Baltic Marine Environment Protection Commission

Working Group on the State of the Environment and Nature Conservation

STATE & CONSERVATION 10-2019

Hamina, Finland, 4-6 May 2019

Document title	Overview of HELCOM assessment data flows
Code	3MA-7
Category	INF
Agenda Item	3MA – Development and implementation of Recommendations
Submission date	29.4.2019
Submitted by	Secretariat
Reference	

Background

STATE & CONSERVATION 9-2018 invited the Secretariat to produce an overview of the data flows related HELCOM assessments and to the BSPI/BSII (Baltic Sea Pressure Index) for State and Conservation 10-2019. STATE & CONSERVATION 9-2018 also invited the Secretariat to include data flows and data needs for candidate indicators in the overview, to facilitate prioritizing further work on indicator development, and present this overview at State and Conservation 10-2019.

STATE & CONSERVATION 9-2019 invited all indicator leads and the Secretariat to present an overview of gaps in the data needed to make the indicators fully functional, to facilitate prioritization of the upcoming work (to largely be based on already existing information collected through the indicator review questionnaire) and invited the indicator manager to present the information at State and Conservation 10-2019.

This document provides and overview of HELCOM assessment related data flows. Data flows are listed including information on:

- Related HELCOM indicators (core, pre-core & candidate) or cumulative impact assessment (BSPI/BSII)
- Existence of monitoring manual record, which sets requirement for monitoring and data reporting
- Current data hosting arrangements
- Problems in obtaining complete and coherent dataset for assessment

This document supplements the previous data flow document provided to State & Conservation 9-2018 by including status of data flow by taking into account feedback and information obtained so far from the questionnaire sent to indicator experts and including BSPI/BSII related data flows or data collection activities.

Action requested

The Meeting is invited to:

- take note of current status of data flows supporting HELCOM assessments.
- take note of the provided information which will be used as a basis for prioritizing future indicator work in the upcoming 2019 HELCOM indicator workshop.
- The Contracting Parties are invited to present national information relating to the identified gaps (reasons, plans for filling the gaps etc.)
- The Meeting is invited to discuss how the gaps could be filled.

Overview of HELCOM databases and data flow arrangements

Background

This document provides and overview of HELCOM assessment related data flows. Data flows are listed including information on:

- Related HELCOM indicators (core, pre-core & and also candidate) or cumulative impact assessment (BSPI/BSII)
- Existence of monitoring manual record, which sets requirement for monitoring and data reporting
- Current data hosting arrangements
- Problems in obtaining complete and coherent dataset for assessment

Current status of data flows and data hosting arrangements

Annex 1 contains a table that outlines data flow arrangements for each indicator. It contains following columns:

- Baltic Sea Action Plan theme related to indicator
- Status of indicator (core, pre-core, candidate)
- Monitoring manual link
- Current data host, only in case of established data flow arrangement. This includes data centers such as ICES or BNI, where contractual agreement is in place. For several indicators HELCOM Secretariat is acting as a data host, as part of its regular activities. In those cases there is no contractual agreement. There can be also data flows which are not managed by HELCOM but other data collection initiative.
- HELCOM Group that is relevant and/or involved in data collation/reporting
- Status of the HELCOM data flow arrangement based on following criteria (NOTE: this is rough qualitative estimate of reporting coverage, not in-depth analysis of coverage of monitoring network or data gaps):

Theme	Value	Description
Regularity	Regular	Annual reporting without need for ad hoc data requests
	Irregular	Ad hoc data request required for data reporting (used in HOLAS II)
Completeness	Functional	Most of the CPs are reporting data
	Sporadic	Serious gaps in data reporting by CPs

- Example of data flow statuses:

Status	Description
Regular-Functional	Data collection is regular (reported annually), and data flow is generally suitable for carrying out assessment (minor gaps can exist)
Regular-Sporadic	Data collection is regular (reported annually), but there is an issue with data flow which hinders assessment (larger gaps or quality issues)
Irregular-Functional	Data collection is irregular (ad hoc data call or other one-off data collection method), but coverage is generally suitable for carrying out assessment (minor gaps can exist)
Irregular-Sporadic	Data collection is irregular (ad hoc data call or other one-off data collection method), and there is an issue with data flow which hinders assessment

- Comments related to data flow arrangement, including feedback received from indicator experts

This document contains also briefly summarizes data flow situation by each theme.

Biodiversity indicators – data flow situation

In general, biodiversity related indicators have very diverse data flow requirements, of which many are of irregular nature and in some cases not even based on national monitoring data which has resulted in data use restrictions and challenges in compiling harmonized assessment for the State of the Baltic Sea report.

