x			x		x				x	x	x				x	x			
Eunotia pectinalis							x				x							x	x		
Fragilaria spp.	x	x		x	x	x	x				x	x	x		x		x	x	x	x	x
Fragilaria capucina var. capucina						x	x	x		x				x				x		x	
Fragilaria construens var. contruens	x							x		x								x	x		
Fragilaria construens var. binodis						x												x			
Fragilaria crotonensis var. crotonensis	x		x		x	x	x	x			x	x	x	x			x	x		x	x
Fragilaria pinnata var. pinnata					x					x											
Frustulia spp.													x								
Gomphonema spp.		x		x			x			x			x	x		x	x	x			
Gomphonema acuminatum					x								x				x	x		x	
Gomphonema acuminatum var. coronatum								x					x				x	x			
Gomphonema angustatum													x								
Gomphonema constrictum	x				x	x	x				x		x		x	x	x	x			
Gomphonema gracile var. dichotoma											x										
Gomphonema montanum var. subclavatum													x								
Gomphonema olivaceum	x	x	x		x	x	x				x	x	x		x	x	x	x	x	x	x
Gomphonema olivaceum var. calcarea	x	x	x		x	x	x		x		x		x								
Gomphonema parvulum	x	x			x	x	x				x		x			x		x			
Gyrosigma spp.	x	x				x	x									x	x	x			
Gyrosigma macrum	x	x	x	x												x					
Gyrosigma spenceri var. spenceri																				x	
Hantzschia spp.													x					x		x	x

APPENDIX D (continued)

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Hantzschia amphioxys		x																			
Hantzschia amphioxys var. vivax													x								
Mastogloia spp.													x								
Mastogloia smithii								x													
Meridion circulare	x					x		x		x			x			x	x	x	x	x	x
Navicula spp.	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x
Navicula accomoda var. accomoda						x															
Navicula bacillum var. bacillum		x				x															
Navicula capitata var. capitata	x	x			x	x							x								
Navicula capitata var. hungarica		x																			
Navicula cincta var. cincta	x																				
Navicula cryptocephala var. cryptocephala	x	x																x			
Navicula cuspidata var. cuspidata	x	x		x	x	x	x				x		x			x		x			
Navicula elginensis var. elginensis	x																			x	
Navicula exigua var. capitata	x																				
Navicula gastrum var. gastrum									x												
Navicula halophila var. tenuirostris													x								
Navicula pupula var. pupula					x								x								
Navicula pupula var. capitata						x							x								
Navicula pupula var. rectangularis					x																
Navicula radiosa var. radiosa					x	x	x						x				x	x			
Navicula radiosa var. tenella	x																				
Navicula reinhardhii var. reinhardhii		x				x												x			
Navicula reinhardhii var. elliptica																		x			
Navicula salinarum var. salinarum	x																				
Navicula salinarum var. intermedia	x						x						x								

APPENDIX D (continued)

	Habitat type #																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Navicula tripunctata var. tripunctata	x	x				x	x						x			x		x		x	x
Nedium spp.	x	x				x	x			x			x				x	x			
Nedium affine var. undulatum													x								
Nedium iridis var. iridis						x							x								
Nitzschia spp.	x	x			x	x	x		x	x	x		x	x	x	x	x	x	x		
Nitzschia amphibia	x						x														
Nitzschia commutata						x															
Nitzschia linearis	x	x	x		x	x	x						x				x	x		x	x
Nitzschia linearis var. tenuis																		x			
Nitzschia lorenziana																		x			
Nitzschia palea	x												x					x			
Nitzschia sigmoidia	x	x			x	x	x				x		x			x		x			
Nitzschia vermicularis																	x				
Opephora spp.																		x			
Opephora martyi													x					x			
Pinnularia spp.	x	x			x	x	x			x	x	x	x		x	x		x	x	x	x
Pinnularia gibba						x								x				x			
Pinnularia maior var. maior						x							x								
Pinnularia mesolepta var. mesolepta																				x	
Pinnularia microstauron var. microstauron				x									x								
Pinnularia viridis var. viridis						x															
Rhoicosphenia curvata	x	x			x	x	x				x		x	x		x	x	x	x	x	x
Rhopalodia gibba	x	x		x	x	x	x				x		x		x		x	x		x	x
Rhopalodia gibberula																		x			
Rhopalodia ventricosa											x					x					
Stauroneis spp.	x				x		x			x			x	x							x
Stauroneis anceps var. anceps	x	x				x	x						x								

APPENDIX D (continued)

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Stauroneis anceps fa. gracilis												x	x				x	x		x	
Stauroneis smithii var. smithii																		x		x	
Stauroneis phoenicenteron var. phoenicenteron						x	x				x		x		x			x		x	
Surirella spp.	x	x	x	x	x	x	x	x		x		x	x	x		x	x	x			
Surirella angustata	x				x	x					x		x					x		x	
Surirella elegans					x															x	
Surirella linearis	x					x							x								
Surirella ovalis	x	x	x		x	x	x						x			x	x	x		x	x
Surirella spiralis																		x			
Surirella splendida	x					x	x											x			
Surirella striatula		x				x			x												
Synedra spp.	x	x		x	x	x	x						x	x			x	x			
Synedra acus	x	x	x		x	x	x	x	x	x	x		x	x		x	x	x		x	
Synedra capitata var. capitata	x						x														
Synedra dorsoventralis		x																			
Synedra fasciculata var. fasciculata							x							x							
Synedra incisa var. incisa							x									x					
Synedra pulchella var. pulchella					x								x								
Synedra rumpens var. rumpens	x					x	x					x	x	x	x			x	x	x	
Synedra ulna	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Synedra ulna var. longissima	x																	x			
Tropidoneis lepidoptera								x													
VII. Cyanophyta																					
A) Cyanophyceae																					
Agmenellum spp. (Merismopedia spp.)	x	x				x	x				x		x				x				
Agmenellum thermale (Merismopedia glauca)	x	x			x	x	x						x			x					

APPENDIX D (continued)

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Agmenellum thermale (Merismopedia elegans var. major)	x																				
Agmenellum quadruplicatum (Merismopedia tenuissima)	x	x	x		x	x	x						x	x		x		x			
Anabaena spp.	x	x			x	x	x		x		x	x	x			x		x		x	x
Anabaena affinis	x						x						x		x			x		x	x
Anabaena circinalis	x	x		x		x	x														
Anabaena spiroides		x																			
Anacystis spp.	x	x		x	x	x	x				x	x	x			x				x	
Anacystis spp. (Gloeocapsa spp.)							x														
Anacystis spp. (Gloeocapsa punctata)																				x	
Anacystis spp. (Gloeocapsa rupestris)						x															
Anacystis spp. (Chroococcus spp.)	x	x			x	x	x									x					
Anacystis cyanea (Microcystis aeruginosa)	x	x		x	x	x	x	x		x	x		x								
Anacystis cyanea (Chroococcus minor)						x					x										
Anacystis cyanea (Chroococcus dispersus)						x															
Anacystis dimidiata (Chroococcus limneticus)		x																			
Anacystis incerta (Microcystis incerta)	x	x		x	x	x	x				x		x		x						
Aphanizomenon spp.	x	x		x	x	x	x						x								
Aphanizomenon flos-aquae (A. holsaticum)	x	x																			
Aphanizomenon ovalisporum						x															

APPENDIX D (continued)

	Habitat type #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Arthrospira spp.						x															
Arthrospira gomontiana											x										
Arthrospira Jenneri	x				x	x					x		x								
Calothrix spp.	x				x								x								
Coccochloris spp.	x																	x			
Coccochloris spp. (Aphanothece spp.)	x																				
Coccochloris spp. (Dactylococcopsis fascicularis)		x																			
Coccochloris spp. (Gloeothece rupestris)	x																				
Coccochloris spp. (Synechocystis aquatilis)							x														
Gloeotrichia echinulata													x								
Gloeotrichia natans						x															
Gomphosphaeria spp.	x	x		x	x	x	x				x	x	x	x		x		x			
Gomphosphaeria spp. (Coelosphaerium spp.)		x																			
Gomphosphaeria aponina	x	x			x	x	x				x		x								
Gomphosphaeria lacustris var. compacta		x																			
Lyngbya spp.	x	x			x	x	x				x		x					x			
Lyngbya aerugineo-caerulea						x												x			
Lyngbya aestuarii										x											
Lyngbya contorta	x	x		x		x	x	x			x		x	x							
Lyngbya Diguetii		x																x			
Lyngbya limnetica	x					x															
Lyngbya Nordgaardi													x								
Lyngbya versicolor	x																				
Nostoc spp.									x				x								
Oscillatoria spp.	x	x		x	x	x	x				x	x	x		x	x	x	x		x	x

APPENDIX D (continued)

	Habitat type #																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Oscillatoria acutissima						x					x		x		x						
Oscillatoria agardhii	x																x	x			
Oscillatoria amphibia													x								
Oscillatoria anguina					x						x		x								
Oscillatoria angusta					x		x				x										
Oscillatoria angustissima	x					x							x								
Oscillatoria articulata											x										
Oscillatoria chalybea					x								x								
Oscillatoria formosa									x				x								
Oscillatoria granulata					x	x							x								
Oscillatoria limnetica	x	x			x	x	x				x		x					x	x		
Oscillatoria limosa					x						x		x					x			
Oscillatoria nigra	x	x			x		x						x								
Oscillatoria prolifica						x							x							x	
Oscillatoria subbrevis	x				x	x	x				x		x	x			x	x			x
Oscillatoria splendida													x								
Oscillatoria tenuis	x				x	x	x				x		x								
Oscillatoria terebriformis																				x	
Pleurocapsa minor (Endophysalis spp.)																		x			
Rivularia minutula						x															
Spirulina spp.	x	x				x	x				x		x				x				x
Spirulina laxa			x																		
Spirulina major					x	x							x								
Spirulina princeps							x														
Spirulina subsalsa		x			x	x					x		x							x	
Unid. Flagellate	x	x		x	x	x	x					x	x			x		x			
Unid. Green											x										
Unid. Bluegreen	x				x	x					x	x	x								
Pennate diatom	x		x	x		x	x		x		x		x					x			

APPENDIX E

List of algae identified by location #1-60
(See footnotes for location name.)

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
I. Chlorophyta																				
A) Chlorophyceae																				
Actinastrum spp.																				
Actinastrum gracilimum						x														
Actinastrum Hantzschii		x			x		x													
Ankistrodesmus spp.																				
Ankistrodesmus convolutus		x		x		x			x											
Ankistrodesmus falcatus		x			x	x	x	x	x										x	
Ankistrodesmus falcatus var. acicularis																				
Ankistrodesmus falcatus var. mirabilis																				
Ankistrodesmus spiralis																				
Botryococcus spp.																				
Botryococcus protuburans var. minor																				
Botryococcus sudeticus																				
Bulbochaetae spp.																				
Chaetophora spp.			x	x				x												
Chaetophora elegans						x			x											
Chaetophora incrassata									x										x	
Characium spp.		x										x					x	x		
Characium ambiguum																				
Characium falcatum									x											
Characium gracilipes																				
Characium limneticum																				
Characium ornithocephalum																				
Chlamydomonas spp.				x				x				x			x		x	x		
Cladophora spp.			x	x				x		x	x					x			x	

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cladophora glomerata																				
Closteriopsis spp.	x																			
Closteriopsis longissima																				
Closteriopsis longissima var. tropica						x			x											
Closterium spp.			x	x					x	x			x		x	x	x	x	x	x
Closterium acerosum																				
Closterium acerosum var. elongatum																				
Closterium acutum																				
Closterium dianae																		x		
Closterium ehrenbergii														x						
Closterium moniliferum			x																	
Closterium leibleinii																				
Closterium venus																				
Coelastrum spp.																				
Coelastrum microporum																				
Coelastrum sphaericum																				
Coleochaete spp.																				
Coleochaete divergens									x											
Coleochaete orbicularis																				
Cosmarium spp.					x	x	x	x	x		x									
Cosmarium constrictum									x											
Cosmarium formosulum									x											
Cosmarium granatum									x											
Cosmarium meneghinii									x											
Cosmarium nitidulum																				
Cosmarium protractum																				
Cosmarium sexangulare									x											
Cosmarium subcostatum																				
Crucigenia spp.																				

