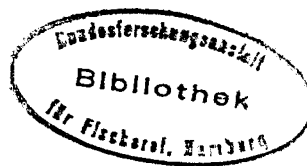


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REPORT OF THE
ICES/HELCOM WORKSHOP AND TRAINING COURSE
ON PHYTOPLANKTON

Tvärminne, Finland
14–16 August 1997

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1 OPENING OF THE WORKSHOP

The Chairman, Ms Agneta Andersson-Nordström, opened the ICES/HELCOM Workshop and Training Course on Phytoplankton (WKPHYT), which was held at the Zoological Station of the University of Helsinki, Tvärminne, from 14–16 August 1997. The Workshop was organized by Mrs Maija Huttunen. Mr Norbert Wasmund was appointed rapporteur. The List of Workshop Participants is attached as Annex 1 to this report.

2 ADOPTION OF AGENDA

The Agenda was adopted, and is attached as Annex 2.

3 BACKGROUND AND PREVIOUS REPORTS

After adoption of the agenda, the Chairman distributed the draft report from the 1996 meeting and opened the discussion concerning it.

It was noted that the recommendation to distribute some important identification literature to Baltic countries was not yet completed. Mrs Maija Huttunen promised to work on this task during autumn 1997. The literature includes:

- Pankow, H. 1990. Ostsee-Algenflora. Jena. ISBN 3-334-00312-4.
- Tikkanen, T., and Willén, T. 1992. Växtp planktonflora. Naturvårdsverket, Eskilstuna. ISBN 91-620-1115-4.
- Thomsen, H.A. (Ed.). 1992. Plankton i de indre danske farvande. Havforskning fra Miljøstyrelsen, No. 11. ISBN 87-7810-034-8.

After some minor amendments by the 1996 rapporteur, Mr Lars Edler, the group accepted the 1996 report.

4 TERMS OF REFERENCE

The terms of reference for the ICES/HELCOM Workshop and Training Course on Phytoplankton were to:

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- a) continue the development of the computerised phytoplankton counting programme;
- b) continue the updating of the Phytoplankton Biomass Estimation;
- c) continue the updating of the Phytoplankton checklist.

Recognizing the growing importance of quality assurance, WKPHYT feels that the work under the phytoplankton expert group continues to be needed as much now as before. WKPHYT was pleased to see that the expert group is still listed in the 1996/1997 overview of ICES Committees and Subsidiary Groups [ICES CM 1997/Gen:6]. Since HELCOM had some requests to the group in the latest version of the draft guidelines, it is hoped that the group's proposals to HELCOM will be adopted.

5 INTERSESSIONAL ACTIVITIES

The Chairman summarized the activities since the last meeting in June 1996:

- According to a recommendation by HELCOM, the group applied for further funding as a project. The project proposal was submitted in September 1996, but was not accepted by HELCOM.
- A suggestion for guidelines revision was sent to the HELCOM BMP Revision Workshop held in Copenhagen in December 1996. These suggestions were based on current practical work and discussions at past meetings.
- The ICES/HELCOM Steering Group on Quality Assurance of Biological Measurements in the Baltic Sea (SGQAB) also addressed the guidelines revision at its meeting in Copenhagen in February 1997.
- In March 1997 the phytoplankton expert group wrote a letter to HELCOM/ICES, asking them to further consider the group's suggestions to the revision of the guidelines.

- During the HELCOM EC MON meeting in May 1997, the guidelines were revised further. It was noted that important parts of the group's suggestions have been included in the revised guidelines. However, the group would still like to make some changes to the revised guidelines. These changes are summarized in Annex 3.

The group's strategy, when quick decisions are required, was discussed. If issues that have not been clearly decided in previous meetings (according to reports) have to be taken between regular meetings, it is up to the Chairman to decide what action should be taken, after consulting with group members. She/he has to get the approval from the representatives of at least three countries before making a response.

Future training courses will only be possible if the costs (e.g., the expenses of the teachers) are covered. Therefore, the group will write a proposal to apply for financial support from HELCOM. The proposal will be written by Mrs Agneta Andersson-Nordström, Mrs Maija Huttunen, and Mr Norbert Wasmund. The proposal should be submitted in early September 1998. According to the letter from Mrs Eeva-Liisa Poutanen from 24 June 1997, funds will be available from 1 July 1998 at the earliest.

