Document title	Future work on HELCOM indicators - Pelagic habitats and foodwebs
Code	5
Category	INF
Submission date	1.10.2019
Submitted by	Secretariat

Background

The following document contains a brief topic summary that addresses the overall aim of indicator work and assessments on the given topic. It outlines, the current status, and gives an indication of the work needed to adjust/develop the identified indicators. Potential avenues of cooperation avenues are also described. Where possible the information has been compiled based on responses received from the HELCOM indicator questionnaire process and revised based on comments received at the 1st HELCOM Indicator Workshop. This is, particularly the case for the section on the aims of the work, which was a focus of attention at that 1st indicator workshop.

Action requested

The Workshop is invited:

- to take note of the information and use it as needed to support the discussion
- provide comments or corrections as needed

Pelagic habitats and foodwebs

Future work on HELCOM indicators – towards the 3rd Holistic Assessment of the Baltic Sea 2023.

Indicators under discussion

1. *Diatom / Dinoflagellate index
2. *Seasonal succession of dominating phytoplankton groups
3. *Zooplankton mean size and total stock (MSTS)
4. *Abundance of coastal fish key functional groups

*Completed indicator questionnaires received.

These indicators appear in the additional document that considers the HELCOM indicator-policy match and scoring (Document 17 - HELCOM indicator-policy matching and draft scoring, and annex).

Aim

An assessment of the Baltic Sea foodweb and pelagic ecosystem to cover aspects such as diversity, balance in abundance, size distribution and productivity across selected trophic levels. Such an assessment would provide an understanding of the food web, and potentially pressures on it, but also provide support for an evaluation of pelagic habitats. Relevant ecological scales that are compatible with assessments under the Baltic Sea Action Plan (BSAP), the EU Marine Strategy Framework Directive (MSFD) and Water Framework Directive (WFD) need to be considered. Distinct quantitative thresholds are needed (where possible) to facilitate a scenario-based management approach. Where ever possible, these assessments should be fully operational and include the widest spatial coverage by the next assessment date. Application of relevant integrated assessments should also be carried out to provide an overview of status that Is not based on independent variables or separate indicator assessments.

General introduction and current status

All four of the listed indicators were updated in 2018, though two were tested in the State of the Baltic Sea report. and have generally high spatial coverage, though in several cases an evaluation was not completed in all areas, with gaps commonly occurring in more southerly regions of the Baltic Sea. These indicators were also summarised in the 2018 State of the Baltic Sea report. A focussed discussion is needed on how to further develop foodweb aspects as while some existing indicators have potential to address this topic they currently lack appropriate policy application (e.g. biomass of three tropic guilds).

Relevant species (regional lists of species for the assessment)

The 2018 assessment of coastal fish key functional groups considered piscivores (differed between assessment area: Perch, Pike, Pikeperch, Burbot, Cod, Turbot) and cyprinids/mesopredators, the zooplankton indicator examined the community level, and the two phytoplankton indicators examined either the ratio between Diatoms-Dinoflagellates, or the dominating groups within each community (generally Diatoms, Dinoflagellates, Cyanobacteria and *M. rubrum*). Zooplankton and phytoplankton indicators have a generally limited spatial coverage. A clear regional list of species that require assessment may be valid. A recent reference list of MSFD species and habitats compiled by the Joint Research Council (JRC) covers these species for the Baltic Sea region, accompanied by the JRC Technical Report documenting the approach used (Document 13 - Supporting information - JRC's

reference lists of MSFD species and habitats, and annexes). These species are also linked to the 2012 HELCOM Check List (Document 14 - Draft HELCOM species list matching, and annex) and matched against (EU) 2016/1251 Table 1D. This latter table does not however cover zooplankton and phytoplankton species. *Please note that both of these documents can be considered as 'drafts' at this stage, and updates or corrections by experts from the Contracting Parties will be warmly welcomed.*

Development/adjustment work

Indicators for fish, zooplankton and phytoplankton have the potential to provide critical information on the Baltic Sea ecosystem and can be focussed to examine food webs and pelagic environments. Further work is needed to adjust existing indicators and to develop relevant new indicators that can be appropriately associated to address these multi-component themes.

Coastal fish key functional groups: The indicator is operational but there are gaps in the current assessment due to aspects such as a lack of data or data reporting (e.g. Lithuanian, Russian and German areas) and due to short time series (e.g. Poland). Future development steps include developing an assessment protocol that does not require time-series data covering 10 or more years. The protocol would include spatial reference values and threshold values as a compliment to the existing one that relies on time-series data covering 10 or more years. This requires statistical analyses and modelling of already collected data. Time and resource issues to carry out this development are a consideration. Development of the coastal fish data base COOL to enable calculation of the indicator in a more automated way would be a beneficial development and possibilities to link the indicator to assessments of commercially exploited fish could be examined (though for MSFD purposes consideration should be given to the point the assessment of a single species in multiple descriptors is generally not accepted).

