



Document title	Overview of core indicators to be used in ‘State of the Baltic Sea’ report to be compiled in the HOLAS II project by mid-2017
Code	4-20
Category	INF
Agenda Item	4 - Matters arising from the subsidiary bodies
Submission date	22.2.2017
Submitted by	Executive Secretary
Reference	

Background

Major progress has been made in HELCOM to develop commonly agreed regionally applicable core indicators. The core indicators form the building blocks of the HELCOM assessments as agreed in the HELCOM Monitoring and Assessment Strategy, adopted by the 2013 HELCOM Ministerial Meeting.

Currently the core indicator work focuses on delivering assessment components to the ‘State of the Baltic Sea’ report developed in the HELCOM HOLAS II project. The first version of the report will be published by mid-2017 with an update to be completed by mid-2018.

HOD 51-2016 (outcome para 6.2) supported the following proposal by GEAR 15-2016 regarding the use of indicators in HOLAS II: 1) if core indicators are not operational on a Baltic-wide scale, the indicators could still be used in the sub-basins where they are operational if agreed by countries sharing that basin 2) if pre-core indicators will be shifted to core indicators or if core indicators will become operational for additional assessment units during 2017, to consider including them in the final version of HOLAS II by mid-2018. The first principle applies to several indicators and will be used in the first version of HOLAS II.

HOD 51-2016 (outcome para 6.22) agreed that Contracting Parties that still have study reservations on the individual indicators could agree to apply these indicators in HOLAS II by indicating that the results are of intermediate/test character and that the indicators may need further development. Core indicators that have been agreed to be included in the ‘State of the Baltic Sea’ report as intermediate/test results are indicated in this document, and an overview of remaining study reservations is given in Annex 2 of this document.

The core indicator development work has been actively ongoing since 2010, and indicators have been presented for adoption to Heads of Delegation as they have progressed sufficiently. Core indicators and threshold values have been adopted as follows:

- HELCOM HOD 39-2012 agreed on the targets of the eutrophication core indicators (outcome para 2.20).
- HELCOM HOD 41-2013 agreed on the list of biodiversity- and hazardous substance core indicators (outcome para 2.45).
- HELCOM HOD 48-2015 adopted on the GES-boundaries for nineteen biodiversity and hazardous substance core indicators (outcome para 3.63).
- HOD 50-2016 agreed on the GES boundaries for four core indicators on hazardous (outcome para 4.48).
- HOD 51-2016 adopted the threshold values for specific assessment units for the core indicators ‘State of the soft-bottom macrofauna community’ and adopted the threshold values for the core indicator ‘Metals’ for Cd and Pb in offshore assessment units (outcome para 6.10, 6.11).

Since HOD 51-2016, the State and Conservation Working Group has endorsed threshold values for selected assessment units for the indicators 'Oxygen debt', 'Cyanobacterial bloom index', 'Total nutrients', 'State of the soft-bottom macrofauna community' and 'Zooplankton mean size and total stock' (see document 4-12). If adopted by HELCOM 38, these new proposals will strengthen the HOLAS II assessment of eutrophication and biodiversity. Considerable gaps however still exist for the assessment of pelagic and benthic habitats. The zooplankton indicator is only operational for a limited number of assessment units and the only core indicator on phytoplankton (Seasonal succession of functional phytoplankton groups) is not operational due to lack of agreement on threshold values. The remaining two phytoplankton indicators being developed in HELCOM are subject to study reservations. Only one biodiversity core indicator exists for the assessment of benthos which is limited to the status of soft-bottom fauna communities. In the biodiversity assessment of HOLAS II these gaps are partly filled by also making use of eutrophication core indicators that are indicating pelagic and benthic habitat conditions, e.g. the eutrophication indicator 'Oxygen debt' is used to represent quality of the soft-bottom macrofauna communities below the halocline.

Finalization of the operationalization of existing core indicators and continued development of pre-core and candidate indicators to improve the assessment situation for the 2018 version of 'State of the Baltic Sea' is planned to be discussed at HOD 52-2017.

This document lists the indicators to be used in the 'State of the Baltic Sea' report developed in the HOLAS II project, and gives an overview of the agreed threshold values and data availability for the mid-2017 version of the report.

Action requested

The Meeting is invited to:

- take note of the information.

Overview of core indicators to be used in ‘State of the Baltic Sea’ report to be compiled in the HOLAS II project by mid-2017

The commonly agreed HELCOM core indicators are used to evaluate progress towards reaching good environmental status of the HELCOM Baltic Sea Action Plan. The current status values of core indicators are compared against a threshold value that represents good environmental status. The threshold value allows for a quantitative evaluation on the progress towards achieving the desired status.

HOD 51-2016 (outcome para 6.8) agreed on the following statement to be applied to core indicator ‘threshold values’ in relation to their use in HOLAS II:

“At this point in time, HOLAS II indicators and threshold values should not automatically be considered by the Contracting Parties that are EU Member States, as equivalent to criteria threshold values in the sense of Commission Decision (EU) 2017/... laying down criteria and methodological standards on good environmental status, but can be used for the purposes of their MSFD obligations by those Contracting Parties being EU Member States that wish to do so”.

The currently agreed core indicators to be used are listed in Table 1. The table is intended as an overview of the indicators currently available to form the basis for the ‘State of the Baltic Sea’ report to be prepared by mid-2017. It should be noted that some of the threshold values for the listed indicators are presented for adoption by HELCOM 38-2017. Also note that the column on data availability indicates that there is data to carry out an assessment in HOLAS II, however, for a number of indicators there are still gaps in data that need to be addressed in the update of the report by mid-2018. Details on the indicator threshold values and data availability for the assessment units are given in Annex 2.

Table 1. Overview of the core indicators with adopted threshold values for which quantitative assessments are made for the mid-2017 version of the ‘State of the Baltic Sea’ report compiled in the HOLAS II project.

Core indicator	Threshold value adopted for all assessment units where indicator is applicable (YES/NO/PARTLY)	Assessment data available for the assessment units with threshold values (YES/NO/PARTLY)
Biodiversity		
Abundance of waterbirds in the breeding season	YES	YES
Abundance of waterbirds in the wintering season	YES	YES
Distribution of Baltic seals	YES	PARTLY
Population trends and abundance of seals	YES	YES
Nutritional status of seals	YES	YES
Reproductive status of seals	YES	YES
Abundance of coastal fish key functional groups	YES	PARTLY
Abundance of key coastal fish species	YES	PARTLY
Abundance of salmon spawners and smolt	YES	PARTLY
Abundance of sea trout spawners and parr	YES	NO – only descriptive
Zooplankton mean size and total stock	PARTLY ¹	YES
State of the soft-bottom macrofauna community ²	PARTLY ³	YES
Trends in arrival of new non-indigenous species	YES	YES

¹ Adoption of threshold values for 5 assessment units is on the agenda of HELCOM 38-2017 (document 4-12).

