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Author(s): Samuel R. Rushforth and Lorin E. Squires

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NEW RECORDS AND COMPREHENSIVE LIST OF THE ALGAL TAXA OF UTAH LAKE, UTAH, USA

Samuel R. Rushforth¹ and Lorin E. Squires¹

ABSTRACT.— Utah Lake is a slightly saline ecosystem containing more than 700 algal taxa. During the past decade a total of 106 algal taxa has been found that has not previously been reported in this water. These new records are reported herein, together with a comprehensive listing of all algal taxa reported from Utah Lake to date.

Utah Lake is a shallow, slightly saline hypereutrophic lake located in the central part of Utah at the eastern edge of the Great Basin geologic province. It is one of the largest freshwater lakes in western North America. The Lake is composed of three major sub-systems, Goshen Bay, Provo Bay, and the main body of the lake. Goshen Bay has the highest salinity in the lake, ranging up to 2300 mg/1 TDS during summer months. Provo Bay is significantly less saline, with TDS generally less than 600 mg/1. The main body of the lake is intermediate in salinity, ranging between 790 and 930 mg/1 TDS (Grimes and Rushforth 1983). Littoral areas in the lake are diverse and include rocky, sandy, and marshy shorelines as well as extensive clay ooze. Emergent vegetation of several vascular species is common in these littoral regions. This wide diversity of major habitat types with disparate salinities coupled with a broad array of microhabitats contributes to an unusually large number of algal taxa found in the lake.

The algal flora of Utah Lake has been of interest for some time. The first reports were published more than 50 years ago by Tanner (1930, 1931) and Snow (1932). After a 40-year hiatus, Utah Lake algae were again examined and reported in two brief communications by Harding (1970, 1971).

The first extensive examination of Utah Lake diatoms was undertaken by Bolland (1974), who studied a 5-m core collected offshore from Geneva. Two additional cores from the main lake and one core from Provo Bay were analyzed by Javakul et al. (1983).

Diatoms from the surface sediments of the lake have also been reported in two papers by Grimes and Rushforth (1982, 1983).

Phytoplankton of Utah Lake was sampled in the mid 1970s by workers of the U.S. Environmental Protection Agency (1977). Their report included a short list of genera present in the lake, together with accessory water chemical data. More extensive phytoplankton sampling was reported by Whiting et al. (1978) in a paper on the environmental requirements of selected Utah Lake algal taxa. This paper included a discussion of several of the dominant species in the lake, together with their environmental preferences. The following year, Squires et al. (1979) discussed the environmental requirements of the dominant phytoplankters that occupy the lake during some summers. These authors demonstrated competitive displacement of the dinoflagellate *Ceratium hirundinella* by the blue-green alga *Aphanizomenon flos-aquae*.

A summary of research on the algae in the water column of the lake performed from 1974 through 1978 (Rushforth et al. 1981) included a comprehensive species list of the phytoplankters and ecological and distribution information on other major taxa.

Grimes et al. (1980) published the only paper to date dealing with the epiphytic algae of the lake. Their paper dealt exclusively with the diatom assemblages on living and dead stems of the grass *Phragmites australis*, which grows in many littoral areas of the lake.

The present paper provides a list of all algal species reported in the literature from all

¹Department of Botany and Range Science, Brigham Young University, Provo, Utah 84602.

habitats of Utah Lake during the years 1930–1978. It also presents the species we have taken in our studies of the lake during 1978–1982, including a significant number of new records from the lake.

METHODS

More than 1000 algal samples were collected from Utah Lake during the period 1978–1982. These samples were collected from all major habitat types and the majority of microhabitats in the lake as part of a long-term cooperative analysis of the lake ecosystem. Collections included qualitative plankton tows, quantitative total plankton samples, qualitative epiphyton samples, and quantitative bottom sediment samples, as well as various qualitative grab samples for strictly taxonomic study.

Samples were returned to our laboratory at Brigham Young University and studied as soon as possible for living nondiatom taxa. Following such study, permanent diatom slides were prepared using standard acid oxidation procedures. All samples were examined on Zeiss RA microscopes using Nomarski and bright field microscopy. Diatom slides have been deposited in the Brigham Young University diatom collection.

All published papers dealing with the algal flora of Utah Lake were studied, and the species names were categorized according to division, class, and order. In examining these papers, we accepted only species that were reported as occurring in the lake or in the marshes at the edge of the lake. This was especially important for Snow's (1932) paper, since she studied a number of waters around the lake that represent separate habitat types.

RESULTS

A total of 686 citations of algal names has been reported in the literature for Utah Lake. In addition, we present herein 106 new records to bring the total number of reported taxa to 792 (Table 1). It should be mentioned that this figure is somewhat misleading since 81 of the citations in the literature are generic names only without specific epithets, and some of these would undoubtedly be duplicates of names used by other authors. In addition, some of the names used by various authors are synonyms of those used by others. We have noted a few of these, but a complete determination of conspecificity is beyond the scope of this paper. We hope to work on selected genera in the future to help resolve this problem.

The largest group of algae in the lake is the diatoms, which are represented by 532 taxonomic names in 51 genera. The Chlorophyta is represented in the lake by a total of 150 taxa in 56 genera. Blue-green algae are also common in the lake, with a total of 69 taxa being reported in 24 genera. The Chrysophyceae is represented by 3 genera containing 9 taxa and the Xanthophyceae by 5 genera containing 13 taxa. In addition, 5 genera including 13 species of Euglenophyta, 2 genera including 4 species of Pyrrophyta, and 2 genera of Cryptophyta are found in the algal flora of Utah Lake.

The new records for the algal flora of Utah Lake reported herein (Table 1) include 63 species and one genus of diatoms, 14 species and one genus of Chlorophyceae, one species of Xanthophyceae, 25 species and three genera of Cyanophyceae, and three species of Euglenophyta.

TABLE 1. Algal taxa collected from Utah Lake from 1930 to the present. The reference number refers to the literature citation provided at the end of the table.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
DIVISION CYANOPHYTA														
CLASS CYANOPHYCEAE														
Order Chroococcales														
<i>Anacystis rupestris</i> (Lyngb.) Drouet & Dail.										10				14
<i>Aphanocapsa grevillei</i> (Hass.) Rabh.					3									
<i>Aphanocapsa virescens</i> (Hass.) Rabh.					3									

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Aphanothece gelatinosa</i> (Henn.) Lemm.														14°
<i>Chroococcus minutus</i> (Kuetz.) Naeg.										10				14
<i>Chroococcus turgidus</i> (Kuetz.) Naeg.														14°
<i>Gloeocapsa punctata</i> Naeg.										10				14
<i>Gomphospheria aponina</i> Kuetz.										10				14
<i>Gomphospheria lacustris</i> Chod.										10				14
<i>Holopedium irregulare</i> Lager.										10				14
<i>Marsonniella elegans</i> Lemm.										10				14
<i>Merismopedia elegans</i> A. Braun.	1													
<i>Merismopedia glauca</i> (Ehr.) Naeg.										10				14
<i>Merismopedia tenuissima</i> Lemm.														14°
<i>Microcystis aeruginosa</i> Kuetz. em. Elenk.				4						10				14
<i>Microcystis incerta</i> Lemm.										10				14
<i>Microcystis protocystis</i> Crow								8		10				14
Order Chamaesiphonales														
<i>Chamaesiphon incrustans</i> Grun.			3											14
<i>Xenococcus</i> species			3											
Order Oscillatoriales														
<i>Anabaena azollae</i> Stras.			3											
<i>Anabaena cylindrica</i> Lemm.			3											
<i>Anabaena flos-aquae</i> (Lyngb.) Breb.								8		10				14
<i>Anabaena oscillarioides</i> Bory														14°
<i>Anabaena spiroides</i> Kleb.								8						
<i>Anabaena spiroides</i> var. <i>crassa</i> Lemm.				4						10				14
<i>Anabaena torulosa</i> (Carm.) Lager.														14°
<i>Anabaena variabilis</i> Kuetz.														14°
<i>Anabaena</i> species	1													
<i>Anabaena</i> species							7							
<i>Aphanizomenon flos-aquae</i> (Lemm.) Ralfs		2		4				8		10				14
<i>Lyngbya aerugineo-caerulea</i> (Kuetz.) Gom.														14°
<i>Lyngbya aestuarii</i> (Mert.) Liebm.														14°
<i>Lyngbya epiphytica</i> Hier. ex Eng. & Prant.														14°
<i>Lyngbya major</i> Meneg.			3											
<i>Lyngbya majuscula</i> (Dill.) Harv.			3							10				
<i>Lyngbya martensiana</i> Meneg.										10				
<i>Lyngbya</i> species			3											
<i>Microcoleus paludosus</i> Kuetz.) Gom.														14°
<i>Nodularia harveyana</i> (Thwaites) Thuret														14°
<i>Nodularia spumigena</i> Mert.				3										
<i>Nostoc caeruleum</i> Lyngb.										10				14
<i>Nostoc</i> species	1													
<i>Oscillatoria agardhii</i> Gom.														14°
<i>Oscillatoria amoena</i> (Kuetz.) Gom.														14°
<i>Oscillatoria amphibia</i> Ag.														14°
<i>Oscillatoria angusta</i> Koppe														14°
<i>Oscillatoria angustissima</i> West & West										10				14
<i>Oscillatoria articulata</i> Gard.										10				
<i>Oscillatoria limosa</i> (Roth) Ag.														14°
<i>Oscillatoria nigro-viridis</i> Thwaites			3											
<i>Oscillatoria sancta</i> (Kuetz.) Gom.														14°
<i>Oscillatoria subbrevis</i> Schmidle										10				
<i>Oscillatoria subtilissima</i> Kuetz.														14°
<i>Oscillatoria tenuis</i> Ag.										10				14
<i>Oscillatoria</i> species	1													
<i>Oscillatoria</i> species							7							
<i>Phormidium ambiguum</i> Gom.														14°
<i>Phormidium autumnale</i> (Ag.) Gom.			3											

