Monitoring Specifications

Date: 2010-01-28

Macrophytes

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Flora - Macrophytes

1.2 Definition

For the purposes of these specifications, macrophytes are subdivided into:

- Eulittoral and sublittoral macroalgae
- Eulittoral and sublittoral seagrass meadows
- *Salicornia* und *Spartina* swards
- Salt meadows and reedbeds from the eulittoral zone to the supralittoral zone

1.3 Competent authority/ies

Federal Government:	UBA, BfN, BSH
Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Benthos and Benthic Habitats
TMAP ad hoc group on seagrass

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Article 11 [2]

Comments

According to Annex III, Table 1, monitoring programmes must be drawn up that encompass the following parameters for angiosperms and macroalgae:

- species composition,
- biomass and
- annual/seasonal variability.

Article 8(1) [3]

Comments

The results of macrophyte monitoring are required for the initial assessment of marine waters. This must incorporate the following parameters for angiosperms and macroalgae:

- species composition,
- biomass and
- annual/seasonal variability.

See MSFD, Annex III, Table 1.

HD [4]

Article 11 [5]

Comments

Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

The "conservation status" of a natural habitat is defined by, among other things, the conservation status of the species that are characteristic of it. Macrophytes represent some of the species typical of many HD habitat types:

- Sandbanks (Natura 2000 Code 1110)
- Estuaries (Natura 2000 Code 1130)
- Lagoons (Natura 2000 Code 1150)
- Large shallow inlets and bays (Natura 2000 Code 1160)
- Reefs (Natura 2000 Code 1170)
- Driftlines (Natura 2000 Code 1210)
- Stony banks (Natura 2000 Code 1220)
- Sea cliffs (Natura 2000 Code 1230)
- *Salicornia* and other annuals colonising mud and sand (Natura 2000 Code 1310)
- *Spartina* swards (Natura 2000 Code 1320)
- Salt meadows (Natura 2000 Code 1330)

WFD [6]

Article 8(1)

Comments

According to the WFD, macrophytes must be investigated as a quality element in transitional and coastal waters at least every three years in the context of surveillance monitoring (see Annex V, 1.3.3 and 1.3.4: monitoring of macroalgae and angiosperms in coastal and transitional waters). In the context of operative monitoring, macrophytes represent an important indicator for eutrophication effects.

HELCOM

Baltic Sea Action Plan [7]

Comments

A range of EcoQOs have been described by HELCOM for all four segments of the Baltic Sea Action Plan, in which respect macrophytobenthos have hitherto played a merely subordinate role (main variable) after phytoplankton and macrozoobenthos (core variables). An assessment should be carried out on the basis of the influence eutrophication exerts on depth range and species composition through nutrient concentrations and the light climate. In future, the significance of macrophytes under the WFD will also be reflected within HELCOM by means of the establishment of a Macrophytobenthos Expert Group.

COMBINE

Comments

The COMBINE-Manual lists phytobenthos as a "main variable". Monitoring is focussed on the "response of the different biological compartments" to eutrophication. In this respect, eutrophication effects stand to the fore: the influence of light conditions and the nutrient situation on depth range and species composition. See also COMBINE, Part C: Guidelines for monitoring of phytobenthic plant and animal communities in the Baltic Sea

A procedure for the assessment of eutrophication is currently being developed as part of the Eutrophication Assessment project. This will involve the specification of appropriate metrics, which will have to be monitored in future.

Macrophytes must be monitored once a year in summer (July-September, preferably August-September).

OSPAR

JAMP (see Theme B: Biological diversity and ecosystems)

Comments

- Monitoring of the distribution of species and habitats.
- Assessment of the ecosystem status in order to determine the range of anthropogenic impacts.

JAMP Common Procedure

Comments

Procedure for the determination of the eutrophication status of the OSPAR marine region.

Macrophytes must be monitored in order to record primary eutrophication effects.

Monitoring frequencies for the purposes of assessment under the OSPAR Common Procedure:

Problem areas und potential problem areas:	Annually
Non problem areas:	Every three years

TMAP [8]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Common Package in Annex 2 describes the monitoring of seagrass and macroalgae (biological parameters), and salt meadows (habitat parameters).

Annual estimation of macrophyte coverage (macroalgae and seagrass, remote sensing and parallel in situ measurements), as well as monthly investigation of selected areas of high variability during the vegetation period.

Technical necessity

	WFD - surveillance	WFD - operative	HD	MSFD	OSPAR	HELCOM	TMAP
Frequency	At least every three years	At least annually	At least every six years	At least annually and seasonally	At least annually	At least annually	At least annually

Minimum requirements concerning the monitoring frequencies for macrophyte monitoring imposed by the directives.

As a rule, annual monitoring (once a year in summer) is necessary on account of macrophytes' high natural variability. A number of the species examined are annual and, in addition to this, display strong seasonality.

2.2 Environmental targets

MSFD

'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 […], taking into account the indicative lists of pressures and impacts set out in […] Annex III.'

HD

This directive is intended to contribute towards ensuring biodiversity through the conservation of natural habitats and wild fauna and flora in the European territory of the Member States to which the Treaty applies (Article 2(1)). Macrophytes are included in the species inventories for various habitat types.

WFD

Good ecological status. This is described as follows:

- Transitional waters: 'There are slight changes in the composition and abundance of macroalgal taxa compared to the type-specific communities. Such changes do not indicate any accelerated growth of phytobenthos or higher forms of plant life resulting in undesirable disturbance to the balance of organisms present in the water body or to the physico-chemical quality of the water'; and
- Coastal waters: 'Most disturbance-sensitive macroalgal and angiosperm taxa associated with undisturbed conditions are present. The level of macroalgal cover and angiosperm abundance show slight signs of disturbance.'

(See WFD, Annex V, 1.3.3 and 1.3.4)

HELCOM

The aims of COMBINE are to:

- determine the extent and the effects of anthropogenic inputs of nutrients on marine biota (Combine Manual-Eutrophication Programme) and
- identify environmentally relevant alterations, in particular the influence of eutrophication (Guidelines for monitoring of phytobenthic plants).

OSPAR

Eutrophication strategy and Common procedure

Assessment of the eutrophication status of the marine environment:

'The overall objective is the achievement in 2010 of a healthy marine environment where eutrophication does not occur.'

Eutrophication status of the North Sea

'All parts of the North Sea should have by 2010 the status of non-problem areas with regard to eutrophication, as assessed under the OSPAR Common Procedure for the Identification of the Eutrophication Status of the Ospar Maritime Area.'

Quality objectives for nutrients and eutrophication effects

- Chlorophyll a - maximum and mean chlorophyll a concentrations during the growing season should remain below a justified area-specific % deviation from the background not exceeding 50 %;
- Eutrophication indicator species - specification of maximum permissible abundances for nuisance and toxic species (area-specific). See also the revised list of EcoQOs (Annex 2).

TMAP

'The monitoring of macroalgae is carried out to assess their changes […] due to changes in input of nutrients.' Further objectives: 'an increased area of, and a more natural distribution and development of […] Zostera fields' (draft TMAP Guidelines), the enhancement of 'carrying capacity', an 'increased area of natural salt marshes' and 'increased natural morphology and dynamics, including natural drainage patterns of artificial salt marshes, under the condition that the present surface area is not reduced' and an 'improved natural vegetation structure, including the pioneer zone, of artificial salt marshes' (targets set in the Trilateral Wadden Sea Plan).

2.3 Threats

The distribution and abundance of macrophytes are influenced very heavily by eutrophication. Further threats are attributable to:

- Historic rock extraction (Baltic Sea)
- Water engineering measures and other built structures

The threats to salt meadows are described in HD Habitat Type: Atlantic Salt Meadows (1330).

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

Only monitoring procedures that are already being implemented are described below. In this respect, the precise method by which the values measured are combined to arrive at an overall assessment is, in some cases, only specified definitively after the tests. Nevertheless, these procedures are mentioned here if the monitoring procedure is well established. Deficiencies are described in section 6.

North Sea

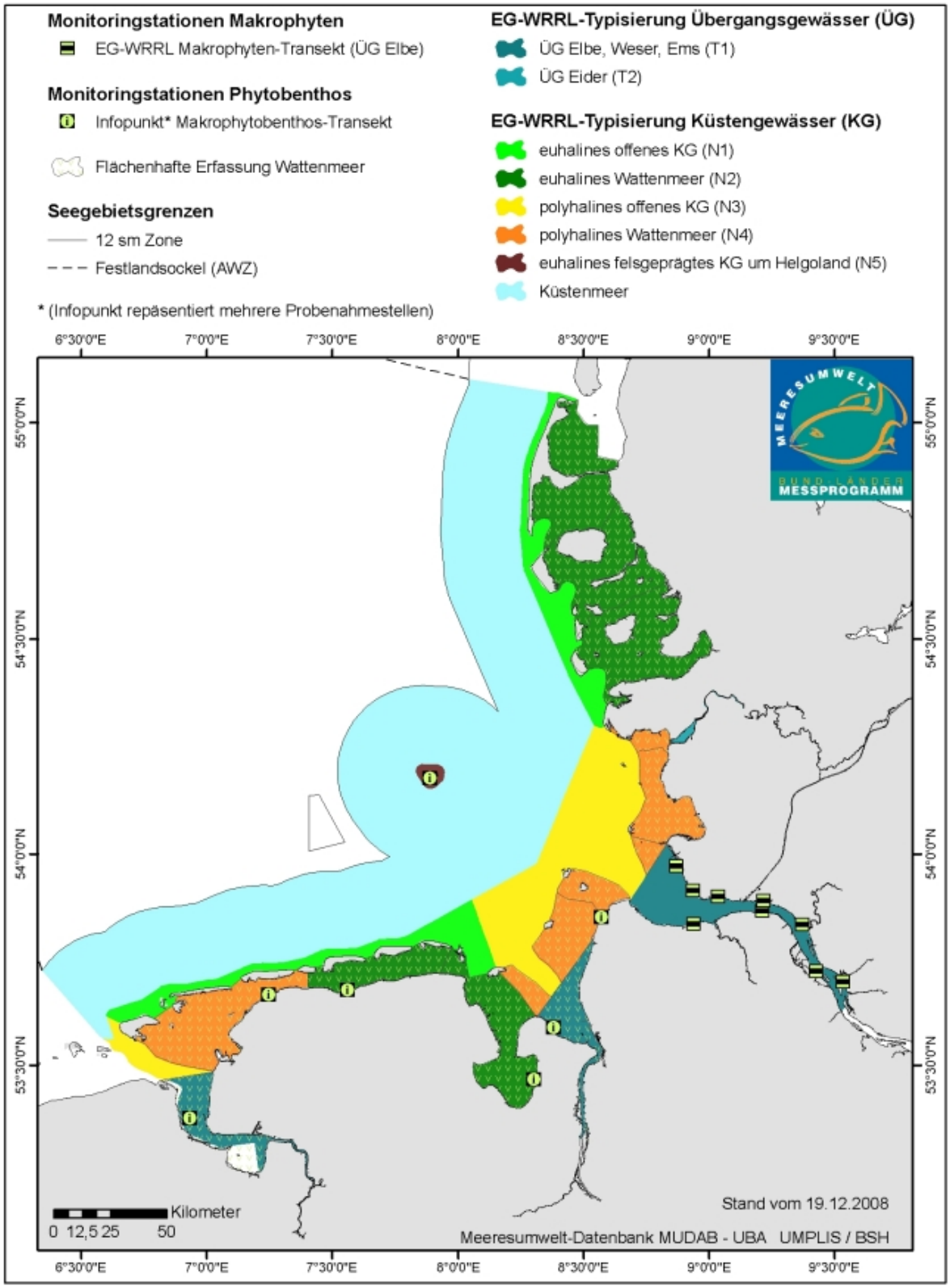

Figure 1: Map showing the stations intended for macrophyte monitoring in the North Sea.

Figure 1 as PDF-Document

Table 1: Occurrence of macrophytes in various water types

	Macroalgae	**Sea grass**	***Salicornia* and *Spartina* swards**	**Salt meadows and reedbeds**
North Sea EEZ	-	-	-	-
North Sea 12-nm zone	X	-	-	-
North Sea sublittoral coastal waters	X	X 1	-	-
North Sea eulittoral coastal waters	X	X	X	X
North Sea transitional waters	X	X	X	X
Heligoland	X	-	-	-

1 Does not occur at present

Macroalgae

- 12-nm zone in the North Sea
  - Where reefs occur, it is to be examined whether they are located at a depth that permits the growth of macrophytes, which should then be used for assessments.
- Coastal waters
  - Eulittoral: areal surveying of green algae mats by means of remote sensing in the eulittoral zone. Lower Saxony: additional in situ transects with surveying of the species inventory and the abundance of red, brown and green algae in representative areas, covering all relevant habitats in the sublittoral and eulittoral zones
- Heligoland (rocky coast)
  - Eulittoral:
    - One qualitative transect and permanent quantitative squares (Schubert, 2006)
    - Spatial-quantitative surveying of the populations of all macrophyte species by means of georeferenced grid mapping
    - Additional spatial surveying of the dense *Fucus* population by means of polygon mapping
    - Species inventory by means of one inspection on foot using the RSL (Reduced Species List) index put forward in Wells et al. (2006) (Kuhlenkamp und Bartsch 2007)
  - Sublittoral:
    - Dive transects replicated three times to survey the depth boundaries of Laminaria hyperborea and four red algae species
- Transitional waters
  - Macroalgae not relevant in these areas

Seagrass

- Coastal waters
  - Eulittoral:
    - Areal surveying by means of remote sensing + in situ surveying of (current and potential) seagrass meadows at selected permanent monitoring fields + staged comprehensive in situ mapping on foot, one-sixth of the area of tidal flats (off Schleswig-Holstein) covered each yea
  - Sublittoral:
    - Macrozoobenthos samples (see Macrozoobenthos) are also checked for the occurrence of seagrass in order to obtain evidence about any reemergence of sublittoral seagrass.
- Transitional waters
  - See information on coastal waters (mesohaline and polyhaline zones only)

Salt meadows and reedbeds

- Coastal waters
  - Area-wide surveys: surveying of vegetation on the basis of CIR aerial images (analogue or digital) and ground truthing
  - Area-wide surveys: surveying seaward of the main dyke and on the islands together with monitoring of habitat types 1150, 1310, 1320 and 1330 every six years
  - Point surveys: permanent monitoring stations at selected locations

- Transitional waters
  - Elbe: site survey below MHT at nine stations (WFD) (Stiller, 2005, 2008). Eider: site survey below MHT at three stations (WFD) (currently being revised in accordance with Stiller, 2005, 2008)
  - Surveying of salt meadows follows that of coastal waters (see information on coastal waters)
  - Weser and Ems: foreshore areas, the proportion of near-natural biotopes and reedbed width are surveyed in accordance with Adolf et al. (2007), and the vegetation structure surveyed in accordance with Stiller (2005, oligohaline zone). In addition to this, there are salt meadows in the polyhaline zone, the extent and zoning of which are surveyed.
  - Work is currently ongoing on the application of this method and the definition of stations in the Ems, Weser, Eider, Krückau, Pinnau and Stör.

See also HD Habitat Type: Atlantic Salt Meadows (Natura 2000 Code 1330).

Baltic Sea

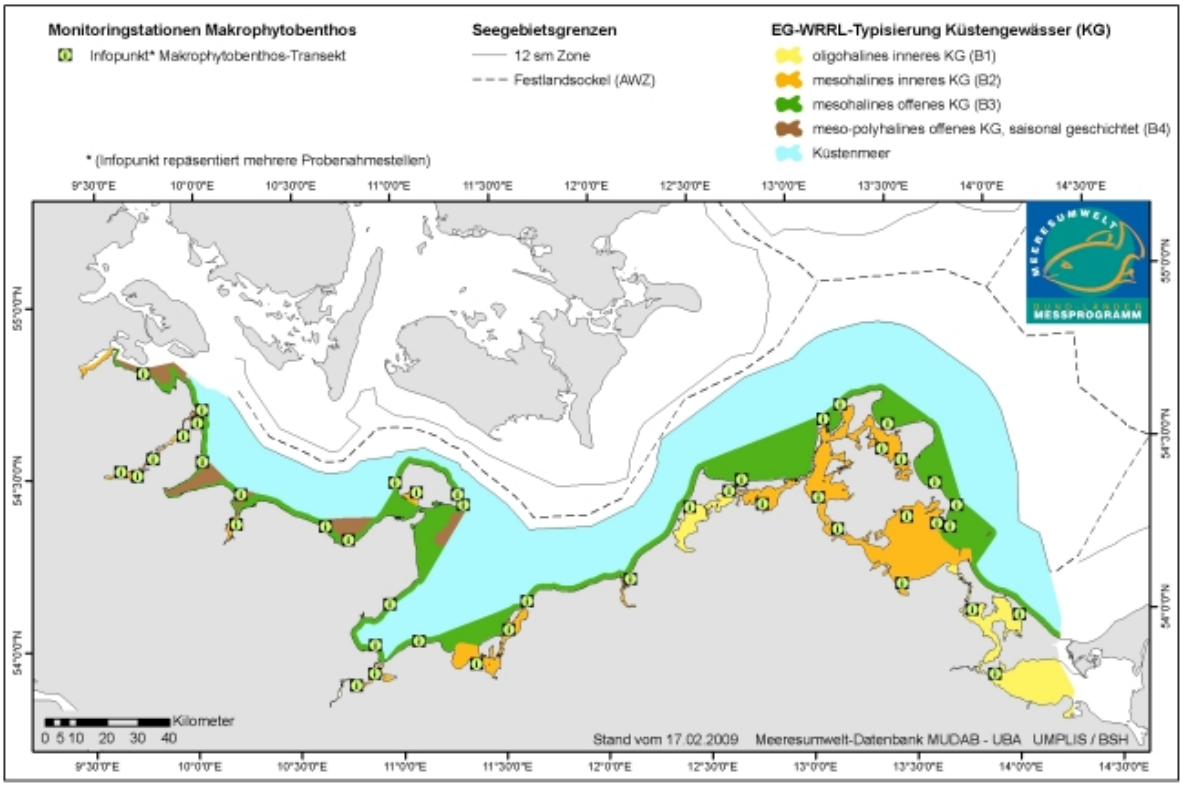

Figure 2: Map showing the stations intended for macrophyte monitoring in the Baltic Sea.

Figure 2 as PDF document

EEZ

Macrophytes on the habitat type reefs, e.g. Kadettrinne, Kriegers Flag, Adlergrund: area-wide surveying with underwater camera and frame sampling

12-nm zone

Extension of measurements in outer coastal waters to the 12-nm zone, since it is necessary to survey the lower distribution limit, which does not necessarily end with the one-nm zone (for methods etc., see information on coastal waters)

Inner coastal waters

- Schleswig-Holstein: nine transects
- Mecklenburg-Vorpommern: 16 transects

Outer coastal waters

- Schleswig-Holstein: 20 transects
- Mecklenburg-Vorpommern: nine transects

Note:

The investigations of macrophytes have to be carried out in accordance with the sample standard operating procedure for laboratories involved in the German Marine Monitoring Programme (BLMP), which is coordinated in accordance with the BLMP: Testing Procedure SOP: Macrophytobenthos Investigations on Marine Substrates of the Littoral Zone, as most recently amended. Reference is made below to the corresponding sections of this SOP.

3.2 Monitoring activities

North Sea

Macrophytes - Sandy Eulittoral - Salt Meadows and Reedbeds

Methods:

General remarks

In Lower Saxony and Schleswig-Holstein, salt meadows are currently surveyed periodically and assessed in the light of the Habitats Directive. During the first management cycle, they are only being used for WFD assessment in Lower Saxony.

The survey method is described in the Marine Monitoring Manual specifications for the various habitat types.

Zone:

Eulittoral

Macrophytes - Sandy Sublittoral - Macroalgae

Methods:

A method for the surveying and assessment of sublittoral macroalgae is still being developed in Lower Saxony at present. In Schleswig-Holstein, the intention is to examine whether such a method is feasible and necessary during the first management cycle.

(See on this topic SOP: Macrophytobenthos, section X)

Parameter:

- Biomass
- Coverage
- Depth range
- Extent (species)
- Position
- Species composition

Zone:

Sublittoral

Macrophytes - Sandy Sublittoral - Seagrass

Methods:

General remarks

Sublittoral seagrasses no longer, or hardly, occur today in the German North Sea because they were killed off by a slime mould infection at the beginning of the 1930s. They have not been able to reestablish themselves to the present day, evidently on account of hydrodynamic factors, possibly also due to the reduced amount of light available. However, they constituted part of the original status of the Wadden Sea. It is for this reason that their absence is assessed negatively. However, confirming their absence across the whole area is methodologically very, and indeed disproportionately, laborious. The `monitoring of the absence of sublittoral seagrass' is therefore based only on point surveys. During the first WFD management periods, the intention is to determine whether a systematic search (e.g. using underwater video) is required and will be possible in future.

Monitoring methods (see on this topic SOP: Macrophytobenthos, section X)

The occurrence of sublittoral seagrass populations is investigated using random samples as part of macrozoobenthos monitoring. It is currently regarded as unlikely that sublittoral seagrass populations will establish themselves again. In consequence, no monitoring method has yet been developed.

Frequency:

Annual, given that to date the schedule has followed that for macrozoobenthos monitoring (see Macrozoobenthos)

Parameter:

- Depth range
- Position

Zone:

Sublittoral

Macrophytes - Sandy Eulittoral - Seagrass - Schleswig-Holstein

Methods:

General remarks

The seagrass populations in the eulittoral zone are very different in Schleswig-Holstein and Lower Saxony, which makes the application of different methodologies necessary. In general, a combination of remote sensing and in situ methods is applied. In this respect, the different proportions of the total seagrass population found in the Wadden Sea off Schleswig-Holstein and Lower Saxony are taken into consideration methodologically.

At present, as part of OFEW, a method is being trialled in which remote sensing data from satellites and aircraft are combined with in situ measurements. The core of the method is the objective classification of remote sensing data, which is advantageous with regard to the comparability of results (spatial and temporal). This development should be observed and the results adopted where applicable. This is also recommended by the TMAP ad hoc working group on seagrass, see Final Report (28 August 2006).

Schleswig-Holstein (see on this topic SOP: Macrophytobenthos, section X)

This work is carried out in accordance with a method put forward by K. Reise (see Dolch et al., 2009). This involves overflights for spatial mapping and the determination of the total area of seagrass (and macroalgae populations). The aircraft flies at an altitude of 300 to 500 m. During the flight, three independent observers enter the corresponding populations on Wadden Sea maps. A distinction is made between 20 - 60 % and > 60 % seagrass coverage of the bed of the Wadden Sea in the areas mapped. These flights are carried out three times a year in summer (if possible in June, July and August) in order to ensure that the maximum seagrass coverage is surveyed in the course of the year to be used for assessment (see Dolch and Reise, 2008).

In addition to this, fixed monitoring units are surveyed on the seabed and one-sixth of the Schleswig-Holstein Wadden Sea is mapped for seagrass meadows each year so that the entire seagrass population is surveyed in the course of one WFD management cycle. All these investigations on the seabed involve estimating the extent of meadows (defined as 20 % plus seabed coverage; in addition to this, areas with 5 % plus coverage are currently surveyed for the purposes of comparison with Lower Saxony) using inspections on foot and GPS points. Transects are walked through meadows in order to survey their mean density and composition in terms of the two *Zostera* species.

Frequency:

Flights three times a year during the vegetation period (June-September)

Annual inspection of permanent monitoring fields on foot and mapping of one-sixth of the total population (six-sixths in six years)

These frequencies are necessary because the occurrence and distribution of macrophytes (seagrass and macroalgae) are subject to major annual fluctuations. At least three overflights are necessary in order to be able to survey the maximum coverage during a year. Annual measurements are necessary because, apart from nutrients, the formation of eutrophication-indicative epiphyte and green algae populations is also dependant on local weather conditions and therefore does not happen every year. Comprehensive surveying has had to be spread out over six years on account of the great deal of effort involved.

Parameter:

- Coverage
- Epiphytes on *Zostera*
- Extent
- Position
- Species composition

Zone:

Eulittoral

Macrophytes - Sandy Eulittoral - Macroalgae - Schleswig-Holstein

Methods:

General remarks

At present, as part of the OFEW project, a method is being trialled in which satellite and aerial remote sensing data are combined with in situ measurements. The core of the method is the objective classification of remote sensing data, which is advantageous with regard to the comparability of results (spatial and temporal). This development should be observed and the results adopted as appropriate. This is also recommended by the TMAP ad hoc working group on seagrass (see Final Report, 28 August 2006).

Schleswig-Holstein (see on this topic SOP: Macrophytobenthos, section X)

Hitherto, this work has been carried out in accordance with a method put forward by K. Reise. This involves overflights for spatial mapping and the determination of the total area of green algae populations (and seagrass) with => 20 % algae coverage of the bed of the Wadden Sea in the areas mapped. The aircraft flies at an altitude of 300 to 500 m. During the flight, three independent observers enter the corresponding populations on maps of the tidal flats. In this respect, a distinction is made between 20 - 60 % and >60 % algae coverage of the examined.bed of the Wadden Sea in the areas mapped. These flights take place three times a year in summer (if possible in June, July and August). This ensures that the maximum coverage of opportunistic algae is surveyed in the course of the year to be used for assessment.

The biomass of green macroalgae is surveyed monthly at two bights with tidal flats in the Königshafen on Sylt. Ten representative samples (stratified random sampling design), each of 100 cm^3, are taken from marked permanent plots, each measuring 50 x 50 m. The samples are analysed by genus (in this case, foliaceous thalli such as *Ulva*, tubular thalli such as *Enteromorpha* or *Chaetomorpha* and *Cladophora*).

Additional surveying of *Fucus* coverage and biomass on shellfish banks (`Stiefelmethode' step method), determination of biomass. Coordination with macrozoobenthos monitoring expedient. At present, preliminary investigations are still being carried out into the surveying of the neophyte *Gracilaria vermiculophylla* (red algae).

Frequency:

Overflights for the surveying of opportunistic algae mats: three times a year (see above). This frequency is necessary because, apart from a need for large quantities of nutrients, the formation of algae mats is also dependent on weather conditions (temperature and insolation). In addition to this, these algae mats are highly mobile, so that they are easily dispersed and could consequently be missed by one-off monitoring. This approach ensures algae mats that appear are also identified and their dimensions surveyed. Since the algae monitoring is carried out concurrently with the monitoring of seagrass (see information on seagrass), only modest additional effort is involved.

Parameter:

- Biomass
- Coverage
- Extent
- Position

Zone:

Eulittoral

Macrophytes - Sandy Eulittoral - Macroalgae - Lower Saxony

Methods:

General remarks

See Macrophytes - Sandy Eulittoral - Macroalgae - Schleswig-Holstein

Lower Saxony (see on this topic SOP: Macrophytobenthos, section X)

Overflights for the surveying of the spatial extent of green algae populations; samples are taken from each of the relevant habitats in four station areas in order to determine the species composition and abundance of red, brown and green algae.

Frequency:

As a rule, annual monitoring is necessary on account of macrophytes' high natural variability.

Green algae overflight at least three times a year during the vegetation period; species composition surveyed in the four above-mentioned station areas every three years

Parameter:

- Biomass
- Coverage
- Extent (species)
- Position
- Species composition

Zone:

Eulittoral

Macrophytes - Sandy Eulittoral - Seagrass - Lower Saxony

Methods:

General remarks

See Macrophytes - Sandy Eulittoral - Seagrass - Schleswig-Holstein

Lower Saxony (see on this topic SOP: Macrophytobenthos, section X)

Comprehensive surveying by means of overflights (aerial survey) in combination with field mapping (every six years). Annual sampling of selected seagrass meadows (permanent monitoring units) to validate aerial data, and survey the annual variability of the seagrass within the six-year period and characteristic supporting parameters (including species composition, density, quantity of epiphytic algae, biomass).

For methods, see: TMAP Seagrass-Report, pp. 16ff.

Frequency:

Comprehensive surveying (area-wide): once in six years. Selected seagrass meadows (permanent monitoring units): annually.

Grounds: As a rule, annual monitoring is necessary on account of macrophytes' high natural variability. The frequencies chosen represent a compromise that reflects the requirements imposed by the WFD - monitoring once every three years. The area-wide surveying may be carried out at a lower frequency, but annual monitoring at selected stations supplies information about developments during the intervening period.

Parameter:

- Coverage
- Epiphytes on *Zostera*
- Extent (species)
- Position
- Species composition

Zone:

Eulittoral

Macrophytes - Rocky Eulittoral (Heligoland)

Methods:

Monitoring methods (see on this topic SOP: Macrophytobenthos, section X)

- Transect and fixed georeferenced square plots: quantitative: all macroalgae species (% coverage of all macroalgae plus macrozoobenthos in 50 x 50 cm frame; photographs of all squares)
- Quantitative grid mapping: approx. 150 georeferenced points; located using sub-metre DGPS (% coverage of all macrophytes plus macrozoobenthos in 50 x 50 cm frame; photographs of all squares)
- Polygon mapping (sub-metre DGPS) of dense *Fucus* and *Ulva* populations
- Inspection of defined habitats on foot at low water to draw up a Reduced Species List of the kind discussed by Wells et al. (2006)

Frequency:

As a rule, annual monitoring is necessary on account of macrophytes' high natural variability.

- Twice in three years in summer: transects; every two to three years: areal surveying. Grounds: Compromise that reflects the development of perennial components, which do not fluctuate heavily as a rule, and ephemeral components, which are indicative of nutrient loading and are affected more heavily by climatic factors. However, more recent findings show that perennial species such as *Fucus serratus* may also be subject to large fluctuations. In so far as this is the case, it is necessary to carry out grid mapping and polygon mapping annually, ideally twice a year (summer and winter aspects) to assess climatic influences (Kuhlenkamp et al., 2009a, b). A lower frequency holds the danger of an erroneous bad assessment if the *Fucus* population temporarily collapses dramatically due to natural storm events (that were not registered at the time) and this cannot be distinguished from an anthropogenic stress effect.
- Wells Index once a year (less time-consuming) (Kuhlenkamp and Bartsch, 2007; Kuhlenkamp et al., 2009a, b)

Parameter:

- Coverage
- Extent (species)
- Position
- Species composition

Zone:

Eulittoral

Macrophytes - Rocky Sublittoral (Heligoland)

Methods:

General remarks

The sublittoral zone of Heligoland constitutes a species-rich habitat unique in Germany that, however, can only be monitored with difficulty on account of its location on the high seas and the diving operations required.

Monitoring methods (see on this topic SOP: Macrophytobenthos, section X)

- Depth boundary transects: quantitative recording of dominant brown seaweeds and red algae in 0.5 m depth sections; carried out along three suitable, permanently marked transects

Frequency:

Depth boundary transects: every three years in summer; however, as the method is very weather-susceptible, this should be undertaken in the first and fourth years of each management cycle so that, where necessary, it is possible to reschedule the work in question for the following year. 1st management cycle: in principle, surveyed annually if possible in order to rapidly obtain a test data set.

Surveying of the total *Laminaria* population once in six years. Given that *Laminaria* live for several years, major changes are not to be expected from one year to the next.

Parameter:

- Coverage
- Depth range
- Extent (species)
- Position
- Species composition

Zone:

Sublittoral

Macrophytes - Transitional Waters

Methods:

General remarks

The transitional waters of the North Sea (Eider, Elbe, Weser, Ems) differ in terms of the macrophyte components that occur in them. In these transitional waters, salt meadows and reedbeds are also to be observed in accordance with the method for coastal waters because otherwise the areas above MHT would not be covered by the site survey for transitional waters in the Elbe. This is carried out in accordance with the methods for coastal waters (see information on coastal waters).

Monitoring methods (see on this topic SOP: Macrophytobenthos, section X)

Registration of vegetation at selected monitoring units in submerged reedbeds, classification using the Site Typology Index for Macrophytes (STIm) (see the assessment procedure proposed by Stiller, 2005). Salt meadows are surveyed following the procedure for coastal waters.

Furthermore, foreshore areas, reedbed widths and the proportion of near-natural biotopes in the Weser and Ems are to be surveyed (after Adolph et al., 2007), as well as, in accordance with the methods for coastal waters, seagrass meadows.

Frequency:

As a rule, annual monitoring is necessary on account of macrophytes' high natural variability.

Once a year in summer: spring mapping is also recommended for the surveying of the complete species spectrum and joint monitoring of macrophytes. Grounds: 'In contrast to the frequency prescribed in the WFD, annual sampling of macrophytes is recommended.' (Stiller, 2005)

Parameter:

- Area
- Biomass
- Coverage
- Depth range
- Epiphytes on *Zostera*
- Extent (species)
- Position
- Species composition
- Vegetation types (TMAP)

Baltic Sea

Macrophytes - Inner Coastal Waters

Methods:

General remarks

The monitoring described here is carried out in the more enclosed fjords (Schlei, Inner Flensburg Fjord,[1] Trave, Inner Orth Bight) as well as the Bodden. There are considerable differences in salinity between these areas, which means that the macrophyte species differ greatly.

Surveys of salt grasslands (created by grazing) and brackish water reedbeds are undertaken under the Habitats Directive but, in accordance with the consensus of the states around the Baltic Sea and a BLMP decision, are not used for assessments under the WFD.

1) Despite the physical allocation of the Inner Flensburg Fjord to type B2, the BALCOSIS procedure for outer coastal waters in the Baltic Sea is applied (see information on outer coastal waters) on account of the composition of the macrophyte growth.

Monitoring methods (see on this topic SOP: Macrophytobenthos, section X)

Surveying of species and their coverage using frame sampling (divers) along a depth transect ¿ surveying of species' lower distribution limit, definition of plant communities (Schubert et al., 2003, Selig et al., 2006, 2008).

The investigations are carried out following the ELBO approach: sampling of vegetation and sediment along transects by divers as far as the lower distribution limit, frame sampling in defined depth sections (0.25; 0.5; 0.75; 1; 1.5; 2; continued at 1 m levels). Five mapping areas (1 m²), which are located at distances of 5 - 10 m apart, are surveyed at each depth level.

An overview of the method is given by 'Vorläufige Handlungsanweisung zur Erfassung der Angiospermen- und Makroalgenbestände in den inneren Küstengewässern der Deutschen Ostseeküste - Bewertung entsprechend den Vorgaben der EU-Wasserrahmenrichtlinie' (Selig et al., 2008, 2nd edition) and the English summary in Steinhardt et al. (2009).

Frequency:

Frequency: once a year in summer, period: 15 June to 15 August. In waters where the charophyte species *Tolypella nidifica* is one of the characteristic species of the plant community, the sampling must be carried out before 15 July. Annual sampling is required because the charophyte species to be used for the assessment display very great variability, i.e. in some years individual species are not found on account of the natural dynamics of seed fall and germination, which could result in an erroneous poor assessment.

Parameter:

- Coverage
- Depth range
- Extent (species)
- Position
- Species composition

Macrophytes - Outer Coastal Waters

Methods:

General remarks

The permanently water-covered macrophytes of the Baltic Sea can only be surveyed at selected monitoring units. Macroalgae (on rocks) and seagrasses (on soft seabed) are surveyed in these areas. Salt grasslands (created by grazing) and brackish water reedbeds are surveyed under the Habitats Directive but, in accordance with the consensus of the states around the Baltic Sea and a BLMP decision, are not used for assessments under the WFD.

Monitoring methods (see on this topic SOP: Macrophytobenthos, section X)

Underwater video for surveying the depth range of *Zostera marina* and *Fucus* spp. (five video transects/station or section of the coast)

Dive investigations in various depth zones (dense seagrass population, 0 - 2 m, 5 - 7 m) for species identification, determination of coverage and biomass. The assessment is carried out following the BALCOSIS procedure.

An overview of the methods for surveying various parameters is given in `Handlungsanweisung zum Monitoring in den äußeren Küstengewässern¿ (Fürhaupter and Meyer, 2008).

Following unsuccessful tests, no macrophyte investigations are carried out for the WFD in water type B4 (Schleswig-Holstein) because the quality of the historical data is too poor and depth boundaries cannot be determined with any certainty on account of the lack of hard substrates in deep water. The BALCOSIS procedure (Fürhaupter and Meyer, 2008) is used to assess this quality element in each of the B4 water bodies in Schleswig-Holstein in conjunction with a neighbouring B3 water body.

Habitat type reefs in the EEZ: underwater video for surveying status, frame sampling (by divers) for the estimation of density and determination of species populations. See also HD Habitat Type: Reefs.

For salt grasslands, see also HD Habitat Type: Atlantic Salt Meadows.

Frequency:

On account of the high interannual variability of, in particular, opportunistic macroalgae, the monitoring is carried out annually in summer. This also corresponds to the requirements imposed by HELCOM (once a year in summer: July-September, preferably August-September))

Parameter:

- Biomass
- Coverage
- Depth range
- Position
- Species composition

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Acidity
- Appraisal of anthropogenic influences (boat traffic, tourism, fishing, etc.)
- Bathymetry
- Climatic conditions
- Ice situation
- Light conditions
- Nutrients
- Salinity
- Sediment exposure
- Sediment properties
- Sedimentation rate
- Sight depth
- Temperature

4 Assessment

4.1 Assessment procedures

North Sea

Title

Coastal Waters - Sandy Eulittoral - Macroalgae and Seagrass

Authors

Assessment procedure and operating procedure

Schleswig-Holstein:

- Dolch and Reise (2008a): 'Seegras-Monitoring im Schleswig-Holsteinischen Wattenmeer 2007'; report for LLUR-SH.
- Dolch, Buschbaum and Reise (2009), in preparation : 'Seegras-Monitoring im Schleswig-Holsteinischen Wattenmeer 2008 inklusive "endgültige Handlungsanweisung plus Bewertungs-Verfahren über 6 Jahre"'.

Lower Saxony:

- Jaklin et al. (2007): Aufbau einer Bewertungsmatrix für die Gewässertypen nach EG-WRRL im Küstengebiet der Nordsee, Schwerpunkt Flussgebietseinheiten Weser und Ems: Teil A: Nährstoffe, Fische, Phytoplankton, Makrophyten (Makroalgen und Seegras); Berichte des NLWKN.

Guideline:

WFD

Stretch of Water:

Coastal waters

Comments:

Description of the assessment procedure

Schleswig-Holstein:

The eulittoral seagrass meadows here are assessed to ascertain their extent, their density and their composition in terms of the two *Zostera* species. In addition to this, the extent and density of opportunistic algae (green macroalgae) are also assessed. These metrics are combined together using their individual standardised EQRs.

The euhaline (North Friesland) and the polyhaline (Dithmarschen) areas of tidal flats off Schleswig-Holstein are assessed separately, but there is no differentiation within these areas because (a) large numbers of macroalgae thalli and, in the autumn, seed-bearing seagrass shoots are constantly being exchanged with the tidal current between the tidal basins, i.e. within the areas tidal flats off under discussion; and (b) green algae mats and seagrass meadows occur particularly frequently at the watersheds between tidal basins in the flats (often the boundaries between water bodies).

Assessment matrix for the North Friesland Macrophytobenthos Index in PDF format

Assessment matrix for the Dithmarschen Macrophytobenthos Index in PDF format

Lower Saxony:

The eulittoral seagrass meadows here are assessed to ascertain their extent, their density and their composition in terms of the two *Zostera* species. In addition to this, the extent and density of opportunistic algae, as well as the species composition of brown and red algae are also assessed. These metrics are combined together using their individual EQRs

.

Metrics, class boundaries, EQRs

Schleswig-Holstein:

Table with limit values, EQRsthat will be completed at the end of 2008

Lower Saxony:

Seagrass and green algae coverage: See Jaklin et al., 2007; apart from this, current class boundaries and EQRs for the parameters green algae coverage and area of seagrass meadows. See Kolbe (2007): 'Intercalibration Report (NEA GIG) - Assessment of German Coastal Waters (NEA1/26, NEA3/4) and Transitional Waters (NEA11) by Macroalgae and Angiosperms:

Macroalgae Species Spectrum (Red and Brown Algae)': in preparation.

Pressures

Eutrophication

North Sea

Title

Coastal Waters - Sandy Eulittoral - Salt Meadows and Reedbeds - Lower Saxony

Authors

Assessment procedure and operating procedure

Lower Saxony:

- Adolph et al. (2007): Aufbau einer Bewertungsmatrix für die Gewässertypen nach EG-WRRL im Küstengebiet der Nordsee, Schwerpunkt Flussgebietseinheiten Weser und Elbe: Abschlussbericht Teil B: Makrophyten (Röhrichte, Brack- und Salzmarschen), Makrozoobenthos, Schadstoffe; Berichte des NLWKN.

Guideline:

WFD

Stretch of Water:

Coastal waters

Comments:

Assessment procedure in Lower Saxony provisional until a procedure harmonised between the Länder is available.

Description of the assessment procedure

See Adolph et al., 2007

Metrics, class boundaries, EQRs

Lower Saxony:

See Adolph et al., 2007

Pressures

Eutrophication, morphological changes

North Sea

Title

Coastal Waters - Sandy Eulittoral - Salt Meadows and Reedbeds - Schleswig-Holstein and Hamburg

Authors

N/a

The assessment procedure is described in the Marine Monitoring Manual specifications for the various habitat types.

Guideline:

HD

Stretch of Water:

Coastal waters

North Sea

Title

Coastal Waters - Sandy Sublittoral

Guideline:

WFD

Stretch of Water:

Coastal waters

Comments:

Description of the assessment procedure

Lower Saxony:

The occurrence of sublittoral seagrass and the species composition of brown and red algae are assessed. These metrics are combined together using their individual EQRs.

Metrics, class boundaries, EQRs

Lower Saxony:

Seagrass: see Jaklin et al., 2007

Macroalgae species spectrum (red and brown algae): in development.

Pressures

Eutrophication, hydromorphological alterations

North Sea

Title

Coastal Waters - Rocky Eulittoral (Heligoland)

Authors

Assessment procedure and operating procedure

- Kuhlenkamp & Bartsch (2007): 'Benthosbewertung Helgoland: Teil I: Phytobenthos'; report for LLUR-SH.
- Kuhlenkamp & Bartsch (2008): 'Marines Monitoring Helgoland: Benthosuntersuchungen gemäß Wasserrahmenrichtlinie: Handlungsanweisung Makrophytobenthos'; report for LLUR-SH.

Guideline:

WFD

Stretch of Water:

Coastal waters

Comments:

Description of the assessment procedure

Initially, the various modules of the assessment procedure are assessed. They are then combined using their EQRs and a weighting (given in percent, see below) to arrive at an overall assessment by the quality element macroalgae. The following modules are used:

- Reduced Species List (RSL, after Wells et al. 2006): species richness, proportion of green algae, proportion of red algae, ESG* ratio, proportion of opportunists: (50 %)
- Green algae: abundance of *Ulva lactuca* in the eulittoral zone (10 %)
- Fucetum: coverage of the eulittoral zone with *Fucus serratus* (20 %)
- Depth boundaries of sublittoral algae: three red algae species and *Laminaria hyperborea* (20 %)

*ESG = Ecological Status Group, adapted in accordance with Orfanidis et al (2001)

Metrics, class boundaries, EQRs

Table 1: Assessment matrix for the Heligoland Phytobenthic Index (HPI) in PDF format (364 kB)

North Sea

Title

Coastal Waters - Rocky Sublittoral (Heligoland)

Authors

Assessment procedure and operating procedure

- Kuhlenkamp & Bartsch (2007) Benthosbewertung Helgoland: 'Benthosbewertung Helgoland: Teil I: Phytobenthos'; report for LLUR-SH.
- Kuhlenkamp & Bartsch (2008) Marines Monitoring Helgoland: 'Marines Monitoring Helgoland: Benthosuntersuchungen gemäß Wasserrahmenrichtlinie: Handlungsanweisung Makrophytobenthos'; report for LLUR-SH.

Guideline:

WFD

Stretch of Water:

Coastal waters

Comments:

Description of the assessment procedure

See Rocky Eulittoral (Heligoland)

Metrics, class boundaries, EQRs

See Rocky Eulittoral (Heligoland)

Pressures

Eutrophication

North Sea

Title

Transitional Waters

Authors

Assessment procedure and operating procedure

Elbe and Eider:

- Stiller (2005): 'Bewertungsverfahren für die Qualitätskomponenten Makrophyten und Angiospermen in der Tideelbe gemäß EG-WRRL'; report for ARGE Elbe.
- Stiller (2008): `Überblicksweise Überwachung der Qualitätskomponenten Makrophyten und Angiospermen in der Tideelbe gemäß EG-Wasserrahmenrichtlinie¿; report for ARGE Elbe.

Weser and Ems:

- Adolph et al. (2007): *Aufbau einer Bewertungsmatrix für die Gewässertypen nach EG-WRRL im Küstengebiet der Nordsee, Schwerpunkt Flussgebietseinheiten Weser und Elbe: Abschlussbericht Teil B: Makrophyten (Röhrichte, Brack- und Salzmarschen), Makrozoobenthos, Schadstoffe*; Berichte des NLWKN (incorporates parameters discussed by Stiller (2005, 2008), see above).
- Seagrass in the polyhaline and mesohaline zones, see information on coastal waters.

Guideline:

WFD

Stretch of Water:

Transitional waters

Comments:

Description of the assessment procedure

Eider and Elbe:

In the procedure based on Stiller (2005, 2008), the submerged reedbeds are assessed by means of the calculation of a Site Typology Index for Macrophytes (STIm), which takes account of the species present, their extent, vegetation zoning and vigour.

Weser and Ems:

In the procedure for oligolahaline foreshore areas based on Adolph et al. (2007), the proportion of near-natural biotopes and reedbed width are surveyed, supplemented by parameters drawn from the Site Typology Index for Macrophytes (STIm) put forward by Stiller (2005, 2008). In addition to this, salt meadows and seagrass meadows in the mesohaline to polyhaline zones are surveyed using the relevant procedure for coastal waters.

Metrics, class boundaries, EQRs

Eider and Elbe:

Allocation of EQR value to ecological status and potential classes for the procedure based on Stiller (2008).

Status classes	**High**	**Good**	**Moderate/strong>**	**Poor**	**Bad**
STI for Macrophytes	>10,0	<=10,0 >7,5	<=7,5 >5,0	<=5,0 >3,0	<= 3,0
EQR	>0,833	<=0,833 >0,625	<=0,625 >0,417	<=0,417 >0,25	<=0,25

Potential classes	**Good and better**	**Moderate**	**Poor**	**Bad**
STI for Macrophytes	>7,5	<=7,5 >5,0	<=5,0 >3,0	<=3,0
EQR	>0,625	<=0,625 >0,417	<=0,417 >0,25	<=0,25

Weser and Ems:

See Adolph et al., 2007

Pressures

Eutrophication, hydromorphological changes

Baltic Sea

Title

Inner Coastal Waters

Authors

Assessment procedure and operating procedure

- Selig et al., 2007 (1st edition) and 2008 (2nd edition): 'Vorläufige Handlungsanweisung zur Erfassung der Angiospermen- und Makroalgenbestände in den inneren Küstengewässern der deutschen Ostseeküste ¿ Bewertung entsprechend den Vorgaben der EU-Wasserrahmenrichtlinie'.

Guideline:

WFD

Stretch of Water:

Coastal waters

Comments:

Description of the assessment procedure

The ELBO procedure is used to assess the regression of the lower distribution limit and the disappearance of particular plant communities specified for each water body in accordance with defined levels of degradation.

The assessment parameters are:

- Definition of plant community (17)
- Charophyte depth limit
- Spermatophyte depth limit

Comments: The final method used to combine the figures and convert them into EQRs will be included in the revised operating procedure by the end of 2008.

Metrics, class boundaries, EQRs

Please forward tables for use in assessment to the University of Rostock/LUNG/LLUR once completed

Pressures

Baltic Sea

Title

Outer Coastal Waters

Authors

Assessment procedure and operating procedure

- Fürhaupter and Meyer (2008): Handlungsanweisung zum Monitoring in den äußeren Küstengewässern der Ostsee nach den Vorgaben der EU-Wasserrahmenrichtlinie, Qualitätskomponente Makrophyten, BALCOSIS-Verfahren; report for LLUR-SH and LUNG-MV.

Guideline:

WFD

Stretch of Water:

Coastal waters

Comments:

Description of the assessment procedure

Seven individual metrics, which encompass soft and hard seabed vegetation, are assessed here. Of these metrics, the depth boundaries of *Zostera marina* and *Fucus* spp. are weighted more heavily because good historical data and models are available for them in Schories et al. (2006). The seven metrics are combined using a weighted median to reach an overall assessment based on macroalgae and angiosperms. The metrics are, in particular:

- *Zostera marina* depth limit
- Proportion of opportunists in *Zostera meadows*
- *Fucus* spp. depth limit
- Dominance of *Fucus* at depths of 0 - 2 m (compared to opportunistic species)
- Proportion of biomass comprising opportunists on hard substrate at depths of 5-7 m
- Reduction in number of species of important perennial macroalgae on hard substrate at 5 - 7 m
- Proportion of biomass comprising *Furcellaria lumbricalis* on hard substrate at 6 - 7 m

Metrics, class boundaries, EQRs

Metric	Ref.	High	Good	Mod	Poor	Bad	EQR_{HG}	EGR_{GM}	Inter-cal?
EQR_{norm} [1]	**1.0**	**1,0 - 0,8**	**0,8 - 0,6**	**0,6 - 0,4**	**0,4 - 0,2**	**0,2 - 0,0**			
***Zostera* depth [m]**	9,4	[9,4-8,5]	(8,5-7,0]	(7,0-4,5]	(4,5-0,5]	(0,5-0,0]	0,9	0,74	Yes
Opportunists in *Zostera* [% mass]	0,5	[0,5-1]	(1-10]	(10-30]	(30-75]	(75-100]	0.5[4]	0,02[4]	No
***Fucus* depth [m]**	9,4	[9,4-8,5]	(8,5-7,0]	(7,0-4,5]	(4,5-0,5]	(0,5-0,0]	0,9	0,74	No
***Fucus* dominance [% coverage]**	80	[80-75]	(75-50]	(50-10]	(10-0,5]	(0,5-0]	0,94	0,63	No
Opportunists in 5-7 m [% mass]	0,5	[0,5-1]	(1-10]	(10-30]	(30-75]	(75-100]	0.5[4]	0,02[4]	No
***Furcellaria* in 5-7 m [% biomass]**	40	[40-30]	(30-20]	(20-5]	(5-0,5]	(0,5-0]	0,75[4]	0,5[4]	No
Species reduction, B3a-water body[2] [Number of species]	7	7	5-6	3-4	1-2	0	0,93[4]	0,64[4]	No
Species reduction, B3b-water body[3] [Number of species]	10	10-9	8-7	6-4	3-2	1-0	0,85[4]	0,65[4]	No

Notes:

*1: The intervals are to be understood as open or closed in line with those of the corresponding metrics

*2: B3 water body east of the Darß Sill

*3: B3 water body west of the Darß Sill

*4: Still needs to be specified uniformly because an EQR has to be calculated in this case

Pressures

Eutrophication

5 Quality assurance

- Quality Assurance Panel (workshops, intercalibration exercises, first draft of a species list, standardisation with DIN, CEN and ISO, support for the establishment of QM systems, drafting of sample SOPs, performance of audits)

Comments

The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the BLMP. Each of the monitoring institutions bears responsibility for establishing and administering its own DIN EN ISO/IEC 17025 quality management systems. The institutions involved in the BLMP coordinate their activities within the framework of the Working Group on Quality Assurance and its sub-working groups, as well as the Ad Hoc Working Group on Benthos.

5.1 Monitoring institutions

- LimnoMar
- LLUR
- MariLim
- Uni-Rostock
- BfN
- NLWKN
- NPV SH
- NLPV NI
- Stiller
- AWI

5.2 Guidance documents

- BLMP Quality Assurance Panel at the UBA, 2008: *Muster-Qualitätsmanagementhandbuch für Laboratorien des Bund/Länder-Messprogramms nach DIN EN ISO/IEC 17025 (BLMP Sample Quality Management Manual)*; Version: 01 of 1 February 2008; Federal Environment Agency.
- BLMP Quality Assurance Panel at the UBA, 2009: *Prüfverfahren-SOP Makrophytobenthos-Untersuchungen auf marinen Substraten: Rahmenbeprobung im Eulitoral (P-SOP-BLMP-MPB_RB-EUL_v01) (Testing Procedure SOP: Macrophytobenthos Investigations on Marine Substrates: Frame Sampling in the Eulittoral Zone)*; Federal Environment Agency (Version: 01 of 15 October 2009 in Members' Area).
- BLMP Quality Assurance Panel at the UBA, 2009: *Prüfverfahren-SOP Makrophytobenthos-Untersuchungen auf marinen Substraten: Rahmenbeprobung im Sublitoral (P-SOP-BLMP-MPB_RB-SUB_v01) (Testing Procedure SOP: Macrophytobenthos Investigations on Marine Substrates: Frame Sampling in the Sublittoral Zone)*; Federal Environment Agency (Version: 01 of 15 October 2009 in Members' Area).
- HELCOM, COMBINE Manual, Annex C-9: Guidelines for monitoring of phytobenthic plant and animal communities in the Baltic Sea.
- JAMP, 2004: *Guidelines on quality assurance for biological monitoring in the OSPAR area.*; ICES Techniques in Marine Environment Sciences; 32; 2004.
- JAMP, ASMO, 1997: *Eutrophication monitoring guidelines - benthos*: 'Technical Annex 1: Hard bottom macrophytobenthos, soft-bottom macrophytobenthos and hard-bottom macrozoobenthos'.

5.3 Standards

- DIN EN ISO/IEC 17025, 2005: General requirements for the competence of testing and calibration laboratories.
- DIN EN 14996, 2006: Water quality - Guidance on assuring the quality of biological and ecological assessments in the aquatic environment.
- DIN EN ISO 19493, 2007: Water quality - Guidance on marine biological surveys of hard-substrate communities.
- DIN EN ISO 16665: Water quality - Guidance for quantitative sampling and sample processing of marine soft-bottom macrofauna.

5.4 Current status

A BLMP Study Group decision (2006) obliged the BLMP laboratories to establish DIN EN ISO/IEC 17025 quality management systems. For this purpose, a Sample Quality Management Manual was drawn up in 2006/2007 by the Quality Assurance Panel in cooperation with the Quality Assurance Sub-Working Group on Quality Management. This manual has been available for subscription from the Quality Assurance Panel at the UBA since mid-2008 and is to be used as the basis for internal QM documentation at laboratories. The manual is designed as a loose-leaf collection, so that regular updates can be added as required. The intention is for it to be gradually supplemented with sample SOPs coordinated within the BLMP. As far as macrophytes are concerned, the following testing procedure SOPs are currently available: Macrophytobenthos Investigations on Marine Substrates: Frame Sampling in the Eulittoral Zone and Macrophytobenthos Investigations on Marine Substrates: Frame Sampling in the Sublittoral Zone, Version 01 of 15 October 2009. The testing procedure SOPs Transect Mapping in the Sublittoral Zone and Vegetation Mapping of Coasts and Estuaries are currently in preparation.

Intercalibration exercises

Not yet available, planned as of 2011.

Workshops

- UBA/BLMP-WS: Methods of Macrophyte Monitoring under the BLMP and the EC WFD including Exercises in the Identification of Marine Macrophytes: Part 1: Hard Seabed Monitoring (2005)
- UBA/BLMP-RV: Methods of Macrophyte Monitoring under the BLMP and the EC WFD including Exercises in the Identification of Marine Macrophytes: Part 2: Soft Seabed Monitoring (2005)
- UBA/BLMP-WS: Taxonomy of Marine Macrophytes and their Significance for Monitoring under the International Conventions on the Protection of the Seas (2001)

6 Literature

- Dolch, T. and K. Reise, 2008: *Seegras-Monitoring im Schleswig-Holsteinischen Wattenmeer, 2007*; report of the State Agency for Agriculture, Environment and Rural Areas of the Land Schleswig-Holstein (LLUR), Flintbek.
- Dolch, T., 2008: *High-resolution spatial analysis of morphodynamics and habitat changes in the Wadden Sea (SE North Sea)*; dissertation; University of Kiel.
- Dolch, T., Buschbaum, C. and K. Reise, 2009: *Seegras-Monitoring im Schleswig-Holsteinischen Wattenmeer 2008*; interim report of the State Agency for Agriculture, Environment and Rural Areas of the Land Schleswig-Holstein (LLUR), Flintbek
- Grimm, V., Strasser, M. and K. Reise, 2003: 'Marine metapopulations: a useful concept?'; *Helgol. Mar. Res.*; 56; pp. 222 - 228.
- Hanski, I., 1999: *Metapopulation Ecology*; Oxford Univ. Press.
- Hauxwell, J., Cebrián, J. and I. Valiela, 2003: `Eelgrass Zostera marina loss in temperate estuaries: relationship to land-derived nitrogen loads and effect of light limitation imposed by algae'; *Mar. Ecol. Prog. Ser.*; 247; pp. 59 - 73.
- Nienburg, W., 1927: 'Zur Ökologie der Flora des Wattenmeeres: I: Der Königshafen bei List auf Sylt'; *Wiss. Meeresunters. (Abt. Kiel)*; 20: pp. 146 - 196.
- Raabe, E.-W., Dierßen, K. and U. Mierwald, 1987: *Atlas der Flora Schleswig-Holsteins und Hamburgs*; Wachholtz-Verlag, Neumünster.
- Reise, K. and I. Siebert, 1994: `Mass occurrence of green algae in the German Wadden Sea'; *Deutsche Hydrogr. Z Suppl.*; 1; pp. 171 - 188.

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

Some of the monitoring activities outside the BLMP are suitable for compliance with monitoring requirements under the Habitats Directive and the WFD. For this reason, it is important for these activities to be taken into consideration in future in the context of German marine monitoring.

7.2 Working steps required

Priorities

Once the assessment schemes for the HD habitat types have been completed, the current network for macrophyte monitoring is to be adapted or extended as necessary.

Monitoring frequencies should be standardised between Schleswig-Holstein and Lower Saxony.

Methodological harmonisation

The aspiration should be to harmonise remote sensing applications between Schleswig-Holstein and Lower Saxony. However, this is only possible to a certain extent on account of area-specific differences (e.g. occurrence of seagrass) and the different methodologies these differences imply.

The concept in Schleswig-Holstein involves one overflight of the salt meadows every five years; the concept in Lower Saxony involves one overflight every six years. Hitherto, both Länder have used aircraft equipped with different technologies (CIR aerial imaging - analogue and digital - in Schleswig-Holstein and conversion to aerial scanning in Lower Saxony). The frequencies and technologies should be harmonised. The time intervals also need to be harmonised - above all in view of the mandatory reporting obligations.

Apart from this, salt meadows are currently surveyed at sample plots/permanent monitoring stations each year in Schleswig-Holstein, while 25 % are covered each year in Lower Saxony. Steps to harmonise these activities should be discussed and implemented, if possible.

Quality assurance

The establishment of DIN EN ISO/IEC 17025 quality management systems under the BLMP should be concluded by 1 January 2012.

In this context, apart from the development of uniform quality standards (QM system), efforts should also be made to ensure the participating institutions work largely in accordance with shared guidelines when the SOPs are being drafted. To this end, the Sample Quality Management Manual is to be amended and the following SOPs drawn up for investigations of macrophytes and macroalgae:

- SOP: Transect Mapping in the Sublittoral Zone
- SOP: Vegetation Mapping of Coasts and Estuaries

The DIN EN ISO/IEC 17025 quality management system includes the following elements:

- documented validation/verification of the investigation methods deployed for the determination of performance characteristics,
- storage of reference and comparative collections
- the qualification and regular training of personnel for the procedures deployed,
- the regular performance of internal and external audits,
- regular participation in national and international interlaboratory comparisons, intercalibration exercises, training courses and workshops, and their evaluation.

The laboratories must guarantee the prompt and complete communication of the investigation results to MUDAB on the basis of the MUDAB data formats, including the QA data that have been defined as a minimum, which meet international standards (ICES).

Further steps to be taken as of 2010:

- Provision of the uniform species list including synonyms via the QA information system
- Drawing up of agreements on taxa that cannot be identified to species level
- List of independent experts for cases where identification is problematic
- Alternating workshops on taxonomic questions, methodology and evaluation procedures (to guarantee uniform minimum quality standards at all laboratories) and intercalibration exercises to ensure that, if possible, some form of external QA can be offered once a year (in this connection, of course, international workshops and intercalibration exercises that allow the UBA Quality Assurance Panel to hold events less frequently have to be taken into consideration). These activities are to be documented adequately and promptly.
- Continuation of the Environmental Research Plan project to draw up identification keys (*Ulva*/*Enteromorpha*)
- Establishment of a data management system for all participating institutions within the framework of the work of the Working Group on Data Management

Since workshops and intercalibration exercises cannot be offered annually by the Quality Assurance Panel (Biology Section), regular interlaboratory comparison analyses should be organised bilaterally and independently between the laboratories, the results of which should be presented and discussed in the Working Group on Quality Assurance. As a matter of principle, attention is to be paid to continuity among

the staff involved in the processing of long-term monitoring series, as well as steps to ensure they are appropriately qualified.

Supporting parameters

Information on sediment exposure and sedimentation rates are required as supporting parameters. To this end, appropriate investigations are necessary.

In so far as technically possible, it should be routine for seagrass areas to be surveyed when echo-sounding measurements and side-scan sonar investigations are undertaken for hydromorphological purposes in order to further develop the relevant methodology.

Assessment procedures

Transitional waters:

Under the ARGE Elbe concept, the intention is for macrophytes to be monitored at nine stations in the Elbe in future. These stations are required in order to extrapolate from the individual transects investigated to the whole section of the river and have already been investigated in 2005 as part of a field test (Stiller, 2005).

In principle, this procedure may also be used for the Ems and Weser. However, the applicability of a procedure from the Netherlands to German transitional waters and the options for its further development are currently being examined.

The salt meadow monitoring methods for coastal waters are to be applied in transitional waters (for grounds: see above).

HD

Where applicable, the assessment schemes for the HD habitat types are to be incorporated into the current monitoring concepts.

OSPAR

An appropriate monitoring concept that includes macrophytes is required for the assessment of the eutrophication status of the North Sea under the Comprehensive Procedure (see also Phytoplankton, Macrozoobenthos und Zooplankton).

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 Secretariat-General 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) 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.

(4) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(5) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(6) 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.

(7) Baltic Sea Action Plan, HELCOM 2007

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

Monitoring Specifications

Date: 2010-03-02

Macrozoobenthos

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Fauna - Macrozoobenthos

1.2 Definition

For the purpose of these specifications, macrozoobenthos are defined as all invertebrate organisms that live on and in the seabed and are retained by a sieve with 1 mm mesh. Smaller sieve meshes are also used in estuaries and silt sediments.

1.3 Competent authority/ies

Federal Government:	UBA, BfN, BSH, BfG
Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLPV NI, NLWKN
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Benthos and Benthic Habitats

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Article 11 [2]

Comments

Under the Marine Strategy Framework Directive, it is necessary to draw up monitoring programmes that should encompass the variables listed in Article 8 (cf. also Annex III, Table 1 of the MSFD), including macrozoobenthos.

Article 8(1) and Article 11, Annex III, Table 1 [3]

Comments

The results of macrozoobenthos monitoring are required for the initial assessment of marine waters. These should encompass the following parameters:

- invertebrate fauna on the seabed
- species composition,
- biomass and
- annual/seasonal variability.

See MSFD Annex III, Table 1.

HD [4]

Article 11 [5]

Comments

Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Macrozoobenthos species that are characteristic of habitats are to be monitored in connection with the habitats in question. See the specifications for the following HD habitat types:

- Sandbanks (Natura 2000 Code 1110)
- Estuaries (Natura 2000 Code 1130)
- Mudflats and sandflats (Natura 2000 Code 1140)
- Coastal lagoons (Natura 2000 Code 1150)
- Large shallow inlets and bays (Natura 2000 Code 1160)
- Reefs (Natura 2000 Code 1170)

Monitoring frequencies are not prescribed. Nor is it possible to derive them unequivocally from the reporting cycles (every six years). More detailed information on this topic will be found in the assessment schemes that are currently being drawn up.

The "conservation status" of a natural habitat is defined by, among other things, the conservation status of the species that are characteristic of it.

WFD [6]

Article 8(1)

Comments

Under the WFD, benthic invertebrate fauna must be investigated as a quality element in transitional and coastal waters at least every three years in the context of surveillance monitoring (see Annex V, 1.3.3 and 1.3.4: monitoring of benthic invertebrate fauna in coastal and transitional waters).

In the context of operative monitoring, macrozoobenthos represent an important indicator.

HELCOM

Baltic Sea Action Plan [7]

Comments

A range of EcoQOs are described by HELCOM for all four segments of the Baltic Sea Action Plan, in which respect macrozoobenthos is to be surveyed for the eutrophication and biodiversity segments, in particular

COMBINE

Comments

The COMBINE Manual lists macrozoobenthos as a mandatory "core variable". The annual monitoring required is focussed on the "response of the different biological compartments" to eutrophication (see Combine Manual, Part C, Annex C-9). In this respect, the following are highlighted as eutrophication effects:

- Increased biomass
- Decline in species diversity
- Deterioration and loss of macrozoobenthos where there is oxygen deficiency.

OSPAR

JAMP (see Theme B: Biological diversity and ecosystems)

Comments

- Monitoring of the distribution of species and habitats.
- Assessment of the ecosystem status in order to determine the extent of anthropogenic degradation.

JAMP Common Procedure

Comments

Procedure for the determination of the eutrophication status of the OSPAR marine region.

When they occur, cases of macrozoobenthos mortality are to be surveyed as secondary eutrophication effects in problem areas and potential problem areas.

List of Threatened and/or Declining Species and Habitats [8]

Comments

Hitherto, the following species found in German waters have been included in the list:

- Arctica islandica (Linnæus, 1767),
- Nucella lapillus (Linnæus, 1758),
- Ostrea edulis (Linnæus, 1758).

Mapping European Seabed Habitats (MESH) [9]

Comments

Under OSPAR, species and habitats have been specified and described in the MESH programme. At the moment, a monitoring strategy is being developed for these species and habitats. It is also intended that "ecological objectives" should be taken into consideration (see 2.2, Environmental targets).

TMAP [10]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The monitoring programme for macrozoobenthos is based on the JAMP programme (i.e., see OSPAR).

Shellfish banks and Sabellaria reefs (Lower Saxony) are specified in the Stade Declaration as trilateral targets (see 2.2).

Technical necessity

Monitoring frequencies

Overview of the minimum requirements with regard to monitoring frequency for macrozoobenthos under the various directives and programmes. Usually, no binding statements are made with regard to the numbers of stations because they are dependent on the heterogeneity of the structures that are in place.

	WFD - surveillance	WFD - operative	HD	MSFD	OSPAR	HELCOM	TMAP
Frequency	At least every three years	At least annually	At least every six years	At least annually, seasonally	At least annually	At least annually	Every one to three years

2.2 Environmental targets

MSFD

Article 10(1) states: "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."

HD

The aim of this Directive shall be to contribute towards ensuring bio-diversity through the conservation of the natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies (Article 2(1)).

Macrozoobenthos are to be taken into consideration as an element in the monitoring of the conservation status of habitats (see list of habitat type specifications in 2.1).

WFD

The ecological status of the biological, chemical and hydromorphological parameters is measured against a defined reference condition. The aspiration is for all surface waters to have a "good" ecological status by 2015:

"The level of diversity and the abundance of invertebrate taxa is slightly outside the range associated with the type-specific conditions. Most of the sensitive taxa of the type-specific communities are present." (See WFD, Annex V, 1.2.3-1.2.4).

HELCOM

Ecological Quality Objectives

1. A healthy Baltic Sea environment with diverse biological components functioning in balance. The environment should have a good ecological status and support sustainable economic and social activities (HELCOM, 25/2004).

2. The Baltic Sea Action Plan [5] calls, among other things, for a Baltic Sea unaffected by eutrophication with natural distribution and occurrence of plants and animals (eutrophication segment). In the segment on biodiversity, the focus is on the near-natural functioning of ecosystems and habitats, in which respect macrozoobenthos communities play a particular role.

OSPAR

Eutrophication status according to OSPAR (Common Procedure)

The "general goal" is "to achieve by the year 2010 a healthy marine environment where eutrophication does not occur."

Ecological Quality Objectives

1. Nutrients and eutrophication effects: influence of eutrophication on changes in and loss of macrozoobenthos - macrozoobenthos should not die off as a result of oxygen deficiency caused by eutrophication and/or the occurrence of toxic algae.

2. Density of sensitive species

See also the revised list of EcoQOs (OSPAR Commission 2006, Annex 2) and Biological Effects (imposex in dog whelks (Nucella lapillus)).

TMAP

The intention is to survey the influence on macrozoobenthos exerted by changes in inputs of nutrients and pollutants, salinity and exposure. Changes in natural processes, species composition, abundances (dominance structures) and the biomass of macrozoobenthos must be observed over time for this purpose.

Another goal is to achieve favourable food availability (for higher trophic levels) (see TMAP-Manual, section 2, part 2).

Trilateral target: "an increased area of, and more natural distribution and development of natural shellfish beds, Sabellaria reefs and Zostera fields."

2.3 Threats

Suitability as indicators

Macrozoobenthos indicates indirect eutrophication effects at an early stage. In this respect, there are, firstly, changes in species composition. Secondly, among other things, oxygen deficiency caused by eutrophication can lead to the loss of macrozoobenthos.

Apart from this, macrozoobenthos are, among other things, indicators for the following impacts and changes:

- Effects of activities on the seabed, dredging works, dumping sites, built structures, trawl fishing
- Input of pollutants
- Changes in morphology and hydrography
- Changes in the climate

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The monitoring concept has been drawn up on the basis of the international obligations set out in section 2.1 and is furthest advanced for the WFD. As the work on the concept continues, it will be harmonised in detail with the activities required by the other directives. A detailed description of the procedures for each individual investigation will be found in the sample standard operating procedure for German Marine Monitoring Programme (BLMP) laboratories: SOP: Macrozoobenthos. The individual sections of these specifications make reference to the relevant SOPs.

North Sea

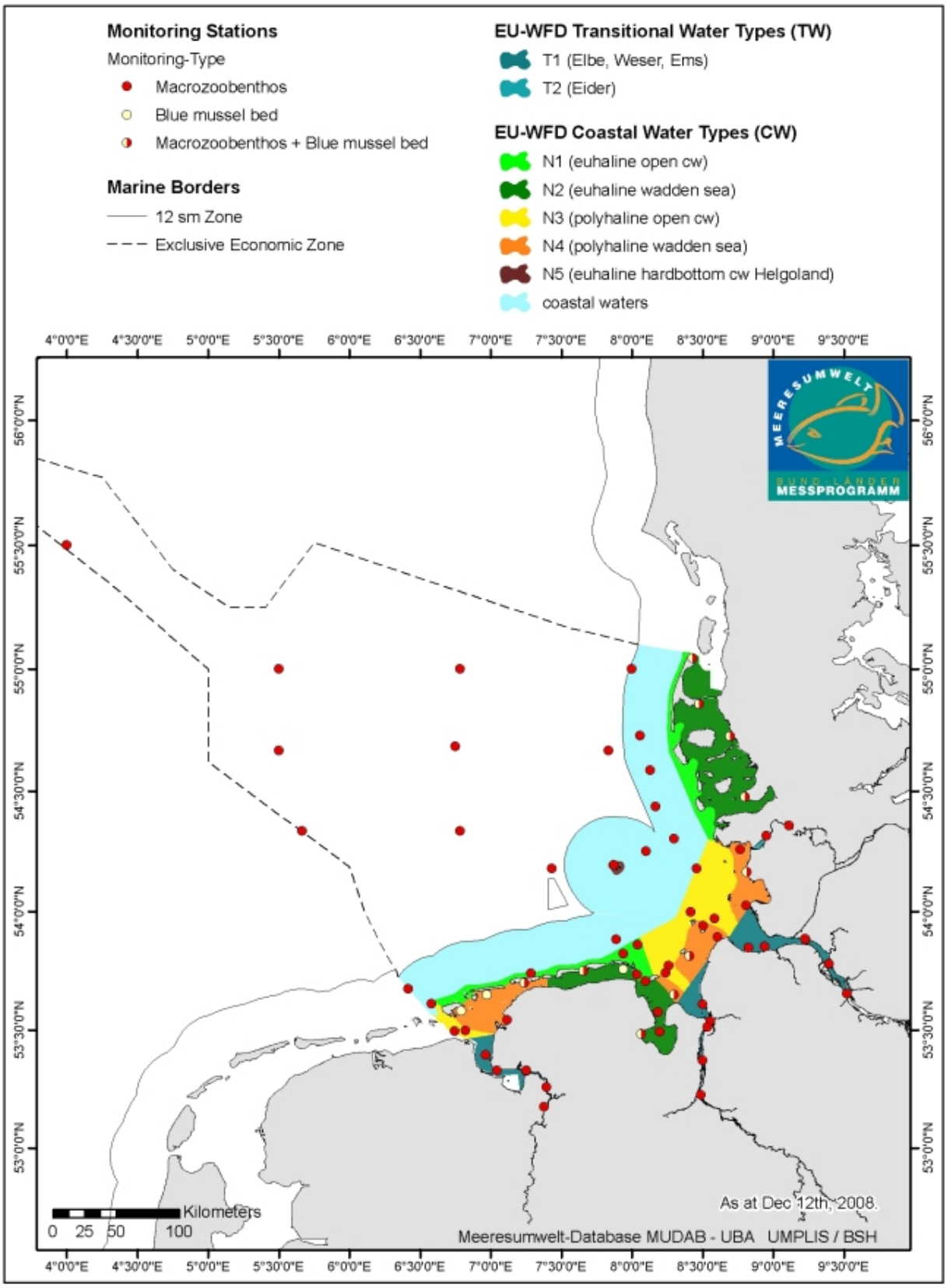

Figure 1: Network for the monitoring of macrozoobenthos in the North Sea: It is still necessary for a representative network of stations to be specified. Proposals have been made for testing stations in the coastal and transitional waters of the Länder and are currently being trialled in the field. They are to be aligned more closely in terms of their intensity and orientation.

Figure 1 as PDF-document

Coastal waters and transitional waters

In Lower Saxony, a selection of stations in the sublittoral and eulittoral zones of coastal and transitional waters is sampled periodically for the assessment of macrozoobenthos. The different sediments and water depths have been taken into consideration at the sites in question. Overall, macrozoobenthos are sampled once a year in the coastal waters of Schleswig-Holstein at six sublittoral stations and twice a year at six stations in the Wadden Sea (eulittoral zone).

In addition to this, blue mussels are monitored in both areas in the context of shellfish management (see below).

In transitional waters, there is provision for one transect in each salinity zone with sublittoral and eulittoral stations, in addition to which the annual BfG stations are used (estuary monitoring).

High Sea/EEZ - IOW on behalf of BSH

The monitoring network for the EEZin the North Sea encompasses 12 stations, which are sampled by IOW each year in spring and autumn. As many benthic communities as possible and various sediment properties and depth levels have been taken into consideration.

Shellfish banks

Alongside the point monitoring activities at the stations of the monitoring network described above, area-wide investigations also have to be carried out to survey eulittoral shellfish banks. Until now, not enough has been known about the locations and sizes of sublittoral shellfish banks for them to be incorporated into the monitoring.

Comments

Macrozoobenthos constitute a significant formative and characteristic element of various habitat types. For this reason, the sampling and, in some cases, areal surveying of the most important habitats of each habitat type or water are necessary in order to assess the status of the habitat types, conservation areas and water quality. In individual cases, it is necessary to decide which habitats/ecotopes best characterise the status of the waters for assessment purposes.

Baltic Sea

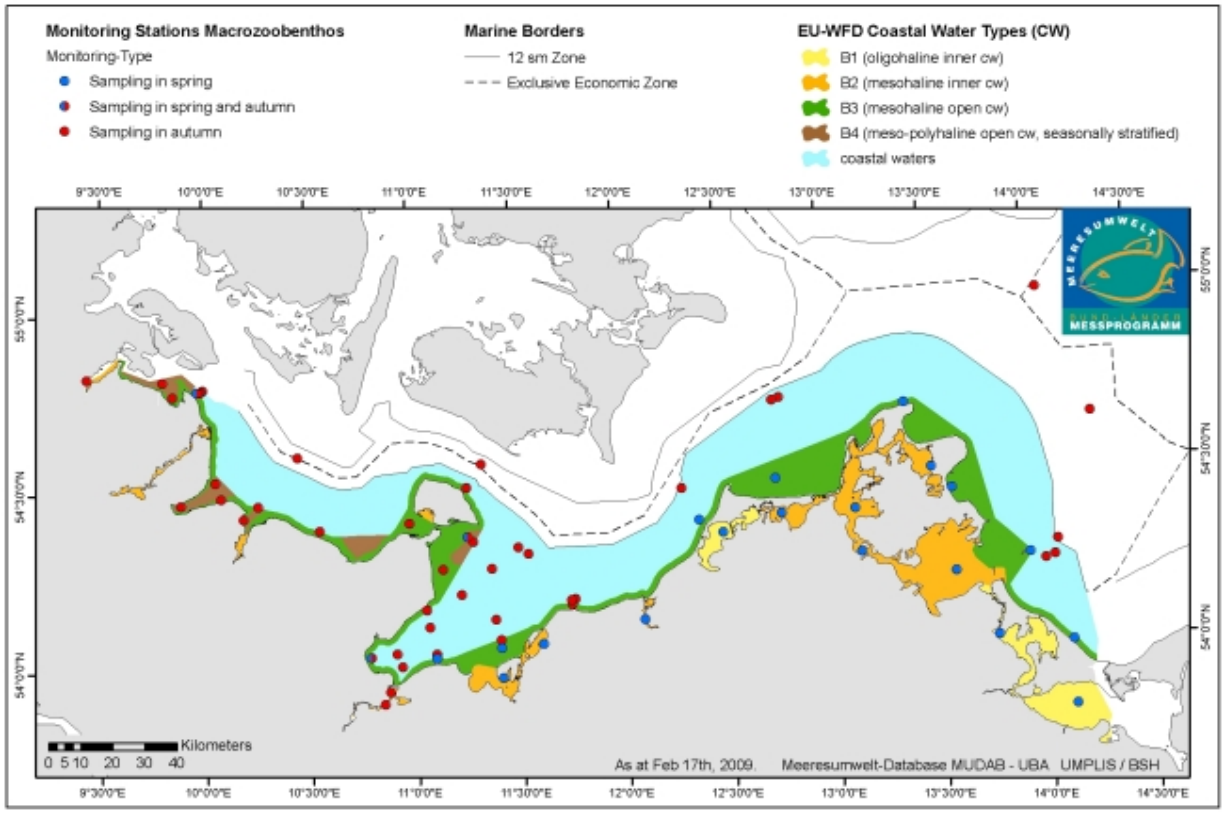

Figure 2: Network for the monitoring of macrozoobenthos in the Baltic Sea

Figure 2 als PDF-document

Coastal waters and transitional waters

The shallow water areas (<15 m water depth) on the Schleswig-Holstein Baltic Sea coast are sampled once a year in spring at 14 stations for the monitoring of soft seabeds. Areas of deep-water mud (>15 m) are examined in autumn at 18 stations on account of seasonal oxygen deficiencies. Phytal fauna are surveyed together with the macrophyte investigations at eight transects in the summer.

On the Mecklenburg-Vorpommern Baltic Sea coast, the representative monitoring network for the investigation of soft seabed fauna is made up of 19 stations in shallow water areas (<15 m water depth), which are sampled once a year in spring, and 12 stations in areas of deep-water mud (>15 m water depth), which are sampled once a year in autumn. Phytal fauna are investigated together with the macrophyte investigations in summer at approx. ten stations.

High sea/EEZ - IOW on behalf of BSH

The monitoring network for the EEZ in the Baltic Sea is made up of eight stations, which are sampled by IOW once a year in autumn. Traditionally, the stations selected are the HELCOM stations, which have been investigated periodically since the early 1980s. The single exception is Station 18, which lies off the coast in 20 m water depth, but is located in the territorial waters of Mecklenburg-Vorpommern. Since long monitoring series are also available for this station, and this section of the coast is indicative for oxygen deficiency and incoming currents from the Kiel Bight, it has also been incorporated into the routine operation of the monitoring network.

3.2 Monitoring activities

North Sea

Macrozoobenthos - North Sea - Not including Shellfish Banks - Eulittoral

Methods:

Sediment samples are taken using box corers and piston corers. In addition to this, visual surveys involving measurements (e.g. surveying of coordinates for the delimitation of a community) or counts (e.g. organisms of one species/unit of area that can be easily identified macroscopically) are carried out.

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Number of samples

Piston/box corers: five to ten parallels

Laboratory methods

Determination of species composition, abundance and biomass: ignition loss or wet mass (see comments on biomass in the section on shellfish banks). The size classes for molluscs and echinoderms are to be determined separately.

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Frequency:

Under the WFD, provision has been made for benthic invertebrate animals to be monitored with a minimum frequency of three years. This minimum frequency is set for waters with low natural variability and negligible disturbing factors. However, the inner and outer waters in the German marine areas exhibit high degrees of natural variability and dynamism. The monitoring network is therefore to be designed in such a way that it takes account of this temporal and spatial variability.

More frequent sampling, at least at some of the network of stations, is therefore imperative if compliance with the reporting duties is to be possible. For instance, evaluation of the monitoring programmes that have been in operation to date shows that, in some cases, annual sampling with samples being taken at various times of year is to be recommended for the purposes of trend analysis.

It is believed that, in this case - i.e., in combination with the data from the network of permanent monitoring units -, it would be sufficient to carry out sampling every six years at the other stations, which are required to survey the spatial variability of macrozoobenthos (areal monitoring units).

The times when samples are taken are to be coordinated depending on the type of water and the issue being addressed. In the North Sea, the monitoring of macrozoobenthos should be carried out in summer as a rule (see also *SOP: Macrozoobenthos*, section 9).

The definitive specifications concerning the frequency of monitoring will depend, among other things, on the assessment schemes for the Habitats Directive that are currently being developed. Furthermore, the MSFD requires evidence about annual and seasonal variability (Annex III, Table 1).

Macrozoobenthos - North Sea - Shellfish Banks

Methods:

Distribution in the eulittoral zone:

The location and extent of the populations on blue mussel banks are determined on the basis of medium-scale aerial images and, to a certain extent, GPS-supported inspections on foot.

Distribution in the sublittoral zone:

In combination with video recordings, grab samples and diving operations, acoustic remote sensing may offer options when the sublittoral distribution of shellfish banks, seagrass meadows, reefs and sandbanks are surveyed. Limits are set on the deployment of optical remote sensing by the high degree of turbidity in the Wadden Sea. Results concerning the deployment of acoustic remote sensing are expected in early 2010 at the latest (research project conducted by the Senckenberg Institute Wilhelmshaven).

Status:

The blue mussel is a typical habitat-forming species in the Wadden Sea. They also have to be monitored in the context of the monitoring of biogenic reefs (1170, sublittoral zone) and vegetation-free mudflats, sandflats and flats of mixed substrate (1140, eulittoral zone) (see also: Monitoring Manual, HD Habitat Type: Reefs).

The quality of blue mussel banks is determined by investigating selected shellfish banks and taking samples in the field. The quality of a blue mussel bank is judged using the following population-biology parameters:

- Areal extent of the bank
- Coverage (percentage of the total area of a shellfish bank occupied by shellfish beds)
- Stocking density (percentage of the shellfish beds occupied by shellfish)
- Biomass (living weight)
- Abundance
- Length-frequency distribution (age structure)

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9.1.2.7.

Accompanying fauna and flora

In Lower Saxony and Schleswig-Holstein, samples of the accompanying fauna on the shellfish banks are taken at selected stations. These activities still remain to be incorporated into the WFD and Habitats Directive assessments.

General remarks on biomass as a parameter:

The WFD does not require the determination of biomass. However, changes in biomass give the first indications of changes in eutrophication processes. OSPAR, TMAP, HELCOM and their monitoring programmes are directly focussed on the surveying of eutrophication processes.

Apart from this, the determination of biomass can be used for the purposes of compliance with the MSFD, the conventions on the protection of the seas and the Habitats Directive, which constitute the grounds on which it is undertaken. The expense involved in determining biomass is relatively insignificant compared to the costs for the whole sample.

Frequency:

General:

Shellfish banks should be monitored at least once a year in spring

Distribution:

Annual monitoring. The occurrence, distribution, extent and quality of shellfish banks are subject to major annual fluctuations. If it is to be possible to compare and assess them between years and within the banks, surveys are required at least annually. Furthermore, formation is also dependant on local weather conditions (e.g. storm events).

Status:

Once or twice a year

Individual shellfish banks are sampled monthly in order to obtain higher levels of temporal resolution with regard to their development over the course of the year.

Macrozoobenthos - North Sea - Sublittoral

Methods:

- 0.1-m² van Veen grab; 30 - 80 kg, 0.2-m² van Veen grab; potentially Reineck box corer and other methods
- Frame dredge: 1-m width, 0.5 - 1-cm mesh
- Sieve: 0.5 - 1-mm mesh (sometimes 250 µm in transitional waters)
- In future, greater use should be made of sonar systems/video techniques for supporting purposes

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Number of samples

Grab: at least five parallels

Dredging: at least one tow

Laboratory methods

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Frequency:

Under the WFD, provision has been made for benthic invertebrate animals to be monitored with a minimum frequency of three years. This minimum frequency is set for waters with low natural variability and negligible disturbing factors. However, the inner and outer waters in the German marine areas exhibit high degrees of natural variability and dynamism. The monitoring network is therefore to be designed in such a way that it takes account of this temporal and spatial variability.

More frequent sampling, at least at some of the network of stations, is therefore imperative if compliance with the reporting duties is to be possible. For instance, evaluation of the monitoring programmes that have been in operation to date shows that, in some cases, annual sampling with samples being taken at various times of year is to be recommended for the purposes of trend analysis.

It is believed that, in this case - i.e., in combination with the data from the network of permanent monitoring units -, it would be sufficient to carry out sampling every six years at the other stations, which are required to survey the spatial variability of macrozoobenthos (areal monitoring units).

The times when samples are taken are to be coordinated depending on the type of water and the issue being addressed.

The definitive specifications concerning the frequency of monitoring will depend, among other things, on the assessment schemes that are currently being developed for the Habitats Directive. The MSFD demands evidence about annual and seasonal variability (Annex III, Table 1).

In the North Sea, the monitoring of macrozoobenthos should as a rule be carried out in summer/autumn (see *SOP: Macrozoobenthos*, section 9.)

Baltic Sea

Macrozoobenthos - Baltic Sea

Methods:

A detailed description of the methods for macrozoobenthos investigations in marine sediments (soft seabed) will be found in the sample standard operating procedure for BLMP laboratories: *SOP: Macrozoobenthos* (section 9).

Methods of sampling

- 0.1-m² van Veen grab; 30 - 80 kg, 0.2-m² van Veen grab;
- Frame dredge
- Hard seabeds: frame
- Sieve: 1-mm mesh
- Frame with net bag (250 µm) for phytal fauna (MarBIT)
- In future, greater use should be made of sonar systems for supporting purposes
- Divers
- Video

Number of samples

Frame: ten to 20 parallels

Grab: three to five parallels (HELCOM: three parallels)

Dredging: at least one tow

Laboratory methods

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Additional parameters:

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Frequency:

Under the WFD, provision has been made for benthic invertebrate animals to be monitored with a minimum frequency of three years. This minimum frequency is set for waters with low natural variability and negligible disturbing factors. However, the inner and outer waters in the German marine areas exhibit high degrees of natural variability and dynamism. The monitoring network is therefore to be designed in such a way that it takes account of this temporal and spatial variability. More frequent sampling, at least at some of the network of stations, is therefore imperative if compliance with the reporting duties is to be possible. For instance, evaluation of the monitoring programmes that have been in operation to date shows that, in some cases, annual sampling with samples being taken at various times of year is to be recommended for the purposes of trend analysis. This is also required by the assessment systems that are in use.

It is believed that, in this case - i.e., in combination with the data from the network of permanent monitoring units -, it would be sufficient to carry out sampling every six years at the other stations, which are required to survey the spatial variability of macrozoobenthos (areal monitoring units).

The times when samples are taken are to be coordinated depending on the type of water and the issue being addressed. E.g. it is recommended that samples be taken from shallow water in the Baltic Sea in early spring (after the thaw), but from deep, oxygen-deficient areas in autumn. The definitive specifications concerning the frequency of monitoring will depend, among other things, on the assessment schemes that are currently being developed for the Habitats Directive. The MSFD demands evidence about annual and seasonal variability (Annex III, Table 1).

The HELCOM standards also require annual sampling, which is carried out in autumn in the coastal waters and EEZs of both Länder.

The assessment for the WFD is carried out in accordance with the MarBIT assessment procedure:

- Hard seabed and phytal: June-July
- Soft seabed: March-April; but autumn in deep, oxygen-deficient areas.

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

Macrozoobenthos

Guideline:

Various directives

Comments:

At present, the assessment procedures are furthest advanced for the WFD, and some may also be suitable for application under the Habitats Directive. In consequence, procedures intended for the WFD predominate in this section. Their suitability for an HD assessment is to be examined by looking at practical examples. The possibility of their use for the MSFD also still needs to be clarified on the basis of the relevant requirements.

North Sea

Title

Multimetric AZTI Marine Biotic Index (M-AMBI)

Authors

Borja et al. (2000), Muxika et al. (2007)

Metrics: Ambi index, number of species, diversity (Shannon)

Guideline:

WFD

Stretch of Water:

Coastal waters

Comments:

The M-Ambi was developed for estuaries and coastal areas by Borja et al. (2000) on the basis of the work of Grall and Glemarec, 1997. The index assesses alterations in the spectrum of species within five ecologically based groups (sensitivity to organic enrichment). In this respect, a change in the values may be characterised by, e.g., an increase in opportunistic species compared to the background level (AMBI). In addition to this, the number of species and Shannon-Wiener diversity are used as metrics. Given the combination of individual values and the incorporation of specific background levels, only EQRs will be given here.

The assessment is based on the following internationally coordinated class boundaries (only the classes high/good and good/moderate are intercalibrated).

Ecological status	High	Good	Moderate	Poor	Bad
M-Ambi	>0,85	<0,85-0,7	<0,7-0,4	<0,4-0,2	<0,2

The method was modified after the first field tests (adaptation of class boundaries as set out above in accordance with Heyer, 2007). A first assessment was carried out with up-to-date data from the monitoring of coastal waters between 2006 and 2009 (Heyer, 2008, Grotjahn et al., 2008, Heyer, 2009).

Detection of pressures:

After various tests in the course of intercalibration, organic enrichment and hazardous substances were designated as the essential pressures the M-Ambi is intended to detect. Its validity is still controversial, even following test runs in the field, since it was possible to identify a clear dependence on sediment type. Eutrophication is not inevitably coupled with organic enrichment in sediment. It is necessary to wait for more experience of this assessment method to be gained in the field.

It is felt further development and trialling are needed to improve the derivation of background values (local background levels, species numbers) and the selection of particularly suitable stations (sediments). The application of station assessments to water bodies is also under discussion. Alternatively, the Dutch BEQI (Van Hoey et al., 2008) and MarBIT (Meyer et al., 2007) systems are currently being trialled. Both procedures still remain to be adapted or further developed for the North Sea.

Heligoland

The MarBIT procedure is being tested and applied to *Laminaria* rhizoid fauna on wave cut platforms and fauna in the Tiefe Rinne. The procedure is currently being optimised.

Shellfish banks (see section on shellfish banks)

The MarBIT procedure is being tested and applied to eulittoral shellfish banks. The procedure is currently being optimised.