² Denmark has a study reservation on the indicator but has agreed to test the indicator in the ‘State of the Baltic Sea’ report denoting results as intermediate (cf. HOD 51-2016 outcome para 6.22).

³ Adoption of threshold values for 7 assessment units and revision of 1 assessment unit is on the agenda of HELCOM 38-2017 (document 4-12).

Core indicator	Threshold value adopted for all assessment units where indicator is applicable (YES/NO/PARTLY)	Assessment data available for the assessment units with threshold values (YES/NO/PARTLY)
Seasonal succession of functional phytoplankton groups ⁴	NO	NO
Eutrophication		
Nitrogen (DIN)	YES	YES
Phosphorous (DIP)	YES	YES
Chlorophyll-a	YES	YES
Water clarity	YES	YES
Oxygen debt	YES ⁵	YES
Total nutrients	PARTLY ⁶	YES
Cyanobacterial bloom index ⁷	PARTLY ⁸	YES
WFD DIN	YES (national)	(national results only)
WFD Total nitrogen	YES (national)	(national results only)
WFD DIP	YES (national)	(national results only)
WFD total phosphorous	YES (national)	(national results only)
WFD chlorophyll-a	YES (national)	(national results only)
WFD water transparency	YES (national)	(national results only)
WFD dissolved oxygen	YES (national)	(national results only)
WFD opportunistic macrophytes	YES (national)	(national results only)
WFD perennial macrophytes	YES (national)	(national results only)
WFD macrofaunal communities	YES (national)	(national results only)
WFD macrofaunal communities/BQI	YES (national)	(national results only)
Inputs of nutrients to the sub-basins	YES	YES
Hazardous substances		
Hexabromocyclodecane (HBCDD)	YES	PARTLY
Metals (Cd, Pb, Hg)	YES	PARTLY
Polybrominated biphenylethers (PBDE)	YES	PARTLY
Perfluorooctane sulphonate (PFOS)	YES	PARTLY
Polyaromatic hydrocarbons (PAH) and their metabolites	YES	PARTLY
Polychlorinated biphenyls (PCB) and dioxins and furan	YES	PARTLY
TBT and imposex ⁹	YES	PARTLY
Radioactive substances	YES	PARTLY
White-tailed eagle productivity	YES	YES
Operational oil-spills from ships	YES	YES

⁴ The indicator is included here since it is a core indicator. Since there is no agreement on threshold values it will however not be used in the first version of 'State of the Baltic Sea'. The continued development will be discussed at the annual meeting of PEG, 3-7 April 2017, St Petersburg, Russia.

⁵ Adoption of threshold values for 3 assessment units is on the agenda of HELCOM 38-2017 (document 4-12)

⁶ Adoption of threshold values for 9 assessment units is on the agenda of HELCOM 38-2017 (document 4-12)

⁷ Note that the indicator is a pre-core indicator that has been agreed to be tested in HOLAS II. Denmark has a study reservation on the indicator but has agreed to test the indicator in the 'State of the Baltic Sea' report denoting results as intermediate (cf. HOD 51-2016 outcome para 6.22)

⁸ Adoption of threshold values for 10 assessment units is on the agenda of HELCOM 38-2017 (document 4-12)

⁹ Denmark has a study reservation on the indicator parameters and thresholds for sediment and imposex and agreed to include the parameters as tests in the 'State of the Baltic Sea' report denoting results as intermediate (cf. HOD 51-2016 outcome para 6.22).

In addition to the quantitative core indicator assessments, the 'State of the Baltic Sea' report will also contain descriptive indicator information in cases where there is no operational core indicator available to provide an assessment against a threshold value, e.g.;

- Number of drowned mammals and waterbirds in fishing gear
- Components from BSII: "loss of seabed due to physical disturbance" "disturbed seabed due to physical disturbance", "disturbed broad habitat types due to physical disturbance"
- Beach litter (pre-core)
- Litter on the seafloor (pre-core)
- Continuous low frequency anthropogenic sound (pre-core)
- Distribution in time and space of loud low- and mid-frequency impulsive sound (pre-core)

Supplementary indicators are HELCOM indicators agreed on by Contracting Parties sharing an assessment unit. The currently proposed indicator to be included in HOLAS II by mid-2017 in this category is:

- Reproductive disorders: malformed eelpout and amphipod embryos (pre-core) (SE, FI – Bothnian Sea, the Quark, possibly Western Gotland Basin)

The use of indicators for commercial fish developed by ICES to assess against F_{MSY} and SSB in the 'State of the Baltic Sea' report in HOLAS II was discussed by HOLAS II 5-2016 and agreed to use the SSB-indicators in the integrated biodiversity assessment (outcome para 3.14). The approach was endorsed by HOD 50-2016 that also clarified that all HELCOM countries are involved in reporting data (outcome para 4.44).

In the integrated assessment of benthic and pelagic habitats, core eutrophication indicators will be used as relevant as indicators of the condition of the habitats i.e. for benthic habitats 'Oxygen debt' will be used in the open sea and 'Secchi depth', 'Macrophytes', 'Macrozoobenthos' and 'Oxygen' in coastal areas and in the assessment of pelagic habitats the eutrophication indicators 'Cyanobacterial blooms', 'Chl a' and 'Phytoplankton biomass' will be used.

Annex 1. Overview of indicators and threshold values for the ‘State of the Baltic Sea’ report by mid-2017

NB: This annex lists only the assessment units to be included in the HOLAS II assessments, thus the Kattegat and Sound areas not included on the lists although indicator threshold values and data may be available.