Fish

For State of the Baltic Sea report, there were 2 indicators on commercial fish which were based on information collected by ICES. For coastal fish related indicators, the regular data flow is organized in FISH-PRO group and data submitted to the database hosted by HELCOM Secretariat. For migratory fish, the data hosting arrangements at HELCOM level are non-existent and indicator has been updated based on data collected by ICES WGBAST.

Birds

For bird indicators, ad-hoc data calls have been carried out in order to obtain data from national data hosts for indicator assessment. In some Contracting Parties, the monitoring is conducted by non-governmental bodies (volunteers, NGOs) resulting in possible restrictions of data usage. In some cases the data used in indicator assessment was restricted for redistribution, which is in contradiction with HELCOM Monitoring and Assessment Strategy and also poses a problem of HELCOM secretariat not being able to make underlying data used in indicator assessment available resulting in lack of transparency of the assessment. Due to large volume of requested data and lack of resources, some existing national data was not processed for the common format which is needed for the data to be included in the database and thus omitted from indicator calculation.

It should be noted that for the wintering and breeding bird indicators used for State of the Baltic Sea report (HOLAS II), the reported data was stemming from coastal monitoring locations. Joint OSPAR/HELCOM/ICES Working Group on Marine Birds (JWGBIRD) identified that a key limitation of the current indicator for wintering birds is that data from at-sea surveys are not included due to lack of monitoring as such and is as such not a data flow issue. The open sea data is currently included in the European Seabirds at Sea (ESAS) in a joint database for both HELCOM and OSPAR which has been tasked to be hosted by ICES. However, the coastal monitoring data which was used in HOLAS II bird indicators is not included in this data flow.

State & Conservation 9-2019 invited the JWG BIRD experts to identify the best way to collate available data on birds at sea and invited the experts to identify and suggest on the optimal reporting frequency and timing for at sea monitoring data. The Meeting further concluded that a structured process needs to be developed for bird indicators and Contracting Parties commitment needed to report the data.

Seals

For seal abundance/distribution indicators, ad-hoc data calls have been carried out by the Secretariat in order to obtain data from national data hosts to the Seal database hosted by HELCOM Secretariat. Discussion on relevant resolution for reporting has been carried out in several SEAL EG meetings. Lack of reporting in response to data call prevents creation of harmonized Baltic dataset.

For other seal indicators such as nutritional and reproductive status indicators, data coverage is limited and has been collected by experts responsible of the indicator assessment on ad hoc basis and a regional database solution does not currently exist.

Phyto- and Zooplankton, Zoobenthos

As reported to previous State & Conservation meetings (S&C 7-2017 Document 3J-7), reporting of phyto- and zooplankton as well as zoobenthos to COMBINE have not been complete or according to required format in past years, and additional data collection from national sources and manual processing to harmonize data was required for all three topics in order to produce indicator assessment for HOLAS II.

Experts have encountered taxonomical problems when the data reported to COMBINE has been extracted for use in phytoplankton and zooplankton indicator assessment. Therefore it should be stressed that reporting to COMBINE should adhere to the HELCOM species lists and biomass conversion factors as specified by the HELCOM projects ZEN-ZIIM and PEG. Experts have also expressed the need for extracting specific data products rather than only raw data.

Experts working with zoobenthos indicator have also stressed the importance of a standardized reporting format and that optimally data should be reported to COMBINE database.

State & Conservation 9-2019 discussed the issues and invited the zoo- and phytoplankton and zoobenthos indicator experts to clarify what issues they came across regarding data usability from COMBINE during HOLAS II and to join a half day online workshop, together with the data host ICES and Secretariat. The workshop requires preparation from the expert side and is currently tentatively planned to take place in Autumn 2019.

Eutrophication indicators – data flow situation

Eutrophication related indicators are in general well organized in terms of data flow due to regular reporting practice to COMBINE carried out by Contracting Parties and established review procedure and automated system for creating indicator data products developed in EUTRO OPER project and carried out by IN-Eutrophication group.

Russian data has not been reported to COMBINE since 2013. For HOLAS II, the gap was filled for Gulf of Finland by using data made available from Gulf of Finland Year project (data until 2014). For future open sea and complete coastal assessments, and more spatially evenly distributed in-situ data, reporting of Russian national monitoring data to COMBINE database would provide significant improvement.

Use of earth observation data and ship-of-opportunity data to complement in-situ monitoring increases spatial and temporal coverage of data used in eutrophication assessment and is part of the data flow arrangement of Chlorophyll-a indicator.

