



## Baltic Marine Environment Protection Commission

Working Group on the State of the Environment and Nature  
Conservation

Hamina, Finland, 6-10 May 2019

STATE & CONSERVATION  
10-2019

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<b>Document title</b>	Draft HELCOM monitoring sub-programme on beach litter
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<b>Category</b>	DEC
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**This document has been revised based on input from STATE & CONSERVATION 10-2019.**

### Background

STATE & CONSERVATION 5-2016 considered and agreed on the proposed procedure for reviewing and updating the HELCOM Monitoring Manual and the engagement of HELCOM expert groups, network and projects (document 2MA-3, table 1), and agreed that exhaustive reviews and revisions of the Manual should be carried out every six years, next time being in 2019. Intermittent revisions to the manual can be proposed by, or requested from, expert bodies, as needed ([Outcome of STATE & CONSERVATION 5-2016](#), para. 2MA. 3).

In such a procedure the EN-Marine Litter is proposed as responsible expert body of the review of the litter monitoring programme. Also the [Terms of Reference of the EN-Marine Litter \(2019-2021\)](#), as approved by HOD 55-2018, requires the network to “Develop a regionally coordinated monitoring sub-programme on macrolitter characteristics and abundance/volume”.

HELCOM litter monitoring programme has two sub-programmes: macrolitter characteristics and abundance/volume and microlitter particle abundance and characteristics.

The HELCOM EN-Marine Litter took note that the sub-programme on macrolitter combines beach, water surface, seafloor and biota. The network discussed further work on this sub-programme, and agreed to approach each of these compartments separately, starting with the drafting of a monitoring sub-programme for the beach compartment where HELCOM work is more advanced. The network agreed to submit a proposal for a monitoring sub-programme on beach litter to STATE & CONSERVATION 10-2019 for consideration ([Memo of the meeting of the HELCOM EN-Marine Litter](#), 17 January 2019).

This document contains the draft monitoring sub-programme on beach litter elaborated using information as contained in the pre-core indicator report on beach litter, the beach litter monitoring guidelines, and the section on marine litter contained in the State of the Baltic Sea report. Denmark, Finland, Germany and Sweden have provided input to the document.

### Action requested

The Meeting is invited to agree on the regional monitoring sub-program on beach litter and on the amendments of the Monitoring Manual accordingly.

## Annex II

# HELCOM Monitoring Programme topic

## Litter

### Contents

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## a. General information on programme topic and sub-programmes

### Programme topic: Litter

This program monitors the amount and composition of marine litter in different compartments. Macrolitter is monitored on the beach and seafloor, whereas microlitter is monitored in the water column and/or in sediments.

### Sub-programme 1: Macrolitter characteristics and abundance/volume – Beach litter

The monitoring of the number of litter items per 100 m beach segment in the Baltic Sea sub-regions is done by each Contracting Party although coordinated by EN-Marine Litter.

## b. Responsible HELCOM subsidiary body

Subsidiary body: Pressure WG, supported by the Expert Network (EN-Marine Litter).

## Sub-programme 1 – Macrolitter characteristics and abundance/volume – Beach litter

The monitoring of this sub-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.

The coordinated regional monitoring program can begin after necessary decisions on the proposal submitted by the EN-Marine Litter to STATE & CONSERVATION 10-2019.

## c. Purpose of monitoring

### c.1 Monitoring programmes

The sub-programme supports the following obligatory MSFD Monitoring Programmes. Tick one or more relevant boxes.

- D10** Litter

## c.2 BSAP segments

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

- Eutrophication
- Hazardous substances
- Biodiversity
- Maritime activities

Commented [A1]: DE: This should also be included (entanglement, ingestions...)

## c.3 Other legislation

The sub-programme links with the following other international legislation (Q8a). Tick one or more relevant boxes.

- Bathing Water Directive
- Common Fisheries Policy – 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: MSFD D10C1

## c.4 Purpose of monitoring

### c.4a Assessment purpose in general

The sub-programme supports the assessment of:

Tick the relevant box.

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

The **sub-programme** supports the assessment of: (Q4k).

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.

