Manual for Marine Monitoring in the

COMBINE

Programme of HELCOM

Part A

General Aspects

Last updated: October 2014

PART A. GENERAL ASPECTS

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NOTE ON UPDATING as of 15 October 2014:

Parts A1 to A5 have been revised. The valid information is now included in the introduction of the HELCOM Monitoring Manual.

A.1. INTRODUCTION

Monitoring is since long a well-established function of the Helsinki Convention. Monitoring of physical, chemical and biological variables of the open sea started in 1979, monitoring of radioactive substances in the Baltic Sea started in 1984.

Until 1992 monitoring of coastal waters was considered as a national obligation and only assessment of such data had to be reported to the Commission. However, under the revised Helsinki Convention, 1992, it is an obligation to conduct also monitoring of the coastal waters and to report the data to the Commission. This programme will also cater for the needs of monitoring in the Baltic Sea Protected Areas (BSPA).

The Environment Committee decided that for management reasons the different program should be integrated into a common structure and thus the Cooperative Monitoring in the Baltic Marine Environment - COMBINE - was instituted in 1992.

This Manual is directed to all performing monitoring in the COMBINE Programme. The Manual defines the contributions made by all Contracting Parties and regulates all methods used.

The document will be revised when there is a need for changes in the Programme content or for updating of technical annexes.

The official version of the Manual for Marine Monitoring in the COMBINE Programme of HELCOM is always available electronically via the HELCOM home page. The validity of copies must always at all times be controlled against the official version by end users.

This Manual is updated once a year. Changes to be included in the Manual should be considered by the Monitoring and Assessment Group and after its endorsement submitted to the Secretariat **not later than 1 June**. These changes will then be valid from **1 January the following year**. All changes are highlighted by a separate note, section by section.

The Manual has last been updated in January 2008 according to the decisions by HELCOM MONAS 10/2008.

A.2. AIMS FOR THE MONITORING

The aims of COMBINE, as decided by HELCOM (HELCOM 14/18, Paragraph 5.27) and further elaborated by BMP-WS 2/96, are:

- To identify and quantify the effects of anthropogenic discharges/activities in the Baltic Sea, in the context of the natural variations in the system, and
- To identify and quantify the changes in the environment as a result of regulatory actions.

This general statement, which is equally valid for monitoring of inputs as well as monitoring of environmental conditions, is then converted into more specific aims for the different types of monitoring. More specifically the aims of COMBINE mean:

For the open sea and coastal area monitoring:

- Hydrographic variations: to set the background for all other measurements related to the identification and quantification of the effects of anthropogenic discharges/activities, the

parameters providing an indication of natural fluctuations in the hydrographic regime of the Baltic Sea must be monitored on a continuous basis.

Problems related to eutrophication:

- To determine the extent and the effects of anthropogenic inputs of nutrients on marine biota, the following variables must be measured:
  a) concentrations of nutrients,
  b) the response of the different biological compartments and
  c) Integration and evaluation of results

For contaminants:

- To compare the level of contaminants in selected species of biota (including different parts of their tissues) from different geographical regions of the Baltic Sea in order to detect possible contamination patterns, including areas of special concern (or ´hot spots´).
- To measure levels of contaminants in selected species of biota at specific locations over time in order to detect whether levels are changing in response to the changes in inputs of contaminants to the Baltic Sea.
- To measure levels of contaminants in selected species of biota at different locations within the Baltic Sea, particularly in areas of special concern, in order to assess whether the levels pose a threat to these species and/or to higher trophic levels, including marine mammals and seabirds.

For the effects of contaminants:

- To carry out biological effects measurements at selected locations in the Baltic Sea, particularly at sites of special concern, in order to assess whether the levels of contaminants in sea water and/or suspended particulate matter and/or sediments and/or in the organisms themselves are causing detrimental effects on biota (e.g., changes in community structure)."

In more explicit terms this requires several types of investigations.

For the study of eutrophication and its effects:

- long-term trend studies,
- studies with the budget approach (i.e. budgets or "mass balances" for main nutrients),
- studies of effects on biota,
- studies providing 'online' information on sudden events,
- studies giving background information including baseline studies and joint studies.