Currently reported in-situ monitoring data covers mostly only open sea areas, thus the development of indicators more applicable on coastal areas would require change of reporting practice to cover also coastal monitoring data.

Hazardous substances indicators – data flow situation

Hazardous substances related indicators are mostly reported to COMBINE database hosted by ICES with the exception of radioactive substances (MORS Database hosted by HELCOM Secretariat). Both reporting flows can be considered as regular and functional, however some data gaps exists and reporting of Russian national monitoring data to COMBINE database would provide significant improvement.

For certain hazardous substances related core indicators, regular data reporting flow is not in place currently, namely:

- Diclofenac
- White-tailed eagle

The development of an automated system (similar in function to Eutrophication indicators is underway (contract with ICES and in cooperation with OSPAR) for the hazardous substances indicators that address concentrations (except diclofenac at this stage). This system is planned to be operational by end of 2019 and will improve data flows, potentially enabling a review of the reported data coverage on supporting parameters by the relevant experts.

Data flows supporting BSII/BSPI

Data flows supporting BSII/BSPI can be divided to Ecosystem Component layers (Annex 2, Table 2) and Human activities (Annex 2, Table 3) .

Ecosystem components

Ecosystem component data flows were mostly required to be obtained from ad hoc data call which was targeted to   State & Conservation. The data resulting from data call was rather comprehensive, but lack or response to data call from some CPs resulted in gaps in final ecosystem component maps. Some CPs provided modelled distribution data and some pointwise survey data, which were both used in final ecosystem component grid maps in order to obtain best possible coverage. This approach creates a caveat in terms of usability of the Ecosystem component layer as well as outcomes of BSII calculation. For broadscale habitat maps, EuSeaMap project outputs were used as a basis, but supplemented by some Cps with national survey data. This increases the accuracy in some areas, but on the other hand creates a quality mismatch for the whole ecosystem component map. Marine mammal distribution maps were new products created for BSPI/BSII by expert consultation with SEAL group. Fish distribution data was obtained from commercial fisheries related data collection framework.

Human activities

BSPI/BSII consists of aggregated pressure layers, which are based on summing individual human activity map layers. Annex 2 (Table 3) displays separately each human activity dataset and in which aggregated pressure layer(s) it is used. In general data flows for many human activites are of ad hoc nature and only few regular data flows are in place within HELCOM. These regular data flows related to shipping traffic and accidents, dredging and radioactive discharges. For some human activities datasets, other non-HELCOM data flows were utilized, e.g. E-PRTR for industrial facilities. For some human activities datasets, the nature of the activity is rather static, when it can considered that rather complete dataset can be obtained from openly available sources when update interval is not clearly defined for the assessment period. These openly available sources included e.g. OpenStreetMap and CORINE land cover.

Annex 1

Table 1. Data flow arrangements for each HELCOM indicator, including core-, pre core- and candidate indicators.

Theme	Indicator	Indicator	Mon.	Database	Data host	Hosting arrangement status	Reporting	Group/Subgroup	Status	Notes
Bio	Abundance of coastal fish key functional groups	Core	Link	Coastal fish COOL	HELCOM Secretariat	No contract – tasked to Secretariat	Annual	S&C/FISH-PRO	Regular-Functional	
Bio	Abundance of key coastal fish species	Core	Link	Coastal fish COOL	HELCOM Secretariat	No contract – tasked to Secretariat	Annual	S&C/FISH-PRO	Regular-Functional	
Bio	Abundance of salmon spawners and smolt	Core	Link		-	No contract – contribution of ICES WGBAST to collate a dataset			Irregular-Sporadic	Data made available by WGBAST
Bio	Abundance of sea trout spawners and parr	Core	Link		-	No contract – contribution of ICES WGBAST to collate a dataset			Irregular-Sporadic	Data made available by WGBAST
Bio	Abundance of waterbirds in the breeding season	Core	Link	HELCOM Bird database	HELCOM Secretariat	No contract – tasked to Secretariat for data used in HOLAS 2 (only coastal data used)	Ad-hoc data call for HOLAS II	ICES-HELCOM-OSPAR JWG BIRD	Irregular-Sporadic	Only coastal data available from monitoring. Common database (rather than national databases) desirable as well as automatic data flow according to a fixed schedule (rather than data calls). Delayed data deliveries have much obstructed work on indicator.
Bio	Abundance of waterbirds in the wintering season	Core	Link	HELCOM Bird database / ESAS	HELCOM Secretariat / ICES	No contract – tasked to Secretariat for data used in HOLAS 2 (only coastal data used) ICES hosts ESAS	Ad-hoc data call for HOLAS II	ICES-HELCOM-OSPAR JWG BIRD	Irregular-Sporadic	Only coastal data available from monitoring. Offshore survey data could be included to ESAS database. Common database (rather than national databases) desirable as well as automatic data flow according to a fixed schedule. Delayed data deliveries have much obstructed work on indicator.
Bio	Diatom/Dinoflagellate index	Pre-Core*	Link	COMBINE	ICES / HELCOM Secretariat	Contract – COMBINE monitoring data / Data collection and processing from national contributors (mainly PEG	Annual	S&C/PEG	Regular-Sporadic	Lack of reporting to COMBINE which has been supplemented with data collection from national contributors (mainly PEG experts) for HOLAS II.

