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A Listing of Algal Taxa Collected from South Dakota Wetlands

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A LISTING OF ALGAL TAXA COLLECTED FROM SOUTH DAKOTA WETLANDS [1]

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ABSTRACT

Algal samples were collected from 52 wetlands in eastern South Dakota during summer, 1984. In this study, 20 wetland types were sampled using the classification of Cowardin et al. (1979). Seven of the 20 habitat types were compared statistically. The algal taxonomic composition in all but two differed significantly from each other. Water chemistry parameters could be statistically compared within three habitat types. Significantly different algal taxa were present in different pH and conductivity ranges but not alkalinity ranges.

Algal taxa are listed with their percent frequency of occurrence in lacustrine, palustrine and riverine habitat types sampled.

INTRODUCTION

Several investigators have listed algae collected from South Dakota lakes (Bell 1961, Haertel 1976, 1977, 1979, Haertel & Jongsma 1982, Hauber 1971, Hern et al., 1979, Koth 1981, Thoreson et al., 1976, Tipton et al., 1972). However, few have listed algae from South Dakota marshes (Sonneman et al., 1982) or rivers (Griffith, 1916).

Algae recorded in previous works were in many cases identified only to genus. Since algae play an important role in the productivity of the palustrine (marshland) and riverine habitats that constitute a large fraction of the water resources of eastern South Dakota, the following objectives were established: (1) provide a listing of all algal taxa found in palustrine, riverine and lacustrine habitats and (2) determine percent frequency of occurrence in the different habitat types sampled.

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METHODS

From May through October 1983, 140 algal samples were collected from 50 locations in the Coteau des Prairie region and two locations in the Minnesota River lowland region of eastern South Dakota (Table 1). Collection sites that contained standing water were sampled by net tow (#25 mesh), water bottle, and aufwuchs samples (scraping of attached algae off stems of submerged plants, rocks, soil and pilings, and bottom soil). Aufwuchs samples were also taken in wetland habitats without standing water. All 52 locations were classified into 20 habitat types (Table 1) following the classification system of Cowardin et al. (1979).

Water chemistry data from 45 locations are shown in Table 1. Measurements taken included pH (Sargent Welch P.B.L. pH meter), conductivity (Y.S.I. model 33 S-C-T meter) and total alkalinity (Hach digital titrator).

Algal taxa were listed by sampling location (Kreitlow 1985) and sampling location combined by habitat-type classification. The percent frequency of occurrence was determined by calculating the percentage of 8 lacustrine, 6 palustrine and 6 riverine habitat types where the algal species were collected (Table 2).

TABLE 1

Sampling Locations Classified According to Habitat Type With Attendant Water Chemistry Parameters

		Location**			Water Chemistry***		
Habitat type	County	TP(N)	R(W)	Sec	pH	Cond.	Alk.
I. Lacustrine							
A. Open water, permanent							
1. Big Stone	Roberts	121	46	5	—	—	—
B. Rock bottom, rubble intermittently exposed							
1. L. Herman	Lake	106	53	10	va	o	m
2. L. Badus	Lake	108	53	24	va	o	l
3. L. Goldsmith	Brookings	110	51	9	—	—	—
4. L. Badger	Kingsbury	112	53	35	—	—	—
5. L. Albert	Kingsbury	112	53	12	va	o	m
6. L. Fish	Deuel	113	47	9	a	o	l
*7. L. South Coteau	Deuel	116	49	29	a	f	l
C. Unconsolidated bottom, gravel-pebble, permanent							
1. L. Cochrane	Deuel	114	47	8	va	o	m
D. Unconsolidated bottom, gravel-pebble, intermittently exposed							
1. L. Thisted	Kingsbury	112	53	25	va	o	m, h
2. L. Spirit	Kingsbury	112	56	30	va	o	h
*3. L. Fox	Deuel	114	48	25	a	f	m
*4. L. Clear	Deuel	115	49	24	a	f	l

TABLE 1 (Continued)

