

HELCOM Monitoring Programme topic

Seabed habitat distribution and extent

Programme:

Habitat-forming species and substrates

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a. Metadata on monitoring strategies and monitoring programmes

a.1 Responsible HELCOM subsidiary body

Please indicate the relevant expert group/network if available, otherwise the responsible HELCOM Working Group.

Permanent Groups	
<input type="checkbox"/>	Gear – Group on the Implementation of the Ecosystem Approach
<input type="checkbox"/>	Maritime – Maritime Working Group
<input type="checkbox"/>	Pressure – Working Group on Reduction of Pressures from the Baltic Sea Catchment Area
<input type="checkbox"/>	Response – Response Working Group
<input checked="" type="checkbox"/>	State and Conservation – Working Group on the State of the Environmental and Nature Conservation
Time-limited Groups	
<input type="checkbox"/>	Agri – Group on Sustainable Agricultural Practices
<input type="checkbox"/>	Fish – Group on Ecosystem-based Sustainable Fisheries
<input type="checkbox"/>	HELCOM-VASAB MSP WG - Joint HELCOM-VASAB Maritime Spatial Planning Working Group
Expert Groups	
<input type="checkbox"/>	AIS EWG – Expert Working Group for Mutual Exchange and Deliveries of AIS data
<input type="checkbox"/>	EN Hazardous Substances – Expert Network on hazardous substances
<input type="checkbox"/>	EN Marine Litter – Expert Network on Marine Litter
<input type="checkbox"/>	EN Noise – Expert Network on Underwater Noise
<input type="checkbox"/>	ESA – Expert Network on Economic and Social Analyses
<input type="checkbox"/>	EWG OWR – Expert Working Group on Oiled Wildlife Response
<input type="checkbox"/>	EWG SHORE – Expert Working Group on Response on the Shore
<input type="checkbox"/>	Green Technology and Alternative Fuels Platform for Shipping
<input type="checkbox"/>	HELCOM/OSPAR TG BALLAST – Joint HELCOM/OSPAR Task Group on Ballast Management Convention Exemptions
<input checked="" type="checkbox"/>	EN Benthic – Expert Network on benthic habitats

- IN-EUTROPHICATION - Intersessional Network on Eutrophication
- IWGAS – Informal Working Group on Aerial Surveillance
- JWG Bird – HELCOM-OSPAR-ICES Joint Working Group on Seabirds
- MORS EG – Expert group on monitoring of radioactive substances in the Baltic Sea
- PRF Cooperation Platform – Cooperation Platform on Port Reception Facilities in the Baltic Sea
- SAFE NAV – Group of Experts on Safety of Navigation
- SUBMERGED – Expert Group on Environmental Risks of Hazardous Submerged Objects

a.2 Regional Cooperation (Regional Cooperation)

The monitoring of this programme is:

- Fully coordinated
- Partly coordinated. Indicate missing component(s):
- Coordinated monitoring is under development. Indicate by which group/project and by when a recommendation on coordinated monitoring can be expected.

Common monitoring guidelines and quality assurance programme only partly in HELCOM COMBINE manual and also national. Common database is missing.

b. Monitoring strategies

b.1 Descriptor

The programme supports the following obligatory MSFD Monitoring Strategies. Tick one or more relevant boxes.

- D1** Biodiversity
- D2** Non-indigenous Species
- D3** Commercial fish and shellfish
- D4** Food webs
- D5** Eutrophication
- D6** Seafloor integrity
- D7** Hydrographical conditions
- D8** Contaminants

- D9** Contaminants in seafood
- D10** Marine litter
- D11** Energy including underwater noise

b.2 BSAP segments

The sub-programme serves the following BSAP segments. Tick one or more relevant boxes.

- Eutrophication
- Hazardous substances
- Biodiversity
- Maritime activities

b.3 Monitoring strategy description

Monitoring strategy : Full description on monitoring of some of the relevant parameters, such as macrozoobenthos and state of the substrate, available in HELCOM COMBINE manual. Detailed information on monitoring frequency and spatial resolution from all countries is not known.

b.4 BSAP Ecological objectives

Choose only the most relevant option(s). Tick one or more boxes below.

Eutrophication	<input type="checkbox"/> Concentrations of nutrients close to natural levels <input type="checkbox"/> Clear water <input type="checkbox"/> Natural level of algal blooms <input checked="" type="checkbox"/> Natural distribution and occurrence of plants and animals <input type="checkbox"/> Natural oxygen levels
Hazardous substances	<input type="checkbox"/> Concentrations of hazardous substances close to natural levels <input type="checkbox"/> All fish safe to eat <input type="checkbox"/> Healthy wildlife <input type="checkbox"/> Radioactivity at pre-Chernobyl levels
Biodiversity	<input checked="" type="checkbox"/> Natural landscapes and seascapes <input type="checkbox"/> Thriving and balanced communities of plants and animals <input type="checkbox"/> Viable populations of species
Maritime activities	<input type="checkbox"/> No illegal pollution <input type="checkbox"/> Safe maritime traffic without accidental pollution <input type="checkbox"/> Efficient response capability

- No introductions of alien species from ships
- Minimum air pollution from ships
- Zero discharges from offshore platforms

b.5 Gaps in monitoring

In relation to the GES criteria addressed, indicate when sufficient monitoring was in place or by when sufficient coverage will be in place ([Coverage_GEScriteria](#))

- Adequate monitoring was in place in 2014
- Adequate monitoring was in place by 2018
- Adequate monitoring is in place by July 2020
- Adequate monitoring will be in place by 2024
- Monitoring is not being put in place for this descriptor due to a low risk
- Monitoring for this descriptor is not relevant

Description of the implementation gaps and plans to complete the establishment and implementation of this descriptor monitoring strategy ([Gaps_Plans](#)):