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Crucigenia apiculata																				
Crucigenia tetrapedia																				
Crucigenia quadrata																				
Cylindrocapsa spp.			x		x							x	x				x			
Cylindrocapsa conferta					x															
Desmococcus viridis																				
Dictyosphaerium spp.																				
Dictyosphaerium pulchellum																				
Draparnaldia spp.			x																	
Dysmorphococcus variabilis												x								
Elakatotrix viridis																				
Euastropsis Richteri									x											
Eudorina spp.																				
Eudorina elegans																				
Franceia Droescheri						x														
Gloeocystis spp.								x												
Gloeocystis major		x																		
Gloeocystis versiculosa																				
Golenkinia spp.																				
Kirchneriella spp.						x														
Kirchneriella contorta																				
Kirchneriella subsolitaria																				
Lagerheimia spp.																				
Lagerheimia longiseta																				
Lagerheimia quadriseta																				
Lagerheimia subsalsa																				
Micractinium spp.																				
Micractinium pusillum																				
Microspora spp.				x											x					

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Microspora pachyderma														x						
Microthamnion strictissimum													x							
Mougeotia spp.																				
Nephrocytium spp.						x														
Nephrocytium agardhianum																				
Oedogonium spp.	x																			
Oocystis spp.					x				x		x									
Oocystis Borgei									x											
Oocystis crassa																				
Oocystis elliptica																				
Oocystis Eremosphaeria		x				x			x											
Oocystis parva																				
Oocystis pusilla																				
Oocystis solitaria																				
Oocystis submarina																				
Palmella mucosa																				
Pandorina spp.																				
Pandorina morum																				
Pediastrum spp.						x														
Pediastrum biradiatum v. emarginatum fa. convexum									x											
Pediastrum boryanum		x			x	x	x	x	x	x										
Pediastrum duplex					x		x		x											
Pediastrum duplex var. clathratum																				
Pediastrum duplex var. gracilimum						x														
Pediastrum duplex var. reticulatum																				
Pediastrum integrum var. priva									x											
Pediastrum simplex var. duodenarium					x	x														
Pediastrum tetras									x											

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Pediastrum tetras var. tetraodon									x											
Pithophora spp.			x					x												
Polyedriopsis spinulosa																				
Polytoma spp.																				
Protoderma viride																				
Quadrigula spp.																				
Quadrigula chodatii																				
Rhizoclonium spp.			x						x	x										
Rhizoclonium hieroglyphicum						x					x									
Rhizoclonium Hookeri		x																		
Scenedesmus spp.				x					x											
Scenedesmus abundans																				
Scenedesmus abundans var. asymmetrica																				
Scenedesmus abundans var. brevicauda																				
Scenedesmus abundans var. longicauda																				
Scenedesmus acuminatus		x			x	x	x	x												
Scenedesmus acuminatus var. minor				x		x														
Scenedesmus acutiformis								x												
Scenedesmus arcuatus																				
Scenedesmus arcuatus var. capitatus																				
Scenedesmus arcuatus var. platydisca									x		x									
Scenedesmus armatus					x															
Scenedesmus brasiliensis																				
Scenedesmus Bernardii		x						x	x											
Scenedesmus bijuga		x				x		x	x		x									
Scenedesmus bijuga var. alternans																				
Scenedesmus bijuga var. flexuosus																				
Scenedesmus dimorphus		x		x				x												

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Scenedesmus incrassatulus								x												
Scenedesmus longus var. ellipticus																				
Scenedesmus obliquus								x	x											
Scenedesmus opoliensis					x						x									
Scenedesmus opoliensis var. contract																				
Scenedesmus quadricauda		x						x	x		x									
Scenedesmus quadricauda var. longispina		x		x		x		x	x		x					x				
Scenedesmus quadricauda var. maximus																				
Scenedesmus quadricauda var. parvus																				
Scenedesmus quadricauda var. quadrispina		x				x		x	x											
Scenedesmus quadricauda var. Westii									x											
Schroederia spp.																				
Schroederia Judayi		x																		
Schroederia setigera																				
Selenastrum spp.		x			x				x											
Selenastrum minutum								x												
Selenastrum Westii																				
Spirogyra spp.			x						x	x				x	x	x			x	
Spondylosium spp.																				
Sphaerocystis spp.																				
Sphaerocystis Schroeteri		x			x	x		x	x		x	x	x	x		x		x	x	
Staurastrum spp.		x				x		x	x											
Staurastrum alternans																				
Staurastrum gracile					x															
Staurastrum margaritaceum																				
Staurastrum paradoxum																				
Staurastrum polymorphum																				
Staurastrum punctulatum									x											

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Stigeoclonium spp.						x							x	x	x	x		x		
Stigeoclonium lubricum																				
Stigeoclonium polymorphum					x							x				x				
Stigeoclonium subsecundum														x						
Tetraedron spp.																				
Tetraedron caudatum																				
Tetraedron enorme										x										
Tetraedron hastatum																				
Tetraedron limneticum					x															
Tetraedron minimum		x						x	x											
Tetraedron muticum								x	x											
Tetraedron muticum fa. punctulatum																				
Tetraedron regulare																				
Tetraedron regulare var. torsum																				
Tetraedron trigonum									x											
Tetraedron trigonum var. gracile																				
Tetrastrum staurogeniaeforme																				
Treubaria setigerum																				
Trentepohlia spp.						x														
Ulothrix spp.									x	x	x	x			x					
Ulothrix subtilissima										x										
Volvox spp.	x		x																	
Zygnema spp.	x																			
B) Charophyceae																				
Chara spp.																				
II. Euglenophyta																				
Euglena spp.	x	x			x	x			x							x				
Euglena acus																				

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Euglena Ehrenbergii																				
Phacus spp.		x		x					x											
Trachelomonas spp.																				
III. Pyrrophyta																				
A) Dinophyceae																				
Ceratium spp.																				
Ceratium hirundinella																				
Peridinium spp.																				
IV. Cryptophyta																				
Cryptomonas spp.																				
V. Chloromonadophyta																				
Vacuolaria virescens								x		x										
VI. Chrysophyta																				
A) Xanthophyceae																				
Characiopsis spp.																				
Ophiocytium spp.									x											
Ophiocytium capitatum var. longispinum																				
Tribonema spp.	x																			
Vaucheria spp.			x											x	x	x		x	x	x
B) Chrysophyceae																				
Dinobryon spp.								x	x		x						x	x		
Dinobryon sertularia									x											
Dinobryon Vanhoeffenii					x															

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
C) Bacillariophyceae																				
1) Centrales																				
Chaetoceros Elmorei																				
Coscinodiscus spp.	x																			
Coscinodiscus lacustris																				
Cyclotella spp.		x		x	x					x						x				
Cyclotella bodanica	x																			
Cyclotella meneghiniana						x			x										x	
Melosira spp.	x		x			x			x	x						x	x			
Melosira islandica					x															
Melosira granulata		x			x	x	x		x	x				x						
Rhizosolenia spp.																				
Stephanodiscus spp.	x															x				
Stephanodiscus astraea						x														
Stephanodiscus niagarae					x															
2) Pennales																				
Achnanthes spp.		x		x												x				
Achnanthes lanceolata var. lanceolata																	x			
Amphipleura pellucida var. pellucida									x											
Amphiprora spp.											x					x				
Amphiprora alata																				
Amphiprora ornata					x								x							
Amphora spp.			x					x		x	x									
Amphora ovalis		x		x	x	x			x				x		x	x	x		x	x
Anomoeoneis costata var. costata																				
Asterionella spp.											x									
Asterionella formosa																				
Caloneis spp.			x		x								x			x		x		
Caloneis amphisbaena var. amphisbaena																				

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Caloneis bacillum var. bacillum																				
Caloneis lewisii var. lewisii				x											x	x				
Caloneis limosa var. limosa																				
Caloneis ventricosa var. ventricosa						x							x							
Campylodiscus spp.																				
Campylodiscus noricus																				
Cocconeis spp.			x								x		x				x			
Cocconeis pendiculus				x		x		x			x	x				x			x	
Cocconeis placentula									x									x		
Cymatopleura spp.																				
Cymatopleura elliptica						x														
Cymatopleura elliptica var. spiralis																				
Cymatopleura solea			x	x	x	x	x						x							
Cymbella spp.	x	x	x	x	x			x	x	x			x	x			x	x	x	
Cymbella affinis																				
Cymbella aspera																				
Cymbella cuspidata																				
Cymbella cymbiformis						x													x	
Cymbella gracilis																				
Cymbella lanceolata																				
Cymbella mexicanum								x												
Cymbella parva																				
Cymbella prostrata					x															
Cymbella triangulum																				
Cymbella tumida				x															x	
Cymbella turgida		x		x		x			x			x			x	x		x	x	
Cymbella ventricosa				x		x		x	x		x	x				x			x	x
Diatoma spp.											x									
Diatoma vulgare						x														

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Diploneis spp.																				
Diploneis smithii														x						
Epithemia spp.																				
Epithemia sorex						x					x									
Epithemia turgida		x		x		x			x			x		x	x	x	x	x		
Eunotia spp.								x		x		x							x	
Eunotia curvata var. curvata		x		x					x				x							
Eunotia pectinalis								x				x		x						
Fragilaria spp.			x	x	x	x			x			x		x	x	x	x	x		
Fragilaria capucina var. capucina					x			x		x	x									x
Fragilaria construens var. contruens					x	x				x	x	x		x						
Fragilaria construens var. binodis																				
Fragilaria crotonensis var. crotonensis		x		x	x	x			x		x				x	x	x		x	x
Fragilaria pinnata var. pinnata									x											
Frustulia spp.		x																		
Gomphonema spp.			x					x		x	x	x								
Gomphonema acuminatum			x	x									x		x				x	
Gomphonema acuminatum var. coronatum				x					x											
Gomphonema angustatum																				
Gomphonema constrictum		x		x				x	x			x	x			x		x	x	
Gomphonema gracile var. dichotoma																				
Gomphonema montanum var. subclavatum																				
Gomphonema olivaceum		x		x	x	x	x		x			x	x	x	x	x	x	x	x	x
Gomphonema olivaceum var. calcarea									x											
Gomphonema parvulum								x												
Gyrosigma spp.			x	x	x	x						x							x	
Gyrosigma macrum																				
Gyrosigma spenceri var. spenceri																				x
Hantzschia spp.													x		x	x	x			

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Hantzschia amphioxys																				
Hantzschia amphioxys var. vivax																				
Mastogloia spp.																				
Mastogloia smithii											x									
Meridion circulare				x						x	x	x	x	x	x	x	x			
Navicula spp.			x		x		x	x		x	x	x	x	x	x	x	x	x		
Navicula accomoda var. accomoda																				
Navicula bacillum var. bacillum																				
Navicula capitata var. capitata							x													
Navicula capitata var. hungarica																				
Navicula cincta var. cincta																				
Navicula cryptocephala var. cryptocephala																				
Navicula cuspidata var. cuspidata		x							x											
Navicula elginensis var. elginensis																				x
Navicula exigua var. capitata																				
Navicula gastrum var. gastrum																				
Navicula halophila var. tenuirostris																				
Navicula pupula var. pupula																				
Navicula pupula var. capitata																				
Navicula pupula var. rectangularis																				
Navicula radiosa var. radiosa				x				x	x											
Navicula radiosa var. tenella																				
Navicula reinhardhii var. reinhardhii					x											x				
Navicula reinhardhii var. elliptica													x							
Navicula salinarum var. salinarum																				
Navicula salinarum var. intermedia																				

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Navicula tripunctata var. tripunctata									x							x	x		x	x
Nedium spp.			x		x			x	x	x		x								
Nedium affine var. undulatum																				
Nedium iridis var. iridis																				
Nitzschia spp.				x					x	x	x		x	x		x		x		
Nitzschia amphibia								x												
Nitzschia commutata																				
Nitzschia linearis		x		x			x						x		x	x	x		x	x
Nitzschia linearis var. tenuis																				
Nitzschia lorenziana																				
Nitzschia palea																				
Nitzschia sigmoidia						x			x											
Nitzschia vermicularis				x																
Opephora spp.												x								
Opephora martyi												x								
Pinnularia spp.		x			x	x		x	x	x		x	x	x	x		x	x	x	x
Pinnularia gibba					x						x									
Pinnularia maior var. maior																				
Pinnularia mesolepta var. mesolepta																				x
Pinnularia microstauron var. microstauron																				
Pinnularia viridis var. viridis																				
Rhoicosphenia curvata				x		x					x	x	x	x	x	x	x			
Rhopalodia gibba		x		x		x			x								x	x		x
Rhopalodia gibberula																			x	
Rhopalodia ventricosa																				
Stauroneis spp.										x	x						x			
Stauroneis anceps var. anceps						x														

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Stauroneis anceps fa. gracilis				x											x				x	x
Stauroneis smithii var. smithii												x	x		x					
Stauroneis phoenicenteron var. phoenicenteron		x							x						x	x		x	x	
Surirella spp.			x		x	x				x	x		x							
Surirella angustata																				x
Surirella elegans																				x
Surirella linearis							x													
Surirella ovalis				x		x									x		x		x	x
Surirella spiralis																				
Surirella splendida																				
Surirella striatula																				
Synedra spp.		x	x				x				x					x				
Synedra acus		x		x	x	x	x	x		x	x	x	x		x				x	x
Synedra capitata var. capitata									x											
Synedra dorsoventralis																				
Synedra fasciculata var. fasciculata											x									
Synedra incisa var. incisa																				
Synedra pulchella var. pulchella																				
Synedra rumpens var. rumpens					x			x			x	x	x	x	x	x		x		
Synedra ulna		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x x
Synedra ulna var. longissima																				
Tropidoneis lepidoptera											x									
VII. Cyanophyta																				
A) Cyanophyceae																				
Agmenellum spp. (Merismopedia spp.)		x			x			x	x											
Agmenellum thermale (Merismopedia glauca)						x		x	x											