Bio	Indicator	Status	Link	Database	Host	Contract/Data flow	Frequency	Group	Reporting	Comments
										experts), hosting by Secretariat
										It would be helpful to be able to obtain data products: sum of diatoms and dinoflagellates from spring for each assessment unit.
Bio	Seasonal succession of dominating phytoplankton groups	Core*	Link	COMBINE	ICES / HELCOM Secretariat	Contract – COMBINE monitoring data / Data collection and processing from national contributors (mainly PEG experts), hosting by Secretariat	Annual	S&C/PEG	Regular-Sporadic	Lack of reporting to COMBINE which has been supplemented with data collection from national contributors (mainly PEG experts) for HOLAS II. COMBINE does not provide aggregated data required for the seasonal succession indicator. It would be helpful to be able to obtain data products from the database.
Bio	Proportion of large fish in the community	Core		ICES BIAS/BITS	ICES	No contract – no HELCOM data flow	Annual			
Bio	Distribution of Baltic seals	Core	Link	HELCOM Seal database	HELCOM Secretariat	No contract – tasked to Secretariat	Ad-hoc data call	S&C/EG MAMA	Irregular-Sporadic	Lack of complete reporting.
Bio	Number of drowned mammals and waterbirds in fishing gears	Pre-Core*	Link		-	No contract	NA	CG FISHDATA	NA	ICES WGBYC has solutions for DC-MAP requirements, which could be used for this indicator.
Bio	Nutritional status of seals	Core	Link		HELCOM Secretariat	No contract – tasked to Secretariat	Ad-hoc data call	S&C/EG MAMA	Irregular-Sporadic	Lack of proper database solution.
Bio	Population trends and abundance of seals	Core	Link	HELCOM Seal database	HELCOM Secretariat	No contract – tasked to Secretariat	Ad-hoc data call	S&C/EG MAMA	Irregular-Sporadic	Lack of complete reporting.
Bio	Reproductive status of seals	Core	Link		HELCOM Secretariat	No contract – tasked to Secretariat	Ad-hoc data call	S&C/EG MAMA	Irregular-Sporadic	Lack of proper database solution.
Bio	State of the soft-bottom macrofauna community	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data / Data collection and processing from national contributors, hosting by Secretariat	Annual	S&C/IN-BENTHIC	Regular-Sporadic	Lack of reporting to COMBINE which has been supplemented with data collection from national contributors. The data is in different format depending on reporting country. Also taxonomic nomenclature differs between countries.
Bio	Cumulative impact on benthic biotopes	Pre-core					NA	S&C/IN-BENTHIC		Indicator would utilize multiple data flows similarly as

