



# Environmental Change Research Centre

Research Report No. 143

Diatom analysis of Polish cores

Report to the Norwegian Institute for Water Research  
Project Number O-28428

H. Bennion, B. Goldsmith, A. Burgess & S. Skulmowska

April 2010

---

ISSN: 1366-7300

Environmental Change Research Centre  
Department of Geography  
University College London  
Pearson Building, Gower Street  
London, WC1E 6BT

## CONTENTS

<b>ACKNOWLEDGEMENTS</b>	2
<b>1 INTRODUCTION AND OBJECTIVES</b>	3
<b>2 METHODS</b>	3
2.1 Core collection	3
2.2 Diatom analysis	3
2.3 Data analysis	5
2.4 Core correlation issues	6
<b>3 LAKE RUMIAN</b>	9
3.1 Diatom analysis	9
3.2 Discussion	9
<b>4 LAKE KIEŁPIŃSKIE</b>	12
4.1 Diatom analysis	12
4.2 Discussion	13
<b>5 LAKE LIDZBARSKIE</b>	16
5.1 Diatom analysis	16
5.2 Discussion	17
<b>6 LOWER RESOLUTION ANALYSIS OF SEVEN LAKES</b>	20
6.1 Diatom analysis	20
6.2 Discussion	20
<b>7 SUMMARY</b>	28
<b>8 REFERENCES</b>	30
<b>LIST OF FIGURES</b>	
Figure 1 Diatom stratigraphy of the Lake Rumian cores with the lower samples (Kajak) superimposed in red onto the gravity core at 19-23 cm	6
Figure 2 Physical and biological data plots with the lower section of the Lake Rumian core (Kajak core) superimposed in red at the 19-23 cm level of the gravity core data	7
Figure 3 Summary diatom diagram of the Lake Rumian core	11
Figure 4 Summary diatom diagram of the Lake Kiełpińskie core	15
Figure 5 Summary diatom diagram of the Lake Lidzbarskie core	19
Figure 6 Summary diatom data from the seven Polish cores	23
<b>LIST OF TABLES</b>	
Table 1 Details of the study sites	4
Table 2 Details of the cores	5
Table 3 Results of the diatom analysis on the Lake Rumian core	10
Table 4 Results of the diatom analysis on the Lake Kiełpińskie core	14
Table 5 Results of the diatom analysis on the Lake Lidzbarskie core	18
Table 6 Results of the diatom analysis on the seven Polish cores	20
<b>APPENDICES</b>	
Appendix 1 Diatom data	21
Appendix 2 Gravity and kajak core comparisons	43

## **ACKNOWLEDGEMENTS**

The authors would like to thank Kevin Roe for preparing the slides, Carl Sayer for assistance with diatom taxonomy and Sigrid Haande, the project manager at NIVA, for provision of site information.

## 1 INTRODUCTION AND OBJECTIVES

The purpose of this project is to supply high resolution diatom data to the Norwegian Institute of Water Research for cores from three Polish lakes: Lakes Rumian, Kiełpińskie and Lidzbarskie, and lower resolution diatom data from a further seven Polish lakes: Dąbrowa Wielka, Dąbrowa Mała, Grądy, Tarczyńskie, Zwiniarz, Zarybinek and Hartowieckie. The data will feed into a palaeolimnological project which also includes analysis of algal pigments and radiometric dating of the cores.

The study aims to assess shifts in the diatom assemblages and to determine the nature of the baseline assemblages. Additionally the project aims to apply an existing diatom-phosphorus (P) transfer function to the diatom data in order to infer the trophic histories of the lakes.

## 2 METHODS

### 2.1 Core collection

Ten sites were selected for study and their main characteristics are summarised in Table 1. A sediment core, approximately 30-40 cm long, was collected in 2009 from each lake using a gravity coring device, and was supplemented with a Kajak core collected at the same time to retrieve a longer record of an additional 10 cm or so (Table 2). The cores from Lakes Rumian, Kiełpińskie and Lidzbarskie were extruded at 1 cm intervals. The cores from the other seven lakes were sampled in three sections only: the core top (0-2 cm), the base sample of the gravity core, and the base sample of the Kajak core. Details are given in Table 2.

### 2.2 Diatom analysis

Diatom slides were prepared from 25 sub-samples of each of the cores from Lakes Rumian, Kiełpińskie and Lidzbarskie using standard techniques (Battarbee *et al.*, 2001). These were screened for preservation and to assess points of change in the core, following which 20 samples were selected for counting. The three samples from each of the other seven sites were prepared in the same way. Analysis was carried out using a Leitz research microscope with a 100x oil immersion objective and phase contrast. Principal floras used in identification were Krammer & Lange-Bertalot (1986-1991). A minimum of 300 valves were identified in each sample. All diatom data are expressed as percentage relative abundance.

A diatom-total phosphorus (TP) transfer function was applied to the diatom data for each core, following taxonomic harmonisation between the training set and the fossil data. Reconstructions of diatom-inferred TP (DI-TP) were produced using a Northwest European training set of 152 relatively small, shallow lakes (< 10 m maximum depth) with a median value for the dataset of 104  $\mu\text{g TP L}^{-1}$  and a root mean squared error of prediction (RMSEP) of 0.21  $\log_{10} \mu\text{g TP L}^{-1}$  for the weighted averaging partial least squares two-component (WA-PLS2) model (Bennion *et al.*, 1996). All reconstructions were implemented using  $C^2$  (Juggins, 2003).

Table 1 Details of the study sites

Lake name	Latitude (N)	Longitude (E)	Lake area km <sup>2</sup>	Surface area catchment km <sup>2</sup>	Lake mean depth m	Lake max depth m	Strat.	TP µg L <sup>-1</sup>	TN mg L <sup>-1</sup>	Chl-a µg L <sup>-1</sup>	pH	Cond µS cm <sup>-1</sup>	Secchi depth m
Dąbrowa Wielka	53° 27' 05,12"	20° 02' 56,25"	6.151	88.7	8.2	34.7	yes	80	1.53	27.5	7.8	343	3.3
Dąbrowa Mała	53° 27' 20,46"	20° 00' 40,44"	1.734	147.6	10	34.5	yes	92	1.46	35.1	8	360	2.1
Grądy	53° 20' 03,57"	19° 52' 52,04"	1.127	318.7	4.7	9.1	no	130	1.91	91.1	9.1	322	0.8
Tarczyńskie	53° 20' 44,19"	19° 53' 02,20"	1.638	301.3	3.8	9.2	no	94	1.16	55.5	8.5	353	1.1
Zwiniarz	53° 26' 02,81"	19° 50' 56,48"											
Zarybinek	53° 22' 19,63"	19° 56' 49,93"	0.738	273.6	2.4	7	no	493	2.62	38.6	8.5	340	1.1
Hartowieckie	53° 23' 44,40"	19° 50' 09,00"	0.696	9.4	2.9	5.2	no	250	1.2	23.8	9	324	1.3
Rumian	53° 23' 01,10"	19° 59' 46,70"	3.058	251.2	6.5	14.4	yes	75	1.1	38.1	8.4	358	1.3
Kielpińskie	53° 21' 10,90"	19° 47' 31,03"	0.608	8.1	6.1	11	yes	105	1.02	10.7	7.6	283	2.8
Lidzbarskie	53° 15' 43"	19° 48' 8"	1.218	561.5	10.1	25.5	yes	66	1.46	46.1	8.1	373	1.4

Strat.: stratification  
No data for Zwiniarz

Table 2 Details of the cores

Lake name	Date of sampling	Water depth at coring site (m)	Samples from gravity core (cm)	Samples from Kajak core (cm)
Dąbrowa Wielka	24/02/2009	32	0-2; 30-31	45-46
Dąbrowa Mała	24/02/2009	32	0-2; 40-41	45-46
Grądy	25/02/2009	9	0-2; 30-31	40-41
Tarczyńskie	25/02/2009	8	0-2; 27-28	44-45
Zwiniarz	25/02/2009	5	0-2; 30-31	40-41
Zarybinek	25/02/2009	6	0-2; 30-31	40-41
Hartowieckie	26/02/2009	5	0-2; 35-36	50-51
Rumian	25/02/2009	14	0-27	34-39
Kiełpińskie	26/02/2009	11	0-30	34-40
Lidzbarskie	20/04/2009	24	0-37	40-48

### 2.3 Data analysis

Summary statistics of the diatom data were calculated for each sample in the cores including the number of taxa observed and the Hill's N2 diversity score (Hill & Gauch, 1980). The results of the analyses were plotted as stratigraphic diagrams using C2 (Juggins, 2003). Cluster analysis was performed on the core data from Lakes Rumian, Kiełpińskie and Lidzbarskie to identify the major zones in the diatom records using CONISS (Grimm, 1987), implemented by TGView version 2.0.2 (Grimm, 2004) or ZONE v.1.2 (Juggins, 1991). CONISS is a program for stratigraphically constrained cluster analysis by the method of incremental sum of squares and ZONE is an MS-DOS program which employs a variety of constrained clustering techniques (ConsLink, ConISS, SplitLSQ and SplitINF) from which common splits can be identified. Zones are illustrated on the stratigraphic plots in order to facilitate description of the major compositional changes.

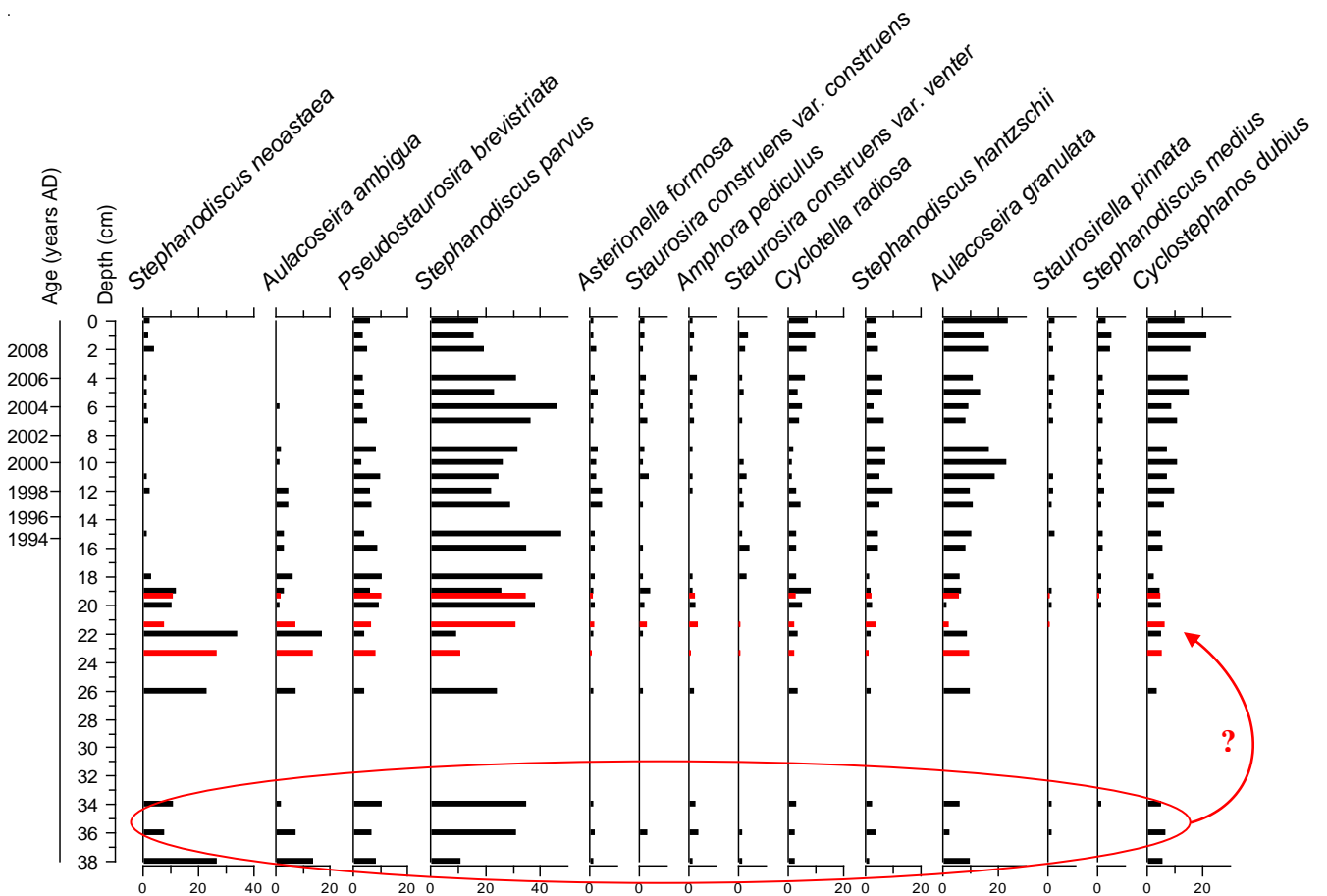
The degree of floristic change in the diatom assemblages between the bottom sample and every other sample in each core was assessed using the squared chord distance (SCD) dissimilarity coefficient (Overpeck *et al.*, 1985) implemented in C2 (Juggins, 2003). This is preferred to other dissimilarity measures as it maximises the signal to noise ratio, it performs well with percentage data and has sound mathematical properties (Overpeck *et al.*, 1985). The scores range from 0 to 2 whereby 0 indicates that two samples are exactly the same and 2 that they are completely different. Scores less than 0.29, 0.39, 0.48 and 0.58 indicate insignificant change at the 1st, 2.5th, 5th and 10th percentile, respectively (Simpson, 2005; Simpson *et al.*, 2005).

Principal components analysis (PCA), an indirect ordination technique (ter Braak & Prentice, 1988), was used to analyse the variance downcore within the diatom assemblages of Lakes Rumian, Kiełpińskie and Lidzbarskie using C2 (Juggins, 2003). The technique summarises the main changes in the data and helps to identify zones of change within complex species-rich data sets. The sample scores for PCA axis 1 are given. Where scores between two neighbouring samples in the core differ markedly this indicates that the assemblages have undergone substantial change between these two points in the core. The scores are also plotted in the stratigraphic diagrams to illustrate the timing of any shifts and whether these were gradual or abrupt.

## 2.4 Core correlation issues

Following the diatom analysis it was clear at all three sites that data from the Kajak core samples did not follow the trends seen in the lower samples of the gravity cores. Consequently, further data analyses were undertaken to assess if the stratigraphies of the two cores were comparable. In addition to the diatom plots and resultant statistical analysis, loss on ignition (LOI) and dry weight data were used to provide comparisons between the cores. The data from Lake Rumian are presented here to illustrate the approach taken and issues arising (Figure 1).

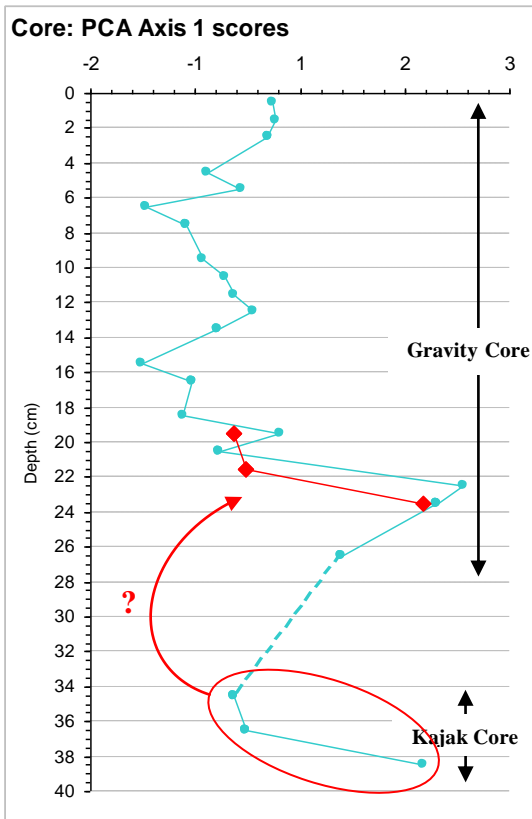
Figure 1 Diatom stratigraphy of the Lake Rumian cores with the lower samples (Kajak) superimposed in red onto the gravity core at 19-23 cm



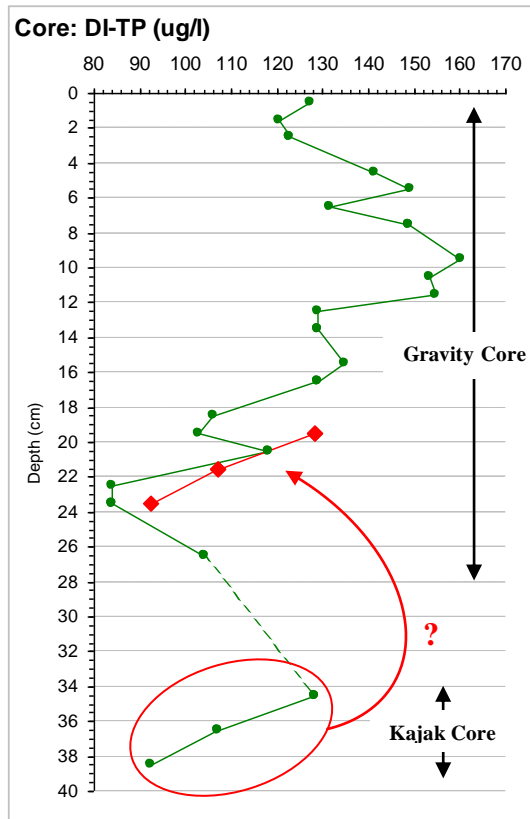
At Lake Rumian the gravity corer was used to collect sediments to a depth of 28 cm and a separate Kajak core was taken to extend this depth to 39 cm. The three samples analysed from the deeper Kajak sediments had very similar diatom assemblages and relative species abundance to samples analysed in the region of 19 – 22 cm of the gravity core (Figure 1). Furthermore, the species recorded from these deeper sediments did not appear to follow the trends in species abundance seen in the gravity core samples. Principal components analysis (PCA) of the diatom data demonstrate the similarity of the Kajak samples with the 18 – 22 cm samples from the gravity core (Figure 2a) and consequently the diatom assemblages within these groups of samples return very similar trends in modelled TP (Figure 2b).