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Phormidium incrustatum</i> (Naeg.) Gom.														14*
<i>Phormidium inundatum</i> Kuetz.														14*
<i>Phormidium tenue</i> (Meneg.) Gom.														14*
<i>Phormidium</i> species	1													
<i>Plectonema boryanum</i> Gom.														14*
<i>Rivularia</i> species	1													
<i>Schizothrix lacustris</i> A. Braun ex Kuetz.										10				
<i>Spirulina laxa</i> G.M.Sm.														14*
<i>Spirulina major</i> Kuetz.														14*
<i>Tolypothrix</i> species		2												
<i>Tolypothrix</i> species			3											
CHLOROPHYTA														
CLASS CHLOROPHYCEAE														
Order Volvocales														
<i>Carteria cordiformis</i> (Cart.) Dill.										10				14
<i>Carteria klebsii</i> (Dang.) France em. Troitz.										10				14
<i>Carteria stellifera</i> Nyg.										10				14
<i>Chlamydomonas altera</i> Skuja										10				14
<i>Chlamydomonas globosa</i> Snow										10				14
<i>Chlamydomonas polypyrenoideum</i> Pres.										10				14
<i>Eudorina elegans</i> Ehr.					4									
<i>Pandorina morum</i> (Muell.) Bory				3	4					10				14
<i>Pandorina</i> species	1													
<i>Pleodorina illinoisensis</i> Kofoid										10				
<i>Pteromonas cordiformis</i> Lemm. em Fott														14*
<i>Pteromonas cruciata</i> Playf.														14*
<i>Pteromonas</i> species							7							
<i>Sphaerellopsis aulata</i> (Pasch.) Gerl.										10				14
<i>Wislouchiella planktonica</i> Skv.										10				14
Order Tetrasporales														
<i>Gloeocystis ampla</i> (Kuetz.) Lager.					5									
<i>Sphaerocystis Schroeteri</i> Chod.										10				14
<i>Tetraspora lubrica</i> (Roth) Ag.			3											
Order Ulotrichales														
<i>Cylindrocapsa geminella</i> Wolle			3											
<i>Geminella scalariformis</i> G.West			3											
<i>Microspora crassior</i> (Hansg.) Hazen			3											
<i>Microspora floccosa</i> (Vauch.) Thur.					5									
<i>Microspora loefgrennii</i> (Nordst.) Lager.			3											
<i>Microspora stagnorum</i> (Kuetz.) Lager.			3											
<i>Microspora tumidula</i> Hazen			3											
<i>Microspora</i> species		2												
<i>Ulothrix aequalis</i> Kuetz.			3											14
<i>Ulothrix cylindricum</i> Pres.														14*
<i>Ulothrix scalariformis</i> G.West			3											
<i>Ulothrix tenerrima</i> Kuetz.			3											
<i>Ulothrix tenuissima</i> Kuetz.			3											
<i>Ulothrix variabilis</i> Kuetz.			3											
<i>Ulothrix zonata</i> (Web. & Mohr.) Kuetz.			3	4										14
<i>Ulothrix</i> species	1													
Order Chaetophorales														
<i>Aphanochaete repens</i> A.Braun			3											
<i>Chaetophora elegans</i> (Roth) Ag.			3											

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Gongrosira</i> species			3											
<i>Myxonema</i> (= <i>Stigeoclonium</i>) species		2												
<i>Stigeoclonium aestivale</i> Hazen														14°
<i>Stigeoclonium attenuatum</i> (Hazen) Coll.														14°
<i>Stigeoclonium stagnatile</i> (Hazen) Coll.										10				14
<i>Stigeoclonium subsecundum</i> Kuetz.			3											
<i>Stigeoclonium tenue</i> (Ag.) Kuetz.			3											14
Order Oedogoniales														
<i>Oedogonium capilliforme</i> Kuetz.			3											
<i>Oedogonium capilliforme</i> var. <i>debaryanum</i> (Chm.) Hirn.			3											
<i>Oedogonium</i> species	1													
Order Ulvales														
<i>Enteromorpha crinita</i> (Roth) Ag.			3											14
<i>Enteromorpha intestinalis</i> (L.) Grev.			3											
<i>Enteromorpha prolifera</i> (Dan.) Ag.			3											
<i>Enteromorpha</i> species ? (recorded as <i>Enteromorelia</i>)	1													
<i>Enteromorpha</i> species		2												
Order Cladophorales														
<i>Cladophora callicoma</i> Kuetz.			3											
<i>Cladophora crispata</i> (Roth) Kuetz.			3											
<i>Cladophora fracta</i> (Dill.) Kuetz.			3											
<i>Cladophora glomerata</i> (Lemm.) Kuetz.			3	4						10				14
<i>Cladophora insignis</i> (Ag.) Kuetz.			3											
<i>Cladophora</i> species	1													
<i>Rhizoclonium hieroglyphicum</i> (Ag.) Kuetz.			3											14
Order Chlorococcales														
<i>Actinastrum gracilimum</i> G.M.Sm.					5									14
<i>Actinastrum hantzschii</i> Lager.					5					10				14
<i>Actinastrum hantzschii</i> var. <i>elongatum</i> G.M.Sm.														14°
<i>Actinastrum hantzschii</i> var. <i>fluviatile</i> Schr.										10				14
<i>Ankistrodesmus convolutus</i> Corda										10				14
<i>Ankistrodesmus falcatus</i> (Corda) Ralfs					5			8		10				14
<i>Ankistrodesmus falcatus</i> var. <i>mirabilis</i> (West & West) G.S.West										10				14
<i>Ankistrodesmus falcatus</i> var. <i>stipitatus</i> (Chod.) Lemm.										10				14
<i>Ankyra judayi</i> (G.M.Sm.) Fott.								8		10				14
<i>Botryococcus braunii</i> Kuetz.				4										
<i>Botryococcus sudeticus</i> Lemm.														14°
<i>Characium</i> species		2												
<i>Chlorococcum infusionum</i> (Schr.) Meneg.				4										
<i>Closteriopsis longissima</i> var. <i>tropica</i> West & West				4						10				14
<i>Coelastrum microporum</i> Naeg.										10				14
<i>Crucigenia quadrata</i> Morr.										10				14
<i>Crucigenia tetrapedia</i> (Kirch.) West & West										10				14
<i>Dictyosphaerium ehrenbergianum</i> Naeg.				4				8		10				14
<i>Francia droscheri</i> (Lemm.) G.M.Sm.														14°
<i>Kirchneriella lunaris</i> (Kirch.) Moeb.										10				14
<i>Lagerheimia longiseta</i> var. <i>major</i> G.M.Sm.										10				14
<i>Lagerheimia wratislawiensis</i> Schr.										10				14
<i>Micractinium pusillum</i> Fres.					5					10				14
<i>Oocystis borgei</i> Snow										10				14
<i>Oocystis elliptica</i> W.West										10				
<i>Oocystis gigas</i> Arch.										10				14
<i>Oocystis gloeocystiformis</i> Borge										10				14
<i>Oocystis lacustris</i> Chod.										10				14