									BSPI/BSII. Most of the underlying data is not regularly updated/collected. The available biotope data sources is not sufficient regarding biotope information in the HELCOM area (HELCOM HUB classification minimum level 4).
Bio	Condition of benthic habitats	Pre-core					NA	S&C/IN-BENTHIC		
Bio	Lower depth limit distribution of the macrophyte community	Pre-core					NA	S&C/IN-BENTHIC		
Bio	Population structure of long-lived macrozoobenthic species	Pre-core		COMBINE?			NA	S&C/IN-BENTHIC		
Bio	Zooplankton mean size and total stock (MSTS)	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data / Data collection and processing from national contributors, hosting by Secretariat	Annual	S&C/ZEN-QAI project	Regular-Sporadic	Lack of reporting to COMBINE which has been supplemented with data collection from national contributors.
Bio	Maximum length fish in the pelagic community	Cand		ICES BIAS/BITS	ICES	No contract – no HELCOM data flow	Annual			
Bio	Harbour porpoise distribution and abundance	Cand						S&C/EG MAMA		
Bio	Seal pup weight at weaning	Cand						S&C/EG MAMA		
Bio	'Marine mammal health indicators'	Cand						S&C/EG MAMA		
Bio	Distribution of seabirds	Cand		HELCOM Bird database / ESAS	HELCOM Secretariat / ICES	No contract – tasked to Secretariat for data used in HOLAS 2 (only coastal data used) ICES hosts ESAS	Ad-hoc data call for HOLAS II	ICES-HELCOM-OSPAR JWG BIRD	Irregular-Sporadic	Only coastal data available from monitoring. Offshore survey data could be included to ESAS database.
Bio	Breeding success in guillemots of Gotland	Cand								
Bio	"Phytoplankton community composition as a food web indicator	Cand		COMBINE	ICES	Contract – COMBINE monitoring data		S&C/PEG		COMBINE data flow could be potentially utilized
Bio	Phytoplankton species assemblage clusters based on environmental factors	Cand		COMBINE	ICES	Contract – COMBINE monitoring data		S&C/PEG		COMBINE data flow could be potentially utilized

Bio	Phytoplankton taxonomic diversity	Cand		COMBINE	ICES	Contract – COMBINE monitoring data		S&C/PEG		COMBINE data flow could be potentially utilized
Bio	Biomass ratio of opportunistic and perennial macroalgae	Cand						S&C/IN-BENTHIC		
Bio	State of hard-bottom communities	Cand						S&C/IN-BENTHIC		
Eutro	Chlorophyll-a	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO	Regular-Functional	
Eutro	Cyanobacterial bloom index	Pre-Core*	Link; Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO	Regular-Functional	
Eutro	Inputs of nutrients to the subbasins	Core	Link; Link	PLC-WATER	BNI	Contract – BNI for hosting PLC database (water)	Annual	PRESSURE/PLC	Regular-Functional	
Eutro	Nitrogen/DIN	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO	Regular-Functional	
Eutro	Oxygen debt	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO	Regular-Functional	
Eutro	Phosphorus/DIP	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO	Regular-Functional	
Eutro	Total nitrogen (TN)	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO	Regular-Functional	
Eutro	Total phosphorus (TP)	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO	Regular-Functional	
Eutro	Water clarity	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO	Regular-Functional	
Eutro	Shallow-water bottom oxygen	Pre-Core		COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO	Regular-Sporadic	Coastal monitoring data not currently included in COMBINE submissions
Eutro	Phytoplankton spring bloom intensity based on chl-a	Pre-Core		COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO		EO data flow not established
Eutro	Deep-water oxygen consumption	Cand		COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO	Regular-Functional	
(Eutro)	Baltic Sea acidification	Cand		COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/IN-EUTRO		Reporting parameters to be extended
Haz.sub	Diclofenac	Pre-Core*			HELCOM Secretariat	No contract – tasked to Secretariat	Ad-hoc data call	PRESSURE/CG PHARMA	Irregular-Sporadic	Monitoring and data collection not established
Haz.sub	Hexabromocyclododecane (HBCDD)	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/EN HAZARDS	Regular-Functional	
Haz.sub	Metals (lead, cadmium and mercury)	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/EN HAZARDS	Regular-Functional	
Haz.sub	Perfluorooctane sulphonate (PFOS)	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/EN HAZARDS	Regular-Functional	
Haz.sub	Polyaromatic hydrocarbons (PAH) and their metabolites	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/EN HAZARDS	Regular-Functional	