Figure 2 Physical and biological data plots with the lower section of the Lake Rumian core (Kajak core) superimposed in red at the 19-23 cm level of the gravity core data

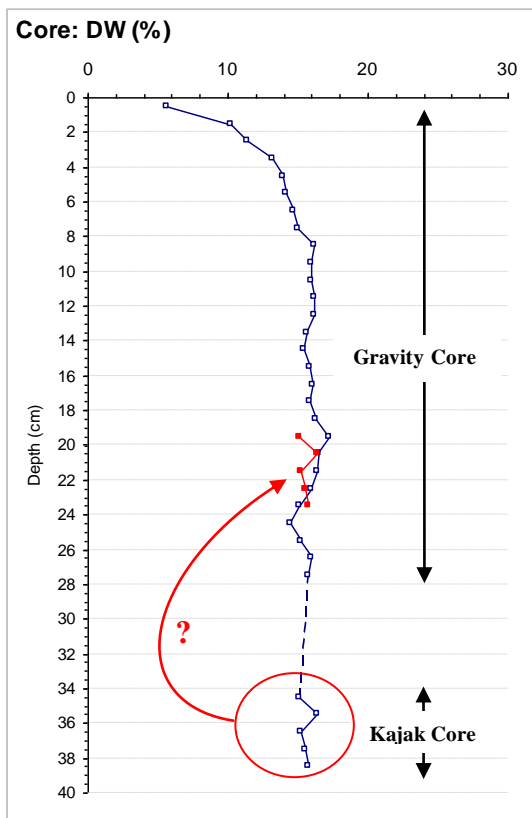
a)



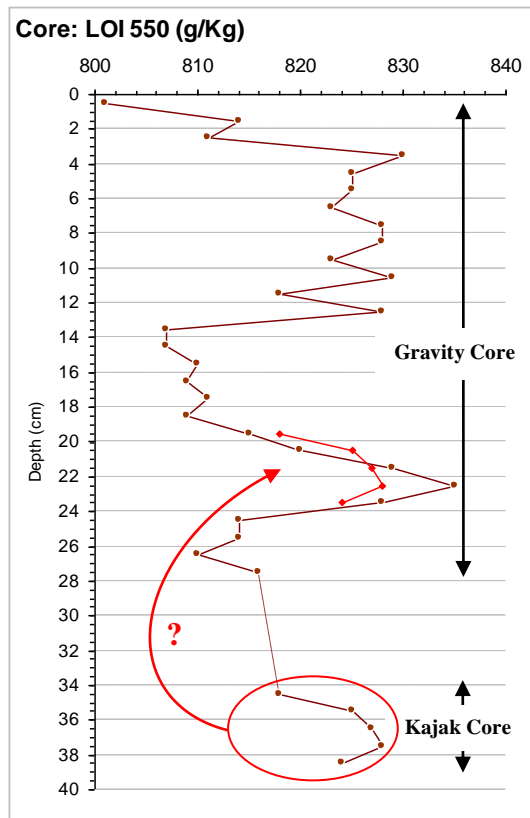
b)



c)



d)





Further evidence that the Kajak core overlaps the lower section of the gravity core comes from the physical characteristics of the sediments. The dry weight of the sediments varied very little in the gravity core, but the organic content (expressed as loss on ignition) shows a distinct peak between 19 – 24 cm which appears to be mirrored by the samples from the Kajak core (Figure 2d). Concentrations of  $^{210}\text{Pb}$  were also slightly higher in the base of the Kajak core (38 cm) than the base of the gravity core (DHI 2009). These features were also seen in the cores collected from Lake Kielpinskie and Lake Lidzbarskie (see Appendix 2).

The similarities within the Rumian cores (and those from Lake Kielpinskie and Lake Lidzbarskie) do not offer conclusive evidence of a non-contiguous chronology but they do suggest that the Kajak cores may not simply extend the gravity core records. When two different corers are used there is always a risk that the stratigraphies will not naturally slot on top of each other as different types of corer can result in differential compression of the sediments. It was therefore considered appropriate to discount the Kajak core data in this study rather than risk an incorrect interpretation of the results. The Kajak samples were also discarded for the low resolution study of the seven additional sites and hence only the top and bottom samples of the gravity cores were used in each case.

### 3 LAKE RUMIAN

#### 3.1 Diatom analysis

Twenty-two samples were analysed for diatoms in the Lake Rumian core (Table 3). A total of 118 diatom taxa were observed in the cores with between 36 and 50 taxa per sample. The samples were not particularly diverse with N2 values between 4.2 and 10.6. The samples were generally dominated by planktonic diatoms representing ~70 to 80% of the total count. The results for the major taxa are shown in Figure 3 and the full dataset is presented in Appendix 1. Most of the abundant taxa were represented in the diatom-TP training set with between 93–99% of the assemblage being represented in all samples.

There were notable changes in the assemblages during the period represented by the core with three zones identified by cluster analysis. The chronology produced by DHI (2009) was used to assign dates to the upper 16 cm of the core. The accumulation rates were high with 16 cm representing ~1993 and the full 28 cm gravity core being estimated to represent only the last 35 - 40 years.

##### *Zone 1 (26–22 cm); ~ mid 1970's (extrapolated estimate of age)*

Zone 1 was dominated by *Stephanodiscus neoastraea* and *S. parvus* with *Aulacoseira ambigua* and *A. granulata* also common. *Cyclostephanos dubius* and *S. medius* were less common in this zone than the upper two zones. *Pseudostaurosira brevistriata* was the only non-planktonic taxon common in this zone. This largely planktonic assemblage is typical of relatively nutrient rich conditions. PCA axis 1 scores were high and the DI-TP reconstruction suggests that TP concentrations were 84 and 104  $\mu\text{g L}^{-1}$ , showing the site to have been nutrient rich at this time. The slightly lower TP value at 22-23 cm is a result of a lower abundance of *S. parvus* recorded in this sample.

##### *Zone 2 (22-3cm) ~1980 - 2006*

Zone 2 was dominated by *Stephanodiscus parvus*, and differed from Zone 1 in the decline of *S. neoastraea* and *Aulacoseira ambigua* and the increased abundance of *Cyclostephanos dubius*, *Aulacoseira granulata* and *Stephanodiscus hantzschii*. Also within the plankton, *Cyclotella radiosia* remained relatively constant through this zone along with low numbers of *S. medius* and *Asterionella formosa*. A number of small, non-planktonic 'Fragilaria complex' taxa were present throughout this zone including: *Pseudostaurosira brevistriata*, *Staurosira construens* (var. *construens* & var. *venter*) and *Staurosirella pinnata*. There was only slight variation within the common taxa with this stability reflected in the PCA axis 1 scores which show only minor changes within Zone 2. The dissimilarity scores between the bottom of Zone 1 and the other samples was low (SCD < 0.4) indicating little floristic change. The DI-TP reconstruction shows an overall increase in TP concentrations compared to Zone 1, with concentrations reaching a maximum of 160  $\mu\text{g L}^{-1}$  at 10 cm (~ 2000), indicative of hypereutrophic conditions. The DI-TP values decreased slightly between 10-4 cm to ~140  $\mu\text{g L}^{-1}$ .

##### *Zone 3 (3-0 cm); ~2006 - 2009*

The diatom flora in Zone 3 was similar to that in Zone 2. Subtle changes in the relative abundance of the common species included a decline of *Stephanodiscus parvus* and very slight increases in *Cyclostephanos dubius*, *Stephanodiscus medius* and *Aulacoseira granulata*. These changes resulted in a slight increase in PCA axis 1 scores at the Zone 2/3 boundary, but no significant change in the SCD scores was observed. The DI-TP concentrations decreased slightly relative to the top of Zone 2, but remained high at ~120-130  $\mu\text{g L}^{-1}$  indicating that hypertrophic conditions exist at the site to the present day.

#### 3.2 Discussion

The analysis of palaeoecological data from Lake Rumian indicate that it has been nutrient-rich for the entire period represented by the core. It should be stressed however, that the sediment dating indicated the 16 cm level to be only 16 years old (DHI, 2009) and extrapolation of these dates back

to the lower section of the core suggests that the sediment record covers only ~40 years. Throughout the period represented by the core the lake has supported a diatom flora associated with very productive waters, and the lake shows evidence that it has increased in productivity over this period. In particular, diatom species such as *Stephanodiscus parvus*, *S. hantzschii* and *Cyclostephanos dubius* have been observed in numerous eutrophic waters worldwide and are common in sediments from highly enriched lakes (e.g. Bennion *et al.*, 1996). While there is evidence that Lake Rumian had slightly lower trophic status at the period represented by the base of the core, it is considered unlikely to represent the reference diatom community for this lake type and a longer sediment core would be needed to determine the pre-enrichment diatom assemblages. The diatom-P transfer function indicates that concentrations were ~ 100  $\mu\text{g L}^{-1}$  in the 1970's.

During the 1980's and 1990's the diatom assemblage was dominated by species commonly found in eutrophic to hypertrophic waters, with *Stephanodiscus parvus* in particular dominating Zone 2 of the core. A gradual increase in *Cyclostephanos dubius* and *S. hantzschii* was also seen towards the top of the core. Even over the relatively short period represented by this core, the diatom-P model suggests that the lake has become further enriched, reaching a TP maximum of ~160  $\mu\text{g L}^{-1}$  by the year 2000. A decrease in *S. parvus* in the uppermost section of the core (representing the last ~10 years) suggests that the site may have experienced a slight decline in nutrient status. The inferred TP value for the surface sample of 127  $\mu\text{g L}^{-1}$  is an overestimate compared to the measured mean TP (75  $\mu\text{g L}^{-1}$ ), but both values indicate the lake to be currently eutrophic. The overestimation is likely to arise due to the large number of lakes in the training set with TP concentrations > 100  $\mu\text{g L}^{-1}$ . Such sites tend to be dominated by the same taxa as those observed in the Lake Rumian core.

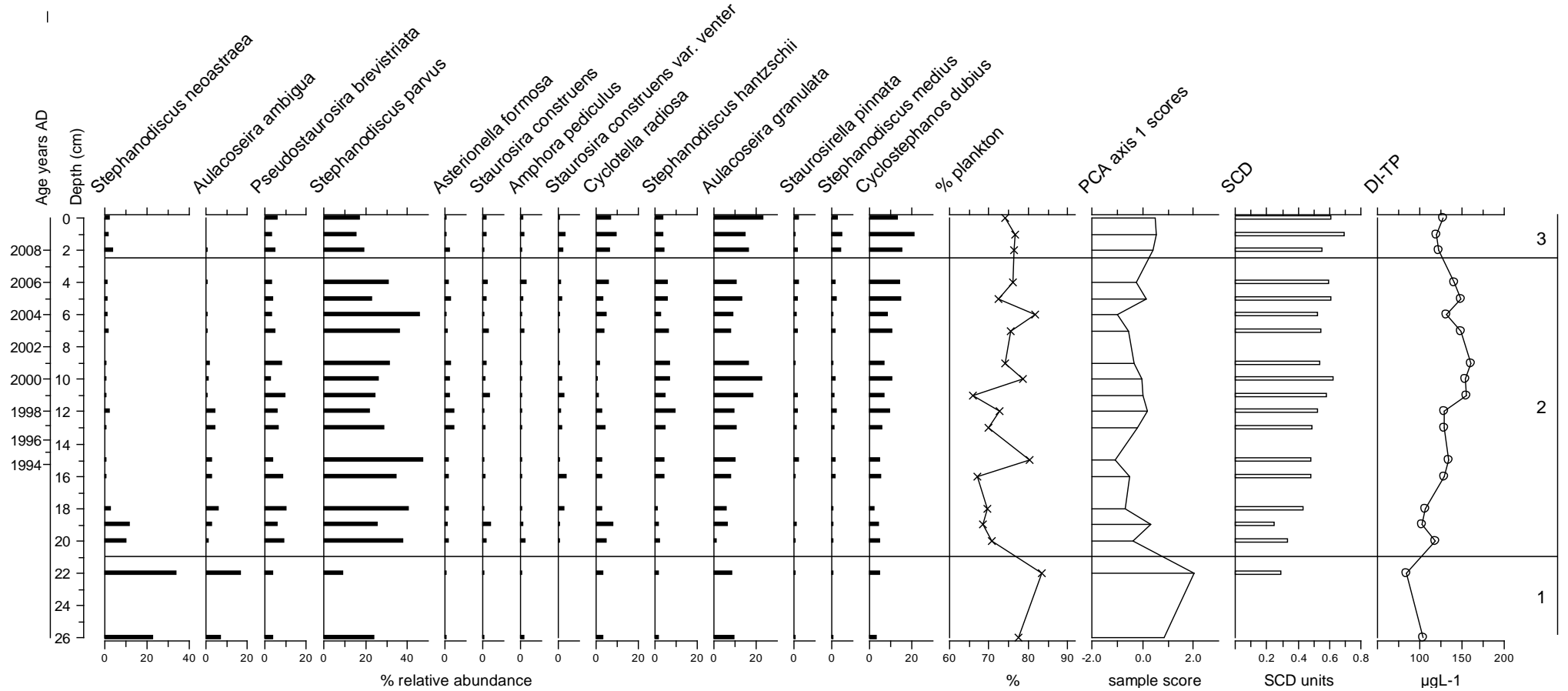
Due to the high sediment accumulation rate, the analysis of a longer core is recommended for Lake Rumian in order to determine the pre-enrichment diatom assemblages and to provide a more comprehensive assessment of the timing and degree of change at this site.

Table 3 Results of the diatom analysis on the Lake Rumian core

Depth (cm)	No. of taxa	N2	DI-TP $\mu\text{g L}^{-1}$	SCD	PCA axis 1 scores
1	39	8.32	127	0.61	0.491
2	37	8.63	120	0.70	0.554
3	43	9.33	123	0.56	0.410
5	44	6.91	141	0.60	-0.266
6	46	9.15	149	0.61	0.131
7	42	4.20	132	0.53	-0.992
8	41	5.96	149	0.55	-0.542
10	42	6.57	160	0.54	-0.331
11	44	6.89	153	0.63	-0.023
12	41	8.13	155	0.59	0.010
13	48	10.58	129	0.53	0.185
14	45	8.31	129	0.50	-0.214
16	38	4.00	135	0.49	-1.072
17	45	6.63	129	0.49	-0.513
19	43	5.16	106	0.44	-0.696
20	43	9.43	103	0.26	0.329
21	36	5.61	118	0.34	-0.367
23	35	5.83	84	0.30	2.044
27	41	7.35	104	0.00	0.862
35	46	6.39			
37	47	7.83			
39	37	7.76			

The shaded samples are from a separate Kajak core which were analysed for diatoms but were not included in the statistical analyses owing to uncertainties surrounding the chronology (see text for explanation)

Figure 3 Summary diatom diagram of the Lake Rumian core



## 4 LAKE KIELPIŃSKIE

### 4.1 Diatom analysis

Twenty samples were analysed for diatoms from the Lake Kielpińskie core (Table 4). A total of 71 diatom taxa were observed in the core with between 21 and 32 taxa per sample. Diatom preservation was good, except in the samples 24-25 cm and 26-27 cm where there was evidence of dissolution. The samples were not particularly diverse, N2 values being 5-10 in the lower core and frequently < 5 in the upper core. The samples were generally dominated by planktonic diatoms varying from ~60 to 90% of the total count. The results for the major taxa are shown in Figure 4 and the full dataset is presented in Appendix 1. Most of the abundant taxa were represented in the diatom-TP training set with over 95% of the assemblage being represented in all samples.

There were changes in the assemblages during the period represented by the core with four zones identified by cluster analysis. The chronology produced by DHI (2009) was used to assign dates to the upper 16 cm of the core.

#### *Zone 1 (28-23 cm); ~early 1900s (extrapolated estimate of age)*

Zone 1 was not dominated by any single taxon and contained numerous planktonic species including *Cyclotella comensis*, typically associated with relatively unproductive waters, and several taxa more commonly found in nutrient-rich conditions, such as *Stephanodiscus neoastraea*, *Cyclotella radiosa*, *Cyclostephanos dubius* and *Stephanodiscus parvus*. A number of non-planktonic 'Fragilaria complex' taxa were also present, namely *Pseudostaurosira brevistriata*, *Staurosirella pinnata* and *Staurosira construens*. The assemblage was relatively stable in this zone with only minor fluctuations in the relative percentage abundances. This stability is reflected in the PCA axis 1 scores which show only minor changes within Zone 1. The dissimilarity scores between the bottom sample and the other samples in Zone 1 were low (SCD < 0.4) indicating little floristic change. The DI-TP reconstruction suggests that TP concentrations were relatively high in Zone 1 at ~70-75  $\mu\text{g L}^{-1}$ , thereby indicating nutrient-rich conditions. The DI-TP value for the 24-25 cm was somewhat higher at 100  $\mu\text{g L}^{-1}$ , largely as a result of the lower percentage of *Cyclotella radiosa* in this sample which has a low TP optimum in the dataset.

#### *Zone 2 (23-19 cm); pre-1950*

The diatom assemblages in Zone 2 were different from those in Zone 1 in that *Stephanodiscus parvus* increased to ~35% of the total count and *Aulacoseira ambigua* comprised ~20% of the assemblage. Conversely *Cyclotella comensis* and the non-planktonic *Fragilaria*-complex taxa declined, and there was an increase in the overall percentage of planktonic diatoms. This suggests that there were habitat shifts in the lake with a move towards a more plankton dominated system and a reduced light climate for the benthic taxa. The other notable feature of Zone 2 was the decline in *Cyclostephanos dubius* to negligible amounts. It should be noted that there was dissolution in the Zone 1 samples which was not evident in the Zone 2 samples and, therefore, some of the observed shifts may be attributed to preferential preservation issues. For example, *Cyclostephanos dubius* is a heavily silicified, robust diatom that may have been less susceptible to dissolution than the more lightly silicified *Aulacoseira* forms. The shift in the species assemblage at the Zone 2/3 boundary was reflected in a sharp decrease in PCA axis 1 scores, and an increase in SCD scores as the assemblage continued to deviate from that found in the basal sample. The DI-TP concentrations remained at ~70  $\mu\text{g L}^{-1}$ , thereby indicating eutrophic conditions.

#### *Zone 3 (19-7cm); ~1940-1990*

This zone was characterized by a further increase in *Stephanodiscus parvus* to > 50% of the assemblage and a decline in *Aulacoseira ambigua*. The relative abundances of the other common taxa remained much the same as in Zone 2. The compositional change resulted in

a further decrease in PCA axis 1 scores but SCD scores were relatively stable at ~0.5-0.6 indicating a moderate degree of change from the bottom sample. The DI-TP concentrations increased slightly at the Zone 2/3 boundary and then remained relatively stable throughout Zone 3 at ~80-90  $\mu\text{g L}^{-1}$ .

#### *Zone 4 (7-0cm); 1990-2009*

This diatom flora in this zone was similar to that in Zone 3. The only notable differences were the slight decline in the relative abundance of *Stephanodiscus parvus* and concomitant increases in *Cyclostephanos dubius* and *Stephanodiscus medius*. Hence, the PCA axis 1 scores increased at the Zone 3/4 boundary. The SCD scores declined slightly to ~0.4 as the assemblage became more similar to that observed in the lower part of the core. The DI-TP concentrations fluctuated throughout this zone but remained high at ~80-90  $\mu\text{g L}^{-1}$  indicating eutrophic conditions to the present day.