Habitat type	County	Location** TP(N)	R(W)	Sec	Water Chemistry*** pH	Cond.	Alk.
E. Unconsolidated bottom, sand, intermittently exposed							
*1. L. Madison	Lake	106	52	22	va	o	l
2. L. Campbell	Brookings	109	50	28	a	o	l
3. L. Poinsett	Hamlin	113	52	31	....	..	..
4. L. Clear	Hamlin	115	53	15	va	f	m
5. L. Alice	Deuel	116	48	6	a	o	m
6. L. Kampeska	Codington	117	53	31	va	f	m
F. Unconsolidated bottom, mud, intermittently exposed							
*1. L. Goldsmith	Brookings	110	51	9	....	..	..
2. L. East Oakwood	Brookings	111	51	18	....	..	..
*3. L. Oak	Brookings	112	48	1	va	f	l
4. L. Cherry	Clark	113	56	35	va	f	l
5. L. Marsh	Hamlin	114	53	29	va	o	vl
6. L. Goose	Codington	116	54	23	a	o	h
7. L. Pelican	Codington	116	53	1	va	f	m
*8. L. School	Deuel	117	50	15	va	f	l
9. L. Round	Deuel	117	50	10	va	f	l
G. Aquatic bed, floating vascular, intermittently exposed							
*1. L. Long	Deuel	106	51	31	a	o	l
*2. L. Mud	Clark	114	57	35	a	o	h

TABLE 1 (Continued)

Habitat type	County	Location** TP(N)	R(W)	Sec	Water Chemistry*** pH	Cond.	Alk.
G. Aquatic bed, floating vascular, intermittently exposed (continued)							
3. L. Reinhart WPA	Clark	114	57	10	cn	o	m
*4. L. Rush	Deuel	116	56	29	va	o	vl
H. Shoreline, mud, intermittently exposed							
1. L. Salt	Deuel	117	47	3	va	p	m
II. Palustrine							
A. Unconsolidated bottom, sand-mud, intermittently exposed, diked							
1. Cochrane Sediment Pond	Deuel	114	47	8	....	..	..
B. Emergent wetland, persistent, permanent							
1. L. Cochrane	Deuel	114	47	8	va	o	m
C. Emergent wetland, persistent, intermittently exposed							
*1. L. Goldsmith	Brookings	110	51	9	....	..	..
2. L. East Oakwood	Brookings	111	51	18	....	..	..
3. Moe Slough	Brookings	112	52	26	....	..	..
4. Deer Creek Marsh	Brookings	112	47	29	cn	o	m
5. Unnamed Marsh	Kingsbury	112	54	9	cn	o	h

TABLE 1 (Continued)

Habitat type	County	Location** TP(N)	R(W)	Sec	Water Chemistry*** pH	Cond.	Alk.
C. Emergent wetland, persistent, intermittently exposed (continued)							
6. L. Spirit	Kingsbury	112	56	30	va	o	h
7. L. Cherry	Kingsbury	113	56	35	va	f	1
8. L. Marsh	Hamlin	114	53	29	va	o	ve
9. L. Reinhart WPA	Clark	114	56	10	cn	o	m
*10. L. Mud	Clark	114	57	35	a	o	h
11. L. Goose	Codington	116	54	23	a	o	h
12. Unnamed Marsh	Codington	116	55	35	a	o	h
*13. L. Rush	Deuel	116	48	29	va	o	vl
14. Unnamed Marsh	Deuel	117	50	11	va	f	m
D. Aquatic bed, floating vascular, intermittently exposed, impounded							
1. L. Agnew	Kingsbury	112	57	20	va	o	m
2. L. Osceola	Kingsbury	112	58	32	va	f	1
E. Moss-lichen moss, saturated							
1. Big Springs Fen	Roberts	124	51	28	....	..	..
F. Scrub-shrub, broadleaf deciduous, seasonally flooded							
1. Unnamed Marsh	Kingsbury	112	54	9	cn	o	h

TABLE 1 (Continued)

Habitat type	County	Location** TP(N)	R(W)	Sec	Water Chemistry*** pH	Cond.	Alk.
III. Riverine							
A. Upper perennial, rock bottom, bedrock, permanent							
1. Big Spring	Roberts	124	51	28	....	..	..
B. Upper perennial, rock bottom, rubble, permanent							
1. Unnamed Spring	Roberts	123	51	8	....	..	..
2. Cobb Spring	Deuel	115	47	27	....	..	..
C. Upper perennial, unconsolidated bottom, gravel-cobble, intermittently exposed							
1. Big Coulee Creek	Deuel	123	51	4	....	..	..
2. Unnamed Creek	Deuel	123	51	8	....	..	..
3. Big Springs Creek	Deuel	124	51	28	....	..	..
4. Cobb Creek	Deuel	115	47	27	....	..	..
*5. West Branch, Lac Qui Parle River	Deuel	115	47	9	a	f	m
D. Upper perennial, unconsolidated bottom, sand-mud, intermittently exposed							
1. Hidewoods Creek	Brookings	111	48	26	a	o	m

TABLE 1 (Continued)

Habitat type	County	Location** TP(N)	R(W)	Sec	Water Chemistry*** pH	Cond.	Alk.
E. Lower perennial, unconsolidated bottom, sand-mud, permanent							
*1. Big Sioux River	Brookings	109	50	35	a	f	m
F. Intermittent, streambed, rubble, saturated							
1. Unnamed Creek Seepage	Roberts	123	51	8	...	...	...