Annex 1. Contents

Biodiversity indicators	7
Abundance of waterbirds in the breeding season	7
Abundance of waterbirds in the wintering season	7
Distribution of Baltic seals	7
Population trends and abundance of seals	7
Nutritional status of grey seals.....	8
Reproductive status of grey seals.....	8
Abundance of coastal fish key functional groups.....	9
Abundance of key coastal fish species	9
Abundance of salmon spawners and smolt	10
Zooplankton mean size and total stock.....	10
State of the soft-sediment macrofauna community	11
Non-indigenous species indicators.....	11
Trends in arrival of new non-indigenous species	11
Eutrophication indicators	12
Nitrogen (DIN)	12
Phosphorous (DIP)	12
Chlorophyll-a	13
Water clarity	13
Oxygen debt.....	14
Total nutrients	14
Cyanobacterial bloom index.....	15
Inputs of nitrogen and phosphorous to the sub-basins	15
Hazardous substances indicators	16
Hexabromocyclodecane (HBCDD)	16
Metals (Cd, Pb, Hg)	16
Polybrominated biphenylethers (PBDE).....	18
Perfluorooctane sulphonate (PFOS).....	19
Polycyclic aromatic hydrocarbons (PAH) and their metabolites.....	19
Polychlorinated biphenyls (PCB) and dioxins and furan.....	20
TBT and imposex.....	21
Radioactive substances	22

White-tailed eagle productivity..... 22

Operational oil-spills from ships..... 22

Annex 2. Current status of HELCOM indicators not used in HOLAS II..... 23

Biodiversity indicators

Abundance of waterbirds in the breeding season

Assessment unit (scale 1)	Threshold	Threshold value	Data available for the assessment unit
Baltic Sea	% of populations whose size is above 30 % of the 1991-2000 level	0,75	Yes

Abundance of waterbirds in the wintering season

Assessment unit (scale 1)	Threshold	Threshold value	Data available for the assessment unit
Baltic Sea	% of populations whose size is above 30 % of the 1991-2000 level	0,75	Yes

Distribution of Baltic seals¹⁰

Threshold value for all species: Pristine conditions. In cases where pristine sand banks have physically disappeared a "modern base line" is used based on currently available haul out sites.

Assessment unit (scale 2)	Data available for the assessment
Grey seals	
East and north of Bornholm	Yes
Southwestern Baltic Sea	Yes
Harbour seals¹¹	
Kalmarsund population	Yes
Southwestern Baltic Sea	Yes
Ringed seals	
Bothnian Bay	Yes
Archipelago Sea, Gulf of Finland, Estonian coastal waters	Yes (partly ¹²)

Population trends and abundance of seals¹³

Grey seal

Threshold value for grey seals: The number must exceed 10000 seals. In addition the population growth rate must 1) exceed 7% in the exponential phase of population growth, or 2) when close to carrying capacity, no decline greater than 10% over a 10-year period. Currently the second criterion is used.

Management unit	Data available for the assessment
-----------------	-----------------------------------

¹⁰ Note that the assessment of seals is carried out for the management units as defined in HELCOM Recommendation 27/28-2. The management units can be associated to HELCOM assessment units.

¹¹ Note that a threshold value and indicator evaluation is also available for Kattegat but will not be used in HOLAS II.

¹² Only Denmark and Sweden has reported data on distribution for the reporting period.

¹³ Note that the assessment of seals is carried out for the management units as defined in HELCOM Recommendation 27/28-2. The management units are can be associated to HELCOM assessment units.

Baltic Sea	Yes
------------	-----

Harbour seals

Threshold value for harbour seals: The number must exceed 10000 seals. In addition the population growth rate must 1) exceed 9% in the exponential phase of population growth, or 2) when close to carrying capacity, no decline greater than 10% over a 10-year period. The first criterion is used for the Kalmarsund and Southwestern Baltic Sea management units.

Management unit	Data available for the assessment
Kalmarsund population	Yes
Southwestern Baltic Sea	Yes

Ringed seal

Threshold value for ringed seals: The number must exceed 10000 seals. In addition the population growth rate must 1) exceed 7% in the exponential phase of population growth, or 2) when close to carrying capacity, no decline greater than 10% over a 10-year period. For ringed seals the first criterion is used.

Management unit	Data available for the assessment
Archipelago Sea ¹⁴	Yes (sporadic)
Gulf of Finland	Yes (sporadic)
Estonian coastal waters	Yes (sporadic)
Bothnian Bay	Yes

Nutritional status of grey seals

Management unit	Threshold value (blubber thickness)	Data available for the assessment ¹⁵
Baltic Sea	By-caught seals: 35 mm	Yes
Baltic Sea	Hunted seals: 49 mm	Yes

Reproductive status of grey seals

Management unit	Threshold value (proportion pregnant grey seal females (>6 years old)	Data available for the assessment ¹⁶
Baltic Sea	90	Yes

¹⁴ Gulf of Finland, Archipelago Sea and Estonian coastal waters are regarded as a single management unit, but sporadic survey data preclude an overall assessment.

¹⁵ Currently data is only used from Finland and Sweden but the indicator is applicable for the entire Baltic Sea. Data from additional countries are expected to be available in the future.

¹⁶ Currently data is used from Finland and Sweden. The indicator is applicable for the entire Baltic Sea. Data from additional countries are expected to be available in the future.

Abundance of coastal fish key functional groups

The threshold value is assessment unit specific however it is presented as a normalized value for all assessment units; 0,6.

The indicator is applicable in all coastal assessment units, only the areas for which data are available to make an assessment for the mid-2017 'State of the Baltic Sea' report are listed in the table below.

Assessment unit (Scale 3 – coastal only)
Bothnian Bay Finnish Coastal waters
Bothnian Bay Swedish Coastal waters
The Quark Finnish Coastal waters
The Quark Swedish Coastal waters
Bothnian Sea Finnish Coastal waters
Bothnian Sea Swedish Coastal waters
Åland Sea Swedish Coastal waters
Archipelago Sea Coastal waters
Northern Baltic Proper Swedish Coastal waters
Gulf of Finland Finnish Coastal waters
Gulf of Riga Estonian Coastal waters
Gulf of Riga Latvian Coastal waters
Western Gotland Basin Swedish Coastal waters
Eastern Gotland Basin Latvian Coastal waters
Eastern Gotland Basin Lithuanian Coastal waters
Bornholm Basin Swedish Coastal waters
Bothnian Bay Finnish Coastal waters
Bothnian Bay Swedish Coastal waters
The Quark Finnish Coastal waters
The Quark Swedish Coastal waters
Bothnian Sea Finnish Coastal waters
Bothnian Sea Swedish Coastal waters
Åland Sea Swedish Coastal waters
Archipelago Sea Coastal waters
Northern Baltic Proper Swedish Coastal waters
Gulf of Finland Finnish Coastal waters
Gulf of Riga Estonian Coastal waters
Gulf of Riga Latvian Coastal waters
Western Gotland Basin Swedish Coastal waters
Eastern Gotland Basin Latvian Coastal waters
Eastern Gotland Basin Lithuanian Coastal waters
Bornholm Basin Swedish Coastal waters

Abundance of key coastal fish species

The threshold value is assessment unit specific however it is presented as a normalized value for all assessment units; 0,6.