For the study of contaminants and their effects:

- studies of temporal trends of contaminants,
- studies of spatial variations in contaminant concentrations and patterns,
- studies providing information on episodic events,
- studies of effects on biota as well as risk evaluations for target species,
- studies of environmental fate of contaminants

A.3. NATIONAL COMMITMENTS

Given that the data obtained in the monitoring programme are needed to conduct periodic assessments of the state of the Baltic marine environment, the variables included in the programme have been classified into three categories to ensure that basic information is obtained for all regions of the Baltic Sea, but that specific regional requirements are taken into account as well as resource levels, different competences available, and the desirability and necessity of sharing the workload among the Contracting Parties. The categories also take account of the need for different types of supporting studies on an occasional basis. The three categories are:

Category 1: Core variables
Explanation: Core variables comprise measurements that have to be carried out on a routine basis to produce comparable and accurate results from all regions of the Baltic Sea as a basic information for an assessment.

Category 2: Main variables
Explanation: Main variables are of equal importance as the core variables for the Baltic Sea Periodic Assessments and have to be measured on a regular basis.

However, for reasons of regional requirements as well as of competence and/or resources not all CPs will be required to carry out all measurements but all measurements will need to be covered on a work-sharing basis.

Category 3: Supporting studies
Explanation: Supporting studies provide information that facilitates the interpretation of monitoring data collected in Category 1 and Category 2 or provide additional information as required.

These investigations are carried out by individual CPs or groups of CPs often in a project- or campaign-like manner. These investigations include, e.g. baseline studies, special monitoring studies, process studies and tests of new methods and techniques.

The success of the monitoring programme depends entirely on the willingness of Contracting Parties to commit themselves to carry out the various parts, particularly variables in Category 1 and Category 2, and that they allocate the resources needed. In this context the following table explaining the regional responsibilities for the Contracting Parties should be considered.

The main responsibilities are as follows:

Baltic Proper: Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden and Russia

Gulf of Bothnia: Finland and Sweden

Gulf of Finland: Estonia, Finland and Russia

Gulf of Riga: Estonia and Latvia

Sound and the Kattegat: Denmark and Sweden

Great Belt: Denmark

Bay of Kiel and Bay of Mecklenburg: Germany

Apart from their main responsibilities, however, the Contracting Parties are encouraged to participate in the programme in other regions of the Baltic Sea Area whenever practicable.

Each Contracting Party has offered to carry out a certain combination of variables, sampling stations and frequencies as regards to Category 1 and Category 2, and often also offered special studies as in Category 3. These contributions are regarded as mandatory for the Contracting Party in question with the understanding that future national decisions on priorities and resource allocation may change their contributions to the programme.

A.4. DIVISION OF THE BALTIC AND ADJACENT WATERS

Sea area			Description
1. BALTIC SEA			The waters bordered by the Swedish, Finnish, Estonian, Latvian, Lithuanian, Russian, Polish, German and Danish coasts to the lines FALSTERBO, STEVN KLINT and GEDSER - DARSSER ORT.
	1.1 GULF OF BOTHNIA		The waters north of a line between SIMPNÄS KLUBB - SÖDERARM - SVENSKA BJÖRN - KÖKARSÖREN HANGÖ PENINSULA.
		A 1.1.1 Bothnian Bay	Gulf of Bothnia north of the line RATAN - ST. FJÄDERÄGG - HÄLSINGKALLAN - STUBBEN - MONÄS.
		B 1.1.2 The Quark	Gulf of Bothnia between the lines RATAN - MONÄS as above and HÖRNEFORS - VAASA.
		C 1.1.3 Bothnian Sea	Gulf of Bothnia between the lines HÖRNEFORS - VAASA and ORMÖN - UNDERSTEN - EMSKÄR - ECKERÖ - SÄTSKÄR - UUSIKAUPUNKI.
		D 1.1.4 Åland Sea	Gulf of Bothnia between Sweden and Åland, bordered to the north by a line ORMÖN - UNDERSTEN- EMSKÄR - ECKERÖ and to the south by a line SIMPNÄS KLUBB - SÖDERARM - SVENSKA BJÖRN -

