NAT. CROAT. | VOL. 27 | No 1 | 1-26 | ZAGREB | June 30, 2018

original scientific paper / izvorni znanstveni rad
DOI 10.20302/NC.2018.27.1

TAXONOMIC SURVEY OF BENTHIC DIATOMS IN NEUM BAY, SOUTHEASTERN ADRIATIC

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Hafner, D., Jasprica, N. & Car, A.: Taxonomic survey of benthic diatoms in Neum Bay, southeastern Adriatic. Nat. Croat., Vol. 27, No. 1, 1-26, 2018, Zagreb.

The objective of this work was to contribute to the knowledge of microphytobenthos in the Adriatic Sea, by studying for the first time the benthic diatom communities in Neum Bay in Bosnia and Herzegovina. For this purpose, the benthic diatoms naturally growing on stones and macroalgae were identified at one station in the small semi-enclosed oligotrophic Neum Bay during 2010 and 2011. A total of 24 samples were collected at two different depths, 0.5 m and 8 m, and analysed with light and scanning electron microscopy. Altogether, 425 pennate and 58 centric taxa (species and infraspecific taxa) belonging to 60 families and 115 genera were noted. Genera with the greatest number of taxa were: *Mastogloia* (46 taxa), *Navicula* (36), *Diploneis* (35), *Nitzschia* (34), *Amphora* (31), *Cocconeis* (27), *Achnanthes* (14), *Halamphora* (12), *Lyrella* (11), and *Surirella* and *Licmophora* (10 each). *Amphora bigibba* var. *interrupta* and *Cocconeis scutellum* were the most frequent taxa, being present in 87.5% of the samples. In total, 142 taxa were found only once (sporadic taxa). Although benthic diatom richness is high in the bay, taxa are apparently not distributed evenly temporally. Consistent quantitative and qualitative data are still needed for a better determination of the seasonal and spatial changes of the epilithic assemblages in the region.

Keywords: Bacillariophyta, shallow oligotrophic bay, species identification, biodiversity, Bosnia and Herzegovina.

Hafner, D., Jasprica, N. & Car, A.: Taksonomska analiza bentoskih dijatomeja u Neumskom zaljevu, jugoistočna obala Jadrana. Nat. Croat., Vol. 27, No. 1, 1-26, 2018, Zagreb.

Cilj rada bio je doprinijeti poznavanju mikrofitobentosa u Jadranskom moru istražujući po prvi put bentoske dijatomejske zajednice u Neumskom zaljevu u Bosni i Hercegovini. Bentoske dijatomeje su određene na jednoj postaji u poluzatvorenom oligotrofnom Neumskom zaljevu 2010. i 2011. Sakupljeno je 24 uzoraka na dubinama 0,5 i 8 m, a analizirani su s pomoću svjetlosnog i skenirajućeg elektronskog mikroskopa. U uzorcima je utvrđeno 425 penatnih i 58 centričnih svojti (vrsta i nižih taksonomskih kategorija) dijatomeja unutar 60 porodica i 115 rodova. Najveći broj svojti nađen je unutar sljedećih rodova: *Mastogloia* (46 svojti), *Navicula* (36), *Diploneis* (35), *Nitzschia* (34), *Amphora* (31), *Cocconeis* (27), *Achnanthes* (14), *Halamphora* (12), *Lyrella* (11) te *Surirella* i *Licmophora* (svaki po 10 svojti). Najčešće svojte su *Amphora bigibba* var. *interrupta* i *Cocconeis scutellum* s 87,5% učestalosti u ukupnom broju uzoraka. Utvrđene su 142 sporadične svojte (utvrđene u samo jednom uzorku). Iako je broj svojti relativno visok, nije utvrđena pravilnost u njihovoj vremenskoj raspodjeli. Radi preciznijeg utvrđivanja sezonskih i prostornih promjena strukture epilitskih dijatomejskih zajednica, potrebni su detaljniji kvalitativni i kvantitativni podaci.

Ključne riječi: Bacillariophyta, plitki oligotrofni zaljev, taksonomska istraživanja, bogatstvo svojti, Bosna i Hecegovina

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INTRODUCTION

Benthic diatoms are colonial or unicellular diatoms, free living or attaching to the substratum by gelatinous extrusion. They are mostly associated with substrata throughout their life cycles. Some of them move actively in sediments and sometimes resuspend in the water column. Benthic diatoms are the most abundant and diversified part of marine microphytobenthos playing an important role in marine ecosystems (Falkowski *et al.*, 2004). These organisms are used as water quality indicators as well as in palaeoecological reconstructions due to their ecophysiological features (Cibic & Blasutto, 2011; Stevenson & Pan, 1999). In addition, knowledge of the structure of the benthic diatom community and the autoecology of individual taxa is a unique source of information in the study of the dynamics of the marine microphytobenthos.

In the Mediterranean Sea, Çolak Sabanci & Koray (2010), Çolak Sabanci (2012) and Álvarez-Blanco & Blanco (2014) recently investigated the structure and taxonomic composition of benthic diatom communities. In the Adriatic Sea, the diatom taxa from natural sediment samples and artificial substrata of the Gulf of Trieste (Bartole *et al.*, 1991-94, Sdrigotti *et al.*, 1999; Munda, 2005), the Venice lagoon (Tolomio & Andreoli, 1989, Tolomio *et al.*, 1999; Facca *et al.*, 2002; Tolomio *et al.* 2002; Facca & Sfriso, 2007), the northwestern Adriatic coast (Totti, 2003; Totti *et al.*, 2007; Franzo *et al.*, 2015, and references therein) were reported. Several studies on epibiontic diatom communities on marine hydroids in the Ligurian Sea have also been reported (Romagnoli *et al.*, 2007, 2014, and references therein). Finally, a checklist on microphytobenthos of the Italian seas, including benthic diatom taxa, was compiled by Cibic & Facca (2010).

On the other hand, to the best of our knowledge, the structure and taxonomic composition of benthic diatoms have been only rarely taken into consideration in the eastern Adriatic Sea (Burić *et al.*, 2004; Miho & Witkowski, 2005; Caput *et al.*, 2008; Levkov *et al.*, 2010; Car *et al.*, 2012; Nenadović *et al.*, 2015; Mejandžić *et al.*, 2015). Diatoms were investigated synoptically and mostly related to estuaries or coastal wetlands.

The objective of this work was to contribute to the knowledge of microphytobenthos in the Adriatic Sea, by studying for the first time the benthic diatom communities in Neum Bay in Bosnia and Herzegovina.

MATERIAL AND METHODS

Study area

Bosnia and Herzegovina has a total sea area of ca. 8 km^2 with only 21.2 kilometers of coastline (Fig. 1). The coast is low and rocky, built up of karstified carbonates and represents only 0.26% of the total length of the Adriatic coastline (Blake & Topalović, 1996; Pikelj & Juračić, 2013). In fact, the sea area of the country is represented by the small, semi-enclosed Neum Bay, located between mainland and the 7 km-long Klek Peninsula (Dupčić-Radić *et al.*, 2013).

Neum Bay is part of the larger Mali Ston Bay, which is enclosed on the seaward side by the 62 km long Pelješac peninsula. It expands to the northwest and connects with the Neretva River channel which is linked with the open sea. Due to its ecological and economic importance, this area with a centuries-long mariculture tradition was in 1983 proclaimed the Mali Ston Bay and Malo More Special Marine Reserve, including Neum Bay. The most important factors that affect the ecological conditions in Mali Ston Bay, primarily salinity and nutrient enrichment, are the inflow of freshwater from the Neretva River in the outer part of the bay and from underwater springs ("vruljas") in the inner part (Jasprica, 1989; Jasprica *et al.*, 1997; Jasprica & Carić, 2001; Čalić *et al.*, 2013).

The average and maximum water depth in Neum Bay are 17 and 27 m, respectively. The bottom structure ranges from sandy sediments in the central part of the bay to rocks where the system communicates with the coastline. The town of Neum (population of 3,236 estimated 2013) is the only coastal settlement in Bosnia and Herzegovina and an important tourism destination for the country, which means that the area is under significant anthropogenic pressure during summer.

Additional details on the area are given by Jasprica *et al.* (2012) and Čalić *et al.* (2013).

Fig. 1. Sampling location (●) in Neum Bay, Bosnia and Herzegovina.

Sampling and analyses

The investigated station (WGS84 42°54'58.7" N; 17°36'17.6" E) was located in the southern part of Neum Bay (Fig. 1). Samples were collected from a depth of 0.5 m in March, May and July of 2010 and at monthly intervals from January to December 2011 (see Tab. 1 for sampling design). In addition, samples were also collected from a depth of 8 m from April to December 2011. Altogether, 24 samples were analysed.

Temperature was measured with an inverted thermometer. Water samples for salinity were taken by 5-L Niskin bottles and determined by argentometric titration (Grasshoff *et al.*, 1983).

Tab. 1. Sampling design of benthic diatom survey conducted in the Neum Bay, Bosnia and Herzegovina (• - sampled; ⊗ - not sampled) in 2010 and 2011.

Years	2010			2011											
Months	3	5	7	1	2	3	4	5	6	7	8	9	10	11	12
0.5 m	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8.0 m	⊗	⊗	⊗	⊗	⊗	⊗	•	•	•	•	•	•	•	•	•

The sampling points were located at the distance of 1 m for the shallow samples and 25 m for the deeper samples from the coastline due to the small bathymetric gradients. The diatom samples were obtained by scraping of the submersed stones and collecting attached macroalgae [mostly *Cystoseira* spp., *Codium vermilara* (Olivi) Delle Chiaje, *Ceramium* spp., *Dictyota dichotoma* (Hudson) J.V.Lamouroux]. To identify epilithic diatoms, stones of 15-20 cm in diameter were collected. Deeper stones were collected by scuba diving. Stones were collected as randomly as possible amongst those that are not completely covered by filamentous algae and on which the diatom biofilm was visible. Stones were put into a plastic bag of 1 L in which 200 mL of distilled water was added. The upper parts of the stones were rubbed with a toothbrush and the mixture was decanted into 250 mL polyethylene bottles (Winter & Duthie, 2000). The samples were preserved with a final concentration of 4% formaldehyde.