The indicator is applicable in all coastal assessment units, only the areas for which data are available to make an assessment for the mid-2017 'State of the Baltic Sea' report are listed in the table.

Assessment unit (Scale 3 – coastal only)
Bothnian Bay Finnish Coastal waters
Bothnian Bay Swedish Coastal waters
The Quark Finnish Coastal waters
The Quark Swedish Coastal waters
Bothnian Sea Finnish Coastal waters
Bothnian Sea Swedish Coastal waters
Åland Sea Swedish Coastal waters
Archipelago Sea Coastal waters
Northern Baltic Proper Swedish Coastal waters
Gulf of Finland Finnish Coastal waters
Gulf of Riga Estonian Coastal waters
Gulf of Riga Latvian Coastal waters
Western Gotland Basin Swedish Coastal waters
Eastern Gotland Basin Lithuanian Coastal waters
Bornholm Basin Swedish Coastal waters
Northern Baltic Proper Swedish Coastal waters
Western Gotland Basin Swedish Coastal waters
Eastern Gotland Basin Latvian Coastal waters
Eastern Gotland Basin Lithuanian Coastal waters
Arkona Basin Danish Coastal waters
Mecklenburg Bight Danish Coastal waters
Belts Danish Coastal waters
The Sound Danish Coastal waters

Abundance of salmon spawners and smolt

Assessment unit (scale 2)	Threshold	threshold absolute value	Data available for the assessment unit
Bothnian Bay	75%PSPC	2313,16	Yes
Bothnian Bay/The Quark	75%PSPC	495,81	Yes
Bothnian Sea	75%PSPC	1,65	Yes
Western Gotland Basin	75%PSPC	65,34	Yes
Eastern Gotland Basin	75%PSPC	213,75	Yes
Gulf of Finland	75%PSPC	189,00	Yes

Zooplankton mean size and total stock

Assessment unit (scale 2)	Threshold value *identifies values for adoption at HELCOM 38-2017	Data available for the assessment unit
Northern Baltic Proper	5.1 / 220 *	Yes
Gulf of Finland	8.6 / 125 *	Yes
Åland Sea	10.3 / 55 *	Yes
Bothnian Sea	* *	Yes

	8.4 / 23.7	
Bothnian Bay	23.7 / 161	* Yes

State of the soft-sediment macrofauna community

Assessment unit Scale 3 – open sea units only	Sensitivity value	Threshold value *identifies values for adoption at HELCOM 38-2017	Data available for the assessment unit
Kiel Bay	Schiele et al 2016 – subset 2 – subset 3 – subset 4	7.22 5.44 4.52	* Yes
Bay of Mecklenburg	Schiele et al 2016 – subset 2 – subset 3 – subset 4	7.22 5.44 4.52	* Yes
Eastern Gotland Basin (interim/test)	Schiele et al 2016 – subset 8 – subset 9	1.81 2.1	* Yes
Western Gotland Basin	Leonardsson et al 2009	4.0	Yes
Gulf of Riga (interim/test)	Schiele et al 2016 – subset 12 – subset 13	1.59 1.07	* Yes
Northern Baltic Proper	Leonardsson et al 2009	4.0	* Yes
Gulf of Finland (interim/test)	Schiele et al 2016 – subset 11 – subset 13	0.93 1.07	* Yes
Åland Sea	Leonardsson et al 2009	4.0	Yes
Bothnian Sea	Leonardsson et al 2009	4.0	Yes
The Quark	Leonardsson et al 2009	*revision 1,5	Yes
Bothnian Bay	Leonardsson et al 2009	1.5	Yes

Non-indigenous species indicators

Trends in arrival of new non-indigenous species

Assessment unit (scale 3)	Threshold value	Data available for the assessment
All assessment units	0 new introductions	Yes

Eutrophication indicators

Nitrogen (DIN)

Assessment unit (Scale 4 – open sea only)	Threshold value ($\mu\text{mol l}^{-1}$)	Data available
The Sound	3.3	Yes
Kiel Bay	5.5	Yes
Bay of Mecklenburg	4.3	Yes
Arkona Sea	2.9	Yes
Bornholm Sea	2.5	Yes
Eastern Gotland Basin	2.6	Yes
Gdansk Basin	4.2	Yes
Western Gotland Basin	2.0	Yes
Northern Baltic Proper	2.9	Yes
Gulf of Riga	5.2	Yes
Gulf of Finland	3.8	Yes
Åland Sea	2.7	Yes
Bothnian Sea	2.8	Yes
The Quark	3.7	Yes
Bothnian Bay	5.2	Yes

Phosphorous (DIP)

Assessment unit (Scale 4 – open sea only)	Threshold value ($\mu\text{mol l}^{-1}$)	Data available
The Sound	0.42	Yes
Kiel Bay	0.57	Yes
Bay of Mecklenburg	0.49	Yes
Arkona Sea	0.36	Yes
Bornholm Sea	0.30	Yes
Eastern Gotland Basin	0.29	Yes
Gdansk Basin	0.36	Yes
Western Gotland Basin	0.33	Yes

Northern Baltic Proper	0.25	Yes
Gulf of Riga	0.41	Yes
Gulf of Finland	0.59	Yes
Åland Sea	0.21	Yes
Bothnian Sea	0.19	Yes
The Quark	0.10	Yes
Bothnian Bay	0.07	Yes

Chlorophyll-a

Assessment unit (Scale 4 – open sea only)	Threshold value ($\mu\text{g l}^{-1}$)	Data available
The Sound	1.2	Yes
Kiel Bay	2.0	Yes
Bay of Mecklenburg	1.8	Yes
Arkona Sea	1.8	Yes
Bornholm Sea	1.8	Yes
Eastern Gotland Basin	1.9	Yes
Gdansk Basin	2.2	Yes
Western Gotland Basin	1.2	Yes
Northern Baltic Proper	1.7	Yes
Gulf of Riga	2.7	Yes
Gulf of Finland	2.0	Yes
Åland Sea	1.5	Yes
Bothnian Sea	1.5	Yes
The Quark	2.0	Yes
Bothnian Bay	2.0	Yes