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Agmenellum thermale (Merismopedia elegans var. major)																				
Agmenellum quadruplicatum (Merismopedia tenuissima)		x				x	x				x	x								
Anabaena spp.		x				x			x						x	x	x			
Anabaena affinis									x						x		x	x	x	
Anabaena circinalis																				
Anabaena spiroides																				
Anacystis spp.		x	x			x	x		x											
Anacystis spp. (Gloeocapsa spp.)		x																		
Anacystis spp. (Gloeocapsa punctata)															x					
Anacystis spp. (Gloeocapsa rupestris)																				
Anacystis spp. (Chroococcus sp.)																				
Anacystis cyanea (Microcystis aeruginosa)					x	x	x	x	x	x	x									
Anacystis cyanea (Chroococcus minor)																				
Anacystis cyanea (Chroococcus dispersus)																				
Anacystis dimidiata (Chroococcus limneticus)																				
Anacystis incerta (Microcystis incerta)					x	x		x	x									x		
Aphanizomenon spp.					x		x	x	x											
Aphanizomenon flos-aquae (A. holsaticum)																				
Aphanizomenon ovalisporum																				

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Arthrospira spp.																				
Arthrospira gomontiana																				
Arthrospira Jenneri																				
Calothrix spp.																				
Coccochloris spp.																				
Coccochloris spp. (Aphanothece sp.)																				
Coccochloris spp. (Dactylococcopsis fascicularis)																				
Coccochloris spp. (Gloeothece rupestris)																				
Coccochloris spp. (Synechocystis aquatilis)								x												
Gloeotrichia echinulata																				
Gloeotrichia natans																				
Gomphosphaeria spp.		x			x	x			x		x					x			x	
Gomphosphaeria spp. (Coelosphaerium spp.)																				
Gomphosphaeria aponina																				
Gomphosphaeria lacustris var. compacta																				
Lyngbya spp.						x	x		x			x								
Lyngbya aerugineo-caerulea																				
Lyngbya aestuarii										x										
Lyngbya contorta		x			x	x	x				x									
Lyngbya Diguetii																				
Lyngbya limnetica																				
Lyngbya Nordgaardi																				
Lyngbya versicolor																				
Nostoc spp.																				
Oscillatoria spp.	x			x		x	x					x	x		x	x	x	x	x	x

APPENDIX E

	# for all																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Oscillatoria acutissima																		x		
Oscillatoria agardhii				x												x				
Oscillatoria amphibia																				
Oscillatoria anguina																				
Oscillatoria angusta									x											
Oscillatoria angustissima						x														
Oscillatoria articulata																				
Oscillatoria chalybea		x																		
Oscillatoria formosa																				
Oscillatoria granulata																				
Oscillatoria limnetica		x				x			x			x		x						
Oscillatoria limosa																x				
Oscillatoria nigra									x											
Oscillatoria prolifica		x																		x
Oscillatoria subbrevis		x		x					x		x	x	x				x			
Oscillatoria splendida																				
Oscillatoria tenuis						x			x											
Oscillatoria terebriformis						x									x					
Pleurocapsa minor (Endophysalis spp.)													x							
Rivularia minutula																				
Spirulina spp.	x			x		x			x								x			
Spirulina laxa																				
Spirulina major																				
Spirulina princeps									x											
Spirulina subsalsa																				x
Unid. Flagellate						x						x								
Unid. Green																				
Unid. Bluegreen						x														
Pennate diatom									x											

APPENDIX E

List of algae identified by location #1-60
(See footnotes for location name.)

	# for all																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
I. Chlorophyta																				
A) Chlorophyceae																				
Actinastrum spp.	x																			x
Actinastrum gracilimum																				
Actinastrum Hantzschii																				
Ankistrodesmus spp.																				
Ankistrodesmus convolutus	x	x	x	x		x			x		x									
Ankistrodesmus falcatus	x	x	x	x	x	x		x	x	x	x	x	x	x						x
Ankistrodesmus falcatus var. acicularis																				
Ankistrodesmus falcatus var. mirabilis			x																	
Ankistrodesmus spiralis					x															
Botryococcus spp.																				x
Botryococcus protuburans var. minor																				
Botryococcus sudeticus																				
Bulbochaetae spp.																				
Chaetophora spp.					x															
Chaetophora elegans	x		x					x		x										
Chaetophora incrassata																				
Characium spp.			x				x		x	x	x	x						x		
Characium ambiguum																				
Characium falcatum																				
Characium gracilipes			x																	
Characium limneticum												x								

APPENDIX E

	# for all																		
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Characium ornithocephalum				x																
Chlamydomonas spp.																x		x	x	x
Cladophora spp.		x	x										x					x		
Cladophora glomerata	x					x														
Closteriopsis spp.																				
Closteriopsis longissima																				
Closteriopsis longissima var. tropica						x			x											
Closterium spp.		x	x	x	x		x	x		x	x					x		x	x	
Closterium acerosum			x																	
Closterium acerosum var. elongatum		x																		
Closterium acutum																				
Closterium dianae																				
Closterium ehrenbergii																				
Closterium moniliferum																				
Closterium leibleinii		x																		
Closterium venus																				
Coelastrum spp.												x					x			
Coelastrum microporum							x		x	x	x								x	
Coelastrum sphaericum																				
Coleochaete spp.																x				
Coleochaete divergens																				
Coleochaete orbicularis			x																	
Cosmarium spp.			x	x			x				x			x	x			x		
Cosmarium constrictum																				
Cosmarium formosulum				x	x						x									
Cosmarium granatum																				

APPENDIX E

	# for all																	
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Cosmarium nitidulum																				
Cosmarium protractum											x									
Cosmarium sexangulare																				
Cosmarium subcostatum										x										
Crucigenia spp.													x							
Crucigenia apiculata																				x
Crucigenia tetrapedia																				
Crucigenia quadrata																				
Cylindrocapsa spp.																				
Cylindrocapsa conferta														x						
Desmococcus viridis			x																	
Dictyosphaerium spp.																				
Dictyosphaerium pulchellum																				
Draparnaldia spp.																				
Dysmorphococcus variabilis																				
Elakatotrix viridis			x																	
Euastropsis Richteri			x																	
Eudorina spp.																				
Eudorina elegans																				
Franceia Droescheri																				
Gloeocystis spp.						x									x					
Gloeocystis major									x											
Gloeocystis versiculosa																				
Golenkinia spp.																				
Kirchneriella spp.			x																	
Kirchneriella contorta																				
Kirchneriella subsolitaria																				
Lagerheimia spp.																				

APPENDIX E

	# for all																	
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Lagerheimia quadriseta																				x
Lagerheimia subsalsa																				
Micractinium spp.																				
Micractinium pusillum																				x
Microspora spp.				x				x								x				
Microspora pachyderma																				
Microthamnion strictissimum																				
Mougeotia spp.		x		x	x											x				
Nephrocytium spp.																				
Nephrocytium agardhianum																				
Oedogonium spp.																				
Oocystis spp.									x	x		x			x			x		
Oocystis Borgei						x														x
Oocystis crassa																				
Oocystis elliptica																				
Oocystis Eremosphaeria			x						x	x										
Oocystis parva									x											
Oocystis pusilla				x																
Oocystis solitaria									x											
Oocystis submarina																				
Palmella mucosa												x								
Pandorina spp.		x																		
Pandorina morum			x	x																
Pediastrum spp.																			x	
Pediastrum biradiatum v. emarginatum fa. convexum																				
Pediastrum boryanum				x		x	x	x	x	x		x		x			x	x	x	
Pediastrum duplex			x			x		x			x	x					x		x	x
Pediastrum duplex var. clathratum									x	x										

APPENDIX E

	# for all																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Pediastrum duplex var. gracilimum																				
Pediastrum duplex var. reticulatum			x																	
Pediastrum integrum var. priva																				
Pediastrum simplex var. duodenarium																				
Pediastrum tetras																				
Pediastrum tetras var. tetraodon																				
Pithophora spp.				x																
Polyedriopsis spinulosa																				
Polytoma spp.																				x
Protoderma viride											x									
Quadrigula spp.																		x		
Quadrigula chodatii												x								
Rhizoclonium spp.		x	x					x		x	x		x	x					x	
Rhizoclonium hieroglyphicum	x		x		x	x	x		x	x	x									
Rhizoclonium Hookeri	x					x					x									
Scenedesmus spp.	x		x	x		x			x		x	x		x					x	x
Scenedesmus abundans											x			x					x	
Scenedesmus abundans var. asymmetrica																				x
Scenedesmus abundans var. brevicauda			x						x											
Scenedesmus abundans var. longicauda																				
Scenedesmus acuminatus			x			x						x								x
Scenedesmus acuminatus var. minor																				x
Scenedesmus acutiformis																				
Scenedesmus arcuatus			x																	

APPENDIX E

	# for all																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Scenedesmus arcuatus var. capitatus			x																	
Scenedesmus arcuatus var. platydisca						x			x											x
Scenedesmus armatus																				
Scenedesmus brasiliensis				x																
Scenedesmus Bernardii			x	x				x												
Scenedesmus bijuga			x	x	x	x	x		x	x	x			x					x	x
Scenedesmus bijuga var. alternans											x									
Scenedesmus bijuga var. flexuosus									x	x	x	x	x							
Scenedesmus dimorphus				x						x				x						
Scenedesmus incrassatulus			x																	
Scenedesmus longus var. ellipticus									x											
Scenedesmus obliquus																x			x	
Scenedesmus opoliensis												x								
Scenedesmus opoliensis var. contract														x						
Scenedesmus quadricauda		x				x	x			x							x		x	
Scenedesmus quadricauda var. longispina			x	x	x	x	x	x	x	x	x	x		x					x	x
Scenedesmus quadricauda var. maximus	x			x		x						x								
Scenedesmus quadricauda var. parvus																				
Scenedesmus quadricauda var. quadrispina			x				x		x											
Scenedesmus quadricauda var. Westii			x						x											

APPENDIX E

	# for all																		
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Schroederia spp.																				x
Schroederia Judayi																				
Schroederia setigera									x									x		
Selenastrum spp.	x										x			x						
Selenastrum minutum														x						
Selenastrum Westii																				
Spirogyra spp.	x	x	x		x			x	x	x						x				x
Spondylosium spp.																				
Sphaerocystis spp.							x													
Sphaerocystis Schroeteri	x		x			x	x		x		x						x			x
Staurastrum spp.											x	x								
Staurastrum alternans																				
Staurastrum gracile																	x			
Staurastrum margaritaceum						x														
Staurastrum paradoxum																				
Staurastrum polymorphum				x																
Staurastrum punctulatum																				
Stigeoclonium spp.								x					x			x		x	x	
Stigeoclonium lubricum						x														
Stigeoclonium polymorphum			x		x	x														
Stigeoclonium subsecundum																				
Tetraedron spp.			x																	
Tetraedron caudatum																				
Tetraedron enorme																				
Tetraedron hastatum																				
Tetraedron limneticum																				
Tetraedron minimum			x								x									
Tetraedron muticum					x					x	x									
Tetraedron muticum fa. punctulatum			x																	

APPENDIX E

	# for all																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Tetraedron regulare																				
Tetraedron regulare var. torsum																				
Tetraedron trigonum			x		x															
Tetraedron trigonum var. gracile																				
Tetrastrum staurogeniaeforme																				x
Treubaria setigerum																				
Trentepohlia spp.																				
Ulothrix spp.				x	x				x											
Ulothrix subtilissima																				
Volvox spp.																				
Zygnema spp.																				
B) Charophyceae																				
Chara spp.		x								x										
II. Euglenophyta																				
Euglena spp.			x	x	x							x		x		x			x	x
Euglena acus																				
Euglena Ehrenbergii																				
Phacus spp.			x	x		x		x	x	x	x	x		x		x			x	
Trachelomonas spp.												x						x		
III. Pyrrophyta																				
A) Dinophyceae																				
Ceratium spp.																				
Ceratium hirundinella																				
Peridinium spp.	x																			
IV. Cryptophyta																				
Cryptomonas spp.																				

APPENDIX E

	# for all																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
V. Chloromonadophyta																				
Vacuolaria virescens																				
VI. Chrysophyta																				
A) Xanthophyceae																				
Characiopsis spp.				x																
Ophiocytium spp.						x		x	x		x					x				
Ophiocytium capitatum var. *longispinum*																				
Tribonema spp.							x		x	x										
Vaucheria spp.			x																	
B) Chrysophyceae																				
Dinobryon spp.	x					x														
Dinobryon sertularia			x																	
Dinobryon Vanhoeffenii																				
C) Bacillariophyceae																				
1) Centrales																				
Chaetoceros Elmorei																				
Coscinodiscus spp.																				
Coscinodiscus lacustris																		x		
Cyclotella spp.	x	x	x	x				x		x									x	
Cyclotella bodanica																				
Cyclotella meneghiniana		x	x	x	x							x		x		x				x
Melosira spp.		x		x	x							x				x		x		x
Melosira islandica																x				
Melosira granulata		x				x	x	x				x	x			x	x	x		x
Rhizosolenia spp.																				
Stephanodiscus spp.													x			x				x

APPENDIX E

	# for all																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Stephanodiscus astraea												x					x			
Stephanodiscus niagarae																				
2) Pennales																				
Achnanthes spp.		x	x	x			x													
Achnanthes lanceolata var. lanceolata																				
Amphipleura pellucida var. pellucida					x															
Amphiprora spp.																				
Amphiprora alata									x					x						
Amphiprora ornata												x								
Amphora spp.		x																		
Amphora ovalis	x	x	x	x	x	x	x		x		x	x		x	x				x	x
Anomoeoneis costata var. costata																				
Asterionella spp.																				
Asterionella formosa						x														
Caloneis spp.	x		x																	
Caloneis amphisbaena var. amphisbaena																				
Caloneis bacillum var. bacillum								x								x				
Caloneis lewisii var. lewisii												x								
Caloneis limosa var. limosa														x						
Caloneis ventricosa var. ventricosa		x																x		
Campylodiscus spp.																				
Campylodiscus noricus																				
Cocconeis spp.																				