State/Impacts	Pressures	Human activities	Effectiveness of
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		causing the pressures	measures
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
If this is selected fill in the following questions: c.4b, c, d	If this is selected fill in the following questions: c.4b, c, e, f	If this is selected fill in the following questions: c.4b, c, e, f	If this is selected fill in the following questions: c.4b, c, e, f

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

Beach litter monitoring will be used to measure the effectiveness of measures when sufficient data (spatial as well as temporal) is available.

**Deleted:** Beach monitoring will be used to measure the effectiveness of measures when sufficient data (spatial as well as temporal) is available.

For questions 4b-4f, select when applicable for the sub-programme, the link to:

- BSAP ecological objectives, MSFD GES criteria (Q5a)
- characteristics, pressures and impacts from MSFD Annex III (Q5c)
- activities (Q7a,7b)

#### *c.4b BSAP Ecological objectives*

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

##### **Eutrophication**

- Concentrations of nutrients close to natural levels
- Clear water
- Natural level of algal blooms
- Natural distribution and occurrence of plants and animals
- Natural oxygen levels

##### **Hazardous substances**

- Concentrations of hazardous substances close to natural levels
- All fish safe to eat
- Healthy wildlife
- Radioactivity at pre-Chernobyl levels

##### **Biodiversity**

- Natural landscapes and seascapes
- Thriving and balanced communities of plants and animals
- Viable populations of species

##### **Maritime activities**

- No illegal pollution
- Safe maritime traffic without accidental pollution
- Efficient response capability
- No introductions of alien species from ships

- 
- Minimum air pollution from ships
  - Zero discharges from offshore platforms
- 

***c.4c MSFD GES Criteria (Q5a)***

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

- Descriptor 10
- 10.1. Characteristics of litter in the marine and coastal environment
  - 10.2. Impacts of litter on marine life

***c.4d Characteristics from MSFD Annex III Table 1.***

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

- 
- |                                |   |
|--------------------------------|---|
| Physical and chemical features | <ul style="list-style-type: none"><li><input type="checkbox"/> Topography and bathymetry of the seabed</li><li><input type="checkbox"/> annual and seasonal temperature regime and ice cover, current velocity, upwelling, wave exposure, mixing characteristics, turbidity, residence time</li><li><input type="checkbox"/> spatial and temporal distribution of salinity</li><li><input type="checkbox"/> spatial and temporal distribution of nutrients (DIN, TN, DIP, TP, TOC) and oxygen</li><li><input type="checkbox"/> pH, pCO<sub>2</sub> profiles or equivalent information used to measure marine acidification</li></ul>  |
| Habitat types                  | <ul style="list-style-type: none"><li><input type="checkbox"/> The predominant seabed and water column habitat type(s) with a description of the characteristic physical and chemical features, such as depth, water temperature regime, currents and other water movements, salinity, structure and substrata composition of the seabed</li><li><input type="checkbox"/> identification and mapping of special habitat types, especially those recognised or identified under Community legislation (the Habitats Directive and the Birds Directive) or international conventions as being of special scientific or biodiversity interest</li><li><input type="checkbox"/> habitats in areas which by virtue of their characteristics, location or strategic importance merit a particular reference. This may include areas subject to intense or specific pressures or areas which merit a specific protection regime.</li></ul> |
| Biological features            | <ul style="list-style-type: none"><li><input type="checkbox"/> 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</li><li><input type="checkbox"/> information on angiosperms, macro-algae and invertebrate bottom fauna, including species composition, biomass and annual/seasonal variability</li><li><input type="checkbox"/> information on the structure of fish populations, including the abundance, distribution and age/size structure of the populations</li><li><input type="checkbox"/> a description of the population dynamics, natural and actual range and status of species of marine mammals and reptiles occurring in the marine region or subregion</li></ul>                                      |
-

- 
- a description of the population dynamics, natural and actual range and status of species of seabirds occurring in the marine region or subregion
  - a description of the population dynamics, natural and actual range and status of other species occurring in the marine region or subregion which are the subject of Community legislation or international agreements
  - an inventory of the temporal occurrence, abundance and spatial distribution of nonindigenous, exotic species or, where relevant, genetically distinct forms of native species, which are present in the marine region or subregion
- 