*Sampling sites from which more than 65 different taxa were recorded.

**TP(N) = township north, R(W) = range west, Sec = section

***Water chemistry ranges measured

pH:
- 7.2-7.5 circumneutral (cn)
- 7.7-8.3 alkaline (a)
- 8.5-9.2 very alkaline (va)

conductivity:
- 630-768 fresh (f)
- 850-6000 oligosaline (o)
- 34,000 polysaline (p)

alkalinity:
- 41-76 very low (vl)
- 140-195 low (l)
- 218-298 medium (m)
- 343-487 high (h)

TABLE 2

Species Identified in South Dakota Wetlands Together With Their Frequency of Occurrence in Each of the Habitat Types (*found in 25% or more of all habitat types sampled)

	Lacustrine (8 types)	Palustrine (6 types)	Riverine (6 types)
Chlorophyceae:			
Actinastrum gracilimum	13		
**Actinastrum hantzschii*	38	17	17
**Ankistrodesmus convolutus*	63	33	50
**Ankistrodesmus falcatus*	75	50	33
Botryococcus protuburans	13		
Botryococcus sudeticus	13		
Bulbochaetae sp.	13		
**Chaetophora elegans*	38	33	17
Chaetophora incrassata	13	17	17
Characium ambiguum		17	
Characium falcatum	13		
Characium gracilipes	13		
Characium limneticum	13		
Characium ornithocephalum		17	
**Chlamydomonas* sp.	75	33	67
**Cladophora glomerata*	63		33
**Closteriopsis longissima*	63		17
Closterium acerosum	38		17
Closterium acutum	13		
Closterium dianae		17	
Closterium ehrenbergii			17
Closterium moniliferum			17
Closterium leibleinii	13	17	17
Closterium venus	25	17	
**Coelastrum microporum*	50	17	17
Coelastrum sphaericum	13	17	
Coleochaete divergens	13		
Coleochaetae orbicularis		17	
Cosmarium constrictum	13		
**Cosmarium formosulum*	50	33	
Cosmarium granatum	25		
Cosmarium meneghinii	13		
Cosmarium nitidulum	13		
Cosmarium protractum		17	
Cosmarium sexangulare	13		
Cosmarium subcostatum	13	17	
Crucigenia apiculata	13	17	17

TABLE 2 (Continued)

	Lacustrine (8 types)	Palustrine (6 types)	Riverine (6 types)
Chlorophyceae (continued):			
Crucigenia tetrapedia	13		
Crucigenia quadrata	38		
Cylindrocapsa conferta	13	17	
Desmococcus viridis		17	17
**Dictyosphaerium pulchellum*	63	17	17
Draparnaldia sp.			17
Dysmorphococcus variabilis		17	17
Elakatotrix viridis	13		
Euastropsis richteri	13		
Eudorina elegans	13		
Franceia droescheri	13		
Gloeocystis major	13	17	
Gloeocystis versiculosa	13		17
Golenkinia sp.	25		17
Kirchneriella contorta	38		
Kirchneriella subsolitaria			17
Lagerheimia longiseta			17
Lagerheimia quadriseta	25		
Lagerheimia subsalsa	50		
Micractinium pusillum	25		
Microspora pachyderma	13		17
Microthamnion strictissimum			17
Mougeotia sp.	13	17	17
Nephrocytium agardhianum	13	17	
Oedogonium sp.	25	17	
**Oocystis Borgei*	75	17	17
Oocystis crassa	25		
Oocystis elliptica			17
**Oocystis eremosphaeria*	63	33	
Oocystis parva	25		
Oocystis pusilla	13	17	
Oocystis solitaria	13		
Oocystis submarina	25		
Palmella mucosa	25	17	
Pandorina morum	13	17	
Pediastrum biradiatum	13		
**Pediastrum boryanum*	63	67	17
**Pediastrum duplex*	75	50	17
Pediastrum integrum	13		
Pediastrum simplex	13		

