

NEW ALGAL SPECIES RECORDS FOR THE GREAT SMOKY MOUNTAINS  
NATIONAL PARK, U.S.A., WITH AN ANNOTED CHECKLIST  
OF ALL REPORTED ALGAL SPECIES FOR THE PARK

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## ABSTRACT

The Great Smoky Mountains National Park, which straddles the Tennessee-North Carolina state line in the U.S.A. is a biologically diverse region which has recently become the site of an effort to chronicle species diversity. The All Taxon Biotic Inventory has as its ambitious goal the discovery and documentation of all species in all phyla present within park boundaries. As a result of several separate recent field trips to the park, we have found 167 new species records, of which 74 are cyanobacteria, 73 are chlorophytes, 1 is a rhodophyte, 10 are tribophytes, 1 is a chrysophyte, 2 are synurophytes, 2 are eustigmatophytes, and 4 are dinoflagellates. This paper also reports 292 diatom taxa from the park not previously recorded in peer-reviewed publications. The literature was surveyed to document previous reports of algal biodiversity. The park now has a total of 579 algal species records: 107 cyanobacteria, 93 chlorophytes, 12 tribonemophytes, 1 chrysophyte, 2 synurophytes, 2 eustigmatophytes, 355 diatoms, 4 dinoflagellates, and 3 rhodophytes. These totals include 61 taxa which could be recognized as distinct but which could not be identified to species. They are recognized as possibly new species. The list of 579 species is still likely a small percentage of the algal species occurring in the park, and further work is certainly needed.

## INTRODUCTION

The Great Smoky Mountains National Park is the largest contiguous preserve east of the Rocky Mountains. The Great Smoky Mountains were formed during the Appalachian Orogeny, which occurred during the Pennsylvanian Period some 200 million years before present (PETERSEN et al. 1973). This orogeny took place in conjunction with the formation of the

supercontinent Pangaea. Much of the sedimentary rock in the mountains was laid down in the Precambrian, over 600 million years ago, when shallow seas covered the area.

The Smoky Mountains serve as a preserve for a large number of species. The north-south orientation of the park, its complex geology, elevational variety, and moist climate contribute to its high biodiversity. Because of the mountainous terrain, old growth forest patches that have never been cleared for lumber still exist within park boundaries, and serve as pristine refugia for some species. The park has been designated an International Biosphere Preserve.

In December of 1997 a major effort was undertaken to identify every species in every phylum present in the park (PEDERSON 1999). This project is called the All Taxon Biodiversity Inventory (ATBI), and includes researchers and National Park Service personnel from throughout the eastern United States. Within the park, species records for vertebrates and higher plants are considered fairly complete. However, protists, fungi, invertebrates, eukaryotic algae, and bacteria are not well documented. As of August 2001, 450 vertebrate, 2,250 fungal, 2,816 higher plant, and 4,280 invertebrate species records had been documented in the park (SHARKEY 2001).

Non-diatom park algal records are limited to several studies of limited scope (DEASON & HERNDON 1989, PALMER 1941, PRESCOTT et al. 1949, 1943, SILVA 1949, SILVA & SHARP 1944). Diatoms of the Great Smoky Mountains were first chronicled by SILVA (1953). Unpublished studies of diatoms include two master's theses (KEITHAN 1983, KOCIOLEK 1982) and an unpublished study by Rex Lowe conducted in 1977. Several new diatom taxa observed in these unpublished studies were subsequently described (CAMBURN & LOWE 1978, LOWE & KOCIOLEK 1984).

This paper reports all algal species observed in the park thus far. It includes the algal taxa from the above published and unpublished studies, as well as taxa observed since initiation of the All Taxon Biotic Inventory. We have updated all records to reflect current taxonomic understanding, and the paper contains some new combinations in those cases where we are sure transfers should be made. Our recent studies indicate that there are a number of algal species new to science in the park. These will be reported in upcoming reports.

## MATERIALS AND METHODS

Lowe began collecting diatoms from the Great Smoky Mountains in 1976, when he sampled Cooper's Creek, Indian Flats Prong, and Madcap Branch. He subsequently collected diatoms from 19 stream sites in the park on 19-22 March, 7-9 June, and 4-6 September 1977. These streams were in four major watersheds: Forge Creek Watershed (Forge Creek, Ekaneetlee Branch, Bower Creek), Tremont Watershed (Indian Flats Prong, Doghobble Branch, Lynn Camp Prong, Sam's Creek), Ramsey Cascade Watershed (Ramsey Branch, Ramsey Prong, Little Pigeon River), and Big Creek Watershed (McGinty Creek, Swallow Fork, Big Creek). This latter study was undertaken to establish water quality in disturbed and undisturbed stretches of each of these watersheds. All samples were processed for diatoms following standard methods (SGRO & JOHANSEN 1995).

KOCIOLEK (1982) sampled several sites in the Abrams Creek Watershed (Abrams Creek and Bower Creek) and several sites in Beech Flats Prong. The intent of his work was primarily to make a floristic survey of the diatoms and build on the species list started by Lowe. This work was the source of the new diatom taxa described in LOWE & KOCIOLEK (1984).

KEITHAN (1983) studied the diatoms of two streams, Camel Hump Creek and Husky Branch. She sampled in July 1981, September 1981, November 1981, March 1982, and May 1982, and chose rapids, runs, and pools in both streams (KEITHAN and LOWE, 1985).

In April, 1999, a number of phycologists and students met in the Great Smoky Mountains to participate in the first Great Smoky Mountains Algal Foray. Many sites were sampled during this event, and samples were examined immediately after collection on photomicroscopes transported to the park for this purpose. No cultures were made from these samples, but a number of non-diatom species were identified.

Several streams were sampled in 1999-2001 by Makosky as part of her thesis research. Samples were processed for diatoms following standard methods. This is an ongoing study, but some of the new species records seen thus far in the project are included in this report.

Gomez and several colleagues collected epilithic aerial algae throughout the park on 19-24 May 2001. Samples consisted of organic material scraped from rocks wetted by seeps, springs, and splash from waterfalls. Scrapings were placed in whirl pack bags on site, and were kept under refrigeration until culture and preservation. This study was conducted primarily by Gomez as part of her thesis research. It is also an ongoing study, but species identified with confidence are included here.

In the study conducted on aerial algae, only non-diatom algae were examined. Upon return to John Carroll University, all samples were divided into portions for culture and preservation. A rough portion of each was transferred to polycarbonate bottles, preserved in 2% formaldehyde, and kept under refrigeration for the duration of the study. Diatom slides were made from all samples for future analysis.

Enrichment cultures of aerial algae were made by dilution plating onto agar-solidified Bold's Basal Medium (BOLD & WYNNE 1978). All cultures were maintained in a growth chamber at John Carroll University at  $200 \mu\text{E}\cdot\text{cm}^{-1}$  irradiance, on a 16:8 hour light:dark cycle, with temperature controlled at  $18^{\circ}\text{C}$  during the light cycle and  $10^{\circ}\text{C}$  during the dark cycle. Cultures were allowed to grow for 4 weeks prior to beginning analysis.

Green algae were subcultured in liquid BBM to induce zoospore formation. Subculture onto nitrogen-free media was used for inducement of heterocyte formation in many cyanobacteria. Those cyanobacteria which failed to thrive on BBM were subcultured on Z8 media (CARMICHAEL 1986). All taxa were examined and photographed using an Olympus BH2 photomicroscope with high resolution Nomarski DIC optics.

Taxonomic determinations were made using standard references. For cyanobacteria, DESIKACHARY (1959), GEITLER (1932), KOMÁREK & ANAGNOSTIDIS (1999), and STARMACH (1966) were the primary references for species, with generic assignments following the recent revisions of KOMÁREK & ANAGNOSTIDIS (ANAGNOSTIDIS & KOMÁREK 1985, 1988, 1990, KOMÁREK & ANAGNOSTIDIS 1986, 1989). References used for identifying green algae were diverse (CROASDALE & FLINT 1986, 1988, CROASDALE et al. 1994, DILLARD 1990, 1991a, 1991b, 1993, Ettl & GÄRTNER 1995, KOMÁREK & FOTT 1983, LOKHORST 1996). Diatoms were also identified using a number of texts (KRAMMER 1997a, 1997b, KRAMMER & LANGE-BERTALOT 1986, 1988, 1991a, 1991b, LANGE-BERTALOT 2001, LANGE-BERTALOT & MEZELTIN 1996, PATRICK & REIMER 1966, 1975). For tribophytes and eustigmatophytes, Ettl & GÄRTNER (1995) was the primary resource.

Placement of diatom taxa in higher taxonomic groups follows the system of ROUND et al. (1990). Placement of coccoid chlorophyte genera in higher level taxa is problematic. We

followed the scheme of GRAHAM & WILCOX (2000), informed by a number of recent phylogenetic studies (BOOTON et al. 1998a 1998b, FRIEDL & ZELTNER 1994, HANGATA 1998, HUSS et al. 1999, LEWIS 1997). Coccoid taxa known to belong in the Trebouxiophyceae were placed in the Trebouxiales. Coccoid taxa known to have directly opposite (DO) flagellar ultrastructure, or belong to that clade based upon DNA sequence data, were placed provisionally in the Sphaeropleales. The Chlorococcales contains the coccoid taxa with the clock-wise orientation of flagellar roots and those azoosporic taxa sharing sequence similarity with those species. Chlorophyte coccoid taxa that have neither been sequenced nor had ultrastructural work performed were left provisionally in the Chlorococcales.

## SITE DESCRIPTIONS

Many sites have been examined over the years, but exact data on most site locations are unavailable. Stream sites are particularly difficult to reconstruct, as streams are long and contain many tributaries. The watersheds sampled in this study and specific sites for which location data are unambiguous are shown on a map of the park (Fig. 1). Alphanumeric codes were chosen for each site (Fig. 1, Table 1). Sites were found with the help of maps and guidebooks (ANONYMOUS 1994, 1998).