There is very little monitoring data on the distribution of habitat-forming species currently available, whereas station or transect-based monitoring of the specific species is carried out in all the Baltic Sea countries. There are available modelling results for distribution of different habitat forming species. Periodically mapping the bathymetry and distribution and condition of geological substrates is included in monitoring/inventory programmes in all the countries. No commonly agreed monitoring methods are in place, which target the extent and quality of the benthic habitats in the Baltic Sea. The drop-video technique in combination with traditional methods used for characterizing benthic communities (grab sampling, SCUBA diving) could be a promising and cost-effective solution at least for certain habitats. The need for joint and standardized monitoring methods/guidelines in the whole Baltic Sea area should be discussed and agreed, considering the diversity of natural conditions, environmental gradients as well as different reporting obligations.

c. Monitoring programmes

c.1 Purpose of monitoring

c.1a Assessment purpose in general

The programme supports the assessment of:

Tick the relevant box.

Temporal trends	Spatial distribution	State classification
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

The **programme** supports the assessment of: ([MonitoringPurpose](#)).

Note that the answer to this question will be decisive for whether to answer upcoming questions e.g.

upcoming questions on pressures should only be answered if the monitoring is defined as supporting the assessment of pressures.

Tick the relevant boxes.

Environmental state and impacts	Pressures in the marine environment	Pressures at source (land-based, riverine, sea-based ¹ and atmospheric sources)	Human activities causing the pressures	Effectiveness of measures
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If this is selected fill in the following questions: c.1b	If this is selected fill in the following questions: c.1c, d	If this is selected fill in the following questions: c.1c, d	If this is selected fill in the following questions: c.1c, d	If this is selected fill in the following questions: c.1c, d

Give any other monitoring purpose e.g. if the programmes include supporting parameters for other monitoring programmes

Supporting HD assessments of marine habitats types.

For questions 1b-1d, select when applicable for the sub-programme, the link from the Reporting on the 2020 update of Article 11 for the Marine Strategy Framework Directive ([MSFD Guidance Document 17, 2020](#)) (*Features*) to:

- Ecosystem components (relevant for monitoring and assessment for Article 8(1a) for D1C2-C5, D3, D4, D6C3-C5, D7C2)
- Pressures and impacts in the marine environment (relevant for monitoring and assessment for Article 8(1b) for D1C1, D2, D5, D6C1-C2, D7C1, D8, D9, D10, D11)
- Pressure inputs to the marine environment (relevant for monitoring and assessment for Article 10)
- Uses and human activities (relevant for monitoring and assessment for Article 8(1c) and 13)

c.1b • Ecosystem components (Features)

Choose only the most relevant option(s). Tick one or more boxes below.

Theme	Sub-theme	Label feature
Species	<input type="checkbox"/> Birds	<input type="checkbox"/> Grazing birds
		<input type="checkbox"/> Wading birds
		<input type="checkbox"/> Surface-feeding birds
		<input type="checkbox"/> Pelagic-feeding birds
		<input type="checkbox"/> Benthic-feeding birds
	<input type="checkbox"/> Mammals	<input type="checkbox"/> Small toothed cetaceans
		<input type="checkbox"/> Deep-diving toothed cetaceans

¹ Sea-based 'Pressures at source' refers to monitoring pressures from sea-based activities where the monitoring is directly at the activity rather than at a distance from or time period after it is generated by the activity (e.g. D1 incidental by-catch when fishing, D2 ballast water discharges, D6 use of bottom fishing gear, D8 contaminant discharges and pollution events from a vessel or pipeline, D11 impulsive sound events from a vessel or platform).

	<input type="checkbox"/> Baleen whales
	<input type="checkbox"/> Seals
<input type="checkbox"/> Reptiles	<input type="checkbox"/> Turtles
<input type="checkbox"/> Fish	<input type="checkbox"/> Coastal fish
	<input type="checkbox"/> Pelagic shelf fish
	<input type="checkbox"/> Demersal shelf fish
	<input type="checkbox"/> Deep-sea fish
	<input type="checkbox"/> Commercially exploited fish and shellfish
<input type="checkbox"/> Cephalopods	<input type="checkbox"/> Coastal/shelf cephalopods
	<input type="checkbox"/> Deep-sea cephalopods
Habitats	<input checked="" type="checkbox"/> Benthic habitats
	<input checked="" type="checkbox"/> Benthic broad habitats
	<input checked="" type="checkbox"/> Other benthic habitats
	<input type="checkbox"/> Pelagic habitats
	<input type="checkbox"/> Pelagic broad habitats
	<input type="checkbox"/> Other pelagic habitats
Ecosystems	<input type="checkbox"/> Physical and hydrological characteristics
	<input type="checkbox"/> Chemical characteristics
	<input type="checkbox"/> Ecosystems, including food webs
	<input type="checkbox"/> Coastal ecosystems
	<input type="checkbox"/> Shelf ecosystems
	<input type="checkbox"/> Oceanic/deep-sea ecosystems

c.1c • Pressures and impacts in the marine environment (Features)

Choose only the most relevant option(s). Tick one or more boxes below.

