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## Background

Sufficiency of measures (SOM) analysis is one of the activities agreed through the Strategic Plan for the BSAP update (cf. activity 2.5). The analysis is guided by the HELCOM SOM Platform, established by HOD 55-2018, and carried out through the HELCOM ACTION project[1] and through the lead by Contracting Parties on specific topics covered by the analysis (see e.g. HOD 56-2019, document 2-2).

The analysis of sufficiency of measures (SOM) will identify gaps in existing measures to reach good environmental status and contribute to identifying needs for new actions for the updated BSAP.

Preliminary results of the SOM analysis will be prepared by March 2020 and an initial evaluation of the results is planned for at the 3rd HELCOM SOM Platform meeting, taking place 24-26 March 2020, Helsinki, Finland.

This document presents the general progress of the SOM analysis and the current situation of data collection on topics relevant to MARITIME, as well as how the results will be used in further BSAP update process.

## Action requested

The Meeting is invited to:

- take note of the progress on the SOM analysis and consider the input from expert surveys; and
- take note of the validation by the MARITIME Group that will take place in April/May 2020

[1] HELCOM ACTION project is co-financed by the EU and coordinated by HELCOM.

# Analysis of sufficiency of measures

## Background

The aim of the sufficiency of measures (SOM) analysis is to assess improvements in environmental state and pressures that can be achieved with existing measures by 2030-2035, and whether these are sufficient to achieve good environmental status (GES) in the Baltic Sea. The SOM analysis is carried out for the main environmental themes in the HELCOM 'State of the Baltic Sea' report, including birds, mammals, fish, benthic habitats, non-indigenous species, hazardous substances, marine litter, underwater noise and input of nutrients. The same overall approach is applied across all topics to ensure comparability and coherence of the results.

The SOM analysis entails estimating the status of the marine environment at a specific future point in time, given measures in existing policies, their implementation status and predicted development of human activities over time (Figure 1).

In addition to supporting the identification of gaps to good status, the analysis provides information, for example, on the relative contribution of activities to pressures, effectiveness of measures types in reducing pressures from activities, most significant pressures affecting state components, pressure reductions required to achieve GES/status improvements, status improvements/pressure reductions from existing measures, and time lags between measures and environmental state.

More information on the SOM analysis is available on a dedicated page at the HELCOM website, as well as a webinar given in January 2020.

