

Monitoring Specifications

Date: 2010-01-25

Hydrography





ARGE BLMP - Working Group for the North Sea and Baltic Sea Monitoring Programme

At the 34th North German Environmental Ministerial Meeting held on 17 April 1997, the competent departments of the German Federal Government and of the federal states of Hamburg, Mecklenburg-Vorpommern, Lower Saxony and Schleswig-Holstein agreed to establish a joint working group co-ordinating the monitoring of the marine environment of the North and Baltic Seas (ARGE BLMP Nord- und Ostsee).

Members of ARGE BLMP are:

- Federal Ministry of Food, Agriculture and Consumer Protection
- Federal Ministry of Transport, Building and Urban Development
- Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
- Federal Ministry of Education and Research
- Authority for Urban Development and Environment of the Free and Hanseatic City of Hamburg
- Mecklenburg-Vorpommern Ministry for Agriculture, the Environment and Consumer Protection
- Lower Saxony Ministry for the Environment and Climate Protection
- Schleswig-Holstein Ministry for Agriculture, the Environment and Rural Areas

The Monitoring Manual describes the current measuring programme implemented under BLMP. The monitoring requirements of the different EC Directives (Marine Strategy Framework Directive, Water Framework Directive, FFH, Birds Directive), marine protection conventions (OSPAR, HELCOM, Trilateral Monitoring and Assessment Program) and other bodies of regulations have been taken into account in the Manual. The Monitoring Manual is available free of charge on the BLMP website at www.blmp-online.de/Seiten/Monitoringhandbuch.htm

Editorial information

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1 General

1.1 Subject area

Physical Monitoring - Hydrography

1.2 Definition

Hydrographic conditions

Temperature:

- Annual and seasonal temperature profile (MSFD)
- Thermal regime (WFD)

Ice conditions:

- Ice coverage

Salinity:

- Spatial and temporal distribution of salinity

Oxygen:

- Oxygen content and saturation (occurrence of H₂S, where applicable)

Turbidity:

- Suspension load

Sight depth:

- Secchi depth

1.3 Competent authority/ies

Federal Government:	BSH
Mecklenburg-Vorpommern:	LUNG , STAUN
Lower Saxony:	NLWKN
Schleswig-Holstein:	LKN-SH , LLUR

1.4 Working group

Ad Hoc Working Group on Hydrography, Hydrology and Morphology

2 Monitoring requirements

2.1 Necessity

[MSFD \[1\]](#)

Article 11, Annexes III and V

Comments

Monitoring programmes that survey the following hydrographic parameters must be drawn up under the Marine Strategy Framework Directive:

- Annual and seasonal temperature profile and ice coverage
- Spatial and temporal distribution of salinity
- Upwelling phenomena
- Mixing characteristics
- Turbidity

Article 8(1) [2]

Comments

The results of hydrographic monitoring are also required for the initial assessment of marine waters. The hydrographic parameters mentioned in Article 11 must be surveyed for this purpose.

[WFD \[3\]](#)

Article 8(1)

Comments

Under the WFD, the following hydrographic parameters must be investigated at least every three months in transitional and coastal waters in the context of surveillance monitoring:

- temperature,
- salinity,
- oxygen content and
- sight depth.

[HELCOM](#)

Baltic Sea Action Plan [4]

Comments

Monitoring requirements for the eutrophication segment are still being specified.

COMBINE

Comments

COMBINE-Manual:

[PART C: Programme for monitoring of eutrophication and its effects](#), Annex C2: Hydrographic and hydrochemical variables

These instructions serve the objectives of the HELCOM Monitoring Programme. It is obligatory for the following hydrographic variables (core variables) to be measured:

- Temperature
- Salinity
- Turbidity
- Oxygen

OSPAR

JAMP Common Procedure

Comments

The [Common Procedure](#) for the Identification of the Eutrophication Status of the OSPAR Maritime Area lists temperature and salinity as essential parameters for the determination of eutrophication status.

Monitoring frequencies for assessment purposes under the OSPAR Common Procedure.