The draft manual for marine monitoring in the COMBINE Programme of HELCOM [EC MON 2/97, version from 16 May 1997; Part C, Annex C-5; Part C, Eutrophication] was carefully read and discussed. Recommendations for changes are summarized in 'Comments on HELCOM Guidelines'.

6 DISCUSSION ON SAMPLING STRATEGY (SAMPLING DEPTH)

Mrs Susanna Hajdu (Sweden) reported that, on the basis of chlorophyll depth profiles and the vertical distribution of different common species, large phytoplankton biomasses (sometimes even the peak) occur in the 10–20 m water layer. To represent the euphotic zone (as is required in the draft manual, chapter 3, 'sampling strategy'), a sample from 0–20 m depth should therefore be mandatory. This was already noted at the 1996 meeting. Mrs Hajdu was aware that historical data can hardly be used for further trend analyses as the sampling method will soon be changed. She pointed out, however, that 'old' data are of poor quality as the sampling frequency was too low hitherto (except for station K2). Therefore, this should not affect a change in the sampling method. Sweden does not want to give up the traditional 0–10 m sampling in the high-frequency (25 times per year) Swedish national monitoring stations (including both coastal and open-sea stations, like BY31 and US5B), which will be reported to HELCOM in the future. However, for the open-sea stations (e.g., K2; 12 times per year), the future HELCOM strategy will be adopted.

Mr Norbert Wasmund (Germany) held the opinion that the data are not so bad and should at least be useful for a trend analysis in some areas. By pooling stations with similar characteristics that are close together, the number of data sets may be increased, especially for trend analyses (e.g., by pooling stations K4, K5, and K7, 310 samples are available from 1979 to 1993, even from this small part of the Arkona Sea). He suggests that trend analyses must have priority if a change in methods is to prevent the already collected 19-year data sets from further trend analyses. He stated that in the case of 0–20 m sampling, two different water bodies (from below and above the thermocline) have to be mixed, leading to higher variability (depending on the variable depth of thermocline) in comparison with 0–10 m sampling, which almost always includes only the upper mixed layer. The primary production experts took this into account by planning integrated sampling down to only 10 m depth. Germany has followed the guidelines to date (sampling 0–10 m) but is willing to adapt to the method which will be required for the new programme.

Mr Andres Jaanus (Estonia) adapted his sampling depth to the depth of the thermocline (but not deeper than 15 m, i.e., mixed sample from 1, 2.5, 5, 7.5, 10, and 15 m). Also in the future he will not be willing to change this method because he does not want to mix different water masses (if 0–20 m should be required). He mentioned that he does not use the 'semi-quantitative method' and will not do that in the future. Therefore, the Estonian statement given in the draft manual (EC MON 2/97, Annex 5, Part C 'Eutrophication...', page 7) should be changed from 'semi-quantitative abundance' to 'quantitative abundance'.

Mrs Maija Huttunen reported that Finland will carry out the semi-quantitative sampling from 5 m water depth (Finnjet sampling for 'algaline'). In addition, one sample from the Finnjet samples will be counted quantitatively every month.

Mrs Elzbieta Niemkiewicz (Poland) and Mrs Iveta Ledaine (Latvia) stated that their countries follow the guidelines (0–10 m mixed sample, taken by rosette sampler) and will adopt the method which will be required in the new manual.

In summary, the group agreed to maintain the decision from the 1996 meeting (even if Estonia and Germany had their reservations), recommending a change in integrated sampling depth from 0–10 m to 0–20 m. The arguments for this decision are:

- some species concentrate in deeper water layers (below 10 m) and can be missed by the old method;
- the euphotic layer extends to about 20 m;
- the old data set is not usable for trend analyses anyway (except for the Bornholm and Arkona basins).

A hose is recommended for obtaining the integrated sample.

If the hose method is not possible, the mixing of water from depths of 1, 5, 10, 15 and 20 m is allowed.

Mr Lars Edler will give a description of the hose method for the guidelines. He will also supply group members with a hose for practical consideration.

7 NEW DRAFT HELCOM MANUAL

After further discussion on the new Draft HELCOM Manual, the group came to rather quick agreement and the changes recommended are summarized in 'Comments on HELCOM Guidelines', which is attached as Annex 3.