Water clarity

Assessment unit (Scale 4 – open sea only)	Threshold value (m)	Data available
The Sound	8.2	Yes
Kiel Bay	7.4	Yes
Bay of Mecklenburg	7.1	Yes

Arkona Sea	7.2	Yes
Bornholm Sea	7.1	Yes
Eastern Gotland Basin	7.6	Yes
Gdansk Basin	6.5	Yes
Western Gotland Basin	8.4	Yes
Northern Baltic Proper	7.1	Yes
Gulf of Riga	5.0	Yes
Gulf of Finland	5.5	Yes
Åland Sea	6.9	Yes
Bothnian Sea	6.8	Yes
The Quark	6.0	Yes
Bothnian Bay	5.8	Yes

Oxygen debt

*identifies values presented for adoption at HELCOM 38-2017

Assessment unit (Scale 4 – open sea only)	Threshold value (mg l ⁻¹)	Data available
The Sound	>2	Yes
Bornholm Sea	6.37	Yes
Eastern Gotland Basin	8.66	Yes
Gdansk Basin	8.66	Yes
Western Gotland Basin	8.66	Yes
Northern Baltic Proper	8.66	Yes
Gulf of Finland	8.66	Yes
Åland Sea	2.02	* Yes
Bothnian Sea	2.02	* Yes
Bothnian Bay	0.81	* Yes

Total nutrients

Note that all threshold values for total nutrients are presented for adoption at HELCOM 38.

Total nitrogen

Assessment unit (Scale 4 – open sea only)	Threshold value ($\mu\text{mol l}^{-1}$)	Data availability for the assessment unit
Gdansk Basin	18.8	Yes
Western Gotland Basin	15.1	Yes
Gulf of Riga	28	Yes
Northern Baltic Proper	16.2	Yes
Gulf of Finland	21.3	Yes
Åland Sea	15.6	Yes
Bothnian Sea	15.7	Yes
The Quark	17.3	Yes
Bothnian Bay	16.9	Yes
The Sound	17.3	Yes

Total phosphorus

Assessment unit (Scale 4-open sea only)	Threshold value ($\mu\text{mol l}^{-1}$)	Data availability for the assessment unit
Gdansk Basin	0.60	Yes
Western Gotland Basin	0.45	Yes
Gulf of Riga	0.70	Yes
Northern Baltic Proper	0.38	Yes
Gulf of Finland	0.55	Yes
Åland Sea	0.28	Yes
Bothnian Sea	0.24	Yes
The Quark	0.24	Yes
Bothnian Bay	0.18	Yes
The Sound	0.68	Yes

Cyanobacterial bloom index

Note that threshold values for the cyanobacterial bloom index are presented for adoption at HELCOM 38.

Assessment unit (Scale 4 – open sea only)	Threshold value* (unitless)	Data availability for the assessment unit
Bay of Mecklenburg	0.92	Yes
Arkona Sea	0.90	Yes
Bornholm Basin	0.87	Yes
Gdansk Basin	0.98	Yes
Eastern Gotland Basin	0.84	Yes
Western Gotland Basin	0.87	Yes
Gulf of Riga	0.90	Yes
Northern Baltic Proper	0.77	Yes
Gulf of Finland	0.90	Yes
Bothnian Sea	0.58	Yes

Inputs of nitrogen and phosphorous to the sub-basins

Assessment unit (Scale 2)	Threshold value		Data available
	Maximum allowable annual nitrogen inputs (tonnes)	Maximum allowable annual phosphorus inputs (tonnes)	
Bothnian Bay	57,622	2,675	Yes

Bothnian Sea	79,372	2,773	Yes
Baltic Proper	325,000	7,360	Yes
Gulf of Finland	101,800	3,600	Yes
Gulf of Riga	88,417	2,020	Yes
Danish Straits	65,998	1,601	Yes

Hazardous substances indicators

NB: The tables for hazardous substances indicators 'HBCDD', 'Metals', 'PBDE', 'PFOS', 'PAH and metabolites', 'PCB, dioxin and furan' and 'TBT and imposex' lists the assessment units on scale 4 for which data is available to carry out the indicator assessment, the listing is based on the outcome of the HELCOM EN-HZ 6-2017 meeting. This does not include the assessment units for which some data are available, but not sufficient to carry out a full indicator assessment (cf. 'initial status assessment' in the outcome of EN-HZ 6-2017). The total number of assessment units on scale 4 is 165. The same threshold value is applicable in all assessment units for the core indicators 'HBCDD', 'Metals', 'PBDE', 'PFOS', 'PAH and metabolites', 'PCB, dioxin and furan' and 'TBT and imposex' indicators, and are not repeated in the tables.

Hexabromocyclodecane (HBCDD)

Threshold value	Reference	Comment
167 µg/kg ww whole fish	EQS biota secondary poisoning ¹⁷	normalized to 5% lipid and adjusted to TL 4.5
Secondary threshold: 170 µg kg ⁻¹ dw sediment	QS	

Assessment unit Scale 4	
Units listed for which an assessment is available	
Code for coastal units	Assessment unit name
	Arkona Basin
	Bornholm Basin
	Eastern Gotland Basin
	Western Gotland Basin
	Northern Baltic Proper
	Bothnian Sea
DEN-012	P1
DEN-014	P3
SWE-011	12n: Östergötland and Stockholm archipelago, middle coastal water
SWE-016	16. South Bothnian Sea, inner coastal water
SWE-018	18. North Bothnian Sea, Høga kusten, inner coastal water
SWE-021	21. North Quark outer coastal water
SWE-022	22. North Bothnian Bay, inner coastal water

Metals (Cd, Pb, Hg)

Substance	Threshold value	Reference	Comment
-----------	-----------------	-----------	---------

¹⁷ 2008/105/EC

Hg	20 µg/kg ww whole fish	EQS biota secondary poisoning ¹	Normalized to 26% dw and adjusted to TL 4.5
Cd	0.2 µg/l	EQS water(AA) ¹	
	Secondary threshold: 2.3 mg/kg sediment	QS from EQS dossier ¹⁸	
	Secondary threshold: 960 µg/kg dw mussels	OSPAR BAC	Long-term aim to calculate threshold based on HELCOM data
Pb	1.3 µg/l	EQS water(AA) ¹	
	Secondary threshold: 120 mg/kg sediment	QS from EQS dossier ¹⁹	
	Secondary threshold: 1300 µg/kg dw mussels	OSPAR BAC ²⁰	Long-term aim to calculate threshold based on HELCOM data
	Secondary threshold: 26 µg/kg ww fish liver	OSPAR proxy BAC ³	Long-term aim to calculate threshold based on HELCOM data