Problem areas und potential problem areas:	Each year
Non problem areas:	Every three years

TMAP [5]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

It is not obligatory for hydrographic parameters to be monitored under the Trilateral Monitoring and Assessment Programme, but they are listed as optional covariables for nutrient investigations:

- oxygen,
- pH value,
- suspended matter,
- turbidity,
- temperature and
- salinity

See *TMAP Manual*, section II.2, Nutrients.

Technical necessity

Overview of monitoring frequencies and cycles:

	WFD	HD	OSPAR	HELCOM	TMAP	MSFD
Frequency	3 months	-	Once/year	?	-	Coherent
Monitoring cycle	Annual	-	Annual	?	-	Coherent

The hydrographic situation constitutes the foundation for almost all other components. It must be monitored across the whole area throughout the year.

It is not sufficient for it to be measured as a supporting factor when other components are monitored because they are amenable to monitoring by means of spatial and temporal point measurements. As a matter of principle, however, it is necessary for spatially and temporally integrated hydrographic values, as well as their temporal history, to be known.

'Measurements of salinity, water temperature (including ice coverage), sea currents, water exchange between North Sea and Baltic, surface water runoff and general meteorology are central parameters for interpreting ecological/chemical parameters' (HELCOM: Ecological Quality Objectives, see p. 38).

2.2 Environmental targets

MSFD

According to Article 10, 'On the basis of the initial assessment made pursuant to Article 8(1), Member States shall, in respect of each marine region or subregion, establish a comprehensive set of environmental targets and associated indicators for their marine waters so as to guide progress towards achieving a good environmental status in the marine environment, taking into account the indicative lists of pressures and impacts set out in Table 2 of Annex III, and of characteristics set out in Annex IV.'

WFD

Achievement and conservation of good ecological status (see WFD, Annex V, 1.2.3 and 1.2.4, General conditions):

'Temperature, oxygenation conditions and transparency do not reach levels outside the ranges established so as to ensure the functioning of the ecosystem and the achievement of the values specified above for the biological quality elements.'

HELCOM

Ecological Quality Objectives

None of the HELCOM EcoQOs relates directly to temperature or salinity.

Oxygen: Natural oxygen concentrations.

Turbidity: Clear water.

OSPAR

Ecological Quality Objectives for Nutrients and Eutrophication Effects

Oxygen concentration, decreased as a result of eutrophication effects, should remain above region-specific levels from 4 to 6 mg oxygen per litre.

2.3 Threats

None

2.4 Spatial allocation

	EEZ	12- nm zone	Coastal waters 1)	Transitional waters
MSFD	x	x	x	-
HD	-	-	-	-
WFD	-	-	x	-
HELCOM	x	x	x	-
OSPAR	x	x	x	x
TMAP	-	-	-	-

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

General

Figure 1: Future network for the monitoring of hydrographic parameters in the North Sea (will be integrated as dynamic mapping service (WMS) where possible)

Figure 2: Future network for the monitoring of hydrographic parameters in the Baltic Sea (will be integrated as dynamic mapping service (WMS) where possible)

The monitoring network operated until now under the German Marine Monitoring Programme (BLMP) meets the requirements derived from OSPAR and HELCOM. Adjustments are required to satisfy the requirements imposed by the WFD and the MSFD:

Lower Saxony

- Neritic zone of the Weser
- Type N4 water bodies
- Further stations in the Weser

Schleswig-Holstein

- North Sea
 - Type N4 water bodies: Hakensand, Dithmarsch Bight and Outer Eider
 - Type N2 water bodies: Hörnum, Aue and Hever tidal basins (GKSS monitoring station that is to be operated in cooperation with ALR Husum and NPA should be integrated into the BLMP)
 - Eider
- Baltic Sea
 - Type B3 water bodies: The entire coastal strip from Gelting Bight to Neustadt Bight
 - Hohwacht Bight (B4)
 - Eastern Fehmarn Sound (B4)

Mecklenburg-Vorpommern, LUNG:

- 38 monitoring stations: sight depth, water temperature, pH value, conductivity, salinity, oxygen and oxygen saturation ten to 12 times a year
- Sampling depths: 1 m and 1 m above the seabed at stations >6 m water depth
- CTD profiles at stations >6 m water depth

Light conditions (turbidity, Secchi depth)

Secchi depth is measured at all hydrography stations in Schleswig-Holstein.