## 4.2 Discussion

The palaeoecological data indicate that Lake Kiełpińskie has been nutrient-rich for the whole period represented by the core. If the sediment accumulation rates calculated for the upper section of the core are extrapolated back to the lower core then the sediment record is estimated to cover less than 100 years. It would seem, therefore, that the lake has supported a diatom community associated with productive waters for at least the last century. The *Stephanodiscus* and *Cyclostephanos* taxa found in the earliest samples have been observed in numerous eutrophic waters worldwide and are commonly seen to increase in sediment records as lakes become progressively enriched (e.g. Bennion *et al.*, 1996). Thus, it is unlikely that this represents the reference diatom community for this lake type and a longer sediment core would be needed to determine the pre-enrichment diatom assemblages. The diatom-P transfer function indicates that concentrations were ~ 70  $\mu\text{g L}^{-1}$  around 100 years ago.

There is evidence of enrichment in the early 1900s with an increase in the planktonic diatom component and in *Stephanodiscus parvus*, in particular. The decrease in *Cyclotella comensis*, which is typically found in nutrient-poor waters, and the reduced relative abundance of the non-planktonic species in Zone 2 suggests that the lake became more productive at this time, possibly with deterioration in the light climate which would have favoured the planktonic forms over those living attached to the plant and sediment surfaces. The diatom-P model suggests that TP concentrations increased slightly to values of ~ 80-90  $\mu\text{g L}^{-1}$  in Zone 3 associated with the expansion of *Stephanodiscus parvus*. This taxon has continued to dominate the assemblages to the present day, although there has been a slight resurgence in *Cyclostephanos dubius* and *Stephanodiscus medius* since ~1990, both taxa which were abundant in Zone 1. Nevertheless, the upper core samples are comprised of taxa typically found in nutrient-rich waters. The inferred TP value for the surface sample of 93  $\mu\text{g L}^{-1}$  indicates that the lake is currently eutrophic and this is in good agreement with the measured mean TP concentration of 105  $\mu\text{g L}^{-1}$ .

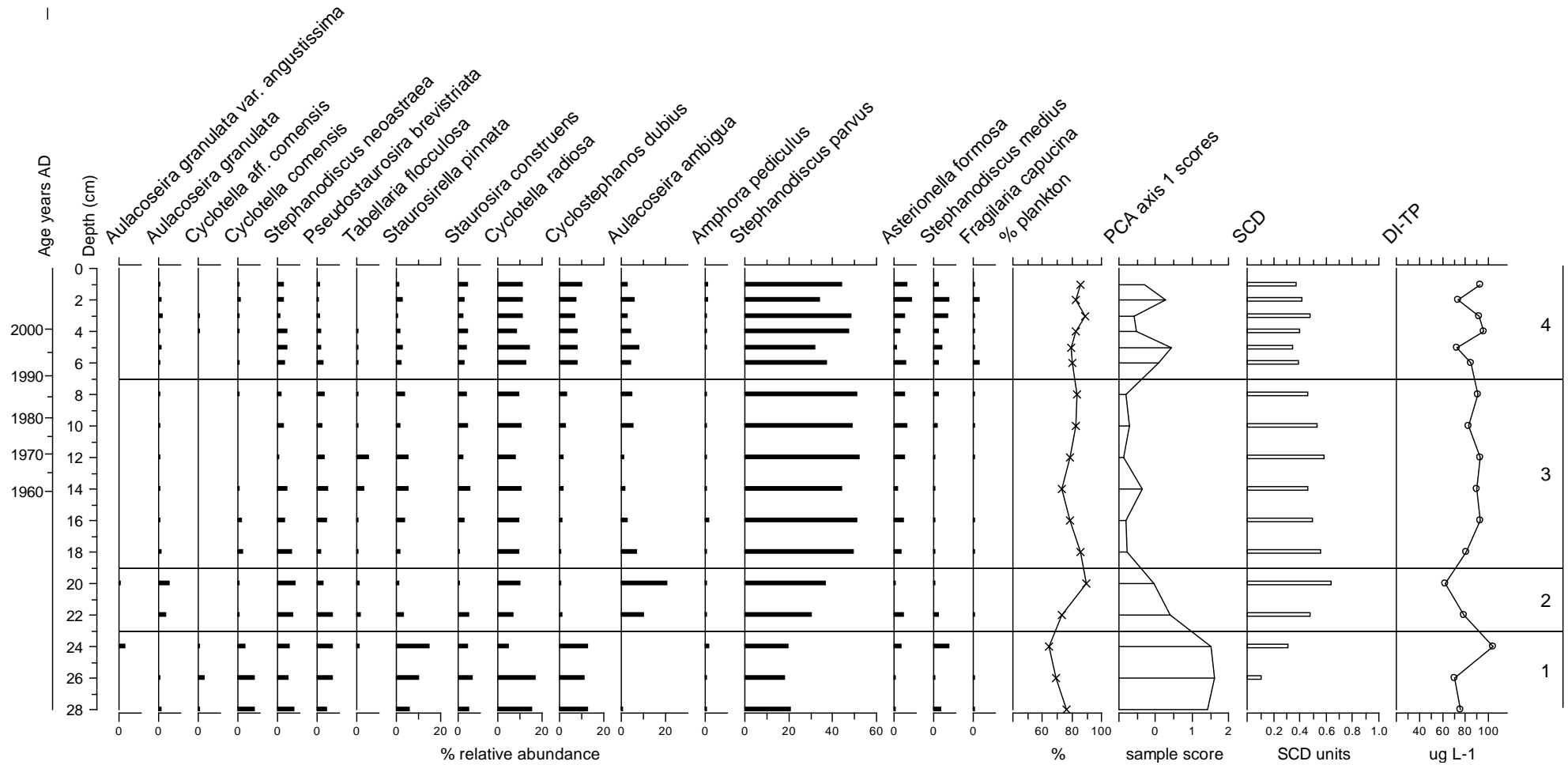
The analysis of a longer sediment core is recommended to determine the pre-enrichment diatom assemblages and to provide a more comprehensive assessment of timing and degree of change at this site.

Table 4 Results of the diatom analysis on the Lake Kiełpińskie core

Depth (cm)	No. of taxa	N2	DI-TP $\mu\text{g L}^{-1}$	SCD	PCA axis 1 scores
1	26	4.28	93	0.38	-0.29
2	29	6.26	74	0.42	0.26
3	23	3.74	92	0.48	-0.60
4	29	3.94	96	0.41	-0.51
5	32	6.59	73	0.36	0.44
6	31	5.52	85	0.40	0.10
8	23	3.45	91	0.47	-0.81
10	27	3.73	83	0.54	-0.71
12	27	3.37	93	0.60	-0.89
14	32	4.37	89	0.47	-0.35
16	30	3.50	93	0.50	-0.80
18	29	3.65	81	0.57	-0.78
20	21	4.81	62	0.65	-0.06
22	28	7.45	79	0.49	0.41
24	24	9.43	104	0.32	1.52
26	25	8.54	71	0.11	1.62
28	24	8.76	75	0.00	1.43
34	25	3.79			
36	33	5.05			
38	23	6.34			

The shaded samples are from a separate Kajak core which were analysed for diatoms but were not included in the statistical analyses owing to uncertainties surrounding the chronology (see text for explanation)

Figure 4 Summary diatom diagram of the Lake Kiełpińskie core





## 5 LAKE LIDZBARSKIE

### 5.1 Diatom analysis

Twenty samples were analysed for diatoms in the Lake Lidzbarskie core (Table 5). A total of 99 diatom taxa were observed in the core with between 28 and 43 taxa per sample. Diatom preservation was good throughout, with no evidence of dissolution. The samples were not very diverse, N2 values being < 10 with the exception of the bottom sample of the gravity core which had an N2 value of 13. All samples were dominated by planktonic diatoms comprising ~80-90% of the total assemblage. The results for the major taxa are shown in Figure 5 and the full dataset is presented in Appendix 1. Most of the abundant taxa were represented in the diatom-TP training set with over 97% of the assemblage being represented in the majority of samples.

There were modest changes in the assemblages during the period represented by the core with four zones identified by cluster analysis. The chronology produced by DHI (2009) was used to assign dates to the upper 20 cm of the core.

#### *Zone 1 (36-23 cm); ~1960-1975 (extrapolated estimate of age)*

Zone 1 was characterized by a wide range of planktonic species typically associated with nutrient-rich waters, including, in order of relative abundance; *Stephanodiscus parvus* (~15-30%), *Cyclostephanos dubius* (~10-15%), *Stephanodiscus* cf. *agassizensis* (~2-10%), *Fragilaria crotonensis* (~2-10%). Although planktonic diatoms were dominant in this zone, Zone 1 also contained the highest percentage relative abundance of non-planktonic diatom taxa (~20%, comprising mostly small benthic '*Fragilaria* complex' taxa) and had the greatest diversity of all zones. The PCA axis 1 scores fluctuated within Zone 1, indicating slight compositional shifts between the bottom sample and the two other samples in this zone. However, the dissimilarity scores between the bottom sample and the other samples in Zone 1 were between ~0.5 and 0.6 indicating only a moderate degree of floristic change. The DI-TP value of 92  $\mu\text{g L}^{-1}$  for the core bottom sample was the lowest for the entire core although it is still indicative of nutrient-rich conditions. DI-TP values for the other samples in this zone were ~130-140  $\mu\text{g L}^{-1}$ , thereby indicating a degree of nutrient-enrichment.

#### *Zone 2 (23-15.5 cm); ~1975-1984*

This zone was split into sub-zones 2a and 2b. Zone 2a (23-18.5 cm) was characterized by a marked increase in the relative abundance of *Cyclostephanos dubius* (to 30-40%) and a concomitant decrease in *Stephanodiscus parvus* (to ~10%). The abundance of *Stephanodiscus hantzschii* increased markedly from <10% to 15-30%. Zone 2b (18.5-15.5 cm) saw similar abundances of *S. hantzschii* to those recorded in Zone 2a, but the relative abundance of *C. dubius* decreased to ~20% and that of *S. parvus* increased to 25-45%. The changes in the relative abundances of these taxa resulted in large shifts in the PCA axis 1 scores in Zone 2. An increase in the SCD scores to ~0.7-0.8 occurred associated with the deviation from the assemblages seen in the core bottom sample. DI-TP values increased to ~200-250  $\mu\text{g L}^{-1}$  in this zone, signalling a period of enrichment.

#### *Zone 3 (15.5-12.5cm); ~1984-1989*

This zone was characterised by a significant decrease in the relative abundance of *S. parvus* (to <5%), a decline of slightly greater magnitude than that seen in Zone 2a. A further feature of Zone 3 was the increase in relative abundances of both *Aulacoseira ambigua* and *Aulacoseira granulata*. Furthermore there were slight increases in *Cyclotella radiososa* and *Asterionella formosa*, taxa typically associated with mesotrophic rather than eutrophic or hypertrophic waters, which were also present in the core bottom sample. *Stephanodiscus* cf. *agassizensis* which was present in Zones 1 and 2 decreased to negligible amounts. The floristic shifts resulted in a large change in PCA axis 1 scores at the Zone 2/3 boundary and a slight decline in SCD scores as the assemblage became more similar to that observed at

the core base. The DI-TP values decreased to  $\sim 140 \mu\text{g L}^{-1}$  suggesting a reduction in nutrient status in the mid-1980s.

#### *Zone 4 (12.5-0 cm); ~1989-2009*

This zone was characterised by high percentages of the three planktonic, centric diatoms, *S. parvus* ( $\sim 20\%$ ), *S. hantzschii* ( $\sim 10\text{-}20\%$ ) and *C. dubius* ( $\sim 20\text{-}30\%$ ). The *Aulacoseira* spp. remained an important component of the flora ( $\sim 15\%$ ) and *C. radiosa* and *A. formosa* jointly comprised  $\sim 10\%$  of the total assemblage. The assemblages in this zone were relatively stable reflected by only small fluctuations in PCA axis 1 scores. Nevertheless, one notable feature was the gradual decline in *S. hantzschii* relative to *C. radiosa* and *A. formosa* towards the top of the core which resulted in a slight decrease in SCD scores to values of  $\sim 0.5$  at the core top. The DI-TP values remained relatively stable at  $\sim 170 \mu\text{g L}^{-1}$  in the lower part of this zone but declined slightly towards the core surface to a minimum value of  $\sim 120 \mu\text{g L}^{-1}$ .

## 5.2 Discussion

The palaeoecological data indicate that Lake Lidzbarskie has been nutrient-rich for the entire period represented by the core. If the sediment accumulation rates calculated for the upper section are extrapolated back to the lower core then the sediment record is estimated to cover approximately 50 years. The lowest nutrient concentration of  $92 \mu\text{g L}^{-1}$  was inferred for the bottom of the core ( $\sim 1960$ ). There was then a period of enrichment with increasing nutrient concentrations throughout the 1960s and 1970s and floristic shifts towards an assemblage associated with very productive waters. The highest nutrient concentrations were inferred for the period representing the 1970s to early 1980s when DI-TP values exceeded  $200 \mu\text{g L}^{-1}$ . Subsequently, nutrient concentrations decreased from the mid-1980s, remaining relatively stable at  $\sim 170 \mu\text{g L}^{-1}$ , and then continued to decrease slightly over the last decade to current DI-TP values of  $\sim 120 \mu\text{g L}^{-1}$ . Several taxa typically found in mesotrophic waters increased towards the upper part of the core, suggesting some degree of improvement in water quality in recent years. The slight increase in DI-TP at the core surface may be due to a 'seasonal artefact' arising from a summer diatom bloom at the time of core collection. The reconstructed values are somewhat higher than the current measured TP of the lake of  $66 \mu\text{g L}^{-1}$ , suggesting that the model has over-estimated TP concentrations for this site. This may arise because most of the lakes in the training set that contain the same taxa as those observed in the Lake Lidzbarskie samples have very high TP concentrations and were also smaller and shallower sites (mostly  $< 3$  m mean depth) than Lidzbarskie which is a relatively deep lake (mean depth 10 m).

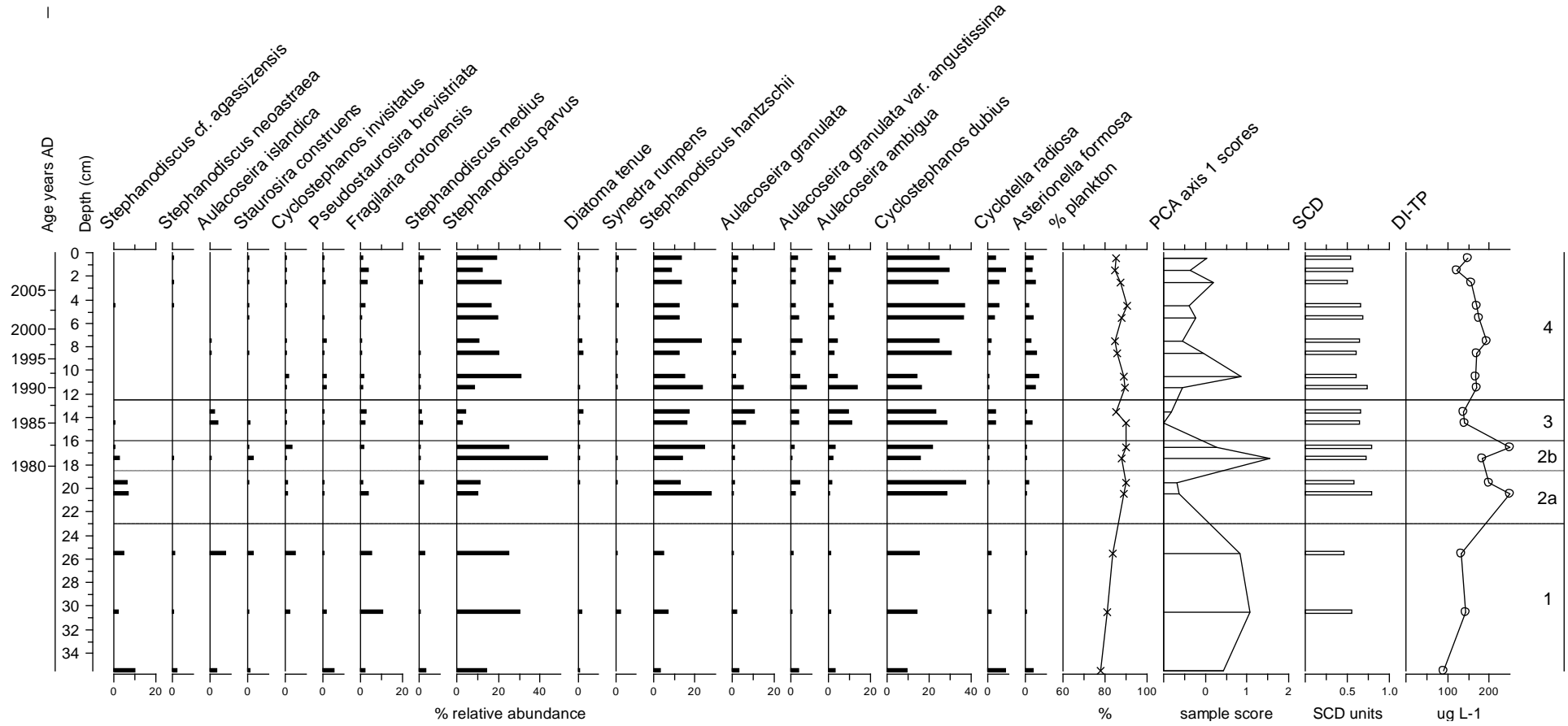
The palaeoecological data indicate that Lake Lidzbarskie has supported a diatom community associated with productive waters for at least the last half century. The *Stephanodiscus* and *Cyclostephanos* taxa found in the earliest samples have been observed in numerous eutrophic waters worldwide and are commonly seen to increase in sediment records as lakes become progressively enriched (e.g. Bennion *et al.*, 1996). Thus it is unlikely that this represents the reference diatom community for this lake type and a longer sediment core would be needed to determine the pre-enrichment diatom assemblages and to provide a more comprehensive assessment of the timing and degree of change at this site.