Haz.sub	Polybrominated diphenyl ethers (PBDE)	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/EN HAZARDS	Regular-Functional	
Haz.sub	Polychlorinated biphenyls (PCB) and dioxins and furans	Core	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/EN HAZARDS	Regular-Functional	
Haz.sub	Radioactive substances: Cesium-137 in fish and surface seawater	Core	Link	MORS-ENV.	HELCOM Secretariat	No contract – tasked to Secretariat	Annual	S&C/MORS	Regular-Functional	
Haz.sub	Reproductive disorders: malformed embryos of amphipods	Suppl	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/EN HAZARDS	Regular-Functional	
Haz.sub	TBT and imposex	Core*	Link	COMBINE	ICES	Contract – COMBINE monitoring data	Annual	S&C/EN HAZARDS	Regular-Functional	
Haz.sub	White-tailed eagle productivity	Core			HELCOM Secretariat	No contract	Ad hoc	S&C/EN HAZARDS	Irregular-Sporadic	Monitoring and data collection not established – sensitive location data
Haz.sub	Reproductive disorders: Malformed amphipod embryos	Supp								
Haz.sub	Acetylcholinesterase inhibition	Pre-core								
Haz.sub	Diclofenac concentration	Pre-core	NA	NA	HELCOM Secretariat	No contract	Ad-hoc data call	PRESSURE / CG-PHARMA	Irregular-Sporadic	Inclusion within the HELCOM COMBINE database could be explored.
Haz.sub	Estrogenic-like chemicals and effects	Pre-core								
Haz.sub	Lysosomal membrane stability (LMS)	Pre-core								
Haz.sub	Fish Disease Index	Pre-core		COMBINE(?)	ICES	Contract – COMBINE monitoring data	Annual	S&C/EN HAZARDS	Indicator not operational	Suitability and coverage of COMBINE to support data needs is currently unclear
Haz.sub	Micronucleus test	Pre-core		COMBINE(?)	ICES	Contract – COMBINE monitoring data	Annual	S&C/EN HAZARDS	Indicator not operational	Suitability and coverage of COMBINE to support data needs is currently unclear
Haz.sub	EROD activity	Cand		COMBINE(?)	ICES	Contract – COMBINE monitoring data	Annual	S&C/EN HAZARDS	Indicator not operational	Suitability and coverage of COMBINE to support data needs is currently unclear
	Operational oil-spills from ships	Core	Link	Illegal spills database	HELCOM Secretariat	HELCOM Secretariat	Annual	MARITIME/IWGAS	Regular-Functional	
	Trends in arrival of new non-indigenous species	Core	Link	AquaNIS / COMBINE	KU	COMPLETE project	Annual		Regular-Sporadic	S&C decided to use AquaNIS for HOLAS2. Data is reported to AquaNIS annually in spring In addition, new observations are constantly added to AquaNIS when the observations are made.

	Spatial dataset		Link	Database	Source	Contract	Frequency	Group/Subgroup	Status	Notes
										A consolidated method to evaluate NIS information stemming from other benthos, plankton and fish monitoring programmes is sorely missing.
	Distribution in time and space of load low- and mid- frequencey impulsive sounds	Pre-core		Impulsive Noise Registry	ICES	Contracted	Annual	PRESSURE/EN NOISE	Regular-Sporadic	Recently established data flow, limited availability of data
	Continuous low frequency anthropogenic sound	Pre-core	Link	Continuous noise database	ICES	To be contracted	Annual, to be established	PRESSURE/EN NOISE	to be established	Agreed in HELCOM 40-2019
	Beach litter	Pre-core	Link		HELCOM Secretariat	No contract – tasked to Secretariat	Ad hoc data call for HOLAS II	PRESSURE/EN MARINE LITTER	Irregular-Sporadic	SPICE Project collated and published beach litter dataset. Lack of operational database solution at HELCOM level.
	Litter on the seafloor	Pre-core	Link	DATRAS	ICES		Ad hoc	PRESSURE/EN MARINE LITTER		SPICE Project extracted and analysed seafloor litter data
	Microlitter in the watercolumn	Cand								

*) tested in HOLAS II

Annex 2

Table 2. Data flow arrangements for HELCOM BSPI/BSII Assessment – Ecosystem components.

Spatial dataset	Source	Guideline/Rec	Reporting	Group/Subgroup	Status	Notes
Ecosystem components – Benthic species	Ad hoc data call to S&C	NA	NA	State & Conservation	Irregular-Sporadic	Mixture of point and polygon data. Including also modelled data. RED LIST Assessment data used. → Heterogenous sources.
Ecosystem components – Birds	Ad hoc data call to S&C	NA	NA	State & Conservation	Irregular-Sporadic	Natura SPA Areas. No data from RU.
Ecosystem components – Broadscale habitats	Non-HELCOM Source: EuSeaMap data products and national data products	NA	NA	State & Conservation	Irregular-Sporadic	Broad-scale habitat map produced in EUSeaMap projects were used. National datasets were used for come CPs as requested by CP.
Ecosystem components – Fish	Non-HELCOM Source: Baltic International	NA	NA	State & Conservation	Regular-Functional	Baltic International Trawl surveys and Landings data (sprat, herring and cod abundance)

