Report on fitting the French national method for the evaluation of lake ecological status using benthic diatoms (IBDL) -Phytobenthos cross-GIG intercalibration exercise

Thibault Leboucher, Sébastien Boutry, Soizic Morin, Vincent Bertrin, Juliette Tison-Rosebery

Report on fitting the French national method for the evaluation of lake ecological status using benthic diatoms (IBDL) - Phytobenthos cross-GIG intercalibration exercise

Leboucher, T., Boutry, S., Morin, S., Bertrin, V., Tison-Rosebery, J.
INRAE UR EABX

Introduction

When the Cross-GIG phytobenthos exercise was carried out, France did not have yet any method based on benthic diatoms and dedicated to the evaluation of lake ecological status. France then participated in this exercise with the Biological Diatom Index (BDI, Coste et al., 2009), routinely used to assess river ecological status. Although previous results tended to advocate for a good correlation between BDI and the pressure gradient at least in shallow lakes (Cellamare et al., 2012), the intercalibration exercise revealed a poor correlation between BDI values and total phosphorous at the national scale (Kelly et al., 2014). Explanations may be found in the fact that many lake taxa were absent from the list of key species used to calculate the BDI, resulting in a globally poor relevance of the final lake status assessment. A new method was thus developed specifically for lakes, namely IBDL (Tison-Rosebery et al., submitted), and related ecological status boundaries were set. This report aims to fit those boundaries to the harmonised definition of good ecological status established in the completed intercalibration exercise, following the "*Procedure to fit new or updated classification methods to the results of a completed intercalibration exercise*" (Birk et al., 2014)

I– IBDL : index settlement and properties

The IBDL assesses lake ecological status based on the composition of the benthic diatom communities and is calibrated against different environmental gradients: biological oxygen demand, Kjeldahl nitrogen, total phosphorous and suspended particles. **Dataset used**

The dataset gathers samplings performed on 93 French lakes during the summer period, each year from 2015 to 2020, and according to Morin et al. (2010). Lakes were classified into three metatypes based on alcalinity, according to the European intercalibration exercice previously performed (Kelly et al., 2014): low alcalinity (LA, alcalinity < 0.2 meq.l^{-1}), medium alcalinity (MA, 0.2 meq.l^{-1} < alcalinity < 1 meq.l^{-1}), high alcalinity (alcalinity > 1 meq.l^{-1}).

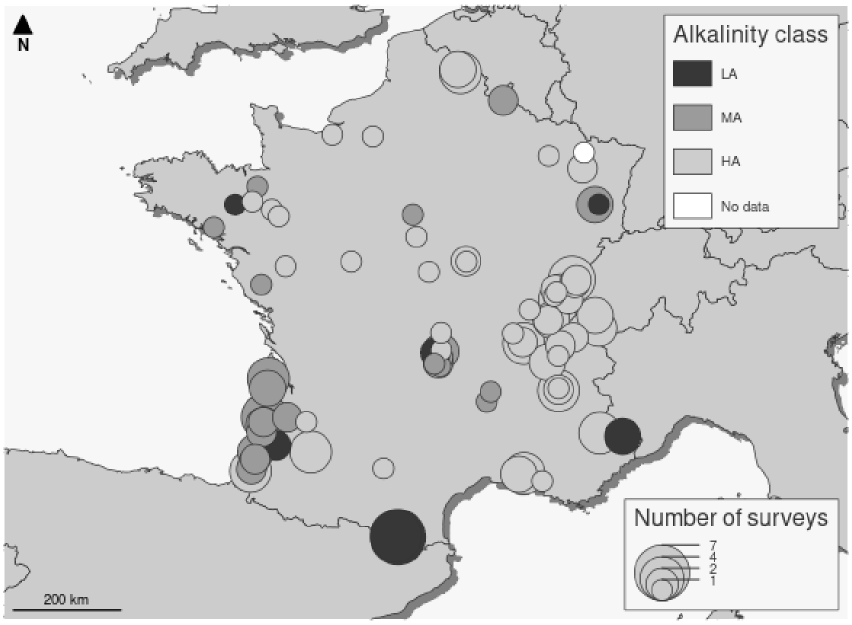

Figure 1: *Study sites and number of samplings per site. Lake alkalinity classes are reported (LA: low alkalinity; MA: medium alkalinity; HA: high alkalinity) (Kelly et al., 2014)*

Diatoms were collected on both mineral substrates and lakeshore macrophyte surfaces, in observation units (OUs) which number and location vary according to the lake surface area and the riparian zone types. Such units are defined and listed in the French macrophyte sampling protocol for lakes (XP T90-328, AFNOR, 2010).

Samples from hard mineral substrates were performed on at least five boulders or cobbles, taken at random in each OU, equivalent to a final surface area of 100 cm², as defined in the NF T90-354 standard (AFNOR 2016). Selected substrates should be submerged within the euphotic zone, at a maximum depth of 0.5 m.

Samplings on macrophytes were performed on helophytes (mainly *Phragmites australis* (Cav.) Trin. ex Steud.). From a minimum of 5 macrophytes taken at random, green stem segments submerged for at least 4 to 6 weeks were collected. These stem segments should be located at a maximum depth of 0.2 m.

Diatoms were sampled from both substrates according to the NF T90-354 protocol, in line with the European standards (EN 13946, European Commission). Cells were identified at 100x magnification by examining permanent slides of cleaned diatom frustules (400 valves per slide), using among others Krammer and Lange-Bertalot (1986 – 1991) and Lange-Bertalot (1995 – 2015, 2000 – 2013). A taxonomic homogenization was performed with Omnidia 5.3 software (Lecointe, Coste & Prygiel, 1993).

All OUs from a single lake were sampled within a maximum of 21 days. Diatom countings should include at least 380 cells per slide, with more than 50% of the diatom cells determined at the species level, to comply with the NF T90-354 requirements.

Physico-chemical parameter values were determined in summer at the deepest point of each lake, according to European standards. Data were obtained from national surveillance monitoring programs. Water quality analysis was not systematically performed each year: in a few cases, the most recent physico-chemical data available for a lake were collected three years before the diatom samples. The following parameters were recorded: biological oxygen demand (BOD_5, $mg.l^{-1}$), Kjeldahl nitrogen (NKJ, $mg.l^{-1}$), ammonium (NH_4, $mg.l^{-1}$), nitrates (NO_3, $mg.l^{-1}$), nitrites (NO_2, $mg.l^{-1}$), orthophosphates (PO_4, $mg.l^{-1}$), total phosphorous (Pt, $mg.l^{-1}$), suspended particles (SP, $mg.l^{-1}$), oxygen (O_2, $mg.l^{-1}$) and oxygen saturation (% O_2).

2 Computation details

All analyses were performed with R 3.6.1 software (R Core Team, 2021).

Considering that the final dataset revealed a particularly discontinuous trophic gradient, we opted for the so-called method "Threshold Indicator Taxa ANalysis" (TITAN, Baker and King, 2020) which, based on bootstraps and permutations, makes it possible to determine a list of "alert taxa". Alert taxa presence and/or increasing abundance reveal the existence of anthropogenic pressures.
A three-step procedure was necessary to build our Biological Diatom Index for Lakes (IBDL): identification of alert taxa, settlement of relevant metrics and aggregation of these metrics to obtain the final index score.

2-1 Identification of alert taxa

For further analysis, we only considered taxa with occurrence equal to or greater than 3 (the so-called "index taxa").

TITAN combines change-point analysis (nCPA; King & Richardson 2003) and indicator species analysis (IndVal, Dufrêne & Legendre 1997). Basically, change-point analysis compares within-group *vs* between-group dissimilarity to detect shifts in community structure along the environmental variable considered (Baker and King, 2020). Indicator species analysis then identifies the strength of association between any particular taxon and this sample grouping. At the end of the process, two IndVal scores are calculated for a single taxon in a two-group classification. The algorithm finally classifies taxa into three different categories: Z^+ taxa showing a significant increase in abundance along the increasing environmental gradient, Z^- taxa showing a significant decrease along this gradient, and indifferent taxa showing no significant trend. Z^+ taxa and Z^- taxa show affinities with respectively the high and the low concentrations of the environmental variable under consideration. Alert taxa were defined as Z^+ or Z^- taxa which shift thresholds were greater or lesser than the community shift threshold (see the list of Alert taxa in Annex 1).

2-2 Building metrics and selecting the relevant ones

For each environmental variable, a metric is calculated at the OU scale according to (1):

$$Metric_M = 1 - \left(\frac{Alert\_taxa}{Index\_axa}\right) \qquad (1)$$

Where "Alert_taxa" is the number of alert taxa in the sample and "Index_taxa" the number of index taxa.

The metric value is bounded between 0 and 1. The lowest value (0) corresponds to a species list entirely composed of alert taxa (determined for the environmental variable considered).

In order to build our index, we further selected the most relevant metrics, i.e. those with the best relationship towards the environmental parameter considered. We used the Pearson's correlation coefficient to measure this statistical association, and only kept metrics showing a Pearson's coefficient >|0.6|: four metrics based on NKJ, BOD5, Pt and SP were finally considered to build the IBDL. We obtained the response patterns of the different metrics via the transformation of raw values into normalized deviations (Standardized Effect Size -SES-, Gotelli and McCabe, 2002, Mondy et al., 2012) (2). SES values allowed obtaining a single response pattern for a metric whatever the lake metatype and the substrate type considered.

$$SES_M = \left(\frac{Metric_M - M_{group}}{sd_{group}}\right) \qquad (2)$$

Where:
$Metric_M$ is the observed value of the metric, M_{group} and sd_{group} respectively the mean and the

standard deviation of the metric value for a given group of samples (i.e substrate type x lake alkalinity metatype) (values of M_{group} and sd_{group} are reported in S1)

The next step consisted in the normalization of SES values ($SESnor_M$) to make their range of variation comparable between metrics (3):

$$SESnor_M = \frac{(SES_M - Min)}{(Max - Min)} \qquad (3)$$

Where:
SES_M is the observed value of SES for a given metric, Min is its minimum value and Max its maximum value in the whole dataset.

We further transformed metric values from normalized SES into EQR (4). The Ecological Quality Ratio (EQR) is the ratio between the observed value of a metric ($SESnor_M$) and its expected value under reference conditions, for any lake metype and any substrate ($SESnor_{Mref}$).

$$EQR = \left(\frac{SESnor_M}{SESnor_{Mref}}\right) \qquad (4)$$

We finally performed a Wilcoxon test to detect the potential influence of the substrate type on the EQR values obtained at the OU scale, for each metric. Metric values (in EQR) calculated from taxa lists sampled on mineral substrates or on macrophytes for a single OU did not significantly differ (p-value= 0.479, n=237).