APPENDIX E

	# for all																		
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Cocconeis pendiculus		x	x	x	x	x		x	x	x	x	x	x		x	x				x
Cocconeis placentula	x	x																		
Cymatopleura spp.																				
Cymatopleura elliptica		x	x			x						x							x	x
Cymatopleura elliptica var. spiralis																				
Cymatopleura solea		x	x			x						x						x		
Cymbella spp.		x	x		x	x					x	x	x	x				x	x	
Cymbella affinis								x												
Cymbella aspera													x							
Cymbella cuspidata																				
Cymbella cymbiformis		x			x															
Cymbella gracilis						x														
Cymbella lanceolata		x																		
Cymbella mexicanum																				
Cymbella parva		x																		
Cymbella prostrata	x	x	x				x					x	x							
Cymbella triangulum																				
Cymbella tumida			x						x											
Cymbella turgida						x			x				x	x						
Cymbella ventricosa	x	x	x	x	x		x	x	x			x			x	x		x	x	
Diatoma spp.																				
Diatoma vulgare		x				x				x			x		x				x	
Diploneis spp.																				
Diploneis smithii																				
Epithemia spp.							x						x		x					
Epithemia sorex		x				x	x			x										
Epithemia turgida		x	x	x	x	x		x		x	x	x		x		x				
Eunotia spp.																				

APPENDIX E

	# for all																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Eunotia curvata var. curvata		x		x	x			x		x	x					x	x			
Eunotia pectinalis											x									
Fragilaria spp.		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	
Fragilaria capucina var. capucina	x	x																		
Fragilaria construens var. contruens																				
Fragilaria construens var. binodis		x																		
Fragilaria crotonensis var. crotonensis	x	x	x	x	x	x		x			x	x								x
Fragilaria pinnata var. pinnata																				
Frustulia spp.																				
Gomphonema spp.													x							
Gomphonema acuminatum	x	x			x															
Gomphonema acuminatum var. coronatum					x															
Gomphonema angustatum																x				
Gomphonema constrictum	x	x	x		x					x		x				x			x	
Gomphonema gracile var. dichotoma										x										
Gomphonema montanum var. subclavatum																				
Gomphonema olivaceum	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x		x	x	x
Gomphonema olivaceum var. calcarea			x	x							x		x			x				x
Gomphonema parvulum							x		x		x	x		x					x	
Gyrosigma spp.		x													x					

APPENDIX E

	# for all																		
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Gyrosigma macrum																		x		x
Gyrosigma spenceri var. spenceri																				
Hantzschia spp.					x															
Hantzschia amphioxys																				
Hantzschia amphioxys var. vivax																				
Mastogloia spp.																				
Mastogloia smithii																				
Meridion circulare			x		x															
Navicula spp.	x	x					x	x	x	x	x		x		x	x			x	x
Navicula accomoda var. accomoda												x								
Navicula bacillum var. bacillum														x						
Navicula capitata var. capitata																		x		
Navicula capitata var. hungarica															x					
Navicula cincta var. cincta																				
Navicula cryptocephala var. cryptocephala		x																x		
Navicula cuspidata var. cuspidata		x		x		x				x				x	x	x		x		
Navicula elginensis var. elginensis																				

APPENDIX E

	# for all																		
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Navicula exigua var. capitata																				
Navicula gastrum var. gastrum																				
Navicula halophila var. tenuirostris																				
Navicula pupula var. pupula																				
Navicula pupula var. capitata																				
Navicula pupula var. rectangularis																				
Navicula radiosa var. radiosa	x	x			x															
Navicula radiosa var. tenella																				
Navicula reinhardhii var. reinhardhii												x			x			x		
Navicula reinhardhii var. elliptica																				
Navicula salinarum var. salinarum																				
Navicula salinarum var. intermedia						x								x						
Navicula tripunctata var. tripunctata	x	x		x		x		x						x	x					
Nedium spp.									x							x				
Nedium affine var. undulatum					x															
Nedium iridis var. iridis														x						
Nitzschia spp.	x	x	x	x		x	x	x	x		x					x		x	x	
Nitzschia amphibia																				
Nitzschia commutata																				
Nitzschia linearis	x	x							x			x		x	x					x
Nitzschia linearis var. tenuis		x																		
Nitzschia lorenziana		x																		
Nitzschia palea		x																		
Nitzschia sigmoidia	x	x				x				x		x		x						

APPENDIX E

	# for all																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Nitzschia vermicularis																				
Opephora spp.																				
Opephora martyi				x																
Pinnularia spp.	x	x	x	x	x	x		x		x						x				
Pinnularia gibba		x																		
Pinnularia maior var. maior																				
Pinnularia mesolepta var. mesolepta																				
Pinnularia microstauron var. microstauron									x											
Pinnularia viridis var. viridis												x								
Rhoicosphenia curvata		x	x	x		x	x			x		x	x					x	x	
Rhopalodia gibba	x	x	x	x	x	x	x	x	x	x			x		x					
Rhopalodia gibberula																				
Rhopalodia ventricosa										x										
Stauroneis spp.					x	x			x											
Stauroneis anceps var. anceps			x			x	x					x	x							
Stauroneis anceps fa. gracilis	x				x			x	x											
Stauroneis smithii var. smithii																				
Stauroneis phoenicenteron var. phoenicenteron	x	x		x						x						x				
Surirella spp.			x				x	x	x			x		x		x			x	x
Surirella angustata	x	x	x						x		x									
Surirella elegans																				
Surirella linearis						x														
Surirella ovalis	x		x			x	x		x			x		x		x			x	x
Surirella spiralis	x	x																		

APPENDIX E

	# for all																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Surirella splendida		x										x								
Surirella striatula														x	x					
Synedra spp.													x	x				x		
Synedra acus			x	x	x						x	x		x				x		x
Synedra capitata var. capitata						x														
Synedra dorsoventralis																		x		
Synedra fasciculata var. fasciculata																				
Synedra incisa var. incisa																				
Synedra pulchella var. pulchella														x						
Synedra rumpens var. rumpens						x		x	x											
Synedra ulna	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x		x	x	x
Synedra ulna var. longissima		x																		
Tropidoneis lepidoptera																				
VII. Cyanophyta																				
A) Cyanophyceae																				
Agmenellum spp. (Merismopedia spp.)						x			x		x							x		
Agmenellum thermale (Merismopedia glauca)			x											x	x					
Agmenellum thermale (Merismopedia elegans var. major)			x																	
Agmenellum quadruplicatum (Merismopedia tenuissima)			x									x			x	x		x	x	x
Anabaena spp.		x			x	x		x		x	x	x	x	x		x	x	x	x	
Anabaena affinis			x	x																

APPENDIX E

	# for all																		
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Anabaena circinalis			x															x		
Anabaena spiroides																				
Anacystis spp.								x								x				
Anacystis spp. (Gloeocapsa spp.)																				
Anacystis spp. (Gloeocapsa punctata)																				
Anacystis spp. (Gloeocapsa rupestris)			x																	
Anacystis spp. (Chroococcus spp.)															x		x			
Anacystis cyanea (Microcystis aeruginosa)			x				x	x	x	x	x	x					x	x	x	
Anacystis cyanea (Chroococcus minor)											x									
Anacystis cyanea (Chroococcus dispersus)																				
Anacystis dimidiata (Chroococcus limneticus)																	x	x		
Anacystis incerta (Microcystis incerta)			x							x	x	x						x		
Aphanizomenon spp.												x						x		x
Aphanizomenon flos-aquae (A. holsaticum)			x																	
Aphanizomenon ovalisporum																				
Arthrospira spp.																				
Arthrospira gomontiana										x										
Arthrospira Jenneri										x										
Calothrix spp.						x														
Coccochloris spp.																				

APPENDIX E

	# for all																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Coccochloris spp. (Aphanothece spp.)																				
Coccochloris spp. (*Dactylococcopsis fascicularis*)															x					
Coccochloris spp. (*Gloeothece rupestris*)																				
Coccochloris spp. (*Synechocystis aquatilis*)																				
Gloeotrichia echinulata																				
Gloeotrichia natans																				
Gomphosphaeria spp.			x					x				x	x	x	x	x				
Gomphosphaeria spp. (*Coelosphaerium* spp.)																				
Gomphosphaeria aponina										x										
Gomphosphaeria lacustris var. *compacta*																				
Lyngbya spp.			x			x				x	x	x			x			x		
Lyngbya aerugineo-caerulea																				
Lyngbya aestuarii																				
Lyngbya contorta							x		x	x	x				x					
Lyngbya Diguetii		x											x							
Lyngbya limnetica																				
Lyngbya Nordgaardi														x						
Lyngbya versicolor						x														
Nostoc spp.									x											
Oscillatoria spp.	x	x	x		x	x	x	x		x				x	x	x	x	x	x	
Oscillatoria acutissima			x					x	x	x	x									
Oscillatoria agardhii																				
Oscillatoria amphibia																				

APPENDIX E

	# for all																		
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Oscillatoria anguina				x						x						x				
Oscillatoria angusta										x	x									
Oscillatoria angustissima																x				
Oscillatoria articulata										x										
Oscillatoria chalybea										x	x					x				
Oscillatoria formosa				x																
Oscillatoria granulata			x		x															
Oscillatoria limnetica			x	x	x			x	x	x	x	x		x		x				
Oscillatoria limosa										x						x				
Oscillatoria nigra						x		x								x				
Oscillatoria prolifica																				
Oscillatoria subbrevis				x		x			x		x									
Oscillatoria splendida									x											
Oscillatoria tenuis				x		x				x						x				
Oscillatoria terebriformis																				
Pleurocapsa minor (Endophysalis spp.)																				
Rivularia minutula																				
Spirulina spp.			x						x	x	x								x	
Spirulina laxa																				x
Spirulina major														x		x				
Spirulina princeps																				
Spirulina subsalsa			x						x	x				x	x					
Unid. Flagellate								x							x		x	x	x	
Unid. Green											x									
Unid. Bluegreen						x		x	x		x									
Pennate diatom		x				x					x					x				x

APPENDIX E

List of algae identified by location #1-60
(See footnotes for location name.)

	41	42	43	44	45	46	47	48	49	# for all 50	51	52	53	54	55	56	57	58	59	60
I. Chlorophyta																				
A) Chlorophyceae																				
Actinastrum spp.	x	x	x	x				x											x	
Actinastrum gracilimum																				
Actinastrum Hantzschii	x							x						x		x				x
Ankistrodesmus spp.																				
Ankistrodesmus convolutus	x		x	x						x	x	x		x		x	x		x	
Ankistrodesmus falcatus	x	x	x	x	x			x				x		x	x	x	x		x	x
Ankistrodesmus falcatus var. acicularis	x			x			x	x		x	x	x								
Ankistrodesmus falcatus var. mirabilis	x			x			x	x	x	x										x
Ankistrodesmus spiralis																				
Botryococcus spp.					x												x		x	
Botryococcus protuburans var. minor										x										
Botryococcus sudeticus																	x			
Bulbochaetae spp.					x															
Chaetophora spp.					x															
Chaetophora elegans																				
Chaetophora incrassata					x															
Characium spp.					x					x	x									
Characium ambiguum														x						
Characium falcatum																				
Characium gracilipes																				
Characium limneticum																				

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Characium ornithocephalum																				
Chlamydomonas spp.			x		x			x	x	x	x	x		x	x					
Cladophora spp.		x								x		x					x		x	x
Cladophora glomerata	x																			
Closteriopsis spp.																				
Closteriopsis longissima											x								x	
Closteriopsis longissima var. tropica	x	x	x																	
Closterium spp.				x	x					x						x				x
Closterium acerosum				x	x															
Closterium acerosum var. elongatum																				
Closterium acutum		x																		
Closterium dianae																				
Closterium ehrenbergii																				
Closterium moniliferum																				
Closterium leibleinii															x					
Closterium venus											x				x	x				
Coelastrum spp.		x					x							x						
Coelastrum microporum	x								x		x	x		x					x	x
Coelastrum sphaericum														x						x
Coleochaete spp.																				
Coleochaete divergens																				
Coleochaete orbicularis																				
Cosmarium spp.		x			x			x			x	x		x			x	x	x	x
Cosmarium constrictum				x																
Cosmarium formosulum				x	x						x						x	x		x
Cosmarium granatum																				x
Cosmarium meneghinii																				