## RESULTS

With the combination of recent and older records, the park now has a total of 579 algal species records: 107 Cyanobacteria, 93 Chlorophyta, 12 Tribophyceae, 1 Chrysophyceae, 2 Synurophyceae, 355 Bacillariophyceae, 2 Eustigmatophyceae, 4 Dinophyta and 3 Rhodophyta. These totals include 61 taxa which could be recognized as distinct but which could not be

identified with confidence to species. They may be rare taxa that we have been unable to identify or taxa new to science.

Thirteen diatom taxa were found that now belong in different genera than those to which they were originally assigned. Some were intraspecific taxa that we felt should be elevated to the species level in accordance with modern taxonomic practice. These taxa, with their taxonomic history and an explanation for the new combination or name, are given below.

***Achnantheidium alpestris* (LOWE & KOCIOLEK) LOWE & KOCIOLEK comb. nov.**

Basionym: *Achananthes deflexa* var. *alpestris* LOWE & KOCIOLEK (1984).

This variety was transferred to *Achnantheidium* and raised to the species level.

***Luticola stigma* (PATRICK) JOHANSEN comb. nov.** Basionym: *Navicula mutica* var. *stigma* PATRICK (1959, p. 96, pl. 8, fig. 3).

This taxon appears to be more closely related to *N. goeppertiniana* (BLEISCH in RABH.) D. MANN than it is to *L. mutica* (KÜTZING) D. MANN. However, given its distinctive valve outline, it should be recognized as a distinct species within the genus *Luticola*.

***Luticola naviculoides* JOHANSEN nom. nov.**

Rejected Synonym: *Navicula mobiliensis* var. *minor* PATRICK (1959, p. 96, pl. 8, fig. 2).

This taxon is similar to *Luticola argutula* (HUSTEDT) D. MANN, but differs by having perfectly parallel sides. PATRICK described it as a variety of *N. mobiliensis* BOYER. However, the valve length of *N. mobiliensis* is 70-95 µm, with striae 10-12 in 10 µm in the center to 16 in 10 µm at the ends. *L. naviculoides* is 34-43 µm long, with striae 16-20 in 10 µm in the center to 24 in 10 µm at the ends. It is clearly not a variety of *N. mobiliensis* by current taxonomic standards. It is named for its boat-like outline, which is distinct among currently described *Luticola* species.

***Luticola terminata* (HUSTEDT) JOHANSEN comb. nov.**

Basionym: *Navicula terminata* HUSTEDT (1966, p. 589, fig. 1594).

Synonym: *Navicula mutica* var. *tropica* HUSTEDT 1936 in SCHMIDT (1874-1959).

KRAMMER & LANGE-BERTALOT (1986) considered this taxon a synonym of *N. goeppertiniana* (BLEISCH) H.L. SMITH. However, this taxon has a slightly smaller length to breadth ratio, is more finely striate, and possesses less markedly radiate striae than that taxon.

***Luticola terminata* var. *rostrata* (KRASSKE) JOHANSEN comb. nov.**

Basionym: *Navicula mutica* var. *tropica* f. *rostrata* KRASSKE (1951, p. 650, pl. 32, figs. 6, 7)

The rostrate ends in this taxon are distinctive, and we have chosen to retain this taxon as a variety within *L. terminata*. KRAMMER & LANGE-BERTALOT (1986, fig. 62:14) illustrated a specimen likely belonging to this taxon as *Navicula* aff. *goeppertiniana* oder aff. *obligata*.

***Placoneis anglica* (RALFS in PRITCHARD) LOWE comb. nov.**

Basionym: *Navicula anglica* RALFS in PRITCHARD (1861, p. 900).

This taxon possesses all of the characters of the genus *Placoneis* MERESCHOWSKI as reviewed by COX (1987).

***Placoneis lata* (M. PERAGALLO in TEMPÈRE & PERAGALLO) LOWE comb. nov.**

Basionym: *Navicula dicephala* var. *lata* M. PERAGALLO in TEMPÈRE & PERAGALLO (1908, p.56).

Synonym: *Navicula elginensis* var. *lata* (M. PERAGALLO in TEMPÈRE & PERAGALLO) PATRICK in PATRICK & REIMER (1966).

As with the nominate variety of *Navicula elginensis* this taxon belongs to the genus *Placoneis*.

We are raising it from a variety to species.

***Placoneis neglecta* (KRASSKE) LOWE comb. nov.**

Basionym: *Navicula neglecta* KRASSKE (1929, p. 354, fig. 5).

Synonyms: *Navicula dicephala* var. *neglecta* (KRASSKE) HUSTEDT (1930); *Navicula elginensis* var. *neglecta* (KRASSKE) PATRICK in PATRICK & REIMER (1966). As with the nominate variety of *Navicula elginensis* this taxon belongs to the genus *Placoneis*. We are raising this variety to a species.

***Planothidium apiculatum* (PATRICK) LOWE comb. nov.**

Basionym: *Achnanthes lanceolata* var. *apiculata* PATRICK (1945, p. 167, pl. 1, figs. 4, 5).

As with other members of *Achnanthes lanceolata* this variety is being transferred to the genus *Planothidium*. For consistency the variety is being elevated to species status.

***Planothidium fossilum* (TEMPÈRE & PERAGALLO) LOWE comb. nov.**

Basionym: *Achnanthes peragalli* var. *fossilis* TEMPÈRE & PERAGALLO (1909, p. 113).

*Achnanthes peragalli* var. *fossilis* has previously been recombined as *Planothidium peragalli* var. *fossilum* (TEMPÈRE & PERAGALLO) ANDRESEN, STOERMER & KREIS. We raise the variety to the species level.

***Sellaphora elliptica* (HUSTEDT) JOHANSEN comb. nov.**

Basionym: *Navicula pupula* var. *elliptica* HUSTEDT (1911, p. 291, pl. 3, fig. 40).

This taxon is clearly a *Sellaphora* species, and is distinguished from *S. pupula* by its elliptical shape.

***Sellaphora mutata* (KRASSKE) JOHANSEN comb. nov.**

Basionym: *Navicula mutata* KRASSKE (1929, p. 354, fig. 16).

Synonym: *Navicula pupula* var. *mutata* (KRASSKE) HUSTEDT (1930).

This taxon is clearly a *Sellaphora* species, and is distinguished from *S. pupula* by its minutely rostrate ends.

***Sellaphora rostrata* (HUSTEDT) JOHANSEN comb. nov.**

Basionym: *Navicula pupula* var. *rostrata* HUSTEDT (1911, p. 291, pl. 3, fig. 39).

Synonym: *Navicula pupula* f. *rostrata* (HUSTEDT) HUSTEDT (1957).

HUSTEDT (1911, 1957) considered this a subspecific taxon of *N. pupula*. However, its distinctive capitate ends set it apart from *S. pupula*, and given the demonstrated sexual incompatibility of morphological demes in this group (MANN 1984, 1988, 1989), we elect to recognize it presently as its own species.

## DISCUSSION

The algal flora for the Great Smoky Mountains National Park is based primarily on those algae found in streams and perpetually moist epilithic substrates in the park. The diatoms have certainly been the group of algae most heavily studied. However, many relatively cosmopolitan diatom taxa have not yet been established in the park. A number of taxa are notably under-represented, including the euglenoids (no taxa so far reported!), the dinoflagellates, and the planktonic Chlorophyta, Chrysophyceae, and Cyanobacteria. The park is depauperate in lentic habitats which would undoubtedly harbor many of these groups, but those that are present have certainly not been extensively studied. Further study of Fontana Lake and the streams in the lower elevations will likely yield more algal records in these taxonomic groups.

*Batrachospermum* is notably absent from our records. We expect that this genus is present in the park, but has not yet been sampled.

Some of the diatom taxa will likely be given different generic assignments in the future. This is particularly certain for a number of *Achnanthes* species. *A. coarctata* is the only taxon which belongs in the current narrow circumscription of this genus. All other species listed in *Achnanthes* in this paper will eventually be transferred to other taxa. However, some of these taxa do not belong to any of the currently described genera with species formerly in *Achnanthes*,

and we did not feel the intent of this paper was to undertake a revision. *Navicula* is a large genus undergoing revision as well, and some of these species will also likely be transferred to other genera in the future. The cyanobacteria are also experiencing revision, and generic assignments could change in the future.

The occurrence of 61 taxa which we could not identify to species was striking. We suspect many of these are species new to science. With the better understanding of taxonomic diversity present within the coccoid chlorophytes and the cyanobacteria that is presently emerging, we would not be surprised to find many endemic or restricted species in the park. The cyanobacteria in particular appear to not fit the descriptions of European taxa, and require further study. Characterization of these unusual taxa will be the subject of a future paper.

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Table 1. Sites for which algae are reported in this paper. Site code is followed by a short description of the site, with county and state (TN = Tennessee, NC = North Carolina). When multiple habitat types were sampled, the site code has a number for each habitat type. Descriptions are based on the topographic trail map of the park (Anonymous 1998).