2-3 Aggregating metric values to obtain the final IBDL score

The final index score was obtained at the OU scale by averaging the different metric values selected, expressed in EQR.
If a score was calculated for both mineral and macrophyte substrates, the minimum value between those two scores was considered as the final score. Each OU belongs to one of the 4 riparian zone types as required in the XP T90-328 standard. These types are defined from the description of the vegetation structure and/or anthropogenic alterations of the lakeshore. The percentage of each riparian zone type is estimated *in situ*, during the sampling surveys, on the whole lake perimeter. The final index score for the whole lake was derived from a weighted average of the $Score_{OU}$ (5), taking into account the percentage of the lake perimeter each OU represents in terms of riparian zone type (Pc_{type}).

$$IBDL = \sum_{type=1}^{4} \left(\overline{Score_{OU}} * Pc_{type}\right) \qquad (5)$$

Finally IBDL scores vary between 0 (worst water quality) and 1. IBDL relationships with the different environmental variables considered were a posteriori tested with simple linear regressions.

2-4 Boundary setting

The list of reference lakes was established from the Circular DE/MAGE/BEMA 04/N 18 n° 2004-08 DCE relating to the constitution and the implementation of the network of reference sites for French freshwaters (rivers and lakes) in application of the WFD. The H/G boundary was set by the 75th percentile of the reference scores. The lower boundaries were obtained by equal divisions of the rest of the distribution (scores between the H/G boundary and 0). The different ecological status thresholds obtained are reported below (in EQR_IBDL, for all lake metatypes):

Reference	High/Good	Good/Moderate	Moderate/Poor	Poor/Bad
1	0,8	0,6	0,4	0,2

II– IBDL: fitting the national classification to the harmonised definition of the good ecological status

For this intercalibration exercice, a reduced dataset was used with 58 sampling surveys spread over 37 lakes. Both the common metric (Rott's TI) and the IBDL were calculated for this dataset.

1. Framework Directive compliance checking

The table below (Table 2) lists the criteria from the IC guidance and compliance checking conclusions.

Compliance criteria	Conclusions
Q1 - Does the national assessment method meet the requirements of the Water Framework Directive?	Yes
Q2 - Is the method newly developed and has thus not yet been intercalibrated?	Yes
Q3 - Has the respective BQE already been intercalibrated successfully within the relevant GIG for the relevant common IC type?	Yes
Q4 - Is the national method applicable to the same common IC types and pressures addressed in the completed IC exercise, and its assessment concept similar to the concept of the methods intercalibrated in the completed exercice?	Yes
Q5 - Is the national data basis available and of sufficient quantity and quality?	Yes
Q6 - Which IC Option was used in the completed exercice?	Option 2 - Indirect comparison (use of common metrics)
Q7 - Is the method sufficiently correlated with the common metric or the BRINC ?	Yes
Q8 - Wich benchmark standardisation was applied in the completed IC exercise?	Case A2: IC Option 1 or 2 using continuous benchmarking

Table 2. *Compliance checking of phytobenthos methods.*

2. IC feasibility checking

2.1 Typology

French lakes were classified into three metatypes, based on alkalinity, and according to the European intercalibration exercice previously performed (Kelly et al., 2014): low alkalinity (LA) (<0.2 meq.L^{-1}), moderate alkalinity (MA) (<1 meq.L^{-1}) or high alkalinity (HA) (≥1 meq.L^{-1}).

2.2 Pressure addressed

In the common intercalibration exercice, all national methods were calibrated to address a single pressure: eutrophication (total phosphorus concentration). IBDL is also calibrated against this pressure. Low alkalinity lakes were not intercalibrated in the common exercice and therefore will not be considered here.

2.3 Relationship between IBDL (EQR) and the trophic pressure

For the intercalibration exercice, IBDL scores were obtained for 58 samples spread over 37 lakes. Figure 2 reports the relationship between these IBDL values (in EQR) and total phosphorus concentrations.

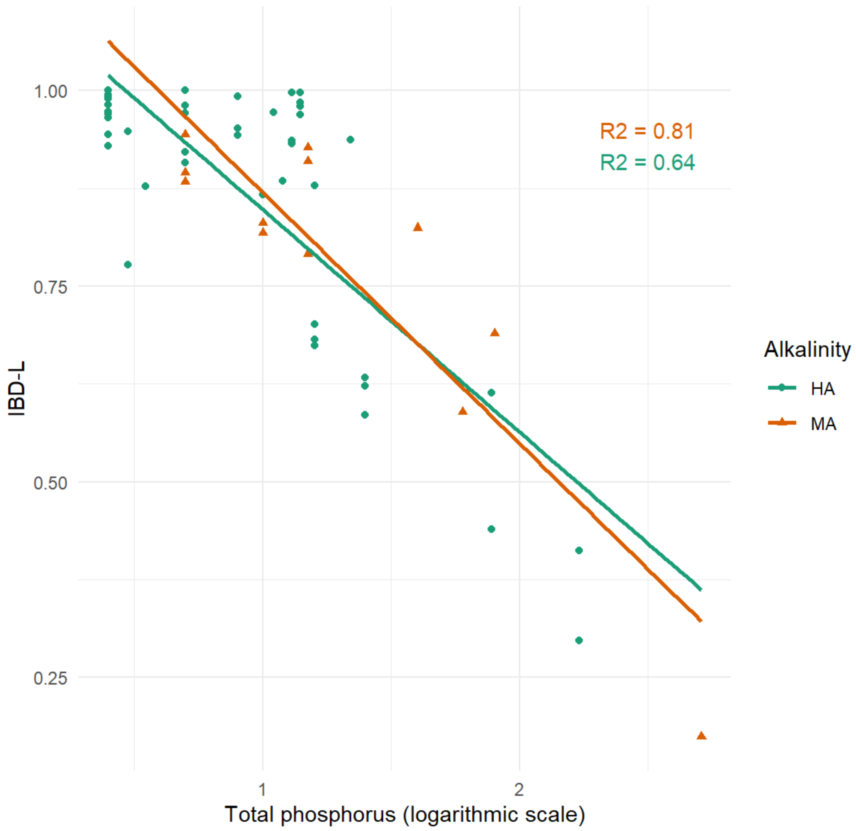

Figure 2. Relationship between total phosphorus concentrations and IBDL (in EQR).

The relationship between IBDL and total phosphorus concentrations is significant for both lake metatypes. For medium alkalinity lakes (12 IBDL values spread over 10 lakes), we obtain an R^2 value of 0.81 and a p-value of 0. For high alkalinity lakes (46 IBDL values spread over 27 lakes), we obtain an R^2 value of 0.64 and a p-value lower than 0.001.

2.4 Assessment concept

All assessment methods included in the common intercalibration exercice focus on the littoral zone of the lakes, including samples from stones or macrophytes, and are based on species proportions in a fixed count. IBDL follows the same assessment concept.

3. Intercalibration exercise for medium alkalinity lakes

Following the procedure to fit new or updated classification methods to the results of a completed intercalibration exercise, the common metric (CM_{obs}) is expressed in EQR and is derived from

Rott's Trophic Index (TI) using the following formula for medium alkalinity lakes:

$$CM_{obs} = (4 - TI) / (4 - 1.38)$$

The CM_{obs} results obtained are listed in Table 3.

The next step described in the intercalibration procedure consists in the calcultation of CM benchmarked scores. Predicted values of the CM (CM_{pred}) are first obtained using the relationship between the common metric and the total phosphorus gradient (TP, µg.L^{-1}), according to the following formula fixed during the original intercalibration exercise (Kelly et al., 2014):

$$CM_{pred} = -0.243 * \log10(TP) + 1.235$$

The CM_{pred} values are listed in Table 3. In order to remove any bias in CM_{pred}, we need to calculate the average residuals of the linear regression between CM_{pred} (y) and CM_{obs} (x). This allows us to calculate the final metric used in this intercalibration exercise (CM_{bm}), according to the following formula.

$$CM_{bm} = CM_{obs} + residual$$

The mean residual between CM_{pred} and CM_{obs} is 0.084. The CM_{bm} values are listed in Table 3.

Lake	Total phosphorus	Root's TI	CM_{obs}	CM_{pred}	CM_{bm}	IBDL
LEO40	60	2.41	0.61	0.8	0.69	0.59
ECH33	5	1.56	0.93	1.07	1.01	0.88
PAR40	10	1.62	0.91	0.99	0.99	0.82
CAZ40	15	1.51	0.95	0.95	1.03	0.91
CAZ40	15	1.49	0.96	0.95	1.04	0.93
ORX40	510	3.43	0.22	0.58	0.3	0.17
BLA40	15	1.75	0.86	0.95	0.94	0.79
BOU33	5	1.52	0.95	1.07	1.03	0.94
LEO40	80	2.56	0.55	0.77	0.63	0.69
AUR40	40	1.8	0.84	0.85	0.92	0.82
LAC33	5	1.92	0.79	1.07	0.88	0.9
BIS40	10	2.33	0.64	0.99	0.72	0.83

Table 3. *CM_{obs}, CM_{pred}, CM_{bm} and IBDL scores for medium alkalinity lakes.*

We can now draw the relationship between the common metric CM_{bm} (y) and the IBDL (x), expressed in EQR, using a linear regression (OLS regression, Figure 3).

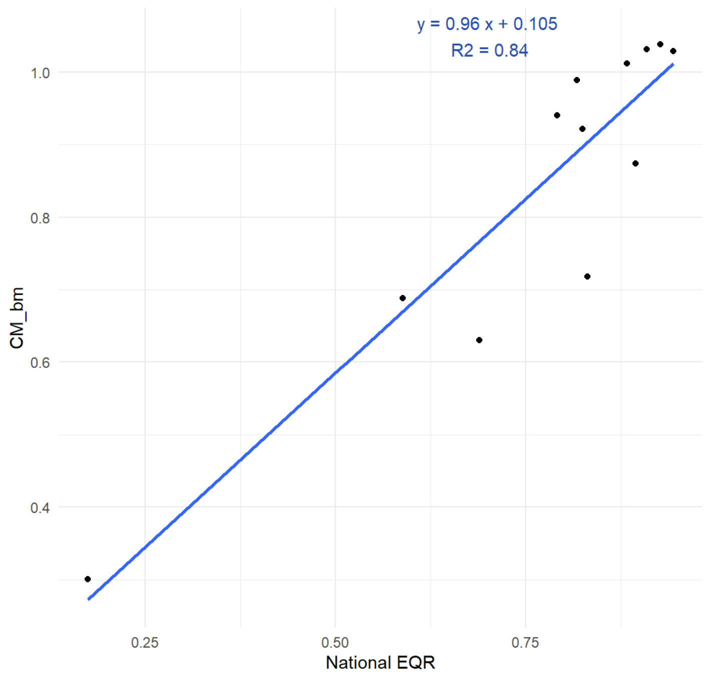

Figure 3. *Relationship between the national EQR and the common metric benchmarked (medium alkalinity lakes).*

Based on this linear regression IBDL scores can be turned into CM_{bm} scores. Thus our national class boundaries (H/G, G/M, M/P & P/B) were converted to CM_{bm} scores. Those predicted values of our national boundaries on the CM_{bm} scale, together with the boundaries common view (Kelly et al., 2004) are reported in Table 4.