North Sea

Title

Estuary Typology Procedure (AETV)

Authors

Krieg (2005)

Metrics: Estuary Typology Index (AeTI), number of species, abundance

Guideline:

WFD

Stretch of Water:

Transitional waters

Comments:

An assessment procedure for the Elbe (AETV) has been developed by Krieg. The Estuary Typology Index (AeTI) used for this purpose represents an adaptation of the Potamon Typology Index (PTI) to the conditions in transitional waters and, apart from species composition and abundance, assesses above all the presence of species that are closely autoecologically associated with the estuary (type-specific species).

The assessment is based on the following class boundaries (which have not yet been intercalibrated):

Ecological status	**High**	**Good**	**Moderate**	**Poor**	**Bad**
AETV	>0,92	0,92-0,8	0,8-0,55	0,55-0,27	<0,27

Apart from the Elbe, the approach has also been tested on the transitional waters in the Ems, Eider and Weser (Krieg 2008), and used for the initial WFD assessment in the Elbe, the lower Ems and the Lower Weser. Assessment with the M-Ambi system is preferred in the outer transitional waters, i.e. the mesohaline and polyhaline zones, of the Weser and the Ems on account of their extensive habitat structures. Alternatively, BEQI (Van Hoey et al., 2008) and M-Ambi are being tested in transitional waters. A hierarchical approach based on the procedures developed in the Netherlands and Belgium (after Escaravage et al. 2004) is being examined in the Weser and Ems; apart from this, other parameters for the assessment of fauna at community level are currently being trialled.

Detection of pressures:

The loss of type-specific species is detected, other functional relationships still need to be field tested and specified.

Habitats Directive:

Thus far, the assessments have been carried out in conformity with the standards set out in the WFD. Work is still ongoing on the incorporation of the HD requirements into the system.

Baltic Sea

Title

Marine Biotic Index Tool (MarBIT)

Authors

Meyer et al., 2007

Metrics: MarBIT index = Median of species diversity, abundance, disturbance-sensitive taxa, tolerant taxa

Guideline:

WFD

Comments:

MarBIT (Marine Biotic Index Tool) was developed by Meyer et al. (2005, 2007) for the ecological assessment of coastal water bodies in the Baltic Sea. It is WFD-compliant, has a five-level assessment scale, includes type-specific background conditions (species lists for each habitat) and is applicable in all occurring habitats (soft seabed, hard seabed, phytal). The approach works with the parameters prescribed by the WFD: species diversity, abundance, disturbance-sensitive taxa and tolerant taxa. Each of these parameters is assessed with its own independent index. Each individual index generates a value that is scaled to the interval between 0 and 1. The MarBITindex calculated from these values is given as a median of the individual values.

The assessment is based on class boundaries that have not hitherto been coordinated. There are plans for them to be coordinated during the second round of intercalibration carried out by the Baltic GIG.

Ecological status	**High**	**Good**	**Moderate**	**Poor**	**Bad**
MarBIT	0,8-1	0,6-0,8	0,4-0,6	0,2-0,4	0-0,2

Pressures/vulnerabilities that may be detected:

Secondary eutrophication effects (oxygen deficiency, silting), organic contamination (sewage works), morphological changes (shipping channels, obstructions) (it is still unclear whether MarBIT responds sensitively to inputs of hazardous substances).

The current data basis is still not sufficient in order to be able to make precise statements about the detection of different types of pressure.

The results of field trials in Schleswig-Holstein and Mecklenburg-Vorpommern produced plausible assessment results.

It is felt further development is needed with regard to the selection of particularly suitable stations and the application of the assessment results to the whole water body (sampling of suitable habitats, areal extent, uncolonised areas).

Baltic Sea

Title

Benthic Quality Index (BQI)

Authors

Rosenberg et al. (2004)

Guideline:

MSFD

Stretch of Water:

EEZ

Comments:

In view of the steep natural salinity gradients from the west (>25 psu) to the east (<5 psu) of the Baltic Sea, it has been possible to show that unmodified indices (e.g. Shannon, BQI, AMBI) cannot be applied (Zettler et al., 2007). Apart from this, it has been shown that the size of the samples can have a decisive influence on the calculations (Fleischer et al., 2007). With the aid of a macrozoobenthos database administered by the Leibniz Institute of Marine Sciences (GEOMAR) in Kiel and the Leibniz Institute for Baltic Sea Research Warnemünde (IOW), which is both spatially and temporally comprehensive, it has been possible to adapt the Swedish BQI index to the specific conditions in the Baltic Sea (Fleischer and Zettler, 2009). The index used has been modified in such a way that the scope of sampling has no influence on the calculations for the most part. Apart from this, the sensitivity/tolerance of the most relevant representatives of macrozoobenthos (125 taxa) were calculated in dependence on two depth levels (below and above 20 m) and for five salinity levels. The abundance, the number of species and the sensitivity/tolerance of the species are incorporated into the calculations. These lists have been made available so that anyone in the Baltic Sea catchment area can carry out calculations with the relevant values and characterise their EcoQ elements.

5 Quality assurance

- NMBAQC
- Quality Assurance Panel (at the UBA (workshops, intercalibration exercises, first draft of a species list, standardisation with DIN, CEN and ISO, support for the establishment of QM systems, drafting of sample SOPs, performance of audits))

Comments

The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the BLMP. Each of the monitoring institutions bears responsibility for establishing and administering its own DIN EN ISO/IEC 17025 quality management systems. The institutions involved in the BLMP coordinate their activities within the framework of the Working Group on Quality Assurance and its sub-working groups, as well as the Ad Hoc Working Group on Benthos and Benthic Habitats.

5.1 Monitoring institutions

- IOW
- LLUR
- BSH
- NLWKN
- NLPV NI
- AWI

5.2 Guidance documents

- BLMP Quality Assurance Panel at the UBA, 2008: *Muster-Qualitätsmanagementhandbuch für Laboratorien des Bund/Länder-Messprogramms nach DIN EN ISO/IEC 17025 (BLMP Sample Quality Management Manual)*; Version: 01 of 1 February 2008; Federal Environment Agency.
- BLMP Quality Assurance Panel at the UBA, 2009: *Prüfverfahren-SOP: Makrozoobenthos-Untersuchungen in marinen Sedimenten (Weichboden), (P-SOP-BLMP-MZB_v01) (Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed))*; Federal Environment Agency (Version: 01 of 15 October 2009 in the Members' Area).
- HELCOM, *COMBINE Manual*, 'Annex C-8: Soft bottom macrozoobenthos.'
- JAMP, 2004: *Guidelines on quality assurance for biological monitoring in the OSPAR area.*; ICES Techniques in Marine Environment Sciences; 32; 2004.
- JAMP, ASMO, 1997: *Eutrophication monitoring guidelines - benthos*: 'Technical Annex 1: Hard bottom macrophytobenthos, soft-bottom macrophytobenthos and hard-bottom macrozoobenthos'.
- JAMP, ASMO, 1997: *eutrophication monitoring guidelines - benthos*: 'Technical Annex 2: Soft-bottom macrozoobenthos'

5.3 Standards

- DIN EN ISO/IEC 17025, 2005: General requirements for the competence of testing and calibration laboratories.
- DIN EN 14996, 2006: Water quality - Guidance on assuring the quality of biological and ecological assessments in the aquatic environment.
- DIN EN 15196, 2006: Water quality - Guidance on sampling and processing of the pupal exuviae of Chironomidae (Order Diptera) for ecological assessment.
- DIN EN ISO 16665: Water quality - Guidance for quantitative sampling and sample processing of marine soft-bottom macrofauna.
- DIN EN ISO 19493, 2007: Water quality - Guidance on marine biological surveys of hard-substrate communities.

5.4 Current status

A BLMP Study Group decision (2006) obliged the BLMP laboratories to establish DIN EN ISO/IEC 17025 quality management systems. For this purpose, a *Sample Quality Management Manual* was drawn up in 2006/2007 by the Quality Assurance Panel in cooperation with the Quality Assurance Sub-Working Group on Quality Management. This manual has been available for subscription from the Quality Assurance Panel at the UBA since mid-2008 and is to be used as the basis for internal QM documentation at laboratories. The manual is designed as a loose-leaf collection, so that regular updates can be added as required. The intention is for it to be gradually supplemented with sample SOPs coordinated within the BLMP. As far as macrozoobenthos is concerned, *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, Version 01 of 15 October 2009 is available. The testing procedure SOPs on diving and video investigations, and the amended *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)* for transitional waters are currently in preparation.

Intercalibration exercises

- UBA/BLMP-RV 2004: Determination of Selected Macrozoobenthos Species in a 'Near-Natural' Macrozoobenthos Sample from the Western Baltic Sea (number of participating laboratories: 16, report: November 2004)
- NMBAQC/BEQUALM: Ring Test Exercise 23 (number of participating laboratories: 15, report: 2004)
- NMBAQC/BEQUALM: Macrobenthos Exercise 11 (number of participating laboratories: 10, report: 2004)
- NMBAQC/BEQUALM: Ring Test Exercise 22 (number of participating laboratories: 13, report: 2003)
- UBA/BLMP-RV: Identification of Selected Macrozoobenthos Species from the North Sea and Baltic Sea (number of participating laboratories: 13, report: October 2001, corrected version: May 2002)
- UBA/BLMP-RV: Identification of 25 Selected Macrozoobenthos Species (number of participating laboratories: 11, report: January 2000)
- Intercalibration Exercise on Sampling Methods for Macrobenthos, ICES Benthos Methods WG (number of participating laboratories: 6, report: January 1985)

Workshops

- UBA/BLMP-WS: Mollusca, Polychaeta, Oligochaeta (2004)
- HELCOM/BEQUALM: Benthos Taxonomic Workshop (2000)
- UBA/BLMP-WS: Polychaeta (1998)
- UBA/BLMP-WS: Amphipoda (1998)
- ICES/HELCOM: Benthos Taxonomic Workshop (1997)
- ICES/HELCOM: Workshop on Quality Assurance of Benthic Measurements in the Baltic Sea (1996)
- ICES/HELCOM: Workshop on Quality Assurance of Benthic Measurements in the Baltic Sea (1994)

6 Literature

- Borja A., Franco, J. and V. Pérez, 2000: 'A marine biotic index to establish the ecological quality of soft-bottom benthos within European estuarine and coastal environments'; *Mar. Poll. Bull.*; 40 (12): pp. 1100 - 1114.
- Fleischer, D. and M. L. Zettler, 2009: 'An adjustment of Benthic ecological quality assessment to effects of salinity'; *Mar. Poll. Bull.*; 58 (2009): pp. 351 - 357.
- Fleischer, D., Grémare, A., Labrune, C., Rumohr, H., Vanden Berghe, E. and M.L. Zettler, 2007: 'Performance comparison of two biotic indices measuring the ecological status of water bodies in the southern Baltic and Gulf of Lions'; *Mar. Poll. Bull.*; 54 (2007): pp. 1598 - 1606.
- Grall J. and M. Glémarec, 1997: 'Using biotic indices to estimate macrobenthic community pertubations in the Bay of Brest'; *Estuarine, Coastal and Shelf Science*; 44 (Suppl. A): pp. 43-53; Science for Management in Coastal and Estuarine Waters: Proceedings of the 25th Annual Symposium of the ECSA: Part 3, Dublin, 11 - 16 September 1995.
- Grotjahn, M., Petri, G., Fischer, U. and W. Heiber, 2008: *EG WRRL - Praxistest Makrozoobenthos - Erprobung und Optimierung der Probennahmemethoden und der Bewertungsverfahren für Makrozoobenthos in den niedersächsischen Übergangs- und Küstengewässern*; Berichte des NLWKN; 82 pp. and 112 pp.
- Heyer, K., 2007: *Intercalibration Report (NEA GIG): Assessment of German Coastal Waters (NEA1/26, NEA3/4) by Benthic Invertebrates*; commissioned by NLWKN; 13 pp.
- Heyer, K., 2009: 'Bestimmung von deutschen Referenzwerten für das "MAMBI-Bewertungsverfahren" und Neuberechnung der Daten des NLWKN Praxistests sowie der Hamburger und Schleswig-Holsteiner Monitoringstationen'; unpublished report for NLWKN; 52 pp.
- Meyer, T., Berg, T. and K. Fürhaupter, 2007: 'Ostsee-Makrozoobenthos Klassifizierungssystem für die Wasserrahmenrichtlinie'; unpublished final report on MariLim commissioned by the University of Rostock; 129 pp.
- Meyer, T., Reincke, T., Fürhaupter, K. and S. Krause, 2005: *Ostsee-Makrozoobenthos-Klassifizierungssystem für die Wasserrahmenrichtlinie*; technical report on MARILIM for the Schleswig-Holstein State Agency for Nature and Environment; 73 pp.
- Muxika, I., Borja, A. and J. Bald, 2007: 'Using historical data, expert judgement and multivariate analysis in assessing reference conditions and benthic ecological status, according to the European Water Framework Directive'; *Mar. Poll. Bull.*; 55 (1-6): pp. 16 - 29.
- Van Hoey, G., Drent, J., Ysebaert, T. and P. Herman, 2007: *The Benthic Ecosystem Quality Index (BEQI), intercalibration and assessment of Dutch coastal and transitional waters for the Water Framework Directive*; NIOO Rapporten; 2007-02.
- Zettler, M.L., Schiedek, D. und B. Bobertz, 2007: 'Benthic biodiversity indices versus salinity gradient in the southern Baltic Sea'; *Mar. Poll. Bull.*; 55 (2007): pp. 258 - 270.

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

The strict deadlines set in the European Directives require very concrete, binding coordination processes between the Länder, the German Federation and the institutes that are implementing the programme. This work is undertaken within the Working Group on Surveying and Assessment and, for the present specifications, the Ad Hoc Working Group on Benthos and Benthic Habitats. Furthermore, recent scientific findings and the experience gained from the application of the procedures make the continued updating of the monitoring concept indispensable.

A review of the monitoring network and monitoring frequency at the regional level, adapted to take account of water conditions and reporting duties, is to be carried out. In particular, considerably more investigations will need to be carried out in future in the sublittoral zone of the North Sea, where there is still a need for development in order to lay the foundations for assessment activities (e.g. areal mapping methods using hydroacoustics). In the Baltic Sea, stations are to be specified in B1 and B2 water bodies.

WFD

North Sea

The monitoring network operated by the Länder has been reorganised and modified or expanded in order to cover characteristic communities and individual water bodies.

Baltic Sea

The monitoring network operated by the Länder has been reorganised and modified or expanded in order to cover characteristic communities and individual water bodies.

HD

The monitoring activities carried out to date may not satisfy the requirements imposed by the Habitats Directive. An appropriate monitoring concept must be developed in coordination with the monitoring for the purposes of the WFD.

The habitat types must be monitored inside and outside the marine HD areas (see conservation targets). The macrozoobenthos monitoring required in the various habitats is described in the monitoring specifications for the habitats in question. The definitive specifications for the monitoring concept will depend on the assessment schemes that are currently being developed for the Habitats Directive.

7.2 Working steps required

Monitoring

Drafting of a monitoring concept for the purposes of the Habitats Directive and harmonisation with the stations/methods used for the WFD. Exploitation of synergies and avoidance of duplicated work. In future, it will be necessary to carry out a similar harmonisation exercise in response to the requirements set out in the MSFD.

Some of the information given in these specifications on the following points will have to be formulated more precisely once the assessment procedures have been optimised:

- Location of the sampling
- Frequency
- Parameters
- Number of parallels
- Methods
- Coordination with macrophyte monitoring (phytal fauna)
- Extensive coordination with the monitoring for biological effects is expedient.
- The monitoring concept still needs to be harmonised with the monitoring in the North Sea EEZ implemented by BSH since 2008. IOW has been commissioned with the performance of this biological monitoring. Investigations are carried out at 12 stations in the Sea EEZ area, which are visited on two trips a year (spring and autumn) (in addition to this, they are also visited five times for the monitoring of zooplankton and phytoplankton). Whether this frequency, two dates a year, is maintained will depend primarily on the experience of sampling in 2008. The intention is for these arrangements to be coordinated once again after this date.

Quality assurance

The establishment of DIN EN ISO/IEC 17025 quality management systems under the BLMP should be concluded by 1 January 2012.

In this context, apart from the development of uniform quality standards (QM system), efforts should also be made to ensure that the participating institutions work largely in accordance with shared guidelines when the SOPs are being drafted. To this end, the current *Sample Quality Management Manual* is to be amended and the following SOPs for macrozoobenthos drawn up:

- *SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)* - amended version covering transitional waters, completion planned for the first six months of 2010
- *SOP: Macrozoobenthos Investigations by Means of Diving Investigations* - completion planned for the first six months of 2010
- *SOP: Macrozoobenthos Investigations by Means of Video Investigations* - completion planned for the second six months of 2010

The DIN EN ISO/IEC 17025 quality management system includes the following elements:

- documented validation/verification of the investigation methods deployed for the determination of performance characteristics,
- storage of reference and comparative collections,
- the qualification and regular training of personnel for the procedures deployed,
- the regular performance of internal and external audits,
- regular participation in national and international interlaboratory comparisons, intercalibration exercises, training courses and workshops, and their evaluation.

The laboratories must guarantee the prompt and complete communication of the investigation results to MUDAB on the basis of the MUDAB data formats, including the QA data that have been defined as a minimum, which meet international standards (ICES).

Further steps to be taken as of 2010:

- Provision of the uniform species list including synonyms via the QA information system and its periodic revision to reflect agreements reached concerning the (re)designation of taxa
- List of independent experts for cases where identification is problematic
- Alternating workshops on taxonomic questions, methodology (priority: grab and diving operations), evaluation procedures (to guarantee uniform minimum quality standards at all laboratories) and intercalibration exercises to ensure that, if possible, some form of external QA can be offered once a year (in this connection, of course, international workshops and intercalibration exercises that allow the UBA Quality Assurance Panel to hold events less frequently have to be taken into consideration). These activities are to be documented adequately and promptly.
- Continuation of the Environmental Research Plan project to draw up identification keys (Polychaeta, Chironomidae)
- Uniform data management system operated by all institutions involved

Since workshops and intercalibration exercises cannot be offered annually by the Quality Assurance Panel (Biology Section), regular interlaboratory comparison analyses should be organised bilaterally and independently between the laboratories, the results of which should be presented and discussed in the Working Group on Quality Assurance and the Ad Hoc Working Group on Benthos and Benthic Habitats. As a matter of principle, attention is to be paid to continuity among the staff involved in the processing of long-term monitoring series, as well as steps to ensure they are appropriately qualified.

Assessment

OSPAR

An appropriate monitoring concept, which includes macrozoobenthos, has been put forward for the assessment of the eutrophication status of the North Sea under the Common Procedure (see also Phytoplankton, Macrophytes and Zooplankton) (monitoring carried out by IOW in the North Sea).

WFD

Assessment systems have been developed and tested for both the North Sea and the Baltic Sea. The results obtained to date will be the subject of further discussions. There is therefore not only a need for continued coordination within the expert bodies responsible, but also for development work in order to highlight alternatives for this kind of assessment. The assessment activities that have been undertaken should be validated in the near future.

HD

Monitoring strategies for the Habitats Directive assessment have still not been drawn up and will have to be taken into consideration when macrozoobenthos is monitored in future.

MSFD

The profile of requirements and the responsibilities for implementation are being clarified at present. The MSFD will be incorporated into the monitoring concept and assessment methodology once this process has been concluded.

Further activities/issues

- The zoobenthos investigations carried out by other institutions (including BFAFi, vTI, Geomar and AWI) should be taken into consideration in planning and incorporated into the BLMP concept.
- The distribution of shellfish banks should be surveyed by means of side-scan sonar with appropriate investigations for the remote sensing of their areal distribution, the characteristics and structure of the substrate in the eulittoral and sublittoral zones, and the surveying of seagrass meadows and reefs.
- The calibration of methods for the determination of weight and a specification of the cases (taxa) to which each method is applicable (ignition loss, wet weight and dry weight) are needed urgently for quality assurance purposes.
- At present, only two type N3 water bodies can be sampled in the coastal waters off Schleswig-Holstein subject to ecological assessment because the methods for monitoring in the sublittoral zone of the Wadden Sea (tidal channels, Wadden Sea currents) are insufficiently reproducible. In consequence, there is a need for research to develop methods in this field.

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 Secretariat-General 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) Version: proposal of the Secretariat-General 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.

(4) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(5) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(6) 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.

(7) Baltic Sea Action Plan, HELCOM 2007

(8) The OSPAR Commission has set itself the objective of recording all species and habitats that need to be protected. This list is used by OSPAR to guide the setting of future priorities for its further work on conservation and the protection of marine biodiversity.
OSPAR is currently drawing up instructions for the monitoring of the species and habitats on the list.

(9) Species and habitats have been specified or described under OSPAR (MESH programme). At present, a monitoring strategy is being developed for this purpose. The intention is for it to take account of "ecological objectives" as well (see Environmental targets).

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

Monitoring-Kennblatt

Stand: 02.03.2010

Makrozoobenthos

MEERESUMWELT

BUND-LÄNDER MESSPROGRAMM

1 General

1.1 Subject area

Biological Monitoring - Fauna - Macrozoobenthos

1.2 Definition

For the purpose of these specifications, macrozoobenthos are defined as all invertebrate organisms that live on and in the seabed and are retained by a sieve with 1 mm mesh. Smaller sieve meshes are also used in estuaries and silt sediments.

1.3 Competent authority/ies

Federal Government:	UBA, BfN, BSH, BfG
Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLPV NI, NLWKN
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Benthos and Benthic Habitats

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Article 11 [2]

Comments

Under the Marine Strategy Framework Directive, it is necessary to draw up monitoring programmes that should encompass the variables listed in Article 8 (cf. also Annex III, Table 1 of the MSFD), including macrozoobenthos.

Article 8(1) and Article 11, Annex III, Table 1 [3]

Comments

The results of macrozoobenthos monitoring are required for the initial assessment of marine waters. These should encompass the following parameters:

- invertebrate fauna on the seabed
- species composition,
- biomass and
- annual/seasonal variability.

See MSFD Annex III, Table 1.

HD [4]

Article 11 [5]

Comments

Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Macrozoobenthos species that are characteristic of habitats are to be monitored in connection with the habitats in question. See the specifications for the following HD habitat types:

- Sandbanks (Natura 2000 Code 1110)
- Estuaries (Natura 2000 Code 1130)
- Mudflats and sandflats (Natura 2000 Code 1140)
- Coastal lagoons (Natura 2000 Code 1150)
- Large shallow inlets and bays (Natura 2000 Code 1160)
- Reefs (Natura 2000 Code 1170)

Monitoring frequencies are not prescribed. Nor is it possible to derive them unequivocally from the reporting cycles (every six years). More detailed information on this topic will be found in the assessment schemes that are currently being drawn up.

The "conservation status" of a natural habitat is defined by, among other things, the conservation status of the species that are characteristic of it.

WFD [6]

Article 8(1)

Comments

Under the WFD, benthic invertebrate fauna must be investigated as a quality element in transitional and coastal waters at least every three years in the context of surveillance monitoring (see Annex V, 1.3.3 and 1.3.4: monitoring of benthic invertebrate fauna in coastal and transitional waters).

In the context of operative monitoring, macrozoobenthos represent an important indicator.

HELCOM

Baltic Sea Action Plan [7]

Comments

A range of EcoQOs are described by HELCOM for all four segments of the Baltic Sea Action Plan, in which respect macrozoobenthos is to be surveyed for the eutrophication and biodiversity segments, in particular

COMBINE

Comments

The COMBINE Manual lists macrozoobenthos as a mandatory "core variable". The annual monitoring required is focussed on the "response of the different biological compartments" to eutrophication (see Combine Manual, Part C, Annex C-9). In this respect, the following are highlighted as eutrophication effects:

- Increased biomass
- Decline in species diversity
- Deterioration and loss of macrozoobenthos where there is oxygen deficiency.

OSPAR

JAMP (see Theme B: Biological diversity and ecosystems)

Comments

- Monitoring of the distribution of species and habitats.
- Assessment of the ecosystem status in order to determine the extent of anthropogenic degradation.

JAMP Common Procedure

Comments

Procedure for the determination of the eutrophication status of the OSPAR marine region.

When they occur, cases of macrozoobenthos mortality are to be surveyed as secondary eutrophication effects in problem areas and potential problem areas.

List of Threatened and/or Declining Species and Habitats [8]

Comments

Hitherto, the following species found in German waters have been included in the list:

- Arctica islandica (Linnæus, 1767),
- Nucella lapillus (Linnæus, 1758),
- Ostrea edulis (Linnæus, 1758).

Mapping European Seabed Habitats (MESH) [9]

Comments

Under OSPAR, species and habitats have been specified and described in the MESH programme. At the moment, a monitoring strategy is being developed for these species and habitats. It is also intended that "ecological objectives" should be taken into consideration (see 2.2, Environmental targets).

TMAP [10]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The monitoring programme for macrozoobenthos is based on the JAMP programme (i.e., see OSPAR).

Shellfish banks and Sabellaria reefs (Lower Saxony) are specified in the Stade Declaration as trilateral targets (see 2.2).

Technical necessity

Monitoring frequencies

Overview of the minimum requirements with regard to monitoring frequency for macrozoobenthos under the various directives and programmes. Usually, no binding statements are made with regard to the numbers of stations because they are dependent on the heterogeneity of the structures that are in place.

	WFD - surveillance	WFD - operative	HD	MSFD	OSPAR	HELCOM	TMAP
Frequency	At least every three years	At least annually	At least every six years	At least annually, seasonally	At least annually	At least annually	Every one to three years

2.2 Environmental targets

MSFD

Article 10(1) states: "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."

HD

The aim of this Directive shall be to contribute towards ensuring bio-diversity through the conservation of the natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies (Article 2(1)).

Macrozoobenthos are to be taken into consideration as an element in the monitoring of the conservation status of habitats (see list of habitat type specifications in 2.1).

WFD

The ecological status of the biological, chemical and hydromorphological parameters is measured against a defined reference condition. The aspiration is for all surface waters to have a "good" ecological status by 2015:

"The level of diversity and the abundance of invertebrate taxa is slightly outside the range associated with the type-specific conditions. Most of the sensitive taxa of the type-specific communities are present." (See WFD, Annex V, 1.2.3-1.2.4).

HELCOM

Ecological Quality Objectives

1. A healthy Baltic Sea environment with diverse biological components functioning in balance. The environment should have a good ecological status and support sustainable economic and social activities (HELCOM, 25/2004).

2. The Baltic Sea Action Plan [5] calls, among other things, for a Baltic Sea unaffected by eutrophication with natural distribution and occurrence of plants and animals (eutrophication segment). In the segment on biodiversity, the focus is on the near-natural functioning of ecosystems and habitats, in which respect macrozoobenthos communities play a particular role.

OSPAR

Eutrophication status according to OSPAR (Common Procedure)

The "general goal" is "to achieve by the year 2010 a healthy marine environment where eutrophication does not occur."

Ecological Quality Objectives

1. Nutrients and eutrophication effects: influence of eutrophication on changes in and loss of macrozoobenthos - macrozoobenthos should not die off as a result of oxygen deficiency caused by eutrophication and/or the occurrence of toxic algae.

2. Density of sensitive species

See also the revised list of EcoQOs (OSPAR Commission 2006, Annex 2) and Biological Effects (imposex in dog whelks (Nucella lapillus)).

TMAP

The intention is to survey the influence on macrozoobenthos exerted by changes in inputs of nutrients and pollutants, salinity and exposure. Changes in natural processes, species composition, abundances (dominance structures) and the biomass of macrozoobenthos must be observed over time for this purpose.

Another goal is to achieve favourable food availability (for higher trophic levels) (see TMAP-Manual, section 2, part 2).

Trilateral target: "an increased area of, and more natural distribution and development of natural shellfish beds, Sabellaria reefs and Zostera fields."

2.3 Threats

Suitability as indicators

Macrozoobenthos indicates indirect eutrophication effects at an early stage. In this respect, there are, firstly, changes in species composition. Secondly, among other things, oxygen deficiency caused by eutrophication can lead to the loss of macrozoobenthos.

Apart from this, macrozoobenthos are, among other things, indicators for the following impacts and changes:

- Effects of activities on the seabed, dredging works, dumping sites, built structures, trawl fishing
- Input of pollutants
- Changes in morphology and hydrography
- Changes in the climate

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The monitoring concept has been drawn up on the basis of the international obligations set out in section 2.1 and is furthest advanced for the WFD. As the work on the concept continues, it will be harmonised in detail with the activities required by the other directives. A detailed description of the procedures for each individual investigation will be found in the sample standard operating procedure for German Marine Monitoring Programme (BLMP) laboratories: SOP: Macrozoobenthos. The individual sections of these specifications make reference to the relevant SOPs.

North Sea

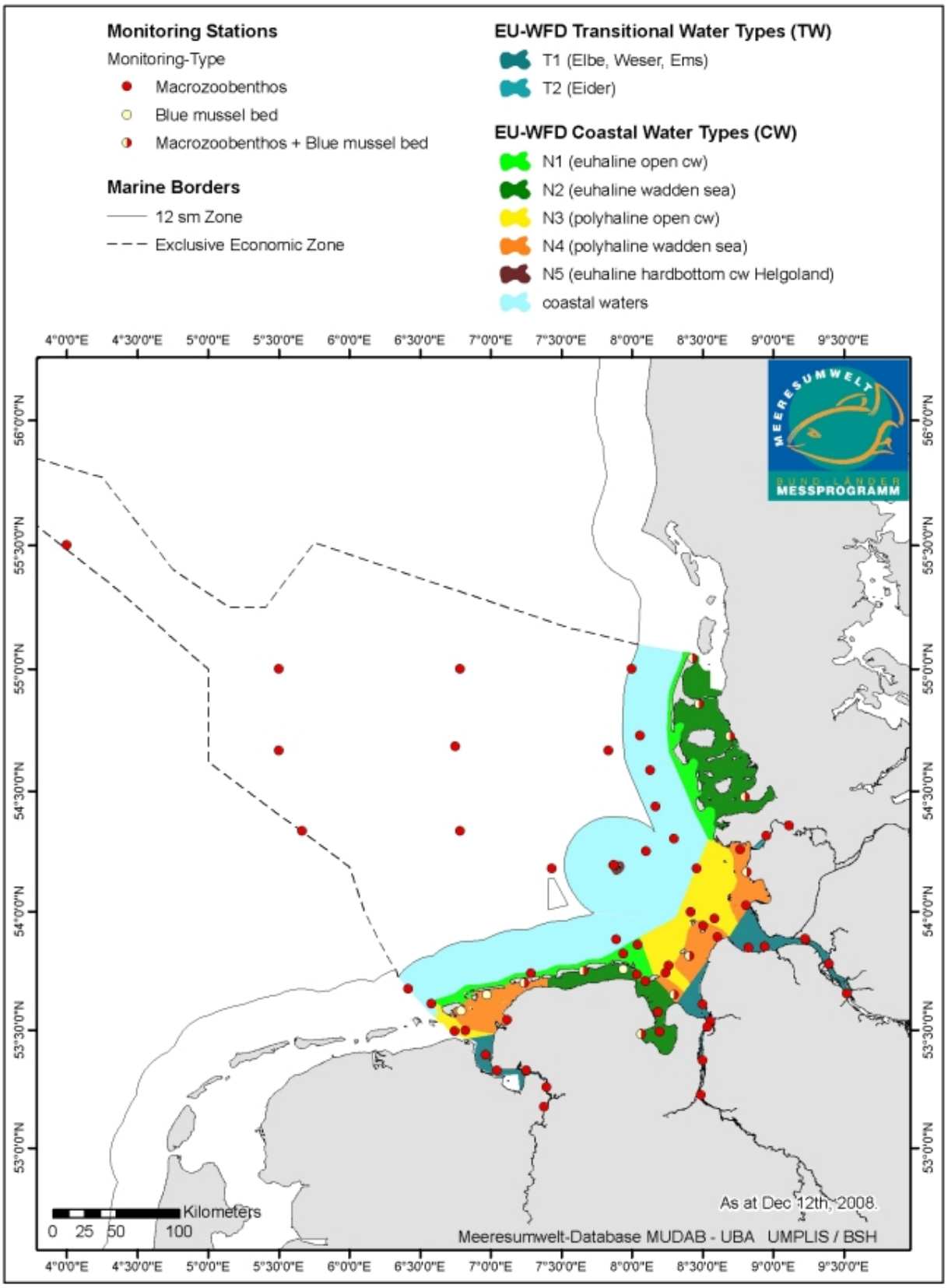

Figure 1: Network for the monitoring of macrozoobenthos in the North Sea: It is still necessary for a representative network of stations to be specified. Proposals have been made for testing stations in the coastal and transitional waters of the Länder and are currently being trialled in the field. They are to be aligned more closely in terms of their intensity and orientation.

Figure 1 as PDF-document

Coastal waters and transitional waters

In Lower Saxony, a selection of stations in the sublittoral and eulittoral zones of coastal and transitional waters is sampled periodically for the assessment of macrozoobenthos. The different sediments and water depths have been taken into consideration at the sites in question. Overall, macrozoobenthos are sampled once a year in the coastal waters of Schleswig-Holstein at six sublittoral stations and twice a year at six stations in the Wadden Sea (eulittoral zone).

In addition to this, blue mussels are monitored in both areas in the context of shellfish management (see below).

In transitional waters, there is provision for one transect in each salinity zone with sublittoral and eulittoral stations, in addition to which the annual BfG stations are used (estuary monitoring).

High Sea/EEZ - IOW on behalf of BSH

The monitoring network for the EEZin the North Sea encompasses 12 stations, which are sampled by IOW each year in spring and autumn. As many benthic communities as possible and various sediment properties and depth levels have been taken into consideration.

Shellfish banks

Alongside the point monitoring activities at the stations of the monitoring network described above, area-wide investigations also have to be carried out to survey eulittoral shellfish banks. Until now, not enough has been known about the locations and sizes of sublittoral shellfish banks for them to be incorporated into the monitoring.

Comments

Macrozoobenthos constitute a significant formative and characteristic element of various habitat types. For this reason, the sampling and, in some cases, areal surveying of the most important habitats of each habitat type or water are necessary in order to assess the status of the habitat types, conservation areas and water quality. In individual cases, it is necessary to decide which habitats/ecotopes best characterise the status of the waters for assessment purposes.

Baltic Sea

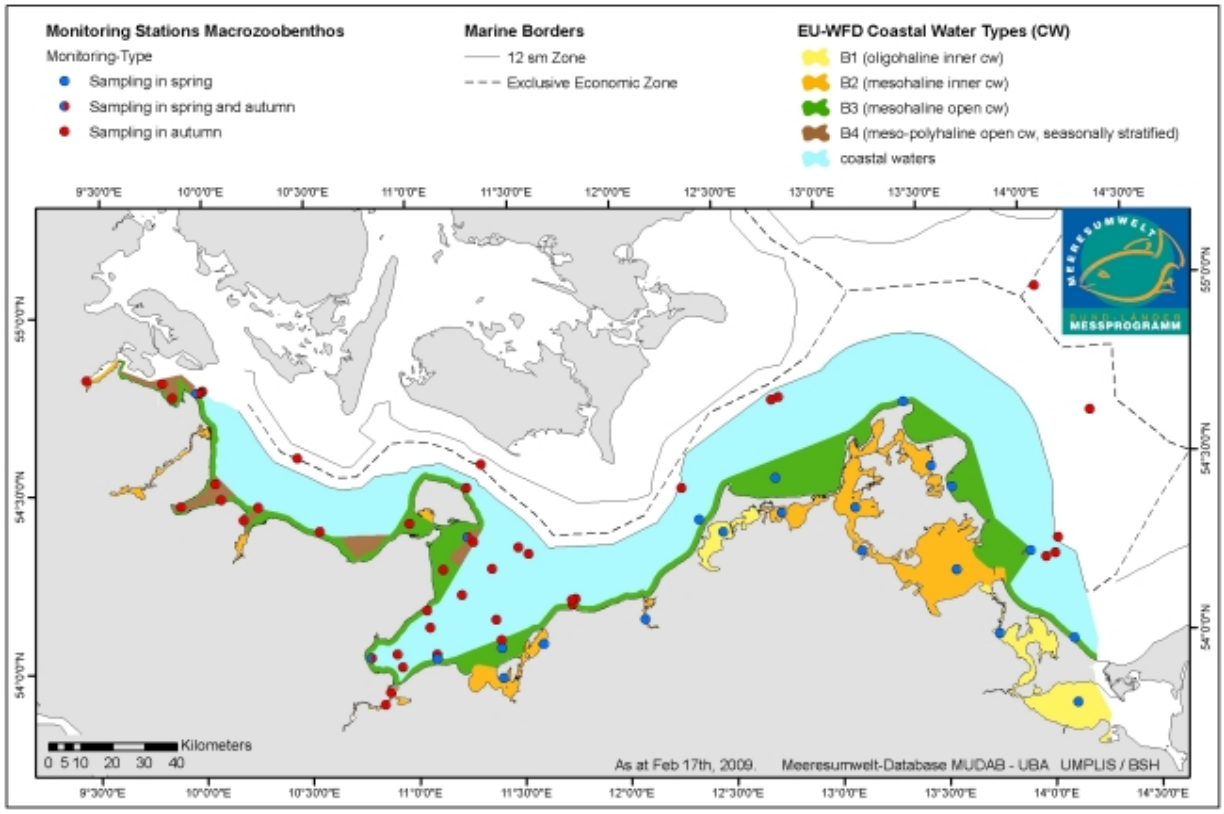

Figure 2: Network for the monitoring of macrozoobenthos in the Baltic Sea

Figure 2 als PDF-document

Coastal waters and transitional waters

The shallow water areas (<15 m water depth) on the Schleswig-Holstein Baltic Sea coast are sampled once a year in spring at 14 stations for the monitoring of soft seabeds. Areas of deep-water mud (>15 m) are examined in autumn at 18 stations on account of seasonal oxygen deficiencies. Phytal fauna are surveyed together with the macrophyte investigations at eight transects in the summer.

On the Mecklenburg-Vorpommern Baltic Sea coast, the representative monitoring network for the investigation of soft seabed fauna is made up of 19 stations in shallow water areas (<15 m water depth), which are sampled once a year in spring, and 12 stations in areas of deep-water mud (>15 m water depth), which are sampled once a year in autumn. Phytal fauna are investigated together with the macrophyte investigations in summer at approx. ten stations.

High sea/EEZ - IOW on behalf of BSH

The monitoring network for the EEZ in the Baltic Sea is made up of eight stations, which are sampled by IOW once a year in autumn. Traditionally, the stations selected are the HELCOM stations, which have been investigated periodically since the early 1980s. The single exception is Station 18, which lies off the coast in 20 m water depth, but is located in the territorial waters of Mecklenburg-Vorpommern. Since long monitoring series are also available for this station, and this section of the coast is indicative for oxygen deficiency and incoming currents from the Kiel Bight, it has also been incorporated into the routine operation of the monitoring network.

3.2 Monitoring activities

North Sea

Macrozoobenthos - North Sea - Not including Shellfish Banks - Eulittoral

Methods:

Sediment samples are taken using box corers and piston corers. In addition to this, visual surveys involving measurements (e.g. surveying of coordinates for the delimitation of a community) or counts (e.g. organisms of one species/unit of area that can be easily identified macroscopically) are carried out.

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Number of samples

Piston/box corers: five to ten parallels

Laboratory methods

Determination of species composition, abundance and biomass: ignition loss or wet mass (see comments on biomass in the section on shellfish banks). The size classes for molluscs and echinoderms are to be determined separately.

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Frequency:

Under the WFD, provision has been made for benthic invertebrate animals to be monitored with a minimum frequency of three years. This minimum frequency is set for waters with low natural variability and negligible disturbing factors. However, the inner and outer waters in the German marine areas exhibit high degrees of natural variability and dynamism. The monitoring network is therefore to be designed in such a way that it takes account of this temporal and spatial variability.

More frequent sampling, at least at some of the network of stations, is therefore imperative if compliance with the reporting duties is to be possible. For instance, evaluation of the monitoring programmes that have been in operation to date shows that, in some cases, annual sampling with samples being taken at various times of year is to be recommended for the purposes of trend analysis.

It is believed that, in this case - i.e., in combination with the data from the network of permanent monitoring units -, it would be sufficient to carry out sampling every six years at the other stations, which are required to survey the spatial variability of macrozoobenthos (areal monitoring units).

The times when samples are taken are to be coordinated depending on the type of water and the issue being addressed. In the North Sea, the monitoring of macrozoobenthos should be carried out in summer as a rule (see also *SOP: Macrozoobenthos*, section 9).

The definitive specifications concerning the frequency of monitoring will depend, among other things, on the assessment schemes for the Habitats Directive that are currently being developed. Furthermore, the MSFD requires evidence about annual and seasonal variability (Annex III, Table 1).

Macrozoobenthos - North Sea - Shellfish Banks

Methods:

Distribution in the eulittoral zone:

The location and extent of the populations on blue mussel banks are determined on the basis of medium-scale aerial images and, to a certain extent, GPS-supported inspections on foot.

Distribution in the sublittoral zone:

In combination with video recordings, grab samples and diving operations, acoustic remote sensing may offer options when the sublittoral distribution of shellfish banks, seagrass meadows, reefs and sandbanks are surveyed. Limits are set on the deployment of optical remote sensing by the high degree of turbidity in the Wadden Sea. Results concerning the deployment of acoustic remote sensing are expected in early 2010 at the latest (research project conducted by the Senckenberg Institute Wilhelmshaven).

Status:

The blue mussel is a typical habitat-forming species in the Wadden Sea. They also have to be monitored in the context of the monitoring of biogenic reefs (1170, sublittoral zone) and vegetation-free mudflats, sandflats and flats of mixed substrate (1140, eulittoral zone) (see also: Monitoring Manual, HD Habitat Type: Reefs).

The quality of blue mussel banks is determined by investigating selected shellfish banks and taking samples in the field. The quality of a blue mussel bank is judged using the following population-biology parameters:

- Areal extent of the bank
- Coverage (percentage of the total area of a shellfish bank occupied by shellfish beds)
- Stocking density (percentage of the shellfish beds occupied by shellfish)
- Biomass (living weight)
- Abundance
- Length-frequency distribution (age structure)

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9.1.2.7.

Accompanying fauna and flora

In Lower Saxony and Schleswig-Holstein, samples of the accompanying fauna on the shellfish banks are taken at selected stations. These activities still remain to be incorporated into the WFD and Habitats Directive assessments.

General remarks on biomass as a parameter:

The WFD does not require the determination of biomass. However, changes in biomass give the first indications of changes in eutrophication processes. OSPAR, TMAP, HELCOM and their monitoring programmes are directly focussed on the surveying of eutrophication processes.

Apart from this, the determination of biomass can be used for the purposes of compliance with the MSFD, the conventions on the protection of the seas and the Habitats Directive, which constitute the grounds on which it is undertaken. The expense involved in determining biomass is relatively insignificant compared to the costs for the whole sample.

Frequency:

General:

Shellfish banks should be monitored at least once a year in spring

Distribution:

Annual monitoring. The occurrence, distribution, extent and quality of shellfish banks are subject to major annual fluctuations. If it is to be possible to compare and assess them between years and within the banks, surveys are required at least annually. Furthermore, formation is also dependant on local weather conditions (e.g. storm events).

Status:

Once or twice a year

Individual shellfish banks are sampled monthly in order to obtain higher levels of temporal resolution with regard to their development over the course of the year.

Macrozoobenthos - North Sea - Sublittoral

Methods:

- 0.1-m² van Veen grab; 30 - 80 kg, 0.2-m² van Veen grab; potentially Reineck box corer and other methods
- Frame dredge: 1-m width, 0.5 - 1-cm mesh
- Sieve: 0.5 - 1-mm mesh (sometimes 250 µm in transitional waters)
- In future, greater use should be made of sonar systems/video techniques for supporting purposes

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Number of samples

Grab: at least five parallels

Dredging: at least one tow

Laboratory methods

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Frequency:

Under the WFD, provision has been made for benthic invertebrate animals to be monitored with a minimum frequency of three years. This minimum frequency is set for waters with low natural variability and negligible disturbing factors. However, the inner and outer waters in the German marine areas exhibit high degrees of natural variability and dynamism. The monitoring network is therefore to be designed in such a way that it takes account of this temporal and spatial variability.

More frequent sampling, at least at some of the network of stations, is therefore imperative if compliance with the reporting duties is to be possible. For instance, evaluation of the monitoring programmes that have been in operation to date shows that, in some cases, annual sampling with samples being taken at various times of year is to be recommended for the purposes of trend analysis.

It is believed that, in this case - i.e., in combination with the data from the network of permanent monitoring units -, it would be sufficient to carry out sampling every six years at the other stations, which are required to survey the spatial variability of macrozoobenthos (areal monitoring units).

The times when samples are taken are to be coordinated depending on the type of water and the issue being addressed.

The definitive specifications concerning the frequency of monitoring will depend, among other things, on the assessment schemes that are currently being developed for the Habitats Directive. The MSFD demands evidence about annual and seasonal variability (Annex III, Table 1).

In the North Sea, the monitoring of macrozoobenthos should as a rule be carried out in summer/autumn (see *SOP: Macrozoobenthos*, section 9.)

Baltic Sea

Macrozoobenthos - Baltic Sea

Methods:

A detailed description of the methods for macrozoobenthos investigations in marine sediments (soft seabed) will be found in the sample standard operating procedure for BLMP laboratories: *SOP: Macrozoobenthos* (section 9).

Methods of sampling

- 0.1-m² van Veen grab; 30 - 80 kg, 0.2-m² van Veen grab;
- Frame dredge
- Hard seabeds: frame
- Sieve: 1-mm mesh
- Frame with net bag (250 µm) for phytal fauna (MarBIT)
- In future, greater use should be made of sonar systems for supporting purposes
- Divers
- Video

Number of samples

Frame: ten to 20 parallels

Grab: three to five parallels (HELCOM: three parallels)

Dredging: at least one tow

Laboratory methods

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Additional parameters:

See *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, section 9

Frequency:

Under the WFD, provision has been made for benthic invertebrate animals to be monitored with a minimum frequency of three years. This minimum frequency is set for waters with low natural variability and negligible disturbing factors. However, the inner and outer waters in the German marine areas exhibit high degrees of natural variability and dynamism. The monitoring network is therefore to be designed in such a way that it takes account of this temporal and spatial variability. More frequent sampling, at least at some of the network of stations, is therefore imperative if compliance with the reporting duties is to be possible. For instance, evaluation of the monitoring programmes that have been in operation to date shows that, in some cases, annual sampling with samples being taken at various times of year is to be recommended for the purposes of trend analysis. This is also required by the assessment systems that are in use.

It is believed that, in this case - i.e., in combination with the data from the network of permanent monitoring units -, it would be sufficient to carry out sampling every six years at the other stations, which are required to survey the spatial variability of macrozoobenthos (areal monitoring units).

The times when samples are taken are to be coordinated depending on the type of water and the issue being addressed. E.g. it is recommended that samples be taken from shallow water in the Baltic Sea in early spring (after the thaw), but from deep, oxygen-deficient areas in autumn. The definitive specifications concerning the frequency of monitoring will depend, among other things, on the assessment schemes that are currently being developed for the Habitats Directive. The MSFD demands evidence about annual and seasonal variability (Annex III, Table 1).

The HELCOM standards also require annual sampling, which is carried out in autumn in the coastal waters and EEZs of both Länder.

The assessment for the WFD is carried out in accordance with the MarBIT assessment procedure:

- Hard seabed and phytal: June-July
- Soft seabed: March-April; but autumn in deep, oxygen-deficient areas.

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

Macrozoobenthos

Guideline:

Various directives

Comments:

At present, the assessment procedures are furthest advanced for the WFD, and some may also be suitable for application under the Habitats Directive. In consequence, procedures intended for the WFD predominate in this section. Their suitability for an HD assessment is to be examined by looking at practical examples. The possibility of their use for the MSFD also still needs to be clarified on the basis of the relevant requirements.

North Sea

Title

Multimetric AZTI Marine Biotic Index (M-AMBI)

Authors

Borja et al. (2000), Muxika et al. (2007)

Metrics: Ambi index, number of species, diversity (Shannon)

Guideline:

WFD

Stretch of Water:

Coastal waters

Comments:

The M-Ambi was developed for estuaries and coastal areas by Borja et al. (2000) on the basis of the work of Grall and Glemarec, 1997. The index assesses alterations in the spectrum of species within five ecologically based groups (sensitivity to organic enrichment). In this respect, a change in the values may be characterised by, e.g., an increase in opportunistic species compared to the background level (AMBI). In addition to this, the number of species and Shannon-Wiener diversity are used as metrics. Given the combination of individual values and the incorporation of specific background levels, only EQRs will be given here.

The assessment is based on the following internationally coordinated class boundaries (only the classes high/good and good/moderate are intercalibrated).

Ecological status	High	Good	Moderate	Poor	Bad
M-Ambi	>0,85	<0,85-0,7	<0,7-0,4	<0,4-0,2	<0,2

The method was modified after the first field tests (adaptation of class boundaries as set out above in accordance with Heyer, 2007). A first assessment was carried out with up-to-date data from the monitoring of coastal waters between 2006 and 2009 (Heyer, 2008, Grotjahn et al., 2008, Heyer, 2009).

Detection of pressures:

After various tests in the course of intercalibration, organic enrichment and hazardous substances were designated as the essential pressures the M-Ambi is intended to detect. Its validity is still controversial, even following test runs in the field, since it was possible to identify a clear dependence on sediment type. Eutrophication is not inevitably coupled with organic enrichment in sediment. It is necessary to wait for more experience of this assessment method to be gained in the field.

It is felt further development and trialling are needed to improve the derivation of background values (local background levels, species numbers) and the selection of particularly suitable stations (sediments). The application of station assessments to water bodies is also under discussion. Alternatively, the Dutch BEQI (Van Hoey et al., 2008) and MarBIT (Meyer et al., 2007) systems are currently being trialled. Both procedures still remain to be adapted or further developed for the North Sea.

Heligoland

The MarBIT procedure is being tested and applied to *Laminaria* rhizoid fauna on wave cut platforms and fauna in the Tiefe Rinne. The procedure is currently being optimised.

Shellfish banks (see section on shellfish banks)

The MarBIT procedure is being tested and applied to eulittoral shellfish banks. The procedure is currently being optimised.

North Sea

Title

Estuary Typology Procedure (AETV)

Authors

Krieg (2005)

Metrics: Estuary Typology Index (AeTI), number of species, abundance

Guideline:

WFD

Stretch of Water:

Transitional waters

Comments:

An assessment procedure for the Elbe (AETV) has been developed by Krieg. The Estuary Typology Index (AeTI) used for this purpose represents an adaptation of the Potamon Typology Index (PTI) to the conditions in transitional waters and, apart from species composition and abundance, assesses above all the presence of species that are closely autoecologically associated with the estuary (type-specific species).

The assessment is based on the following class boundaries (which have not yet been intercalibrated):

Ecological status	**High**	**Good**	**Moderate**	**Poor**	**Bad**
AETV	>0,92	0,92-0,8	0,8-0,55	0,55-0,27	<0,27

Apart from the Elbe, the approach has also been tested on the transitional waters in the Ems, Eider and Weser (Krieg 2008), and used for the initial WFD assessment in the Elbe, the lower Ems and the Lower Weser. Assessment with the M-Ambi system is preferred in the outer transitional waters, i.e. the mesohaline and polyhaline zones, of the Weser and the Ems on account of their extensive habitat structures. Alternatively, BEQI (Van Hoey et al., 2008) and M-Ambi are being tested in transitional waters. A hierarchical approach based on the procedures developed in the Netherlands and Belgium (after Escaravage et al. 2004) is being examined in the Weser and Ems; apart from this, other parameters for the assessment of fauna at community level are currently being trialled.

Detection of pressures:

The loss of type-specific species is detected, other functional relationships still need to be field tested and specified.

Habitats Directive:

Thus far, the assessments have been carried out in conformity with the standards set out in the WFD. Work is still ongoing on the incorporation of the HD requirements into the system.

Baltic Sea

Title

Marine Biotic Index Tool (MarBIT)

Authors

Meyer et al., 2007

Metrics: MarBIT index = Median of species diversity, abundance, disturbance-sensitive taxa, tolerant taxa

Guideline:

WFD

Comments:

MarBIT (Marine Biotic Index Tool) was developed by Meyer et al. (2005, 2007) for the ecological assessment of coastal water bodies in the Baltic Sea. It is WFD-compliant, has a five-level assessment scale, includes type-specific background conditions (species lists for each habitat) and is applicable in all occurring habitats (soft seabed, hard seabed, phytal). The approach works with the parameters prescribed by the WFD: species diversity, abundance, disturbance-sensitive taxa and tolerant taxa. Each of these parameters is assessed with its own independent index. Each individual index generates a value that is scaled to the interval between 0 and 1. The MarBITindex calculated from these values is given as a median of the individual values.

The assessment is based on class boundaries that have not hitherto been coordinated. There are plans for them to be coordinated during the second round of intercalibration carried out by the Baltic GIG.

Ecological status	**High**	**Good**	**Moderate**	**Poor**	**Bad**
MarBIT	0,8-1	0,6-0,8	0,4-0,6	0,2-0,4	0-0,2

Pressures/vulnerabilities that may be detected:

Secondary eutrophication effects (oxygen deficiency, silting), organic contamination (sewage works), morphological changes (shipping channels, obstructions) (it is still unclear whether MarBIT responds sensitively to inputs of hazardous substances).

The current data basis is still not sufficient in order to be able to make precise statements about the detection of different types of pressure.

The results of field trials in Schleswig-Holstein and Mecklenburg-Vorpommern produced plausible assessment results.

It is felt further development is needed with regard to the selection of particularly suitable stations and the application of the assessment results to the whole water body (sampling of suitable habitats, areal extent, uncolonised areas).

Baltic Sea

Title

Benthic Quality Index (BQI)

Authors

Rosenberg et al. (2004)

Guideline:

MSFD

Stretch of Water:

EEZ

Comments:

In view of the steep natural salinity gradients from the west (>25 psu) to the east (<5 psu) of the Baltic Sea, it has been possible to show that unmodified indices (e.g. Shannon, BQI, AMBI) cannot be applied (Zettler et al., 2007). Apart from this, it has been shown that the size of the samples can have a decisive influence on the calculations (Fleischer et al., 2007). With the aid of a macrozoobenthos database administered by the Leibniz Institute of Marine Sciences (GEOMAR) in Kiel and the Leibniz Institute for Baltic Sea Research Warnemünde (IOW), which is both spatially and temporally comprehensive, it has been possible to adapt the Swedish BQI index to the specific conditions in the Baltic Sea (Fleischer and Zettler, 2009). The index used has been modified in such a way that the scope of sampling has no influence on the calculations for the most part. Apart from this, the sensitivity/tolerance of the most relevant representatives of macrozoobenthos (125 taxa) were calculated in dependence on two depth levels (below and above 20 m) and for five salinity levels. The abundance, the number of species and the sensitivity/tolerance of the species are incorporated into the calculations. These lists have been made available so that anyone in the Baltic Sea catchment area can carry out calculations with the relevant values and characterise their EcoQ elements.

5 Quality assurance

- NMBAQC
- Quality Assurance Panel (at the UBA (workshops, intercalibration exercises, first draft of a species list, standardisation with DIN, CEN and ISO, support for the establishment of QM systems, drafting of sample SOPs, performance of audits))

Comments

The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the BLMP. Each of the monitoring institutions bears responsibility for establishing and administering its own DIN EN ISO/IEC 17025 quality management systems. The institutions involved in the BLMP coordinate their activities within the framework of the Working Group on Quality Assurance and its sub-working groups, as well as the Ad Hoc Working Group on Benthos and Benthic Habitats.

5.1 Monitoring institutions

- IOW
- LLUR
- BSH
- NLWKN
- NLPV NI
- AWI

5.2 Guidance documents

- BLMP Quality Assurance Panel at the UBA, 2008: *Muster-Qualitätsmanagementhandbuch für Laboratorien des Bund/Länder-Messprogramms nach DIN EN ISO/IEC 17025 (BLMP Sample Quality Management Manual)*; Version: 01 of 1 February 2008; Federal Environment Agency.
- BLMP Quality Assurance Panel at the UBA, 2009: *Prüfverfahren-SOP: Makrozoobenthos-Untersuchungen in marinen Sedimenten (Weichboden), (P-SOP-BLMP-MZB_v01) (Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed))*; Federal Environment Agency (Version: 01 of 15 October 2009 in the Members' Area).
- HELCOM, *COMBINE Manual*, 'Annex C-8: Soft bottom macrozoobenthos.'
- JAMP, 2004: *Guidelines on quality assurance for biological monitoring in the OSPAR area.*; ICES Techniques in Marine Environment Sciences; 32; 2004.
- JAMP, ASMO, 1997: *Eutrophication monitoring guidelines - benthos*: 'Technical Annex 1: Hard bottom macrophytobenthos, soft-bottom macrophytobenthos and hard-bottom macrozoobenthos'.
- JAMP, ASMO, 1997: *eutrophication monitoring guidelines - benthos*: 'Technical Annex 2: Soft-bottom macrozoobenthos'

5.3 Standards

- DIN EN ISO/IEC 17025, 2005: General requirements for the competence of testing and calibration laboratories.
- DIN EN 14996, 2006: Water quality - Guidance on assuring the quality of biological and ecological assessments in the aquatic environment.
- DIN EN 15196, 2006: Water quality - Guidance on sampling and processing of the pupal exuviae of Chironomidae (Order Diptera) for ecological assessment.
- DIN EN ISO 16665: Water quality - Guidance for quantitative sampling and sample processing of marine soft-bottom macrofauna.
- DIN EN ISO 19493, 2007: Water quality - Guidance on marine biological surveys of hard-substrate communities.

5.4 Current status

A BLMP Study Group decision (2006) obliged the BLMP laboratories to establish DIN EN ISO/IEC 17025 quality management systems. For this purpose, a *Sample Quality Management Manual* was drawn up in 2006/2007 by the Quality Assurance Panel in cooperation with the Quality Assurance Sub-Working Group on Quality Management. This manual has been available for subscription from the Quality Assurance Panel at the UBA since mid-2008 and is to be used as the basis for internal QM documentation at laboratories. The manual is designed as a loose-leaf collection, so that regular updates can be added as required. The intention is for it to be gradually supplemented with sample SOPs coordinated within the BLMP. As far as macrozoobenthos is concerned, *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*, Version 01 of 15 October 2009 is available. The testing procedure SOPs on diving and video investigations, and the amended *Testing Procedure SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)* for transitional waters are currently in preparation.

Intercalibration exercises

- UBA/BLMP-RV 2004: Determination of Selected Macrozoobenthos Species in a 'Near-Natural' Macrozoobenthos Sample from the Western Baltic Sea (number of participating laboratories: 16, report: November 2004)
- NMBAQC/BEQUALM: Ring Test Exercise 23 (number of participating laboratories: 15, report: 2004)
- NMBAQC/BEQUALM: Macrobenthos Exercise 11 (number of participating laboratories: 10, report: 2004)
- NMBAQC/BEQUALM: Ring Test Exercise 22 (number of participating laboratories: 13, report: 2003)
- UBA/BLMP-RV: Identification of Selected Macrozoobenthos Species from the North Sea and Baltic Sea (number of participating laboratories: 13, report: October 2001, corrected version: May 2002)
- UBA/BLMP-RV: Identification of 25 Selected Macrozoobenthos Species (number of participating laboratories: 11, report: January 2000)
- Intercalibration Exercise on Sampling Methods for Macrobenthos, ICES Benthos Methods WG (number of participating laboratories: 6, report: January 1985)

Workshops

- UBA/BLMP-WS: Mollusca, Polychaeta, Oligochaeta (2004)
- HELCOM/BEQUALM: Benthos Taxonomic Workshop (2000)
- UBA/BLMP-WS: Polychaeta (1998)
- UBA/BLMP-WS: Amphipoda (1998)
- ICES/HELCOM: Benthos Taxonomic Workshop (1997)
- ICES/HELCOM: Workshop on Quality Assurance of Benthic Measurements in the Baltic Sea (1996)
- ICES/HELCOM: Workshop on Quality Assurance of Benthic Measurements in the Baltic Sea (1994)

6 Literature

- Borja A., Franco, J. and V. Pérez, 2000: 'A marine biotic index to establish the ecological quality of soft-bottom benthos within European estuarine and coastal environments'; *Mar. Poll. Bull.*; 40 (12): pp. 1100 - 1114.
- Fleischer, D. and M. L. Zettler, 2009: 'An adjustment of Benthic ecological quality assessment to effects of salinity'; *Mar. Poll. Bull.*; 58 (2009): pp. 351 - 357.
- Fleischer, D., Grémare, A., Labrune, C., Rumohr, H., Vanden Berghe, E. and M.L. Zettler, 2007: 'Performance comparison of two biotic indices measuring the ecological status of water bodies in the southern Baltic and Gulf of Lions'; *Mar. Poll. Bull.*; 54 (2007): pp. 1598 - 1606.
- Grall J. and M. Glémarec, 1997: 'Using biotic indices to estimate macrobenthic community pertubations in the Bay of Brest'; *Estuarine, Coastal and Shelf Science*; 44 (Suppl. A): pp. 43-53; Science for Management in Coastal and Estuarine Waters: Proceedings of the 25th Annual Symposium of the ECSA: Part 3, Dublin, 11 - 16 September 1995.
- Grotjahn, M., Petri, G., Fischer, U. and W. Heiber, 2008: *EG WRRL - Praxistest Makrozoobenthos - Erprobung und Optimierung der Probennahmemethoden und der Bewertungsverfahren für Makrozoobenthos in den niedersächsischen Übergangs- und Küstengewässern*; Berichte des NLWKN; 82 pp. and 112 pp.
- Heyer, K., 2007: *Intercalibration Report (NEA GIG): Assessment of German Coastal Waters (NEA1/26, NEA3/4) by Benthic Invertebrates*; commissioned by NLWKN; 13 pp.
- Heyer, K., 2009: 'Bestimmung von deutschen Referenzwerten für das "MAMBI-Bewertungsverfahren" und Neuberechnung der Daten des NLWKN Praxistests sowie der Hamburger und Schleswig-Holsteiner Monitoringstationen'; unpublished report for NLWKN; 52 pp.
- Meyer, T., Berg, T. and K. Fürhaupter, 2007: 'Ostsee-Makrozoobenthos Klassifizierungssystem für die Wasserrahmenrichtlinie'; unpublished final report on MariLim commissioned by the University of Rostock; 129 pp.
- Meyer, T., Reincke, T., Fürhaupter, K. and S. Krause, 2005: *Ostsee-Makrozoobenthos-Klassifizierungssystem für die Wasserrahmenrichtlinie*; technical report on MARILIM for the Schleswig-Holstein State Agency for Nature and Environment; 73 pp.
- Muxika, I., Borja, A. and J. Bald, 2007: 'Using historical data, expert judgement and multivariate analysis in assessing reference conditions and benthic ecological status, according to the European Water Framework Directive'; *Mar. Poll. Bull.*; 55 (1-6): pp. 16 - 29.
- Van Hoey, G., Drent, J., Ysebaert, T. and P. Herman, 2007: *The Benthic Ecosystem Quality Index (BEQI), intercalibration and assessment of Dutch coastal and transitional waters for the Water Framework Directive*; NIOO Rapporten; 2007-02.
- Zettler, M.L., Schiedek, D. und B. Bobertz, 2007: 'Benthic biodiversity indices versus salinity gradient in the southern Baltic Sea'; *Mar. Poll. Bull.*; 55 (2007): pp. 258 - 270.

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

The strict deadlines set in the European Directives require very concrete, binding coordination processes between the Länder, the German Federation and the institutes that are implementing the programme. This work is undertaken within the Working Group on Surveying and Assessment and, for the present specifications, the Ad Hoc Working Group on Benthos and Benthic Habitats. Furthermore, recent scientific findings and the experience gained from the application of the procedures make the continued updating of the monitoring concept indispensable.

A review of the monitoring network and monitoring frequency at the regional level, adapted to take account of water conditions and reporting duties, is to be carried out. In particular, considerably more investigations will need to be carried out in future in the sublittoral zone of the North Sea, where there is still a need for development in order to lay the foundations for assessment activities (e.g. areal mapping methods using hydroacoustics). In the Baltic Sea, stations are to be specified in B1 and B2 water bodies.

WFD

North Sea

The monitoring network operated by the Länder has been reorganised and modified or expanded in order to cover characteristic communities and individual water bodies.

Baltic Sea

The monitoring network operated by the Länder has been reorganised and modified or expanded in order to cover characteristic communities and individual water bodies.

HD

The monitoring activities carried out to date may not satisfy the requirements imposed by the Habitats Directive. An appropriate monitoring concept must be developed in coordination with the monitoring for the purposes of the WFD.

The habitat types must be monitored inside and outside the marine HD areas (see conservation targets). The macrozoobenthos monitoring required in the various habitats is described in the monitoring specifications for the habitats in question. The definitive specifications for the monitoring concept will depend on the assessment schemes that are currently being developed for the Habitats Directive.

7.2 Working steps required

Monitoring

Drafting of a monitoring concept for the purposes of the Habitats Directive and harmonisation with the stations/methods used for the WFD. Exploitation of synergies and avoidance of duplicated work. In future, it will be necessary to carry out a similar harmonisation exercise in response to the requirements set out in the MSFD.

Some of the information given in these specifications on the following points will have to be formulated more precisely once the assessment procedures have been optimised:

- Location of the sampling
- Frequency
- Parameters
- Number of parallels
- Methods
- Coordination with macrophyte monitoring (phytal fauna)
- Extensive coordination with the monitoring for biological effects is expedient.
- The monitoring concept still needs to be harmonised with the monitoring in the North Sea EEZ implemented by BSH since 2008. IOW has been commissioned with the performance of this biological monitoring. Investigations are carried out at 12 stations in the Sea EEZ area, which are visited on two trips a year (spring and autumn) (in addition to this, they are also visited five times for the monitoring of zooplankton and phytoplankton). Whether this frequency, two dates a year, is maintained will depend primarily on the experience of sampling in 2008. The intention is for these arrangements to be coordinated once again after this date.

Quality assurance

The establishment of DIN EN ISO/IEC 17025 quality management systems under the BLMP should be concluded by 1 January 2012.

In this context, apart from the development of uniform quality standards (QM system), efforts should also be made to ensure that the participating institutions work largely in accordance with shared guidelines when the SOPs are being drafted. To this end, the current *Sample Quality Management Manual* is to be amended and the following SOPs for macrozoobenthos drawn up:

- *SOP: Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)* - amended version covering transitional waters, completion planned for the first six months of 2010
- *SOP: Macrozoobenthos Investigations by Means of Diving Investigations* - completion planned for the first six months of 2010
- *SOP: Macrozoobenthos Investigations by Means of Video Investigations* - completion planned for the second six months of 2010

The DIN EN ISO/IEC 17025 quality management system includes the following elements:

- documented validation/verification of the investigation methods deployed for the determination of performance characteristics,
- storage of reference and comparative collections,
- the qualification and regular training of personnel for the procedures deployed,
- the regular performance of internal and external audits,
- regular participation in national and international interlaboratory comparisons, intercalibration exercises, training courses and workshops, and their evaluation.

The laboratories must guarantee the prompt and complete communication of the investigation results to MUDAB on the basis of the MUDAB data formats, including the QA data that have been defined as a minimum, which meet international standards (ICES).

Further steps to be taken as of 2010:

- Provision of the uniform species list including synonyms via the QA information system and its periodic revision to reflect agreements reached concerning the (re)designation of taxa
- List of independent experts for cases where identification is problematic
- Alternating workshops on taxonomic questions, methodology (priority: grab and diving operations), evaluation procedures (to guarantee uniform minimum quality standards at all laboratories) and intercalibration exercises to ensure that, if possible, some form of external QA can be offered once a year (in this connection, of course, international workshops and intercalibration exercises that allow the UBA Quality Assurance Panel to hold events less frequently have to be taken into consideration). These activities are to be documented adequately and promptly.
- Continuation of the Environmental Research Plan project to draw up identification keys (Polychaeta, Chironomidae)
- Uniform data management system operated by all institutions involved

Since workshops and intercalibration exercises cannot be offered annually by the Quality Assurance Panel (Biology Section), regular interlaboratory comparison analyses should be organised bilaterally and independently between the laboratories, the results of which should be presented and discussed in the Working Group on Quality Assurance and the Ad Hoc Working Group on Benthos and Benthic Habitats. As a matter of principle, attention is to be paid to continuity among the staff involved in the processing of long-term monitoring series, as well as steps to ensure they are appropriately qualified.

Assessment

OSPAR

An appropriate monitoring concept, which includes macrozoobenthos, has been put forward for the assessment of the eutrophication status of the North Sea under the Common Procedure (see also Phytoplankton, Macrophytes and Zooplankton) (monitoring carried out by IOW in the North Sea).

WFD

Assessment systems have been developed and tested for both the North Sea and the Baltic Sea. The results obtained to date will be the subject of further discussions. There is therefore not only a need for continued coordination within the expert bodies responsible, but also for development work in order to highlight alternatives for this kind of assessment. The assessment activities that have been undertaken should be validated in the near future.

HD

Monitoring strategies for the Habitats Directive assessment have still not been drawn up and will have to be taken into consideration when macrozoobenthos is monitored in future.

MSFD

The profile of requirements and the responsibilities for implementation are being clarified at present. The MSFD will be incorporated into the monitoring concept and assessment methodology once this process has been concluded.

Further activities/issues

- The zoobenthos investigations carried out by other institutions (including BFAFi, vTI, Geomar and AWI) should be taken into consideration in planning and incorporated into the BLMP concept.
- The distribution of shellfish banks should be surveyed by means of side-scan sonar with appropriate investigations for the remote sensing of their areal distribution, the characteristics and structure of the substrate in the eulittoral and sublittoral zones, and the surveying of seagrass meadows and reefs.
- The calibration of methods for the determination of weight and a specification of the cases (taxa) to which each method is applicable (ignition loss, wet weight and dry weight) are needed urgently for quality assurance purposes.
- At present, only two type N3 water bodies can be sampled in the coastal waters off Schleswig-Holstein subject to ecological assessment because the methods for monitoring in the sublittoral zone of the Wadden Sea (tidal channels, Wadden Sea currents) are insufficiently reproducible. In consequence, there is a need for research to develop methods in this field.

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 Secretariat-General 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) Version: proposal of the Secretariat-General 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.

(4) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(5) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(6) 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.

(7) Baltic Sea Action Plan, HELCOM 2007

(8) The OSPAR Commission has set itself the objective of recording all species and habitats that need to be protected. This list is used by OSPAR to guide the setting of future priorities for its further work on conservation and the protection of marine biodiversity.
OSPAR is currently drawing up instructions for the monitoring of the species and habitats on the list.

(9) Species and habitats have been specified or described under OSPAR (MESH programme). At present, a monitoring strategy is being developed for this purpose. The intention is for it to take account of "ecological objectives" as well (see Environmental targets).

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

Monitoring Specifications

Date: 2010-01-25

Hydrography

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

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 H_2S, 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).

Monitoring Specifications

Date: 2010-01-25

Hydrology

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Physical Monitoring - Hydrology

1.2 Definition

Description of hydrological conditions using the following parameters:

Water level, tidal range, current, sea state and wave exposure, as well as the structure and condition of the intertidal zone, freshwater flow regime and exchange times.

1.3 Competent authority/ies

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

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 hydrological parameters must be drawn up under the Marine Strategy Framework Directive:

- current velocity,
- wave exposure and
- residence time.

Article 8(1) [2]

Comments

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

WFD [3]

Article 8(1); Annex V, 1.13, 1.14

Comments

Under the WFD, the hydrological conditions in transitional and coastal waters must be investigated. These include:

- volume of water and water level,
- freshwater flow regime (transitional waters),
- direction of dominant currents (coastal waters) and
- wave exposure.

HELCOM

PLC-Water [4]

OSPAR

JAMP RID Monitoring Programme [5]

Comments

Joint Monitoring and Assessment Programme - investigation of riverine inputs and direct discharges.

TMAP [6]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

Fluctuations and trends in the following hydrological parameters are to be monitored:

- Water level
- Flooding of salt meadows and sea state

Technical necessity

Water level measurements are required for the assessment of the tidal regime.

Overview of monitoring frequencies and cycles:

	WFD	HD	OSPAR	HELCOM	TMAP	MSFD
Frequency	N.a.	-	?	?	-	Coherent
Monitoring cycle	N.a.	-	?	?	-	Coherent

2.2 Environmental targets

MSFD

Article 9

"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 […], taking into account the indicative lists of pressures and impacts set out in […] Annex III."

HD

See the assessment schemes for habitat types (in preparation).

WFD

Annex V, 1.2.3 and 1.2.4:

Hydrology (transitional and coastal waters)

The freshwater flow regime in transitional waters, the direction and velocity of dominant currents in coastal waters and wave exposure correspond totally or nearly totally to conditions consistent with the achievement of the values specified for the biological quality elements.

TMAP

Information is to be obtained in order to ascertain whether changes in the hydrological situation have been caused by anthropogenic activities.

Target: A natural dynamic situation in the tidal area.

2.3 Threats

Climate change

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

There are limited numbers of monitoring stations and area-wide models for the following parameters: surface runoff, sea state, current and water level. Marine monitoring will be able to build on these components in future, but at present does not yet cover all water bodies subject to the WFD.

Appropriate investigations are to be carried out or available results have to be taken into account for the determination of exchange times and residence times.

3.2 Monitoring activities

North Sea and Baltic Sea

Hydrology

Methods:

The determination of the freshwater flow regime in transitional waters is based on measurements of surface runoff in the lower reaches or estuary of the watercourse in question. For this purpose, it has traditionally been necessary to calculate the flow rate from the runoff rate and runoff velocity, integrated over the cross-section of the water. To an increasing extent, autonomous ultrasonic devices that record water current velocities (ADCPs) are being installed in many places.

The direction and velocity of the currents in coastal waters vary dramatically over small distances depending on a small scale correspondent to the local morphological structures, in particular close to the coast and in the Wadden Sea, which means it is difficult to measure them across wide areas. As a rule, the currents in the coastal waters of the North Sea are dominated by the influence of the tides, which results in clearly alternating current directions in the channels and sharply varying currents on the intertidal mudflats. A dominant current cannot meaningfully be given for areas of tidal flats. Apart from measurements of local currents, the results of operational hydraulic-numerical models (BSH, DHI, BAW, …) are used for the monitoring of this parameter in the Baltic Sea and the coastal zone of the North Sea. These circulation models are three-dimensional and take account of the meteorological conditions forecast over the North Sea and Baltic Sea. With grid spacings of one nautical mile, they satisfy the requirements for WFD monitoring. The resolution of these operational models is inadequate for the more finely structured morphology of the Wadden Sea area. However, there are high-resolution models for parts of the Wadden Sea. Although they are not applied operationally, they may be deployed in operative monitoring or monitoring for surveillance purposes, depending on the issue that is being addressed.

Wave exposure in coastal waters is surveyed primarily using anchored wave measurement buoys. Apart from this, ultrasonic gauges, ADCPs and pressure cells, sometimes coupled with current probes, as well as special wave radar devices also come to be deployed in shallower waters. The results of the measurements are represented using one- and two-dimensional spectra. In addition to this, time series for characteristic sea state parameters such as significant wave height, wave period and, where available, mean wave direction are stored.

Mathematical sea state models are deployed for the area-wide determination of sea state. There are also high-resolution models for parts of the Wadden Sea in this field, although they are not actually applied in operation (see information on currents).

WFD Reporting Summary Sampling Method (2000 Characters):

Specially anchored wave-tracking buoys and water level monitoring devices are deployed to determine wave exposure.
The freshwater flow regime in transitional waters is surveyed at selected points in adjacent flowing waters.

WFD Reporting Summary Analysis Method (2000 Characters):

Changes in wave exposure and current conditions are determined using mathematical models.

Operative monitoring:

WFD Reporting Summary Frequence Method (2000 Charactersn):

At present, it is not necessary to monitor hydrological quality elements operatively.

WFD Reporting Summary Cycle Description (2000 Characters):

At present, it is not necessary to monitor hydrological quality elements operatively.

Surveillance monitoring:

WFD Reporting Summary Frequence Method (2000 Characters):

At present, the surveillance monitoring of hydrological conditions does not deviate from the general frequencies.

WFD Reporting Summary Cycle Description (2000 Characters):

At present, the surveillance monitoring of hydrological conditions does not deviate from the general frequencies.

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea

Title

Tidal Regime Assessment under the WFD

Authors

Ad Hoc Working Group on the Hydrography, Hydrology and Morphology of Coastal Waters

Guideline:

Various directives

Comments:

Hydrological conditions and the tidal regime are assessed using the assessment matrix put forward by the Ad Hoc Working Group on Hydrography, Hydrology and Morphology.

5 Quality assurance

- Quality Assurance Panel (Working Group on Quality Assurance under the auspices/guidance 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 hydrological measurements and calculations of hydrological conditions comply with the state of the art and are carried out using comparable methods.
- WFD Reporting Summary Confidence (2000 Characters): *Has not yet been completed - but would be desirable in future!*

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

Parameters

There are networks in place for the monitoring of the following parameters: water level, current, sea state and freshwater flow regime. The spatial and temporal resolution of these networks does not satisfy all the requirements imposed by the above-mentioned directives. The monitoring activities required are already being carried out for some subfields, and the results are available to the specialist institutions as required.

Appropriate studies are still to be carried out to determine exchange times.

7.2 Working steps required

Priorities

- Completion and implementation of the monitoring concept for the WFD.
- Determination of exchange times.

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) On the basis of HELCOM Recommendation 26/2, Compilation of Waterborne Pollution Load (PLC Water), HELCOM 26 decided that waterborne inputs should be surveyed in two phases:

- 1. Total direct loads of nutrients and hazardous substances were to be reported to HELCOM annually.
- 2. As of 2006, the Contracting Parties were to draw up a comprehensive summary of all inputs into inland waters located within the catchment area of the Baltic Sea every six years.

(5) Annual surveying of surface runoff and riverine inputs of selected substances into the marine environment. See also the information on nutrients and pollutants. The parameters to be monitored under OSPAR are listed in the documents cited.

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

Monitoring-Kennblatt

Stand: 25.01.2010

Hydrologie

MEERESUMWELT

BUND-LÄNDER MESSPROGRAMM

1 General

1.1 Subject area

Physical Monitoring - Hydrology

1.2 Definition

Description of hydrological conditions using the following parameters:

Water level, tidal range, current, sea state and wave exposure, as well as the structure and condition of the intertidal zone, freshwater flow regime and exchange times.

1.3 Competent authority/ies

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

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 hydrological parameters must be drawn up under the Marine Strategy Framework Directive:

- current velocity,
- wave exposure and
- residence time.

Article 8(1) [2]

Comments

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

WFD [3]

Article 8(1); Annex V, 1.13, 1.14

Comments

Under the WFD, the hydrological conditions in transitional and coastal waters must be investigated. These include:

- volume of water and water level,
- freshwater flow regime (transitional waters),
- direction of dominant currents (coastal waters) and
- wave exposure.

HELCOM

PLC-Water [4]

OSPAR

JAMP RID Monitoring Programme [5]

Comments

Joint Monitoring and Assessment Programme - investigation of riverine inputs and direct discharges.

TMAP [6]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

Fluctuations and trends in the following hydrological parameters are to be monitored:

- Water level
- Flooding of salt meadows and sea state

Technical necessity

Water level measurements are required for the assessment of the tidal regime.

Overview of monitoring frequencies and cycles:

	WFD	HD	OSPAR	HELCOM	TMAP	MSFD
Frequency	N.a.	-	?	?	-	Coherent
Monitoring cycle	N.a.	-	?	?	-	Coherent

2.2 Environmental targets

MSFD

Article 9

"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 […], taking into account the indicative lists of pressures and impacts set out in […] Annex III."

HD

See the assessment schemes for habitat types (in preparation).

WFD

Annex V, 1.2.3 and 1.2.4:

Hydrology (transitional and coastal waters)

The freshwater flow regime in transitional waters, the direction and velocity of dominant currents in coastal waters and wave exposure correspond totally or nearly totally to conditions consistent with the achievement of the values specified for the biological quality elements.

TMAP

Information is to be obtained in order to ascertain whether changes in the hydrological situation have been caused by anthropogenic activities.

Target: A natural dynamic situation in the tidal area.

2.3 Threats

Climate change

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

There are limited numbers of monitoring stations and area-wide models for the following parameters: surface runoff, sea state, current and water level. Marine monitoring will be able to build on these components in future, but at present does not yet cover all water bodies subject to the WFD.

Appropriate investigations are to be carried out or available results have to be taken into account for the determination of exchange times and residence times.

3.2 Monitoring activities

North Sea and Baltic Sea

Hydrology

Methods:

The determination of the freshwater flow regime in transitional waters is based on measurements of surface runoff in the lower reaches or estuary of the watercourse in question. For this purpose, it has traditionally been necessary to calculate the flow rate from the runoff rate and runoff velocity, integrated over the cross-section of the water. To an increasing extent, autonomous ultrasonic devices that record water current velocities (ADCPs) are being installed in many places.

The direction and velocity of the currents in coastal waters vary dramatically over small distances depending on a small scale correspondent to the local morphological structures, in particular close to the coast and in the Wadden Sea, which means it is difficult to measure them across wide areas. As a rule, the currents in the coastal waters of the North Sea are dominated by the influence of the tides, which results in clearly alternating current directions in the channels and sharply varying currents on the intertidal mudflats. A dominant current cannot meaningfully be given for areas of tidal flats. Apart from measurements of local currents, the results of operational hydraulic-numerical models (BSH, DHI, BAW, …) are used for the monitoring of this parameter in the Baltic Sea and the coastal zone of the North Sea. These circulation models are three-dimensional and take account of the meteorological conditions forecast over the North Sea and Baltic Sea. With grid spacings of one nautical mile, they satisfy the requirements for WFD monitoring. The resolution of these operational models is inadequate for the more finely structured morphology of the Wadden Sea area. However, there are high-resolution models for parts of the Wadden Sea. Although they are not applied operationally, they may be deployed in operative monitoring or monitoring for surveillance purposes, depending on the issue that is being addressed.

Wave exposure in coastal waters is surveyed primarily using anchored wave measurement buoys. Apart from this, ultrasonic gauges, ADCPs and pressure cells, sometimes coupled with current probes, as well as special wave radar devices also come to be deployed in shallower waters. The results of the measurements are represented using one- and two-dimensional spectra. In addition to this, time series for characteristic sea state parameters such as significant wave height, wave period and, where available, mean wave direction are stored.

Mathematical sea state models are deployed for the area-wide determination of sea state. There are also high-resolution models for parts of the Wadden Sea in this field, although they are not actually applied in operation (see information on currents).

WFD Reporting Summary Sampling Method (2000 Characters):

Specially anchored wave-tracking buoys and water level monitoring devices are deployed to determine wave exposure.
The freshwater flow regime in transitional waters is surveyed at selected points in adjacent flowing waters.

WFD Reporting Summary Analysis Method (2000 Characters):

Changes in wave exposure and current conditions are determined using mathematical models.

Operative monitoring:

WFD Reporting Summary Frequence Method (2000 Charactersn):

At present, it is not necessary to monitor hydrological quality elements operatively.

WFD Reporting Summary Cycle Description (2000 Characters):

At present, it is not necessary to monitor hydrological quality elements operatively.

Surveillance monitoring:

WFD Reporting Summary Frequence Method (2000 Characters):

At present, the surveillance monitoring of hydrological conditions does not deviate from the general frequencies.

WFD Reporting Summary Cycle Description (2000 Characters):

At present, the surveillance monitoring of hydrological conditions does not deviate from the general frequencies.

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea

Title

Tidal Regime Assessment under the WFD

Authors

Ad Hoc Working Group on the Hydrography, Hydrology and Morphology of Coastal Waters

Guideline:

Various directives

Comments:

Hydrological conditions and the tidal regime are assessed using the assessment matrix put forward by the Ad Hoc Working Group on Hydrography, Hydrology and Morphology.

5 Quality assurance

- Quality Assurance Panel (Working Group on Quality Assurance under the auspices/guidance 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 hydrological measurements and calculations of hydrological conditions comply with the state of the art and are carried out using comparable methods.
- WFD Reporting Summary Confidence (2000 Characters): *Has not yet been completed - but would be desirable in future!*

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

Parameters

There are networks in place for the monitoring of the following parameters: water level, current, sea state and freshwater flow regime. The spatial and temporal resolution of these networks does not satisfy all the requirements imposed by the above-mentioned directives. The monitoring activities required are already being carried out for some subfields, and the results are available to the specialist institutions as required.

Appropriate studies are still to be carried out to determine exchange times.

7.2 Working steps required

Priorities

- Completion and implementation of the monitoring concept for the WFD.
- Determination of exchange times.

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) On the basis of HELCOM Recommendation 26/2, Compilation of Waterborne Pollution Load (PLC Water), HELCOM 26 decided that waterborne inputs should be surveyed in two phases:

- 1. Total direct loads of nutrients and hazardous substances were to be reported to HELCOM annually.
- 2. As of 2006, the Contracting Parties were to draw up a comprehensive summary of all inputs into inland waters located within the catchment area of the Baltic Sea every six years.

(5) Annual surveying of surface runoff and riverine inputs of selected substances into the marine environment. See also the information on nutrients and pollutants. The parameters to be monitored under OSPAR are listed in the documents cited.

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

Monitoring Specifications

Date: 2010-02-22

Morphology Substrate

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Physical Monitoring - Morphology - Substrate

1.2 Definition

Description of the composition and structure of the seabed

- Quantity, composition and structure of the substrate (transitional waters)
- Composition and structure of the substrate (coastal waters)

1.3 Competent authority/ies

Federal Government:	BfG, BfN, BSH, WSV
Mecklenburg-Vorpommern:	LUNG, STAUN
Lower Saxony:	NLPV NI, NLWKN
Schleswig-Holstein:	LLUR, LKN-SH

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 morphological parameters must be drawn up under the Marine Strategy Framework Directive:

- Structure and substrate composition of the seabed

Article 8(1) [2]

Comments

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

HD [3]

Article 11 [4]

Comments

Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Hydromorphology plays an important role in the assessment of typical habitat structures (see the additional parameters for assessment purposes in the monitoring specifications for the different habitat types and the corresponding assessment schemes).

WFD [5]

Article 8(1)

Comments

Under the WFD, morphological changes are to be surveyed every six years as a quality element. These include the following parameters: quantity, composition and structure of the substrate.

TMAP [6]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The monitoring of the geomorphological characteristics of the Wadden Sea has the objective of assessing possible climate changes (e.g. rising sea levels, increase in storm events) and their impacts on habitats, species and communities.

Technical necessity

Overview of monitoring frequencies and cycles:

	WFD	HD	OSPAR	HELCOM	TMAP	MSFD
Frequency	Once	N.a.	?	?	N.a.	Coherent
Monitoring cycle	Every six years	N.a.	?	?	N.a.	Coherent

2.2 Environmental targets

MSFD

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 […], taking into account the indicative lists of pressures and impacts set out in […] Annex III."

HD

See the assessment schemes for the various habitat types.

WFD

Annex 5, 1.2.3 and 1.2.4:

Transitional waters

The quantity, structure and substrates of transitional water beds, and the structure and condition of the intertidal zones correspond to conditions consistent with the achievement of the values specified for the biological quality elements.

Coastal waters:

The structure and substrates of the coastal bed, and the structure and condition of the intertidal zones correspond to conditions consistent with the achievement of the values specified for the biological quality elements.

TMAP

Targets for the Wadden Sea:

- A natural dynamic situation

An increased area of geomorphologically and biologically undisturbed tidal flats and subtidal areas.

2.3 Threats

Natural morphodynamics are disturbed by:

- construction activities,
- deepening projects

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

Combination of point and area-wide investigations.

3.2 Monitoring activities

North Sea and Baltic Sea

Morphology: Substrate Composition and Structure

Methods:

Both organogenic and clastic components, seabed-physical parameters such as roughness (surface structure) and hardness (density, compaction), the rheological properties of the substrates and, sometimes, suspended load are investigated during the monitoring of the seabed's structure, the substrate and, in transitional waters, the quantity of the substrate.

According to CIS 2.4 Coast Guidance, the substrate is to be divided into four classes: mud, sand-gravel, mixed sediments and bedrock. This classification allows only a very rough description that does not include structural properties.

In consequence, the mean particle size distribution, the approximate mineralogical composition and two general seabed-physical properties, roughness and hardness, are also surveyed in the course of measurements for surveillance monitoring.

Further analytical parameters are to be investigated, depending on the reason for the operative or surveillance monitoring.

In methodological terms, sediment is appraised/designated firstly as a supporting parameter in the context of the investigation of benthic biotic communities using grabs, sediment cores and samples taken by divers/dip sampling. Secondly, whole water bodies are mapped with what is practically a area-wide approach using hydroacoustic and remote sensing procedures, as well as targeted in situ sampling.

Wadden Sea/eulittoral zone

- Analysis of sediments:
  - Investigations of sediment structure and properties at selected stations recorded using standardised protocols
  - Determination of grain size distributions and seabed-physical parameters (water content, consolidation) at further stations
- Remote sensing procedures: evaluation of aerial or satellite images in accordance with the OFEW method (STELZER, K., BROCKMANN, C. (2007): "Operationalisierung von Fernerkundungsmethoden fürs Wattenmeermonitoring (OFEW) - Abschlussbericht").

Open sea/sublittoral zone

- depth-sounder bearing with additional hydroacoustic seabed classification (Acoustic Ground Discrimination System, AGDS) with a view to the characterisation of the structure and composition of the substrate, including shellfish banks and seagrass meadows.
- Side-scan-sonar investigations for the characterisation of substrates, colonies and their spatial distribution (approx. every six to 12 years).
- Sampling during biological sampling by divers, grabs or video monitoring.

WFD Reporting Summary Sampling Method (2000 Characters):

As a rule, the quantity, structure and substrate of the seabed are surveyed/measured using hydroacoustic, optical and in situ procedures. Depending on the technical capacities of the authority that carries out the monitoring, the following state-of-the-art methods are deployed: Echosounding using the sediment classification system and side-scan sonar in the sublittoral zone, and multispectral optical remote sensing in the eulittoral zone. In addition to this, in situ samples are taken with core drills and grabs, and an accompanying rough appraisal/designation carried out in the field.

Furthermore, sediments are surveyed as supporting parameters when benthos is sampled.

WFD Reporting Summary Analysis Method (2000 Characters):

The results of the substrate investigations are gathered in decentralised and central archives, and made available by the individual providers in analogue or digital forms as sedimentological maps of the seabed (ESRI shapes, map services).

Seabed classification, remote sensing and sonar data are classified during postprocessing in accordance with the CIS 2.4 substrate classes.

Operative Monitoring:

WFD Reporting Summary Frequence Method (2000 Characters):

The operative monitoring of morphological conditions (distribution of hard substrates) is only required in the outer coastal waters of the Baltic Sea. It is carried out once a year at selected points.

WFD Reporting Summary Cycle Description (2000 Characters):

The operative monitoring of morphological conditions (hard substrates) is carried out each year in the outer coastal waters of the Baltic Sea.

Surveillance Monitoring:

WFD Reporting Summary Frequence Method (2000 Characters):

The surveillance monitoring of substrates is carried out at irregular intervals, mostly in the context of R&D projects.

WFD Reporting Summary Cycle Description (2000 Characters):

At present, the surveillance monitoring of substrates in the coastal and transitional waters of Germany¿s river basin districts does not comply with the prescribed minimum cycles of six years.

Frequency:

Seabed sediments and structures are surveyed at irregular intervals depending on the conditions for the deployment of remote sensing, ship-based procedures and in situ sampling. They should be scheduled/covered in such a way that significant changes in the substrate of the North Sea and Baltic Sea can be recorded within six years.