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Code	Site
ABB	Andrews Bald Bog, below Clingman's Dome, Swain Co., NC
AC	Abrams Creek, west end of park from Cade's Cove to Chilhowee Lake, Blount Co., TN
ACT	Alum Cave Trail, epilithic habitats between Arch Rock and Alum Cave, Sevier Co., TN
AF	Abrams Falls, a large cascade in Abrams Creek, Blount Co., TN
ANT	Anthony Creek, the easternmost tributary of Abrams Creek, Blount Co., TN
APP	Appalachian Trail, wet trailside rock, Swain Co., NC
BF	Beech Flats Prong, the westernmost tributary of the Oconaluftee River, Swain Co., NC
BIG	Big Creek, aerial epilithic habitats in drainage, east end of park, Haywood Co., NC
BIG1	Big Creek, stream habitat, east end of park, Haywood Co., NC
BOW	Bower Creek, a tributary of Forge Creek in Abrams Creek watershed, Blount Co., TN
BRA	Bradley Fork, northernmost tributary of the Oconaluftee River, Swain Co., NC
CAC	Cataloochee Creek, east end of park, Haywood Co., NC
CAD	Cades Cove, unspecified habitats in Abrams Creek watershed, Blount Co., TN
CAN	Cane Creek, small stream in northwest corner of park, Blount Co., TN
CAT	Cataloochie Road, wet rocks by side of road, east end of park, Haywood Co., NC
CC	Cooper Creek, a tributary of the Tuckasegee River, Swain Co., NC
CD1	Clingman's Dome, damp soil, Swain Co., NC
CD2	Clingman's Dome, damp rock, Swain Co., NC
CH	Camel Hump Creek, a tributary of Cosby Creek, Cocke Co., TN
CHA1	Charlies Bunion, gently flowing water below site, Sevier Co., TN
CHA2	Charlies Bunion, wet rock at base, Sevier Co., TN
CHI	Chimney's Trailhead, acidic soil, Sevier Co., TN
EC	Eagle Creek, southern part of park, emptying into Fontana Lake, Swain Co., NC
FC	Fighting Creek, tributary of the West Prong of the Little Pigeon River, Sevier Co., TN
FLA	Flat Creek, eastern tributary of Bunches Creek, Swain Co., NC
FON	Fontana Lake, reservoir along southern boundary of the park, Swain Co., NC
FON1	Fontana Lake, lakeshore trail along Eagle Creek arm, Swain Co., NC
GAT	Gatlinburg, soil above town, Sevier Co., TN
GCD	Road from Gatlinburg to Clingman's Dome, Sevier Co. TN to Swain Co., NC
GRE1	Greenbrier swimming pool, Sevier Co., TN
GRE2	Greenbrier, sluggish water near Hiking Club Cabin, Sevier Co., TN
GRO	Grotto Falls, small cascade in Roaring Fork watershed, Sevier Co., TN
GSM	Great Smoky Mountains National Park, unidentified site.

HAN Hannah Mountain Trail, rocks in swift stream, Blount Co., TN  
HAZ Hazel Creek, southern part of park, emptying into Fontana Lake, Swain Co., NC  
HUG Hughes Ridge-Bradley Fork Trail, trailside rock, Swain Co., NC  
HU Husky Branch, tributary of the Little River above Elkmont, Sevier Co., TN  
HWF Hen Wallow Falls, cascade in small tributary of Cosby Creek, Cocke Co., TN  
IC Indian Creek, eastern tributary of Deep Creek, Swain Co., NC  
IGG Indian Grave Gap, north of Cades Cove, Sevier Co., TN  
LAU Laurel Falls near Elkmont, wet siliceous rocks, Sevier Co., TN  
PIG1 Little Pigeon River, Middle Prong, near Hiking Club cabin, Greenbrier, Sevier Co., TN  
PIG2 Little Pigeon River below Trout Branch, Sevier Co., TN  
LRG1 Little River Gorge, damp rocks along road to Cades Cove, Sevier Co., TN  
LRG2 Little River Gorge, unspecified habitat, Sevier Co., TN  
LOW Lower Gap Trail, wet rocks along trail, Sevier Co., TN  
MBC Madcap Branch  
MEI Meigs Creek, tributary of the Little River, Sevier Co., TN  
MOO Moore's Cabin Spring, Gregory Bald, Graham Co., NC  
MYR Myrtle Point, east of Mount Le Conte, wet rocks, Sevier Co., TN  
NEW1 Newfound Gap, wet debris, Sevier Co., TN  
NEW2 Newfound Gap, stream below gap, Sevier Co., TN  
NEW3 Newfound Gap, roadside drain on the road to the gap, Sevier Co., TN  
NEW4 Newfound Gap, wet schist, Sevier Co., TN  
PEC Pecks Corner, spring near Hughes Ridge Trail, Swain Co., NC  
POR Porters Creek, tributary of the Little Pigeon River, Sevier Co., TN  
RAM Ramsey Prong, tributary of the Middle Prong Little Pigeon River, Sevier Co., TN  
RAM1 Ramsey Cascades, cascade on Ramsey Prong, Sevier Co., TN  
RFT Roaring Fork Trail, above site known as 1000 drips, Sevier Co., TN  
ROU Round Bottom CCC camp, Swain Co., NC  
SUG1 Sugarlands C.C.C. Camp, turbid stream above camp, Sevier Co., TN  
SUG2 Sugarlands Mountain Trail near Mt. Collins, Sevier Co., TN  
WP Walker Prong, below Newfound Gap, Sevier Co., TN

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Table 2. Algal species observed in the Great Smoky Mountains National Park. Sources of each record are coded as follows: 1) Algal Foray in May 1999; 2) DEASON & HERNDON (1989); 3) FLECHTNER et al. (2002); 4) GOMEZ, JOHANSEN & LOWE in May 2001; 5) KEITHAN (1983); 6) KOCIOLEK (1982); 7) LOWE 1976-1977 studies; 8) LOWE & KOCIOLEK (1984); 9) MAKOSKY 1999-2001 study; 10) SILVA (1949); 11) SILVA (1953); 12) SILVA & SHARP (1944). Sites codes refer to sites in Table 1.

Taxon	Source	Sites
<b>CYANOBACTERIA</b>		
<b>CYANOPHYCEAE</b>		
<b>Chroococcales</b>		
<i>Anacystis marginata</i> Meneghini	12	POR
<i>Anacystis rupestris</i> (Lyngbye) Drouet & Daily	12	LRG2
<i>Aphanocapsa grevillei</i> (Berkeley) Rabenhorst	12	LRG2
<i>Aphanocapsa muscicola</i> (Meneghini) Wille	4	GRO, AF
<i>Aphanocapsa</i> sp. 1	4	CAT1
<i>Aphanothece castagnei</i> (Brébisson) Rabenhorst	4	AF, RFT
<i>Aphanothece naegeli</i> Wartmann in Rabenhorst	4	LRG1
<i>Aphanothece saxicola</i> Nägeli	1	AF, GRO
<i>Chamaesiphon confervicolus</i> A. Braun in Rabenhorst	1	FLA
<i>Chamaesiphon incrustans</i> Grunow in Rabenhorst	1	ANT
<i>Chamaesiphon rostaffinskii</i> Hansgirg	12	SUG1
<i>Chlorogloeoa microcystoides</i> Geitler	1	AF
<i>Chroococcus cohaerens</i> (Brébisson) Nägeli	4	BIG2
<i>Chroococcus helveticus</i> Nägeli	4	BIG2
<i>Chroococcus montanus</i> Hansgirg	4	AF, CAT
<i>Chroococcus pallidus</i> (Nägeli) Nägeli	4	LRG1
<i>Chroococcus tenax</i> (Kirchner) Hieronymus	4	LRG1, RFT, AF, BIG
<i>Chroococcus turgidus</i> (Kützing) Nägeli	12	RAM1
<i>Chroococcus</i> sp. 1	4	AF
<i>Chroococcus</i> sp. 2	4	BIG
<i>Gloeocapsa aeruginosa</i> Kützing	4	AF
<i>Gloeocapsa rupestris</i> Kützing	4	RFT, AF, BIG7, CAT
<i>Gloeocapsopsis dvorakii</i> (Novacek) Komárek & Anagn.	1	AF
<i>Gloeocapsopsis magma</i> (Brébisson) Komárek & Anagnostidis	4, 12	RAM1, CAT, RFT
<i>Gloeocapsopsis</i> sp. 1	4	LRG1, AF
<i>Gloeothece confluens</i> Nägeli	1, 4	AF, BIG, CAT
<i>Gloeothece fusco-lutea</i> Nägeli	4	BIG
<i>Gloeothece palea</i> (Kützing) Rabenhorst	4	LRG1, CAT
<i>Gloeothece rupestris</i> (Lyngbye) Bornet in Wittrock & Nordstedt	4	RFT, AF, BIG
<i>Gloeothece tepidariorum</i> (A. Braun) Lagerheim	4	RFT, AF, BIG

<i>Pleurocapsa minor</i> Hansgirg em. Geitler	4	LRG1
<i>Pleurocapsa</i> sp. 1	4	CAT
<i>Synechococcus elongatus</i> (Nägeli) Nägeli	4	CAT, RFT
<i>Synechocystis</i> sp. 1	4	LRG1
<b>Oscillatoriales</b>		
<i>Gomontinema</i> sp. 1	4	BIG
<i>Gomontinema</i> sp. 2	4	BIG
<i>Jaaginema</i> sp. 1	4	CAT
<i>Leptolyngbya foveolarum</i> (Rabenhorst ex Gom.) Anagn. & Komárek	4	LRG1
<i>Leptolyngbya</i> cf. <i>frigida</i> (Fritsch) Anagn. & Komárek	4	CAT
<i>Leptolyngbya nostocorum</i> (Bornet ex Gomont) Anagn. & Komárek	12	LRG2
<i>Leptolyngbya ochracea</i> (Thuret ex Gomont) Anagn. & Komárek	12	GRE1, POR
<i>Leptolyngbya</i> cf. <i>subtillissima</i> (Kütz. ex Hansg.) Komárek & Anagn.	4	RFT
<i>Leptolyngbya subtruncata</i> (Voronichin) Anagnostidis	4	LRG1
<i>Leptolyngbya tenuis</i> (Agardh ex Gomont) Anagn. & Komárek	4, 12	CAD, GRO
<i>Leptolyngbya</i> sp. 1	4	BIG
<i>Leptolyngbya</i> sp. 2	4	BIG
<i>Leptolyngbya</i> sp. 3	4	CAT
<i>Leptolyngbya</i> sp. 4	4	CAT
<i>Microcoleus minimus</i> Frémy	4	CAT
<i>Oscillatoria formosa</i> Bory ex Gomont	1	ANT
<i>Oscillatoria limosa</i> Agardh ex Gomont	12	PIG1, GRE2
<i>Oscillatoria subbrevis</i> Schmidle	4	GRO
<i>Oscillatoria tenuis</i> var. <i>natans</i> Gomont	12	IGG1
<i>Oscillatoria</i> sp. 1	4	BIG
<i>Phormidium aerugineo-caeruleum</i> (Gomont) Anagn. & Komárek	4	CAT
<i>Phormidium autumnale</i> Trevisan ex Gomont	12	NEW1
<i>Phormidium inundatum</i> Kützing ex Gomont	12	ACT, IGG, PIG, RAM1, SUG2,
GCD		
<i>Phormidium</i> cf. <i>numidicum</i> (Gomont) Anagnostidis	4	BIG
<i>Phormidium irruguum</i> (Kützing ex Gomont) Anagn. & Komárek	1	AF
<i>Phormidium papyraceum</i> Kützing ex Gomont	12	AC, IGG, POR
<i>Phormidium</i> cf. <i>pristleyi</i> Fritsch	4	RFT
<i>Phormidium puteale</i> (Montagne ex Gomont) Anagn. & Komárek	12	GRE2
<i>Phormidium retzii</i> Kützing ex Gomont	12	AC, BRA, POR
<i>Phormidium uncinatum</i> Gomont	12	WP
<i>Phormidium versicolor</i> (Gomont) Anagn. & Komárek	12	POR
<i>Phormidium</i> sp. 1	4	BIG
<i>Phormidium</i> sp. 2	4	CAT
<i>Phormidium</i> sp. 3	4	CAT
<i>Plectonema tomasinianum</i> Kützing ex Gomont	12	IGG
<i>Plectonema</i> sp. 1	4	CAT
<i>Porphyrosiphon</i> sp. 1	4	BIG
<i>Pseudanabaena</i> sp. 1	4	BIG
<i>Schizothrix friesii</i> (Agardh) Gomont	12	GAT
<i>Schizothrix muelleri</i> Nägeli ex Gomont	12	LAU
<i>Schizothrix tinctoria</i> Gomont	4	RFT
<i>Schizothrix vaginata</i> (Nägeli in Kützing) Gomont	4	CAT
<i>Symploca muralis</i> Kützing ex Gomont	12	POR, ROU
<i>Symploca muscorum</i> Gomont	12	LRG2
<b>Nostocales</b>		
<i>Amphithrix janthina</i> Bornet & Flahault	12	IGG
<i>Anabaena orhyzae</i> Fritsch	4	CAT