	Trawl surveys and Landings data applied.					Cod spawning areas: Hüssy, K. 2011. Review of western Baltic cod (Gadus morhua) recruitment dynamics. ICES Journal of Marine Science 68(7), 1459-1471. In addition, Gdansk deep was added. Pikeperch recruitment areas: National model for FI and for other areas delineated by selecting areas where depth < 5 m, logged exposure < 5, salinity < 7 PSU, Secchi depth < 2 m and distance to deep (10m) water < 4km. Perch recruitment areas: National model for FI and for other areas delineated by selecting areas where depth < 4 m (For Danish waters < 3 m), logged exposure < 5 (exposure model described in Isæus 2004), and salinity < 10 PSU.
Ecosystem components – Mammals	RED LIST Assessment and expert consultation	NA	NA	SEAL EG	Irregular-Functional	The distribution maps from HELCOM Red list assessment of the Baltic Sea, using seal group expert consultation. For the Baltic Sea Impact Index, the map was modified to represent four abundance classes, based on expert consultation
Ecosystem components – Natura habitats	Ad hoc data call to S&C	NA	NA	State & Conservation	Irregular-Sporadic	Data quality and habitat definitions vary between countries. Data is often based on modelling and ground-truthing has not always taken place. Habitat directive not implemented in RU, thus no data.
Ecosystem components – Pelagic habitats	Non-HELCOM Source: IOW and MERIS (SYKE)	NA	NA	State & Conservation		Polygon data on sulfidic areas kindly provided by Leibniz-Institut für Ostseeforschung Warnemünde (IOW). Eastern Baltic Sea (excluding some coastal areas): 300 m resolution satellite data (MERIS) on Chl-a concentration (maximum value of weeks 12-22, 2003-2011) provided by the Finnish Environment Institute.

Table 3. Data flow arrangements for HELCOM BSPI/BSII Assessment – Human activities datasets used as input for aggregated pressure layers.

Spatial dataset	Pressure Layer(s)	Source	Guideline/Rec	Reporting	Group/Subgroup	Status	Notes
Land claim	Physical loss	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Sporadic	Provided to HOLAS II by DK, FI, SE and PL. The activity was declared as not relevant in DE, EE, LV and LT.
Watercourse modification	Physical loss, Changes to hydrological conditions	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Sporadic	Provided to HOLAS II by EE, FI, PL. The activity was declared as not relevant in DE and LT.
Extraction of sand and gravel	Physical loss, Physical Disturbance	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Sporadic	Provided to HOLAS II by DE, DK, EE, FI, LT, PL, SE.
Dredging (capital)	Physical loss	REC 36-2 reporting, Ad hoc data call to HOLAS II	REC 36-2	(Annual)	PRESSURE/EN DREDS	Regular-Sporadic	Only voluntary reporting of dredging locations under REC 36-2, complemented with ad hoc data call. Considerable differences in data submitted by different CPs.

Activity	Pressure	Data source	Reference	Frequency	Reporting	Status	Comments
Dredging (maintenance)	Physical Disturbance	REC 36-2 reporting, Ad hoc data call to HOLAS II	REC 36-2	(Annual)	PRESSURE/EN DREDS	Regular-Sporadic	Only voluntary reporting of dredging locations under REC 36-2, complemented with ad hoc data call. Considerable differences in data submitted by different CPs.
Deposit of dredged material	Physical Disturbance	REC 36-2 reporting	REC 36-2	Annual	PRESSURE/EN DREDS	Regular-Functional	
Oil platforms	Physical loss, Changes to hydrological conditions	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Functional	Only 2 installations in the Baltic so coverage can be considered full.
Pipelines	Physical loss, Physical Disturbance	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Sporadic	Provided to HOLAS II by DE, DK, FI, PL, SE.
Wind farms (operational)	Physical loss, Physical Disturbance, Changes to hydrological conditions	Ad hoc data call to HOLAS II, EMODnet Human activities	NA	NA	NA	Irregular-Functional	Supplemented with national information and locations of turbines extracted from EO data.
Cables	Physical loss, Physical Disturbance	Ad hoc data call to HOLAS II, EMODnet Human activities	NA	NA	NA	Irregular-Sporadic	Provided to HOLAS II by DE, DK, EE, FI, LT, PL, SE. The activity was declared as not relevant in DE and LT.
Harbors	Physical loss	HELCOM AIS, EMODnet, OpenStreetMap, Baltic Port List	NA	NA	NA	Irregular-Functional	Dataset can be considered as rather static and complete.
Marinas and leisure harbours	Physical loss	OpenStreetMap	NA	NA	NA	Irregular-Functional	Dataset can be considered as rather static and complete.
Bridges and other constructions	Physical loss	OpenStreetMap	NA	NA	NA	Irregular-Functional	Dataset can be considered as rather static and complete.
Oil terminals, refineries	Physical loss	Baltic Port List	NA	NA	NA	Irregular-Functional	Dataset can be considered as rather static and complete.
Finfish mariculture	Physical loss, Physical Disturbance	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Sporadic	Provided to HOLAS II by DE, DK, FI, SE. The activity was declared as not relevant in EE, LV, LT and PL.
Shellfish mariculture	Physical loss, Physical Disturbance	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Sporadic	Provided to HOLAS II by DE, DK, SE. The activity was declared as not relevant in EE, FI, LV, LT, PL and RU.
Shipping density	Physical disturbance	HELCOM AIS	REC 33-1R	Continuous, near real-time, HELCOM AIS Network	MARITIME/AIS EWG	Regular-Functional	