In the laboratory, the material collected was cleaned of organic material for light (LM) and scanning electron microscopy (SEM) observations. Material was treated with sulfuric acid-potassium permanganate, decolorized with oxalic acid, and acid residues were removed by repeated decantation. The cleaned material was pipetted onto ethanol-cleaned cover-slips and left to air-dry, before mounting in Canada balsam when they were ready for light microscopic examination as permanent slides (Hasle & Fryxell, 1970). In order to register all diatom taxa, the entire surface area of each permanent slide has been surveyed. Whenever possible, diatoms were identified to species rank and counted at 1000 x magnification by phase-contrast optics with a Microstar binocular microscope (AO Scientific Instruments), 100 x PlanApo oil immersion objective. Slides have been deposited in the diatom collection of the Institute for Marine and Coastal Research, University of Dubrovnik, Dubrovnik, Croatia.

Ultrastructural analysis was performed using SEM. A drop of the cleaned sample was air-dried overnight on aluminium stubs and coated with gold–palladium or osmium. SEM observations were made at the Warsaw University of Technology, Faculty of Materials Science and Engineering, using a Hitachi S-3500, SU-70 and SEM/ STEM S-5500.

Identifications were made following Peragallo & Peragallo (1897–1908), Hendey (1964), Ricard (1974, 1975, 1977), Poulin *et al.* (1984, 1990), Bérard-Therriault *et al.* (1986, 1987), Hartley (1986), Snoeijs (1993, 1999), Snoeijs & Potapova (1995), Snoeijs & Kasperovicienė (1996), Snoeijs & Balashlova (1998), Hartley *et al.* (1996), and Witkowski *et al*. (2000). Nomenclature and data on general environments of taxa follow AlgaeBase (Guiry & Guiry, 2017), and only partially Álvarez-Blanco & Blanco (2014).

RESULTS

Environmental conditions

In 2011, surface water temperature varied between 10.0 and 27.1°C, and maximum was recorded in September, while the minimum was noted in January (Tab. 2). The salinity ranged between 32.0 in April and 38.4 in December. Warm summer months were characterized by lower salinity, while in the cooler months of winter and spring salinity was mostly related to the precipitation regime and the extremely dynamic water flow from the underwater karstic springs (“vruljas”) that feed the bay.

Tab. 2. Monthly distribution of the temperature and salinity on the surface (0.5 m depth) in Neum Bay in 2010 and 2011.

Years	2010			2011											
Months	3	5	7	1	2	3	4	5	6	7	8	9	10	11	12
Temperature (°C)	10.4	15.9	25.2	10.0	10.9	10.2	15.9	15.5	22.5	24.9	26	27.1	23.1	.	15.7
Salinity	36.7	37.2	36.4	34.2	33.5	36.6	32.0	36.9	34.9	35.6	34.7	35.2	.	.	38.4

Taxonomic composition of the benthic diatom community

During this study, a total of 483 specific and infraspecific diatom taxa were identified in Neum Bay (Tab. 3). The list of taxa included 425 pennate and 58 centric diatoms belonging to all three recognized diatom classes: Coscinodiscophyceae, Mediophyceae and Bacillariophyceae (Medlin & Kaczmarska, 2004), and 60 families (Tab. 3). Among them, two taxa were included in Bacillariophyta *incertae sedis* (*sensu* Guiry & Guiry, 2017). Ten families were included in Coscinodiscophyceae, 11 in Mediophyceae and 39 in Bacillariophyceae.

Families with the greatest number of genera were: Naviculaceae (8 genera), Bacillariaceae (6), Achnanthidiaceae (6), Surirellaceae (6), Fragilariaceae (6), Eupodiscaceae (6) and Plagiogrammaceae (4). Additionally, the highest number of species and infraspecific taxa belonged to Naviculaceae (56).

Altogether, 115 genera were found in all samples. Thirteen genera were included in Coscinodiscophyceae, 17 in Mediophyceae and 87 in Bacillariophyceae. Genera with the greatest number of taxa were: *Mastogloia* (46 taxa), *Navicula* (36), *Diploneis* (35), *Nitzschia* (34), *Amphora* (31), *Cocconeis* (27), *Achnanthes* (14), *Halamphora* (12), *Lyrella* (11) and *Surirella* and *Licmophora* (10 each). In total, 24 genera had two taxa each, while 60 were composed of one taxon only. Regarding the habitat type (*sensu* Guiry & Guiry, 2017), the greatest number of diatom taxa (152) have been characterized as exclusively marine, 15 are brackish and 29 exclusively freshwater diatoms, while one (*Mastogloia exigua*) has been characterized as exclusively a soil diatom. Among truly marine diatoms, three *Amphora* taxa (*Amphora bigibba* var. *interrupta*, *A. hyalina* and *A. laevissima*) showed high frequency of appearance and were found in more than 50% of the samples.

However, *Amphora bigibba* var. *interrupta* and *Cocconeis scutellum* were the most frequent taxa, being present in 87.5% of the samples. Taxa with high frequencies (79.1-83.3%) were: *Achnanthes brevipes* (83.3%), *Toxarium undulatum* (79.1%) and *Licmophora remulus* (79.1%), while others (centric diatoms *Actinocyclus subtilis*, *Biddulphia biddulphiana*; and pennates *Grammatophora oceanica*, *Halamphora coffeiformis*, *Brebissonia lanceolata*, *Coronia decorus*, *Synedra fulgens*, *Trachyneis aspera* and *Surirella fastuosa*, Fig. 2) were found from 62.5% to 66.7% of the samples. Altogether, 34 taxa were found in at least 50% or more of the samples and could be characterised as taxa with higher frequency of appearance. In total, 142 taxa were found only once (sporadic taxa) during the investigated period (Tab. 3).

Some taxa appeared only in particular seasons and/or depths, but the determination of the relationship between their appearance and abundances, and the ecological conditions in the bay falls outside of the scope of the present paper.

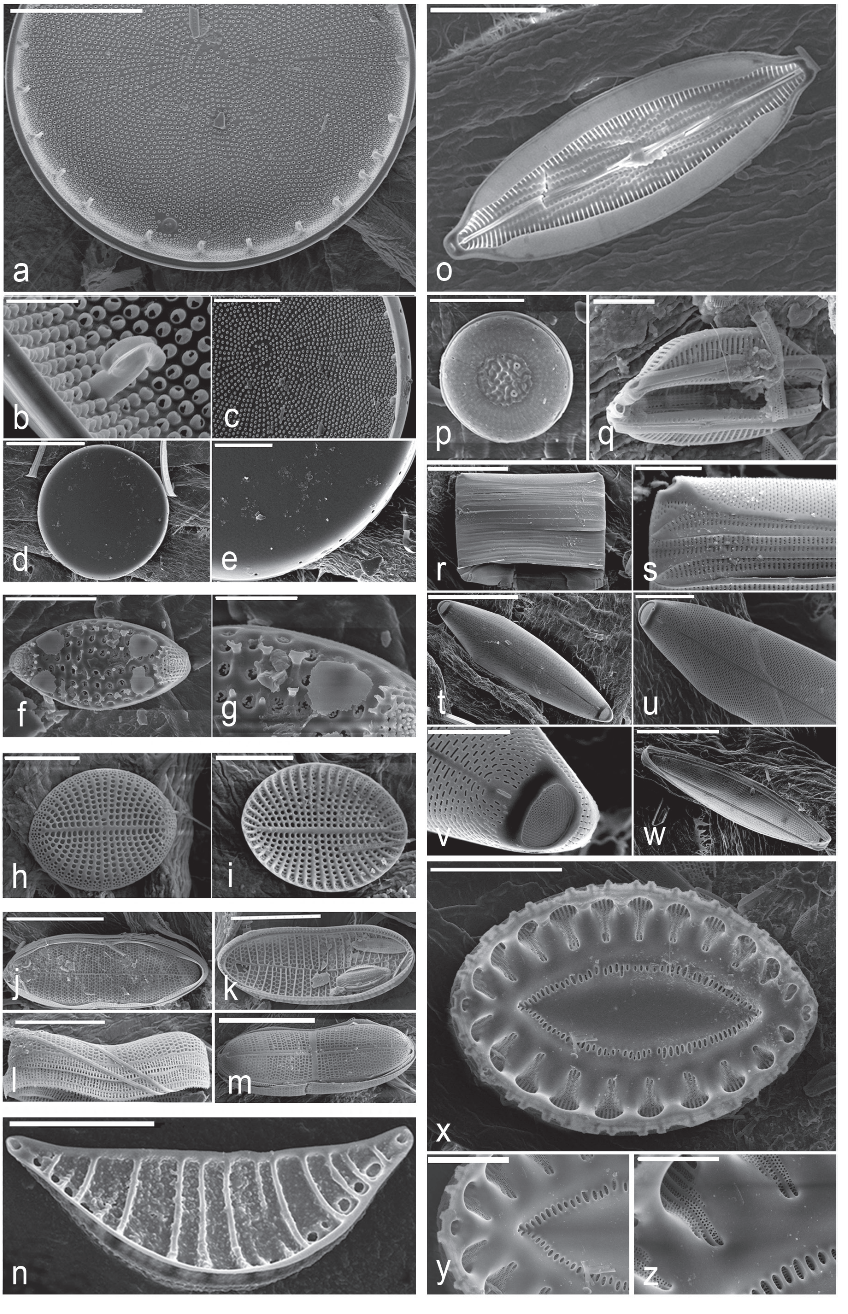

Fig. 2. Scanning electron microscope (SEM) micrographs of benthic diatoms in the Neum Bay: a-e) *Actinocyclus subtilis* (W.Gregory) Ralfs; f-g) *Dimeregramma minus* (W.Gregory) Ralfs; h-i) *Cocconeis scutellum* Ehrenberg; j-m) *Achnanthes brevipes* C.Agardh; n) *Rhopalodia pacifica* Krammer; o) *Mastogloia ignorata* Hustedt; p) *Cyclotella meneghiniana* Kützing; q) *Halamphora coffeiformis* (C.Agardh) Levkov; r-w) *Striatella unipunctata* (Lyngbye) C.Agardh; x-z) *Surirella fastuosa* (Ehrenberg) Ehrenberg. Scale bars = 40 μm (d), 30 μm (j, m, r, t), 20 μm (a, k, l, w, x), 10 μm (c, e, h, i, n, o, u, y), 5 μm (f, p, q, s, v, z), 2 μm (b, g).

Tab. 3. Species and infraspecific taxa of benthic diatoms in Neum Bay in 2010 and 2011, including data on their family-level affiliations, general environment (GE: S – soil taxa, M – marine, B – brackish, F – freshwater, *sensu* Guiry & Guiry, 2017), seasonal distribution in shallow (0.5 m) and deeper (8.0 m) samples, absolute (n) and percentage (%) frequency of appearance.