Sea area			Description
			KÖKARSÖREN - NYHAMN.
		E 1.1.5 Archipelago Sea	Gulf of Bothnia between Åland and Finland, bordered to the north by a line SÄLSKÄR - UUSIKAUPUNKI and to the south by a line NYHAMN - KÖKARSÖREN - HANGÖ PENINSULA.
	F 1.2 GULF OF FINLAND		Baltic Sea east of the line HANGÖ PENINSULA - PÕÕSASPEA.
	G 1.3 GULF OF RIGA		Baltic Sea east of the lines OVISI- SÕRVE - PAMMANA - SÕRU - TAHKUNA - PÕÕSAPEA.
	1.4 BALTIC PROPER		Baltic Sea within the lines SIMPNÄS KLUBB - SÖDERARM - SVENSKA BJÖRN - KÖKASÖREN - HANGÖ PENINSULA - PÕÕSAPEA - TAHKUNA - SÕRU - PAMMANA SÕRVE - OVISI - Estonian, Latvian, Lithuanian, Russian, Polish and German coasts up to DARSSER ORT - GEDSER - Danish coast to STEVNS KLINT - FALSTERBO - Swedish coast to SIMPNÄS KLUBB
		H 1.4.1 Northern Baltic Proper	Baltic Proper north of a line ARKÖSUND - GOTSKA SANDÖN - VILSANDI - SAAREMAA.
		1.4.2 Central Baltic Proper	Baltic Proper between the lines ARKÖSUND - GOTSKA SANDÖN - VILSANDI - SAAREMAA and UTLÄNGAN - southern end of ÖLAND - PAPE.
		I 1.4.2.1 Western Gotland Basin	1.4.2.1 The division lines between the Eastern and Western Central Basins
		J 1.4.2.2 Eastern Gotland Basin	1.4.2.2 (Gotland Basins) are GOTSKA SANDÖN - FÅRÖ and HOBURG to the coordinate N 56o 11.00' E 18o09.00'.
		K 1.4.3 Southern Baltic Proper	Baltic Proper south of the line UTLÄNGÄN - southern end of ÖLAND to PAPE.
		L 1.4.3.1 Gulf of Gdansk	Baltic Proper south of the line ROSEWIE - TARAN (Brusterort).

Sea area		Description
2. BELT SEA		The waters between the lines HASENÖRE - GNIBEN in the north and GEDSER - DARSSER ORT in the south.
	M 2.1 BAY OF MECKLENBURG	Baltic Sea between the lines GEDSER - DARSSER ORT and HYLLEKROG - MARIENLEUCHTE.
	N 2.2 KIEL BAY	The waters between the lines FALSHÖFT - VEJSNÄS NAKKE - GULSTAF - KAPPELS CHURCH and MARIENLEUCHTE - HYLLEKROG.
	O 2.3 LITTLE BELT	The waters between the lines FALSHÖFT - VAJSNÄS NAKKE - GULSTAF in the south to the line between AEBELÖ - BJÖRNS KNUDE in the north.
	P 2.4 GREAT BELT	The waters between the line HASENÖRE - GNIBEN in the north, and in the south the line GULSTAF - KAPPELS CHURCH.
Q 3. THE SOUND		The waters between the Danish and Swedish coasts between the lines STEVNS KLINT - FALSTERBO and GILLEJE - KULLEN.
R 4. KATTEGAT		The waters between the Danish and Swedish coasts from the lines HASENORE - GNIBEN and GILLEJE - KULLEN to a line SKAGEN - MARSTRAND.
S 5. SKAGERRAK		The waters between the Danish, Swedish and Norwegian coasts from the line SKAGEN - MARSTRAND to the line LINDESNES - HANSTHOLM.

A map of the division of the Baltic Sea and adjacent waters can be found in the HELCOM Monitoring and Assessment Strategy (attachment 4)

The COMBINE sampling stations presented by the Contracting Parties are accessible in Excel table format or via HELCOM map service.