<i>Anabaena variabilis</i> Bornet & Flahault	12	NEW3
<i>Anabaena variabilis</i> var. <i>ellipsospora</i> Fritsch	4	CAT
<i>Anabaena</i> sp. 1	4	CAT
<i>Calothrix braunii</i> Bornet & Flahault	4	RFT
<i>Calothrix fusca</i> Bornet & Flahault	4, 12	CAT, LRG2
<i>Calothrix parietina</i> Thuret ex Bornet & Flahault	12	PIG2
<i>Calothrix</i> sp. 2	4	CAT
<i>Coleodesmium wrangelii</i> Borzi ex Geitler	1, 3	MEI
<i>Leptochaete rivularis</i> Hansgirg	1	AF
<i>Nodularia harveyana</i> Thuret ex Bornet & Flahault	4	CAT
<i>Nostoc commune</i> Vaucher ex Bornet & Flahault	1, 4	GCD, AF
<i>Nostoc linkia</i> (Roth) Bornet ex Bornet & Flahault	4	CAT
<i>Nostoc microscopicum</i> Carmichael ex Bornet & Flahault	4, 12	RFT, BIG, LRG2
<i>Nostoc pruniforme</i> Agardh ex Bornet & Flahault	1	FON1
<i>Nostoc</i> sp. 1	4	AF
<i>Nostoc</i> sp. 2	4	BIG
<i>Scytonema figuratum</i> Agardh ex Bornet & Flahault	12	LRG2
<i>Scytonema guayanense</i> Bornet & Flahault	12	LRG2
<i>Scytonema</i> cf. <i>holstii</i> Hieronymus in Engler	4	GCD
<i>Scytonema</i> cf. <i>pseudohofmannii</i> Bharadwaja	4	BIG
<i>Scytonema</i> cf. <i>stuposum</i> (Kützing) Bornet	4	AF
<i>Scytonema tolypotrichoides</i> Bornet & Flahault	12	LRG2
<i>Stigonema hormoides</i> (Kützing) Bornet & Flahault	1, 4	AF, BIG, CAT
<i>Stigonema minutum</i> Bornet & Flahault	12	RAM1
<i>Stigonema tomentosum</i> (Kützing) Hieronymus	1, 4	AF, CAT
<i>Tolypothrix byssoidea</i> (Hassall) Kirchner	12	LRG1
<i>Tolypothrix</i> sp. 1	4	BIG

## CHLOROPHYTA

### CHAROPHYCEAE

#### Klebsormidiales

<i>Klebsormidium dissectum</i> (Gay) Lokhorst	4	LRG1
<i>Klebsormidium elegans</i> Lokhorst	4	RAM1
<i>Klebsormidium flaccidum</i> (Kützing) Silva, Mattox & Blackwell	4	GCD
<i>Klebsormidium nitens</i> (Menegheni in Kützing) Lokhorst	1, 4	MEI, AF
<i>Klebsormidium sterile</i> (Deason & Bold) Silva, Mattox & Blackwell	4	LOW
<i>Stichococcus bacillaris</i> Nägeli	4	AF, CAT, GRO
<i>Stichococcus fluitans</i> Gary	10	RAM1
<i>Stichococcus minutus</i> Grintzesco & Péterfi	4	AF, LOW
<i>Stichococcus subtilis</i> (Kützing) Klecker	12	POR
<i>Stichococcus scopulinus</i> Hazen	12	PEC

### CHLOROPHYCEAE

#### Volvocales

<i>Tetraspora cylindrica</i> (Wahlenberg) Agardh	10	RAM
<i>Tetraspora lubrica</i> (Roth) Agardh	1	MEI
<i>Tetraspora lacustris</i> Lemmermann	1	AF

#### Chlorococcales

<i>Axilococcus clingmanii</i> Deason & Herndon	2	CD1
<i>Burkillia</i> sp. 1	4	LRG1
<i>Chlorococcum ellipsoideum</i> Deason & Bold	4	BIG, CAT, GRO
<i>Chlorococcum</i> cf. <i>tatrense</i> Archibald	4	AF

<i>Chlorococcum</i> sp. 1	4	LRG1
<i>Coccomyxa confluens</i> (Kützing) Fott	1	AF
<i>Coccomyxa dispar</i> Schmidle	12	RAM1
<i>Coelastrum microporum</i> Nägeli	1	FON
<i>Dictyochloris pulchra</i> Deason & Herndon	2	CHI
<i>Dictyosphaerium pulchellum</i> Wood	1	FON
<i>Elliptochloris cf. bilobata</i> Tschermak-Woess		4 ACT
<i>Elliptochloris reniformis</i> S. Watanabe	4	CAT
<i>Elliptochloris subsphaerica</i> (Reisigl) Ettl and Gartner	4	CAT
<i>Ettlia cf. pseudoalveolaris</i> (Deason & Bold) Komárek	4	LRG1
<i>Ettlia</i> sp. 1	4	CAT, GRO
<i>Gloeocystis polydermatica</i> (Kützing) Hindák	1	AF
<i>Gloeocystis vesiculosa</i> Nägeli	12	HUG
<i>Gloeocystis</i> sp. 1	4	CAT
<i>Lautosphaeria monfumosa</i> Deason & Herndon	2	CHI
<i>Lobosphaeriopsis</i> sp. 1	4	LRG1
<i>Nephrocytium agardhianum</i> Nägeli	1	FON
<i>Trochisia granulata</i> (Reinsch) Hansgirg	1	AF
<b>Sphaeropleales</b>		
<i>Bracteacoccus cf. minor</i> (Chodat) Petrova	4	RFT
<i>Bracteacoccus</i> sp. 1	4	LRG1
<i>Monorophidium</i> sp. 1	4	BIG
<i>Scenedesmus abundans</i> (Kirchner) Chodat	4	RFT
<i>Scenedesmus quadricauda</i> (Turp.) Brébisson	1	FON2
<i>Scenedesmus serratus</i> (Corda) Bohlin	4	LRG1
<i>Scotiellopsis levicostata</i> (Gollerbach) Puncocharova & Kalina	4	CAT, LRG1
<i>Scotiellopsis terrestris</i> Punčoch. et. Kalina	4	AF, CAT
<i>Scotiellopsis</i> sp. 1	4	LRG1
<b>Chaetophorales</b>		
<i>Drapernaldia acuta</i> (Agardh) Kützing	1	MEI
<i>Drapernaldia platyzonata</i> Hazen	10	RAM
<i>Drapernaldia plumosa</i> (Vaucher) Agardh	10	NEW2
<i>Stigeoclonium attenuatum</i> (Hazen) Collins	1	AF
<b>Gloeotilales</b>		
<i>Geminella terricola</i> Petersen	4	LOW
<i>Microspora stagnorum</i> (Kützing) Lagerheim	12	CHA1
<i>Microspora tumidula</i> Hazen	12	GRE2
<i>Microspora willeana</i> Lagerheim	12	CHA2
<b>Prasiolales</b>		
<i>Schizogonium murale</i> Kützing	10, 12	APP, NEW
<b>TREBOUXIOPHYCEAE</b>		
<b>Trebouxiales</b>		
<i>Chlorella cf. assymetrica</i> Mainx	4	RFT
<i>Chlorella minutissima</i> Fott & Novaková	4	AF
<i>Chlorella vulgaris</i> Beijerinck	4	LRG1
<i>Chlorella</i> sp. 1	4	BIG, CAT
<i>Choricystis</i> sp. 1	4	LRG1, CAT, AF
<i>Muriella decolor</i> Vischer	4	LOW
<i>Muriella terrestris</i> Petersen	4	AF
<i>Myrmecia cf. bisecta</i> Reisigl	4	LRG1

<i>Microthamnion kuetzingianum</i> Nägeli	10	POR
<i>Nannochloris</i> sp. 1	4	CAT
<i>Oocystis solitaria</i> f. <i>major</i> Wille	4	LRG1

#### ULVOPHYCEAE

##### Trentepohliales

<i>Epibolium dramaticola</i> Printz	4	RFT
<i>Trentepohlia aurea</i> (Linné) Martius	12	MYR

##### Ulotrichales

<i>Ulothrix aequalis</i> Kützing	1	ANT
<i>Ulothrix variabilis</i> Kützing	4, 10	MOO, CAT
<i>Ulothrix</i> cf. <i>verrucosa</i> Lokhorst	4	ACT