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Oocystis novae-semillae</i> Willie										10				
<i>Oocystis parva</i> West & West										10				14
<i>Oocystis pusilla</i> Hans.										10				14
<i>Oocystis submarina</i> Lager.										10				14
<i>Pediastrum boryanum</i> (Turp.) Meneg.			3		5					10				14
<i>Pediastrum duplex</i> Meyen								8		10				14
<i>Pediastrum duplex</i> var. <i>brachylobum</i> A.Braun										10				
<i>Pediastrum duplex</i> var. <i>clathratum</i> (A.Braun.) Lager.				4						10				14
<i>Pediastrum duplex</i> var. <i>gracilimum</i> West & West										10				14
<i>Pediastrum simplex</i> (Meyen) Lemm.										10				
<i>Pediastrum simplex</i> var. <i>duodenarium</i> (Bail.) Rabh.										10				
<i>Pediastrum tetras</i> (Ehr.) Ralfs.										10				14
<i>Pediastrum tetras</i> var. <i>tetraodon</i> (Chorda) Rabh.										10				14
<i>Pediastrum</i> species	1													
<i>Planktosphaeria gelatinosa</i> G.M.Sm.					5									14
<i>Quadrigula closteriodes</i> (Bohlin) Printz														14*
<i>Quadrigula lacustria</i> (Chod.) G.M.Sm.										10				14
<i>Scenedesmus abundans</i> var. <i>brevicauda</i> G.M.Sm.					5					10				14
<i>Scenedesmus acuminatus</i> (Lager.) Chod.										10				14
<i>Scenedesmus arcuatus</i> var. <i>platydisca</i> G.M.Sm.					5									
<i>Scenedesmus bijuga</i> (Turp.) Lager														14*
<i>Scenedesmus bijuga</i> var. <i>alterans</i> (Rein.) Hansg.										10				14
<i>Scenedesmus bijuga</i> var. <i>flexuosus</i> Lemm.										10				14
<i>Scenedesmus dimorphus</i> (Turp.) Kuetz.				4						10				14
<i>Scenedesmus longus</i> var. <i>naegeltii</i> (Breb.) G.M.Sm.										10				14
<i>Scenedesmus opoliensis</i> P.Richter										10				14
<i>Scenedesmus perforatus</i> Lemm.				4						10				14
<i>Scenedesmus quadricauda</i> (Turp.) Breb.				4						10				14
<i>Scenedesmus quadricauda</i> var. <i>longispina</i> (Chod.) G.M.Sm.										10				14
<i>Scenedesmus quadricauda</i> var. <i>parvus</i> G.M.Sm.					5									
<i>Scenedesmus quadricauda</i> var. <i>maximus</i> West & West													13	
<i>Scenedesmus quadricauda</i> var. <i>quadrispina</i> (Chodat) G.M.Sm.														14*
<i>Scenedesmus quadricauda</i> var. <i>westii</i> G.M.Sm.													13	
<i>Scenedesmus</i> species	1													
<i>Scenedesmus</i> species							7							
<i>Schroederia setigera</i> (Schr.) Lemm.								8		10				14
<i>Schroederia</i> species							7							
<i>Selenastrum bibraianum</i> Reinsch										10				14
<i>Selenastrum gracile</i> Reinsch				4						10				14
<i>Selenastrum westii</i> G.M.Sm.										10				14
<i>Treubaria triappendiculata</i> Bern.								8		10				14
Order Zygnematales														
<i>Closterium moniliferum</i> (Bory) Ehr.														14*
<i>Closterium venus</i> Kuetz.					5									
<i>Closterium</i> species	1													
<i>Closterium</i> species										10				
<i>Cosmarium margaritifera</i> Meneg.				3										
<i>Cosmarium oculiferum</i> Lagh.				3										
<i>Cosmarium ralfsii</i> Breb.				3										
<i>Cosmarium tetraophthalmum</i> (Kuetz.) Breb.				3										
<i>Cosmarium</i> species	1													
<i>Desmidium</i> species	1													
<i>Docidium</i> species			2											
<i>Genicularia</i> species			2											
<i>Mougeotia</i> species			2											
<i>Mougeotia</i> species				3										

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Spirogyra decimina</i> (Muell.) Kuetz.			3											
<i>Spirogyra formosa</i> (Trans.) Czur.														14*
<i>Spirogyra porticalis</i> (Muell.) Cl.														14*
<i>Spirogyra</i> species	1													
<i>Staurostrum natator</i> West					5									
<i>Staurostrum paradoxum</i> Meyen					5					10				14
<i>Staurostrum tetracerum</i> Ralfs										10				14
<i>Zygnema</i> species	1													
CLASS CHAROPHYCEAE														
<i>Chara</i> species			3											
DIVISION CHRYSOPHYTA														
CLASS CHRYSOPHYCEAE														
Order Chromulinales														
<i>Hydrurus foetidus</i> (Vill.) Trev.				4										
Order Ochromonadales														
<i>Dinobryon bavarium</i> Imhof		2												
<i>Dinobryon divergens</i> Imhof										10				
<i>Dinobryon sociale</i> var. <i>americanum</i> (Brunn.) Bach.										10				
<i>Dinobryon sertularia</i> Ehr.				4										
<i>Mallomonas acaroides</i> Perty										10				
<i>Mallomonas caudata</i> Iwan.										10				14
<i>Mallomonas pseudocoronata</i> Pres.										10				14
<i>Mallomonas tonsurata</i> Teil.										10				14
CLASS XANTHOPHYCEAE														
Order Mischococcales														
<i>Characiopsis cylindrica</i> (Lamb.) Lemm.					5									
<i>Chlorobotrys regularis</i> (W. West) Bohl.					5									
<i>Ophiocytium cochleare</i> (Eich.) A. Braun.			3											
<i>Ophiocytium cuspidatum</i> (Bail.) Rabh.			3											
<i>Ophiocytium majus</i> Naeg.			3											
<i>Ophiocytium parvulum</i> (Perty) A. Braun.			3											
Order Tribonematales														
<i>Tribonema bombycinum</i> (Ag.) Derb. & Sol.			3	4						10				14
<i>Tribonema minus</i> Hazen			3	4										14
<i>Tribonema utriculosum</i> Hazen				3										
<i>Tribonema</i> species	1													
Order Vaucheriales														
<i>Vaucheria borealis</i> Hirn														14*
<i>Vaucheria geminata</i> (Vauch.) DeCand.			3											
<i>Vaucheria sessilis</i> var. <i>clavata</i> (Vauch.) DeCand.				3										
CLASS BACILLARIOPHYCEAE**														
<i>Achnanthes affinis</i> Grun.											11			14
<i>Achnanthes chilensis</i> var. <i>subaequalis</i> Reim.													13	
<i>Achnanthes clevei</i> Grun.						6				10			13	14
<i>Achnanthes clevei</i> var. <i>rostrata</i> Hust.											11		13	14