Zooplankton mean size and total stock (MSTS): The indicator is applicable in all areas of the Baltic Sea and there is an existing protocol by which threshold values are developed, however, it is currently only operational in the basins with agreed threshold values (Bothnian Bay, Bothnian Sea, Åland Sea, Gulf of Finland, WGB, and Gdansk Basin). Recently, Germany has completed indicator evaluation and derived threshold values for Bornholm and Arkona basins. An Inventory, synthesis and analysis of national data to derive the threshold values for the basins where they are missing is required, as well as bi- and trilateral interactions for agreeing on these values in the shared basins (e.g., The Quark, Gulf of Riga, EGB, Bornholm, Arkona, and Kattegat). The work can be completed in a few months, but experts capable of doing this would most likely require specific national funding. There is also ongoing work to complete collection of data for individual body size variability across the basins, which was initiated as a part of the method harmonization for indicator threshold setting and resources (approximately 2 person-months) for the statistical analysis, evaluation and documentation of this information to be used in the indicator work is needed. National data sources (not HELCOM COMBINE) are main source of current indicator evaluation and this should be addressed, in addition to association with other foodweb related indicators.

Diatom / Dinoflagellate index: The indicator is operational in practice but only tested in one area at present (Eastern Gotland Basin), though used by some countries in national reporting. Study reservations on the indicator need to be addressed and general consensus on future development is required. The indicator could be expanded to the whole Baltic Sea (except lagoons and large river plumes), if threshold values are proposed and approved. If this indicator is to be developed further it can quickly be completed and made operational for Kiel Bay, Bay of Mecklenburg, Arkona Basin, Bornholm Basin, Eastern Gotland Basin, Gulf of Gdansk and Gulf of Riga. Suitability of the data basis in the northern Baltic Proper, Aland Sea and Western Gotland Basin has to be checked. For example

Swedish data from the Landsort Deep and the Askö station are sufficient to use this indicator in these waters, too. Applicability of the indicator in the Gulf of Finland and Gulf of Bothnia has to be checked. This checking would require approximately 6 months of work by the experts involved from the lead and co-lead countries. Currently original data have been provided directly from the national experts (members of Phytoplankton Expert Group PEG). A review of the HELCOM COMBINE database needs to be considered for phytoplankton data if it is to be used as the source of this indicator evaluation (currently relies on national experts to gather data). Data extraction from HELCOM COMBINE in the form of summaries of biomass sum of diatoms and dinoflagellates from spring, and silicate consumption, may be valid developments but would need to be developed in the review of functionality. The application of this indicator for foodwebs should also be considered.

Seasonal succession of dominating phytoplankton groups: The indicator is operational in practice but only tested in some areas at present. Concerns related to applicability on the indicator need to be addressed and general consensus on future development is required, though the it should be applicable in almost all coastal and open sea waters around the Baltic Sea. The indicator could be expanded to certain other areas (e.g. Finnish waters) relatively easily, with updating of the existing indicator assessment and inclusion of new areas (e.g. Finnish coastal waters) requiring 2–3 man-months by the experts involved from the lead and co-lead countries. Data collection and reporting is currently carried out by national experts and considered as the best current approach due to need for a review of HELCOM COMBINE data reporting and details of data reported for specific phytoplankton groups to support the indicator evaluation. Consideration also needs to be given to how this indicator can be applied in areas where salinity gradients are large (i.e. assessment units with varied salinity and impact on community composition) and how to explore baselines where monitoring may not have existed during an appropriate 'baseline' period. Approval of threshold values through appropriate HELCOM processes remains to be carried out. Furthermore, discussion should take place on how threshold values can change in space and time through hydrological and climatic variation and this aspect needs to be considered during future assessment phases.

Note: many of the above issues or potential obstacles also have resource implications.

Potential obstacles

Coastal fish: Potential obstacles for coastal fish indicators have been identified. Currently the main obstacle for performing assessments on a Baltic wide scale is national support for assessment work and coastal fish monitoring. National funding is lacking in some countries and currently all analyses and data compilation are dominantly carried out by Sweden.

Zooplankton: Funding support for experts that can do the data synthesis and analysis and the current project-based approach (i.e. ZEN ZIIM) that supports the work. Current data reporting and hosting at ICES (i.e. in HELCOM COMBINE) also needs to be addressed to make it viable for indicator evaluation.

Phytoplankton: Current data reporting and hosting at ICES (i.e. in HELCOM COMBINE) also needs to be addressed to make it viable for indicator evaluation. Availability of good time series data (e.g. 15-20 years) with regular sampling throughout the vegetation period may also impact on spatial application of the indicator.

Frequency

Indicators could be developed to adopt an annual update frequency, though major updates should be times with relevant HELCOM and other policy relevant deadlines (e.g. 6 year MSFD cycle). Other indicators would likely require clearer data flows, clarification on roles of groups hosting them and

improved assessment methodologies (e.g. automation) to make regular updates viable. For some indicators (e.g phytoplankton) a minimum of 5 years of data is required to carry out the evaluation (i.e. suitable balance for natural variation).

Potential for cooperation

Coastal fish: HELCOM FISH PRO III and research institutes to which coastal fish experts are affiliated. Potentially a link to ICES WGs and OSPAR, though OSPAR currently focusses only on off-shore and sensitive species in their current assessments.

Zooplankton: Effective work and linkages between/within the ZEN ZIIM project and national monitoring laboratories is important. Strong synergies with OSPAR and projects working on indicator development, particularly in Mediterranean and Black seas also relevant.

Phytoplankton: Cooperation with ICES to enhance the usability of the HELCOM COMBINE database will be needed and there may be links to explore with OSPAR.

Other issues

The workshop is invited to document other aspects they consider to be relevant to the development of this specific indicator category.

A number of issues raised previously (though not an exclusive list) that may be relevant for discussion include: integration rules, appropriate coordination with MSFD CIS processes, and appropriate coordination with OSPAR.