#### ZYGNEMAPHYCEAE

##### Zygnematales

<i>Actinotaenium cruciferum</i> (DeBary) Teiling	1	FLA
<i>Actinotaenium cucurbita</i> Brébisson	4	BIG, RAM1
<i>Actinotaenium curtum</i> (Brébisson) Teiling ex Ružička & Pouzar	4	BIG
<i>Closterium eboracense</i> (Ehrenberg) Turner	1	FLA
<i>Closterium lineatum</i> Ehrenberg	1	MEI
<i>Closterium moniliferum</i> (Bory) Ehrenberg	1	AF
<i>Closterium toxon</i> West	1	AF
<i>Cosmarium</i> cf. <i>undulatum</i> Corda	4	AF
<i>Cosmarium</i> cf. <i>turnerianum</i> Maskell	4	LRG1
<i>Cylindrocystis brebissonii</i> Meneghini	4	LOW
<i>Cylindrocystis</i> sp. 1	4	BIG
<i>Genticularia elegans</i> West & West	1	FLA
<i>Micrasterias denticulata</i> Brébisson	1	FON1
<i>Micrasterias</i> cf. <i>truncata</i> (Corda) Brébisson	4	ACT
<i>Mougeotia</i> sp. 1	4	ACT
<i>Netrium digitus</i> (Ehr.) Itzigson & Rothe	12	SUG1
<i>Penium margaritaceum</i> (Ehr.) Brébisson in Ralfs	1	AF
<i>Pleurotaenium coronatum</i> (Brébisson) Rabenhorst	1	FON1
<i>Roya</i> sp. 1	4	AF
<i>Spirogyra pseudo-juergensii</i> H. Silva	1	LRG2
<i>Staurastrum lapponicum</i> (Schmidle) Groenblad	1	FON1
<i>Staurastrum orbiculare</i> (Ehrenberg) Ralfs	1	LRG2
<i>Staurastrum quadricuspdatum</i> Turner	1	FON
<i>Zygogonium ericetorum</i> Kützing	10	SUG2

#### RHODOPHYTA

##### FLORIDEOPHYCEAE

##### Acrochaetiales

<i>Audouinella violacea</i> (Kützing) Hamel	1	MEI
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##### Batrachospermales

<i>Lemanea fucina</i> Bory	12	PIG, RAM
<i>Paralemanea annulata</i> (Kützing) Vis & Sheath	12	PIG, RAM

#### HETEROKONTOPHYTA

## CHRYSOPHYCEAE

### Ochramonadales

*Dinobryon sertularia* (Lemmermann) Krieger 1 FON

## SYNUROPHYCEAE

### Synurales

*Mallomonas pseudocoronata* Prescott 1 FON

*Synura uvella* Ehrenberg 1 FON

## TRIBONEMOPHYCEAE

### Mischococcales

*Monallantus stichococcoides* Pascher 4 CAT, RFT

*Monodus* sp. 1 4 CAT

*Nephrodiella* sp. 1 4 RFT

*Pleurochloris nanella* Geitler 4 CAT

*Pleurogaster* sp. 1 4 GRO

### Tribonematales

*Tribonema aequale* Pascher 4 CAT

*Tribonema bombycinium* (Agardh) Derbes & Sol  
ROU 12 BRA, LRG1, NEW4, RAM,

*Tribonema monochloron* Pascher & Geitler 1 GCD

*Tribonema spirotaenia* Ettl 1 AF

### Vaucheriales

*Vaucheria sessilis* (Vaucher) De Cand. 10 SUG1

*Xanthonema bristolianum* (Pascher) Silva 4 CAT

*Xanthonema* sp. 1 4 LOW

## EUSTIGMATOPHYCEAE

*Eustigmatos magnus* (Petersen) Hibberd 4 RFT, LRG1

*Eustigmatos* sp. 1 4 RFT

## BACILLARIOPHYCEAE

### Achnanthes

*Achnanthes coarctata* (Brébisson in W. Smith) Grunow 5, 6 AC, BF, CH, HU

*Achnanthes harveyi* Reimer 5, 6 BF, HU

*Achnanthes lewisiana* Patrick 6, 7 AC, BOW, CC

*Achnanthes lutheri* Hustedt 5, 6, 8 BF, CH, HU

*Achnanthes reimeri* Camburn 6 AC, BF

*Achnanthes saxonica* Krasske ex Hustedt  
TW 5, 6, 7 AC, BOW, BF, CH, FC, HU,

*Achnanthes stewartii* Patrick 5, 6, 7 AC, BOW, BF, CC, CH, FC,  
HU, IC, MCB, PIG1, RAM

*Achnanthes subhudsonis* var. *kraeuseli* Cholnoky 6 AC

*Achnanthes subrostrata* var. *appalachiana* Camburn & Lowe 5, 6, 7 AC, BOW, BF, CH, FC, HU,  
PIG1, RAM, TW

*Achnanthidium deflexum* (Reimer) Kingston 7 BOW, PIG1, TW

*Achnanthidium alpestris* (Lowe & Kociolek) Lowe & Kociolek 5, 6, 8 AC, BOW, BF, CH, HU

<i>Achnanthydium exiguum</i> (Grunow) Czarnecki	7	IC, MCB
<i>Achnanthydium exiguum</i> var. <i>heterovalvum</i> (Krasske) Czarnecki	5, 6	AC, BF
<i>Achnanthydium microcephalum</i> Kützing	5,6	AC, BF, CH
<i>Achnanthydium minutissimum</i> (Kützing) Czarnecki	5, 6, 7, 11	AC, BOW, BF, CC, CH, FC,
HU, IC, LRG2, MCB, PIG1, RAM, TW		
<i>Cocconeis diminuta</i> Pantocsek	6	AC
<i>Cocconeis pediculus</i> Ehrenberg	9	AC
<i>Cocconeis placentula</i> (Ehrenberg) Hustedt	7, 12	AC, IC, CC, LRG2, MCB
<i>Cocconeis placentula</i> var. <i>lineata</i> (Ehrenberg) Van Heurck	5, 6, 7, 12	AC, BOW, BF, CH, FC, HU,
TW		
<i>Eucocconeis lapponica</i> var. <i>ninckei</i> (Guerm. & Mang.) Edlund	7	CC, MCB
<i>Karayeva clevei</i> (Grunow) Round & Bukhtiyarova	6	AC
<i>Karayeva laterostrata</i> (Hustedt) Round & Bukhtiyarova	6	AC
<i>Lemnicola hungarica</i> (Grunow) Round & Basson	9	EC
<i>Planothydium apiculatum</i> (Patrick) Lowe	9	CAN
<i>Planothydium dubium</i> (Grun.) Round & Bukhtiyarova	5, 6	AC, BF, CH, HU
<i>Planothydium fossilis</i> (Tempere & Peragallo in Peragallo) Lowe	6	AC
<i>Planothydium haukianum</i> (Grunow) Round & Bukhtiyarova	6	AC
<i>Planothydium lanceolatum</i> (Bréb. ex Kützing) Round & Bukhtiyarova	6, 7, 12	AC, BOW, BF, CC, CH, FC,
HAN, HU, IC, MCB, PIG1, RAM		
<i>Psammothidium helveticum</i> (Hustedt) Bukhtiyarova & Round	5, 6	AC, BF, CH, HU
<i>Psammothidium marginulata</i> (Grunow) Bukhtiyarova & Round	6, 7	AC, BOW, BF, CH, FC, PIG1,
RAM		
<i>Psammothidium subatomoides</i> (Hustedt) Bukhtiyarova & Round	5, 6, 7	AC, BOW, BF, CH, FC, HU,
PIG1, RAM, TW		
<i>Rossithidium linearis</i> (W. Smith) Round & Bukhtiyarova	7	CC, MCB
<b>Aulacoseirales</b>		
<i>Aulacoseira alpigena</i> (Grunow) Krammer	9	CAC
<i>Aulacoseira distans</i> (Ehrenberg) Simonsen	9	GCD
<b>Bacillariales</b>		
<i>Hantzschia amphioxys</i> (Ehrenberg) Grunow	7	GSM
<i>Nitzschia acida</i> Camburn	6	AC
<i>Nitzschia acicularis</i> W. Smith	6	AC
<i>Nitzschia amphibia</i> Grunow	6	AC
<i>Nitzschia balcanica</i> Hustedt	6	AC
<i>Nitzschia clausii</i> Hantzsch	6	AC
<i>Nitzschia dissipata</i> (Kützing) Grunow	5, 6	AC, BF, HU
<i>Nitzschia dissipata</i> var. <i>media</i> (Hantzsch) Grunow	9	AC
<i>Nitzschia microcephala</i> Grunow	6	AC, BF
<i>Nitzschia frustulum</i> (Kützing) Grunow	5, 6, 7	AC, BF, CC, CH, FC, HU,
PIG1, RAM		
<i>Nitzschia frustulum</i> var. <i>perpusilla</i> (Rabenhorst) Grunow	7	TW
<i>Nitzschia gracilis</i> Hantzsch	6	AC
<i>Nitzschia linearis</i> W. Smith	6	AC
<i>Nitzschia monanestris</i> Camburn	6	AC
<i>Nitzschia palea</i> (Kützing) W. Smith	5, 6	AC, CH
<i>Nitzschia sublinearis</i> Hustedt	6	AC
<i>Nitzschia terricola</i> Lund	6, 7	AC, TW
<i>Nitzschia tropica</i> Hustedt	6	BF
<i>Tryblionella acuta</i> (Cleve) D.G. Mann in Round et al.	6	AC
<b>Cymbellales</b>		
<i>Cymbella affinis</i> Kützing	6, 12	AC, LRG2
<i>Cymbella aspera</i> (Ehrenberg) H. Peragallo	6	AC, BF