APPENDIX E

	41	42	43	44	45	46	47	48	49	# for all 50	51	52	53	54	55	56	57	58	59	60
Cosmarium nitidulum					x															
Cosmarium protractum																				
Cosmarium sexangulare																				
Cosmarium subcostatum														x						
Crucigenia spp.		x		x						x	x									
Crucigenia apiculata	x				x															
Crucigenia tetrapedia																				x
Crucigenia quadrata				x						x										x
Cylindrocapsa spp.																				
Cylindrocapsa conferta																				
Desmococcus viridis	x																			
Dictyosphaerium spp.			x	x									x	x			x			x
Dictyosphaerium pulchellum				x						x	x	x	x	x		x			x	x
Draparnaldia spp.																				
Dysmorphococcus variabilis														x						
Elakatotrix viridis																				
Euastropsis Richteri																				
Eudorina spp.										x										
Eudorina elegans								x												
Franceia Droescheri																				
Gloeocystis spp.																				
Gloeocystis major																				
Gloeocystis versiculosa											x									
Golenkinia spp.	x				x		x													
Kirchneriella spp.	x		x	x				x		x		x		x					x	
Kirchneriella contorta										x		x							x	x
Kirchneriella subsolitaria	x																			
Lagerheimia spp.											x									

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Lagerheimia longiseta			x																	
Lagerheimia quadriseta			x																	
Lagerheimia subsalsa				x									x	x						x
Micractinium spp.		x	x																	x
Micractinium pusillum		x																		
Microspora spp.																				
Microspora pachyderma										x										
Microthamnion strictissimum																				
Mougeotia spp.					x	x									x					
Nephrocytium spp.				x	x						x	x							x	
Nephrocytium agardhianum										x				x						
Oedogonium spp.							x					x								
Oocystis spp.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Oocystis Borgei	x			x	x							x	x			x	x		x	
Oocystis crassa		x					x			x	x									
Oocystis elliptica	x																			
Oocystis Eremosphaeria		x				x														x
Oocystis parva													x							
Oocystis pusilla																			x	
Oocystis solitaria																				
Oocystis submarina							x					x								
Palmella mucosa								x						x						
Pandorina spp.											x			x		x				
Pandorina morum																				
Pediastrum spp.			x															x	x	
Pediastrum biradiatum v. emarginatum fa. convexum																				
Pediastrum boryanum	x	x		x	x		x		x	x	x	x	x	x		x	x	x	x	x
Pediastrum duplex	x	x		x				x						x		x	x		x	x

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Pediastrum duplex var. clathratum																				
Pediastrum duplex var. gracilimum																			x	
Pediastrum duplex var. reticulatum		x																		
Pediastrum integrum var. priva																				
Pediastrum simplex var. duodenarium	x										x			x		x				x
Pediastrum tetras											x			x						
Pediastrum tetras var. tetraodon																				
Pithophora spp.																				
Polyedriopsis spinulosa	x																			
Polytoma spp.																				
Protoderma viride																				
Quadrigula spp.	x													x						x
Quadrigula chodatii																				
Rhizoclonium spp.				x	x			x	x	x	x	x	x		x	x				x
Rhizoclonium hieroglyphicum																				
Rhizoclonium Hookeri																				
Scenedesmus spp.	x							x				x		x			x	x		
Scenedesmus abundans	x	x									x			x			x			x
Scenedesmus abundans var. asymmetrica														x						
Scenedesmus abundans var. brevicauda							x						x	x						
Scenedesmus abundans var. longicauda														x						
Scenedesmus acuminatus										x	x	x					x		x	
Scenedesmus acuminatus var. minor	x	x		x	x						x			x						
Scenedesmus acutiformis																				

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Scenedesmus arcuatus																				
Scenedesmus arcuatus var. capitatus		x																		
Scenedesmus arcuatus var. platydisca	x				x		x				x			x			x			
Scenedesmus armatus																		x		
Scenedesmus brasiliensis																				
Scenedesmus Bernardii																				
Scenedesmus bijuga	x	x		x	x					x	x	x	x	x		x	x	x	x	x
Scenedesmus bijuga var. alternans														x						
Scenedesmus bijuga var. flexuosus		x					x					x								x
Scenedesmus dimorphus		x	x		x					x	x			x		x	x		x	x
Scenedesmus incrassatulus																				
Scenedesmus longus var. ellipticus																				
Scenedesmus obliquus											x			x			x		x	
Scenedesmus opoliensis																				
Scenedesmus opoliensis var. contract																				
Scenedesmus quadricauda	x	x	x	x	x		x			x		x	x	x		x	x	x	x	x
Scenedesmus quadricauda var. longispina	x	x		x	x		x			x	x		x	x		x	x	x	x	x
Scenedesmus quadricauda var. maximus		x																		x
Scenedesmus quadricauda var. parvus																			x	
Scenedesmus quadricauda var. quadrispina																		x		
Scenedesmus quadricauda var. Westii											x			x						

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Schroederia spp.							x			x										
Schroederia Judayi		x		x								x		x						
Schroederia setigera													x	x		x				
Selenastrum spp.											x						x			
Selenastrum minutum																		x		
Selenastrum Westii											x	x		x						
Spirogyra spp.				x	x															
Spondylosium spp.					x															
Sphaerocystis spp.			x																	
Sphaerocystis Schroeteri	x	x		x	x			x				x		x		x				
Staurastrum spp.	x		x	x	x				x		x	x						x	x	x
Staurastrum alternans											x									
Staurastrum gracile		x		x																
Staurastrum margaritaceum																				
Staurastrum paradoxum																				
Staurastrum polymorphum					x						x									
Staurastrum punctulatum																				
Stigeoclonium spp.		x						x	x		x	x				x				
Stigeoclonium lubricum																				
Stigeoclonium polymorphum														x						
Stigeoclonium subsecundum																				
Tetraedron spp.											x									x
Tetraedron caudatum	x				x						x			x				x		
Tetraedron enorme																				
Tetraedron hastatum				x																
Tetraedron limneticum																				
Tetraedron minimum	x				x					x	x			x				x		x
Tetraedron muticum	x				x						x									x
Tetraedron muticum fa. punctulatum																		x		

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Tetraedron regulare				x										x					x	x
Tetraedron regulare var. torsum				x																
Tetraedron trigonum																				
Tetraedron trigonum var. gracile	x				x						x									x
Tetrastrum staurogeniaeforme	x		x							x							x			x
Treubaria setigerum	x									x	x								x	
Trentepohlia spp.																				
Ulothrix spp.			x		x															
Ulothrix subtilissima																				
Volvox spp.																				
Zygnema spp.																				
B) Charophyceae																				
Chara spp.					x															
II. Euglenophyta																				
Euglena spp.	x	x		x	x		x	x	x	x	x	x		x	x	x	x	x		x
Euglena acus	x																			
Euglena Ehrenbergii											x									
Phacus spp.	x	x	x	x	x			x	x	x	x			x	x	x	x		x	x
Trachelomonas spp.			x								x	x		x			x	x		
III. Pyrrophyta																				
A) Dinophyceae																				
Ceratium spp.			x	x																
Ceratium hirundinella																				x
Peridinium spp.			x																	
IV. Cryptophyta																				
Cryptomonas spp.									x	x	x	x			x					x

APPENDIX E

	# for all																			
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
V. Chloromonadophyta																				
Vacuolaria virescens																				
VI. Chrysophyta																				
A) Xanthophyceae																				
Characiopsis spp.																				
Ophiocytium spp.																				
Ophiocytium capitatum var. *longispinum*	x													x						
Tribonema spp.							x										x			
Vaucheria spp.																				
B) Chrysophyceae																				
Dinobryon spp.																				
Dinobryon sertularia										x	x									
Dinobryon Vanhoeffenii																				
C) Bacillariophyceae																				
1) Centrales																				
Chaetoceros Elmorei						x	x													
Coscinodiscus spp.																				
Coscinodiscus lacustris																				
Cyclotella spp.			x	x					x				x	x		x			x	x
Cyclotella bodanica																				
Cyclotella meneghiniana	x	x			x			x	x	x	x	x	x	x			x		x	x
Melosira spp.			x	x	x					x					x			x		x
Melosira islandica																				
Melosira granulata	x	x		x			x	x	x	x		x	x	x		x			x	x
Rhizosolenia spp.			x	x																
Stephanodiscus spp.			x									x								

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Stephanodiscus astraea		x		x																
Stephanodiscus niagarae																				
2) Pennales																				
Achnanthes spp.																				
Achnanthes lanceolata var. lanceolata					x															
Amphipleura pellucida var. pellucida																				
Amphiprora spp.																				
Amphiprora alata							x					x	x							
Amphiprora ornata																x	x			x
Amphora spp.			x	x		x	x					x	x	x		x	x	x	x	
Amphora ovalis	x			x	x		x		x	x		x	x	x	x	x	x	x	x	x
Anomoeoneis costata var. costata						x	x													
Asterionella spp.																				
Asterionella formosa																				
Caloneis spp.							x													
Caloneis amphisbaena var. amphisbaena	x																			
Caloneis bacillum var. bacillum																				
Caloneis lewisii var. lewisii																x				
Caloneis limosa var. limosa											x								x	x
Caloneis ventricosa var. ventricosa					x					x							x			x
Campylodiscus spp.						x														
Campylodiscus noricus													x							
Cocconeis spp.										x	x				x	x	x	x		

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Cocconeis pendiculus	x			x	x		x	x		x				x			x		x	x
Cocconeis placentula					x					x	x						x	x		x
Cymatopleura spp.												x								
Cymatopleura elliptica							x						x			x	x		x	x
Cymatopleura elliptica var. spiralis							x													
Cymatopleura solea	x	x		x			x						x				x	x		x
Cymbella spp.	x			x				x	x		x	x					x		x	x
Cymbella affinis																				x
Cymbella aspera																				
Cymbella cuspidata													x							
Cymbella cymbiformis					x													x		
Cymbella gracilis	x																			
Cymbella lanceolata																				
Cymbella mexicanum																				
Cymbella parva																				x
Cymbella prostrata		x																		x
Cymbella triangulum				x															x	x
Cymbella tumida																				
Cymbella turgida		x		x	x		x							x						x
Cymbella ventricosa				x	x		x				x	x				x				
Diatoma spp.	x																		x	
Diatoma vulgare																				
Diploneis spp.																		x		
Diploneis smithii																				
Epithemia spp.				x						x	x			x	x			x	x	x
Epithemia sorex	x			x	x	x													x	x
Epithemia turgida				x	x		x	x			x			x	x		x	x	x	x
Eunotia spp.												x								

APPENDIX E

	# for all																			
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Eunotia curvata var. curvata					x										x					
Eunotia pectinalis																				
Fragilaria spp.			x	x	x		x			x	x	x		x	x			x		
Fragilaria capucina var. capucina																				
Fragilaria construens var. contruens																			x	x
Fragilaria construens var. binodis																				
Fragilaria crotonensis var. crotonensis				x							x			x					x	x
Fragilaria pinnata var. pinnata											x									
Frustulia spp.																				
Gomphonema spp.	x		x												x					
Gomphonema acuminatum					x										x					
Gomphonema acuminatum var. coronatum																				
Gomphonema angustatum																				
Gomphonema constrictum	x				x						x			x	x					x
Gomphonema gracile var. dichotoma																				
Gomphonema montanum var. subclavatum					x															
Gomphonema olivaceum	x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x
Gomphonema olivaceum var. calcarea		x				x			x	x	x	x		x	x		x	x		
Gomphonema parvulum	x								x	x	x	x		x	x	x		x		
Gyrosigma spp.	x	x		x													x			x

APPENDIX E

	# for all																			
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Gyrosigma macrum	x		x									x								x
Gyrosigma spenceri var. spenceri																				
Hantzschia spp.																x				
Hantzschia amphioxys							x													
Hantzschia amphioxys var. vivax																		x		
Mastogloia spp.													x							
Mastogloia smithii																				
Meridion circulare	x																			
Navicula spp.	x	x			x	x	x		x	x	x		x	x			x		x	
Navicula accomoda var. accomoda																				
Navicula bacillum var. bacillum							x													
Navicula capitata var. capitata		x					x		x	x		x	x	x	x	x	x			x
Navicula capitata var. hungarica																				
Navicula cincta var. cincta									x											
Navicula cryptocephala var. cryptocephala							x													x
Navicula cuspidata var. cuspidata	x	x	x		x		x			x			x		x	x	x	x		x
Navicula elginensis var. elginensis																				x