- Other features
- A description of the situation with regard to chemicals, including chemicals giving rise to concern, sediment contamination, hotspots, health issues and contamination of biota (especially biota meant for human consumption),
  - a description of any other features or characteristics typical of or specific to the marine region or subregion
- 

***c.4e Pressures and impacts, MSFD Annex III Table 2 (Q5c)***

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

- Other physical disturbance
- Underwater noise (e.g. from shipping, underwater acoustic equipment),
  - Marine litter.
- 

***c.4f Activities (Q7a, 7b)***

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

- Energy production: wind
  - Energy production: oil gas extraction
  - Extraction of living resources: seaweed
  - Extraction of living resources: genetic resources
  - Extraction of living resources: Fisheries
  - Extraction of non-living resources: Marine mining
  - Extraction of non-living resources: Dredging
  - Extraction of non-living resources: Desalination
  - Food production Aquaculture
  - Man-made structures: land claim
  - Man-made structures: Port
  - Man-made structures: submarine cables
  - Man-made structures: Offshore structures
  - Military: Defence operation
  - Military: dumping
  - Recreation: tourism
-

- Research and Survey: research
- Transport: shipping
- Waste disposal: solid waste
- Waste disposal: storage of gasses
- Land based activities/industries: industry discharges
- Land based activities/industries: agricultural run-off
- Land based activities/industries: municipal waste water
- Activities Uses All
- Uses Activities Other

## d. Monitoring and assessment requirements

In order to assess the pre-core indicator 'Beach litter' (STATE & CONSERVATION 5-2016, [document 4J-27](#)), three sampling campaigns during the year have to be organised; preferably during the same survey periods used in other international established monitoring programmes. If it is possible, according to national climatological conditions, a forth campaign is to be conducted during winter time. Information from this forth campaign, when available, will be included separately in the assessment (i.e. different colours on map representations).

Beach litter is to be monitored by all HELCOM Contracting Parties, covering all coastal areas of the Baltic Sea. The number of beaches to monitor per country is to be determined nationally, but needs to ensure a representative coverage of their respective coastal area as well as an equally well representation of all beach categories. Beaches are to be classified as "urban", "rural" and "peri-urban". Choosing a mix of urban, rural and peri-urban beaches will provide knowledge on different types of sources of litter. Litter on rural beaches is more likely to indicate sea based sources and the litter situation at sea (background values for litter pollution level) - since very little littering is expected from visitors. Urban and peri-urban beaches would more reflect the contribution of land-based activities on and nearby the beach. Criteria to follow to select beaches to sample are specified in the [HELCOM guidelines for monitoring beach litter](#) (section 2.4.2).

Data from national monitoring should be analysed aiming at identifying the number of litter items per type of material and most frequent litter items (top beach litter items) standardized to a 100m stretch of beach.

Types of material to consider are: "artificial polymer materials", "rubber", "cloth/textile", "paper/cardboard", "processed/worked wood", "metal", "glass/ceramics" and "undefined".

Top beach litter items are to be determined for the different types of beaches (urban, peri-urban and rural beaches) following the rank method. Top 10-20 item lists of marine litter items occurring on beaches should preferably be derived so data from each survey are weighted equally within one station and also weighted equally between stations instead of only making top 10 lists of total sum of all litter items. Thereby will the weight of surveys/seasons and stations which most litter items registered be reduced.

The HELCOM EN-Marine Litter considered the assessment unit to be used for the assessment of the beach litter indicator, and considered the appropriateness of using Scale 2 or Scale 3 of the HELCOM

Commented [A2]: "If feasible" should be added. Beaches should be categorized, but might not be equally represented.



sub-divisions of the Baltic Sea for regional monitoring and assessment purposes (see attachment 4 of the HELCOM Monitoring and Assessment Strategy). The Scale 3 may be used even if the indicator is not applicable to off-shore areas due to lack of data as the monitoring is based on beach sampling. The data is primarily representative of beaches located in a certain Scale 2 or scale 3 sub-division. The experts of HELCOM EN-Marine Litter agreed to postpone the decision on the scale of the assessment pending on further discussion to take place as part of the finalisation of the pre-core indicator report.

