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Monitoring programme: Biodiversity - Seabed habitats
Programme topic: Benthic community species distribution and abundance

SUB-PROGRAMME: HARDBOTTOM SPECIES

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REGIONAL COORDINATION

The monitoring of this sub-programme is: **not coordinated**.

The monitoring of macroalgae follows national methods which have been developed for national EU WFD assessments. Development of a basis for coordinated assessment, including monitoring, focused on identifying parameters and indicators which are not already bound by national legislation and also on identifying the most relevant spatial scales for assessments in the marine area. The development took place under the HELCOM CORESET II project and considered parameters included various specific macroalgae parameters as well as blue mussel coverage. When core indicators are developed, the discrepancies in methods and elements monitored by countries need to be considered.

PURPOSE OF MONITORING (Q4K)

Follow up of progress towards:

Baltic Sea Action Plan (BSAP)	Segments	Biodiversity Eutrophication
	Ecological objectives	Clear water Natural distribution and occurrence of plants and animals Natural landscapes and seascapes Thriving and balanced communities of plants and animals
Marine strategy framework directive (MSFD)	Descriptors	D1 Biodiversity D2 Non-indigenous species D5 Eutrophication D6 Seafloor integrity
	Criteria (Q5a)	1.1 Species distribution 1.4 Habitat distribution 1.5 Habitat extent 1.7 Ecosystem structure 2.1. Abundance and state characterisation of non-indigenous species 5.3 Indirect effects of nutrient enrichment 6.1 Physical damage, having regard to substrate characteristics
	Features (Q5c)	Biological features: A description of the biological communities associated with the predominant seabed and water column habitats. Information on angiosperms, macro-algae and invertebrate bottom fauna, including species composition, biomass and annual/seasonal variability.
Other relevant legislation (Q8a)	Habitats Directive Water Framework Directive	

Assessment of: (Q4k)

State/Impacts	X	temporal trends, spatial distribution, status classification
Pressures		
Human activities causing the pressures		
Effectiveness of measures		

Scale of data aggregation for assessments: (Q10a)

HELCOM assessment unit Level 1: Baltic Sea	
HELCOM assessment unit Level 2: Subbasin	
HELCOM assessment unit Level 3: Subbasins with coastal and offshore division	
HELCOM assessment unit Level 4: Subbasins with coastal WFD division	X

MONITORING CONCEPTS TABLE

Coordination	Elements <u>Q9a (Q5c)</u>	Parameter <u>Q9a (Q5c)</u>	Method <u>Q9c, Q9d</u>	QA/QC <u>Q9e, 9f</u>	Frequency <u>Q9h, 9i</u>	Spatial resolution <u>Q9g, 9i</u>	Link to HELCOM core indicators	Link to MSFD GES characteristics <u>Q5b</u>	Spatial scope <u>Q4i</u>	Monitoring started <u>Q4h</u>	CPs monitoring
National	Macroalgae	Areal extent of habitat	National methods	National	Yearly	Covering a couple of waterbodies per water type (by several transects per waterbody) PL: No monitoring in coastal waters, only open sea.	-	1.5.1 Habitat area	WFD CW		DE, DK, EE, FI, LT, PL, SE

National	Blue mussels	Areal extent of habitat	National methods	National	Yearly	Covering a couple of waterbodies per water type (by several transects per waterbody)	-	1.5.1 Habitat area	WFD CW		FI, SE
National	Blue mussels	Population size (abundance)	National methods	National	Yearly	Selected mussel reefs per sub-basin	-	1.6.2 Relative abundance and/or biomass	WFD CW		FI, SE
National	Blue mussels	Size of individuals (length or weight)	National methods	National	Yearly	Selected mussel reefs per sub-basin	<u>Population structure of long-lived macrozoobenthic species</u>	1.6.2 Relative abundance and/or biomass 6.2.4 Parameters describing the characteristics of the size spectrum of the benthic community	WFD CW		FI
National	Macroalgae (Fucus)	Species distributional range/pattern	Assessment of depth limits by video recording or diving along transects	National	Yearly	One or several "samples" (=locations) per WFD water body with 5 replicates per sample/location	Lower depth distribution limit of macrophyte species (pre-core indicator)	1.4.1 Distributional range 1.4.2 Distributional pattern	WFD CW	2006	DE, FI, SE, EE, DK, LV, LT