Table 5 Results of the diatom analysis on the Lake Lidzbarskie core

Depth (cm)	No. of taxa	N2	DI-TP $\mu\text{g L}^{-1}$	SCD	PCA axis 1 scores
0.5	40	7.57	149	0.55	0.05
1.5	38	7.49	121	0.58	-0.37
2.5	37	7.17	157	0.51	0.18
4.5	35	5.16	170	0.67	-0.39
5.5	36	4.97	177	0.69	-0.23
7.5	34	6.73	193	0.66	-0.55
8.5	34	6.07	171	0.61	-0.05
10.5	34	6.33	168	0.62	0.86
11.5	35	7.21	171	0.75	-0.54
13.5	39	7.71	140	0.67	-0.82
14.5	37	7.00	141	0.66	-0.99
16.5	32	5.44	249	0.80	0.28
17.5	31	4.04	184	0.73	1.54
19.5	35	5.28	198	0.59	-0.67
20.5	35	5.44	250	0.81	-0.63
25.5	38	8.68	134	0.47	0.84
30.5	40	7.10	144	0.57	1.07
35.5	43	13.26	92	0.00	0.42
40.5	32	3.95			
45.5	28	6.87			

The shaded samples are from a separate Kajak core which were analysed for diatoms but were not included in the statistical analyses owing to uncertainties surrounding the chronology (see text for explanation)

Figure 5 Summary diatom diagram of the Lake Lidzbarskie core



## 6 LOWER RESOLUTION ANALYSIS OF SEVEN LAKES

### 6.1 Diatom analysis

Two samples (from the gravity core top and bottom) were analysed for diatoms in each of the cores from Dąbrowa Wielka, Dąbrowa Mała, Zarybinek, Tarczyńskie, Grądy, Hartowieckie and Zwiniarz (Table 6). The results for the major taxa in each core are shown in Figure 6 and the full dataset is presented in Appendix 1. Most of the abundant taxa were represented in the diatom-TP training set with over 95% of the assemblage being represented in all samples with the exception of the bottom sample of the Dąbrowa Wielka core where representation was only 87%.

Table 6 Results of the diatom analysis on the seven Polish cores

Sample code	No. of taxa	N2	DI-TP $\mu\text{g L}^{-1}$	SCD	% plankton
DABW00	40	6.45	42	0.98	75
DABW30	55	14.78	73		62
DABM00	36	10.18	62	0.78	87
DABM40	49	3.49	100		77
ZARY00	49	9.77	150	0.40	37
ZARY30	53	8.97	124		36
TARC00	35	7.45	144	0.33	85
TARC27	45	10.71	178		71
GRAD00	29	5.20	212	0.56	91
GRAD30	41	6.30	154		74
HART00	30	8.50	101	1.16	79
HART35	25	6.62	132		8
ZWIN00	33	6.66	113	0.83	81
ZWIN30	25	7.68	119		42

### 6.2 Discussion

The analysis of the diatom assemblages in the top and bottom samples of the seven gravity cores revealed a variety of changes. The cores were not dated and, therefore, the time period represented by the core bottom samples is not known. It is unlikely that the cores from the seven lakes cover the same time period as sediment accumulation rates will vary from site to site depending on catchment sources and within lake production. Nevertheless in our interpretation we assume that the core top sample represents present day conditions and the core bottom sample represents some time in the past. It should also be noted that analysis of only two samples per core is unable to provide information on changes that have occurred in the period between the two samples. For example, the top sample may suggest that the lake is less productive today than in the past but it is quite possible that the lake could have experienced enrichment in the intervening period and is showing signs of recovery only in recent years.

Of the seven study lakes, Zarybinek and Tarczyńskie exhibit the least change in diatom composition with SCD scores of only 0.4 and 0.33, respectively, between the core bottom and top samples. Zarybinek is comprised of a mix of non-planktonic and planktonic taxa typically associated with nutrient-rich lakes including the '*Fragilaria*' taxa (e.g. *Pseudostaurosira brevistriata*, *Staurosirella pinnata*), *Stephanodiscus parvus* and *Cyclostephanos dubius*. The DI-TP results give high concentrations of 124 and 150  $\mu\text{g L}^{-1}$  for the bottom and top samples, respectively. These values are somewhat lower than the current measured mean of the lake which is in excess of 400  $\mu\text{g L}^{-1}$ . Tarczyńskie has a plankton dominated assemblage including *Cyclostephanos dubius*, *Stephanodiscus hantzschii*, *Aulacoseira granulata* and *Aulacoseira ambigua*, taxa typically found in productive, alkaline waters. The diatom model produced high concentrations of 178 and 144  $\mu\text{g L}^{-1}$  for the bottom

and top samples, respectively, indicating that the lake was nutrient rich in the past and remains so today. The reconstructed values are in reasonable agreement with the current measured TP of  $94 \mu\text{g L}^{-1}$ .

The diatom shifts observed in three of the lakes are indicative of enrichment. Hartowieckie exhibits the greatest amount of change with a SCD score of 1.16 between the core bottom and top sample and a marked increase in the planktonic component from 8 to ~80%. The most notable shifts are the decline of the non-planktonic '*Fragilaria*' taxa and the increase in *Stephanodiscus parvus* and *Cyclostephanos dubius*. Similar changes were observed in the Zwiniarz core with a SCD score of 0.83 between core bottom and top samples, an increase in planktonic taxa from ~40-80%, and marked increases in *Stephanodiscus parvus* and *Cyclostephanos dubius*, in addition to *Cyclotella radiosa*, relative to the non-planktonic '*Fragilaria*' taxa. In both lakes these shifts suggest major habitat shifts with a move towards dominance of planktonic taxa. This is typically associated with eutrophication as increased planktonic production leads to deterioration in the light climate thus reducing the available habitat for benthic forms living on the surface sediments or attached to plant and rock surfaces (e.g. Vadeboncoeur *et al.*, 2003).

The ecological interpretation is not supported by the DI-TP results, however, which suggest that both lakes had high concentrations in excess of  $100 \mu\text{g L}^{-1}$  in the past and have not experienced an increase over time. The transfer function appears to under-estimate TP concentrations for Hartowieckie based on comparison with measured current data. There are no nutrient data available for Zwiniarz to make such a comparison with the model output. The main explanation for this is the high percentage abundance of benthic *Fragilaria* taxa in the bottom samples of the two lakes. These are cosmopolitan taxa with a wide TP tolerance and hence are poor indicators of changes in nutrient concentrations. They are commonly found in shallow lakes, often growing in situ on the surface sediments or attached to substrates such as stones and macrophytes. They can swamp the diatom assemblages in such lakes making it difficult to extract useful information regarding changes in water quality or to apply transfer functions to infer nutrient concentrations (e.g. Bennion *et al.*, 2001). Nevertheless, based on the compositional shifts in the cores, one can still interpret the changes as being indicative of eutrophication.

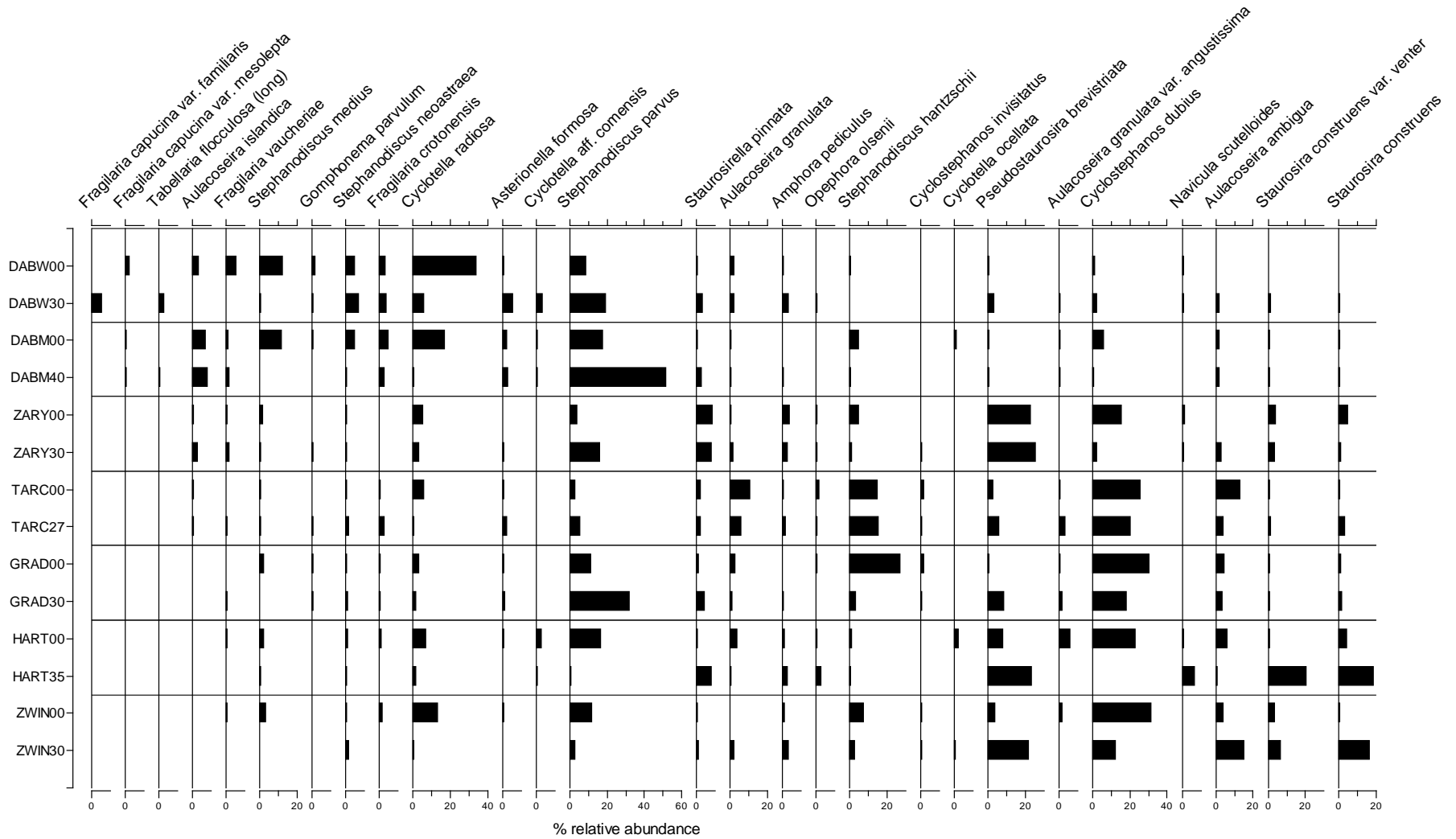
The third lake where the shifts are indicative of enrichment is Grądy, although here the data are more equivocal. The deviation from the core bottom sample is modest (SCD=0.56) and the increase in planktonic taxa is 74 to ~90%. The most notable change is the increase in *Stephanodiscus hantzschii* relative to *S. parvus*. The former has a higher TP optimum in the diatom training set and, therefore, the model infers higher values for the top than the bottom sample with concentrations of  $212$  and  $154 \mu\text{g L}^{-1}$ , respectively. The DI-TP value for the surface appears to over-estimate current concentrations which are measured as  $130 \mu\text{g L}^{-1}$ . A higher resolution study is recommended to assess the direction and nature of the changes in Grądy in more detail.

The data for Dąbrowa Wielka and Dąbrowa Mała suggest that the sites might be currently less productive than in the past. Both sites undergo a reasonable degree of change with SCD scores of 0.98 and 0.78 between their core top and bottom samples, respectively. There are no major habitat shifts as the assemblages of both the bottom and top samples are dominated by planktonic forms. Both lakes experience an increase in *Stephanodiscus medius* and *Cyclotella radiosa* and a concomitant decline in *S. parvus*. The two former taxa are typically associated with less productive lakes than *S. parvus* and hence the TP reconstructions infer a decline in concentrations at both sites. However, in Dąbrowa Mała there are higher percentages of *Stephanodiscus hantzschii* and *Cyclostephanos dubius* in the core tops compared with the core bottom samples, indicating that the lake still has a predominantly nutrient-rich diatom flora. The diatom data suggest that Dąbrowa Mała is somewhat more productive than Dąbrowa Wielka and this is in agreement with the measured TP concentrations for the two sites. It is difficult to draw any firm conclusions about

improvement in water quality on the basis of only two samples per core and the analysis of additional samples is therefore recommended to assess more fully the changes in species composition at these two lakes.

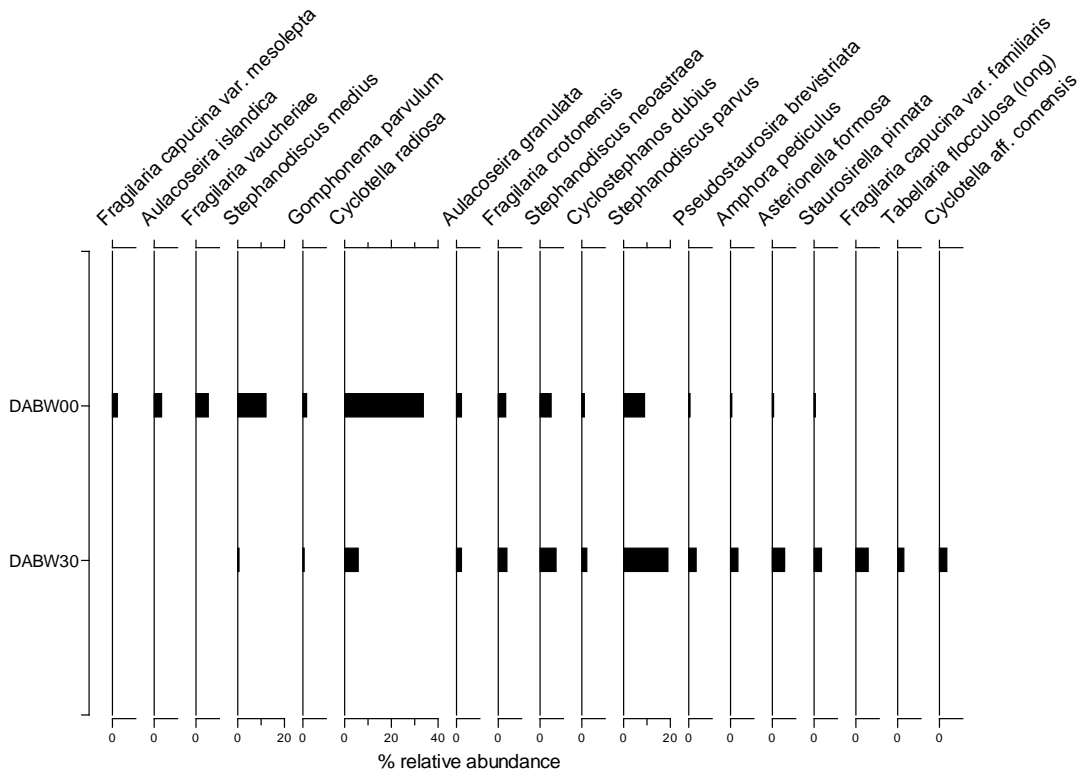
Figure 6 Summary diatom data from the seven Polish cores

a) Composite diagram showing summary data from all seven cores

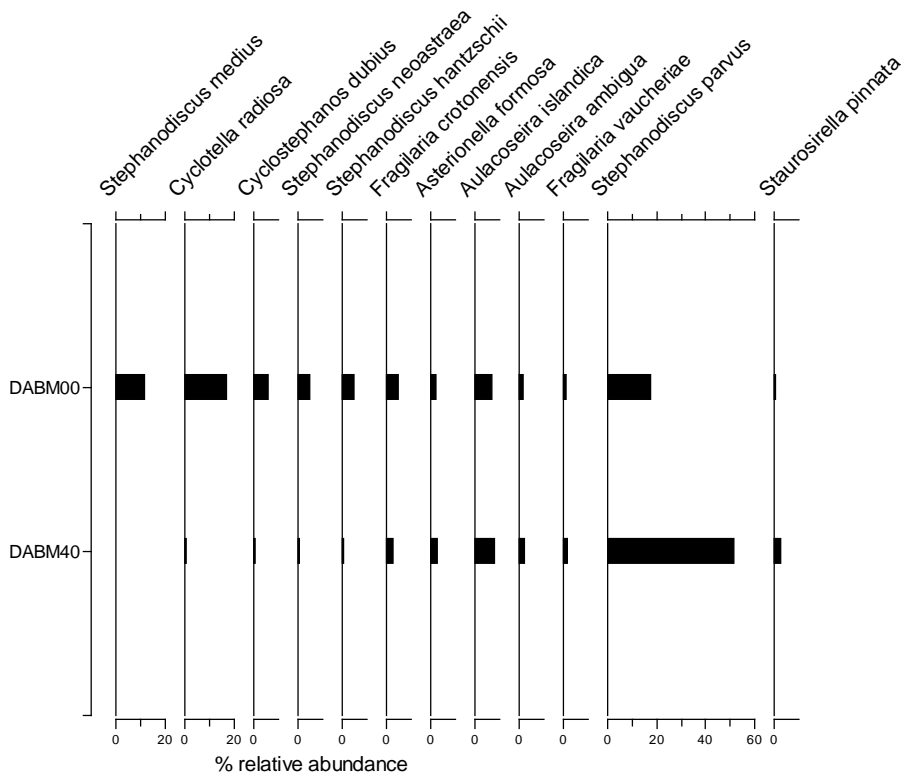




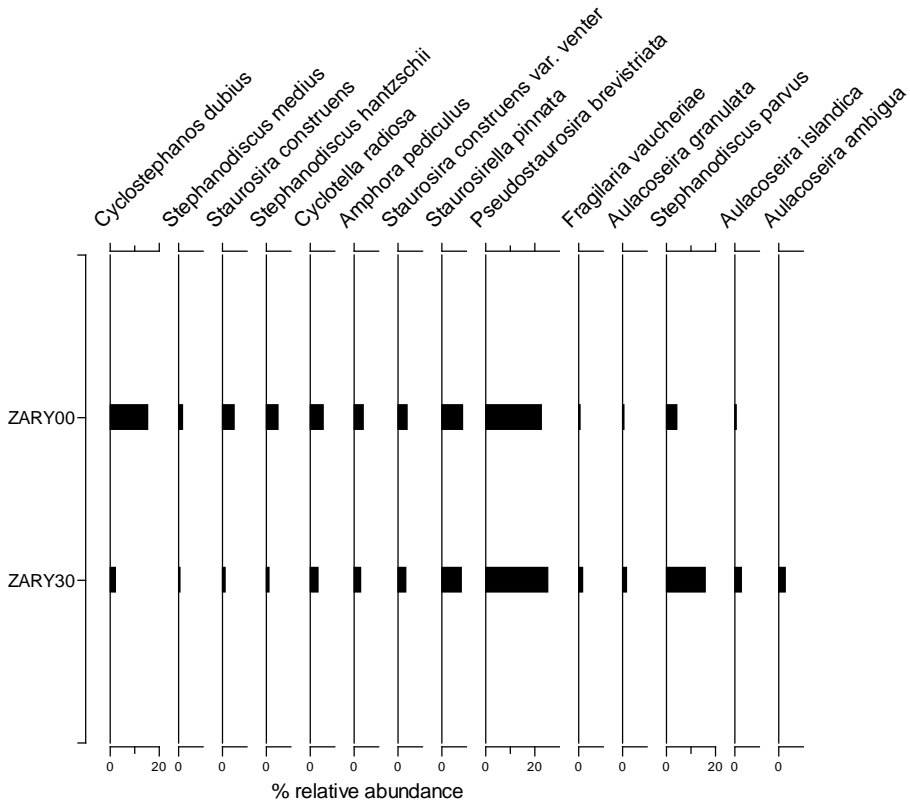
b) Summary diatom data for Dąbrowa Wielka