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Achnanthes deflexa</i> Reim.										10				14
<i>Achnanthes exigua</i> Grun.										10	11		13	14
<i>Achnanthes gibberula</i> Grun.														14*
<i>Achnanthes hauckiana</i> Grun.									9	10	11		13	14
<i>Amphora</i> species									9					
<i>Anomoeoneis costata</i> (Kuetz.) Hust.						6								14
<i>Anomoeoneis serians</i> var. <i>brachysira</i> (Breb. ex Kuetz.) Hust.														14*
<i>Anomoeoneis sphaerophora</i> (Ehr.) Pfitz.						6			9	10	11		13	14
<i>Anomoeoneis sphaerophora</i> var. <i>guentheri</i> O.Muell.						6								
<i>Anomoeoneis vitrea</i> (Grun.) Ross											11		13	14
<i>Anomoeoneis</i> species											11			
<i>Asterionella formosa</i> Hassall				4		6			9	10	11		13	14
<i>Bacillaria paradoxa</i> Gmelin										10	11			14
<i>Bacillaria paxillifer</i> (Muell.) Hend. (= <i>B. paradoxa</i>)													13	
<i>Biddulphia laevis</i> Ehr.										10	11			14
<i>Caloneis amphisbaena</i> (Bory) Cl.										10	11		13	14
<i>Caloneis bacillaris</i> var. <i>thermalis</i> (Grun.) Cl.											11			14
<i>Caloneis bacillum</i> (Grun.) Cl.						6				10	11		13	14
<i>Caloneis fenzlii</i> (Grun.) Patr.						6								
<i>Caloneis fenzlioides</i> Cl.-Eul.									9	10	11		13	14
<i>Caloneis lamella</i> Zakr.											11			
<i>Caloneis lewisii</i> Patr.													13	
<i>Caloneis limosa</i> (Kuetz.) Patr.						6							13	14
<i>Caloneis oregonica</i> (Ehr.) Patr.											11			14
<i>Caloneis permagna</i> (Bail.) Cl.													13	14
<i>Caloneis schumanniana</i> (Grun.) Cl.										10				
<i>Caloneis schumanniana</i> var. <i>fasciata</i> Hust.											11		13	14
<i>Caloneis schumanniana</i> var. <i>linearis</i> Hust.											11			
<i>Caloneis silicula</i> (Ehr.) Cl.											11		13	14
<i>Caloneis silicula</i> var. <i>limosa</i> (Kuetz.) VanLand.											11		13	
<i>Caloneis ventricosa</i> (Ehr.) Meist.						6					11			14
<i>Caloneis ventricosa</i> var. <i>subundulata</i> (Grun.) Patr.														14*
<i>Caloneis ventricosa</i> var. <i>truncatula</i> (Grun.) Meist.													13	14
<i>Campylodiscus clypeus</i> Ehr.											11			14
<i>Campylodiscus hibernicus</i> Ehr.										10				
<i>Campylodiscus noricus</i> var. <i>hibernicus</i> (Ehr.) Grun. (= <i>Campylodiscus hibernicus</i>)											11		13	
<i>Chaetoceros elmorei</i> Boyer		2												14
<i>Cocconema</i> (= <i>Cymbella</i>) species		2												
<i>Cocconeis diminuta</i> Pant.						6				10	11		13	14
<i>Cocconeis disculus</i> (Schum.) Cl.						6					11		13	14
<i>Cocconeis fluviatilis</i> Wall.						6								
<i>Cocconeis pediculus</i> Ehr.						6				10	11		13	14
<i>Cocconeis placentula</i> Ehr.						6								14
<i>Cocconeis placentula</i> var. <i>euglypta</i> (Ehr.) Cl.						6			9	10	11			14
<i>Cocconeis placentula</i> var. <i>lineata</i> (Ehr.) V.H.						6			9	10	11	12	13	14
<i>Coscinodiscus lacustris</i> Grun.										10				14
<i>Coscinodiscus</i> species									9					
<i>Cyclotella antiqua</i> W.Sm.										10				14
<i>Cyclotella bodanica</i> Eulen.										10				14
<i>Cyclotella comta</i> (Ehr.) Kuetz.											11			
<i>Cyclotella kuetzingiana</i> Thwaites						6			9	10	11			14
<i>Cyclotella kuetzingiana</i> var. <i>planetophora</i> Fricke											11		13	14
<i>Cyclotella meneghiniana</i> Kuetz.						6			9	10	11	12	13	14
<i>Cyclotella meneghiniana</i> var. <i>pumila</i> (Grun. ex V.H.) Hust.											11			14
<i>Cyclotella ocellata</i> Pant.						6				10	11		13	14

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Cyclotella stelligera</i> (Cl.) Grun.										10				14
<i>Cyclotella striata</i> (Kuetz.) Grun.														14°
<i>Cyclotella striata</i> var. <i>ambigua</i> Grun.														14°
<i>Cyclotella</i> species 1											11			
<i>Cyclotella</i> species 2											11			
<i>Cylindrotheca gracilis</i> (Breb.) Grun.										10				14
<i>Cymatopleura angulata</i> Grev.														14°
<i>Cymatopleura elliptica</i> (Breb.) W.Sm.										10	11		13	14
<i>Cymatopleura elliptica</i> var. <i>constricta</i> Grun.						6								14
<i>Cymatopleura solea</i> (Breb.) W.Sm.						6				10	11		13	14
<i>Cymatopleura solea</i> var. <i>palffyi</i> (Pant.) Cl.-Eul.														14°
<i>Cymatopleura solea</i> var. <i>regula</i> (Ehr.) Grun.						6								
<i>Cymbella affinis</i> Kuetz.									9	10	11		13	14
<i>Cymbella amphicephala</i> Naeg. ex Kuetz.											11			14
<i>Cymbella cistula</i> (Ehr.) Kirch.						6				10	11		13	14
<i>Cymbella cymbiformis</i> Ag.										10	11		13	14
<i>Cymbella ehrenbergii</i> Kuetz.						6								
<i>Cymbella inaequalis</i> (Ehr.) Rabh.											11		13	14
<i>Cymbella mexicana</i> (Ehr.) Cl.						6				10	11		13	14
<i>Cymbella microcephala</i> Grun.										10				14
<i>Cymbella minuta</i> Hilse ex Rabh.									9					14
<i>Cymbella minuta</i> f. <i>latens</i> (Krasske) Reim.														14°
<i>Cymbella minuta</i> var. <i>pseudogracilis</i> (Choln.) Reim.											11			14
<i>Cymbella minuta</i> var. <i>silesiaca</i> (Bleisch ex Rabh.) Reim.										10	11		13	14
<i>Cymbella muelleri</i> Hust.									9	10	11	12	13	14
<i>Cymbella muelleri</i> f. <i>ventricosa</i> (Temp. et Perag.) Reim.											11		13	14
<i>Cymbella prostrata</i> (Berk.) Cl.									9	10	11			14
<i>Cymbella prostrata</i> var. <i>aeurswaldii</i> (Rabh.) Reim.											11		13	14
<i>Cymbella protracta</i> Ost.														14°
<i>Cymbella pusilla</i> Grun.											11			14
<i>Cymbella sinuata</i> Greg.										10	11			14
<i>Cymbella suburgida</i> Hust.						6								
<i>Cymbella tumida</i> (Breb. ex Kuetz.) V.H.										10	11		13	14
<i>Cymbella tumidula</i> Grun. ex A.Schmidt										10				14
<i>Cymbella turgida</i> Greg.						6								
<i>Cymbella</i> species			2											
<i>Cymbella</i> species									9					
<i>Cymbella</i> species 1										10				
<i>Cymbella</i> species 2										10				
<i>Denticula elegans</i> Kuetz.										10	11		13	14
<i>Denticula elegans</i> var. <i>kittoniana</i> (Grun.) DeT.											11			
<i>Denticula elegans</i> f. <i>valida</i> Pedic.										10				14
<i>Denticula subtilis</i> Grun.														14°
<i>Denticula tenuis</i> Kuetz.														14°
<i>Denticula tenuis</i> var. <i>crassula</i> (Naeg.) West & West											11			14
<i>Diatoma anceps</i> (Ehr.) Kirchn.						6								14
<i>Diatoma hiemale</i> (Roth) Hieb.											11			14
<i>Diatoma hiemale</i> var. <i>mesodon</i> (Ehr.) Grun.											11			14
<i>Diatoma tenue</i> Ag.										10	11		13	14
<i>Diatoma tenue</i> var. <i>elongatum</i> Lyngb.									9	10	11	12		14
<i>Diatoma vulgare</i> Bory										10	11		13	14
<i>Diatoma vulgare</i> var. <i>breve</i> Grun.											11			14
<i>Diatoma vulgare</i> var. <i>grande</i> (W.Sm.) Grun.										10				
<i>Diatoma</i> species		1	2											
<i>Diatomella balfouriana</i> Grev.											11			14
<i>Diploneis elliptica</i> (Kuetz.) Cl.											11		13	14
<i>Diploneis marginestriata</i> Hust.											11		13	14
<i>Diploneis oblongella</i> (Naeg. ex Kuetz.) Ross									9	10	11		13	14
<i>Diploneis oculata</i> (Breb.) Cl.													13	