APPENDIX E

	# for all																			
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Navicula exigua var. capitata																				x
Navicula gastrum var. gastrum						x														
Navicula halophila var. tenuirostris																x				
Navicula pupula var. pupula														x						
Navicula pupula var. capitata																		x		
Navicula pupula var. rectangularis					x															
Navicula radiosa var. radiosa											x						x			
Navicula radiosa var. tenella												x								
Navicula reinhardhii var. reinhardhii										x										
Navicula reinhardhii var. elliptica																				
Navicula salinarum var. salinarum									x											
Navicula salinarum var. intermedia				x																
Navicula tripunctata var. tripunctata	x												x							
Nedium spp.		x																		
Nedium affine var. undulatum																				
Nedium iridis var. iridis																		x		
Nitzschia spp.	x	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
Nitzschia amphibia								x												
Nitzschia commutata																	x			
Nitzschia linearis					x								x		x	x	x	x		x
Nitzschia linearis var. tenuis																				
Nitzschia lorenziana																				
Nitzschia palea																				x
Nitzschia sigmoidia	x			x						x				x			x	x		x

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Nitzschia vermicularis																				
Opephora spp.																				
Opephora martyi																				
Pinnularia spp.	x	x			x		x			x	x		x	x	x	x	x	x		x
Pinnularia gibba																				
Pinnularia maior var. maior													x							
Pinnularia mesolepta var. mesolepta																				
Pinnularia microstauron var. microstauron																				
Pinnularia viridis var. viridis																				
Rhoicosphenia curvata	x			x	x				x	x		x		x			x	x	x	x
Rhopalodia gibba			x		x		x		x	x	x	x	x	x	x		x	x	x	x
Rhopalodia gibberula																				
Rhopalodia ventricosa	x																			
Stauroneis spp.				x	x															
Stauroneis anceps var. anceps																				
Stauroneis anceps fa. gracilis																		x		
Stauroneis smithii var. smithii																				
Stauroneis phoenicenteron var. phoenicenteron																				
Surirella spp.			x	x			x	x					x	x		x	x			x
Surirella angustata									x					x			x			x
Surirella elegans														x						
Surirella linearis													x						x	x
Surirella ovalis	x						x	x	x	x		x	x	x		x				
Surirella spiralis																				

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Surirella splendida				x																x
Surirella striatula						x							x			x				
Synedra spp.	x	x	x	x	x				x	x	x	x	x			x	x	x	x	x
Synedra acus	x			x	x			x		x	x			x			x		x	x
Synedra capitata var. capitata																				
Synedra dorsoventralis																				
Synedra fasciculata var. fasciculata				x																
Synedra incisa var. incisa	x			x																
Synedra pulchella var. pulchella					x															
Synedra rumpens var. rumpens																	x			
Synedra ulna	x	x		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x
Synedra ulna var. longissima																				x
Tropidoneis lepidoptera																				
VII. Cyanophyta																				
A) Cyanophyceae																				
Agmenellum spp. (Merismopedia spp.)							x						x	x					x	
Agmenellum thermale (Merismopedia glauca)	x			x	x			x			x	x		x		x	x	x	x	x
Agmenellum thermale (Merismopedia elegans var. major)																				
Agmenellum quadruplicatum (Merismopedia tenuissima)	x			x	x		x	x		x	x	x	x	x		x	x	x	x	x
Anabaena spp.	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x			x
Anabaena affinis																				

APPENDIX E

	# for all																			
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Anabaena circinalis		x	x	x				x		x						x				x
Anabaena spiroides										x										
Anacystis spp.													x							x
Anacystis spp. (Gloeocapsa spp.)																				
Anacystis spp. (Gloeocapsa punctata)																				
Anacystis spp. (Gloeocapsa rupestris)																				
Anacystis spp. (Chroococcus spp.)	x	x	x		x			x			x					x				x
Anacystis cyanea (Microcystis aeruginosa)		x	x	x	x		x	x	x	x	x	x	x	x		x	x		x	x
Anacystis cyanea (Chroococcus minor)																				
Anacystis cyanea (Chroococcus dispersus)																				
Anacystis dimidiata (Chroococcus limneticus)							x										x			
Anacystis incerta (Microcystis incerta)			x	x					x	x			x	x		x	x		x	x
Aphanizomenon spp.		x	x					x	x	x	x			x		x	x	x		x
Aphanizomenon flos-aquae (A. holsaticum)									x	x										
Aphanizomenon ovalisporum																				
Arthrospira spp.																	x			
Arthrospira gomontiana																				
Arthrospira Jenneri					x			x			x			x		x				
Calothrix spp.															x					
Coccochloris spp.																				

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Coccochloris spp. (Aphanothece spp.)									x											
Coccochloris spp. (Dactylococcopsis fascicularis)																				
Coccochloris spp. (Gloeothece rupestris)									x											
Coccochloris spp. (Synechocystis aquatilis)																				
Gloeotrichia echinulata					x															
Gloeotrichia natans																	x			
Gomphosphaeria spp.	x	x	x	x	x		x	x			x	x	x	x		x	x		x	
Gomphosphaeria spp. (Coelosphaerium spp.)																				
Gomphosphaeria aponina				x	x		x			x	x	x	x				x	x	x	x
Gomphosphaeria lacustris var. compacta							x													
Lyngbya spp.		x		x	x			x		x	x						x	x		x
Lyngbya aerugineo-caerulea																			x	
Lyngbya aestuarii																				
Lyngbya contorta			x	x								x				x	x		x	x
Lyngbya Diguetii																				
Lyngbya limnetica																			x	x
Lyngbya Nordgaardi													x	x						
Lyngbya versicolor																				
Nostoc spp.						x									x					
Oscillatoria spp.	x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	x	x
Oscillatoria acutissima																				
Oscillatoria agardhii								x	x											
Oscillatoria amphibia													x							

APPENDIX E

	# for all																		
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Oscillatoria anguina											x				x					
Oscillatoria angusta											x				x					
Oscillatoria angustissima																				
Oscillatoria articulata																				
Oscillatoria chalybea											x									
Oscillatoria formosa						x														
Oscillatoria granulata											x		x							
Oscillatoria limnetica				x	x		x		x		x		x	x	x	x				
Oscillatoria limosa					x						x									
Oscillatoria nigra							x								x					
Oscillatoria prolifica																				
Oscillatoria subbrevis											x			x	x					
Oscillatoria splendida					x															
Oscillatoria tenuis					x								x							
Oscillatoria terebriformis																				
Pleurocapsa minor (Endophysalis spp.)																				
Rivularia minutula																	x			
Spirulina spp.		x			x													x		
Spirulina laxa																				
Spirulina major											x		x							
Spirulina princeps																				
Spirulina subsalsa					x						x									
Unid. Flagellate	x	x	x	x	x		x		x	x	x	x	x	x		x				
Unid. Green																				
Unid. Bluegreen							x			x	x	x								
Pennate diatom				x		x						x	x						x	

Footnotes for Appendix E

1 - East Oakwood Lake (5/15/83)
2 - East Oakwood Lake (6/16/83)
3 - Unnamed Creek (Hidewoods) (5/18/83)
4 - Unnamed Creek (Hidewoods) (6/21/83)
5 - Oak Lake (5/18/83)
6 - Oak Lake (6/21/83)
7 - Oak Lake (9/22/83)
8 - Fox Lake (5/18/83)
9 - Fox Lake (6/21/83)
10 - Sediment Ponds (Lake Cochrane) (5/18/83)
11 - Lake Cochrane (5/18/83)
12 - Big Coulee Creek (6/4/83)
13 - Unnamed Creek (6/4/83)
14 - Seepage (Unnamed Creek) (6/4/83)
15 - Unnamed Spring (6/4/83)
16 - Big Springs Creek (6/4/83)
17 - Big Spring (6/4/83)
18 - Fen (Big Springs Creek) (6/4/83)
19 - Cobb Creek (6/8/83)
20 - Unnamed Spring (feeds Cobb Creek) (6/8/83)
21 - West Branch Lac Qui Parle River (6/8/83)
22 - West Branch Lac Qui Parle River (8/31/83)
23 - Lake Goldsmith (6/16/83)
24 - Moe Slough (6/16/83)
25 - Deer Creek (6/21/83)
26 - Fish Lake (6/21/83)
27 - Thisted Lake (6/22/83)
28 - Unnamed Marsh (6/22/83)
29 - Spirit Lake (6/22/83)
30 - Lake Agnew (6/22/83)
31 - Lake Osceola (6/22/83)
32 - Lake Pelican (7/5/83)
33 - Lake Kampeska (7/5/83)
34 - Goose Lake (7/5/83)
35 - Clear Lake (Hamlin) (7/5/83)
36 - Unnamed Marsh (7/5/83)
37 - Lake Poinsett (7/5/83)
38 - Lake Poinsett (8/16/83)
39 - Badger Lake (7/5/83)
40 - Bigstone Lake (7/6/83)
41 - Big Sioux River (7/27/83)
42 - Lake Campbell (7/27/83)
43 - Lake Campbell (10/7/83)
44 - Clear Lake (Deuel) (7/27/83)
45 - Rush Lake (7/27/83)
46 - Salt Lake (7/27/83)
47 - Lake Alice (7/27/83)
48 - Lake Badus (8/7/83)
49 - Lake Herman (8/7/83)
50 - Lake Madison (8/7/83)
51 - Long Lake (8/7/83)
52 - Lake Albert (8/16/83)
53 - Lake Marsh (8/16/83)
54 - Mud Lake (8/16/83)
55 - Unnamed Lake (Reinhart W.P.A.) (8/16/83)
56 - Cherry Lake (8/16/83)
57 - School Lake (8/31/83)
58 - Round Lake (8/31/83)
59 - Unnamed Lake (8/31/83)
60 - South Coteau Lake (8/31/83)

APPENDIX F

List of algae identified by water chemistry ranges and sampling methods
(See legend for description of water chemistry ranges and sampling methods)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
I. Chlorophyta													
A) Chlorophyceae													
Actinastrum spp.		x	x	x	x			x	x		x	x	x
Actinastrum gracilimum			x	x				x			x	x	
Actinastrum Hantzschii		x	x	x	x			x	x	x	x	x	x
Ankistrodesmus spp.												x	
Ankistrodesmus convolutus		x	x	x	x			x	x	x	x	x	x
Ankistrodesmus falcatus	x	x	x	x	x		x	x	x	x	x	x	x
Ankistrodesmus falcatus var. acicularis		x	x	x	x			x	x		x	x	x
Ankistrodesmus falcatus var. mirabilis		x	x	x	x			x	x		x	x	x
Ankistrodesmus spiralis	x				x				x			x	
Botryococcus spp.			x	x	x		x	x			x	x	x
Botryococcus protuburans var. minor			x		x			x			x		x
Botryococcus sudeticus			x	x				x			x		
Bulbochaetae spp.			x		x		x				x		
Chaetophora spp.	x	x	x		x		x		x			x	
Chaetophora elegans	x	x	x	x	x			x	x	x		x	
Chaetophora incrassata		x	x	x	x		x		x			x	
Characium spp.	x	x	x	x	x		x	x	x	x	x	x	
Characium ambiguum		x			x					x		x	
Characium falcatum		x		x					x		x		
Characium gracilipes											x		
Characium limneticum			x	x					x			x	
Characium ornithocephalum											x		
Chlamydomonas spp.	x	x	x		x		x	x	x	x	x	x	x
Cladophora spp.	x	x	x	x	x			x	x		x	x	

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Cladophora glomerata		x		x	x			x	x			x	
Closteriopsis spp.													x
Closteriopsis longissima		x	x	x	x			x			x	x	
Closteriopsis longissima var. tropica		x	x	x	x			x	x	x	x	x	x
Closterium spp.	x	x	x	x	x		x	x	x	x	x	x	x
Closterium acerosum		x	x	x	x		x	x			x		
Closterium acerosum var. elongatum		x		x					x		x		
Closterium acutum		x			x			x					x
Closterium dianae												x	
Closterium ehrenbergii												x	
Closterium moniliferum											x		
Closterium leibleinii	x	x		x	x				x		x	x	x
Closterium venus	x	x	x	x	x			x	x		x	x	
Coelastrum spp.		x	x		x			x	x	x	x	x	x
Coelastrum microporum		x	x	x	x			x	x	x	x	x	x
Coelastrum sphaericum		x		x	x			x		x		x	
Coleochaete spp.		x		x	x					x		x	
Coleochaete divergens		x		x					x			x	
Coleochaete orbicularis												x	
Cosmarium spp.			x	x	x		x	x	x	x	x	x	x
Cosmarium constrictum		x		x				x	x			x	
Cosmarium formosulum	x	x	x	x	x		x	x	x		x	x	
Cosmarium granatum		x		x				x	x		x	x	
Cosmarium meneghinii		x		x					x		x		
Cosmarium nitidulum			x		x		x						
Cosmarium protractum			x	x				x			x		
Cosmarium sexangulare		x		x					x			x	
Cosmarium subcostatum		x	x		x				x	x	x	x	
Crucigenia spp.		x	x	x	x			x	x		x		x