Theme	Label: Feature
Biological	<input type="checkbox"/> Newly introduced non-indigenous species
	<input type="checkbox"/> Established non-indigenous species
	<input type="checkbox"/> Species affected by incidental by-catch
Physical and hydrological	<input type="checkbox"/> Hydrographical changes
	<input checked="" type="checkbox"/> Physical disturbance to seabed
	<input checked="" type="checkbox"/> Physical loss of the seabed
Substances, litter and energy	<input type="checkbox"/> Eutrophication
	<input type="checkbox"/> Contaminants – non UPBT substances
	<input type="checkbox"/> Contaminants – UPBT substances
	<input type="checkbox"/> Contaminants – in seafood
	<input type="checkbox"/> Adverse effects on species or habitats

- Acute pollution events
- Litter in the environment
- Impulsive sound in water
- Continuous low frequency sound

c.1d • Pressure inputs to the marine environment (Features)

Theme	Label: Feature
Biological	<input type="checkbox"/> Input or spread of non-indigenous species
	<input type="checkbox"/> Input of microbial pathogens
	<input type="checkbox"/> Input of genetically modified species and translocation of native species
	<input type="checkbox"/> Loss of, or change to, natural biological communities due to cultivation of animal or plant species
	<input type="checkbox"/> Disturbance of species (e.g. where they breed, rest and feed) due to human presence
	<input type="checkbox"/> Extraction of, or mortality/injury to, wild species (by commercial and recreational fishing and other activities)
Substances, litter and energy	<input type="checkbox"/> Input of nutrients — diffuse sources, point sources, atmospheric deposition
	<input type="checkbox"/> Input of organic matter — diffuse sources and point sources
	<input type="checkbox"/> Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) — diffuse sources, point sources, atmospheric deposition, acute events
	<input type="checkbox"/> Input of litter (solid waste matter, including micro-sized litter)
	<input type="checkbox"/> Input of anthropogenic sound (impulsive, continuous)
	<input type="checkbox"/> Input of other forms of energy (including electromagnetic fields, light and heat)
	<input type="checkbox"/> Input of water — point sources (e.g. brine)

c.1e • Uses and human activities (Features)

Choose only the most relevant option(s). Tick one or more boxes below.

Theme	Label: Feature
Physical restructuring of rivers, coastline or seabed (water management)	<input type="checkbox"/> Land claim
	<input type="checkbox"/> Canalisation and other watercourse modifications
	<input type="checkbox"/> Coastal defence and flood protection
	<input type="checkbox"/> Offshore structures (other than for oil/gas/renewables)
	<input type="checkbox"/> Restructuring of seabed morphology, including dredging and depositing of

	materials
Extraction of non-living resources	<input type="checkbox"/> Extraction of minerals (rock, metal ores, gravel, sand, shell)
	<input type="checkbox"/> Extraction of oil and gas, including infrastructure
	<input type="checkbox"/> Extraction of salt
	<input type="checkbox"/> Extraction of water
Production of energy	<input type="checkbox"/> Renewable energy generation (wind, wave and tidal power), including infrastructure
	<input type="checkbox"/> Non-renewable energy generation
	<input type="checkbox"/> Transmission of electricity and communications (cables)
Extraction of living resources	<input type="checkbox"/> Fish and shellfish harvesting (professional, recreational)
	<input type="checkbox"/> Fish and shellfish processing
	<input type="checkbox"/> Marine plant harvesting
	<input type="checkbox"/> Hunting and collecting for other purposes
Cultivation of living resources	<input type="checkbox"/> Aquaculture — marine, including infrastructure
	<input type="checkbox"/> Aquaculture — freshwater
	<input type="checkbox"/> Agriculture
	<input type="checkbox"/> Forestry
Transport	<input type="checkbox"/> Transport infrastructure
	<input type="checkbox"/> Transport — shipping
	<input type="checkbox"/> Transport — air
	<input type="checkbox"/> Transport — land
Urban and industrial uses	<input type="checkbox"/> Urban uses
	<input type="checkbox"/> Industrial uses
	<input type="checkbox"/> Waste treatment and disposal
Tourism and leisure	<input type="checkbox"/> Tourism and leisure infrastructure
	<input type="checkbox"/> Tourism and leisure activities
Security/defence	<input type="checkbox"/> Military operations (subject to Article 2(2))
Education and research	<input type="checkbox"/> Research, survey and educational activities

c.2 Other legislation

The sub-programme links with the following other international legislation ([OtherPoliciesConventions](#)). Tick one or more relevant boxes.

Bathing Water Directive

Common Fisheries Policy and Data Collection Framework

- Habitats Directive
- Birds Directive
- Nitrates Directive
- Urban Waste Water Treatment Directive
- Water Framework Directive
- OSPAR Convention
- Trilateral Wadden Sea Convention
- Other, Specify:

c.3 Implementation of Regional Cooperation **(RegionalCooperation_implementation)**

Indicate the level of implementation by selecting one of the following:

- No coordination
- Agreed data collection methods
- Common monitoring strategy (spatial and temporal design of programme)
- Coordinated data collection (delivered separately by each country)
- Joint data collection (multinational delivery using same platform and/or algorithms)

c.4 Monitoring concepts

Monitoring concepts table²:

Current means of coordination	Features or elements	Parameter	Method	QA/QC	Frequency ³	Spatial resolution (density) of sampling	Link to HELCOM core indicators ⁴	Spatial scope	Monitoring started (year)	CPs monitoring ⁵
	Elements (Features) (Features_enum)	Parameters (Parameter) (ParametersOther)	MonitoringMethod (Monitoring Method) MonitoringMethodOther)	(Free text)	MonitoringFrequency	(ProgrammeDescription)	(RelatedIndicator) (RelatedIndicator_name)	(SpatialScope)	(TemporalScope)	(CountryCode_Enum)
National	Macroalgae (e.g. <i>Fucus vesiculosus</i>)	ABU/COV: Species abundance (numbers or coverage)	Drop-video mapping and verifying transects by divers.	National	Yearly, some areas once per 6 years	All WFD coastal water bodies		WFD CW	2014	EE
National	Angiosperms (<i>Zostera and others</i>)	DIST-R: Species distributional range/ pattern	Assessment of depth limits by video recording or diving along transects	National	Yearly (in rotation)	4 areas in each of the 5 sub-basins		Coastal	2021	FI
HELCOM	HabBenOther (Other benthic habitats) Soft-bottom macrofauna	ABU: Population size (abundance)	HEL-032 HELCOM COMBINE manual, Part C, Annex C8	HELCOM COMBINE manual	Yearly	3-10 offshore stations per subbasin and 3-10 stations per coastal water type.		EEZ, coastal waters	1965	All HELCOM Contracting Parties

² Needed codelists can be found on 2020 update of Article 11 for the Marine Strategy Framework Directive (MSFD Guidance Document 17, 2020).