TABLE 2 (Continued)

	Lacustrine (8 types)	Palustrine (6 types)	Riverine (6 types)
Chlorophyceae (continued):			
**Pediastrum tetras*	50	17	17
Pithophora sp.	13	17	17
Polyedriopsis spinulosa			17
Polytoma sp.	13		
Protoderma viride		17	
Quadrigula chodatii	13		
**Rhizoclonium hieroglyphicum*	38	33	17
Rhizoclonium hookeri	13	17	17
**Scenedesmus abundans*	63	33	
**Scenedesmus acuminatus*	75	17	33
Scenedesmus acutiformis	13		
**Scenedesmus arcuatus*	88	17	17
Scenedesmus armatus	13	17	
Scenedesmus brasiliensis		17	
Scenedesmus bernardii	25	33	
**Scenedesmus bijuga*	88	50	17
**Scenedesmus dimorphus*	63	33	17
Scenedesmus incrassutulus	25	17	
Scenedesmus longus		17	
**Scenedesmus obliquus*	50	17	17
Scenedesmus opoliensis	13	33	
**Scenedesmus quadricauda*	88	67	50
Schroederia judayi	38	17	
Schroederia setigera	38	17	
Selenastrum minutum	13	17	
Selenastrum westii	25		
**Spirogyra* sp.	38	50	67
Spondylosium sp.	13	17	
**Sphaerocystis schroeteri*	88	67	50
Staurastrum alternans	13		
Staurastrum gracile	38		
Staurastrum margaritaceum	13		
Staurastrum paradoxum	13		
Staurastrum polymorphum	13	17	
Staurastrum punctilatum	13		
Stigeoclonium lubricum	13		
Stigeoclonium polymorphum	25	17	17
Stigeoclonium subsecundum			17
Tetraedron caudatum	13	17	17
Tetraedron enorme		17	
Tetraedron hastatum	13		

TABLE 2 (Continued)

	Lacustrine (8 types)	Palustrine (6 types)	Riverine (6 types)
Chlorophyceae (continued):			
Tetraedron limneticum	13		
**Tetraedron minimum*	38	33	17
**Tetraedron muticum*	50	33	17
Tetraedron regulare	50		
**Tetraedron trigonum*	50	17	17
**Tetrastrum staurogeniaeforme*	50		17
Treubaria setigerum	38		17
Trentepohlia sp.	13		
**Ulothrix* sp.	50	33	33
Ulothrix subtilissima		17	
Volvox sp.		17	17
Zygnema sp.		17	
Charophyceae			
Chara sp.	13	33	17
Euglenophyceae			
**Euglena* sp.	75	17	33
Euglena acus			17
Euglena ehrenbergii	13		
**Phacus* sp.	63	50	33
**Trachelomonas* sp.	50	17	
Dinophyceae			
Ceratium hirundinella	25		
Peridinium sp.	25		
Cryptophyceae			
Cryptomonas sp.	38	17	
Vacuolaria virescens	13	17	
Xanthophyceae			
Characiopsis sp.	17		
Ophiocytium capitatum	13		17
**Tribonema* sp.	38	33	
**Vaucheria* sp.		33	67
Chrysophyceae			
**Dinobryon* sp.	38	17	33
Dinobryon sertularia	50		
Dinobryon vanhoeffenii	13		

TABLE 2 (Continued)

	Lacustrine (8 types)	Palustrine (6 types)	Riverine (6 types)
Bacillariophyceae			
Chaetoceros elmorei	25		
Coscinodiscus lacustris	13		
Cyclotella bodanica		17	
**Cyclotella meneghiniana*	75	17	33
Melosira islandica	13	17	
**Melosira granulata*	75	33	50
Rhizoselenia sp.	25		
Stephanodiscus astraea	38		
Stephanodiscus niagare	13		
Achnanthes lanceolata		17	17
Amphipleura pellucida	13	17	17
Amphiprora alata	50		
Amphiprora ornata	25	17	17
**Amphora ovalis*	75	33	83
Anomoeoneis costata	25		
Asterionella formosa	13		
Caloneis amphisbaena			17
Caloneis bacillum		33	
Caloneis lewisii	25	17	50
Caloneis limosa	38	17	
Caloneis ventricosa	38	17	17
Diatoma vulgare	38	17	17
Diploneis smithii			17
**Epithemia sorex*	75	50	33
**Epithemia turgida*	63	50	83
**Eunotia curvata*	38	50	33
Eunotia pectinalis	13	17	33
**Fragilaria capucina*	38	33	33
**Fragilaria construens*	38	17	33
**Fragilaria crotonensis*	75	67	67
Fragilaria pinnata	13	17	
Frustulia sp.		17	
**Gomphonema acuminatum*	25	17	50
Gomphonema angustatum		17	
**Gomphonema constrictum*	50	50	50
Gomphonema gracile		17	
Gomphonema montanum		17	
**Gomphonema olivaceum*	88	67	100
**Gomphonema parvulum*	63	33	33
Gyrosigma macrum	38		17
Gyrosigma spenceri		17	50