Parameter:

- Sediment grain size distribution
- Sediment structure
- Sediment type
- Sediment volume
- Substrate of the river and sea bed

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

North Sea and Baltic Sea Substrate Assessment - Distribution, Composition and Structure

Authors

Ad Hoc Working Group on the Hydrography, Hydrology and Morphology of Coastal Waters

Guideline:

Various directives

Comments:

The composition and structure of substrates are assessed using the assessment matrix put forward by the Ad Hoc Working Group on Hydrography, Hydrology and Morphology.

5 Quality assurance

- Quality Assurance Panel (at the UBA (workshops, intercalibration exercises, first abstract/scheme of a species list, standardisation with DIN, CEN and ISO, support for establishment of QM systems, drafting of sample SOPs, performance of audits))

Comments

The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the BLMP. Each of the monitoring institutions bears responsibility for establishing and administering its own DIN EN ISO/IEC 17025 quality management systems. The institutions involved in the BLMP coordinate their activities within the framework of the Working Group on Quality Assurance and the Ad Hoc Working Group on Hydrography, Hydrology and Morphology.

5.1 Monitoring institutions

5.2 Guidance documents

- BLMP Quality Assurance Panel at the UBA, 2008: *Muster-Qualitätsmanagementhandbuch für Laboratorien des Bund/Länder-Messprogramms nach DIN EN ISO/IEC 17025 (BLMP Sample Quality Management Manual)*; Version: 01 of 1 February 2008; Federal Environment Agency.
- BLMP Quality Assurance Panel at the UBA, 2010, in prep.: Prüfverfahren-SOP Sedimentansprache und Korngrößenverteilung (Testing Procedure SOP: Sediment Appraisal/designation and Grain Size Distribution); Federal Environment Agency.
- CIS 2.4 Coast Guidance

5.3 Standards

- WFD Reporting Summary Standards (2000 Characters): The surveying of sediments complies with the state of the art and is carried out using comparable methods in accordance with SOP: Sediment Appraisal/designation and Grain Size Analysis.
- WFD Reporting Summary Confidence (2000 Characters): *Has not yet been completed - but would be desirable in future!*

5.4 Current status

Intercalibration exercises

- Not yet available?

Workshops

- Still to be completed

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

General

Studies of the composition and structure of the substrate should concentrate on dynamic regions in which the morphology is changing naturally or as a result of relevant interventions. Natural changes can be identified from Landsat images in the eulittoral zone and using side-scan sonar or multibeam echosounder in the sublittoral zone.

North Sea

Studies of substrate composition like those described by van Bernem et al. (1994) or Reimers (2003) should be repeated at time intervals of six to 12 years for the purposes of the Central Command for Marine Emergencies Germany, on the one hand, and the HD and WFD, on the other. The results encompass/include both information on the sediments at approx. 3,000 Wadden Sea stations and information about macrozoobenthos/(benthic) macroinvertebrates species composition and abundance.

Future investigations will have to concentrate on areas that exhibit particularly high levels of dynamism. In the eulittoral zone of the Wadden Sea, these are the edges of the subtidal channels, while the dynamic areas in the sublittoral zone can be surveyed with side-scan sonar. In the Elbe estuary, the Medemgrund constitutes a very dynamic region where, for example, the 1 m depth contour shifts by as much as 50 or 100 m a year.

Baltic Sea

At present, there are still no comprehensive records for the Baltic Sea that could be used to describe the composition and structure of its substrates. Such records can be drawn up on the basis of historical data. Potential gaps in the data are to be closed by appropriate studies.

The need for the data to be updated is not as pressing as in the North Sea on account of the lower levels of dynamism.

7.2 Working steps required

Priorities

- Integration of monitoring activities for the surveying of substrate composition into marine monitoring
- Upgrading of data management (see below)

Incorporation of hydroacoustic and remote-sensing procedures into monitoring.

General

- The current activities undertaken with the aim of describing the composition and structure of the substrate are important for the implementation of the HD, WFD and MSFD, and also comply with the requirements of the trilateral Wadden Sea programme. It therefore appears expedient for the results obtained in the course of future marine monitoring to be collated in order to secure the flow of information between the relevant specialist institutions.
- Hydroacoustic investigations, e.g. using echosounding, should be carried out on as many trips as possible, providing/in so far as the technology this requires is available.
- The surveying of the sublittoral distribution of mussel banks, geogenic reefs and sandbanks, and seagrass meadows using sonar procedures should be further developed. Thanks to this technology, it appears possible for surveying of the occurrence and distribution of these habitats and biotopes to be implemented in future/with this technology, it appears possible to measure the occurrence and distribution of these habitats and biotopes in the near future.

Quality assurance

The participating institutions are striving/ambitious to build up and introduce uniform QA standards by means of the introduction of a DIN EN ISO/IEC 17025 quality management system (BLMP Study Group decision, 2006), which would ideally lead to the accreditation of these institutions. The establishment of DIN EN ISO/IEC 17025 quality management systems under the BLMP should be concluded by 1 January 2012.

In this context, apart from the development of uniform quality standards (QM system), efforts should also be made to ensure that the participating institutions work largely in accordance with shared guidelines when the SOPs are being drafted/developed. To this end, the current Sample Quality Management Manual is to be amended and Testing Procedure SOP: Sediment Appraisal/designation and Grain Size Distribution drawn up. / Therefore the Testing Procedure SOP "Sediment Appraisal/designation and Grain Size Distribution" will be developed in addition to the current Sample Quality Management Manual. The intention is for this SOP to be completed in the first six months of 2010.

The DIN EN ISO/IEC 17025 quality management system includes the following elements:

- documented validation/verification of the investigation methods deployed for the determination of performance/procedure characteristics/method features,
- storage of reference and comparative collections,
- the qualification and regular training of personnel for the procedures deployed,
- the regular performance of internal and external audits,
- regular participation in national and international interlaboratory comparisons, intercalibration exercises, training courses and workshops, and their evaluation.

Data availability

- Measurements of grain size composition taken in the course of/line with macrozoobenthos/(benthic) macroinvertebrate studies must be incorporated into the databases in which the morphological measurements are compiled.
- Compilation of sediment data that are obtained in the course of individual studies (e.g. degree dissertations), research projects, proceedings for the collection/conservation/preservation of evidence/monitoring activities, etc.
- Only data (pieces of information) that have been evaluated and quality assured should be provided to relevant users and institutions.

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) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(4) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(5) 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.

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

Monitoring Specifications

Date: 2010-01-25

Morphology Bathymetry

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Physical Monitoring - Morphology - Bathymetry

1.2 Definition

Description of morphological conditions

- Depth variation
- Topography
- Morphodynamic changes

1.3 Competent authority/ies

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

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 morphological parameters must be drawn up under the Marine Strategy Framework Directive:

- Topography and bathymetry of the seabed

Article 8(1) [2]

Comments

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

HD [3]

Article 11 [4]

Comments

The Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Hydromorphology also plays an important role in the assessment of typical habitat structures (see assessment schemes (in preparation)) and the designation of HD habitats. E.g., bathymetry is used for the definition of sandbank habitats.

WFD [5]

Article 8(1)

Comments

Under the WFD, morphological changes are to be surveyed as a quality element every six years. These include:

- depth variation and
- the structure of intertidal zones

TMAP [6]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The monitoring of the geomorphological characteristics of the Wadden Sea has the objective of assessing possible changes in the climate (e.g. rising sea levels, increased frequency of storm events) and their impacts on habitats, species and communities. (See on this topic TMAP Manual, section 1.1, Geomorphology.)

Technical necessity

Overview of monitoring frequencies and cycles:

	WFD	HD	OSPAR	HELCOM	TMAP	MSFD
Frequency	Once	N.a.	?	?	N.a.	Coherent
Monitoring cycle	Every six years	N.a.	?	?	N.a.	Coherent

Bathymetric investigations are carried out above all to maintain the safety and ease of shipping.

As far as the biological components are concerned, temporal trends in particular play a major role in bathymetry as additional parameters for assessment purposes. These trends may have both natural and anthropogenic causes.

2.2 Environmental targets

MSFD

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 […], taking into account the indicative lists of pressures and impacts set out in […] Annex III.'

WFD

Annex 5, 1.2.3 and 1.2.4:

Transitional waters:

Depth variation, substrate conditions, and both the structure and condition of the intertidal zones correspond to conditions consistent with the achievement of the values specified for the biological quality elements.

Coastal waters:

Depth variation, the structure and substrate of the coastal bed, and both the structure and the condition of the intertidal zones correspond to conditions consistent with the achievement of the values specified for the biological quality elements.

2.3 Threats

Construction measures, deepening projects

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

General

Traditionally, the bathymetry of the seabed in the sublittoral zone and the parts of the eulittoral zone that are navigable with boats has been surveyed by means of depth soundings, for which (single beam) echosounders are used, although this is increasingly being done using multibeam echosounder technologies. In the shallow eulittoral and supralittoral zones, the measurements are still carried out largely using levelling techniques at present. Here too, however, a shift in methodology towards remote sensing procedures such as laser scanning has been apparent for several years.

The results of the surveys are compiled in the Coastal Depth Sounding Database (PDBK) and made available by the individual providers in analogue and digital forms as bathymetric maps of the seabed with depth figures, depth contours and, sometimes, colour depth layers. Until the end of 2004, all the depth data in the sea maps were based on Mean Low Water Springs. Since 2005, they have been based on LAT (Lowest Astronomical Tide).

North Sea

In the context of synoptic surveying, the coastal waters of the North Sea are depth sounded at least once in a six-to-12-year cycle (see the BSH depth soundings in the North Sea during the period 2000-2005, the surveys carried out by the State Agency for Agriculture, Environment and Rural Areas of the Land Schleswig-Holstein at Husum and the annual depth soundings carried out by WSV in the North Sea and the Kiel Canal).

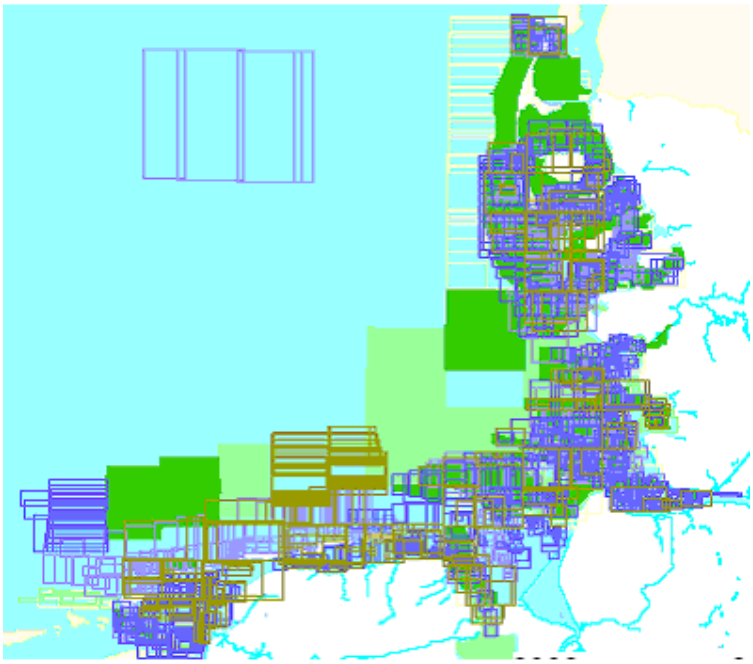

Figure 1: Depth soundings carried out by BSH in the North Sea during the period 2000-2005

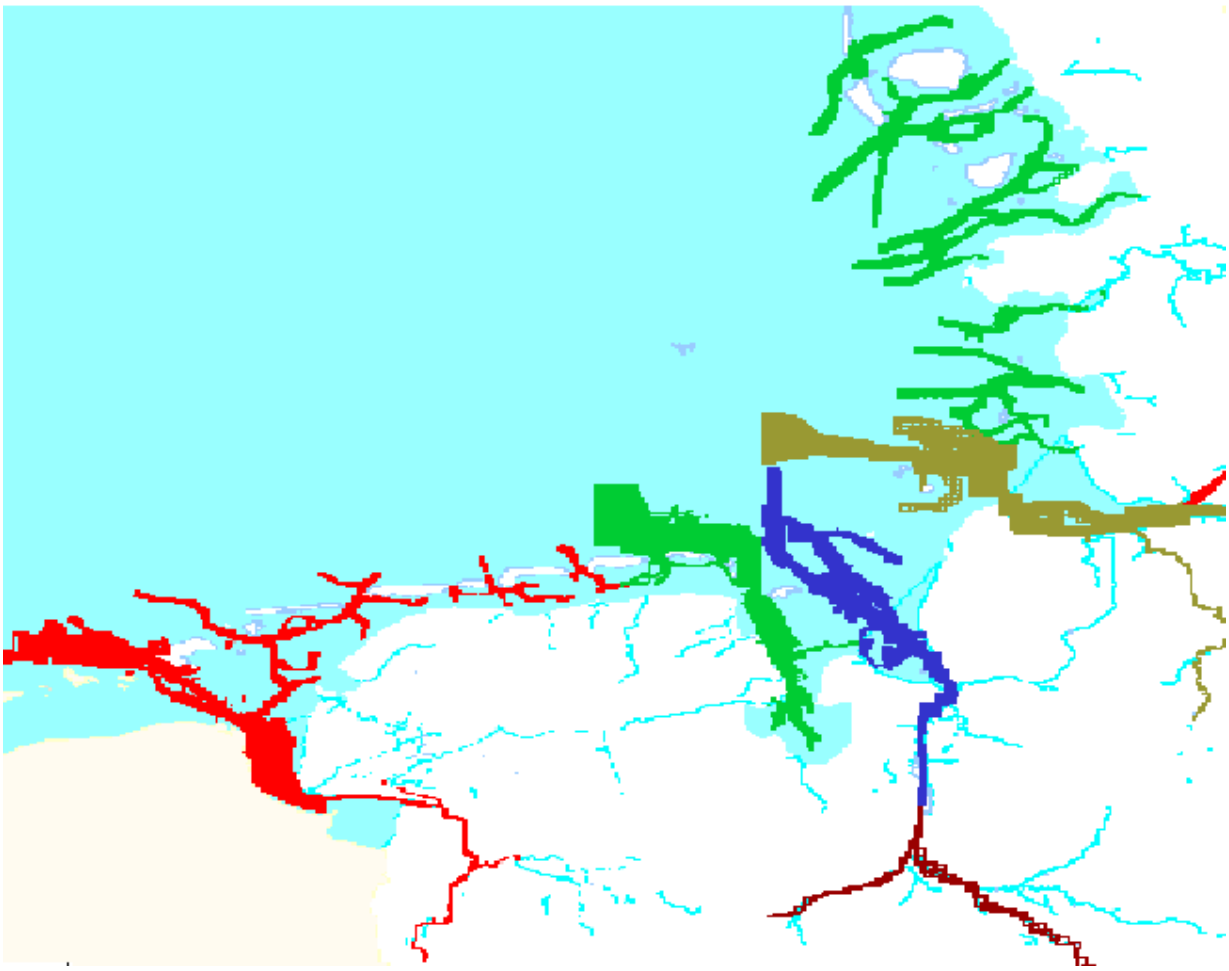

Figure 2: Depth soundings carried out by the Emden, Wilhelmshaven, Bremerhaven, Cuxhaven, Brunsbüttel and Tönning Waterways and Shipping Offices in the North Sea and Kiel Canal (2004 and 2005)

Baltic Sea

The coverage of the Baltic Sea coast is markedly less thorough than that of the North Sea (see the BSH and WSV depth soundings in the Baltic Sea). In consequence, there is a clear need for additional depth soundings.

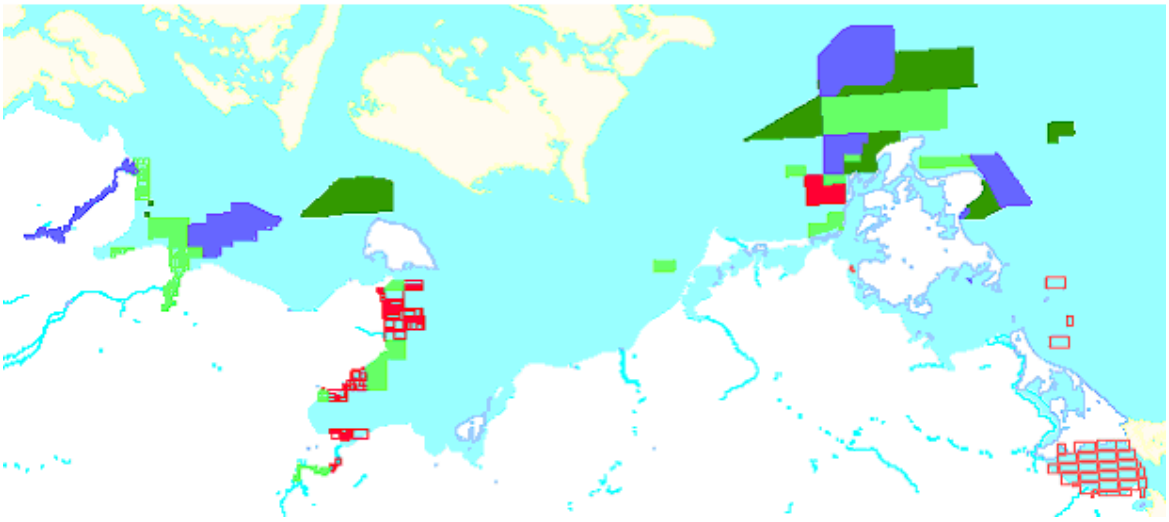

Figure 3: Depth soundings carried out by BSH in the Baltic Sea during the period 2000-2004

Figure 4: Depth soundings carried out by the Lübeck and Stralsund Waterways and Shipping Offices in the Baltic Sea, 2004

3.2 Monitoring activities

North Sea and Baltic Sea

Morphology: Bathymetry

Methods:

Morphology: Bathymetry

Echosound and multibeam echosound depth soundings in the sublittoral zone - terrestrial and laser scan surveying in the eulittoral zone. If possible combined with side-scan-sonar investigations (approx. every six to 12 years; see also Monitoring Specifications: Substrate).

Intertidal zone

The structure of the intertidal zone has been delineated to some extent in the literature using morphodynamic parametrisations, e.g. the ratio of the cross-section of a channel to the tidal volume of the associated river basin district. Providing the natural morphodynamic equilibria for an area can be determined on the basis of time series of sufficient quality, it is possible to identify deviations from these states using a parametrisation of this kind.

The primary hydrological and morphological parameters water level and depth are therefore to be surveyed and evaluated in order to monitor the structure of the intertidal zone.

WFD Reporting Summary Sampling Method (2000 Characters):

As a rule, bathymetry is surveyed using hydroacoustic, levelling and laser scanning procedures. Depending on the technical capacities of the authority that is conducting the measurements, the following state of the art methods are deployed: echosounding and multibeam echosounding (sublittoral zone), laser scanning (eulittoral zone) and terrestrial survey procedures.

WFD Reporting Summary Analysis Method (2000 Characters):

The results of the hydrographic surveys are compiled in decentralised and central archives and databases, the Coastal Depth Sounding Database (PDBK) for example, and made available by the individual providers in analogue or digital form as bathymetric maps of the seabed.

Operative monitoring:

WFD Reporting Summary Frequency Method (2000 Characters):

The operative monitoring of morphological conditions is only required in the outer coastal waters of the Baltic Sea. It is carried out once a year at selected points.

WFD Reporting Summary Cycle Description (2000 Characters):

The operative monitoring of morphological conditions in the outer coastal waters of the Baltic Sea is carried out each year.

Surveillance monitoring:

WFD Reporting Summary Frequency Method (2000 Characters):

The surveillance monitoring of morphological conditions in coastal and transitional waters is carried out quasi-synoptically.

WFD Reporting Summary Cycle Description (2000 Characters):

At present, the surveillance monitoring of morphological conditions in the coastal and transitional waters of the German river basin districts does not comply with the prescribed minimum cycles of six years.

Frequency:

Hitherto, the frequencies have been scheduled in such a way that it has been possible for significant changes in the bathymetry of the North Sea and Baltic Sea to be surveyed within six years. It is not possible for the frequencies recently specified for the synoptic surveying of the seabed to deliver the information required in all fields.

Parameter:

- Depth
- Position

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

Assessment of Depth Variation under the WFD

Authors

Ad Hoc Working Group on the Hydrography, Hydrology and Morphology of Coastal Waters

Guideline:

Various directives

Comments:

The depth variations and structure of the intertidal zone are assessed using the assessment matrix put forward by the Ad Hoc Working Group on Hydrography, Hydrology and Morphology.

5 Quality assurance

Comments

5.1 Monitoring institutions

5.2 Guidance documents

5.3 Standards

- WFD Reporting Summary Confidence (2000 Characters): *Has not yet been completed - but would be desirable in future!*
- WFD Reporting Summary Standards (2000 Characters): The hydrographic surveys comply with the state of the art and are carried out using comparable methods. IHO Special Publication 44 is applicable.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

The depth sounding data from the North Sea coast will be recorded by the institutions involved in the KFKI Synoptic Surveying Working Group in a six-to-12-year cycle.

7.2 Working steps required

Priorities

- Integration of depth-sounding data from the Coastal Depth Sounding Database
- Provision of differential topographies

Depth-sounding data

- The BSH and WSV depth-sounding data are required in the context of German marine monitoring. Structures for the use of the data have been put in place in the form of the Coastal Depth Sounding Database (PDBK) administered by the BAW Information Technology Service Centre in Ilmenau. The database can be used to search for and order data online. It would be desirable for the relevant specialist institutions to be able to download data online, and this is already possible on the WSV Intranet.
- Comprehensive plausibilisation is desirable and should already be undertaken in the institutions that carry out the depth sounding. E.g. identical measured values appear at several successive positions in some data sets.
- Information about changes, i.e. erosion and sedimentation processes in particular, is required for the purposes of the WFD. These differential topographies should be delivered centrally by the data suppliers along with their other information, and should cover various periods between one and six years. A uniform resolution, e.g. a 50 x 50 m grid, would have to be specified for this purpose.

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) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(4) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(5) 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.

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

Monitoring Specifications

Date: 2011-10-19

Hydrochemistry

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Chemical Monitoring - Hydrochemistry

1.2 Definition

Nutrients, organic carbon and marine acidification (pH values; pCO_2 profiles)

(oxygen conditions, see Hydrography)

1.3 Competent authority/ies

Federal Government:	BSH, UBA
Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN
Schleswig-Holstein:	LLUR

1.4 Working group

Ad Hoc Working Group on Nutrients and Plankton
Ad Hoc Working Group on Hydrography, Hydrology and Morphology

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Article 11 [2]

Comments

On the basis of the initial assessment made pursuant to Article 8(1), Member States shall establish and implement coordinated monitoring programmes for the ongoing assessment of the environmental status of their marine waters on the basis of the indicative lists of elements set out in Annex III and the list set out in Annex V, and by reference to the environmental targets established pursuant to Article 10.

Article 8(1) [3]

Comments

The results of nutrient monitoring are required for the initial assessment of marine waters. To this end, the following parameters must be monitored in order for physico-chemical features to be described:

Annex III, Table 1

- spatial and temporal distribution of nutrients (DIN, TN, DIP, TP, TOC) and oxygen;
- pH, pCO_2 profiles or equivalent information used to measure marine acidification.

HD [4]

Article 11 [5]

Comments

Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Consideration of nutrient inputs in the assessment of habitat impairments. See the assessment schemes for habitat types.

WFD [6]

Article 8(1)

Comments

Under the WFD, nutrient status is to be monitored as one of the physico-chemical quality elements every three months in coastal waters that are subject to ecological assessment. The mandatory parameters are total nitrogen, total phosphorus, NO_3 and PO_4. See also Annex V, 1.3.4.

Nitrates Directive [7]

General [8]

HELCOM

COMBINE

Comments

PART C: Eutrophication and its effects

Annex C2, Hydrographic and hydrochemical variables:

This guideline is intended to achieve the aims of the HELCOM monitoring programme. The following core variables are measured:

Hydrochemistry:

- Nutrients: phosphate, total phosphorus, ammonium, nitrate, nitrite, total nitrogen, silicate

Supporting parameters:

- Temperature
- Salinity
- pH value
- Secchi depth

See also Hydrography

OSPAR

JAMP Common Procedure

Comments

Common Procedure (OSPAR Agreement 2005-3) for the Identification of the Eutrophication Status of the OSPAR Maritime Area.

Assessment of the eutrophication status of the OSPAR area

"Problem areas" and "potential problem areas":	Annually
"Non problem areas":	Every three years

It is mandatory for the following parameters to be monitored:

Hydrochemistry:

- Nutrients: phosphate, total phosphorus, ammonium, nitrate, nitrite, total nitrogen, silicate
- Oxygen saturation (see Hydrography)

Supporting parameters:

- pH value
- Temperature
- Salinity
- Secchi depth

JAMP RID Monitoring Programme [9]

Comments

Joint Monitoring and Assessment Programme - Riverine Inputs and Direct Discharges.

Annual surveying of riverine inputs of selected substances into the marine environment. The parameters to be monitored under OSPAR are listed in the documents cited.

TMAP [10]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

See TMAP-Manual, Chapter 2, 2.1, Nutrients:

- The monitoring of nutrients has the objective of assessing the effects of changes in the input of nutrients on ecological elements and processes.
- Apart from this, the intention is to document the effectiveness of policy targets. To this end, two strategies are to be pursued:

1. Winter concentrations (weekly to monthly from November to February along salinity gradients)

2. Nutrient effects and seasonal fluctuations (monthly measurements together with plankton measurements)

2.2 Environmental targets

MSFD

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.'

HD

See assessment schemes for habitat types.

WFD

Annex V, 1.2.3 and 1.2.4, General conditions: 'Nutrient concentrations do not exceed the levels 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:

Nutrient concentrations close to natural levels.

OSPAR

Eutrophication strategy:

In line with OSPAR's general aims, eutrophication is to be prevented and a healthy marine environment, in which eutrophication no longer occurs, achieved and conserved by 2010.

Ecological Quality Objectives for Nutrients and Eutrophication Effects: 'winter nutrient concentrations'.

Winter concentrations of dissolved anorganic nitrogen and/or phosphorus should exceed salinity-related natural background levels by a maximum of 50 %. By 2010, all areas of the North Sea should be classified as non-problem areas in respect of eutrophication.

2.3 Threats

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The influences exerted by tides (North Sea) and wind (North Sea and Baltic Sea) make the North Sea and Baltic Sea very dynamic waters. Although it is possible to distinguish between the individual water bodies, they shift their positions within certain bounds and there is continuous exchange between them. A relatively dense monitoring network is required if account is to be taken of this high degree of variability.

North Sea

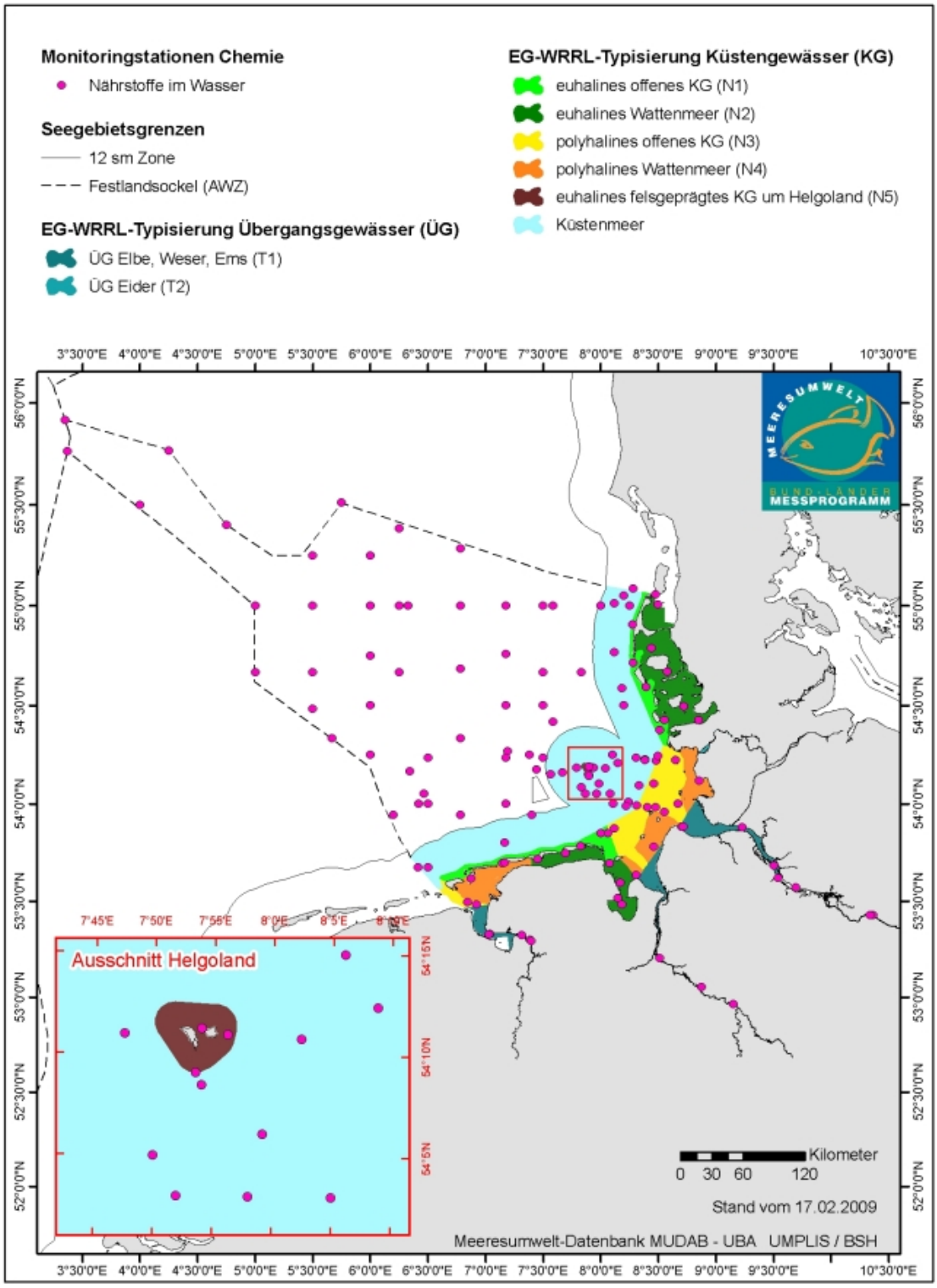

Figure 1: German Marine Monitoring Programme (BLMP) activities in the North Sea: Monitoring of Nutrients in Water

Figure 1 as PDF document

BSH:

40 monitoring stations:
Three times a year: nitrite+nitrate, ammonium, phosphate, silicate, TP and TN
12 monitoring stations (biology stations):
additional twice a year: nitrite+nitrate, ammonium, phosphate, silicate, TP and TN

Sampling depths: surface (5 m), near bottom and below the thermocline

The measurements at the monitoring stations should be supplemented with continuous measurements using automatic nutrient analysers between the stations in order to obtain measurements on transects with a high degree of temporal resolution.

LLUR:

2009 monitoring network: 21 stations, nine stations for the BLMP in the North Sea and another 12 stations for the WFD in the coastal waters/neritic zones of the Eider and Elbe.

Monitoring frequencies: There are six BLMP stations where samples are taken just three times a year by the water monitoring ship M/S Haithabu.

At another 15 stations, samples are taken both by the water monitoring ship M/S Haithabu and by helicopter. However, helicopters are only deployed seasonally for the algae early detection system (AlgFES) in the period from May to September/October.

Monitoring variables: Filtered samples are analysed to quantify the concentrations of various nutrients, ammonium, nitrite, nitrate, total nitrogen, phosphate, total phosphorus and silicate. In addition to this, unfiltered samples are also analysed to quantify total nitrogen and total phosphorus. These measurements are carried out at the Schleswig-Holstein Land Laboratory in Neumünster.

The samples are always taken from a standard depth one metre below the surface. At the stations sampled by the M/S Haithabu, CTD vertical profiles are always taken with a multiparameter probe as well.

NLWKN:

Nutrient distribution in winter (one helicopter sampling in the 1st and 4th quarter each): nitrite+nitrate, ammonium, ortho-phosphate, silicate, DOC, TP, and TN at 17 stations.

Sampling for these parameters is additionally carried out throughout the year at another 7 stations - weekly (2 stations), 2-weekly (2 stations), or once per quarter (4 stations); see phytoplankton specifications.

Permanent monitoring station

The area west of Heligoland is represented by the UFSDB (Unmanned Lightship Deutsche Bucht) monitoring network station (54°10' N, 07°27' E). Apart from hydrographic parameters (T, S, oxygen), the BSH also carries out continuous nutrient measurements at this station.

Baltic Sea

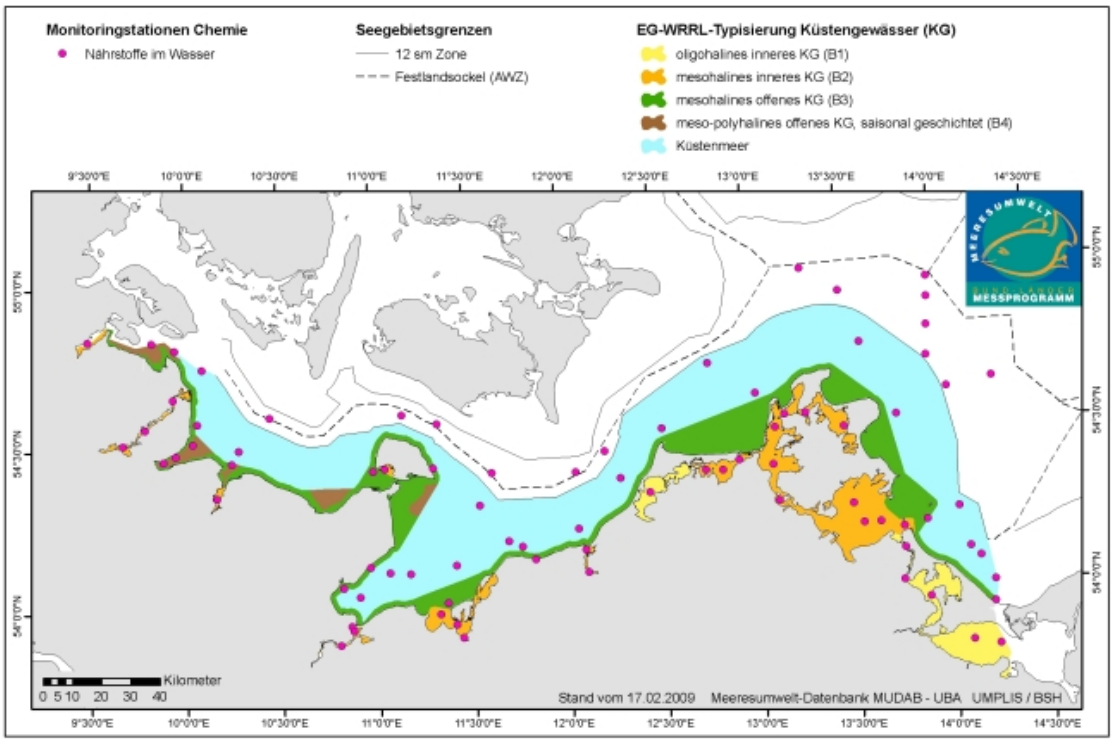

Figure 2: BLMP activities in the Baltic Sea: Monitoring of Nutrients in Water.

Figure 2 as PDF-Document

IOW:

Five times a year: NO_3, NO_2, PO_4, SiO_4

Selected stations: TN, TP and NH_4, as well as DOC, POC, DON

Sampling depths: 1, 10, 20, 30, 40 m and seabed
Certain stations: 5 m and 15 m as well

LLUR

2009 monitoring network: 25 stations: 13 stations for the BLMP in the Baltic Sea and another 12 stations for the WFD in the coastal waters/neritic zones of the Schlei and the Trave.

Monitoring frequencies: 24 stations: ten samples are taken each year by the water monitoring ship M/S Haithabu. 18 to 20 samples are taken at an intensive monitoring station in the Outer Kiel Fjord.

Monitoring variables: In coastal waters/neritic zones with low suspension levels, nutrients are quantified in unfiltered samples, while in the Schlei and the Trave filtered samples are analysed to quantify ammonium, nitrite, nitrate, total nitrogen, phosphate, total phosphorus and silicate. In addition to this, unfiltered samples from the stations in the Schlei and the Trave are also analysed to determine total nitrogen and total phosphorus. These measurements are carried out at the Schleswig-Holstein Land Laboratory in Neumünster.

The samples are always taken from standard depths one metre below the surface and, at stations with water depths greater than 12 metres, one metre above the seabed. CTD vertical profiles measured with a multiparameter probe are always taken as well at all stations.

LUNG:

38 monitoring stations: ten to 12 times a year: NO_3, NO_2, NH_4, TN, PO_4, TP, SiO_4, DOC, TOC

Sampling depths: 1 m and, at stations with water depth >6 m, 1 m above the seabed
CTD profiles at stations with water depth >6 m

Comments:

The 'Baltic Sea Hole' in the Hohwacht Bight is a military restricted area (sea range). The water body is similar to that around the Kiel Lighthouse station, which is why this station is also representative for the restricted area.

Vertical resolution

When samples are taken at offshore stations, the standard depths should be sampled where there are stratifications.

3.2 Monitoring activities

North Sea and Baltic Sea

Hydrochemistry

Methods:

North Sea:

Total N

Oxidative pressure digestion with potassium peroxodisulphate, followed by determination as nitrate.

Modified in accordance with DIN EN ISO 11905-1.

Ammonium

Filtration of water samples. Analysis of ammonium. Modified in accordance with DIN EN ISO 11732-4 (continuous flow analysis).

Nitrate

Filtration of water samples. Reduction with cadmium and determination as nitrite. Modified in accordance with DIN EN 26777 or EN ISO 13395, continuous flow injection analysis with automatic detection.

Total P

Oxidative pressure digestion with potassium peroxodisulphate, followed by determination as phosphate. Photometric procedure using ammonium molybdate.
Modified in accordance with DIN EN ISO 6878 (manual method).

Phosphate

Filtration of water samples (DIN EN 1189), continuous flow injection analysis with automatic detection. Modified in accordance with DIN EN ISO 15681-2 for flow injection analysis and continuous flow analysis.

Silicate

Filtration of water samples. Modified in accordance with DIN EN ISO 16264 for flow injection analysis and continuous flow analysis.

NLWKN: The analyses are made using inductively coupled plasma optical emission spectrometry (ICP-OES) analogous to DIN EN ISO 11885 (E 22), (September 2009)

Baltic Sea:

IOW

Total N

Alkaline oxidative pressure digestion with potassium peroxodisulphate (microwave), followed by determination as nitrate.

Total P

Alkaline oxidative pressure digestion with potassium peroxodisulphate (microwave), followed by determination as phosphate.

NH_4

Indophenol blue, manual detection using photometer.

PO_4

Molybdenum blue.

NO_3

Reduction to nitrite, determination as azo dye.

NO_2

Determination as azo dye.

SiO_4

Molybdenum blue.
All four parameters are quantified in an autoanalyser (Evolution III, Alliance) using filtered samples.
The methods are based on Grasshoff et al., 1983.

Parameter:

- NH4
- NO2
- NO2 + NO3
- Organic carbon (particulate)
- PO4
- SiO4
- Total nitrogen (TN)
- Total phosphorus (TP)
- pH value

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Biovolume (biomass)
- Chlorophyll a (biomass)
- Oxygen saturation
- Salinity
- Secchi depth
- Temperature
- pH value

4 Assessment

4.1 Assessment procedures

North Sea

Title

Hydrochemistry - OSPAR - North Sea

Guideline:

OSPAR

Comments:

The assessment is carried out using the OSPAR Common Procedure (OSPAR, 2005-3).

The elevated values used for the assessment are given in Table 1.

Cat.	Parameters	Dimen-sion	Estuaries	Wadden Sea	Coastel Waters	Off-shore	Central North Sea
	Salinity		0-19	25-30	28-34,5	>34,5	>34,5
I	TN TP	µM	20-33 0,5-1,2	17-21 0,9-1,1	17-18 1,0-1,1	13 0,83	13 0,83
	River discharges	Kt/y	Tab. 5.2.1.1.1				
	DIN PO_4	µM	17-26 0,2-0,5	11-14 0,6	11-12 0,6	8 0,5	8 0,5
	Nutrient ratios TN/TP DIN/DIP	M/M	65 47-225	24-33 27-38	24 26	18 20	18 20

Table 1: Assessment table, Brockmann, U., D. Topcu and M. Schütt: Assessment of the eutrophication status of the German Bight according to the OSPAR Comprehensive Procedure; OSPAR, ICG; COMP2:008Rev.1, ICG:COMP2:00109a-g; 54 pp; London, 2007

Baltic Sea

Title

Hydrochemistry - Baltic Sea

Guideline:

Various directives

Comments:

		Background value					Elevated value (1.5 x background value)				
Water type	Salinity Ø	TN [Year]	DIN [Winter]	NO_3 [Winter]	TP [Year]	PO_4 [Winter]	TN [Year]	DIN [Winter]	NO_3 [Winter]	TP [Year]	PO_4 [Winter]
B1	1,8-3,5	10	7	5	0,5-0,3	0,22-0,13	15	10,5	7,5	0,8-0,5	0,3-0,2
B2	5-18	13-8	8-6	5-3	0,6-0,3	0,26-0,14	20-12	12-9	7,5-4,5	0,9-0,5	0,4-0,2
B3	6,5-15	12-9	7	5	0,6-0,4	0,25-0,17	18-14	10,5	7,5	0,9-0,6	0,40-0,25
B4	10,5-20	10	7	5	0,6-0,5	0,24-0,18	15	10,5	7,5	0,9-0,8	0,36-0,27
Arkona Sea	7-9	10	2,5-2,0	2,5-2,0	0,45	0,30-0,25	15	3,8-3,0	3,8-3,0	0,70	0,45-0,38

The reference period applicable in each case is stated; winter: November - February

Table 1: Mean background and elevated values for nutrients (µM) in the coastal water types found in the Baltic Sea (Brockmann et al., 2005)

		Background value					Elevated value (1.5 x background value)				
Water type	Salinity Ø	TN [Year]	DIN [Winter]	NO_3 [Winter]	TP [Year]	PO_4 [Winter]	TN [Year]	DIN [Winter]	NO_3 [Winter]	TP [Year]	PO_4 [Winter]
B1	1,8-3,5	0,14	0,10	0,07	0,016-0,009	0,007-0,004	0,21	0,15	0,11	0,025-0,016	0,009-0,006
B2	5-18	0,18-0,11	0,11-0,08	0,07-0,04	0,019-0,009	0,008-0,004	0,28-0,17	0,17-0,13	0,11-0,06	0,028-0,016	0,012-0,006
B3	6,5-15	0,17-0,13	0,10	0,07	0,019-0,012	0,008-0,005	0,25-0,20	0,15	0,11	0,028-0,019	0,012-0,008
B4	10,5-20	0,14	0,10	0,07	0,019-0,016	0,007-0,006	0,21	0,15	0,11	0,028-0,025	0,0118-0,008
Arkona Sea	7-9	0,14	0,035-0,030	0,035-0,030	0,014	0,009-0,008	0,21	0,05-0,04	0,05-0,04	0,022	0,014-0,012

Table 2: Mean background and elevated values for nutrients (mg/L) in the coastal water types found in the Baltic Sea (Brockmann et al., 2005)

5 Quality assurance

- QUASIMEME (Quality Assurance Laboratory Performance Studies for Environmental Measurements in Marine Samples)
- Quality Assurance Panel (Quality Assurance Panel at the UBA (workshops, standardisation with DIN, CEN and ISO, support for the establishment of QM systems, drafting of sample SOPs, performance of audits))

Comments

The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the BLMP. Each of the monitoring institutions bears responsibility for establishing and administering its own quality management systems. The institutions involved in the BLMP coordinate their activities within the framework of the Working Group on Quality Assurance and the Ad Hoc Working Group on Nutrients and Plankton.

5.1 Monitoring institutions

- IOW
- LLUR
- BSH
- LUNG
- NLWKN
- AWI
- ARGE ELBE

5.2 Guidance documents

- *AQS-Merkblatt zu den Rahmenempfehlungen der Länderarbeitsgemeinschaft Wasser (LAWA) für die Qualitätssicherung bei Wasser-, Abwasser-, und Schlammuntersuchungen, 2004:* 'Kontrollkarten (A-2)'.
- *DEV zur Wasseruntersuchung, 1997: 39. und 45. Lieferung: I: Strategien für die Wasseranalytik: Verfahrensentwicklung, Validierung und Qualitätssicherung in der Routine;* 74 pp.
- BLMP Quality Assurance Panel at the UBA, 2004: Leitlinie zur Methodenvalidierung.
- BLMP Quality Assurance Panel at the UBA, 2008: *Muster-Qualitätsmanagementhandbuch für Laboratorien des Bund/Länder-Messprogramms nach DIN EN ISO/IEC 17025 (BLMP Sample Quality Management Manual)*; Version: 01 of 1 February 2008; Federal Environment Agency.
- HELCOM, COMBINE Manual, 'Annex B-10: Technical note on determination of nutrients'.
- HELCOM, COMBINE Manual, 'Annex B-11: Chemical analysis of anoxic waters'.
- HELCOM, COMBINE Manual, 'Annex B-15: Technical note on the measurement of pH in seawater.'.
- HELCOM, COMBINE Manual, 'Annex B-16: Technical note on the measurement of total alkalinity in seawater'
- HELCOM, COMBINE Manual, 'Annex B-18: Technical Note on the determination of organic carbon in seawater'
- HELCOM, COMBINE Manual, 'Annex B-9: Technical note on the determination of hydrographic parameters'.
- JAMP, ASMO, 1997: Eutrophication Monitoring Guidelines: Nutrients.
- JAMP, ASMO, 1997: Eutrophication Monitoring Guidelines: Oxygen.

5.3 Standards

- ISO 10304-1, 2007: Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate.
- DIN EN ISO 11732, 2005-05: Water quality - Determination of ammonium nitrogen - Method by flow analysis (CFA and FIA) and spectrometric detection.
- DIN EN ISO 13395, 1996-12: Water quality - Determination of nitrite nitrogen and nitrate nitrogen and the sum of both by flow analysis (CFA and FIA) and spectrometric detection.
- DIN EN ISO 15681-2, 2005-05: Water quality - Determination of orthophosphate and total phosphorus contents by flow analysis (FIA and CFA) - Part 2: Method by continuous flow analysis (CFA).
- DIN EN ISO 5667-3, 2004-05: Water quality - Sampling - Guidance on the preservation and handling of water samples (ISO 5667-3: 2003).
- ISO 5667-9, 1992-10: Water quality - Sampling - Part 9: Guidance on sampling from marine waters.
- DIN EN ISO 6878, 2004-09: Water quality - Determination of phosphorus - Ammonium molybdate spectrometric method.
- DIN EN ISO 10304-2, 1996-11: Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 2: Determination of bromide, chloride, nitrate, nitrite, orthophosphate and sulphate in waste water.
- DIN EN ISO 11905-1, 1998-08: Water quality - Determination of nitrogen - Part 1: Method using oxidative digestion with peroxodisulfate.
- DIN EN ISO 15681-1, 2005-05: Water quality - Determination of orthophosphate and total phosphorus contents by flow analysis (FIA and CFA) - Part 1: Method by flow injection analysis (FIA).
- DIN EN ISO 16264, 2004-05: Water quality - Determination of soluble silicates by flow analysis (FIA and CFA) and photometric detection.
- DIN EN 6777, 1993-04: Water quality - Determination of nitrite - Molecular absorption spectrometric method.
- DIN EN ISO/IEC 17025, 2005: General requirements for the competence of testing and calibration laboratories.

5.4 Current status

A BLMPStudy Group decision (2006) obliged the BLMP laboratories to establish DIN EN ISO/IEC 17025 quality management systems. For this purpose, a Sample Quality Management Manual was drawn up in 2006/2007 by the Quality Assurance Panel in cooperation with the Quality Assurance Sub-Working Group on Quality Management. This manual has been available for subscription from the Quality Assurance Panel at the UBA since mid-2008 and is to be used as the basis for internal QM documentation at laboratories. The manual is designed as a loose-leaf collection, so that regular updates can be added as required. The intention is for it to be gradually supplemented with sample SOPs coordinated within the BLMP as necessary. At present, no sample SOPs for nutrients are in preparation.

The BSH is already DIN EN ISO 17025 accredited.

Further basic requirements placed on quality assurance at the laboratories are the deployment of validated sampling and analysis methods, the use of certified reference materials and regular participation in intercalibration exercises.

Intercalibration exercises

- QUASIMEME intercalibration exercises: Nutrients in Sea Water, twice a year

Workshops

- UBA/BLMP-WS 2001: Analytical Procedures and Quality Assurance for the Determination of Nutrients, Heavy Metals and Organic Pollutants in Marine Water (report, 2001)

6 Literature

- Brockmann, U., Topcu, D. und M. Schütt, 2007: Assessment of the eutrophication status of the German Bight according to the OSPAR Comprehensive Procedure; OSPAR, ICG; COMP2:008Rev.1, ICG:COMP2:00109a-g; 54 pp; London, 2007.

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

7.2 Working steps required

Quality assurance

The establishment of DIN EN ISO/IEC 17025 quality management systems under the BLMP should be concluded by 1 January 2012.

A documented process for the verification and validation of testing procedures was drawn up in 2009 to complement the Sample Quality Management Manual. This process will be presented to the BLMP Study Group in February 2010 for approval.

The DIN EN ISO/IEC 17025 quality management system includes the following elements:

- documented validation/verification of the investigation methods deployed for the determination of performance characteristics,
- ongoing validation of the accuracy and precision of each procedure for the specific intended use, e.g. by the use of control charts and the deployment of (certified) reference materials, as far as possible,
- the qualification and regular training of personnel for the procedures deployed,
- the regular performance of internal and external audits,
- regular participation in national and international interlaboratory comparisons, intercalibration exercises, training courses and workshops, and their evaluation.

The laboratories must guarantee the prompt and complete communication of the investigation results to MUDAB on the basis of the MUDAB data formats, including the QA data that have been defined as a minimum, which meet international standards (ICES).

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 Secretariat-General 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) 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.

(4) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(5) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(6) 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.

(7) The Nitrates Directive requires the following activities connected with monitoring and reporting:

- drawing up and implementing suitable monitoring programmes to assess the effectiveness of action programmes,
- monitoring the nitrate concentration in fresh water and
- reviewing the eutrophic state of fresh surface waters, esturial waters and coastal waters.

(8) The Nitrates Directive formulates the following activities connected with monitoring and reporting:

- drawing up and implementing suitable monitoring programmes to assess the effectiveness of action programmes
- monitoring the nitrate concentration in fresh water and
- reviewing the eutrophic state of fresh surface waters, esturial waters and coastal waters.

(9) Annual surveying of surface runoff and riverine inputs of selected substances into the marine environment. See also the information on nutrients and pollutants. The parameters to be monitored under OSPAR are listed in the documents cited.

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

Monitoring Specifications

Date: 2010-03-03

Phytoplankton

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Flora - Phytoplankton

1.2 Definition

The totality of all vegetable organisms suspended in water that display no or only minimal active movement, so that changes of position - in particular in a horizontal direction - occur exclusively or quite overwhelmingly due to water currents.

1.3 Competent authority/ies

Federal Government:	UBA, BfN, BSH, BfG
Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLPV NI, NLWKN
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Nutrients and Plankton

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Article 10 (Establishment of environmental targets)

Article 11 (Monitoring programmes)

Article 8(1) (Assessment)

Comments

Description of the biological communities associated with the predominant seabed and water column habitats. This would include information on phytoplankton and zooplankton communities, including the species, and seasonal and geographical variability.

Article 9 (Determination of good environmental status)

WFD [2]

Article 8(1)

Comments

Under the WFD, phytoplankton must be investigated as a quality element in the context of surveillance monitoring in transitional and coastal waters, at least every six months to be precise (Annex V, 1.3.4). In the context of operative monitoring, phytoplankton represents an important indicator for eutrophication effects.

SWD

Articles 1, 2, 7 and Annex

Comments

The water quality of the shellfish waters must be monitored in order to guarantee the high quality of the shelled animals used for human consumption (shellfish and gastropods). The parameters to be monitored are listed in the Annex of the Shellfish Waters Directive, e.g. saxitoxin. Attention should accordingly be paid to toxin-producing species of algae when phytoplankton is monitored.

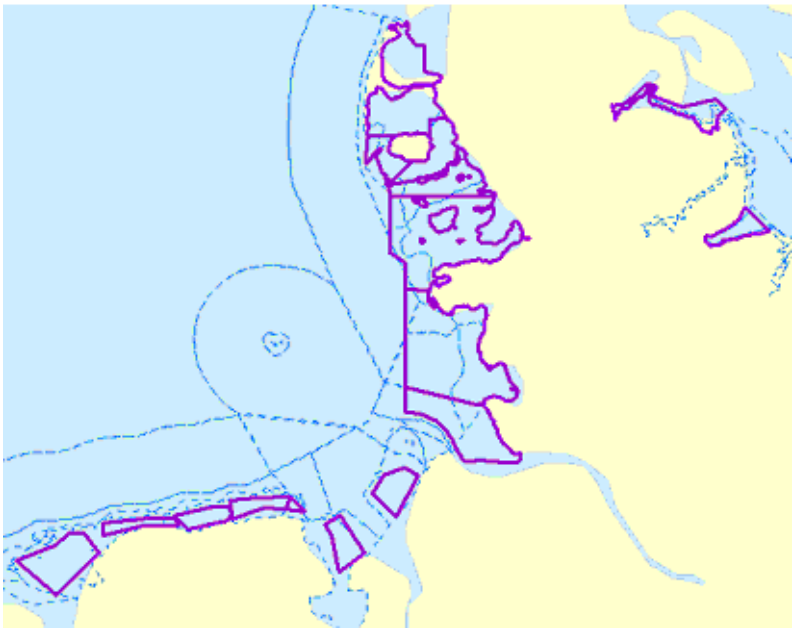

Figure 1: Shellfish waters in the North Sea and Baltic Sea (areas outlined in purple)

HELCOM

Baltic Sea Action Plan [3]

Comments

The Baltic Sea Action Plan, which is intended to ensure the Baltic Sea achieves a good ecological status by 2021, was adopted in November 2007. HELCOM will continue its long-standing activities identifying, monitoring and combating harmful influences on environmental quality in the Baltic Sea area.

See HELCOM Baltic Sea Action Plan

COMBINE

Comments

The main HELCOM monitoring activities are integrated under the COMBINE programme, which brings together the work done in the open sea and coastal waters. The COMBINE programme assesses the influence of the input of nutrients and other damaging substances on the ecosystem and identifies trends in the various compartments of the ecosystem, such as water, biota and sediment.

The German contribution to the monitoring of eutrophication and its effects: fixed sampling stations in the open sea, at which chlorophyll-a, species composition, the abundance of phytoplankton and biomass are investigated. A frequency of five times a year is specified for these investigations. In addition to this, it is recommended that further investigations be carried out with high frequencies (> 12 times a year).

Programme on Eutrophication and its Effects

Comments

Phytoplankton is regarded as one of the mandatory "core variables". It should be used to detect changes in biodiversity and the foodchain, as well as alterations in the population of primary producers. Particular attention should be devoted to immigrant species and toxic species.

OSPAR

JAMP Common Procedure

Comments

Procedure for the determination of the eutrophication status of the OSPAR marine region.

"7.5 For areas, including local areas located in wider non-problem areas, identified as problem or potential problem areas, a sufficient frequency and spatial coverage of all the parameters in the programme (chlorophyll a and indicator species) should be monitored and reported each year. For areas defined as non-problem areas, results relating to the monitoring of the assessment parameters listed in Category I should be reported once in 3 years." In this respect, levels of spatial and temporal resolution should be laid down specifically for each area. In the case of phytoplankton, the following indicator species should be investigated:

- Nuisance species: *Phaeocystis*, *Noctiluca*
- Potentially toxic species: *Chrysochromulina polylepis*, *Gymnodinium mikimotoi*, *Alexandrium* spp., *Dinophysis* spp., *Prorocentrum* spp.

Monitoring frequencies for the purposes of assessment under the OSPAR Common Procedure:

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

TMAP [4]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The "Common Package" takes the following parameters for phytoplankton into consideration:

- Species composition, abundances of dominant and selected species according to the OSPAR-JAMP Eutrophication monitoring guidelines: phytoplankton species composition,
- Biomass measured by chlorophyll a (JAMP Guidelines)

The investigations are required for the description of eutrophication status.

2.2 Environmental targets

MSFD

Article 1: 'This Directive establishes a framework within which Member States shall take the necessary measures to achieve or maintain good environmental status in the marine environment by the year 2020 at the latest.'

It is still necessary for environmental targets to be assessed and specified.

WFD

Good ecological status is defined as follows for transitional and coastal waters (see WFD, Annex V, 1.2.3 and 1.2.4):

1. Transitional waters:

'There are slight changes in the composition and abundance of phytoplanktonic taxa.'

2. Coastal waters:

'The composition and abundance of phytoplanktonic taxa show slight signs of disturbance.'

Furthermore, the following targets are set for transitional and coastal waters:

'There are slight changes in biomass compared to type-specific conditions. Such changes do not indicate any accelerated growth of algae resulting in undesirable disturbance to the balance of organisms present in the water body or to the quality of the water.

A slight increase in the frequency and intensity of the type-specific planktonic blooms may occur.'

HELCOM

The aim of the Baltic Sea Action Plan is to ensure the Baltic Sea has a good ecological status by 2021. HELCOM will continue its long-standing monitoring programme for the identification and monitoring of environmental quality in the Baltic Sea area.

The main HELCOM monitoring activities are integrated under the COMBINE programme, which brings together the work done in the open sea and coastal waters.

The aim of COMBINE is to determine the extent and effects of anthropogenic inputs of nutrients on marine biota (Combine Manual-Eutrophication Programme). See also: HELCOM EcoQOs.

OSPAR

Eutrophication strategy and Common Procedure

Assessment of the eutrophication status of the marine environment:

'The overall ecological objective is to achieve by the year 2010 a healthy marine environment where eutrophication does not occur.'

Ecological Quality Objectives

Eutrophication status of the North Sea:

'All parts of the North Sea should have by 2010 the status of non-problem areas with regard to eutrophication, as assessed under the OSPAR Common Procedure for the Identification of the Eutrophication Status of the OSPAR Maritime Area.'

The following ecological quality objectives have accordingly been set for phytoplankton:

1. Chlorophyll a - maximum and mean concentrations during the growing season should remain below a justified area-specific % deviation from the background not exceeding 50 %.

Apart from this, macrozoobenthos or fish should not be killed off as a result of eutrophication-related oxygen deficiency or toxic algae.

See also the specifications on Macrozoobenthos and the Ecological Quality Objectives (Annex 2).

In future, indicator species for eutrophication or maximum permissible abundances for nuisance and toxic species will be defined specifically for particular areas.

TMAP

Targets for water and sediment

'A Wadden Sea which can be regarded as a eutrophication non-problem area.'

Phytoplankton monitoring is carried out in order to survey the effects of changes in the inputs of nutrients:

See also TMAP Manual.

2.3 Threats

Phytoplankton (abundance and species spectrum) are threatened by:

- Eutrophication
- Ballast water, accidental introduction of alien species
- Climate change

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

North Sea

Phytoplankton monitoring is carried out by the following institutions in coastal waters: NLWKN (Lower Saxony Water Management, Coastal Defence and Nature Conservation Agency) in Lower Saxony; LLUR (State Agency for Agriculture, Environment and Rural Areas) in Schleswig-Holstein; and IOW (Institute for Baltic Sea Research Warnemünde on behalf of BSH) in coastal waters and the German Bight. The Wadden Sea Station Sylt of the Alfred Wegener Institute provides its data for the monitoring of the Schleswig-Hostein Wadden Sea. The Biologische Anstalt Helgoland of the Alfred Wegener Institute provides its data for the monitoring of the waters around Heligoland.

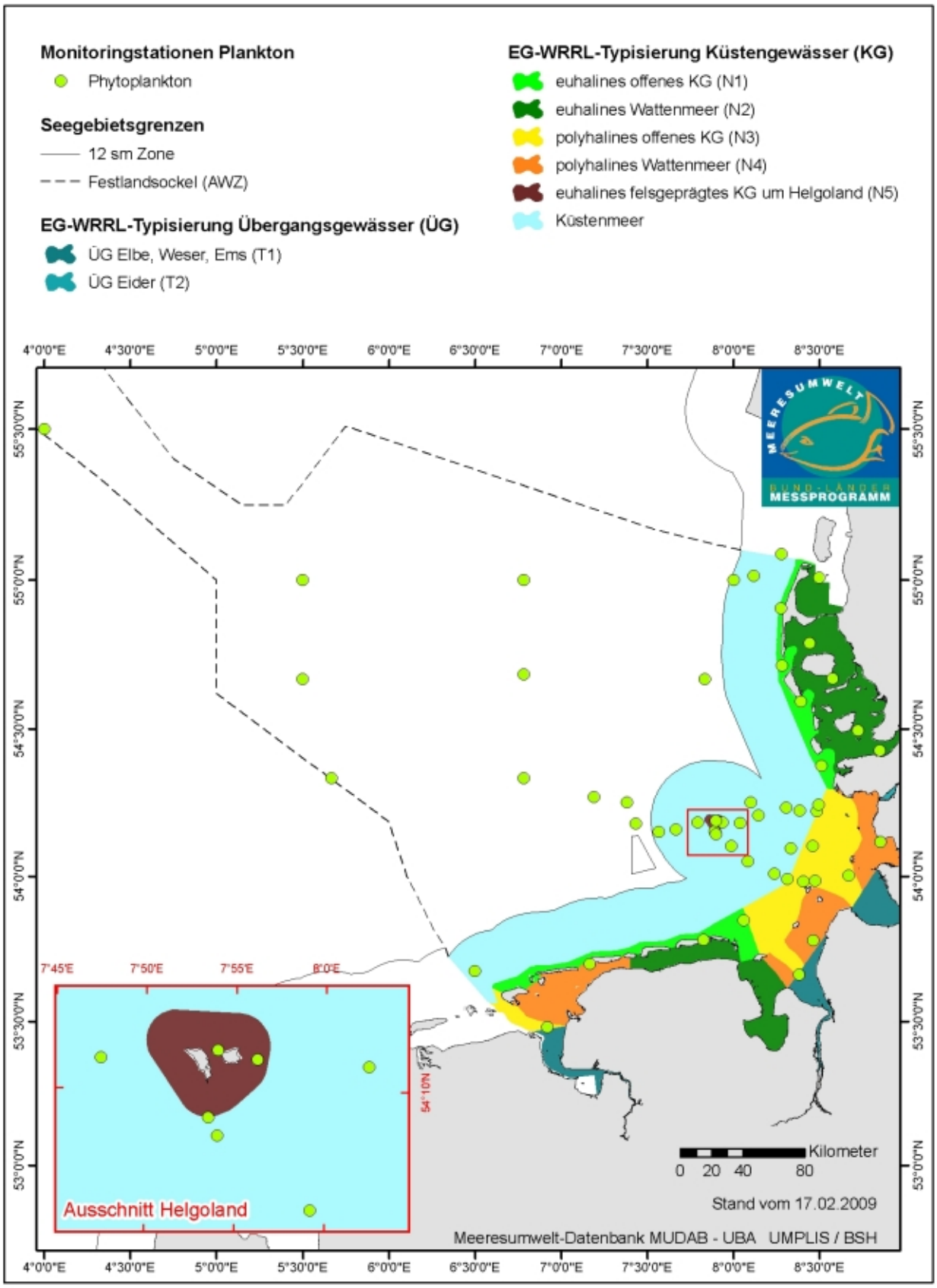

Figure 2: Map showing the stations intended for phytoplankton monitoring in the North Sea

Figure 2 as PDF-document

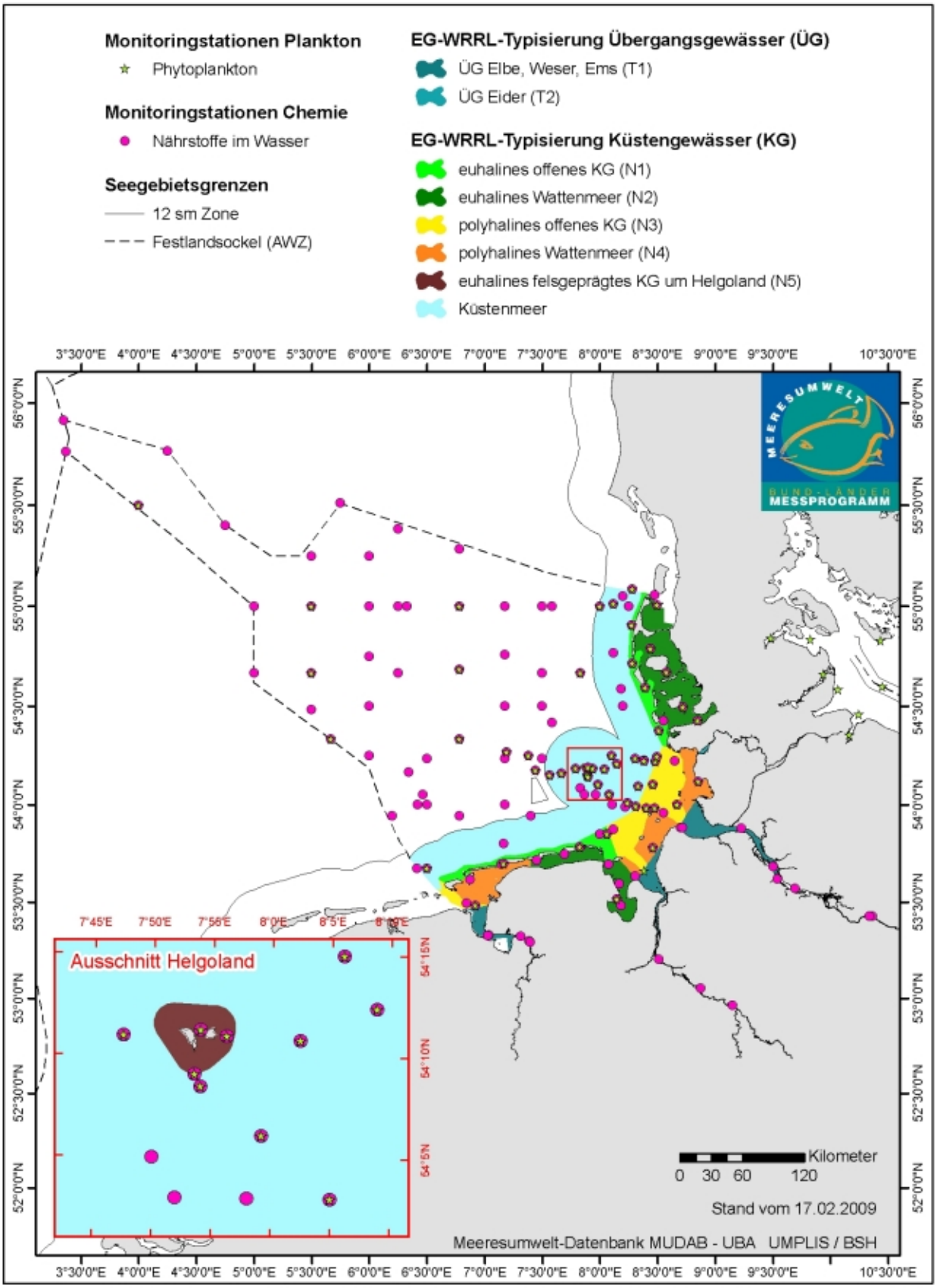

Figure 3: Map showing the stations intended for phytoplankton and nutrient monitoring in the North Sea

Figure 3 as PDF-document

Baltic Sea

Phytoplankton monitoring is carried out by the following institutions in coastal waters: LLUR (State Agency for Agriculture, Environment and Rural Areas) in Schleswig-Holstein; and LUNG (State Authority for Environment, Nature Protection and Geology) in Mecklenburg-Western Pomerania.

Monitoring in the open Baltic Sea (German EEZ) is carried out by IOW (Institute for Baltic Sea Research Warnemünde) on behalf of BSH as part of the monitoring activities for HELCOM. Five sea trips are undertaken each year for this purpose.

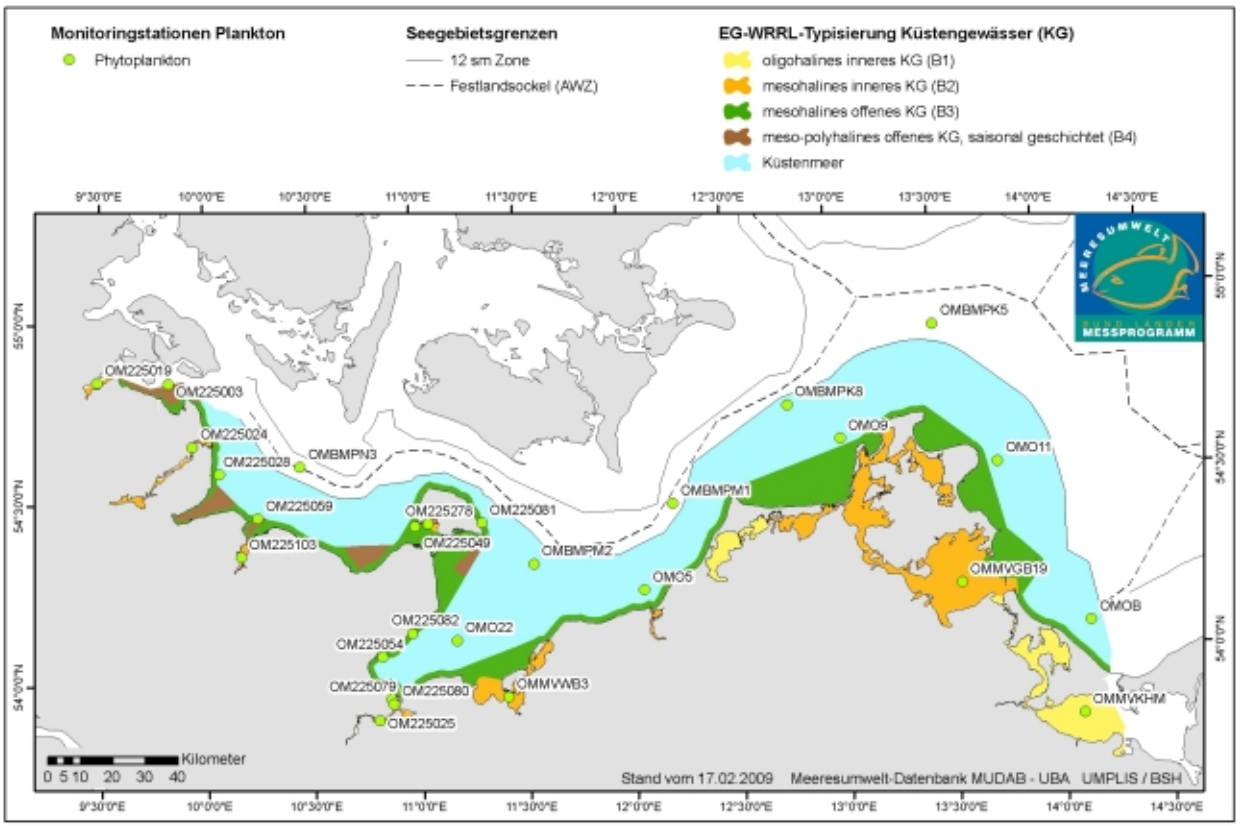

Figure 4: Map showing the stations intended for phytoplankton monitoring in the Baltic Sea

Figure 4 as PDF-Document

LUNG:

Eight monitoring stations: species spectrum, abundance and biovolume seven times a year
Sampling depth: 1 m.

3.2 Monitoring activities

North Sea and Baltic Sea

Phytoplankton

Methods:

Description of the methods

Phytoplankton samples are quantified microscopically in sedimentation chambers and Petri dishes. Apart from this, chlorophyll a content is determined as a measure of biomass.

The analysis of phytoplankton samples has to be undertaken in accordance with the sample standard operating procedure for laboratories involved in the German Marine Monitoring Programme (BLMP), which has been coordinated within the Programme: Testing Procedure SOP: Phytoplankton Investigations in Coastal Surface Waters (Qualitative and Quantitative), as most recently amended.

Zone:

Sublittoral

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Inputs of substances (rivers, atmosphere)
- NH4
- NO2
- NO3
- Oxygen content
- PO4
- Particulate nitrogen (PON)
- Particulate organic phosphorus (POP)
- Salinity
- Secchi depth
- SiO4
- Stratification conditions (temp., salinity)
- Temperature
- Total nitrogen (TN)
- Total organic carbon (TOC)
- Total phosphorus (TP)
- filterable substances (suspended matter)
- pH value

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

Assessment Procedure - Phytoplankton - Transitional Waters

Guideline:

Various directives

Comments:

Transitional waters are characterised by high concentrations of suspended matter and wide fluctuations in salinity, which worsen the growth conditions for phytoplankton. 'For these reasons, and in accordance with the current state of knowledge, it does not appear expedient to monitor the ecological status of a type 1 transitional water area using phytoplankton.' (ARGE-Elbe, 2005 and Sub-Working Group on Phytoplankton)

North Sea

Title

Assessment Procedure - Phytoplankton - North Sea

Guideline:

Various directives

Comments:

The assessment of the ecological status of the North Sea and its coastal waters is based on several pillars, as both a comprehensive assessment based on phytoplankton species composition of the kind required by the Water Framework Directive and the assessment required for the MSFD still remain to be carried out.

The assessments include 1) a comparison with derived and partly intercalibrated background values for phytoplankton biomass, 2) an assessment of the temporal development of phytoplankton biomass in time series, 3) a combined assessment of species composition and biomass during the spring bloom and 4) an intercalibrated assessment of *Phaeocystis* bloom frequency.

- (1) Brockmann et al. calculated background values for phytoplankton biomass (Brockmann et al., 2006, see Table 1) on the basis of an extensive, comprehensive data set (research and monitoring data), taking background values for riverine inputs (without human influences) into consideration. These values permit a comprehensive assessment to be carried out.

Table 1: Background values for the 90th percentile of phytoplankton biomass (µg/l) in coastal waters and the German Bight (Brockmann et al., 2006; Brockmann, personal communication).

Area	Type	Background	Transition to good status (+50%)	Transition to moderate status (+50%)	Intercalibrated
German Bight	Salt>32	3	4.5	6.8	No
Wadden Sea	NEA 1/26c	3.3	5	7.5	With DK
Wadden Sea	NEA 3/4	4.8	7.2	10.8	No

- (2) The two stations that have been recording time series in the Wadden Sea for the longest are Norderney (since 1987) and Sylt (since 1984). The highest levels of temporal resolution (> 50 observations/year) are achieved at these stations. This assessment supplements the assessment developed by Brockmann et al. by demonstrating a statistically significant correlation between inputs of nutrients from rivers and phytoplankton biomass (van Beusekom, 2008, see Figures. 5 and 6).

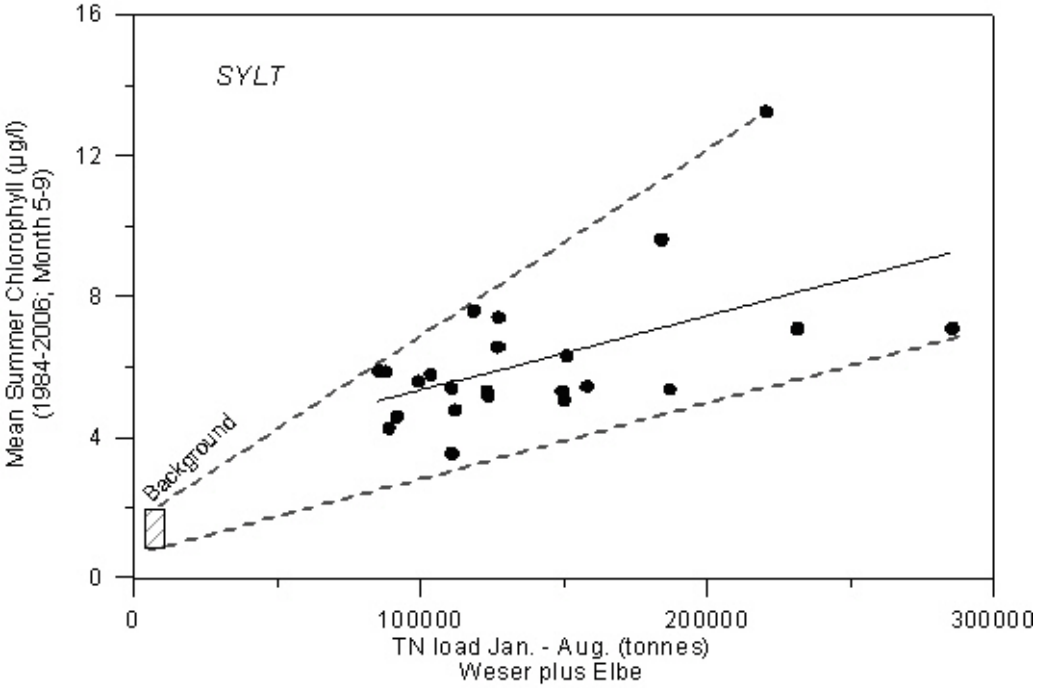

Abbildung 5: The correlation between mean phytoplankton biomass in summer in the Lister Tief (AWI long-term data, biomass as chlorophyll a, mean value for the months May to September) and the nitrogen loads of the rivers Weser and Elbe (sum of the months January to August)

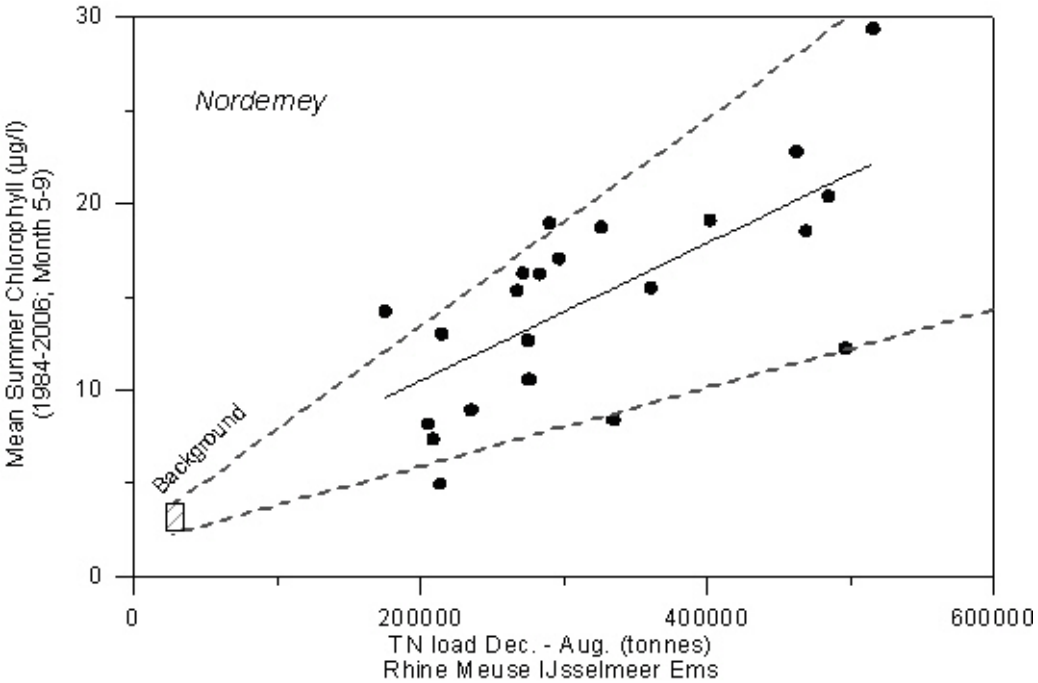

Abbildung 6: The correlation between the mean phytoplankton biomass in summer at Norderney (NLWKN long-term data, biomass as chlorophyll a, mean value for the months May to September) and the nitrogen loads of the rivers Rhine, Maas, IJsselmeer and Ems (sum of the months December of the previous year and January to August)

- (3) The Water Framework Directive requires an assessment based on phytoplankton species composition. Dürselen (2006) developed an assessment for spring phytoplankton on the basis of the available monitoring data, taking the background values determined by Brockmann et al. into consideration. The foundations for the assessment are chlorophyll a concentrations, total biovolume, the biovolume of Biddulphiales and the biovolume of individual indicator species; apart from this, the N and P conditions in the waters are also taken into consideration. The spring aspect (March to May) is examined because phytoplankton growth in spring builds on the accumulations of nutrients deposited in the water during the winter. This assessment system is currently being further developed in the light of the intercalibration process.

- (4) In parallel to the assessment by the multifactor assessment system based on Dürselen, coastal waters are categorised according to the limit values for *Phaeocystis* blooms and chlorophyll concentrations during the vegetation period generated during the intercalibration process.

Table 2: Assessment of the frequency of *Phaeocystis* blooms with cell count >10^6/l.

Gebiet	Type	Backround	Transition to good status (+50%)	Transition to moderate status (+50%)	Intercalibrated	Directive
Wadden Sea	NEA 3/4	8,3 %	9 %	17 %	Yes	WFD

The partly intercalibrated assessments based on background values (Brockmann et al.) and *Phaeocystis* bloom frequency are crucial because they are internationally intercalibrated. The assessment of the time series shows the correlation with riverine inputs and contributes to the assessment of the effectiveness of the measures taken in rivers. It has not yet been possible for an assessment based on species composition to be developed.

Directive: WFD, OSPAR

Baltic Sea

Title

Multifactor Assessment Procedure for the Parameters Species Spectrum and Biomass

Authors

Sagert et al. (2008, national)

Guideline:

Various directives

Comments:

Multifactor assessment procedure based on Sagert et al. (2008, national) for the parameters species spectrum and biomass: assessment by TN, chlorophyll a, sight depth, total biovolume, Cyanophyceae biovolume and Chlorophyceae biovolume.

The assessment of coastal waters in the Baltic Sea is also based on several approaches. A comprehensive assessment of the kind required by the WFD still remains to be undertaken. The different approaches are as follows:

- Multifactor assessment procedure based on Sagert/Selig (national) for species spectrum and biomass as parameters: assessment by taxonomic groups, TN, chlorophyll a and sight depth.
- Biomass (biovolume and C content) and species composition as parameters: after Wasmund et al. (2008) on the basis of historic data (national)
- Biomass as a parameter: intercalibrated as chlorophyll a within the Baltic GIG (international)
- HELCOM - EUTRO PRO (HEAT assessment tool). The development of this tool will be concluded in November.

Directive: WFD, HELCOM

There are various directives that have been developed either for coastal waters or the open sea.

They apply different categorisations for water quality assessment, e.g. the EU WFD uses a five-level scale, while the others merely use two classes.

These categorisations correspond as follows (excerpt from HELCOM, 2006, Figure 2.5):

EU Water Framework Directive (WFD)	**High (sehr gut)**	**Good (gut)**	**Moderate (mäßig)**	**Poor (unbefriedigend)**	**Bad (schlecht)**
HELCOM EUTRO (HELCOM 2006)	**Non-polluted water**		**Eutrophic conditions/polluted water**		
European Marine Strategy (EMS)	**Non-polluted water**		**Polluted water**		
HELCOM EcoQO project)[1]	**Non-polluted area**		**Polluted area**		
OSPAR COMPP)[2]	**Non-polluted area**		**Polluted area**		

)[1] Ecological Quality Objectives

)[2] OSPAR Comprehensive Procedure for the Identification of the Eutrohication Status of the Marine Area.

The strategy for the characterisation of water quality consists in defining a 'historic' background status, which is then to be restored. Deviations of up to 50 % from these background values (in terms of the phytoplankton parameters discussed here) would still be indicative of a good (non-polluted) status.

Re 1) Coastal waters:

Sagert et al. (2008) summarised data on possible background values for total nitrogen concentration (TN), chlorophyll a concentration (chl a) and sight depth (Secchi depth) from various sources, and determined correlations between them. In addition to this, the taxonomic composition of phytoplankton is also used as an indicator.

They summarise the results of their investigations in tables, which are reproduced here in Tables 4 and 5.

Table 4: Background values for chlorophyll a concentration (µg/l) in comparison to the basic variable TN (µmol/l) and the derived variables for class definition (sight depth (m) and percentage decline in sight depth relative to the relevant chlorophyll a value in comparison to the background value for sight depth (% s.d.)). In each case, the values give the boundary between two classes: H/G (High/Good), G/M (Good/Moderate), M/P (Moderate/Poor), P/B (Poor/Bad). *1 Kleines Haff, Peenestrom; *2

Type	PSU	Parameter	Background value	H/G	G/M	M/P	P/B
B1*1	0,5-5	TN	40	43	51	71	180
		Chl a*2	8,5	9,3	12,6	21,5	115
	1,8*5	Sight depth*3	2,5	2,2	1,7	1,1	0,3
		% s.d.	0	8	26	51	86
B2a	7,5*5	TN *6	14,5	15,4	18,5	25,6	71,0
		Chl a*2	1,6	1,8	2,4	4,1	21,5
		Sight depth*3	8,3	7,6	6,1	4,1	1,2
		% s.d.	0	8	27	51	86
B2b	13,7*5	TN *6	12,9	13,4	16,1	22,1	58,4
		Chl a*2	1,3	1,4	1,9	3,2	15,7
		Sight depth*3	9,8	9,0	7,2	4,9	1,5
		% s.d.	0	4-8	25-27	50	85
B3a	8,0*5	TN *6	14,0	14,6	18,0	24,3	64,5
		Chl a*2	1,5	1,6	2,3	3,8	18,5
		Sight depth*3	8,5	8,1	6,3	4,3	1,3
		% s.d.	0	3-7	26-28	50	85
B3b	13,1*5	TN *6	12,8	13,4	16,1	22,1	58,8
		Chl a*2	1,3	1,4	1,9	3,2	15,9
		Sight depth*3	9,7	9,0	7,2	4,9	1,5
		% s.d.	0	3-7	24-26	49-50	85
B4	10-20	TN *6	12,8	13,4	16,1	22,1	58,8
		Chl a*2	1,3	1,4	1,9	3,2	15,9
	15,7*5	Sight depth*3	9,7	9,0	7,2	4,9	1,5
		% s.d.	0	3-7	24-26	49-50	85
Calculated *Zostera* - B3b depth limit, salinity: 13.1 PSU; Equation 4 (Sagert et al., 2005)							
		Zc*4	9,3	8,6	6,7	4,2	0,6
Zostera - depth limit of concentrated populations (Schories et al., 2007)							
		Zc	>8,1	8,1	7,2	4,3	0,8

Table 5: Background values for total biovolume, the biovolume of Cyanophyceae and Cryptophyceae. The classes are defined on the basis of the class boundaries for TN set out in the table. In each case, the values give the boundary between two classes: H/G (High/Good), G/M (Good/Moderate), M/P (Moderate/Poor), P/B (Poor/Bad).

Type	Parameter	Background value	H/G	G/M	M/P	P/B
B1*1	TN [µmol l^{-1}]	40	43	51	71	180
	Biovolume [mm^3 l^{-1}]	1,8	2	2,5	3,9	13,3
	Cyanophyceae [mm^3 l^{-1}]	0,8	0,9	1,2	2,1	10,1
	Chlorophyceae [mm^3 l^{-1}]	-	-	0,1	0,3	1,9
B2a	TN [µmol l^{-1}]	14,5	15,4	18,5	25,6	71
	Biovolume [mm^3 l^{-1}]	0,48	0,52	0,66	1,01	3,89
	Cyanophyceae [mm^3 l^{-1}]	0,14	0,16	0,21	0,37	2,1
	Chlorophyceae [mm^3 l^{-1}]	-	-	0,02	0,03	0,27
B2b	TN [µmol l^{-1}]	12,9	13,4	16,1	22,1	58,4
	Biovolume [mm^3 l^{-1}]	0,4	0,45	0,55	0,85	3
	Cyanophyceae [mm^3 l^{-1}]	0,11	0,12	0,17	0,29	1,5
	Chlorophyceae [mm^3 l^{-1}]			0,01	0,02	0,18
B3a	TN [µmol l^{-1}]	14	14,6	18	24,3	64,5
	Biovolume [mm^3 l^{-1}]	0,45	0,5	0,65	0,95	3,4
	Cyanophyceae [mm^3 l^{-1}]	0,13	0,14	0,2	0,34	1,77
	Chlorophyceae [mm^3 l^{-1}]	-	-	0,01	0,03	0,22
B3b/B4	TN [µmol l^{-1}]	12,8	13,4	16,1	22,1	58,8
	Biovolume [mm^3 l^{-1}]	0,4	0,45	0,55	0,85	3
	Cyanophyceae [mm^3 l^{-1}]	0,11	0,12	0,17	0,29	1,52
	Chlorophyceae [mm^3 l^{-1}]	-	-	0,01	0,02	0,18

The background values for chlorophyll concentration are based on models or expert characterisations. Some of the background values for sight depth are based on historical data.

Re 2) The only reliable historical data on phytoplankton biomass and quantitative composition are from the coastal waters of the Kiel Bight (Wasmund et al., 2008). At the beginning of the 20th century, an average phytoplankton biomass (annual mean over the whole water column, in units of carbon) of 55 mg C/m^3 was determined in the Kiel Fjord, while the annual means for diatoms and dinoflagellates were roughly the same, and their sum constituted 90 % of the phytoplankton. The proportion of diatoms in the spring bloom was at least 80 %. These conditions were still found in the Flensburg Outer Fjord in the mid-20th century, so appear representative for the area.

Re 3) Table 6: The assessment of phytoplankton biomass (chlorophyll a) was intercalibrated internationally by the Baltic GIG for the water types (B3) B4 (international: CW B12b).

Background value	**High/Good**	**Good/Moderate**
1,2 (1,1 - 1,4)	1,3 (1,1 - 1,5)	1,9

Re 4) Neritic zone:

Binding European legislation for the open sea equivalent to the WFD is being developed (European Marine Strategy, EMS).

Various HELCOM projects, such as the Ecological Quality Objectives (EcoQOs), EUTRO and EUTRO-PRO are laying the foundations for the development of the HELCOM Eutrophication Assessment Tool (HEAT) and, ultimately, EMS as well.

Each of the Eutrophication Quality Objectives (EutroQOs) is determined by a background value and the acceptable deviation from this value.

The background paper drawn up by HELCOM EUTRO-PRO will be published in 2010. The relevant phytoplankton data for German outer coastal waters and open sea waters are set out here in advance in Table 7. The mean summer values (June-September) for sight depth and chlorophyll-a concentration (surface water) during the years 2003-2007 and the background value valid for the corresponding marine area are shown.

	Sight depth (m)		Chl. a conc. (µg/L)	
	2003 - 2007	Background value	2003 - 2007	Background value
Pomeranian Bay	4.9	8.5	6.7	1.5
Arkona Sea	N.m.		2	1
Darß-Zingst outer coast	4.7	9.7	1.9	1.3
Wismar Bight	3.5	9.7	5	1.3
Lübeck Bight	5.9	9.5	2.2	1.2
Mecklenburg Bight	N.m.		2	1
Fehmarn Belt	5.5	9.5	1.8	1.2
SW Kiel Bight	5.5	9.6	2	1.2
NW Kiel Bight & Flensburg Bight	6.2	9.7	2.2	1.2

N.m. = No adequate measured values

5 Quality assurance

- EQAT (phytoplankton, services provided by the State Reservoir Administration of Saxony (LTV) and the German Association for Drinking Water Reservoirs (ATT)))
- HELCOM (PEG training courses and intercalibration exercises)
- QUASIMEME (provider of intercalibration exercises: only chlorophyll a in concentrations < 5 µg/l)
- Quality Assurance Panel (at the UBA (workshops, intercalibration exercises, first draft of a species list, standardisation with DIN, CEN and ISO, support for the establishment of QM systems, drafting of sample SOPs, performance of audits))

Comments

The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the BLMP. Each of the monitoring institutions bears responsibility for establishing and administering its own quality management systems. The institutions involved in the BLMP coordinate their activities within the framework of the Working Group on Quality Assurance and the Quality Assurance Sub-Working Group on Plankton.