Furthermore, the sampling stations and sampling frequencies for different parameters can be viewed in the following maps:

Figure A.2. All monitoring stations
Figure A.3. Hydrograpahy stations
Figure A.4. Nutrient stations
Figuer A.5. Chlorophyll-a stations
Figure A.6. Phytoplankton stations
Figure A.7. Productivity stations
Figure A.8. Zooplankton stations
Figure A.9. Zoobenthos stations
Figure A.10. Microbiology stations

A.5. DATA REPORTING

Results of measurements carried out according to the agreed monitoring programme shall be reported and exchanged as follows:

Data should be submitted to the ICES the year after sampling (http://ocean.ices.dk/Submission/Default.aspx). The deadline for the submission of data to the Secretariat is **1 May for hydrographic and hydrochemical data and 1 September for biological data and harmful substances**.

Data reporting should be in accordance with the latest ICES reporting formats. Together with the data a national data report is to be provided containing the following information (EC MON 2/97, 12/1, Annex 9):

I DATA IDENTIFICATION IN THE REPORTING FORMAT

- type of samples
- sample identification

II RESULTS

1. Compliance with the programme

2. The reporting institute should state if there is a quality management system established or not

3. Chemical data should have an uncertainty value and a method of calculating the uncertainty

4. Internal QA information

- methods (possible deviations from the manual)
- detection limits (on voluntary basis)
- equipment
- conditions during sampling and analysis

5. External QA information

- certified reference material used (mean values; voluntary if an uncertainty value and a method of calculating the uncertainty is reported)
- participation in ring tests (voluntary if an uncertainty value and a method of calculating the uncertainty is reported)
- participation in taxonomic workshops

III ACIVITY REPORT

- stations
- variables
- basic statistics on data aggregated by sub-region, season and variable/species with full scientific name (mean, range and number of samples, for phytoplankton range of cell volumes)
- comments on concentrations/values found

IV INFORMATION ABOUT CORRECTIONS MADE ON THE DATA DELIVERED IN PREVIOUS YEARS

V DESCRIPTION OF EXCEPTIONAL NATURAL CONDITIONS, POSSIBLE EVENTS ETC. IN THE SUB-REGIONS

VI SHORT DESCRIPTION ON THE ENVIRONMENTAL STATE OF THE SUB-REGIONS

For further information about data collection and use, please refer to the HELCOM Data and Information Strategy (attachment 2 of the HELCOM Monitoring and Assessment Strategy)

A.6. CONTINUOUS INFORMATION BETWEEN MONITORING INSTITUTES

The Internet/World Wide Web provides a co-ordinated, but decentralised, mean to disseminate and to get access to information and data of relevance for the COMBINE. Most institutes responsible for data collection in the COMBINE Programme have a World Wide Web server of their own or have at least an access to Internet.

The internet/www links should be basis for fast and continuos dissemination of information.

To improve the information flow the HELCOM Web site should be further developed. The basic information should, however, be provided by various research institutes. At the first stage, the institutes should publish information at their Web sites on

- cruise plans relevant for the monitoring programmes
- cruise reports
- exceptional environmental events
- other relevant information on the Baltic Sea environment.

At the second stage, systems for regular information dissemination on results relevant to monitoring programme and for data exchange should be developed.

The cruise reports should contain a table listing the stations visited and the determinands measured at each station, together with a short description of the cruise in general and the most important findings. The cruise report could also contain a map showing the cruise track and stations visited, and maps or drawings showing interesting observations, e.g., areas with H_2 S or low 0_2 concentrations.

In case the Internet/www is not available, the cruise plans and cruise reports should be mailed directly to the following addresses:

Denmark
National Environmental Research Institute
Department of Marine Ecology and Microbiology
Gunni Ærtebjerg Nielsen
Frederiksborgvej 399
P.O. Box 358
DK-4000 Roskilde
e-mail: gae@dmu.dk

Estonia
Estonian Marine Institute
Marine Research Centre
Urmas Lips
Paldiski St. 1
EE-0001 Tallinn
e-mail: urmas@phys.sea.ee

Finland
Finnish Environment Institute
Marine Centre
P O Box 140
FI-00251 Helsinki
http://www.ymparisto.fi/default.asp?node=24453&lan=en