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Diploneis pseudovalis</i> Hust.						6				10	11		13	14
<i>Diploneis puella</i> (Schum.) Cl.													13	14
<i>Diploneis smithii</i> (Breb. ex W.Sm.) Cl.						6								
<i>Diploneis smithii</i> var. <i>dilatata</i> (M.Perag.) Boyer										10	11		13	14
<i>Diploneis smithii</i> var. <i>pumila</i> (Grun.) Hust.										10				
<i>Diploneis</i> species 1											11			
<i>Diploneis</i> species 2											11			
<i>Diploneis</i> species													13	
<i>Encyonema</i> (= <i>Cymbella</i>) species	1													
<i>Entomoneis alata</i> (Ehr.) Ehr.										10				14
<i>Entomoneis paludosa</i> (W.Sm.) Reim.						6					11		13	14
<i>Epithemia adnata</i> (Kuetz.) Breb.						6			9	10				
<i>Epithemia adnata</i> var. <i>minor</i> (Perag. et Herib.) Patr.											11		13	14
<i>Epithemia adnata</i> var. <i>porcellus</i> (Kuetz.) Patr.									9		11			
<i>Epithemia adnata</i> var. <i>proboscidea</i> (Kuetz.) Patr.									9		11			
<i>Epithemia argus</i> (Ehr.) Kuetz.						6					11		13	14
<i>Epithemia argus</i> var. <i>alpestris</i> Grun.											11			
<i>Epithemia argus</i> var. <i>longicornus</i> (Ehr.) Grun.													13	
<i>Epithemia argus</i> var. <i>protracta</i> A.Mayer											11		13	14
<i>Epithemia hyndmanii</i> W.Sm.											11			14
<i>Epithemia intermedia</i> Fricke						6					11		13	14
<i>Epithemia ocellata</i> (Ehr.) Kuetz.													13	14
<i>Epithemia sores</i> Kuetz.						6				10	11			14
<i>Epithemia turgida</i> (Ehr.) Kuetz.						6				10	11		13	14
<i>Epithemia turgida</i> var. <i>granulata</i> (Ehr.) Brun.						6				10	11			14
<i>Epithemia turgida</i> var. <i>westernmannii</i> (Ehr.) Grun.														14*
<i>Epithemia zebra</i> (Ehr.) Kuetz.						6								
<i>Epithemia zebra</i> var. <i>saxonica</i> (Kuetz.) Grun.						6								
<i>Epithemia</i> species	1													
<i>Eunotia arcus</i> var. <i>bidens</i> Grun.										10	11			14
<i>Eunotia curvata</i> (Kuetz.) Lagerst.											11			14
<i>Eunotia diodon</i> Ehr.						6								
<i>Eunotia incisa</i> W.Sm. ex Greg.											11			14
<i>Eunotia pectinalis</i> (O.F.Muell.) Rabh.											11		13	14
<i>Eunotia pectinalis</i> var. <i>minor</i> (Kuetz.) Rabh.											11			14
<i>Eunotia tenella</i> (Grun.) Cl.														14*
<i>Eunotia</i> species	2													
<i>Fragilaria bicapitata</i> A.Mayer						6								
<i>Fragilaria brevistriata</i> Grun.						6			9	10	11			14
<i>Fragilaria brevistriata</i> var. <i>capitata</i> Herib.						6				10				14
<i>Fragilaria brevistriata</i> var. <i>inflata</i> (Pant.) Hust.						6			9	10	11	12	13	14
<i>Fragilaria capucina</i> var. <i>mesolepta</i> Rabh.						6					11			14
<i>Fragilaria construens</i> (Ehr.) Grun.						6			9	10	11	12	13	14
<i>Fragilaria construens</i> var. <i>binodis</i> (Ehr.) Grun.						6			9	10	11		13	14
<i>Fragilaria construens</i> var. <i>pumila</i> Grun.						6				10	11		13	14
<i>Fragilaria construens</i> var. <i>venter</i> (Ehr.) Grun.						6			9	10	11	12	13	14
<i>Fragilaria crotonensis</i> Kitton										9	10		13	14
<i>Fragilaria lapponica</i> Grun.						6			9		11		13	14
<i>Fragilaria leptostauron</i> (Ehr.) Hust.						6				10	11		13	14
<i>Fragilaria leptostauron</i> var. <i>dubia</i> (Grun.) Hust.						6					11		13	14
<i>Fragilaria pinnata</i> Ehr.						6			9		11	13		14
<i>Fragilaria pinnata</i> var. <i>intercedens</i> (Grun.) Hust.											11			14
<i>Fragilaria pinnata</i> var. <i>lancettula</i> (Schum.) Hust.						6			9					14
<i>Fragilaria similis</i> Krasske									9		11		13	14
<i>Fragilaria vaucheriae</i> (Kuetz.) Peters.						6			9	10	11	12	13	14
<i>Fragilaria vaucheriae</i> var. <i>capitellata</i> (Grun.) Patr.														14*
<i>Fragilaria virescens</i> Ralfs						6			9		11		13	14
<i>Frustulia rhomboides</i> (Ehr.) DeT.						6								14

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Frustulia vulgaris</i> (Thwaites) DeT.											11			14
<i>Gomphonema herculeana</i> (Ehr.) Cl.						6								
<i>Gomphonema acuminatum</i> Ehr.											11			14
<i>Gomphonema affine</i> Kuetz.									9					14
<i>Gomphonema affine</i> var. <i>insigne</i> (Greg.) Andrews											11			
<i>Gomphonema angustatum</i> (Kuetz.) Rabh.						6				10	11		13	14
<i>Gomphonema angustatum</i> var. <i>intermedia</i> Grun.														14°
<i>Gomphonema clevei</i> Fricke										10	11			14
<i>Gomphonema dichotomum</i> Kuetz.											11		13	14
<i>Gomphonema gracile</i> Ehr. em. V.H.						6			9		11			14
<i>Gomphonema intricatum</i> Kuetz.						6			9	10	11		13	14
<i>Gomphonema intricatum</i> var. <i>vibrio</i> (Ehr.) Cl.														14°
<i>Gomphonema lanceolatum</i> Ag.														14°
<i>Gomphonema olivaceum</i> (Lyngb.) Kuetz.						6			9	10	11		13	14
<i>Gomphonema olivaceum</i> var. <i>calcareum</i> (Cl.) Cl.											11		13	14
<i>Gomphonema parvulum</i> Kuetz.									9	10	11		13	14
<i>Gomphonema septum</i> Mogh.														14°
<i>Gomphonema sphaerophorum</i> Ehr.										10				
<i>Gomphonema subclavatum</i> (Grun.) Grun.											11			14
<i>Gomphonema subclavatum</i> var. <i>commutatum</i> (Grun.) A.Mayer									9		11			14
<i>Gomphonema subclavatum</i> var. <i>mexicanum</i> (Grun.) Patr.											11			14
<i>Gomphonema tenellum</i> Kuetz.									9					14
<i>Gomphonema truncatum</i> Ehr.										10				14
<i>Gomphonema truncatum</i> var. <i>capitatum</i> (Ehr.) Patr.											11		13	
<i>Gomphonema truncatum</i> var. <i>turgidum</i> (Ehr.) Patr.											11			
<i>Gomphonema ventricosum</i> Greg.						6			9	10	11		13	14
<i>Gomphonema</i> species	1													
<i>Gomphonema</i> species									9					
<i>Gyrosigma acuminatum</i> (Kuetz.) Rabh.						6				10	11	12	13	14
<i>Gyrosigma attenuatum</i> (Kuetz.) Rabh.						6								
<i>Gyrosigma macrum</i> (W.Sm.) Griff. & Henfr.						6					11			14
<i>Gyrosigma spencerii</i> (Quek.) Griff. & Henfr.											11		13	14
<i>Gyrosigma spencerii</i> var. <i>curvula</i> (Grun.) Reim.						6								
<i>Gyrosigma strigilis</i> (W.Sm.) Cl.											11		13	14
<i>Hannaea arcus</i> (Ehr.) Patr.						6				10				14
<i>Hantzschia amphioxys</i> (Ehr.) Grun.										10	11		13	14
<i>Hantzschia amphioxys</i> f. <i>capitata</i> O.Muell.										10				14
<i>Hantzschia virgata</i> (Roper) Grun.											11			14
<i>Mastogloia elliptica</i> var. <i>danseii</i> (Thwaites) Cl.						6				10	11		13	14
<i>Mastogloia pumila</i> (Grun.) Cl.														14°
<i>Mastogloia smithii</i> Thwaites ex W.Sm.						6							13	14
<i>Mastogloia smithii</i> var. <i>lacustris</i> Grun.						6					11		13	14
<i>Melosira distans</i> (Ehr.) Kuetz.											11			14
<i>Melosira granulata</i> (Ehr.) Ralfs						6		8	9	10	11	12	13	14
<i>Melosira granulata</i> var. <i>angustissima</i> O.Muell.						6			9	10	11	12	13	14
<i>Melosira islandica</i> O.Muell.											11		13	
<i>Melosira italica</i> (Ehr.) Kuetz.									9	10	11	12	13	14
<i>Melosira roseana</i> Rabh.											11			14
<i>Melosira varians</i> Ag.										10	11		13	14
<i>Melosira</i> species							7							
<i>Meridion circulare</i> (Grev.) Ag.						6								14
<i>Meridion circulare</i> var. <i>constrictum</i> (Ralfs) V.H.											11			
<i>Meridion</i> species	1													
<i>Navicula abiskoensis</i> Hust.											11		13	14
<i>Navicula accepta</i> Hust.											11			
<i>Navicula accomoda</i> Hust.													13	14