Given the variability of litter data, which is influenced greatly by season, weather conditions and water currents, a 6-year running mean in line with the requirements of the Marine Strategy Framework Directive (MSFD, 2008) is considered appropriate to provide a baseline predict for trends in terms of an average level of pollution. Once the baseline is set, operational targets for the reduction of relevant (top) findings on beaches need to be defined in order to be judged against the baseline. As a midterm target, a downward trend in input of plastics should be achieved.

### **e. Monitoring concept(s)**

## Monitoring concept(s)

Current means of coordination	Elements	Parameter	Method <sup>1</sup>	QA/QC	Frequency <sup>2</sup>	Spatial resolution (density) of sampling	Link to HELCOM core indicators <sup>3</sup>	Link to GES characteristics	Spatial scope	Monitoring started (year)	CPs monitoring <sup>4</sup>
	Q9a (Q5c)	Q9b	Q9c, Q9d	Q9e, 9f	Q9h, 9i	Q, 9g, 9i		Q5b	Q4i	Q4h	
National	Beach litter	Quantity and type of litter items	OSPAR beach litter guideline	OSPAR	Other (specify) 3 surveys a year (April, June/July, September/October).	3 beaches		Properties and quantities of ML do not cause harm to the coastal and marine environment	EEZ	2015	Denmark
National	Beach litter	Quantity and type of litter items	UNEP/IOC (MARLIN)	National	Other (specify) 3 surveys a year (spring, summer, autumn)	10 beaches		Properties and quantities of ML do not cause harm to the coastal and marine environment	EEZ	2012	Estonia

<sup>1</sup> Reference to a published or publicly available document or URL link (Q, 9c) if different from published (Q, 9d)

<sup>2</sup> The option "Different for each country - see MORE overview" refers to the [overview](#) carried out in 2013

<sup>3</sup> Give the name of HELCOM core indicators that are based on the monitoring parameter.

<sup>4</sup> Provide information on the Contracting Parties that are monitoring the parameter.

Current means of coordination	Elements	Parameter	Method <sup>1</sup>	QA/QC	Frequency <sup>2</sup>	Spatial resolution (density) of sampling	Link to HELCOM core indicators <sup>3</sup>	Link to GES characteristics	Spatial scope	Monitoring started (year)	CPs monitoring <sup>4</sup>
National	Beach litter	Quantity and type of litter items	UNEP-methodology	National	Other (specify) 3 surveys a year (April-May; July-August; October-November)	13 beaches		Properties and quantities of ML do not cause harm to the coastal and marine environment	EEZ	2012	Finland
National	Beach litter	Quantity and type of litter items	OSPAR Guidelines	National	Other (specify) 4 surveys a year (Apr., mid Jun. - mid Jul., mid Sep. - mid Oct., mid Dec. - mid Jan.)	32 beaches		Properties and quantities of ML do not cause harm to the coastal and marine environment	EEZ	2012	Germany
National	Beach litter	Quantity and type of litter items	MARLIN/UNEP	National	Yearly Summer	42 beaches		Properties and quantities of ML do not cause harm to the coastal and marine environment	EEZ	2012	Latvia

Current means of coordination	Elements	Parameter	Method <sup>1</sup>	QA/QC	Frequency <sup>2</sup>	Spatial resolution (density) of sampling	Link to HELCOM core indicators <sup>3</sup>	Link to GES characteristics	Spatial scope	Monitoring started (year)	CPs monitoring <sup>4</sup>
National	Beach litter	Quantity and type of litter items	OSPAR Guidelines	National	Other (specify) 4 surveys a year	4 beaches		Properties and quantities of ML do not cause harm to the coastal and marine environment	EEZ	2012	Lithuania
National	Beach litter	Quantity and type of litter items	National methodology	National	Other (specify) 4 surveys a year (Apr. - mid Jun. - mid Jul., mid Sep. - mid Oct., mid Dec. - mid Jan.)	15 beaches		Properties and quantities of ML do not cause harm to the coastal and marine environment	EEZ	2015	Poland
National	Beach litter	Quantity and type of litter items	MARLIN methodology	National	Other (specify) 3 surveys a year (Spring, Summer, Autumn)	10 beaches		Properties and quantities of ML do not cause harm to the coastal and marine environment	EEZ	2012	Sweden