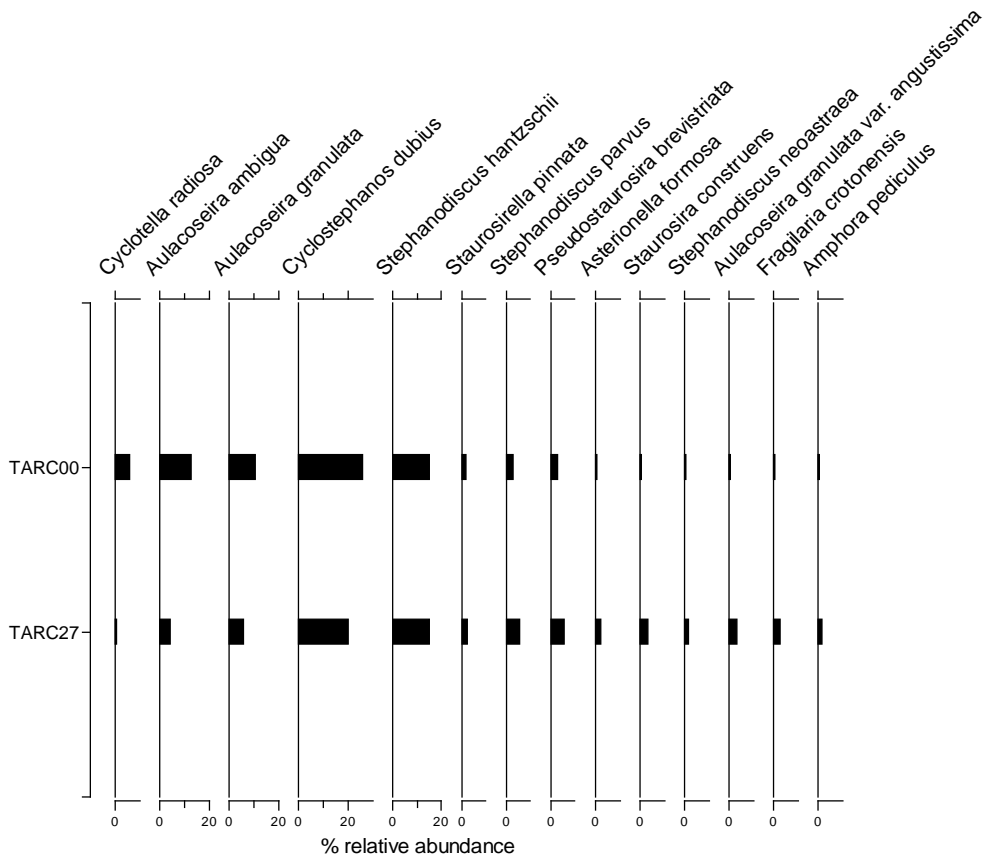
c) Summary diatom data for Dąbrowa Mała



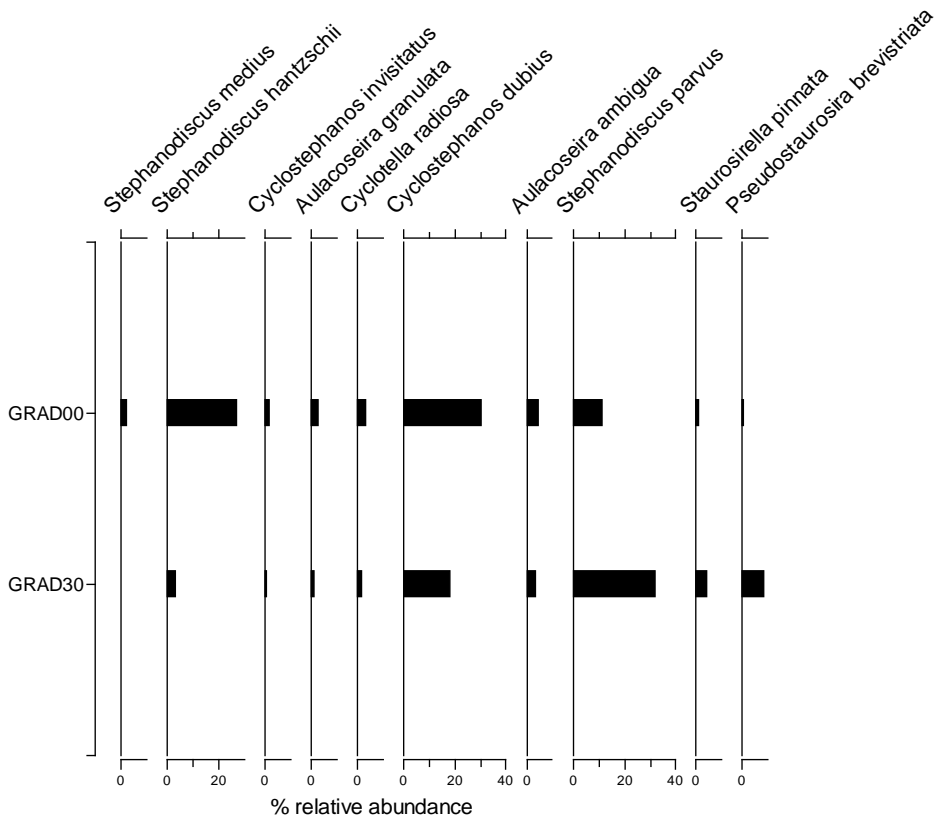
d) Summary diatom data for Zarybinek



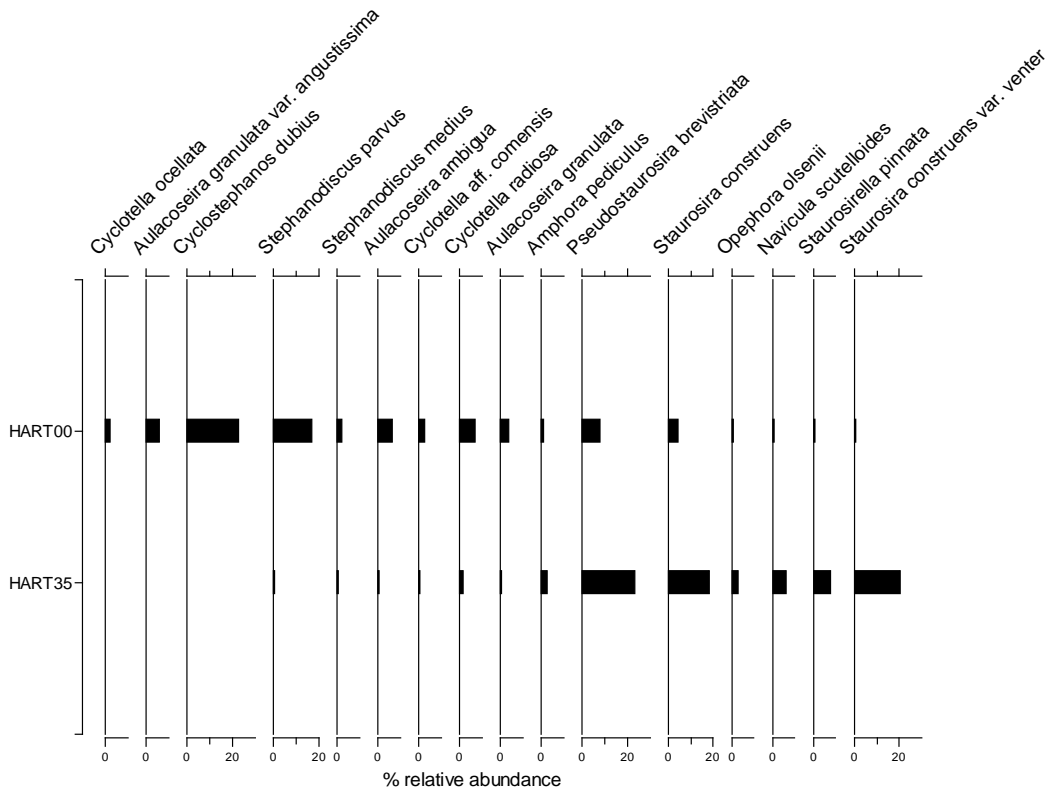
e) Summary diatom data for Tarczyńskie



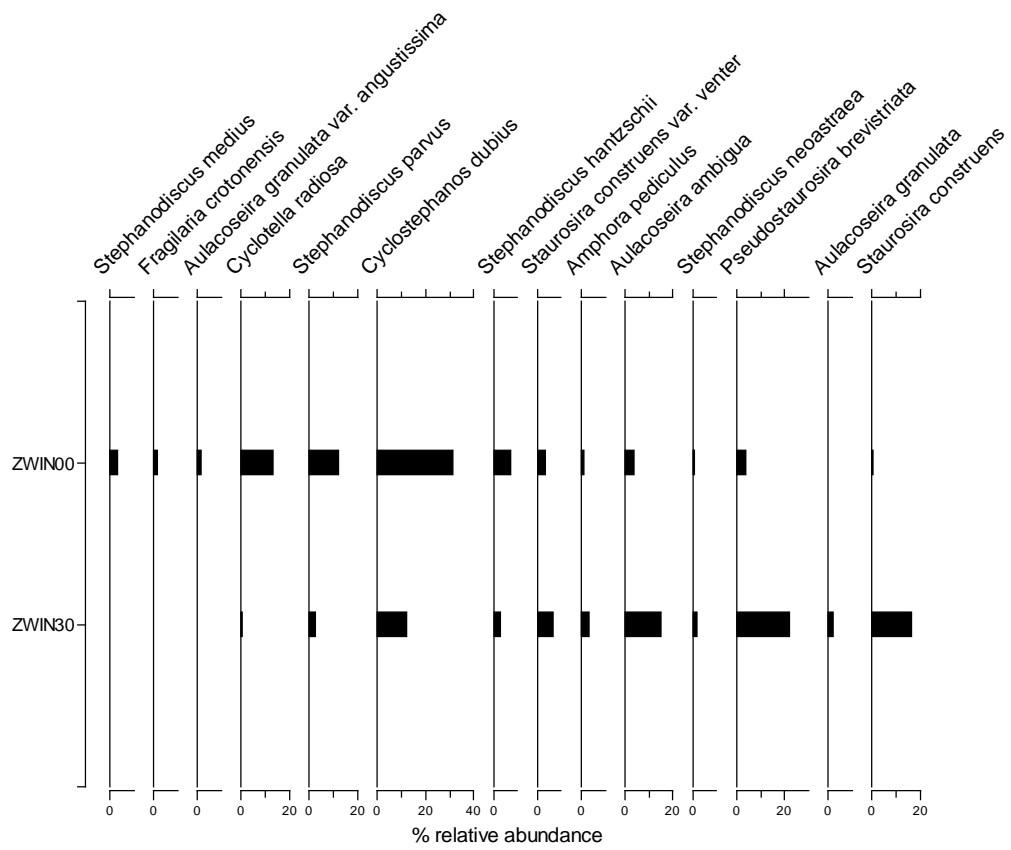
f) Summary diatom data for Grądy



g) Summary diatom data for Hartowieckie



h) Summary diatom data for Zwiniarz



## 7 SUMMARY

The palaeoecological study has determined the degree of ecological change for the study lakes. However, the pre-enrichment reference communities could not be defined for Lakes Rumian, Kiełpińskie and Lidzbarskie owing to the relatively short time period represented by the sediment cores (50-100 years). The cores from the seven sites analysed for top and bottom samples were not dated and, therefore, the time period represented by the core bottom samples is not known.

The data indicate that Lake Rumian has been nutrient-rich for the entire period represented by the core which is estimated to extend back ~40-50 years. Nevertheless, there is evidence of enrichment over this period with increases in taxa associated with highly enriched lakes in the 1980s-1990s. A decrease in *Stephanodiscus parvus* in the uppermost section of the core (representing the last ~10 years) suggests that the site may have experienced a slight decline in nutrient status in recent years. Due to the high sediment accumulation rate, the analysis of a longer core is recommended for Lake Rumian in order to determine the pre-enrichment diatom assemblages and to provide a more comprehensive assessment of the timing and degree of change at this site.

The data indicate that Lake Kiełpińskie has been nutrient-rich for the whole period represented by the core which is estimated to cover less than 100 years. There is evidence of enrichment in the early 1900s with an increase in the planktonic diatom component, particularly in *Stephanodiscus parvus*, a species associated with nutrient-rich waters, and a decrease in *Cyclotella comensis*, which is typically found in nutrient-poor waters. *S. parvus* continues to dominate the recent assemblages although modest increases in *Cyclostephanos dubius* and *Stephanodiscus medius* since ~1990, both taxa observed at the bottom of the core, perhaps point to a slight decline in productivity in the last few decades. As for Lake Rumian the analysis of a longer sediment core is recommended to determine the pre-enrichment diatom assemblages.

The data indicate that Lake Lidzbarskie has been nutrient-rich for the entire period represented by the core which is estimated to cover approximately 50 years. There is evidence of enrichment throughout the 1960s to early 1980s when the diatom flora was dominated by *Stephanodiscus* and *Cyclostephanos* taxa typical of nutrient-rich systems. Whilst these taxa continue to dominate the assemblages, there has been a slight increase in several taxa associated with mesotrophic waters in the last two decades, perhaps suggesting some improvement in water quality in recent years. As for Lake Rumian and Kiełpińskie, a longer sediment core would be needed to determine the pre-enrichment diatom assemblages of this site.

Of the seven cores analysed at the lower resolution of top and bottom samples, Zarybinek and Tarczyńskie exhibited the least change in diatom composition with diatom floras typically associated with nutrient-rich lakes including '*Fragilaria*' taxa, *Stephanodiscus parvus*, *Stephanodiscus hantzschii* and *Cyclostephanos dubius*. The data suggest that these two lakes were nutrient rich in the past and remain so today and there have been no major changes in species composition. At three lakes the diatom shifts were indicative of enrichment. At Hartowieckie and Zwiniarz there was a marked increase in the planktonic component with declines in the non-planktonic '*Fragilaria*' taxa and increases in *Stephanodiscus parvus* and *Cyclostephanos dubius*. These habitat shifts are typically associated with eutrophication as increased planktonic production leads to deterioration in the light climate thus reducing the available habitat for benthic taxa. However, an increase in TP concentrations was not inferred by the diatom transfer function owing to the high abundance of benthic *Fragilaria* taxa in the bottom samples of the two lakes. These are cosmopolitan taxa with a wide TP tolerance and hence are poor indicators of changes in nutrient concentrations. At Grądy the most notable change was an increase in *Stephanodiscus hantzschii* relative to *S. parvus* which could signal enrichment although a

higher resolution study is recommended to assess the direction and nature of the changes in more detail. At Dąbrowa Wielka and Dąbrowa Mała the data suggest that the sites might be currently less productive than in the past. Both lakes experienced an increase in *Stephanodiscus medius* and *Cyclotella radiosa*, taxa associated with less nutrient-rich conditions than *S. parvus*, the latter species being less abundant in the top samples. The analysis of additional samples from these two lakes is recommended to assess more fully the changes in species composition and to determine whether there is an improvement in water quality.

## 8 REFERENCES

- Battarbee R.W., Jones V.J., Flower R.J., Cameron N.G., Bennion H., Carvalho L. & Juggins S. 2001. Diatoms. In: Smol J.P, Birks H.J.B. & Last W.M (eds.), *Tracking Environmental Change Using Lake Sediments. Volume 3: Terrestrial, Algal, and Siliceous Indicators*, Kluwer Academic Publishers, Dordrecht, The Netherlands, pp. 155 -202.
- Bennion H., Appleby P.G. & Phillips G.L. 2001. Reconstructing nutrient histories in the Norfolk Broads: implications for the application of diatom-phosphorus transfer functions to shallow lake management. *Journal of Paleolimnology*, **26**, 181-204.
- Bennion, H., Juggins, S. & Anderson, N.J. 1996. Predicting epilimnetic phosphorus concentrations using an improved diatom-based transfer function and its application to lake eutrophication management. *Environmental Science and Technology*, **30**, 2004-2007.
- DHI 2009. <sup>210</sup>Pb-dating of three lake sediment cores from Poland. Report Project no.11091401, May 2009, 28 pp
- Grimm, E.C. 1987. CONISS: A Fortran 77 program for stratigraphically constrained cluster analysis by the method of incremental sum of squares. *Computer and Geosciences*, **13**, 13-35.
- Grimm, E.C. 2004. TGView version 2.0.2. Illinois State Museum, Springfield, USA.
- Hill, M.O. & Gauch, H.G. 1980. Detrended correspondence analysis, an improved ordination technique. *Vegetatio*, **42**, 47-58.
- Juggins, S. 1991. ZONE version 1.2 User guide. University of Newcastle, Newcastle upon Tyne, UK.
- Juggins, S. 2003. C<sup>2</sup> User guide. Software for ecological and palaeoecological data analysis and visualisation. University of Newcastle, Newcastle upon Tyne, UK, 69 pp.
- Krammer, K. & Lange-Bertalot, H. 1986-1991. Bacillariophyceae. 1-4 Teil.: In: H. Ettl, J. Gerloff, H. Heynig & D. Mollenhauer, eds. *Süßwasserflora von Mitteleuropa*. Stuttgart: Gustav Fischer Verlag.
- Overpeck, J.T., Webb, T. & Prentice, I.C. 1985. Quantitative interpretation of fossil pollen spectra - dissimilarity coefficients and the method of modern analogs. *Quaternary Research*, **23**, 87-108.
- Simpson G.L 2005. *Defining restoration targets for acidified upland lakes using diatom and cladoceran sub-fossil remains and the modern analogue approach*. Unpublished Ph.D Thesis. University of London.
- Simpson, G.L., Shilland, E. M., Winterbottom, J. M. & Keay, J. 2005. Defining reference conditions for acidified waters using a modern analogue approach. *Environmental Pollution*, **137**, 119-133.
- ter Braak, C.J.F. & Prentice, I.C. 1988. A Theory of Gradient Analysis. *Advances in Ecological Research*, **18**, 271-317.
- Vadeboncoeur Y., Jeppesen E., Vander Zanden M.J., Schierup H.H., Christoffersen K. & Lodge D.M. 2003. From Greenland to Green Lakes: cultural eutrophication and the loss of benthic pathways in lakes. *Limnology and Oceanography*, **48**, 1408-1418.