						2010			2011																						
Taxon	Family	GE				March	May	July	January	February	March	April		May		June		July		August		September		October		November		December		n	Freq. (%)
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Achnanthes brevipes C.Agardh	Achnanthaceae	+	+	+	.	.	+	+	+	+	+	+	+	+	+	+	+	+	.	+	+	+	.	+	.	+	+	+	+	20	83.33
Achnanthes brevipes var. *intermedia* (Kützing) Cleve	Achnanthaceae	.	.	.	+	.	.	.	+	.	+	.	+	.	.	.	.	.	+	.	.	+	.	.	+	.	.	+	+	8	33.33
Achnanthes gracilis Lee	Achnanthaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Achnanthes groenlandica (Cleve) Grunow	Achnanthaceae	.	+	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2	8.33
Achnanthes javanica Grunow	Achnanthaceae	.	+	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Achnanthes kuwaitensis Hendey	Achnanthaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	4.17
Achnanthes lemmermannii Hustedt	Achnanthaceae	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	2	8.33
Achnanthes longipes C.Agardh	Achnanthaceae	.	+	+	+	.	.	.	.	.	.	+	+	.	+	.	+	.	.	+	+	.	.	.	+	+	+	.	+	10	41.67
Achnanthes marginalis Hendey	Achnanthaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	2	8.33
Achnanthes parvula Kützing	Achnanthaceae	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	+	.	.	.	.	.	3	12.50
Achnanthes pseudogroenlandica Hendey	Achnanthaceae	.	.	.	.	.	+	.	.	+	.	+	+	+	.	+	.	+	+	+	.	.	.	.	.	+	.	.	.	10	41.67
Achnanthes separata Hustedt	Achnanthaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Achnanthes septa var. *incurvata* (Ostrup) Cleve-Euler	Achnanthaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	2	8.33
Achnanthes sp.1	Achnanthaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	+	.	+	.	.	.	4	16.67
Actinocyclus gallicus F.Meister	Hemidiscaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	3	12.50
Actinocyclus ingens var. *irregularis* (Van Heurck) D. M. Harwood & T. Maruyama	Hemidiscaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Actinocyclus normanii (W.Gregory ex Greville) Hustedt	Hemidiscaceae	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Actinocyclus ochotensis A.P.Jousé	Hemidiscaceae	.	+	.	.	.	.	.	+	+	+	.	.	.	+	.	.	.	.	+	.	+	+	+	.	+	+	+	+	12	50.00
Actinocyclus splendens J.Rattray	Hemidiscaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2	8.33
Actinocyclus subtilis (W.Gregory) Ralfs	Hemidiscaceae	.	.	.	.	+	+	.	+	+	+	.	.	+	.	+	.	+	+	+	+	+	.	+	+	+	.	+	.	16	66.67
Actinocyclus sp.1	Hemidiscaceae	.	.	.	.	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	4	16.67
Actinoptychus adriaticus Grunow	Heliopeltaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	2	8.33
Actinoptychus octonarius (Ehrenberg) Kützing	Heliopeltaceae	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	+	.	.	.	.	3	12.50
Actinoptychus senarius (Ehrenberg) Ehrenberg	Heliopeltaceae	.	+	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	+	.	5	20.83
Actinoptychus splendens (Shadbolt) Ralfs	Heliopeltaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	+	.	.	+	.	.	4	16.67
Actinoptychus vulgaris Schumann	Heliopeltaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Amphora abludens R.Simonsen	Catenulaceae	.	+	.	.	+	.	.	+	+	.	.	.	.	+	.	+	.	+	+	.	.	.	.	.	.	.	+	.	8	33.33
Amphora amoena Hustedt	Catenulaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Amphora arenaria Donkin	Catenulaceae	.	+	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	+	.	+	+	.	.	+	.	+	.	+	9	37.50
Amphora arenicola Grunow	Catenulaceae	+	+	+	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Amphora beaufortiana Hustedt	Catenulaceae	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11	45.83
Amphora bigibba var. *interrupta* (Grunow) Cleve	Catenulaceae	.	+	.	.	.	+	+	+	+	.	+	+	+	+	+	+	+	+	+	+	+	.	+	+	+	+	+	+	21	87.50
Amphora cingulata Cleve	Catenulaceae	.	+	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33

						2010			2011																						
Taxon	Family	GE				March	May	July	January	February	March	April		May		June		July		August		September		October		November		December		n	Freq. (%)
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Amphora copulata (Kützing) Schoeman & R.E.M.Archibald	Catenulaceae	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Amphora corpulenta var. *capitata* Tempere & Peragallo	Catenulaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Amphora crassa W.Gregory	Catenulaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Amphora delicatissima Krasske	Catenulaceae	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Amphora cf. *gacialis* W.Smith	Catenulaceae	.	+	.	.	.	.	.	+	+	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	5	20.83
Amphora gracilis Ehrenberg	Catenulaceae	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	+	.	.	+	.	.	.	.	.	.	.	.	4	16.67
Amphora graeffeana Hendey	Catenulaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	2	8.33
Amphora grevilleana Gregory	Catenulaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	2	8.33
Amphora hyalina Kützing	Catenulaceae	+	+	.	.	.	.	.	+	+	+	.	+	+	+	+	+	.	+	+	+	+	.	.	.	.	.	+	+	14	58.33
Amphora immarginata Nagumo	Catenulaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Amphora laevis Gregory	Catenulaceae	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	2	8.33
Amphora laevissima W.Gregory	Catenulaceae	.	+	.	.	+	.	+	.	.	.	.	+	.	+	.	+	.	+	+	+	+	+	.	+	.	.	.	+	12	50.00
Amphora lineolata Ehrenberg	Catenulaceae	+	.	+	.	.	.	.	+	+	.	+	+	.	+	.	.	+	+	.	+	.	.	.	+	+	.	+	.	11	45.83
Amphora lunata Østrup	Catenulaceae	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.	+	+	+	+	.	.	+	.	.	.	+	9	37.50
Amphora obtusa W.Gregory	Catenulaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Amphora ovalis (Kützing) Kützing	Catenulaceae	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	+	4	16.67
Amphora pediculus (Kützing) Grunow	Catenulaceae	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	2	8.33
Amphora proteus W.Gregory	Catenulaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	2	8.33
Amphora pseudohyalina Simonsen	Catenulaceae	.	.	.	.	.	.	+	+	+	+	+	+	+	+	.	.	+	+	.	+	.	.	.	+	.	.	+	.	13	54.17
Amphora robusta Gregory	Catenulaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Amphora cf. *securicula*	Catenulaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	4.17
Amphora subacutiuscula Schoeman	Catenulaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Amphora sp.1	Catenulaceae	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	+	.	.	4	16.67
Amphora sp.2	Catenulaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Anorthoneis hyalina Hustedt	Achnanthidiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	2	8.33
Ardissonea formosa (Hantzsch) Grunow	Ardissoneaceae	.	+	.	.	+	+	.	.	.	.	.	.	.	+	.	.	.	.	+	+	.	.	.	+	+	+	.	+	9	37.50
Ardissonea robusta (Ralfs ex Pritchard) De Notaris	Ardissoneaceae	.	+	.	.	+	.	.	.	.	+	.	.	.	+	+	+	+	.	.	+	.	+	.	+	.	+	.	+	11	45.83
Astartiella sp.1	Achnanthidiaceae	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Asteromphalus hookeri Ehrenberg	Asterolampraceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	+	.	.	.	3	12.50
Aulacoseira granulata (Ehrenberg) Simonsen	Aulacoseiraceae	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	3	12.50
Auliscus sculptus (W.Smith) Brightwell	Eupodiscaceae	.	+	.	.	+	+	.	+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	6	25.00
Auricula amphitritis Castracane	Auriculaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	2	8.33
Auricula sp.1	Auriculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Azpeitia nodulifera (A.W.F.Schmidt) G.A.Fryxell & P.A.Sims	Heliopeltaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	4.17
Bacillaria paxillifera (O.F.Müller) T.Marsson	Bacillariaceae	.	+	+	+	.	+	.	.	.	+	.	+	.	+	.	.	+	.	+	.	.	.	.	+	+	.	.	.	8	33.33

Taxon	Family	GE				2010			2011																					n	Freq. (%)
						March	May	July	January	February	March	April		May		June		July		August		September		October		November		December			
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Bacillaria socialis (Gregory) Ralfs	Bacillariaceae	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	+	+	+	.	+	+	.	+	.	.	8	33.33
Bacteriastrum sp.1	Chaetocerotaceae	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Berkeleya scopulorum (Brébisson ex Kützing) E.J.Cox	Berkeleyaceae	.	+	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	3	12.50
Biddulphia alternans (Bailey) Van Heurck	Biddulphiaceae	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Biddulphia biddulphiana (J.E.Smith) Boyer	Biddulphiaceae	.	+	.	.	.	+	+	+	.	+	.	.	.	+	+	+	.	+	.	+	+	+	+	+	.	+	+	+	16	66.67
Biddulphia tuomeyi (J.W.Bailey) Roper	Biddulphiaceae	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	4	16.67
Brachysira aponina Kützing	Brachysiraceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	4.17
Brachysira estonarium Witkowski, Lange-Bertalot & Metzeltin	Brachysiraceae	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	2	8.33
Brebissonia lanceolata (C.Agardh) R.K.Mahoney & Reimer	Cymbellaceae	.	.	+	+	.	.	.	+	+	+	+	.	+	+	+	+	+	+	+	.	+	.	+	+	.	.	+	.	15	62.50
Caloneis abludens	Naviculaceae	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Caloneis bicuneata (Grunow) Boyer	Naviculaceae	.	+	.	.	.	+	.	.	+	.	.	.	.	+	+	+	+	.	.	+	.	+	.	.	.	.	.	+	9	37.50
Caloneis clavicula Z.Levkov & Metzeltin	Naviculaceae	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Caloneis egena (A.Schmidt) Cleve	Naviculaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Caloneis elongata (Grunow) Boyer	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Caloneis excentrica (Grunow) Boyer	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	.	.	.	.	.	+	.	.	.	.	.	.	5	20.83
Caloneis liber (W.Smith) Cleve	Naviculaceae	+	+	+	.	+	.	.	.	.	.	.	+	+	+	.	+	.	.	.	+	.	.	.	+	+	.	.	.	8	33.33
Caloneis liber var. linearis Cleve	Naviculaceae	.	+	.	.	.	+	.	+	.	.	.	.	.	.	.	+	+	+	+	+	.	.	.	+	.	+	+	.	10	41.67
Caloneis sp.1	Naviculaceae	.	.	.	.	.	.	.	.	.	.	+	+	+	+	.	.	.	.	.	.	.	.	.	+	.	.	.	+	6	25.00
Campylodiscus clypeus (Ehrenberg) Ehrenberg ex Kützing	Surirellaceae	+	+	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Campylodiscus echeneis Ehrenberg ex Kützing	Surirellaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Campylodiscus fastuosus Ehrenberg	Surirellaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Campylodiscus innominatus R.Ross & Abdin	Surirellaceae	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Campylodiscus punctulatoides M.Ricard	Surirellaceae	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Campylodiscus sp.1	Surirellaceae	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	3	12.50
Carinasigma latum (E.J.Cox) G.Reid	Pleurosigmataceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	3	12.50
Catacombas gaillonii (Bory) D.M.Williams & Round	Licmophoraceae	+	+	+	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Ceratoneis closterium Ehrenberg	Fragilariaceae	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9	37.50
Climacosphenia moniligera Ehrenberg	Climacospheniaceae	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	2	8.33
Cocconeiopsis orthoneoides (Hustedt) Witkowski	Cocconeidaceae	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1	4.17
Cocconeis apiculata (Greville) A.W.F.Schmidt	Achnanthidiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Cocconeis britannica Naegeli ex Kützing	Achnanthidiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Cocconeis californica Grunow	Achnanthidiaceae	+	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17