## PARAMETER

<b>Element/Parameter pair</b>
Beach litter/Quantity and type of litter items

## METHOD

<b>Element/parameter</b>
<b>Beach litter/Quantity and type of litter items</b>
<p>The length of the segment of the coastline to be sampled should be 100 m with the possibility of conducting subsampling for cigarette butts and snuff, paraffin, pellets, all visible fragments, as well as other items if needed. If such subsampling is conducted 10 m stretch is to be monitored (see MARLIN, 2013). Before data analysis, all data must be standardized to a 100m stretch of beach. This means that the results for sub-samples of beach (i.e. 10m) must be extrapolated and, with the results of surveys on more than 100m of beach, the average number of items for 100m should be calculated and used for analysis (i.e. number of items recorded on 300 m of beach should be divided by 3 to give the average number of items per 100m).</p> <p>The width of the beach (from the waterline to back of the beach, e.g. the foot of dunes or high vegetation behind) is also to be reported. The area should preferably also include the highest waterline with litter deposited also under more extreme high water conditions.</p> <p>Litter items, visible to the naked eye (lower size limit at about 0.5cm), are to be counted and recorded by type of material ("artificial polymer materials", "rubber", "cloth/textile", "paper/cardboard", "processed/worked wood", "metal", "glass/ceramics" and "undefined"). The amount of litter per type of material in number of items is to be determined.</p> <p>Litter items should be identified using different coding list (the updated JRC 2013, OSPAR 2010 or MARLIN 2013).</p> <p>For further specifications see <a href="#">HELCOM Guidelines for beach litter monitoring</a>.</p>

## QA/QC

<b>Element/Parameter pair</b>
<b>Beach litter/Quantity and type of litter items</b>
<a href="#">DE, DK, EE, FI, LT, LV, PL and SE: National</a>

Deleted: DE, EE, FI, LT, LV, PL and SE: National; DK: OSPAR.

## FREQUENCY

### Frequency

<b>Element/Parameter pair</b>
<b>Beach litter/Quantity and type of litter items</b>
Three or four times a year if sampling in winter is possible, depending on the country. One country conducts monitoring yearly.

## SPATIAL SCOPE

### Spatial Scope

<b>Element/Parameter pair</b>
<b>Beach litter/Quantity and type of litter items</b>
<a href="#">Monitoring is performed by HELCOM countries covering all coastal areas of the Baltic Sea.</a>

**Deleted:** Monitoring is performed by HELCOM countries in their EEZ covering all coastal areas of the Baltic Sea.

## SPATIAL RESOLUTION (DENSITY) OF SAMPLING

### Spatial resolution

<b>Element/Parameter pair</b>
<b>Beach litter/Quantity and type of litter items</b>
The number of beaches monitored depends on the country: DK: 3, EE: 10, FI: 13, DE: 32, LV: 42, LI: 4, PL: 15 and SE: 10.