## APPENDIX 1 DIATOM DATA

### *Diatom data for the Lake Rumian core (% relative abundance)*

% data		Depth (cm)																			Kajak samples		
Full Name	Code	0	1	2	4	5	6	7	9	10	11	12	13	15	16	18	19	20	22	26	34	36	38
<i>Achnanthes conspicua</i>	AC023A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.3
<i>Achnanthes exigua</i>	AC008A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
<i>Achnantheidium minutissimum</i>	AC013A	0.3	0.0	0.3	0.3	0.0	0.3	0.5	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Amphora inariensis</i>	AM013A	0.0	0.0	0.0	0.0	0.6	0.0	0.5	1.0	1.0	0.3	0.6	0.0	0.5	0.7	0.3	0.3	1.3	1.3	0.3	0.6	0.6	0.3
<i>Amphora libyca</i>	AM011A	0.0	0.3	0.3	0.0	0.3	0.0	0.5	0.0	1.0	0.7	0.3	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.3	0.3	0.0
<i>Amphora ovalis</i>	AM001A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
<i>Amphora pediculus</i>	AM008A	1.6	2.0	1.2	3.0	1.5	1.0	1.9	1.3	0.3	1.0	1.3	0.7	0.3	0.3	1.0	1.8	2.5	0.3	1.9	2.6	3.4	0.9
<i>Aneumastus tusculus</i>	NA001A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.3
<i>Asterionella formosa</i>	AS001A	0.9	1.0	2.5	2.1	3.0	1.0	1.4	3.2	2.5	2.6	4.7	4.6	1.9	2.3	2.3	1.8	2.2	1.3	1.3	1.6	1.9	0.9
<i>Aulacoseira ambigua</i>	AU002A	0.0	0.0	0.6	0.6	0.0	1.3	0.3	2.2	1.6	0.7	4.7	4.6	3.0	3.0	6.6	3.4	1.9	17.1	7.6	2.2	7.5	14.2
<i>Aulacoseira granulata</i>	AU003A	23.5	15.5	16.8	11.0	13.9	9.3	8.6	16.8	23.2	19.2	10.1	11.2	10.6	8.7	6.2	7.0	1.6	9.0	10.1	6.4	2.5	10.1
<i>Aulacoseira islandica</i>	AU009A	0.6	0.3	0.6	0.0	0.6	1.3	0.5	0.3	1.0	0.0	0.0	0.0	0.0	0.3	0.7	0.9	0.0	0.0	0.0	0.0	0.0	0.0
<i>Caloneis bacillum</i>	CA002A	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
<i>Caloneis schumanniana</i>	CA004A	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cavinula scutelloides</i>	NA028A	0.0	0.0	0.3	0.3	0.0	0.3	0.5	0.0	0.0	0.3	0.0	0.0	0.3	0.3	0.3	0.3	1.3	0.3	0.3	0.3	0.3	0.3
<i>Centronella reicheltii</i>	FR075A	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cocconeis disculus</i>	CO010A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
<i>Cocconeis neothumensis</i>	CO067A	0.3	0.3	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.3	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
<i>Cocconeis pediculus</i>	CO005A	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.0	0.0	0.0	0.0	0.0
<i>Cocconeis placentula var. euglypta</i>	CO001B	0.0	0.3	0.0	0.6	0.3	0.6	0.3	0.0	0.0	0.7	0.0	0.0	0.8	0.7	0.3	0.6	0.3	1.0	0.3	0.3	0.0	0.3
<i>Cocconeis placentula var. lineata</i>	CO001C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cyclostephanos dubius</i>	CC001A	13.5	21.7	15.6	14.6	15.4	8.9	11.1	7.6	10.8	7.6	9.8	6.3	5.4	5.7	2.6	4.6	5.3	5.5	3.5	5.1	6.9	5.7
<i>Cyclostephanos tholiformis</i>	CC003A	0.0	0.0	0.0	0.3	1.5	1.3	1.1	1.3	1.3	1.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0
<i>Cyclotella comensis</i>	CY010A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
<i>Cyclotella meneghiniana</i>	CY003A	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cyclotella pseudostelligera</i>	CY002A	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0
<i>Cyclotella radiosa</i>	CY019A	7.2	10.2	6.9	6.3	3.9	5.1	4.3	1.9	1.3	1.3	3.2	4.6	3.3	3.3	3.3	8.2	5.3	3.9	3.5	3.2	2.5	2.8
<i>Cymbella affinis</i>	CM022A	0.6	0.0	0.3	0.0	0.0	0.0	0.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0
<i>Cymbella cistula</i>	CM006A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cymbella subaequalis</i>	CM050A	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cymbella tumida</i>	CM042A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
<i>Diatoma tenue</i>	DT004A	0.0	0.3	0.0	0.0	0.3	0.3	0.5	0.3	0.3	0.0	0.3	0.0	0.3	0.0	0.7	0.3	0.3	0.3	0.6	1.0	0.9	0.6
<i>Diatoma vulgare</i>	DT003A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Diploneis sp.</i>	DP9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



% data		Depth (cm)																			Kajak samples		
Full Name	Code	0	1	2	4	5	6	7	9	10	11	12	13	15	16	18	19	20	22	26	34	36	38
<i>Encyonema minutum</i>	CM031A	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.3	0.0	0.3	0.0
<i>Encyonema reichardtii</i>	CM113A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Encyonema silesiacum</i>	CM103A	0.3	0.0	0.3	0.0	0.3	0.3	0.5	0.0	1.0	0.3	0.6	0.3	0.3	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.6
<i>Eolimna minima</i>	NA042A	0.0	0.0	0.3	0.0	0.0	0.3	0.3	0.0	0.3	0.7	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Epithemia</i> sp.	EP9999	0.3	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.3	0.0	0.3	0.3	0.0	0.0	0.6	0.0
<i>Eucoconneis laevis</i>	AC083A	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Eunotia minor</i>	EU110A	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Fallacia subclucidula</i>	NA753A	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria bidens</i>	FR026A	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria capucina</i> var. <i>capucina</i>	FR009A	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.0	1.0	0.3	0.3	1.4	1.7	0.3	0.6	0.9	0.0	0.6	0.0	1.3	1.6
<i>Fragilaria capucina</i> var. <i>familiaris</i>	FR9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria capucina</i> var. <i>gracilis</i>	FR009H	0.0	0.0	0.0	0.3	0.3	0.0	0.8	0.0	0.3	0.3	0.3	0.0	0.3	0.7	0.7	0.3	0.3	0.0	0.0	0.3	0.0	0.0
<i>Fragilaria capucina</i> var. <i>mesolepta</i>	FR009B	0.3	0.7	0.0	0.0	0.0	0.0	0.5	0.0	0.3	0.0	0.0	1.3	0.5	0.3	1.3	0.0	0.0	0.0	0.3	0.6	0.3	0.0
<i>Fragilaria crotonensis</i>	FR008A	0.6	0.3	0.3	0.0	0.0	0.6	0.3	0.0	0.6	0.7	1.6	1.7	0.8	0.7	1.0	1.5	1.9	0.3	0.9	1.0	0.6	0.6
<i>Fragilaria radians</i>	FR059A	0.0	0.0	0.0	0.0	0.6	0.3	0.5	0.0	0.0	0.7	2.5	2.3	0.0	0.3	0.3	3.0	0.3	0.0	0.6	0.3	1.3	0.6
<i>Fragilaria vaucheriae</i>	FR007A	0.6	0.7	0.9	0.3	0.9	0.3	0.0	0.3	0.0	1.0	0.9	0.0	0.3	0.3	0.3	0.6	0.0	0.0	0.3	0.0	0.3	0.9
<i>Geissleria ignota</i> var. <i>acceptata</i>	NA433D	0.3	1.0	0.9	0.0	0.6	0.0	0.3	0.3	0.3	0.3	0.0	1.3	0.0	0.3	0.0	0.0	0.6	0.3	0.0	0.3	0.3	0.0
<i>Gomphoneis olivaceum</i>	GO001A	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.3	0.7	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.3	0.6
<i>Gomphonema angustum</i>	GO073A	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Gomphonema parvulum</i>	GO013A	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3
<i>Gomphonema pumilum</i>	GO080A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Gomphonema truncatum</i>	GO023A	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0
<i>Hippodonta capitata</i>	NA066A	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Hippodonta hungarica</i>	NA004A	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Karayevia clevei</i>	AC006A	0.6	0.3	0.6	0.0	1.2	1.0	0.8	0.6	0.6	0.3	0.3	1.0	0.0	1.0	0.0	0.6	0.6	0.3	0.0	0.3	1.3	0.0
<i>Kolbesia ploenensis</i>	AC049A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Lemnicola hungarica</i>	AC032A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Martyana martyi</i>	OP001A	0.3	0.0	0.0	0.0	0.9	0.6	0.0	0.3	0.3	0.3	0.0	0.3	0.3	0.7	1.0	0.9	1.3	0.3	1.9	1.6	1.6	1.3
<i>Melosira varians</i>	ME015A	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.0	0.3	0.0	0.0	0.0	0.0	0.0
<i>Meridion circulare</i>	MR001A	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula capitoradiata</i>	NA745A	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0
<i>Navicula cari</i>	NA051A	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.6
<i>Navicula cryptotenella</i>	NA751A	0.9	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.9	0.0
<i>Navicula gregaria</i>	NA023A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula menisculus</i>	NA030A	0.0	0.0	0.3	0.3	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
<i>Navicula praeterita</i>	NA578A	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula radiosa</i> var. <i>radiosa</i>	NA003A	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula reichardtiana</i>	NA768A	0.6	0.0	0.0	0.3	0.6	0.0	0.3	0.3	0.0	0.0	0.6	0.7	0.0	0.0	1.3	0.6	0.0	0.0	0.0	0.3	0.0	0.0
<i>Navicula reinhardtii</i>	NA026A	0.6	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0

% data		Depth (cm)																			Kajak samples		
Full Name	Code	0	1	2	4	5	6	7	9	10	11	12	13	15	16	18	19	20	22	26	34	36	38
<i>Navicula sp.</i>	NA9999	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula subrhyncocephala</i>	NA743A	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula subrotundata</i>	NA114A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.3	0.0	0.3	0.3	0.0	0.0
<i>Navicula tripunctata</i>	NA095A	0.3	0.3	0.3	0.3	0.0	0.3	0.5	0.6	0.3	0.3	0.3	0.7	0.5	0.3	0.3	0.0	0.3	0.3	0.0	1.0	0.0	0.0
<i>Navicula trivialis</i>	NA063A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula veneta</i>	NA054A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia amphibia</i>	NI014A	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.8	0.3	0.3	0.0	0.0	0.0	0.0	0.6	0.0	0.0
<i>Nitzschia dissipata</i>	NI015A	0.3	0.0	0.3	0.3	0.0	0.0	0.0	0.3	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia fonticola</i>	NI002A	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.5	0.7	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0
<i>Nitzschia heufleriana</i>	NI052A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia palea</i>	NI009A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia pumila</i>	NI150A	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia pura</i>	NI216A	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia recta</i>	NI025A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Nitzschia sociabilis</i>	NI166A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia sp.</i>	NI9999	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Opephora olsenii</i>	OP008A	0.0	0.0	0.3	0.0	0.6	0.0	0.0	0.3	1.0	1.0	0.0	0.7	1.1	1.0	0.3	0.9	0.9	0.0	0.6	0.6	0.3	1.3
<i>Placoneis clementis</i>	NA050A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
<i>Placoneis decussis</i>	NA317A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Planothidium granum</i>	AC158A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Planothidium lanceolatum</i>	AC001A	0.0	0.3	0.3	0.0	0.6	0.6	0.0	1.0	0.6	0.3	0.3	1.0	0.3	0.3	0.0	0.3	0.6	0.0	0.9	0.3	0.0	0.0
<i>Psammothidium lauenbergianum</i>	AC085A	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
<i>Pseudostaurosira brevistriata</i>	FR006A	6.6	3.9	5.3	3.9	4.5	3.5	5.1	8.9	3.5	10.3	6.6	7.3	4.3	9.3	10.8	6.7	9.7	4.5	4.1	10.6	7.2	8.5
<i>Reimeria sinuata</i>	CM003A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Rhoicosphenia abbreviata</i>	RC002A	0.3	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.6	0.0	0.3	0.0	0.3	0.3	0.3	0.6	0.0	1.0	0.3	0.3	0.3	0.3
<i>Sellaphora bacillum</i>	NA071A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0
<i>Sellaphora pupula</i>	NA014A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Sellaphora rotunda</i>	NA090A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.6	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.3	0.0
<i>Sellaphora vitabunda</i>	NA168A	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
<i>Staurosira binodis</i>	FR028A	2.5	0.7	0.9	0.3	0.9	0.6	1.6	1.3	0.6	1.3	0.3	1.3	0.8	2.7	1.0	1.2	0.9	1.3	1.3	1.3	0.3	2.5
<i>Staurosira construens var. construens</i>	FR002A	1.9	2.3	0.9	2.7	2.1	1.0	3.0	1.9	1.6	3.6	0.6	1.7	0.3	1.3	1.0	4.0	1.9	1.0	1.3	0.6	3.1	0.6
<i>Staurosira construens var. venter</i>	FR002C	0.3	3.6	2.5	1.5	2.1	0.6	0.8	0.6	2.2	3.0	1.6	2.0	0.8	4.0	3.3	0.3	0.6	0.0	0.0	0.6	0.9	0.9
<i>Staurosira elliptica</i>	FR018A	0.0	0.3	0.6	0.6	1.2	0.3	0.3	0.0	0.0	1.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Staurosirella leptostauron</i>	FR014A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Staurosirella pinnata</i>	FR001A	2.8	1.0	1.9	2.4	2.1	1.6	2.2	0.6	0.0	2.3	2.2	1.7	2.4	0.7	0.0	1.5	1.3	0.6	0.3	1.3	0.9	0.0
<i>Stephanodiscus hantzschii</i>	ST001A	4.4	3.9	4.7	6.5	6.5	3.2	6.8	7.6	7.6	5.3	10.1	5.3	4.6	4.7	1.6	2.1	2.5	1.9	2.2	2.6	4.1	1.6
<i>Stephanodiscus medius</i>	ST014A	3.1	5.3	4.7	2.1	2.7	1.3	2.2	1.3	2.2	1.7	2.8	1.3	2.2	2.3	1.3	1.2	0.9	0.3	0.6	1.0	0.6	0.0
<i>Stephanodiscus neoastreae</i>	ST022A	2.8	2.3	4.0	1.5	1.8	1.6	2.2	0.3	0.3	1.0	2.5	0.3	1.1	0.7	3.0	11.9	10.7	34.2	23.3	10.9	7.8	27.0
<i>Stephanodiscus parvus</i>	ST010A	17.6	15.8	19.6	31.3	23.1	46.3	36.8	31.7	26.3	24.8	22.5	29.4	47.7	35.0	41.0	25.9	38.4	9.7	24.3	34.9	31.3	11.0

% data		Depth (cm)																			Kajak samples			
Full Name	Code	0	1	2	4	5	6	7	9	10	11	12	13	15	16	18	19	20	22	26	34	36	38	
<i>Surirella sp.</i>	SU9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Synedra acus var. acus</i>	SY003A	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.3	0.3	0.0	0.3	0.0	0.0	0.3	0.7	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Synedra acus var. angustissima</i>	SY003C	0.3	0.3	0.9	0.6	0.6	0.3	0.0	0.6	0.3	0.0	1.3	0.3	0.0	0.7	0.3	0.6	0.0	0.3	0.0	0.6	0.6	0.3	0.3
<i>Synedra parasitica var. subconstricta</i>	SY004B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Synedra rumpens</i>	FR009G	0.0	1.0	0.6	0.3	0.6	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Synedra ulna</i>	SY001A	0.3	1.0	0.3	0.3	0.3	0.3	0.3	0.0	0.3	0.3	0.3	0.3	0.8	0.7	0.0	0.6	0.3	0.3	0.3	0.3	0.3	0.3	0.6
<i>Tabellaria [floculosa (long)]</i>	TA9998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.9	0.3	1.3	0.6	2.8	0.0	0.0
<i>Tryblionella angustata</i>	NI020A	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