Boundary	Projection of the national EQRs on the CM_{bm} scale	Common view EQRs
H/G	0.877	0.849
G/M	0.685	0.588
M/P	0.492	0.309
P/B	0.300	0.025

Table 4. *Predicted projections of the national boundaries on the CM_{bm} scale and common view for medium alkalinity lakes.*

Deviations between our boundaries expressed in CM_{bm} and the common views are expressed as a proportion of the class width considered. For the H/G boundary, for example, this can be calculated with the following formula.

$$((a * 0.8 + b) - 0.849) / ((a * 0.8 + b) - (a * 0.6 + b))$$

with ***a*** the slope of the relationship between the common metric CM_{bm} (y) and the IBDL expressed in EQR (x) and ***b*** the intercept of the same regression (Figure 2). Results are reported in Table 5.

Boundary	Deviation
H/G	0.14
G/M	0.50

Table 5. *Deviation between boundaries on the common metric scale and the common view (medium alkalinity lakes).*

The H/G boudary falls <u>above</u> the common view with about 14% of one class width and the G/M boundary also falls <u>above</u> the common view with about 50% of one class width. If this value is ≤ 25%, the boundary meets the comparability criteria. If this value is > 25% and ≤ 50%, the boundary can be lowered until the deviation between the national boundary and the common exercise boundary is ≤ 25%, but there is not compulsory to perform this adjustment.

Here, we consider that this is not necessary to lower our G/M boundary and that our results correspond to what is expected. This choice is justified by the discrepency between the total phosphorus gradients in the common exercise and in the French data set. Indeed, in the common exercice dataset, total phosphorus concentrations ranges between 3 and 1000 $\mu g.L^{-1}$, while in the French dataset total phosphorus concentrations ranges between 2.5 and 170 $\mu g.L^{-1}$.

4. IC of the high alkalinity lakes

The procedure for high alkalinity lakes is the same as for medium alkalinity lakes except for a few changes in the equations. The common metric (CM_{obs}) is expressed in EQR and is derived from Rott's Trophic Index (TI) using the following formula for high alkalinity lakes:

$$\mathbf{CM_{obs} = (4-TI) / (4-1.88)}$$

The CM_{obs} results obtained are listed in Table 6.

Predicted values of the CM (CM_{pred}) are first obtained using the relationship between the common metric and the total phosphorus gradient (TP, $\mu g.L^{-1}$), according to the following formula fixed during the original intercalibration exercise (Kelly et al., 2014):

$$\mathbf{CM_{pred} = -0.382 * \log10(TP) + 1.431}$$

The CM_{pred} results obtained are also listed in Table 6. In order to remove any bias in CM_{pred}, we need to calculate the average residuals of the linear regression between CM_{pred} (y) and CM_{obs} (x). This allows us to calculate the final metric used in this intercalibration exercise (CM_{bm}), according to the following formula.

$$\boldsymbol{CM_{bm} = CM_{obs} + residual}$$

The mean residual between CM_{pred} and CM_{obs}s is 0.117. The CM_{bm} values are listed in table 6.

Lake	Total phosphorus	Root's TI	CM_{obs}	CM_{pred}	CM_{bm}	IBDL
LRO39	12	1.81	1.03	1.02	1.15	0.88
ENT25	22	1.52	1.17	0.92	1.29	0.94
PAL38	14	1.34	1.25	0.99	1.37	0.98
REM25	2.5	0.99	1.42	1.28	1.54	1
SPO25	3	1.47	1.19	1.25	1.31	0.95
LAF38	13	1.71	1.08	1.01	1.2	1
PET38	8	1.59	1.14	1.09	1.25	0.99
RGL69	16	2.38	0.77	0.97	0.88	0.68
RGL69	16	2.4	0.75	0.97	0.87	0.7

BAR01	2.5	0.95	1.44	1.28	1.56	1
BAR01	2.5	1.45	1.2	1.28	1.32	0.97
AIG73	2.5	1.8	1.04	1.28	1.15	0.97
MON74	8	1.62	1.12	1.09	1.24	0.95
ANT74	2.5	1.17	1.34	1.28	1.45	1
GEB69	16	1.69	1.09	0.97	1.21	0.88
BOU73	13	1.58	1.14	1.01	1.26	0.94
UBY32	25	2.44	0.74	0.9	0.85	0.63
UBY32	25	2.5	0.71	0.9	0.82	0.58
ETI39	5	1.1	1.37	1.16	1.49	1
LPC38	5	1.99	0.95	1.16	1.07	0.92
ALL04	2.5	1.29	1.28	1.28	1.39	0.99
CHA39	5	1.58	1.14	1.16	1.26	0.97
ENT25	14	1.6	1.13	0.99	1.25	0.97
NAN01	5	1.82	1.03	1.16	1.15	0.91
ANN74	3.5	1.8	1.04	1.22	1.15	0.88
ANT74	2.5	1.31	1.27	1.28	1.39	0.94
ENT13	170	2.92	0.51	0.58	0.63	0.3
YRI40	10	2.26	0.82	1.05	0.94	0.87
AUL13	78	2.76	0.59	0.71	0.7	0.44
RGL69	16	2.56	0.68	0.97	0.8	0.67
ANS69	3	2.27	0.82	1.25	0.93	0.78
LPC38	5	1.62	1.12	1.16	1.24	0.98
PAL38	8	2.09	0.9	1.09	1.02	0.94
ENT13	170	2.9	0.52	0.58	0.64	0.41
LRO39	13	1.62	1.12	1.01	1.24	0.93
ETI39	2.5	1.29	1.28	1.28	1.4	0.99
LGM39	2.5	0.99	1.42	1.28	1.54	0.99
ENT25	14	1.89	1	0.99	1.11	1
SYL01	11	1.7	1.09	1.03	1.2	0.97
ENT25	14	1.73	1.07	0.99	1.19	0.98
ANT74	2.5	1.07	1.38	1.28	1.5	0.98
BAR01	2.5	1.28	1.28	1.28	1.4	1
ALL04	2.5	1.27	1.29	1.28	1.4	0.97
AUL13	78	2.51	0.7	0.71	0.82	0.61
UBY32	25	2.44	0.74	0.9	0.85	0.62
MON74	2.5	1.54	1.16	1.28	1.28	0.93

Table 6. *Lake by lake results of the intercalibration procedure (high alkalinity).*

We can now draw the relationship between the common metric CM_{bm} (y) and the IBDL (x), expressed in EQR, using a linear regression (OLS regression, Figure 4).

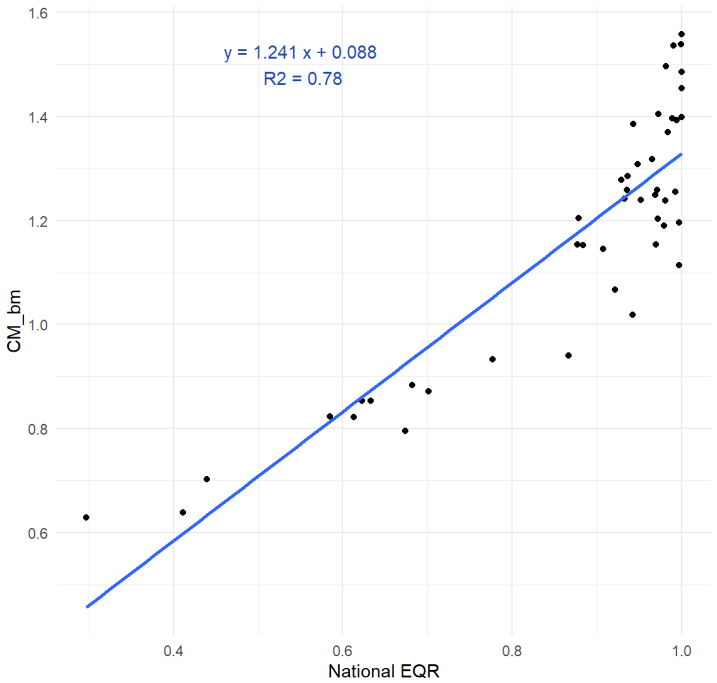

Figure 4. *Relationship between the national EQR and the common metric benchmarked (high alkalinity).*

Based on this linear regression IBDL scores can be turned into CM_{bm} scores. Thus our national class boundaries (H/G, G/M, M/P & P/B) were converted to CM_{bm} scores. Those predicted values of our national boundaries on the CM_{bm} scale, together with the boundaries common view (Kelly et al., 2004) are reported in Table 7.

Boundary	Projection of the national EQRs on the CM_{bm} scale	Common view EQRs
H/G	1.081	0.965
G/M	0.833	0.790
M/P	0.584	0.604
P/B	0.336	0.416

Table 7. *Predicted projections of the national boundaries on the* CM_{bm} *scale and common view for high alkalinity lakes.*

Deviations between our boundaries expressed in CM_{bm} and the common views are expressed as a proportion of the class width considered.
Results are reported in Table 8.

Boundary	Deviation
H/G	0.47
G/M	0.17

Table 8. *Amount of the deviation between boundaries on the common metric scale and the global view (high alkalinity lakes).*

The H/G boudary falls above the common view with about 47% of one class width and the G/M boudary also falls above the common view with about 17% of one class width. These results correspond to what is expected. If this value is ≤ 25%, the boundary meets the comparability criteria. If this value is > 25% and ≤ 50%, the boundary can be lowered until the deviation between the national boundary and the common exercise boundary is ≤ 25%, but there is not compulsory to perform this adjustment.

Here, we consider that this is not necessary to lower our H/G boundary and that our results correspond to what is expected. This choice is justified by the discrepency between the total phosphorus gradients in the common exercise and in the French data set. Indeed, in the common exercice dataset, total phosphorus concentrations ranges between 3 and 1000 $\mu g.L^{-1}$, while in the French dataset total phosphorus concentrations ranges between 2.5 and 170 $\mu g.L^{-1}$.

Literature

AFNOR, 2010. Qualité de l'eau - Echantillonnage des communautés de macrophytes en plans d'eau. Norme NF 90 T-328.

AFNOR, 2016. Qualité de l'eau – Échantillonnage, traitement et analyse de diatomées benthiques en cours d'eau et canaux. Association française de normalisation, Norme NF 90 T-354.