³ The option "Different for each country - see MORE overview" refers to the [overview](#) carried out in 2013

⁴ Give the name of HELCOM core indicators that are based on the monitoring parameter.

⁵ Provide information on the Contracting Partie(s) that are monitoring the parameter.

Current means of coordination	Features or elements	Parameter	Method	QA/QC	Frequency ³	Spatial resolution (density) of sampling	Link to HELCOM core indicators ⁴	Spatial scope	Monitoring started (year)	CPs monitoring ⁵
National	Geological substrate	COV, EXT, DIST-P Coverage, extent and pattern						EEZ		All HELCOM Contracting Parties
National	Substrate condition	Abundance of drifting macroalgae on coarse and sandy substrates	drop video		yearly	Circa 20 sites (4 in 5 subbasins)		coastal waters	2021	FI

PARAMETER

Element/Parameter pair
Macroalgae / Species abundance
Angiosperms / Species distribution
Soft-bottom macrofauna / Population size
Macroalgae by drop videos / Macroalgae by drop videos
Angiosperms by drop videos / Angiosperms by drop videos

METHOD (MonitoringDetails)

Macroalgae / Species abundance
In Estonia macroalagae species abundance is monitored according to WFD method (Torn&Martin, 2011).
Angiosperms / Species distribution
In Estonia species distribution of angiosperms is monitored according to WFD method (Torn&Martin, 2011).
Soft-bottom macrofauna / Population size
Drop video mapping, diving and the HELCOM COMBINE manual. Information on SE methods currently being used in the national MSFD Article 11 report (monitoring programme Vegetationsklädda bottnar): https://www.havochvatten.se/hav/samordning--fakta/miljoovervakning/marin-miljoovervakning/vegetationskladda-bottnar.html
Macroalgae by drop videos / Macroalgae by drop videos
In Finland the monitoring has not started, however baseline mapping of the macroalgae distribution by drop video, diver transects and modeling has been carried out since 2004. The method for monitoring has been suggested.
In Denmark baseline mapping og reef sites (HD type 1170) and “bubbling reefs” (HD type: 1180) have been conducted in Natura 2000 sites including overall vegetation parameters (combined acoustic mapping with use of dropvideo, ROV and divers). No regular monitoring.
In Estonia drop camera observations are included in standard WFD monitoring procedure (Torn&Martin, 2011). Drop cameras are used also in monitoring of benthic habitats (Torn et al 2017).
In the German EEZ reefs are being monitored which includes macroalgae by drop camera and video transects and dredging
Angiosperms by drop videos / Angiosperms by drop videos

<p>In Finland the monitoring will start in 2021 in all the 5 subbasins (4 areas in each) by yearly rotating cycle. In addition, baseline mapping of the angiosperm distribution by drop video, diver transects and modeling has been carried out since 2004.</p> <p>In Denmark there are no regular monitoring but scientific projects working to test the applicability of drones, satellite images.</p> <p>In Estonia drop camera observations are included in standard WFD monitoring procedure (Torn&Martin, 2011). Drop cameras are used also in monitoring of benthic habitats (Torn et al 2017).</p> <p>In Germany there is a regular monitoring in inner and coastal waters</p>
<p>Substrate condition</p>
<p>In Finland substrate condition is evaluated from drop videos estimating abundance of loose-lying macroalgae on sandy and coarse substrates.</p>

QA/QC

<p>Macroalgae / Species abundance</p> <p>National (EE)</p>
<p>Angiosperms / Species distribution</p>
<p>Soft-bottom macrofauna / Population size</p> <p>National and HELCOM COMBINE manual</p>
<p>Macroalgae by drop videos / Macroalgae by drop videos</p> <p>National</p>
<p>Angiosperms by drop videos / Angiosperms by drop videos</p> <p>National</p>

FREQUENCY

Frequency

<p>Macroalgae / Species abundance</p> <p>Estonia: yearly in 43 coastal waterbodies sites, at least once in 6 years in another 134 sites</p>
<p>Angiosperms / Species distribution</p> <p>Estonia: yearly in 43 coastal waterbodies sites, at least once in 6 years in another 134 sites</p>
<p>Soft-bottom macrofauna / Population size</p> <p>Estonia – once per year</p>

Estonia: yearly in 4 areas, at least once in 6 years in another 12 areas; monitoring started in 1995.

Germany: yearly also video transects and dredging

Macroalgae by drop videos / Macroalgae by drop videos

Estonia: yearly in 4 coastal waterbodies, areas, at least once in 6 years in another 14 areas; use of drop videos started in 2005.

Germany: yearly also video transects and dredging

Angiosperms by drop videos / Angiosperms by drop videos

Finland: in ca 20 areas (4 in each 5 subbasins), monitored in yearly rotation.

Germany yearly (different methods)

Substrate condition

Finland: in ca 20 areas (4 in each 5 subbasins), monitored in yearly rotation.