Assessment unit Scale 4				
Units listed for which an assessment is available				
Code for coastal units	Assessment unit name	Substance for which assessment is available		
	Kiel Bay	Hg	Pb	Cd
	Bay of Mecklenburg		Pb	Cd
	Arkona Basin	Hg	Pb	Cd
	Bornholm Basin	Hg	Pb	Cd
	Eastern Gotland Basin	Hg	Pb	Cd
	Western Gotland Basin	Hg	Pb	
	Northern Baltic Proper	Hg	Pb	
	Bothnian Sea	Hg	Pb	
DEN-002	M2	Hg	Pb	Cd
DEN-003	M3	Hg	Pb	Cd
DEN-008	OW2	Hg	Pb	Cd
DEN-009	OW3a	Hg	Pb	Cd
DEN-010	OW3b	Hg	Pb	Cd
DEN-012	P1	Hg	Pb	Cd
DEN-014	P3	Hg	Pb	Cd
DEN-015	P4	Hg	Pb	Cd
EST-005	Muuga-Tallinna-Kakumäe lahe rannikuvesi	Hg	Pb	
GER-004	mesohaline open coastal waters, Suedliche Mecklenburger Bucht/ Travemuende bis Warnemünde	Hg	Pb	Cd
GER-009	mesohaline inner coastal waters, Barther Bodden, Grabow	Hg	Pb	Cd
GER-013	mesohaline inner coastal waters, Greifswalder Bodden	Hg		
GER-020	oligohaline inner coastal waters, Kleines Haff	Hg	Pb	Cd

¹⁸ EU 2005. Substance Data Sheet Cadmium

¹⁹ EU 2011. Substance Data Sheet Lead

²⁰ OSPAR 2010. Background Document on CEMP assessment criteria for the QSR 2010 (proxy BACs derived at MON in 2007)

GER-023	meso- to polyhaline open coastal waters, seasonally stratified, Flensburger Aussenfoerde	Hg	Pb	Cd
GER-026	mesohaline inner coastal waters, Mittlere Schlei		Pb	Cd
GER-028	mesohaline open coastal waters, Eckerfoerder Bucht, Rand	Hg	Pb	Cd
GER-031	meso- to polyhaline open coastal waters, seasonally stratified, Kieler Aussenfoerde		Pb	Cd
LIT-002	Coastal waters. Southern coastal sandy coast	Hg	Pb	Cd
POL-002	PL TW I WB 8 very sheltered, fully mixed, substratum: silt/sandy silt/silty sand; ice cover >90 days, water residence time 52 days	Hg	Pb	
POL-006	PL TW IV WB 4 partly stratified, moderately exposed, substratum: sand/silt; ice - incidental	Hg	Pb	Cd
POL-015	PL CW II WB 6E central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel	Hg	Pb	Cd
SWE-011	12n: Östergötland and Stockholm archipelago, middle coastal water	Hg	Pb	
SWE-012	12s: Östergötland and Stockholm archipelago, middle coastal water	Hg		
SWE-016	16. South Bothnian Sea, inner coastal water	Hg		
SWE-018	18. North Bothnian Sea, Höga kusten, inner coastal water	Hg	Pb	
SWE-020	20. North Quark inner coastal water	Hg		
SWE-021	21. North Quark outer coastal water	Hg	Pb	
SWE-022	22. North Bothnian Bay, inner coastal water	Hg	Pb	

Polybrominated biphenylethers (PBDE)

Threshold value	Reference	Comment
0.0085 µg/kg ww fish muscle	EQS biota human health ¹	Normalized to 5% lipid and adjusted to TL 4
<i>Secondary threshold: sediment</i>		

Assessment unit Scale 4	
Units listed for which an assessment is available	
Code for coastal units	Assessment unit name
	Kiel Bay
	Arkona Basin
	Bornholm Basin
	Eastern Gotland Basin
	Western Gotland Basin
	Northern Baltic Proper
	Bothnian Sea
DEN-009	OW3a
DEN-012	P1
DEN-014	P3
DEN-015	P4
SWE-011	12n: Östergötland and Stockholm archipelago, middle coastal water
SWE-016	16. South Bothnian Sea, inner coastal water
SWE-018	18. North Bothnian Sea, Höga kusten, inner coastal water
SWE-021	21. North Quark outer coastal water

SWE-022	22. North Bothnian Bay, inner coastal water
---------	---

Perfluorooctane sulphonate (PFOS)

Threshold value	Reference	Comment
9.1 µg/kg ww fish muscle	EQS biota human health ¹	Normalized to 26% dw and adjusted to TL 4. Potential use of conversion factor between liver and muscle
Secondary threshold: 1.3 10 ⁻⁴ µg/l	EQS water (AA) ¹	

Assessment unit Scale 4	
Units listed for which an assessment is available	
Code for coastal units	Assessment unit name
	Bothnian Sea
	Northern Baltic Proper
	Western Gotland Basin
	Bornholm Basin
	Arkona Basin
SWE-022	22. North Bothnian Bay, inner coastal water
SWE-021	21. North Quark outer coastal water
SWE-018	18. North Bothnian Sea, Höga kusten, inner coastal water
SWE-016	16. South Bothnian Sea, inner coastal water
SWE-011	12n: Östergötland and Stockholm archipelago, middle coastal water
DEN-015	P4
DEN-014	P3
DEN-012	P1
DEN-010	OW3b
DEN-009	OW3a
DEN-008	OW2
DEN-003	M3
DEN-002	M2

Polyaromatic hydrocarbons (PAH) and their metabolites

Substance	Threshold value	Reference	Comment
benzo(a) pyrene	5 µg/kg ww crustaceans and molluscs	EQS biota human health ¹	
Secondary substance: Fluoranthene;	Secondary threshold: 30 µg/kg ww crustaceans and molluscs,	EQS biota human health ¹	
Secondary substance: Anthracene	Secondary threshold: 24 µg/kg dw sediment	EQS	Normalized to 5% TOC