5.1 Monitoring institutions

- AWI
- IOW
- LLUR
- LUNG
- NLWKN

5.2 Guidance documents

- *AQS-Merkblatt zu den Rahmenempfehlungen der Länderarbeitsgemeinschaft Wasser (LAWA) für die Qualitätssicherung bei Wasser-, Abwasser-, und Schlammuntersuchungen, 2004:* 'Kontrollkarten (A-2)'.
- *DEV zur Wasseruntersuchung, 1997: 39. und 45. Lieferung: I: Strategien für die Wasseranalytik: Verfahrensentwicklung, Validierung und Qualitätssicherung in der Routine;* 74 pp.
- BLMP Quality Assurance Panel at the UBA, 2008: *Muster-Qualitätsmanagementhandbuch für Laboratorien des Bund/Länder-Messprogramms nach DIN EN ISO/IEC 17025 (BLMP Sample Quality Management Manual)*; Version: 01 of 1 February 2008; Federal Environment Agency.
- BLMP Quality Assurance Panel at the UBA, 2009: Prüfverfahren-SOP: Phytoplankton (Testing Procedure SOP: Phytoplankton); Federal Environment Agency (Version: 01 of 15 October 2009 in Member's Area).
- HELCOM, COMBINE Manual, 'Annex C-4: Phytoplankton chlorophyll a.'.
- HELCOM, COMBINE Manual, 'Annex C-5: Phytoplankton primary production.'.
- HELCOM, COMBINE Manual, 'Annex C-6: Phytoplankton Species composition, abundance and biomass.'.
- HELCOM: Checklist of Baltic Sea Phytoplankton Species.; Baltic Sea Environment Proceedings; 95; 2004)
- JAMP, 2004: *Guidelines on quality assurance for biological monitoring in the OSPAR area.*; ICES Techniques in Marine Environment Sciences; 32; 2004.
- JAMP, ASMO, 1997/5: Eutrophication monitoring guidelines - phytoplankton species composition..
- JAMP, ASMO, 1997: Eutrophication monitoring guidelines - chlorophyll a..

5.3 Standards

- DIN EN ISO 5667-3, 2004-05: Water quality - Sampling - Guidance on the preservation and handling of water samples (ISO 5667-3: 2003).
- ISO 5667-9, 1992-10: Water quality - Sampling - Part 9: Guidance on sampling from marine waters.
- DIN EN ISO/IEC 17025, 2005: General requirements for the competence of testing and calibration laboratories.
- DIN EN 14996, 2006: Water quality - Guidance on assuring the quality of biological and ecological assessments in the aquatic environment.
- DIN EN 15204: Water quality - Guidance standard on the enumeration of phytoplankton using inverted microscopy (Utermoehl technique).
- CEN, 2005: Water quality - Guidance on quantitative and qualitative sampling of marine phytoplankton (Draft).
- CEN, 2006: Phytoplankton biovolume determination using inverted microscopy (Utermöhl technique) (Draft).
- ISO 10260, 1992: Water quality - Measurement of biochemical parameters - Spectrometric determination of the chlorophyll-a concentration.
- DIN 38412-16, 1985: German standard methods for the examination of water, waste water and sludge; test methods using water organisms (group L); determination of chlorophyll a in surface water (L 16).

5.4 Current status

A BLMP Study Group decision (2006) obliged the BLMP laboratories to establish DIN EN ISO/IEC 17025 quality management systems. For this purpose, a Sample Quality Management Manual was drawn up in 2006/2007 by the Quality Assurance Panel in cooperation with the Quality Assurance Sub-Working Group on Quality Management. This manual has been available for subscription from the Quality Assurance Panel at the UBA since mid-2008 and is to be used as the basis for internal QM documentation at laboratories. The manual is designed as a loose-leaf collection, so that regular updates can be added as required. The intention is for it to be gradually supplemented with sample SOPs coordinated within the BLMP. As far as phytoplankton are concerned, Testing Procedure SOP: Phytoplankton Investigations in Coastal Surface Waters (Qualitative and Quantitative), Version: 01 of 15 October 2009, is already available. Testing Procedure SOP: Chlorophyll a Determination in Surface Waters is currently in preparation.

LUNG is already DIN EN ISO 17025 accredited.

Intercalibration exercises

- State Environmental Management Company Neusörnewitz, 2008: LÜRV B3 - Chlorophyll in Surface Water, 2008 (number of participating laboratories: 39, report: 2008)
- UBA/HELCOM/BLMP-RV, 2007: Phytoplankton Analysis 2007 (number of participating laboratories: 25, report: in preparation)
- German Association for Drinking Water Reservoirs, 2007: Phytoplankton Intercalibration Exercise (number of participating laboratories: 64, report: 2008)
- German Association for Drinking Water Reservoirs, 2005: Phytoplankton Intercalibration Exercise (number of participating laboratories: 21, report: 2006)
- HELCOM: PEG Phytoplankton Intercalibration 2003 (number of participating laboratories: 18, report: 2003)
- UBA/BLMP-RV, 2002: Comparability of Chlorophyll-a Determinations by Various Methods (number of participating laboratories: 11, report: November 2002)
- QUASIMEME intercalibration exercises: Chlorophyll a in Sea Water, twice a year
- UBA/BLMP-RV, 2001: Identification and Counting of Species in a Natural Phytoplankton Sample from the North Sea (number of participating laboratories: 12, report: 2001)
- BEQUALM: Phytoplankton Assemblage Analysis (number of participating laboratories: 42, report: 2001)
- BEQUALM: Phytoplankton Assemblage Analysis (number of participating laboratories: 40, report: 2000)
- HELCOM: PEG Phytoplankton Intercalibration 2000 (number of participating laboratories: 10, report: 2000)
- UBA/BLMP-RV, 1999: Identification of 20 Selected Species from the North Sea and Baltic Sea using Photographs (number of participating laboratories: 10, report: 1999)
- UBA/BLMP-RV, 1999: Identification and Counting of Four Selected Species from Algae Cultures (number of participating laboratories: 10, report: 1999)
- Third Biological Intercalibration Workshop (HELCOM), 1990, Visby (number of participating laboratories: 10, report: 1991)
- Second Biological Intercalibration Workshop (HELCOM), 1982, Rønne (Denmark) (number of participating laboratories: 7, report: 1982)
- Biological Workshop (HELCOM), 1979, Baltic Marine Environment Protection Commission, Stralsund (number of participating laboratories: 11, report: 1980)

Workshops

- UBA/BLMP-WS: Identification and Taxonomy of Marine Diatoms (2007)
- UBA/BLMP-WS: Identification and Taxonomy of Marine Dinoflagellates (2003)
- UBA/BLMP-WS: Taxonomy of Cyanobacteria and Coccal Green Algae and their Distribution in the Baltic Sea (2000)
- UBA/BLMP-WS: Small Naked Flagellates (1998)
- UBA/BLMP-WS: Processing of Hard-to-Identify Species (1998)

6 Literature

- HELCOM, (in preparation): *Integrated Thematic Assessment of Eutrophication in the Baltic Sea (HELCOM EUTRO-PRO)*
- HELCOM, 2006: *Development of tools for assessment of eutrophication in the Baltic Sea. Baltic Sea;* Baltic Sea Environment Proceedings; 104.
- Sagert, S., Selig, U. and H. Schubert, 2008: 'Phytoplanktonindikatoren zur ökologischen Klassifizierung der deutschen Küstengewässer der Ostsee'; *Rostocker Meeresbiol. Beitr.*; 20: pp. 45 - 69.
- Wasmund, N., Göbel, J. and B. v. Bodungen, 2008: `100-years-changes in the phytoplankton community of Kiel Bight (Baltic Sea)'; *J. Mar. Syst.*

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

7.2 Working steps required

If the current monitoring proposal is to be adapted and its implementation ensured, it will be necessary to secure the human and material resources this will require. In addition to this, the following measures are necessary:

Assessment

There is still no comprehensive assessment available for the WFD. In particular, the assessment based on phytoplankton species composition needs to be further developed. The assessments proposed by Dürselen (2006), Wasmund et al. (2008) and Sagert et al. (2008) need to be put through field testing. The assessment procedures must be developed at the national and international levels by the GIG groups.

According to the GIG, the other phytoplankton parameters should also be assessable by 2012 in addition to chlorophyll a (see WFD, abundance, composition, blooms). However, there is no data basis for the corresponding concepts, which means the sampling network and the quality of the sampling will have to make up for this deficiency.

There is still no assessment system available for the MSFD. An initial assessment and a description of good environmental status will have to be drawn up and environmental targets set by 2012.

Spatial and temporal resolution

The logistic effort involved in the concept that has been described for the implementation of the WFD monitoring requirements is difficult to afford, in particular with regard to the temporal resolution of ship-based measurements.

Due to the very great degree of effort required, the results of the first tests should be evaluated in the light of the following questions in order to minimise the monitoring effort:

- To what extent are measurements needed in winter?
- Would monthly measurements during the period from May to September be sufficient for the purposes of assessment?
- Can results from high-frequency permanent monitoring stations (>= 26 measurements per year) be used as supplementary information in order to reduce the monitoring frequency in the neighbouring water bodies or groups of water bodies? In order to increase the spatial and temporal resolution of phytoplankton data, the sampling should therefore be coordinated between the Länder so that it can be carried out with a division of labour between them.

Apart from this, it is necessary to use other procedures to supplement the ship-based measurements:

- Above all, remote sensing data should also be taken into consideration in off-shore waters in future.
- In so far as this would be expedient and technically possible at the stations in question, permanent monitoring stations should be upgraded with facilities for the measurement of chlorophyll content in order to obtain, e.g., data on bloom development with high levels of temporal resolution. This methodology is to be implemented in coastal waters, in particular, because remote sensing still cannot be applied there.
- Apart from this, research ships, official ships and ferries with automatic monitoring facilities (e.g. FerryBox) should be integrated into the system.

Quality assurance

The establishment of DIN EN ISO/IEC 17025 quality management systems under the BLMP should be concluded by 1 January 2012. By then, apart from the development of uniform quality standards (QM system), efforts should also be made to ensure that the participating institutions work largely in accordance with shared guidelines when the SOPs are being drafted. To this end, the following SOP for phytoplankton investigations is to be drawn up to supplement the Sample Quality Management Manual:

- SOP: Chlorophyll a Determination in Surface Waters ¿ completion planned for the first six months of 2010

The DIN EN ISO/IEC 17025 quality management system includes the following elements:

- documented validation/verification of the investigation methods deployed for the determination of performance characteristics,
- ongoing validation of the accuracy and precision of each procedure for the specific intended use, e.g. by means of control charts and the deployment of (certified) reference materials, as far as possible,
- the qualification and regular training of personnel for the procedures deployed,
- the regular performance of internal and external audits,
- regular participation in national and international interlaboratory comparisons, intercalibration exercises, training courses and workshops, and their evaluation.

The laboratories must guarantee the prompt and complete communication of the investigation results to MUDAB on the basis of the MUDAB data formats, including the QA data that have been defined as a minimum, which meet international standards (ICES).

Further steps to be taken as of 2010:

- Provision of the uniform species list including synonyms via the QA information system
- Drawing up of agreements on taxa that cannot be identified to species level
- List of independent experts for cases where identification is problematic
- Alternating workshops on taxonomic questions, methodology and evaluation procedures (to guarantee uniform minimum quality standards at all laboratories) and intercalibration exercises to ensure that, if possible, some form of external QA can be offered once a year (in this connection, of course, international workshops and intercalibration exercises that allow the UBA Quality Assurance Panel to hold events less frequently have to be taken into consideration). These activities are to be documented adequately and promptly.
- Establishment of a data management system for all participating institutions within the framework of the work of the Working Group on Data Management

Since workshops and intercalibration exercises cannot be offered annually by the Quality Assurance Panel (Biology Section), regular interlaboratory comparison analyses should be organised bilaterally and independently between the laboratories, the results of which should be presented and discussed in the Working Group on Quality Assurance or its sub-working groups.

Research needed

- Development of quick testing procedures for the analysis of algal toxins so that sampling only has to be initiated when this is needed (i.e. a limit value is exceeded).
- Quick tests for the automatic surveying of indicator species by means of molecular-biological techniques.
- Investigations of trigger factors (temperature) and control factors (grazing) in order to isolate the point at which the spring phytoplankton bloom commences.
- The precise pattern of conditions that leads to the development of summer blue algae blooms is a subject of international research. At present, it is not possible to make any statements concerning defined radiation, nutrient and wind conditions in the Baltic Sea (cf. Wasmund, 1997, Lips, 2005), so research continues to be needed.
- An initial assessment must be carried out for the MSFD. This assessment will be the foundation for the drafting of ecological quality objectives and corresponding observation programmes.
- An assessment based on species composition and the abundance of phytoplankton must be drawn up for the . Further research is needed in this field. The Alfred Wegener Institute holds very old data (going back to the beginning of the 20th century) and comprehensive time series on phytoplankton biodiversity (net phytoplankton), which could form the foundation for such an assessment.
- Integration of classic monitoring and automatic measuring procedures within a data-assimilating ecosystem model.

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) 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.

(3) Baltic Sea Action Plan, HELCOM 2007

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

Monitoring Specifications

Date: 2010-01-27

Zooplankton

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Fauna - Zooplankton

1.2 Definition

Mesozooplankton (200 - 2000 µm) and macrozooplankton (2 - 20 mm)

1.3 Competent authority/ies

Federal Government:	UBA, BSH
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN
Schleswig-Holstein:	LLUR

1.4 Working group

Ad Hoc Working Group on Nutrients and Plankton

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Article 10

Comments

(Establishment of environmental targets)

Article 11 [2]

Comments

(Monitoring programmes)

Article 8(1) [3]

Comments

(Assessment)

A description of the biological communities associated with the predominant seabed and water column habitats. This would include information on the phytoplankton and zooplankton communities, including the species and seasonal and geographical variability. The results of the monitoring are required for the initial assessment of marine waters.

See MSFD, Annex III

Article 9

Comments

(Determination of good environmental status)

HELCOM

COMBINE

Comments

COMBINE programme for the monitoring of eutrophication and its effects: spatial and temporal variability of plankton:

- species composition,
- abundance and
- biomass of mesozooplankton as a secondary eutrophication effect and for the characterisation of water masses.

On the German side, investigations are carried out in the following areas: Eastern Gotland Basin, southern Central Baltic Sea, Arkona Basin and Mecklenburg Bight.

COMBINE manual: German contribution to the monitoring of eutrophication and its effects:

Fixed sampling stations in the open sea, at which the species composition and abundance of mesozooplankton are investigated.

OSPAR

JAMP Common Procedure

Comments

Common Procedure for the Identification of the Eutrophication Status of the OSPAR Maritime Area.

The Comprehensive Procedure is to be applied in all areas that have been identified as (potential) problem areas with regard to eutrophication. It encompasses zooplankton grazing, which is included in the "checklist of qualitative parameters for a holistic assessment" as a supporting factor.

ICES

Working Group on Integrated Coastal Zone Management

Comments

Zooplankton are clearly affected by changes in temperature: "Zooplankton seems sensitive to environmental changes, and these could be used as an indicator for climate change or other impacts." (Working group on integrated coastal zone management - ICES, 2006)

Technical necessity

Zooplankton exhibit important interactions with other biological components, such as fish for example. The zooplankton data from the Heligoland-Reede Station allow clear correlations with the development of individual fish populations (e.g. sand eels) to be identified. This makes it possible to forecast the development of sand eel populations with a probability of 95 %.

2.2 Environmental targets

MSFD

'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 […], taking into account the […] characteristics set out in Annex IV.' (Article 10)

HELCOM

HELCOM Ecological Quality Objectives:

'Thriving and balanced communities of plants and animals¿. Indicator: "Zooplankton community structure".

OSPAR

Eutrophication Strategy and Common Procedure

Assessment of the eutrophication status of the marine environment:

'The overall objective is the achievement in 2010 of a healthy marine environment where eutrophication does not occur'

Ecological Quality Objectives

Eutrophication status of the North Sea:

'All parts of the North Sea should have by 2010 the status of non-problem areas with regard to eutrophication, as assessed under the OSPAR Common Procedure for the Identification of the Eutrophication Status of the Ospar Maritime Area.'

2.3 Threats

Eutrophication

2.4 Spatial allocation

	EEZ	12- nm zone	Coastal waters 1)	Transitional waters
MSFD	x	x	-	-
Birds Directive	-	-	-	-
HD	-	-	-	-
WFD	-	-	-	-
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

The monitoring network covers the open North Sea and the open Baltic Sea. The WFDdoes not provide for the monitoring of zooplankton. Nor has it been part of the monitoring programme in coastal waters to date. As far as coastal waters are concerned, the time series administered by AWI and IOW are available.

North Sea

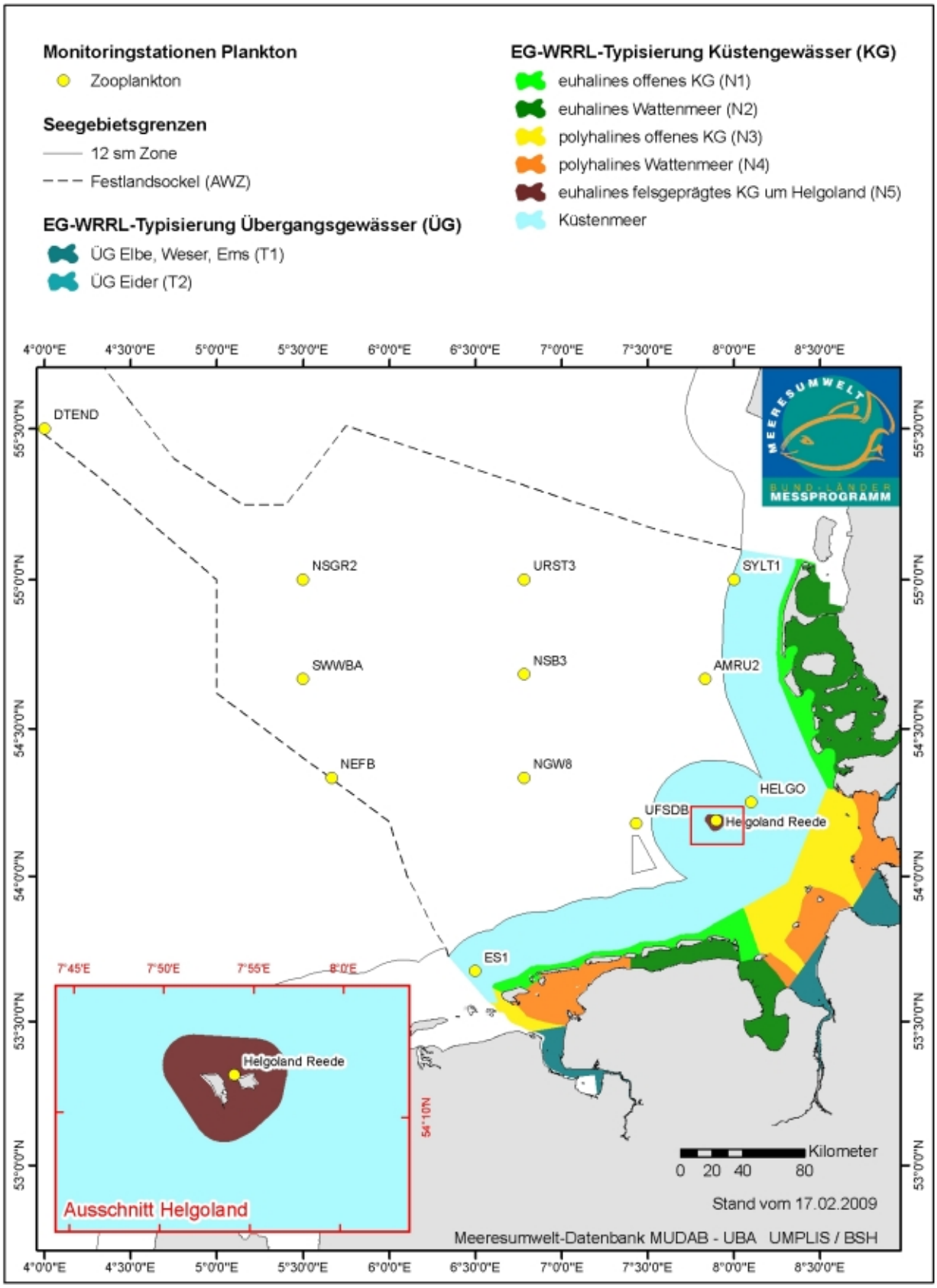

Figure 1: Map showing the stations intended for zooplankton monitoring in the North Sea

Figure 1 as PDF-document

Baltic Sea

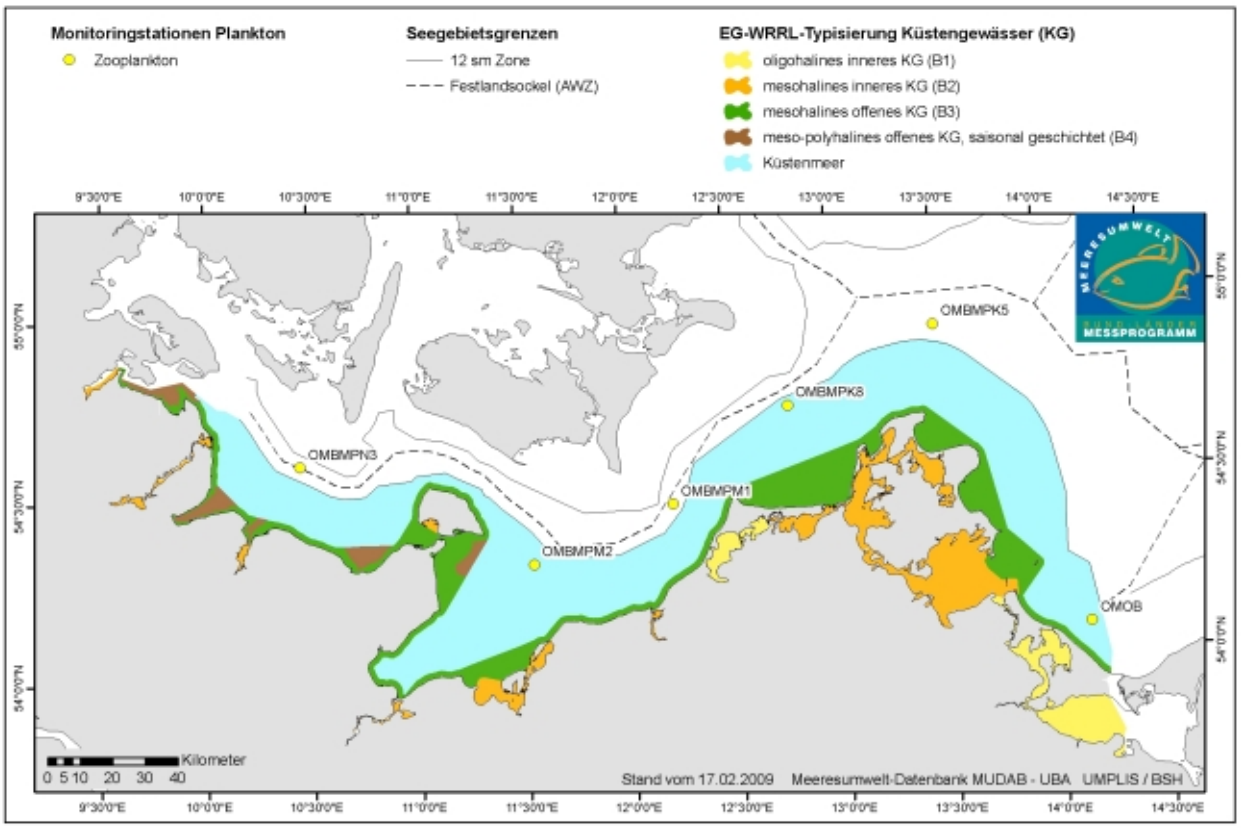

Figure 2: Map showing the stations intended for zooplankton monitoring in the Baltic Sea

Figure 2 as PDF-Document

3.2 Monitoring activities

North Sea and Baltic Sea

Zooplankton - North Sea and Baltic Sea

Methods:

The analysis of zooplankton samples has to be undertaken in accordance with the sample standard operating procedure for laboratories involved in the German Marine Monitoring Programme (BLMP), which has been coordinated within the Programme: Testing Procedure SOP: Mesozooplankton Surveying in Marine Waters (Not including Inner Coastal Waters).

Current methods should only be retained in justified exceptional cases where they are used for ongoing long-term monitoring series.

Frequency:

Under the COMBINE programme, zooplankton are monitored five times a year as a core variable in the Baltic Sea. In addition to this, HELCOM recommends a monitoring frequency of at least 12 measurements a year for high-frequency measurements, while measurements should be taken weekly during the vegetation period.

However, this frequency is not sufficient because the development of zooplankton displays very strong seasonal and, in particular, interannual fluctuations. Monitoring series with frequencies of more than 52 samples a year are required for any valid interpretation. In this respect, a few stations operating at high frequencies should be preferred to many stations operating at low monitoring frequencies.

Zooplankton are monitored five times a year in the North Sea under the auspices of the BSH-IOW monitoring programme. AWI provides its data (when available). AWI takes samples weekly in the North Frisian Wadden Sea, and three times a week at Heligoland.

Parameter:

- Abundance (fauna)
- Biomass
- Species spectrum

Zone:

Sublittoral

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Nutrients
- Phytoplankton (biomass, species composition)
- Salinity
- Temperature

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

Zooplankton

Guideline:

Various directives

Comments:

No assessment procedure is available. Evaluations of time series show a strong temperature effect, above all.

5 Quality assurance

- HELCOM (ZEN training courses and intercalibration exercises)
- Quality Assurance Panel (at the UBA (research projects for the validation of methods, intercalibration exercises, standardisation with DIN, CEN and ISO, support for the establishment of QM systems, drafting of sample SOPs, performance of audits))

Comments

The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the BLMP. Each of the monitoring institutions bears responsibility for establishing and administering its own DIN EN ISO/IEC 17025 quality management systems. The institutions involved in the BLMP coordinate their activities within the framework of the Working Group on Quality Assurance and its sub-working groups.

5.1 Monitoring institutions

- IOW
- Senckenberg
- AWI
- FTZ

5.2 Guidance documents

- *AQS-Merkblatt zu den Rahmenempfehlungen der Länderarbeitsgemeinschaft Wasser (LAWA) für die Qualitätssicherung bei Wasser-, Abwasser-, und Schlammuntersuchungen, 2004:* 'Kontrollkarten (A-2)'.
- *DEV zur Wasseruntersuchung, 1997: 39. und 45. Lieferung: I: Strategien für die Wasseranalytik: Verfahrensentwicklung, Validierung und Qualitätssicherung in der Routine;* 74 pp.
- BLMP Quality Assurance Panel at the UBA, 2008: *Muster-Qualitätsmanagementhandbuch für Laboratorien des Bund/Länder-Messprogramms nach DIN EN ISO/IEC 17025 (BLMP Sample Quality Management Manual)*; Version: 01 of 1 February 2008; Federal Environment Agency.
- HELCOM, *COMBINE Manual*, 'Annex C-7: Mesozooplankton'.
- JAMP, 2004: *Guidelines on quality assurance for biological monitoring in the OSPAR area.*; ICES Techniques in Marine Environment Sciences; 32; 2004.

5.3 Standards

- DIN EN ISO 5667-3, 2004-05: Water quality - Sampling - Guidance on the preservation and handling of water samples (ISO 5667-3: 2003).
- ISO 5667-9, 1992-10: Water quality - Sampling - Part 9: Guidance on sampling from marine waters.
- DIN EN ISO/IEC 17025, 2005: General requirements for the competence of testing and calibration laboratories.
- DIN EN 14996, 2006: Water quality - Guidance on assuring the quality of biological and ecological assessments in the aquatic environment.

5.4 Current status

A BLMP Study Group decision (2006) obliged the BLMP laboratories to establish DIN EN ISO/IEC 17025 quality management systems. For this purpose, a Sample Quality Management Manual was drawn up in 2006/2007 as part of the BLMP process. This manual has been available for subscription from the Quality Assurance Panel at the UBA since mid-2008 and is to be used as the basis for internal QM documentation at laboratories. The manual is designed as a loose-leaf collection, so that regular updates can be added as required. The intention is for it to be gradually supplemented with sample SOPs coordinated within the BLMP. As far as zooplankton are concerned, SOP: Mesozooplankton Surveying in Marine Waters (Not including Inner Coastal Waters) is currently in preparation.

Intercalibration exercises

- UBA/HELCOM/BLMP-RV: Zooplankton Analysis 2007/2008 (number of participating laboratories: 22, report: 2009)
- Baltic Sea Mesozooplankton Ring Test (number of participating laboratories: 10, report: 2004)

Workshops

- ICES/HELCOM: Workshop on QA of Biological Measurements in the Baltic (1996)
- HELCOM Working Group on Zooplankton: Third Biological Intercalibration Workshop (1990)
- HELCOM Working Group on Mesozooplankton: Second Biological Intercalibration (1982)
- First Biological Workshop, Baltic Marine Environment Protection Commission (1979)

6 Literature

- Telesh, I., Postel, L., Heerkloss, R., Mironova, E., Skarlato, S., 2008: *Zooplankton of the Open Baltic Sea: Atlas*; BMB Publication; 20; Meerswiss. Ber.; Warnemünde; 73: pp. 1 - 251.

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

Action should be taken to ensure that the long-term series at Heligoland-Reede is continued and anchored as an important component of German marine monitoring.

Long-term series for the surveying of zooplankton with a monitoring frequency of >= 52/year should be established in the following areas:

- Lower Saxon Wadden Sea
- Schleswig-Holstein Baltic Sea coast

The frequency quoted is necessary if it is to be possible to record the interannual and seasonal variability of zooplankton in the data analysis and take account of it in the evaluation.

With regard to the data collected to date, a comprehensive evaluation that examines correlations with the development of fish populations is necessary. Apart from this, the influence of the inflow from the Elbe on the variability of zooplankton at the Heligoland-Reede station should be given greater attention.

7.2 Working steps required

Priorities

There is still no assessment of ecological status for zooplankton. This is necessary, in particular, for the assessment required by the MSFD.

An appropriate assessment concept that includes zooplankton as a 'supporting parameter' is required for the assessment of the eutrophication status of the North Sea under the Common Procedure (see also Phytoplankton, Macrophytes und Macrozoobenthos).

Upgrading of monitoring stations to take high-frequency measurements.

The data series from Heligoland-Reede should have been evaluated more comprehensively, in particular as regards correlations with the development of fish populations. Another deficiency of this time series is the inadequacy of the evaluation as far as water bodies and salinity are concerned.

The high-frequency, long-term zooplankton series at Heligoland-Reede (>= 52 measurements a year) should definitely be continued, and its methodological and personnel continuity secured.

General

Judged in the light of their great ecological significance (see Necessity), the role played by zooplankton as a component of the marine environment has been accorded a very low priority to date in the context of marine monitoring. It is therefore important that zooplankton are also investigated intensively over the long term using methods that go beyond the requirements of the relevant directives. A concept is therefore being proposed in which zooplankton monitoring would be expanded with further high-frequency monitoring stations (see 3, Monitoring concept).

Assessment

Until now, there has been no assessment of zooplankton as an environmental indicator. Such an assessment is required under OSPAR, HELCOM and the MSFD. In certain circumstances, the monitoring concept will have to be amended in response to this assessment.

Quality assurance

The establishment of DIN EN ISO/IEC 17025 quality management systems under the BLMP should be concluded by 1 January 2012.

In this context, apart from the development of uniform quality standards (QM system), efforts should also be made to ensure that the participating institutions work largely in accordance with shared guidelines when the SOPs are being drafted. To this end, the current Sample Quality Management Manual is to be adapted and the following SOP for zooplankton investigations drawn up:

- SOP: Mesozooplankton Surveying in Marine Waters (Not including Inner Coastal Waters) - completion planned for first six months of 2010

The DIN EN ISO/IEC 17025 quality management system includes the following elements:

- documented validation/verification of the investigation methods deployed for the determination of performance characteristics,
- ongoing validation of the accuracy and precision of each procedure for the specific intended use, e.g. by means of the use of control charts and the deployment of (certified) reference materials, as far as possible,
- the qualification and regular training of personnel for the procedures deployed,
- the regular performance of internal and external audits,

- regular participation in national and international interlaboratory comparisons, intercalibration exercises, training courses and workshops, and their evaluation.

The laboratories must guarantee the prompt and complete communication of the investigation results to MUDAB on the basis of the MUDAB data formats, including the QA data that have been defined as a minimum, which meet international standards (ICES).

Further steps to be taken as of 2009:

- Provision of the uniform species list including synonyms via the QA information system
- Drawing up of agreements on taxa that cannot be identified to species level
- List of independent experts for cases where identification is problematic
- Alternating workshops on taxonomic questions, methodology and evaluation procedures (to guarantee uniform minimum quality standards at all laboratories) and intercalibration exercises to ensure that, if possible, some form of external QA can be offered once a year (in this connection, of course, international workshops and intercalibration exercises that allow the UBA Quality Assurance Panel to hold events less frequently have to be taken into consideration). These activities are to be documented adequately and promptly.
- Establishment of a data management system for all participating institutions within the framework of the work of the Working Group on Data Management

Since workshops and intercalibration exercises cannot be offered annually by the Quality Assurance Panel (Biology Section) and, like those for phytoplankton, the long-term zooplankton series display effects that depend on the individuals who process the samples, regular interlaboratory comparison analyses should be organised bilaterally and independently between the laboratories that carry out zooplankton investigations, the results of which should be presented and discussed in the Working Group on Quality Assurance. As a matter of principle, attention is to be paid to continuity among the staff involved in the processing of long-term monitoring series, as well as steps to ensure they are appropriately qualified. Staff should make active use of the HELCOM MONAS Zooplankton Expert Network as a forum for the discussion of technical issues.

Methodology

Methods with which additional information can be used to address 'undersampling' (deployment of sediment traps and acoustic procedures) should definitely be tested. Processing capacities will be required temporarily for the evaluation of the present test series.

Long-term data series

The high-frequency, long-term zooplankton series at Heligoland-Reede (>= 52 measurements a year) should definitely be continued, and its methodological and personnel continuity ensured. As an alternative, it is to be recommended that the series be continued in close cooperation with BSH and the Federal Research Centre for Fisheries. This would establish close links with the work being done in the field of fisheries.

As yet, the data series has still not been comprehensively evaluated, in particular with regard to correlations with the development of fish populations. Another deficiency of this time series is the inadequacy of the evaluation as far as water bodies and salinity levels are concerned.

Data management

Decisive progress in this direction is achievable, in particular if the data are made available to the wider research community. It should be guaranteed as a matter of course that the data producers will be involved when these data are used in order to rule out erroneous inferences during the interpretation of the figures. A future data management system that reflects concerns specific to zooplankton could support this development.

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 Secretariat-General 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) 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.

Monitoring Specifications

Date: 2010-02-22

Birds

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Fauna - Birds

1.2 Definition

Seabirds and coastal birds, in particular the target species for marine and coastal SPAs and species typical of the relevant HD habitat types, as well as all further species listed in Annex I of the Birds Directive and regularly occurring species of migratory birds covered by Article 4(2) of the Birds Directive.

1.3 Competent authority/ies

Federal Government:	BfN
Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLPV NI, NLWKN / VSW
Schleswig-Holstein:	LLUR / VSW, LKN-SH

1.4 Working group

Ad Hoc Working Group on Vertebrates (Birds, Mammals, Fish)

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Articles 8 and 11, Annexes III and V

Comments

The environmental status of European marine waters is to be recorded and assessed by means of coordinated monitoring programmes.

The requirements with regard to bird monitoring have not yet been specified by the European Commission.

Birds Directive

Article 01

Comments

The Directive relates to the conservation of all species of naturally occurring birds in the wild state in the European territory of the Member States to which the Treaty applies.

Article 04

Comments

(1) The species mentioned in Annex I shall be the subject of special conservation measures concerning their habitat. Trends and variations in population levels shall be taken into account as a background for evaluations. The species list corresponds to the species mentioned in Annex I.

(2) Member States shall take similar measures for regularly occurring migratory species not listed in Annex 1, […] as regards their breeding, moulting and overwintering areas and staging posts along their migration routes. To this end, Member States shall pay particular attention to the protection of wetlands and particularly to wetlands of international importance.

No species list is prescribed.

Article 10

Comments

(1) Member States shall encourage research and any other work required as a basis for the protection, management and use of the population of all species of bird referred to in Article 1.

(2) Particular attention shall be paid to research and work on the subjects listed in Annex V.

·Annex V

Comments

b) Listing and ecological description of areas particularly important to migratory species on their migratory routes and as overwintering and nesting grounds;

c) Listing of data on the population levels of migratory species as shown by ringing;

f) Determining the role of certain species as indicators of pollution;

g) Studying the adverse effect of chemical pollution on population levels of bird species.

HD [2]

Article 11

Comments

Birds are listed as relevant for assessment purposes in the inventories of species typical of various FFH habitat types:

- Link to the marine HD 11 Habitat Assessment Matrices (German)

1110 - Sandbanks which are slightly covered by seawater all the time

1130 - Estuaries

1140 - Mudflats and sandflats not covered by seawater at low tide

1150 - Coastal lagoons

1160 - Large shallow inlets and bays

1170 - Reefs

- Marine HD 12 Habitat Assessment Matrices (German)

1220 - Perennial vegetation of stony banks

1230 - Vegetated sea cliffs

- Marine HD 13 Habitat Assessment Matrices (German)

1310 - Salicornia and other annuals colonising mud and sand

1320 - Spartina swards

1330 - Atlantic salt meadows

- Marine HD 21 Habitat Assessment Matrices (German)

2110 - Embryonic shifting dunes

2120 - Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")

2130 - Fixed coastal dunes with herbaceous vegetation

2140 - Decalcified fixed dunes with Empetrum nigrum

2150 - Atlantic decalcified fixed dunes

2170 - Dunes with Salix repens

2190 - Humid dune slacks

HELCOM

Baltic Sea Action Plan [3]

Comments

To date, HELCOM has defined 64 Baltic Sea Protection Areas (BSPAs), for which monitoring requirements are being formulated as part of a project:

Implementation of the Joint HELCOM/OSPAR Work Programme on Marine Protected Areas (HELCOM BSPA) (2004-2005)

(See: http://www.helcom.fi/BSAP/en_GB/intro/)

List of Threatened and/or Declining Species and Habitats [4]

Comments

Species that occur in the region:

Gavia arctica - Black-throated diver (overwintering)

Gavia stellata - Red-throated diver (overwintering)

Podiceps auritus - Horned grebe (overwintering)

Tadorna tadorna - Common shelduck (breeding)

Mergus serrator - Red-breasted merganser (breeding)

Sterna albifrons - Little tern (breeding)

Sterna sandvicensis - Sandwich tern

Cepphus grylle - Black guillemot (overwintering)

Calidris alpina schinzii - Dunlin (breeding)

MONAS

Comments

A concept for bird monitoring (HELCOM MONAS, 2004) has already been adopted, but not yet implemented.

Additional species listed by HELCOM MONAS (2004):

- *Recurvirostra avosetta* - Pied avocet
- *Charadrius hiaticula* - Ringed plover
- *Tringa totanus* - Common redshank
- *Larus canus* - Common gull
- *Uria aalge* - Common guillemot

OSPAR

EcoQOs [5]

Ecological quality objectives

Comments

- Trends in seabird populations as an index for the status of seabird communities
- Seabirds: proportion of oiled guillemots among those found dead or dying on beaches should be 10 % or less.
- Fulmars and litter - EcoQO as OSPAR pilot project.
- Pollutants in bird eggs - EcoQO as OSPAR pilot project.

List of Threatened and/or Declining Species and Habitats [6]

Comments

The OSPAR Commission has set itself the objective of recording all species and habitats that need to be protected. This list is used by OSPAR to guide the setting of future priorities for its further work on conservation and the protection of marine biodiversity.

To date, the following bird species that occur in German waters have also been included in this list:

Aythya marila - Greater scaup

Larus fuscus fuscus - Lesser black-backed gull

Melanitta fusca - Velvet scoter

Rissa tridactyla - Black-legged kittiwake

Sterna dougallii - Roseate tern

TMAP [7]

Wadden Sea Plan (Stade Declaration, 1997), section 9

Comments

The following monitoring programmes have been set up to assess the targets laid down in the Wadden Sea Plan (WSP) with regard to birds:

- Monitoring (number and distribution) of breeding birds (including species list)
- Monitoring (number, phenology and distribution) of resting birds (including species list)
- Monitoring of dead, beach-washed birds (all species)
- Pollutants in bird eggs (this point is dealt with in Monitoring Specifications: Organic Pollutants)
- TMAP Manual, section II.7

The revised TMAP provides for the monitoring of breeding success as an additional parameter (including species list). Apart from this, a further set of parameters is being proposed to take resting birds at sea and the occurrence of sea ducks into consideration.

RAMSAR

Article 1

Comments

(2) For the purpose of this Convention, waterfowl are birds ecologically dependent on wetlands.

Monitoring and investigation of the ecological character of the RAMSAR sites and assessment of the status and development of wetlands.

AEWA [8]

Article II(1)

Comments

(1) Parties shall take coordinated measures to maintain migratory waterfowl species in a favourable conservation status or to restore them to such a status.

The species are defined in Annex 2 to the Agreement. The species list corresponds to the species included in Annex 2.

Article III(1)

Comments

(1) The Parties shall take measures to conserve migratory waterfowl, giving special attention to endangered species as well as to those with an unfavourable conservation status.

·Annex 3

Comments

As an integral part of the Agreement (according to Article IV(1)), section 5 of the Annex obliges the Parties to carry out the following monitoring activities:

- (5.2) Parties are to endeavour to monitor the populations listed in Tables 1 und 2.
- (5.4) The Parties are to cooperate with a view to determining the migration routes of all populations listed in Table 1, using available knowledge of breeding and non-breeding season distributions and census results, and by participating in coordinated ringing programmes.

2.2 Environmental targets

MSFD

Creation of marine strategies that serve the objective of ensuring the marine environment achieves a good environmental status by the year 2021 at the latest , permanently guaranteeing its protection and preservation, and preventing its deterioration.

Birds Directive

Article 2

Member States shall take the requisite measures to maintain the population of the species referred to in Article 1 at a level which corresponds in particular to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements, or to adapt the population of these species to that level.

Species and area-specific conservation targets are currently only available in draft.

HD

Ensuring biodiversity through the conservation:

- of natural habitats. (See HD, Article 2)

HELCOM

Ecological Quality Objectives:

- Healthy Baltic Sea environment with diverse biological components functioning in balance, resulting in a good ecological status and supporting a wide range of sustainable human economic and social activities. (HELCOM, 25/2004)
- Viable seabird populations

OSPAR

Ecological Quality Objectives:.

- (1) The proportion of oiled common guillemots among those found dead or dying on beaches should be 10 % or less in all areas of the North Sea.
- (2) Seabird population trends: no background has yet been set.
- (3) Plastic particles in seabird stomachs: less than 10 % of northern fulmars having 0.1 g or more plastic in the stomach - in samples of 50-100 beach-washed fulmars found from each of five different areas of the North Sea over a period of at least five years.
- (4) EcoQO 3.5 (sand eel availability), see Fish.

TMAP

The Wadden Sea Plan sets out the following ecological targets for birds:

Favourable conditions for migrating and breeding birds:

- favourable food availability;
- natural breeding success;
- sufficiently large undisturbed resting and moulting areas;
- natural flight distances.

(See Trilateral Wadden Sea Plan, Stade, 1997, section 9)

RAMSAR

Wetlands of international importance, especially as waterfowl habitat (title of the Convention)

AEWA

To maintain migratory waterfowl species at population level in a favourable conservation status or to restore them to such status. (Article II(1))

2.3 Threats

(From anthropogenic influences)

- a) Mortality in gillnets (due to entanglement and drowning; Baltic Sea)
- b) Oiling (mortality, poisoning)
- c) Disruption due to shipping traffic (scaring up/away)
- d) Reduction of food availability (e.g. due to the degradation and/or destruction of foraging grounds)
- e) Obstacles in the form of technical structures (risk of collision; disorientation due to the scarecrow effect, lighting; fragmentation and reduction of habitats)
- f) Pollutant accumulation (mortality, impairment of fitness)
- g) Accumulation of litter in the digestive tract (mortality, impairment of fitness)
- h) Entanglement in pieces of litter,e.g. net debris (mortality)

(a-h based on Garthe 2003)

- i) Restriction of natural dynamics in the Wadden Sea (coastal protection measures)
- j) Disruption due to tourism
- k) Agricultural use (e.g. grazing of North Sea salt marshes)
- l) Predation
- m) Climate change (frequency of flooding, etc.)

2.4 Spatial allocation

	EEZ	12- nm zone	Coastal waters 1)	Transitional waters
MSFD	x	x	x	-
Birds Directive	x	x	x	x
HD	x	x	x	x
HELCOM	x	x	x	-
OSPAR	x	x	x	-
TMAP	-	x	x	x
RAMSAR	-	-	-	-
AEWA	x	x	x	x

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

Monitoring network

Future monitoring network

The reporting duties and the bird monitoring activities associated with them relate to overall populations (national, Land-wide; inside and outside conservation areas). A catalogue of the species to be investigated in marine monitoring is available. Surveys are to be carried out specifically for individual species, spaces and periods.

Breeding birds

Monitoring of the breeding populations and breeding success of selected seabird and coastal bird species, in particular target species for the marine and coastal SPAs and species typical of the relevant HD habitat types, as well as further species listed in Annex I of the Birds Directive and regularly occurring species of migratory birds covered by Article 4(2) of the Birds Directive in the region.

Migratory birds

Monitoring of all seabird and coastal bird species with a focus on target species for the marine and coastal SPAs and species typical of the relevant HD habitat types, as well as further species listed in Annex I of the Birds Directive and regularly occurring species of migratory birds covered by Article 4(2) of the Birds Directive in the North Sea and Baltic Sea.

Beached birds

Gillnet victims (Baltic Sea)

(Tables 1 und 2)

Overview of the future coastal monitoring programme

Parameter	Area	Period and frequency	Species	Derived from	Survey programme	Amendments needed
Resting populations	North Sea	All year round, every 14 - 15 days	At least all waders and waterfowl, birds of prey and songbirds typical of the coast, including species listed in Annex I, BD	TMAP, BD, FFH, Ramsar, AEWA, OSPAR	Synchronous waterfowl count, spring tide counts, resting bird surveys at sea	SAS still not involved
Resting populations	Baltic Sea	September - April, monthly	Waders and waterfowl	BD, FFH, Ramsar, AEWA, HELCOM	Waterfowl census (IWC), resting bird surveys at sea (primarily by aircraft)	Mecklenburg - Western Pomerania still not involved Secure basis (coordination + evaluation of IWC carried out by associations/volunteers to date)
Breeding populations	North Sea, Baltic Sea	April - June	TMAP species list, species listed in Annex I and endangered migratory breeding species covered by Article 4(2), BD	BD, FFH, HELCOM, OSPAR, TMAP	TMAP (Wadden Sea), breeding populations in conservation areas	Baltic Sea?
Breeding success	North Sea	April - July	At least oystercatchers, common terns	TMAP, BD	TMAP	TMAP - species list: Eurasian Spoonbill, Common Eider, Oystercatcher, Avocet, Black-headed Gull, Lesser Black-backed Gull, Herring Gull, Sandwich Tern, Common Tern, Arctic Tern
Population structure	North Sea, Baltic Sea	Breeding period	At least oystercatchers, common terns	TMAP, BD	Ringing programmes	Still to be implemented
Gillnet victims	Baltic Sea	October - April	Waterfowl	BD, HELCOM		Still to be implemented

Overview of the future offshore monitoring programme

Parameter	Area	Period and frequency	Target species	Derived from	Survey programme	Amendments needed
Resting populations	North Sea: comprehensive survey	January, every three years	Seabirds	BD, OSPAR	Aerial survey at sea	Still to be implemented
Resting populations	North Sea: SPAs, Eastern German Bight and Schleswig-Holstein/Lower Saxon conservation areas	Winter, annually if possible, at least every two years	*Gavia*-Divers, Little Gull	BD, OSPAR	Aerial survey at sea	Still to be implemented
Resting populations	North Sea: SPAs, Eastern German Bight and Schleswig-Holstein/Lower Saxon conservation areas	Spring, annually if possible, at least every two years	*Gavia*-Divers, Little Gull	BD, OSPAR	Aerial survey at sea	Still to be implemented
Resting populations	North Sea: Schleswig-Holstein offshore, parallel to coast	Alternating annually	Common scoter	BD, OSPAR	Aerial survey at sea, established	-
Resting populations	North Sea: Schleswig-Holstein offshore	Alternating summer/post-breeding period annually	Terns, gulls, Helgoland cliff breeders	BD, OSPAR	Ship-based survey at sea	Still to be implemented
Resting populations	Baltic Sea: comprehensive aerial survey, including shallow grounds and Greifswald Bodden	January every three years	Seabirds	BD, HELCOM	Aerial survey at sea	Still to be implemented
Resting populations	Baltic Sea: Schleswig-Holstein shallow grounds	January and spring, annually	Sea ducks	BD, HELCOM	Aerial survey at sea, established	-
Resting populations	Baltic Sea: Schleswig-Holstein deep waters	Spring, annually	Sea ducks	BD, HELCOM	Aerial survey at sea, established	-
Resting populations	Baltic Sea: conservation areas, EEZ, Mecklenburg-Western Pomerania	Spring and August, annually if possible, at least every two years	Sea ducks, *Gavia*-Divers, Little Gull	BD, HELCOM	Aerial survey at sea	Still to be implemented
Resting populations	Baltic Sea: Pomeranian Bight SPA and neighbouring areas	January every two years	Sea ducks, horned grebe, *Gavia*-Divers	BD, HELCOM	Ship-based survey at sea	Still to be implemented

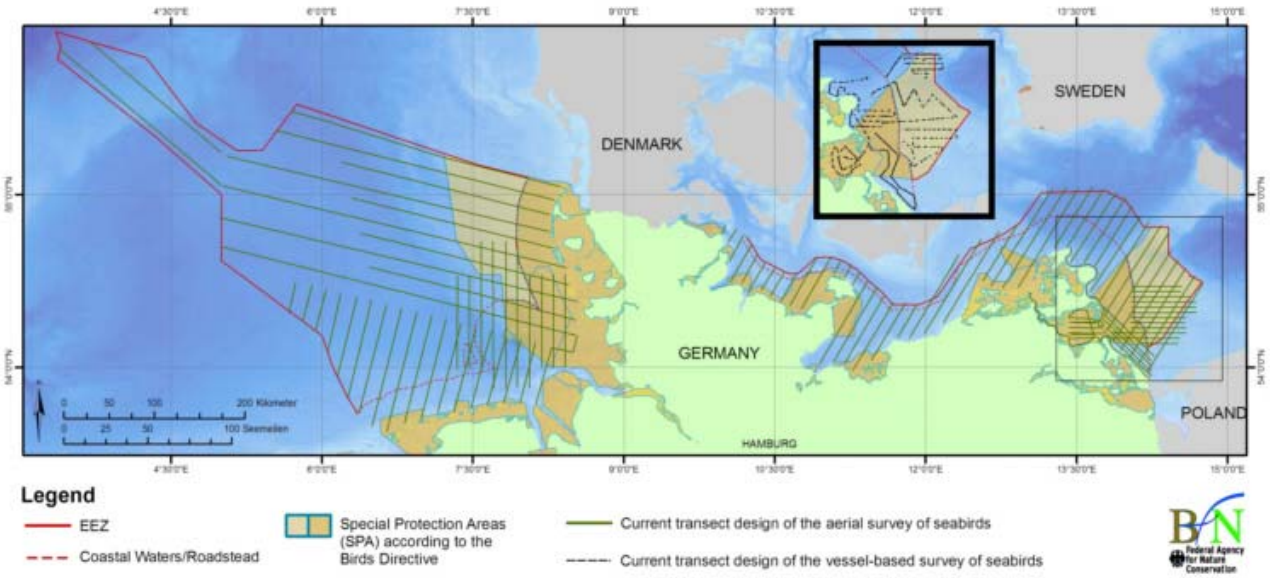

Figure 1: Monitoring of seabirds

Figure 1 as PDF-Document

Frequency and timing

General

Breeding birds

- Population survey of colony breeders and selected species annually
- Population survey of other species on the species list annually at sampling plots, area-wide survey every six years
- Measurements of indicator species' breeding success at selected breeding sites
- Studies of population structure (ringing programmes)

Resting birds

North Sea

- Mid-winter count (January) of seabirds and coastal birds, complete count along the entire coastlines
- 26 surveys per year at representative resting sites at spring tide (around high tide)
- Annual, species-specific surveys ((Branta-)geese twice, sanderling once at spring tide around high tide, common eider at least twice and moulting common shelduck three times around low tide)
- Twice in six years: one complete aerial survey of seabirds in the German North Sea in winter (if possible synchronous with coastal mid-winter count in January)
- Annually if possible, at least every two years: two aerial surveys in the offshore conservation areas, one each in winter and spring (focus on *Gavia*-Divers and Little Gull)
- Annually: one ship-based survey in the offshore conservation areas of Schleswig-Holstein and Lower Saxony, alternating summer and autumn/post-breeding period with a focus on terns, gulls and Helgoland cliff breeders
- Annually: one aerial survey in the offshore area (territorial waters parallel to coast) with a focus on common scoter at alternating seasons

Baltic Sea

- Mid-winter count (January) of seabirds and coastal birds, complete count along the entire coastlines
- Eight mid-monthly counts of all wader and waterfowl species carried out from land (September-April)
- Twice in six years: one aerial survey of the entire German Baltic Sea in mid-January, if possible synchronous with coastal mid-winter count
- Annually: two aerial surveys of the Schleswig-Holstein shallow grounds in January and spring with a focus on sea ducks
- Annually: one aerial survey of the deep-water areas of Schleswig-Holstein in spring with a focus on sea ducks
- Annually if possible, at least every two years: two aerial surveys of the conservation areas in the EEZ and off Mecklenburg-Western Pomerania in spring and August
- Every two years: one ship-based survey of the Pomeranian Bay SPA and neighbouring areas in mid-January
- Monitoring of found-dead birds: gillnet victims, representative random samples in October-April

Methods

Breeding population surveys based on Südbeck et al. (2005), Hälterlein et al. (1995)

Breeding success based on Thyen et al. (1998) (new version in prep.)

Resting population surveys based on Wahl et al. (in preparation)

Spring tide counts based on Rösner (1995)

Resting bird surveys at sea (Seabirds at Sea):

- **Ship-based survey** based on Garthe et al. (2002)
- **Aerial survey** based on Diederichs et al. (2002), BSH (2007)

Surveys of sea ducks at low tide based on Kempf and Eskildsen (2000), Wahl et al. (in preparation)

Parameters

Breeding and resting birds (all directives):

Population
Distribution
Phenology (resting birds)
Population structure
reproductive success

Beached birds (OSPAR, TMAP, HELCOM)

- Oiling rate of guillemots
- Proportion of plastic particles in fulmar stomachs (North Sea);
- Extension to oiling rates and gillnet victims (Baltic Sea; proposal on basis ofHELCOM MONAS, 2004)

Additional parameters for assessments

Only parameters that derive from the assessment matrices for the various directives/conventions on the marine subhabitat are to be listed.

Biology:

Food availability (TMAP):

"Food availability" was defined as an objective for birds under the Wadden Sea Plan, Stade, 1997. This can only be monitored by analysing data on benthos, (small) fish, seagrass and salt marshes. It is to be taken into consideration accordingly when the individual monitoring parameters are conceived and their specifications drawn up.

Hydrography:

Tide (spring tide counts), water levels

Fisheries:

Scope of gillnet fishing

3.2 Monitoring activities

North Sea and Baltic Sea

Breeding Birds

Methods:

- Breeding population surveys based on Südbeck et al. (2005), Hälterlein et al. (1995)
- Breeding success based on Thyen et al. (1998)
- Ringing programmes

Frequency:

- Population survey of colony breeders and selected species annually
- Population survey of other species on the species list annually at sample sites (Census areas), complete survey every six years
- Breeding success measurements of indicator species at selected breeding sites annually
- Studies of population structure (ringing programmes)

Parameter:

- Distribution
- Population

Beached Birds

Methods:

- Driftline monitoring: see TMAP Monitoring Handbook
- Monitoring of gillnet victims (Baltic Sea only): to date, only point monitoring in Mecklenburg-Western Pomerania carried out, method for whole area must be developed

Frequency:

Monitoring of gillnet victims:

Driftline monitoring: 13 surveys from October to April

Parameter:

- Gillnet victims
- Oiling rate of guillemots
- Proportion plastic particles in stomach

North Sea

Resting Birds - North Sea

Methods:

- Resting population surveys based on Wahl et al. (in preparation)
- Spring tide counts based on Rösner (1995)
- Resting bird surveys at sea (Seabirds at Sea):
  - Ship-based survey based on Garthe et al. (2002)
  - Aerial survey based on Diederichs et al. (2002), BSH (2007)
- Surveys of sea ducks at low tide based on Kempf and Eskildsen (2000), Wahl et al. (in preparation)

Frequency:

- Mid-winter count (January) of seabirds and coastal birds, complete count along the entire coastlines
- 26 surveys a year at representative resting sites at spring tide around high tide
- Annual, species-specific surveys ((Branta-)geese twice, sanderling once at spring tide around high tide, common eider at least twice and moulting common shelduck three times around low tide)
- Twice in six years: one aerial complete survey of seabirds in the German North Sea in winter (if possible synchronous with coastal mid-winter count in January)
- Annually if possible, at least every two years: two aerial surveys in the conservation areas in offshore waters, one each in winter and spring (focus on Gavia-Divers and little gull)
- Annually: one ship-based survey in the offshore conservation areas of Schleswig-Holstein and Lower Saxony, alternating summer and autumn/post-breeding period with a focus on terns, gulls and Helgoland cliff breeders
- Annually: one aerial survey in offshore waters (territorial waters parallel to coast) with a focus on common scoter at alternating seasons

Parameter:

- Distribution
- Phenology
- Population

Baltic Sea

Resting Birds - Baltic Sea

Methods:

- Resting population surveys based on Wahl et al. (in preparation)
- Resting bird surveys at sea (Seabirds at Sea):
  - Ship-based survey based on Garthe et al. (2002)
  - Aerial survey based on Diederichs et al. (2002), BSH (2007)
- Surveys of sea ducks at low tide based on Kempf and Eskildsen (2000), Wahl et al. (in preparation)

Frequency:

- Mid-winter count (January) of seabirds and coastal birds, complete count along the entire coastlines
- Eight mid-monthly counts of all wader and waterfowl species carried out from land (September-April)
- Twice in six years: one areial survey of the entire German Baltic Sea in mid-January, if possible synchronous with coastal mid-winter count
- Annually: two aerial surveys of shallow grounds off Schleswig-Holstein in January and spring with a focus on sea ducks
- Annually: one aerial survey of the deep-water areas off Schleswig-Holstein in spring with a focus on sea ducks
- Annually if possible, at least every two years: two aerial surveys of the conservation areas in the EEZ and off Mecklenburg-Western Pomerania in spring and August
- Every two years: one ship-based survey of the Pomeranian Bay SPA and neighbouring areas in mid-January
- Monitoring of beached birds: gillnet victims, representative random samples, October-April

Parameter:

- Distribution
- Phenology
- Population

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Food availability (birds)
- Scope of gillnet fishing
- Tide (e.g. for spring tide counts)
- Water level

4 Assessment

4.1 Assessment procedures

Breeding birds

North Sea and Baltic Sea

Title

TMAP Alert System

Authors

Koffijberg 2007, see section 6

Guideline:

Various directives

Resting Birds

North Sea and Baltic Sea

Title

BfN, *Profiles of Seabirds and Waterfowl of the German North and Baltic Seas*

Authors

Mendel et al., 2008, see section 6

Guideline:

Birds Directive

5 Quality assurance

- Quality Assurance Panel (at the UBA (workshops, intercalibration exercises, first draft of a species list, standardisation with DIN, CEN and ISO, support for the establishment of QM systems, drafting of sample SOPs, performance of audits))

Comments

The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the BLMP. Each of the monitoring institutions bears responsibility for establishing and administering its own quality management systems. The institutions involved in the BLMP coordinate their activities within the framework of the Working Group on Quality Assurance and the Ad Hoc Working Group on Vertebrates.

5.1 Monitoring institutions

- NLWKN / VSW
- NLPV HH
- BfN
- LUNG
- NPV SH
- NLPV NI
- LLUR / VSW
- NPA-MV

5.2 Guidance documents

- BLMP Quality Assurance Panel at the UBA, 2008: *Muster-Qualitätsmanagementhandbuch für Laboratorien des Bund/Länder-Messprogramms nach DIN EN ISO/IEC 17025 (BLMP Sample Quality Management Manual)*; Version: 01 of 1 February 2008; Federal Environment Agency.
- BSH, 2007: Standard - Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment (StUK 3).
- Blew, J., 2003: 'New Ways to Test and Improve Methods - Quality Assurance Activities in Breeding Bird Monitoring'; *Wadden Sea Newsletter*; 2003 (2): pp. 18 - 23.
- Buckland, S., Anderson, D. R., Burnham, K. P., Laake, J. L, Borchers, D. L. and L. Thomas, 2001: *Introduction to Distance Sampling: Estimating abundance of biological populations*; Oxford University Press Inc., New York.
- Diederichs, A., Nehls, G. und I. K. Petersen, 2002: 'Flugzeugzählungen zur großflächigen Erfassung von Seevögeln und marinen Säugern als Grundlage für Umweltverträglichkeitsstudien im Offshorebereich'.; *SEEVÖGEL*; 23 (2): pp. 38 - 46.
- Dierschke, V. and N. Kempf, in prep.: `Die flugzeugbasierte Erfassung von Seevögeln auf See'; in: Wahl, J., Garthe, S., Boschert, M., Heinicke, T., Krüger, T. and C. Sudfeldt (eds.): *Methodenstandards zur Erfassung rastender Wasservögel*; Radolfzell; commissioned by the German Inter-State Working Group of Bird Conservation Observatories and the Federation of German Avifaunists (DDA).
- Garthe, S., Hüppop, O. und T. Weichler, 2002: 'Anleitung zur Erfassung von Seevögeln auf See von Schiffen'; *Seevögel*; 23: pp. 47 - 55.
- Hälterlein, B., Fleet, D.M., Henneberg, H.R., Mennebäck, T., Rasmussen, L.M., Südbeck, P., Thorup, O. and R. Bird, 1995: `Anleitung zur Brutbestandserfassung von Küstenvögeln im Wattenmeerbereich'; *SEEVÖGEL*; 16 (1): pp. 3 - 24; Wadden Sea Ecosystem; 3/1995; Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group and Joint Monitoring Group for Breeding Birds in the Wadden Sea
- Kempf, N. and K. Eskildsen, 2000: `Enten im Watt'; National Park Administration Schleswig-Holstein Wadden Sea; *Wattenmeermonitoring 1998*; Schriftenreihe des Nationalparks Schleswig-Holsteinisches Wattenmeer: pp. 27 - 30.
- Rösner, H.-U., 1995: `Hinweise zur Durchführung der Rastvogelzählungen im Schleswig-Holsteinischen Wattenmeer (Zählanleitung)'; WWF, Husum; unpublished.
- Südbeck, P., Andretzke, H., Fischer, S., Gedeon, K., Schikore, T., Schröder, K. and C. Sudfeldt (eds.), 2005: *Methodenstandards zur Erfassung der Brutvögel Deutschlands*; Radolfzell; commissioned by the German Inter-State Working Group of Bird Conservation Observatories and the Federation of German Avifaunists (DDA); 777 pp.
- Thyen, S., Becker, P.H., Exo, K.-M., Hälterlein, B., Hötker, H. und P. Südbeck, 1998: 'Monitoring Breeding Success of Coastal Birds,Final Report of the Pilot Study 1996 - 1997'; Wadden Sea Ecosystem; 8: pp. 7 - 55, Common Wadden Sea Secretariat and Trilateral Monitoring and Assessment Group, Wilhelmshaven.
- Wahl, J., Garthe, S., Boschert, M., Heinicke, T., Krüger, T. and C. Sudfeldt (eds.), in prep.; *Methodenstandards zur Erfassung rastender Wasservögel*; Radolfzell; commissioned by the German Inter-State Working Group of Bird Conservation Observatories and the Federation of German Avifaunists (DDA).

5.3 Standards

5.4 Current status

There are instructions on standardised surveying methods for all subfields of bird monitoring. In every case, their application presupposes advanced knowledge of the identification and counting of birds in each specific situation (where necessary at long distances), which can as a rule only be acquired through good training and/or as many years of experience as possible. There is consequently a great need for training in bird monitoring skills. Some of the training courses are organised by the competent authorities (cf. 1.3), the nature conservation associations that work in this field, university-based contractors and the specialist ornithological associations.

Intercalibration exercises

Not yet available

Workshops

- Quality Assurance Meetings of the Joint Monitoring Group for Breeding Birds in TMAP, since 1993

Training for breeding and resting bird surveys

- Full-time employees and civilian service conscripts/ecological year volunteers working with authorities and associations are trained annually under TMAP.
- Institutions involved in Seabirds at Sea monitoring currently train their counters independently. The concept also includes the training of qualified trainers and proposals for intercalibration exercises.

6 Literature

- Essink, K., Dettmann, C., Farke, H., Laursen, K., Lüerßen, G., Marencic, H. and W. Wiersinga, 2005: *Wadden Sea Quality Status Report 2004*; Wadden Sea Ecosystem; 19; Common Wadden Sea Secretariat, Wilhelmshaven; 359 pp.
- Garthe, S. and N. Sonntag, in prep.: `Die schiffsbasierte Erfassung von Seevögeln auf See¿; in: Wahl, J., Garthe, S., Boschert, M., Heinicke, T., Krüger, T. and C. Sudfeldt (eds.): *Methodenstandards zur Erfassung rastender Wasservögel*; Radolfzell; commissioned by the German Inter-State Working Group of Bird Conservation Observatories and the Federation of German Avifaunists (DDA).
- Garthe, S., 2003: `Verteilungsmuster und Bestände von Seevögeln in der Ausschließlichen Wirtschaftszone (AWZ) der deutschen Nord- und Ostsee und Fachvorschläge für EU-Vogelschutzgebiete¿; *Ber. Vogelschutz*; 40: pp. 15 - 56.
- Koffijberg, K., 2007: `Inventory of national implementation of the EU-Birds Directive in the Wadden Sea and proposal for trilateral harmonisation of conservation targets in the Wadden Sea Plan¿; unpublished report; Common Wadden Sea Secretariat; 11 pp.
- Mendel, B. et al., 2008: *Profiles of Seabirds and Waterfowl of the German North and Baltic Seas: Distribution, Ecology and Sensitivities to Human Activities within the Marine Environment*; Schriftenreihe Naturschutz und Biologische Vielfalt; 59; BfN.

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

See the information on the individual programmes in 3.2.

Table 1 und 2 contain detailed recommendations.

7.2 Working steps required

Priorities

Formal agreement of the proposed monitoring programme with the specification of its methodology, and its subsequent establishment and anchoring as a permanent programme in the context of marine monitoring.

Amendment of current programme elements or establishment of new programme elements, including costings:

- Additional dates for waterfowl counting in Mecklenburg-Western Pomerania
- Implementation of breeding success monitoring (Baltic Sea)
- Monitoring of gillnet victims (Baltic Sea)
- Implementation of resting bird surveys at sea
- Incorporation of survey activities undertaken by volunteers/associations into marine monitoring (e.g., waterfowl census, breeding populations on Helgoland, breeding and resting populations in the Lower Saxon Wadden Sea)

Consideration of further bird species for OSPAR and HELCOM monitoring (in particular, the Baltic Sea Action Plan).

Creation of an assessment system for all relevant bird species on the basis of the trilateral alert system and the BfN species profiles.

Decision-making on and coordination of the joint award of monitoring contracts (e.g. surveys of resting birds at sea).

Further activities required

Resting and breeding birds

- Extension of QA activities to areas outside the Wadden Sea National Parks, including the drafting of standards concerning the type/scope of training and optical equipment for staff (to be implemented by the specialist ornithological associations, in particular DDA).
- "Food availability" was defined as an objective for birds under the Wadden Sea Plan, Stade, 1997 (new version 2010). This can only be monitored by analysing data on benthos, (small) fish, seagrass and salt marshes. It is to be taken into consideration accordingly when the individual monitoring parameters are conceived and their specifications drawn up.

Found-dead birds

Evaluation of methodology and results of examinations of gillnet victims (Mecklenburg-Western Pomerania), and implementation of Baltic Sea-wide monitoring.

Resting birds at sea

The counts from ships and aircraft are to be calibrated.

Quality assurance

The participating institutions are striving to build up and introduce uniform QA standards by means of the introduction of a DIN EN ISO/IEC 17025 quality management system (BLMP Study Group decision, 2006), which would ideally lead to the accreditation of these institutions. The establishment of DIN EN ISO/IEC 17025 quality management systems under the BLMP should be concluded by 1 January 2012.

In some cases, specific quality assurance methods have to be developed and established for the field of bird monitoring or adjustments made to current quality management documents.

In this context, apart from the development of uniform quality standards (QM system), efforts should also be made to ensure that the participating institutions work largely in accordance with shared guidelines when the SOPs are being drafted. To this end, the current Sample Quality Management Manual is to be adapted and suitable sample SOPs for bird monitoring drawn up. This work is expected to begin in 2010.

The DIN EN ISO/IEC 17025 quality management system includes the following elements:

- documented validation/verification of the investigation methods deployed for the determination of performance characteristics,
- storage of reference and comparative collections,
- the qualification and regular training of personnel for the procedures deployed,
- the regular performance of internal and external audits,
- regular participation in national and international interlaboratory comparisons, intercalibration exercises, training courses and workshops, and their evaluation.

Data management

As far as the development of a future data management system within marine monitoring is concerned, it is to be noted that structures and information systems for the acquisition of bird monitoring data already exist at various levels. The following steps are therefore essential:

- Creation of structures where these are not yet in place (by specialist institutions/associations)
- Central acquisition of (meta)data from the programmes (e.g. via NOKIS)
- Agreements on data management with specialist institutions/associations
- Creation of interfaces
- Agreements on data storage and use/intellectual property rights
- Reimbursement of expenses to specialist institutions, where applicable

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) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(3) Baltic Sea Action Plan, HELCOM 2007

(4) HELCOM adopted a `List of threatened and/or declining species and biotopes/habitats' in December 2006, but has not adopted further measures, although it is planning this in the context of the Baltic Sea Action Plan (see below).

(5) It is still necessary for appropriate monitoring concepts to be specified for the monitoring of the Ecological Quality Objectives (see 2.2, Environmental targets). Since the monitoring concepts for the EcoQOs are currently being drawn up, there are still no standards for the frequency of monitoring.

(6) The OSPAR Commission has set itself the objective of recording all species and habitats that need to be protected. This list is used by OSPAR to guide the setting of future priorities for its further work on conservation and the protection of marine biodiversity.
OSPAR is currently drawing up instructions for the monitoring of the species and habitats on the list.

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

(8) As an integral component of the Agreement, the Action Plan (Annex 3) obliges the Parties, among other things, to undertake the following activities that are to be classified as monitoring (section 5):

- Monitoring of the populations listed in Table 1: The results shall be [. . .] sent to international institutions, to enable reviews of population status.
- Migration routes of the species listed should be determined. Counts during and outside the breeding season and census results should be taken into consideration in this respect.

Monitoring Specifications

Date: 2010-02-22

Mammals

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Fauna - Mammals

1.2 Definition

The following marine mammal species are to be included in the German marine monitoring:

- Common seal (*Phoca vitulina*)
- Grey seal (*Halichoerus grypus*)
- Harbour porpoise (*Phocoena phocoena*)

1.3 Competent authority/ies

Federal Government:	BfN
Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, LAVES, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Vertebrates (Birds, Mammals, Fish)

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Articles 8 and 11, Annexes III and V

Comments

The environmental status of European marine waters is to be surveyed and assessed by means of coordinated monitoring programmes.

- MSFD, Articles 8 and 11, Annexes III and V

HD [2]

Articles 2 and 11

Comments

The Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

- HD, Article 2
- HD, Article 11

In addition to this, marine mammals are relevant for assessment procedures because they feature in the inventories of typical species for HD habitat types.

- Assessment schemes for habitat types

Regulation (EC) 812/2004

General [3]

Comments

Surveying of incidental catches of harbour porpoises in fisheries and amending Regulation (EC) 88/98.

- Regulation (EC) 812/2004

HELCOM

List of Threatened and/or Declining Species and Habitats [4]

Comments

HELCOM has adopted a list of threatened species and biotopes/habitats.

- List
- *Combine Manual*

Furthermore, indicators from which monitoring obligations will be derived are being drawn up.

OSPAR

EcoQOs [5]

Ecological quality objectives

Comments

Harbour and grey seal population trends

Bycatches of harbour porpoise

- MASH 05/3/Info.4-E,L
- EcoQOs
- Summary of OSPAR monitoring requirements

List of Threatened and/or Declining Species and Habitats [6]

Comments

The harbour porpoise is included in the OSPAR List of Threatened and/or Declining Species and Habitats. With the respective OSPAR background document a "monitoring and assessment strategy" has been developed for this species.

- OSPAR Initial List of Threatened and Declining Species and Habitats (e.g. MASH 05/3/Info.4-E)
- OSPAR background document

TMAP [7]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The monitoring requirements for common seals are set out in the TMAP Manual, section 2. At the same time, they contribute to compliance with the obligations imposed by the Seal Agreement.

- Stade Declaration, 1997
- *TMAP Manual* section 2

At present, grey seal and harbour porpoise monitoring is not a trilateral obligation.

CMS/Seal Agreement

Seal Agreement, Articles V and VIII

Agreement on the Conservation of Seals in the Wadden Sea

Comments

Act on the Agreement on the Conservation of Seals in the Wadden Sea (Trilateral Seal Agreement) of 16 October 1990

Original version (English)

German version

Articles V and VIII:

In particular, the following parameters are to be monitored:

- population trends, for example by means of periodic aerial surveys and counts,
- seal migration,
- seal population parameters, e.g. diseases, survival, age structure, sex ratio,
- concentrations of substances that, in the light of research results, appear to play a major role in the conservation status of the seal population (in particular, in seal tissues and organisms that are preyed upon by seals).

ASCOBANS

Comments

Act on the Agreement of 31 March 1992 on the Conservation of Small Cetaceans of the Baltic and North Seas

Germany is subject to requirements concerning the monitoring of the harbour porpoise as its only domestic cetacean species. The monitoring requirements are set out in the second paragraph of the Annex.

With regard to the Baltic Sea, the ASCOBANS Parties put in place the Recovery Plan for Baltic Harbour Porpoises (JASTARNIA Plan) in 2002.

http://www.ascobans.org/

BDGD

(Conferences of the North Sea Ministers)

Comments

Harbour porpoise bycatches: Annual bycatches should be below 1.0 % of the best population estimate.

- Bergen Declaration, 2002
- Gothenburg Declaration, 2006

2.2 Environmental targets

MSFD

Implementation of marine strategies that serve the objective of achieving good status in the marine environment, at the latest by 2021, ensuring the permanent protection and preservation of the marine environment and preventing any deterioration of environmental quality.

- MSFD, Articles 1 and 5
- MSFD, Articles 9 and 10

HD

Ensuring biodiversity through the conservation of natural habitats and wild fauna and flora. Maintaining or restoring the favourable conservation status of natural habitats and species of wild fauna and flora.

- HD, Article 2(1) and (2)

Furthermore, specified conservation targets for marine protected areas under this directive (Sites of Community Importance / Special Areas of Conservation) have been drawn up in draft.

HELCOM

Ecological Quality Objective:

Viable populations of seals and harbour porpoises

- List of EcoQs

OSPAR

The Contracting Parties shall (…) take the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems.

- OSPAR Convention, Art. 2(1)

Ecological Quality Objectives:

- Presence and extent of threatened and/or declining species in the North Sea.
- Seal population trends in the North Sea: No decline in population > 10 % over a period of ten years.
- Harbour porpoise bycatches: Annual bycatches should be below 1.7 % of the best population estimate.
- List of EcoQOs.

TMAP

Marine mammals (common seal, grey seal and harbour porpoise) that have viable populations and are able to reproduce naturally. In addition to this, as far as the grey seal and common seal are concerned, the survival of juvenile animals.

- Stade Declaration, Section 10

CMS/Seal Agreement

Article III: The Parties shall cooperate closely with a view to achieving and maintaining a favourable conservation status for the seal population.

Original version (English)

German version

ASCOBANS

2.1 The Parties undertake to cooperate closely in order to achieve and maintain a favourable conservation status for small cetaceans. Provisionally, ASCOBANS would like to achieve levels of growth that raise the populations to 80 % of the habitat's carrying capacity.

Jastarnia Plan

The aspiration is for bycatch levels to amount to a maximum of 1.7 % of the population of harbour porpoises. The absolute bycatch rate in the Baltic Sea will have to be reduced to two animals a year if this is to be achieved (Berggren et al., 2002).

2.3 Threats

Essentially, marine mammals are vulnerable to:

- Fishing
- Pollutants
- Shipping traffic (including leisure activities)

2.4 Spatial allocation

	EEZ	12- nm zone	Coastal waters 1)	Transitional waters
MSFD	x	x	x	-
HD	x	x	x	x
WFD	-	-	-	-
HELCOM	x	x	x	-
OSPAR	x	x	x	x
TMAP	-	-	x	x
CMS/Seal Agreement	-	-	-	-
ASCOBANS	x	x	x	x
Jastarnia Plan	-	-	-	-

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

Populations of common seals and grey seals are monitored by means of wide-area registration (as a rule, aerial, land- and ship-based counts) and, in the case of harbour porpoises, aerial transects. Acoustic under water monitoring is deployed in areas with low densities of harbour porpoises. Further parameters for population dynamics are determined by means of examinations of found-dead seals and samples taken from living animals among the wild population (common seals only).

Common seals in the Baltic Sea

- Potential and current haul-out sites: surveying of juvenile and adult animals monthly (June/July: every 14 days)
- Surveying of as many found-dead animals as possible and pathological examination of all suitable specimens

Common seals in the North Sea

Population:

- Two overflights at moulting time (August)

Reproduction:

- Three overflights at pupping time (May/June) (in addition to this, inspections are carried out on foot on Heligoland)

Found-dead animals:

- Surveying of as many found-dead animals as possible, dissection of animals that can be examined (at least 20) (pathology, where applicable virology)

Health status:

- One to two samples a year taken from living animals among the wild population (including blood and faeces)

Grey seals in the Baltic Sea

- Potential and current haul-out sites: surveying of juvenile and adult animals monthly (April: every 14 days)
- Surveying of as many found-dead animals as possible and examination of all suitable specimens (pathology)

Grey seals in the North Sea

Population:

- Two overflights or inspections on foot (Heligoland) at moulting time (March/April)

Reproduction:

- At least three ship-based/aerial surveys or inspections on foot (Heligoland) at pupping time (December/January)

Found-dead animals:

- Surveying of as many found-dead animals as possible (pathology)

Harbour porpoises in the Baltic Sea

Line transects by plane (Fig. 1):

- Baltic Sea west of Fehmarn (Area E under the MINOS area design, extended eastwards where necessary): twice in six years in summer, jointly with Denmark if possible
- Baltic Sea between Fehmarn and Odra Bank (MINOS Areas F and G): combined with bird surveys in winter

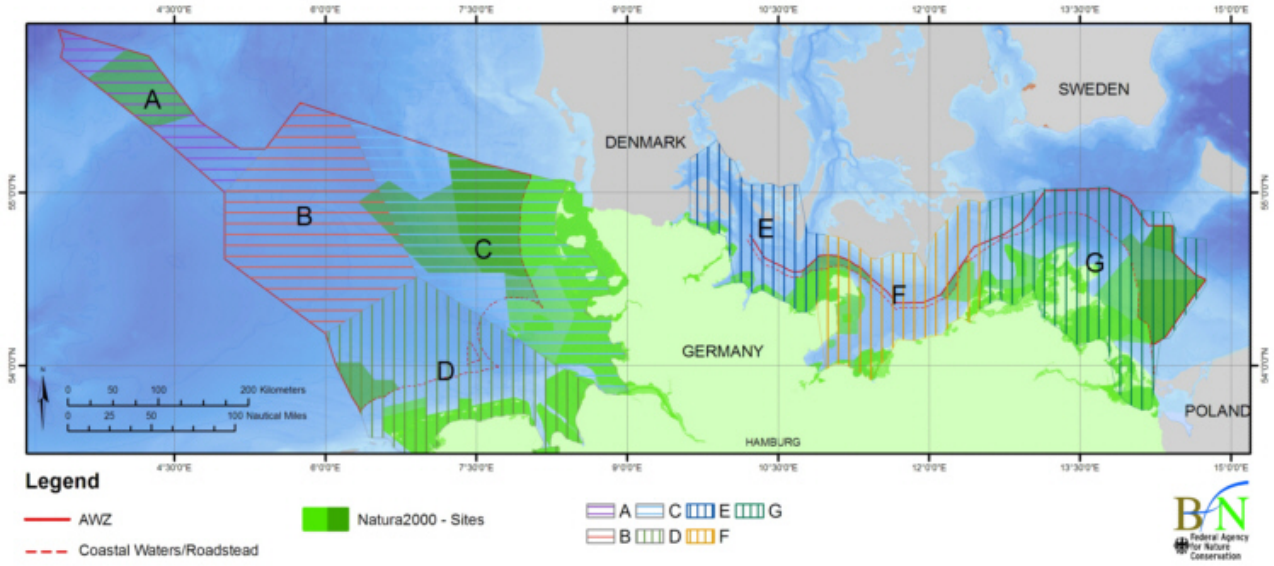

Fig. 1: MINOS area and transect design for harbour porpoise survey flights

Figure 1 as PDF-Document

Stationary Acoustic Monitoring (using PODs) (Fig. 2):

During all year:

- Kiel Bight (three MINOS stations: A1-A3)
- Baltic Sea around Fehmarn (five MINOS stations: B1, B2, B5-B7)
- Mecklenburg Bight (four MINOS stations: C8-C11)
- Darß (six MINOS stations: D8, D9, D10, D13, D14, E16)
- Rügen (three MINOS stations: E 17, F18, F21)
- Pomeranian Bay (six MINOS stations: G23, G25, H19, H21, H23, H28)

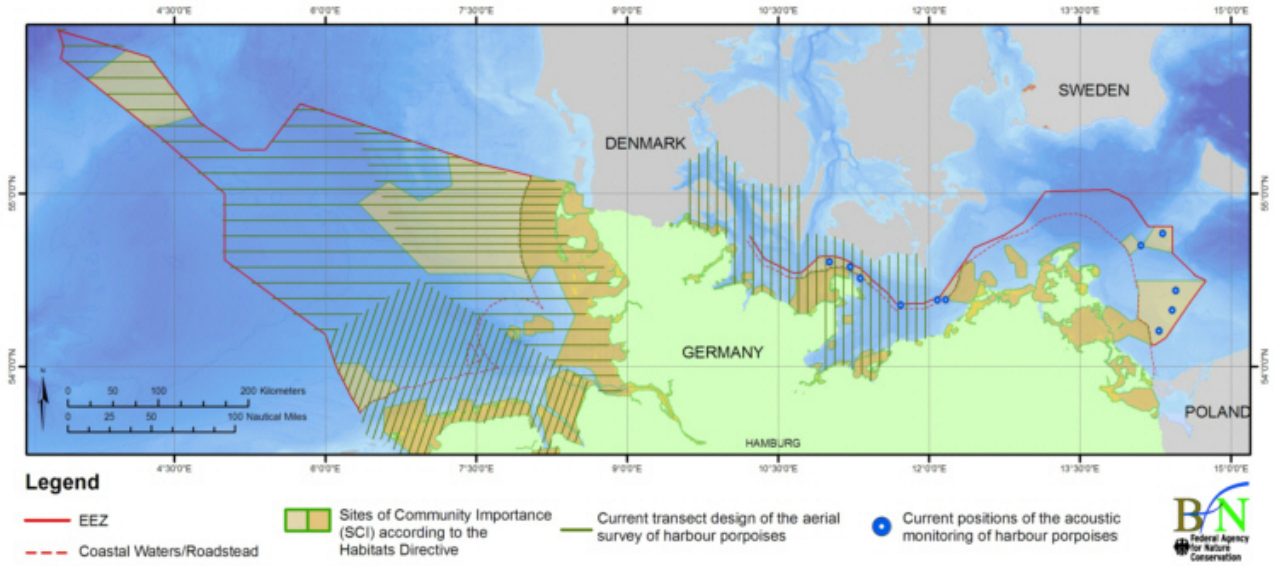

Fig. 2: Monitoring of harbour porpoises

Figure 2 as PDF-Document

Found-dead animals:

- Surveying of as many found-dead animals as possible and examination of all suitable specimens (pathology)

Bycatch:

- Complete, all-year-round surveying of bycatches in accordance with international obligations, examination of all suitable specimens (pathology)

Harbour porpoises in the North Sea

Line transects by plane (Fig. 1):

- Complete survey twice in six years in June (transects based on MINOS area design, Areas A-D), distance between transects: 10 km
- Surveying in protected areas annually: MINOS Area C (distance between transects: 5 km): twice in June/July
- Lower Saxon and Hamburg territorial waters with extension to Borkum Reef Ground SCI (distance between transects: 5 km): annually, twice in March/April

Stationary Acoustic Monitoring (POD):

During all year:

- Lower Saxon Wadden Sea National Park: two stations, Schleswig-Holstein Wadden Sea National Park: three stations (MINOSlocations)

Found-dead animals:

- Surveying of as many found-dead animals as possible and examination of all suitable specimens (pathology)

Bycatch:

- Complete, all-year-round surveying of bycatches in accordance with international obligations, examination of all suitable specimens (pathology).

3.2 Monitoring activities

North Sea and Baltic Sea

Mammals - Common Seals and Grey Seals

Methods:

Population:

North Sea: Seal Management Plan as amended to cover grey seal monitoring

- SMP

Baltic Sea: in accordance with the LUNG concept

Dissections and diagnosis of health status (Siebert et al., 2007, Müller et al., 2004)

Parameter:

- Distribution
- Habitat use/quality
- Health status
- Mortality due to bycatches
- Population size
- Reproduction/birth rate (proportion of mother/calf groups)

Mammals - Harbour Porpoises

Methods:

Line transects by aircraft (Buckland et al., 2001, Diederichs et al., 2002, Hiby & Lovell, 1998, Lovell, 1999)

Static acoustic monitoring (POD) (BSH StUK, 2007)

Dissections and diagnosis of health status (Siebert et al., 2001)

Parameter:

- Distribution
- Habitat use/quality
- Health status
- Mortality due to bycatches
- Population size
- Reproduction/birth rate (proportion of mother/calf groups)

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Fishing industry (techniques)
- Pollutants in prey organisms
- Shipping traffic
- Technical interventions

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

Mammal Assessment Procedure

Guideline:

Various directives

Comments:

- Assessment schemes for HD species (Schnitter et al., 2006).
- OSPAR scheme (MASH 07/3/3-Add.4-E)

5 Quality assurance

- Quality Assurance Panel (at the UBA (workshops, intercalibration exercises, first draft of a species list, standardisation with DIN, CEN and ISO, support for establishment of QM systems, drafting of sample SOPs, performance of audits))

Comments

The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the BLMP. Each of the monitoring institutions bears responsibility for establishing and administering its own quality management systems. The institutions involved in the BLMP coordinate their activities within the framework of the Working Group on Quality Assurance and the Ad Hoc Working Group on Vertebrates.

5.1 Monitoring institutions

- LLUR
- MLUR
- BfN
- LUNG
- NLPV NI
- LAVES
- LKN-SH
- LVA-MV

5.2 Guidance documents

- BLMP Quality Assurance Panel at the UBA, 2008: *Muster-Qualitätsmanagementhandbuch für Laboratorien des Bund/Länder-Messprogramms nach DIN EN ISO/IEC 17025 (BLMP Sample Quality Management Manual)*; Version: 01 of 1 February 2008; Federal Environment Agency.
- BSH, 2007: Standard - Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment (StUK 3).
- Buckland, S., Anderson, D. R., Burnham, K. P., Laake, J. L, Borchers, D. L. and L. Thomas, 2001: *Introduction to Distance Sampling: Estimating abundance of biological populations*; Oxford University Press Inc., New York.
- Diederichs, A., Nehls, G. und I. K. Petersen, 2002: 'Flugzeugzählungen zur großflächigen Erfassung von Seevögeln und marinen Säugern als Grundlage für Umweltverträglichkeitsstudien im Offshorebereich'.; *SEEVÖGEL*; 23 (2): pp. 38 - 46.
- Hiby, A. R. and P. Lovell, 1998: 'Using aircraft in tandem formation to estimate abundance of harbour porpoise'; *Biometrics*; 54: pp. 1280 - 1289.
- JAMP, 2004: *Guidelines on quality assurance for biological monitoring in the OSPAR area.*; ICES Techniques in Marine Environment Sciences; 32; 2004.
- Müller G., Kaim, U. Haas, L., Greiser-Wilke, I., Wohlsein, P., Siebert, U. and W. Baumgärtner, 2004: '*Phocine distemper* virus: characterization of the *Morbillivirus* causing the seal epizootic in northwestern Europe in 2002'; *Archive of Virology*.
- Siebert, U., Wohlsein, P., Lehnert, K. and W. Baumgärtner, 2007: 'Pathological Findings in Harbour Seals (*Phoca vitulina*): 1996-2005'; *J. Comp. Path.*; 2007; 137: pp. 47 - 58.
- Siebert, U., Wünschmann, A., Weiss, R., Frank, H., Benke, H. and K. Frese, 2001: 'Post-mortem findings in Harbour porpoises (*Phocoena phocoena*) from the German North and Baltic Seas'; *J. Comp. Path.*; 2007; 124: pp. 102 - 114.

5.3 Standards

5.4 Current status

There are instructions on standardised surveying methods for all subfields of mammal monitoring. In every case, their application presupposes advanced knowledge of the identification and counting of species in each specific situation (where necessary at long distances), which can as a rule only be acquired as a result of good training and/or as many years of experience as possible. There is consequently a great need for training in monitoring skills.

Standards that cover the methods for the evaluation and quality assurance of POD data are still to be developed. TPODs must be calibrated before their deployment and subsequently at regular intervals. The German Oceanographic Museum (DMM) has developed a suitable calibration method, and all TPODs deployed by the Museum and the FTZ West Coast are calibrated there. A large number of the measuring devices deployed in Germany and internationally by various institutions and companies have also been calibrated at DMM.