Oxygen

Oxygen is measured at just a few stations in the coastal waters of Lower Saxony. Oxygen content is also measured at all hydrography stations in Schleswig-Holstein.

3.2 Monitoring activities

North Sea and Baltic Sea

Hydrography

Methods:

General

Water sampling is carried out in accordance with the German standard methods for the examination of water, waste water and sludge, DIN 38402-A16, Sampling of sea water. Specific requirements are regulated in the relevant DIN, EN or ISO standards for the different parameters.

Temperature

In situ measurement with multiparameter probe (German standard methods for the examination of water, waste water and sludge, DIN 38404-C4).

Salinity

In situ measurement of conductivity at 25° with multiparameter probe. Calculation of salinity from the measurement of conductivity (German standard methods for the examination of water, waste water and sludge, DIN 38404-C6, DIN EN ISO 27888-C8).

Note: In Lower Saxony, salinity is not determined from conductivity.

Oxygen

In situ measurement with multiparameter probe (German standard methods for the examination of water, waste water and sludge, EN 25814-G22 in comparison to the manual method (iodometric determination), EN 25813-G21).

Sight depth/turbidity

DIN EN ISO 7027 & C2.

Note: The comparability of Secchi depths depends not just on the light conditions and (the position of) the surveyor, but is also hampered by the use of disks of differing sizes.

Suspended matter

Gravimetric (see Naumann et al.); this should be complemented by the systematic acquisition of satellite data on the area-wide distribution of suspended matter.

Supporting measurements

Temperature, salinity and oxygen content should be surveyed in the course of all biological and chemical investigations and are important because the results complement hydrographic studies.

WFD Reporting Summary Sampling Method (2000 characters):

With regard to sampling, the details of its planning, the techniques used, and the homogenisation and preservation of samples are described in the EN ISO 5667ff series of standards. Note is to be taken of the LAWA analytical quality assurance data sheets, which complement these standards. In addition to this, the following conventions have been established:

As a rule, the sample from the aqueous phase is taken as a random sample. Except where other provisions have been adopted, the investigations are carried out on the original sample.

WFD Reporting Summary Analysis Method (2000 Characters):

In a standard case, state-of-the-art procedures are applied to determine the chemico-physical quality elements. As a rule, these are DIN or EN ISO analytical procedures. In some cases, special procedures may also be applied if an analytical method has not, or not yet, been standardised.

Operative Monitoring:

WFD Reporting Summary Frequency Method (2000 Characters): Up to ten times a year

WFD Reporting Summary Cycle Description (2000 Characters): Annual

Surveillance Monitoring:

WFD Reporting Summary Frequency Method (2000 Characters): Surveillance monitoring does not deviate from the general frequencies.

WFD Reporting Summary Cycle Description (2000 Characters): Annual

Medium:

water

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

Hydrography - Sight Depth

Guideline:

Various directives

Comments:

The following sources should be taken into consideration as the foundations for background values ('high status') and elevated values ('good status'):

- Limit values derived from EU directives (e.g. Freshwater for Fish Directive, 78/659/EEC)
- Target values (LAWA, international river basin districts)
- LAWA quality classification
- Expert knowledge

The BLMP Study Group Sub-Working Group on Physico-Chemical Quality Components has drawn up an assessment system for the coastal water types found in the North Sea and Baltic Sea (updated: 13 December 2005). The background value represents 'high status' and the elevated value represents 'good status'.