The following points were discussed:

- Should formalin be required as a fixative if the sample is intended to be stored for longer than 1 year?
- Is a 24 h sedimentation time long enough?
- What can be done if buoyant cyanobacteria do not settle out in the sedimentation chamber?
- What is the best relationship between sedimentation volume and number of counting units (How many species should be counted up to 50 units)?

Some of these questions should be discussed at the next meeting.

The list of counting units in the draft manual (Version 16, May 1997, Part C, Annex C-6, page 5) may, in general, be kept as it is. However, some old names (*Gomphosphaeria*, *Lyngbya*?, *Oscillatoria*?) should be replaced; Mrs Maija Huttunen will do this revision during autumn 1997.

Mrs Susanna Hajdu pointed out that the new Tables C-6.1 and C-6.2 in the draft manual (Version 16, May 1997, Part C, Annex C-6) are unnecessarily long and that the original Russian literature is only available for Russian-speaking people. The group agreed that the old table (see Baltic Sea Environmental Proceedings No. 27 D, page 33) would still be sufficient and should be kept, with the addition of the following citation:

Lund, J.W.G., Kipling, C., and Le Cren, E.D. 1958. The inverted microscope method of estimating algal numbers and the statistical basis of estimations by counting. *Hydrobiologia*, 11(2):143-170.

The Russian literature (Kozova and Melnik, 1978) could be kept as a reference for Russian-speaking members. (However, these tables were added to the manual after the last EC MON meeting without previous discussion.)

The formula on page 9 of the draft manual (Version 16, May 1997) will be checked by Mrs Agneta Andersson-Nordström (factor C without dimension?).

Annex 1, cited in the draft manual on pages 3 and 9, is still not included. It is presumed that this annex will be the same as in the 'old' guidelines (see Baltic Sea Environmental Proceedings No. 27 D, page 55-60).

The chapter on biomass transformations should come from the old guidelines (see Baltic Sea Environment Proceedings No. 27 D, page 41-54, but without carbon content calculation) with some changes according to the phytoplankton expert group's meeting in 1996 (see report from that meeting). Mrs Maija Huttunen and Mr Lars Edler will produce a better design (compared to that from the report), which will be submitted to HELCOM.

8 SEMI-QUANTITATIVE ANALYSIS OF PHYTOPLANKTON SAMPLES

The semi-quantitative analysis of phytoplankton samples was discussed. An objective criterion for defining the different rankings was not found. Mrs Gertrud Cronberg (teacher for the course) stated that a semi-quantitative method is much more difficult than a quantitative method, because the estimate of the different categories (sparse, common, etc.) is done

without the exact counting of cell numbers. She will send a manual on this method (from limnological work) to the Finnish Institute of Marine Research (FIMR). She also pointed out that this method requires very experienced staff and is seriously affected when a change in staff occurs. Mr Lars Edler, together with Mrs Seija Hällfors, will formulate a sentence which should be added to the Introduction (page 10 of the draft manual, Annex C-6).

9 FINNISH COUNTING PROGRAMME

Mrs Maija Huttunen distributed the Finnish counting programme (including the manual), which was supplied by HELCOM. The species list for the programme has been produced by the Finnish Institute of Marine Research (FIMR) but has to be adapted by the individual countries according to their species spectrum. There are, however, problems in deciding on the species code because the Rubin code is no longer being maintained. ICES/HELCOM will decide on a new coding system in the near future. If new species, with no official code, need to be added to the list, Maija Huttunen should be notified. She will add the new species to the list and be responsible for updating the phytopla.dat-file. Also, species codes can be checked via the FIMR homepage.

Mrs Maija Huttunen pointed out that there are some problems with the size classes decided by the expert group in 1996. It seems that too many size classes are involved (e.g., with THALSIRZ); size intervals of 10 µm should be sufficient. The size classes that should be used will be discussed at the next meeting, after which some members of the group will test the size classes. The group was informed that, at present, the HELCOM data bank is under reorganization. Therefore, national representatives will store their data in the national data bank for the time being.