**Diatom data for the Lake Kiełpińskie core (% relative abundance)**

% data		Depth (cm)																	Kajak core		
Full Name	Code	1	2	3	4	5	6	8	10	12	14	16	18	20	22	24	26	28	34	36	38
<i>Achnanthes exigua</i>	AC008A	0.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.3	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0
<i>Achnantheidium minutissimum</i>	AC013A	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Amphora libyca</i>	AM011A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.3	1.3	0.6	0.3	0.3
<i>Amphora pediculus</i>	AM012A	1.6	1.6	0.3	1.0	1.3	0.0	0.3	0.7	1.3	1.3	2.3	0.7	1.0	0.7	1.9	0.6	1.3	0.6	0.3	0.3
<i>Asterionella formosa</i>	AS001A	6.4	8.4	5.2	2.9	1.6	5.8	5.2	6.2	5.1	2.3	4.6	3.6	1.3	4.9	3.5	1.3	0.6	3.2	3.3	3.3
<i>Aulacoseira ambigua</i>	AU002A	3.2	6.5	3.2	4.6	8.5	4.8	5.2	5.9	1.6	2.3	2.9	7.6	21.3	10.8	0.0	0.0	1.0	6.1	15.0	17.4
<i>Aulacoseira granulata</i>	AU003A	1.3	1.6	1.9	0.3	1.6	1.3	0.3	0.3	1.0	1.3	0.3	1.6	5.5	3.6	0.0	1.3	1.6	5.8	4.2	14.1
<i>Aulacoseira granulata var. angustissima</i>	AU003B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	2.9	0.0	0.0	0.6	0.0	3.3
<i>Cavinula lapidosa</i>	NA152A	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Centronella reicheltii</i>	FR075A	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cocconeis neodiminuta</i>	CO066A	0.0	0.6	0.0	0.3	0.3	0.3	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
<i>Cocconeis placentula</i>	CO001B	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
<i>Craticula cuspidata</i>	NA056A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Craticula minusculoides</i>	NA512A	0.6	0.0	0.3	1.0	1.3	0.0	0.0	0.3	0.3	0.3	0.3	1.0	0.0	0.0	0.6	0.0	0.0	0.0	0.7	0.0
<i>Cyclostephanos dubius</i>	CC001A	10.6	7.8	7.4	8.5	8.2	8.4	3.6	3.0	2.2	2.3	1.6	0.7	0.6	1.6	13.2	11.8	13.3	1.3	1.3	1.0
<i>Cyclotella comensis</i>	CY010A	0.6	1.6	0.3	0.7	0.0	0.6	0.6	0.0	0.0	0.3	2.0	2.6	1.3	1.0	3.9	8.0	8.1	0.0	0.0	0.0
<i>Cyclotella comensis cf.</i>	CY9991	0.0	0.0	1.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	3.2	1.3	0.0	0.0	0.0
<i>Cyclotella cyclopuncta</i>	CY059A	0.0	0.0	0.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.7	0.0
<i>Cyclotella ocellata</i>	CY009A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.3	1.0	0.0
<i>Cyclotella pseudostelligera</i>	CY002A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
<i>Cyclotella radiosa</i>	CY019A	11.5	11.3	11.6	8.8	14.9	13.2	9.7	11.1	8.3	11.0	10.1	9.9	10.6	7.2	5.2	17.6	15.6	10.0	6.2	9.9
<i>Cymbella minuta</i>	CM031A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Cymbella sp.</i>	CM9999	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Diatoma tenuis</i>	DT004A	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Diploneis subovalis</i>	DP061A	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0
<i>Encyonema gracile</i>	CM018A	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Encyonema minutum</i>	CM103A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3
<i>Epithemia</i>	EP9999	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.6	0.0	0.3	0.0	0.0	0.3	0.0	0.0
<i>Epithemia andata</i>	EP007A	0.0	0.0	0.0	0.3	0.6	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
<i>Epithemia sorex</i>	EP001A	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.7
<i>Epithemia turgida</i>	EP004A	0.0	0.0	0.0	0.0	0.3	0.6	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
<i>Eunotia sp.</i>	EU9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria capucina</i>	FR009A	0.3	2.9	1.0	1.3	0.6	3.2	1.3	1.3	1.3	0.0	0.7	1.0	0.0	1.3	0.0	0.3	0.3	0.6	0.3	0.7
<i>Fragilaria crotonensis</i>	FR008A	0.6	0.0	0.3	0.3	1.3	1.0	1.0	1.0	0.3	0.0	0.3	1.6	0.3	0.0	0.0	0.0	0.3	0.6	0.7	0.0
<i>Fragilariforma exigua</i>	FR064A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.7	0.0	0.0	0.7	0.6	0.0	0.0	0.0	0.0	0.0
<i>Gomphonema parvulum</i>	GO013A	0.0	1.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.6	0.0	0.0
<i>Gomphonema truncatum</i>	GO023A	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

% data		Depth (cm)																	Kajak core				
Full Name	Code	1	2	3	4	5	6	8	10	12	14	16	18	20	22	24	26	28	34	36	38		
<i>Gyrosigma</i> sp.	GY9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7		
<i>Hippodonta capitata</i>	NA066A	0.6	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	1.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Karayevia clevei</i>	AC006A	0.0	0.0	0.0	0.0	0.9	0.3	0.0	0.3	0.0	0.0	0.7	0.0	0.6	1.3	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0
<i>Navicula cari</i>	NA051A	0.0	0.0	0.0	0.7	0.0	0.3	0.0	1.0	0.3	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0
<i>Navicula perminuta</i>	NA565A	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula praeterita</i>	NA578A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
<i>Navicula radiosa</i>	NA003A	0.0	0.3	0.0	0.0	0.6	0.0	0.0	0.3	0.6	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.7
<i>Navicula</i> sp.	NA9999	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia dissipata</i>	NI015A	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Nitzschia frustulum</i>	NI008A	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0
<i>Nitzschia linearis</i>	NI031A	0.0	0.0	1.9	0.3	0.0	1.0	0.0	0.3	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Nitzschia recta</i>	NI025A	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.3	0.0	0.0
<i>Nitzschia</i> sp.	NI9999	0.0	0.0	0.6	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Parlibellus protracta</i>	NA047A	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Pinularia</i>	PI9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Placoneis pseudoanglica</i>	NA744A	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.0	0.0	0.0	0.0	0.0
<i>Planothidium lanceolatum</i>	AC001A	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	1.3	0.0	0.0	0.3	0.0	0.0	0.0	0.3	1.0	0.0	0.0	0.7	0.0	0.0
<i>Psammothidium helveticum</i>	AC134A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
<i>Pseudostaurosira brevistriata</i>	FR006A	1.6	1.0	1.6	2.3	2.2	3.2	3.9	2.6	3.8	5.5	4.9	2.0	3.2	7.2	7.4	7.3	4.9	3.5	4.2	3.6	0.0	0.0
<i>Sellaphora bacillum</i>	NA071A	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Sellaphora pupula</i>	NA014A	0.0	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Staurosira binodis</i>	FR002B	0.6	0.0	0.3	0.3	1.3	0.3	0.6	0.0	0.0	0.0	0.0	0.3	0.0	1.3	0.3	0.3	0.6	0.0	0.3	0.3	0.0	0.3
<i>Staurosira construens</i>	FR002A	4.8	2.9	2.6	4.6	4.4	3.2	4.2	4.6	2.9	5.8	2.9	1.0	1.0	5.2	4.8	7.0	5.5	2.9	2.0	0.7	0.0	0.0
<i>Staurosirella leptostauron</i>	FR014A	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.3	1.0	0.0	1.0	0.0	0.7	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Staurosirella pinnata</i>	FR001A	1.6	2.9	0.6	2.0	3.2	2.9	4.2	2.3	6.1	5.8	4.2	2.0	1.6	3.9	15.5	10.5	6.5	2.9	2.0	0.3	0.0	0.0
<i>Stephanodiscus hantzschii</i>	ST001A	0.0	0.0	0.0	0.0	0.3	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Stephanodiscus medius</i>	ST014A	2.9	7.1	6.8	2.6	4.4	2.9	2.6	2.0	1.0	1.0	1.0	0.7	1.0	2.6	7.4	1.3	3.6	1.3	0.0	1.3	0.0	1.3
<i>Stephanodiscus neoastraea</i>	ST022A	3.2	2.9	1.6	4.6	4.7	3.9	2.3	3.0	1.3	4.5	3.6	6.6	8.4	7.2	5.8	5.4	8.1	3.9	7.5	13.5	0.0	0.0
<i>Stephanodiscus parvus</i>	ST010A	44.6	34.6	48.7	47.9	32.6	37.9	51.6	49.2	52.5	44.8	51.5	50.0	37.1	31.0	20.0	18.5	21.1	48.9	39.9	25.7	0.0	0.0
<i>Surirella</i> sp.	SU9999	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Synedra parasitica</i>	FR045A	0.0	0.3	0.0	0.3	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.7	0.6	0.7	0.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0
<i>Synedra ulna</i>	SY001A	0.3	1.0	1.0	0.7	0.9	1.6	0.6	1.3	0.6	0.3	0.7	2.0	0.0	1.6	1.3	1.6	0.6	1.3	0.3	0.3	0.0	0.3
<i>Synedra ulna</i> var. <i>acus</i>	SY003A	0.6	0.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.6	0.0	0.7	0.0	0.0	
<i>Tabellaria flocculosa</i>	TA001A	0.0	0.0	0.0	0.3	0.9	0.3	0.6	1.3	5.7	3.5	1.0	1.0	1.6	2.3	1.6	0.0	0.0	2.6	2.3	1.0	0.0	0.0

**Diatom data for the Lake Lidzbarskie core (% relative abundance)**

% data		Depth (cm)																		Kajak core	
Full Name	Code	0	1	2	4	5	7	8	10	11	13	14	16	17	19	20	25	30	35	40	45
<i>Psammothidium bioretii</i>	AC141A	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Karayevia clevei</i>	AC006A	0.0	0.0	0.0	0.4	0.5	0.3	0.4	0.0	0.0	0.2	0.0	0.0	0.0	0.3	0.2	0.3	0.6	1.2	0.0	0.0
<i>Achnanthes conspicua</i>	AC023A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.5	0.0	0.0	0.0	0.7	0.0
<i>Lemnicola hungarica</i>	AC032A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7	0.0
<i>Planothidium lanceolatum</i>	AC001A	0.6	0.3	1.8	0.3	0.8	1.4	1.7	0.3	0.9	0.5	0.2	1.8	0.3	0.3	0.2	0.6	1.0	0.9	0.4	0.5
<i>Achnantheidium minutissimum</i>	AC013A	0.6	0.0	0.8	0.3	0.0	1.4	1.1	0.6	0.6	1.0	0.0	0.0	0.0	0.3	0.2	0.0	0.6	0.6	0.4	0.0
<i>Amphora inariensis</i>	AM013A	0.6	0.6	0.0	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.0	0.0	0.0	0.3	0.0	0.0
<i>Amphora llybca</i>	AM011A	0.0	0.6	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5
<i>Amphora ovalis</i>	AM001A	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Amphora pediculus</i>	AM008A	0.0	0.6	0.0	0.0	0.5	0.6	0.3	1.6	0.6	0.0	0.7	0.0	0.6	0.3	0.0	0.9	1.3	2.4	0.0	0.0
<i>Amphora veneta</i>	AM004A	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Asterionella formosa</i>	AS001A	4.4	3.6	5.3	2.4	4.3	3.1	5.6	6.9	5.1	1.0	3.7	0.6	1.2	2.0	1.2	0.9	0.6	4.5	1.5	5.3
<i>Aulacoseira ambigua</i>	AU002A	3.8	6.3	2.4	2.7	3.2	4.8	3.4	5.0	14.2	9.9	11.4	3.6	2.6	2.0	1.0	1.8	1.6	3.6	0.0	2.9
<i>Aulacoseira granulata (coarse)</i>	AU003A	3.1	2.8	2.1	3.2	0.0	4.5	2.0	2.2	6.0	11.2	6.7	1.5	1.8	1.4	0.5	0.3	2.5	3.6	0.0	1.4
<i>Aulacoseira granulata (fine)</i>	AU003B	3.4	2.8	2.4	2.7	4.0	5.9	2.5	4.7	7.9	4.2	4.0	2.1	1.2	4.9	2.5	1.8	1.3	4.2	2.6	3.8
<i>Aulacoseira islandica</i>	AU009A	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.0	0.0	2.5	4.0	0.0	0.6	0.0	0.0	7.9	0.0	3.6	0.0	2.9
<i>Caloneis schumanniana</i>	CA004A	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cocconeis neothumensis</i>	CO067A	0.0	0.0	0.0	0.0	0.3	0.6	1.1	0.0	0.0	0.0	0.2	0.0	0.3	0.3	0.0	0.0	0.3	0.6	0.0	0.5
<i>Cocconeis pediculus</i>	CO005A	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.6	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0
<i>Cocconeis placentula var. euglypta</i>	CO001B	0.6	0.3	0.4	0.0	0.3	0.0	0.0	0.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cocconeis placentula var. lineata</i>	CO001C	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cocconeis placentula var. placentula</i>	CO001A	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0
<i>Cocconeis placentula var. pseudolineata</i>	CO001E	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.0	0.0
<i>Cyclostephanos dubius</i>	CC001A	25.0	29.8	24.8	37.2	37.0	25.2	31.0	15.0	17.1	23.8	29.0	22.3	16.1	38.2	28.7	15.8	14.6	9.8	12.8	19.1
<i>Cyclostephanos invisitatus</i>	CC002A	1.3	0.8	0.5	0.6	0.0	0.3	1.1	1.9	0.6	0.7	0.7	3.9	1.2	1.4	1.7	5.3	2.9	0.0	4.0	1.0
<i>Cyclostephanos tholiformis</i>	CC003A	0.9	0.8	1.3	1.5	0.0	0.6	0.6	0.9	1.3	0.2	0.7	0.6	0.3	0.0	1.0	0.0	0.6	0.0	0.4	2.4
<i>Cyclotella atomus</i>	CY011A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.2	0.0	1.2	0.0	0.0	0.7	1.0
<i>Cyclotella meneghiniana</i>	CY003A	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.6	0.3	0.0	0.2	0.3	0.0	0.6	0.2	0.0	0.0	0.3	0.0	0.0
<i>Cyclotella pseudostelligera</i>	CY002A	0.0	0.6	0.3	0.0	0.5	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cyclotella radiosa</i>	CY019A	4.4	8.8	5.5	5.6	3.5	2.2	1.7	0.6	0.3	4.0	4.0	0.9	0.3	0.9	0.2	2.3	2.2	8.9	0.0	0.5
<i>Cymbella cistula</i>	CM006A	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0
<i>Encyonema silesiacum</i>	CM103A	0.6	0.0	0.0	0.3	0.0	0.6	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
<i>Reimeria sinuata</i>	CM003A	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cymbella sp.</i>	CM9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
<i>Diatoma tenue</i>	DT004A	0.8	0.6	0.9	0.4	1.1	2.0	2.5	0.2	0.5	2.6	0.7	0.7	0.7	1.3	0.1	0.1	2.2	0.6	0.9	1.4
<i>Epithemia sp.</i>	EP9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
<i>Eunotia sp.</i>	EU9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0

% data		Depth (cm)																		Kajak core	
Full Name	Code	0	1	2	4	5	7	8	10	11	13	14	16	17	19	20	25	30	35	40	45
<i>Fragilaria bidens</i>	FR026A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Pseudostaurosira brevistriata</i>	FR006A	0.9	0.3	1.7	0.0	0.5	2.2	1.1	2.2	2.1	1.2	1.2	0.0	0.0	1.2	1.0	0.9	2.2	6.0	1.5	0.2
<i>Fragilaria capucina</i> var. <i>capucina</i>	FR009A	0.3	1.4	0.0	0.0	0.0	0.6	0.0	0.0	0.0	2.0	0.0	0.0	0.1	0.0	0.5	0.0	0.0	0.6	0.0	0.0
<i>Fragilaria capucina</i> var. <i>familiaris</i>	FR9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria capucina</i> var. <i>mesolepta</i>	FR009B	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0
<i>Synedra rumpens</i>	FR009G	1.6	1.0	0.0	1.6	0.1	0.6	1.0	0.5	0.5	0.0	0.1	0.0	0.7	0.3	0.2	0.7	3.0	0.0	0.2	0.0
<i>Staurosira binodis</i>	FR002B	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Staurosira construens</i> var. <i>construens</i>	FR002A	0.3	0.6	0.3	0.6	0.3	0.0	0.3	0.0	0.0	0.2	1.4	0.9	2.9	0.3	0.0	3.2	0.6	1.5	0.4	2.4
<i>Staurosira construens</i> var. <i>venter</i>	FR002C	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	1.0	0.0	0.0	0.0	0.7	0.0
<i>Fragilaria crotonensis</i>	FR008A	1.4	4.0	3.4	2.7	0.8	1.3	0.4	2.2	1.7	3.1	2.9	2.2	0.0	1.7	4.2	5.7	11.1	2.5	2.6	2.1
<i>Staurosira elliptica</i>	FR018A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
<i>Staurosirella pinnata</i>	FR001A	0.6	1.0	0.8	0.0	0.0	0.8	0.8	0.6	0.0	0.7	0.0	0.9	0.9	0.9	0.2	2.8	1.0	1.2	0.0	1.0
<i>Fragilaria tenera</i>	FR060A	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria vaucheriae</i>	FR007A	1.1	3.2	0.4	0.3	0.0	0.0	0.3	0.3	0.3	1.2	0.7	0.3	1.8	0.3	1.4	0.6	0.3	0.0	1.1	0.0
<i>Gomphonema minutum</i>	GO050A	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Gomphoneis olivaceum</i>	GO001A	0.0	0.3	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	1.2	0.4	0.0
<i>Gomphonema parvulum</i>	GO013A	0.3	0.6	0.0	0.6	0.8	0.0	0.6	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0
<i>Gomphonema pumilum</i>	GO080A	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
<i>Gomphonema</i> sp.	GO9999	0.0	0.0	0.0	0.3	0.0	0.6	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Gomphonema truncatum</i>	GO023A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Melosira varians</i>	ME015A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Meridion circulare</i>	MR001A	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
<i>Hippodonta capitata</i>	NA066A	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.4	0.0
<i>Navicula capitoradiata</i>	NA745A	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.2	0.4	0.0	0.3	0.0	0.0
<i>Navicula cincta</i>	NA021A	0.0	0.6	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula cryptotenella</i>	NA751A	0.6	0.0	0.8	0.6	0.5	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
<i>Navicula gregaria</i>	NA023A	0.0	0.0	0.3	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.4	0.0
<i>Geissleria ignota</i> var. <i>acceptata</i>	NA433D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.0
<i>Navicula menisculus</i>	NA030A	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0
<i>Eolimna minima</i>	NA042A	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Sellaphora pupula</i>	NA014A	0.9	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.3	0.0	0.6	0.0	0.3	0.0	0.2
<i>Navicula radiosa</i> var. <i>radiosa</i>	NA003A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
<i>Navicula reichardtiana</i>	NA768A	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.2	0.0	0.3	0.6	0.0	0.2	0.0	0.3	0.0	0.0	0.0
<i>Navicula reichardtiana</i>	NA026A	0.3	0.0	0.0	0.0	0.3	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula rhyncocephala</i>	NA008A	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
<i>Navicula</i> sp.	NA9999	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.3	0.0	0.0
<i>Navicula tripunctata</i>	NA095A	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.3	0.2	0.0	0.0	0.0	0.0	0.0
<i>Aneumastus tusculus</i>	NA001A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
<i>Nitzschia amphibia</i>	NI014A	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0