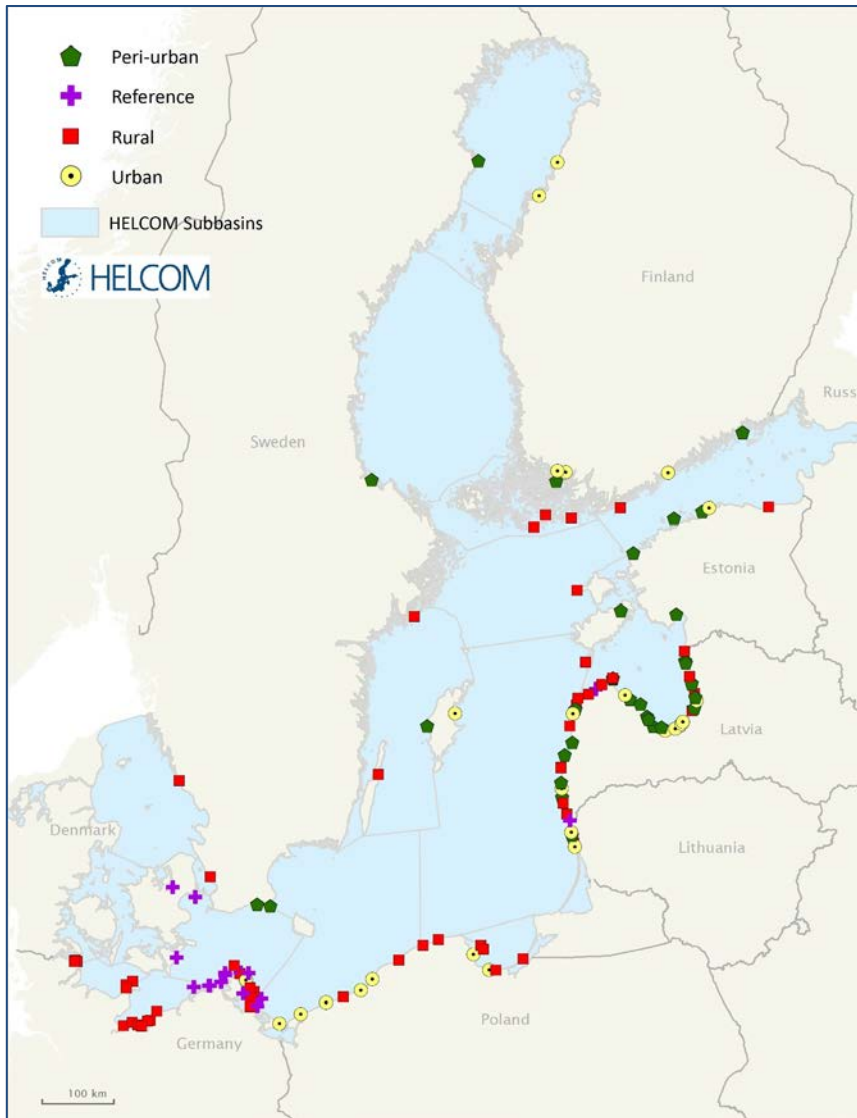


Figure 1 - Map containing beach litter monitoring stations by type of beaches.

Commented [A3]: DE: An elaboration on what reference beach implies needs to be added

Provide considerations for the scale of aggregation of data for an indicator-based assessment (Q10a), 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

## f. Gaps in monitoring

The monitoring of beach litter started for most HELCOM countries in 2012, and has continued regularly since then. However, monitoring is not nationally coordinated in one country and is only seasonally conducted in another one. The network of monitoring stations has expanded since 2015, which together with the suggested coordinated monitoring program will provide a more complete and coherent image of the extent of beach litter items found in the different sub-regions. The monitoring program will also allow for a reliable input of monitoring data resulting in scientific conclusions based on a solid knowledgebase and as a consequence, the assessment of the pressure will be done with more certainty.

## g. 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 (Q10c)** Tick the relevant boxes below:

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

**What method/mechanism will be used to make the data available? (Q10c)** Tick the relevant boxes below and provide location:

- Providing URL to view data:
- Providing URL to download data:



Provide location of data in national data centre: Raw data are stored nationally and it is foreseen that processed data is available in a regional database or international data centre (e.g. OSPAR beach litter database, MARLINN, EMODnet).

Provide location of data in international data centre (e.g. RSC, ICES, EEA, EMODnet):

**Will the EC/EEA have use rights? (Q10c)** Tick the relevant box below:

- Open access
- Moratorium
- Restricted by general licence
- Restricted by specific licence
- Data will not be available

**Which INSPIRE standard is/will be used? (Q10c)** Tick the relevant box below:

- Hydrography
- Protected sites
- Agriculture and aquaculture facilities
- Area management/restriction/regulation zones and reporting units
- Environmental monitoring facilities
- Geology
- Habitats and biotopes
- Land cover
- Land use
- Oceanographic geographical features
- Sea regions
- Species distribution

**When will the data first become available? (Q10c)**

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

To be decided.