Assessment unit Scale 4	
Units listed for which an assessment is available	

Code for coastal units	Assessment unit
	The Sound
	Arkona Basin
	Northern Baltic Proper
DEN-002	M2
DEN-003	M3
DEN-008	OW2
DEN-009	OW3a
DEN-010	OW3b
DEN-012	P1
DEN-014	P3
DEN-015	P4
POL-006	PL TW IV WB 4 partly stratified, moderately exposed, substratum: sand/silt; ice - incidental
POL-015	PL CW II WB 6E central Polish coast, coastal waters, exposed, fully mixed, substratum: sand/pebbles/gravel

Polychlorinated biphenyls (PCB) and dioxins and furan

Substances	Threshold value	Reference	Comment
Dioxin and dioxin-like compounds	0.0065 TEQ/kg ww fish muscle, crustaceans or molluscs	EQS biota human health ¹	Normalized to 5% lipid and adjusted to TL 4
Non-dioxin like PCBs;	sum of congeners (28, 52, 101, 138, 153, 180) 75 µg/kg ww fish muscle	EC 1881/2006	

Assessment unit Scale 4	
Units listed for which an assessment is available	
Code for coastal units	Assessment unit name
	Kattegat
	Kiel Bay
	Arkona Basin
	Bornholm Basin
	Eastern Gotland Basin
	Western Gotland Basin
	Northern Baltic Proper
	Bothnian Sea
DEN-008	OW2
DEN-009	OW3a
DEN-010	OW3b
DEN-012	P1
DEN-014	P3
DEN-015	P4
EST-005	Muuga-Tallinna-Kakumäe lahe rannikuvesi
FIN-005	Lounainen välisaaristo
FIN-007	Merenkurkun ulkosaaristo
GER-004	mesohaline open coastal waters, Suedliche Mecklenburger Bucht/ Travemuende bis Warnemünde
GER-013	mesohaline inner coastal waters, Greifswalder Bodden
GER-020	oligohaline inner coastal waters, Kleines Haff

POL-002	PL TW I WB 8 very sheltered, fully mixed, substratum: silt/sandy silt/silty sand; ice cover >90 days, water residence time 52 days
SWE-011	12n: Östergötland and Stockholm archipelago, middle coastal water
SWE-012	12s: Östergötland and Stockholm archipelago, middle coastal water
SWE-016	16. South Bothnian Sea, inner coastal water
SWE-018	18. North Bothnian Sea, Höga kusten, inner coastal water
SWE-020	20. North Quark inner coastal water
SWE-021	21. North Quark outer coastal water
SWE-022	22. North Bothnian Bay, inner coastal water

TBT and imposex

Substance	Threshold value	Reference	Comment
TBT	1.6 µg /kg dw sediment (5% TOC)	QS ²¹	Study reservation Denmark. Agreed to test in HOLAS II Normalized to 5% TOC
	<i>Secondary threshold: 0.2 ng/l water</i>	<i>EQS water (AA)¹</i>	
	<i>Secondary threshold: 12 µg/kg dw mussel</i>	<i>EAC²²</i>	Study reservation Denmark. Agreed to test in HOLAS II
imposex	<i>Peringia ulvae</i> : 0.1 VDSI <i>Nucella lapillus</i> : 2.0 VDSI <i>Neptunea antiqua</i> : 2.0 VDSI <i>Hinia reticulata</i> : 0.3 VDSI <i>Buccinum undatum</i> : 0.3 VDSI <i>Littorina littorea</i> : <0.3 ISI	Gercken & Sordyl 2009; Magnusson et al 2016 OSPAR EcoQO ²³	Study reservation Denmark. Agreed to test in HOLAS II

Assessment unit Scale 4	
Units listed for which an assessment is available	
Code for coastal units	Assessment unit name
	Kattegat
	Great Belt
	The Sound
DEN-007	OW1
DEN-008	OW2
DEN-009	OW3a
SWE-001	1s: West Coast inner coastal water
SWE-003	4. West Coast outer coastal water, Kattegat
SWE-004	5. South Halland and north Öresund coastal water
SWE-005	6. Öresund coastal water
SWE-006	7. Skåne coastal water
SWE-007	8. Blekinge archipelago and Kalmarsund, inner coastal water
SWE-008	9. Blekinge archipelago and Kalmarsund, outer coastal water
SWE-011	12n: Östergötland and Stockholm archipelago, middle coastal water
SWE-012	12s: Östergötland and Stockholm archipelago, middle coastal water
SWE-015	15. Stockholm archipelago, outer coastal water

²¹ HELCOM 2016. Draft core indicator report on TBT and imposex

²² OSPAR 2008. Document 379. CEMP Assessment Manual Co-ordinated Environmental Monitoring Programme Assessment Manual for contaminants in sediment and biota

²³ OSPAR 2010. EcoQO on imposex in dogwhelks and other selected gastropods. QUALITY STATUS REPORT 2010 Evaluation of the OSPAR system of EcoQOs for the North Sea,
http://qsr2010.ospar.org/media/assessments/p00406_supplements/p00406_suppl_6_imposex_dogwhelks.pdf

SWE-025	25. Göta and Nordre älv estuary
---------	---------------------------------

Radioactive substances

Assessment unit (scale 2)	Threshold value	Data available for the assessment	
All assessment units	Pre-chernobyl level	Yes	
	herring		2.5 Bq kg ⁻¹
	flounder and plaice		2.9 Bq kg ⁻¹
	seawater		15 Bq m ⁻³

White-tailed eagle productivity

Assessment unit (scale 3 - coastal only)	Threshold value	Data available for the assessment
All assessment units Except: 'Gulf or Riga Latvian Coastal waters' where not applicable	Productivity: 0.97 nestlings. Brood size: 1.71 nestlings. Breeding success: 0.59 (59%)	Yes

Operational oil-spills from ships

Assessment unit Scale 2	Threshold value Annual average of total spills during reference period 2008-2013 [m3]	Data available
Bothnian bay	0,1135	Yes
Quark	0,0007	Yes
Bothnian sea	0,1863	Yes
Åland sea	0,1363	Yes
Gulf of Finland	5,2447	Yes
Northern Baltic Proper	14,3056	Yes
Gulf of Riga	0,0124	Yes
Western Gotland Basin	0,2304	Yes
Eastern Gotland basin	1,8503	Yes
Gdansk Bay	0,1038	Yes
Bornholm Basin	2,8667	Yes
Arkona	7,6978	Yes
Bay of Mecklenburg	0,4070	Yes
Kiel Bay	0,1575	Yes
The Sound	0,1121	Yes