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Navicula amphibola</i> Cl.										10	11			14
<i>Navicula anglica</i> Ralfs											11		13	14
<i>Navicula angusta</i> Grun.											11			
<i>Navicula arenaria</i> Donk.									9					14
<i>Navicula arcensis</i> Hust.									9	10			13	14
<i>Navicula atomus</i> (Kuetz.) Grun.											11			14
<i>Navicula auriculata</i> Hust.														14°
<i>Navicula aurora</i> Sov.						6			9	10	11			14
<i>Navicula bacillum</i> Ehr.						6					11		13	
<i>Navicula bicephala</i> Hust.						6								
<i>Navicula capitata</i> Ehr.						6				10	11			14
<i>Navicula capitata</i> var. <i>hungarica</i> (Grun.) Ross						6			9	10	11	12	13	14
<i>Navicula capitata</i> var. <i>luneburgensis</i> (Grun.) Patr.											11		13	14
<i>Navicula cincta</i> (Ehr.) Ralfs									9		11		13	14
<i>Navicula circumtexta</i> Meist. ex Hust.									9	10	11		13	14
<i>Navicula clementis</i> Grun.											11			14
<i>Navicula crucicula</i> (W.Sm.) Donk.										10				
<i>Navicula cryptocephala</i> Kuetz.						6			9	10	11		13	14
<i>Navicula cryptocephala</i> var. <i>veneta</i> (Kuetz.) Rabb.									9	10	11	12	13	14
<i>Navicula cuspidata</i> (Kuetz.) Kuetz.										10	11	12	13	14
<i>Navicula cuspidata</i> var. <i>heribaudi</i> Perag.											11		13	14
<i>Navicula cuspidata</i> var. <i>major</i> Meist.											11		13	14
<i>Navicula difficillimoides</i> Hust.						6					11			14
<i>Navicula dulcis</i> Patr.														14°
<i>Navicula elginensis</i> (Greg.) Ralfs														14°
<i>Navicula elginensis</i> var. <i>rostrata</i> (A.Mayer) Patr.														14°
<i>Navicula exigua</i> Greg. ex Grun.									9	10			13	14
<i>Navicula exigua</i> var. <i>capitata</i> Patr.										10				14
<i>Navicula festiva</i> Krasske													13	
<i>Navicula gastrum</i> (Ehr.) Kuetz.													13	14
<i>Navicula gottlandica</i> Grun.													13	
<i>Navicula graciloides</i> A.Mayer									9	10	11		13	14
<i>Navicula gregaria</i> Donk.						6					11			14
<i>Navicula grimmei</i> Krasske														14°
<i>Navicula halophila</i> (Grun.) Cl.											11		13	14
<i>Navicula halophila</i> f. <i>tenuirostris</i> Hust.														14°
<i>Navicula heufleri</i> Grun.													13	14
<i>Navicula heufleri</i> var. <i>leptocephala</i> (Breb. ex Grun.) Perag.									9				13	14
<i>Navicula inflexa</i> (Greg.) Ralfs.													13	
<i>Navicula insociabilis</i> var. <i>dissipatoides</i> Hust.											11			
<i>Navicula integra</i> (W.Sm.) Ralfs						6								
<i>Navicula lacustris</i>						6								
<i>Navicula laevissima</i> Kuetz.														14°
<i>Navicula lanceolata</i> (Ag.) Kuetz.						6			9	10	11		13	14
<i>Navicula lapidosa</i> Krasske						6								
<i>Navicula menisculus</i> var. <i>upsaliensis</i> (Grun.) Grun.										10	11		13	14
<i>Navicula minima</i> Grun.						6			9	10	11		13	
<i>Navicula minuscula</i> Grun.										10	11			14
<i>Navicula molestiformis</i> Hust.											11			
<i>Navicula muralis</i> Grun.						6								
<i>Navicula mutica</i> Kuetz.						6					11		13	14
<i>Navicula mutica</i> var. <i>cohnii</i> (Hilse) Grun.											11		13	14
<i>Navicula mutica</i> var. <i>nivalis</i> (Ehr.) Hust. (= <i>Navicula nivalis</i>)													13	14

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Navicula mutica</i> var. <i>undulata</i> (Hilse) Grun.						6								14
<i>Navicula nivalis</i> Ehr.											11			14
<i>Navicula oblonga</i> (Kuetz.) Kuetz.						6			9	10	11		13	14
<i>Navicula odiosa</i> Wall.											11			14
<i>Navicula omisa</i> Hust.											11			
<i>Navicula pelliculosa</i> (Breb. ex Kuetz.) Hilse										10	11		13	14
<i>Navicula peregrina</i> (Ehr.) Kuetz.									9	10	11		13	14
<i>Navicula placentula</i> (Ehr.) Kuetz.						6					11		13	14
<i>Navicula placentula</i> f. <i>rostrata</i> A.Mayer														14°
<i>Navicula protracta</i> Grun.											11		13	14
<i>Navicula protracta</i> f. <i>subcapitata</i> (Wisl. et Por.) Hust.											11			
<i>Navicula pseudotuscula</i> Hust.											11			
<i>Navicula pupula</i> Kuetz.						6				10	11		13	14
<i>Navicula pupula</i> var. <i>capitata</i> (Skv.) Meyer														14°
<i>Navicula pupula</i> var. <i>elliptica</i> Hust.														14°
<i>Navicula pupula</i> var. <i>mutata</i> (Krasske) Hust.											11			14
<i>Navicula pupula</i> var. <i>rectangularis</i> (Greg.) Grun.						6				10	11		13	14
<i>Navicula pygmaea</i> Kuetz.						6				10	11			14
<i>Navicula radiosa</i> Kuetz.						6				10	11		13	14
<i>Navicula radiosa</i> var. <i>parva</i> Wall.													13	
<i>Navicula radiosa</i> var. <i>tenella</i> (Breb. ex Kuetz.) Grun.									9		11		13	14
<i>Navicula reinhardtii</i> (Grun.) Grun.						6					11		13	14
<i>Navicula reinhardtii</i> var. <i>elliptica</i> Herib.										10	11		13	14
<i>Navicula rhyncocephala</i> Kuetz.									9	10	11		13	14
<i>Navicula rhyncocephala</i> var. <i>amphiceros</i> (Kuetz.) Grun.											11	12	13	14
<i>Navicula rhyncocephala</i> var. <i>germainii</i> (Wall.) Patr.														14°
<i>Navicula salinarum</i> Grun.									9	10			13	14
<i>Navicula salinarum</i> var. <i>intermedia</i> (Grun.) Cl.									9	10	11			14
<i>Navicula schroeteri</i> var. <i>escambia</i> Patr.									9		11			14
<i>Navicula scutelloides</i> W.Sm. ex Greg.						6				10	11		13	14
<i>Navicula secreta</i> var. <i>apiculata</i> Patr.										10	11		13	14
<i>Navicula secreta</i> var. <i>apiculata</i> Patr.											11		13	14
<i>Navicula secreta</i> var. <i>apiculata</i> Patr.														14°
<i>Navicula seminulum</i> Grun.											11	12		
<i>Navicula seminuloides</i> Hust.														
<i>Navicula septata</i> Hust.						6								
<i>Navicula strenzkei</i> Hust.											11			
<i>Navicula subbacillum</i> Hust.														14°
<i>Navicula subhamulata</i> Grun.						6					11		13	14
<i>Navicula symmetrica</i> Patr.											11			14
<i>Navicula tenelloides</i> Hust.									9	10	11		13	14
<i>Navicula tenera</i> Hust.														14°
<i>Navicula tripunctata</i> (O.F.Muell.) Bory									9	10	11		13	14
<i>Navicula tripunctata</i> var. <i>schizonemoides</i> (V.H.) Patr.									9		11		13	14
<i>Navicula tuscula</i> Ehr.										10	11		13	
<i>Navicula viridula</i> (Kuetz.) Kuetz. em V.H.										10			13	14
<i>Navicula viridula</i> var. <i>avenacea</i> (Breb. ex Grun.) V.H.											11			14
<i>Navicula viridula</i> var. <i>rostellata</i> (Kuetz.) Cl.											11			14
<i>Navicula wardii</i> Patr.													13	
<i>Navicula wittrockii</i> (Lagerst.) Temp. et Perag.											11			
<i>Navicula species</i>	1	2												
<i>Navicula species</i>									9					
<i>Navicula species</i>											11			
<i>Navicula species</i>										10				
<i>Neidium affine</i> (Ehr.) Pfitz.						6					11			