Tab. 3. continued

						2010			2011																						
Taxon	Family	GE				March	May	July	January	February	March	April		May		June		July		August		September		October		November		December		n	Freq. (%)
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Cocconeis californica var. *kerguelensis* H.Heiden	Achnanthidiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	2	8.33
Cocconeis capensis (Cholnoky) Witkowski	Achnanthidiaceae	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Cocconeis costata Gregory	Achnanthidiaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Cocconeis costata var. *hexagona* Grunow	Achnanthidiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	2	8.33
Cocconeis dirupta W.Gregory	Achnanthidiaceae	.	+	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	4	16.67
Cocconeis dirupta var. *flexella* (Janisch & Rabenhorst) Grunow	Achnanthidiaceae	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	2	8.33
Cocconeis discrepans A.W.F.Schmidt	Achnanthidiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Cocconeis distans W.Gregory	Achnanthidiaceae	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	3	12.50
Cocconeis fasciolata (Ehrenberg) N.E.Brown	Achnanthidiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	2	8.33
Cocconeis krammeri Lange-Bertalot & Metzeltin	Achnanthidiaceae	.	?	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Cocconeis latecostata Hustedt	Achnanthidiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	2	8.33
Cocconeis molesta var. *crucifera* Grunow	Achnanthidiaceae	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	+	+	.	.	.	.	+	.	.	+	6	25.00
Cocconeis molesta var. *molesta* Kützing	Achnanthidiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	4.17
Cocconeis notabilis Pantocsek	Achnanthidiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	2	8.33
Cocconeis nugalas M.H.Hohn & J.Hellerman	Achnanthidiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Cocconeis pelta A.Schmidt	Achnanthidiaceae	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Cocconeis peltoides Hustedt	Achnanthidiaceae	+	+	+	+	.	.	.	.	.	.	.	+	.	.	.	+	.	+	.	+	.	.	.	+	.	.	.	+	6	25.00
Cocconeis pinnata W.Gregory ex Greville	Achnanthidiaceae	.	+	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	+	.	.	.	+	.	.	.	+	5	20.83
Cocconeis placentula var. *euglypta* (Ehrenberg) Grunowa	Achnanthidiaceae	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	2	8.33
Cocconeis schmidtii Heiden	Achnanthidiaceae	.	+	.	.	+	.	.	.	.	.	.	.	+	+	.	+	+	+	.	.	.	.	.	.	.	.	.	.	6	25.00
Cocconeis scutellum Ehrenberg	Achnanthidiaceae	+	+	+	.	.	+	+	+	+	+	+	+	.	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21	87.50
Cocconeis speciosa Gregory	Achnanthidiaceae	.	+	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Cocconeis woodii Reyes	Achnanthidiaceae	.	+	.	.	+	.	.	.	.	.	.	+	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	4	16.67
Cocconeis sp.1	Achnanthidiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Coronia decora (Brébisson) Ruck & Guiry	Surirellaceae	.	+	.	.	.	+	.	+	+	+	.	+	+	+	+	.	+	.	+	+	+	.	.	+	.	+	.	+	15	62.50
Coronia limbata (Brébisson) Ruck & Guiry	Surirellaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Coscinodiscus hauckii var. *mesoleius* Cleve	Coscinodiscaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	2	8.33
Coscinodiscus sp.1	Coscinodiscaceae	.	.	.	.	+	.	.	+	.	.	.	+	.	.	.	+	+	.	.	+	.	.	.	+	.	.	.	+	8	33.33
Ctenophora pulchella var. *lanceolata* (O'Meara) L.Bukhtiyarova	Ulnariaceae	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Cyclotella meneghiniana Kützing	Stephanodiscaceae	.	.	.	+	.	.	.	.	.	.	.	.	+	+	.	+	.	+	.	+	.	.	.	.	.	.	.	.	5	20.83
Cymatoneis sulcata (Greville) Cleve	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	2	8.33
Cymatosira lorenziana Grunow	Eupodiscaceae	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	+	+	.	.	.	.	.	.	.	.	4	16.67
Cymbella sp.1	Cymbellaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	4.17
Delphineis minutissima (Hustedt) Simonsen	Rhaphoneidaceae	.	+	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	3	12.50
Diatoma vulgaris Bory	Tabellariaceae	.	.	.	+	.	.	.	.	.	.	+	+	.	.	+	.	.	.	+	+	.	.	.	+	.	.	.	.	6	25.00
Dickieia subinflata (Grunow) D.G.Mann	Anomoeoneidaceae	.	+	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	2	8.33

						2010			2011																						
Taxon	Family	GE				March	May	July	January	February	March	April		May		June		July		August		September		October		November		December		n	Freq. (%)
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Dimeregramma fulvum (W.Gregory) Ralfs	Plagiogrammaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	.	+	5	20.83
Dimeregramma marinum (W.Gregory) Ralfs	Plagiogrammaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.		.	.	.	.	.	2	8.33
Dimeregramma minus (W.Gregory) Ralfs	Plagiogrammaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	+	.	+	+	.	.	+	.	+	+	+	+	+	.	+	11	45.83
Diploneis aestuari Hustedt	Diploneidaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Diploneis bombus (Ehrenberg) Ehrenberg	Diploneidaceae	.	.	.	.	.	+	+	+	+	.	.	.	.	.	.	+	+	+	+	+	.	.	+	+	+	.	+	+	14	58.33
Diploneis caffra (M.H.Giffen) Witkowski, Lange-Bertalot & Metzeltin	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	+	.	.	.	.	.	.	.	.	3	12.50
Diploneis chersonensis (Grunow) Cleve	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	+	+	.	.	.	.	.	+	.	.	.	.	5	20.83
Diploneis coffaeiformis (Schmidt) Cleve	Diploneidaceae	.	+	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	+	+	.	.	.	+	.	.	.	.	6	25.00
Diploneis crabro (Ehrenberg) Ehrenberg	Diploneidaceae	.	.	.	+	.	+	.	.	.	.	.	+	.	+	.	.	.	.	+	+	+	+	+	.	.	+	+	.	10	41.67
Diploneis didyma (Ehrenberg) Ehrenberg	Diploneidaceae	.	+	+	+	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Diploneis dilatata (M.Peragallo) H.Lange-Bertalot & A.Fuhrmann	Diploneidaceae	.	.	.	+	.	.	.	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	12.50
Diploneis fusca (W.Gregory) Cleve	Diploneidaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Diploneis incurvata (Gregory) Cleve	Diploneidaceae	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2	8.33
Diploneis incurvata var. *dubia* Hustedt	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	.	+	+	.	.	.	.	5	20.83
Diploneis javanica	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Diploneis litoralis var. *clathrata* (Østrup) Cleve	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	+	.	.	.	+	.	.	.	+	.	.	.	+	7	29.17
Diploneis litoralis var. *litoralis* (Donkin) Cleve	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	2	8.33
Diploneis mirabilis D.König	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Diploneis nitescens (W.Gregory) Cleve	Diploneidaceae	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	4	16.67
Diploneis notabilis (Greville) Cleve	Diploneidaceae	.	.	.	.	.	+	.	.	+	.	.	+	.	.	.	+	+	+	+	+	.	+	+	+	+	+	.	.	13	54.17
Diploneis novaeseelandiae (A.Schmidt) Hustedt	Diploneidaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Diploneis papula (A.W.F.Schmidt) Cleve	Diploneidaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	2	8.33
Diploneis parca (A.W.F.Schmidt) Boyer	Diploneidaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	4.17
Diploneis rex S.J.M.Droop	Diploneidaceae	.	+	.	.	.	.	.	+	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	+	6	25.00
Diploneis sejuncta f. *constricta* Hustedt	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Diploneis smithii (Brébisson) Cleve	Diploneidaceae	.	+	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Diploneis smithii (Brébisson) Cleve var. *smithii* Morphotype 1 sensu Droop	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	.	.	.	.	+	.	+	.	.	.	.	3	12.50
Diploneis smithii (Brébisson) Cleve var. *smithii* Morphotype 11 sensu Droop	Diploneidaceae	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	+	.	+	+	+	+	+	+	.	.	+	+	+	12	50.00
Diploneis smithii var. *recta* Peragallo	Diploneidaceae	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	+	+	.	+	+	.	.	.	.	.	.	.	.	6	25.00
Diploneis splendida Cleve	Diploneidaceae	.	+	.	.	+	+	.	.	.	.	.	+	+	+	+	+	.	+	.	+	+	+	.	.	.	.	.	+	12	50.00
Diploneis stroemii Hustedt	Diploneidaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	.	3	12.50
Diploneis subovalis Cleve	Diploneidaceae	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Diploneis vacillans (A.Schmidt) Cleve var. *renitens*	Diploneidaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17