Biomass data for all species and size classes have to be incorporated into the phytopla.dat-file of the counting programme. These biomass factors will be calculated by a sub-group, comprising Mrs Susanna Hajdu [Convener], Mrs Maija Niemelä, Mrs Irina Olenina, Mrs Iveta Ledaine, Mrs Agneta Andersson-Nordström, Mr Norbert Wasmund, Mr Lars Edler, and Mrs Maija Huttunen. The factors will be given to Mrs Maija Huttunen, who will enter the data in the phytopla.dat-file.

10 NEW SPECIES CHECKLIST

A new species checklist (cf. the checklist by Edler, Hällfors, and Niemi, 1984, referred to in the 'old' guidelines, pp. 61-86) is seriously needed. Mr Guy Hällfors is updating his old list, but still needs three months of intensive work in the upcoming year before it will be completed. He will also need funding to continue this work. All group members should send information on new phytoplankton species. For this purpose, it would be best if Mr Guy Hällfors sends his preliminary list to the group's members to add further information.

Problematic samples supplied by group's members were discussed with the experienced teachers, Mrs Gertrud Cronberg (specialist in cyanobacteria) and Mr Guy Hällfors (specialist in small flagellates).

11 HOMEPAGE OF THE FIMR

Mrs Seija Hällfors introduced the group to the homepage of the FIMR [<http://www.fimr.fi>] and the homepage of the phytoplankton expert group [<http://www2.fimr.fi/algaline/plankton/htm>]. Algal images were also of interest [<http://www2.fimr.fi/algaline/gallery/gallery/htm>].

The group agreed that the following information should be included on the group's homepage:

- address list, including information about who is working with HELCOM samples and who is a cooperating person;
- literature list: if new literature is found, Mrs Maija Huttunen should be informed and she will update the list, indicating 'new' additions;
- phytoplankton check list for the Baltic Sea (this can be included at the end of 1998 or 1999), in the future the check list should also include plankton identification sheets;
- information (e.g., messages about training courses);
- links to other homepages of interest (e.g., Kattegat/Skagerrak checklist, HELCOM homepage, harmful algae).

Identification sheets should (/will) be designed by FIMR (Mrs Seija Hällfors [Convener], Mrs Maija Huttunen, Mr Juha-Markku Leppänen) in cooperation with a subgroup of the phytoplankton expert group comprising Mrs Susanna Hajdu, Mrs Irina Olenina, Mr Lars Edler, Mrs Gertrud Cronberg, and Mr Guy Hällfors. The experience of Mr Mats Kylenehtierna should also be used.

12 FUTURE MEETINGS

Mrs Irina Olenina agreed to be the local organizer of the next workshop of the phytoplankton expert group. It is scheduled to be held in Klaipeda in the last week of August 1998 (for 5 days). The phytoplankton course will be guided by Mrs Gertrud Cronberg (for cyanobacteria) and by Mrs Seija Hällfors and Mr Guy Hällfors (for small flagellates). A letter of invitation to the lecturers will be written by Mrs Irina Olenina and will also be signed by Mrs Agneta Andersson-Nordström. When the 'proposal group' applies for financial support, it should consider to also apply for support for producing a compendium on cyanobacteria by Mrs Gertrud Cronberg. Mrs Cronberg will need samples from the group before the meeting. Mrs Maija Huttunen will bring the video-microscope to facilitate intercomparisons. It was agreed that the maximum number of participants for the course should be limited to 20.

The 1999 meeting will take place in Sweden in early September. The course will deal with diatoms (including slide preparation) and will be presented by Mr Guy Hällfors. Mrs Eija Rantajärvi (trend analysis) and Mrs Pauli Snoeijs (canonical analysis) will be asked to give lectures on trend analyses and canonical analysis.

Mrs Susanna Hajdu informed the group (according to Mr Henrik Enevoldsen, IOC course organizer) that the IOC-NorFa course, held in Tvärminne from 16–22 August 1997, is planned to be repeated in Estonia in 1998. Those who could not take part in the 1997 course will have the opportunity to take part in the 1998 course. The application form will be available via the FIMR homepage (Mrs Maija Huttunen).

Mrs Maija Huttunen promised to create a group mailbox on the internet to facilitate communication within the group.