<i>Cymbella cistula</i> (Ehrenberg) Kirchner	6	AC
<i>Cymbella cymbiformis</i> Agardh	11	AF
<i>Cymbella ehrenbergii</i> Kützing	12	BRA
<i>Cymbella hauckii</i> Van Heurck	6, 12	BF, BRA
<i>Cymbella naviculiformis</i> Auerswald in Rabenhorst	6, 7, 12	AC, BF, BRA, MCB
<i>Cymbella scotica</i> W. Smith	12	BRA
<i>Cymbella tumida</i> (Brébisson ex Kützing) Van Heurck	6, 12	AC, LRG2
<i>Cymbella turgidula</i> Grunow	9	AC
<i>Encyonema hebridicum</i> Grunow ex Cleve	11	AF
<i>Encyonema lunatum</i> (W. Smith) Van Heurck	7	IC, CC, MCB
<i>Encyonema minutum</i> (Hilse ex Rabh.) D.G. Mann in Round et al. HU, IC, MCB, RAM, TW	5, 6, 7, 12	AC, BOW, BF, CC, CH, FIG,
<i>Encyonema neomesianum</i> Krammer	5, 7	BOW, CH, FC
<i>Encyonema perpusillum</i> (A. Cleve) D.G. Mann in Round et al.	6	AC, BF
<i>Encyonema prostratum</i> (Berkeley) Kützing	6, 12	AC, FIG
<i>Encyonema silesiaca</i> Bleisch in Rabenhorst	9	EC
<i>Encyonemopsis microcephala</i> (Grunow) Krammer	9	CAC
<i>Gomphonema minuta</i> (Stone) Kociolek & Stoermer	6	AC
<i>Gomphonema acuminatum</i> Ehrenberg	6, 7	AC, CC, IC
<i>Gomphonema angustatum</i> var. <i>obtusatum</i> (Kützing) Grunow	9	HWF
<i>Gomphonema affine</i> Kützing	7	TW
<i>Gomphonema affine</i> var. <i>insigne</i> (Gregory) Andrews	7	IC, TW
<i>Gomphonema angustatum</i> (Kützing) Rabenhorst HU, IC, MCB, RAM, TW	5, 6, 7	AC, BOW, BF, CC, CH, FC,
<i>Gomphonema brasiliensis</i> Grunow	5, 6	AC, CH, HU
<i>Gomphonema christensenii</i> Lowe & Kociolek	8	BOW
<i>Gomphonema consector</i> Hohn & Hellerman	7	CC, IC
<i>Gomphonema constrictum</i> Ehrenberg	7, 11	AF, IC, MCB
<i>Gomphonema dichotomum</i> Kützing	7	CC, FC, IC, MCB, RAM
<i>Gomphonema freesei</i> Lowe & Kociolek	8	BOW
<i>Gomphonema gibba</i> Wallace	9	AC
<i>Gomphonema gracile</i> Ehrenberg MCB, PIG1	6, 7	AC, BOW, BF, CC, FC, IC,
<i>Gomphonema gracile</i> var. <i>naviculoides</i> (W. Smith) Van Heurck	11, 12	RAM1
<i>Gomphonema grunowii</i> Patrick	11, 12	RAM1
<i>Gomphonema intricatum</i> Kützing	9	CAC
<i>Gomphonema intricatum</i> var. <i>vibrio</i> (Ehrenberg) Cleve	9	BIG1
<i>Gomphonema mehleri</i> Camburn	6	AC
<i>Gomphonema micropus</i> Kützing	9	EC
<i>Gomphonema parvulum</i> Kützing HU, IC, MCB, PIG1, RAM, TW	5, 6, 7	AC, BOW, BF, CC, CH, FC,
<i>Gomphonema puiggarianum</i> Grunow in Van Heurck	7	BOW, FC, RAM, TW
<i>Gomphonema rhombicum</i> Fricke	9	HAZ
<i>Gomphonema sphaerophorum</i> Ehrenberg	6, 12	AC, LRG2
<i>Gomphonema subclavatum</i> (Grunow) Grunow	6, 7	AC, CC, IC
<i>Gomphonema subclavatum</i> var. <i>commutatum</i> (Grunow) A. Mayer	7, 11, 12	AC, FC, TW
<i>Gomphonema subclavatum</i> var. <i>mexicanum</i> Grunow	9	BIG1
<i>Gomphonema tenellum</i> Ehrenberg	7	BOW, CC, FC, IC, MCB
<i>Gomphonema truncatum</i> var. <i>capitatum</i> (Ehrenberg) Patrick	9, 11, 12	CAN, LRG2
<i>Gomphonema truncatum</i> var. <i>cuneatum</i> (Fricke) Camburn	7	GSM
<i>Gomphonema ventricosum</i> Gregory	11	AF
<i>Placoneis abiskoensis</i> (Hustedt) Lange-Bertalot & Metzeltin	6	BF
<i>Placoneis anglica</i> (Ralfs in Pritchard) Lowe	11	AF
<i>Placoneis clementis</i> (Grunow) Cox	6	AC
<i>Placoneis elginensis</i> (Gregory) Cox	6, 7	AC, BF, IC
<i>Placoneis lata</i> (M. Peragallo) Lowe	6	AC

<i>Placoneis neglecta</i> (Krasske) Lowe	6	AC, BF
<i>Placoneis gastrum</i> (Ehrenberg) Cox	6, 7	BF, IC
<i>Reimeria sinuata</i> (Gregory) Kociolek & Stoermer	6	AC, BOW, BF
<i>Rhoicosphenia curvata</i> (Kützing) Grunow ex Rabenhorst	6	AC
<b>Eunotiales</b>		
<i>Eunotia arcus</i> Ehrenberg	7	CC
<i>Eunotia bidentula</i> W. Smith	9	POR
<i>Eunotia billii</i> Lowe & Kociolek	8	BOW
<i>Eunotia curvata</i> (Kützing) Lagerst. PIG1, RAM, TW	5, 6, 7	AC, BF, HU, IC, CC, MCB,
<i>Eunotia diodon</i> Ehrenberg	6, 7	BF, IC
<i>Eunotia elegans</i> Østrup	5, 6, 7	BF, CH, IC, CC, MCB
<i>Eunotia exigua</i> (Brébisson ex Kützing) Rabenhorst FC, IC, MCB, PIG1, RAM, TW	5, 6, 7, 12	AC, BOW, BF, CC, CD2, CH,
<i>Eunotia fallax</i> A. Cleve	7	IC
<i>Eunotia flexuosa</i> (Brébisson in Kützing) Kützing	9	CAN
<i>Eunotia formica</i> Ehrenberg	5, 6	AC, BF, CH
<i>Eunotia glacialis</i> Meister	6	AC, BF
<i>Eunotia hexaglyphus</i> Ehrenberg	9	AC
<i>Eunotia incisa</i> W. Smith	5, 6	BF, CH
<i>Eunotia indica</i> Grunow	7	FC, TW
<i>Eunotia lunaris</i> (Ehrenberg) Brébisson in Rabenhorst	12	BRA
<i>Eunotia maior</i> (W. Smith) Rabenhorst	7	IC, CC, MCB
<i>Eunotia meisteri</i> var. <i>bidens</i> Hustedt	7	CC
<i>Eunotia microcephala</i> Krasske	12	BRA, LRG2, RAM
<i>Eunotia monodon</i> var. <i>bidens</i> (Gregory) W. Smith	7	GSM
<i>Eunotia naegeli</i> Migula	9	CAN
<i>Eunotia pectinalis</i> (Kützing) Rabenhorst	9	ABB
<i>Eunotia pectinalis</i> var. <i>minor</i> (Kützing) Rabenhorst IC, MCB, PIG1, RAM, TW	5, 6, 7	AC, BOW, BF, CC, FC, HU,
<i>Eunotia perpusilla</i> Grunow RAM, TW	5, 6	AC, BOW, BF, CH, HU, PIG1,
<i>Eunotia praerupta</i> Ehrenberg	7	FC, IC
<i>Eunotia praerupta</i> var. <i>bidens</i> (Ehrenberg) Grunow	5, 6, 7	BF, CC, CH, HU
<i>Eunotia praerupta</i> var. <i>inflata</i> Grunow	7	GSM
<i>Eunotia rhomboidea</i> Hustedt HU, IC, MCB, PIG1, RAM, TW	5, 6, 7	AC, BOW, BF, CC, CH, FC,
<i>Eunotia septentrionalis</i> Østrup	9	BIG1
<i>Eunotia serra</i> Ehrenberg	7	PIG1
<i>Eunotia soleirolii</i> (Kützing) Rabenhorst	5, 6	BF, CH, HU
<i>Eunotia suecica</i> A. Cleve	6, 7	AC, BF, RAM
<i>Eunotia sudetica</i> O. Müller	9	CAN
<i>Eunotia tenella</i> (Grunow) Cleve	9	CAN
<i>Eunotia valida</i> Hustedt	9	BIG1
<i>Eunotia vanheurckii</i> var. <i>intermedia</i> (Krasske ex Hustedt) Patrick	6, 12	BF, RAM
<i>Eunotia veneris</i> (Kützing) De Toni	12	BRA
<b>Fragilariales</b>		
<i>Asterionella formosa</i> Hassall	1, 9	FON
<i>Diatoma hiemale</i> var. <i>mesodon</i> (Ehrenberg) Grunow HU, IC, MCB, PIG1, RAM, TW	5, 6, 7, 12	AC, BOW, BF, CC, CH, FC,
<i>Diatoma vulgare</i> var. <i>breve</i> Grunow	9	HAZ
<i>Fragilaria crotonensis</i> Kitton	9	FON
<i>Fragilaria socia</i> (Wallace) Lange-Bertalot	9	HAZ