North Sea and Baltic Sea

Title

Hydrography - Salinity

Guideline:

Various directives

Comments:

The following sources should be taken into consideration as the foundations for background values ('high status') and elevated values ('good status'):

- Limit values derived from EU directives (e.g. Freshwater for Fish Directive, 78/659/EEC)
- Target values (LAWA, international river basin districts)
- LAWA quality classification
- Expert knowledge

It is not possible to identify anthropogenic influences on salinity in coastal waters due to their high degree of natural variability, particularly in the western Baltic Sea. In consequence, the salinity levels that are currently being measured may also be adopted as background values. In the large estuaries, salinity levels may rise in connection with the deepening of shipping channels and discharges of brine due to the solution mining of caverns.

North Sea and Baltic Sea

Title

Hydrography - Oxygen

Guideline:

Various directives

Comments:

The following sources should be taken into consideration as the foundations for background values ('high status') and elevated values ('good status'):

- Limit values derived from EU directives (e.g. Freshwater for Fish Directive, 78/659/EEC)
- Target values (LAWA, international river basin districts)
- LAWA quality classification
- Expert knowledge

(Also oxygen saturation)

The BLMP Study Group Sub-Working Group on Physico-Chemical Quality Components has drawn up an assessment system for the coastal water types found in the North Sea and Baltic Sea (updated: 13 December 2005). The background value represents 'high status' and the elevated value represents 'good status'.

Background value:	100 % oxygen saturation
Elevated value:	At least 75 % oxygen saturation or at most 130 % oxygen oversaturation

In the Wadden Sea, the proportion of the area covered by 'black spots' is used additionally for assessment purposes. Here, the elevated value is taken to be, at most, 0.5 % of the area of tidal and wind flats.

LAWA criteria: Pressures on oxygen balance (saprobity): water quality class worse than Class II (LAWA, 2000) over more than 70 % of the stretch of water. If more than 30 % is affected, the achievement of the target is regarded as uncertain.

5 Quality assurance

- Quality Assurance Panel (Working Group on Quality Assurance under the auspices of the Quality Assurance Panel at the UBA)

Comments

5.1 Monitoring institutions

5.2 Guidance documents

5.3 Standards

- WFD Reporting Summary Standards (2000 Characters): The information given in ANALYSIS_METHOD is applicable
- WFD Reporting Summary Confidence (2000 Characters): The accuracy of the measurement results depends on the analytical quantification limits prescribed in the individual measurement and analysis procedures.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

Spatial resolution

Transitional and coastal waters: Reduction in number and relocation of monitoring units to leave 19 monitoring units in accordance with the WFD concept for Mecklenburg-Vorpommern (Table 6).

Parameters

The following parameters should be measured in addition to salinity, oxygen content and temperature:

- suspension load,
- turbidity,
- sight depth (Secchi) and
- light conditions: global radiation, UV-B

HELCOM

The monitoring requirements that derive from the Baltic Sea Action Plan (eutrophication segment) must be taken into consideration in future.

7.2 Working steps required

Priorities

- Expansion and adaptation of the network of stations
- Extension of the parameters to be monitored
- Adjustment of monitoring frequencies and cycles
- Review of the options for the use of remote sensing data (DeMarine Environment project)

Footnotes

(1) Marine Strategy Framework Directive; Directive 2008/56/EC of 17 June 2008. This also applies to transitional waters and coastal waters covered by Directive 2000/60/EC, where pertinent aspects of the protection of the marine environment not dealt with in Directive 2000/60/EC are at issue.

(2) Version: proposal of the General-Secretariat of 13 November 2006.

This also applies to transitional waters and coastal waters covered by Directive 2000/60/EC, where pertinent aspects of the protection of the marine environment not dealt with in Directive 2000/60/EC are at issue.

(3) EC Water Framework Directive; Directive 2000/60/EC. The coastal waters subject to ecological assessment under the WFD extend 1 nautical mile beyond the baseline.

(4) Baltic Sea Action Plan, HELCOM 2007

(5) The monitoring requirements under TMAP were specified in the Wadden Sea Plan ([Sylt, 2010](#)) (see also [TMAP Manual, section 2](#)).