13 CLOSING OF THE WORKSHOP

After acknowledging the local organizer, Mrs Maija Huttunen, and the two teachers, Mrs Gertrud Cronberg and Mr Guy Hällfors, for their valuable contributions and thanking the group for their active participation, the Chairman closed the Workshop.

ANNEX 1

LIST OF PARTICIPANTS

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ANNEX 2

AGENDA

14 August 1997

- 1) Opening of the meeting
- 2) Introduction of the participants
- 3) Appointment of rapporteur
- 4) Adoption of the agenda
- 5) Discussion of the report of the last year's meeting
- 6) Past year's activities
- 7) Information from the HELCOM EC MON meeting
- 8) Future projects

15 August 1997

- 9) Discussion of the draft manual for marine monitoring in the COMBINE Programme of HELCOM
- 10) Microscopical work with samples (Guy Hällfors: Chlorophyceae, Bacillariophyceae, Haptophyceae, Gertrud Cronberg: Cyanobacteria)
- 11) Continuation of discussion of the draft manual

16 August 1997

- 12) Lecture on Cryptomonadales (Guy Hällfors)
- 13) Continuation of discussion of the draft manual
- 14) Planning of the group's meetings/courses in 1998 and 1999
- 15) Phytoplankton counting programme, including checklist
- 16) Homepage on internet
- 17) Biomass calculation
- 18) Closing of the meeting

ANNEX 3

COMMENTS ON THE HELCOM GUIDELINES

Recommended changes to the 'Draft manual for marine monitoring in the combine programme of HELCOM' (Version 16 May 1997, Annex C-6):

Page 1, chapter 1. ('Introduction') should read:

"Phytoplankton serves as an indicator of the effects of eutrophication. Nutrient enrichment may give rise to shifts in phytoplankton biomass and species composition (e.g. from diatoms to flagellates, some of which are nuisance or toxic species) and an increase in the frequency, magnitude and duration of phytoplankton blooms which may be harmful."

Page 1, chapter 2., point 3:

"3. to identify key phytoplankton species (e.g. dominating, harmful or indicator species)."

Page 1, chapter 3. ('Sampling strategy'):

The last sentence of the first paragraph ("It will for instance...") may be deleted.

The last sentence of the chapter should read:

"The following manual deals with sea water measurements."

Page 1, chapter 4. ('Sampling') should be changed for a mandatory sampling from 0–20 m. Sampling depths of 2.5 and 7.5 should be deleted. The plastic hose sampling might be described in greater detail.

Page 2, chapter 5.1 ('Quantitative sampling'):

Second paragraph: "The samples should be counted as soon as possible, preferably within one year. They should be stored dark and cool. Samples stored for more than one year are of little use."

In the first line up from the lower end of page 2:

"Store in a tightly stoppered glass bottle and keep cool."

Page 3, chapter 5.2, last sentence of paragraph 1:

"The samples should be stored in the dark and kept cool."

Page 5, chapter 'Counting procedure', Second sentence:

"All species found should be listed and counted using the HELCOM counting software."

Page 5, The list of counting units in the draft manual (Version 16 May 1997, Part C, Annex C-6, page 5) may in general be kept as it is. However, some old names (Gomphosphaeria, Lyngbya ?, Oscillatoria ?) should be replaced; Mrs Maija Huttunen will do the revision.

Table C.6.1. and C.6.2. should be replaced by the old one, also adding the reference of LUND *et al.* (1958).

The formula on page 9 in the draft manual (Version 16, May 1997) should have the unit (dm^{-3}) and not (No dm^{-3}).

Page 10, chapter 6.4, ranking terms:

"1 sparse, one or a few (less than ..."

"2 few, slightly more cells or ..."

last sentence in that chapter:

"... as for the quantitative analysis"

Annex 1, cited in the draft manual on pages 3 and 9 is still not included. It is assumed that the Annex will be the same as in the old guidelines (see Baltic Sea Environmental Proceedings No. 27 D, pages 55–60).

The chapter on biomass transformations should be taken from the old guidelines (see Baltic Sea Environmental Proceedings No. 27 D, pages 41–54, but without carbon content calculation) with some changes as per the phytoplankton expert group's meeting in 1996 (see report from that meeting). Mrs Maija Huttunen and Mr Lars Edler will produce a better design (compared to that from the 1996 report), which will be submitted to HELCOM.