<i>Fragilaria vaucheriae</i> (Kützing) Petersen TW	6, 7	AC, BOW, BF, CC, IC, MCB,
<i>Fragilariaforma virescens</i> (Ralfs) Williams & Round MCB, PIG1, RAM, TW	6, 7, 12	AC, BOW, BF, BRA, IC, CC,
<i>Fragilariaforma virescens</i> var. <i>capitata</i> (Østrup) Czarnecki	12	BRA
<i>Hannaea arcus</i> (Ehrenberg) Patrick	6, 7	BOW, BF
<i>Hannaea arcus</i> var. <i>amphioxys</i> (Rabenhorst) Patrick	6, 7	BOW, BF
<i>Martyana martyi</i> (Héribaud) Round in Round et al.	6	AC
<i>Meridion circulare</i> (Greville) Agardh HU, IC, LRG2, PIG1, RAM, TW	5, 6, 7, 12	AC, BOW, BF, CC, CH, FC,
<i>Meridion circulare</i> var. <i>constrictum</i> (Ralfs) Van Heurck	5, 6	AC, BF, CH, HU
<i>Pseudostaurosira brevistriata</i> (Grunow) Williams & Round	6	AC
<i>Staurosirella leptostauron</i> (Ehrenberg) Williams & Round	6, 11	AC, AF
<i>Staurosirella leptostauron</i> var. <i>dubia</i> (Grunow) Edlund	6	AC
<i>Staurosirella pinnata</i> (Ehrenberg) Williams & Round	6	AC
<i>Synedra acus</i> var. <i>angustissima</i> Grunow	9	FON
<i>Synedra delicatissima</i> W. Smith	6	AC
<i>Synedra parasitica</i> (W. Smith) Hustedt	6	AC
<i>Synedra rumpens</i> Kützing	7	CC, IC, MCB
<i>Synedra rumpens</i> var. <i>familiaris</i> (Kützing) Grunow	11, 12	LRG2
<i>Synedra rumpens</i> var. <i>fragilarioides</i> Grunow	9	EC
<i>Synedra rumpens</i> var. <i>scotica</i> Grunow	9	BIG1
<i>Synedra ulna</i> (Nitzsch) Ehrenberg MCB, TW	6, 7, 12	AC, BOW, BF, CC, IC, LRG2,
<i>Synedra ulna</i> var. <i>contracta</i> Østrup	6, 9, 11	AC, BF, BIG1, HAN
<i>Synedra ulna</i> var. <i>oxyrhynchus</i> f. <i>mediocontracta</i> Hustedt	9, 12	EC, HAN
<i>Synedra ulna</i> var. <i>ramesii</i> (Héribaud & Perigallo) Hustedt	12	FC, LRG2

### Melosirales

<i>Melosira varians</i> Agardh	6, 12	AC, BF
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### Naviculales

<i>Adlafia suchlandtii</i> (Hustedt) Lange-Bertalot in Moser et al.	6, 8	AC, BF
<i>Amphiptera pellucida</i> (Kützing) Kützing	6	AC
<i>Brachysira brebissonii</i> Ross	6, 7	BF, CC, IC, MCB
<i>Brachysira vitrea</i> (Grunow) Ross in Hartley	6, 7	AC, BF, RAM, TW
<i>Caloneis alpestris</i> (Grunow) Cleve	6	AC
<i>Caloneis bacillum</i> (Grunow) Cleve	6, 7	AC, BF, CC
<i>Caloneis hyalina</i> Hustedt	6	AC
<i>Caloneis schumanniana</i> var. <i>biconstricta</i> f. <i>baikalensis</i> Skvortzow	6	AC
<i>Caloneis lewisii</i> var. <i>inflata</i> (Schultze) Patrick	6	AC
<i>Caloneis undulata</i> (Gregory) Krammer	11	AF
<i>Cavinula cocconeiformis</i> (Gregory ex Greville) D.G. Mann & Stickle	6, 7	AC, BF, IC
<i>Chamaepinnularia bergeri</i> (Krasske) Lange-Bertalot	6	AC
<i>Chamaepinnularia margaritacea</i> (Hustedt) Lange-Bertalot	6	BF
<i>Chamaepinnularia mediocris</i> (Krasske) Lange-Bertalot	6, 7	BF, FC, PIG1, RAM, TW
<i>Chamaepinnularia soehrensensis</i> var. <i>hassica</i> (Krasske) Lange-Bertalot	6, 7	BF, FC, IC, RAM
<i>Craticula accomoda</i> (Hustedt) D.G. Mann in Round et al.	6	AC, BF
<i>Craticula cuspidata</i> (Kützing) D.G. Mann in Round et al.	6	AC
<i>Decussata placenta</i> (Ehr.) Lange-Bert. & Mezeltin in Lange-Bert. HU, IC, MCB, RAM, TW	5, 6, 7, 12	AC, BF, BRA, CC, FC, HAN,
<i>Diadesmis contenta</i> (Grunow) D.G. Mann in Round et al. RAM, TW	5, 6, 7	AC, BOW, BF, CH, FC, HU,
<i>Diadesmis contenta</i> var. <i>biceps</i> (Grunow) Hamilton MCB	5, 6, 7	AC, BF, CC, CH, HU, IC,

<i>Diadmesmis perpusilla</i> (Kützing) D.G. Mann in Round et al. HU, IC, MCB, RAM, TW	5, 6, 7	AC, BOW, BF, CC, CH, FC,
<i>Diploneis elliptica</i> (Kützing) Cleve	6, 7	AC, IC
<i>Diploneis fusca</i> (Gregory) Cleve	7	IC, CC, MCB
<i>Diploneis marginestriata</i> Hustedt	6	AC
<i>Diploneis oblongella</i> (Naegeli ex Kützing) Ross	6	AC
<i>Diploneis smithii</i> var. <i>dilatata</i> (Peragallo) Boyer	9	GRO
<i>Fallacia indifferens</i> (Hustedt) D.G. Mann in Round et al.	6	AC, BF
<i>Fallacia vitrea</i> (Østrup) D.G. Mann in Round et al.	7	FC
<i>Fistulifera saprophila</i> (Lange-Bertalot & Bonik) Lange-Bertalot	6	AC
<i>Frustulia rhomboides</i> (Ehrenberg) De Toni RAM	6, 7	AC, BOW, BF, CC, IC, MCB,
<i>Frustulia rhomboides</i> var. <i>amphipleuroides</i> (Grunow) Cleve LRG2, MCB, TW	5, 6, 7, 12	AC, BF, CC, CH, HU, IC,
<i>Frustulia rhomboides</i> var. <i>capitata</i> (A. Mayer) Patrick	5, 6	AC, BF, CH
<i>Frustulia rhomboides</i> var. <i>crassinervia</i> (Brébisson ex W. Smith) Ross	6, 7, 12	BF, BRA, CC, IC
<i>Frustulia rhomboides</i> var. <i>saxonica</i> (Rabenhorst) De Toni	5, 6, 7	BF, CH, HU, IC
<i>Frustulia vulgaris</i> (Thwaites) De Toni	6, 7, 12	AC, BF, BRA, IC
<i>Frustulia weinholdii</i> Hustedt	6, 7	AC, IC
<i>Geissleria decussis</i> (Hustedt) Lange-Bertalot & Mezeltin	5, 6, 12	AC, CH, HU, LRG2
<i>Geissleria paludosa</i> (Hustedt) Lange-Bertalot & Mezeltin	6	AC
<i>Gyrosigma nodiferum</i> (Grunow) G. West	9	AC
<i>Gyrosigma scalproides</i> (Rabenhorst) Cleve	6	AC, BF
<i>Gyrosigma spencerii</i> (W. Smith) Griffith & Henfrey	6	AC
<i>Hippodonta capitata</i> (Ehr.) Lange-Bert., Metzeltin & Witkowski	6	AC
<i>Hippodonta hungarica</i> (Grunow) Lange-Bert., Metzeltin & Witkowski	6	AC
<i>Luticola cohnii</i> (Hilse) D.G. Mann in Round et al.	7	CC
<i>Luticola goeppertiana</i> (Bleisch) D.G. Mann in Round et al.	7	CC, IC, MCB
<i>Luticola goeppertiana</i> var. <i>stigma</i> (Patrick) comb. nov.	9	CAC
<i>Luticola naviculoides</i> Johansen	6	AC
<i>Luticola mutica</i> (Kützing) D.G. Mann in Round et al.	6	AC, BF
<i>Luticola muticoides</i> (Hustedt) D.G. Mann in Round et al.	6	AC
<i>Luticola stigma</i> (Patrick) Johansen	9	CAT
<i>Luticola terminata</i> (Hustedt) Johansen	6	BF
<i>Luticola terminata</i> var. <i>rostrata</i> (Krasske) Johansen	5, 6, 8	AC, BF, CH
<i>Microcostatus krasskei</i> (Hustedt) Johansen & Sray	5, 6	AC, BF, HU
<i>Navicula angusta</i> Grunow FC, HAN, HU, IC, LRG2, MCB, TW	5, 6, 7, 12	AC, BOW, BF, BRA, CC, CH,
<i>Navicula arvensis</i> Hustedt	9	CAN
<i>Navicula bicephala</i> Hustedt	6	AC, BF
<i>Navicula cincta</i> (Ehrenberg) Ralfs in Pritchard	9	BIG1
<i>Navicula cryptocephala</i> Kützing	6, 7	AC, BF, CC
<i>Navicula cryptotenella</i> Lange-Bertalot	9	AC
<i>Navicula erifuga</i> Lange-Bertalot	9	CAD
<i>Navicula globosa</i> Meister	6	AC
<i>Navicula gottlandica</i> Grunow	9	POR
<i>Navicula graciloides</i> A. Mayer	6	AC
<i>Navicula gregaria</i> Donkin	6	AC
<i>Navicula hambergii</i> Hustedt	6	AC, BF
<i>Navicula hasta</i> Pantocsek	6, 8	AC
<i>Navicula lanceolata</i> (Agardh) Kützing	7	MCB
<i>Navicula lateropunctata</i> Wallace	9	POR
<i>Navicula minima</i> Grunow	6	AC, BF
<i>Navicula notha</i> Wallace	7	IC
<i>Navicula paratunkae</i> Petersen	6	AC
<i>Navicula pseudoarvensis</i> Hustedt	6	AC