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Neidium affine</i> var. <i>amphirhyncus</i> (Ehr.) Cl.											11			
<i>Neidium bisulcatum</i> var. <i>baicalense</i> (Skv. & Meyer) Reim.														14°
<i>Neidium dubium</i> (Ehr.) Cl.											11		13	
<i>Neidium iridis</i> (Ehr.) Cl.						6				10	11	12	13	14
<i>Nitzschia acicularis</i> W.Sm.						6			9	10			13	14
<i>Nitzschia acicularoides</i> Hust.											11			
<i>Nitzschia acuta</i> Hantz.						6								14
<i>Nitzschia amphibia</i> Grun.									9	10	11		13	14
<i>Nitzschia angustata</i> (W.Sm.) Grun.						6					11		13	14
<i>Nitzschia angustata</i> var. <i>acuta</i> Grun.											11		13	
<i>Nitzschia apiculata</i> (Greg.) Grun.						6			9		11	12		14
<i>Nitzschia capitellata</i> Hust.														14°
<i>Nitzschia clausii</i> Hantz.						6								
<i>Nitzschia communis</i> Rabh.										10				14
<i>Nitzschia denticula</i> Grun.											11			14
<i>Nitzschia dissipata</i> (Kuetz.) Grun.						6			9	10	11	12		14
<i>Nitzschia dubia</i> W.Sm.											11			
<i>Nitzschia epithemioides</i> Grun.														14°
<i>Nitzschia filiformis</i> (W.Sm.) Hust.						6			9	10	11			14
<i>Nitzschia fonticola</i> Grun.										10				14
<i>Nitzschia frustulum</i> (Kuetz.) Grun.						6			9	10	11		13	14
<i>Nitzschia gracilis</i> Hantz.						6			9		11		13	14
<i>Nitzschia granulata</i> Grun.											11		13	14
<i>Nitzschia hantzschiana</i> Rabh.						6			9	10	11		13	14
<i>Nitzschia holsatica</i> Hust.									9					
<i>Nitzschia hungarica</i> Grun.						6				10	11	12	13	14
<i>Nitzschia inconspicua</i> Grun.									9		11		13	14
<i>Nitzschia intermedia</i> Hantz. ex Cl. & Grun.											11		13	14
<i>Nitzschia lacunarum</i> Hust.						6								
<i>Nitzschia linearis</i> (Ag.) W.Sm.						6			9	10	11		13	14
<i>Nitzschia longissima</i> var. <i>closterium</i> (W.Sm.) V.H.									9	10	11			14
<i>Nitzschia microcephala</i> Grun.														14°
<i>Nitzschia minuta</i> Bleisch											11			
<i>Nitzschia obtusa</i> W.Sm.						6								14
<i>Nitzschia ovalis</i> Arnott									9	10	11			14
<i>Nitzschia palea</i> (Kuetz.) W.Sm.						6			9	10	11	12	13	14
<i>Nitzschia paleacea</i> Grun.									9	10	11			14
<i>Nitzschia perminuta</i> Grun.										10				
<i>Nitzschia punctata</i> (W.Sm.) Grun.						6			9	10	11		13	14
<i>Nitzschia pusilla</i> (Kuetz.) Grun. em. Lange-Bert.														14°
<i>Nitzschia recta</i> Hantz.											11			
<i>Nitzschia romana</i> Grun.						6					11		13	14
<i>Nitzschia sigma</i> (Kuetz.) W.Sm.											11		13	14
<i>Nitzschia sigmoidea</i> (Ehr.) W.Sm.									9	10	11		13	14
<i>Nitzschia spectabilis</i> (Ehr.) Ralfs											11			14
<i>Nitzschia stagnorum</i> Rabh.									9		11			14
<i>Nitzschia subacicularis</i> Hust.														14°
<i>Nitzschia subtilis</i> (Kuetz.) Grun.											11		13	14
<i>Nitzschia thermalis</i> Kuetz.											11			14
<i>Nitzschia thermalis</i> var. <i>minor</i> Hilse						6								
<i>Nitzschia tryblionella</i> Hantz.										10	11		13	14
<i>Nitzschia tryblionella</i> var. <i>debilis</i> (Arnott) A.Mayer						6				10	11		13	14
<i>Nitzschia tryblionella</i> var. <i>genuina</i> Grun.														
(= <i>Nitzschia tryblionella</i> var. <i>tryblionella</i>)										10				
<i>Nitzschia tryblionella</i> var. <i>levidensis</i> (W.Sm.) Grun.										10	11		13	14
<i>Nitzschia tryblionella</i> var. <i>victoriae</i> Grun.						6				10	11		13	14
<i>Nitzschia valdestrata</i> Aleem et Hust.														14°

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Nitzschia</i> species 1									9					
<i>Nitzschia</i> species 2									9					
<i>Nitzschia</i> species 1											11			
<i>Nitzschia</i> species 2											11			
<i>Nitzschia</i> species 3											11			
<i>Opephora martyi</i> Herib.									9	10	11		13	14
<i>Pinnularia abaujensis</i> var. <i>linearis</i> (Hust.) Patr.														14°
<i>Pinnularia abaujensis</i> var. <i>subundulata</i> (A.Mayer ex Hust.) Patr.											11			
<i>Pinnularia acrosphaeria</i> W.Sm.														14°
<i>Pinnularia appendiculata</i> (Ag.) Cl.											11			14
<i>Pinnularia biceps</i> Greg.											11			
<i>Pinnularia borealis</i> Ehr.						6					11		13	14
<i>Pinnularia borealis</i> var. <i>rectangularis</i> Carlson										10				
<i>Pinnularia brebissonii</i> (Kuetz.) Rabh.										10	11			14
<i>Pinnularia burkii</i> Patr.													13	
<i>Pinnularia maior</i> (Kuetz.) Rabh.											11		13	14
<i>Pinnularia microstauron</i> (Ehr.) Cl.						6				10	11		13	14
<i>Pinnularia molaris</i> (Grun.) Cl.						6								
<i>Pinnularia nobilis</i> (hr.) Ehr.														14°
<i>Pinnularia obscura</i> Krasske													13	14
<i>Pinnularia ruttneri</i> Hust.											11			
<i>Pinnularia viridis</i> (Nitz.) Ehr.						6				10	11		13	14
<i>Pinnularia viridis</i> var. <i>minor</i> Cl.											11		13	14
<i>Plagiotropis arizonica</i> Czar. & Blinn.											11			14
<i>Plagiotropis vitrea</i> (W.Sm.) Grun.										10				14
<i>Plagiotropis vitrea</i> var. <i>scaligera</i> (Grun. ex Cl. & Grun.) Perag.														14°
<i>Pleurosigma australe</i> Grun.										10				14
<i>Pleurosigma delicatulum</i> W.Sm.						6				10	11	12	13	14
<i>Rhizosolenia minima</i> Levan.														14°
<i>Rhoicosphenia curvata</i> (Kuetz.) Grun. ex Rabh.				4		6			9	10	11		13	14
<i>Rhopalodia gibba</i> (Ehr.) O.Muell.						6			9	10	11		13	14
<i>Rhopalodia gibba</i> var. <i>ventricosa</i> (Kuetz.) H. et M.Perag.										10	11		13	14
<i>Rhopalodia gibberula</i> (Ehr.) Muell.														14°
<i>Rhopalodia gibberula</i> var. <i>protracta</i> Grun.										10				14
<i>Rhopalodia gibberula</i> var. <i>vanheurckii</i> O.Muell.									9		11		13	14
<i>Rhopalodia musculus</i> (Kuetz.) O.Muell.										10	11		13	14
<i>Scoliopleura peisonis</i> Grun.						6				10	11	12	13	14
<i>Stauroneis anceps</i> Ehr.														14°
<i>Stauroneis anceps</i> var. <i>siberica</i> Grun. ex Cl.						6								
<i>Stauroneis kriegeri</i> Patr.														14°
<i>Stauroneis muriella</i> f. <i>linearis</i> Lund						6								
<i>Stauroneis phoenicenteron</i> (Nitz.) Ehr.						6				10	11		13	14
<i>Stauroneis phoenicenteron</i> var. <i>brunii</i> (M.Perag & Herib.) Voigt						6								
<i>Stauroneis phoenicenteron</i> f. <i>gracilis</i> (Ehr.) Hust.						6								
<i>Stauroneis smithii</i> Grun.											11			14
<i>Stauroneis wislouchii</i> Poretz. & Anis.											11			
<i>Stauroneis</i> species													13	
<i>Stephanodiscus astraea</i> (Ehr.) Grun.						6			9	10				14
<i>Stephanodiscus astraea</i> var. <i>minutula</i> (Kuetz.) Grun.									9	10		12		14
<i>Stephanodiscus carconensis</i> var. <i>pusilla</i> Grun.											11			
<i>Stephanodiscus dubius</i> (Fricke) Hust.											11	12	13	
<i>Stephanodiscus hantzschii</i> Grun.											11	12		
<i>Stephanodiscus invisitatus</i> Hohn & Heller.											11	12	13	14
<i>Stephanodiscus minutus</i> Cl. & Moell.											11	12		