Baker, E, King, R.S., Kahle, D., 2020. TITAN2: Threshold Indicator Taxa Analysis. R package version 2.4.1. https://CRAN.R-project.org/package=TITAN2

Birk, S., Willby, N., Poikane, S., Van De Bund, W., 2014. Water Framework Directive Intercalibration Manual: Procedure to fit new or updated classification methods to the results of a completed intercalibration. Publications Office of the European Union, Luxembourg.

Boutry, S.; Bertrin, V. & Dutartre, A., 2015. Indice Biologique Macrophytique en Lac (IBML) : notice de calcul. Irstea, pp.25. ⟨hal-02602320⟩.

Boutry, S., Morin, S., Bertrin, V., Tison-Rosebery, J., 2021. Évaluation écologique des plans d'eau basée sur les communautés de diatomées benthiques - Proposition d'une version finale de l'IBDL. Rapport scientifique, pôle INRAE-OFB ECLA, 47p.

Carayon, D., Eulin-Garrigue, A., Vigouroux, R., & Delmas, F., 2020. A new multimetric index for the evaluation of water ecological quality of French Guiana streams based on benthic diatoms. Ecological Indicators, 113: 106248.

Cellamare, M., Morin, S., Coste, M., Haury, J., 2012. Ecological assessment of French Atlantic lakes based on phytoplankton, phytobenthos and macrophytes. Environmental Monitoring and Assessment, 184(8): 4685-4708.

CEN (Comité Européen de Normalisation), 2003. Water quality - Guidance standard for the routine sampling and pretreatment of benthic diatoms from rivers. EN 13946:2003. Comité Européen de Normalisation, Geneva, Switzerland.

Coste, M., Boutry, S., Tison-Rosebery, J. Delmas, F., 2009. Improvements of the Biological Diatom Index (BDI): Description and efficiency of the new version (BDI-2006). Ecological indicators, 9(4): 621-650.

European Union, 2000. Directive 2000/60/EC of the European Parliament and of the Council of 23rd October 2000 Establishing a Framework for Community Action in the Field of Water Policy. Official Journal of European Communities, European Commission, Brussels (2000) (22 December, L 327/1).

Gotelli, N.J. and McCabe, D.J., 2002. Species co-occurrence: a meta-analysis of J.M. Dia-mond's assembly rules model. Ecology, 83(8): 2091–2096.

Kelly, M.; Acs, E.; Bertrin, V.; Bennion, H.; Borics, G.; Burgess, A.; Denys, L.; Ecke, F.; Kahlert, M.; Karjalainen, S.; Kennedy, B.; Marchetto, A.; Morin, S.; Picinska Faltynowicz, J.; Phillips, G.; Schönfelder, I.; Schönfelder, J.; Urbanic, G.; Van Dam, H., Zalewski, T., 2014. Water Framework Directive Intercalibration Technical Report: Lake Phytobenthos ecological assessment methods Publications Office of teh European Union, 125 p.

King, L., Clarke, G., Bennion, H., Kelly, M., Yallop, M., 2006. Recommendations for sampling littoral diatoms in lakes for ecological status assessments. J. Appl. Phycol. 18, 15 – 25.

King, R. S., & Richardson, C. J., 2003. Integrating bioassessment and ecological risk assessment: an approach to developing numerical water-quality criteria. Environmental management, 31(6): 795-809.

Lange-Bertalot, H., 1995-2015. Iconographia Diatomologica. Annotated Diatom Micrographs. K €

onigstein: Koeltz Scientific Books.

Lecointe, C., Coste, M., Prygiel, J., 1993. “ Omnidia ” : Software for taxonomy, calculation of diatom indices and inventories management. Hydrobiologia, 269-270: 509-513.

Mondy, C. P., Villeneuve, B., Archaimbault, V., Usseglio-Polatera, P., 2012. A new macroinvertebrate-based multimetric index (I2M2) to evaluate ecological quality of French wadeable streams fulfilling the WFD demands: A taxonomical and trait approach. Ecological Indicators, 18: 452-467.

R Core Team, 2021. R: A language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from http://www.R-project.org/

Rott E., Pipp E., Pfister P., van Dam H., Ortler K., Binder N., Pall K. 1998. Indikationslisten fur Aufwuchsalgen. Teil 2: Trophieindikation. Bundesministerium fur Land-und Forstwirtschaft, Wien.Scheffer M. (1998) Ecology of Shallow Lakes. Chapman and Hall,London, 228 pp.

Annex 1: List of alert taxa

code	name	author	Alert taxa (1 : yes ; O : no)			
			DBO5	SP	NKJ	Pt
AAMB	Aulacoseira ambigua	(Grunow) Simonsen	0	0	0	0
ABRT	Achnanthidium bioretii	(Germain) Edlund	0	0	0	0
ABRY	Adlafia bryophila	(Petersen) Lange-Bertalot in Moser & al.	0	0	0	0
ACAF	Achnanthidium affine	(Grun) Czarnecki	0	0	0	0
ACLI	Achnanthidium lineare	W. Smith	0	0	0	1
ACOP	Amphora copulata	(Kützing) Schoeman & Archibald	1	1	1	1
ADAM	Achnanthidium atomoides	Monnier, Lange-Bertalot & Ector	0	0	0	0
ADAS	Achnanthidium anastasiae	(Kaczmarska) Chudaev et Gololobova	0	0	0	0
ADBA	Achnanthidium barbei	Le Cohu & Pérès	0	0	0	0
ADCA	Achnanthidium caledonicum	Lange-Bertalot)Lange-Bertalot	0	0	0	0
ADCT	Achnanthidium catenatum	(Bily & Marvan) Lange-Bertalot	0	0	0	1
ADDA	Achnanthidium daonense	(Lange-Bertalot) Lange-Bertalot Monnier & Ector	0	0	0	0
ADEG	Achnanthidium exiguum	(Grunow) Czarnecki	1	0	0	1
ADEU	Achnanthidium eutrophilum	(Lange-Bertalot)Lange-Bertalot	1	1	1	1
ADEX	Achnanthidium exile	(Kützing) Heiberg	0	0	0	0
ADGL	Achnanthidium gracillimum	(Meister)Lange-Bertalot	0	0	0	0
ADHE	Achnanthidium helveticum	(Hustedt) Monnier Lange-Bertalot & Ector	0	0	0	0
ADJK	Achnanthidium jackii	Rabenhorst	0	0	0	0
ADKR	Achnanthidium kranzii	(Lange-Bertalot) Round & Bukhtiyarova	0	0	0	0
ADLA	Achnanthidium latecephalum	Kobayasi	0	0	0	0
ADMC	Achnanthidium microcephalum	Kützing sensu W. Smith	0	0	1	0
ADMI	Achnanthidium minutissimum	(Kützing) Czarnecki	0	0	0	0
ADMO	Achnanthidium delmontii	PeRes. Le Cohu et Barthes	0	0	0	0
ADMS	Adlafia minuscula	(Grunow) Lange-Bertalot	0	0	0	0
ADMU	Adlafia muralis	(Grunow in Van Heurck 1880) Li et Qi	0	0	0	0
ADNM	Achnanthidium neomicrocephalum	Lange-Bertalot & Staab	0	0	0	0
ADPL	Achnanthidium pseudolineare	Van de Vijver. Novais et Ector	0	0	0	0
ADPS	Achnanthidium petersenii	(Hustedt) C.E. Wetzel,Ector, D.M. Williams & Jüttner	0	0	0	0
ADPY	Achnanthidium pyrenaicum	(Hustedt) Kobayasi	0	0	0	0
ADRI	Achnanthidium rivulare	Potapova & Ponader	0	0	0	1
ADRK	Achnanthidium rosenstockii	(Lange-Bertalot) Lange-Bertalot in Krammer & Lange-Bertalot	0	0	0	0
ADRU	Achnanthidium druartii	Rimet & Couté in Rimet & al.	0	1	0	1
ADSA	Achnanthidium saprophilum	(Kobayasi et Mayama) Round & Bukhtiyarova	0	0	0	0
ADSB	Achnanthidium straubianum	(Lange-Bertalot)Lange-Bertalot	0	0	0	0
ADSH	Achnanthidium subhudsonis	(Hustedt) H. Kobayasi	1	1	0	0
ADSO	Achnanthidium subatomoides	(Hustedt) Monnier, Lange-Bertalot et Ector	0	0	0	0
ADTR	Achnanthidium trinode	Ralfs in Pritchard	0	0	0	0
AFOR	Asterionella formosa	Hassall	0	0	0	0
AGRU	Achnanthes grubei	Simonsen	0	0	0	0
AGSL	Aulacoseira granulata	(Ehrenberg) Simonsen	1	1	1	1
AHOF	Achnanthidium hoffmannii	Van de Vijver. Ector, Mertens & Jarlman	0	0	0	0
AINA	Amphora inariensis	Krammer	0	0	0	0
ALBL	Adlafia langebertalotii	Monnier et Ector	0	0	0	0
AMDN	Amphora meridionalis	Levkov	0	0	0	0