Tab. 3. continued

Taxon	Family	GE				2010			2011																						
						March	May	July	January	February	March	April		May		June		July		August		September		October		November		December		n	Freq. (%)
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Diploneis vacillans (A.Schmidt) Cleve var. *vacillans*	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	+	+	+	+	.	.	.	+	.	.	.	.	7	29.17
Diploneis weissflogii (A.W.F.Schmidt) Cleve	Diploneidaceae	+	+	+	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	3	12.50
Diploneis weissflogii var. *pentagonal*	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Diploneis sp.1	Diploneidaceae	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	+	+	+	.	.	.	.	.	5	20.83
Diploneis sp.2	Diploneidaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	2	8.33
Encyonema ventricosum (C.Agardh) Grunow	Gomphonemataceae	.	.	.	+	+	.	.	.	.	.	+	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Entomoneis corrugata (Giffen) Witkowski, Lange-Bertalot & Metzeltin	Entomoneidaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Entomoneis paludosa (W.Smith) Reimer in R.M.Patrick & Reimer	Entomoneidaceae	.	+	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	+	.	.	.	+	+	.	.	.	5	20.83
Epithemia sp.1	Rhopalodiaceae	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	2	8.33
Fallacia floriniae (M.Møller) Witkowski	Sellaphoraceae	+	+	+	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	.	.	.	.	+	.	+	5	20.83
Fallacia forcipata (Greville) Stickle & D.G.Mann	Sellaphoraceae	+	+	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	+	.	.	+	.	.	+	.	.	5	20.83
Fallacia litoricola (Hustedt) D.G.Man	Sellaphoraceae	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Fallacia nummularia (Greville) D.G.Mann	Sellaphoraceae	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Fallacia pygmaea (Kützing) Stickle & D.G.Mann	Sellaphoraceae	.	+	+	.	.	.	.	+	.	.	.	+	.	.	.	+	+	.	+	+	.	.	.	.	+	+	+	.	9	37.50
Fallacia rogalli Voigt	Sellaphoraceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	2	8.33
Fallacia spatiata (Østrup) Witkowski	Sellaphoraceae	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Fallacia subforcipata (Hustedt) D.G.Mann	Sellaphoraceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Fragilaria capensis Grunow	Fragilariaceae	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Fragilaria sopotensis Witkowski & Lange-Bertalot	Fragilariaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Fragilaria sp.1	Fragilariaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	+	+	.	.	4	16.67
Fragilariopsis sp.1	Bacillariaceae	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	16.67
Glyphodesmis scripta	Plagiogrammaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Glyphodesmis sp.1	Plagiogrammaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Gomphonema acuminatum f. *coronata* (Ehrenberg) Cleve	Gomphonemataceae	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Gomphonema apicatum Ehrenberg	Gomphonemataceae	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Gomphonema olivaceum (Hornemann) Brébisson	Gomphonemataceae	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Grammatophora gibberula Kützing	Grammatophoraceae	.	.	.	.	+	+	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	5	20.83
Grammatophora hamulifera Kützing	Grammatophoraceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Grammatophora macilenta W.Smith	Grammatophoraceae	.	+	+	.	.	.	.	+	.	.	.	+	.	.	.	+	.	+	.	+	.	.	.	+	.	+	+	+	9	37.50
Grammatophora marina (Lyngbye) Kützing	Grammatophoraceae	.	+	.	.	.	.	.	.	+	.	+	+	.	.	.	.	+	.	+	+	.	.	+	.	+	.	.	.	8	33.33
Grammatophora oceanica Ehrenberg	Grammatophoraceae	+	+	+	.	+	.	.	+	.	+	.	+	.	.	.	+	+	+	+	+	+	+	+	+	.	+	+	+	16	66.67
Grammatophora oceanica var. *subtilissima* (J.W.Bailey) De Toni	Grammatophoraceae	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	3	12.50

Taxon	Family	GE				2010			2011																						
						March	May	July	January	February	March	April		May		June		July		August		September		October		November		December		n	Freq. (%)
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Grammatophora serpentina Ehrenberg	Grammatophoraceae	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Grammatophora undulata Ehrenberg	Grammatophoraceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	4.17
Grammatophora sp.1	Grammatophoraceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1	4.17
Gyrosigma scalproides (Rabenhorst) Cleve	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Gyrosigma sp.1	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	4.17
Gyrosigma sp.2	Naviculaceae	.	.	.	.	.	.	.	+	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	3	12.50
Halamphora acutiuscula (Kützing) Levkov	Amphipleuraceae	.	+	+	.	.	+	.	.	.	.	.	.	+	.	+	.	.	+	.	.	.	.	.	.	.	+	.	.	5	20.83
Halamphora borealis (Kützing) Levkov	Amphipleuraceae	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Halamphora coffeiformis (C.Agardh) Levkov	Amphipleuraceae	+	+		.	.	.	.	+	+	.	+	+	+	+	.	.	+	+	+	+	+	.	+	+	+	.	+	+	16	66.67
Halamphora costata (W.Smith) Levkov	Amphipleuraceae	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	+	+	.	.	.	+	.	.	.	.	5	20.83
Halamphora cuneata (Cleve) Levkov	Amphipleuraceae	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	4	16.67
Halamphora cymbifera (Gregory) Levkov	Amphipleuraceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Halamphora exigua (W.Gregory) Levkov	Amphipleuraceae	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	4.17
Halamphora holsatica (Hustedt) Levkov	Amphipleuraceae	.	.	+	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Halamphora kolbei (Aleem) Álvarez-Blanco & S.Blanco	Amphipleuraceae	.	+	.	.	.	.	.	.	+	.	.	+	.	+	.	+	+	+	+	+	.	.	.	+	.	.	.	.	9	37.50
Halamphora lineata (Gregory) Levkov	Amphipleuraceae	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Halamphora subangularis (Hustedt) Levkov	Amphipleuraceae	.	+	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	3	12.50
Halamphora subholsatica (Krammer) Levkov	Amphipleuraceae	.	.	+	.	+	.	.	.	.	+	.	.	.	+	+	+	.	+	.	+	+	+	.	+	.	+	.	.	11	45.83
Hantzschia elongata (Hantzsch) Grunow	Bacillariaceae	.	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Hantzschia sp.1	Bacillariaceae	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Haslea cf. *balearica* Witkowski	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2	8.33
Haslea duerrenbergiana (Hustedt) F.A.S.Sterrenburg	Naviculaceae	+	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	2	8.33
Haslea spicula (Hickie) Bukhtiyarova	Naviculaceae	.	+	+	.	+	.	.	.	+	.	.	+	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	5	20.83
Haslea sp.1	Naviculaceae	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Hemiaulus hauckii Grunow ex Van Heurck	Hemiaulaceae	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		0.00
Hyalodiscus radiatus (O'Meara) Grunow	Hyalodiscaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	2	8.33
Hyalodiscus scoticus (Kützing) Grunow	Hyalodiscaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	4.17
Hyalosira interrupta (Ehrenberg) J.N.Navarro	Rhabdonemataceae	.	+	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	3	12.50
Hyalosira sp.1	Rhabdonemataceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	4.17
Hyalosynedra laevigata (Grunow) D.M.Williams & Round	Ulnariaceae	.	+	.	.	.	+	.	.	.	.	+	+	.	+	.	.	+	+	+	+	+	+	.	.	.	+	+	+	13	54.17
Iconella linearis (W.Smith) Ruck & Nakov	Surirellaceae	.	.	.	.	+	+	.	.	+	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6	25.00
Karayevia submarina (Hustedt) Bukhtiyarova	Achnanthidiaceae	+	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Lampriscus shadboltianum (Greville) Peragallo & Peragallo	Biddulphiaceae	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Licmophora abbreviata C.Agardh	Licmophoraceae	+	+	.	.	+	.	.	.	.	.	+	+	.	.	.	+	.	+	+	+	.	.	.	.	.	.	.	.	7	29.17

Tab. 3. continued

Taxon	Family	GE				2010			2011																					n	Freq. (%)
						March	May	July	January	February	March	April		May		June		July		August		September		October		November		December			
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Licmophora debilis (Kützing) Grunow	Licmophoraceae	.	+	.	.	+	+	.	.	+	.	.	.	+	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	6	25.00
Licmophora ehrenbergii (Kützing) Grunow	Licmophoraceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	+	+	.	.	.	.	.	.	.	+	5	20.83
Licmophora flabellata (Greville) C.Agardh	Licmophoraceae	.	.	.	.	+	+	.	+	+	+	.	+	+	+	+	.	.	.	+	+	.	.	.	.	.	.	+	+	13	54.17
Licmophora gracilis (Ehrenberg) Grunow	Licmophoraceae	.	+	.	.	+	+	+	.	+	+	+	+	+	.	+	.	.	.	+	+	.	.	.	.	.	.	+	.	13	54.17
Licmophora hastata Mereschkowsky	Licmophoraceae	.	.	.	.	+	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	12.50
Licmophora paradoxa (Lyngbye) C.Agardh	Licmophoraceae	.	.	.	.	+	.	.	.	+	+	.	.	.	+	+	+	+	+	+	+	.	+	.	.	+	.	.	.	12	50.00
Licmophora pfannkuckae Giffen	Licmophoraceae	.	.	+	.	.	.	.	.	.	.	+	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	4	16.67
Licmophora remulus (Grunow) Grunow	Licmophoraceae	.	.	.	.	+	+	+	.	+	+	.	+	+	.	+	+	+	+	+	+	+	+	.	.	+	+	+	+	19	79.17
Licmophora sp.1	Licmophoraceae	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	+	.	.	.	4	16.67
Luticola ventricosa (Kützing) D.G.Mann	Diadesmidaceae	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1	4.17
Lyrella abrupta (Gregory) D.G.Mann	Lyrellaceae	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	.	.	.	.	+	4	16.67
Lyrella amphoroides D.G.Mann	Lyrellaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Lyrella clavata (Gregory) D.G.Mann	Lyrellaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Lyrella david-mannii Witkowski, Lange-Bertalot & Metzeltin	Lyrellaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Lyrella fogedii Witkowski, Lange-Bertalot & Metzeltin	Lyrellaceae	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	+	.	.	.	+	4	16.67
Lyrella hennedyi (W.Smith) Stickle & D.G.Mann	Lyrellaceae	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	3	12.50
Lyrella lyra (Ehrenberg) Karajeva	Lyrellaceae	+	+	.	.	.	.	.	.	.	+	.	+	.	+	.	+	.	+	.	+	+	+	.	+	.	.	.	+	10	41.67
Lyrella lyroides (Hendey) D.G.Mann	Lyrellaceae	.	.	.	.	+	.	.	.	.	+	.	+	+	+	.	+	.	+	.	+	+	.	+	+	.	+	.	+	13	54.17
Lyrella cf. *lyroides*	Lyrellaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Lyrella spectabilis (Gregory) D.G.Mann	Lyrellaceae	+	+	.	.	.	.	.	.	+	+	.	+	.	.	.	.	.	+	+	+	.	+	+	+	.	+	.	+	11	45.83
Lyrella sp.1	Lyrellaceae	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	2	8.33
Mastogloia adriatica Voigt	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	+	.	+	.	+	.	+	.	+	.	.	.	7	29.17
Mastogloia affinis Cleve	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1	4.17
Mastogloia beaufortiana Hustedt	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	4.17
Mastogloia binotata (Grunow) Cleve	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	+	+	.	.	+	.	+	.	+	8	33.33
Mastogloia borneensis Hustedt	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	2	8.33
Mastogloia braunii Grunow	Mastogloiaceae	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	3	12.50
Mastogloia corsicana Grunow	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Mastogloia crucicula (Grunow) Cleve	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	+	.	.	.	.	.	+	.	.	5	20.83
Mastogloia crucicula var. *alternans* Zanon	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	+	.	+	.	.	.	.	.	.	.	.	4	16.67
Mastogloia cuneata (Meister) R.Simonsen	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	+	+	.	.	.	.	.	.	.	.	4	16.67
Mastogloia cyclops Voigt	Mastogloiaceae	.	.	.	.	.	.	.	.	+	+	.	.	.	.	+	+	+	+	.	+	+	+	+	+	.	.	.	+	12	50.00
Mastogloia decussata Grunow	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Mastogloia emarginata Hustedt	Mastogloiaceae	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	3	12.50
Mastogloia erythraea Grunow	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	.	.	3	12.50
Mastogloia erythraea var. *grunowii* Foged	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17