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Crucigenia apiculata		x	x	x	x		x		x			x	x
Crucigenia tetrapedia		x		x				x			x		
Crucigenia quadrata		x	x	x	x			x			x	x	x
Cylindrocapsa spp.												x	
Cylindrocapsa conferta		x			x					x		x	
Desmococcus viridis		x		x					x			x	
Dictyosphaerium spp.		x	x	x	x		x	x		x	x		x
Dictyosphaerium pulchellum		x	x	x	x		x	x	x	x	x	x	x
Draparnaldia spp.												x	
Dysmorphococcus variabilis		x			x					x		x	
Elakatotrix viridis												x	
Euastropsis Richteri		x		x					x		x		
Eudorina spp.			x		x			x			x		x
Eudorina elegans			x		x			x			x		x
Franceia Droescheri			x	x				x			x		
Gloeocystis spp.		x	x	x	x			x			x	x	
Gloeocystis major			x		x			x		x	x	x	
Gloeocystis versiculosa		x			x			x			x	x	
Golenkinia spp.		x	x	x	x		x		x		x	x	x
Kirchneriella spp.		x	x	x	x			x	x	x	x	x	x
Kirchneriella contorta		x	x	x	x			x	x		x	x	x
Kirchneriella subsolitaria		x		x					x		x	x	x
Lagerheimia spp.		x			x			x			x		x
Lagerheimia longiseta													
Lagerheimia quadriseta													x
Lagerheimia subsalsa		x	x	x	x		x	x		x	x		
Micractinium spp.		x		x	x			x			x		x
Micractinium pusillum		x			x			x					x
Microspora spp.	x	x			x				x	x		x	

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Microspora pachyderma			x		x			x			x	x	
Microthamnion strictissimum												x	
Mougeotia spp.	x	x	x	x	x	x	x		x	x	x	x	
Nephrocytium spp.		x	x	x	x		x	x	x		x	x	x
Nephrocytium Agardhianum		x	x		x			x		x	x	x	
Oedogonium spp.		x	x		x				x			x	x
Oocystis spp.	x	x	x	x	x	x	x	x	x	x	x	x	x
Oocystis Borgei		x	x	x	x		x	x	x		x	x	x
Oocystis crassa		x	x		x			x	x		x	x	x
Oocystis elliptica		x		x					x				x
Oocystis Eremosphaeria		x	x	x	x	x		x	x	x	x	x	
Oocystis parva			x		x		x			x	x		
Oocystis pusilla			x	x				x			x		x
Oocystis solitaria			x		x					x	x		
Oocystis submarina		x	x		x				x			x	
Palmella mucosa		x	x	x	x			x	x	x		x	x
Pandorina spp.		x	x	x	x			x	x	x	x	x	x
Pandorina morum											x		
Pediastrum spp.			x	x				x	x		x	x	x
Pediastrum biradiatum v. emarginatum fa. convexum		x		x					x			x	
Pediastrum boryanum	x	x	x	x	x		x	x	x	x	x		x
Pediastrum duplex	x	x	x	x	x			x	x	x	x		x
Pediastrum duplex var. clathratum			x		x				x	x	x	x	
Pediastrum duplex var. gracilimum		x	x	x					x		x	x	
Pediastrum duplex var. reticulatum		x			x			x			x	x	
Pediastrum integrum var. priva		x		x					x		x		
Pediastrum simplex var. duodenarium			x	x				x			x		
Pediastrum tetras		x	x	x	x			x	x	x	x	x	x

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Pediastrum tetras var. tetraodon		x		x	x			x	x	x	x	x	x
Pithophora spp.											x	x	
Polyedriopsis spinulosa		x		x					x				x
Polytoma spp.													x
Protoderma viride			x	x				x				x	
Quadrigula spp.	x	x		x	x			x	x	x	x	x	x
Quadrigula chodatii			x	x					x		x		
Rhizoclonium spp.	x	x	x	x	x		x	x	x	x	x	x	x
Rhizoclonium hieroglyphicum	x	x	x	x	x			x	x	x	x	x	
Rhizoclonium Hookeri		x	x	x	x			x				x	
Scenedesmus spp.		x	x	x	x			x	x	x	x	x	x
Scenedesmus abundans		x	x	x	x			x	x	x	x	x	x
Scenedesmus abundans var. asymmetrica		x			x					x		x	x
Scenedesmus abundans var. brevicauda		x	x		x		x		x	x	x	x	
Scenedesmus abundans var. longicauda		x			x					x	x	x	
Scenedesmus acuminatus		x	x	x	x			x	x		x	x	x
Scenedesmus acuminatus var. minor		x	x	x	x		x	x	x	x	x	x	x
Scenedesmus acutiformis												x	
Scenedesmus arcuatus											x		
Scenedesmus arcuatus var. capitatus		x			x			x			x	x	
Scenedesmus arcuatus var. platydisca		x	x	x	x		x	x	x	x	x	x	x
Scenedesmus armatus			x	x					x			x	
Scenedesmus brasiliensis											x		
Scenedesmus Bernardii	x	x		x	x				x	x	x	x	x
Scenedesmus bijuga	x	x	x	x	x		x	x	x	x	x	x	x
Scenedesmus bijuga var. alternans		x	x	x	x			x		x	x		
Scenedesmus bijuga var. flexuosus		x	x	x	x			x	x	x	x	x	x
Scenedesmus dimorphus		x	x	x	x		x	x	x	x	x	x	x

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Scenedesmus incrassatulus											x	x	
Scenedesmus longus var. ellipticus			x		x					x		x	
Scenedesmus obliquus		x	x	x	x			x	x	x	x	x	x
Scenedesmus opoliensis			x	x	x				x		x	x	
Scenedesmus opoliensis var. contracta		x	x		x					x		x	
Scenedesmus quadricauda		x	x	x	x		x	x	x	x	x	x	x
Scenedesmus quadricauda var. longispina	x	x	x	x	x		x	x	x	x	x	x	x
Scenedesmus quadricauda var. maximus		x	x	x	x			x	x		x	x	x
Scenedesmus quadricauda var. parvus		x	x	x	x			x		x	x	x	
Scenedesmus quadricauda var. quadrispina		x	x	x	x			x	x	x	x	x	x
Scenedesmus quadricauda var. Westii		x	x	x	x			x	x	x	x	x	
Schroederia spp.		x	x		x			x	x		x		x
Schroederia Judayi		x	x	x	x		x	x	x	x	x	x	x
Schroederia setigera	x	x	x	x	x			x	x	x	x	x	
Selenastrum spp.		x	x	x	x			x	x	x	x	x	x
Selenastrum minutum		x	x	x	x				x	x	x	x	x
Selenastrum Westii		x	x		x			x	x	x	x	x	
Spirogyra spp.	x	x	x	x	x		x	x	x	x	x	x	x
Spondylosium spp.			x		x		x					x	
Sphaerocystis spp.			x		x				x			x	x
Sphaerocystis Schroeteri		x	x	x	x		x	x	x	x	x	x	x
Staurastrum spp.		x	x	x	x		x	x	x		x	x	x
Staurastrum alternans		x			x			x			x	x	
Staurastrum gracile		x	x		x			x			x		x
Staurastrum margaritaceum		x			x			x				x	
Staurastrum paradoxum		x		x				x				x	
Staurastrum polymorphum		x	x		x		x	x		x	x	x	
Staurastrum punctulatum		x		x					x			x	

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Stigeoclonium spp.	x	x	x	x	x			x	x	x		x	
Stigeoclonium lubricum		x			x			x				x	
Stigeoclonium polymorphum	x	x			x			x	x		x		
Stigeoclonium subsecundum												x	
Tetraedron spp.		x		x	x			x			x	x	x
Tetraedron caudatum		x	x	x	x		x	x	x	x	x	x	x
Tetraedron enorme											x		
Tetraedron hastatum		x		x				x			x		
Tetraedron limneticum											x		
Tetraedron minimum		x	x	x	x		x	x	x	x	x	x	x
Tetraedron muticum	x	x	x	x	x		x	x	x		x	x	x
Tetraedron muticum fa. punctulatum			x	x					x		x		x
Tetraedron regulare		x	x	x	x			x		x	x		
Tetraedron regulare var. torsum		x		x				x					x
Tetraedron trigonum	x	x		x	x				x		x		
Tetraedron trigonum var. gracile		x	x	x	x		x	x	x		x	x	x
Tetrastrum staurogeniaeforme		x	x	x	x			x	x		x	x	x
Treubaria setigerum		x	x	x	x			x	x		x	x	x
Trentepohlia spp.			x	x				x				x	
Ulothrix spp.	x	x	x	x	x		x		x	x	x	x	x
Ulothrix subtilissima												x	
Volvox spp.											x		x
Zygnema spp.													x
B) Charophyceae													
Chara spp.		x	x	x	x		x		x		x	x	
II. Euglenophyta													
Euglena spp.	x	x	x	x	x		x	x	x	x	x	x	x
Euglena acus		x		x					x		x		

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Euglena Ehrenbergii		x			x			x				x	
Phacus spp.	x	x	x	x	x		x	x	x	x	x	x	x
Trachelomonas spp.	x	x	x	x	x			x	x	x	x	x	x
III. Pyrrophyta													
A) Dinophyceae													
Ceratium spp.		x		x				x			x		x
Ceratium hirundinella		x	x	x	x			x			x		x
Peridinium spp.		x		x					x		x		x
IV. Cryptophyta													
Cryptomonas spp.	x	x	x	x	x			x	x		x	x	x
V. Chloromonadophyta													
Vacuolaria virescens			x		x				x		x	x	
VI. Chrysophyta													
A) Xanthophyceae													
Characiopsis spp.											x		
Ophiocytium spp.	x	x	x	x	x			x	x	x	x	x	x
Ophiocytium capitatum var. *longispinum*		x		x	x				x	x	x		x
Tribonema spp.		x	x	x	x			x	x	x	x	x	x
Vaucheria spp.												x	
B) Chrysophyceae													
Dinobryon spp.		x	x	x	x			x	x		x	x	
Dinobryon sertularia		x	x	x	x			x	x		x		x
Dinobryon Vanhoeffenii											x		

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
C) Bacillariophyceae													
1) Centrales													
Chaetoceros Elmorei		x	x		x	x			x				x
Coscinodiscus spp.													x
Coscinodiscus lacustris	x				x				x		x	x	
Cyclotella spp.	x	x	x	x	x		x	x	x	x	x	x	x
Cyclotella bodanica													x
Cyclotella meneghiniana	x	x	x	x	x		x	x	x	x	x	x	x
Melosira spp.	x	x	x	x	x		x	x	x	x	x	x	x
Melosira islandica		x			x					x	x	x	
Melosira granulata	x	x	x	x	x		x	x	x	x	x	x	x
Rhizosolenia spp.		x		x				x					x
Stephanodiscus spp.		x	x	x	x				x	x	x	x	x
Stephanodiscus astraea		x	x	x	x			x	x		x	x	x
Stephanodiscus niagarae											x		
2) Pennales													
Achnanthes spp.		x	x	x	x				x		x	x	
Achnanthes lanceolata var. lanceolata			x		x		x					x	
Amphipleura pellucida var. pellucida	x	x		x	x				x		x	x	
Amphiprora spp.			x		x				x		x	x	
Amphiprora alata		x	x		x				x	x	x	x	x
Amphiprora ornata		x	x	x	x		x	x	x		x	x	x
Amphora spp.		x	x	x	x	x	x	x	x	x	x	x	x
Amphora ovalis	x	x	x	x	x		x	x	x	x	x	x	x
Anomoeoneis costata var. costata		x	x		x	x			x			x	x
Asterionella spp.			x		x				x			x	
Asterionella formosa		x			x			x			x		
Caloneis spp.		x			x				x		x	x	
Caloneis amphisbaena var. amphisbaena		x		x					x		x	x	x

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Caloneis bacillum var. bacillum	x	x			x					x	x		x
Caloneis lewisii var. lewisii		x	x	x	x			x	x		x	x	
Caloneis limosa var. limosa		x	x	x	x			x		x	x	x	
Caloneis ventricosa var. ventricosa	x	x	x	x	x		x	x	x		x	x	x
Campylodiscus spp.			x			x			x			x	
Campylodiscus noricus			x		x		x					x	
Cocconeis spp.	x	x	x	x	x			x	x		x	x	x
Cocconeis pendiculus	x	x	x	x	x		x	x	x	x	x	x	x
Cocconeis placentula		x	x	x	x		x	x	x	x	x	x	x
Cymatopleura spp.			x		x				x		x		x
Cymatopleura elliptica		x	x	x	x		x	x	x		x	x	x
Cymatopleura elliptica var. spiralis		x			x				x			x	
Cymatopleura solea	x	x	x	x	x		x	x	x		x	x	x
Cymbella spp.	x	x	x	x	x			x	x	x	x	x	x
Cymbella affinis	x	x		x	x			x		x			x
Cymbella aspera			x	x					x			x	
Cymbella cuspidata			x		x		x					x	
Cymbella cymbiformis	x	x	x	x	x		x	x	x		x	x	
Cymbella gracilis		x			x			x				x	
Cymbella lanceolata		x		x					x			x	
Cymbella mexicanum												x	
Cymbella parva		x		x				x	x			x	x
Cymbella prostrata		x	x	x	x			x	x		x	x	x
Cymbella triangulum		x	x	x				x			x	x	x
Cymbella tumida		x			x				x		x	x	
Cymbella turgida		x	x	x	x		x	x	x	x	x	x	x
Cymbella ventricosa	x	x	x	x	x		x	x	x	x	x	x	
Diatoma spp.			x	x	x			x	x			x	
Diatoma vulgare		x	x	x	x			x	x		x	x	