National	Macroalgae	Species abundance (biomass)	Sampling by divers in certain depth levels and assessment of species specific dry weight in the laboratory	National	Yearly	One or several "samples" (=locations) per WFD water body with 5 replicates per sample/location	Lower depth distribution limit of macrophyte species (pre-core indicator)	1.6.2 Relative abundance and/or biomass	WFD CW	2006	DE
National	Macroalgae	Species abundance (numbers or cover)	Sampling by divers in certain depth levels and assessment of species specific cover in the field	National	Yearly	One or several "samples" (=locations) per WFD water body with 5 replicates per sample/location	Lower depth distribution limit of macrophyte species (pre-core indicator)	1.5.1 Habitat area	WFD CW	2006	DE, FI, SE, EE, DK, LV, LT
National	Macroalgae	Species present (whole community or selected species only)	Sampling by divers in certain depth levels and assessment of species specific cover estimations in the field and dry weight in the laboratory	National	Yearly	One or several "samples" (=locations) per WFD water body with 5 replicates per sample/location	Extent of benthic biotopes (pre-core indicator)	1.6.2 Relative abundance and/or biomass	WFD CW	2006	DE, FI

National	All macrozoobentos species	Species present, abundance and biomass	Sampling by divers	National	4 yearly and other 12 at least once per 6 years	-	WFD water bodies	1995	EE
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Brief description of monitoring

Detailed information on monitoring frequency and spatial resolution has not yet been collected from all countries but will be added.

Element / parameter

Macroalgae/Areal extent (lower depth limit of the selected species, such as *Fucus vesiculosus*, *Furcellaria lumbricalis*, *Polysiphonia fucoides*, *Rhodomela confervoides* and *Phyllophora pseudoceranoides*).

Macroalgae/Species abundance (numbers or cover)

Macroalgae/Species abundance (biomass)

Macroalgae/Species present (whole community or selected species only)

Method

Depth limit is determined in line transects at selected locations along depth gradient (across the currently existing depth limit of the species, not the whole depth range) with a towed video sledge or by divers.

Cover estimations are made by divers at fixed stations, at specified depth intervals (densest part of the vegetation biotope) in an area of 20-25m² and within frames (0.25m²), frames with 5 replicates per location. The cover estimate includes all species (or other relevant taxa) that are identifiable under water and for non-identifiable species samples are collected. The cover estimate can exceed 100% if the macrophytes grow in several layers.

Biomass- and taxonomic determinations are done in laboratories on samples collected by divers at fixed stations at specified depth intervals (densest parts of the vegetation biotope) in frames (0.0625m²) with 5 replicates per location.

In Poland sampling by divers is done at fixed stations (points), where three replicate samples are collected with (0.25 m²) per each depth interval.

QA/QC

National

Frequency	Varies between countries: Yearly (79%, n=277, DE, DK, EE, LT, PL, SE) Every 3rd year (13%, n=46, EE, FI, LT, SE) Every 6th year (6%, n=21, DK) Twice per year (2%, n=7, PL).
Spatial Scope	-
Spatial resolution	As hard substrate is scarce along the German coastline, often only one or two locations with macroalgae in sufficient density per water body, the rationale is often to sample where sampling is possible. In the northern Baltic Sea, hard-bottom monitoring sites are designed to cover at least the coastal water types, where representative water bodies are selected (3-5 replicate sites per monitoring area). In Finnish waters the sites are selected to include bladder wrack, red algae and blue mussels (if feasible). In Poland there is no monitoring in coastal waters, only in the open sea areas. There are only 2 transect locations in transitional waters and 4 locations in open sea stations.
Element / parameter	Blue mussel/Areal extent (optimum depth limit of the blue mussel zone) Blue mussel/Population abundance (density) Blue mussels (size of individuals)
Method	In Finland monitoring is planned to start in 2015. The method for abundance has been suggested, while the method for size measurements is under development.
QA/QC	National
Frequency	In Finland 1-2/6 years
Spatial Scope	WFD CW
Spatial resolution	In the northern Baltic Sea, hard-bottom monitoring sites are designed to cover selected sites along the coast. In the Finnish waters, the sites are selected to include bladder wrack, red algae and blue mussels (if available).