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Stephanodiscus niagarae</i> Ehr.				4		6			9	10	11		13	14
<i>Stephanodiscus subtilis</i> V.Goor											11	12	13	
<i>Stephanodiscus</i> species												12		
<i>Stephanodiscus</i> species 1													13	
<i>Stephanodiscus</i> species 2													13	
<i>Surirella angusta</i> Kuetz.						6			9	10	11		13	14
<i>Surirella biseriata</i> Breb.											11		13	14
<i>Surirella linearis</i> W.Sm.						6					11		13	14
<i>Surirella linearis</i> var. <i>constricta</i> Grun.						6								
<i>Surirella ovalis</i> Breb.						6				10	11	12	13	14
<i>Surirella ovalis</i> var. <i>brightwellii</i> (W.Sm.) Cl.-Eul.									9	10	11		13	
<i>Surirella ovata</i> Kuetz.									9	10	11	12	13	14
<i>Surirella ovata</i> var. <i>pinnata</i> W.Sm.						6								14
<i>Surirella patella</i> Ehr.											11			14
<i>Surirella pseudovalis</i> Hust.											11			
<i>Surirella robusta</i> Ehr.											11			14
<i>Surirella robusta</i> var. <i>splendida</i> (Ehr.) V.H.											11		13	
<i>Surirella spiralis</i> Kuetz.						6					11			
<i>Surirella striatula</i> Turp.										10	11		13	14
<i>Surirella</i> species		2												
<i>Synedra acus</i> Kuetz.						6			9		11		13	14
<i>Synedra amphicephala</i> var. <i>austriaca</i> (Grun.) Hust.													13	
<i>Synedra capitata</i> Ehr.						6				10	11		13	14
<i>Synedra cyclopum</i> Bruts.														14°
<i>Synedra delicatissima</i> var. <i>angustissima</i> Grun.									9	10	11	12	13	14
<i>Synedra famelica</i> Kuetz.														14°
<i>Synedra fasciculata</i> (Ag.) Kuetz.														14°
<i>Synedra fasciculata</i> var. <i>truncata</i> (Grev.) Patr.									9	10	11			14
<i>Synedra filiformis</i> var. <i>exilis</i> Cl.-Eul.						6								
<i>Synedra mazamensis</i> Sov.									9	10	11			14
<i>Synedra minuscula</i> Grun.											11			14
<i>Synedra parasitica</i> (W.Sm.) Hust.													13	
<i>Synedra parasitica</i> var. <i>subconstricta</i> (Grun.) Hust.														14°
<i>Synedra pulchella</i> Kuetz.														14°
<i>Synedra radians</i> Kuetz.														14°
<i>Synedra rumpens</i> Kuetz.														14°
<i>Synedra rumpens</i> var. <i>familiaris</i> (Kuetz.) Grun.						6				10				14
<i>Synedra rumpens</i> var. <i>fragilarioides</i> Grun.										10	11			14
<i>Synedra rumpens</i> var. <i>meneghiniana</i> Grun.											11		13	
<i>Synedra rumpens</i> var. <i>scotica</i> Grun.										10	11			14
<i>Synedra socia</i> Wall.									9					14
<i>Synedra tenera</i> W.Sm.										10	11			14
<i>Synedra ulna</i> (Nitz.) Ehr.						6			9	10	11	12	13	14
<i>Synedra ulna</i> var. <i>contracta</i> Oestr.									9	10	11			14
<i>Synedra ulna</i> var. <i>danica</i> (Kuetz.) Grun.														14°
<i>Synedra ulna</i> var. <i>longissima</i> (W.Sm.) Brun.						6								
<i>Synedra ulna</i> var. <i>oxyrhynchus</i> (Kuetz.) V.H.														14°
<i>Synedra ulna</i> var. <i>oxyrhynchus</i> f.														
<i>mediocontracta</i> (Forti) Hust.													13	
<i>Synedra ulna</i> var. <i>spathulifera</i> (Grun.) V.H.						6								
<i>Synedra ulna</i> var. <i>subaequalis</i> (Grun.) V.H.											11			
<i>Synedra</i> species		1	2											
<i>Tabellaria flocculosa</i> (Roth) Kuetz.				4										
<i>Tabellaria</i> species		2												
<i>Tetracyclus lacustris</i> Ralfs						6								
<i>Thalassiosira fluviatilis</i> Hust.											11			14
<i>Thalassiosira</i> species										10				
<i>Thalassiosira</i> species											11			
<i>Thalassiosira</i> species												12		

Table 1 continued.

Species	Reference													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
DIVISION EULENOPHYTA														
CLASS EULENOPHYCEAE														
Order Euglenales														
<i>Euglena ehrenbergii</i> Klebs										10				14
<i>Euglena gracilis</i> Klebs										10				14
<i>Euglena oxyuris</i> Schmar.										10				14
<i>Euglena proxima</i> Dang.										10				14
<i>Euglena tripteris</i> (Duj.) Klebs														14*
<i>Euglena viridis</i> Ehr.														14*
<i>Euglena</i> species							7							
<i>Lepocinclis salina</i> Fritsch										10				14
<i>Phacus chloroplastes</i> Pres.										10				14
<i>Phacus spiralis</i> All. et Jahn														14*
<i>Phacus tortus</i> (Lemm.) Skv.										10				
<i>Strombomonas fluviatilis</i> (Lemm.) Defl.										10				14
<i>Trachelomonas crebea</i> (Kill.) Defl.										10				14

DIVISION PYRRHOPHYTA**CLASS DINOPHYCEAE****Order Peridinales**

Ceratium hirundinella (Muell.) Dujard. 2 4 8 10 14

Order Glenodinales

Glenodinium dinobryonis (Wol.) Lind. 10 14

Glenodinium penardiforme (Lind.) Schill. 10 14

Glenodinium species 7

CRYPTOPHYTA**CLASS CRYPTOPHYCEAE****Order Cryptomonadales**

Chroomonas species 7

Cryptomonas species 7

Column numbers refer to the following papers:

1. Tanner (1930)

3. Snow (1932)

5. Harding (1971)

7. EPA (1977)

9. Grimes et al. (1980)

11. Grimes and Rushforth (1982)

13. Javakul and Rushforth (1983)

2. Tanner (1931)

4. Harding (1970)

6. Bolland (1974)

8. Whiting (1978)

10. Rushforth et al. (1981)

12. Grimes and Rushforth (1983)

14. Present report

*Algal species previously unreported from Utah Lake.

**Diatoms are listed in alphabetical order.

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