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Diploneis spp.			x	x					x				x
Diploneis smithii												x	
Epithemia spp.		x	x	x	x			x	x	x	x	x	x
Epithemia sorex	x	x	x	x	x	x	x	x	x		x	x	x
Epithemia turgida	x	x	x	x	x		x	x	x	x	x	x	x
Eunotia spp.											x	x	
Eunotia curvata var. curvata	x	x	x	x	x		x	x	x	x		x	x
Eunotia pectinalis			x	x				x			x	x	
Fragilaria spp.	x	x	x	x	x		x	x	x	x	x	x	x
Fragilaria capucina var. capucina		x	x	x	x				x		x	x	
Fragilaria contruens var. contruens		x	x	x	x			x	x		x	x	x
Fragilaria contruens var. binodis		x		x					x		x		
Fragilaria crotonensis var. crotonensis	x	x	x	x	x			x	x	x	x	x	x
Fragilaria pinnata var. pinnata		x			x			x			x	x	x
Frustulia spp.													x
Gomphonema spp.	x	x	x	x	x				x		x	x	x
Gomphonema acuminatum	x	x	x	x	x		x		x		x	x	
Gomphonema acuminatum var. coronatum	x	x			x				x		x	x	x
Gomphonema angustatum		x			x					x		x	
Gomphonema constrictum	x	x	x	x	x		x	x	x	x	x	x	x
Gomphonema gracile var. dichotoma			x		x				x			x	
Gomphonema montanum var. subclavatum			x		x		x					x	
Gomphonema olivaceum	x	x	x	x	x		x	x	x	x	x	x	x
Gomphonema olivaceum var. calcarea	x	x	x	x	x	x		x	x	x	x	x	x
Gomphonema parvulum	x	x	x	x	x			x	x	x	x	x	x
Gyrosigma spp.		x	x	x	x			x	x		x	x	x
Gyrosigma macrum	x	x	x	x	x			x	x		x	x	x
Gyrosigma spenceri var. spenceri												x	
Hantzschia spp.	x		x	x	x			x	x			x	

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Hantzschia amphioxys		x			x				x			x	
Hantzschia amphioxys var. vivax			x	x					x			x	
Mastogloia spp.			x		x		x					x	
Mastogloia smithii			x		x				x		x		
Meridion circulare	x	x	x	x	x				x		x	x	
Navicula spp.	x	x	x	x	x	x	x	x	x	x	x	x	x
Navicula accomoda var. accomoda			x	x					x			x	
Navicula bacillum var. bacillum		x			x				x	x	x		
Navicula capitata var. capitata	x	x	x	x	x		x	x	x	x	x	x	
Navicula capitata var. hungarica			x	x					x			x	
Navicula cincta var. cincta			x		x				x		x	x	
Navicula cryptocephala var. cryptocephala	x	x		x	x			x	x		x	x	x
Navicula cuspidata var. cuspidata	x	x	x	x	x		x	x	x	x	x	x	x
Navicula elginensis var. elginensis		x		x				x				x	
Navicula exigua var. capitata		x		x				x	x			x	
Navicula gastrum var. gastrum			x			x			x				x
Navicula halophila var. tenuirostris			x	x				x				x	
Navicula pupula var. pupula		x			x					x	x	x	
Navicula pupula var. capitata			x	x				x	x			x	x
Navicula pupula var. rectangularis			x		x		x				x		
Navicula radiosa var. radiosa	x	x	x	x	x			x	x		x	x	x
Navicula radiosa var. tenella			x		x				x		x		
Navicula reinhardhii var. reinhardhii	x		x	x	x			x	x		x	x	
Navicula reinhardhii var. elliptica												x	
Navicula salinarum var. salinarum			x		x				x			x	
Navicula salinarum var. intermedia		x		x	x			x		x	x	x	
Navicula tripunctata var. tripunctata	x	x	x	x	x		x	x	x	x	x	x	x
Nedium spp.		x	x	x	x			x	x	x	x	x	
Nedium affine var. undulatum	x				x				x		x		

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Nedium iridis var. iridis		x	x	x	x				x	x	x	x	
Nitzschia spp.	x	x	x	x	x	x	x	x	x	x	x	x	x
Nitzschia amphibia			x		x			x			x	x	
Nitzschia commutata			x	x				x				x	
Nitzschia linearis	x	x	x	x	x		x	x	x	x	x	x	x
Nitzschia linearis var. tenuis		x		x					x				x
Nitzschia lorenziana		x		x					x				x
Nitzschia palea		x	x	x	x			x	x	x	x	x	x
Nitzschia sigmoidia		x	x	x	x			x	x	x	x	x	x
Nitzschia vermicularis		x			x				x		x		
Opephora spp.												x	
Opephora martyi											x	x	
Pinnularia spp.	x	x	x	x	x		x	x	x	x	x	x	x
Pinnularia gibba		x	x	x	x				x			x	x
Pinnularia maior var. maior			x		x		x				x	x	
Pinnularia mesolepta var. mesolepta												x	
Pinnularia microstauron var. microstauron			x		x					x		x	x
Pinnularia viridis var. viridis			x	x					x		x		
Rhoicosphenia curvata	x	x	x	x	x		x	x	x	x	x	x	x
Rhopalodia gibba	x	x	x	x	x		x	x	x	x	x	x	x
Rhopalodia gibberula											x		
Rhopalodia ventricosa		x	x	x	x				x			x	x
Stauroneis spp.	x	x	x	x	x		x	x	x	x	x	x	x
Stauroneis anceps var. anceps		x	x	x	x			x	x		x	x	
Stauroneis anceps fa. gracilis	x	x	x		x				x	x	x	x	x
Stauroneis smithii var. smithii												x	
Stauroneis phoenicenteron var. phoenicenteron		x	x	x	x				x	x	x	x	x
Surirella spp.	x	x	x	x	x		x	x	x	x	x	x	x

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Surirella angustata		x	x	x	x			x	x	x	x	x	x
Surirella elegans		x			x					x		x	x
Surirella linearis		x	x	x	x		x	x			x	x	x
Surirella ovalis		x	x	x	x		x	x	x	x	x	x	x
Surirella spiralis		x		x					x		x	x	x
Surirella splendida		x	x	x				x	x		x	x	x
Surirella striatula			x	x	x		x	x	x		x	x	
Synedra spp.	x	x	x	x	x	x	x	x	x	x	x	x	x
Synedra acus	x	x	x	x	x	x		x	x	x	x	x	x
Synedra capitata var. capitata		x		x	x			x	x		x	x	
Synedra dorsoventralis	x				x				x			x	
Synedra fasciculata var. fasciculata		x	x	x	x			x	x			x	
Synedra incisa var. incisa		x		x				x	x			x	
Synedra pulchella var. pulchella		x	x		x		x			x	x	x	
Synedra rumpens var. rumpens	x	x	x	x	x			x	x	x	x	x	x
Synedra ulna	x	x	x	x	x	x	x	x	x	x	x	x	x
Synedra ulna var. longissima		x		x				x	x			x	
Tropidoneis lepidoptera			x		x				x		x		
VII. Cyanophyta													
A) Cyanophyceae													
Agmenellum spp. (Merismopedia spp.)	x	x	x	x	x		x	x	x	x	x	x	x
Agmenellum thermale (Merismopedia glauca)		x	x	x	x		x	x	x	x	x	x	x
Agmenellum thermale (Merismopedia elegans var. major)												x	
Agmenellum quadruplicatum (Merismopedia tenuissima)	x	x	x	x			x	x	x	x	x	x	x
Anabaena spp.	x	x	x	x	x	x	x	x	x	x	x	x	x

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Anabaena affinis		x		x					x		x	x	
Anabaena circinalis	x	x	x	x	x			x	x		x	x	x
Anabaena spiroides			x		x			x			x		
Anacystis spp.	x	x	x	x	x		x	x	x	x	x		x
Anacystis spp. (Gloeocapsa spp.)			x	x					x		x		
Anacystis spp. (Gloeocapsa punctata)											x		
Anacystis spp. (Gloeocapsa rupestris)											x		
Anacystis spp. (Chroococcus spp.)	x	x	x	x	x		x	x	x		x		x
Anacystis cyanea (Microcystis aeruginosa)	x	x	x	x	x		x	x	x	x	x	x	x
Anacystis cyanea (Chroococcus minor)			x	x				x			x		
Anacystis cyanea (Chroococcus dispersus)			x	x				x			x		
Anacystis dimidiata (Chroococcus limneticus)	x	x			x				x		x		
Anacystis incerta (Microcystis incerta)	x	x	x	x	x		x	x	x	x	x	x	x
Aphanizomenon spp.	x	x	x	x	x			x	x	x	x	x	x
Aphanizomenon flos-aquae (A. holsaticum)			x		x			x	x		x		x
Aphanizomenon ovalisporum											x	x	
Arthrospira spp.			x	x				x			x		
Arthrospira gomontiana			x		x				x			x	
Arthrospira Jenneri		x	x	x	x		x	x	x	x	x	x	x
Calothrix spp.	x	x			x			x	x		x	x	
Coccochloris spp.		x	x	x	x				x		x	x	
Coccochloris spp. (Aphanothece spp.)											x		
Coccochloris spp. (Dactylococcopsis fascicularis)			x	x					x		x		
Coccochloris spp. (Gloeothece rupestris)			x		x				x		x		

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Coccochloris spp. (Synechocystis aquatilis)												x	
Gloeotrichia echinulata			x		x		x					x	
Gloeotrichia natans			x	x				x				x	
Gomphosphaeria spp.	x	x	x	x	x		x	x	x	x	x	x	x
Gomphosphaeria spp. (Coelosphaerium spp.)											x		
Gomphosphaeria aponina		x	x	x	x		x	x	x		x	x	x
Gomphosphaeria lacustris var. compacta		x			x				x				
Lyngbya spp.	x	x	x	x	x		x	x	x		x	x	x
Lyngbya aerugineo-caerulea			x	x				x				x	
Lyngbya aestuarii											x	x	
Lyngbya contorta		x	x	x	x			x	x	x	x	x	x
Lyngbya Diguetii		x	x	x					x			x	
Lyngbya limnetica		x	x	x				x			x		
Lyngbya Nordgaardi		x	x		x					x		x	
Lyngbya versicolor		x			x		x	x				x	
Nostoc spp.	x		x		x	x			x	x		x	
Oscillatoria spp.	x	x	x	x	x		x	x	x	x	x	x	x
Oscillatoria acutissima	x		x	x	x			x	x	x	x	x	
Oscillatoria agardhii		x	x		x			x	x			x	
Oscillatoria amphibia			x		x		x						
Oscillatoria anguina	x	x			x			x	x	x	x	x	x
Oscillatoria angusta	x	x	x	x	x			x	x		x	x	x
Oscillatoria angustissima		x	x	x	x					x		x	
Oscillatoria articulata			x		x				x			x	
Oscillatoria chalybea		x	x	x	x			x	x	x	x	x	
Oscillatoria formosa			x			x			x		x	x	
Oscillatoria granulata	x	x	x		x		x	x	x		x	x	

APPENDIX F (continued)

	pH			Conductivity			Alkalinity				Sampling Method		
	1	2	3	1	2	3	1	2	3	4	1	2	3
Oscillatoria limnetica	x	x	x	x	x		x	x	x	x	x	x	x
Oscillatoria limosa		x	x		x		x	x	x	x	x	x	
Oscillatoria nigra	x	x		x	x			x	x	x	x	x	
Oscillatoria prolifica											x	x	
Oscillatoria subbrevis	x	x	x	x	x			x	x	x	x	x	x
Oscillatoria splendida			x		x		x			x		x	
Oscillatoria tenuis		x	x	x	x		x	x	x	x	x	x	
Oscillatoria terebriformis												x	
Pleurocapsa minor (Endophysalis spp.)											x	x	
Rivularia minutula			x	x				x				x	
Spirulina spp.		x	x	x	x		x	x	x	x	x	x	x
Spirulina laxa													x
Spirulina major		x	x		x		x	x		x	x	x	x
Spirulina princeps		x		x					x			x	
Spirulina subsalsa		x	x	x	x		x	x	x	x	x	x	x
Unid. Flagellate	x	x	x	x	x		x	x	x	x	x	x	x
Unid. Green				x				x			x		
Unid. Bluegreen	x	x	x	x	x			x	x	x	x	x	x
Pennate diatom		x	x	x	x	x	x	x	x	x	x	x	x

Legend:

pH
1 = 7.2-7.5 (circumneutral)
2 = 7.7-8.3 (alkaline)
3 = 8.5-9.2 (very alkaline)

Sampling Method
1 = tow
2 = aufwuchs
3 = water bottle

Legend:

Conductivity (micromhos/cm)
1 = 630-768 (fresh)
2 = 850-6000 (oligosaline)
3 = 34000 (polysaline)
Alkalinity (mg/l $CaCO_3$)
1 = 41-76 (very low alkalinity)
2 = 140-195 (low alkalinity)
3 = 218-298 (medium alkalinity)
4 = 343-487 (high alkalinity)