ASSESSMENT REQUIREMENTS

Monitoring requirements and gaps

Monitoring is to be carried out to fulfill assessment requirements of HELCOM ecological objectives that are specified through HELCOM core indicators. The requirements on monitoring can include number of stations, the sampling frequency and replication.

Monitoring requirements

An appropriate assessment of the state of the hard-bottom fauna and flora along the coast requires monitoring in several coastal waterbodies. Each coastal waterbody should be monitored with a few transects, in order to decrease the impact of natural variation in the assessment.

In sites meant for status classification, it is enough to carry out the monitoring every 3rd year. In sites meant for detecting temporal change, annual monitoring is required in order to create reliable time series data. For macroalgae, monitoring is to be carried out during the summer months, the exact timing depending on biogeographical characteristics (may be different in the southern and northern areas of the Baltic Sea).

The small-scale spatial variation in substrate can potentially affect the measurement outcome, and has to be considered in monitoring of macroalgae depth limits, thus an area of circa 25-49 sqm should optimally be considered in a monitoring location. This can be achieved, for example, by diving horizontally along the lower depth limit of the selected species.

Gaps

The main gap in current monitoring of macroalgae is the lack of common methodology for sampling and analysis. The areal coverage of the macroalgae monitoring is quite extensive and the temporal frequency of the sampling is adequate.

Blue mussel monitoring is not done in many countries and there has been no coordination in the method development. In Finland, blue mussel monitoring will start in 2015 in selected sites where macroalgae are currently monitored.

In Germany only a few sites are suitable to assess the depth limit of macrophyte species on hardbottom substrates and the substrate availability is not sufficient to follow the depth gradient in sufficient detail. Suitable sites may exist outside the WFD CW area (1sm zone) in low numbers, but they are currently not monitored although monitoring is planned. Species composition, biomass and cover are not monitored continuously along the depth gradient, only at certain depth intervals, which were identified as appropriate for WFD purposes.

Adequacy for assessment of GES (Q5d)

Monitoring should provide adequate data and information to enable the periodic assessment of environmental status, and distance from and progress towards GES as required by MSFD under Article 9 and 11.

Adequate data? Yes for eutrophication. No for biodiversity

Established methods for assessment? Yes

Adequate understanding of GES?	Yes
Adequate capacity to perform assessments?	Yes for eutrophication. No for biodiversity

Assessment of natural variability (Q5e)

Quantitative. For hard-bottom parameters correlation with water quality parameters is high, however the data resolution produced through monitoring may in some instances be too low to produce statistically significant correlations. Hard bottom parameters can be used to assess GES both from the perspective of biodiversity and eutrophication. The effect of natural variability on the assessment confidence can be reduced by sampling in 3-5 replicate sites close to each other within a same coastal water type. The macroalgae indicators are intercalibrated with neighbouring countries (within same water types) in order to have comparable status classification.

DATA PROVIDERS AND ACCESS

Data access point	National databases
Data type (Q10c)	
Data availability (Q10c)	
Data access (Q10c)	
INSPIRE standard (Q10c)	
When will data become available? (Q10c)	
Data update frequency (Q10c)	Every 6th years
Describe how the data and information from the programmewill be made accessible to the EC/EEA	
Contact points in the Contracting parties	Contact point to national monitoring programmes will be added
Has the data been used in HELCOM assessments?	Partly

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