Intercalibration exercises

Not yet available

Workshops

- ECS Workshop on Static Acoustic Monitoring of Cetaceans, 2006
- Static Acoustic Monitoring (SAM) as a Tool for Environmental Impact Studies with Emphasis on Offshore Wind Farm Constructions, MINOSplus Workshop at DMM, 2006
- SCANSII Final Workshop, 8 December 2006
- ECS Workshop on Estimation of G(o) in Line Transect Surveys of Cetaceans, 2004

6 Literature

- Conservation and Management Plan for the Wadden Sea Seal Population 2007-2010.
- 'Draft Monitoring and Assessment Strategy for *Phocoena phocoena* (Harbour Porpoise) Populations in the OSPAR Maritime Area'; (MASH 07/3/3-Add.4-E)

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

To date, no attention has been devoted to mammals under the BLMP. The ongoing monitoring activities and the methods for the monitoring of common seals, grey seals and harbour porpoises developed under various projects (JASTARNIA, MINOS, SCANS) are suitable for compliance with the monitoring requirements imposed by the conventions and directives as a whole (cf. 3.1-3.4).

7.2 Working steps required

Priorities

- Establishment and anchoring of the present concept as a permanent programme in the context of marine monitoring.
- Completion of detailed harbour porpoise and seal monitoring concepts for the whole German Baltic Sea.
- Completion of detailed concepts for stationary POD monitoring in the Wadden Sea.
- Determination of the costs for the introduction or amendment of monitoring parameters.
- Decision-making on and coordination of the joint award of monitoring contracts (for example, harbour porpoise surveys at sea).
- Measures for the transposition of EU Regulation 812/2004 on the monitoring of incidental catches of harbour porpoises into German law. Amendment of the coastal fisheries ordinances of the Länder to provide for a duty to report bycatches. Furthermore: the drafting of a concept for the comprehensive monitoring of harbour porpoise bycatches, remuneration of expenses for the delivery of incidentally caught animals.
- Description of the exact channels through which the monitoring data used to assess individual parameters are derived when complying with the reporting duties, contact to be taken up with the competent bodies in Denmark (Baltic Sea), and Denmark, the Netherlands and the UK (North Sea) for the spatial-temporal and methodological harmonisation of harbour porpoise surveys in accordance with the HD reporting duties.

Quality assurance

The participating institutions are striving to build up and introduce uniform QA standards by means of the introduction of a DIN EN ISO/IEC 17025 quality management system (BLMP Study Group decision, 2006), which would ideally lead to the accreditation of the institutions. The establishment of DIN EN ISO/IEC 17025 quality management systems under the BLMP should be concluded by 1 January 2012.

In some cases, specific quality assurance methods have to be developed and established for the field of marine mammal monitoring or adjustments made to existing quality management documents.

In this context, apart from the development of uniform quality standards (QM system), efforts should also be made to ensure that the participating institutions work largely in accordance with shared guidelines when the SOPs are being drafted. To this end, the current Sample Quality Management Manual is to be amended and suitable sample SOPs for mammal monitoring drawn up. This work is expected to begin in 2010.

The DIN EN ISO/IEC 17025 quality management system includes the following elements:

- documented validation/verification of the investigation methods deployed for the determination of performance characteristics,
- storage of reference and comparative collections,
- the qualification and regular training of personnel for the procedures deployed,
- the regular performance of internal and external audits,
- regular participation in national and international interlaboratory comparisons, intercalibration exercises, training courses and workshops, and their evaluation.

Data management

Since the monitoring concept has been formally agreed, an appropriate data management concept is to be developed in order to guarantee that the various institutions provide the data necessary for the purposes in question. To this end, the Sub-Working Group on Vertebrates is to specify who the data suppliers are and what information has to be made available (e.g. geographical position, date, method). Once this has been done, data import and export interfaces are to be created.

Harmonisation with existing national and international databases such as the ASCOBANS international database, the SAS database, the MINOS database, and the databases of the Federal Government and Länder.

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) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(3) Surveying of incidental catches of harbour porpoises in fisheries and amending Regulation (EC) 88/98.

(4) HELCOM adopted a `List of threatened and/or declining species and biotopes/habitats' in December 2006, but has not adopted further measures, although it is planning this in the context of the Baltic Sea Action Plan (see below).

(5) It is still necessary for appropriate monitoring concepts to be specified for the monitoring of the Ecological Quality Objectives (see 2.2, Environmental targets). Since the monitoring concepts for the EcoQOs are currently being drawn up, there are still no standards for the frequency of monitoring.

(6) The OSPAR Commission has set itself the objective of recording all species and habitats that need to be protected. This list is used by OSPAR to guide the setting of future priorities for its further work on conservation and the protection of marine biodiversity.
OSPAR is currently drawing up instructions for the monitoring of the species and habitats on the list.

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

Monitoring Specifications

Date: 2010-02-22

Fish

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Fauna - Fish

1.2 Definition

Fish and cyclostomata

1.3 Competent authority/ies

Federal Government:	vTI, BfN
Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG, Lfa-Fischerei MV
Lower Saxony:	NLWKN, NLPV NI, LAVES, SFA
Schleswig-Holstein:	LKN-SH, LLUR

1.4 Working group

Ad Hoc Working Group on Vertebrates (Birds, Mammals, Fish)

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Articles 4 and 7, Annexes III and IV

Comments

The environmental status of European marine waters is to be surveyed and assessed by means of coordinated monitoring programmes.

- MSFD, Articles 4 and 7, Annexes III and IV

HD [2]

Articles 2 and 11

Comments

Member States shall undertake surveillance of the conservation status of species and the habitats referred to in Article 2 with particular regard to priority habitat types and priority species.

- HD, Article 2
- HD, Article 11

In addition to this, fish are relevant for assessment procedures because they feature in the inventories of typical species for HD habitat types.

- Krause et al., 2008

WFD [3]

Article 8(1); Annex V, 1.13, 1.14

Comments

Under the WFD, fish must be monitored as a quality element in transitional waters at least every three years

- WFD, Article 8(1)
- WFD Annex 5, 1.1.3/1.1.4 and 1.2.3/1.2.4

No selection of species is prescribed.

HELCOM

Comments

HELCOM has adopted a list of endangered species and habitats.

- List
- COMBINE Manual

Furthermore, indicators from which monitoring obligations will be derived are being drawn up.

OSPAR

Comments

OSPAR has adopted a list of endangered species and habitats. According to this list, 19 fish species must be monitored at present. Monitoring instructions are being drawn up for this purpose.

- MASH 05/3/Info.4-E,L

EcoQOs [4]

Ecological quality objectives

Comments

Monitoring obligations for fish are to be derived from two EcoQOs (see 2.2) (ICES calculation).

- EcoQOs
- Summary of OSPAR monitoring requirements (I. Narberhaus)

TMAP [5]

Comments

Fish monitoring is not a trilateral obligation at present.

- Stade-Deklaration 1997
- TMAP-Manual Kapitel 2

The TMAP ad hoc working group fish has recommended trilateral targets for fish stocks in the Wadden Sea. These will be discussed during the revision of the Wadden Sea Plan to be completed by 2010.

- Draft TMAP species list

CFP

Comments

The EU Member States record the size of the stocks of commercially exploited fish species and forecast the development of these stocks. In future, fisheries management is intended to be complemented by ecosystem-oriented approaches.

2.2 Environmental targets

MSFD

Implementation of marine strategies that serve the objective of achieving good status in the marine environment, at the latest by 2021, ensuring the protection and preservation of the marine environment over the long term and preventing any deterioration of environmental quality.

- MSFD, Articles 1 and 5
- MSFD, Articles 9 and 10

HD

Ensuring biodiversity through the conservation of natural habitats and wild fauna and flora. Maintaining or restoring the favourable conservation status of natural habitats and species of wild fauna and flora.

- HD, Article 2(1) and (2)

Furthermore, drafts of specified conservation targets for marine conservation areas have been drawn up.

WFD

Achievement of a good ecological status of fish fauna in transitional waters by 2015.

- WFD, Annex V, 1.2.3

HELCOM

- (1) Healthy Baltic Sea environment with diverse biological components functioning in balance, resulting in a good ecological status and supporting a wide range of sustainable human economic and social activities.
    - HELCOM, 25/2004
- (2) Thriving and balanced communities of plants and animals (coastal fish communities).
- (3) Viable stocks of fish.

OSPAR

The Contracting Parties shall (...) take the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems.

- OSPAR Convention, Article 2(1)

Ecological Quality Objectives (EcoEcoQOs) for fish:

- (1) Spawning stock biomass of commercial fish species in the North Sea: The biomass should be above precautionary reference points that have been set by the relevant fisheries institutions. In this respect, fish mortality is to be taken into consideration by ICES.
- (2) Fish communities: changes in the ratio of large to small fish, i.e. average weight and average maximum length.
- (3) Sand eel availability.
    - EcoQO Manual (draft)

TMAP

The presence of typical Wadden Sea fish fauna and the preservation of the Wadden Sea's nursery function for fish are proposed as environmental targets to be formulated by TMAP.

CFP

Use and conservation of fish stocks within safe biological limits by use of the setting of scientifically based catch quantities, limitation of fishing operations and issue of technical regulations.

2.3 Threats

As far as most migratory diadromous fish species are concerned, the principle potential threats lie in non-marine waters (loss of spawning habitats, passability of migration routes, etc.). In marine waters, mortality due to bycatch levels in commercial fisheries represents the principle threat.

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

Monitoring network

Biological data on fish stocks are currently being gathered by various institutions for different purposes. The data required for German marine monitoring are to be supplied from all the surveys listed here. Additional surveys that are required are listed in 6.2.

The monitoring network currently being operated by vTI in the North Sea and Baltic Sea is shown in Figs. 1 and 3.

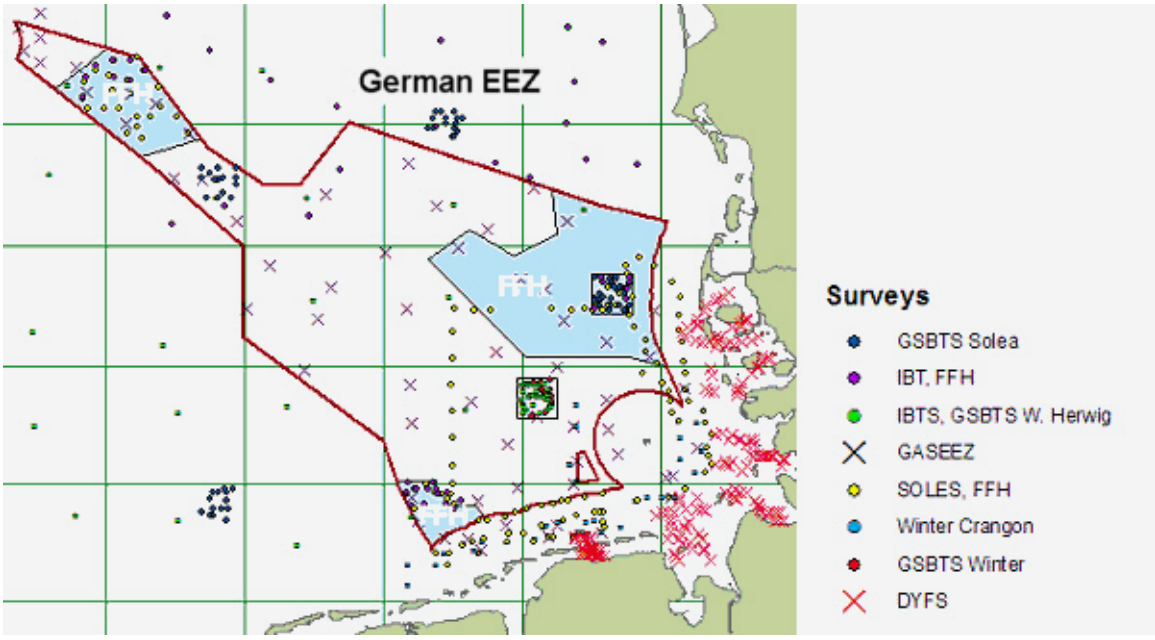

Fig. 1: Present vTI monitoring network in the North Sea (the Hydroacoustic Survey is not shown, as the stations used are alternated)

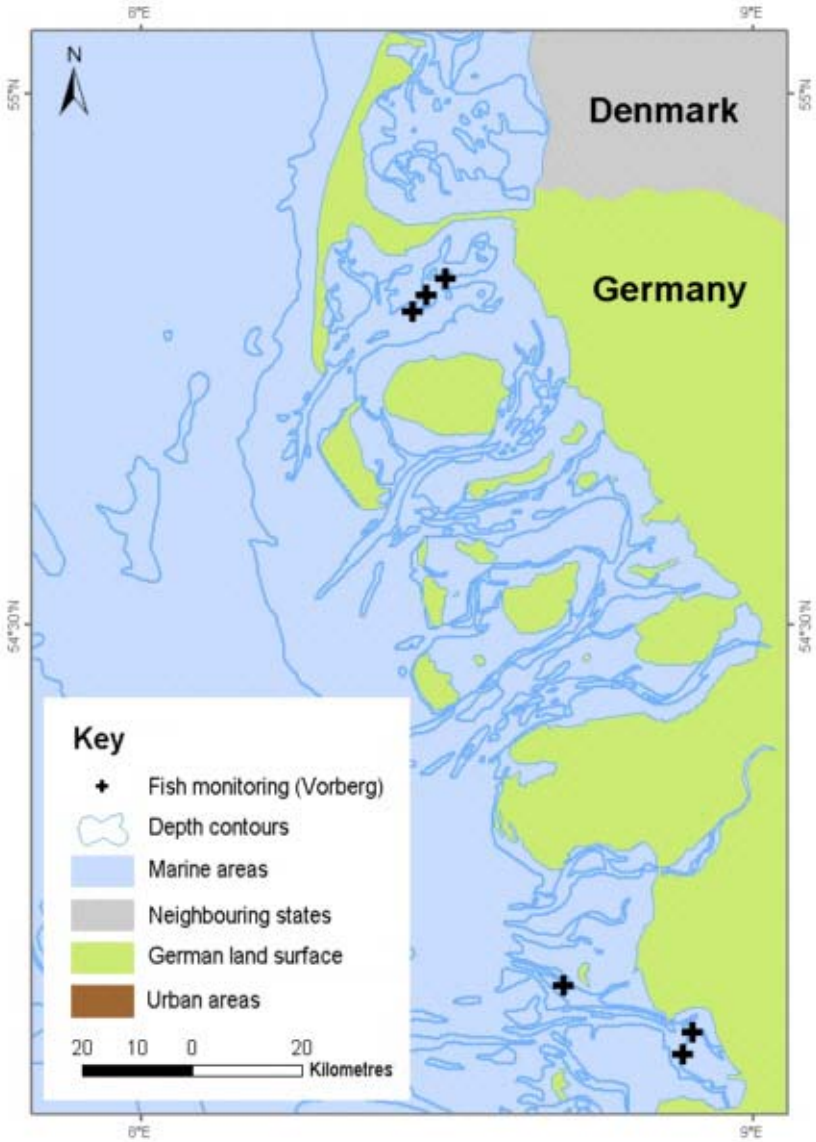

Fig. 2: NPV Schleswig-Holstein monitoring network (annual stow net fishing in the Wadden Sea)

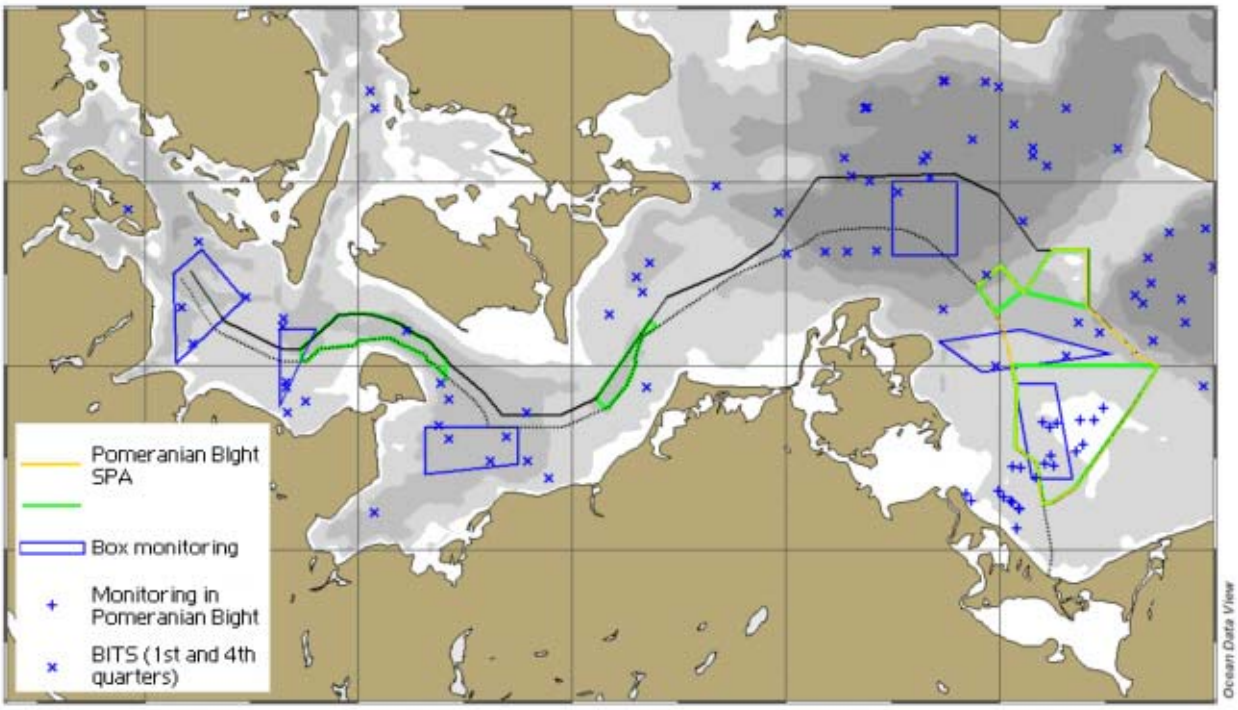

Fig. 3: vTI monitoring network in the Baltic Sea in relation to the boundaries of territorial waters (black dotted line) and the EEZ (black line), as well as the Pomeranian Bay SPA (yellow) and the proposed HD areas

---

Data on the titles, purposes and durations of scientific fish surveys in the North Sea, the Baltic Sea and transitional waters are given in the tables below (see 3.2, Monitoring activities).

Methods

Surveying of stocks in transitional waters (North Sea)

- Stow net fishing (pelagic fish fauna)
  - Vorberg, 1998
- Reports of rare species from professional and amateur fishermen and women
  - Thiel et al., 2007

Surveying of stocks in coastal waters (North Sea)

- Stow net fishing (pelagic fish fauna)
  - Vorberg, 1998
- Beam trawl fishing (demersal fish fauna)
  - DYFS
- Reports from commercial and amateur fishermen and women
  - Thiel et al., 2007

Surveying of stocks in the EEZ (North Sea and Baltic Sea)

- Trawl fishing
  - Survey Trawl Standardisation, ICES, 2005
  - IBTS Manual, ICES, 2006
  - GSBTS: Ehrich et al., 2007
- Reports from commercial and amateur fishermen and women
  - Thiel et al., 2007

Parameters

All the parameters for distribution, population and habitat quality provided for by the Habitats Directive can only be evaluated in combination with monitoring in rivers. The origins of the data required for the assessment of individual parameters are indicated in the species tables:

- Table of target species for German marine monitoring
- Table of species by habitat type
- Schnitter et al., 2006

General parameters for seabed monitoring:

- Presence - distribution of "priority" species (see species list)
- Presence of "secondary" species (see species list)

Supplementary information where possible:

- Abundance
- Biomass
- Size composition
- Age structure (particular species, commercially important species)
- Habitat quality (at present, however, fish populations are most vulnerable outside marine waters in the habitats along migration routes and the spawning habitats in rivers.)

Additional parameters for assessment

Only parameters derived for a marine subhabitat from the assessment schemes required by the various directives/conventions are to be listed. Coordination with river monitoring is absolutely essential for the overall assessment of additional parameters as well.

Mandatory:

Water engineering and maintenance:

Passability of structures at the transition from marine to brackish water
Habitat loss (due to dumping sites, improvement of shipping channels)

Use:

Fisheries (effort and landing figures from EU DCR)
Offshore exploration
Port construction measures
Marine mining

Hydrography:

Salinity, temperature at each monitoring station

Optional:

Anthropogenic inputs of substances:

Accidents
Inputs of warm water (limited to rivers)

Biology:

Invasive species, ...

Hydrochemistry

Hydrography

3.2 Monitoring activities

North Sea

Fish - North Sea - DYFS

Methods:

Title:	**Demersal Young Fish Survey, DYFS**
Priority:	Monitoring absolutely essential
Institution:	vTI-SF
Period:	Since 1974 - ongoing
Objective:	Determination of spatial and temporal changes in fish communities in shallow coastal waters.
Method:	Annual monitoring with beam trawl in coastal waters.
Supporting parameters:	Hydrography (CTD)

Frequency:

Annual monitoring

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Fish - North Sea - GASEEZ

Methods:

Title:	**German Autumn Survey EEZ (GASEEZ)**
Priority:	Monitoring absolutely essential
Institution:	vTI-SF
Period:	Since 2004 - ongoing
Objective:	Determination of spatial and temporal changes in fish communities
Method:	Annual monitoring at 80 permanent stations distributed over the whole EEZ in the North Sea. Deployment of bottom trawl and beam trawl in alternate years
Supporting parameters:	Hydrography (CTD)

Frequency:

Annual monitoring - autumn

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Fish - North Sea - GSBTS

Methods:

Title:	**German Small Scale Bottom Trawl Survey (GSBTS)**
Priority:	Monitoring absolutely essential
Institution:	vTI-SF
Period:	Since 1987 - ongoing
Objective:	Surveying of small-scale and long-term changes in demersal fish fauna in three permanent study areas.
Method:	Samples taken in permanent study areas (`boxes'), each measuring 10x10 nautical miles. Recording six-monthly in two boxes, annually in one box. GOV bottom trawl (see IBTS Manual) and cod net. - Link to GSBTS: Ehrich et al., 2007.
Supporting parameters:	Hydrography (CTD); since 1999: benthic epifauna, (2-m beam trawl) and, irregularly, infauna (van Veen grab), surveyed by the Senckenberg Institute (FIS)

Frequency:

Summer and winter

Parameter:

- Age structure
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Fish - North Sea - Stow Net Fishing in the Schleswig-Holstein Wadden Sea

Methods:

Title:	**Stow Net Fishing in the Schleswig-Holstein Wadden Sea**
Priority:	Monitoring absolutely essential
Institution:	NPV SH
Period:	Since 1991 - indefinite
Objective:	Monitoring is required under TMAP and will be required in future for Natura 2000. Furthermore, it contributes to the surveillance of the occurrence of Red List species.
Method:	Annual sampling in August with stow net at three stations in the Hörnum Deep and three stations in the Meldorf Bight.
Supporting parameters:	Hydrography (CTD)

Frequency:

Annual sampling in August

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Fish - North Sea - Hydroacoustic Survey

Methods:

Title:	**Hydroacoustic Survey (Herring)**
Priority:	Monitoring useful for assessment
Institution:	vTI-SF
Period:	Since 1987 - ongoing
Objective:	Surveying of stock parameters for herring and sprat as basis for fisheries assessment and management.
Method:	Annual acoustic monitoring with accompanying fish catches using pelagic trawl for validation of sonar readings.
Supporting parameters:	Hydrography (CTD)

Frequency:

Annual monitoring

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Fish - North Sea - IBTS

Methods:

Title:	**International Bottom Trawl Survey (IBTS)**
Priority:	Monitoring useful for assessment
Institution:	vTI-SF
Period:	Since 1991 - ongoing
Objective:	Determination of stock parameters for commercially exploited demersal fish species as basis for fisheries assessment and management.
Method:	Once a year in the 3rd quarter, trawl tow with GOV trawl (see IBTS Manual) in the ICES rectangles in the German Bight.
Supporting parameters:	Hydrography (CTD); since 1999: benthic epifauna (2-m beam trawl) and, irregularly, infauna (van Veen grab), surveyed by the Senckenberg Institute (FIS

Frequency:

Once a year in the 3rd quarter

Parameter:

- Age structure
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Fish - North Sea - Monitoring in the East Frisian Wadden Sea

Methods:

Title:	**Monitoring in the East Frisian Wadden Sea**
Priority:	Monitoring useful for assessment
Institution:	AWI
Period:	Since 1998 - indefinite (?)
Objective:	Monitoring of species composition, abundance and biomass of all fish species and decapods was begun against a background of ecosystem research; currently being continued in the context of climate research activities.
Method:	Sampling with 3 m beam trawl twice a year (March and July/August) in the Spiekeroog and Langeoog tidal channel system, and along the 5 m line off both islands two hours before and after low tide.
Supporting parameters:	-

Frequency:

Twice a year (March and July/August)

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Fish - North Sea - Monitoring in the Sylt-Rømø Bight

Methods:

Title:	**Monitoring in the Sylt-Rømø Bight**
Priority:	Monitoring useful for assessment
Institution:	AWI
Period:	2006 - 2009
Objective:	The data gathered should be incorporated into the ecological network analysis (ENA) model for the Sylt-Rømø Bight in order to, among other things, survey the influence of invasive fish species on the ecological network.
Method:	Six to seven samples taken at four locations per year, mini-bottom trawl and floating trawl.
Supporting parameters:	-

Frequency:

Six to seven samples taken per year

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Fish - North Sea - Sole Survey

Methods:

Title:	**Sole Survey**
Priority:	Monitoring absolutely essential
Institution:	vTI-SF
Period:	Since 1976 - ongoing
Objective:	Determination of spatial and temporal changes in fish communities
Method:	Annual monitoring of demersal fish with beam trawl in coastal waters and, since 1999, selected areas of the EEZ (HD areas).
Supporting parameters:	Hydrography (CTD)

Frequency:

Annual monitoring

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Eider

Fish - Transitional Waters - Fish Monitoring in the Eider

Methods:

Title:	**Fish Monitoring in the Eider**
Priority:	Monitoring absolutely essential
Institution:	LLUR
Period:	Every three years since 2006
Objective:	Monitoring and assessment of fish communities
Method:	Stow net fishing during two tides, once in early summer and once in autumn
Supporting parameters:	-

Frequency:

Every three years (early summer and autumn)

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Elbe

Fish - Transitional Waters - Fish Monitoring in the Elbe

Methods:

Title:	**Fish Monitoring in the Elbe**
Priority:	Monitoring absolutely essential
Institution:	Elbe Water Quality Office (WGE)
Period:	Since 2000 - indefinite
Objective:	Monitoring is carried out together with the monitoring of pollutants in fish, which has been a component of the German Marine Monitoring Programme (BLMP) since 1986.
Method:	Stow net fishing
Supporting parameters:	-

Frequency:

Not stated

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Ems

Fish - Transitional Waters - Fish Monitoring in the Ems

Methods:

Title:	**Fish Monitoring in the Ems**
Priority:	Monitoring absolutely essential
Institution:	LAVES
Period:	Investigations in 2006
Objective:	Monitoring and assessment of fish communities
Method:	Stow net fishing
Supporting parameters:	-

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Weser

Fish - Transitional Waters - Fish Monitoring in the Weser

Methods:

Title:	**Fish Monitoring in the Weser**
Priority:	Monitoring absolutely essential
Institution:	LAVES
Period:	2002, 2003, monitoring planned as of 2007
Objective:	Monitoring and assessment of fish communities
Method:	Stow net fishing
Supporting parameters:	-

Frequency:

Not stated

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Baltic Sea

Fish - Baltic Sea - BITS

Methods:

Title:	**Baltic International Trawl Surveys (BITS)**
Priority:	Monitoring absolutely essential
Institution:	vTI-OSF
Period:	Since 1991 - indefinite
Objective:	Determination of stock parameters for commercially exploited demersal fish species as basis for fisheries assessment and management
Method:	Twice a year in the 1st and 4th quarters, approx. 50 trawl tows (see ICES WG BIFS BITS Manual) in ICES Subdivisions 22 and 24. - Link to BITS Manual
Supporting parameters:	Hydrography (CTD)

Frequency:

Twice a year in the 1st and 4th quarters

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Fish - Baltic Sea - Box Monitoring in the Western Baltic Sea

Methods:

Title:	**Box Monitoring in the Western Baltic Sea**
Priority:	Monitoring absolutely essential
Institution:	vTI-OSF
Period:	Since 2003 - indefinite
Objective:	Surveying of small-scale and long-term changes in demersal fish fauna
Method:	Samples taken in five permanent study areas ('boxes') once a year (June), ten tows/box with TV trawl
Supporting parameters:	Hydrography (CTD)

Frequency:

Samples taken once a year (June)

Fish - Baltic Sea - Hydroacoustic Surveys

Methods:

Title:	**Hydroacoustic Surveys (Sprat and Herring)**
Priority:	Monitoring absolutely essential
Institution:	vTI-OSF
Period:	Since 1992 - indefinite (October survey); since 2001 - indefinite (May survey)
Objective:	Surveying of stock parameters for herring and sprat as basis for fisheries assessment and management
Method:	Annual international acoustic monitoring with accompanying pelagic trawl tows for validation of sonar readings. The October survey covers ICES Subdivisions 22 and 24, the May survey only covers ICES Subdivision 24 (see *Manual for the Baltic International Acoustic Surveys (BIAS)* (ICES 2003). - Link to BIAS Manual
Supporting parameters:	Hydrography (CTD)

Frequency:

Annual monitoring

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

Fish - Baltic Sea - Monitoring in the Pomeranian Bay

Methods:

Title:	**Monitoring in the Pomeranian Bight (previously Eel Survey)**
Priority:	Monitoring absolutely essential
Institution:	vTI-OSF
Period:	Since 1993 - indefinite
Objective:	Surveying of long-term changes in demersal fish fauna
Method:	15 tows with eel trawl on each occasion and, since 2002, additional surveying of small fish fauna with 2 m beam trawl
Supporting parameters:	Hydrography (CTD)

Frequency:

Not stated

Parameter:

- Age structure
- Biomass
- Distribution of priority species
- Habitat quality (evidence about spawning habitats)
- Ratio of cyprinids to percids
- Size composition

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Accidents
- Fishing industry (techniques)
- Habitat loss
- Hydrochemistry
- Hydrography
- Inputs of warm water
- Invasive species
- Marine mining
- Offshore exploration
- Passability
- Port construction measures
- Sediment composition

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

Fish - General

Guideline:

Various directives

Comments:

At present, there is no standardised, uniform procedure for the assessment of the ecological status of fish in transitional waters, coastal waters and the EEZ. The development of an interregional assessment instrument of this kind for marine monitoring should be considered.

North Sea and Baltic Sea

Title

Fish - Transitional Waters

Authors

Scholle et al 2006

Guideline:

WFD

Stretch of Water:

Transitional waters

Comments:

- Scholle et al. 2006

North Sea and Baltic Sea

Title

Fish - HD Assessment Procedure
Monitoring in Germany under Articles 11 and 17 of the Habitats Directive

Guideline:

HD

Comments:

Habitats Directive (species):

- Schnitter et al., 2006

Habitats Directive (habitats):

- Krause et al., 2008

North Sea and Baltic Sea

Title

Fish - HELCOM Assessment Procedure

Authors

HELCOM

Guideline:

HELCOM

Comments:

- Link to HELCOM Assessment Procedure (in development)

North Sea and Baltic Sea

Title

Fish - OSPAR Assessment Procedure

Guideline:

OSPAR

Comments:

- OSPAR Assessment Procedure (to date, coverage of sturgeon und whitefish only)

North Sea and Baltic Sea

Title

Fish - TMAP Assessment Procedure

Guideline:

TMAP

Stretch of Water:

Coastal waters

Comments:

- Link to TMAP Assessment Procedure (trend calculation procedure in preparation)

5 Quality assurance

- Quality Assurance Panel (at the UBA (workshops, intercalibration exercises, first draft of a species list, standardisation with DIN, CEN and ISO, support for establishment of QM systems, drafting of sample SOPs, performance of audits))

Comments

The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the BLMP. Each of the monitoring institutions bears responsibility for establishing and administering its own quality management systems. The institutions involved in the BLMP coordinate their activities within the framework of the Working Group on Quality Assurance and the Ad Hoc Working Group on Vertebrates.

5.1 Monitoring institutions

- NLPV HH
- Lfa-Fischerei MV
- NLPV NI
- AWI
- LAVES
- vTI
- ARGE ELBE
- SFA
- LKN-SH

5.2 Guidance documents

- BLMP Quality Assurance Panel at the UBA, 2008: *Muster-Qualitätsmanagementhandbuch für Laboratorien des Bund/Länder-Messprogramms nach DIN EN ISO/IEC 17025 (BLMP Sample Quality Management Manual)*; Version: 01 of 1 February 2008; Federal Environment Agency.
- BSH, 2007: Standard - Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment (StUK 3).
- EU data collection programme: Regulations 1639/2001 and 1581/2004.
- HELCOM, *COMBINE Manual*, 'Annex C-10: Guidelines for coastal fish monitoring.'.
- ICES, 2005: *Survey Trawl Standardisation*.
- ICES, 2006: *Manual for the International BottomTrawl Surveys*.
- JAMP, 2004: *Guidelines on quality assurance for biological monitoring in the OSPAR area.*; ICES Techniques in Marine Environment Sciences; 32; 2004.

5.3 Standards

- DIN EN ISO/IEC 17025, 2005: General requirements for the competence of testing and calibration laboratories.
- DIN EN 14996, 2006: Water quality - Guidance on assuring the quality of biological and ecological assessments in the aquatic environment.
- DIN EN 14962, 2006: Water quality - Guidance on the scope and selection of fish sampling methods.
- DIN EN 14757, 2005: Water quality - Sampling of fish with multi-mesh gillnets.
- EU data collection programme: Regulations 1639/2001 and 1581/2004.
- ICES, 2005: Survey Trawl Standardisation
- ICES, 2006: Manual for the International Bottom Trawl Surveys.
- BSH, 2007: Standard - Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment (StUK 3).

5.4 Current status

There are instructions on standardised surveying methods for all subfields of fish monitoring. In every case, their application presupposes advanced knowledge of the identification and surveying of fish in each specific situation, which can as a rule only be acquired through good training and/or experience as possible.

Intercalibration exercises

Not available yet

Workshops

- Still to be completed

Deficiencies to be remedied

- There is no uniform sampling strategy for flowing waters and their river basins, coastal areas and the EEZ. It should be adapted to the circumstances as far as meaningfully possible.
- The comparability of fish data from different water types is limited.
- The compilation and evaluation of data from different sources is limited.
- Lack of surveying methods for fish on rocky and reef seabeds.
- Taxonomic workshops on species that are difficult to identify (e.g. how to distinguish lampreys, young Atlantic salmon and lake trout, shad/twaite shad, dragonet, pipefish and goby species, lesser sand eels, seasnails and turbots).
- Formal agreement of evaluation guidelines for long-term datasets
- Optimisation of the storage and redistribution of electronic catch data

6 Literature

- Common Wadden Sea Secretariat, 1997: Stade Declaration: Trilateral Wadden Sea Plan: Ministerial Declaration of the Eighth Trilateral Governmental Conference on the Protection of the Wadden Sea: Stade, 1997.
- Common Wadden Sea Secretariat, 2006: *Report of the TMAP ad hoc working group fish*, 'Annex 5'.
- Erich, S. et al., 2007: '20 years of the German Small-Scale Bottom Trawl Survey (GSBTS): A review': *Senckenbergiana maritima*; 37 (1); pp. 13 - 18; Frankfurt am Main.
- European Community, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; CONSLEG: 1992L0043 - 01/05/2004; p. 6.
- European Community, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; CONSLEG: 1992L0043 - 01/05/2004; p. 9.
- European Community, 2003: Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, *Official Journal*; L 327, p. 12.
- European Community, 2003: Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, *Official Journal*; L 327.
- European Community, 2003: Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, *Official Journal*; L 327, p. 46 (1.2.3, Transitional waters).
- European Community, 2004: EU data collection programme: Regulations 1639/2001 and 1581/2004.
- European Community, 2005: Directive of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive), COD/2005/0211, 24 October 2005, pp. 16 - 18.
- European Community, 2005: Directive of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive), COD/2005/0211, 24 October 2005, pp. 27 - 20 and 31.
- European Community, 2005: Directive of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive), COD/2005/0211, 24 October 2005, pp. 14 and 16.
- HELCOM, 2007: *HELCOM lists of threatened and/or declining species and biotopes/habitats in the Baltic Sea area*; Baltic Sea Environment Proceedings; 113.
- HELCOM, *25/2004*
- ICES, 2003: *Manual for the International Acoustic Survey (BIAS)*.
- ICES, 2005: *Report of the Study Group on Survey Trawl Standardisation (SGSTS), 16-18 April 2005, Rome, Italy*; ICES CM 2005/B:02; 67 pp.
- ICES, 2007: *Manual for the Baltic International Trawl Surveys (BITS)*; Rostock.
- ICES: *Manual for the International Bottom Trawl Surveys (IBTS)* ; revision VII.
- Krause, J. et al., 2008: *Bewertungsschemata für die marinen Lebensraumtypen der FFH-Richtlinie.*.
- Naberhaus, I., 2007: `Zusammenstellung der nach Oslo-Paris- und Helsinki-Konvention zu überwachende Arten in der deutschen Nord- und Ostsee'; working paper; 6 September 2007.
- Neudecker, T., 2000: `Der Demersal Young Fish Survey (DYFS) in Schleswig-Holstein - Entwicklung und derzeitiger Stand'; in: *Wattenmeermonitoring 2000*; report of the National Park Administration Schleswig-Holstein Wadden Sea.
- OSPAR, 1992: Convention for the Protection of the Marine Environment of the North-East Atlantic; Article 2(1).
- OSPAR, 2005: *2004 Initial OSPAR List of Threatened and/or Declining Species and Habitats*; MASH 05/3/Info.4-E(L).
- OSPAR, 2007: *Draft EcoQO Handbook - Part B*; BDC 07/2/3-Add.1-E.
- OSPAR, 2007: *Draft Monitoring and Assessment Strategy for Acipenser sturio Populations in the OSPAR Maritime Area*; MASH 07/3/3-Add.5-E.
- OSPAR, 2007: *Draft proposal for the assessment and monitoring of the status of Houting in the OSPAR Maritime Area*; MASH 07/3/3 Add.2.
- Schnitter, P. H. et al., 2006: `Empfehlungen für die Erfassung und Bewertung von Arten als Basis für das Monitoring nach Artikel 11 und 17 der FFH-Richtlinie in Deutschland'; *Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt Halle*; Sonderheft 2; 2006; pp. 193 - 237.
- Scholle, J., Schuchardt, B. und D. Kraft, 2006: *Fischbasiertes Bewertungswerkzeug für Übergangsgewässer der norddeutschen Ästuare*.
- Thiel, R., 2007: *`Erfassung von FFH-Anhang II-Fischarten in der deutschen AWZ von Nord- und Ostsee (ANFIOS): Schlussbericht für das F&E-Vorhaben';* commissioned by the Federal Agency for Nature Conservation.
- Trilateral Monitoring and Assessment Group: *TMAP Manual: The Trilateral Monitoring and Assessment Program (TMAP)*; Common Wadden Sea Secretariat, Wilhelmshaven; Chapter 2.
- Sub-Working Group on Vertebrates - Fish, 2008: *Zielarten deutsches Meeresmonitoring: Arbeitstabelle*.

- Vorberg, R., 2006: `Monitoring der Fische im Wattenmeer'; in *Wattenmeermonitoring 1998*; report of the National Park Administration Schleswig-Holstein Wadden Sea.

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

North Sea:

- Establishment of stow net fishing in at least two areas in the coastal waters of Lower Saxony (comparable to Schleswig-Holstein)
- Fishing industry catch reports (proposal: development of a reward system to improve information about rare species)

Baltic Sea:

- Fishing industry catch reports (proposal: development of reward systems to improve information about rare species)
- Identification and drafting of a monitoring concept for twaite shad spawning sites in the Oder Lagoon
- Establishment of fish monitoring in Bodden waters and the lower reaches of rivers in Mecklenburg-Western Pomerania

7.2 Working steps required

Priorities:

Monitoring programmes

- Formal agreement of the proposed monitoring programme with the specification of its methodology, and its subsequent establishment and anchoring as a permanent programme in the context of marine monitoring.
- Continuation of the coordination work begun (25 September 2008) on migratory fish species with colleagues who work on inland waters to arrive at operationalised assessment criteria of the kind discussed by Schnitter et al. (2006) and carry out joint overall assessments under the HD. The BfN in Bonn (Division I 1.3) has been requested to manage contacts with marine monitoring (Sub-Working Group on Vertebrates).
- Decision about the establishment of fish monitoring in Bodden waters and the lower reaches of rivers in Mecklenburg-Western Pomerania by Mecklenburg-Western Pomerania.
- Action to ensure the permanent, long-term availability of AWI data (see 3.1) as part of future fish monitoring.

Quality assurance

The participating institutions are striving to build up and introduce uniform QA standards by means of the introduction of a DIN EN ISO/IEC 17025 quality management system (BLMP Study Group decision, 2006), which would ideally lead to the accreditation of these institutions. The establishment of DIN EN ISO/IEC 17025 quality management systems under the BLMP should be concluded by 1 January 2012.

In some cases, specific quality assurance methods have to be developed and established for the field of fish monitoring or adjustments made to existing quality management documents.

In this context, apart from the development of uniform quality standards (QM system), efforts should also be made to ensure that the participating institutions work largely in accordance with shared guidelines when the SOPs are being drafted. To this end, the current Sample Quality Management Manual is to be adapted and suitable sample SOPs for fish monitoring drawn up. This work is expected to begin in 2011.

The DIN EN ISO/IEC 17025 quality management system includes the following elements:

- documented validation/verification of the investigation methods deployed for the determination of performance characteristics,
- storage of reference and comparative collections
- the qualification and regular training of personnel for the procedures deployed,
- the regular performance of internal and external audits,
- regular participation in national and international interlaboratory comparisons, intercalibration exercises, training courses and workshops, and their evaluation.

Data management

Once the monitoring concept has been formally agreed, an appropriate data management concept is to be developed in order to guarantee that the various institutions provide the data necessary for the purposes in question. To this end, the Sub-Working Group on Vertebrates is to specify who the data suppliers are and what information has to be made available (e.g. geographical position, date, method). Once this has been done, data import and export interfaces are to be created.

Further activities:

EU DCR

Integration of effort and landing data (EU DCR) into marine monitoring.

Under the EU's Common Fisheries Policy, the Member States have committed themselves to forward effort and landing figures to the EU for the control of quotas (EU DCR). The landing quantities for each stock (management unit) are forwarded to the ICES. These data should also be used for the evaluation of monitoring results on other quality elements (e.g. macrozoobenthos).

Additional catch reports

Information sent in by fishermen, anglers and expert observers (e.g. at fish passes) should also be incorporated into the figures. This may make it possible for the occurrence of fish kills and HD species, for example, to be monitored qualitatively. A suitable reward system should be developed for this purpose.

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) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(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) It is still necessary for appropriate monitoring concepts to be specified for the monitoring of the Ecological Quality Objectives (see 2.2, Environmental targets). Since the monitoring concepts for the EcoQOs are currently being drawn up, there are still no standards for the frequency of monitoring.

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

Monitoring Specifications

Date: 2010-01-14

Pollutants

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Chemical Monitoring - Pollutants

1.2 Definition

Monitoring of concentrations of organic pollutants, heavy metals and organometallic compounds in biota, sediment/suspended material and water.

Scope: Monitoring areas in the North Sea and Baltic Sea for which the German Federation and the Länder are responsible on the basis of current legislation and the commitments that have been entered into, as a rule inland waters, coastal and transitional waters and the high sea in the EEZ.

1.3 Competent authority/ies

Federal Government:	vTI, BfG, BSH, UBA
Hamburg:	BSU
Mecklenburg-Vorpommern:	Lfa-Fischerei MV, IOW, LUNG
Lower Saxony:	NLWKN
Schleswig-Holstein:	LLUR

1.4 Working group

Ad Hoc Working Group on Pollutants and Biological Effects

2 Monitoring requirements

Both the programmes established under the regional sea conventions and the European Union's Marine Strategy involve the monitoring of pollutants in the sea as an essential component that facilitates the determination of its environmental status, the setting of targets for the achievement of a good environmental status and the derivation of measures with which inputs can be reduced and the effectiveness of the measures taken controlled.

2.1 Necessity

EU

It has been necessary for pollutants to be monitored in various ways for a long time under various European directives. The main directives in this field include Directive 2006/11/EC of the European Parliament and of the Council on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Water Protection Directive, codifies 76/464/EEC) and its daughter directives, Directive 79/923/EEC on the quality required of shellfish waters (Shellfish Directive), Directive 2000/60/EC establishing a framework for Community action in the field of water policy (Water Framework Directive, WFD) with its daughter directive 2008/105/EC (on environmental quality standards) and Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive, MSFD).

Ultimately, the intention is for the Water Protection Directive, the Shellfish Directive and the Fish Directive to be codified by the WFD.

The MSFD is intended to implement the requirements laid down in the European Marine Strategy (EMS [7]); JRC/ICES task groups have been established for each of the descriptors listed in the MSFD and are drawing up recommendations concerning criteria and methodological standards for the implementation of the MSFD. The regional sea conventions will be involved as appropriate in the initial assessment and future monitoring.

MSFD [1]

Comments

DIRECTIVE 2008/56/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)

Investigations of pollutants are necessary in order to carry out the initial assessment required by Article 8(1), to define environmental targets on the basis of this initial assessment (Article 10) and to establish ongoing environmental monitoring programmes (Article 11).

The investigations necessary in order to describe the chemical status for the initial assessment and in the monitoring programmes that are to be established cover the following issues:

- problem chemicals,
- sediment contamination,
- hot spots,
- health issues,
- contamination of biota (in particular biota intended for human consumption).

To this end, the following pressures and impacts must be surveyed:

- Introduction of synthetic compounds (e.g. priority substances under the Water Framework Directive that are relevant for the marine environment, biologically active substances, pesticides, antifoulants and pharmaceuticals, resulting from losses from diffuse sources, pollution by ships and atmospheric deposition);
- introduction of non-synthetic compounds (e.g. heavy metals and hydrocarbons, resulting from pollution by ships and atmospheric deposition);
- introduction of radionuclides.

HD [2]

Article 11 [3]

Comments

The Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Inputs of pollutants are to be taken into consideration in the assessment of impairments to habitats. See the assessment matrices for habitat types (in preparation).

WFD [4]

General

Comments

The WFD regulates the monitoring of pollutants in inland, transitional and coastal waters, in the course of which their chemical status is determined by means of

- surveillance monitoring,
- operational monitoring and
- investigative monitoring.

The provisions set out in the following directives are due to be incorporated into the WFD. The intention is for the provisions set out in the Water Protection Directive (76/464/EEC) to be incorporated into the WFD by 2013; in the mean time, the Water Protection Directive has been codified by a revised version, 2006/11/EC. The environmental quality standards to be observed are set out in its daughter directive, 2008/105/EC.

Water Protection Directive

2006/11/EC (codifies 76/464/EEC) and its daughter directives

Shellfish Directive (Articles 1, 2 and 7, and Annex)

Directive 79/923/EEC on the quality required of shellfish waters

The Member States must monitor organohalogenated compounds at least every six months in the designated shellfish waters.

Fish Directive

Directive 2006/44/EC on the quality of fresh waters needing protection or improvement in order to support fish life (codifies 78/659/EEC) prescribes the monitoring of zinc and dissolved copper; examination by taste only is prescribed for phenolic compounds, while visual examination and, where necessary, examination by taste are prescribed for petroleum hydrocarbons.

HELCOM

Baltic Sea Action Plan [5]

Comments

The Baltic Sea Action Plan sets out four targets that relate to hazardous substances:

- Concentrations close to background levels
- All fish safe to eat
- Healthy wildlife
- Radioactivity at pre-Chernobyl level

A procedure (CHASE) has been developed for the integrated assessment of these targets. The data on hazardous substances obtained in the course of environmental monitoring are incorporated into this procedure. In this respect, these monitoring specifications focus on the first of the targets cited above and the comparison of measured values to background or background reference values.

Pollution caused by hazardous substances refers to the discharge to, and presence of, a number of different anthropogenic substances in the marine environment. These substances include those that do not occur naturally in the environment but also natural substances, whose concentrations exceed natural levels.

Hazardous substances have adverse effects on the ecosystem, such as:

- Impaired general health status of animals
- Impaired reproduction of animals, especially top predators
- Increased pollutant levels in fish for human food.

Although monitoring indicates that the loads of some hazardous substances have been reduced considerably over the past 20 - 30 years, problems still persist; and concentrations in the marine environment of some new substances have even increased.

COMBINE

Comments

The COMBINE programme involves the monitoring of selected contaminants in selected species and selected organs from various regions of the Baltic Sea. The substances, compartments and areas to be investigated, and the minimum monitoring frequencies are set out in Part D of the Combine Manual and its annexes.

OSPAR

JAMP RID Monitoring Programme [6]

Comments

Joint Monitoring and Assessment Programme for the monitoring of riverine inputs and direct discharges.

JAMP-CAMP

Comprehensive Atmospheric Monitoring Programme

Comments

The Comprehensive Atmospheric Monitoring Programme requires the monitoring of inputs into the marine environment via atmospheric deposition.

JAMP-CEMP [7]

Joint Monitoring and Assessment Programme - Co-ordinated Environmental Monitoring Programme

Comments

The Coordinated Environmental Monitoring Programme is intended to monitor the concentrations of chemical contaminants (not including radionuclides) in marine biota (primarily fish and shellfish), sediments and marine waters, biological effects, nutrients, and direct and indirect eutrophication effects.

TMAP [8]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

http://www.waddensea-secretariat.org/TMAP/Monitoring.html

Wadden Sea Plan (Stade Declaration, 1997)

With regard to pollutants, TMAP requires the surveying of the temporal development and spatial distribution of TBT in water and sediments, and the concentrations of pollutants in blue mussels, flounder and bird eggs in the Wadden Sea area. In this respect, the monitoring is carried out in accordance with the OSPAR JAMP guidelines.

Chemical variables

- Nutrients
- Pollutants in sediment
- Pollutants in shellfish (blue mussels), flounder and seabird eggs

CMS/Seal Agreement

Seal Agreement, Articles V and VIII

Agreement on the Conservation of Seals in the Wadden Sea

Comments

The Wadden Sea States shall "monitor […], in particular in seal tissues and in organisms which are preyed upon by seals, the levels of those substances which in the light of the results of research appear to play a major role in the conservation status of the seal population."

2.2 Environmental targets

MSFD

(Article 1(2))

By 2020, the Member States shall

- achieve or maintain good environmental status in the marine environment;
- protect and preserve the marine environment, prevent its deterioration or, where practicable, restore marine ecosystems in areas where they have been adversely affected;
- prevent and reduce inputs in the marine environment, with a view to phasing out pollution as defined in Article 3(8), so as to ensure there are no significant impacts on or risks to marine biodiversity, marine ecosystems, human health or legitimate uses of the sea.

HD

Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora

The main objectives of the Habitats Directive (HD) are the conservation and restoration of biological diversity. The intention is for these objectives to be achieved with the creation of a European network of nature protection areas, Natura 2000. The Member States are obliged to designate, conserve and develop sites at which species and habitats of European significance occur.

WFD

- Protection of ALL waters - groundwater and surface waters, including coastal waters
- "Good status" for all waters within 15 years; ecological quality is the essential criterion for surface waters; the essential criteria for groundwater are its quantity and chemical purity
- Integrated water resources management based on river basin districts
- Development of emissions criteria for the prevention and reduction of pollution at source; also development of immissions criteria (quality targets for waters)
- "Phasing-out" of particularly hazardous substances
- Setting of appropriate water prices in order to encourage the careful handling of this precious resource
- Closer involvement of citizens in planning and decision-making processes

HELCOM

http://www.helcom.fi/helcom/en_GB/aboutus/

HELCOM's main goal is to protect the marine environment of the Baltic Sea from all sources of pollution, and to restore and safeguard its ecological balance.

HELCOM's vision for the future is a healthy Baltic Sea environment with diverse biological components functioning in balance, resulting in a good ecological status and supporting a wide range of sustainable economic and social activities.

Targets relating to hazardous substances

HELCOM Recommendation 19/5

The Objective of the Commission with regard to hazardous substances is

- to prevent pollution of the Convention Area by continuously reducing discharges, emissions and losses of hazardous substances, with the ultimate aim of concentrations in the environment near background values for naturally occurring substances and close to zero for man made synthetic substances,
- to reduce discharges, emissions and losses of hazardous substances likely to reach the marine environment, to levels that are not harmful to man or nature,
- to move towards the target of the cessation of discharges, emissions and losses of hazardous substances […] by the year 2020.

COMBINE

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 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.

Baltic Sea Action Plan (BSAP)

The agreed goal of HELCOM on hazardous substances is a Baltic Sea undisturbed by hazardous substances. The goal is described by four ecological objectives:

- Concentrations of hazardous substances close to natural levels
- All fish safe to eat
- Healthy wildlife
- Radioactivity at pre-Chernobyl level

In order to have operational ecological objectives, indicators have been identified. The agreed objectives will be monitored by the state of the environment (State and Impact). The indicators are represented by concentrations of selected heavy metals, organic substances and radioactive substances in different environmental compartments such as in sediment and fish, as well as health aspects of white-tailed eagle and seals.

OSPAR

1992 OSPAR Convention: ARTICLE 2: GENERAL OBLIGATIONS: 1

The Contracting Parties shall, in accordance with the provisions of the Convention, take all possible steps to prevent and eliminate pollution and shall take the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected.

To this end Contracting Parties shall, individually and jointly, adopt programmes and measures and shall harmonise their policies and strategies.

ANNEX IV: ON THE ASSESSMENT OF THE QUALITY OF THE MARINE ENVIRONMENT: ARTICLE 1

For the purposes of this Annex "monitoring" means the repeated measurement of:

- the quality of the marine environment and each of its compartments, that is, water, sediments and biota;
- activities or natural and anthropogenic inputs which may affect the quality of the marine environment;
- the effects of such activities and inputs.

Monitoring may be undertaken either for the purposes of ensuring compliance with the Convention, with the objective of identifying patterns and trends or for research purposes.

Objectives relating to hazardous substances

Objectives of the Hazardous Substances Committee (HSC)

In accordance with the general objective, the objective of the Commission with regard to hazardous substances is to prevent pollution of the maritime area by continuously reducing discharges, emissions and losses of hazardous substances, with the ultimate aim of achieving concentrations in the marine environment near background values for naturally occurring substances and close to zero for man-made synthetic substances.

Objectives of the ASMO Joint Assessment and Monitoring Programme (JAMP)

4. The main objectives of the JAMP are:

- the preparation of environmental assessments of the status of the marine environment of the OSPAR maritime area or its regions, including the exploration of new and emerging problems in the marine environment;
- the preparation of contributions to overall assessments of the implementation of the OSPAR strategies, including in particular the assessment of the effects of relevant measures on the improvement of the quality of the marine environment. Such assessments will help inform the debate on the development of further measures;

supported by:

- the implementation of collective OSPAR monitoring, including the development of the necessary methodologies;
- the preparation of environmental data and information products needed to implement the OSPAR strategies.

CEMP

The Coordinated Environmental Monitoring Programme (CEMP) is that part of the monitoring within the JAMP where the national contributions overlap and are co-ordinated.

The aim of the CEMP is to deliver comparable data from across the OSPAR maritime area, which can be used in assessments to address the specific questions raised in the JAMP.

TMAP

Trilateral cooperation between the Netherlands, Germany and Denmark.

http://www.waddensea-secretariat.org/TMAP/Monitoring.html

Trilateral policy and management aims "to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way" (Guiding Principle).

The aim of the TMAP is:

- To provide a scientific assessment of the status and development of the Wadden Sea ecosystem and
- To assess the status of implementation of the trilateral Targets of the Wadden Sea Plan.

Targets relating to pollutants

Monitoring the contamination of pollutants in biota in the Wadden Sea is carried out in order

- to detect and assess the response of natural processes in the ecosystem to changes in pollution levels. The processes concerned here are food chain fluxes and reproduction (including recruitment). There are links with primary production and decomposition;
- to detect and assess the response of species to changes in pollution levels which may affect the abundance and physiological functioning of species leading to structural changes in the ecosystem.

With respect to the "Quality of Water and Sediment" the following Target applies to pollutants in biota (Wadden Sea Plan):

- Background concentrations of natural micropollutants
- Concentrations of man-made substances as resulting from zero-discharges

The monitoring of sediment is carried out to assess the effects of changes in contaminant inputs on

- chemical processes,
- natural processes (primary production, food chain fluxes, production, decomposition),
- selected key species (effects on the abundance and physiological functioning of species),
- selected communities (as indicators of changes in the environmental conditions).

Furthermore, the monitoring has the aim to assess

- the effectiveness of measure take [sic] for reduction of contamination (temporal trend monitoring),
- the existing level of marine contamination (spatial distribution monitoring).

EMS

COM(2002) 539 final: COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

The overall aim [is] "to promote sustainable use of the seas and conserve marine ecosystems", given that the marine environment is subject to a variety of threats.

The MSFD is intended to contribute to this aim.

2.3 Threats

COM(2002) 539 final: COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

The threats to the marine ecosystem include the loss or degradation of biodiversity and changes in its structure, loss of habitats, contamination by dangerous substances and nutrients and possible future effects of climate change. They are the consequences of various pressures such as commercial fishing, oil and gas exploration, shipping, waterborne and atmospheric deposition of dangerous substances, waste dumping, physical degradation of the habitat due to interventions such as dredging, and extraction of sand and gravel.

2.4 Spatial allocation

	Inland surface waters	**Inner coastal/transitional waters**	**Neritic zone (12-nm zone)**	**Open sea (EEZ)**
Water Framework Directive 2000/60/EC	x	x Baseline + 1 nm	x 1)	
Water Protection Directive 2006/11/EC	x	x	x	
Shellfish Directive	x	x	x	
Fish Directive	x (Freshwater)			
Marine Strategy Framework Directive2008/56/EC			x	x
OSPAR		x	x	x
TMAP		x	x Wadden Sea	
HELCOM			x	x

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

Only some of the parameters included in the following lists are components of regular monitoring programmes. Most of the substances on the "Priority Lists" are investigated in the course of projects, baseline studies, one-off surveys, etc. in order to obtain information about their occurrence and concentrations. Decisions are then taken about the further monitoring of these substances on the basis of the information that has been obtained. In so far as this is the case, the lists and programmes are subject to constant review and, where necessary, revision.

North Sea

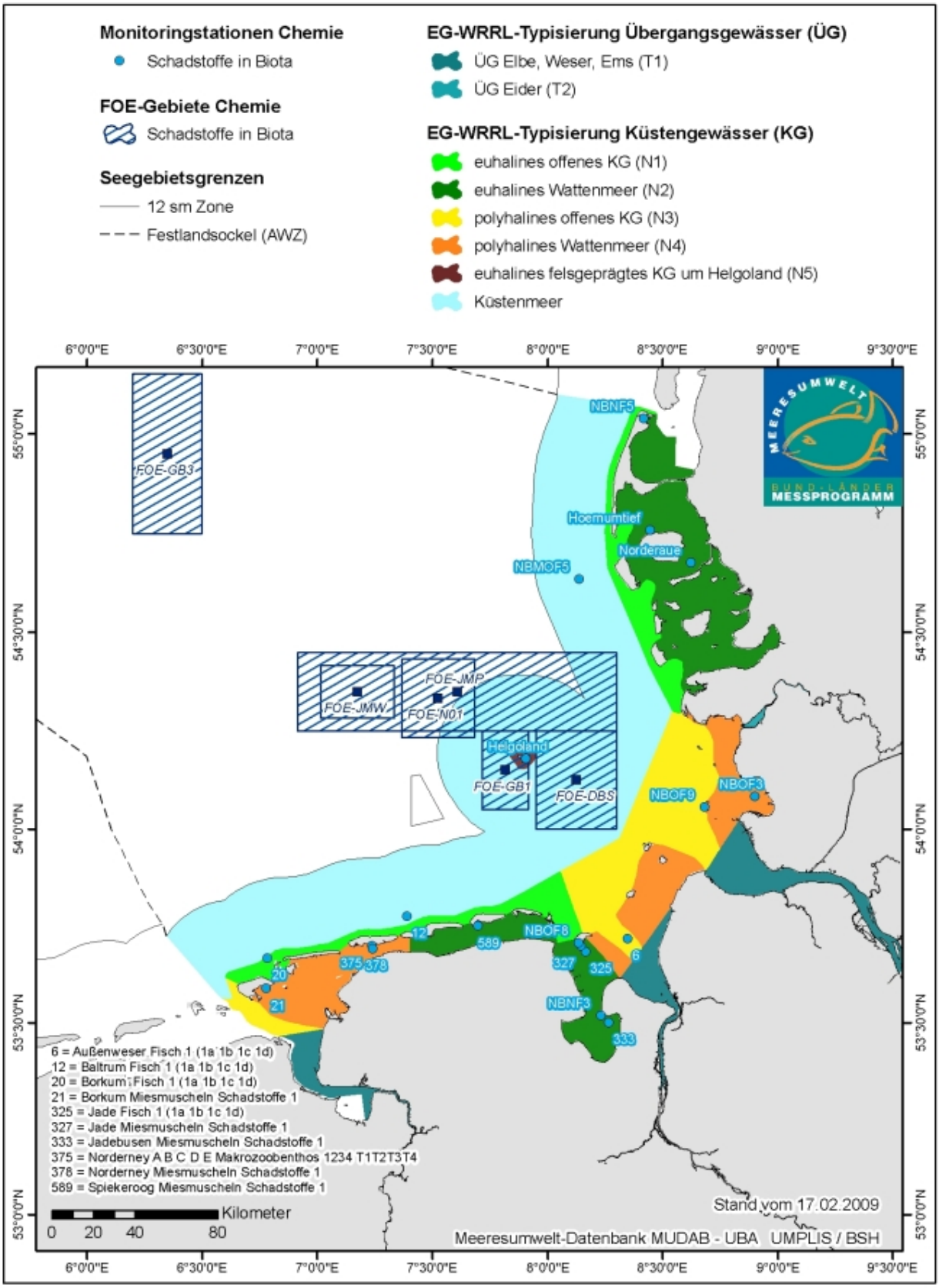

Figure 1: Map of stations intended for the monitoring of pollutants in biota in the North Sea.

Figure 1 as PDF-document

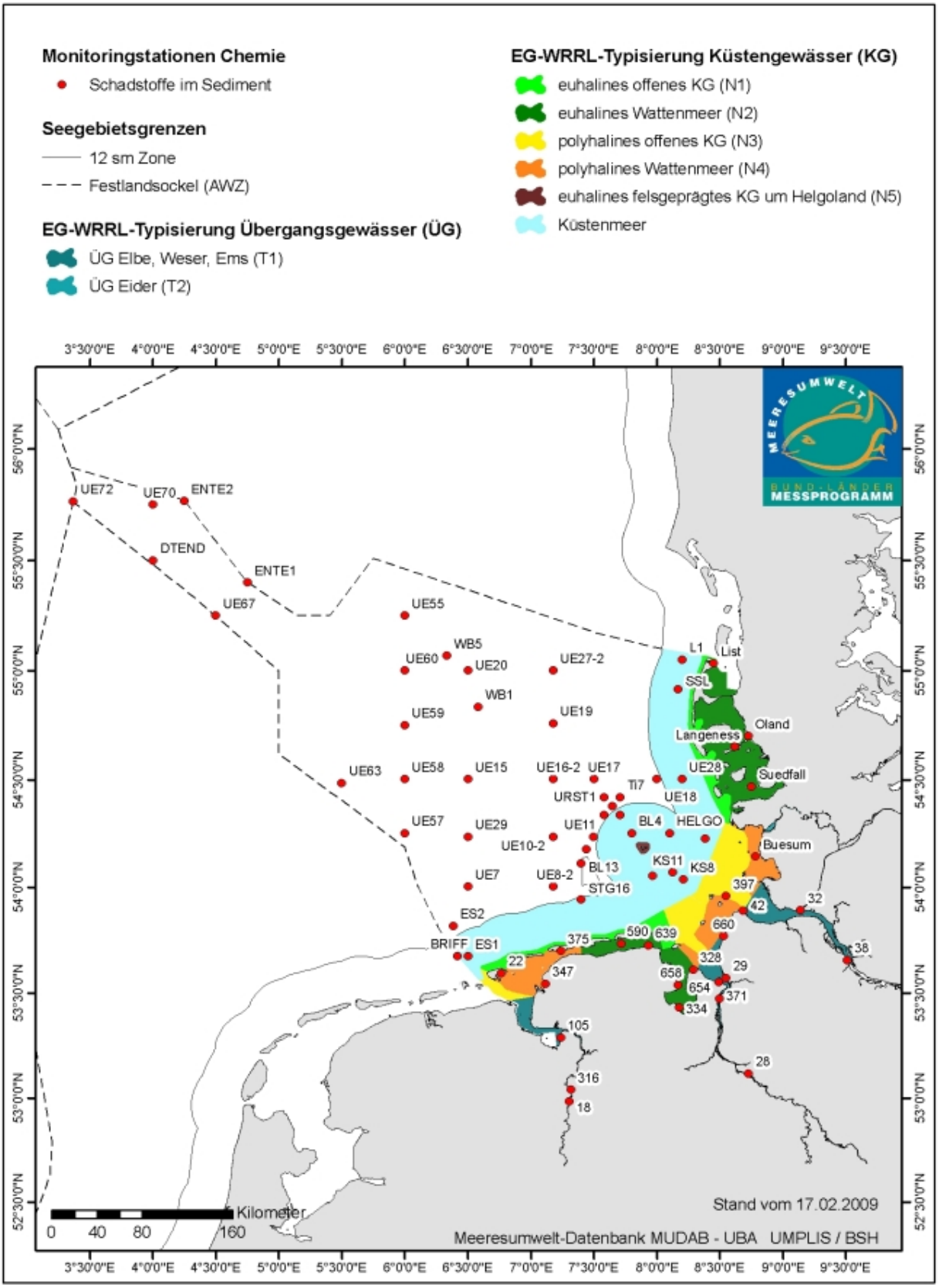

Figure 2: Map of stations intended for the monitoring of pollutants in sediment in the North Sea.

Figure 2 as PDF-document

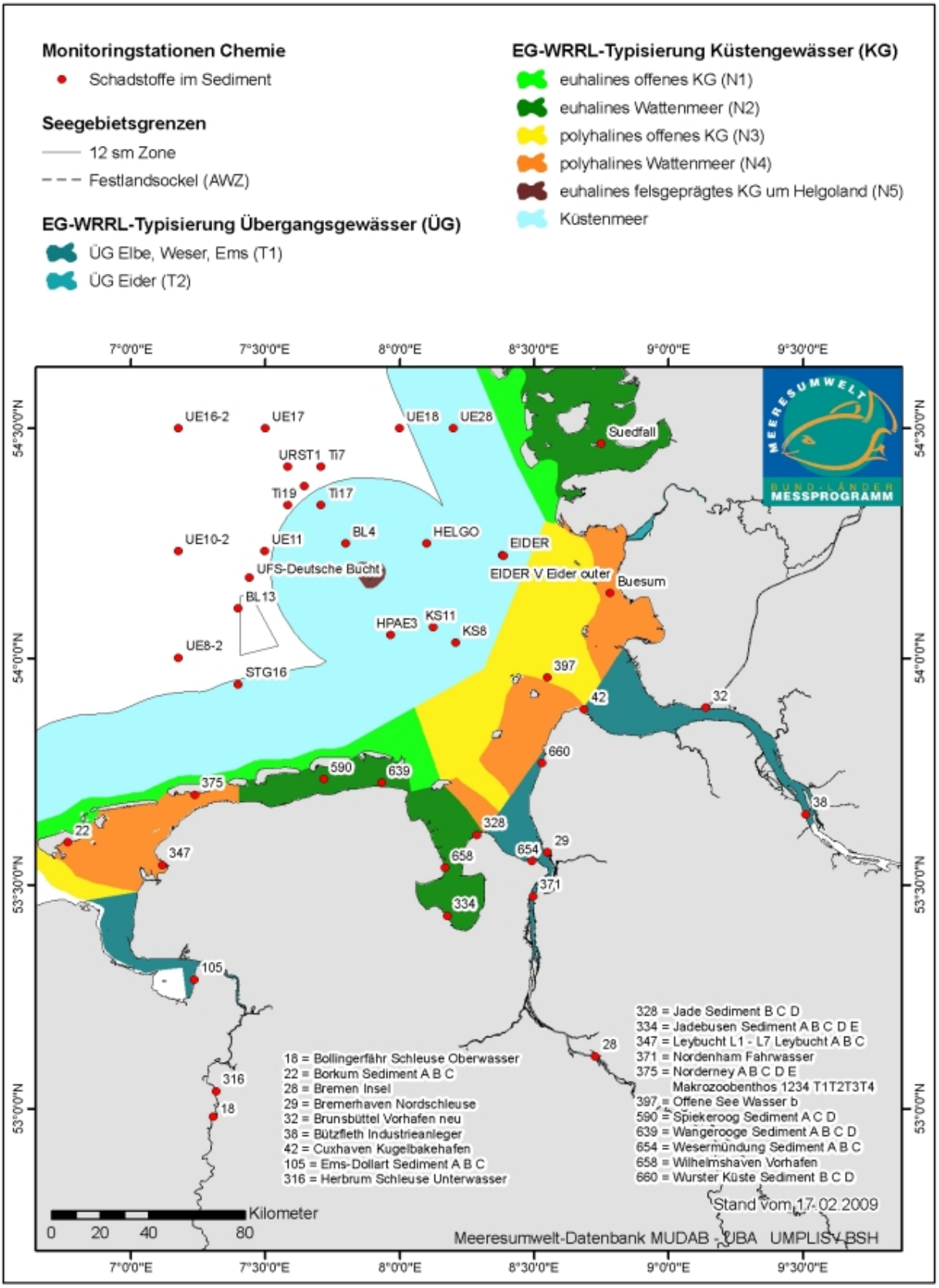

Figure 3: Map of stations intended for the monitoring of pollutants in sediment in the North Sea.

Figure 3 as PDF-document

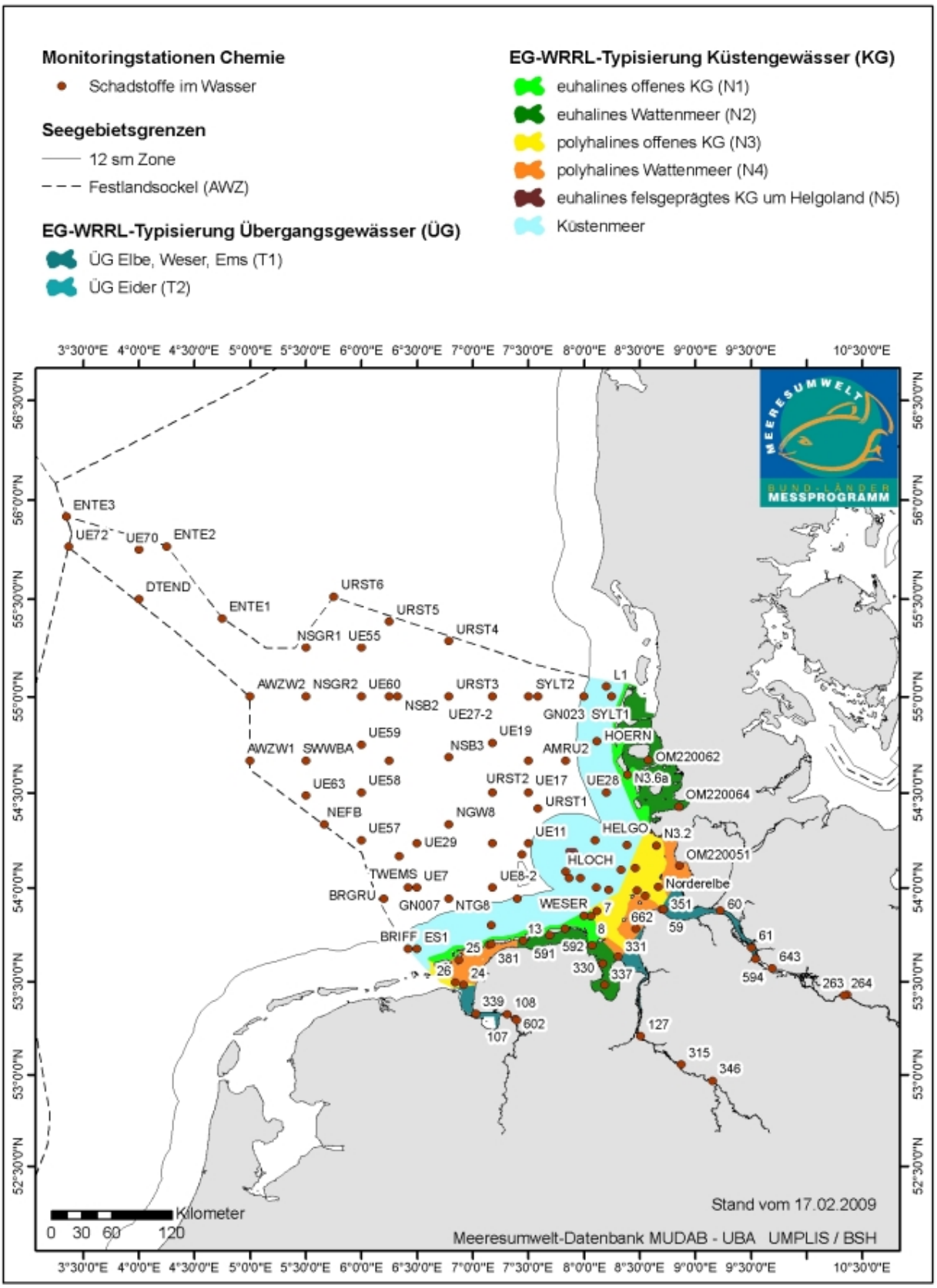

Figure 4: Map of stations intended for the monitoring of pollutants in water in the North Sea.

Figure 4 as PDF-document

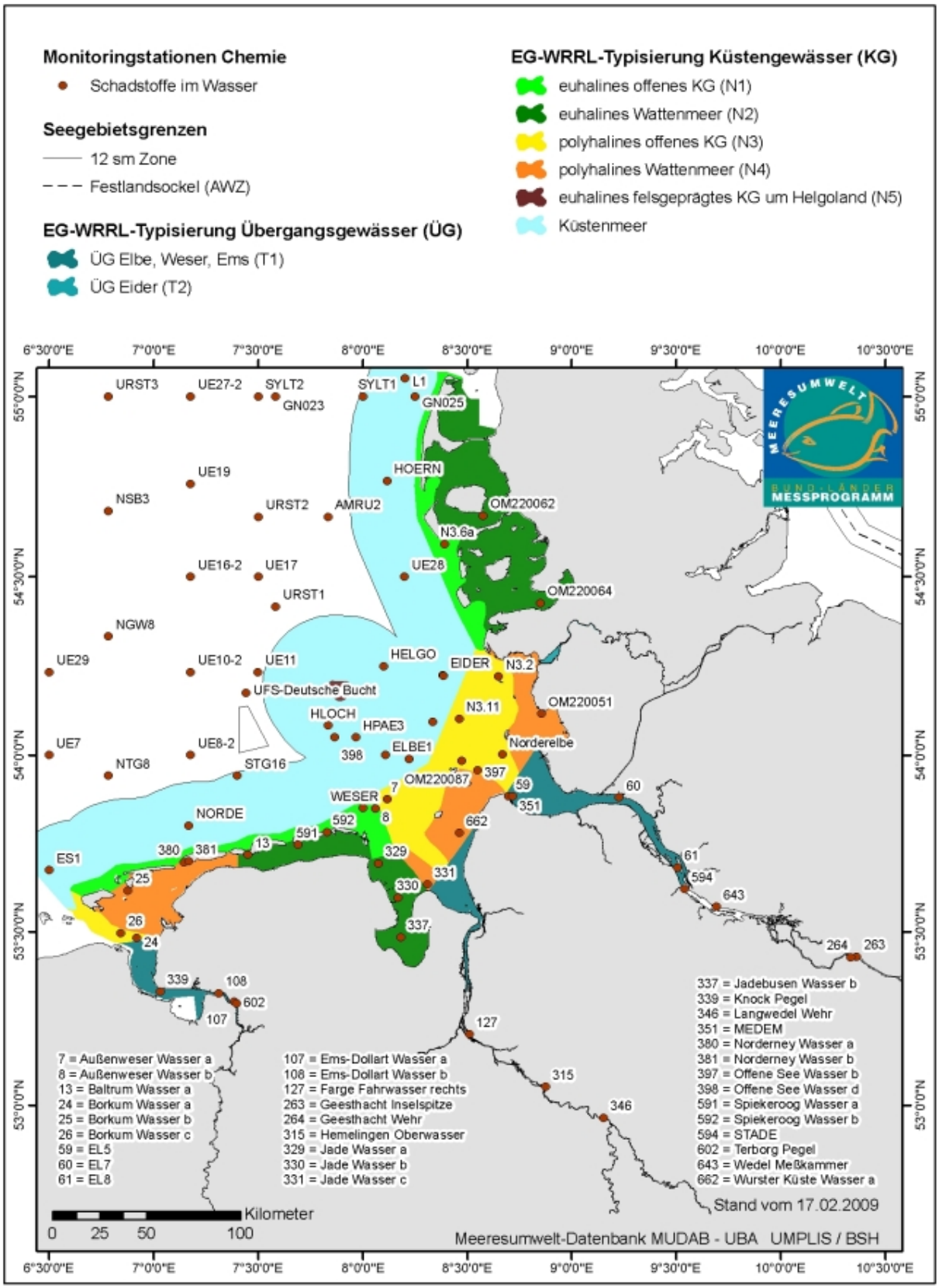

Figure 5: Map of stations intended for the monitoring of pollutants in water in the North Sea.

Figure 5 as PDF-document

Baltic Sea

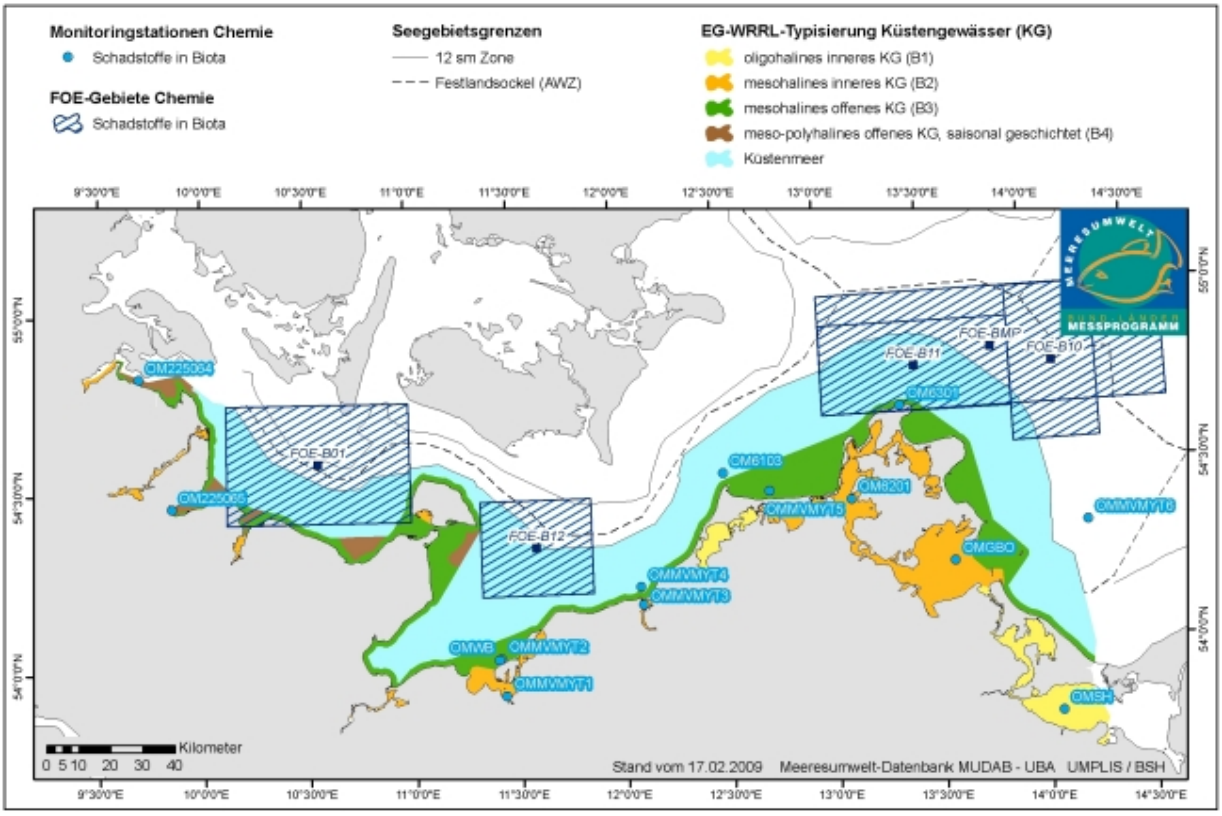

Figure 6: Map of stations intended for the monitoring of pollutants in biota in the Baltic Sea.

Figure 6 as PDF-document

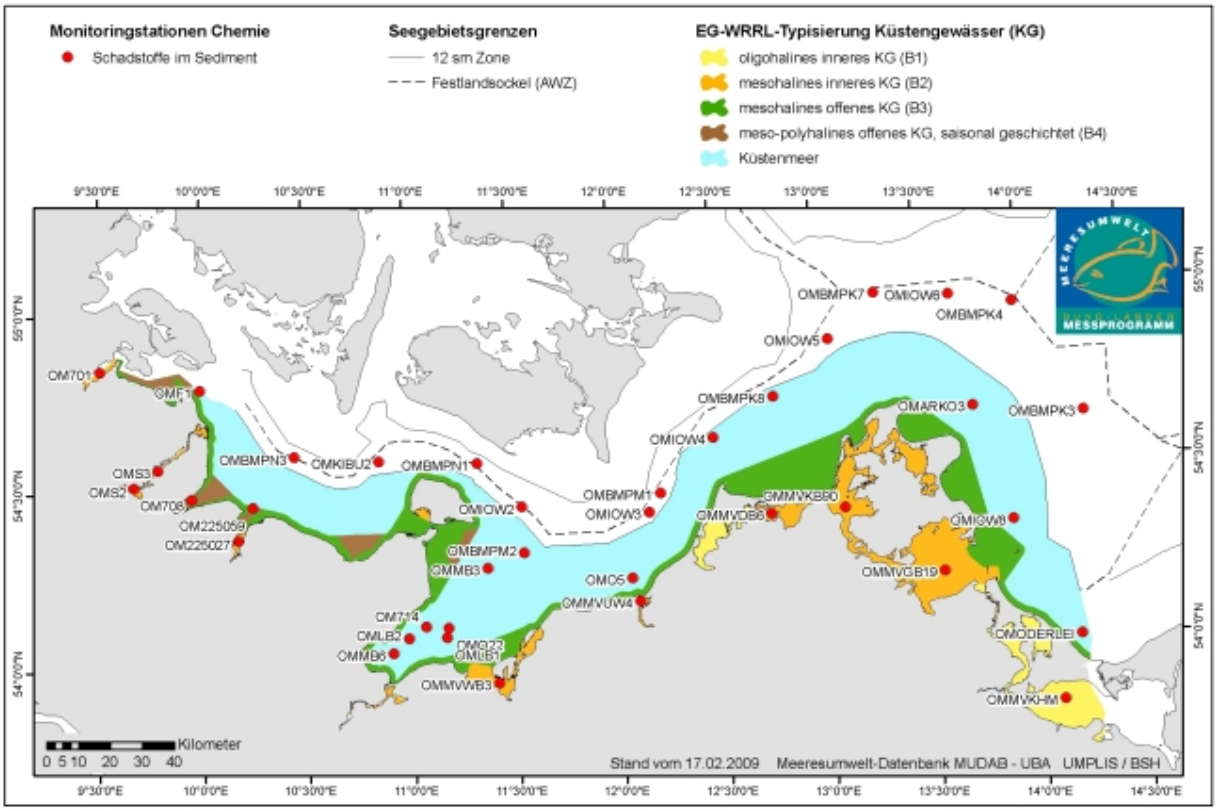

Figure 7: Map of stations intended for the monitoring of pollutants in sediment in the Baltic Sea.

Figure 7 as PDF-document

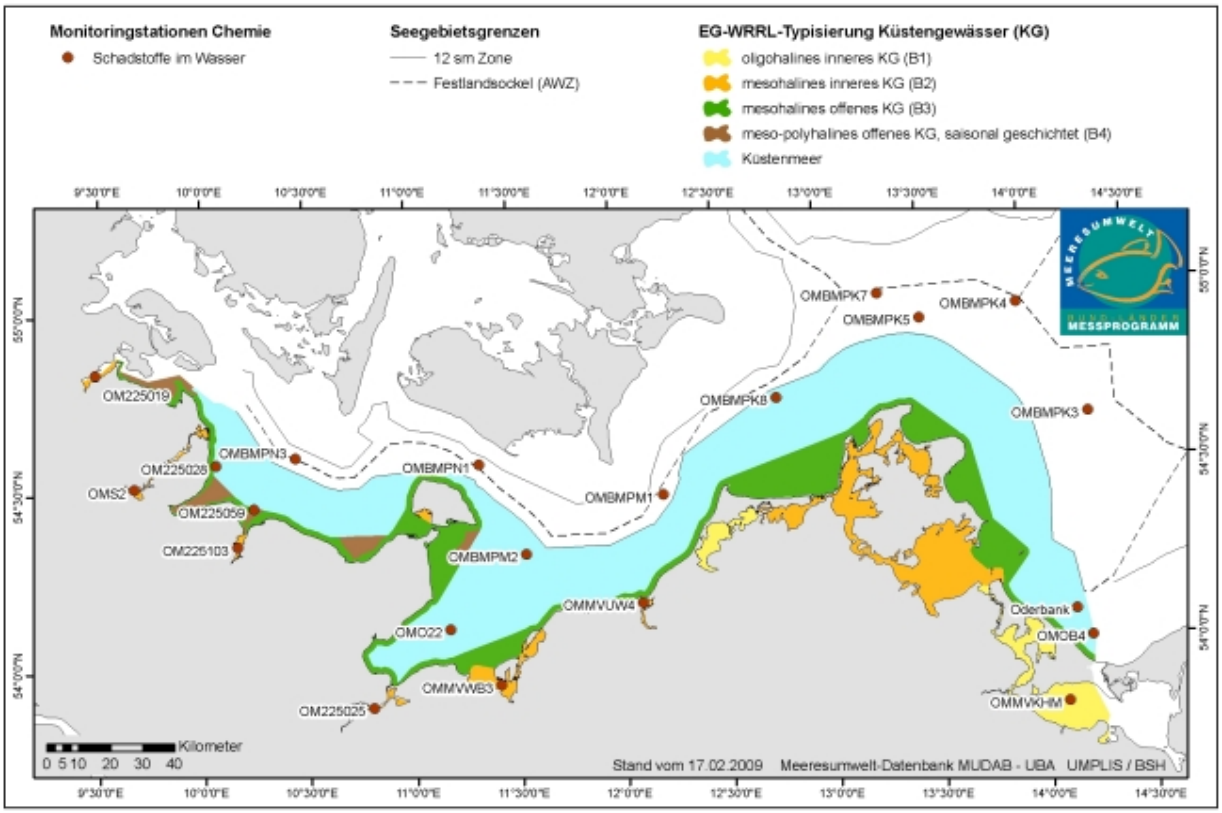

Figure 8: Map of stations intended for the monitoring of pollutants in water in the Baltic Sea.

Figure 8 as PDF-document

3.2 Monitoring activities

North Sea

- Organic Pollutants - North Sea - Biota
- Organic Pollutants - North Sea - Water
- Organic Pollutants - North Sea - Sediment
- Trace Metals - North Sea - Biota
- Trace Metals - North Sea - Sediment
- Trace Metals - North Sea - Water

Baltic Sea

- Trace Metals - Baltic Sea - Biota
- Trace Metals - Baltic Sea - Sediment
- Trace Metals - Baltic Sea - Water
- Organic Pollutants - Baltic Sea - Biota
- Organic Pollutants - Baltic Sea - Sediment
- Organic Pollutants - Baltic Sea - Water

3.3 Additional parameters

4 Assessment

Under the Water Framework Directive and the current marine conventions, OSPAR in particular, criteria have been developed for the assessment of the quality of waters in terms of chemical pollutants. These pollutants, which have been selected as priority substances on account of their toxic, persistent and bioaccumulating characteristics, are to be compared with the assessment criteria adopted for each particular monitoring programme.

4.1 Assessment procedures

North Sea and Baltic Sea

Title

Assessment procedure WRRL

Guideline:

WFD

Comments:

Under the WFD, chemical status is assessed in line with the Environmental Quality Standards (EQSs) laid down in Directive 2008/105/EC, expressed as the total concentration in the whole water sample:

- Organic priority substances: the concentration in the dissolved phase (filtration through 45-µm filter)
- Priority metals and three priority substances: the concentration in biota tissue (wet weight)

At present, EQSs have been set for 33 priority substances and eight further substances (cf. Directive 2008/105/EC). The method by which the EQSs are derived is described in Lepper 2005. The EQSs take account of direct ecotoxicological effects in various habitats (water, sediment), as well as indirect ecotoxicological effects as a result of bioaccumulation in biota (secondary poisoning of top predators). In order to be able to monitor both long-term and short-term effects, two types of EQS have been derived:

- (a) the annual average EQS-AA) for protection against chronic effects and
- (b) the maximum allowable concentration (EQS-MAC) for protection against chronic toxic effects caused by short-term pollution peaks.

The EQS-MACs must never be exceeded at any time.

Furthermore, the provisions set out in Directive 2009/90/EC apply when monitoring is carried out.

If a water body satisfies all environmental quality standards, its chemical status is categorised as good. In order to assess the impacts of anthropogenic activities over longer periods of time and facilitate their reduction where possible, it is necessary to carry out long-term trend surveys with which exposure to pollutants that tend to accumulate in biota or sediments can be monitored.

North Sea and Baltic Sea

Title

Assessment procedure MSFD

Guideline:

MSFD

Comments:

Qualitative descriptors for the determination of good environmental status are set out in Annex I MSFD. Descriptor 8 is formulated as follows: "Concentrations of contaminants are at levels not giving rise to pollution effects." This means that contaminants, i.e. substances or groups of substances that are toxic, persistent and bioaccumulating, must not cause any direct and/or indirect adverse effects in the marine environment.

A good environmental status in terms of this descriptor would be achieved if contaminants had no pollution effects on the marine environment and it were possible to prevent these habitats from becoming progressively more vulnerable. A corresponding assessment strategy that covers the relevant contaminants and assessment criteria is currently being developed on the basis of the current marine assessment strategies (cf. OSPAR), subject to consideration of the WFD.

Monitoring should, on the one hand, survey concentrations of pollutants in the relevant matrices (biota, sediment, water) and, on the other hand, quantify biological effects in the ecosystems that are being observed. In this context, the threshold values used for the risk assessment must be selected in such a way that no contradictory effects are to be expected. In this respect, the temporal development of concentrations should also be observed in order to register critical values in good time. The selection of regionally significant contaminants, the taxa to be observed and biological parameters may differ from one marine region to the next. At the same time, harmonised observation and assessment methods at the European level should ensure a uniform degree of environmental protection.

North Sea and Baltic Sea

Title

Assessment procedure TMAP

Guideline:

TMAP

Comments:

Under this monitoring programme, pollutants in biota and sediment are monitored and assessed in accordance with the current OSPAR and WFD assessment criteria. When assessments are carried out, pollutant concentrations are analysed from the river mouth to their accumulation in sediment or biota. The data are evaluated visually, organised to show temporal and spatial trends.

North Sea

Title

Assessment procedure OSPAR

Guideline:

OSPAR

Comments:

Two types of assessment criteria are used as the basis for the assessment of concentrations of pollutants in sediment and biota under the OSPAR Joint Assessment and Monitoring Programme (JAMP).