<i>Navicula pseudofrickia</i> Patrick	7	IC
<i>Navicula radiosa</i> Kützing	9	AC
<i>Navicula radiosa</i> var. <i>tenella</i> (Brébisson ex Kützing) Grunow	6, 7, 12	AC, BF, BRA, IC, LRG2, MCB
<i>Navicula rhynchocephala</i> Kützing	6, 12	AC
<i>Navicula salinarum</i> var. <i>intermedia</i> (Grunow) Cleve	6	AC
<i>Navicula schmassmannii</i> Hustedt	6	BF
<i>Navicula schroeteri</i> var. <i>escambia</i> Patrick	6	AC
<i>Navicula simula</i> Patrick	7	CC, MCB
<i>Navicula subhamulata</i> Grunow	6	AC
<i>Navicula tantula</i> Hustedt	7	MCB
<i>Navicula tenuicephala</i> Hustedt	6	AC
<i>Navicula tripunctata</i> (O. Müller) Bory	6	AC
<i>Navicula tripunctata</i> var. <i>schizonemoides</i> (Van Heurck) Patrick	9	HAZ
<i>Navicula trivialis</i> Lange-Bertalot	6	AC
<i>Navicula upsaliensis</i> (Grunow) Peragallo	7	CC
<i>Navicula venerabilis</i> Hohn & Hellerman	7	IC
<i>Navicula veneta</i> Kützing	6, 7, 12	AC, BF, IC
<i>Navicula ventralis</i> Krasske	6	AC
<i>Navicula viridula</i> var. <i>linearis</i> Hustedt	6	AC
<i>Navicula viridula</i> var. <i>rostellata</i> (Kützing) Cleve	6	AC
<i>Navicula wallacei</i> Reimer	6	AC
<i>Navicula yorkensis</i> Camburn	6	AC
<i>Neidium affine</i> (Ehrenberg) Pfitzer	6	BF
<i>Neidium affine</i> var. <i>longiceps</i> (Gregory) Cleve	6	AC
<i>Neidium affine</i> var. <i>amphirhynchus</i> (Ehrenberg) Cleve	9	CAD
<i>Neidium alpinum</i> Hustedt	6	AC
<i>Neidium ampliatum</i> (Ehrenberg) Krammer	9	AC
<i>Neidium binode</i> (Ehrenberg) Hustedt	6	AC
<i>Neidium bisulcatum</i> (Lagerstedt) Cleve	6, 7	BF, CC, IC, MCB
<i>Neidium bisulcatum</i> var. <i>subundulatum</i> (Grunow) Reimer	6	BF
<i>Neidium dubium</i> (Ehrenberg) Cleve	6	BF
<i>Neidium hankensis</i> Skvortzow	6	AC
<i>Neidium hercynicum</i> var. <i>subrostratum</i> Wallace	9	CAN
<i>Neidium iridis</i> (Ehrenberg) Cleve	6, 12	AC, BF
<i>Neidium iridis</i> var. <i>amphigomphus</i> (Ehrenberg) A. Mayer	9	FON1
<i>Neidium iridis</i> var. <i>vernalis</i> Reichelt	6	BF
<i>Neidium ladogensense</i> var. <i>densestriatum</i> f. <i>peribryum</i> Lowe & Kociolek	6, 7, 8	BF, IC, FIG1, RAM
<i>Neidium tenuissimum</i> Hustedt	6	AC, BF
<i>Pinnularia abaujensis</i> var. <i>rostrata</i> (Patrick) Patrick	7	CC
<i>Pinnularia abaujensis</i> var. <i>subundulata</i> (A. Mayer ex Hustedt) Patrick	7	IC
<i>Pinnularia biceps</i> Gregory	7	BOW, FC, TW
<i>Pinnularia borealis</i> var. <i>rectangularis</i> Carlson	6	BF
<i>Pinnularia braunii</i> var. <i>amphicephala</i> (A. Mayer) Hustedt	7	CC, MCB
<i>Pinnularia brebissonii</i> var. <i>diminuta</i> (Cleve) Grunow	7	IC
<i>Pinnularia burkei</i> Patrick	5, 6	AC, BF, CH, HU
<i>Pinnularia intermedia</i> (Lagerstedt) Cleve	7	IC, MCB
<i>Pinnularia macilenta</i> Ehrenberg	12	BRA
<i>Pinnularia maior</i> Kützing	7, 12	BRA, CC
<i>Pinnularia mesoglynlya</i> Ehrenberg	5, 6	BF, CH, HU
<i>Pinnularia mesolepta</i> (Ehrenberg) W. Smith	6	BF
<i>Pinnularia mesolepta</i> var. <i>angusta</i> Cleve	7	IC, MCB
<i>Pinnularia microstauron</i> (Ehrenberg) Cleve	7	MCB
<i>Pinnularia nodosa</i> (Ehrenberg) W. Smith	6	BF
<i>Pinnularia obscura</i> Krasske	6, 7	AC, BF, CC
<i>Pinnularia stomatophora</i> (Grunow) Cleve	6, 7	BF, IC, MCB
<i>Pinnularia streptoraphe</i> Cleve	7	MCB

<i>Pinnularia subcapitata</i> Gregory	7	CC, IC, MCB
<i>Pinnularia subcapitata</i> var. <i>paucistriata</i> (Grunow) Cleve	7	IC
<i>Pinnularia substomatophora</i> Hustedt	7	IC
<i>Pinnularia termitina</i> (Ehrenberg) Patrick	5, 6	AC, BF, CH, HU
<i>Pinnularia titusiana</i> Hagelstein	7	MCB
<i>Pinnularia viridis</i> (Nitzsch) Ehrenberg	6, 12	AC, BF, BRA
<i>Sellaphora elliptica</i> (Hustedt) Johansen	9	CAC
<i>Sellaphora laevissima</i> (Kützing) D.G. Mann	6	AC
<i>Sellaphora mutata</i> (Krasske) Johansen	6	AC
<i>Sellaphora parapupula</i> Lange-Bertalot	5, 6	AC, HU
<i>Sellaphora pupula</i> (Kützing) Mereschkowsky	6, 7	AC, IC, MCB
<i>Sellaphora rectangularis</i> (Gregory) Lange-Bertalot & Mezeltin	6, 7	BF, FC, RAM
<i>Sellaphora rostrata</i> (Hustedt) Johansen	6	AC
<i>Sellaphora seminulum</i> (Grunow) Mann RAM, TW	5, 6, 7	AC, BF, CC, CH, FC, HU, IC,
<i>Stauroneis acuta</i> var. <i>tenyana</i> Tempère ex Cleve	6	AC
<i>Stauroneis anceps</i> Ehrenberg	7	IC, TW
<i>Stauroneis anceps</i> f. <i>gracilis</i> Rabenhorst	6	BF
<i>Stauroneis borrichi</i> var. <i>subcapitata</i> (Petersen) Lund	6	BF
<i>Stauroneis kriegeri</i> Patrick	6	AC, BF
<i>Stauroneis obtusa</i> Lagerstedt	9	GCD
<i>Stauroneis phoenicenteron</i> (Nitzsch) Ehrenberg	9, 12	BRA, MEI
<i>Stauroneis phoenicenteron</i> f. <i>gracilis</i> (Ehrenberg) Hustedt	6	AC, BF
<i>Stauroneis smithii</i> Grunow	6	AC
<i>Stauroneis smithii</i> var. <i>incisa</i> Pantocsek	6	AC
<b>Orthoseirales</b>		
<i>Orthoseira roeseana</i> (Rabenhorst) O'Meara	6, 9	BF, BIG1
<b>Surirellales</b>		
<i>Cymatopleura solea</i> (Brébisson) W. Smith	6	AC
<i>Stenopterobia delicatissima</i> (Lewis) Brébisson ex Van Heurck	9	ABB
<i>Surirella agmatalis</i> Camburn	6	AC
<i>Surirella angustata</i> Kützing	6, 7	AC, CC
<i>Surirella carolinicola</i> Camburn	6	AC
<i>Surirella linearis</i> W. Smith	9	AC
<i>Surirella linearis</i> var. <i>helvetica</i> (Brun) Meister	6	AC
<i>Surirella ovata</i> Kützing	5, 6	AC, CH
<i>Surirella ovata</i> var. <i>pinnata</i> W. Smith	6	AC
<i>Surirella stalagma</i> Hohn & Hellerman	6	AC
<i>Surirella spiralis</i> Kützing	6	AC
<i>Surirella tenera</i> var. <i>nervosa</i> W. Smith	6, 12	AC
<b>Tabellariales</b>		
<i>Tabellaria fenestrata</i> (Lyngbye) Kützing	1, 9	FON
<i>Tabellaria flocculosa</i> (Roth) Kützing	6	AC
<i>Tetracyclus rupestris</i> (A. Br.) Grunow	6	AC, BF
<b>Thalassiophysales</b>		
<i>Amphora ovalis</i> var. <i>affinis</i> (Kützing) Van Heurck ex De Toni	6	AC
<i>Amphora ovalis</i> var. <i>pediculis</i> (Kützing) Van Heurck ex De Toni	6	AC
<i>Amphora perpusilla</i> (Grunow) Grunow	6	AC
<b>Thalassiosirales</b>		
<i>Cyclotella meneghiniana</i> Kützing	6	AC, BF
<i>Cyclotella pseudostelligera</i> Hustedt	6	AC

<i>Cyclotella stelligera</i> Cleve in Grunow	6	AC
<b>Rhopalodiales</b>		
<i>Epithemia adnata</i> var. <i>saxonica</i> (Kützing) Patrick	9	AC
<i>Epithemia turgida</i> var. <i>westermanii</i> (Ehrenberg) Grunow	6	AC
<i>Rhopalodia brebissonii</i> Krammer	9	FON1
<i>Rhopalodia gibberula</i> (Ehrenberg) O. Müller	7	CC, IC, MCB
<i>Rhopalodia gibberula</i> var. <i>vanheurckii</i> O. Müller	6	AC, BF
<b>DINOPHYTA</b>		
<b>Gloeodinales</b>		
<i>Gloeodinium montanum</i> Klebs	1	AF
<b>Peridinales</b>		
<i>Peridinium umbonatum</i> Stein	1	FON1
<i>Peridinium willei</i> Huitfeld-Kaas	1	FON
<i>Thompsodinium intermedium</i> (Thompson) Bourrelly	1	FON1

Figure 1. Map of Great Smoky Mountains National Park, with sites marked on map. Circles indicate general location, not necessarily exact location. Streams have a single marker next to the site code, but may have been sampled in multiple sites in the stream. For explanation of site codes see Table 1.