Germany
Federal Research Institute for Rural Areas, Forestry and Fisheries
Mr. Michael Haarich

Institute of Fishery Ecology
Marckmannstr. 129 b Haus 4

D-20539 Hamburg
e-mail: michael.haarich@vti.bund.de

Latvia
Latvian Institute of Aquatic Ecology
8 Daugavgrivas str.
LV-1007 Riga
e-mail: juris.aigars@lhei.gov.lv
http://www.lhei.lv/en/index.php

Lithuania
Marine Research Centre
Taikos ave. 26
LT-91149 Klaipeda
e-mail: jtc@jtc.am.lt

Poland
Institute of Meteorology and Water
Management, Maritime Branch
Waszyngtona 42
PL-81 342 Gdynia
e-mail: krzymins@stratus.imgw.gdynia.pl

Russian
State Oceanographic Institute
6 Kropotkinski per.
119 288 Moscow
Russia

Sweden
Stockholm Marine Sciences Centre
Stockholm University
S-106 91 Stockholm
e-mail: smf@smf.su.se

Gothenburg Marine Sciences Centre
Gothenburg University
S-413 81 Gothenburg
e-mail: robert.engstrom@matnat.gu.se

Umeå Marine Sciences Centre
Umeå University
Norrbyn
S-910 20 Hörnefors
e-mail: erik.bonsdorff@umf.umu.se,
johan.wikner@umf.umu.se

Swedish Meteorological and Hydrological Institute
Oceanographical Laboratory
Building 31, Nya Varvet
S-426 71 Västra Frölunda
e-mail: postmaster@smhi.se

Swedish Meteorological and Hydrological Institute
Mr. Hans Dahlin
S-601 76 Norrköping
e-mail: hdahlin@smhi.se

International Organisations

International Council for the Exploration of the Sea (ICES)
H.C. Andersens Boulevard 44-46
DK-1553 Copenhagen V
e-mail: info@ices.dk

Helsinki Commission - Baltic Marine Environment Protection Commission
Katajanokanlaituri 6 B
FI-00160 Helsinki
e-mail: helcom@helcom.fi

The Contracting Parties are also encouraged to send the usual ROSCOP cruise reports as a file copy or as a paper copy to ICES (info@ices.dk). Cruise reports can also be submitted via the SeaDataNet website at: http://www.seadatanet.org/Metadata/CSRl.

For the CMP neither cruise reports nor ROSCOP reports must be given.

A.7. CONDITIONS REQUIRED FOR CARRYING OUT MONITORING/SCIENTIFIC RESEARCH IN THE FISHING/ECONOMIC ZONE (FOR PROGRAMMES ADOPTED BY THE HELSINKI COMMISSION)

HELCOM Recommendation 12/1 concerning procedures for granting permits for monitoring and research activities in the territorial waters and exclusive economic zones, fishing zones or continental shelves was adopted by the Comission in 1992. The recommendation "urges the Contracting Parties to grant one year permits for planned research activities in the exclusive economic zones, fishing zones or continental shelfs, in the framework of the BMP, during which period the coastal state is only to be notified in advance for each individual cruise. Also the Contracting Parties are urged to facilitate and without unnecessary delay grant the permits in connection with the monitoring cruises and for research vessels for all Baltic Sea States to carry out joint scientific studies of common interest, and to submit to the Environment Committee information about their efforts made in this respect."

The conditions (status in August 1997) required for carrying out scientific research in the fishing/economic zone are given in Table A.1.

TABLE A.1. Conditions required for carrying out scientific research in the fishing/economic zone (for programmes adopted by the Helsinki Commission)

Party	Territorial zone (T_z) (nautical miles)	Which one is defined: Exclusive economic zone (Ez) or fishing zone (Fz)	Is permission or notification needed for: T_z	Ez / Fz	Time limit for the application	Notification/request for a permission to be addressed to
Denmark	3	E_z, F_z	1) Permission 2) In case of 1 year permits: Permission/ notification	1) Permission 2) In case of 1 year permits: Permission/ notification	30 days	Ministry of Foreign Affairs (via diplomatic channels)
Estonia	12 *	E_z	yes	yes	6 months	Ministry for Foreign Affairs
Finland	12 **	F_z	yes	F_z	6 working days	Ministry for Foreign Affairs (via diplomatic channels)
Germany	up to 12	E_z = Sea	yes	yes	6 weeks	from the country's