			Alert taxa (1 : yes ; O : no)			
code	name	author	DBO5	SP	NKJ	Pt
AMID	Amphora indistincta	Levkov	0	0	0	0
AMLB	Amphora lange-bertalotii	Levkov, & Metzeltin	1	0	1	1
AMUZ	Aulacoseira muzzanensis	(Meister) Krammer	0	1	0	1
ANSS	Aneumastus stroesei	(Østrup) Mann & Stickle in Round Crawford & Mann	0	0	0	0
AOVA*	Amphora ovalis var. ovalis	(Kützing) Kützing	0	0	0	0
APED	Amphora pediculus	(Kützing) Grunow	1	1	0	1
APEL	Amphipleura pellucida	Kützing	0	0	0	0
ASBL	Achnanthidium sublineare	Van de Vijver. Jarlman et Ector	0	0	0	0
AUGR	Aulacoseira granulata	(Ehrenberg) Simonsen	0	1	1	1
AUPU	Aulacoseira pusilla	(Meister) Tuji et Houki	0	1	1	1
AUSL	Aulacoseira scalaris	(Grunow) Houk, Klee & Passauer	0	0	0	1
AUSU	Aulacoseira subarctica	(O. Müller) Haworth	0	0	0	0
AUVA	Aulacoseira valida	Grunow)Krammer	0	1	1	1
AVTU	Amphora vetula	Levkov,	0	0	0	0
AZHA	Achnanthidium zhakovschikovii	M. Potapova	0	0	0	0
BBRE*	Brachysira brebissonii subsp. brebissonii	Ross in Hartley	0	0	0	0
BGAR	Brachysira garrensis	(Lange-Bertalot & Krammer) Lange-Bertalot	0	0	0	0
BLIL	Brachysira liliana	Lange-Bertalot	0	0	0	0
BMIC	Brachysira microcephala	(Grunow) Compère	0	0	0	0
BNEG	Brachysira neglectissima	Lange-Bertalot	0	0	0	0
BNEO	Brachysira neoexilis	Lange-Bertalot	0	0	0	0
BPAX	Bacillaria paxillifera	(O.F. Müller) Hendey	0	0	0	0
BPRO	Brachysira procera	Lange-Bertalot & Moser	0	0	0	0
BVIT	Brachysira vitrea	(Grunow) Ross in Hartley	0	0	0	0
CAEX*	Cymbella excisa var. excisa	Kützing	0	1	0	0
CAFF*	Cymbella affinis var. affinis	Kützing	0	1	0	0
CAFM	Cymbella affiniformis	Krammer	0	0	0	0
CAMB	Craticula ambigua	(Ehrenberg) Mann	0	0	0	1
CATE	Caloneis tenuis	(Gregory) Krammer	0	0	0	0
CATO	Cyclotella atomus	Hustedt	0	0	1	1
CBAC	Caloneis bacillum	(Grunow) Cleve	0	0	0	0
CBAM	Cymbopleura amphicephala	Krammer	0	0	0	0
CBHD	Cymbopleura hustedtii	Novelo Tavera & Ibarra	0	0	0	0
CBNA*	Cymbopleura naviculiformis var. naviculiformis	(Auerswald) Krammer	0	0	0	0
CCMP	Cymbella compacta	Østrup	0	0	0	0
CCOC	Cavinula cocconeiformis	(Gregory ex Greville) Mann & Stickle in Round Crawford & Mann	0	0	0	0
CCYM	Cymbella cymbiformis	Agardh	0	0	0	0
CDTG*	Cyclotella distinguenda var. distinguenda	Hustedt	0	0	0	0
CDUB	Cyclostephanos dubius	(Fricke) Round	0	0	0	1
CEUG	Cocconeis euglypta	Ehrenberg	1	1	1	0
CEXF*	Cymbella excisiformis var. excisiformis	Krammer	0	0	0	0
CFON	Caloneis fontinalis	(Grunow in Van Heurck) Cleve-Euler	1	1	1	1
CFTF	Cymbopleura florentiniformis	Krammer	0	0	0	0
CHEL	Cymbella helvetica	Kützing	0	0	0	0
CHHA	Chamaepinnularia hassiaca	(Krasske) Cantonati & Lange-Bertalot	0	0	0	0
CHME	Chamaepinnularia mediocris	(Krasske) Lange-Bertalot in Lange-Bertalot & Metzeltin	0	0	0	0
CINV	Cyclostephanos invisitatus	Hohn & Hellerman)Theriot Stoermer	0	1	0	0

code	name	author	Alert taxa (1 : yes ; O : no)			
			DBO5	SP	NKJ	Pt
		& Håkansson				
CJAR	Cavinula jaernefeltii	(Hustedt) Mann & Stickle in Round Crawford & Mann	0	0	0	0
CKPP	Cymbella kappii	(Cholnoky) Cholnoky	0	0	0	0
CLAE*	Cymbella laevis var. laevis	Naegeli ex Kützing	0	0	0	0
CLBE	Cymbella lange-bertalotii	Krammer	0	0	0	0
CLCT	Caloneis lancettula	(Schulz) Lange-Bertalot & Witkowski	1	1	1	0
CLEP	Cymbella leptoceros	(Ehrenberg) Kützing	0	0	0	0
CLNT	Cocconeis lineata	Ehrenberg	0	0	0	1
CLTL	Cymbella lancettula	(Krammer) Krammer	0	0	0	0
CMDU	Cyclotella meduanae	Germain emend Genkal	1	1	1	1
CMEN	Cyclotella meneghiniana	Kützing	0	1	1	1
CMLF	Craticula molestiformis	(Hustedt) Lange-Bertalot	0	0	0	0
CNCI*	Cymbella neocistula var. neocistula	Krammer	0	0	0	0
CNLC	Cymbella neolanceolata	W. Silva	0	0	0	0
CNLP*	Cymbella neoleptoceros var. neoleptoceros	Krammer	0	1	1	1
CNTH	Cocconeis neothumensis	Krammer	1	0	0	1
COPL	Cocconeis pseudolineata	(Geitler) Lange-Bertalot	0	0	0	0
CPAR	Cymbella parva	(W. Sm.) Kirchner in Cohn	0	0	0	0
CPED	Cocconeis pediculus	Ehrenberg	0	0	0	0
CPLA*	Cocconeis placentula var. placentula	Ehrenberg	0	0	0	1
CPPV	Cymbella perparva	Krammer	0	0	0	0
CPRX*	Cymbella proxima var. proxima	Reimer in Patrick & Reimer	0	0	0	0
CPSE	Cavinula pseudoscutiformis	(Hustedt) Mann & Stickle in Round Crawford & Mann	0	0	0	0
CSAQ*	Cymbopleura subaequalis var. subaequalis	(Grunow) Krammer	0	0	0	0
CSBH	Cymbella subhelvetica	Krammer	0	0	0	0
CSCI	Cymbella subcistula	Krammer	0	0	0	0
CSHU	Caloneis schumanniana	(Grunow in Van Heurck) Cleve	0	0	0	0
CSLP	Cymbella subleptoceros	Krammer	0	0	0	0
CSMU	Chamaepinnularia submuscicola	(Krasske) Lange-Bertalot	0	0	0	0
CSNU	Craticula subminuscula	(Manguin) C.E. Wetzel & Ector	1	1	1	1
CTPU	Ctenophora pulchella	(Ralfs ex Kütz.) Williams et Round	0	0	0	0
CTRQ	Centric diatoms	Diatomées centriques indifférenciées	0	0	0	0
CTUM	Cymbella tumida	(Brébisson)Van Heurck	0	0	0	1
CVUL*	Cymbella vulgata var. vulgata	Krammer	0	0	0	0
DCAL	Diploneis calcilacustris	Lange–Bertalot et A. Fuhrmann	0	0	0	0
DCOF*	Diadesmis confervacea var. confervacea	Kützing	0	0	1	0
DEHR	Diatoma ehrenbergii	Kützing	0	0	0	0
DITE	Diatoma tenue	Agardh	0	1	0	1
DKUE*	Denticula kuetzingii var. kuetzingii	Grunow	0	0	0	0
DMES	Diatoma mesodon	(Ehrenberg) Kützing	0	0	0	0
DOBL	Diploneis oblongella	(Naegeli) Cleve-Euler	0	0	0	0
DOCU	Diploneis oculata	(Brébisson in Desmazières) Cleve	0	0	1	0
DPAR	Diploneis parma	Cleve	0	0	0	0
DPDE	Delicatophycus delicatulus	(Kützing) M.J.Wynne .	0	0	0	0
DPSG	Discostella pseudostelligera	(Hustedt) Houk & Klee emend. Genkal	0	1	0	0
DSEP	Diploneis separanda	Lange-Bertalot	0	0	0	0
DSTE	Discostella stelligera	(Cleve et Grun.) Houk & Klee	0	0	0	0

			Alert taxa (1 : yes ; O : no)			
code	**name**	**author**	**DBO5**	**SP**	**NKJ**	**Pt**
DTEN	Denticula tenuis	Kützing	0	0	0	0
DVUL	Diatoma vulgaris	Bory	0	0	0	0
EADN	Epithemia adnata	(Kützing) Brébisson	1	1	1	1
EARB	Eunotia arcubus	Nörpel-Schempp & Lange-Bertalot	0	0	0	0
EARC*	Eunotia arcus var. arcus sensu stricto	Ehrenberg	0	0	0	0
EAUE	Encyonema auerswaldii	Rabenhorst	0	1	0	0
EBLU	Eunotia bilunaris	(Ehrenberg) Schaarschmidt	0	0	0	0
EBOA	Eunotia boreoalpina	Lange-Bertalot & Nörpel-Schempp	0	0	0	0
EBOT	Eunotia botuliformis	Wild, Nörpel-Schempp & Lange-Bertalot	0	0	0	0
ECAE*	Encyonema caespitosum var. caespitosum	Kützing	0	0	0	0
ECAL	Encyonopsis alpina	Krammer & Lange-Bertalot	0	0	0	0
ECES	Encyonopsis cesatii	(Rabenhorst) Krammer	0	0	0	0
ECKR	Encyonopsis krammeri	Reichardt	0	0	0	0
ECPM	Encyonopsis minuta	Krammer & Reichardt	0	0	0	0
ECTA	Encyonopsis tavirana	Krammer	0	0	0	0
EEXI	Eunotia exigua	(Brébisson ex Kützing) Rabenhorst	0	0	0	0
EFAB	Eunotia faba	(Ehrenberg) Grunow in Van Heurck	0	0	0	0
EGBA	Epithemia gibba	(Ehrenberg) Kützing	0	1	1	1
EHOR	Encyonopsis horticola	Van de Vijver, Lange-Bertalot & Compère	0	0	0	0
EIMP	Eunotia implicata	Nörpel Lange-Bertalot & Alles	0	0	0	0
EINC*	Eunotia incisa var. incisa	Gregory	0	0	0	0
ELBV*	Encyonema lange-bertalotii var. lange-bertalotii	Krammer	0	0	0	0
ELEI	Encyonema leibleinii	(C. Agardh) Silva, Jahn Ludwig & Menezes	0	0	0	0
EMIN	Eunotia minor	(Kützing) Grunow in Van Heurck	0	0	0	0
ENAE	Eunotia naegelii	Migula	0	0	0	0
ENCM	Encyonopsis microcephala	(Grunow) Krammer	0	0	0	0
ENEE	Encyonopsis neerlandica	Van de Vijver. Verweij, Van Der Wal & Mertens	0	0	0	0
ENKA	Encyonema kalbei	Krammer	0	0	0	0
ENMI	Encyonema minutum	(Hilse in Rabh.) D.G. Mann in Round Crawford & Mann	1	1	1	1
ENNG	Encyonema neogracile	Krammer	0	0	0	0
ENRE	Encyonema reichardtii	(Krammer) D.G. Mann in Round Crawford & Mann	0	0	0	0
ENVE	Encyonema ventricosum	(Kützing) Grunow in Schmidt & al.	0	0	0	0
EOCO	Eolimna comperei	Ector Coste et Iserentant in Coste & Ector	0	0	0	0
EPBO	Epithemia proboscidea	Kützing	0	0	0	0
EPEC*	Eunotia pectinalis var. pectinalis	(Kützing) Rabenhorst	0	0	0	0
EPHP	Epithemia parallela	(Grunow) Ruck & Nakov	0	0	0	0
ERHO	Eunotia rhomboidea	Hustedt	0	0	0	0
ESLE	Encyonema silesiacum	(Bleisch in Rabh.) D.G. Mann	1	1	1	1
ESMI	Epithemia smithii	Carruthers in Gray	0	0	0	0
ESOR	Epithemia sorex	Kützing	1	0	1	1
ESUB	Eunotia subarcuatoides	Alles Nörpel & Lange-Bertalot in Alles et al.	0	0	0	0
ESUM	Encyonopsis subminuta	Krammer & Reichardt	0	0	0	0
ETEN	Eunotia tenella	(Grunow in Van Heurck) Hustedt in Schmidt & al	0	0	0	0