SPATIAL SCOPE

Spatial Scope

Macroalgae / Species abundance and/or distribution

Estonia – transects in coastal WB-s

Angiosperms / Species distribution

Estonia – transects in coastal WB-s

Soft-bottom macrofauna / Population size

-

Macroalgae by drop videos / Macroalgae by drop videos

Mainly territorial waters but also in offshore areas (in German offshore waters Angiosperms do not occur)

Angiosperms by drop videos / Angiosperms by drop videos and other methods

Mainly territorial waters but also in offshore areas

Substrate condition

Finland: coastal waters

SPATIAL RESOLUTION (DENSITY) OF SAMPLING

Spatial resolution

Macroalgae / Species abundance

Angiosperms / Species distribution
Soft-bottom macrofauna / Population size
Estonia: spatial resolution - coastal waters WFD division - at least 3 transects in each surface water body
Germany according to WFD in coastal waters and MSFD offshore + Habitats Directive on sandbanks and reefs
Macroalgae by drop videos / Macroalgae by drop videos
Estonia: spatial resolution - coastal waters WFD division - at least 3 transects in each surface water body
Angiosperms by drop videos / Angiosperms by drop videos
Finland: in ca 20 areas (4 in each 5 subbasins), several transects per area.
Substrate condition
Finland: in ca 20 areas (4 in each 5 subbasins), several transects per site.

Provide considerations for the scale of aggregation of data for an indicator-based assessment Tick one or more relevant boxes below:

- HELCOM assessment unit Level 4: Subbasins with coastal WFD division
- HELCOM assessment unit Level 3: Subbasins with coastal and offshore division
- HELCOM assessment unit Level 2: Subbasin
- HELCOM assessment unit Level 1: Baltic Sea
- MSFD Region
- EU
- Other (specify)
- Unknown

c.5 Monitoring and assessment requirements

Monitoring requirements:

The HELCOM core indicators directly linked to the sub-programme are still at a pre-core indicator stage of development. Creating specifications for monitoring requirements is a part of the development work of the indicators.

The monitoring of habitat-forming species and substrates focuses on covering wide sea areas with the purpose of providing data on extent and distribution. However, the data can also include parameters that enable state classification based on the condition of habitat-forming species. Monitoring of extent and distribution of habitat-forming species and substrates, require spatial methods such as drop video, aerial surveys (aeroplanes, satellites, remote helicopters), multiple diving transects, randomized grab samples, multibeam sonars or different combinations of these methods. As the primary focus of monitoring is not in detecting temporal change but spatial status

(at certain time intervals), the monitoring frequency can be every 3 to 6 years.

The quality and quantity dimensions of habitat change are traditionally considered when assessing the status of habitats. There are hardly any operational methods used to estimate the quantity of a selected habitat that would also be useful for monitoring habitat extent (area or volume). To monitor habitat extent and describe the change of habitat extent or size statistically, methods that fully cover selected areas, delineate habitat boundaries, or use a large number of point observations may be used. There are several examples of methods that could qualify for this type of monitoring, including those applied on seagrass meadows being repeatedly mapped using aqua scope, video or remote sensing.

Although benthic monitoring for macrofauna and macrophytes is carried out within the COMBINE monitoring, no coordinated monitoring for habitat distribution and extent currently exists. Joint methods and guidelines will need to be agreed upon to provide data for the core indicators.

Adequacy for assessment of GES:

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 Article 11.

	Yes	No
Adequate data?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Established methods for assessment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Adequate understanding of GES?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Adequate capacity to perform assessments?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Assessment of natural variability

Qualitative. The borders of habitats and biotopes are naturally a continuum, which must be considered when assessing the distribution, extent and pattern of a biotope.

c.6 Data providers and access

From which database the data can be made available? Tick the relevant boxes below:

HELCOM HELCOM PLC HELCOM MORS
COMBINE

Other:

If the previous answer is "Other" please fill in the next questions (In case the answer is a HELCOM database, the HELCOM Secretariat will do it)

Data type Tick the relevant boxes below:

- Unprocessed/raw Data
- Processed Data sets
- Data Products
- Modelled data

Data management: General description of data management ([DataManagement](#), Free text)

What method/mechanism will be used to make the data available? Tick the relevant boxes below and provide location ([DataAccess](#)):

- Providing URL to view data:
- Providing URL to download data:
- Provide location of data in national data centre: [Click here to enter text.](#)
- Provide location of data in international data centre (e.g. RSC, ICES, EEA, EMODnet):

When will the data first become available? ([DataPublicationDate](#))

Enter the date of reporting, or even a past date if desired (MM/YYYY):

EE: March next year after monitoring.

How frequently are the data expected to be updated thereafter? Tick the relevant box below:

- | | |
|--|--|
| <input type="checkbox"/> Every 6 years | <input type="checkbox"/> Weekly |
| <input type="checkbox"/> Every 3 years | <input type="checkbox"/> Daily |
| <input type="checkbox"/> Every 2 years | <input type="checkbox"/> Hourly |
| <input checked="" type="checkbox"/> Yearly | <input type="checkbox"/> Continually |
| <input type="checkbox"/> 6-monthly | <input type="checkbox"/> One-off |
| <input type="checkbox"/> 3-monthly | <input type="checkbox"/> As needed |
| <input type="checkbox"/> Monthly | <input type="checkbox"/> Other (specify) |
| <input type="checkbox"/> 2-weekly | <input type="checkbox"/> Unknown |

List providing contact points in the Contracting Parties

EE: Estonian Environment Agency

Has the data been used or is it planned to be used in HELCOM assessments? Tick the relevant box below:

Yes No

Select if data is used in the following Baltic Sea Environment Fact Sheets (BSEF) Tick the relevant boxes below:

Biodiversity

- Abundance and distribution of marenzelleria species
- Abundance and distribution of Round goby
- Abundance and distribution of the Zebra mussel
- Biopollution level index
- Observed non-indigenous and cryptogenic species in the Baltic Sea
- Population development of Great Cormorant
- Population development of Sandwich Tern
- Population development of Southern Dunlin
- Population Development of White-tailed Sea Eagle
- Temporal development of Baltic coastal fish communities and key species