- Background concentrations (BCs) are concentrations of contaminants in remote and pristine ecosystems based on contemporary or historical data. Background assessment concentrations (BACs), which are derived from background concentrations by statistical methods, have been developed in order to assess real background levels. Background concentrations of anthropogenic substances should not be detectable in pristine ecosystems. On the derivation of background concentrations and background assessment concentrations, cf. CEMP Assessment Manual (OSPAR 2008).
- Environmental assessment criteria (EACs) are chosen in such a way that no chronic effects are expected to occur in the most sensitive marine species when contaminant concentrations are below these levels in the relevant matrices (mostly biota and sediment). It has been possible for these assessment criteria to be derived for individual substances by drawing on data from toxicological investigations, while in some cases environmental quality standards for water have had to be converted into EACs using a coefficient of distribution.

Assessment criteria for the assessment of CEMP monitoring data on hazardous substances were developed for the first time for the QSR 2010 in order to allow the data to be visualised in the form of a three-level traffic-light system (blue/green/red). According to OSPAR Document 2009/461, "green" stands for a "good ecological status" as defined by the MSFD, in which case the concentrations of pollutants represent little or even no risk.

Baltic Sea

Title

Assessment procedure HELCOM

Guideline:

HELCOM

Comments:

HELCOM has not developed any assessment criteria of its own, but leaves it up to its members to set individual limit values for the concentrations of pollutants in the Baltic Sea.

5 Quality assurance

- QUASIMEME (provider of intercalibration exercises on anorganic and organic pollutants in water, sediments and biota)
- Quality Assurance Panel ((GMMP) (at the UBA) (workshops, standardisation with DIN, CEN and ISO, support for the establishment and administration of QM systems, drafting of sample SOPs, definition of minimum requirements for analytical procedures.)

Comments

Each of the monitoring institutions bears responsibility for establishing and administering its own DIN EN ISO/IEC 17025 quality management systems. The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the GMMP. The institutions involved in the GMMP coordinate their activities within the framework of the Working Group on Quality Assurance and the Ad Hoc Working Group on Pollutants and Biological Effects.

5.1 Monitoring institutions

- IOW
- LLUR
- BSH
- NLWKN
- vTI
- BfG
- IAR
- UPB
- WGElbe
- LVA-MV

5.2 Guidance documents

- *AQS-Merkblätter für die Wasser-, Abwasser- und Schlammuntersuchung*, updatable collection of data sheets on the framework analytical quality assurance recommendations issued by the Federation/Länder Joint Water Commission (LAWA), updated 2009.
- *DEV zur Wasseruntersuchung, 1997: 39. und 45. Lieferung: I: Strategien für die Wasseranalytik: Verfahrensentwicklung, Validierung und Qualitätssicherung in der Routine;* 74 pp.
- Federal Environment Agency, *UPB-Standardarbeitsanweisungen: Standardarbeitsanweisungen Umweltproben*
- Federal Environment Agency, GMMP Quality Assurance Panel, 2004: *Leitlinie zur Methodenvalidierung*.
- Federal Environment Agency, GMMP Quality Assurance Panel, 2008: *Muster-Qualitätsmanagementhandbuch für Laboratorien des Bund/Länder-Messprogramms nach DIN EN ISO/IEC 17025 (GMMP Sample Quality Management Manual)*, Version: 01 of 1 February 2008
- HELCOM, *COMBINE Manual*, "Part B. General guidelines on quality assurance for monitoring in the Baltic Sea".
- HELCOM, *COMBINE Manual*, "Part D: Programme for monitoring of contaminants and their effects".
- JAMP, *Guidelines for Monitoring Contaminants in Biota* (agreement 1999-2)
- JAMP, *Guidelines for Monitoring Contaminants in Sediments* (agreement 2002-16)

5.3 Standards

- ISO 5667-9, 1992-10: Water quality - Sampling - Part 9: Guidance on sampling from marine waters.
- DIN EN ISO/IEC 17025, 2005: General requirements for the competence of testing and calibration laboratories.
- DIN EN ISO 5667-3, 2004-05: Water quality - Sampling - Guidance on the preservation and handling of water samples (ISO 5667-3: 2003).

5.4 Current status

A GMMP Study Group decision (2006) obliged the GMMP laboratories to establish DIN EN ISO/IEC 17025 quality management systems. For this purpose, a Sample Quality Management Manual was drawn up in 2006/2007 by the Quality Assurance Panel in cooperation with the Quality Assurance Sub-Working Group on Quality Management. This manual has been available for subscription from the Quality Assurance Panel at the UBA since mid-2008 and is to be used as the basis for internal QM documentation at laboratories. The manual is designed as a loose-leaf collection, so that regular updates can be added as required. Where necessary, it is to be gradually supplemented with sample SOPs and documented processes agreed within the GMMP.

In order to guarantee and harmonise the quality and comparability of the analytical results reached under the GMMP, target values for lower limits of application (LOAs) were introduced in 2006 (Study Group decision of 30 January 2006). When the frequency distributions of concentrations of selected chemical parameters were investigated in various matrices, it became apparent that a large proportion of the concentrations measured lay below the limits of application that had been defined and the target values for the LOAs had therefore been set too high. Since, apart from this, sufficient consideration was still not being given to background values and the assessment criteria to be monitored, the target values for lower limits of application were to be replaced by minimum requirements for determination limits, subject to consideration of relevant provisions in the field of water protection, given that clear definitions for such determination limits had been defined internally as validation parameters at laboratories and they had also been introduced into international provisions (decision adopted at the 38th meeting of the Working Group on Quality Assurance on 2 December 2008).

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

7.2 Working steps required

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) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(3) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(4) 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.

(5) Baltic Sea Action Plan, HELCOM 2007

(6) Annual surveying of surface runoff and riverine inputs of selected substances into the marine environment. See also the information on nutrients and pollutants. The parameters to be monitored under OSPAR are listed in the documents cited.

(7) Coordination of national monitoring programmes for the surveying of various parameters, including the Nutrient Monitoring Programme.

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

Monitoring Specifications

Date: 2011-07-15

Biological Effects

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Biological Effects

1.2 Definition

Physiological, biochemical, histological and pathological investigations on marine organisms for the surveying of exposures to and/or adverse effects caused by pollutants.

Scope: Marine and coastal areas in the North Sea and Baltic Sea for which the German Federation and the Länder are responsible on the basis of current legislation and the commitments that have been entered into (transitional and coastal waters, including the high sea in the EEZ).

1.3 Competent authority/ies

Federal Government:	UBA, vTI
Hamburg:	BSU
Mecklenburg-Vorpommern:	Lfa-Fischerei MV, LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH
D, DK, NL:	CWSS

1.4 Working group

Ad Hoc Working Group on Pollutants and Biological Effects

2 Monitoring requirements

The following international directives, conventions and monitoring programmes include components that involve the monitoring of biological effects, or there are plans for such components to be incorporated into them in the future:

2.1 Necessity

MSFD [1]

Comments

The purpose of the Marine Strategy Framework Directive (MSFD) is implementation of the provisions of the European Marine Strategy (EMS). Suitable programmes and assessment procedures for chemicals are currently being, or have already been, developed by the working groups established under the regional marine conventions and ICES. Regional maritime conventions will be involved in the initial assessment and future monitoring as appropriate.

- problem chemicals,
- sediment contamination,
- hot spots,
- health issues,
- contamination of biota.

The effects of biological pollutants are not mentioned explicitly, but are covered by the references to the current regional programmes and sea conventions that have be taken into consideration. The provisions concerning the implementation of the MSFD are currently being drawn up by a number of expert groups.

HELCOM

Baltic Sea Action Plan [2]

Comments

The Baltic Sea Action Plan stipulates that selected hazardous substances and their effects are to be investigated in the Baltic Sea in future. In this context, the monitoring of biological effects is intended to facilitate a reliable ecosystem health assessment.

COMBINE

Comments

Biological effects monitoring under the COMBINE programme should include and integrate measurements of the effects of pollutant concentrations from the tissue level through to the population level. It should also cover different levels in the food web, as well as different time scales in manifestations of the effects of exposure (acute and chronic responses). Parallel to these studies, levels of relevant pollutants in the indicator organisms and relevant environmental matrices should be measured.

It is important that monitoring data, whether they are contaminant or effect data, are produced with high enough quality. Quality assurance is an important requirement to ensure a consistently high data quality.

OSPAR

JAMP

Comments

Of OSPAR's activities, it is the Coordinated Environmental Monitoring Programme, which covers the monitoring of concentrations of chemical contaminants (not including radionuclides) in marine biota (principally fish and shellfish), sediments and sea waters, biological effects, nutrients, and direct and indirect eutrophication effects, that is relevant to these specifications.

TMAP [3]

Comments

With regard to the effects of pollutants, TMAP requires surveying of the temporal development and spatial distribution of hatching success and reproductive success among birds in the Wadden Sea area.

2.2 Environmental targets

HELCOM

HELCOM's main goal is to protect the marine environment of the Baltic Sea from all sources of pollution, and to restore and safeguard its ecological balance. To this end, pollution of marine areas has to be prevented by reducing inputs, emissions, and discharges of hazardous substances. The aim is to prevent all inputs by 2020 and to achieve concentrations in the marine environment that are close to natural background values for naturally occurring substances or close to zero for artificial substances.

The Baltic Sea Action Plan (2007) has the general aim of achieving a good ecological status for the Baltic Sea by 2021. With regard to hazardous substances, it formulates the following ecological targets:

- Concentrations of hazardous substances close to natural levels
- All fish and other seafood safe to eat
- Healthy wildlife
- Radioactivity at pre-Chernobyl level

The effects of hazardous substances are covered primarily by the target of "healthy wildlife", as well as, to a lesser degree, the target of "fish safe to eat".

OSPAR

The OSPAR members will take all possible steps to prevent and eliminate pollution and will continue making all measurements required to protect the oceans from the adverse effects of human activities. They will safeguard human health and conserve marine ecosystems or restore them if they have been subject to particularly negative impacts.

TMAP

Trilateral policy and management aim to achieve, as far as possible, a natural and sustainable ecosystem. The aim of TMAP is to assess the status and evolution of the Wadden Sea ecosystem.

EMS

The overrriding goal of the European Marine Strategy (EMS) is "to promote sustainable use of the seas and conserve marine ecosystems", given that the marine environment is exposed to numerous threats. (The Water Framework Directive does not deal with the effects of pollutants.)

2.3 Threats

The threats to the marine ecosystem include the loss or degradation of biodiversity and changes in its structure, loss of habitats, contamination by dangerous substances and nutrients, and possible future effects of climate change. They are the consequences of various pressures such as commercial fishing, oil and gas exploration, shipping, waterborne and atmospheric deposition of dangerous substances, waste dumping, physical degradation of the habitat due to interventions such as dredging, and extraction of sand and gravel.

2.4 Spatial allocation

	EEZ	12- nm zone	Coastal waters 1)	Transitional waters
HELCOM	x	x	x	x
OSPAR	x	x	x	x
TMAP	-	-	x	x
EMS	x	x	-	-

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

HELCOM

COMBINE

The aims of COMBINE, as decided by HELCOM (HELCOM 14/18, para. 5.27) and further elaborated by BMP-WS 2/96, are to identify the effects of human activities in the Baltic Sea and to quantify them in the context of natural variability, and to identify and quantify changes in the environment as a result of regulatory actions. For that purpose, biological effects measurements will be carried out at selected locations in the Baltic Sea, and levels of pollutants will be determined in water, sediment, suspended particulate matter,and organisms in order to find out whether they have any detrimental effects on biota, for example changes in the structure of communities.

OSPAR

Joint Assessment and Monitoring Programme (JAMP)

JAMP includes biological effects monitoring integrated with the use of chemical analysis. The purpose of JAMP is to identify situations where pollutants cause biological effects, to predict the highest organisational level at which such effects occur, and to determine whether such effects result in harm to living resources and/or marine ecosystems, or otherwise interfere with maritime uses.

- Identification of endangered regions and causes of endangerment;
- understanding the causes of biological effects;
- measures to control pollution;
- monitoring the effectiveness of measures taken.

Measurements of biological effects have the following purposes, inter alia:

- to establish the spatial distribution and extent of biological effects of specific pollutants on marine organisms;
- to identify temporal and spatial changes in such effects.

Co-ordinated Environmental Monitoring Programme (CEMP)

CEMP is aimed at delivering comparable data from across the OSPAR maritime area, which can be used to address the specific questions raised in JAMP.

TMAP

The breeding success of birds is monitored in order to assess birds response to pollution.

3.1 Description of monitoring network

Only some of the parameters included in the following lists are part of the above monitoring programmes. The monitoring of most of the parameters is still voluntary at present. In so far as this is the case, the lists and programmes are subject to constant review and, where necessary, revision.

North Sea

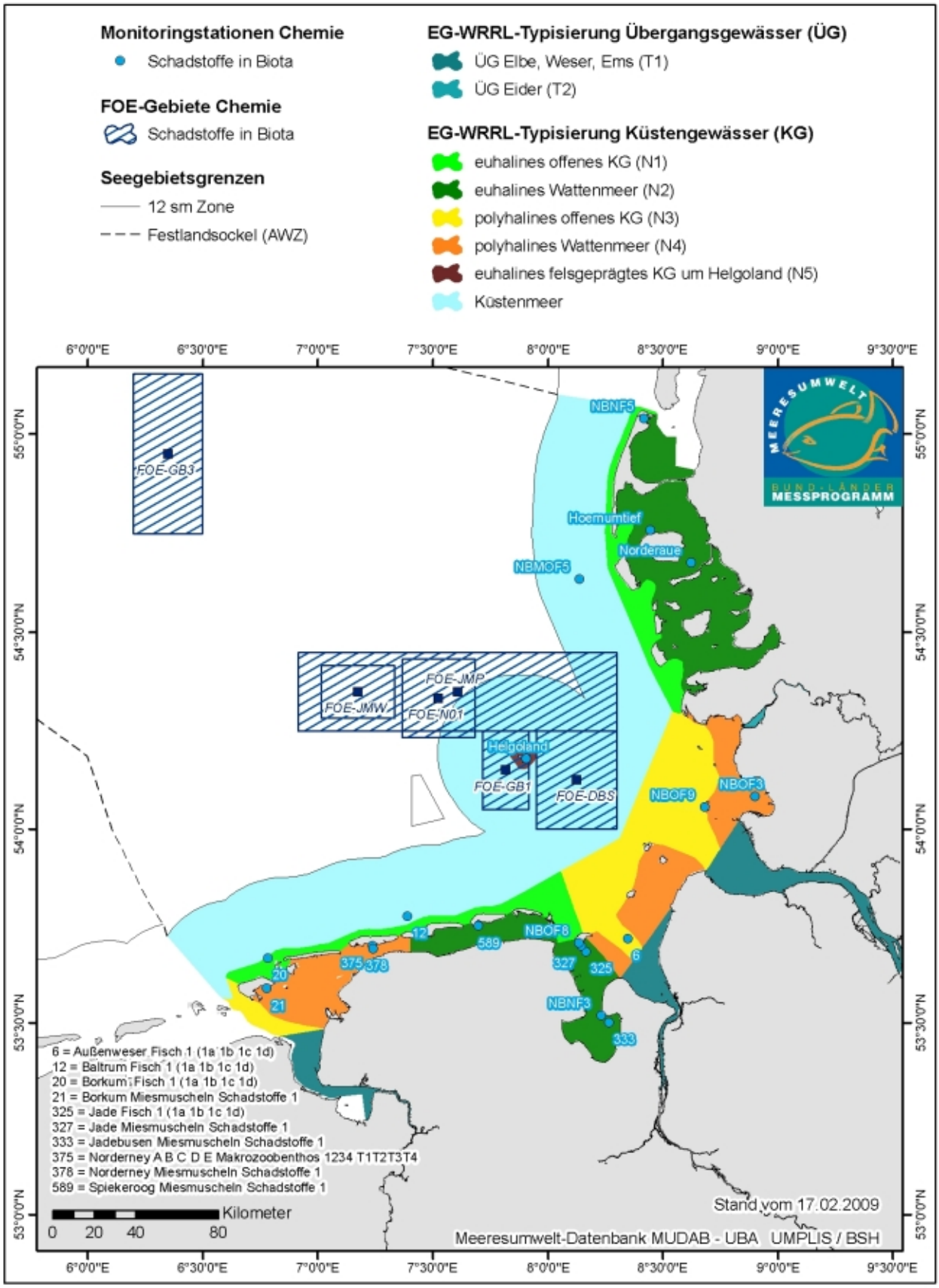

Figure 1: Network for the monitoring of biological effects in the North Sea.

Figure 1 as PDF-document

Baltic Sea

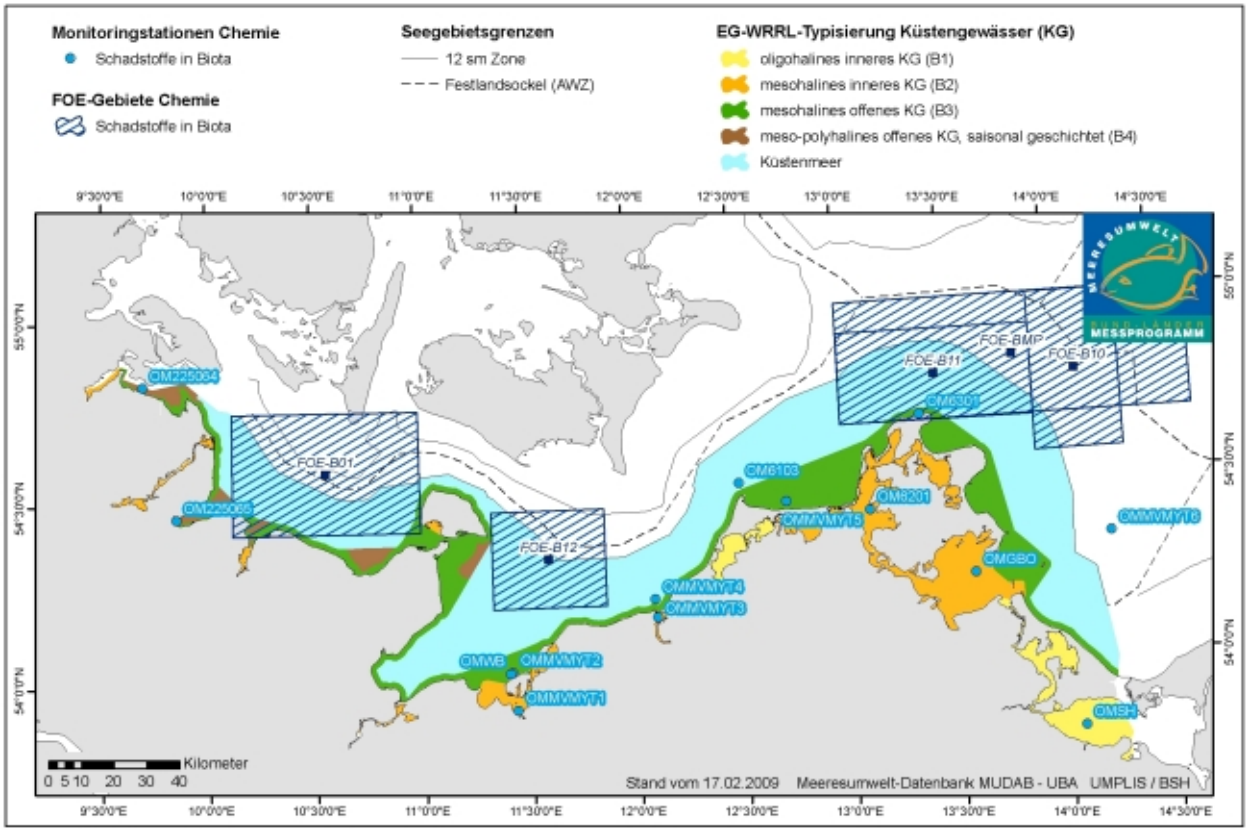

Figure 2: Network for the monitoring of biological effects in the Baltic Sea.

Figure 2 as PDF-document

3.2 Monitoring activities

A final decision on the methods and measures to be used in biological effects monitoring has not yet been made. Additional research is required particularly with respect to data evaluation. The pan-Baltic research project "BEAST" (Biological Effects of Anthropogenic Chemical Stress: Tools for the Assessment of Ecosystem Health) under the BONUS+ funding scheme deals with the development, testing, and application of biomarkers to be used in monitoring the environmental status in different Baltic Sea regions. The international "ICON" workshop (Integrated Assessment of Contaminant Impacts on the North Sea) parallelly covers the North Sea region. Integrated monitoring and a holistic assessment are central to both projects.

North Sea

OSPAR - CEMP and pre-CEMP

Methods:

Co-ordinated Environmental Monitoring Programme (CEMP)

The Co-ordinated Environmental Monitoring Programme is divided into two parts: the mandatory CEMP (Appendices 2-7), and pre-CEMP which is not yet mandatory (Appendices 8-15). The programme is reviewed annually and updated where necessary. As a rule, parameters are included in pre-CEMP if OSPAR considers they should be monitored although the prerequisites for regular, mandatory monitoring are not yet met. However, it is also possible for parameters to be removed from both CEMP and pre-CEMP.

OSPAR - CEMP

Methods:

TBT-specific effects in gastropods

Status	Appendix	Parameter	Comments
CEMP	5	TBT-specific effects (imposex, intersex) in gastropods	In gastropod species for which assessment schemes are available
		TBT in sediment *)	*) Alternative for TBT effects if no suitable organism is available for TBT-specific effects

OSPAR - pre-CEMP

Methods:

Fish, etc.

Status	Appendix	Parameter	(Probable) target date for reclassification as CEMP parameter/remarks
Pre CEMP	14	Metal specific effects: metallothionein, ALA-D and oxidative stress PAH specific effects: cyotochrome P450 (EROD), DNA adducts, PAH metabolites, liver pathology, and macroscopic liver neoplasms.	2010 *JAMP Guidelines for Contaminant-Specific Biological Effects* Technical Annexes 1 and 2.
	15	Bioassays with sediments, pore water and water	Technical Annexes 1-4
		CYP1a (EROD)	Technical Annex 1
		Lysosome membrane stability (LMS)	Technical Annex 6
		Liver histopathology/macroscopic liver neoplasms	2010 Technical Annexes 7-8
		Externally visible fish diseases	2010 Technical Annex 9
		Reproductive success in fish	Technical Annex 10

TMAP

Methods:

Reproductive success of birds

Mandatory TMAP Parameters (covering entire intertidal area):

Para-meters	Monitoring network	Measuring frequency	Method	WFD	BD/HD	OSPAR	OTHER	Coverage
Hatching success (birds)	2-4 Stations per region	Annually (April - July)	After TMAP pilot project	-	X	-	X	15 regions
Re-productive success (birds)	2-4 Stations per region	Annually (April - July)	After TMAP pilot project	-	X	-	X	15 regions

Baltic Sea

HELCOM - COMBINE

Methods:

The HELCOM monitoring programme COMBINE currently (end of 2009) does not yet require monitoring of the biological effects of pollutants. Some states routinely monitor biological effects. Information is available at http://www.helcom.fi/groups/monas/CombineManual/PartD/en_GB/main/#d11.

Substances	Parameters
TBT	TBT in soft tissue of blue mussels *Mytilus edulis* (coastal supporting programme)
	Imposex in whelk (coastal supporting programme)
PAHs, PCDD/Fss, PCDFs, co-planar PCBs	EROD induction, histopathology
Organophosphate and carbamate, pesticides	AChE inhibition

HELCOM - BSAP

Methods:

The "Baltic Sea Action Plan" (BSAP) defines HELCOM's future targets concerning the status of the Baltic Sea. The targets of biological effects monitoring are defined as folows:

"The monitoring of biological effects of hazardous substances provides information on their adverse effects on marine organisms in situ. These effects are visible both as direct physical changes in some animals in the form of sterility and failed breeding among birds, but also as physiological changes measurable as biomarkers and other ecotoxicological tools. Detection of biological effects is of strategic importance to the overall monitoring of hazardous substances since many methods reveal the potential presence of substances (or substance groups) that are not feasible to be measured on a regular basis due to their huge number and technical difficulties in analysis." (HELCOM, 2007).

HELCOM (2007) additionally states: "There is a need to further develop the indicators and targets for healthy wildlife"

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Current
- Oxygen content
- Salinity
- Temperature

4 Assessment

4.1 Assessment procedures

North Sea

Title

Biological Effects - Gastropods

Guideline:

OSPAR

Comments:

OSPAR Assessment:

Imposex in gastropods: Assessment classes for the genuses *Nucella*, *Littorina*, *Nassarius*, *Buccinum* and *Neptunea* (OSPAR, 2005).

Assessment class	***Nucella***	***Littorina***	***Nassarius***	***Buccinum***	***Neptunea***
Criterion	VDSI	ISI	VDSI	PCI	VDSI
A Imposex level is close to zero.	<0,3	<0,3	<0,3	<0,3	<0,3
B Imposex level indicates exposure to TBT concentrations below EAC	0,3 - <2,0	<0,3	<0,3	<0,3	0,3 - <2,0
C Imposex level indicates exposure to TBT concentrations above EAC.	2,0 - <4,0	<0,3 - <0,7	0,3 - 4,0	0,3 - 4,0	2,0 - 4,0
D Reproductive capacity is affected by the presence of sterile females.	4,0 - 5,0	0,7-2,0	May occur beyond 4,0	May occur beyond 4,0	May occur beyond 4,0
E Populations are unable to reproduce. The majority of females are sterile.	5,0 - 6,0	>2,0	-	-	-
F Populations are absent/extinct	-	-	-	-	-

EAC - Environmental Assessment Concentration: lowest concentration at which detrimental, unacceptable effects and risks are to be expected.

North Sea

Title

Procedure in development

Guideline:

Various directives

Comments:

The assessment criteria in the following table are proposals that are subject to scientific discussion and are still being amended on an ongoing basis.

Bioeffect assessment procedures, still in development			**Assessment criteria**		
Name	**Species/ parameter**	**Source**	**Background**	**Elevated**	**High**
Reproductive success Eelpout (frequency %)	malformed larvae	ICES WKIMON 2007	0 - 1	>1 - 2	>2
	late dead larvae		0 - 2	>2 - 3	>3
	growth retarded larvae		0 - 4	>2 - 6	>6
EROD S9-fraction (pmol/min mg protein)	Dab (f), flounder, plaice	ICES/OSPAR SGIMC 2010	<=178, <=24 <=10	>178, >24 >10	-
EROD Mikrosomal (pmol/min mg protein)	Dab (f), cod, plaice	ICES/OSPAR SGIMC 2010	<=780, <=145 <=255	>780, >145 >255	-
Bioassays sediment (% mortality)	*Corophium*	ICES WKIMON 2008 ICES/OSPAR SGIMC 2009	0 - 30	>30 - <60	>60
	Arenicola		0 - 10	>10 - <50	>50
Bioassays water (% abnormality)	Bivalve embryos		0 - 20	>20 - <50	>50
Bioassays water (% mortality)	Copepods		0 - 10	>10 - <50	>50
	Sea urchins embryos		0 - 10	10 - <100	100
Bioassays water (% abnormality)			0 - 10	10 - <50	50
Bioassays water (% growth)			0 - 20	>20 - <50	>50
Lysosomal stability (min)	Neutral red retention (all species)	ICES WKIMON 2008	>120	<=120 - >=50	<50
	Cytochemical (all species)	ICES WKIMON 2007	>20	<=20 - >=10	<10

PAH-metabolite 1-hydroxypyrene (ng/ml bile; HPLC-F or GC/MS)	Dab	ICES SGIMC 2010	<=16	-	-
	Cod	ICES SGIMC 2010	<=21	21 - 483	>483
	Flounder	ICES SGIMC 2010	<=16	>16	>-
	Haddock	ICES SGIMC 2010	<=13	>13	>-
	Turbot	ICES SGIMC 2010	-	-	>909
	Halibut	ICES SGIMC 2010	-	-	>745
Fish Disease Index - FDI	Alle Spezies	ICES WG PDMO 2010	will be revised	will be revised	will be revised
DNA-adducts (nmol / mol DNA)	Dab	ICES WKIMON 2007	<=7,9	-	-
	Haddock	ICES WKIMON 2007	<=8,6	-	-
	Pollack	ICES WKIMON 2007	<=7,9	-	-
	Dab, haddock, pollack	ICES/OSPAR SGIMC 2009	Limited data available. Further validation and development necessary.		

5 Quality assurance

- BEQUALM ((provider of intercalibration exercises on water and sediment bioassays, fish diseases, luminescence bacteria assays and biomarkers).)
- QUASIMEME ((provider of intercalibration exercises on anorganic and organic pollutants in water, sediments and biota))
- Quality Assurance Panel (at the UBA (workshops, standardisation with DIN, CEN and ISO, support for the establishment of QM systems, drafting of sample SOPs, definition of minimum requirements for analytical procedures).)

Comments

Each of the monitoring institutions bears responsibility for establishing and administering its own DIN EN ISO/IEC 17025 quality management systems. The Quality Assurance Panel at the Federal Environment Agency is responsible for the coordination of quality assurance under the GMMP. The institutions involved in the GMMP coordinate their activities within the framework of the Working Group on Quality Assurance and the Ad Hoc Working Group on Pollutants and Biological Effects.

5.1 Monitoring institutions

- LimnoMar
- IfAÖ
- NLWKN
- vTI

5.2 Guidance documents

- HELCOM COMBINE
- ICES-Times
- JAMP/CEMP
- TMAP

5.3 Standards

- DIN EN ISO/IEC 17025, 2005: General requirements for the competence of testing and calibration laboratories.
- DIN EN 14996, 2006: Water quality - Guidance on assuring the quality of biological and ecological assessments in the aquatic environment.

5.4 Current status

A GMMP Study Group decision (2006) obliged the GMMP laboratories to establish DIN EN ISO/IEC 17025 quality management systems. For this purpose, a Sample Quality Management Manual was drawn up in 2006/2007 by the Quality Assurance Panel in cooperation with the Quality Assurance Sub-Working Group on Quality Management. This manual has been available for subscription from the Quality Assurance Panel at the UBA since mid-2008 and is to be used as the basis for internal QM documentation at laboratories. The manual is designed as a loose-leaf collection, so that regular updates can be added as required. It is to be gradually supplemented with sample SOPs agreed within the GMMP.

In order to guarantee and harmonise the quality and comparability of the analytical results reached under the GMMP, target values for lower limits of application (LOAs) were introduced in 2006 (Study Group decision of 30 January 2006). When the frequency distributions of concentrations of selected chemical parameters were investigated in various matrices, it became apparent that a large proportion of the concentrations measured lay below the limits of application that had been defined and the target values for the LOAs had therefore been set too high. Since, apart from this, sufficient consideration was still not being given to background values and the assessment criteria to be monitored, the target values for lower limits of application were to be replaced by minimum requirements for determination limits, subject to consideration of relevant provisions in the field of water protection, given that clear definitions for such determination limits had been defined internally as validation parameters at laboratories and they had also been introduced into international provisions (decision adopted at the 38th meeting of the Working Group on Quality Assurance on 2 December 2008).

Intercalibration exercises

- BEQUALM EROD Intercalibration 2008
- BEQUALM EROD intercalibration 2004/2005
- BEQUALM Liver Histopathology 2004/2005
- BEEP 2003 - EROD und AChE

Workshops

- BALCOFISH/BEAST practical workshop on eelpout sampling and examinations at Søminestationen, Holbæk, Denmark, 19.-20.10.2009
- UBA/UPB Eelpout Monitoring Workshop, Berlin, 07.-08.09.2009
- ICES/BSRP SEA-GOING WORKSHOP ON FISH DISEASE MONITORING IN THE BALTIC SEA 2005 (WKFDM)
- ICES workshop on biological effects of contaminants in pelagic ecosystems 2001 (Guidelines for Data Reporting)

6 Literature

- Barsiene, J., Lehtonen, K.K., Köhler, A., Broeg, K., Vuorinen, P.J., Lang, T., Pempkowiak, J., Syvokiene, J., Dedonyte, V., Rybakovas, A., Repecka, R., Vuontisjärvi, H. and J. Kopecka, 2006: Biomarker responses in flounder (*Platichthys flesus*) and mussel (*Mytilus edulis*) in the Klaipeda-Butinge area (Baltic sea). Mar Pollut Bull, 53: 422-436.
- Feist, S.W., Lang, T., Stentiford, G.D. and A. Köhler, 2004: Biological effects of contaminants: use of liver pathology of the European flatfish dab (*Limanda limanda* L.) and flounder (*Platichthys flesus* L.) for monitoring. In: ICES Techniques in Marine Environmental Sciences, 38 42.
- Kammann, U., 2007: PAK metabolites in bile fluids of dab (*Limanda limanda*) and flounder (*Platichthys flesus*) - spatial distribution and seasonal changes. Environ Sci Pollut Res, 14(2): 102-108.
- Kammann, U., Lang, T., Berkau, A.-J. and M. Klempt, 2008: Biological effect monitoring in dab (*Limanda limanda*) using gene transcript of CYP1A or EROD ¿ a comparison. Environ Sci Pollut Res, 15(7): 600-605
- Lang, T., Wosniok, W., Barsiene, J., Broeg, K., Kopecka, J. and J. Parkkonen, 2006: Liver histopathology in Baltic flounder (*Platichthys flesus*) as indicator of biological effects of contaminants. Mar Pollut Bull, 53:488-496.
- Lehtonen, K., Schiedek, D., Köhler, A., Lang, T., Vuorinen, P.J., Förlin, L., Barsiene, J., Pempkowiak, J. and J. Gercken, 2006: The BEEP project in the Baltic Sea: Overview of results and outline for a regional biological effects monitoring strategy. Mar Pollut Bull, 53: 523-537.
- Schnell, S., Schiedek, D., Schneider, R., Balk, L., Vuorinen, P.J., Karvinen, H. and T. Lang, 2008: Biological indications of contaminant exposure in Atlantic cod (*Gadus morhua*) in the Baltic Sea. Canadian Journal of fisheries and aquatic sciences, 65: 1122-1134.
- Thain, J.E., Vethaak, A.D. and K. Hylland, 2008: Contaminants in marine ecosystems: developing an integrated indicator framework using biological-effect techniques. ICES JOURNAL OF MARINE SCIENCE, 65:1508-1514.
- van der Oost, R., Beyer, J. and N.P.E. Vermeulen, 2003: Fish bioaccumulation and biomarkers in environmental risk assessment: a review. Environ Toxicol Phar, 13(2): 57-149.

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

The fact that, within the framework of the international North and Baltic Sea monitoring programmes (OSPAR, HELCOM, MSFD), concepts for an integrative monitoring approach (combination of chemical and biological components) are currently being developed and their practical application is being studied proves the need to include biological effects in the German Marine Monitoring Programme (BLMP). Therefore, the BLMP monitoring programme should take into account international recommendations and, in particular, should include parameters which already are mandatory in the CEMP programme or will become mandatory shortly.

Besides, there are other programmes and projects which are also relevant for future BLMP work: under the BONUS+ funding scheme, the "BEAST" and "BALCOFISH" research projects study the use of biomarkers in monitoring the health status of different Baltic Sea regions and the impacts of chemicals on Baltic Sea fish.

A decision will have to be made on the parameters that should be included in a future BLMP monitoring programme, on the way this should be done, and on the most effective implementation.

Selection of biomarkers for BLMP

As pointed out under 3.2 above, the CEMP programme lists the parameters required to be measured, and pre-CEMP those for which measuring is not yet mandatory because all prerequisites are not yet met. The selection criteria of the CEMP programme can be included in BLMP as a mission statement.

A mandatory biomarker measurement in CEMP meets the following requirements:

- One or more mandatory measuring methods, described in detail, are available and have been published; they have been accepted by expert bodies.
- The measuring method provides for adequate quality control, which includes successful interlaboratory studies. Data from different laboratories are comparable and meet the requirements for inclusion in a common database.
- Clearly defined assessment criteria for the particular parameter which are suitable for operationalisation are available. The criteria allow a distinction to be made between background levels and elevated levels; they mark a limit above which unacceptable effects or risks have to be expected. Several intermediate stages are conceivable.

CEMP is only one of several suitable programmes which BLMP can use as a basis for its selection of biomarkers. Intelligent use of biomarkers at different biological organisation levels may lead to a marked improvement in future environmental monitoring.

7.2 Working steps required

A German BLMP planning body for integrative monitoring has to be established which will allow the data collected during routine monitoring to be related to any biological effects caused by the pollutants monitored, and which will allow an integrated assessment of data applying the assessment criteria. This planning body, on the one hand, will have to keep track of international developments in the field of monitoring and, on the other hand, will have to be capable of making recommendations regarding national monitoring networks and the integration of biological and chemical components. The BLMP working group on pollutants and biological effects ("Ad-hoc-AG") should take part in the discussion.

Targets include the following:

- Definition of issues to be dealt with, review of monitoring network and concept if required;
- selection of biomarkers and other monitoring parameters;
- recommendations for sampling strategies;
- operationalisation of collected data based on available assessment criteria (temporal and spatial delimitation);
- development of a strategy for an integrated evaluation of monitoring data on pollutants and effects (choice, classification, and weighting of parameters, integration stages);
- quality control / intercalibration of biological parameters.

Future environmental monitoring programmes will have to apply a holistic approach. Factors of environmental relevance should not be assessed individually and separated from each other.

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) Baltic Sea Action Plan, HELCOM 2007

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

Monitoring Specifications

Date: 2010-05-27

HD Habitat Type 1130
Estuaries

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 1130 - Estuaries

1.2 Definition

Estuaries (Natura 2000 Code 1130)

1.2.1 EU-Definition

The European Commission is currently drafting a *Guidance document on estuaries and adjacent coastal zones*. The latest draft proposes the following revision of the definition of Habitat Type 1130 in the EC *Interpretation Manual*:

Downstream part of a river valley extending from the limit of brackish water. The outer limit has to be defined at local level in coherence with the transitional water bodies identified during the WFD implantation.

In North-East Atlantic coast, estuaries are subject to the tide. River estuaries are coastal inlets where, unlike "large shallow inlets and bays" there is generally a substantial fresh water influence. The mixing of fresh water and sea water and the reduced current flows in the shelter of the estuary lead to deposition of fine sediments, often forming extensive intertidal sand and mud flats. Estuarine ecosystems are characterized by subtidal and intertidal habitats (slikke) including salt marshes (shore). Some of them are identified as habitat types in their own right and occur in other coastal areas. Where the tidal currents are faster than flood tides, most sediments deposit to form a delta at the mouth of the estuary.

Channels and/or shipping lanes are part of the habitat in all geographical conditions as they play a role in the hydrological functioning of estuaries, including the circulation of water and the deposition of sediment. Furthermore, these channels may also form part of the estuarine migration routes of Annex II fish species.

If fresh water tidal areas form part of the estuary, the upstream boundary may be marked by the limit of tidal influence. However occurrence of tidal influence without brackish water is not sufficient for defining the habitat type 1130 estuaries. Nevertheless, it is possible and in the discretion of Member States to designate such areas under 1130.

Baltic, Mediterranean and Black sea river mouths may be considered as estuary subtypes with brackish water and nearly no tide. Their definition is made at Member states level in relation with the obligations of the annex 2 of the Water Framework Directive (typologies). When the distinction among habitat is uncertain, as between 1130 estuaries and 1150* lagoons, the choice made by the Member states in the Standard Data Form will be considered as accurate. In Baltic estuaries, large wetland vegetation (halophytic) and luxurious aquatic vegetation in shallow water areas occur.

An estuary forms an ecological unit with the surrounding terrestrial and subtidal coastal habitat types. In terms of nature conservation, these different habitat types should not be separated, and this reality must be taken into account during the selection of sites. Estuaries are sometimes related to coastal lagoons (1150*) or to large shallow inlets and bays (1160). Sand banks (1110), sandflats and mudflats (1140), reefs (1170) and salt marshes (1310 to 1330) may also be a component part of habitat 1130 Estuaries.

1.2.2 National definition (BfN)

See the BfN-Definition and the following explanations:

Sea river mouths, provided they are still subject to regular influences from brackish water (with identifiable adaptations on the part of plants and animals) and tides (North Sea only), with communities in the water body, on the bed of the estuary and on the banks. In contrast to "shallow inlets and bays", there is a throughflow of water markedly influenced by fresh water. The vegetation along the banks (riparian tall herbs, annual populations, salt marsh, tidal alluvial forest, etc.) is included in this habitat type. Habitat Type 1130 constitutes a landscape complex that may consist of numerous biotope types.

1.2.3 Mapping procedure

In its horizontal plane, Habitat Type 1130 (estuaries) encompasses the whole, passable river water body of the polyhaline river mouth area as far as the upper brackish water limit (oligohaline zone). Optionally, limnic areas of the tidally influenced river system may also be components of the network of sites used for reporting on this habitat type, in which case they are also to be integrated into the relevant sites.

Estuaries are taken to comprise all river mouth areas and lower reaches of rivers that are subject to regular influences from salt or brackish water (defined as >/= 0.5 parts per thousand; in the Elbe, this area extends as far as the confluence of the Wedeler Au); on the North Sea, 1130 sites also include areas that are subject to a tidal influence in the fresh water area (Baltic Sea, see below). As a matter of principle, according to an agreement between the Länder, those areas that are reached at least ten times a year (ten-year average) by tidal and/or high water-related water level fluctuations are included in the sites designated. In this respect, ecologically coherent biotope and habitat complexes, and hydrological and

geomorphological structures typical of estuaries are to be incorporated into the sites as fully as possible. The influence of flowing water must be a determining factor when areas are allocated to estuaries. The boundaries of estuaries in the North Sea are defined using the same method as for the implementation of the WFD, which involves drawing a straight line between the outermost landmarks (Elbe: Cuxhaven-Friedrichskoog; Eider: Hundeknöll-Vollerwiek (Eider Barrage); Weser: Langwarden-West Padingbüttel dyke corner (in contrast to the delimitation of transitional waters under the WFD); Ems: East Eemshaven dyke corner-West Pilsum dyke corner).

Estuaries on the Baltic Sea are delimited from large shallow inlets and bays, and coastal lagoons on the basis of the determining hydrological and hydrochemical conditions. In the absence of tides, the up-river boundary is determined exclusively by the brackish water limit (0.5 parts per thousand). In practice, this boundary is frequently drawn by reference to plant species indicative of salt. When the salinity of surface water is being measured, it is to be kept in mind that, due to its greater density, salt water forms a layer under fresh water when conditions are calm, which means the salinity is frequently greater at deeper points in flowing water than that at the surface.

The vertical plane of Habitat Type 1130 (estuaries) encompasses all zonations of the deep water area (including artificially deepened navigation channels) as far as the upper limit of the area influenced by the highest water levels (e.g. due to storm surges, high waters). The upper boundary is often determined by built structures (e.g. dykes) that artificially constrict the original estuary. Heavily anthropogenically influenced areas, including adjacent seaward tidal and wind flats and expanses of water that do not belong to current HD areas, are excluded.

In addition to this, sites assigned to other habitat types within the biotope complex (including 1110, 1140, 1210, 1310, 1330, 6430, 6510 and 91E0) are surveyed and assessed as habitat types in their own right. Other biotope types found in estuaries, such as sandy beaches, brackish and fresh water riverine tidal and wind flats, beds of common reeds, grasslands and wooded areas are also surveyed separately, but summarily assessed as delimited functional spaces within Habitat Type 1130.

Estuaries may be subdivided into ecological functional spaces (see section 4.1) for the purposes of mapping and assessment.

1.3 Competent authority/ies

Bremen:	SBUV
Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Article 11, Annexes III and V

Comments

On the basis of the initial assessment made pursuant to Article 8(1), Member States shall establish and implement coordinated monitoring programmes for the ongoing assessment of the environmental status of their marine waters on the basis of the indicative lists of elements set out in Annex III and the list set out in Annex V, and by reference to the environmental targets established pursuant to Article 10.

The monitoring programme should cover the essential features and characteristics and the environmental status of those waters, based on the indicative lists set out in Annex III.

The following aspects must be covered:

a) The physical and chemical features, the habitat types, the biological features and the hydro-morphology.

b) The predominant pressures and impacts, including human activity, on the environmental status of those waters.

Birds Directive

Article 10

Comments

1) Member States shall encourage research and any work required as a basis for the protection, management and use of all species of bird referred to in Article 1.

2) Particular attention shall be paid to research and work on the subjects listed in Annex V.

ANNEX V

a) National lists of species in danger of extinction or particularly endangered species, taking into account their geographical distribution.

b) Listing and ecological description of areas particularly important to migratory species on their migratory routes and as wintering and nesting grounds.

c) Listing of data on the population levels of migratory species as shown by ringing.

HD [2]

Article 11 [3]

Comments

Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Article 17 [4]

Comments

Every six years […] Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning […] the main results of the surveillance referred to in Article 11.

WFD [5]

Article 8

Comments

Member States shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status within each river basin district:

for surface waters such programmes shall cover:

- the volume and level or rate of flow to the extent relevant for ecological and chemical status and ecological potential, and
- the ecological and chemical status and ecological potential.

HELCOM

Comments

See the following monitoring specifications: Macrophytes, Macrozoobenthos, Fish, Birds, Pollutants, Hydrochemistry, Hydrography, Hydrology, Substrate und Bathymetry

OSPAR

Comments

See the following monitoring specifications: Macrophytes, Macrozoobenthos, Fish, Birds, Pollutants, Hydrochemistry, Hydrography, Hydrology, Substrate und Bathymetry

TMAP [6]

Comments

See the following monitoring specifications: Macrophytes, Macrozoobenthos, Fish, Birds, Pollutants, Hydrochemistry, Hydrography, Hydrology, Substrate und Bathymetry

Technical necessity

The monitoring frequencies required differ depending on the relevant law, directive, convention, etc. and the parameters to be considered. In each case, the monitoring frequencies are specified by reference to the individual parameters. On this topic, see the following monitoring specifications: Macrophytes, Macrozoobenthos, Fish, Birds, Pollutants, Hydrochemistry, Hydrography, Hydrology, Substrate und Bathymetry

2.2 Environmental targets

HD

To secure and, where applicable, develop the favourable conservation status of Habitat Type 1130 (estuaries). The following measures may be required for this purpose:

a.) General targets:

- Conservation and development/restoration of the estuary with its saline, brackish and fresh water zones, and adjoining areas as a large ecosystem and habitat complex in as natural as possible a state with all structures and functions
- Conservation and development/restoration of the characteristic saline, brackish and fresh water zoning with its corresponding biotopes and species
- Conservation and development/restoration of hydrochemical and hydrophysical water conditions and processes of neritic zones and estuaries involved in the formation of biotopes
- Conservation and development/restoration of largely natural sedimentation and current conditions, and largely natural dynamics in coastal, river and riparian areas affected by natural inundations
- Conservation and development/restoration of a largely natural soil structure and morphodynamics
- Conservation and development/restoration of sections of river that do not have hard structures along their banks, are unchannelised, have undergone few other modifications or have been regenerated without their banks and bed being stabilised or the construction of dams and water extraction systems
- Conservation and development/restoration of ecological interrelationships with surrounding terrestrial, limnic and marine areas
- Conservation and development/restoration of the estuary¿s function as a barrier-free migration route for water-bound organisms
- Conservation, development, safeguarding and, if necessary, restoration of the estuary¿s general and specific functions for species for which special responsibilities exist (Annex II HD, Annex I BD and other international agreements).

b.) Specific targets:

- Extension of the areas subject to inundation and sedimentation
- Increase in the proportion of shallow water zones
- Increase in the proportions of alluvial forests, reedbeds, tall herbaceous communities, salt meadows, species-rich grassland and other biotope types typical of estuaries
- No action to maintain bank defences or construct new bank defences, where there are no compelling grounds for the bank to be stabilised
- Restoration of passability for migrating fish and lampreys

Overall, it is not so much a matter of conserving the status quo of individual HD conservation resources in the estuary, but of preserving and promoting the essential functions of the estuary in a changing landscape.

2.3 Threats

The following anthropogenic influences are potential threats:

- Inputs of nutrients and pollutants
- Changes in course and structure
- Expansion and maintenance of navigational channels
- Construction and operation of port and industrial installations (e.g. power stations)
- Dyke building, training dykes, bank revetements
- Relocation of sediment, dumping, disposal sites for dredged materials
- Alterations to characteristic hydrological variables, e.g. passability, due to structures built across the estuary and hydropower stations
- Shifts in the brackish water limit upstream
- Increases in current speeds
- Tidal pumping effect: decline in areas of shallow water due to the silting up of side channels
- Exploration and extraction of raw materials (gas and oil)
- Drainage of the inundation area
- Intensive agricultural and forestry use of the inundation area
- Shipping traffic, e.g. erosion of banks caused by wave attack
- Recreational use/tourism
- Professional and sport fishing
- Hunting
- Rising sea levels
- Encroachment of invasive species

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (Sachteleben, Behrens et al., 2009).

Each of the occurrences of HD Habitat Type 1130 (estuaries) is to be regarded as a single site within the boundaries described by the Länder in the Natura 2000 report. There are therefore four sites in the North Sea catchment (the Elbe, the Weser, the Ems and the Eider) and four further sites in the Baltic Sea catchment (the Trave, the Warnow, the Darß-Zingst Bodden Chain with the Recknitz, and the Peenestrom with the Achterwasser and the Kleines Haff). Under the concept, a total census is to be carried out for this habitat type on account of the small number of sites.

3.1 Description of monitoring network

North Sea

Monitoring units have been defined for the North Sea and are available within the BfN as shapefiles.

Baltic Sea

Monitoring units have been defined for the Baltic Sea and are available within the BfN as shapefiles.

The following parameters, which are derived from the habitat type assessment matrix (section 4.1), are already covered by monitoring networks that can be used to aggregate data meaningfully for the assessment of Habitat Type 1130 (estuaries):

- Hydrology
  See the monitoring specifications for Hydrology and Morphology (Substrate, Bathymetry)
- Sublittoral and eulittoral structures, bank structures, inundation areas
  See the monitoring specifications for Hydrology and Morphology (Substrate, Bathymetry); depth-sounding plans; evaluation of aerial images
- Vegetation structures
  See the monitoring specifications for Hydrology and Morphology (Substrate, Bathymetry); evaluation of aerial images; biotope mapping
- Completeness of typical species inventory
  See the monitoring specifications for Macrophytes, Macrozoobenthos, Fish, Birds, Mammals
- Global input of nutrients
  See the monitoring specifications for Pollutants
- Global input of hazardous substances
  See the monitoring specifications for Pollutants
- Dumping activities
  WSV data
- Passability for migrating fish
  See the monitoring specifications for Hydrology and Morphology (Substrate, Bathymetry)
- Bank improvement
  WSV data
- Bank erosion
  See the monitoring specifications for Hydrology and Morphology (Substrate, Bathymetry)
- Water engineering measures and shipping traffic
  WSV data; official statistics
- Drainage of the inundation area
  Evaluation of aerial images
- Exploration and extraction of raw materials
  Official statistics
- Sediment extraction
  WSV data
- Built developments
  Evaluation of aerial images
- Professional and sport fishing of all types (e.g. beam-trawl fishing, trawl fishing, gillnet fishing, angling)
  Official statistics

- Recreational use/tourism
  Partly from official statistics
- Dyke building
  Evaluation of aerial images
- Agricultural and forestry use
  Evaluation of aerial images
- Invasive species
  Evaluation of biotope mapping

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Estuaries (1130)

Methods:

Area-wide surveying of all sites to ascertain their range and area. Selection and permanent specification of representative sample areas or transects for the detailed surveying of particular parameters (see below).

Basic monitoring and specification of the monitoring network

An area-wide survey of the habitat type is carried out in the course of the six-year reporting cycle in order to assess its range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform characterisation and assessment of the HD habitat type across the different Länder.

HD Habitat Type 1130 (estuaries) constitutes a habitat complex that, in consequence, may also include further HD habitat types, which are integral components of the complex. The following are among the possible component habitat types:

- 1110 Sandbanks which are slightly covered by sea water all the time
- 1140 Mudflats and sandflats not covered by seawater at low tide
- 1210 Annual vegetation of drift lines
- 1310 *Salicornia* and other annuals colonising mud and sand
- 1320 *Spartina* swards (*Spartinion maritimae*)
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')
- 2330 Inland dunes with open *Corynephorus* and *Agrostis* grasslands
- 2310 Dry sand heaths with *Calluna* and *Genista*
- 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
- 6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)
- 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)
- 91F0 Riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers (*Ulmenion minoris*)

Furthermore, the following Habitats Directive species are significant for the characterisation of estuaries:

- 1095 Sea lamprey, *Petromyzon marinus*
- 1099 River lamprey, *Lampetra fluviatilis*
- 1103 Twaite shad, *Alosa fallax*
- 1106 Atlantic salmon, *Salmo salar*
- 1130 Asp, *Aspius aspius*
- 1351 Harbour porpoise, *Phocoena phocoena*
- 1365 Common seal, *Phoca vitulina*
- 1601* Elbe water dropwort, *Oenanthe conioides*

As components of the superordinate HD Habitat Type 1130 (estuaries), all the above-mentioned conservation resources are subject to EU reporting obligations in their own right, and are therefore covered by the regular HD monitoring programme run by the German federation and Länder under the LANA decision, as well as, where applicable, the HD monitoring programmes implemented by the individual Länder. In consequence, it is also possible for questions raised about Habitat Type 1130 (estuaries), as the next higher level in the hierarchy, to be answered by aggregating in a meaningful fashion the data obtained from investigations and assessments that are conducted for these purposes using the monitoring networks dedicated to specific conservation resources. This applies to the same extent for the exploitation of the data on the quality parameters 'macrozoobenthos', 'macrophytes' and 'fish' acquired in the context of the monitoring obligations imposed by the WFD. If appropriate monitoring units required to satisfy the obligations imposed by the Habitats Directive and Water Framework Directive are located within the boundaries of Habitat Type 1130 (estuaries) sites, the information

gathered there may be fed directly into the evaluation of these sites.

Remaining gaps in knowledge require dedicated surveys. For instance, there is a need for, above all, continuous observation of the increase or decline in the areas covered by the biotopes found in 'estuary' habitat complexes, such as deep water areas, shallow water zones, tidal and wind flats, reedbeds, alluvial forests and farmland. To this end, evaluations of water depth-sounding plans, laserscanning overflights and the evaluation of aerial images are necessary every three years if possible (every six years, at least).

Should the information gained from the two approaches discussed above not be sufficient for a plausible assessment of conservation status, additional terrestrial mapping is required. To this end, transects are to be established at suitable points from the foot of the dyke to the sublittoral zone as long-term observation areas that reflect the gradients characteristic of the estuary in question (shallow to deep, fresh water to sea water), as well as the typical habitat and species inventories.

Since reedbeds are not subject to monitoring obligations as a separate HD habitat type and their significance for the quality of HD Habitat Type 1130 (estuaries) is particularly great, a monitoring programme should be established for this biotope type that meaningfully consolidates data from the current macrophyte monitoring units, which are required in transitional waters to comply with the WFD. In addition to this, depending on the salinity gradient, up to ten monitoring units should be established between the polyhaline river mouth and the limnic area. The reedbeds are to be mapped accordingly every three years if possible (every six years, at least).

Frequency:

All sites must be sampled at least once within a reporting period of six years, in which respect attention is to be paid to the even and ecologically meaningful distribution of sampling activities across these six years.

Parameter:

- Completeness of the typical species inventory (plants, macrozoobenthos, fish, birds, beetles, mammals)
- Hydrology
- Impairment factors
- Impairments (exploration and extraction of raw materials, sediment extraction, built developments, professional and sport fishing of all types (e.g. beam-trawl fishing, trawl fishing, gillnet fishing, angling))
- Impairments (global input of nutrients, global input of hazardous materials, dumping activities, passability for migrating fish, bank improvement, bank erosion, water engineering measures and shipping traffic, drainage of the inundation area)
- Impairments (recreational use/tourism, dyke building, agricultural and forestry use, invasive species)
- Range and area
- Sublittoral and eulittoral structures, bank structures, inundation area
- Typical spectrum of structures, species and vegetation types
- Vegetation structures (biotope types according to the mapping keys issued by the Länder)

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Types - Estuaries (1130)

Guideline:

HD

Comments:

The assessment matrix for Habitat Type 1130 can be downloaded by clicking on the following link:

Assessment matrix

For the purposes of assessing conservation status, functional spaces that are to be assessed separately (assessment subareas) may be delimited within extensive estuaries, thus making it possible for both quality differences and any measures that are required to be identified with greater clarity. The criteria for the delimitation of such functional spaces are: salinity levels, differentiation into sublittoral/eulittoral/supralittoral zones, main rivers and tributaries or side channels, bays, islands, types of agricultural use.

Biotopes that are simultaneously to be allocated to another habitat type (e.g. salt meadows) are assessed twice (as a separate habitat type and as part of the estuary complex in question).

The assessment table referred to above is supplemented by the assessment of estuarine functional spaces designated as assessment subareas according to the following principles:

Subarea assessment of the conservation status of estuarine functional spaces

	A	B	C
Sublittoral zone	Side channels without deepened navigational channels and major impairments	Side channels without deepened navigational channels, but with indirect impairments, e.g. due to changes in currents and pressure on water quality	Main rivers with regularly deepened navigational channels
Eulittoral zone (tidal and wind flat areas, incl. bank line, not including additional habitat types)	Near-natural tidal and wind flat areas with complete vegetation zoning (including well developed beds of rushes and common reeds), gradual transition to shallow water zones, banks unstabilised	Near-natural tidal and wind flat areas with well developed vegetation zoning (including extensive beds of common reeds), shallow water zones restricted, banks stabilised in places	Tidal and wind flat areas heavily impaired by the deepening of shipping channels and wave attack (tidal and wind flat areas slope relatively steeply into deep water, reedbeds absent or only fragmentary), banks stabilised
Supralittoral zone (inundation areas, not including additional habitat types)	Species-rich grassland (mesophile grassland (GM), other species-rich humid and wet grassland (GF), sedge-, rush- or tall herb-rich wet meadow (GN)), dry reedbeds, sedge fens and/or willow scrub with natural relief and natural tidal channel system	Species-rich grassland (mesophile grassland (GM), other species-rich humid and wet grassland (GF), sedge-, rush- or tall herb-rich wet meadow (GN)), dry reedbeds and/or sedge fens with group structure or with subareas comprising species-poor grassland (intensive marsh grassland (GIM)); apart from ditches, near-natural tidal channels also present	Artificially drained areas with species-poor grassland (intensive marsh grassland (GIM), sown grassland (GA)), eutrophic fallow stages (semiruderal grass and herbaceous communities (UH)), allochthonous stands of woody plants, arable land, etc.; more natural biotopes scattered in small patches, at most
Subareas that are to be allocated to another habitat type	Assessment in accordance with the standards for the habitat type in question (cf. 1140, 1170, 1310, 1320, 1330, 6430, 6510, 91E0, etc.)		

5 Quality assurance

- Quality Assurance Panel

Comments

The participating institutions are striving to build up uniform QA standards using a quality management system.

5.1 Monitoring institutions

- LLUR
- NLPV HH
- SBUV
- LUNG
- NLWKN
- NPV SH
- BSU
- NLPV NI
- NPA-MV
- Counties

5.2 Guidance documents

- Drachenfels, O.v., ed., 2008: 'Hinweise zur Definition und Kartierung der Lebensraumtypen von Anh. I der FFH-Richtlinie in Niedersachsen - auf der Grundlage des Interpretation Manuals der Europäischen Kommission (Version EUR 25 vom April 2003): Stand: 04/2008' (unpublished).
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- Draft-version *Guidance document on estuaries and adjacent coastal zones*
- European Commission / DG Environment, 2003: *Interpretation Manual of European Union Habitats*, Eur 25 (April 2003).
- European Commission, 1999: *Towards a European Integrated Coastal Zone Management (ICZM) Strategy: General Principles and Policy Options;* Luxembourg; Publications Office of the European Union.
- European Commission, 2003: *Common implementation strategy for the water framework directive (2000/60/EC), Transitional and coastal waters-Typology, Reference conditions and classification systems, Guidance Document No 5,*; Luxembourg; Office for official publications of the European Communities; 116 pp.
- European Commission, 2004: 'Note to the file: German Site Proposals for the Habitat Type 1130 "Estuaries"'; European Commission, DG Environment, Nature and Biodiversity; 4 pp. (unpublished).
- European Commission, 2005: 'Interpretation note on "Estuaries" (habitat type 1130), with a view to aiding the selection/delimitation and protection/management of Sites Of Community Interest hosting this habitat type' (unpublished).
- European Commission, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitat Directive: Explanatory Notes and Guidelines: Final Draft October 2006*; European Commission, DG Environment, Nature and Biodiversity; 64 pp. + annexes.
- European Commission, 2007: *Interpretation Manual of European Union Habitats*; DG Environment, Nature and biodiversity; 142 pp.
- European Environment Agency, 2004: *EU Headline Biodiversity Indicators: Proceedings of the Stakeholders¿ Conference Biodiversity and the EU - Sustaining Life, Sustaining Livelihoods: Malahide, Ireland, 25 - 27 May 2004.*
- Monitoring specifications for the other parameters listed in section 3.
- Sachteleben, J., Behrens, M. et al., 2009: *Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: November 2008)*; commissioned by the Federal Agency for Nature Conservation.
- Ssymank, A., Hauke, U., Rückriem C. and E. Schröder, 1998: *Das europäische Schutzgebietssystem NATURA 2000 - BFN-Handbuch zur Umsetzung der Fauna-Flora-Habitat-Richtlinie und der Vogelschutz-Richtlinie*; Schriftenreihe für Landschaftspflege und Naturschutz; 53; Bonn Bad Godesberg.

5.3 Standards

- Monitoring specifications for the other parameters listed in section 3

5.4 Current status

Monitoring specifications for the other parameters listed in section 3

6 Literature

- ARGE Elbe, 1995: *Spektrum und Verbreitung der Rundmäuler und Fische in der Elbe von der Quelle bis zur Mündung: Aktuelle Befunde im Vergleich zu alten Daten.*
- ARGE Elbe, 2002: *Typisierung des Übergangsgewässers in der Flussgebietseinheit Elbe nach EG-Wasserrahmenrichtlinie*; ed. T. Gaumert.
- ARGE Elbe (Special Action Group) with the Elbe Water Quality Office, 2004: *Umsetzung der EG-Wasserrahmenrichtlinie (WRRL), Koordinierungsraum Tideelbe - Bestandsaufnahme und Erstbewertung (Anhang II / Anhang IV der WRRL) des Tideelbestroms (C-Bericht)*; draft, 31 August 2004: pp. 18 - 19.
- Abraham, R. and T.-P. Lübbe, 1996: 'Effizienzkontrolle im Naturschutzgebiet "Haseldorfer Binnenelbe mit Elbvorland": Endbericht'; report commissioned by the Itzehoe Office for Agriculture and Water Management; unpublished.
- Aschenberg, H., 1992: 'Deichschutz und Binnenentwässerung im Stromspaltungsgebiet der Elbe im Raum Hamburg'; in: German Association for Water Resources and Land Improvement (DVWK): *Historischer Küstenschutz*; ed. Kramer, J. and H. Rohde; Konrad Wittwer-Verlag; Stuttgart.
- BBB - Büro für Biologische Bestandsaufnahmen, 1997: 'Beschreibung des Ist-Zustandes, Bewertung der Unterelbe als Lebensraum für terrestrische Tiere und Pflanzen und Prognose der Entwicklung'; in: //UVS zur Anpassung der Fahrrinne der Unter- und Außenelbe an die Containerschiffahrt - Schutzgut Pflanzen und Tiere: Terrestrische Lebensgemeinschaften, Materialband IV, Kartenband, Materialband VI//; report commissioned by the Federal WSW, the WSA Hamburg and the BWA Hamburg.
- Backx, J.J.G.M., Berg, G.v.d., Geilen, N., de Hoog, A., Houwing, E. J., Ohm, M., van Oirschot, M. and M. van Wijngaarden, 2003: ' Case Study on the Haringvliet Estuary'; in: CIS Working Group 2.2, ed.: *Guidance Document on Identification and Designation of Heavily Modified and Artificial Water Bodies in Europe.*
- Balzer, S., Boedeker, D. and U. Hauke (2002): 'Interpretation, Abgrenzung und Erfassung der marinen und Küsten-Lebensraumtypen nach Anhang I der FFH-Richtlinie in Deutschland'; Natur und Landschaft; 77(1): pp. 20 - 28.
- Below, H. and C. Hobohm, 1998: 'Fahrwasservertiefungen in der Tideelbe und mögliche Auswirkungen auf den Bestand des Schierlings-Wasserfenchel (*Oenanthe conioides*)'; *Jb. Naturw. Verein Fstm. Lbg.*; 41: pp. 103 - 115.
- Belting, S., 1995- 2000: *Dauerbeobachtungsflächen zur vegetationskundlichen Erfassung in den Naturschutzgebieten Asseler Sand, Hullen und Allwördener Außendeich (Schachblumen-Bestände).*
- Bergemann, M., 1995: 'Die Lage der oberen Brackwassergrenze im Elbästuar'; *Deutsche Gewässerkundliche Mitteilungen*; 39(4/5): pp. 134 - 137.
- Federal Waterway and Shipping Administration and Hamburg Waterway and Shipping Office: *Bericht zur Beweissicherung 2003 zur Anpassung der Fahrrinne der Unter- und Außenelbe an die Containerschifffahrt: Stand Mai 2004, Version 4.0*.
- Biomonitoring & Illustration, Daunicht, Birte and Dr. W. Daunicht, 2000-2001b: *Erfassung der Rastvögel und Überwinterer am Elbufer in Niedersachsen im Bereich des Gauensiekersands, Asselersands und Schwarztonnensand - Ist-Zustand, Bewertung und Prognose: Fachgutachten zur Umweltverträglichkeitsuntersuchung zur Variantenprüfung der Elbquerung der A20 Nord-West-Umfahrung Hamburg, Schutzguttiere*; commissioned by COCHETCONSULT).
- Federal Institute of Hydrology, 1999: *Handlungsanweisung für den Umgang mit Baggergut im Küstenbereich (HABAK-WSV).*
- CIS Working Group 2.4 (COAST), 2003: *Guidance on Typology, Reference Conditions and Classification Systems for Transitional and Coastal Waters.*
- Cameron, W.M. and D.W. Pritchard, 1963: 'Estuaries'; in: M.N. Hill, ed.: *The Sea*; vol. 2; Wiley & Sons, New York: pp. 306 - 324.
- Christiansen, H., 2000: 'Verdriftungswege von Finteneiern mit Fundort Mühlenberger Loch (Zeitraum April / Mai 2000)'; unpublished report commissioned by the Hamburg State Ministry for Economic and Labour Affairs, Department for River and Port Engineering.
- Common Wadden Sea Secretariat, 1997: Stade Declaration: Trilateral Wadden Sea Plan: Ministerial Declaration of the Eighth Trilateral Governmental Conference on the Protection of the Wadden Sea: Stade, 1997.
- Common Wadden Sea Secretariat, 2002: Esbjerg Declaration: Ministerial Declaration of the Ninth Trilateral Governmental Conference on the Protection of the Wadden Sea: Esbjerg, 31 October 2001.
- Dalrymple, R.W., Zaitlin, B.A. and R. Boyde, 1992: 'A conceptual model for estuarine sedimentation'; *J. Sedimentary Petrology*; 62: pp. 1130 -1146.
- Dyer, K.R., 1997: *Estuaries: A Physical Introduction*; 2nd edition; Wiley & Sons; New York: 195 pp.
- Garthe, S. and A. Mitschke, 1996: `Das Ramsar-Gebiet "Mühlenberger Loch" - ein Süßwasserwatt im Elbeästuar: 30jährige Entwicklung der Avifauna und Naturschutzbewertung; *Naturschutz und Landschaftsplanung*; 28: pp. 75 - 79.
- Gaumert, T., 2000: *Die Entwicklung des Fischartenspektrums der Elbe mit Berücksichtigung der Neozoen-Problematik.*
- Grüttner, H., 1992: 'Deichschutz und Binnenentwässerung der schleswig-holsteinischen Elbmarschen'; in: Kramer, J. and H. Rohde, ed.: Historischer Küstenschutz - Deichbau, Inselschutz und

Binnenentwässerung an Nord- und Ostsee; German Association for Water Resources and Land Improvement (DVWK); Wittwer, Stuttgart.
- Kiel Institute for Landscape Ecology (KifL), 1998: 'FFH-Verträglichkeitsstudie für die geplante DA-Erweiterung im Mühlenberger Loch (Freie und Hansestadt Hamburg)'; unpublished report commissioned by BFUB Hamburg GmbH.
- Kiel Institute for Landscape Ecology (KifL), 2004: 'Erhaltungs- und Entwicklungsziele für die Gebiete von Gemeinschaftlicher Bedeutung im Ästuar der Elbe'; unpublished report commissioned by the Hamburg State Ministry for Economic and Labour Affairs, Department for River and Port Engineering and the North German Länder HD Steering Group.
- Kiel Institute for Landscape Ecology (KifL), 2004: 'Vorläufiger Konventionsvorschlag für eine länderübergreifend einheitliche Meldepraxis des Lebensraumtyps [1130] [Ästuarien] an der Unterelbe'; unpublished report commissioned by the North German Länder HD Steering Group.
- Kafemann, R., Thiel, R. and A. Sepulveda, 1996: 'Die fischereiökologische Bedeutung der Nebenstromgewässer der Unterelbe'; *Arch. Hydrobiol.*; Suppl. 110 (Unters. Elbe-Ästuar 7): pp. 199 - 214.
- Kiesewetter, B., Holsten, B., Baumung, S. and C. Lutz, 1997: 'Bedeutung der Elbe als Rastgebiet für durchziehende, rastende oder überwinternde Vogelarten - Ist-Zustand, Bewertung und Prognose'; in: *Umweltverträglichkeitsuntersuchung zur Anpassung der Fahrrinne der Unter- und Außenelbe an die Containerschiffahrt - Materialband VI: Schutzgut Tiere und Pflanzen, Terrestrische Lebensgemeinschaften - Anhang 5.*
- Kötter, F., 1961: 'Die Pflanzengesellschaften im Tidegebiet der Unterelbe'; *Arch. Hydrobiol.*; Suppl. 26(1); Stuttgart: pp. 106 - 184.
- McLusky, D.S. and M. Elliot, 2004: *The Estuarine Ecosystem*; 3rd edition; Oxford University Press.
- Mitschke, A., 1997: 'Zur vogelkundlichen Entwicklung der Hamburger Elbbucht "Mühlenberger Loch" von 1992 bis 1997'; *Hamburger Avifaun. Beitr.*; 29: pp. 163 - 181.
- Nehring, S., 2000: *Ästuare: Das Habitat für eingeschleppte Makroinvertebrate*
- Neumann, M., 2002: 'Gebietsauswahl für Rundmaul- und Fischarten des Anhangs II der FFH-Richtlinie in der von der schleswig-holsteinischen Landesregierung beschlossenen Natura 2000-Gebietskulisse'; unpublished report commissioned by the State Agency for Nature and Environment of the Land Schleswig-Holstein.
- Oslo-Paris Convention (OSPAR): Convention for the Protection of the Marine Environment of the North-East Atlantic.
- Perillo, G.M.E., 1995: *Geomorphology and Sedimentology of Estuaries: Definitions and Geomorphologic Classifications of Estuaries; Development in Sedimentology*; 53, Elsevier; Amsterdam; 471 pp.
- Planungsgruppe Ökologie und Umwelt Nord (PÖUN), 1998: 'Umweltverträglichkeitsstudie zur Anpassung der Fahrrinne der Unter- und Außenelbe an die Containerschiffahrt'; unpublished study commissioned by the Federal Waterway and Shipping Administration, the Hamburg Waterway and Shipping Office and the Hamburg State Ministry for Economic and Labour Affairs, Department for River and Port Engineering; Hanover.
- Spieker, J., Obst, G., Köhler, S. and G. Ramm, 2001: *Vorstudie zur Klärung der Relevanz der Gewässerflora (Makrophyten, Angiospermen, Großalgen) für die Bewertung des ökologischen Zustands im Teileinzugsgebiet Tideelbe: Endbericht, 21.12.2001*; report commissioned by ARGE Elbe, WFD Working Group.
- Ssymank, A., Hauke, U., Rückriem, C. and E. Schröder, 1998: *Das europäische Schutzgebietssystem NATURA 2000 - BFN-Handbuch zur Umsetzung der Fauna-Flora-Habitat-Richtlinie und der Vogelschutz-Richtlinie*; Schriftenreihe für Landschaftspflege und Naturschutz; 53; Bonn Bad Godesberg.
- Wolff, W. J., 1999: 'Exotic invaders of the meso-oligohaline zone of estuaries in the Netherlands: Why are there so many?'; *Helgoländer Meeresunters.*; 52: pp. 393 - 400.

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

7.2 Working steps required

Priorities

- Coordination of monitoring in terms of the methods applied between Bremen, Mecklenburg-Vorpommern, Lower Saxony, Schleswig-Holstein and Hamburg (harmonisation of monitoring network, monitoring frequencies and methods)
- Specification and surveying of study areas or transects
- Data management: standards set by the EU, support provided, standards set and evaluation carried out by BfN, GIS and Land databases, updating of Standard Data Forms
- Evaluation with a view to management plans and/or necessary measures

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) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(3) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(4) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

(5) 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.

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

Monitoring Specifications

Date: 2010-05-20

HD Habitat Type 1140 Mudflats and Sandflats Not Covered by Seawater at Low Tide

MEERESUMWELT

BUND-LÄNDER MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 1140 - Mudflats and Sandflats Not Covered by Seawater at Low Tide

1.2 Definition

*See BfN definition and the note on the tidal flat areas of the North Sea:

Mudflats and sandflats not covered by seawater at low tide (Natura 2000 Code 1140)

Areas of sand and mud in the coastal and brackish water areas of the North Sea and Baltic Sea and in adjoining inlets, coastal lagoons and salt meadows that are regularly exposed at LAT (lowest astronomical tide) (tidal flats of the North Sea) or in average weather conditions (wind flats of the Baltic Sea).

Special structures

- Seagrass populations (*Zosteretum marinae*)
- Shellfish banks with *Mytilus edulis*

Note on the tidal flats of the North Sea:

The area that is regularly exposed between LAT (lowest astronomical tide) and the mean high tide (MHT) line, including the seagrass meadows located in this area. The boundaries to the independent habitat types *Salicornia* and other annuals colonising mud and sand (1310), *Spartina* swards (*Spartinion maritimae*) (1320) and Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330) are determined by the Land-specific definitions of these habitat types. Sandbanks that are still covered with water at MHT, but exposed at low water are surveyed as tidal flats down to the lowest astronomical tide (LAT) line.

The boundaries to anthropogenic structures such as stone facings and dykes lie at the foot of these structures. (i.e. they are not always identical with MHT).

The vegetation-free tidal flat areas of estuaries that belong to the Habitat Type 1130 biotope complex are to be delimited as a separate unit.

Note on the wind flats of the Baltic Sea

Wind flats is the term used to designate intermittently exposed shallow water zones in the Baltic Sea. In contrast to the periodic tidal rhythm of the North Sea, the wind flats of the Baltic Sea are subject to weather-dependent, aperiodic fluctuations in water level. Well developed wind flats occur on accreting coasts (spits, bars), in shallow water zones and on abrasion platforms in inner and outer coastal waters.

1.3 Competent authority/ies

Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Article 11, Annexes III and V

Comments

On the basis of the initial assessment made pursuant to Article 8(1), Member States shall establish and implement coordinated monitoring programmes for the ongoing assessment of the environmental status of their marine waters on the basis of the indicative lists of elements set out in Annex III and the list set out in Annex V, and by reference to the environmental targets established pursuant to Article 10.

The monitoring programme should cover the essential features and characteristics and the environmental status of those waters, based on the indicative lists set out in Annex III.

The following aspects must be covered:

a) The physical and chemical features, the habitat types, the biological features and the hydro-morphology.

b) The predominant pressures and impacts, including human activity, on the environmental status of those waters.

Birds Directive

Article 10

Comments

(1) Member States shall encourage research and any work required as a basis for the protection, management and use of all species of bird referred to in Article 1.

(2) Particular attention shall be paid to research and work on the subjects listed in Annex V.

Annex V

a) National lists of species in danger of extinction or particularly endangered species, taking into account their geographical distribution;

b) Listing and ecological description of areas particularly important to migratory species on their migratory routes and as wintering and nesting grounds;

c) Listing of data on the population levels of migratory species as shown by ringing.

HD [2]

Article 11 [3]

Comments

Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Article 17 [4]

Comments

Every six years […] Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning […] the main results of the surveillance referred to in Article 11.

WFD [5]

Article 8

Comments

Member States shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status within each river basin district:

Such programmes shall cover:

i) the volume and level or rate of flow to the extent relevant for ecological and chemical status and ecological potential, and

ii) the ecological and chemical status and ecological potential.

HELCOM

Comments

See the following monitoring specifications: Macrophytes, Macrozoobenthos, Fish, Birds, Pollutants, Hydrochemistry, Hydrography, Hydrology, Substrate and Bathymetry

OSPAR

Comments

See the following monitoring specifications: Macrophytes, Macrozoobenthos, Fish, Birds, Pollutants, Hydrochemistry, Hydrography, Hydrology, Substrate and Bathymetry

TMAP [6]

Comments

See the following monitoring specifications: Macrophytes, Macrozoobenthos, Fish, Birds, Pollutants, Hydrochemistry, Hydrography, Hydrology, Substrate and Bathymetry

Technical necessity

The monitoring frequencies required differ depending on the relevant law, directive, convention, etc. and the parameters to be considered. In each case, the monitoring frequencies are specified by reference to the individual parameters. On this topic, see the following monitoring specifications: Macrophytes, Macrozoobenthos, Fish, Birds, Pollutants, Hydrochemistry, Hydrography, Hydrology, Substrate and Bathymetry

2.2 Environmental targets

HD

Schleswig-Holstein

To guarantee, to the greatest possible extent, the undisturbed development of natural processes.

The following targets reflect this objective:

The conservation of

- largely natural geomorphological dynamics,
- largely natural hydrophysical and hydrochemical conditions and processes,
- largely natural sediment and current conditions,
- biotope complexes, and typical structures and functions,
- the highest possible water quality,
- largely unimpaired areas.

Lower Saxony

The overarching targets for the National Park are prescribed by the Lower Saxon Wadden Sea National Park Act (NWattNPG).

According to Section 2 NWattNPG, the targets are as follows:

- The protection of the singular character of the nature and landscape of the Wadden region off the Lower Saxon coast, including the characteristic appearance of the landscape
- The conservation of natural processes and biological diversity in the National Park, especially the preservation or restoration of a favourable conservation status for the habitat types, and animal and plant species mentioned in the Act

The objective is the conservation of the tidal flats (mudflats, sandflats and flats of mixed substrate) as an undisrupted habitat type with natural functions. The present area, in particular that of mudflats, must not be reduced further. Eulittoral shellfish banks and seagrass meadows are to be conserved or restored as formative components of the habitat type's natural development and manifestations. Areas with microbial mats deserve special attention. Particular significance attaches to the conservation or restoration of undisrupted hydrodynamics with an undisrupted supply of sediment to the tidal flats. This makes it possible for a complete sequence of sediments (essentially mudflats, sandflats and flats of mixed substrate) to occur across their natural range, with their natural properties and dynamics. The typical array of species is to be conserved with natural abundances and dominances, efforts are to be made to ensure the water column contains a natural suspension load. The function of the tidal flats in the decomposition of organic substances must be conserved. The function of the tidal flats as a food area is to be safeguarded. Apart from the pure availability of food, far-reaching freedom from disturbance is also to be ensured in order to guarantee this is possible. The objective is to conserve the tidal flats' 'resilience', i.e. their capacity to return to their original status following disruption. The conservation of shellfish banks, which constitute a naturally occurring hard substrate, is accorded particular significance in view of their importance as spawning grounds, feeding areas, retreat areas and

nurseries, as well as their distinctly increased species diversity, filtering function, deposition rates and the function they play in absorbing the force of waves.

2.3 Threats

The following anthropogenic influences are potential threats:

- Input of nutrients
- Input of hazardous substances
- Macroalgae coverage
- Exploration and extraction of raw materials (e.g. gas, oil, sediment, brine)
- Construction measures/installations, incl. energy pipelines (e.g. construction of port and industrial installations)
- Water engineering measures and installations (e.g. coastal defences)
- Shipping traffic and water engineering measures (e.g. navigation channels, training dykes)
- Recreational use/tourism
- Professional and sport fishing of all types (e.g. beam-trawl fishing, trawl fishing, gillnet fishing, angling, shell fisheries)
- Military exercises
- Disposal sites for sediment and dredgings/dumping activities
- Proliferation of neozoa and neophytes

2.4 Spatial allocation

Inner coastal waters of the North Sea and Baltic Sea.

Occurs extensively on the North Sea coast and islands as tidal flats. Smaller sites occur on the Baltic Sea coast as wind flats (areas exposed by offshore winds).

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

Monitoring units in the North Sea:

Monitoring units have been defined for the North Sea and are available within the BfN as shapefiles.

Monitoring units in the Baltic Sea:

Monitoring units have been defined for the Baltic Sea and are available within the BfN as shapefiles.

- Sediment structures and distribution (according to the monitoring specifications for Substrate and Bathymetry)
- Sediment supply (in accordance with the monitoring specifications for Substrate and Bathymetry)
- Oxidation layer (in accordance with the monitoring specifications for Macrozoobenthos) See also Testing Procedure SOP: *Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*
- Hydrology and morphology (in accordance with the monitoring specifications for Hydrology, Substrate and Bathymetry)
- Seagrass populations (in accordance with the monitoring specifications for Macrophytes)
- Blue mussel banks (in accordance with the monitoring specifications for Makrozoobenthos)
- Completeness of typical species inventory (in accordance with the monitoring specifications for Macrophytes, Makrozoobenthos, Fish and Birds)
- Global input of nutrients (in accordance with the monitoring specifications for Hydrochemistry)
- Global input of hazardous substances (in accordance with the monitoring specifications for Pollutants)
- Exploration and extraction of raw materials, brine, gas and oil (official statistics and other sources)
- Sediment extraction (official statistics and other sources)
- Construction measures/installations, incl. energy pipelines (official statistics and other sources)
- Water engineering measures and installations, e.g. coastal defences, navigation channels, training dykes (official statistics and other sources)
- Shipping traffic (official statistics and other sources)
- Recreational use/tourism (partly from official statistics)
- Professional and sport fishing of all types, e.g. beam-trawl fishing, trawl fishing, gillnet fishing, angling, shell fisheries (official statistics and other sources)
- Military exercises (official statistics and other sources)
- Disposal sites for sediment and dredgings/dumping activities (official statistics and other sources)

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Mudflats and Sandflats (1140)

Methods:

- Sediment structures and distribution (in accordance with the monitoring specifications for Substrate, Bathymetry)
- Sediment supply (in accordance with the monitoring specifications for Substrate, Bathymetry)
- Oxidation layer (in accordance with the monitoring specifications for Macrozoobenthos) See also Testing Procedure SOP: *Macrozoobenthos Investigations in Marine Sediments (Soft Seabed)*
- Hydrology and morphology (in accordance with the monitoring specifications for Hydrology, Substrate and Bathymetry)
- Seagrass populations (in accordance with the monitoring specifications for Macrophytes)
- Blue mussel banks (in accordance with the monitoring specifications for Macrozoobenthos)
- Completeness of the typical species inventory (in accordance with the monitoring specifications for Macrophytes, Macrozoobenthos, Fish and Birds)
- Global input of nutrients (in accordance with the monitoring specifications for Hydrochemistry)
- Global input of hazardous substances (in accordance with the monitoring specifications for Pollutants)

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Construction measures/installations, incl. energy pipelines (official statistics and other sources)
- Disposal sites for sediment and dredgings/dumping activities (official statistics)
- Exploration and extraction of raw materials, brine, gas and oil (official statistics)
- Military exercises (official statistics and other sources)
- Professional and sport fishing of all types, e.g. beam-trawl fishing, trawl fishing, gillnet fishing, angling, shell fisheries (official statistics and other sources)
- Recreational use/tourism (partly from official statistics)
- Sediment extraction (official statistics and other sources)
- Shipping traffic (official statistics and other sources)
- Water engineering measures and installations, e.g. coastal defences, navigation channels, training dykes (official statistics and other sources)

4 Assessment

4.1 Assessment procedures

North Sea

Title

HD Habitat Types - Mudflats and Sandflats Not Covered by Seawater at Low Tide (1140)

Guideline:

HD

Comments:

The assessment matrix for Habitat Type 1140 can be downloaded by clicking on the following link:

Assessment matrix

The assessment must be carried out using the assessment procedures for the various components, such as macrophytes, hydrology, etc. These assessment procedures must be adjusted for this purpose.