			Alert taxa (1 : yes ; O : no)			
code	name	author	DBO5	SP	NKJ	Pt
ETUR*	Epithemia turgida var. turgida	(Ehrenberg) Kützing	0	0	0	0
EUAL	Eucocconeis alpestris	(Brun) Lange-Bertalot	0	0	0	0
EUFL	Eucocconeis flexella	(Kützing) Meister	0	0	0	0
EULA	Eucocconeis laevis	(Østrup) Lange-Bertalot	0	0	0	0
EVUL*	Encyonema vulgare var. vulgare	Krammer	0	0	0	0
FAPO	Fragilaria amphicephaloides	Lange-Bertalot in Hofmann & al.	0	0	0	0
FAQU	Fragilaria aquaplus	Lange-Bertalot & Ulrich	0	0	0	0
FAUT	Fragilaria austriaca	(Grunow) Lange-Bertalot	0	0	0	0
FBIP	Fragilaria bipunctata	(Ehrenb.) Hemprich & Ehrenb.	0	0	0	0
FCRO	Fragilaria crotonensis	Kitton	0	0	0	1
FCRS	Frustulia crassinervia	(Breb.) Lange-Bertalot et Krammer	0	0	0	0
FFBI	Fragilariforma bicapitata	(A.Mayer) Williams & Round	0	0	0	0
FFNI	Fragilariforma nitzschioides	(Grunow) Lange-Bertalot in Hofmann Werum & Lange-Bertalot	0	0	0	0
FFUS	Fragilaria fusa	(R.M. Patrick) Wengrat, C.E. Wetzel & E. Morales	1	1	0	1
FFVI	Fragilariforma virescens	(Ralfs) Williams & Round	0	0	0	0
FGRA	Fragilaria gracilis	Østrup	0	0	0	0
FMES	Fragilaria mesolepta	Rabenhorst	0	0	1	0
FMIT	Fallacia mitis	(Hustedt) D.G. Mann	0	0	0	0
FMIV	Fragilaria microvaucheriae	C.E. Wetzel et Ector	0	0	0	1
FNEV	Fragilaria nevadensis	Linares-Cuesta & Sanchez-Castillo	0	0	0	0
FNIN	Fragilaria neointermedia	Tuji et D.M. Williams	0	0	0	0
FPDE	Fragilaria perdelicatissima	Lange-Bertalot & Van de Vijver	0	0	0	0
FPEC	Fragilaria pectinalis	Lyngbye	1	1	0	1
FPEM	Fragilaria perminuta	(Grunow) Lange-Bertalot	0	0	0	0
FPRU	Fragilaria pararumpens	Lange-Bertalot, Hofmann & Werum in Hofmann & al.	0	0	0	0
FRAD	Fragilaria radians	(Kütz.) Williams & Round	1	0	0	1
FRUM	Fragilaria rumpens	(Kütz.) G.W.F. Carlson	0	1	0	0
FSAP	Fistulifera saprophila	(Lange-Bertalot & Bonik) Lange-Bertalot	0	0	0	0
FSAX	Frustulia saxonica	Rabenhorst	0	0	0	0
FSBH	Fallacia subhamulata	(Grunow in V. Heurck) D.G. Mann	0	0	0	0
FSLU	Fallacia sublucidula	(Hustedt) D.G. Mann	0	0	0	0
FSOC	Fragilaria socia	(Wallace) Lange-Bertalot	0	0	0	0
FSXP	Fragilaria saxoplanctonica	Lange-Bertalot & Ulrich	0	0	0	0
FTEN	Fragilaria tenera	(W. Smith) Lange-Bertalot	0	0	0	0
FTNU	Fragilaria tenuissima	Lange-Bertalot & Ulrich	0	0	0	0
FVAU*	Fragilaria vaucheriae var. vaucheriae	(Kützing) Petersen	1	1	0	0
FVUL	Frustulia vulgaris	(Thwaites) De Toni	0	0	0	0
GACC	Geissleria acceptata	(Hustedt) Lange-Bertalot & Metzeltin	0	0	0	0
GACD	Gomphonema acidoclinatiforme	Metzeltin & Lange-Bertalot	0	0	0	0
GACU*	Gomphonema acuminatum var. acuminatum	Ehrenberg	0	0	0	0
GADC	Gomphonema acidoclinatum	Lange-Bertalot & Reichardt	1	0	1	1
GAFF	Gomphonema affine	Kützing	0	0	0	0
GAGU	Gomphonema angustius	E. Reichardt	0	0	0	0
GAGV	Gomphonema angustivalva	E. Reichardt	1	0	0	0
GANG	Gomphonema angustatum	(Kützing) Rabenhorst	0	0	1	0
GAUG	Gomphonema augur	Ehrenberg	0	0	0	0
GAUR	Gomphonema auritum	A. Braun ex Kützing	0	0	0	0
GBOB	Gomphonema bourbonense	E. Reichardt et Lange-Bertalot	1	1	1	1
GBRE	Gomphonema brebissonii	Kützing	0	0	0	0

code	name	author	Alert taxa (1 : yes ; O : no)			
			DBO5	SP	NKJ	Pt
GCAD	Gomphonema campodunense	E.Reichardt	0	0	0	0
GCAP	Gomphonema capitatum	Ehrenberg	0	0	0	0
GCLA	Gomphonema clavatum	Ehrenberg	0	0	1	1
GCOR	Gomphonema coronatum	Ehrenberg	0	0	0	0
GCUN	Gomphonema cuneolus	E. Reichardt	0	0	0	0
GCUV	Gomphonema curvipedatum	H. Kobayasi ex Osada	0	0	0	0
GCUW	Geissleria cummerowi	(L. Kalbe) Lange-Bertalot	0	0	0	0
GELG	Gomphonema elegantissimum	Reichardt & Lange-Bertalot in Hofmann & al.	0	0	0	0
GERI	Gomphoneis eriense	(Grunow) Skvortzow & Meyer	0	0	0	0
GEXL	Gomphonema exilissimum	(Grun.) Lange-Bertalot & Reichardt	0	0	0	0
GGDI	Gomphonema graciledictum	E.Reichardt	0	0	1	0
GGRA	Gomphonema gracile	Ehrenberg	0	0	0	0
GHEB	Gomphonema hebridense	Gregory	0	0	0	0
GITA	Gomphonema italicum	Kützing	1	0	0	0
GLAT	Gomphonema lateripunctatum	Reichardt & Lange-Bertalot	0	0	0	0
GLOV	Gomphonella olivacea		0	1	0	0
GLTC	Gomphonema laticollum	Reichardt	0	0	0	0
GMEX	Gomphonema mexicanum	Grunow	0	0	0	0
GMIC*	Gomphonema micropus var. micropus	Kützing	0	0	0	0
GMIN*	Gomphonema minutum f. minutum	(Ag.)Agardh	0	1	0	0
GMIS	Gomphonema minusculum	Krasske	0	0	0	0
GNVC	Gomphonema naviculoides	W. Smith	0	0	0	0
GPAN	Gomphocymbellopsis ancyli	(Cleve) Krammer	0	0	0	0
GPAR*	Gomphonema parvulum var. parvulum f. parvulum	(Kützing) Kützing	0	1	0	1
GPLI	Gomphosphenia lingulatiformis	(Lange-Bertalot & Reichardt) Lange-Bertalot	0	1	1	1
GPSA	Gomphonema pseudoaugur	Lange-Bertalot	0	0	0	0
GPUM	Gomphonema pumilum	(Grunow) Reichardt & Lange-Bertalot	1	1	0	1
GRHB	Gomphonema rhombicum	M. Schmidt	0	0	0	0
GSBG	Gomphonema subangustatum	Lange-Bertalot Cavacini Tagliaventi & Alfinito	0	0	0	0
GSCD	Gomphonema scardicum	Mitić–Kopanja, Wetzel, Ector & Levkov	0	0	0	0
GSCI	Gyrosigma sciotoense	(Sullivan et Wormley) Cleve	0	0	0	0
GSCL	Gomphonema subclavatum	Grunow	1	1	1	1
GSPP	Gomphonema saprophilum	(Lange-Bertalot & Reichardt) Abarca, R. Jahn, J. Zimmermann & Enke	0	1	1	1
GTER	Gomphonema tergestinum	(Grunow in Van Heurck) Schmidt in Schmidt & al.	0	0	0	0
GTNO	Gomphonema tenoccultum	Reichardt	0	0	0	0
GTRU	Gomphonema truncatum	Ehrenberg	1	0	0	0
GVIB	Gomphonema vibrio	Ehrenberg	0	0	0	0
GYAT	Gyrosigma attenuatum	(Kützing) Rabenhorst	0	0	0	0
GYKU	Gyrosigma kuetzingii	(Grunow) Cleve	0	0	0	0
HCAP	Hippodonta capitata	(Ehr.)Lange-Bert.Metzeltin & Witkowski	0	1	0	0
HLMO	Halamphora montana	(Krasske) Levkov,	0	0	0	0
HNEG	Hippodonta neglecta	Lange-Bertalot Metzeltin & Witkowski	0	0	0	0
HOLI	Halamphora oligotraphenta	(Lange-Bertalot) Levkov	0	0	0	0
HPDA	Hippodonta pseudacceptata	(Kobayasi) Lange-Bertalot Metzeltin & Witkowski	0	0	0	0