Eutrophication

- Bacterioplankton growth
- Chlorophyll-a concentrations, temporal variations and regional differences from satellite remote sensing
- Cyanobacteria biomass
- Cyanobacterial blooms in the Baltic Sea
- Cyanobacteria bloom index
- Impacts of invasive phytoplankton species on the Baltic Sea ecosystem in 1980-2008
- Nitrogen atmospheric deposition to the Baltic Sea
- Nitrogen emissions to the air in the Baltic Sea area
- Phytoplankton biomass and species succession
- Shifts in the Baltic Sea summer phytoplankton communities in 1992-2006
- Spatial distribution of the winter nutrient pool
- Unusual phytoplankton event

Hazardous substances

- Atmospheric deposition of heavy metals on the Baltic Sea
- Atmospheric deposition of PCDD/Fs on the Baltic Sea
- Atmospheric emissions of heavy metals in the Baltic Sea region
- Atmospheric emissions of PCDD/Fs in the Baltic Sea region

- Cesium-137 in Baltic Sea sediments
- Temporal trends in contaminants in Herring in the Baltic Sea in the period 1980-2010
- Emissions from Baltic Sea shipping
- Illegal discharges of oil in the Baltic Sea
- Liquid discharges of Cs-137, Sr-90 and Co-60 into the Baltic Sea
- Trace metal concentrations and trends in Baltic surface and deep waters

Hydrography

- Development of Sea Surface Temperature in the Baltic Sea
- Hydrography and Oxygen in the Deep Basins
- Ice season
- Total and regional runoff to the Baltic Sea
- Water Exchange between the Baltic Sea and the North Sea, and conditions in the Deep Basins
- Wave climate in the Baltic Sea

c.7 MSFD Criteria (GES Criteria)

Choose only the most relevant option(s). Tick one or more boxes below.

Descriptor 1	<p><input type="checkbox"/> D1C1 – Primary:</p> <p>The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long- term viability is ensured.</p> <p>Member States shall establish the threshold values for the mortality rate from incidental by-catch per species, through regional or subregional cooperation.</p> <p><input type="checkbox"/> D1C2 – Primary:</p> <p>The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.</p> <p>Member States shall establish threshold values for each species through regional or subregional cooperation, taking account of natural variation in population size and the mortality rates derived from D1C1, D8C4 and D10C4 and other relevant pressures. For species covered by Directive 92/43/EEC, these values shall be consistent with the Favourable Reference Population values established by the relevant Member States under Directive 92/43/EEC.</p> <p><input type="checkbox"/> D1C3 – Primary for commercially- exploited fish and cephalopods and secondary for other species:</p> <p>The population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity, and survival rates) of the species are indicative of a healthy population which is not adversely affected due to anthropogenic pressures.</p> <p>Member States shall establish threshold values for specified characteristics of each species through regional or subregional cooperation, taking account of adverse effects</p>
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	<p>on their health derived from D8C2, D8C4 and other relevant pressures.</p> <p><input type="checkbox"/> D1C4 – Primary for species covered by Annexes II, IV or V to Directive 92/43/EEC and secondary for other species:</p> <p>The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions.</p> <p>Member States shall establish threshold values for each species through regional or subregional cooperation. For species covered by Directive 92/43/EEC, these shall be consistent with the Favourable Reference Range values established by the relevant Member States under Directive 92/43/EEC.</p> <p><input checked="" type="checkbox"/> D1C5 – Primary for species covered by Annexes II, IV and V to Directive 92/43/EEC and secondary for other species:</p> <p>The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species.</p> <p><input type="checkbox"/> D1C6 – Primary</p> <p>The condition of the habitat type, including its biotic and abiotic structure and its functions (e.g. its typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), is not adversely affected due to anthropogenic pressures.</p> <p>Member States shall establish threshold values for the condition of each habitat type, ensuring compatibility with related values set under Descriptors 2, 5 and 8, through regional or subregional cooperation.</p>
Descriptor 2	<p><input type="checkbox"/> D2C1 – Primary:</p> <p>The number of non-indigenous species which are newly introduced via human activity into the wild, per assessment period (6 years), measured from the reference year as reported for the initial assessment under Article 8(1) of Directive 2008/56/EC, is minimised and where possible reduced to zero.</p> <p>Member States shall establish the threshold value for the number of new introductions of non-indigenous species, through regional or subregional cooperation.</p> <p><input type="checkbox"/> D2C2 – Secondary:</p> <p>Abundance and spatial distribution of established non-indigenous species, particularly of invasive species, contributing significantly to adverse effects on particular species groups or broad habitat types.</p> <p><input type="checkbox"/> D2C3 – Secondary:</p> <p>Proportion of the species group or spatial extent of the broad habitat type which is adversely altered due to non-indigenous species, particularly invasive non-indigenous species.</p> <p>Member States shall establish the threshold values for the adverse alteration to species groups and broad habitat types due to non-indigenous species, through regional or subregional cooperation.</p>
Descriptor 3	<p><input type="checkbox"/> D3C1 – Primary:</p> <p>The Fishing mortality rate of populations of commercially-exploited species is at or below levels which can produce the maximum sustainable yield (MSY). Appropriate</p>