5 Quality assurance

Comments

5.1 Monitoring institutions

Commissioning organisations (coordinating agencies)

- LLUR
- NLPV HH
- LUNG
- NLWKN
- NLPV NI
- LKN-SH
- NPA-MV

5.2 Guidance documents

- See the following monitoring specifications: Makrophytes, Macrozoobenthos, Fish, Birds, Hydrochemistry, Hydrology, Substrate, Bathymetry und Pollutants

5.3 Standards

- See the following monitoring specifications: Makrophytes, Macrozoobenthos, Fish, Birds, Hydrochemistry, Hydrology, Substrate, Bathymetry und Pollutants

5.4 Current status

See the following monitoring specifications: Makrophytes, Macrozoobenthos, Fish, Birds, Hydrochemistry, Hydrology, Substrate, Bathymetry und Pollutants

6 Literature

- Adolph, W., Jaklin, S., Meemken, M. and H. Michaelis, 2003: 'Die Seegrasbestände der niedersächsischen Watten (2000 - 2002)'; Dienstber. Forschungsstelle Küste; 1/2003; Norderney: pp. 1 - 19.
- Brinkman, A.G. and T. Bult, 2002: *Geschikte eulitorale gebieden in de Nederlandse Waddenzee voor het voorkomen vanmeerjarige natuurlijke mosselbanken: Hoofdrapport voor deel-project F2 van EVA II*; Alterra-rapport; 456.
- Brinkman, A.G., Bult, T., Dankers, N., Meijboom, A., den Os, D., van Stralen, M.R. and J. de Vlas, 2003: *Mosselbanken, ken-merken, oppervlaktebepaling en beoordeling van stabiliteit*; Alterra-rapport; 707, ISSN 1566 - 7197.
- Buschbaum, C. and B. Saier, 2001: 'Growth of the mussel *Mytilus edulis* L. in the Wadden Sea affected by tidal emergence and barnacle epibionts'; *J. Sea Res.*; 45: pp. 27 - 36.
- Buschbaum, C., 2002: 'Siedlungsmuster und Wechselbeziehungen von Seepocken (Cirripedia) auf Muschelbänken (*Mytilus edulis* L.) im Wattenmeer'; *Ber. Polarforsch. Meeresforsch.*; 408: pp. 1 - 143.
- Common Wadden Sea Secretariat, 2002a: *Shellfish Fisheries: An overview of policies for shellfish fishing in the Wadden Sea*; Wilhelmshaven, Germany; 21 pp.
- Common Wadden Sea Secretariat, 2002b: *Blue Mussel Monitoring: Report of the Second TMAP Blue Mussel Workshop on Ameland, 8 - 10 April 2002*; Wilhelmshaven, Germany.
- Dankers, N., Meijboom, A., de Jong, M., Dijkman, E., Cremer, J., Fey, F., Smaal, A., Craemeersch, J., Brummelhuis, E., Steenbergen, J. and D. Baars, 2006: *De ontwikkeling van de Japanse Oester in Nederland*; Wageningen IMARES; Report C040/06.NULL
- Dankers, N.M.J.A., Herlyn, M., Kristensen, P.S., Michaelis, H., Millat, G., Nehls, H. and M. Ruth, 1999: `Blue mussels and blue mussel beds in the littoral'; in: Jong, F. de, Bakker, J.F., van Berkel, C.J.M., Dankers, N.M.J.A., Dahl, K., Gätje, C., Marencic, H. and P. Potel, eds., 1999: *1999 Wadden Sea Quality Status Report*; Wadden Sea Ecosystem; 9; Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Quality Status Report Group; Wilhelmshaven: pp. 141 - 145.
- Dankers, N.M.J.A., Meijboom, A., Cremer, J.S.M., Dijkman, E.M., Hermes, Y. and L. te Marvelde, 2003: *Historische ontwikkeling van droogvallende mosselbanken in de Nederlandse Waddenzee*; Alterra-rapport; 876; ISSN 1566 - 7197.
- Dijkema, K.S., Tienen, G. van and J.J. van Beek, 1989: *Habitats of The Netherlands: German and Danish Wadden Sea 1:100,000*; Research Institute for Nature Management, Texel/Veth Foundation; Leiden; 24 maps.
- Ens, B.J., Smaal, A.C.S. and J. de Vlas, 2004: *The effects of shellfish fishery on the ecosystems of the Dutch Wadden Sea and Oosterschelde: Final report on the second phase of the scientific evaluation of the Dutch Shellfish policy (EVA II)*; Alterra report; 1011; ISSN 1566 - 7197; RIVO report; C056/04;RIKZ-report RKZ/2004.031.; 212 pp.
- Common Wadden Sea Secretariat, 2002c: Esbjerg Declaration: Ministerial Declaration of the Ninth Trilateral Governmental Conference on the Protection of the Wadden Sea: Esbjerg, 31 October 2001.
- Essink, K. and P. Tydeman, 1991: 'Sampling accuracy'; in: Keegan, B.F., ed., 1991b: *COST 647 Coastal Benthic Ecology: Activity Report 1988-1991*; Commission of the European Communities, Directorate-General XII for Science, Research and Development, Environment and Research Program; pp. 295 - 297.
- Essink, K., 1989: *Bemonstering en analyses von macroscopische bodemfauna van de droogvallende platen in Waddenzee, Oosteschelde en Westerschelde (littoral): Getijdewateren Standaard Voorschrift.*
- HARBASINS, 2006: *Workshop on Remote Sensing of Intertidal Flats: Presentations and Practical Exercises*; Brockmann Consult and Common Wadden Sea Secretariat; proceedings of a workshop at the Geesthachter Innovations- und Technologiezentrum (GITZ), 11 - 12 September 2006.
- HARBASINS, 2007: *Synergies in the WFD implementation in the Wadden Sea: Report from a trilateral workshop, Hamburg, 24 - 25 October 2007.*
- HELCOM, 1988: *Guidelines for the Baltic Monitoring Program for the Third Stage: Part D: Biological Determinants*; Baltic Sea Environment Proceedings; 27 D; 164 pp.
- Herlyn, M. and G. Millat, 2000: 'Decline of the intertidal blue mussel (*Mytilus edulis*) stock at the coast of Lower Saxony (Wadden Sea) and influence of mussel fishery on the development of young mussel beds'; *Hydrobiologia*; 426: pp. 203 - 210.
- Herlyn, M. and G. Millat, 2004: *Wissenschaftliche Begleituntersuchungen zur Aufbauphase des Miesmuschelmanagements im Nationalpark 'Niedersächsisches Wattenmeer'*; Lower Saxon Wadden Sea Foundation; Project No. 32/98, final report; March 2004; 226 pp.
- Herlyn, M., 2005: 'Quantitative assessment of intertidal blue mussel (*Mytilus edulis* L.) stocks: combined methods of remote sensing, field investigation and sampling'; *J. Sea Res.*; 53 (in press).
- ICES, 1994: *Report of the ICES/HELCOM Workshop on Quality Assurance of Benthic Measurements in the Baltic Sea*; ICES CM. 1994/E:10.
- ICES, 1996: *Report of the ICES/HELCOM Second Workshop on Quality Assurance of biological measurements in the Baltic Sea*; ICES CM 1996/E:1.
- Kastler, T. and H. Michaelis, 1997: 'Der Rückgang der Seegrasbestände im niedersächsischen Wattenmeer'; Ber. Forsch.-Stelle Küste Norderney; 41: pp. 119 - 139.
- Keegan, B.F., ed., 1991: *COST 647 Coastal Benthic Ecology: Activity Report 1988 - 1991*; Commission of

the European Communities, Directorate-General XII for Science, Research and Development, Environment and Research Program.
- Keegan, B.F., ed., 1991: *Space and Time Series Data in Coastal Benthic Ecology: An analytical exercise organized within the framework of COST 647 Coastal Benthic Ecology*; Commission of the European Communities, Directorate-General XII for Science, Research and Development, Environment and Research Program.
- Koppejan, H., Groeneweg A.H. and B.J.M. Jansen, 2001: *Standaardvoorschift macrophytobenthos kartiering in de Waddenzee en Oosterschelde*; Ministry of Transport and Water Management, Survey Department; rapport MD-GAE-1002; 24 June 2001; 38 pp.
- Kristensen, P. S, 1997: *Blåmuslingebestanden i det danske Vadehav august 1996*; DFU-rapport; 36 - 97; 27 pp.
- Kristensen, P.S. and N. J. Pihl., 2003: *Blåmuslingebestanden i det danske Vadehav efteråret 2002*; DFU-rapport; 122-03; 35 pp.
- Kristensen, P.S. and N.J. Pihl, 2006: *Blåmuslinge- og stillehavsøstersbestanden i det danske Vadehav efteråret 2006*: Danish Institute for Fisheries Research; Charlottenlund; DFU-rapport; 167-06; ISBN: 87-7481-027-8.
- Kristensen, P.S., 1994: *Blåmuslingebestanden i det danske Vadehav og Båmuslingefiskeri (1991 - 1993)*; DFH-rapport; 476-94; 56 pp.
- Kristensen, P.S., 1995: *Aerial surveys, biomass estimates, and elimination of the mussel population (Mytilus edulis L.), in the Danish Wadden Sea, 1991-1994*; ICES, Shellfish Committee; C.M. 1995/K: 44; 22 pp.
- Marencic, H., Bakker, J., Farke, H., Gätje, C., de Jong, F., Kellermann, A., Laursen, K., Perdersen, T.F. and J. de Vlas, 1996: *The Trilateral Monitoring and Assessment Program (TMAP) Expert Workshops 1995/1996: Wadden Sea Ecosystem 1996*; Common Wadden Sea Secretariat and Trilateral Monitoring and Assessment Group; Wilhelmshaven.
- Michaelis, H., Obert, B., Schultenkötter, I. and L. Böcker, 1995: 'Die Miesmuschelbestände der Niedersächsischen Watten (1989 - 1991)'; *Ber. Forschungsstelle Küste Norderney*; 40: pp. 55 - 71.
- Millat, G. and M. Herlyn, 1999: 'Documentation of intertidal mussel bed (*Mytilus edulis*) sites at the coast of Lower Saxony'; *Senckenbergiana marit.*; 29: pp. 83 - 93.
- Munch-Petersen, S. and P.S. Kristensen, 1987: *Assessment of the stocks of mussels in the Danish Wadden Sea*; ICES, Shellfish Committee; C.M. 1987/K:13; 21 pp.
- Munch-Petersen, S. and P.S. Kristensen, 2001: 'On the dynamics of the stocks of blue mussels (*Mytilus edulis* L.) in the Danish Wadden Sea'; in: G. Burnell, ed.: *Coastal Shellfish - A Sustainable Resource*; Hydrobiologia; 465: pp. 31 - 43.
- Munksgaard, C., 1989: *Investigations of the mussel stocks in the Danish Wadden Sea: Rept. to the Forest and Nature Agency*; Inst. of Genetics and Ecol., Aarhus University; 39 pp. (in Danish).
- Nehls, G. and H. Büttger, 2006: *Miesmuschelmonitoring 1998 - 2005 im Nationalpark Schleswig-Holsteinisches Wattenmeer*; report for the National Park Administration Schleswig-Holstein Wadden Sea; Husum.
- Nehls, G. and H. Büttger, 2007: *Spread of the Pacific Oyster Crassostrea gigas in the Wadden Sea: Causes and consequences of a successful invasion*; HARBASINS Report; CWSS, WHV.
- Nehls, G. and M. Ruth, 2004: *Miesmuschelmonitoring und Miesmuschelmanagement im Nationalpark Schleswig-Holsteinisches Wattenmeer: 1. Berichtszeitraum 1997 - 2002*; report commissioned by the National Park Administration Schleswig-Holstein Wadden Sea and the Agency for Rural Areas of the Land Schleswig-Holstein, Kiel; Hockensbüll and Kiel.
- Nehls, G., 2003: *Miesmuschelmonitoring im Nationalpark Schleswig-Holsteinisches Wattenmeer 1998-2003*; report commissioned by the National Park Administration Schleswig-Holstein Wadden Sea; Hockensbüll.
- Nehls, G., Diederichs, S., Thieltges, D. and M. Strasser, 2005: 'Perishing blue mussels and invading aliens - What are the reasons for ecological turnover in the Wadden Sea?'; WSNL; 2005(1); pp. 17 - 20.
- Nehring, S. and H. Leuchs, 1999: *Neozoa (Makrobenthos) an der deutschen Nordseeküste - Eine Übersicht*; Ber. Bundesanstalt für Gewässerkunde; 1200; 131 pp.
- OSPAR, 1997: *JAMP Eutrophication Monitoring Guidelines: Benthos (9/6/97)*; 12 pp.
- OSPAR, 1997: *JAMP Eutrophication Monitoring Guidelines: Benthos*; 11 pp.
- Rees, H.L., Heip, D., Vincx, M., and M.M. Parker, 1991: *Benthos communities: Use in monitoring point source discharges*; ICES Techniques in Marine Environmental Sciences; 16; 70 pp.
- Reise, K. et al., 2005: 'Seagrass'; in: *Wadden Sea Quality Status Report 2004*.
- Reise, K., 2001: 'Algen und Seegras: grüne Matten und Wiesen im Watten'; in: *Wattenmeermonitoring 2000*; Schriftenreihe des Nationalparks Schleswig-Holsteinisches Wattenmeer.
- Reise, K., Dankers, N. and K. Essink, 2005: 'Introduced species'; in: *Wadden Sea Quality Status Report 2004*; chap. 6.
- Rumohr, H., 1990: *Soft bottom macrofauna: Collection and treatment of samples*; ICES Techniques in Marine Environmental Sciences; 8; 18 pp.
- Rumohr, H., 1999: *Soft bottom macrofauna: Collection, treatment and quality assurance of samples (Revision of No. 8)*; ICES Techniques in Marine Environmental Sciences; 27; 19 pp.
- Saier, B., 2001: 'Direct and indirect effects of seastars *Asterias rubens* on mussel beds (*Mytilus edulis*) in the Wadden Sea'; *J. Sea Res.*; 46: pp. 29 - 42.

- Salonen, K. and J. Sarvala, 1985: 'Combination of freezing and aldehyde fixation: A superior preservation method for biomass determination of aquatic invertebrates'; *Arch. Hydrobiol.*; 103: pp. 217 - 230.
- Schanz, A. and K. Reise, 2005: *Seegras-Monitoring im Schleswig-Holsteinischen Wattenmeer: Forschungsbericht zur Bodenkartierung ausgewählter Seegraswiesen im Schleswig-Holsteinischen Wattenmeer 2003*; commissioned by the State Agency for Nature and Environment of the Land Schleswig-Holstein; Flintbek; 25 pp.
- Schmidt, H., 2001: 'Die Entwicklung der Sturmhäufigkeit in der Deutschen Bucht zwischen 1879 und 2000'; *Klimastatusbericht 2001*; German National Meteorological Service; Offenbach/Main: pp. 199 - 205.
- Scholle, J. and K. Dau, 2007: *Reference conditions of biological quality components in accordance with the EU Water Framework Directive in coastal and transitional waters in NL, D and DK*.
- Smaal, A.C., Stralen, M.R. van, Kersting, K. and N. Dankers, 2003: *De gevolgen van gecontroleerde bevissing voor bedekking en omvang van litorale mosselzaadbankeneen test vande 'Jan Louw' hypothese en van de mogelijkheden voor natuurbouw*; RIVO rapport; Netherlands Institute for Fisheries Research (RIVO); Yerseke.
- Steenbergen, J., Baars, J.M.D.D., Kesteloo, J.J., Stralen, M.R. van and T.P. Bult, 2004: *Het mosselbestand en areaal aan mosselbanken op de droogvallende platen in de Waddenzee inhet voorjaar van 2004*; RIVO report; C067/04.
- Steenbergen, J., Baars, J.M.D.D., Stralen, M.R. van, Kesteloo-Hendrikse, J.J. and T.P. Bult, 2003a: *Het mosselareaal en -be-stand op de droogvallende platen in de Waddenzee in hetvoorjaar van 2003*; RIVO report; C070/03.
- Steenbergen, J., Stralen, M.R., van, Baars, J.M.D.D. and T.P. Bult, 2003b: *Reconstructie van het areaal litorale mosselen inde Waddenzee in de periode najaar 1994-voorjaar 2002*; RIVO report; C076/03.
- Stoddard, P., 2003: 'Reconstruction of Blue Mussel Beds Using Aerial Photographs from 1989 and 2002 of the North Frisian Wadden Sea, Germany'; unpublished report; BioConsult SH; Hockensbüll.
- Stralen, M.R. van, 2002: *De ontwikkeling van mosselbestandenop droogvallende platen en in het sublitoraal van de Waddenzee vanaf 1955, een reconstructie op basis van gegevensuit de mosselzaadvisserij*; MarinX-rapport; 2001(10); marinX; Scharendijke; 57 pp.
- TMAG, 2000: *Technical Report on Blue Mussels, Cockles*, Sabellaria *Reefs and* Zostera; March 2000; Document TWG 00/1/8d WSP Projects 15/16 Benthos Report; 36 pp.
- TMAP *Manual*, update 2001: Chapter II-5.5 Blue Mussels; 6 pp.
- TMAP Ad Hoc Expert Group Seagrass Monitoring, 2006: *Draft TMAP Guidelines*.
- Thieltges, D.W., 2005: 'Impact of an invader: epizootic American slipper limpet *Crepidula fornicata* reduces survival and growth in European mussels'; *Mar. Ecol. Prog. Ser.*; 286: pp. 13 - 19.
- Thieltges, D.W., Strasser, M. and K. Reise, 2003: 'The American slipper limpet *Crepidula fornicata* (L.) in the northern Wadden Sea 70 years after its introduction'; *Helgol. Mar. Res.*; 57: pp. 27 - 33.
- Wehrmann, A., Markert, A., May, P., Schieck, P. and A. Schmidt, 2006: *Gefährdungspotential der eulitoralen Miesmuschelbänke im Niedersächsischen Wattenmeer durch die Bioinvasion der Pazifischen Auster* Crassostrea gigas; final report on Lower Saxon Wadden Sea Foundation Project 7/02.

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

7.2 Working steps required

The HD assessment matrix for mudflats and sandflats not covered by seawater at low tide on the BfN homepage must be replaced with the harmonised version referred to in these monitoring specifications.

Since the assessment has to be carried out using the assessment procedures for the various components, such as macrophytes, hydrology, etc., these assessment procedures must be adjusted.

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) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(3) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(4) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

(5) 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.

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

Monitoring Specifications

Date: 2010-06-14

HD Habitat Type 1150
Coastal Lagoons

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 1150 - Coastal Lagoons

1.2 Definition

1.2.1 EU definition (Interpretation Manual 2007)

"Lagoons are expanses of shallow coastal salt water, of varying salinity and water volume, wholly or partially separated from the sea by sand banks or shingle, or, less frequently, by rocks. Salinity may vary from brackish water to hypersalinity depending on rainfall, evaporation and through the addition of fresh seawater from storms, temporary flooding of the sea in winter or tidal exchange. With or without vegetation from *Ruppietea maritimae*, *Potametea*, *Zosteretea* or *Charetea* (CORINE 91: 23.21 or 23.22).

- Flads and gloes, considered a Baltic variety of lagoons, are small, usually shallow, more or less delimited water bodies still connected to the sea or have been cut off from the sea very recently by land upheaval. Characterised by well-developed reedbeds and luxuriant submerged vegetation and having several morphological and botanical development stages in the process whereby sea becomes land.
- Salt basins and salt ponds may also be considered as lagoons, providing they had their origin on a transformed natural old lagoon or on a saltmarsh, and are characterised by a minor impact from exploitation."

1.2.2 National definition

"Lagoons are expanses of coastal water wholly or partially separated from the sea that are salty/brackish or display a higher degree of freshwater influence (coastal lakes, lagoons) and are at least temporarily influenced by salt water. Often, they are separated from the sea only by narrow beach ridges, less frequently by shingle banks or bars of rock. During winter storm tides, they are affected by influxes of seawater. Lagoons are a characteristic element of equilibrium coasts. The salinity and water volume in lagoons are highly variable."

1.2.3 Mapping procedure

Shallow, dynamically changing coastal waters that are created as a result of natural processes, with alternating salt water and fresh water influences; wholly or partially separated from the sea by sandbanks, beaches or salt meadows; only reached by sea water when storm surges occur, but not extensively inundated or only supplied with additional water via tidal channels at MHT. Their substrates are not completely exposed at low water (subareas exposed during ebb tides are to be allocated to Habitat Type 1140, where applicable). This habitat type also includes temporary waters, provided they contain water for at least several weeks without interruption during the vegetation period. Completely desalinated stagnant waters without any influence from sea water are not to be included in 1150 sites.

In the Baltic Sea region, there are extensive and sometimes richly structured Bodden and sections of Bodden that may be allocated to Habitat Type 1150 (coastal lagoons) on account of their character. The following criteria must be satisfied for this to apply:

- Largely or clearly separated from the sea
- No defining inflow of fresh water from landward feeder streams

The boundaries of this habitat type should be drawn along the mean waterline. It therefore encompasses the water body and the shorelines with their reedbeds, tall herbaceous communities and pioneer communities. Adjoining terrestrial areas do not belong to this habitat type, even if they are occasionally inundated.

Ponds or small anthropogenic waters (e.g. bomb craters, pits dug for dyke building materials, salt pans) are not surveyed as coastal lagoons. Waters to be classified as Habitat Type 1150 should usually be at least 100 - 200 m² in area.

Unlike dyked and/or technically drained primary sites (e.g., in Schleswig-Holstein, Wesseker See, Lister Koog), recently created artificial brackish coastal waters and retention polders (e.g. sluice ponds, waters in dyked former tidal and wind flats or salt meadow areas, flooded gravel pits; e.g., in Schleswig-Holstein, Rantumbecken, Beltringharder Koog, Kronenloch/Wöhrdener Loch) do not belong to this habitat type.

Delimitation from other habitat types:

1130 Estuaries: No river mouth areas, no determining influence from inflows of fresh water.

1.3 Competent authority/ies

Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	NPV SH, LLUR

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all the habitats listed in Annex I HD: "Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types." Where applicable, sites outside HD areas are also to be covered.

Article 17 [3]

Comments

Article 17 governs the performance of the reporting obligations. "Every six years […] Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning […] the main results of the surveillance referred to in Article 11."

DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

WFD [4]

Article 8 in conjunction with Article 6 and Annex IV

Comments

"Member States shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status within each river basin district."

"[F]or protected areas the above programmes shall be supplemented by those specifications contained in Community legislation under which the individual protected areas have been established." (Third indent of Article 8(1))

According to Article 6 in conjunction with Annex IV, the protected areas also include NATURA 2000 areas designated for the conservation of habitats and species, where the maintenance or improvement of water status is an important factor in their protection.

TMAP [5]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the instrument that has enabled the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined (cf. CWSS and TMAG, 2004).

2.2 Environmental targets

HD

Maintenance of Habitat Type 1150 with a favourable conservation status or, where applicable, its restoration to such a status:

- Coastal lagoons created and influenced by natural processes, temporarily connected to the neritic zone and with natural habitat dynamics in beach/salt meadow and dune complexes marked by differing levels of halinity, mostly influenced by brackish water.
- Species composition typical of the relevant biotopes with stable populations of the characteristic species
- Stable or increasing range and overall area
- No or minor impairments, above all due to recreational activities, inputs of nutrients and construction measures undertaken for the purposes of coastal protection

TMAP

No specific targets have been defined for coastal lagoons (*Wadden Sea Quality Status Report 2004*).

2.3 Threats

- Restriction of natural dynamics due to coastal protection measures
- Potentially localised over-intensive grazing
- Land lost to construction measures

2.4 Spatial allocation

Comments on BD - coastal waters

This habitat type is covered indirectly by the Birds Directive if it is a habitat for bird species crucial to the value of an EU bird protection area.

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN, BEHRENS et al., 2009).

Under the concept, a total census is to be carried out for this habitat type on account of the small number of sites.

The coastal lagoon sites that have been delimited are based on physical regional/geographical and geomorphological units (islands, sections of foreshore). This means every island or section of foreshore on which the habitat type actually occurs is regarded as a site.

3.1 Description of monitoring network

North Sea

On the North Sea coast, [still to be specified] sites are located in Schleswig-Holstein and eight sites in Lower Saxony. This habitat type is not found in the Hamburg Wadden Sea.

Baltic Sea

On the Baltic Sea, [still to be specified] sites are located on the Schleswig-Holstein Coast and [still to be specified] sites in Mecklenburg-Vorpommern.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Coastal Lagoons (1150)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Characteristic structures, functions and species

The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type.

Monitoring concept:

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample areas or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of the monitoring network

An area-wide survey of habitat types is carried out in the course of the six-year reporting cycle in order to assess their range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder.

Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level. In the case of marine habitat types and estuaries, substantive, structural synergy effects between the surveying of habitat types and the monitoring required by the WFD are to be secured.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN, BEHRENS et al., 2009). Where a total census is to be carried out, each site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and the survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels.

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. In the case of small coastal lagoons, it is also possible for full-coverage site surveying to be implemented. The 'structured walks' procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type assessed for the relevant biogeographical region, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN, BEHRENS et al., 2009).

Parameter:

- Area of the 1150 Habitat Type
- Biotope types according to the mapping keys issued by the Länder; additionally, on the North Sea, TMAP vegetation types
- Flowering plant species, algae species as well, if possible
- Impairment and threat factors
- Impairments
- Manifestation of the biotope complex (representation of all characteristic vegetation types/successional stages)
- Range and area
- Selected characteristic animal species (e.g. breeding and migratory birds) as well, if possible, depending on the size and structure of the coastal lagoons
- Typical spectrum of structures, species and vegetation types
- Water and vegetation structure

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Type - Coastal Lagoons (1150)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the 'Pinneberg Schema' (Updated: 27 May 2008)

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17 (further to which, the standards specified in European Commission, DG Environment, 2006 are applied). The typical species listed in the matrices under the assessment criterion 'Completeness of the typical species inventory' are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventory of typical species for this habitat type represents one of the essential criteria that have to be assessed to ascertain its conservation status and therefore also to comply with the reporting obligations imposed by Article 17 HD. Nevertheless, no separate species monitoring needs to be carried out on individual characteristic or typical species, while they are to be assessed exclusively as indicators of the conservation status of the habitat type in question. It is necessary for population sizes or levels of coverage to be quantified at least roughly in the study areas, since increases and decreases in the abundances of typical species (and also of species indicative of disruption) are important parameters.

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level are used to supplement the assessment of the unique features of this habitat type that are specific to the physical region/Land in question.

Assessment matrix (PDF)

5 Quality assurance

- Quality Assurance Panel

Comments

The participating institutions are striving to build up uniform QA standards.

5.1 Monitoring institutions

- LLUR
- LUNG
- NLWKN
- NLPV NI
- LKN-SH

5.2 Guidance documents

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v., ed., 2008: 'Hinweise zur Kartierung und Bewertung der FFH-Lebensraumtypen in Niedersachsen, mit Anlagen'; duplicated manuscript
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes & Guidelines: Final Draft.*
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats.*
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis "FFH-Berichtspflichten Meere und Küsten": Stand: 27.05.2008.*
- Sachteleben, J., Behrens M. et al., 2009: Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: Oktober 2009); commissioned by the Federal Agency for Nature Conservation.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Juli 2007.*
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007.*
- State Authority for Environment, Nature Protection and Geology of the Land Mecklenburg-Vorpommern, 2010: *Anleitung für die Kartierung von Biotoptypen und FFH-Lebensraumtypen in Mecklenburg-Vorpommern: 2. vollst. überarb. Aufl., Stand: März 2010.*
- TMAP Manual

5.3 Standards

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 1150 must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

- Specification and surveying of study areas or transects
- Data management: GIS and Land databases, updating of Standard Data Forms
- Evaluation with a view to management plans and/or necessary measures

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

(4) 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.

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

Monitoring Specifications

Date: 2010-05-12

HD Habitat Type 1210 Annual Vegetation of Drift Lines

MEERESUMWELT

BUND-LÄNDER MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 1210 - Annual Vegetation of Drift Lines

1.2 Definition

1.2.1 EU-Definition

Annual vegetation of drift lines

Formations of annuals or representatives of annuals and perennials, occupying accumulations of drift material and gravel rich in nitrogenous organic matter (*Cakiletea maritimae* p.).

1.2.2 National definition

Young drift lines colonised by annuals with sea rocket communities (*Cakiletea maritimae*) on organic drift material deposited at high tide and gravel enriched with organic material. Frequently overtopped with sand on sandy beaches; also found on shingle beaches. For the most part, these are narrow, linear habitats, although extensive formations occur more rarely on sand banks.

1.2.3 Mapping procedure

On the North Sea, annual vegetation of drift lines is widespread on sandy beaches along the German mainland coast and islands, provided they are not used too heavily for bathing. On the Baltic Sea coast, annual vegetation of drift lines occurs to a lesser extent, but is widespread. Annual vegetation of drift lines on sand is much more frequent than the rarer formation on shingle beaches. The occurrence of corresponding vegetation is a crucial precondition for the allocation of a section of beach to this habitat type.

The vegetation is made up overwhelmingly of annual species and is often gappy (depending on the intensity with which the beach is used), while its spatial distribution may change to a greater or lesser degree after every high tide. For this reason, vegetation-free areas of the drift line are also to be incorporated into the area delimited if corresponding plant species occur at least now and then in the section examined. Drift lines are mostly linear formations, although extensive formations are also found more rarely in sandflat areas. On account of the annual variations in the location of the drift lines above the waterline, the whole beach or sandflat between the line of the mean water level in the Baltic Sea or mean high water spring tides in the North Sea and, landward, dunes or the occurrence of perennial vegetation is incorporated into the area delimited.

Embryonic shifting dunes may host drift line species, which are treated separately as a distinct habitat type (2110) if *Elymus farctus* is dominant and the dunes rise distinctly, as a rule at least 30 cm, above the surrounding beach.

Delimitation from other habitat types:

1220: Vegetation overwhelmingly made up of annual species.

1230: Position below the foot of the sea cliff slope.

2110: Largely flat relief or dunes rising <0.3 m above beach level.

1.3 Competent authority/ies

Mecklenburg-Vorpommern:	LUNG
Schleswig-Holstein:	LKN-SH, LLUR

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

"Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species."

This provision is not limited to NATURA 2000 areas, while habitat types outside Habitats Directive areas are also to be included in the monitoring as appropriate.

Article 17 [3]

Comments

"Every six years […], Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include […] the main results of the surveillance referred to in Article 11."

Article 17 governs the performance of the reporting obligations in general terms. DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

WFD [4]

Article 8 in conjunction with Article 6 and Annex IV

Comments

"Member States shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status…"

"[F]or protected areas the above programmes shall be supplemented by those specifications contained in Community legislation under which the individual protected areas have been established." (Third indent of Article 8(1))

Under Article 6 in conjunction with Annex IV, the protected areas also include NATURA 2000 sites designated for the protection of habitats and species, provided the maintenance or improvement of water status is an important factor in their protection.

TMAP [5]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the most important instrument enabling the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined (cf. CWSS and TMAG, 2004).

2.2 Environmental targets

HD

Maintenance of Habitat Type 1210 with a favourable conservation status or, where applicable, its restoration to such a status:

- Stable or increasing range and overall area
- Dynamics of the annual vegetation of drift lines involved in the formation of biotopes
- Largely natural sediment, current and wave conditions
- Species composition typical of the relevant biotopes with stable populations of the characteristic species
- No or minor impairments, above all due to coastal protection, beach clearance and tourism

TMAP

The following targets have been defined for beaches (Wadden Sea Quality Status Report 2004):

- Increased natural dynamics
- Favourable conditions for migrating and breeding birds

2.3 Threats

- Restriction of natural dynamics as a result of coastal protection measures
- Beach clearance, including mechanical changes (trampling, recreational use)

2.4 Spatial allocation

Comments on the BD - coastal waters

This habitat type is covered indirectly by the Birds Directive if it is a habitat for bird species crucial to the value of an EU bird protection area.

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN and BEHRENS, 2009).

On account of the small number of large-scale sites that have been defined, a total census is to be carried out for this habitat type under the concept. The sites that have been delimited are geographically/topographically discrete spaces, as a rule islands or parts of islands and/or sections of coast oriented towards adjacent seaward water bodies (subject to the WFD).

North Sea

On the North Sea coast, there are eight sites in Schleswig-Holstein and two sites in Hamburg.

Baltic Sea

On the Baltic Sea, there are 19 sites on the Schleswig-Holstein coast and 13 sites in Mecklenburg-Vorpommern.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Annual Vegetation of Drift Lines (1210)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Typical species spectrum and ecological structural diversity

The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type.

Monitoring concept:

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample plots or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of the monitoring network

An area-wide survey of the habitat type is carried out in the course of the six-year reporting cycle in order to assess its range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder. Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN and BEHRENS, 2009). Where a total census is to be carried out, each site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels. As a rule, the individual sites should not be less than approx. 100 m in length; the survey areas specified reflect the form and size of the sites delimited in the course of the area-wide mapping.

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. Where appropriate, it is also possible for full-coverage site

surveying to be implemented at small sites along the mainland coasts on the North Sea and Baltic Sea. The "structured walks" procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type for the relevant biogeographical region assessed, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN and BEHRENS, 2009).

Parameter:

- Area of the habitat type
- Biotope types according to the mapping keys issued by the Länder; additionally, on the North Sea, TMAP vegetation types
- Coastal protection measures
- Mechanical changes, clearance
- Recreational uses/facilities
- Species spectrum
- Structures, processes and zoning typical of the location

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Type - Annual Vegetation of Drift Lines (1210)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17.

The typical species listed in the matrices under the assessment criterion "Completeness of the typical species inventory" are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. Given that "typical species" may occur in various habitat types, they are not to be equated with "characteristic species".

The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventories of typical species for the habitat types represent one of the main ecological assets that have to be assessed in order to comply with the obligations placed on Member States with regard to reporting to the EU. Nevertheless, although they are to be assessed as indicators of the conservation status of the habitat type in question, no separate species monitoring needs to be carried out on individual typical species. Information on the presence of the species is sufficient for this purpose. Optionally, abundances, trends, etc. may be obtained to support the assessment.

The assessment of the manifestations of the habitat type specific to the physical region in question is used to supplement the habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level.

On the assessment of beaches and sea cliffs (Habitat Types 1210 - 1230):

The habitat types for beaches and sea cliffs are highly dynamic habitats, the boundaries and manifestations of which are subject to constant change. Active coastal dynamics and their manifestations are therefore reflected, in particular, in the assessment parameters for habitat structures and impairments.

The diversity of natural substrates typical of the habitat and, in particular, processes that have identifiable effects on sea cliffs (rock falls, solifluction, etc.) are assessed as expressions of unrestricted coastal dynamics. Biotic parameters are subordinated.

The assessment is carried out by meaning the subcriteria.

The proportion of all the plant species potentially present at a location that actually occur is drawn on for the assessment.

In addition to this, furthermore, the number or occurrence of typical animal species may be incorporated into the assessment as a subcriterion, provided studies of suitable species groups are available.

In particular, mechanical and structural changes in the habitat type sites or the surrounding areas that influence them, inputs of substances and damage caused by recreational use are assessed as impairments. As a matter of principle, what is decisive is the subcriterion that has been assessed least favourably in each case, i.e. the subcriterion that constitutes the greatest impairment.

Assessment matrix

5 Quality assurance

- Quality Assurance Panel

5.1 Monitoring institutions

- LLUR
- LUNG
- LKN-SH

5.2 Guidance documents

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes & Guidelines: Final Draft.*
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats.*
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis "FFH-Berichtspflichten Meere und Küsten": Stand: 27.05.2008.*
- Sachteleben, J., Behrens, M. et al., 2009: *Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: November 2008)*; commissioned by the Federal Agency for Nature Conservation.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Juli 2007.*
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007.*
- State Authority for Environment, Nature Protection and Geology of the Land Mecklenburg-Vorpommern, 2010: *Anleitung für die Kartierung von Biotoptypen und FFH-Lebensraumtypen in Mecklenburg-Vorpommern: 2. vollst. überarb. Aufl., Stand: März 2010.*
- TMAP Manual

5.3 Standards

- To be specified by the Quality Assurance Panel at the UBA as necessary.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 1210 must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

- Specification and surveying of study areas or transects
- Data management: GIS and Land databases, updating of Standard Data Forms
- Evaluation with a view to management plans and/or necessary measures

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

(4) 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.

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

Monitoring Specifications

Date: 2010-05-14

HD Habitat Type 1220 Perennial Vegetation of Stony Banks

MEERESUMWELT

BUND-LÄNDER MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 1220 - Perennial Vegetation of Stony Banks

1.2 Definition

1.2.1 EU-definition

Perennial vegetation of stony banks

Perennial vegetation of the upper beaches of great shingle banks, formed by *Crambe maritima*, *Honkenya peploides* and other perennial species. A wide range of vegetation types may be found on large shingle structures inland of the upper beach. On more mature, stable shingle coastal forms of grassland, heath and scrub vegetation may develop. Some areas of unusual vegetation dominated by lichens and bryophytes are found on more mature shingle.

1.2.2 National definition

Shingle and gravel banks, the upper areas of which feature perennial, halotolerant and nitrophile vegetation (*Cakiletea maritimae* p.p.). Also includes the sea spray-influenced lower slopes of sea cliffs with corresponding vegetation.

1.2.3 Mapping procedure

This habitat type encompasses gravel, boulder and shingle beaches, mostly below sea cliffs (moraine, chalk or sandstone cliffs), with perennial halotolerant and nitrophile vegetation such as sea kale and sea beet. Smaller vegetation-free areas, and small saline waters and coastal lagoons (< 500 m² in area) may be incorporated into the area delimited.

Gravel and shingle beaches with perennial vegetation are linked to sea cliffs. For instance, the only sites on the German North Sea coast are found on Heligoland and Sylt. On the Baltic Sea coast, this habitat type occurs above all where there are beach ridges at exposed beaches (e.g. the Greifswald Bodden) and sea cliffs (e.g. eastern Rügen, Hiddensee, Usedom, Geltinger Birk). On coastal moraine cliffs, this habitat type often occurs in intimate mosaics with annual vegetation of drift lines.

Delimitation from other habitat types:

1150: Coastal lagoons <500 m² in beach ridge systems.

1210: Vegetation overwhelmingly made up of perennial species.

1230: Position on or below the foot of the sea cliff slope.

1.3 Competent authority/ies

Mecklenburg-Vorpommern:	LUNG
Schleswig-Holstein:	LKN-SH, LLUR

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

"Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species."

This provision is not limited to NATURA 2000 areas, while habitat types outside Habitats Directive areas are also to be included in the monitoring.

Article 17 [3]

Comments

"Every six years […], Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include […] the main results of the surveillance referred to in Article 11."

Article 17 governs the performance of the reporting obligations in general terms. DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

WFD [4]

Article 8 in conjunction with Article 6 and Annex IV

Comments

"Member States shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status…"

"[F]or protected areas the above programmes shall be supplemented by those specifications contained in Community legislation under which the individual protected areas have been established." (Third indent of Article 8(1))

Under Article 6 in conjunction with Annex IV, the protected areas also include NATURA 2000 sites designated for the protection of habitats and species, provided the maintenance or improvement of water status is an important factor in their protection.

TMAP [5]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the most important instrument enabling the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined (cf. CWSS and TMAG, 2004).

2.2 Environmental targets

HD

Maintenance of Habitat Type 1220 with a favourable conservation status or, where applicable, its restoration to such a status:

- Stable or increasing range and overall area
- Substrate diversity and structures involved in the formation of biotopes
- Biotope-typical species composition with stable populations of the characteristic species
- No or minor impairments, above all due to coastal protection, agricultural use and tourism

TMAP

The following targets have been defined for beaches (*Wadden Sea Quality Status Report 2004*):

- Increased natural dynamics
- Favourable conditions for migrating and breeding birds

2.3 Threats

- Restriction of natural dynamics by coastal protection measures
- Mechanical changes (trampling, recreational use)

2.4 Spatial allocation

Comments on BD - coastal waters

This habitat type is covered indirectly by the Birds Directive if it is a habitat for bird species crucial to the value of an EU bird protection area.

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN and BEHRENS, 2009).

On account of the small number of large-scale sites that have been defined, a total census is to be carried out for this habitat type under the concept. The sites that have been delimited are geographically/topographically discrete spaces, as a rule islands or parts of islands and/or sections of coast oriented towards adjacent seaward water bodies (subject to the WFD).

North Sea

On the North Sea coast, there are ten sites in Schleswig-Holstein.

Baltic Sea

On the Baltic Sea coast, there are 25 sites in Schleswig-Holstein, and nine sites in Mecklenburg-Vorpommern.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Perennial Vegetation of Stony Banks (1220)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Typical species spectrum and ecological structural diversity

The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type.

Monitoring concept

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample areas or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of the monitoring network

An area-wide survey of the habitat type is carried out in the course of the six-year reporting cycle in order to assess its range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder. Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN and BEHRENS, 2009). Where a total census is to be carried out, each site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels. As a rule, the individual sites should not be less than approx. 1,000 m² in area; the survey areas specified reflect the form and size of the sites delimited in the course of the area-wide mapping. Exception: smaller sites of particular significance and representativity (see selection criteria).

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. Where appropriate, it is also possible for full-coverage site

surveying to be implemented at small sites along the mainland coasts on the North Sea and Baltic Sea. The "structured walks" procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type for the relevant biogeographical region assessed, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN and BEHRENS, 2009).

Parameter:

- Agricultural use
- Area of the habitat type
- Biotope types according to the mapping keys issued by the Länder; additionally, on the North Sea, TMAP vegetation types
- Coastal protection measures
- Recreational uses/facilities
- Species spectrum
- Structures, processes and zoning typical of the location

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Type - Surveying and Evaluation of Perennial Vegetation of Stony Banks (1220)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the 'Pinneberg Schema' (Updated: 27 May 2008)

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17.

The typical species listed in the matrices under the assessment criterion "Completeness of the typical species inventory" are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. Given that "typical species" may occur in various habitat types, they are not to be equated with "characteristic species".

The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventories of typical species for the habitat types represent one of the main ecological assets that have to be assessed in order to comply with the obligations placed on Member States with regard to reporting to the EU. Nevertheless, although they are to be assessed as indicators of the conservation status of the habitat type in question, no separate species monitoring needs to be carried out on individual typical species. Information on the presence of the species is sufficient for this purpose. Optionally, abundances, trends, etc. may be obtained to support the assessment.

The assessment of the manifestations of the habitat type specific to the physical region in question is used to supplement the habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level.

<u>On the assessment of beaches and sea cliffs (Habitat Types 1210 - 1230):</u>

The habitat types for beaches and sea cliffs are highly dynamic habitats, the boundaries and manifestations of which are subject to constant change. Active coastal dynamics and their manifestations are therefore reflected, in particular, in the assessment parameters for habitat structures and impairments.

The diversity of natural substrates typical of the location and, in particular, processes that have identifiable effects on sea cliffs (rock falls, solifluction, Et cetera - and so on) are assessed as expressions of unrestricted coastal dynamics. Biotic parameters are subordinated.

The assessment is carried out by meaning the subcriteria.

The proportion of all the plant species potentially present at a location that actually occur is drawn on for the assessment.

In addition to this, furthermore, the number or occurrence of typical animal species may be incorporated into the assessment as a subcriterion, provided studies of suitable species groups are available.

In particular, mechanical and structural changes in the habitat type sites or the surrounding areas that influence them, inputs of substances and damage caused by recreational use are assessed as impairments. As a matter of principle, what is decisive is the subcriterion that has been assessed least favourably in each case, i.e. the subcriterion that constitutes the greatest impairment.

Assessment matrix

5 Quality assurance

- Quality Assurance Panel

5.1 Monitoring institutions

- LLUR
- LUNG
- LKN-SH

5.2 Guidance documents

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes & Guidelines: Final Draft.*
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats.*
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis "FFH-Berichtspflichten Meere und Küsten": Stand: 27.05.2008.*
- Sachteleben, J., Behrens, M. et al., 2009: *Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: November 2008)*; commissioned by the Federal Agency for Nature Conservation.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Juli 2007.*
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007.*
- State Authority for Environment, Nature Protection and Geology of the Land Mecklenburg-Vorpommern, 2010: *Anleitung für die Kartierung von Biotoptypen und FFH-Lebensraumtypen in Mecklenburg-Vorpommern: 2. vollst. überarb. Aufl., Stand: März 2010.*
- TMAP Manual

5.3 Standards

- To be specified by the Quality Assurance Panel at the UBA as necessary.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 1220 must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

- Specification and surveying of study areas or transects
- Data management: GIS and Land databases, updating of Standard Data Forms
- Evaluation with a view to management plans and/or necessary measures

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

(4) 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.

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

Monitoring Specifications

Date: 2010-05-03

HD Habitat Type 1230 Vegetated Sea Cliffs of the Atlantic and Baltic Coasts

MEERESUMWELT

BUND-LÄNDER MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 1230 - Vegetated Sea Cliffs of the Atlantic and Baltic Coasts

1.2 Definition

1.2.1 EU definition

Vegetated sea cliffs of the Atlantic and Baltic coasts

Vegetated cliffs exhibit a complex pattern of variation reflecting the degree of maritime exposure, geology and geomorphology, biogeographical provenance and pattern of human management. Typically, on the most exposed cliffs there is a zonation from crevice and ledge communities of the steepest slopes beside the sea (*Crithmo-Armerietealia*, Géhu 1964) through to closed maritime grasslands on upper cliff slopes, cliff tops and cliff ledges where there is deeper accumulation of soils (*Silenion maritimae*, Malloch 1973). Further inland and on more sheltered cliffs, these grade into a complex assemblage of maritime and paramaritime types of heath, calcareous grassland, acid grassland, therophyte, tall herb, scrub and wind-pruned woodland vegetation, each enriched by floristic elements characteristic of coastal habitats. On soft coasts with much active movement, complex assemblages of maritime and non-maritime vegetation occur.

1.2.2 National definition

Complexes of sea cliffs on Atlantic, North Sea and Baltic Sea coasts where there is at least partial cover with higher plants. Since these are dynamic habitats, the total cliff complex, including an at least 100-m-wide conservation strip above the cliff edge, is to be included. On the Baltic Sea, this habitat type is found in the form of chalk sea cliffs and coastal moraine cliffs; on the North Sea, it is essentially represented by the sandstone cliffs of Heligoland.
(Updated: 29 November 2006)

1.2.3 Mapping procedure

The seaward boundary is the foot of the cliff/slope, the course of which determines the zone influenced by deposition on the beach beneath the cliff and may, in certain circumstances, extend as far as the coastline (Baltic Sea) or the MHT line (North Sea). Clear indications include fresh boulder belts, deposited and washed sand and clay, fallen trees and root plates, and remains of cliff vegetation from soil clods that have slipped down (e.g. coltsfoot communities). Areas previously covered by heaps of slip debris also belong to this habitat type where the heaps have been almost completely denuded, e.g. by high tides. It is sufficient for the occurrence of corresponding structures to have been promptly documented, e.g. in the course of an earlier mapping trip during habitat type monitoring. Cliff springs that run across the beach are included.

Beaches on which annual or perennial vegetation or dune formation may become established and that can therefore be mapped as separate units, e.g. as annual vegetation of drift lines (1210), perennial vegetation of stony banks (1220), Atlantic salt meadow (1330) or embryonic shifting dunes (2110), are among the areas that do not fall within this habitat type.

The lower slopes of sea cliffs on the island of Heligoland that are covered exclusively by algae and extend as far as the coastline are included in this habitat type.

Where eroding sea cliffs are set back from the sea and only very rarely subject to marine influences, the seaward boundary usually runs directly along the foot of the slope.

Landwards, the boundary of the habitat type runs:

- Along the boundary to the next land use, if arable land and comparable intensively used land, settlements and installations permissible under the Land Nature Conservation Act adjoin it in the strip of land designated for the protection of water and recreational utility; an at least 2-m-wide strip above the last edge of the slope is included;
- Along landward boundaries to other habitat types located above the sea cliff (e.g. European dry heaths (4030), beech forests (9110 - 9130)); if this boundary extends considerably further than 100 m inland, only recognisably coastally influenced parts of the area beyond this are included;
- Along landward boundaries to other biotope types located above the sea cliff (e.g. coastal grasslands, scrub, wetlands, dry herbaceous communities, mixed woodland, areas characterised by successional processes), areas mapped as biotopes or areas to be developed as biotopes (e.g.. land owned by nature conservation foundations or public bodies, compensatory areas); if these extend considerably further than 100 m inland, only recognisably coastally influenced parts of the area beyond this are included.

The criteria for categorisation as 'coastally influenced' include:

- Significant occurrence of species or subspecies of flora (rarely, it may also be possible for fauna to be verified) that are generally indicative of the influence of salt (including airborne salt) or that experience suggests show an affinity with the particular microclimate in the vicinity of the coast (e.g. *Festuca rubra* ssp. *litoralis*, *Tripleurospermum maritimum* or particularly frost-susceptible species).
- Growth forms indicative of the influence of salt or the marine climate (in particular, sea winds).
- Functional ecological relationships, e.g. biotope complexes that evidently belong together, zonation, penetration.

Habitat Type 1230 is conceived as a complex, which is why all other occurring habitat types listed in Annex I are also to be mapped and assessed as separate units in each case. E.g., the following habitat types may occur on or above the cliff: coastal dunes (2120, 2130, 2140, etc.), European dry heaths (4030), semi-natural dry grasslands and scrubland facies (6210), species-rich Nardus grassland (6230) and petrifying springs with tufa formation (7220). The forest and woodland habitat types 9110, 9120, 9130, 9160, 9180 and 9190 are also surveyed as separate units and as components of the complex, provided they are still subject to maritime influences. Phenomena that are particularly characteristic of such a situation include the occurrence of wind pruning and sweep of the bole on beeches. See above for further criteria. Scrub and pioneer stands are allocated to the corresponding habitat types, provided these are spatially related as successional stages and are identifiable as such in phytosociological terms.

Delimitation from other habitat types:

1110, 1140, 1160, 1170: No overlap, as these habitat types extend (approximately) to the coastline (Baltic Sea) or MHT line (North Sea; 1110: MLT line) at most. The wave-cut platforms around Heligoland are reef (1170) and directly adjoin Habitat Type 1230 at the MHT line.

1210, 1220: Absence of corresponding structures (drift lines; beach ridges, including beach ridges with cliff material worn down by attrition, large beach ridge landscapes in front of fossil cliffs, etc.) and vegetation, absence of clearly identifiable direct domination by erosion and denudation processes on the cliff.

1330: Halophytes occurring in narrow strips, lines or small patches (mostly individual species and not salt meadow vegetation in a narrower sense) are sometimes characteristic of areas on the lower slopes and at the foot of the cliff that have been dormant for a somewhat longer period. These also include, in particular, small populations with *Bolboschoenus maritimus* (sea clubrush), *Phragmites australis* (common reed) and some of the characteristic plant species. Coherent extensive and small sites usually do not belong to the complex, but to 1330, or are to be surveyed as part of 1210 or 1220 (e.g. this is more frequently the case on the Schlei).

6430: Hydrophilous tall herb communities that accompany watercourse banks are limited to running waters, so overlaps could occur on streams and in V-shaped valleys within the complex. Just like woodland margin formations, they often cannot be distinguished from other Habitat Type 1230 tall herb communities and are therefore, as a matter of principle, only surveyed as separate units at sites that are typical in area.

7220: Petrifying springs with tufa formation are identifiable thanks to vegetation associated with tufa formation and are to be delimited by reference to the associated spring-head.

9110 - 9190: All extensive manifestations to be characterised as forests at coherent sites that, as a rule, are >1,000 m² in area (ravine forests are frequently smaller) and in which species characteristic of the forest habitat type are able to live, at least for periods, are also surveyed as separate units in each case.

1.3 Competent authority/ies

Mecklenburg-Vorpommern:	STAUN, LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

"Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species."

This provision is not limited to NATURA 2000 areas, while habitat types outside Habitats Directive areas are also to be included in the monitoring as appropriate

Article 17 [3]

Comments

"Every six years […], Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include […] the main results of the surveillance referred to in Article 11."

Article 17 governs the performance of the reporting obligations in general terms. DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

WFD [4]

Article 8 in conjunction with Article 6 and Annex IV

Comments

"Member States shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status…"

"[F]or protected areas the above programmes shall be supplemented by those specifications contained in Community legislation under which the individual protected areas have been established." (Third indent of Article 8(1))

Under Article 6 in conjunction with Annex IV, the protected areas also include NATURA 2000 sites designated for the protection of habitats and species, provided the maintenance or improvement of water status is an important factor in their protection.

2.2 Environmental targets

HD

Maintenance of Habitat Type 1230 with a favourable conservation status or, where applicable, its restoration to such a status by means of the conservation, restoration and, where applicable, development of:

- Dynamics involved in the formation of biotopes at sea cliffs with typical structures
- Unbuilt-up and unstabilised areas above and below sea cliffs to ensure natural erosion and development
- Largely natural sediment, current and wave conditions off sea cliffs
- Typical structures and functions (see assessment matrix)

2.3 Threats

Current impairments according to the information given in the national report submitted under Article 17 of the Habitats Directive for the reporting period 2001 - 2006 (BMU, 2008):

- Trampling
- Coastal protection measures
- Erosion

2.4 Spatial allocation

As the definition indicates, sea cliffs are located only on the margins of coastal waters. The conservation status of sea cliffs is dependent, in particular, on current conditions, high tides/storm surges and similar phenomena.

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN and BEHRENS, 2009).

Under the concept, a total census is to be carried out for this habitat type.

North Sea

On the North Sea, the sites are limited to Schleswig-Holstein (Heligoland, Geest islands) (seven sites).

Baltic Sea

On the Baltic Sea coast, the sites are several times larger and are more widely distributed. 24 sites have been delimited in Schleswig-Holstein; 20 sites have been delimited in Mecklenburg-Vorpommern.

The sites that have been delimited are geographically/topographically discrete areas, as a rule islands or parts of islands and/or sections of coast oriented towards adjacent seaward water bodies (subject to the WFD).

On the specification of the monitoring network, see section 3.2.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Sea Cliffs (1230)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Typical species spectrum and ecological structural diversity

The sampling strategy is to be specified separately for the individual types of sea cliff. Representative sites may be selected from among sea cliffs that display similar biotic and abiotic conditions. The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type, which is usually composed of various biotopes.

Use should be made of basic monitoring with loose grids, provided the species and habitats are in a good, stable situation, but selective monitoring (more intensive sampling) should be undertaken as soon as problems come to light in order to survey the scale of the problems and facilitate an adequate response.

Monitoring concept:

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample plots or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of monitoring network

An area-wide survey of the habitat type is carried out in the course of the six-year reporting cycle in order to assess its range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform characterisation and assessment of HD habitat types across the different Länder. Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN and BEHRENS, 2009). Where a total census is to be carried out, each dune heath site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered

in these areas. The number of transects and survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels. As a rule, the individual sites should not be less than approx. 1,000 m² in area; the survey areas specified reflect the form and size of the sites delimited in the course of the area-wide mapping. Exception: smaller sites of particular significance and representativity (see selection criteria).

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of locations. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. Where appropriate, it is also possible for full-coverage site surveying to be implemented at small sites along the mainland coasts on the North Sea and Baltic Sea. The 'structured walks' procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type for the relevant biogeographical region assessed, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN and BEHRENS, 2009).

Parameter:

- Abundance (flora)
- Area
- Coastal protection measures
- Construction measures
- Exposure (active or passive cliff)
- Inputs of substances/materials
- Position
- Recreational uses/facilities
- Species spectrum
- Structures/processes (landslips, washed debris, rock falls, etc.)

Zone:

Littoral

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Hydrology (status quo and trends)
- Morphology (status quo and trends)

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Types - Vegetated Sea Cliffs (1230)

Authors

(KRAUSE et al 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the 'Pinneberg Schema' (Updated: 27 May 2008):

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17.

The typical species listed in the matrices under the assessment criterion 'Completeness of the typical species inventory' are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. Given that 'typical species' may occur in various habitat types, they are not to be equated with 'characteristic species'.

The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventories of typical species for the habitat types represent one of the main ecological assets that have to be assessed in order to comply with the obligations placed on Member States with regard to reporting to the EU. Nevertheless, although they are to be assessed as indicators of the conservation status of the habitat type in question, no separate species monitoring needs to be carried out on individual typical species. Information on the presence of the species is sufficient for this purpose. Optionally, abundances, trends, etc. may be obtained to support the assessment.

The assessment of the manifestations of the habitat type specific to the physical region in question is used to supplement the habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level.

On the assessment criteria:

The habitat types for beaches and sea cliffs are highly dynamic habitats, the boundaries and manifestations of which are subject to constant change. Active coastal dynamics and their manifestations are therefore reflected, in particular, in the assessment parameters for habitat structures and impairments.

<u>Habitat structures:</u>

The diversity of natural substrates typical of the location and, in particular, processes that have identifiable effects on sea cliffs (rock falls, solifluction, etc.) are assessed as expressions of unrestricted coastal dynamics. Biotic parameters are subordinated.

The assessment is carried out by meaning the subcriteria.

<u>Typical species inventory:</u>

The proportion of all the plant species potentially present at a location that actually occur is drawn on for the assessment.

In addition to this, furthermore, the number or occurrence of typical animal species may be incorporated into the assessment as a subcriterion, provided studies of suitable species groups are available.

Impairments:

In particular, mechanical and structural changes in the habitat type sites or the surrounding areas that influence them, inputs of substances and damage caused by recreational use are assessed as impairments. As a matter of principle, what is decisive is the subcriterion that has been assessed least favourably in each case, i.e. the subcriterion that constitutes the greatest impairment.

Assessment matrix (PDF)

5 Quality assurance

Comments

The participating institutions are striving to build up and introduce uniform QA standards.

5.1 Monitoring institutions

- LLUR
- LUNG
- NPV SH

5.2 Guidance documents

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes & Guidelines: Final Draft.*
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats.*
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis "FFH-Berichtspflichten Meere und Küsten": Stand: 27.05.2008.*
- Sachteleben, J., Behrens, M. et al., 2009: *Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: November 2008)*; commissioned by the Federal Agency for Nature Conservation.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Juli 2007.*
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007.*
- TMAP Manual

5.3 Standards

- To be specified by the Quality Assurance Panel at the UBA as necessary.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 1230 must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

Priorities

- Data management: standards set by the European Union, support provided, standards set and evaluation carried out by BfN
- Conclusive compilation of current habitat type site shapes (at present, still not available for Mecklenburg-Vorpommern)
- Conclusive specification of transects/survey areas in Schleswig-Holstein (carried out as part of or directly following the current, ongoing HD habitat type monitoring or the extended TMAP procedure in Schleswig-Holstein; due to be concluded in 2012) and Mecklenburg-Western Pomerania
- Evaluation with a view to management plans and/or necessary measures

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

(4) 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.

Monitoring Specifications

Date: 2010-05-20

HD Habitat Type 1310 *Salicornia* and Other Annuals Colonising Mud and Sand

MEERESUMWELT

BUND-LÄNDER MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 1310 - Salicornia and Other Annuals Colonising Mud and Sand

1.2 Definition

1.2.1 Definition (*Interpretation Manual*)

Salicornia and other annuals colonising mud and sand (1310)

1) Formations composed mostly or predominantly of annuals, in particular Chenopodiaceae of the genus *Salicornia* or grasses, colonising periodically inundated muds and sands of marine or interior salt marshes. *Thero-Salicornietea*, *Frankenietea pulverulentae*, *Saginetea maritimae*. Sub-types:

15.11 - Glasswort swards (*Thero-Salicornietalia*): annual glasswort (*Salicornia* spp., *Microcnemum coralloides*), seablite (*Suaeda maritima*), or sometimes salwort (*Salsola* spp.) formations colonising periodically inundated muds of coastal saltmarshes and inland salt-basins.

15.12 - Mediterranean halo-nitrophilous pioneer communities (*Frankenion pulverulentae*): formations of halo-nitrophilous annuals (*Frankenia pulverulenta*, *Suaeda splendens*, *Salsola soda*, *Cressa cretica*, *Parapholis incurva*, *Parapholis strigosa*, *Hordeum marinum*, *Sphenopus divaricatus*) colonising salt muds of the Mediterranean region, susceptible to temporary inundation and extreme drying;

15.13 - Atlantic sea-pearlwort communities (*Saginion maritimae*): formations of annual pioneers occupying sands subject to variable salinity and humidity, on the coasts, in dune systems and saltmarshes. They are usually limited to small areas and best developed in the zone of contact between dune and saltmarsh.

15.14 - Central Eurasian crypsoid communities : Sparse solonchak formations of annual grasses of genus *Crypsis* (*Heleochloa*) colonizing drying muds of humid depressions of the salt steppes and saltmarshes (15.A) of Eurasia, from Pannonia to the Far East.

2) Plants:

15.11 - *Salicornia* spp., *Microcnemum coralloides*, *Suaeda maritima*;

15.12 - *Frankenia pulverulenta*, *Suaeda splendens*, *Salsola soda*, *Cressa cretica*, *Parapholis incurva*, *Parapholis strigosa*, *Hordeum marinum*, *Sphenopus divaricatus*;

15.13 - *Sagina maritima*, *Sagina nodosa*, *Cochlearia danica*, *Gentiana littorale*, *Bupleurum tenuissimum*;

15.14 - *Crypsis* spp., *Cyperus pannonicus*, *Spergularia media*, *Spergularia marina*, *Salicornia* spp., *Lepidium latifolium*, *Chenopodium* spp., *Atriplex* spp., *Dianthus guttatus*, *Artemisia santonicum*.

3) Corresponding categories

United Kingdom classification: "SM7 *Arthrocnemum perenne* stands", "SM8 Annual *Salicornia* saltmarsh", "SM9 *Suaeda maritima* saltmarsh" and "SM27 Ephemeral saltmarsh vegetation with *Sagina maritima*".

Nordic classification: 15.11 - "4233 *Salicornia strictissima*-typ", "4252 *Salicornia* europaea-typ", "4253 *Spergularia salina*-typ".

1.2.2 National definition (BfN)

Pioneer vegetation with *Salicornia* and other annuals colonising mud and sand (Natura 2000 Code 1310):

Habitat Type 1310 is characterised by gappy annual pioneer vegetation in the eulittoral zone of coasts on sandy and muddy soils. It includes tidal and wind flats and low-lying sandflats, between approx. -40 to 0 cm below MHT, with *Thero-Salicornietalia* vegetation.

This habitat type includes mudflats and sandflats that are not completely covered at low tide with annual, mostly gappy vegetation comprising *Salicornia* species. On the North Sea, Habitat Type 1310 is usually formed from the mean high tide line to approx. 40 cm below it and mostly found seaward of salt meadows. Depending on the substrate and duration of inundation, various Salicornia species may predominate.

On the German North Sea coast, Salicornia and other annuals colonising mud and sand are widely distributed and occupy large parts of the overall area of tidal flats. This habitat type is most prominent on muddy coasts and less exposed sandy coasts (e.g. island sandflats). On the Baltic Sea coast, Habitat Type 1310 occurs only in small patches, mostly in mosaics with salt marshes in the western part of the Baltic (e.g. Wismar Bight).

1.3 Competent authority/ies

Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Habitat Types; Ad Hoc Working Group on Benthos and Benthic Habitats

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Article 11, Annexes III and V

Comments

On the basis of the initial assessment made pursuant to Article 8(1), Member States shall establish and implement coordinated monitoring programmes for the ongoing assessment of the environmental status of their marine waters on the basis of the indicative lists of elements set out in Annex III and the list set out in Annex V, and by reference to the environmental targets established pursuant to Article 10.

The monitoring programme should cover the essential features and characteristics and the environmental status of those waters, based on the indicative lists set out in Annex III.

The following aspects must be covered:

a) The physical and chemical features, the habitat types, the biological features and the hydro-morphology.

b) The predominant pressures and impacts, including human activity, on the environmental status of those waters.

Birds Directive

Article 10

Comments

(1) Member States shall encourage research and any work required as a basis for the protection, management and use of all species of bird referred to in Article 1.

(2) Particular attention shall be paid to research and work on the subjects listed in Annex V.

Annex V

a) National lists of species in danger of extinction or particularly endangered species, taking into account their geographical distribution;

b) Listing and ecological description of areas particularly important to migratory species on their migratory routes and as wintering and nesting grounds;

c) Listing of data on the population levels of migratory species as shown by ringing.

HD [2]

Article 11 [3]

Comments

Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Article 17 [4]

Comments

Every six years […] Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning […] the main results of the surveillance referred to in Article 11.

WFD [5]

Article 8

Comments

Member States shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status within each river basin district.

TMAP [6]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the instrument that has enabled the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined.

The TMAP results may be used in the context of HD monitoring as a data source for a number of habitat types and species of the Atlantic region (CWSS and TMAG, 2004). In future, data from this programme should be incorporated into the surveying of the following conservation resources: common seal, grey seal, harbour porpoise, and Habitat Types 1110 - 1330 and 2110 - 2190.

Technical necessity

	WFD	HD	BD	OSPAR	HELCOM	TMAP	MSFD
Frequency	Annual, or every three years	Every six years	N.a.	N.a.	N.a.	Number: not stated; area-wide: every six years; sample plots: annual	Annual

2.2 Environmental targets

MSFD

MSRL targets

Birds Directive

BD conservation targets for Schleswig-Holsteins

BD conservation targets forHamburg 1
BD conservation targets for Hamburg 2

BD conservation targets for Niedersachsen

BD conservation targets for Mecklenburg-Vorpommern

HD

HD conservation targets for Schleswig-Holsteins

HD conservation targets for Hamburg 1
HD conservation targets for Hamburg 2]

HD conservation targets for Niedersachsen

HD conservation targets for Mecklenburg-Vorpommern

WFD

WFD-targets

TMAP

TMAP Wadden Sea Plan

2.3 Threats

The following anthropogenic influences are potential threats:

- Input of nutrients
- Input of hazardous substances
- Exploration and extraction of raw materials (e.g. gas, oil, sediment, brine)
- Construction measures/installations, including energy pipelines (e.g. construction of port and industrial installations)
- Water engineering measures and installations (e.g. coastal defences)
- Shipping traffic and water engineering measures (e.g. navigation channels, training dykes)
- Recreational use/tourism
- Disposal sites for sediment and dredgings/dumping activities

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (Sachteleben et al., 2009). Under the concept, a total census is to be carried out for this habitat type.

The sites that have been delimited are based on physical regional/geographical and geomorphological units (islands, sections of foreshore). This means every island, Hallig or section of foreshore on which the habitat type actually occurs is regarded as a site.

North Sea:

On the North Sea coast, there are 19 sites in Schleswig-Holstein, 22 sites in Lower Saxony and three sites in the Hamburg Wadden Sea.

Baltic Sea:

On the Baltic Sea, three sites are located on the Schleswig-Holstein coast and four sites in Mecklenburg-Vorpommern.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Salicornia (1310)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Typical species spectrum and ecological structural diversity

Monitoring concept:

Area-wide surveying of position, size, and vegetation zoning and typification derived from digital infrared aerial images by means of classification and field mapping.

Plus qualitative surveying of selected permanent plots/transects.

Basic monitoring and specification of the monitoring network:

An area-wide survey of habitat types is carried out in the course of the six-year reporting cycle in order to assess their range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform characterisation and assessment of HD habitat types across the different Länder.

Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level. In the case of marine habitat types and estuaries, substantive, structural synergy effects between the surveying of habitat types and the monitoring required by the WFD are to be secured.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN, BEHRENS et al., 2009). Where a total census is to be carried out, each site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and the survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels.

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of locations. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. In the case of small mainland coastal sites along the North Sea and Baltic Sea, it is also possible for full-coverage site surveying to be implemented. The "structured

walks" procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the location in question. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type assessed for the relevant biogeographical region, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN, BEHRENS et al., 2009).

The positioning of the survey areas may be modified in exceptional cases in order to guarantee their representativeness where land is lost, other major changes occur in the relevant site or complex of sites, or on account of other findings.

In contrast to the account in the Interpretation Manual (cf. Subtype 15.11), although in line with the BfN Handbuch, *Salicornia* swards at inland salt basins are not surveyed in this context, but as the priority habitat type *1340. Fragmentary formations in polders are not included.

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Impairment and threat factors
- Impairments (according to standardised list)
- Plant species or plant communities
- Range and area
- Relief, tidal channel structure and inundation dynamics
- TMAP units and biotope types according to the mapping keys issued by the Länder
- Typical species spectrum and structural diversity

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Types - 13 Habitat Types

Authors

Jochen Krause, Olaf von Drachenfels, Götz Ellwanger, Hubert Farke, David M. Fleet, Jürgen Gemperlein, Kathrin Heinicke, Christof Herrmann, Henrich Klugkist, Uwe Lenschow, Christian Michalczyk, Ingo Narberhaus, Eckhard Schröder, Martin Stock and Kristin Zscheile (2009)

Guideline:

HD

Comments:

The assessment matrix for Habitat Types 1310, 1320 and 1330 can be downloaded by clicking on the following link: http://www.bfn.de/0316_ak_marin.html

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level are used to supplement the assessment of the manifestations of this habitat type that are specific to the physical region/Land in question.

5 Quality assurance

Comments

The participating institutions are striving to build up uniform QA standards using a quality management system.

5.1 Monitoring institutions

- LLUR
- NLPV HH
- LUNG
- NLWKN
- NLPV NI
- LKN-SH
- NPA-MV

5.2 Guidance documents

- Mapping keys for biotope types issued by the Länder
- TMAP Manual

5.3 Standards

- To be specified by the Quality Assurance Panel at the UBA as necessary.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

Not required.

7.2 Working steps required

Priorities

- The digital aerial surveying method should be implemented uniformly throughout Germany. Information is required concerning the flying conditions (time, solar elevation and water level), the camera technology used, the visual data requirements (scale, coverage, resolution, positional accuracy, channels, etc.) and the visual data to be supplied (mosaics, surface model, projection, etc.).
- Standardisation of mapping in terms of effort and mapping keys is desirable.
- Complete depiction of the TMAP vegetation typology in the Lower Saxon National Park.
- The Ad Hoc Working Group on Habitat Types is working to draw up a joint methodological manual for salt meadows. All methodological details should be specified and described in the TMAP Manual.

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) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(3) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(4) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

(5) 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.

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

Monitoring Specifications

Date: 2010-05-21

HD Habitat Type 1320
Spartina Swards
(*Spartinion maritimae*)

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 1320 - *Spartina* Swards (*Spartinion maritimae*)

1.2 Definition

1.2.1 Definition (Interpretation Manual)

Spartina swards (*Spartinion maritimae*) (1320)

1) Perennial pioneer grasslands of coastal salt muds, formed by *Spartina* or similar grasses. When selecting sites, preference should be given to those areas supporting rare or local *Spartina*. Sub-types:

15.21 - Flat-leaved cordgrass swards: perennial pioneer grasslands of coastal salt muds, dominated by flat-leaved *Spartina maritima*, *Spartina townsendii*, *Spartina anglica*, *Spartina alterniflora*.

15.22 - Rush-leaved cordgrass swards: perennial pioneer grasslands of southern Iberian coastal salt muds, dominated by the junciform-leaved *Spartina densiflora*.

2) Plants:

15.21 - *Spartina maritima*, *Spartina alterniflora*;

15.22 - *Spartina densiflora*.

3) Corresponding categories

United Kingdom classification: 'SM4 *Spartina maritima* saltmarsh' and 'SM5 *Spartina alterniflora* saltmarsh'.

1.2.2. National definition (BfN)

Spartina swards (*Spartinion maritimae*; Natura 2000 Code 1320):

Perennial *Spartina* swards on tidal and wind flats (*Spartinion maritimae*). As a rule, the populations consist of a single, monodominant *Spartina* species (differs from region to region), which is the only higher plant, and extend as far as approx. -0.4 m MHT in the North Sea; *Spartina* swards displace or replace the *Salicornia* and salt meadow belt to a certain extent.

1.3 Competent authority/ies

Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Habitat Types; Ad Hoc Working Group on Benthos and Benthic Habitats

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Article 11, Annexes III and V

Comments

On the basis of the initial assessment made pursuant to Article 8(1), Member States shall establish and implement coordinated monitoring programmes for the ongoing assessment of the environmental status of their marine waters on the basis of the indicative lists of elements set out in Annex III and the list set out in Annex V, and by reference to the environmental targets established pursuant to Article 10.

The monitoring programme should cover the essential features and characteristics and the environmental status of those waters, based on the indicative lists set out in Annex III.

The following aspects must be covered:

a) The physical and chemical features, the habitat types, the biological features and the hydro-morphology.

b) The predominant pressures and impacts, including human activity, on the environmental status of those waters.

Birds Directive

Article 10

Comments

(1) Member States shall encourage research and any work required as a basis for the protection, management and use of all species of bird referred to in Article 1.

(2) Particular attention shall be paid to research and work on the subjects listed in Annex V.

Annex V

a) National lists of species in danger of extinction or particularly endangered species, taking into account their geographical distribution;

b) Listing and ecological description of areas particularly important to migratory species on their migratory routes and as wintering and nesting grounds;

c) Listing of data on the population levels of migratory species as shown by ringing.

HD [2]

Article 11 [3]

Comments

Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Article 17 [4]

Comments

Every six years […] Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning […] the main results of the surveillance referred to in Article 11.

WFD [5]

Article 8

Comments

Member States shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status within each river basin district.

TMAP [6]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the instrument that has enabled the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined.

The TMAP results may be used in the context of HD monitoring as a data source for a number of habitat types and species of the Atlantic region (CWSS and TMAG, 2004). In future, data from this programme should be incorporated into the surveying of the following conservation resources: common seal, grey seal, harbour porpoise, and Habitat Types 1110 - 1330 and 2110 - 2190.

Technical necessity

	WFD	HD	BD	OSPAR	HELCOM	TMAP	MSFD
Frequency	Annual, or every three years	Every six years	N.a.	N.a.	N.a..	Number: not stated; wide area: every six years; sample plots: annual	Annual

2.2 Environmental targets

MSFD

MSFD targets

Birds Directive

BD conservation targets for Schleswig-Holstein

BD conservation targets for Hamburg 1
BD conservation targets for Hamburg 2

BD conservation targets for Lower Saxony

BD conservation targets for Mecklenburg-Vorpommern

HD

HD conservation targets for Schleswig-Holstein

HD conservation targets for Hamburg 1
HD conservation targets for Hamburg 2

HD conservation targets for Lower Saxony

HD conservation targets for Mecklenburg-Vorpommern

WFD

WFD targets

TMAP

TMAP Wadden Sea Plan

2.3 Threats

Spartina swards are not currently threatened in Germany, since these species were mostly established or introduced for the purposes of land reclamation. Any threats that could arise would only become possible as a result of further dyke building projects.

The following anthropogenic influences are potential threats:

- Inputs of nutrients
- Inputs of hazardous substances
- Exploration and extraction of raw materials (e.g. gas, oil, sediment, brine)
- Construction measures/installations, including energy pipelines (e.g. construction of port and industrial installations)
- Water engineering measures and installations (e.g.coastal defences)
- Shipping traffic and water engineering measures (e.g. navigation channels, training dykes)
- Recreational use/tourism
- Disposal sites for sediment and dredgings/dumping activities

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (Sachteleben et al., 2009). Under the concept, a total census is to be carried out for this habitat type.

The sites that have been delimited are based on physical regional/geographical and geomorphological units (islands, sections of foreshore). This means every island, Hallig or section of foreshore on which the habitat type actually occurs is regarded as a site.

North Sea:

On the North Sea coast, there are 14 sites in Schleswig-Holstein, 24 sites in Lower Saxony and one site in the Hamburg Wadden Sea.

Baltic Sea:

There are no sites on the Baltic Sea.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Spartina Swards (1320)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Typical species spectrum and ecological structural diversity

Monitoring concept:

Area-wide surveying of position, size, and vegetation zoning and typification derived from digital infrared aerial images by means of classification and field mapping.
Plus qualitative surveying of selected permanent plots/transects.

Basic monitoring and specification of the monitoring network:

An area-wide survey of habitat types is carried out in the course of the six-year reporting cycle in order to assess their range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder.

Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level. In the case of marine habitat types and estuaries, substantive, structural synergy effects between the surveying of habitat types and the monitoring required by the WFD are to be secured.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see Sachteleben, Behrens et al., 2009). Where a total census is to be carried out, each site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and the survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels.

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. In the case of small mainland coastal sites along the North Sea and Baltic Sea, it is also possible for full-coverage site surveying to be implemented. The 'structured walks' procedure may be deployed in this context. Where appropriate, the transects encompass all the

habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type assessed for the relevant biogeographical region, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see Sachteleben, Behrens et al., 2009).

The positioning of the survey areas may be modified in exceptional cases in order to guarantee their representativeness where land is lost, other major changes occur in the relevant site or complex of sites, or on account of other findings.

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Impairment and threat factors
- Impairments (according to standardised list)
- Plant species or plant communities
- Range and area
- Relief, tidal channel structure and inundation dynamics
- TMAP units and biotope types according to the mapping keys issued by the Länder
- Typical species spectrum and structural diversity

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Types - 13 Habitat Types

Authors

Jochen Krause, Olaf von Drachenfels, Götz Ellwanger, Hubert Farke, David M. Fleet, Jürgen Gemperlein, Kathrin Heinicke, Christof Herrmann, Henrich Klugkist, Uwe Lenschow, Christian Michalczyk, Ingo Narberhaus, Eckhard Schröder, Martin Stock and Kristin Zscheile (2009)

Guideline:

HD

Comments:

The assessment matrix for Habitat Types 1310, 1320 and 1330 can be downloaded by clicking on the following link: http://www.bfn.de/0316_ak_marin.html

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level are used to supplement the assessment of the manifestations of this habitat type that are specific to the physical region/Land in question.

5 Quality assurance

Comments

The participating institutions are striving to build up QA standards using a quality management system.

5.1 Monitoring institutions

- LLUR
- NLPV HH
- LUNG
- NLWKN
- NLPV NI
- LKN-SH
- NPA-MV

5.2 Guidance documents

- Mapping keys for biotope types issued by the Länder
- TMAP Manual

5.3 Standards

- To be specified by the Quality Assurance Panel at the UBA as necessary.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

Not required

7.2 Working steps required

Priorities

- The digital aerial surveying method should be implemented uniformly throughout Germany. Information is required concerning the flying conditions (time, solar elevation and water level), the camera technology used, the visual data requirements (scale, coverage, resolution, positional accuracy, channels, etc.) and the visual data to be supplied (mosaics, surface model, projection, etc.).
- Standardisation of mapping in terms of effort and mapping keys is desirable.
- Complete depiction of the TMAP vegetation typology in the Lower Saxon National Park.
- The Ad Hoc Working Group on Habitat Types is working to draw up a joint methodological manual for salt meadows. All methodological details should be specified and described in the TMAP Manual.

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) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(3) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(4) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

(5) 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.

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

Monitoring Specifications

Date: 2010-05-21

HD Habitat Type 1330
Atlantic Salt Meadows
(*Glauco-Puccinellietalia maritimae*)

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 1330 - Atlantic Salt Meadows

1.2 Definition

1.2.1 EU definition (*Interpretation Manual*)

Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330)

1) Salt meadows of Baltic, North Sea, English Channel and Atlantic shores. *Aster tripolium* can be present or abundant in most subdivisions.

2) Plants:

15.31 - *Puccinellia maritima*;

15.32 - *Halimione portulacoides*, *Halimione pedunculata*, *Aster tripolium*;

15.33 - *Armeria maritima*, *Glaux maritima*, *Plantago maritima*, *Frankenia laevis*, *Artemisia maritima*, *Festuca rubra*, *Agrostis stolonifera*, *Juncus gerardii*, *Carex extensa*, *Blysmus rufus*, *Eleocharis* spp.;

15.34 - *Spergularia marina*, *Puccinellia distans*, *Puccinellia fasciculata*, *Puccinellia retroflexa*, *Puccinellia maritima*, *Triglochin maritimum*, *Potentilla anserina*, *Halimione portulacoides*;

15.35 - *Elymus pycnanthus* (=*Agropyron pungens*) or *Elymus repens*;

15.36 - *Atriplex littoralis*, *Atriplex hastata*, *Beta maritima*, *Matricaria maritima*.

3) Corresponding categories

United Kingdom classification: 'SM10 Transitional low-marsh vegetation', '*SM11 Aster tripolium* var. *discoides* saltmarsh', 'SM12 Rayed *Aster tripolium* saltmarsh', 'SM13 *Puccinellia maritima - Triglochin maritimum* saltmarsh', 'SM14 *Halimione portulacoides* saltmarsh', 'SM15 *Juncus maritimus - Triglochin maritimum* saltmarsh', '*SM16 Festuca rubra* saltmarsh community', 'SM17 *Artemisia maritima* community', 'SM18 *Juncus maritimus* community', 'SM19 *Blysmus rufus* saltmarsh community' and 'SM20 *Eleocharis uniglumis* community'.

Nordic classification : 15.32 - '4231 *Puccinellia maritima*-typ', 15.33 - '422 Övre landstrandensvegetation'.

1.2.2 National definition (BfN)

Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*; Natura 2000-Code 1330):

Atlantic, Baltic Sea and North Sea salt marshes in their complete typical zonation from common salt marsh grass (natural, grazed or semi-natural), to creeping red fescue, mud rush swards and sea wormword scrub in higher locations, and high tide drift lines with *Agropyron pycnanthum*. This habitat type also includes sites that feature the sedges *Carex distans* and *Carex extensa* or *Eleocharis uniglumis* and *Eleocharis palustris*. The natural dynamics of inundation by sea water (North Sea) are important indicators of salt marshes. On the Baltic Sea, salt marshes may also occur on peat substrates ('inundated coastal bogs'), where they are the secondary outcome of the grazing of brackish reedbeds, etc.

1.3 Competent authority/ies

Hamburg:	BSU
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Habitat Types; Ad Hoc Working Group on Benthos and Benthic Habitats

2 Monitoring requirements

2.1 Necessity

MSFD [1]

Article 11, Annexes III and V

Comments

On the basis of the initial assessment made pursuant to Article 8(1), Member States shall establish and implement coordinated monitoring programmes for the ongoing assessment of the environmental status of their marine waters on the basis of the indicative lists of elements set out in Annex III and the list set out in Annex V, and by reference to the environmental targets established pursuant to Article 10.

The monitoring programme should cover the essential features and characteristics and the environmental status of those waters, based on the indicative lists set out in Annex III.

The following aspects must be covered:

a) The physical and chemical features, the habitat types, the biological features and the hydro-morphology.

b) The predominant pressures and impacts, including human activity, on the environmental status of those waters.

Birds Directive

Article 10

Comments

(1) Member States shall encourage research and any work required as a basis for the protection, management and use of all species of bird referred to in Article 1.

(2) Particular attention shall be paid to research and work on the subjects listed in Annex V.

Annex V

a) National lists of species in danger of extinction or particularly endangered species, taking into account their geographical distribution;

b) Listing and ecological description of areas particularly important to migratory species on their migratory routes and as wintering and nesting grounds;

c) Listing of data on the population levels of migratory species as shown by ringing.

HD [2]

Article 11 [3]

Comments

Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Article 17 [4]

Comments

Every six years […] Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning […] the main results of the surveillance referred to in Article 11.

WFD [5]

Article 8

Comments

Member States shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status within each river basin district.

TMAP [6]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the instrument that has enabled the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined.

The TMAP results may be used in the context of HD monitoring as a data source for a number of habitat types and species of the Atlantic region (CWSS and TMAG, 2004). In future, data from this programme should be incorporated into the surveying of the following conservation resources: common seal, grey seal, harbour porpoise, and Habitat Types 1110 - 1330 and 2110 - 2190.

Technical necessity

Overview of monitoring frequencies and cycles:

	WFD	HD	BD	OSPAR	HELCOM	TMAP	MSFD
Frequency	Annual, or every three years	Every six years	N.a.	N.a.	N.a.	Number: not stated; wide area: every six years; sample areas: annual	Annual

2.2 Environmental targets

MSFD

MSRL targets

Birds Directive

BD conservation targets for Schleswig-Holsteins

BD conservation targets forHamburg 1
BD conservation targets for Hamburg 2

BD conservation targets for Niedersachsen

BD conservation targets for Mecklenburg-Vorpommern

HD

HD conservation targets for Schleswig-Holsteins

HD conservation targets for Hamburg 1
HD conservation targets for Hamburg 2]

HD conservation targets for Niedersachsen

HD conservation targets for Mecklenburg-Vorpommern

WFD

WFD-targets

TMAP

TMAP Wadden Sea Plan

2.3 Threats

The following anthropogenic influences are potential threats:

- Input of nutrients
- Input of hazardous substances
- Exploration and extraction of raw materials (e.g. gas, oil, sediment, brine)
- Construction measures/installations, including energy pipelines (e.g. construction of port and industrial installations)
- Water engineering measures and installations (e.g. coastal defences)
- Dyke building projects, hard structures along the coast
- Grazing, turf extraction
- Shipping traffic and water engineering measures (e.g. navigation channels, training dykes)
- Recreational use/tourism
- Disposal sites for sediment and dredgings/dumping activities

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (Sachteleben et al., 2009). Under the concept, a total census is to be carried out for this habitat type.

The sites that have been delimited are based on physical regional/geographical and geomorphological units (islands, sections of foreshore). This means every island, Hallig or section of foreshore on which the habitat type actually occurs is regarded as a site.

North Sea:

On the North Sea coast, there are 19 sites in Schleswig-Holstein, 26 sites in Lower Saxony and three sites in the Hamburg Wadden Sea.

Baltic Sea:

On the Baltic Sea, 21 sites are located on the Schleswig-Holstein coast and 13 sites in Mecklenburg-Vorpommern.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Atlantic Salt Meadows (1330)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Typical species spectrum and ecological structural diversity

Monitoring concept:

Area-wide surveying of position, size, and vegetation zoning and typification derived from digital infrared aerial images by means of classification and field mapping.

Plus qualitative surveying of selected permanent plots/transects.

Basic monitoring and specification of the monitoring network:

An area-wide survey of habitat types is carried out in the course of the six-year reporting cycle in order to assess their range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder.

Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level. In the case of marine habitat types and estuaries, substantive, structural synergy effects between the surveying of habitat types and the monitoring required by the WFD are to be secured.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see Sachteleben, Behrens et al., 2009). Where a total census is to be carried out, each site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and the survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels.

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. In the case of small mainland coastal sites along the North Sea and Baltic Sea, it is also possible for full-coverage site surveying to be implemented. The "structured

walks" procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type assessed for the relevant biogeographical region, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see Sachteleben, Behrens et al., 2009).

The positioning of the survey areas may be modified in exceptional cases in order to guarantee their representativeness where land is lost, other major changes occur in the relevant site or complex of sites, or on account of other findings.

Mapping instructions for Schleswig-Holstein

The typical structures include beach ridges and dunes, the diversity of the near-natural tidal channel system with, e.g. scour holes, flood pools and salt pans, vegetation-free patches, erosive edges, other structures generated as a result of the dynamics and development of salt meadows, anthills and other zoogenic or use-related formations, small patches of brackish reedbeds and other vegetation types, small-scale sweet-water intrusions, small-scale salt marsh pioneer stages (e.g. *Salicornion*, *Saginion*) and drift line material that has been washed ashore, e.g. accumulations of shells and flotsam.

The structures mentioned are not included if they are allocated to other habitat types listed in Annex I and can be mapped as such. Above all, coastal lagoons (1150), perennial vegetation of stony banks (1220), embryonic shifting dunes (2110), and *Salicornia* and other annuals colonising mud and sand (1310) may be identified.

Delimitation from other habitat types

1130: Estuaries may include salt meadows, which are usually incorporated completely into the estuary site, but surveyed separately. Transitions to alluvial grassland and perennial grass meadows are included, providing species typical of saline habitats still occur. Small-scale sites reached by marine and river-influenced high waters without any identifiable influence from brackish water may be incorporated into Habitat Types 1330/1130 as part of mosaic formations. Larger areas clearly separated from the sea by estuarine salt meadows without any identifiable influence from brackish water belong to Habitat Type 1130.

1310: Position clearly below MHT, vegetation light to open, with or without very scattered salt meadow species (often common salt marsh grass).

2110/2130: Gappy salt meadow pioneer stages (e.g. Amrum/Kniepsand, sandflats) are to be distinguished from embryonic shifting/grey dunes by the fact that they only exhibit unclear dune formation and host a significant proportion of salt meadow species. They are to be mapped as Habitat Type 1330.

6430: Fresh water and brackish reedbeds rich in tall herbaceous plants where salt meadow species occur (see above). Only relevant within estuaries, in other river mouth areas, on small feeder streams and springs flowing into the sea, as well as in similar situations where, by definition, 6430 may occur adjacent to 1330.

3.3 Additional parameters

The following parameters are required additionally for the assessments::

- Impairment and threat factors
- Impairments (according to standardised list)
- Plant species or plant communities
- Range and area
- Relief and tidal channel structure
- TMAP units and biotope types according to the mapping keys issued by the Länder
- Typical species spectrum and structural diversity
- Vegetation zoning and structure

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Types - 13 Habitat Types

Authors

Jochen Krause, Olaf von Drachenfels, Götz Ellwanger, Hubert Farke, David M. Fleet, Jürgen Gemperlein, Kathrin Heinicke, Christof Herrmann, Henrich Klugkist, Uwe Lenschow, Christian Michalczyk, Ingo Narberhaus, Eckhard Schröder, Martin Stock and Kristin Zscheile (2009)

Guideline:

HD

Comments:

The assessment matrix for Habitat Types 1310, 1320 and 1330 can be downloaded by clicking on the following link: http://www.bfn.de/0316_ak_marin.html

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level are used to supplement the assessment of the manifestations of this habitat type that are specific to the physical region/Land in question.

5 Quality assurance

Comments

The participating institutions are striving to build up uniform QA standards using a quality management system.

5.1 Monitoring institutions

- LLUR
- NLPV HH
- LUNG
- NLWKN
- NLPV NI
- LKN-SH
- NPA-MV

5.2 Guidance documents

- Mapping keys for biotope types issued by the Länder
- TMAP Manual

5.3 Standards

- To be specified by the Quality Assurance Panel at the UBA as necessary.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

Not required.

7.2 Working steps required

Priorities

- The digital aerial surveying method should be implemented uniformly throughout Germany. Information is required concerning the flying conditions (time, solar elevation and water level), the camera technology used, the visual data requirements (scale, coverage, resolution, positional accuracy, channels, etc.) and the visual data to be supplied (mosaics, surface model, projection, etc.).
- Standardisation of mapping in terms of effort and mapping keys is desirable.
- Complete depiction of the TMAP vegetation typology in the Lower Saxon National Park.
- The Ad Hoc Working Group on Habitat Types is working to draw up a joint methodological manual for salt meadows. All methodological details should be specified and described in the TMAP Manual.

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) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(3) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(4) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

(5) 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.

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

Monitoring Specifications

Date: 2010-06-16

HD Habitat Type 2110
Embryonic Shifting Dunes

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 2110 - Embryonic Shifting Dunes

1.2 Definition

1.2.1 EU definition (Interpretation Manual)

Formations of the coast representing the first stages of dune construction, constituted by ripples or raised sand surfaces of the upper beach or by a seaward fringe at the foot of the tall dunes.

1.2.2 National definition

Embryonic shifting dunes or foredunes on the sandy depositing shores of the Atlantic, North Sea and Baltic Sea. Colonised by just a few plants, mostly sand couch (*Elymus farctus*) (=*Agropyron junceum*), they reach a height of up to approx. 1 m before grading into white dunes with marram grass (biogenic dune formation).

1.2.3 Mapping procedure

Habitat Type 2110: Embryonic shifting dunes or foredunes on the sandy depositing shores of the North Sea and Baltic Sea with natural habitat dynamics involving denudation and the constant wind deposition of lime-rich sand in relatively flat, salt or brackish water-influenced beach complexes (+/- 30 cm above the surrounding beach) with modest couch grass (*Elymus farctus*) cover, etc. The freshly wind- or water-deposited sands, which are more or less influenced by salt water or brackish water and more or less calcareous, depending on the original material from which the dunes have been formed, are in contact with shallow water areas, tidal and wind sandflats, beaches, white dunes and salt meadows in near-natural island areas. Penetration by drift lines is typical.

On account of their vegetation cover, embryonic shifting dunes exhibit first pedogenic developments, such as rooting of the substrate and occasional humus formation. However, the rate at which soil formation proceeds is merely negligible, which means humic horizons are not yet taking shape.

Embryonic shifting dunes are the initial stages of further dune and vegetation development.

Delimitation from other habitat types:

2120: Marram grass is absent or comprises small proportions of the vegetation.

1.3 Competent authority/ies

Hamburg:	BSU, NLPV HH
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitats Directive areas are also to be included in the monitoring as appropriate.

"Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types."

Article 17 [3]

Comments

"Every six years […] Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning […] the main results of the surveillance referred to in Article 11."

DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

TMAP [4]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the instrument that has enabled the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined.

The TMAP results may be used in the context of HD monitoring as a data source for a number of habitat types and species of the Atlantic region (CWSS and TMAG, 2004). In future, data from this programme should be incorporated into the surveying of the following conservation resources: common seal, grey seal, harbour porpoise, and Habitat Types 1110 - 1330 and 2110 - 2190.

2.2 Environmental targets

HD

Maintenance of Habitat Type 2110 (embryonic shifting dunes) with a favourable conservation status or, where applicable, its restoration to such a status:

- Conservation of natural habitat dynamics involving denudation and the wind deposition of lime-rich sand in relatively flat, salt or brackish water-influenced beach complexes as a specific transitional biotope and as a precondition for the formation of new dunes
- Complete zoning of typical vegetation with younger and older developmental stages, including patches of open sand
- Stable or increasing range and overall area
- Natural transitions to white dune habitats
- Biotope-typical species composition with stable populations of the characteristic species
- No or minor impairments, above all due to coastal protection measures and tourism

TMAP

The following targets have been defined for embryonic shifting dunes (*Wadden Sea Quality Status Report 2004*):

- Increasing natural dynamics of beaches, embryonic shifting dunes and primary dune slacks in interaction with the adjacent offshore zone
- Increasing presence of complete natural vegetation development
- Favourable conditions for migrating and breeding birds

2.3 Threats

- Removal of sand in areas with natural dynamics as a result of coastal protection measures
- Dune reinforcement, dune stabilisation, sand trap fences
- Rubbish disposal at sea
- Pollution with oil
- Recreational activities
- Disruption of sensitive breeding bird species by bathing tourism

2.4 Spatial allocation

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN, BEHRENS et al., 2009).

Under the concept, a total census is to be carried out for this habitat type.

The 2110 sites that have been delimited are based on physical regional/geographical and geomorphological units (islands, sections of foreshore). This means every island or section of foreshore on which the habitat type actually occurs is regarded as a site.

Smaller, heavily anthropogenically influenced embryonic shifting dunes in secondary sandy areas on the foreshore (in polders, on artificial bathing beaches) are not designated as sites in their own right.

3.1 Description of monitoring network

North Sea

On the North Sea coast, 11 sites are located in Schleswig-Holstein and nine sites in Lower Saxony. This habitat type is not found in the Hamburg Wadden Sea.

Baltic Sea

On the Baltic Sea, 19 sites are located on the Schleswig-Holstein coast. According to the minutes of the special meeting of the Sub-Working Group on Habitat Types of 27 - 29 April 2009, there are six sites in Mecklenburg-Vorpommern (concrete information and shapes are not yet available).

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Embryonic Shifting Dunes (2110)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Typical species spectrum and ecological structural diversity

The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type.

Monitoring concept:

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample areas or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of the monitoring network

An area-wide survey of habitat types is carried out in the course of the six-year reporting cycle in order to assess their range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder.

Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level. In the case of marine habitat types and estuaries, substantive, structural synergy effects between the surveying of habitat types and the monitoring required by the WFD are to be secured.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN, BEHRENS et al., 2009). Where a total census is to be carried out, each site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and the survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and

quantitative levels.

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. In the case of small mainland coastal sites on the North Sea and Baltic Sea, it is also possible for full-coverage site surveying to be implemented. The 'structured walks' procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type assessed for the relevant biogeographical region, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN, BEHRENS et al., 2009).

Parameter:

- Area of the 2110 Habitat Type
- Biotope types according to the mapping keys issued by the Länder; additionally, on the North Sea, TMAP vegetation types
- Dune and vegetation structure
- Fern and flowering plant species
- Impairment and threat factors
- Impairments
- Manifestation of the biotope complex (representation of all characteristic vegetation types/successional stages)
- Range and area
- Selected characteristic animal species (e.g. breeding birds) as well, if possible
- Typical spectrum of structures, species and vegetation types

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Types - Embryonic Shifting Dunes (2110)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the 'Pinneberg Schema' (Updated: 27 May 2008)

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17 (further to which, the standards specified in European Commission, DG Environment, 2006 are applied).

The typical species listed in the matrices under the assessment criterion 'Completeness of the typical species inventory' are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. Given that 'typical species' may occur in various habitat types, they are not to be equated with 'characteristic species'.

The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventories of typical species for the habitat types represent one of the main ecological assets that have to be assessed in order to comply with the obligations placed on Member States with regard to reporting to the EU. Nevertheless, although they are to be assessed as indicators of the conservation status of the habitat type in question, no separate species monitoring needs to be carried out on individual typical species. It is necessary for population sizes or levels of coverage to be quantified at least roughly in the study areas, since increases and decreases in the abundances of typical species (and also of species indicative of disruption) are important parameters.

<u>On the assessment of coastal dunes (Habitat Types 2110 - 2190):</u>

Coastal dunes are divided into nine different habitat types that correspond to particular successional stages and frequently form biotope complexes made up of intimate mosaics, which are (ideally) characterised by highly dynamic habitat and vegetation development. In dune areas where there is nothing to restrict the natural processes of accumulation and erosion, it is therefore neither expedient nor actually possible to conserve a particular dune habitat type at a particular place in a particular condition. Rather, favourable conservation status is dependent on the dynamic processes that constantly create new pioneer stages (embryonic shifting dunes or young, still salt-influenced dune slacks) within a larger area, while in other parts of the area the successional process moves on to more mature stages, which may culminate in woodlands (Habitat Type 2180), provided the process is not set in train once again by extreme events. If the different manifestations of all habitat types relevant in a particular case constantly occur to a sufficient degree in a natural dune area of this kind (making up more or less varying proportions of the total area), the habitat types found in this complex are to be assigned the conservation status A.