% data		Depth (cm)																		Kajak core	
Full Name	Code	0	1	2	4	5	7	8	10	11	13	14	16	17	19	20	25	30	35	40	45
<i>Nitzschia capitellata</i>	NI028A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia dissipata</i>	NI015A	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
<i>Nitzschia fonticola</i>	NI002A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.1	1.0	0.6	0.1	0.9	1.0	0.0	0.3	0.0	0.4	0.0
<i>Nitzschia palea</i>	NI009A	0.6	0.4	0.5	0.0	0.7	0.0	0.4	0.2	0.0	0.2	0.5	0.6	0.7	0.9	1.2	0.0	0.0	0.3	0.0	0.5
<i>Nitzschia pumila</i>	NI150A	0.3	0.0	0.3	0.3	0.0	0.0	0.1	0.6	0.3	0.5	0.5	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.2	0.5
<i>Nitzschia recta</i>	NI025A	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.0
<i>Nitzschia solita</i>	NI206A	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.7	0.0
<i>Nitzschia sp.</i>	NI9999	0.6	0.1	0.0	0.6	0.4	0.3	0.3	0.2	0.3	0.0	0.2	0.3	0.0	0.4	0.7	0.1	0.3	0.0	0.0	0.5
<i>Martyana martyi</i>	OP001A	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.3	0.0	0.7	0.0
<i>Opephora olsenii</i>	OP008A	0.2	1.0	0.3	0.0	1.2	1.4	0.0	0.0	0.9	0.2	0.1	0.0	0.0	0.3	0.2	0.0	0.0	0.3	0.0	0.0
<i>Orthosira roseana</i>	OS005A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Rhoicosphenia abbreviata</i>	RC002A	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0
<i>Stephanodiscus cf. agassizensis</i>	ST9999	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.9	2.9	6.9	7.4	5.3	2.5	10.4	4.4	1.9
<i>Stephanodiscus hantzschii</i>	ST001A	13.8	9.1	13.7	13.0	12.6	23.6	13.0	15.6	24.1	17.9	16.4	25.2	14.4	13.6	28.3	5.3	7.3	3.6	11.3	12.4
<i>Stephanodiscus medius</i>	ST014A	2.8	1.4	2.1	0.0	0.0	0.0	0.8	0.9	0.6	1.7	2.0	0.6	0.3	2.6	0.0	2.9	0.6	3.9	0.4	2.9
<i>Stephanodiscus neoastreae</i>	ST022A	0.3	0.0	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.5	1.3	2.4	0.7	1.4
<i>Stephanodiscus parvus</i>	ST010A	19.7	12.9	21.9	17.1	20.4	11.2	20.6	31.2	8.9	4.7	3.2	25.5	44.3	11.6	10.8	25.7	30.7	14.9	46.6	28.6
<i>Surirella sp.</i>	SU9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Synedra acus var. acus</i>	SY003A	0.0	0.3	0.3	0.3	0.7	0.3	0.3	0.9	0.5	0.0	0.4	0.1	0.0	0.3	0.2	0.1	0.5	0.0	0.0	0.2
<i>Synedra acus var. angustissima</i>	SY003C	0.9	0.8	0.8	0.3	0.7	1.5	2.0	0.5	0.0	0.4	0.4	0.0	0.4	0.7	1.1	0.1	0.5	0.6	0.2	1.0
<i>Synedra ulna</i>	SY001A	0.0	0.1	0.1	0.1	0.3	0.1	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.3	0.2	0.1	0.0	0.0
<i>Tabellaria [flocculosa (long)]</i>	TA9998	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.2
<i>Thalassiosira sp.</i>	TH9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.0	0.0



**Diatom data for the 7 Polish lake gravity core tops and bottoms (% relative abundance)**

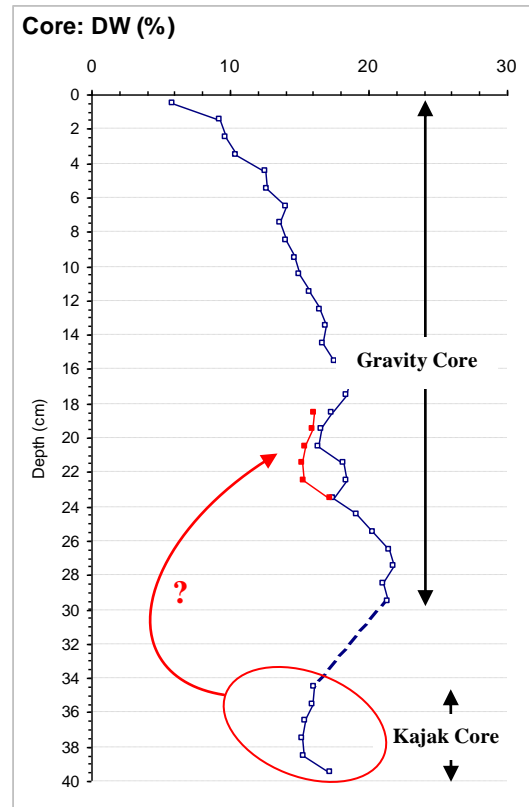
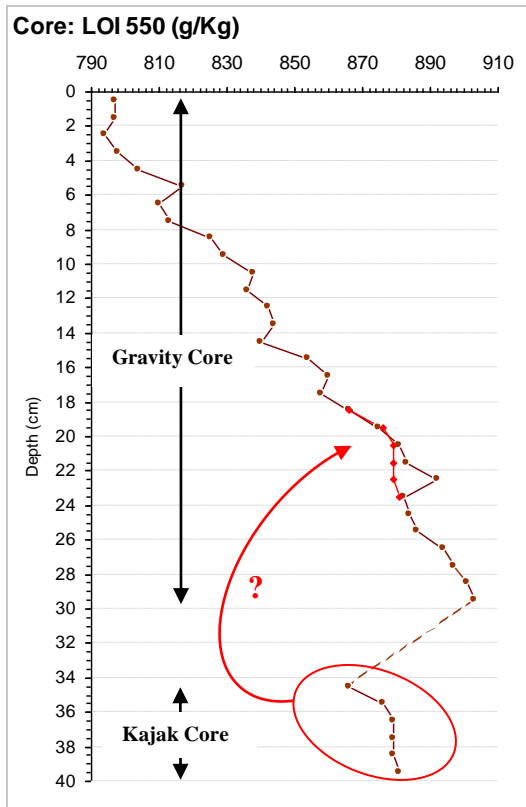
% data	Sample code															
	Full Name	Code	DABW00	DABW30	DABM00	DABM40	ZARY00	ZARY30	TARC00	TARC27	GRAD00	GRAD30	HART00	HART35	ZWIN00	ZWIN30
<i>Achnanthes conspicua</i>	AC023A	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
<i>Achnanthes oestrupii</i>	AC007A	0.6	0.0	0.3	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.6
<i>Achnanthes sp.</i>	AC9999	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.3
<i>Achnantheidium minutissimum</i>	AC013A	0.0	0.0	0.0	1.5	0.5	0.2	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Amphora libyca</i>	AM011A	0.6	0.3	0.3	0.2	0.5	0.9	0.0	0.0	0.0	0.3	0.0	0.6	0.3	0.6	0.6
<i>Amphora ovalis</i>	AM001A	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Amphora pediculus</i>	AM008A	0.6	3.9	0.0	1.0	4.3	3.0	0.3	2.1	0.0	0.6	1.3	3.1	1.8	3.9	3.9
<i>Amphora veneta</i>	AM004A	0.0	0.0	0.0	0.0	0.5	0.2	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
<i>Asterionella formosa</i>	AS001A	0.6	5.9	2.8	2.9	0.0	0.5	0.9	2.7	1.0	1.4	0.7	0.0	1.3	0.0	0.0
<i>Aulacoseira ambigua</i>	AU002A	0.0	2.0	2.0	2.4	0.3	3.4	13.3	4.6	4.9	3.7	6.6	1.2	4.4	15.5	15.5
<i>Aulacoseira granulata</i>	AU003A	2.5	2.8	0.3	1.0	1.0	2.3	11.2	6.1	3.3	1.7	4.3	1.2	0.3	2.6	2.6
<i>Aulacoseira granulata var. angustissima</i>	AU003B	0.0	0.8	0.8	1.2	0.3	0.0	0.9	3.6	0.7	2.0	6.3	0.0	2.3	0.0	0.0
<i>Aulacoseira islandica</i>	AU009A	3.7	0.0	7.6	8.2	0.8	3.2	0.6	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Aulacoseira italica fo. crenulata</i>	AU001D	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cocconeis neothumensis</i>	CO067A	0.0	0.3	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.3	0.3	0.3	0.0	0.0
<i>Cocconeis pediculus</i>	CO005A	0.6	0.0	0.0	0.0	0.0	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cocconeis placentula var. euglypta</i>	CO001B	0.6	0.0	0.0	0.2	0.0	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cocconeis placentula var. lineata</i>	CO001C	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cocconeis placentula var. placentula</i>	CO001A	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
<i>Cocconeis placentula var. pseudolineata</i>	CO001E	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cocconeis spp. (raphe valves)</i>	CO9999	0.7	0.1	0.3	0.7	0.4	0.8	0.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cyclostephanos dubius</i>	CC001A	1.4	2.8	6.4	0.7	15.8	2.5	26.4	20.6	31.1	18.8	23.4	0.0	31.9	12.9	12.9
<i>Cyclostephanos invisitatus</i>	CC002A	0.0	0.0	0.0	0.2	0.3	0.5	1.9	1.2	2.3	0.6	0.0	0.0	0.5	0.3	0.3
<i>Cyclostephanos tholiformis</i>	CC003A	0.0	0.0	0.0	0.0	0.5	0.0	0.9	0.9	0.3	1.7	0.0	0.0	0.0	0.0	0.0
<i>Cyclotella aff. comensis</i>	CY9991	0.0	3.6	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.6	0.0	0.0	0.0
<i>Cyclotella distinguenda var. unipunctata</i>	CY028B	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cyclotella krammeri</i>	CY054A	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cyclotella ocellata</i>	CY009A	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.6
<i>Cyclotella pseudostelligera</i>	CY002A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
<i>Cyclotella radiosa</i>	CY019A	34.3	6.2	17.3	1.2	5.8	3.6	6.2	0.9	3.9	2.3	7.6	1.9	13.5	0.6	0.6
<i>Cymbella affinis</i>	CM022A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
<i>Cymbella caespitosa</i>	CM070A	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cymbella cistula</i>	CM006A	0.3	0.3	0.0	0.0	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Cymbella sp.</i>	CM9999	0.0	0.6	0.0	0.2	0.5	0.0	0.3	0.3	0.3	0.0	0.0	0.9	0.0	0.0	0.0
<i>Diatoma tenue</i>	DT004A	0.0	0.3	0.0	0.7	0.1	0.2	0.0	1.4	0.0	0.6	0.0	0.0	0.0	0.0	0.0
<i>Diatoma vulgare</i>	DT003A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Diploneis marginestriata</i>	DP012A	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

% data		Sample code													
Full Name	Code	DABW00	DABW30	DABM00	DABM40	ZARY00	ZARY30	TARC00	TARC27	GRAD00	GRAD30	HART00	HART35	ZWIN00	ZWIN30
<i>Encyonema prostrata</i>	CM045A	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Encyonema silesiacum</i>	CM103A	0.3	0.0	0.0	0.0	0.3	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
<i>Eolimna minima</i>	NA042A	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
<i>Epithemia adnata</i>	EP007A	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Epithemia sorex</i>	EP001A	0.8	0.6	0.3	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0
<i>Epithemia sp.</i>	EP9999	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Epithemia turgida</i>	EP004A	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria berlinensis</i>	FR076A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
<i>Fragilaria bidens</i>	FR026A	0.0	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria capucina var. capucina</i>	FR009A	0.0	1.3	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria capucina var. mesolepta</i>	FR009B	2.5	0.0	1.3	1.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria crotonensis</i>	FR008A	3.8	4.3	5.5	3.1	0.1	0.2	0.8	3.2	0.8	1.1	1.6	0.0	2.1	0.0
<i>Fragilaria nitzschoides</i>	FR042A	0.0	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria parasitica</i>	FR045A	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria sp. girdles</i>	FR9999	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Fragilaria tenera</i>	FR060A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.5	0.0
<i>Fragilaria vaucheriae</i>	FR007A	6.0	0.1	1.4	2.2	1.1	2.0	0.0	0.9	0.0	0.6	0.7	0.0	0.9	0.0
<i>Geissleria schoenfeldii</i>	NA128A	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	1.3	0.0
<i>Gomphonema accuminatum</i>	GO006A	0.0	0.6	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Gomphonema olivaceum</i>	GO001A	0.3	0.3	0.6	0.5	0.0	0.2	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
<i>Gomphonema parvulum</i>	GO013A	2.3	0.3	0.6	0.0	0.0	0.5	0.0	0.3	0.7	0.6	0.0	0.0	0.3	0.0
<i>Gomphonema pumilum</i>	GO080A	0.0	0.8	0.0	0.0	0.3	0.5	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
<i>Gomphonema sp.</i>	GO9999	0.0	0.6	0.0	0.2	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Gomphonema truncatum</i>	GO023A	0.8	0.8	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Gyrosigma acuminatum</i>	GY005A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
<i>Hippodonta capitata</i>	NA066A	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Karayevia clevei</i>	AC006A	0.0	0.8	0.0	0.5	0.0	0.7	0.3	1.2	0.0	0.0	0.3	0.6	0.0	0.3
<i>Mayamaea atomus var. atomus</i>	NA084A	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.6	0.0	0.3	0.0	0.3
<i>Diatoma vulgare</i>	DT003A	0.0	0.3	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3
<i>Diploneis marginestriata</i>	DP012A	0.0	0.0	1.1	0.5	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
<i>Encyonema prostrata</i>	CM045A	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
<i>Encyonema silesiacum</i>	CM103A	0.0	0.0	0.6	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Eolimna minima</i>	NA042A	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Epithemia adnata</i>	EP007A	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Epithemia sorex</i>	EP001A	0.0	0.6	0.6	0.7	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
<i>Epithemia sp.</i>	EP9999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula menisculus</i>	NA030A	0.3	0.6	0.0	0.2	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0
<i>Navicula pseudotuscula</i>	NA589A	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula radiosa var. radiosa</i>	NA003A	0.0	0.0	0.0	0.0	0.3	1.1	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0

% data		Sample code													
Full Name	Code	DABW00	DABW30	DABM00	DABM40	ZARY00	ZARY30	TARC00	TARC27	GRAD00	GRAD30	HART00	HART35	ZWIN00	ZWIN30
<i>Navicula reichardtiana</i>	NA768A	0.0	2.0	0.0	0.0	0.0	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula reichardtiana</i>	NA026A	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula rhyncocephala</i>	NA008A	0.0	0.0	0.0	0.0	0.5	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Navicula scutelloides</i>	NA028A	0.6	0.6	0.0	0.0	1.8	0.7	0.0	0.0	0.0	0.0	0.7	6.9	0.0	0.0
<i>Navicula sp.</i>	NA9999	0.3	0.3	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.3	0.0
<i>Navicula tripunctata</i>	NA095A	0.6	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0
<i>Nitzschia acicularis</i>	NI042A	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0
<i>Nitzschia amphibia</i>	NI014A	0.6	0.0	0.3	0.0	1.4	0.6	0.3	1.1	0.3	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia dissipata</i>	NI015A	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
<i>Nitzschia fonticola</i>	NI002A	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.6	0.0	0.3	0.0	0.0	0.0	0.0
<i>Nitzschia palea</i>	NI009A	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia pumila</i>	NI150A	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia recta</i>	NI025A	0.0	0.1	0.0	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Nitzschia sp.</i>	NI9999	0.4	0.4	0.0	0.5	0.3	0.3	0.5	0.8	0.3	0.3	0.0	0.0	0.0	0.0
<i>Opephora olsenii</i>	OP008A	0.0	1.1	0.0	0.2	0.5	1.1	1.9	0.3	0.3	0.0	0.7	3.1	0.3	0.0
<i>Planothidium lanceolatum</i>	AC001A	0.0	0.6	0.6	0.7	1.0	0.2	0.0	0.0	0.3	0.3	0.0	0.3	0.5	0.6
<i>Pseudostaurosira brevistriata</i>	FR006A	0.8	3.8	0.8	1.0	23.0	25.9	3.1	6.4	1.0	9.1	8.2	23.7	4.2	22.3
<i>Reimeria sinuata</i>	CM003A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
<i>Rhoicosphenia abbreviata</i>	RC002A	0.6	0.8	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Rhopalodia gibba</i>	RH001A	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Sellaphora bacillum</i>	NA071A	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.3	0.0	0.3	0.0	0.0
<i>Sellaphora pupula</i>	NA014A	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.3
<i>Staurosira binodis</i>	FR002B	0.3	0.0	0.0	0.7	1.5	1.8	0.0	0.6	0.3	0.6	0.0	1.9	0.5	0.0
<i>Staurosira construens var. construens</i>	FR002A	0.0	0.8	0.3	1.2	5.3	1.8	1.2	3.9	1.5	2.0	4.9	19.0	0.8	17.1
<i>Staurosira construens var. venter</i>	FR002C	0.0	1.7	0.8	0.5	4.4	3.9	0.9	1.5	0.3	0.9	1.3	20.9	3.6	7.1
<i>Staurosira elliptica</i>	FR018A	0.0	0.0	0.0	0.0	0.8	1.4	0.3	0.0	0.0	0.6	0.0	0.0	0.0	0.3
<i>Staurosirella pinnata</i>	FR001A	0.3	3.9	0.3	2.9	9.0	8.6	2.5	2.7	1.6	4.9	0.7	8.4	0.8	1.6
<i>Stephanodiscus cf. agassizensis</i>	ST9999	0.0	1.4	0.3	0.0	0.0	0.0	0.6	0.6	0.0	1.7	0.7	0.0	0.0	0.6
<i>Stephanodiscus hantzschii</i>	ST001A	0.8	0.0	5.0	0.7	5.0	1.8	15.5	15.8	27.2	3.7	1.3	0.6	7.8	3.2
<i>Stephanodiscus medius</i>	ST014A	12.7	0.8	12.3	0.0	2.0	0.7	0.9	0.3	2.6	0.0	2.6	0.3	3.6	0.0
<i>Stephanodiscus neoastreae</i>	ST022A	5.3	7.6	5.0	0.7	0.5	0.5	0.6	2.1	0.7	1.7	1.3	0.9	0.5	2.3
<i>Stephanodiscus parvus</i>	ST010A	9.3	19.6	17.9	52.3	4.5	16.4	3.4	6.1	11.8	32.5	17.1	1.2	12.5	3.2
<i>Synedra acus var. acus</i>	SY003A	0.1	0.3	0.4	0.0	0.0	0.0	0.2	0.5	0.3	0.0	0.0	0.0	0.0	0.0
<i>Synedra acus var. angustissima</i>	SY003C	0.0	0.3	1.1	0.4	0.3	0.1	0.0	0.6	0.3	0.4	0.2	0.0	0.6	0.0
<i>Synedra rumpens</i>	FR009G	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.5	0.5	0.7	0.0	0.0	0.3	0.0
<i>Synedra ulna</i>	SY001A	1.1	0.3	1.8	0.0	0.3	0.6	0.3	0.0	0.0	0.0	0.2	0.0	0.1	0.0
<i>Tabellaria [floculosa (long)]</i>	TA9998	0.0	3.1	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Thalassiosira sp.</i>	TH9999	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.5	0.0

## APPENDIX 2 GRAVITY AND KAJAK CORE COMPARISONS

### Lake Kiełpińskie



### Lake Lidzbarskie