Recreational boating and sports	Physical disturbance, Disturbance of species due to human presence	Non HELCOM Source: SHEBA Project	NA	NA	NA	Irregular-Functional	
Fishing intensity (subsurface swept area ratio average 2011-2016)	Physical disturbance	HELCOM-ICES VMS Data call	NA	NA	ICES WGSFD	Irregular-Functional	Advice request to ICES WGSFD to produce Fisheries intensity maps.
Coastal defence and flood protection (under construction)	Physical disturbance	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Sporadic	Provided to HOLAS II by DE, DK, EE, FI, PL, SE. The activity was declared as not relevant in LT.
Furcellaria harvesting	Physical disturbance	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Functional	Provided to HOLAS II by EE. The activity was declared as not relevant in DE, DK, FI, LV, LT, PL and RU.
Hydropower dams	Changes to hydrological conditions	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Functional	Provided to HOLAS II by EE. The activity was declared as not relevant in DE, DK, FI, LV, LT, PL and RU.
Inputs of continuous anthropogenic sounds	Ambient underwater sound	Non HELCOM Source: BIAS Project	Underwater noise guideline	Annual, to be established	PRESSURE/EN-NOISE	To be established	HELCOM 40-2019 agreed on establishing database for monitoring data of underwater sound.
Impulsive sound events 2011-2016	Inputs of impulsive anthropogenic sound (into water)	HELCOM-OSPAR Registry of impulsive sounds		Annual	PRESSURE/EN-NOISE	Regular-Functional	
Discharge of warm water from nuclear power plants	Input of heat	Ad hoc data call to HOLAS II	NA	NA	S&C/MORS EG	Irregular-Functional	
Fossil fuel energy production (only location available)	Input of heat	Non HELCOM Source: E-PRTR	NA	NA	NA		
Pollution ship accidents	Oil slicks and spills	HELCOM Shipping accidents database / EMCIP	NA	Annual	MARITIME	Regular-Functional	Data collection was seized for 2014-2016 but continued in 2017 after which data collection is done from EMSA EMCIP database and merged with data from RU.
Illegal oil discharges	Oil slicks and spills	HELCOM Illegal oil discharges database	NA	Annual	MARITIME/IWGAS	Regular-Functional	
Integrated assessment of hazardous substances	Input of hazardous substances	COMBINE	Monitoring manual	Annual	S&C/EN HAZ	Regular-Functional	

Discharges of radioactive substances from NPPs	Introduction of radionuclides	MORS Discharge register	MORS Guideline	Annual	S&C/MORS EG	Regular-Functional	
Nutrient concentrations (phosphorus and nitrogen)	Relative distribution of nutrient concentrations (phosphorus and nitrogen)	COMBINE, supplemented with SMHI, EEA and Gulf of Finland Year data	Monitoring manual	Annual	S&C	Regular-Functional	
Bathing sites	Disturbance of species due to human presence	Non-HELCOM Source: EEA	NA	NA	NA	Irregular-Functional	Dataset can be considered as rather static and complete.
Urban land use	Disturbance of species due to human presence	Non-HELCOM Source: Corine Land Cover and OpenStreetMap	NA	NA	NA	Irregular-Functional	Dataset can be considered as rather static and complete.
Fish extraction – commercial fisheries	Extraction of, or mortality/injury to fish	Non-HELCOM Source: EC DCF and ICES	NA	NA	NA	Regular-Functional	
Game hunting of seabirds	Extraction of, or mortality/injury to seabirds	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Functional	
Predator control of seabirds	Extraction of, or mortality/injury to seabirds	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Functional	
Hunting of seals	Extraction of, or mortality/injury to mammals	Ad hoc data call to HOLAS II	NA	NA	NA	Irregular-Functional	
Spread of non-indigenous species	Introduction of nonindigenous species and translocations	NIS Indicator	Link	Annual	S&C	Irregular-Functional	