**How frequently are the data expected to be updated thereafter? (Q10c)** Tick the relevant box below:

- Every 6 years
- Weekly
- Every 3 years
- Daily
- Every 2 years
- Hourly

- Yearly                       Continually  
 6-monthly                       One-off  
 3-monthly                       As needed  
 Monthly                       Other (specify)  
 2-weekly                       Unknown

**Describe how the data and information from the programme will be made accessible to the EC/EEA, indicating whether this is in place already or under development. (Q10d)**

Processed data will be available. Danish data is reported to EEAs database Marine Litter Watch and thereby available to EEA.

**List providing contact points in the Contracting Parties**

HELCOM EN-Marine Litter, in particular in (i) Denmark, the Danish Centre for Environment and Energy (DCE); (ii) Finland for beach litter: Sanna Suikkanen (SYKE) and Hanna Haaksi (KAT) and for microlitter: Outi Setälä (SYKE); and (iii) Sweden: Eva Blidberg, Keep Sweden Tidy (eva.blidberg@hsr.se).

**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

## **h. Literature**

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

(1) HELCOM (2018) HELCOM Guidelines for monitoring beach litter. <http://www.helcom.fi/Documents/Action%20areas/Monitoring%20and%20assessment/Manuals%20and%20Guidelines/Guidelines%20for%20monitoring%20beach%20litter.pdf>. Accessed 6 March 2019. (2) HELCOM (2016) HELCOM Pre-core indicator on 'Beach litter', document 4J-27 to STATE & CONSERVATION 5-2016 <https://portal.helcom.fi/meetings/STATE%20-%20CONSERVATION%205-2016-363/MeetingDocuments/4J-27%20Pre-core%20indicator%20on%20%E2%80%98Beach%20litter%E2%80%99%20-%20proposed%20shift%20in%20status%20to%20core%20indicator.pdf> and [https://portal.helcom.fi/meetings/STATE%20-%20CONSERVATION%205-2016-363/MeetingDocuments/4J-27%20Annex\\_HELCOM%20pre-core%20indicator%20on%20Beach%20litter.xlsx?Web=1](https://portal.helcom.fi/meetings/STATE%20-%20CONSERVATION%205-2016-363/MeetingDocuments/4J-27%20Annex_HELCOM%20pre-core%20indicator%20on%20Beach%20litter.xlsx?Web=1) (Annex to the report). Accessed 6 March 2019. (3) HELCOM (2018) SPICE report: Task 2.1.3 Development of baselines of marine litter – Report on the analysis of compiled data on microlitter in the Baltic Sea [http://www.helcom.fi/Documents/HELCOM%20at%20work/Projects/Completed%20projects/SPICE/Theme%202\\_Deliverable%202.1.3.pdf](http://www.helcom.fi/Documents/HELCOM%20at%20work/Projects/Completed%20projects/SPICE/Theme%202_Deliverable%202.1.3.pdf). Accessed 6 March 2019. (4) HELCOM (2018) State of the Baltic Sea – Second HELCOM holistic assessment 2011-2016. Baltic Sea Environment Proceedings 155 <http://stateofthebalticsea.helcom.fi/>. Accessed 6 March 2019. (5) HELCOM (2018) SPICE report: Task 2.1.1 Development of baselines of marine litter – Identification of top litter items in the Baltic Sea region [http://www.helcom.fi/Documents/HELCOM%20at%20work/Projects/Completed%20projects/SPICE/Theme%202\\_Deliverable%202.1.1.b.pdf](http://www.helcom.fi/Documents/HELCOM%20at%20work/Projects/Completed%20projects/SPICE/Theme%202_Deliverable%202.1.1.b.pdf). Accessed 6 March 2019. (6) Commission Decision (EU) 2017/848 of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU. (7) Addamo, A. M., Laroche, P., Hanke, G. (2017): Top Marine Beach Litter Items in Europe. - EUR 29249 EN, Publications Office of the European Union, Luxembourg.