			Alert taxa (1 : yes ; O : no)			
code	name	author	DBO5	SP	NKJ	Pt
HPEP	Humidophila perpusilla	(Grunow) Lowe, Kociolek, Johansen,Van de Vijver, Lange-Bertalot & Kopalová	0	0	0	0
HSMA	Humidophila schmassmannii	(Hustedt) Buczkó et Wojtal	0	0	0	0
HTHU	Halamphora thumensis	(A.Mayer) Levkov	0	0	0	0
HVEN	Halamphora veneta	(Kützing) Levkov,	0	0	0	0
KALA	Karayevia laterostrata	(Hustedt) Bukhtiyarova	0	0	0	0
KAPL	Karayevia ploenensis	(Hustedt) Bukhtiyarova	0	0	0	0
KCLE*	Karayevia clevei var. clevei	(Grunow) Bukhtiyarova	1	0	0	0
LGOP	Luticola goeppertiana	(Bleisch) D.G.Mann ex J.Rarick, S.Wu, S.S.Lee & Edlund	0	0	0	0
LHUN	Lemnicola hungarica	(Grunow) Round & Basson	0	0	0	0
LRAD	Lindavia radiosa	(Grunow) De Toni & Forti	0	0	0	0
MAAT*	Mayamaea atomus var. atomus	(Kützing) Lange-Bertalot	0	0	0	0
MCIR*	Meridion circulare var. circulare	(Greville) C.A. Agardh	0	0	0	0
MING	Mayamaea ingenua	(Hustedt) Lange-Bertalot & Hofmann in Hofmann & al.	0	1	0	1
MLAC	Mastogloia lacustris	(Grunow) van Heurck	0	0	0	0
MPMI	Mayamaea permitis	(Hustedt) Bruder & Medlin	0	1	1	1
MSMI	Mastogloia smithii	Thwaites	0	0	0	0
MSTJ	Mastogloia sterijovskii	A. Pavlov. Jovanovska, C.E.Wetzel, Ector & Levkov	0	0	0	0
MVAR	Melosira varians	Agardh	0	1	0	1
NAAN	Navicula angusta	Grunow	0	0	0	0
NACD	Nitzschia acidoclinata	Lange-Bertalot	1	0	0	1
NACI	Nitzschia acicularis	Kützing) W.M.Smith	1	1	1	1
NAGN	Nitzschia agnita	Hustedt	0	1	1	0
NAGW	Nitzschia agnewii	Cholnoky	0	0	0	0
NALP	Neidium alpinum	Hustedt	0	0	0	0
NAMP*	Nitzschia amphibia f. amphibia	Grunow	1	1	1	1
NANT	Navicula antonii	Lange-Bertalot	1	1	1	1
NAPB	Nitzschia alpinobacillum	Lange-Bertalot	0	0	0	0
NCAR	Navicula cari	Ehrenberg	0	0	0	0
NCIN	Navicula cincta	(Ehr.) Ralfs in Pritchard	0	0	0	0
NCLA	Nitzschia clausii	Hantzsch	0	0	0	0
NCPL	Nitzschia capitellata	Hustedt in A. Schmidt & al.	0	0	1	0
NCPR	Navicula capitatoradiata	Germain	1	1	1	1
NCRY	Navicula cryptocephala	Kützing	0	0	1	0
NCTE	Navicula cryptotenella	Lange-Bertalot	1	1	1	0
NCTO	Navicula cryptotenelloides	Lange-Bertalot	1	1	1	0
NCTT	Navicula cataracta-rheni	Lange-Bertalot	1	1	0	1
NCTV	Navicula caterva	Hohn & Hellerman	0	1	1	1
NDBF	Neidiomorpha binodeformis	Cantonati, Lange-Bertalot & Angeli	0	0	0	0
NDIS*	Nitzschia dissipata subsp. dissipata	(Kützing) Grunow	1	1	1	0
NDRA	Nitzschia draveillensis	Coste & Ricard	0	0	0	0
NEUT	Nitzschia eutinensis	Lange-Bertalot & Werum	1	1	1	1
NEXI	Navicula exilis	Kützing	0	0	0	0
NFIL*	Nitzschia filiformis var. filiformis	(W.M.Smith) Van Heurck	1	1	1	1
NFON	Nitzschia fonticola	Grunow in Cleve et Möller	0	1	1	0
NFSO	Nanofrustulum sopotensis	(Witkowski & Lange-Bert.) E.Morales, C.E.Wetzel & Ector, comb. nov.	0	0	0	0
NFTR	Nanofrustulum trainori	(E.Morales) E.Morales, comb. nov.	1	0	0	1
NGDU	Navigeia decussis	(Østrup) Bukhtiyarova	0	0	0	0
NGER	Navicula germainii	Wallace	0	0	0	0

			Alert taxa (1 : yes ; O : no)			
code	name	author	DBO5	SP	NKJ	Pt
NGES	Nitzschia gessneri	Hustedt	0	0	0	0
NGOT	Navicula gottlandica	Grunow in Van Heurck	0	0	0	0
NGRE	Navicula gregaria	Donkin	0	0	0	0
NHAN	Nitzschia hantzschiana	Rabenhorst	0	0	0	0
NHEU	Nitzschia heufleriana	Grunow	0	0	0	0
NHIN	Navicula hintzii	Lange-Bertalot	0	0	0	0
NHMD	Navicula heimansioides	Lange-Bertalot	0	0	0	0
NIAR	Nitzschia archibaldii	Lange-Bertalot	0	0	0	0
NIBU	Nitzschia bulnheimiana	(Rabenhorst) H.L.Smith	0	0	0	0
NIFQ	Nitzschia frequens	Hustedt	0	0	0	0
NIFR*	Nitzschia frustulum var. frustulum	(Kützing) Grunow	1	1	1	1
NIGF	Nitzschia graciliformis	Lange-Bertalot & Simonsen	0	0	0	0
NIGR	Nitzschia gracilis	Hantzsch	1	1	1	1
NILA	Nitzschia lacuum	Lange-Bertalot	0	0	0	0
NIME	Nitzschia media	Hantzsch.	0	0	0	0
NINC	Nitzschia inconspicua	Grunow	1	1	1	1
NINT	Nitzschia intermedia	Hantzsch ex Cleve & Grunow	1	1	0	1
NIOG	Nitzschia oligotraphenta	(Lange-Bertalot) Lange-Bertalot in Hofmann & al.	0	0	0	0
NIPM	Nitzschia perminuta	(Grunow) M.Peragallo	0	0	0	0
NISU	Nitzschia subtilis	Grunow in Cleve et Grunow	0	0	0	0
NIVA	Nitzschia valdestriata	Aleem & Hustedt	0	0	0	0
NJOC	Navicula johncarterii	D.M.Williams	0	0	0	0
NLAN	Navicula lanceolata	(Agardh) Ehrenberg	0	0	0	0
NLIN*	Nitzschia linearis var. linearis	(Agardh) W.M.Smith	0	0	0	0
NLTK	Navicula leistikowii	Lange-Bertalot	0	0	0	0
NMCA	Navicula microcari	Lange-Bertalot	0	0	0	0
NMIC	Nitzschia microcephala	Grunow in Cleve & Moller	0	0	0	0
NMOK	Navicula moskalii	Metzeltin, Witkowski & Lange-Bertalot	0	0	0	0
NMTA	Navicula metareichardtiana	Lange-Bertalot & Kusber nom.nov.	1	1	0	1
NNOT	Navicula notha	Wallace	0	0	0	0
NOLI	Navicula oligotraphenta	Lange-Bertalot & Hofmann	0	0	0	0
NPAE	Nitzschia paleacea	(Grunow) Grunow in Van Heurck	1	1	1	1
NPAL*	Nitzschia palea var. palea	(Kützing) W.Smith	1	0	1	1
NPML	Nitzschia pumila	Hustedt	1	1	1	1
NPRA	Navicula praeterita	Hustedt	0	0	0	0
NRAD	Navicula radiosa	Kützing	0	0	0	0
NREC	Nitzschia recta	Hantzsch in Rabenhorst	0	1	0	0
NRHY	Navicula rhynchocephala	Kützing	0	0	0	0
NSBN	Navicula subalpina	Reichardt	0	0	0	0
NSIA	Navicula simulata	Manguin	1	1	1	1
NSNM	Navicula sancti-naumii	Levkov, et Metzeltin	1	1	1	0
NSOC	Nitzschia sociabilis	Hustedt	1	1	0	1
NSOL	Nitzschia solgensis	Cleve-Euler	0	1	1	1
NSTS	Nitzschia soratensis	Morales & Vis	0	1	1	1
NSUA	Nitzschia subacicularis	Hustedt in A. Schmidt et al.	0	1	1	1
NTAB	Nitzschia tabellaria	(Grun.) Grun. in Cl. & Grunow	0	1	0	0
NTCX	Navicula trophicatrix	Lange-Bertalot	0	0	0	0
NTPT	Navicula tripunctata	(O.F.Müller) Bory	1	1	1	1
NTRV*	Navicula trivialis var. trivialis	Lange-Bertalot	0	1	1	1
NUVI	Nupela vitiosa	(Schimanski) Lange-Bertalot in Krammer & Lange-Bertalot	0	0	0	0
NVDA*	Navicula vandamii var. vandamii	Schoeman & Archibald	0	0	0	0

code	name	author	Alert taxa (1 : yes ; O : no)			
			DBO5	SP	NKJ	Pt
NVEN	Navicula veneta	Kützing	0	1	1	1
NVGL	Navicula virginalis	Hustedt	0	0	0	0
NWIL	Navicula wildii	Lange-Bertalot	0	0	0	0
NXAS	Navicula associata	Lange-Bertalot	0	0	0	0
NYCO	Nitzschia costei	Tudesque, Rimet & Ector	0	1	0	0
NZAL	Nitzschia alpina	Hustedt	0	0	0	0
NZRA	Nitzschia radicula	Hustedt	0	0	0	0
NZSU	Nitzschia supralitorea	Lange-Bertalot	0	1	0	1
PABD	Psammothidium abundans	(Manguin in Bourrelly & Manguin) Bukhtiyatrova et Round	0	0	0	0
PABV	Planothidium abbreviatum	(Reimer) Potapova	1	0	0	1
PADE	Pantocsekiella delicatula	(Hustedt) K.T. Kiss et Ács	0	0	0	0
PALT	Psammothidium altaicum	(Poretzky) Bukhtiyarova in Bukhtiyarova & Round	0	0	0	0
PALV	Pseudostaurosira alvareziae	Cejudo-Figueras Morales & Ector	0	0	0	1
PCLD	Placoneis clementioides	(Hustedt) Cox	0	0	0	0
PCMS	Pantocsekiella comensis	(Grunow in Van Heurck) K.T. Kiss et Ács	0	0	0	0
PCOS	Pantocsekiella costei	(Druart et F. Straub) K.T. Kiss et Ács	0	0	0	0
PDAU	Planothidium daui	(Foged) Lange-Bertalot	0	0	0	0
PDID	Psammothidium didymum	(Hustedt) Bukhtiyarova et Round	0	0	0	0
PDOP	Pseudostaurosira parasitoides	(Lange-Bertalot, Rol.Schmidt & Klee in Schmidt et al.) E.Morales, M.L.García & Maidana	0	0	0	0
PDPC	Pseudostaurosiropsis connecticutensis	Morales	1	0	0	1
PEBR	Peronia brasiliensis	Hustedt	0	0	0	0
PFIB	Peronia fibula	(Brébisson ex Kützing)Ross	0	0	0	0
PGRI	Psammothidium grischunum	(Wuthrich) Bukhtiyarova et Round	0	0	0	0
PGRN	Planothidium granum	(Hohn & Hellerman) Lange-Bertalot	0	0	0	0
PHEL	Psammothidium helveticum	(Hustedt) Bukhtiyarova et Round	0	0	0	0
PKUE	Psammothidium kuelbsii	(Lange-Bertalot in L.-B. & K.) Bukhtiyarova et Round	0	0	0	0
PLFR	Planothidium frequentissimum	(Lange-Bertalot) Lange-Bertalot	0	0	0	1
PLHO	Platessa holsatica	(Hustedt) Lange-Bertalot	0	0	0	0
PLJO	Platessa joursacense	(Héribaud) Chudaev in Chudaev. Gololobova et Kulikovskiy	0	0	0	0
PLPM	Planothidium pumilum	Bąk & Lange-Bertalot	0	0	0	0
PLVA	Psammothidium levanderi	(Hustedt) Bukhtiyarova	0	0	0	0
PLVU	Psammothidium lacus-vulcani	(Lange-Bert. et Kram.) Bukht. et Round	0	0	0	1
PMNT	Planothidium minutissimum	(Krasske) Morales	0	0	0	0
PMSC*	Pseudostaurosira microstriata var. microstriata	(Marciniak) Flower	0	0	0	0
PMUL	Planothidium minusculum	(Hustedt) Witkowski, Kulikovskiy et Pliński	0	0	0	0
POBL	Platessa oblongella	(Østrup) C.E. Wetzel, Lange-Bertalot & Ector	0	0	0	0
POCL	Pantocsekiella ocellata	(Pantocsek) K.T. Kiss et Ács	0	0	0	0
POVA	Punctastriata ovalis	Williams & Round	0	0	0	0
PPRS	Pseudostaurosira parasitica	(W.Smith) Morales	0	0	0	0
PPSA	Placoneis pseudanglica	(Lange-Bertalot) Cox	0	0	0	0
PRBU	Planothidium robustius	(Hustedt) Lange-Bertalot	0	0	0	0
PROH	Planothidium rostratoholarcticum	Lange-Bertalot & Bąk	1	0	0	0