As a matter of principle, progressive ageing of dunes is to be found in dune areas where natural dynamics are severely restricted - mostly due to coastal protection measures. Even where an individual dune or dune slack still exhibits typical, well developed vegetation (e.g. a lichen-rich grey hair-grass grey dune sward or a bed of common reeds), downgrading is necessary if more immature stages in the relevant area are receding or have now disappeared on account of the general anthropogenic conditions.

In view of this, it would not be expedient to assess individual dunes on their own. When the transects or study areas are specified, care must be taken to ensure that dune areas with largely natural dynamics and fixed, ageing dune areas (where present) are always given adequate consideration.

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level are used to supplement the assessment of the manifestations of this habitat type that are specific to the physical region/Land in question.

Assessment matrix

5 Quality assurance

Comments

5.1 Monitoring institutions

- LLUR
- NLPV HH
- LUNG
- NLWKN
- BSU
- NLPV NI
- LKN-SH

5.2 Guidance documents

- *Interpretation Manual of European Union Habitats*
- *TMAP Manual*, 'Beaches and Dunes', 28 March 2008
- Mapping keys for biotope types issued by the Länder

5.3 Standards

5.4 Current status

6 Literature

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v., ed., 2008: 'Hinweise zur Kartierung und Bewertung der FFH-Lebensraumtypen in Niedersachsen, mit Anlagen'; duplicated manuscript.
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive - Explanatory Notes & Guidelines, Final Draft*.
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats*.
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis ¿FFH-Berichtspflichten Meere und Küsten¿: Stand: 27.05.2008*.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung; Juli 2007*.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007*.
- Sachteleben, J., Behrens, M. et al., 2009: *Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: November 2008)*; commissioned by the Federal Agency for Nature Conservation.
- TMAP *Manual*, 2008.

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 2110 (embryonic shifting dunes) must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

- Specification and surveying of study areas or transects
- Data management: GIS and Land databases, updating of Standard Data Forms

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

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

Monitoring Specifications

Date: 2010-06-16

HD Habitat Type 2120
Shifting Dunes along the Shoreline with *Ammophila arenaria* (White Dunes)

MEERESUMWELT

BUND-LÄNDER MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 2120 - Shifting Dunes along the Shoreline with Ammophila arenaria (White Dunes)

1.2 Definition

1.2.1 EU definition (Interpretation Manual)

Mobile dunes forming the seaward cordon or cordons of dune systems of the coasts (16.2121, 16.2122 and 16.2123). *Ammophilion arenariae*, *Zygophyllion fontanesii*.

1.2.2 National definition

White dunes along the Atlantic, North Sea and Baltic Sea coasts, dominated by marram grass (*Ammophila arenaria* and x *Ammocalamagrostis baltica*) and up to several metres high. Mostly high sand input, incipient soil desalination and independence from groundwater are characteristic.

1.2.3 Mapping procedure

Habitat Type 2120: White dunes along the Atlantic, North Sea and Baltic Sea coasts, dominated by marram grass (*Ammophila arenaria* and x *Ammocalamagrostis baltica*) and up to several metres high. Mostly strong morphodynamics, incipient soil desalination and independence from groundwater are characteristic. The locations are lime-rich with low proportions of humus, are relatively oligohaline, and exhibit constant sand input of several decimetres and the incipient formation of fresh water lenses.

Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) are in contact with seaward beaches, immature embryonic shifting dunes and more mature dune habitat types (2130 to 2190), and are a typical zoning element within the sequence of dunes.

Delimitation from other habitat types:

2110: Sand couch (*Elytrigia juncea*) is absent or comprises small proportions of the vegetation.

2130: Lime-rich sands with gappy vegetation cover, dominance of marram grass, species typical of grey dune swards are absent or comprise low proportions of the vegetation (e.g. sand sedge).

1.3 Competent authority/ies

Hamburg:	BSU, NLPV HH
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitats Directive areas are also to be included in the monitoring as appropriate.

"Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types."

Article 17 [3]

Comments

"Every six years […] Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning […] the main results of the surveillance referred to in Article 11."

DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

TMAP [4]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the instrument that has enabled the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined.

The TMAP results may be used in the context of HD monitoring as a data source for a number of habitat types and species of the Atlantic region (CWSS and TMAG, 2004). In future, data from this programme should be incorporated into the surveying of the following conservation resources: common seal, grey seal, harbour porpoise, and Habitat Types 1110 - 1330 and 2110 - 2190.

2.2 Environmental targets

HD

Maintenance of Habitat Type 2120 (shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)) with a favourable conservation status or, where applicable, its restoration to such a status:

- Conservation of natural habitat dynamics involving denudation and the wind deposition of lime-rich sand as a precondition for the emergence and conservation of the habitat type.
- Complete zoning of typical vegetation with younger and older developmental stages, including patches of open sand
- Stable or increasing range and overall area
- Natural transitions to grey dune habitats
- Biotope-typical species composition with stable populations of the characteristic species
- No or minor impairments, above all due to coastal protection measures and tourism

TMAP

The following targets have been defined for shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (Wadden Sea Quality Status Report 2004):

- Increasing presence of complete natural vegetation development
- Favourable conditions for breeding birds

2.3 Threats

- Dune reinforcement, dune stabilisation, sand trap fences
- Coverage of open white dune areas with flotsam, cut material
- Recreational activities

2.4 Spatial allocation

	EEZ	12- nm zone	Coastal waters 1)	Transitional waters
Birds Directive	-	-	x	-
HD	-	-	x	-
WFD	-	-	-	-
TMAP	-	-	x	-

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN, BEHRENS et al., 2009). Under the concept, a total census is to be carried out for this habitat type.

The 2120 sites that have been delimited are based on physical regional/geographical and geomorphological units (islands, sections of foreshore). This means every island or section of foreshore on which the habitat type actually occurs is regarded as a site.

Heavily anthropogenically influenced smaller white dunes in secondary sandy areas on the foreshore (in polders, on artificial bathing beaches) are not designated as sites in their own right.

3.1 Description of monitoring network

North Sea

On the North Sea coast, nine sites are located in Schleswig-Holstein and ten sites in Lower Saxony. This habitat type is not found in the Hamburg Wadden Sea.

Baltic Sea

On the Baltic Sea, 23 sites are located on the Schleswig-Holstein coast. According to the minutes of the special meeting of the Sub-Working Group on Habitat Types of 27 - 29 April 2009, there are nine sites in Mecklenburg-Vorpommern (concrete information and shapes are not yet available).

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Shifting Dunes along the Shoreline (2120)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Typical species spectrum and ecological structural diversity

The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type.

Monitoring concept:

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample areas or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of the monitoring network

An area-wide survey of habitat types is carried out in the course of the six-year reporting cycle in order to assess their range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder.

Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level. In the case of marine habitat types and estuaries, substantive, structural synergy effects between the surveying of habitat types and the monitoring required by the WFD are to be secured.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN, BEHRENS et al., 2009). Where a total census is to be carried out, each site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and the survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and

quantitative levels.

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. In the case of small mainland coastal sites on the North Sea and Baltic Sea, it is also possible for full-coverage site surveying to be implemented. The "structured walks" procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type assessed for the relevant biogeographical region, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN, BEHRENS et al., 2009).

Parameter:

- Area of the 2120 Habitat Type
- Biotope types according to the mapping keys issued by the Länder; additionally, on the North Sea, TMAP vegetation types
- Dune and vegetation structure
- Fern and flowering plant species
- Impairment and threat factors
- Impairments
- Manifestation of the biotope complex (representation of all characteristic vegetation types/successional stages)
- Range and area
- Selected characteristic animal species (e.g. breeding birds) as well, if possible
- Typical spectrum of structures, species and vegetation types

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Type - Shifting Dunes along the Shoreline with Ammophila arenaria (White Dunes) (2120)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the "Pinneberg Schema" (Updated: 27 May 2008)

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17 (further to which, the standards specified in European Commission, DG Environment, 2006 are applied).

The typical species listed in the matrices under the assessment criterion "Completeness of the typical species inventory" are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. Given that "typical species" may occur in various habitat types, they are not to be equated with "characteristic species".

The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventories of typical species for the habitat types represent one of the main ecological assets that have to be assessed in order to comply with the obligations placed on Member States with regard to reporting to the EU. Nevertheless, although they are to be assessed as indicators of the conservation status of the habitat type in question, no separate species monitoring needs to be carried out on individual typical species. It is necessary for population sizes or levels of coverage to be quantified at least roughly in the study areas, since increases and decreases in the abundances of typical species (and also of species indicative of disruption) are important parameters.

<u>On the assessment of coastal dunes (Habitat Types 2110 - 2190):</u>

Coastal dunes are divided into nine different habitat types that correspond to particular successional stages and frequently form biotope complexes made up of intimate mosaics, which are (ideally) characterised by highly dynamic habitat and vegetation development. In dune areas where there is nothing to restrict the natural processes of accumulation and erosion, it is therefore neither expedient nor actually possible to conserve a particular dune habitat type at a particular place in a particular condition. Rather, favourable conservation status is dependent on the dynamic processes that constantly create new pioneer stages (embryonic shifting dunes or young, still salt-influenced dune slacks) within a larger area, while in other parts of the area the successional process moves on to more mature stages, which may culminate in woodlands (Habitat Type 2180), provided the process is not set in train once again by extreme events. If the different manifestations of all habitat types relevant in a particular case constantly occur to a sufficient degree in a natural dune area of this kind (making up more or less varying proportions of the total area), the habitat types found in this complex are to be assigned the conservation status A.

As a matter of principle, progressive ageing of dunes is to be found in dune areas where natural dynamics are severely restricted - mostly due to coastal protection measures. Even where an individual dune or dune slack still exhibits typical, well developed vegetation (e.g. a lichen-rich grey hair-grass grey dune sward or a bed of common reeds), downgrading is necessary if more immature stages in the relevant area are receding or have now disappeared on account of the general anthropogenic conditions.

In view of this, it would not be expedient to assess individual dunes on their own. When the transects or study areas are specified, care must be taken to ensure that dune areas with largely natural dynamics and fixed, ageing dune areas (where present) are always given adequate consideration.

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level

are used to supplement the assessment of the unique features of this habitat type that are specific to the physical region/Land in question.

Assessment matrix

5 Quality assurance

5.1 Monitoring institutions

- LLUR
- NLPV HH
- LUNG
- NLWKN
- BSU
- NLPV NI
- LKN-SH

5.2 Guidance documents

- *Interpretation Manual of European Union Habitats*
- *TMAP Manual*, 'Beaches and Dunes', 28 March 2008
- Mapping keys for biotope types issued by the Länder

5.3 Standards

5.4 Current status

6 Literature

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v., ed., 2008: 'Hinweise zur Kartierung und Bewertung der FFH-Lebensraumtypen in Niedersachsen, mit Anlagen'; duplicated manuscript.
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive - Explanatory Notes & Guidelines, Final Draft*.
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats*.
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis ¿FFH-Berichtspflichten Meere und Küsten¿: Stand: 27.05.2008*.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung; Juli 2007*.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007*.
- State Authority for Environment, Nature Protection and Geology of the Land Mecklenburg-Vorpommern, 2010: *Anleitung für die Kartierung von Biotoptypen und FFH-Lebensraumtypen in Mecklenburg-Vorpommern: 2. vollst. überarb. Aufl., Stand: März 2010.*
- Sachteleben, J., Behrens, M. et al., 2009: *Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: November 2008)*; commissioned by the Federal Agency for Nature Conservation.
- TMAP *Manual*, 2008.

7 Activities required to implement the concept

Performance of monitoring in accordance with the criteria discussed above.

7.1 Changes to the current monitoring programme

7.2 Working steps required

- Specification and surveying of study areas or transects
- Data management: GIS and Land databases, future BfN data sheet, updating of Standard Data Forms

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

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

Monitoring Specifications

Date: 2010-06-14

HD Habitat Type 2130 Fixed Coastal Dunes with Herbaceous Vegetation (Grey Dunes)

MEERESUMWELT

BUND-LÄNDER MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 2130 - Fixed Coastal Dunes with Herbaceous Vegetation (Grey Dunes)

1.2 Definition

1.2.1 EU definition (Interpretation Manual, 2007)

"Fixed dunes, stabilised and colonised by more or less closed perennial grasslands and abundant carpets of lichens and mosses, from the Atlantic coasts (and the English Channel) between the Straits of Gibraltar and Cap Blanc Nez, and the shores of the North Sea and the Baltic. […] The vegetation may be a closed cover of grassland, sparse annual grassland on sand or dominated by mosses and lichen; the content of limestone (Ca2+) may vary greatly and is generally diminishing with age and succession towards brown dune systems (dune heathland)."

1.2.2 National definition

"Fixed dunes, mostly dominated by grass, unwooded or sparsely wooded, with incipient soil formation, located landward of marram grass dunes along the Atlantic, North Sea and Baltic Sea coasts.

Apart from species-rich communities of *Koelerion albescentis* (class of sandy dry grasslands), *Corynephorion* (grey hair-grass sward) and the *Thero-Airion* alliance (ephemeral-rich *Aira* swards), Habitat Type 2130 is also characterised by cryptogam-richness (patchy moss and lichen carpets). Occasional transitions to semi-arid *Mesobromion* grassland and *Trifolio-Geranietea* fringes occur. The lime content varies depending on the parent substrate and increasing decalcification sets in with the gradual transition to brown dunes."

1.2.3 Mapping procedure

Largely fixed coastal dunes, mostly dominated by grass communities, unwooded or sparsely wooded with incipient soil formation and increasing decalcification. The typical vegetation consists of base-rich dry grasslands (*Koelerion albescenti*), grey hair-grass sward (*Corynephorion*) and ephemeral-rich *Aira* swards (*Thero-Arion*), scattered with moss and lichen carpets. This habitat type includes all other grey dune stages with herbaceous vegetation (e.g. marram grass, perennial herbaceous communities) and small vegetation-free areas. It does not include larger areas of flat sand with similar vegetation (e.g.in polders).

Delimitation from other habitat types:

2120: Where marram grass dominates parts of the area, this is indicative of more or less dense undergrowth made up of grey dune mosses or herbaceous plants. Dominant marram grass populations occur in small patches within Habitat Type 2130, particularly on the tops of grey dunes.

2140, 2150: Dwarf scrub plants are absent or only occur in larger numbers in very small patches.

2160, 2170: Sea-buckthorn or creeping willow are absent or scattered with thin coverage across the primarily herbaceous vegetation.

2190: Absence of species indicative of humidity in the slacks between grey dunes.

2130: Position in the immediate vicinity of the coast.

1.3 Competent authority/ies

Hamburg:	BSU, NLPV HH
Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LLUR, LKN-SH

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats listed in Annex I HD: "Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species." In this respect, consideration is also to be given to sites outside HD areas as appropriate.

Article 17 [3]

Comments

Article 17 governs the performance of the reporting obligations. "Every six years […] Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning […] the main results of the surveillance referred to in Article 11."

DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

TMAP [4]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the instrument that has enabled the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined (cf. CWSS and TMAG, 2004).

2.2 Environmental targets

HD

Maintenance of Habitat Type 2130 with a favourable conservation status or, where applicable, its restoration to such a status:

- Natural habitat dynamics involving denudation and the wind deposition of moderately base-rich to lime-poor sand as a precondition for the emergence and conservation of the habitat type
- Complete zoning of typical vegetation with younger and older developmental stages, including patches of open sand
- Stable or increasing range and overall area
- Natural transitions to white and brown dune habitats
- Biotope-typical species composition with stable populations of the characteristic species
- No or minor impairments, above all due to coastal protection measures and tourism

TMAP

The following targets have been defined for fixed coastal dunes with herbaceous vegetation (grey dunes) (Wadden Sea Quality Status Report 2004):

- Increasing presence of complete natural vegetation development
- Favourable conditions for migrating and breeding birds

2.3 Threats

- Restriction of natural dynamics due to coastal protection measures, resulting in increasing proliferation of woody plants, etc.
- Proliferation of invasive species
- Localised degradation by large rabbit populations, where relevant
- Inputs of nutrients
- Recreational activities
- Land lost to construction projects

2.4 Spatial allocation

Comments on BD - coastal waters

This habitat type is covered indirectly by the Birds Directive if it is a habitat for bird species crucial to the value of an EU bird protection area.

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN, BEHRENS et al., 2009).

Under the concept, a total census is to be carried out for this habitat type on account of the small number of sites.

The 2130 sites that have been delimited are based on physical regional/geographical and geomorphological units (islands, sections of foreshore). This means every island or section of foreshore on which the habitat type currently occurs is regarded as a site. In Lower Saxony, small secondary sites on artificially created sandy beaches and in polders are not categorised as sites.

3.1 Description of monitoring network

North Sea

On the North Sea coast, two sites are located in Hamburg, [still to be specified] sites in Schleswig-Holstein and ten sites in Lower Saxony.

Baltic Sea

On the Baltic Sea, 22 sites are located on the Schleswig-Holstein coast and 16 sites in Mecklenburg-Vorpommern.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Grey Dunes (2130)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Characteristic structures, functions and species
- Impairment and threat factors

The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type.

Monitoring concept:

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample areas or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of the monitoring network:

An area-wide survey of habitat types is carried out in the course of the six-year reporting cycle in order to assess their range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder.

Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level. In the case of marine habitat types and estuaries, substantive, structural synergy effects between the surveying of habitat types and the monitoring required by the WFD are to be secured.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN, BEHRENS et al., 2009). Where a total census is to be carried out, each site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and the survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and

quantitative levels.

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. In the case of small mainland coastal sites on the North Sea and Baltic Sea, it is also possible for full-coverage site surveying to be implemented, where appropriate. The "structured walks" procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the location in question. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type assessed for the relevant biogeographical region, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN, BEHRENS et al., 2009).

Parameter:

- Area of the 2130 Habitat Type
- Biotope types according to the mapping keys issued by the Länder; additionally, on the North Sea, TMAP vegetation types
- Dune and vegetation structure
- Fern and flowering plant species, typical moss and lichen species as well, if possible
- Impairments
- Manifestation of the biotope complex (representation of all characteristic vegetation types/successional stages)
- Range and area
- Selected characteristic animal species (e.g. breeding birds) as well, if possible
- Typical spectrum of structures, species and vegetation types

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Type - Fixed Coastal Dunes with Herbaceous Vegetation (Grey Dunes) (2130)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the "Pinneberg Schema" (Updated: 27 May 2008)

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17 (further to which, the standards specified in European Commission, DG Environment, 2006 are applied). The typical species listed in the matrices under the assessment criterion "Completeness of the typical species inventory" are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventory of typical species for this habitat type represents one of the essential criteria that have to be assessed to ascertain its conservation status and therefore also to comply with the reporting duties imposed by Article 17 HD. Nevertheless, no separate species monitoring needs to be carried out on individual characteristic or typical species, while they are to be assessed exclusively as indicators of the conservation status of the habitat type in question. It is necessary for population sizes or levels of coverage to be quantified at least roughly in the study areas, since increases and decreases in the abundances of typical species (and also of species indicative of disruption) are important parameters.

<u>On the assessment of coastal dunes (Habitat Types 2110 - 2190):</u>

Coastal dunes are divided into nine different habitat types that correspond to particular successional stages and frequently form biotope complexes made up of intimate mosaics, which are (ideally) characterised by highly dynamic habitat and vegetation development. In dune areas where there is nothing to restrict the natural processes of accumulation and erosion, it is therefore neither expedient nor actually possible to conserve a particular dune habitat type at a particular place in a particular condition. Rather, favourable conservation status is dependent on the dynamic processes that constantly create new pioneer stages (embryonic shifting dunes or young, still salt-influenced dune slacks) within a larger area, while in other parts of the area the successional process moves on to more mature stages, which may culminate in woodlands (Habitat Type 2180), provided the process is not set in train once again by extreme events. If the different manifestations of all habitat types relevant in a particular case constantly occur to a sufficient degree in a natural dune area of this kind (making up more or less varying proportions of the total area), the habitat types found in this complex are to be assigned the conservation status A.

As a matter of principle, progressive ageing of dunes is to be found in dune areas where natural dynamics are severely restricted - mostly due to coastal protection measures. Even where an individual dune or dune slack still exhibits typical, well developed vegetation (e.g. a lichen-rich grey hair-grass grey dune sward or a bed of common reeds), downgrading is necessary if more immature stages in the relevant area are receding or have now disappeared on account of the general anthropogenic conditions.

In view of this, it would not be expedient to assess individual dunes on their own. When the transects or study areas are specified, care must be taken to ensure that dune areas with largely natural dynamics and fixed, ageing dune areas (where present) are always given adequate consideration.

The assessment matrix for Habitat Type 2130 can be downloaded by clicking on the following link:

Assessment matrix

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level are used to supplement the assessment of the unique features of this habitat type that are specific to the physical region/Land in question.

5 Quality assurance

5.1 Monitoring institutions

- LLUR
- NLPV HH
- LUNG
- NLWKN
- BSU
- NLPV NI
- LKN-SH

5.2 Guidance documents

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v., ed., 2008: 'Hinweise zur Kartierung und Bewertung der FFH-Lebensraumtypen in Niedersachsen, mit Anlagen'; duplicated manuscript
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes & Guidelines: Final Draft.*
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats.*
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis "FFH-Berichtspflichten Meere und Küsten": Stand: 27.05.2008.*
- Sachteleben, J., Behrens M. et al., 2009: Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: Oktober 2009); commissioned by the Federal Agency for Nature Conservation.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Juli 2007.*
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007.*
- State Authority for Environment, Nature Protection and Geology of the Land Mecklenburg-Vorpommern, 2010: *Anleitung für die Kartierung von Biotoptypen und FFH-Lebensraumtypen in Mecklenburg-Vorpommern: 2. vollst. überarb. Aufl., Stand: März 2010.*
- TMAP Manual

5.3 Standards

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 2130 must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

- Specification and surveying of study areas or transects
- Data management: GIS and Land databases, updating of Standard Data Forms
- Evaluation with a view to management plans and/or necessary measures

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

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

Monitoring Specifications

Date: 2010-05-04

HD Habitat Type 2140 Decalcified Fixed Dunes with *Empetrum nigrum*

MEERESUMWELT

BUND-LÄNDER MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 2140 - Decalcified Fixed Dunes with *Empetrum nigrum*

1.2 Definition

1.2.1 EU definition

* Decalcified fixed dunes with *Empetrum nigrum*:

Decalcified dunes colonised by *Empetrum nigrum* heaths of the coasts. Syntaxa associated to this habitat type: *Empetrion nigri*, *Calluno Genistion pilosae p.*, *Ericion tetralicis p.*

- The term "fixed" should be taken to mean the opposite of "shifting". The psychrophilic coastal association *Carici trinervis-Callunetum vulgaris* de Foucault & Géhu 78 may be included here.

1.2.2 National definition

Largely fixed, decalcified coastal dunes with dwarf scrub heaths that exhibit a high proportion of crowberry (*Empetrum nigrum*). Crowberry mostly colonises the wind-exposed sides of the dunes. The northern sides of the dunes, in particular, exhibit a several-centimetre-thick, intensively brown-coloured raw humus level on podzol-regosol soil.

This habitat type includes sites at Geest locations in contact with the coast.

1.2.3 Mapping procedure

The areas that have been delimited encompass coastal dunes and near-coastal Geest heaths on islands and the mainland with proportions of *Empetrum nigrum* or typical *Empetrum* heath (e.g. *Hieracio-Empetretum*). *Empetrum* sites in mosaic formations with *Calluna* heaths, coherent populations of common heather with notable proportions of crowberry and other small-scale mixed, transitional and mosaic formations are to be allocated to this habitat type or incorporated into the areas delimited.

The areas not surveyed include sites where *Empetrum nigrum* only occurs as individual specimens, in individual scattered cushions or in some other form that is evidently more or less random, and sites where overwhelmingly *Empetrum*-free *Calluna* heaths or *Calluna* populations cover wider areas and/or occur in defined locations, for example on exposed south-facing slopes (cf. 2150).

Scattered, small-scale fragments of dune grassland (e.g. grey hair-grass communities, ephemeral-rich Aira swards, crested hair-grass communities) in the m² range as gap and pioneer phases of crowberry heath and the sometimes strongly divergent vegetation of near-natural special structures in the dune complex, such as disturbed patches around bird colonies or rabbit burrows, are among the structures that are to be regarded as typical.

Delimitation from other habitat types:

2150: Significant, more than random occurrence of *Empetrum nigrum* (crowberry).

2190: Crowberry-rich heaths in humid dune slacks with considerable proportions of species indicative of humidity (e.g. *Erica tetralix*) should be allocated to Habitat Type 2190.

1.3 Competent authority/ies

Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LKN-SH, LLUR

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

"Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species."

This provision is not limited to NATURA 2000 areas, while habitat types outside Habitats Directive areas are also to be included in the monitoring as appropriate.

Article 17 [3]

Comments

"Every six years […], Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include […] the main results of the surveillance referred to in Article 11."

Article 17 governs the performance of the reporting obligations in general terms. DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

TMAP [4]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the most important instrument enabling the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined (cf. CWSS and TMAG, 2004).

The monitoring requirements under TMAP were specified in the Wadden Sea Plan (Stade Declaration, 1997) as the Common Package in Annex 2 (see also TMAP Manual, Chapter 2).

2.2 Environmental targets

HD

Maintenance of Habitat Type 2140 with a favourable conservation status or, where applicable, its restoration to such a status by means of the conservation, restoration and, where applicable, development of:

- Dune complexes and structures with crowberry
- Mosaic complexes with other characteristic habitats or scattered special locations such as cliff edges, damp patches, oligotrophic sandy grasslands, heathland areas
- Natural soil development and largely undisrupted hydrological conditions
- Natural dune formation processes
- Typical structures and functions (see assessment matrix)

TMAP

The following targets have been defined for grey dunes (Wadden Sea Quality Status Report 2004):

- Increased presence of a complete natural vegetation succession
- Favourable conditions for migrating and breeding birds

2.3 Threats

Current impairments according to the information given in the national report submitted under Article 17 of the Habitats Directive for the reporting period 2001 - 2006 (BMU, 2008):

- New afforestation, forest regrowth, in particular planting of non-autochthonous species
- Increasing proliferation of woody plants as a consequence of the restriction of natural dynamics by coastal protection measures
- Urban sprawl (dispersed settlement)
- Transport routes and installations
- Footpaths and cycle paths
- Sport and leisure facilities
- Golf courses
- Camping and caravan sites
- Sport and recreation (outdoor activities)
- Other recreational and tourism activities
- Trampling (visitor overload)
- Other forms of environmental pollution, human interventions and uses
- Changes in sea currents
- Dykes, embankments, artificial beaches
- Coastal protection measures (tetrapods, hard structures)
- Eutrophication (natural)
- Immigration of new species (invasive neophytes)

2.4 Spatial allocation

As the definition indicates, decalcified dunes with *Empetrum* are found, if at all, in particular habitat situations on the margins of coastal waters. The conservation status of decalcified dunes with *Empetrum* as part of a dune complex (see comments in section 4.1) is only indirectly dependent on their spatial allocation.

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN and BEHRENS, 2009).

Under the concept, a total census is to be carried out for this habitat type.

North Sea

On the North Sea coast, the sites are several times larger and are more widely spread (seven sites in Lower Saxony, six sites in Schleswig-Holstein). This habitat type is not found in the Hamburg area.

Baltic Sea

On the Baltic Sea, the sites are limited to Mecklenburg-Vorpommern (three sites).

The sites that have been delimited are geographically/topographically discrete areas, as a rule islands or parts of islands and/or sections of coast oriented towards adjacent seaward water bodies (subject to the WFD).

On the specification of the monitoring network, see section 3.2.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Decalcified Dunes (2140)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Typical species spectrum and ecological structural diversity

Representative sites may be selected from among decalcified dunes with *Empetrum* that display similar biotic and abiotic conditions. The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type, which is usually composed of various biotopes.

Use should be made of basic monitoring with loose grids, provided the species and habitats are in a good, stable situation, but selective monitoring (more intensive sampling) should be undertaken as soon as problems come to light in order to survey the scale of the problems and facilitate an adequate response.

Monitoring concept:

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample plots or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of the monitoring network

An area-wide survey of the habitat type is carried out in the course of the six-year reporting cycle in order to assess its range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder. Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN and BEHRENS, 2009). Where a total census is to be carried out, each dune heath site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the

qualitative and quantitative levels. As a rule, the individual sites should not be less than approx. 1,000 m² in area; the survey areas specified reflect the form and size of the sites delimited in the course of the area-wide mapping. Exception: smaller sites of particular significance and representativity (see selection criteria).

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. Where appropriate, it is also possible for full-coverage site surveying to be implemented at small sites along the mainland coasts on the North Sea and Baltic Sea. The 'structured walks' procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type for the relevant biogeographical region assessed, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN and BEHRENS, 2009).

Parameter:

- Area of the habitat type
- Dune and vegetation structure
- Impairments (according to standardised list)
- Manifestation of the biotope complex (representation of all characteristic successional stages from embryonic shifting dunes to wooded dunes)
- Plant species (including lichens and mosses in permanent plots)
- Range and area
- Typical species spectrum and structural diversity

3.3 Additional parameters

Selected animal groups (birds, wild bees/digger wasps, grasshoppers) may also be considered at permanent plots where this is possible (presence/absence of characteristic species).

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Type - Decalcified Fixed Dunes with *Empetrum nigrum* (2140)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the 'Pinneberg Schema' (Updated: 27 May 2008)

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17.

The typical species listed in the matrices under the assessment criterion 'Completeness of the typical species inventory' are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. Given that 'typical species' may occur in various habitat types, they are not to be equated with 'characteristic species'.

The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventories of typical species for the habitat types represent one of the main ecological assets that have to be assessed in order to comply with the obligations placed on Member States with regard to reporting to the EU. Nevertheless, although they are to be assessed as indicators of the conservation status of the habitat type in question, no separate species monitoring needs to be carried out on individual typical species. Information on the presence of the species is sufficient for this purpose. Optionally, abundances, trends, etc. may be obtained to support the assessment.

<u>On the assessment of coastal dunes (Habitat Types 2110-2190):</u>

Coastal dunes are divided into nine different habitat types that correspond to particular successional stages and frequently form biotope complexes made up of intimate mosaics, which are (ideally) characterised by highly dynamic habitat and vegetation development.

In dune areas where there is nothing to restrict the natural processes of accumulation and erosion, it is therefore neither expedient nor actually possible to conserve a particular dune habitat type at a particular place in a particular condition. Rather, favourable conservation status is dependent on the dynamic processes that constantly create new pioneer stages (embryonic shifting dunes or young, still salt-influenced dune slacks) within a larger area, while in other parts of the area the successional process moves on to more mature stages, which may culminate in woodlands (Habitat Type 2180), provided the process is not set in train once again by extreme events. If the different manifestations of all habitat types relevant in a particular case constantly occur to a sufficient degree in a natural dune area of this kind (making up more or less varying proportions of the total area), the habitat type of this complex is to be assigned the conservation status A. In view of this, it would not be expedient to assess individual dunes on their own. Rather, coherent dune areas with uniform general conditions should be delimited in the course of the initial surveys. These delimited areas then form the assessment units. Such assessment areas should encompass a maximum of one island or the dune area of a particular section of coast. In the course of the monitoring, the proportions and manifestations of the habitat types within these assessment areas can then be determined and summarily assessed using suitable procedures (e.g. evaluation of aerial images in combination with the terrestrial surveying of transects).

Dune areas where natural dynamics are severely restricted - mostly due to coastal protection measures - should be examined separately. As a matter of principle, progressive ageing of dunes is to be found in these places. Even where an individual dune or dune slack still exhibits typical, well developed vegetation (e.g. a lichen-rich grey hair-grass grey dune sward or a reedbed), downgrading is necessary if more immature stages in the relevant area are receding or have now disappeared on account of the general anthropogenic conditions. If only more mature developmental stages were still to occur, the consequence would be the loss of particular habitat types (e.g. 2110, embryonic shifting dunes) or a

considerable proportion of a habitat type's typical species, unless this were countered by means of management measures intended to restore pioneer stages or development measures intended to restore natural dynamics. The less mature stages are accorded particular significance because they provide habitats for most of the species that occur only or predominately on coastal dunes. By contrast, the most mature stages of coastal dunes and dune slacks (including *Calluna* heath, forests, grey willow scrub), at least those in which well investigated species groups are found, host only a few coastal specialists, if any.

Accordingly, closer examination of the individual habitat types is required in heavily anthropogenically influenced dune areas, in which respect it is not the individual dune, but the coherent overall complex of the habitat type in question that should be assessed here as well. Only in this way can the representation of all developmental stages be taken appropriately into consideration.

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level are used to supplement the assessment of the manifestations of this habitat type that are specific to the physical region/Land in question.

Reference areas: biogeographical regions

Assessment matrix

5 Quality assurance

5.1 Monitoring institutions

- LUNG
- NLWKN
- NPV SH
- NLPV NI

5.2 Guidance documents

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes & Guidelines: Final Draft.*
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats.*
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis "FFH-Berichtspflichten Meere und Küsten": Stand: 27.05.2008.*
- Sachteleben, J., Behrens, M. et al., 2009: *Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: November 2008)*; commissioned by the Federal Agency for Nature Conservation.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Juli 2007.*
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007.*
- TMAP Manual

5.3 Standards

- To be specified by the Quality Assurance Panel at the UBA as necessary.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 2140 must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

Priorities

- Data management: GIS and Land databases, future BfN data sheet, updating of Standard Data Forms
- Conclusive compilation of current habitat type site shapes (at present, still not available for Mecklenburg-Vorpommern)
- Conclusive specification of transects/survey areas in Schleswig-Holstein (carried out as part of or directly following the current, ongoing HD habitat type monitoring or the extended Schleswig-Holstein TMAP procedure; due to be concluded in 2012)
- Evaluation with a view to management plans and/or necessary measures

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

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

Monitoring Specifications

Date: 2010-05-14

HD Habitat Type 2150
Atlantic Decalcified Fixed Dunes
(*Calluno-Ulicetea*)

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 2150 - Atlantic Decalcified Fixed Dunes (Calluno-Ulicetea)

1.2 Definition

1.2.1 EU definition

*Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)

Decalcified dunes of France, Belgium and Britain, colonised by heaths of the alliances *Calluno-Genistion* or *Ulicion minoris*, and of Iberia, colonised by heaths of the alliance *Ericion umbellatae*.

1.2.2 National Definition

Largely fixed, decalcified coastal dunes with dwarf shrub heaths that are dominated by common heather (*Calluna vulgaris*). Typical locations are decalcified sands with an acidic raw humus layer (podzolisation). There are also grassy or lichen- and moss-rich formations.

1.2.3 Mapping procedure

Dwarf shrub heaths dominated by common heather (*Calluna vulgaris*) on older, already fixed dunes with acidic soils and distinct humus accumulations. Slight sand drifting occurs in places. Coastal heaths are sometimes found in intimate mosaics with crowberry (Habitat Type 2140). While common heather tends to colonise sun-exposed dune slopes, crowberry prefers dune slopes that face away from the sun where the air is humid.

Scattered, small-scale fragments of dune grassland, pioneer phases of dune heath and the sometimes strongly divergent vegetation of near-natural special structures in a dune complex, such as disturbed patches around bird colonies or rabbit burrows, are among the structures that are to be regarded as typical.

Delimitation from other habitat types:

2140: Dominance of *Calluna vulgaris*; individual specimens of *Empetrum nigrum* only.

2190: Only sites outside humid dune slacks.

1.3 Competent authority/ies

Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LKN-SH, LLUR

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

"Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species."

This provision is not limited to NATURA 2000 areas, while habitat types outside Habitats Directive areas are also to be included in the monitoring as appropriate.

Article 17 [3]

Comments

"Every six years […], Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include […] the main results of the surveillance referred to in Article 11."

Article 17 governs the performance of the reporting obligations in general terms. DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

TMAP [4]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the most important instrument enabling the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined (cf. CWSS and TMAG, 2004).

2.2 Environmental targets

HD

Maintenance of Habitat Type 2150 with a favourable conservation status or, where applicable, its restoration to such a status by means of the conservation, restoration and, where applicable, development of:

- Natural habitat dynamics in the surrounding area involving denudation and the wind deposition of moderately base-rich to lime-poor sand as a precondition for the emergence and conservation of the habitat type.
- Populations of common heather that are viable on a large scale
- Stable or increasing range and overall area
- Natural transitions to grey dune and white dune habitats
- Biotope-typical species composition with stable populations of the characteristic species
- No or minor impairments, above all due to coastal protection, beach clearance and tourism

TMAP

The following targets have been defined for dunes (*Wadden Sea Quality Status Report 2004*):

- Increasing presence of complete natural vegetation development
- Favourable conditions for migrating and breeding birds

2.3 Threats

- Restriction of natural dynamics by coastal protection measures, resulting in, among other things, increasing proliferation of woody plants
- Proliferation of invasive species
- Local impairment by large rabbit populations, where present
- Nutrient inputs
- Recreational activities
- Land lost to construction projects

2.4 Spatial allocation

Comments on the BD - coastal waters

This habitat type is covered indirectly by the Birds Directive if it is a habitat for bird species crucial to the value of an EU bird protection area.

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN and BEHRENS, 2009).

Under this concept, a total census is to be carried out for this habitat type on account of the small number of large-scale sites that have been defined. The dune heath sites that have been delimited are based on physical regional-geographical and geomorphological units (islands, sections of foreshore, inshore water bodies subject to the WFD).

North Sea

On the North Sea coast, six sites are located in Schleswig-Holstein, while there is one site in Lower Saxony.

Baltic Sea

On the Baltic Sea, there are four sites on the Schleswig-Holstein coast and three sites in Mecklenburg-Vorpommern.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Atlantic Decalcified Dunes (2150)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Characteristic structures, functions and typical species

Monitoring concept

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample plots or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of monitoring network

An area-wide survey of the habitat type is carried out in the course of the six-year reporting cycle in order to assess its range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder. Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN and BEHRENS, 2009). Where a total census is to be carried out, each dune heath site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels. As a rule, the individual sites should not be less than approx. 1,000 m² in area; the survey areas specified reflect the form and size of the sites delimited in the course of the area-wide mapping. Exception: smaller sites of particular significance and representativity (see selection criteria).

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. Where appropriate, it is also possible for full-coverage site

surveying to be implemented at small sites along the mainland coasts on the North Sea and Baltic Sea. The "structured walks" procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type for the relevant biogeographical region assessed, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN and BEHRENS, 2009).

Parameter:

- Area of the 2150 Habitat Type
- Biotope types according to the mapping keys issued by the Länder; additionally, on the North Sea, TMAP vegetation types
- Dune and vegetation structure (including vitality)
- Impairment and threat factors
- Impairments
- Plant species
- Range and area
- Selected characteristic animal species as well, where possible
- Subcategory of the biotope complex (coastal dynamics involving representation of all characteristic dune stages)
- Typical species spectrum and structural diversity

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Type - Atlantic Decalcified Fixed Dunes (Calluno-Ulicetea) (2150)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the "Pinneberg Schema" (Updated: 27 May 2008)

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17 (further to which, the standards specified in European Commission, DG Environment, 2006 are applied). The typical species listed in the matrices under the assessment criterion "Completeness of the typical species inventory" are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventories of typical species for the habitat types represent one of the main ecological assets that have to be assessed in order to comply with the obligations placed on Member States with regard to reporting to the EU. Nevertheless, although they are to be assessed as indicators of the conservation status of the habitat type in question, no separate species monitoring needs to be carried out on individual typical species. The abundances of typical species and species indicative of disruption are classified in the study areas. Information on trends, etc. may be used optionally for supporting purposes.

On the assessment of coastal dunes (Habitat Types 2110 - 2190):

Coastal dunes are divided into nine different habitat types that correspond to particular successional stages and frequently form biotope complexes made up of intimate mosaics, which are (ideally) characterised by highly dynamic habitat and vegetation development.

In dune areas where there is nothing to restrict the natural processes of accumulation and erosion, it is therefore neither expedient nor actually possible to conserve a particular dune habitat type at a particular place in a particular condition. Rather, favourable conservation status is dependent on the dynamic processes that constantly create new pioneer stages (embryonic shifting dunes or young, still salt-influenced dune slacks) within a larger area, while in other parts of the area the successional process moves on to more mature stages, which may culminate in woodlands (Habitat Type 2180), provided the process is not set in train once again by extreme events. If the different manifestations of all habitat types relevant in a particular case constantly occur to a sufficient degree in a natural dune area of this kind (making up more or less varying proportions of the total area), the habitat type of this complex is to be assigned the conservation status A.

As a matter of principle, progressive ageing of dunes is to be found in dune areas where natural dynamics are severely restricted - mostly due to coastal protection measures. Even where an individual dune or dune slack still exhibits typical, well developed vegetation (e.g. a lichen-rich grey hair-grass grey dune sward or a reedbed), downgrading is necessary if more immature stages in the relevant area are receding or have now disappeared on account of the general anthropogenic conditions.

In view of this, it would not be expedient to assess individual dunes on their own. Rather, coherent dune areas with uniform general conditions should be delimited in the course of the initial surveys. These delimited areas then form the assessment units.

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level are used to supplement the assessment of the manifestations of this habitat type that are specific to the physical region/Land in question.

Assessment matrix

5 Quality assurance

Comments

The participating institutions are striving to build up and introduce uniform QA standards.

5.1 Monitoring institutions

- LLUR
- LUNG
- NLWKN
- NLPV NI
- LKN-SH

5.2 Guidance documents

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes & Guidelines: Final Draft.*
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats.*
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis "FFH-Berichtspflichten Meere und Küsten": Stand: 27.05.2008.*
- Sachteleben, J., Behrens, M. et al., 2009: *Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: November 2008)*; commissioned by the Federal Agency for Nature Conservation.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Juli 2007.*
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007.*
- State Authority for Environment, Nature Protection and Geology of the Land Mecklenburg-Vorpommern, 2010: *Anleitung für die Kartierung von Biotoptypen und FFH-Lebensraumtypen in Mecklenburg-Vorpommern: 2. vollst. überarb. Aufl., Stand: März 2010.*
- TMAP Manual

5.3 Standards

- To be specified by the Quality Assurance Panel at the UBA as necessary.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 2150 must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

Priorities

- Specification and surveying of study areas or transects
- Data management: GIS and Land databases, updating of Standard Data Forms
- Evaluation with a view to management plans and/or necessary measures

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

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

Monitoring Specifications

Date: 2010-06-09

HD Habitat Type 2160
Dunes with
Hippophaë rhamnoides

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 2160 - Dunes with *Hippophaë rhamnoides*

1.2 Definition

1.2.1 EU definition (Interpretation Manual, 2007

"Sea-buckthorn formations of forest colonisation in both dry and humid dune depressions."

1.2.2 National definition

"Grey dunes covered with sea-buckthorn bushes (*Hippophaë rhamnoides*)"

"This habitat type includes dune scrub areas that are primarily made up of sea-buckthorn. They may occur on grey dunes or in dune slacks. It is not possible to distinguish originally domestic and subspontaneous colonies of sea-buckthorn with any degree of certainty, and both belong to this habitat type."

1.2.3 Mapping procedure

Coastal dunes with scrub that features a high proportion of sea-buckthorn (*Hippophaë rhamnoides*). Mainly older white dune stages and younger, still base-rich grey dune stages.

Larger flat areas of sand with similar vegetation (e.g. in polders) are not included.

Delimitation from other habitat types:

2120, 2130, 2140, 2150, 2170: High level of coverage with sea-buckthorn and, where applicable, other tall shrubs (common elder, roses, hawthorn, etc.).

2190: High level of coverage with sea-buckthorn and, where applicable, other tall shrubs in combination with the absence of species indicative of humidity.

1.3 Competent authority/ies

Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LKN-SH, LLUR

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats listed in Annex I HD: "Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types." In this respect, consideration is to be given to sites outside HD areas as well, where appropriate.

Article 17 [3]

Comments

Article 17 governs the performance of the reporting obligations. "Every six years […] Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning […] the main results of the surveillance referred to in Article 11."

DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

TMAP [4]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the instrument that has enabled the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined (cf. CWSS and TMAG, 2004).

2.2 Environmental targets

HD

Maintenance of Habitat Type 2160 with a favourable conservation status or, where applicable, its restoration to such a status:

- Near-natural sea-buckthorn scrub, above all in the transitional areas between white and grey dunes. Admixture of other autochthonous shrub species, such as creeping willow, common elder or hawthorn, depending on the location and developmental stage
- Natural habitat dynamics involving denudation and the wind deposition of lime-rich sand as a precondition for the emergence and conservation of the habitat type
- Complete zoning of typical vegetation with younger and older developmental stages, including patches of open sand
- Stable or increasing range and overall area
- Natural transitions to unwooded white and grey dune habitats
- Biotope-typical species composition with stable populations of the characteristic species
- No or minor impairments, above all due to coastal protection measures and tourism

TMAP

The following targets have been defined for coastal dunes (Wadden Sea Quality Status Report 2004):

- Increasing presence of complete natural vegetation development
- Favourable conditions for migrating and breeding birds

2.3 Threats

- Restriction of natural dynamics due to coastal protection measures
- Proliferation of invasive species (in particular Ramanas rose)
- Localised degradation by large rabbit populations, where relevant
- Inputs of nutrients
- Recreational activities
- Land lost to construction projects

2.4 Spatial allocation

Comments on BD - coastal waters

This habitat type is covered indirectly by the Birds Directive if it is a habitat for bird species crucial to the value of an EU bird protection area.

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN, BEHRENS et al., 2009).

Under the concept, a total census is to be carried out for this habitat type on account of the small number of sites.

The sites that have been delimited are based on physical regional/geographical and geomorphological units (islands, sections of foreshore). This means every island or section of foreshore on which the habitat type currently occurs is regarded as a site. In Lower Saxony, small secondary sites on artificially created sandy beaches and in polders are not categorised as sites.

3.1 Description of monitoring network

North Sea

On the North Sea coast, one site is located in Schleswig-Holstein and nine sites in Lower Saxony.

Baltic Sea

On the Baltic Sea, four sites are located on the Schleswig-Holstein coast and four in Mecklenburg-Vorpommern.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Dunes with *Hippophaë rhamnoides* (2160)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Characteristic structures, functions and species
- Impairment and threat factors

The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type.

Monitoring concept:

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample areas or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of the monitoring network:

An area-wide survey of habitat types is carried out in the course of the six-year reporting cycle in order to assess their range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder.

Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level. In the case of marine habitat types and estuaries, substantive, structural synergy effects between the surveying of habitat types and the monitoring required by the WFD are to be secured.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN, BEHRENS et al., 2009). Where a total census is to be carried out, each site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and the survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels.

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanently measured long-term areas to several large, spatially specified survey areas along transects and transects in their entirety. In the case of small mainland coastal sites on the North Sea and Baltic Sea, it is also possible for full-coverage site surveying to be implemented, where appropriate. The "structured walks" procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type assessed for the relevant biogeographical region, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN, BEHRENS et al., 2009).

Parameter:

- Area of the 2160 Habitat Type
- Biotope types according to the mapping keys issued by the Länder; additionally, on the North Sea, TMAP vegetation types
- Dune and vegetation structure
- Fern and flowering plant species
- Impairments
- Manifestation of the biotope complex (representation of all characteristic vegetation types/successional stages)
- Range and area
- Selected characteristic animal species (e.g. breeding birds) as well, if possible
- Typical spectrum of structures, species and vegetation types

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Type - Dunes with *Hippophaë rhamnoides* (2160)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the "Pinneberg Schema" (Updated: 27 May 2008)

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17 (further to which, the standards specified in European Commission, DG Environment, 2006 are applied). The typical species listed in the matrices under the assessment criterion "Completeness of the typical species inventory" are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventory of typical species for this habitat type represents one of the essential criteria that have to be assessed to ascertain its conservation status and therefore also to comply with the reporting obligations imposed by Article 17 HD. Nevertheless, no separate species monitoring needs to be carried out on individual characteristic or typical species, while they are to be assessed exclusively as indicators of the conservation status of the habitat type in question. It is necessary for population sizes or levels of coverage to be quantified at least roughly in the study areas, since increases and decreases in the abundances of typical species (and also of species indicative of disruption) are important parameters.

<u>On the assessment of coastal dunes (Habitat Types 2110 - 2190):</u>

Coastal dunes are divided into nine different habitat types that correspond to particular successional stages and frequently form biotope complexes made up of intimate mosaics, which are (ideally) characterised by highly dynamic habitat and vegetation development. In dune areas where there is nothing to restrict the natural processes of accumulation and erosion, it is therefore neither expedient nor actually possible to conserve a particular dune habitat type at a particular place in a particular condition. Rather, favourable conservation status is dependent on the dynamic processes that constantly create new pioneer stages (embryonic shifting dunes or young, still salt-influenced dune slacks) within a larger area, while in other parts of the area the successional process moves on to more mature stages, which may culminate in woodlands (Habitat Type 2180), provided the process is not set in train once again by extreme events. If the different manifestations of all habitat types relevant in a particular case constantly occur to a sufficient degree in a natural dune area of this kind (making up more or less varying proportions of the total area), the habitat types found in this complex are to be assigned the conservation status A.

As a matter of principle, progressive ageing of dunes is to be found in dune areas where natural dynamics are severely restricted - mostly due to coastal protection measures. Even where an individual dune or dune slack still exhibits typical, well developed vegetation (e.g. a lichen-rich grey hair-grass grey dune sward or a bed of common reeds), downgrading is necessary if more immature stages in the relevant area are receding or have now disappeared on account of the general anthropogenic conditions.

In view of this, it would not be expedient to assess individual dunes on their own. When the transects or study areas are specified, care must be taken to ensure that dune areas with largely natural dynamics and fixed, ageing dune areas (where present) are always given adequate consideration.

The assessment matrix for Habitat Type 2160 can be downloaded by clicking on the following link:

Assessment matrix

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level

are used to supplement the assessment of the unique features of this habitat type that are specific to the physical region/Land in question.

5 Quality assurance

5.1 Monitoring institutions

- LLUR
- LUNG
- NLWKN
- NLPV NI
- LKN-SH

5.2 Guidance documents

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v., ed., 2008: 'Hinweise zur Kartierung und Bewertung der FFH-Lebensraumtypen in Niedersachsen, mit Anlagen'; duplicated manuscript
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes & Guidelines: Final Draft.*
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats.*
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis "FFH-Berichtspflichten Meere und Küsten": Stand: 27.05.2008.*
- Sachteleben, J., Behrens M. et al., 2009: Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: Oktober 2009); commissioned by the Federal Agency for Nature Conservation.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Juli 2007.*
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007.*
- State Authority for Environment, Nature Protection and Geology of the Land Mecklenburg-Vorpommern, 2010: *Anleitung für die Kartierung von Biotoptypen und FFH-Lebensraumtypen in Mecklenburg-Vorpommern: 2. vollst. überarb. Aufl., Stand: März 2010.*
- TMAP Manual

5.3 Standards

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 2160 must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

- Specification and surveying of study areas or transects
- Data management: GIS and Land databases, updating of Standard Data Forms
- Evaluation with a view to management plans and/or necessary measures

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

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

Monitoring Specifications

Date: 2010-06-14

HD Habitat Type 2170
Dunes with
Salix repens ssp. *argentea*
(*Salicion arenariae*)

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 2170 - Dunes with *Salix repens* ssp. *argentea*

1.2 Definition

1.2.1 EU definition (Interpretation Manual, 2007)

"*Salix repens* communities (*Salicion arenariae*), colonising wet dune slacks. Following the lowering of the ground water table or accumulation of drift sand, these communities may develop into mesophilous communities as the *Pyrolo-Salicetum* (with *Pyrola rotundifolia*, *Viola canina*, *Monotropa hypopitys*) or, into xerophilous *Salix* communities (with *Carlina vulgaris*, *Thalictrum minus*) or into *Salix repens* communities with *Mesobromion* elements"

1.2.2 National definition

"Dune willow scrub with creeping willow *Salix repens* ssp. *argentea* [*Salix arenaria*]."

"This habitat type includes dune scrubs that are primarily formed by creeping willow. They may occur on grey dunes or in dune slacks with fixed sand and humus formation. Creeping willow scrub occurs mostly in intimate mosaics with sea-buckthorn scrub, dune heaths and grey dunes."

1.2.3 Mapping procedure

Coastal dunes and moderately humid dune slacks marked by dominance of creeping willow (*Salix repens* ssp. *argentea* (= ssp. *dunensis*)).

This habitat type does not include larger flat areas of sand with similar vegetation (e.g. sandy areas in polders with creeping willow growth).

Delimitation from other habitat types:

2120, 2130, 2140, 2150: Dominance of creeping willow compared to herbaceous white and grey dune plants and dwarf shrubs found on dune heaths (in particular crowberry and common heather)

2160: Dominance of creeping willow, low proportion of sea-buckthorn at most (Lower Saxony: < 25 %)

2190: Species indicative of wetness are absent or appear in very low proportions (e.g. different types of reedbed or small-sedge fens). Where corresponding characteristic species occur, humid dune slacks are allocated primarily to Habitat Type 2190.

1.3 Competent authority/ies

Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LKN-SH, LLUR

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats listed in Annex I HD: "Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types.Quot; In this respect, consideration is to be given to sites outside HD areas as well, where appropriate.

Article 17 [3]

Comments

Article 17 governs the performance of the reporting obligations. "Every six years […] Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning […] the main results of the surveillance referred to in Article 11."

DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

TMAP [4]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the instrument that has enabled the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined (cf. CWSS and TMAG, 2004).

2.2 Environmental targets

HD

Maintenance of Habitat Type 2170 with a favourable conservation status or, where applicable, its restoration to such a status:

- Near-natural creeping willow scrub on dunes and in moderately humid dune slacks within diverse coastal dune complexes
- Natural habitat dynamics involving denudation and the wind deposition of lime-rich to lime-poor sand - depending on the manifestation of the habitat type
- Intact water balance
- Complete zoning of typical vegetation with younger and older developmental stages, including patches of open sand; balanced distribution between dunes free of woody plants and scrub
- Stable or increasing range and overall area
- Biotope-typical species composition with stable populations of the characteristic species
- No or minor impairments, above all due to coastal protection measures and tourism

TMAP

The following targets have been defined for coastal dunes (Wadden Sea Quality Status Report 2004):

- Increasing presence of complete natural vegetation development
- Favourable conditions for migrating and breeding birds

2.3 Threats

- Restriction of natural dynamics due to coastal protection measures
- Falling groundwater levels
- Proliferation of invasive species (in particular Ramanas rose)
- Localised degradation by large rabbit populations, where relevant
- Inputs of nutrients
- Recreational activities
- Land lost to construction projects

2.4 Spatial allocation

Comments on BD - coastal waters

This habitat type is covered indirectly by the Birds Directive if it is a habitat for bird species crucial to the value of an EU bird protection area.

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN, BEHRENS et al., 2009).

Under the concept, a total census is to be carried out for this habitat type on account of the small number of sites.

The 2170 sites that have been delimited are based on physical regional/geographical and geomorphological units (islands, sections of foreshore). This means every island or section of foreshore on which the habitat type currently occurs is regarded as a site. In Lower Saxony, small secondary sites on artificially created sandy beaches and in polders are not categorised as sites.

3.1 Description of monitoring network

North Sea

On the North Sea coast, five sites are located in Schleswig-Holstein and nine sites in Lower Saxony.

Baltic Sea

On the Baltic Sea, two sites are located on the Schleswig-Holstein coast and three sites in Mecklenburg-Vorpommern.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Dunes with *Salix repens* (2170)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Characteristic structures, functions and species
- Impairment and threat factors

The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type.

Monitoring concept:

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and establishment of permanent representative sample areas or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of the monitoring network:

An area-wide survey of habitat types is carried out in the course of the six-year reporting cycle in order to assess their range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder.

Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level. In the case of marine habitat types and estuaries, substantive, structural synergy effects between the surveying of habitat types and the monitoring required by the WFD are to be secured.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN, BEHRENS et al., 2009). Where a total census is to be carried out, each site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and the survey areas specified within the transects must be sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels.

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. In the case of small mainland coastal sites on the North Sea and Baltic Sea, it is also possible for full-coverage site surveying to be implemented, where appropriate. The "structured walks" procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type assessed for the relevant biogeographical region, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN, BEHRENS et al., 2009).

Parameter:

- Area of the 2170 Habitat Type
- Biotope types according to the mapping keys issued by the Länder; additionally, on the North Sea, TMAP vegetation types
- Dune and vegetation structure
- Fern and flowering plant species
- Impairments
- Manifestation of the biotope complex (representation of all characteristic vegetation types/successional stages)
- Selected characteristic animal species (e.g. breeding birds) as well, if possible

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Type - Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) (2170)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the "Pinneberg Schema" (Updated: 27 May 2008)

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17 (further to which, the standards specified in European Commission, DG Environment, 2006 are applied). The typical species listed in the matrices under the assessment criterion "Completeness of the typical species inventory" are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventory of typical species for this habitat type represents one of the essential criteria that have to be assessed to ascertain its conservation status and therefore also to comply with the reporting obligations imposed by Article 17 HD. Nevertheless, no separate species monitoring needs to be carried out on individual characteristic or typical species, while they are to be assessed exclusively as indicators of the conservation status of the habitat type in question. It is necessary for population sizes or levels of coverage to be quantified at least roughly in the study areas, since increases and decreases in the abundances of typical species (and also of species indicative of disruption) are important parameters.

<u>On the assessment of coastal dunes (Habitat Types 2110 - 2190):</u>

Coastal dunes are divided into nine different habitat types that correspond to particular successional stages and frequently form biotope complexes made up of intimate mosaics, which are (ideally) characterised by highly dynamic habitat and vegetation development. In dune areas where there is nothing to restrict the natural processes of accumulation and erosion, it is therefore neither expedient nor actually possible to conserve a particular dune habitat type at a particular place in a particular condition. Rather, favourable conservation status is dependent on the dynamic processes that constantly create new pioneer stages (embryonic shifting dunes or young, still salt-influenced dune slacks) within a larger area, while in other parts of the area the successional process moves on to more mature stages, which may culminate in woodlands (Habitat Type 2180), provided the process is not set in train once again by extreme events. If the different manifestations of all habitat types relevant in a particular case constantly occur to a sufficient degree in a natural dune area of this kind (making up more or less varying proportions of the total area), the habitat types found in this complex are to be assigned the conservation status A.

As a matter of principle, progressive ageing of dunes is to be found in dune areas where natural dynamics are severely restricted - mostly due to coastal protection measures. Even where an individual dune or dune slack still exhibits typical, well developed vegetation (e.g. a lichen-rich grey hair-grass grey dune sward or a bed of common reeds), downgrading is necessary if more immature stages in the relevant area are receding or have now disappeared on account of the general anthropogenic conditions.

In view of this, it would not be expedient to assess individual dunes on their own. When the transects or study areas are specified, care must be taken to ensure that dune areas with largely natural dynamics and fixed, ageing dune areas (where present) are always given adequate consideration.

The assessment matrix for Habitat Type 2170 can be downloaded by clicking on the following link:

Assessment matrix

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level

are used to supplement the assessment of the unique features of this habitat type that are specific to the physical region/Land in question.

5 Quality assurance

5.1 Monitoring institutions

- LLUR
- LUNG
- NLWKN
- NLPV NI
- LKN-SH

5.2 Guidance documents

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v., ed., 2008: 'Hinweise zur Kartierung und Bewertung der FFH-Lebensraumtypen in Niedersachsen, mit Anlagen'; duplicated manuscript
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes & Guidelines: Final Draft.*
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats.*
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis "FFH-Berichtspflichten Meere und Küsten": Stand: 27.05.2008.*
- Sachteleben, J., Behrens M. et al., 2009: Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: Oktober 2009); commissioned by the Federal Agency for Nature Conservation.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Juli 2007.*
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007.*
- State Authority for Environment, Nature Protection and Geology of the Land Mecklenburg-Vorpommern, 2010: *Anleitung für die Kartierung von Biotoptypen und FFH-Lebensraumtypen in Mecklenburg-Vorpommern: 2. vollst. überarb. Aufl., Stand: März 2010.*
- TMAP Manual

5.3 Standards

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 2170 must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

- Specification and surveying of study areas or transects
- Data management: GIS and Land databases, updating of Standard Data Forms
- Evaluation with a view to management plans and/or necessary measures

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

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

Monitoring Specifications

Date: 2010-05-05

HD Habitat Type 2180
Wooded Dunes of the Atlantic, Continental and Boreal Region

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 2180 - Wooded Dunes of the Atlantic, Continental and Boreal Region

1.2 Definition

1.2.1 EU definition

Wooded dunes of the Atlantic, Continental and Boreal region:

Natural or semi-natural forests (long established) of the Atlantic, Continental and Boreal region coastal dunes with a well developed woodland structure and an assemblage of characteristic woodland species. It corresponds to oak groves and beech-oak groves with birch (*Quercion robori-petraeae*) on acid soils, as well as forests of the *Quercetalia pubescenti-petraeae* order. Pioneer stages are open forests with *Betula* spp. and *Crataegus monogyna*, mixed forests with *Fraxinus excelsior*, *Quercus robur*, *Ulmus minor* and *Acer pseudoplatanus* or, in wet slacks, pioneer forests with *Salix alba* which develop into humid mixed forests or marsh forests. On southern Atlantic coasts, it mainly corresponds to mixed *Pinus pinaster-Quercus ilex* forests, forests of *Quercus suber* and *Quercus robur* or forest stage with *Quercus robur* or *Quercus pubescens*. On Baltic coasts also pioneer forest of *Alnus* spp. or *Pinus sylvestris*.

1.2.2 National definition

Coastal dunes, including flat-bottomed hollows and depressions with natural or near-natural forests. On the North Sea, these may be, above all, pioneer forests made up of birch, aspen or rowan, mixed oak forests on acidic soils, as well as birch and alder swamps or carrs in wet dune slacks. The exceptions are afforested areas and spontaneously regenerated stands consisting of allochthonous tree species (e.g. black pine, white poplar, sycamore maple). Cohesive tree stands of approx. 0.1 - 0.2 ha. and greater in area belong to this habitat type. It includes sites on Geest edges covered with drifting sand along the mainland coast at Cuxhaven.

1.2.3 Mapping procedure

The criterion for the delimitation of the site is the occurrence of natural or near-natural woodland populations of the listed syntaxa along dunes of the North Sea and Baltic Sea coasts, in humid dune slacks and on areas of sand between coastal dunes, including corresponding pioneer, dune-building, mature and transitional stages, as well as corresponding forest and scrub fringes.

Furthermore, this habitat type includes afforested areas with species typical of the physical region and autochthonous species that are subject to near-natural development.

When surveying and assessment activities are undertaken, the influences exerted on typical locations and communities by dune dynamics, coastal dynamics and typical successional processes are to be taken into consideration. More recent growths of woody plants that express unfavourable conservation statuses in open dune slack manifestations are surveyed as the corresponding manifestation of habitat type 2190.

Delimitation from other habitat types:

2190: Occurrence of forest manifestations that are clearly identifiable as forest-like formations of woody plants, e.g. with associated pioneer and fringe communities. Species or species alliances found in humid dune slacks are potentially represented in undergrowth, but are not conservation objectives in themselves.

1.3 Competent authority/ies

Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LKN-SH, LLUR

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

"Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species."

This provision is not limited to NATURA 2000 areas, while habitat types outside Habitats Directive areas are also to be included in the monitoring as appropriate.

Article 17 [3]

Comments

"Every six years […], Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include […] the main results of the surveillance referred to in Article 11."

Article 17 governs the performance of the reporting obligations in general terms. DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

TMAP [4]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the most important instrument enabling the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined (cf. CWSS and TMAG, 2004).

The monitoring requirements under TMAP were specified in the Wadden Sea Plan (Stade Declaration, 1997) as the Common Package in Annex 2 (see also TMAP Manual, Chapter 2).

2.2 Environmental targets

HD

Maintenance of Habitat Type 2180 with a favourable conservation status or, where applicable, its restoration to such a status by means of the conservation, restoration and, where applicable, development of:

- Dunes, dune slacks and areas of sand between dunes with natural or near-natural deciduous woodland
- Coherent populations, including scrub, pioneer and decay stages
- Mosaic complexes with other characteristic habitats or scattered grey dunes, heaths and damp patches
- Natural soil development and largely undisrupted hydrological conditions
- Typical structures and functions
- Natural dune formation processes

TMAP

The following targets have been defined for more mature coastal dunes (*Wadden Sea Quality Status Report 2004*):

- Increasing presence of complete natural vegetation development
- Favourable conditions for migrating and breeding birds

2.3 Threats

Current impairments according to the information given in the national report submitted under Article 17 of the Habitats Directive for the reporting period 2001-2006 (BMU, 2008):

- Forestry use, in particular planting of allochthonous species
- Alteration of hydrological regime and functions, lowering of groundwater levels
- Spontaneous immigration of new, allochthonous species
- Urban sprawl (dispersed settlement)
- Transport routes and installations
- Sport and recreational facilities
- Camping and caravan sites
- Eutrophication (natural)

2.4 Spatial allocation

As the definition indicates, wooded coastal dunes are found, if at all, in particular habitat situations on the margins of coastal waters. The conservation status of wooded coastal dunes that are part of a dune complex (see the comments in section 4.1) is only indirectly dependent on their spatial allocation.

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN and BEHRENS, 2009).

Under the concept, a total census is to be carried out for this habitat type.

North Sea

On the North Sea coast, there are nine sites in Lower Saxony and one site in Schleswig-Holstein. This habitat type is not found in the Hamburg area.

Baltic Sea

On the Baltic Sea coast, three sites have been designated in Schleswig-Holstein and 11 in Mecklenburg-Vorpommern.

The sites that have been delimited are geographically/topographically discrete areas, as a rule islands or parts of islands and/or sections of coast oriented towards adjacent seaward water bodies (subject to the WFD).

On the specification of the monitoring network, see section 3.2.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Wooded Coastal Dunes (2180)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Typical species spectrum and ecological structural diversity

Representative sites may be selected from among wooded coastal dunes that exhibit similar biotic and abiotic conditions. The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type, which is usually composed of different biotopes.

Use should be made of basic monitoring with loose grids, provided the species and habitats are in a good, stable situation, but selective monitoring (more intensive sampling) should be undertaken as soon as problems come to light in order to survey the scale of the problems and facilitate an adequate response.

Monitoring concept:

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample plots or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of the monitoring network

An area-wide survey of the habitat type is carried out in the course of the six-year reporting cycle in order to assess its range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder.

Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN and BEHRENS, 2009). Where a total census is to be carried out, each dune heath site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and survey areas specified within the transects must be

sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels. As a rule, the individual sites should not be less than approx. 1,000 m² in area; the survey areas specified reflect the form and size of the sites delimited in the course of the area-wide mapping. Exception: smaller sites of particular significance and representativity (see selection criteria).

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. Where appropriate, it is also possible for full-coverage site surveying to be implemented at small sites along the mainland coasts on the North Sea and Baltic Sea. The "structured walks" procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type for the relevant biogeographical region assessed, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN and BEHRENS, 2009).

Parameter:

- Dune and vegetation structure
- Impairment and threat factors
- Impairments (according to standardised list)
- Manifestation of the biotope complex (representation of all characteristic successional stages from embryonic shifting dunes to wooded dunes)
- Plant species, area of the habitat type
- Range and area
- Typical species spectrum and structural diversity

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Type - Wooded Dunes of the Atlantic, Continental and Boreal Region (2180)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the "Pinneberg Schema" (Updated: 27 May 2008)

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17 (further to which, the standards specified in European Commission, DG Environment, 2006 are applied).

The typical species listed in the matrices under the assessment criterion "Completeness of the typical species inventory" are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. Given that "typical species" may occur in various habitat types, they are not to be equated with "characteristic species".

The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventories of typical species for the habitat types represent one of the main ecological assets that have to be assessed in order to comply with the obligations placed on Member States with regard to reporting to the EU. Nevertheless, although they are to be assessed as indicators of the conservation status of the habitat type in question, no separate species monitoring needs to be carried out on individual typical species. Information on the presence of the species is sufficient for this purpose. Optionally, abundances, trends, etc. may be obtained to support the assessment.

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level are used to supplement the assessment of the manifestations of this habitat type that are specific to the physical region/Land in question.

<u>On the assessment of coastal dunes (Habitat Types 2110-2190):</u>

Coastal dunes are divided into nine different habitat types that correspond to particular successional stages and frequently form biotope complexes made up of intimate mosaics, which are (ideally) characterised by highly dynamic habitat and vegetation development.

In dune areas where there is nothing to restrict the natural processes of accumulation and erosion, it is therefore neither expedient nor actually possible to conserve a particular dune habitat type at a particular place in a particular condition. Rather, favourable conservation status is dependent on the dynamic processes that constantly create new pioneer stages (embryonic shifting dunes or young, still salt-influenced dune slacks) within a larger area, while in other parts of the area the successional process moves on to more mature stages, which may culminate in woodlands (Habitat Type 2180), provided the process is not set in train once again by extreme events. If the different manifestations of all habitat types relevant in a particular case constantly occur to a sufficient degree in a natural dune area of this kind (making up more or less varying proportions of the total area), the habitat type of this complex is to be assigned the conservation status A. In view of this, it would not be expedient to assess individual dunes on their own. Rather, coherent dune areas with uniform general conditions should be delimited in the course of the initial surveys. These delimited areas then form the assessment units. Such assessment areas should encompass a maximum of one island or the dune area of a particular section of coast. In the course of the monitoring, the proportions and manifestations of the habitat types within these assessment areas can then be determined and summarily assessed using suitable procedures (e.g. evaluation of aerial images in combination with the terrestrial surveying of transects).

Dune areas where natural dynamics are severely restricted - mostly due to coastal protection measures - should be examined separately. As a matter of principle, progressive ageing of dunes is to be found in

these places. Even where an individual dune or dune slack still exhibits typical, well developed vegetation (e.g. a lichen-rich grey hair-grass grey dune sward or a reedbed), downgrading is necessary if more immature stages in the relevant area are receding or have now disappeared on account of the general anthropogenic conditions. If only more mature developmental stages were still to occur, the consequence would be the loss of particular habitat types (e.g. 2110, embryonic shifting dunes) or a considerable proportion of a habitat type's typical species, unless this were countered by means of management measures intended to restore pioneer stages or development measures intended to restore natural dynamics. The less mature stages are accorded particular significance because they provide habitats for most of the species that occur only or predominately on coastal dunes. By contrast, the most mature stages of coastal dunes and dune slacks (including *Calluna* heath, forests, grey willow scrub), at least those in which well investigated species groups are found, host only a few coastal specialists, if any.

Accordingly, closer examination of the individual habitat types is required in heavily anthropogenically influenced dune areas, in which respect it is not the individual dune, but the coherent overall complex of the habitat type in question that should be assessed here as well. Only in this way can the representation of all developmental stages be taken appropriately into consideration.

Reference areas: biogeographical regions

Assessment matrix

5 Quality assurance

Comments

The participating institutions are striving to build up and introduce uniform QA standards.

5.1 Monitoring institutions

- LLUR
- LUNG
- NLWKN
- NPV SH
- NLPV NI

5.2 Guidance documents

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes & Guidelines: Final Draft.*
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats.*
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis "FFH-Berichtspflichten Meere und Küsten": Stand: 27.05.2008.*
- Sachteleben, J., Behrens, M. et al., 2009: *Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: November 2008)*; commissioned by the Federal Agency for Nature Conservation.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Juli 2007.*
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007.*
- TMAP Manual

5.3 Standards

- To be specified by the Quality Assurance Panel at the UBA as necessary.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 2180 must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

Priorities

- Data management: GIS and Land databases, future BfN data sheet, updating of Standard Data Forms
- Conclusive compilation of current habitat type site shapes (at present, still not available for Mecklenburg-Vorpommern)
- Conclusive specification of transects/survey areas in Schleswig-Holstein (carried out as part of or directly following the current, ongoing HD habitat type monitoring or the extended Schleswig-Holstein TMAP procedure; due to be concluded in 2012) and Mecklenburg-Vorpommern
- Evaluation with a view to management plans and/or necessary measures

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

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

Monitoring Specifications

Date: 2010-05-11

HD Habitat Type 2190
Humid Dune Slacks

MEERESUMWELT

BUND-LÄNDER
MESSPROGRAMM

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 Assesment 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

Issued by
Bundesamt für Seeschifffahrt und Hydrographie (BSH)
Sekretariat Bund/Länder-Messprogramm für die Meeresumwelt von Nord- und Ostsee (BLMP)
Bernhard-Nocht-Straße 78
20359 Hamburg

www.blmp-online.de

1 General

1.1 Subject area

Biological Monitoring - Habitats - HD Habitat Type 2190 - Humid Dune Slacks

1.2 Definition

1.2.1 EU-Definition

Humid dune slacks

Humid depressions of dunal systems. Humid dune-slacks are extremely rich and specialised habitats very threatened by the lowering of water tables.

Sub-types:

16.31 - Dune-slack pools (*Charetum tomentosae*, *Elodeetum canadense*, *Hippuridetum vulgaris*, *Hottonietum palustris*, *Potametum pectinati*): fresh-water aquatic communities (cf. 22.4) of permanent dune-slack water bodies.

16.32 - Dune-slack pioneer swards (*Juncenion bufonii* p.: *Gentiano-Erythraeetum littoralis*, *Hydrocotylo-Baldellion*): pioneer formations of humid sands and dune pool fringes, on soils with low salinity.

16.33 - Dune-slack fens: calcareous and, occasionally, acidic fen formations (cf. 54.2, 54.4, in particular 54.21, 54.2H, 54.49), often invaded by creeping willow, occupying the wettest parts of dune-slacks.

16.34 - Dune-slack grasslands: humid grasslands and rushbeds (see 37.31, 37.4) of dune-slacks, also often with creeping willows (*Salix rosmarinifolia*, *Salix arenaria*).

16.35 - Dune-slack reedbeds, sedgebeds and canebeds: reedbeds, tall-sedge communities and canebeds (cf. 53.1, 53.2, 53.3) of dune-slacks.

1.2.2 National definition

Wet to humid depressions, troughs, slack systems and marginal areas in coastal dune areas with nutrient-poor conditions on sandy soils, influenced by groundwater, rainwater and/or at times brackish water, in some cases dry in summer; some dune slacks in island Geest and on the Baltic Sea are also sandy-gravely and somewhat base-richer. Depending on the hydrology, dynamics and successional processes, the humid dune slacks in Schleswig-Holstein are nearly vegetation-free (e.g. primary slacks in secondary dune complexes) or are colonised by, among other things, pioneer formations that include halophytes on humid sand, on and in ephemeral and permanent waters, and by dwarf rush and shoreweed communities, humid dwarf scrub heaths and oligotrophic grassland, bog gley soil, bog and marsh vegetation, humid grassland, reedbeds and sedge fens. The plant cover is open-gappy to dense, often low, but sometimes also rich in woody plants with, above all, dwarf scrub and creeping willow. The vegetation types may occur next to each other, in diverse complexes or one after the other in succession; in many cases, they are also found in intimate mosaics with other coastal dune habitat types.

1.2.3 Mapping procedure

The areas delimited are humid to wet dune slacks in coastal dunes and their freshwater and/or salt-water-influenced marginal areas with aquatic, amphibian or terrestrial vegetation of the listed biotope types/syntaxa, including the transitions, complexes and mosaic formations that occur in the field.

The sites are deliminated by reference to the occurrence of hydrophile vegetation types and/or plant species indicative of alternating humidity and wetness.

<u>Delimitation from other habitat types:</u>

1150: Rarely or at most occasionally brackish-water-influenced troughs and slacks, no permanent brackish water conditions.

2170: No extensive stands of creeping willow. However, creeping willow may sometimes also feature prominently in the populations of the dune slack communities. In so far as this is the case, creeping willow bushes in humid dune slacks with numerous species indicative of humidity (e.g. *Carex nigra*, *Epipactis palustris*) should be assigned to 2190 where doubts arise.

1.3 Competent authority/ies

Mecklenburg-Vorpommern:	LUNG
Lower Saxony:	NLWKN, NLPV NI
Schleswig-Holstein:	LKN-SH, LLUR

1.4 Working group

Ad Hoc Working Group on Habitat Types

2 Monitoring requirements

2.1 Necessity

HD [1]

Article 11 [2]

Comments

"Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species."

This provision is not limited to NATURA 2000 areas, while habitat types outside Habitats Directive areas are also to be included in the monitoring as appropriate.

Article 17 [3]

Comments

"Every six years […], Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include […] the main results of the surveillance referred to in Article 11."

Article 17 governs the performance of the reporting obligations in general terms. DocHab 04-03/03 (European Commission, 2006) sets out further substantive standards and guidelines.

TMAP [4]

Wadden Sea Plan (Stade Declaration, 1997)

Comments

The Trilateral Wadden Sea Plan was adopted at the eighth Trilateral Government Conference between the three countries with coastlines along the Wadden Sea, Denmark, Germany and the Netherlands. It is inspired by the guiding principle of achieving, as far as possible, a natural, self-sustaining ecosystem in which natural processes can proceed in an undisturbed way. The Plan formulates joint conservation targets, including targets for water and sediments, beaches, dunes, salt marshes and marine mammals. Projects and measures are developed to promote the achievement of these targets. Since 1994, the Trilateral Monitoring and Assessment Programme (TMAP) has been the most important instrument enabling the parties to track the progress made towards the achievement of the targets throughout the Wadden Sea. Measurable physical, chemical, biological and socioeconomic variables are examined (cf. CWSS and TMAG, 2004).

The monitoring requirements under TMAP were specified in the Wadden Sea Plan (Stade Declaration, 1997) as the Common Package in Annex 2 (see also *TMAP Manual*, Chapter 2).

2.2 Environmental targets

HD

Maintenance of Habitat Type 2190 with a favourable conservation status or, where applicable, its restoration to such a status by means of the conservation, restoration and, where applicable, development of:

- Humid and wet dune slacks
- Typical structures and functions
- Undisrupted hydrological conditions, in particular for the groundwater balance
- Nutrient-poor conditions
- Dynamic dune and dune slack formation processes
- Mosaic complexes with other characteristic habitats and contact habitats, such as waters, humid heaths, dune heaths or scrub

TMAP

The following targets have been defined for more mature coastal dunes (Wadden Sea Quality Status Report 2004):

- Increasing presence of complete natural vegetation development
- Favourable conditions for migrating and breeding birds

2.3 Threats

Current impairments according to the information given in the national report submitted under Article 17 of the Habitats Directive for the reporting period 2001 - 2006 (BMU, 2008):

- New afforestation, forest regrowth, planting of allochthonous species
- Residential areas, urbanisation, urban sprawl (dispersed settlement)
- Transport routes and installations
- Sport and recreational facilities, camping and caravan sites
- Other recreational and tourism activities
- Trampling (visitor overload)
- Other forms of environmental pollution, human interventions and uses
- Alteration of the hydrological regime and functions
- Dykes, embankments, artificial beaches
- Coastal protection measures (tetrapods, hard structures)
- Immigration of new species

2.4 Spatial allocation

As the definition indicates, humid dune slacks are located only on the margins of coastal waters. The conservation status of humid dune slacks that are part of a dune complex (see the comments in section 4.1) is dependent on their spatial allocation when they are located in a vulnerable position and surges/high tides occur.

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

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

The foundation for the network is provided by the Concept for the Monitoring of the Conservation Status of Habitat Types and Species under the Habitats Directive in Germany (*Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland*), which was drawn up at the federal level for terrestrial habitat types on the basis of the results of an R+D project (SACHTELEBEN and BEHRENS, 2009).

Under the concept, a total census is to be carried out for this habitat type.

North Sea

On the North Sea coast, there are nine sites in Lower Saxony and six sites in Schleswig-Holstein. This habitat type is not found in the Hamburg area.

Baltic Sea

On the Baltic Sea coast, there are eight sites in Schleswig-Holstein and eight sites in Mecklenburg-Western Pomerania.

The sites that have been delimited are geographically/topographically discrete areas, as a rule islands or parts of islands and/or sections of coast oriented towards adjacent seaward water bodies (subject to the WFD).

On the specification of the monitoring network, see section 3.2.

3.2 Monitoring activities

North Sea and Baltic Sea

Surveying and Evaluation of Humid Dune Slacks (2190)

Methods:

The target variables are the status quo and trends in:

- Occurrence, range and area
- Typical species spectrum and ecological structural diversity

Representative sites may be selected from among humid dune slacks that display similar biotic and abiotic conditions. The sampling strategy must make it possible to obtain evidence about the ecological status of the habitat type, which is usually composed of various biotopes.

Use should be made of basic monitoring with loose grids, provided the species and habitats are in a good, stable situation, but selective monitoring (more intensive sampling) should be undertaken as soon as problems come to light in order to survey the scale of the problems and facilitate an adequate response.

Monitoring concept:

Area-wide surveying of the overall extent of the habitat type to ascertain its range and area. Selection and permanent specification of representative sample plots or transects for the detailed surveying of qualitative parameters (see below).

Basic monitoring and specification of the monitoring network

An area-wide survey of the habitat type is carried out in the course of the six-year reporting cycle in order to assess its range and area as characteristic variables. Both on the North Sea and on the Baltic Sea, this survey is carried out using aerial images and the biotope mapping keys issued by the Länder and/or the TMAP typology and the associated mapping key. The primary goal is the uniform identification and assessment of HD habitat types across the different Länder.

Depending on what is known about the changes in certain areas, it may be sufficient to carry out reviews of known sites based on aerial images in alternation with area-wide terrestrial surveys. This is a matter to be decided by the relevant specialist authorities at Land level.

Representative survey areas along the transects are established and surveyed or the transects surveyed in their entirety in order to record characteristic qualitative variables (characteristic structures, functions and species, impairments) (for general comments on the specification of survey areas, see SACHTELEBEN and BEHRENS, 2009). Where a total census is to be carried out, each dune heath site must be covered by at least one transect. The transects or the survey areas within the transects represent the various sites in terms of their manifestation, variability and conservation status (selection criteria: topographical, geomorphological and habitat situation, structure and size). The data that are required for the assessment of the criteria mentioned in the assessment matrix (see below) are gathered in these areas. The number of transects and survey areas specified within the transects must be

sufficient to adequately depict the variance of the manifestations and conservation statuses at the qualitative and quantitative levels. As a rule, the individual sites should not be less than approx. 1,000 m²

As a rule, the transects run at right angles to the coastline in order to optimise the representation of the sequence of habitats. Depending on the size of the site or the complexes of sites, the survey areas may range in size from single, permanent plots to several large, spatially specified survey areas along transects and transects in their entirety. Where appropriate, it is also possible for full-coverage site surveying to be implemented at small sites along the mainland coasts on the North Sea and Baltic Sea. The 'structured walks' procedure may be deployed in this context. Where appropriate, the transects encompass all the habitat types found on the relevant section of coast or island. This is the best way of incorporating natural transitions and dynamic changes into the assessment.

The survey areas along the transects or the transects themselves are to be plotted using GPS with the highest possible positional accuracy (approx. 1 - 5 m), so that they can be surveyed again when the mapping procedure is repeated. Where the sites change to a considerable extent, the boundaries of the transects or survey areas must be adjusted as necessary. The length of the transects may be increased in areas where a habitat type is expanding or decreased where a habitat type is shrinking.

Frequency:

The frequency for the surveys of the transects or survey areas ranges from once a year to once per reporting period. In the latter case, the survey cycle is to be intensified as necessary, depending on the actual dynamics of change at the specific location. The concrete specification of the transects and survey areas and, where appropriate, the specification of a different survey cycle are matters to be decided by the relevant specialist authorities at Land level.

The results from the individual survey areas are compiled and the conservation status of the habitat type for the relevant biogeographical region assessed, incorporating the results of the area-wide mapping, in order to carry out an overall assessment of the habitat type site in question (see SACHTELEBEN and BEHRENS, 2009).

Parameter:

- Dune and vegetation structure
- Impairment and threat factors
- Impairments (according to standardised list)
- Manifestation of the biotope complex (representation of all characteristic vegetation types/successional stages)
- Plant species, area of the habitat type
- Range and area
- TMAP units and biotope types according to the mapping keys issued by the Länder (for range and area)
- Typical spectrum of species and vegetation types, structural diversity

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea and Baltic Sea

Title

HD Habitat Type - Humid Dune Slacks (2190)

Authors

(KRAUSE et al., 2008)

Guideline:

HD

Comments:

Assessment Matrix Drawn up by the Federation-Länder Working Group on Habitats Directive Reporting Obligations for Marine and Coastal Sites within the Framework Laid Down in the 'Pinneberg Schema' (Updated: 27 May 2008)

The assessment matrices for the marine and coastal habitat types listed in Annex I of the Habitats Directive form the basis for the performance of the monitoring and reporting obligations established in Articles 11 and 17 (further to which, the standards specified in European Commission, DG Environment, 2006 are applied).

The typical species listed in the matrices under the assessment criterion 'Completeness of the typical species inventory' are intended to reflect the functional structure of a habitat type, since this is not evaluated in any other way. Given that 'typical species' may occur in various habitat types, they are not to be equated with 'characteristic species'.

The species lists set out here are not exhaustive. It remains possible for items to be added and deleted in order to take account of more recent findings. The species lists must be adjusted to specific regional circumstances for the mapping of the sites in question. The threshold values cited for some habitat and impairment parameters also have to be specified particularly for individual regions as appropriate.

The inventories of typical species for the habitat types represent one of the main ecological assets that have to be assessed in order to comply with the obligations placed on Member States with regard to reporting to the EU. Nevertheless, although they are to be assessed as indicators of the conservation status of the habitat type in question, no separate species monitoring needs to be carried out on individual typical species. Information on the presence of the species is sufficient for this purpose. Optionally, abundances, trends, etc. may be obtained to support the assessment.

<u>On the assessment of coastal dunes (Habitat Types 2110-2190):</u>

Coastal dunes are divided into nine different habitat types that correspond to particular successional stages and frequently form biotope complexes made up of intimate mosaics, which are (ideally) characterised by highly dynamic habitat and vegetation development.

In dune areas where there is nothing to restrict the natural processes of accumulation and erosion, it is therefore neither expedient nor actually possible to conserve a particular dune habitat type at a particular place in a particular condition. Rather, favourable conservation status is dependent on the dynamic processes that constantly create new pioneer stages (embryonic shifting dunes or young, still salt-influenced dune slacks) within a larger area, while in other parts of the area the successional process moves on to more mature stages, which may culminate in woodlands (Habitat Type 2180), provided the process is not set in train once again by extreme events. If the different manifestations of all habitat types relevant in a particular case constantly occur to a sufficient degree in a natural dune area of this kind (making up more or less varying proportions of the total area), the habitat type of this complex is to be assigned the conservation status A. In view of this, it would not be expedient to assess individual dunes on their own. Rather, coherent dune areas with uniform general conditions should be delimited in the course of the initial surveys. These delimited areas then form the assessment units. Such assessment areas should encompass a maximum of one island or the dune area of a particular section of coast. In the course of the monitoring, the proportions and manifestations of the habitat types within these assessment areas can then be determined and summarily assessed using suitable procedures (e.g. evaluation of aerial images in combination with the terrestrial surveying of transects).

Dune areas where natural dynamics are severely restricted - mostly due to coastal protection measures - should be examined separately. As a matter of principle, progressive ageing of dunes is to be found in these places. Even where an individual dune or dune slack still exhibits typical, well developed vegetation (e.g. a lichen-rich grey hair-grass grey dune sward or a reedbed), downgrading is necessary if more immature stages in the relevant area are receding or have now disappeared on account of the general anthropogenic conditions. If only more mature developmental stages were still to occur, the

consequence would be the loss of particular habitat types (e.g. 2110, embryonic shifting dunes) or a considerable proportion of a habitat type's typical species, unless this were countered by means of management measures intended to restore pioneer stages or development measures intended to restore natural dynamics. The less mature stages are accorded particular significance because they provide habitats for most of the species that occur only or predominately on coastal dunes. By contrast, the most mature stages of coastal dunes and dune slacks (including *Calluna* heath, forests, grey willow scrub), at least those in which well investigated species groups are found, host only a few coastal specialists, if any.

Accordingly, closer examination of the individual habitat types is required in heavily anthropogenically influenced dune areas, in which respect it is not the individual dune, but the coherent overall complex of the habitat type in question that should be assessed here as well. Only in this way can the representation of all developmental stages be taken appropriately into consideration.

The habitat type profiles and assessment matrices drawn up by the specialist authorities at Land level are used to supplement the assessment of the manifestations of this habitat type that are specific to the physical region/Land in question.

Assessment scheme

5 Quality assurance

Comments

The participating institutions are striving to build up and introduce uniform QA standards.

5.1 Monitoring institutions

- LLUR
- LUNG
- NLWKN
- NPV SH
- NLPV NI

5.2 Guidance documents

- Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; *Official Journal*; L 206: pp. 7-50.
- Drachenfels, O.v.; 2004: *Kartierschlüssel für Biotoptypen in Niedersachsen unter besonderer Berücksichtigung der nach § 28a und § 28b NNatG geschützten Biotope sowie der Lebensraumtypen von Anhang I der FFH-Richtlinie: Stand März 2004: 6., völlig überarb. Aufl.*; Naturschutz Landschaftspfl. Niedersachs.; A/4; 240 pp.
- European Commission, DG Environment, 2006: *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes & Guidelines: Final Draft.*
- European Commission, DG Environment, 2007: *Interpretation Manual of European Union Habitats.*
- Krause, J., Drachenfels, O.v., Ellwanger, G., Farke, H., Fleet, D.M., Gemperlein, J., Heinicke, K., Herrmann, C., Klugkist, H., Lenschow, U., Michalczyk, C., Narberhaus, I., Schröder, E., Stock, M. and K. Zscheile (2008): *Bewertungsschemata für die Küsten- und Meereslebensraumtypen der FFH-Richtlinie: Ergebnis Bund-Länder-Arbeitskreis "FFH-Berichtspflichten Meere und Küsten": Stand: 27.05.2008.*
- Sachteleben, J., Behrens, M. et al., 2009: *Konzept zum Monitoring des Erhaltungszustandes von Lebensraumtypen und Arten der FFH-Richtlinie in Deutschland: Ergebnisse des F+E-Vorhabens "Konzeptionelle Umsetzung der EU-Vorgaben zum FFH-Monitoring und Berichtspflichten in Deutschland" (Stand: November 2008)*; commissioned by the Federal Agency for Nature Conservation.
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Hinweise zur Bewertung des Erhaltungszustandes von FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Juli 2007.*
- State Agency for Nature and Environment of the Land Schleswig-Holstein, 2007: *Steckbriefe und Kartierhinweise für FFH-Lebensraumtypen in Schleswig-Holstein: 1. Fassung, Mai 2007.*
- TMAP Manual

5.3 Standards

- To be specified by the Quality Assurance Panel at the UBA as necessary.

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

HD Habitat Type 2190 must be monitored in accordance with the methodology described in sections 3 and 4.

7.2 Working steps required

Priorities

- Data management: GIS and Land databases, future BfN data sheet, updating of Standard Data Forms
- Conclusive compilation of current habitat type site shapes (at present, still not available for Mecklenburg-Vorpommern)
- Conclusive specification of transects/survey areas in Schleswig-Holstein (carried out as part of or directly following the current, ongoing HD habitat type monitoring or the extended Schleswig-Holstein TMAP procedure; due to be concluded in 2012) and Mecklenburg-Vorpommern
- Evaluation with a view to management plans and/or necessary measures

Footnotes

(1) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

(2) Article 11 (monitoring of habitats and all species listed in Annexes II, IV and V) imposes the obligation to monitor the conservation status of all habitats (listed in Annex I) of Community interest. In consequence, this provision is not limited to NATURA 2000 areas, but habitat types outside the Habitat Directive areas are also to be included in the monitoring as appropriate.

(3) Article 17 governs the performance of reporting obligations. The Habitats Directive imposes binding obligations concerning the submission of reports to the European Commission (Articles 11 and 17).

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