Annex 2. Current status of HELCOM indicators not used in HOLAS II

Table 1. List of core indicators with remaining indicator specific national study reservations

Core indicator	Study reservation
Theme: Hazardous substances	
Polyaromatic hydrocarbons (PAH) and their metabolites	Denmark (HOD 50-2016 para 4-48) <ul style="list-style-type: none"> - Primary threshold value on metabolites (1-hydroxypyrene) - Secondary substance fluoranthene secondary threshold value for sediment
TBT and imposex	Denmark (HOD 50-2016 para 4.48) <ul style="list-style-type: none"> - Primary threshold TBT in sediment (agreed to test in HOLAS II S&C6E-2017) - Secondary threshold TBT in mussels - Primary threshold imposex (agreed to test in HOLAS II S&C6E-2017) Denmark (State & Conservation 5E-2017 para 5.2)
Metals	Estonia, Denmark (State and Conservation 5-2016) <ul style="list-style-type: none"> - Secondary threshold value for Cd in fish liver
Polychlorinated biphenyls (PCB) and dioxins and furans	Denmark (HOD 50-2016) <ul style="list-style-type: none"> - Secondary threshold CB-118 in biota
Theme: Biodiversity and food-web	
State of soft-bottom macrofauna community	Denmark (HOD 51-2016, para 6-2) <ul style="list-style-type: none"> - Denmark accepts that the indicator is tested in HOLAS II and results are indicated as intermediate (State & Conservation 5E.2017, para 5.2).
Proportion of large fish in the community (LFI)	At State & Conservation 5-2016 (para 4J.26) the approach presented by the Lead Country for trend based threshold value and assessment of available dataset for HOLAS II purposes was not endorsed. Germany, Estonia and Poland provided written comments regarding their reservations after the meeting. At State & Conservation 5E-2017 (para 4.2) Denmark and Poland did not support the inclusion of descriptive qualitative information on pelagic offshore LFI in HOLAS II
Seasonal succession of functional phytoplankton groups	At State & Conservation 5-2016 (para 4J.38) the indicator was endorsed, but the proposed GES boundary approach was not endorsed. Denmark placed a study reservation. Germany stated that a final decision can be taken only once an assessment of applicability in the western Baltic Sea is available. Denmark: HOD 51-2016 (para 6.23) agrees to include the indicator as a test in HOLAS II denoting results as intermediate

Table 2. List of pre-core and candidate indicators proposed to be shifted to core indicators but not adopted as such by HOD 51-2016

Pre-core indicator	Study reservation on shift to core indicator
Theme: Biodiversity and food-web	
Diatom/Dinoflagellate index	Denmark (State and Conservation 5-2016): national testing of the diatom-dinoflagellate index does not show relevant responses to nutrient stress
Cumulative impact on benthic biotopes	Denmark (State and Conservation 5-2016 para 4J.50) reservation placed due to lack of data and current state of the indicator Poland (HOD 51-2016): Lack of data
Phytoplankton community composition as a foodweb indicator (candidate)	Denmark (State and Conservation 5-2016): study reservation on the indicator which was reiterated at State and Conservation 5E-2016. At HOD 51-2016 Poland placed a study reservation on the shift of status for the indicator. At State and Conservation 5E-2016 Poland informed that the study reservation is retained based on results of national testing however that other Contracting Parties that wish to do so can use the indicator in HOLAS II. Thus it is still a candidate indicator (outcome para 6.18)
Theme: Eutrophication	

Cyanobacterial bloom index	<p>Germany (HOD 51-2016 outcome para 6.17) expressed aim to clarify reservation by considering applicability of satellite data when results are available.</p> <p>Denmark (State and Conservation 5-2016, para 4J.41) analysis of the western Baltic Sea to be carried out before being shifted to core, however agreed that the indicator can be used in HOLAS II by indicating that the results are of interim/test character (HOD 51-2016 para 6.22-6.23)</p> <p>State and Conservation 5E-2017 (outcome para 3.2) endorsed threshold values for the indicator and noted that Denmark supports the indicator being included as test/interim results in HOLAS II (outcome para 5.2)</p>
Theme: Litter	
Beach litter	<p>Sweden (State and Conservation 5-2016) can support the interim definition of GES, however is not able to endorse the shift from pre-core to core indicator.</p>

Table 3. List of HELCOM pre-core indicators as of the outcome of HOD 51-2016

Theme: Biodiversity
<p>Lower depth limit distribution of the macrophyte community</p> <p>Condition of benthic habitats</p>
Theme: Eutrophication
<p>Shallow water oxygen</p> <p>Phytoplankton spring bloom intensity based on chl-a</p>
Theme: Hazardous substances
<p>Reproductive disorders: malformed eelpout and amphipod embryos²⁴</p> <p>Acetylcholinesterase inhibition</p> <p>Diclofenac concentration</p> <p>Estrogenic-like chemicals and effects</p> <p>Lysosomal membrane stability (LMS)</p> <p>Fish disease index</p> <p>Micronucleus test</p>
Theme: Litter
<p>Beach litter</p> <p>Litter on the seafloor</p>
Theme: Underwater noise
<p>Continuous low frequency anthropogenic sound</p> <p>Distribution in time and space of loud low- and mid-frequency impulsive sound</p>

Table 5. List of HELCOM candidate indicators

Theme: Biodiversity and foodweb
<p>Harbour porpoise distribution and abundance</p> <p>Seal pup weight at weaning</p> <p>'marine mammal health'²⁵</p> <p>Distribution of seabirds</p>

²⁴ proposed to be used as supplementary indicator in HOLAS II by Finland and Sweden (State and Conservation 5-2016 outcome paragraph 4J.49)

²⁵ The specific indicator has not yet been specified, however the intention to develop new health indicators for marine mammals has been noted by State and Conservation 5-2016 and that this intention should be reflected in HOLAS II (outcome para 4J.10)

Breeding success in guillemots of Gotland
Maximum length fish in the pelagic community
State of hard-bottom communities
Biomass ratio of opportunistic and perennial macroalgae
Phytoplankton species assemblage clusters based on environmental factors
Phytoplankton taxonomic diversity
Theme: Eutrophication
Deep-water oxygen consumption
Theme: Hazardous substances
PCB and dioxins for fish safe to eat
EROD activity
Theme: Litter
Microlitter in the water column
Pressures
Dredging and dumping of dredge materials