	<p>scientific bodies shall be consulted in accordance with Article 26 of Regulation (EU) No 1380/2013.</p> <p><input type="checkbox"/> D3C2 — Primary:</p> <p>The Spawning Stock Biomass of populations of commercially-exploited species are above biomass levels capable of producing maximum sustainable yield. Appropriate scientific bodies shall be consulted in accordance with Article 26 of Regulation (EU) No 1380/2013.</p> <p><input type="checkbox"/> D3C3 — Primary:</p> <p>The age and size distribution of individuals in the populations of commercially-exploited species is indicative of a healthy population. This shall include a high proportion of old/large individuals and limited adverse effects of exploitation on genetic diversity.</p> <p>Member States shall establish threshold values through regional or subregional cooperation for each population of species in accordance with scientific advice obtained pursuant to Article 26 of Regulation (EU) No 1380/2013.</p>
Descriptor 4	<p><input type="checkbox"/> D4C1 — Primary:</p> <p>The diversity (species composition and their relative abundance) of the trophic guild is not adversely affected due to anthropogenic pressures.</p> <p>Member States shall establish threshold values through regional or subregional cooperation.</p> <p><input type="checkbox"/> D4C2 — Primary:</p> <p>The balance of total abundance between the trophic guilds is not adversely affected due to anthropogenic pressures.</p> <p>Member States shall establish threshold values through regional or subregional cooperation.</p> <p><input type="checkbox"/> D4C3 — Secondary:</p> <p>The size distribution of individuals across the trophic guild is not adversely affected due to anthropogenic pressures.</p> <p>Member States shall establish threshold values through regional or subregional cooperation.</p> <p><input type="checkbox"/> D4C3 — Secondary (to be used in support of criterion D4C2, where necessary):</p> <p>Productivity of the trophic guild is not adversely affected due to anthropogenic pressures.</p> <p>Member States shall establish threshold values through regional or subregional cooperation.</p>
Descriptor 5	<p><input type="checkbox"/> D5C1 — Primary:</p> <p>Nutrient concentrations are not at levels that indicate adverse eutrophication effects.</p> <p>The threshold values are as follows:</p> <ul style="list-style-type: none"> (a) in coastal waters, the values set in accordance with Directive 2000/60/EC; (b) beyond coastal waters, values consistent with those for coastal waters under Directive 2000/60/EC. Member States shall establish those values through

regional or subregional cooperation

D5C2 — Primary:

Chlorophyll a concentrations are not at levels that indicate adverse effects of nutrient enrichment.

The threshold values are as follows:

(c) in coastal waters, the values set in accordance with Directive 2000/60/EC;

(d) beyond coastal waters, values consistent with those for coastal waters under Directive 2000/60/EC. Member States shall establish those values through regional or subregional cooperation.

D5C3 — Secondary:

The number, spatial extent and duration of harmful algal bloom events are not at levels that indicate adverse effects of nutrient enrichment.

D5C4 — Secondary:

The photic limit (transparency) of the water column is not reduced, due to increases in suspended algae, to a level that indicates adverse effects of nutrient enrichment.

The threshold values are as follows:

(e) in coastal waters, the values set in accordance with Directive 2000/60/EC;

(f) beyond coastal waters, values consistent with those for coastal waters under Directive 2000/60/EC. Member States shall establish those values through regional or subregional cooperation.

D5C5 — Primary (may be substituted by D5C8):

The concentration of dissolved oxygen is not reduced, due to nutrient enrichment, to levels that indicate adverse effects on benthic habitats (including on associated biota and mobile species) or other eutrophication effects.

The threshold values are as follows:

(g) in coastal waters, the values set in accordance with Directive 2000/60/EC;

(h) beyond coastal waters, values consistent with those for coastal waters under Directive 2000/60/EC. Member States shall establish those values through regional or subregional cooperation.

D5C6 — Secondary:

The abundance of opportunistic macroalgae is not at levels that indicate adverse effects of nutrient enrichment.

The threshold values are as follows:

(a) in coastal waters, the values set in accordance with Directive 2000/60/EC;

(b) should this criterion be relevant for waters beyond coastal waters, values consistent with those for coastal waters under Directive 2000/60/EC. Member States shall establish those values through regional or subregional cooperation.

D5C7 — Secondary:

The species composition and relative abundance or depth distribution of macrophyte

	<p>communities achieve values that indicate there is no adverse effect due to nutrient enrichment including via a decrease in water transparency, as follows:</p> <ul style="list-style-type: none"> (a) in coastal waters, the values set in accordance with Directive 2000/60/EC; (b) should this criterion be relevant for waters beyond coastal waters, values consistent with those for coastal waters under Directive 2000/60/EC. Member States shall establish those values through regional or subregional cooperation. <p><input type="checkbox"/> D5C8 – Secondary: (except when used as a substitute for D5C5):</p> <p>The species composition and relative abundance of macrofaunal communities, achieve values that indicate that there is no adverse effect due to nutrient and organic enrichment, as follows:</p> <ul style="list-style-type: none"> (a) in coastal waters, the values for benthic biological quality elements set in accordance with Directive 2000/60/EC; (b) beyond coastal waters, values consistent with those for coastal waters under Directive 2000/60/EC. Member States shall establish those values through regional or subregional cooperation.
Descriptor 6	<p><input type="checkbox"/> D6C1 – Primary:</p> <p>Spatial extent and distribution of physical loss (permanent change) of the natural seabed.</p> <p><input type="checkbox"/> D6C2 – Primary:</p> <p>Spatial extent and distribution of physical disturbance pressures on the seabed.</p> <p><input checked="" type="checkbox"/> D6C3 – Primary:</p> <p>Spatial extent of each habitat type which is adversely affected, through change in its biotic and abiotic structure and its functions (e.g. through changes in species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), by physical disturbance.</p> <p>Member States shall establish threshold values for the adverse effects of physical disturbance, through regional or subregional cooperation.</p> <p><input checked="" type="checkbox"/> D6C4 – Primary:</p> <p>The extent of loss of the habitat type, resulting from anthropogenic pressures, does not exceed a specified proportion of the natural extent of the habitat type in the assessment area.</p> <p>Member States shall establish the maximum allowable extent of habitat loss as a proportion of the total natural extent of the habitat type, through cooperation at Union level, taking into account regional or subregional specificities.</p> <p><input checked="" type="checkbox"/> D6C5 – Primary:</p> <p>The extent of adverse effects from anthropogenic pressures on the condition of the habitat type, including alteration to its biotic and abiotic structure and its functions (e.g. its typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), does not exceed a specified proportion of the natural extent of the habitat type in the assessment area.</p>