Taxon	Family	GE				2010 March	2010 May	2010 July	2011 January	2011 February	2011 March	2011 April		2011 May		2011 June		2011 July		2011 August		2011 September		2011 October		2011 November		2011 December		n	Freq. (%)
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Mastogloia exigua F.W.Lewis	Mastogloiaceae	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Mastogloia exilis Hustedt	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	.	+	.	.	.	+	.	.	5	20.83
Mastogloia fallax Cleve	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	+	.	.	.	+	.	.	.	+	5	20.83
Mastogloia fimbriata (T.Brightwell) Grunow	Mastogloiaceae	.	+	.	.	.	+	+	.	.	.	.	+	.	.	.	+	.	+	.	+	+	.	.	+	.	.	.	+	9	37.50
Mastogloia foliolum Brun	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1	4.17
Mastogloia grunowii A.Schmidt	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	+	+	.	.	.	.	5	20.83
Mastogloia horvathiana Grunow	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	+	+	+	+	+	+	.	.	8	33.33
Mastogloia ignorata Hustedt	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	+	+	+	+	+	.	.	+	+	+	.	+	11	45.83
Mastogloia inaequalis Cleve	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	+	.	.	.	3	12.50
Mastogloia latecostata Husted	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2	8.33
Mastogloia linearis Simonsen	Mastogloiaceae	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	4	16.67
Mastogloia macdonaldii Greville	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	3	12.50
Mastogloia mauritiana Brun	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	+	+	.	+	.	+	6	25.00
Mastogloia mediterranea Hustedt	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	3	12.50
Mastogloia ovalis A.Schmidt	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		0.00
Mastogloia ovata Grunow	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	2	8.33
Mastogloia ovulum Hustedt	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	3	12.50
Mastogloia paradoxa Grunow	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	2	8.33
Mastogloia peragalloi Cleve	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	+	.	.	.	.	3	12.50
Mastogloia pseudoexigua Cholnoky	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	3	12.50
Mastogloia pseudolatecostata T.A.Yohn & R.A.Gibson	Mastogloiaceae	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	+	+	+	.	.	+	.	.	.	.	7	29.17
Mastogloia pumila (Grunow) Cleve	Mastogloiaceae	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	2	8.33
Mastogloia pusilla Grunow	Mastogloiaceae	+	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	2	8.33
Mastogloia quinquecostata Grunow	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	4.17
Mastogloia recta Hustedt	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Mastogloia regula Hustedt	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	2	8.33
Mastogloia similis Hustedt	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	+	+	+	.	+	+	.	.	8	33.33
Mastogloia smithii Thwaites ex W.Smith	Mastogloiaceae	+	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	+	.	.	.	3	12.50
Mastogloia splendida (Gregory) H.Pergallo	Mastogloiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	+	+	.	.	+	.	+	.	+	7	29.17
Mastogloia varians Hustedt	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	4.17
Mastogloia sp.1	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	+	+	+	.	+	+	+	.	.	+	10	41.67
Melosira moniliformis (O.F.Müller) C.Agardh	Hyalodiscaceae	.	+	+	.	+	+	.	.	.	.	.	.	+	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	5	20.83
Melosira moniliformis var. *octogona* (Grunow) Hustedt	Hyalodiscaceae	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2	8.33
Melosira nummuloides C.Agardh	Hyalodiscaceae	+	+	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Melosira varians C.Agardh	Hyalodiscaceae	.	.	.	+	+	.	.	.	+	.	.	.	+	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	5	20.83
Meridion circulare (Greville) C.Agardh	Tabellariaceae	.	.	.	+	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33

Tab. 3. continued

						2010			2011																						
Taxon	Family	GE				March	May	July	January	February	March	April		May		June		July		August		September		October		November		December		n	Freq. (%)
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Navicula abunda Hustedt	Naviculaceae	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Navicula agnita Hustedt	Naviculaceae	.	+	.	.	.	.	.	.	.		.	.	.	.	+	.	.	.	+	.	.	.	.	+	+	+	.	.	6	25.00
Navicula apiculata Brébisson	Naviculaceae	.	+	.	.	.	.	.	.	+	.	.	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	4	16.67
Navicula arenaria Donkin	Naviculaceae	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	+	.	.	.	.	.	3	12.50
Navicula arenaria var. *rostellata* Lange-Bertalot	Naviculaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	2	8.33
Navicula besarensis Giffen	Naviculaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	2	8.33
Navicula bipustulata Mann	Naviculaceae	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Navicula borneoensis Hustedt	Naviculaceae	.	+	.	.	+	.	.	.	.	.	.	+	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	4	16.67
Navicula cancellata Donkin	Naviculaceae	.	+	+	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	+	+	.	.	.	6	25.00
Navicula cincta (Ehrenberg) Ralfs	Naviculaceae	+	.	+	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Navicula cluthensis f. *rostrata* (Simonsen) Hustedt	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Navicula cluthensis var. *cluthensis* Gregory	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Navicula crucifera Grunow	Naviculaceae	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Navicula digitoradiata (W.Gregory) Ralfs	Naviculaceae	.	+	+	+	.	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	12.50
Navicula directa (W.Smith) Ralfs	Naviculaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	+	.	.	+	.	.	5	20.83
Navicula eidrigiana J.R.Carter	Naviculaceae	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Navicula flagellifera Hustedt	Naviculaceae	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	+	.	+	.	.	+	.	.	.	.	.	6	25.00
Navicula longa (W.Gregory) Ralfs	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	2	8.33
Navicula longa var. *irregularis* Hustedt	Naviculaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	+	.	.	.	.	.	.	4	16.67
Navicula luciae A.Witkowski & Lange-Bertalot	Naviculaceae	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Navicula palpebralis Brébisson ex W.Smith	Naviculaceae	.	.	+	.	.	.	.	.	.	.	.	+	+	+	.	.	.	+	.	+	.	.	.	.	.	.	.	.	4	16.67
Navicula palpebralis var. *angulosa* (W.Gregory) Van Heurck	Naviculaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Navicula pennata A.Schmidt	Naviculaceae	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	3	12.50
Navicula pennata var. *maxima* Cleve	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	4.17
Navicula pinnata Pantocsek	Naviculaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	2	8.33
Navicula ramosissima (C.Agardh) Cleve	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Navicula rolandii S.Wunsam, A.Witkowski, & Lange-Bertalot	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	4.17
Navicula subrostellata Hustedt	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Navicula trigonocephala (Ehrenberg) Ralfs	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Navicula vara Hustedt	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Navicula subagnita Proshkina-Lavrenko	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Navicula sp.1	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Navicula sp.2	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.	+	.	+	.	5	20.83
Navicula sp.3	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Navicula sp.4	Naviculaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1	4.17

Taxon	Family	GE				2010			2011																					n	Freq. (%)
						March	May	July	January	February	March	April		May		June		July		August		September		October		November		December			
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Navicula sp.5	Naviculaceae	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	2	8.33
Nitzschia acuminata var. *subconstricta* Grunow	Bacillariaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Nitzschia agnita Hustedt	Bacillariaceae	+	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2	8.33
Nitzschia angularis W.Smith	Bacillariaceae	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	.	+	.	.	.	2	8.33
Nitzschia bartholomei Grunow	Bacillariaceae	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	5	20.83
Nitzschia behrei Hustedt	Bacillariaceae	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2	8.33
Nitzschia bilobata W.Smith	Bacillariaceae	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	3	12.50
Nitzschia commutatoides Lange-Bertalot	Bacillariaceae	.	.	+	.	.	.	.	.	.	.	+	+	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	3	12.50
Nitzschia compressa var. *elongata* (Grunow) Lange-Bertalot	Bacillariaceae	.	+	.	.	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	5	20.83
Nitzschia constricta (Gregory) Grunow	Bacillariaceae	+	.	+	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	+	.	.	4	16.67
Nitzschia distans W.Gregory	Bacillariaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	+	+	.	.	.	+	.	.	.	.	3	12.50
Nitzschia distans var. *tumescens* Grunow	Bacillariaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	3	12.50
Nitzschia fluminensis Grunow	Bacillariaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	5	20.83
Nitzschia frustulum (Kützing) Grunow	Bacillariaceae	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	2	8.33
Nitzschia fusiformis Grunow	Bacillariaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	.	.	.	.	2	8.33
Nitzschia incerta (Grunow) M.Peragallo	Bacillariaceae	+	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	12	50.00
Nitzschia incurvata var. *lorenziana* R.Ross	Bacillariaceae	.	.	+	.	.	.	.	+	.	.	.	+	+	+	.	+	+	.	+	.	+	.	.	+	+	+	.	+	11	45.83
Nitzschia insignis W.Gregory	Bacillariaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	3	12.50
Nitzschia liebethruthii Rabenhorst	Bacillariaceae	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	+	.	.	.	.	.	.	.	4	16.67
Nitzschia longissima (Brébisson) Ralfs	Bacillariaceae	.	+	.	.	.	+	.	.	+	+	.	+	.	+	.	.	+	+	.	.	.	+	.	+	.	+	+	.	4	16.67
Nitzschia macilenta W.Gregory	Bacillariaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	+	+	+	+	+	.	.	.	.	+	.	.	+	+	2	8.33
Nitzschia marginulata var. *didyma* Grunow	Bacillariaceae	+	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	9	37.50
Nitzschia normannii Grunow	Bacillariaceae	+	+	+	.	.	.	.	.	.	+	+	+	+	+	.	.	.	+	.	.	.	.	.	+	.	.	.	+	2	8.33
Nitzschia panduriformis var. *continua* Grunow	Bacillariaceae	.	+	.	.	.	.	.	.	.	+	.	.	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	8	33.33
Nitzschia pararostrata (Lange-Bertalot) Lange-Bertalot	Bacillariaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	+	+	.	.	.	.	.	.	4	16.67
Nitzschia peisonis Pantocsek	Bacillariaceae	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	20.83
Nitzschia pellucida Grunow	Bacillariaceae	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	2	8.33
Nitzschia plioveterana Lange-Bertalot	Bacillariaceae	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	3	12.50
Nitzschia scalpelliformis Grunow	Bacillariaceae	+	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	+	.	.	.	7	29.17
Nitzschia sigma (Kützing) W.Smith	Bacillariaceae	+	+	+	+	.	.	.	.	.	.	.	.	.	+	.	+	+	+	+	+	.	+	+	.	+	+	.	+	4	16.67
Nitzschia sigmaformis Hustedt	Bacillariaceae	+	+	.	.	.	+	.	.	.	.	+	+	.	+	+	.	.	.	.	+	.	.	.	.	.	.	.	.	11	45.83
Nitzschia subconstricta Desikachary & Prema	Bacillariaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	4	16.67
Nitzschia tryblionella Hantzsch	Bacillariaceae	+	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Nitzschia ventricosa Kitton	Bacillariaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	+	+	.	.	+	+	+	.	.	.	1	4.17
Nitzschia sp.1	Bacillariaceae	.	.	.	.	+	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	+	.	.	.	6	25.00
Odontella aurita (Lyngbye) C.Agardh	Eupodiscaceae	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17