TABLE 2 (Continued)

	Lacustrine (8 types)	Palustrine (6 types)	Riverine (6 types)
Bacillariophyceae (continued):			
Hantzschia amphioxys	13		
Mastogloia smithii	13		
**Meridion circulare*	38	33	100
Navicula accomoda	13		
Navicula bacillum	25		
Navicula capitata	50		
Navicula cincta	13		
Navicula cryptocephala	25		
**Navicula cuspidata*	63	33	33
Navicula elginensis	13		
Navicula exigua	13		
Navicula gastrum	13		
Navicula halophila		17	
Navicula pupula	25	17	
**Navicula radiosa*	50	17	33
Navicula reinhardii	25		17
Navicula salinarum	25	17	
**Navicula tripunctata*	50	17	67
Nedium affine		17	
Nedium iridis	13	17	
Nitzschia amphibia	25		
Nitzschia commutata	13		
**Nitzschia linearis*	75	17	67
Nitzschia lorenziana			17
Nitzschia palea	13	17	17
**Nitzschia sigmoidia*	63	33	33
Nitzschia vermicularis			17
Opephora martyi		17	17
Pinnularia gibba	13	17	17
Pinnularia maior	13	17	
Pinnularia mesolepta			17
Pinnularia microstauron	13	17	
Pinnularia viridis	13		
**Rhoicosphenia curvata*	63	50	100
**Rhopaloidia gibba*	63	50	67
Rhopaloidia gibberula			17
Rhopaloidia ventricosa		17	17
**Stauroneis anceps*	50	33	50
Stauroneis smithii			33
**Stauroneis phoenicenteron*	25	50	33
**Surirella angustata*	38	33	33

TABLE 2 (Continued)

	Lacustrine (8 types)	Palustrine (6 types)	Riverine (6 types)
Bacillariophyceae (continued):			
Surirella elegans	13		
Surirella linearis	25	17	
**Surirella ovalis*	75	17	83
Surirella spiralis			17
Surirella splendida	38		17
Surirella striatula	38		
**Synedra acus*	100	67	67
Synedra capitata	25		
Synedra dorsoventralis	13		
Synedra fasciculata	13	17	
Synedra incisa	13		17
Synedra pulchella	13	17	
**Synedra rumpens*	38	67	50
**Synedra ulna*	100	100	100
Tropidoneis lepidoptera	13		
Cyanophyceae			
**Anabaena affinis*	25	33	50
Anabaena circinalis	50		
Anabaena spiroides	13		
**Aphanizomenon flos-aquae*	63		
Aphanizomenon ovalisporum	13		
Aphanothece sp.	13		
Arthrospira gomontiana		17	
**Arthrospira jenneri*	38	33	
Calothrix sp.	25		
Chroococcus minor	13	17	
Chroococcus dispersus	13		
Chroococcus limneticus	13		
Coelosphaerium sp.	13		
Dactylococcopsis fascicularis	13		
Gloeocapsa punctata			17
Gloeocapsa rupestris	13		
Gloeothece rupestris	13		
Gloeotrichia echinulata		17	
Gloeotrichia natans	13		
**Gomphosphaeria aponina*	63	33	
Gomphosphaeria lacustris	13		
Lyngbya aerugineo-caerulea	13		17
Lyngbya aestuarii		17	
**Lyngbya contorta*	63	50	

TABLE 2 (Continued)