Party	Territorial zone (T_z) (nautical miles)	Which one is defined: Exclusive economic zone (Ez) or fishing zone (Fz)	Is permission or notification needed for: T_z	Ez / Fz	Time limit for the application	Notification/request for a permission to be addressed to
		Limit chart No. 2921 (various distances), Fz = up to 12 nm				embassy in Germany to the Auswärtiges Amt
Latvia	12	E_z	yes	yes (E_z)	3 months	Ministry for Foreign Affairs
Lithuania	12	E_z	yes	yes	6 weeks	Ministry for Foreign Affairs
Poland	12	E_z, F_z	yes	yes	3 months	Ministry for Foreign Affairs
Russia	12	E_z	permission	permission	5 months	Ministry of Science and Technical Policy of the Russian Federation
Sweden	12	E_z	yes	yes (E_z)	4-6 weeks	Coast Guard (via the country's embassy in Sweden)

*The maximum 12 nm. The actual zone varies due to the adjacent territorial zone of Finland, Russia and Latvia.

** The maximum 12 nm. The actual zone varies due to the adjacent territorial zone of Estonia, Russia and Sweden.

A.8. FORMAT FOR NOTIFICATION OF PROPOSED MONITORING AND RESEARCH CRUISES

NOTIFICATION OF PROPOSED RESEARCH CRUISE, GENERAL, PART A

1. Name of research ship

- Cruise No.

2. Dates of cruises From To

3. Operating authority
   - Telephone
     Telefax

4. Owner (if different from para 3)

5. Particulars of ship:
   - Name
     Nationality
     Overall length metres
     Maximum draught metres
     Net tonnage
     Propulsion
     Call sign

6. Crew
   - Name of master
     No. of crew

7. Scientific personnel
   - Name and address of scientist in charge
     Telephone
     Telefax
     No. of scientists

8. Geographical area in which ship will operate (with reference in latitude and longitude)

9. Brief description of purpose of cruise

10. Dates and names of intended ports of call

11. Any special logistic requirements at ports of call

NOTIFICATION OF PROPOSED RESEARCH CRUISE, DETAIL, PART B

1. Name of research ship
   - Cruise No.

2. Dates of cruise From To

3. Purpose of research and general operational methods

4. Attach chart showing (on an appropriate scale) the geographical area work, positions of intended stations, tracks of survey lines, positions of moored/seabed equipment

5. Types of samples required, e.g. geological/water/plankton/fish/radioactivity/isotope ... and methods by which samples will be obtained (including dredging/coring/drilling)

6. Details of moored equipment:

- Dates
  Laying Recovery Description Latitude Longitude

7. Explosives:

- Type and trade name
  (b) Chemical content
  (c) Depth and trade class and storage
  (d) Size
  (e) Depth of detonation
  (f) Frequency of detonation
  (g) Position in latitude and longitude
  (h) Dates of detonation

8. Detail and reference of

- Any relevant previous/future cruises
  (b) Any previously published research data relating to the proposed cruise
  (Attach separate sheet if necessary)

9. Names and addresses of such scientists with whom previous contact has been made in the coastal state in which the waters where the proposed cruise is to take place are

10. State:

- (a) Whether visits to the ship in port by scientists of the coastal state concerned will be acceptable
  (b) Whether it will be acceptable to carry on board an observer from the coastal state for any part of the cruise and dates and ports of embarkation/disembarkation
  (c) When research data from intended cruise is likely to be made available to the coastal state and if so by what means

SCIENTIFIC EQUIPMENT

11. Complete the following table - SEPARATE COPY FOR EACH COASTAL STATE
(indicate "YES" or "NO")

List of all major Marine Scientific Equipment proposed to be used and indicate waters in which it will be deployed	Within fishing limits	On continental shelf	Distance from / coast			
			Within 3 NM	Between 3-12 NM	Between 12-50 NM	Between 50-200 NM