Tab. 3. continued

Taxon	Family	GE				2010			2011																					n	Freq. (%)
						March	May	July	January	February	March	April		May		June		July		August		September		October		November		December			
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Odontella sp.1	Eupodiscaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2	8.33
Oestrupia ergadensis (W.Gregory) Witkowski	Pinnulariaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	2	8.33
Oestrupia powellii (Lewis) Heiden ex Hustedt	Pinnulariaceae	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Oestrupia powellii var. *vidovichii* (Grunow) Heiden	Pinnulariaceae	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	2	8.33
Opephora burchardtiae Witkowski	Staurosiraceae	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Opephora guenter-grassii (Witkowski & Lange-Bertalot) Sabbe & Vyverman	Staurosiraceae	.	+	+	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	4	16.67
Opephora krumbeinii A.Witkowski, Witak & K.Stachura apud Lange-Bertalot & S.I.Genkal	Staurosiraceae	+	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Opephora marina (W.Gregory) Petit	Staurosiraceae	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	3	12.50
Opephora mutabilis (Grunow) Sabbe & Wyverman	Staurosiraceae	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	2	8.33
Opephora pacifica (Grunow) Petit	Staurosiraceae	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	2	8.33
Opephora schwartzii (Grunow) Petit ex Pelletan	Staurosiraceae	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	2	8.33
Opephora sp.1	Staurosiraceae	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	+	+	.	+	6	25.00
Pantocsekiella ocellata (Pantocsek) K.T.Kiss & E.Ács	Stephanodiscaceae	.	.	.	+	+	.	.	.	.	.	+	+	.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	.	6	25.00
Paralia sulcata (Ehrenberg) Cleve	Paraliaceae	+	+	+	.	+	.	.	.	.	+	.	.	.	.	+	+	+	+	.	+	+	.	+	+	+	+	.	+	13	54.17
Parlibellus delognei (Van Heurck) E.J.Cox	Berkeleyaceae	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	2	8.33
Parlibellus rhombicula (Hustedt) Witkowski	Berkeleyaceae	.	+	.	.	.	+	+	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	20.83
Petrodictyon gemma (Ehrenberg) D.G.Mann	Surirellaceae	.	+	+	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	+	.	.	.	+	+	.	+	+	8	33.33
Petroneis humerosa (Brébisson ex W.Smith) Stickle & D.G.Mann	Lyrellaceae	+	+	+	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	+	+	.	.	.	.	.	.	.	.	4	16.67
Pinnularia claviculus Schulz	Pinnulariaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	.	+	.	.	.	.	.	.	4	16.67
Pinnularia trevelyana (Donkin) Rabenhorst	Pinnulariaceae	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2	8.33
Pinnularia sp.1	Pinnulariaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Plagiodiscus martensianus Grunow & Eulenstein	Surirellaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	.	3	12.50
Plagiodiscus nervatus Grunow	Surirellaceae	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	2	8.33
Plagiogramma atomus Greville	Plagiogrammaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2	8.33
Plagiogramma interruptum (W.Gregory) Ralfs	Plagiogrammaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Plagiogramma staurophorum (W.Gregory) Heiberg	Plagiogrammaceae	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	3	12.50
Plagiogrammopsis vanheurckii (Grunow) Hasle, Stosch & Syvertsen	Eupodiscaceae	.	+	.	.	+	+	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	4	16.67

Taxon	Family	GE				2010			2011																					n	Freq. (%)
						March	May	July	January	February	March	April		May		June		July		August		September		October		November		December			
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Plagiotropis lepidoptera (W.Gregory) Kuntze	Plagiotropidaceae	.	+	+	.	.	.	.	+	.	+	.	+	+	+	+	+	.	+	.	.	+	+	+	+	.	.	+	.	13	54.17
Plagiotropis tayrecta T.B.B.Paddock	Plagiotropidaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	+	+	+	+	+	+	.	+	.	+	+	+	+	12	50.00
Planothidium delicatulum (Kützing) Round & Bukhtiyarova	Achnanthidiaceae	.	.	+	+	+	.	.	.	.	.	.	+	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	5	20.83
Planothidium quarnerensis (Grunow) Witkowski, Lange-Bertalot & Metzelin	Achnanthidiaceae	.	.	.	+	.	+	.	.	+	.	.	.	.	.	.	+	+	+	.	+	.	+	.	+	.	+	.	+	10	41.67
Platessa salinarum (Grunow) Lange-Bertalot	Naviculaceae	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Pleurosigma angulatum (J.T.Quekett) W.Smith	Pleurosigmataceae	.	+	.	.	+	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	4	16.67
Pleurosigma formosum W.Smith	Pleurosigmataceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	+	.	.	+	.	.	+	+	7	29.17
Pleurosigma itium Ricard	Pleurosigmataceae	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	.	.		+	+	.	.	+	+	.	.	.	.	7	29.17
Pleurosigma sp.1	Pleurosigmataceae	.	.	.	.	.	.	.	+	.	+	+	+	+	+	.	.	+	+	+	+	.	.	+	.	+	+	.	.	13	54.17
Pleurosira laevis (Ehrenberg) Compère	Eupodiscaceae	+	.	+	.	.	.	.	+	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	4	16.67
Podocystis adriatica (Kützing) Ralfs	Fragilariaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	+	4	16.67
Podosira sp.1	Hyalodiscaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Prestauroneis protracta (Grunow) I.W.Bishop, Minerovic, Q.Liu & Kociolek	Stauroneidaceae	.	+	+	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	3	12.50
Protokeelia cholnokyi (M.H.Giffen) Round & Basson	Rhopalodiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.		0.00
Protokeelia sp.1	Rhopalodiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Protoraphis atlantica R.A.Gibson	Protoraphidaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Psammodictyon panduriforme (W.Gregory) D.G.Mann	Bacillariaceae	+	+	+	.	.	.	.	.	+	.	.	.	.	.	+	+	+	+	+	+	+	.	+	+	+	+	.	+	7	29.17
Psammodictyon rudum (Cholnoky) D.G.Mann	Bacillariaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	+	+	+	.	.	+	+	.	.	.	.	1	4.17
Psammodiscus nitidus (W.Gregory) Round & D.G.Mann	Psammodiscaceae	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	+	+	+	.	.	.	.	.	+	.	.	6	25.00
Pseudostaurosiropsis geocollegarum (Witkowski) E.A.Morales	Staurosiraceae	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	4.17
Rhabdonema adriaticum Kützing	Rhabdonemataceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	+	+	+	.	+	.	+	.	+	+	10	41.67
Rhabdonema minutum Kützing	Rhabdonemataceae	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2	8.33
Rhizosolenia styliformis T.Brightwell	Rhizosoleniaceae	.	+	.	.	+	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.		0.00
Rhoicosphenia abbreviata (C.Agardh) Lange-Bertalot	Rhoicospheniaceae	+	.	+	+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Rhoicosphenia linearis Østrup	Rhoicospheniaceae	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Rhoicosphenia marina (Kützing) M.Schmidt	Rhoicospheniaceae	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	+	3	12.50
Rhopalodia acuminata Krammer	Rhopalodiaceae	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	+	+	+	+	.	.	+	+	.	.	.	.	3	12.50
Rhopalodia musculus (Kützing) Otto Müller	Rhopalodiaceae	+	+	+	+	.	.	.	.	.	+	+	+	+	+	+	+	.	+	.	.	.	.	.	.	.	.	.	+	7	29.17
Rhopalodia pacifica Krammer	Rhopalodiaceae	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	+	+	+	+	+	+	+	+	+	+	+	9	37.50
Rhopalodia sterrenburgii Krammer	Rhopalodiaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17