	Lacustrine (8 types)	Palustrine (6 types)	Riverine (6 types)
Cyanophyceae (continued):			
Lyngbya diguetii	13	17	
Lyngbya limnetica	25		
Lyngbya nordgaardi		17	
Lyngbya versicolor	13		
**Merismopedia glauca*	63	17	17
Merismopedia elegans	13		
**Merismopedia tenuissima*	75	33	33
**Microcystis aeruginosa*	75	50	
**Microcystis incerta*	63	50	
Nostoc sp.	13	17	
Oscillatoria acutissima	13	50	
Oscillaaoria agardhii	13		33
Oscillatoria amphibia	13		
Oscillatoria anguina	13	33	
Oscillatoria angusta	25	17	
Oscillatoria angustissima	25	17	
Oscillatoria articulata	13		
Oscillatoria chalybea	13	17	
Oscillatoria formosa	13	17	
Oscillatoria granulata	25	17	
**Oscillatoria limnetica*	63	33	33
Oscillatoria limosa	13	33	17
**Oscillatoria nigra*	50	17	
Oscillatoria prolifica	13	17	17
**Oscillatoria subbrevis*	50	50	50
Oscillatoria splendida		17	
**Oscillatoria tenuis*	50	33	
Oscillatoria terebriformis			17
Pleurocapsa minor			17
Rivularia minutula	13		
Spirulina laxa	13		
Spirulina major	25	17	
Spirulina princeps	13		
**Spirulina subsalsa*	38	33	17
Synechocystis aquatilis	13		

A Chi-square test with 2-way contingency tables (Steel & Torrie, 1980) was used to determine whether algal floristic composition differed significantly between habitat types. Five lacustrine, one palustrine and one riverine habitat type included sufficient replications for Chi-square comparisons (habitat types IB, D, E, F, G, IIC, and IIIC, Table 1). After determining which habitat types contained significantly different algal communities, habitat types exhibiting no significant differences (IB and IE) were pooled to see if algal composition was influenced by water chemistry parameters. Sufficient replications were present to test six water chemistry ranges in pooled habitats IB and IE. Two water chemistry ranges could be compared within habitat IIIC.

RESULTS AND DISCUSSION

Nine classes and more than 300 species of algae were collected in this study (Table 2). Members of the Class Rhodophyceae, collected by Haertel (1982) unpublished data, were not found in this study. The three most abundant classes included Bacillariophyceae (diatoms, 98 species), Chlorophyceae (greens, 86 species), and Cyanophyceae (bluegreens, 58 species). The largest number of species were found in lacustrine sites (173), followed by palustrine sites (151) and riverine sites (105).

Sixty of the 78 species that appeared in more than 25% of all habitat types sampled were collected from all three major habitat types (Table 2). It is of interest to note that four common species collected from lacustrine and riverine sites were not found associated with palustrine sites. Thirteen common species, mostly bluegreens, from lacustrine and palustrine sites were not taken from riverine sites. Only a single common species was not collected from lacustrine sites.

Of the less common algae (taxa found in less than 25% of all habitat types), 21 were restricted to riverine sites with only one species collected from more than one riverine habitat type. Of the 25 taxa restricted to palustrine sites only one *(Caloneis bacillum)* was collected from more than one palustrine habitat type. Of 99 taxa restricted to lacustrine sites, 29 were collected from more than one lacustrine habitat type.

Some collection sites showed much greater algal diversity than others. More than 65 taxa of algae were collected from each of the 12 locations asterisked in Table 1.

Results of the Chi-square test with 2-way contingency tables showed that 11 of 12 habitat comparisons tested were significantly different from each other in terms of their algal communities (Table 3). This suggests that the habitat classification developed by Cowardin et al. (1979) is useful for algal studies.

TABLE 3

Chi-square Determination of Differences Between 7 Habitat Types

	Lacustrine					Palustrine
	Rock (IB)	Gravel (ID)	Sand (IE)	Mud (IF)	Floating (IG)	Emergent (IIC)
Gravel (ID)						
Sand (IE)	.06	**				
Mud (IF)	**		**			
Floating (IG)		*	*			
Palustrine (IIC)	**			**		
Riverine (IIIC)	**		**		**	**

*Significance .05

**Significance .01

The algal community composition was affected by some water chemistry parameters. Algal community structure was found to be significantly different (.05) between fresh and oligosaline sites, very significantly different (.01) between alkaline and very alkaline pH, but not significantly different between low and medium alkalinity sites. Only algal differences in waters with medium and high alkalinities could be tested within habitat IIC. These differences were not significant. Sletten and Larson (1984) similarly found that vascular plants were restricted by salinity but not by alkalinity.

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