	<p>Member States shall establish threshold values for adverse effects on the condition of each habitat type, ensuring compatibility with related values set under Descriptors 2, 5, 6, 7 and 8, through cooperation at Union level, taking into account regional or subregional specificities. Member States shall establish the maximum allowable extent of those adverse effects as a proportion of the total natural extent of the habitat type, through cooperation at Union level, taking into account regional or subregional specificities.</p>
<p>Descriptor 7</p>	<p><input type="checkbox"/> D7C1 – Secondary:</p> <p>Spatial extent and distribution of permanent alteration of hydrographical conditions (e.g. changes in wave action, currents, salinity, temperature) to the seabed and water column, associated in particular with physical loss(1) of the natural seabed.</p> <p><input type="checkbox"/> D7C2 – Secondary:</p> <p>Spatial extent of each benthic habitat type adversely affected (physical and hydrographical characteristics and associated biological communities) due to permanent alteration of hydrographical conditions.</p>
<p>Descriptor 8</p>	<p><input type="checkbox"/> D8C1 – Primary:</p> <p>Within coastal and territorial waters, the concentrations of contaminants do not exceed the following threshold values:</p> <ul style="list-style-type: none"> (a) for contaminants set out under point 1(a) of criteria elements, the values set in accordance with Directive 2000/60/EC; (b) when contaminants under point (a) are measured in a matrix for which no value is set under Directive 2000/60/EC, the concentration of those contaminants in that matrix established by Member States through regional or subregional cooperation; (c) for additional contaminants selected under point 1(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects. Member States shall establish these concentrations through regional or subregional cooperation, considering their application within and beyond coastal and territorial waters. <p>Beyond territorial waters, the concentrations of contaminants do not exceed the following threshold values:</p> <ul style="list-style-type: none"> (a) for contaminants selected under point 2(a) of criteria elements, the values as applicable within coastal and territorial waters; (b) for contaminants selected under point 2(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects. Member States shall establish these concentrations through regional or subregional cooperation. <p><input type="checkbox"/> D8C2 – Secondary:</p> <p>The health of species and the condition of habitats (such as their species composition and relative abundance at locations of chronic pollution) are not adversely affected due to contaminants including cumulative and synergetic effects.</p> <p>Member States shall establish those adverse effects and their threshold values through</p>

	<p>regional or subregional cooperation.</p> <p><input type="checkbox"/> D8C3 – Primary: The spatial extent and duration of significant acute pollution events are minimised.</p> <p><input type="checkbox"/> D8C4 – Secondary (to be used when a significant acute pollution event has occurred): The adverse effects of significant acute pollution events on the health of species and on the condition of habitats (such as their species composition and relative abundance) are minimised and, where possible, eliminated.</p>
Descriptor 9	<p><input type="checkbox"/> D9C1 – Primary: The level of contaminants in edible tissues (muscle, liver, roe, flesh or other soft parts, as appropriate) of seafood (including fish, crustaceans, molluscs, echinoderms, seaweed and other marine plants) caught or harvested in the wild (excluding fin-fish from mariculture) does not exceed:</p> <p>(a) for contaminants listed in Regulation (EC) No 1881/2006, the maximum levels laid down in that Regulation, which are the threshold values for the purposes of this Decision;</p> <p>(b) for additional contaminants, not listed in Regulation (EC) No 1881/2006, threshold values, which Member States shall establish through regional or subregional cooperation.</p>
Descriptor 10	<p><input type="checkbox"/> D10C1 – Primary: The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment.</p> <p>Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities.</p> <p><input type="checkbox"/> D10C2 – Primary: The composition, amount and spatial distribution of micro-litter on the coastline, in the surface layer of the water column, and in seabed sediment, are at levels that do not cause harm to the coastal and marine environment.</p> <p>Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities.</p> <p><input type="checkbox"/> D10C3 – Secondary: The amount of litter and micro-litter ingested by marine animals is at a level that does not adversely affect the health of the species concerned. Member States shall establish threshold values for these levels through regional or subregional cooperation.</p> <p><input type="checkbox"/> D10C4 – Secondary: The number of individuals of each species which are adversely affected due to litter, such as by entanglement, other types of injury or mortality, or health effects. Member States shall establish threshold values for the adverse effects of litter, through regional or subregional cooperation.</p>

Descriptor 11	<input type="checkbox"/> D11C1 – Primary: The spatial distribution, temporal extent, and levels of anthropogenic impulsive sound sources do not exceed levels that adversely affect populations of marine animals. Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities. <input type="checkbox"/> D11C2 – Primary: The spatial distribution, temporal extent and levels of anthropogenic continuous low-frequency sound do not exceed levels that adversely affect populations of marine animals. Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities.
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d. References

Make a list of cited references and literature for further supportive information.

HELCOM (2013) HELCOM Underwater Biotope and habitat classification system (HELCOM HUB)

Torn, Kaire; Martin, Georg (2011). Assessment method for the ecological status of Estonian coastal waters based on submerged aquatic vegetation. In: Brebbia, C.A.; Beriatos, E. (Ed.). Sustainable Development and Planning V (443–452).. Southampton: WIT Press. (WIT Transactions on Ecology and the Environment; 150).10.2495/SDP110371.

Torn, K.; Herkül, K.; Martin, G.; Oganjan, K. (2017). Assessment of quality of three marine benthic habitat types in northern Baltic Sea. Ecological Indicators, 73, 772–783.[10.1016/j.ecolind.2016.10.037](https://doi.org/10.1016/j.ecolind.2016.10.037).

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