Tab. 3. continued

						2010			2011																						
Taxon	Family	GE				March	May	July	January	February	March	April		May		June		July		August		September		October		November		December		n	Freq. (%)
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Rhopalodia sp.1	Rhopalodiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Seminavis barbara Witkowski	Naviculaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	4.17
Skabitschewskia borealis (A.Cleve) Lange-Bertalot & Kulikovskiy	Achnanthaceae	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Stauroneis plicata C.Brockmann	Stauroneidaceae	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	4	16.67
Stauroneis smithii Grunow	Stauroneidaceae	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	4.17
Staurosira sp.1	Fragilariaceae	.	.	.	.	.	.	.	+	.	+	+	+	+	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	7	29.17
Striatella unipunctata (Lyngbye) C.Agardh	Striatellaceae	.	+	.	.	+	.	.	.	.	.	.	.	.	.	+	+	+	+	+	.	+	.	+	.	+	.	+	+	11	45.83
Surirella brebissonii Krammer & Lange-Bertalot	Surirellaceae	.	.	+		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	4.17
Surirella ceylanensis var. *oblongistriata* F.Hustedt	Surirellaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Surirella crumena Brébisson ex Kützing	Surirellaceae	.	.	.	.	.	+	+	+	.	+	+	+	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	9	37.50
Surirella fastuosa (Ehrenberg) Ehrenberg	Surirellaceae	+	+	.	.	.	.	.	.	.	.	.	.	+	+	+	+	+	+	+	+	+	.	+	+	+	+	+	+	15	62.50
Surirella hybrida Grunow	Surirellaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	2	8.33
Surirella lata W.Smith	Surirellaceae	.	+	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	3	12.50
Surirella scalaris M.H.Giffen	Surirellaceae	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	+	+	.	+	.	.	.	+	.	+	8	33.33
Surirella spiralis Kützing	Surirellaceae	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	3	12.50
Surirella striatula Turpin	Surirellaceae	+	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Surirella sp.1	Surirellaceae	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2	8.33
Synedra commutata Grunow	Fragilariaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	4.17
Synedra crystallina (C.Agardh) Kützing	Fragilariaceae	.	+	+	.	.	.	.	.	.	+	.	.	+	+	.	+	+	+	.	.	.	.	.	+	.	.	+	+	9	37.50
Synedra fulgens (Greville) W.Smith	Fragilariaceae	.	+	+	.	.	+	.	+	+	+	.	.	+	+	+	.	+	.	+	+	+	+	+	+	.	.	+	.	15	62.50
Tabularia fasciculata (C.Agardh) D.M.Williams & Round	Ulnariaceae	.	+	+	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Tabularia investiens (W.Smith) D.M.Williams & Round	Ulnariaceae	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	3	12.50
Talaroneis furcigera (Grunow) Sterrenburg	Plagiogrammaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	+	+	.	+	.	.	+	+	.	+	.	+	9	37.50
Terpsinoë americana (Bailey) Grunow	Anaulaceae	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	4.17
Tetramphora decussata (Grunow) Stepanek & Kociolek	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	+	+	+	.	.	.	+	.	.	.	.	7	29.17
Tetramphora rhombica (Kitton) Stepanek & Kociolek	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	+	+	.	.	.	4	16.67
Tetramphora sulcata (Brébisson) Stepanek & Kociolek	Mastogloiaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	2	8.33
Thalassiophysa hyalina (Greville) Paddock & P.A.Sims	Thalassiophysaceae	.	+	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Thalassiosira hyalina (Grunow) Gran	Thalassiosiraceae	.	.	.	.	.	.	.	.	+	.	.	.	+	+	.	.	.	+	.	+	.	.	.	.	+	.	.	+	7	29.17
Toxarium hennedyanum (Gregory) Pelletan	Toxariaceae	.	+	.	.	+	+	+	+	+	+	+	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	10	41.67
Toxarium undulatum J.W.Bailey	Toxariaceae	.	+	.	.	.	+	+	+	.	+	+	+	+	+	+	+	+	+	+	+	+	.	.	+	.	+	+	+	19	79.17

						2010			2011																						
Taxon	Family	GE				March	May	July	January	February	March	April		May		June		July		August		September		October		November		December		n	Freq. (%)
		S	M	B	F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8	0.5	8		
Trachyneis aspera (Ehrenberg) Cleve	Naviculaceae	.	+	.	.	.	+	.	.	.	.	.	.	.	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15	62.50
Triceratium favus Ehrenberg	Triceratiaceae	.	+	.	.	.	.	.	.	.	.	+	+	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	5	20.83
Triceratium pentacrinus (Ehrenberg) Wallich	Triceratiaceae	.	+	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	3	12.50
Triceratium reticulatum Greville	Triceratiaceae	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	+	4	16.67
Trieres mobiliensis (J.W.Bailey) Ashworth & Theriot	Eupodiscaceae	.	+	.	.	+	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	12.50
Trigonium formosum (Brightwell) Cleve	Trigoniaceae	.	+	.	.	.	.	.	.	.	+	.	.	.	.	+	+	+	.	+	+	.	.	.	+	+	.	.	+	9	37.50
Tryblionella apiculata W.Gregory	Bacillariaceae	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	1	4.17
Tryblionella coarctata (Grunow) D.G.Mann	Bacillariaceae	.	+	.	.	.	+	+	+	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	+	.	.	+	+	13	54.17
Tryblionella compressa (J.W.Bailey) Poulin	Bacillariaceae	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	+	.	.	.	+	+	+	.	+	8	33.33
Tryblionella didyma (Hustedt) D.G.Mann	Bacillariaceae	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	9	37.50
Tryblionella hungarica (Grunow) Frenguelli	Bacillariaceae	+	+	+	+	.	.	.	.	.	+	+	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	3	12.50
Tryblionella littoralis (Grunow) D.G.Mann	Bacillariaceae	.	.	.	.	+	.	.	+	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	4	16.67
Tryblionella marginulata (Grunow) D.G.Mann	Bacillariaceae	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	5	20.83
Tryblionella navicularis (Brébisson) Ralfs	Bacillariaceae	.	+	+	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	8.33
Tryblionella scalaris (Ehrenberg) Siver & P.B.Hamilton	Bacillariaceae	+	+	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Undatella lineata (Greville) Paddock & P.A.Sims	incertae sedis	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	4.17
Undatella quadrata (Brébisson ex Kützing) Paddock & P.A.Sims	incertae sedis	.	+	.	.	.	.	+	+	.	+	.	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	6	25.00

DISCUSSION

In the present study, small forms belonging to some of the most taxonomically complex genera (e.g. *Amphora*, *Navicula* and *Nitzschia*), characterized by a considerable morphological variability, were recognized (Sullivan & Currin, 2000). A similar diatom community has been reported for different hard substrates from the Adriatic Basin (Munda, 2005; Totti *et al*., 2007) and for coastal rocks of the Mediterranean (cf. Álvarez-Blanco & Blanco, 2014). Regarding their ecology, the genus *Navicula* includes taxa with a very wide ecological range (Krammer & Lange-Bertalot, 1991), while *Amphora* and some *Achnanthes* taxa are mostly typical of nutrient-poor regions (Agatz *et al*., 1999). The difficulty in their identification was a major problem in this study. As a matter of fact, more than 40 taxa in Tab. 3 are not fully determined to species level. Additionally, it has been pointed out that some taxa may exhibit more than one growth form, reflecting the different strategies of spatial utilization (cf. Romagnoli *et al*., 2014, and references therein) adopted for the competitive advantage they provide. In this study, although he samples contained a mixture of forms growing on the stones and some epiphytic forms, we refer to this collective community as epilithon (*sensu* Çolak Sabanci, 2012).

The presence of taxa associated with fresh to brackish waters may be correlated with the precipitation regime and the dynamic water flow from the underground karstic springs ("vruljas") that feed the bay. These taxa were well adapted to this changing environment and these results also support the idea that some species could have different responses to the environmental conditions, resulting in a better or worst adaptation to them (Underwood *et al*., 1998; Ribeiro *et al*., 2003; Miho & Witkowski, 2005).

In our study, the genus *Mastogloia* was the richest in taxa number, and the most frequent taxa were *Amphora bigibba* var. *interrupta*, *Cocconeis scutellum*, *Achnanthes brevipes*, *Toxarium undulatum* and *Licmophora remulus*. *Mastogloia* species, one of the largest diatom genera (Pennesi *et al*., 2011, and references therein), can be found within different biotopes (Çolak Sabanci, 2013). In our study, the most frequent *Mastogloia* was *M. cyclops* which has been characterized as good indicator of coastal zones (Wachnicka *et al*., 2010). Some taxa (e.g., *C. scutellum*, *Halamphora coffeiformis*) were found on different substrata and do not seem to have a preference either for geographic region or for the substrate type (Romagnoli *et al*., 2014). By contrast, *C. scutellum* is considered as typical epiphytic taxon (Ulanova & Snoeijs, 2006).

It is difficult to determine the possible seasonal fluctuations in the assemblages based on qualitative data. Many taxa such as *Achnanthes brevipes*, *Actinocyclus subtilis*, *Grammatophora oceanica* and *Cocconeis scutellum* did not show any kind of marked seasonality. This was also found for several *Cocconeis* taxa (*C. molesta*, *C. placentula*, *C. scutellum*) in the Venice Lagoon (Tolomio & Andreoli, 1989). Additionally, Çolak Sabanci (2012) in the study based on the seasonal sampling, showed that some of the above mentioned taxa did not have any apparent preference for a given season in the Aegean lagoon in Turkey. In our case, a range of factors can naturally be expected to affect diatom development in the bay, and this research will be investigated in depth in the future.

In our study, the number of taxa was higher than found in floristic surveys conducted in other, similar habitats, in a broad sense and over a wide geographic area in Adriatic or Mediterranean (e.g., Miho & Witkowski, 2005; Çolak Sabanci, 2011, 2012). Other authors obtained quite different results due to differences in the size of the studied areas, environmental conditions and seasons. In addition, special attention must be paid to the use of different cleaning and processing treatments of benthic marine diatom samples from Mediterranean oligotrophic areas (Vermeulen *et al*., 2012);marine diatoms are likely to be very sensitive to common treatments used in studies of freshwater populations because of the lower availability of silicic acid and of the interference of salinity in silica fixation (Conley *et al*., 1989).

To summarize, this study represents the first floristic list focused on benthic diatoms for Bosnia and Herzegovina. Our analysis shows that, although benthic diatom richness is high in the bay, taxa are apparently not distributed evenly temporally. This is most likely due to the discrete design of the surveys, as many of the rare taxa may occur commonly in unexplored localities of the Adriatic Basin. Also, consistent quantitative and qualitative data are still needed for a better determination of the seasonal and spatial changes of the epilithic assemblages in the region.

From a purely scientific standpoint, it will be intriguing to quantify their contribution to the flow of energy and cycling of material in the bay. More practically, these data will be useful for a rational management of this important regional resource. Namely, the bay is part of a complex ecosystem of the wider area of the Mali Ston Bay (Croatia), which is an important part of the region's natural heritage and they must in fact be protected according to international obligations. Thus, sustainable land management must ensure protection of the centuries-old cultivation of shellfish *Ostrea edulis* in whole of Mali Ston Bay (Viličić, 2017).

AUTHOR CONTRIBUTIONS

N.J. designed the study and wrote the manuscript, D.H. conducted the field sampling, prepared the samples for counting and analysed the samples using the light microscope, A.C. performed scanning electron microscopy analysis. All authors commented on the manuscript.

ACKNOWLEDGEMENTS

The authors thank Dr. Rade Garić for drawing Fig. 1, Steve Latham (UK) for improving the English, and two anonymous reviewers whose observations improved the quality of the final version of the manuscript. This research was supported by Croatian Ministry of Science, Education and Sports (project 275-0000000-3186) and by Croatian science foundation (HRZZ, IP-2014-09-2945).

Received August 6, 2017

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