			Alert taxa (1 : yes ; O : no)			
code	name	author	DBO5	SP	NKJ	Pt
PROS	Psammothidium rossii	(Hustedt) Bukhtiyarova et Round	0	0	0	0
PRST	Planothidium rostratum	(Østrup) Lange-Bertalot	0	0	0	0
PSBR	Pseudostaurosira brevistriata	(Grun.in Van Heurck) Williams & Round	0	0	0	0
PSCT	Psammothidium scoticum	(Flower & Jones) Bukhtiyarova et Round	0	0	0	0
PSME	Pseudostaurosira medliniae	D.M.Williams & Morales	0	0	0	0
PSPO	Pseudostaurosira polonica	(Witak & Lange-Bertalot) Morales et M.B. Edlund	0	0	0	0
PSRE	Psammothidium rechtensis	(Leclercq) Lange-Bertalot	0	0	0	0
PSSE	Pseudostaurosira elliptica	(Schumann) Edlund, Morales & Spaulding	0	0	0	0
PTCO	Platessa conspicua	(A.Mayer) Lange-Bertalot	0	0	0	0
PTDE	Planothidium delicatulum	(Kütz.) Round & Bukhtiyarova	0	0	0	0
PTDU	Planothidium dubium	(Grunow) Round & Bukhtiyarova	0	0	0	0
PTLA	Planothidium lanceolatum	(Brébisson ex Kützing) Lange-Bertalot	1	0	0	0
PTPU	Praestephanos triporus	(Genkal & G.V. Kuzmin)Tuji & J.-S. Ki	1	1	1	1
PUDI	Punctastriata discoidea	Flower	0	0	0	0
PULA	Punctastriata lancettula	(Schumann) Hamilton & Siver	0	0	0	0
PUSB	Pseudostaurosira subconstricta	(Grunow) Kulikovskiy & Genkal ., stat. nov.	0	0	0	0
PVEN	Psammothidium ventrale	(Krasske) Bukhtiyarova et Round	0	0	0	0
PWUE	Pantocsekiella wuethrichiana	(Druart et F. Straub) K.T. Kiss et Ács	0	0	0	0
PZIE	Platessa ziegleri	(Lange-Bertalot) Lange-Bertalot	0	0	0	0
RABB	Rhoicosphenia abbreviata	(C.Agardh) Lange-Bertalot	1	0	0	1
RPUS	Rossithidium pusillum	(Grunow) F.E.Round & Bukhtiyarova	0	0	0	0
RSIN	Reimeria sinuata	(Gregory) Kociolek & Stoermer	0	0	0	0
RUNI	Reimeria uniseriata	Sala Guerrero & Ferrario	0	0	0	0
SACB	Sellaphora archibaldii	(J.C. Taylor et Lange–Bertalot) Ács, C.E. Wetzel et Ector .	0	0	0	0
SARV	Sellaphora arvensis	(Hustedt) C.E. Wetzel et Ector	0	0	0	0
SBND	Staurosira binodis	(Ehrenberg) Lange-Bertalot in Hofmann Werum et Lange-Bertalot	0	0	0	0
SCAN	Staurosirella canariensis	(Lange-Bertalot) E. Morales, Ector, Maidana & Grana .	0	0	1	0
SCHK	Sellaphora chistiakovae	(Kulikovskiy et Lange-Bertalot) Wetzel, Ector Van De Vijver,Compère & D.G.Mann	0	0	0	1
SCON	Staurosira construens	Ehrenberg	0	0	0	0
SCPO	Sellaphora cosmopolitana	(Lange-Bertalot) C.E. Wetzel et Ector	0	0	0	0
SCRA	Sellaphora crassulexigua	(Reichardt) Wetzel, Ector, Van De Vijver, Compère & D.G.Mann	1	1	1	1
SCRM	Stauroneis charlesreimeri	Lange-Bertalot & Metzeltin	0	0	0	0
SEAT	Sellaphora atomoides	Wetzel & Ector	0	0	0	0
SEBA	Sellaphora bacillum	(Ehrenberg) D.G.Mann	0	0	0	0
SECA	Sellaphora capitata	D.G. Mann & S.M. Mc Donald	0	0	0	0
SELA	Sellaphora laevissima	(Kützing) D.G. Mann	0	0	0	0
SELO	Sellaphora elorantana	(Lange-Bertalot) C.E. Wetzel	0	0	0	0
SEUT	Sellaphora utermoehlii	(Hustedt) C.E. Wetzel et D.G. Mann	0	0	0	0
SEXG	Stauroforma exiguiformis	(Lange-Bertalot) Flower Jones et Round	0	0	0	0
SIDE	Simonsenia delognei	Lange-Bertalot	0	1	1	0
SINM	Stauroforma inermis	Flower Jones et Round	0	0	0	1
SLEP	Staurosirella leptostauron	(Ehr.) Williams & Round	0	0	0	0
SLMU	Staurosirella mutabilis	(W. Smith) E. Morales & Van de Vijver	0	0	0	0

			Alert taxa (1 : yes ; O : no)			
code	**name**	**author**	**DBO5**	**SP**	**NKJ**	**Pt**
SLPP	Staurosira lapponica	(Grunow) Lange-Bertalot	0	0	0	0
SMTO	Sellaphora mutatoides	Lange-Bertalot & Metzeltin	0	0	0	0
SNIG	Sellaphora nigri	C.E. Wetzel et Ector . emend	0	1	1	1
SODB	Staurosira oldenburgiana	(Hustedt)Lange-Bertalot	0	1	0	1
SPAV	Stephanodiscus parvus	Stoermer et Håkansson	0	0	0	0
SPCO	Staurosira pseudoconstruens	(Marciniak) Lange-Bertalot	0	0	0	0
SPDV	Sellaphora pseudoarvensis	(Hustedt) C.E. Wetzel et Ector	0	0	0	0
SPIN	Staurosirella pinnata	(Ehrenberg) Williams&Round	0	0	0	0
SPRG	Skabitschewskia peragalli	(Brun & Héribaud) Kulikovskiy & Lange-Bertalot	0	0	0	0
SPSV	Sellaphora pseudoventralis	(Hustedt) Wetzel, Ector Van De Vijver, Compère & D.G.Mann. Mann	0	0	0	0
SPUP	Sellaphora pupula	(Kützing) Mereschkowksy	0	0	1	1
SRAE	Sellaphora raederae	(Lange-Bertalot) C.E. Wetzel	0	0	0	0
SRBU	Staurosira robusta	(Fusey) Lange-Bertalot	0	0	0	0
SRMA	Staurosira martyi	(Héribaud) Lange-Bertalot	0	0	0	0
SRTU	Sellaphora rotunda	(Hustedt) Wetzel, Ector Van De Vijver, Compère & D.G.Mann. Mann	0	0	0	0
SSBG	Sellaphora schaumburgii	(Lange-Bertalot et G. Hofmann) C.E. Wetzel & Ector	0	0	0	0
SSGE	Sellaphora saugerresii	(Desm.) C.E. Wetzel & D.G. Mann in Wetzel et al.	1	1	1	1
SSMI	Stauroneis smithii	Grunow	0	0	0	0
SSRT	Sellaphora subrotundata	(Hustedt) Wetzel, Ector Van De Vijver, Compère & D.G.Mann. Mann	0	0	0	0
SSTM	Sellaphora stroemii	(Hustedt) Kobayasi in Mayama Idei Osada & Nagumo	0	0	0	0
SSVE	Staurosira venter	(Ehrenberg) Cleve & Moeller	0	0	0	0
STLG	Staurosirella grunowii	(Pantocsek) E. Morales, Buczkó & Ector	0	0	0	0
STMI	Stephanodiscus minutulus	(Kützing) Cleve & Moller	0	0	0	0
STOV	Staurosirella ovata	Morales	0	0	0	0
STSB	Staurosira berolinensis	(Lemm.) Lange-Bertalot	0	0	0	1
SVTL	Sellaphora ventraloides	(Hustedt) Falasco & Ector	0	0	0	0
TANG	Tryblionella angustata	W.M. Smith	0	0	0	0
TATU	Tryblionella angustatula	(Lange-Bertalot) Cantonati & Lange-Bertalot in Kusber et al. .	0	1	1	1
TBNO	Tryblionella brunoi	(Lange-Bertalot) Cantonati et Lange-Bertalot in Kusber et al.	0	0	0	0
TFEN	Tabellaria fenestrata	(Lyngbye) Kützing	0	0	0	0
TFLO	Tabellaria flocculosa	(Roth) Kützing	0	0	0	0
TKUE	Tryblionella kuetzingii	Alvarez-Blanco & S.Blanco	0	0	0	0
TVEN	Tabellaria ventricosa	Kützing	0	0	0	0
UACU	Ulnaria acus	(Kützing) Aboal	0	1	0	1
UBIC	Ulnaria biceps	(Kützing) Compère	0	0	0	0
UDEL	Ulnaria delicatissima	(W.Smith) Aboal & Silva	0	0	0	0
UULN	Ulnaria ulna	(Nitzsch) Compère	1	0	1	1