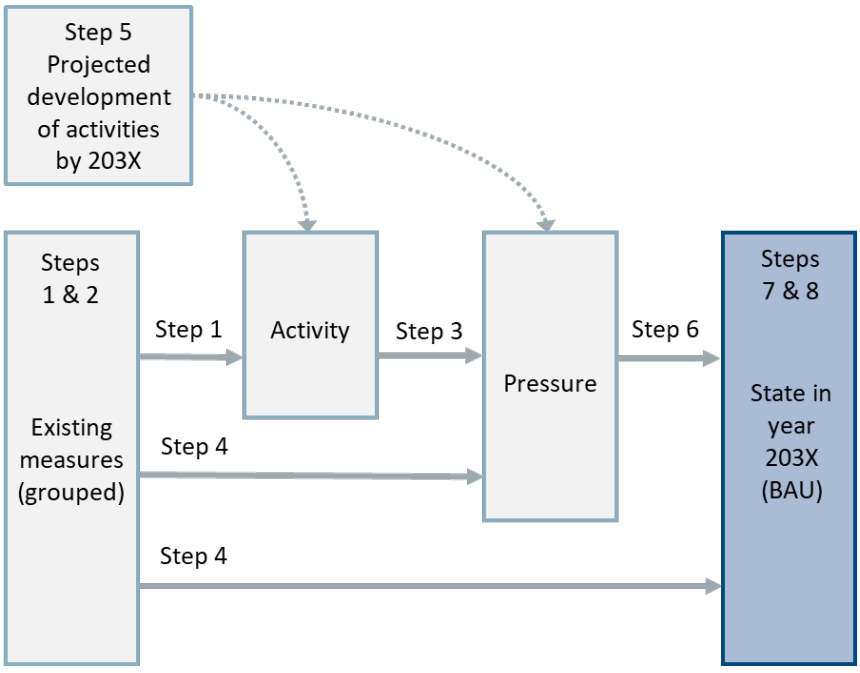


Figure 1. Recollection of the main components and steps of the SOM analysis

Step 1. Existing measures, including activity-measure links
Step 2. Estimating time-lags for measure effects on pressures
Step 3. Identifying main pathways for pressures using activity-pressure linkages
Step 4. Estimation of effects of measures
Step 5. Projected development of human activities/pressures
Step 6. Linking reduced pressures with state components
Step 7. Comparison of BAU and GES and assessing sufficency of measures
Step 8. Assessment of the effect of time-lags to recovery on state components

## Collection of input data to the SOM analysis

The collation of data for the SOM analysis has, for the main part, been finalized at the end of February 2020. This includes data on activity-pressure contributions (Step 3), effectiveness of measures (Step 4), state-pressure linkages (Step 6) and projections of human activities (Step 5). Additional data collection and adjustments, for example clarifying the role of individual experts in group responses to surveys, may still take place in March 2020.

For activity-pressure contributions (Step 3), a data-driven approach has been used for loss and disturbance to the seabed (data collated during HOLAS II project), introduction of non-indigenous species (based on entries to the AquaNIS database) and input of nutrients (ACTION WP4, based on PLC-6). For the remaining relevant topics, an expert-based approach has been employed and activity-pressure surveys have been distributed to relevant HELCOM expert bodies and SOM topic teams. Additional responses have still been sought in early 2020 for some of the topics. An overview of responses received per topic and country will be collated for SOM Platform 3-2020.

Expert surveys on effectiveness of measures (Step 4) and pressure-state linkages (Step 6) have been implemented in December 2019 – February 2020. The expert pool was formed from the representatives of the relevant HELCOM expert networks and groups, as well as additional experts nominated by Contracting Parties (representatives of HELCOM Working Groups and SOM Platform) specifically for the task. Altogether, 469 experts (unique cases) were identified as potential respondents to the surveys, with 35-114 experts per topic. An overview of responses received per topic and country has been collated for SOM Platform 3-2020 (Document 2-1). Expert data on the effectiveness of measures will be complemented with the results of a literature review carried out by the ACTION project and the Secretariat. A description of the data collection for the input of nutrients is provided in the section below.

Projected development of human activities (Step 5) is also based on compiling relevant national and regional literature and the report has been submitted by SOM Platform 3-2020 (Document 2-2).

The data from the expert surveys on activity-pressure contributions, effectiveness of measures and pressure-state linkages, as well as the literature review on the effectiveness of measures will be validated by HELCOM Working Groups in spring 2020. The validation will take place intersessionally (via correspondence or online meeting) or through the WG spring meetings (follow link for details), depending on the timing of the meeting. Topic-specific summary statistics and distributions of the responses will be presented for validation. The data will also include summary information of the background of the respondents, i.e. their country, organization type, field and years of experience.

## Data collection on non-indigenous species

Note: The information in this section on the number of responses and experts is current as of 1.3.2020.

### *Activity-pressure contributions*

To determine the activity contributions to the relevant pressure, Primary introductions of non-indigenous species, entries on primary introductions into the Baltic Sea were recovered from the AquaNIS database for 2005-2016 (AquaNIS, 2015). The introduction vectors listed in these entries are a close match to the standard SOM activity list. These data and methodology were presented to MARITIME 18-2019 for comments and approval. The methodology has been amended according to the received feedback and will be reintroduced to Maritime as part of the intersessional validation process.

### *Effectiveness of measures*

Based on the activity-pressure contributions, measure types were designed to cover introductions through shipping ballast water, shipping biofouling, canals and aquaculture. The NIS Topic Team, led by HELCOM Secretariat, created the measure types and defined the structural relationships between the measure types and activities and pressures in collaboration with HELCOM ACTION WP6. The measure types were informed by the existing measures list, but were also designed to acknowledge the full breadth of potential measures.

For non-indigenous species, the survey structure comprised 19 unique measure types covering four activities. All the measure types were unique to a particular activity. Altogether this resulted in 19 measure types covering the single pressure, *Primary introductions of non-indigenous species*.

36 experts received an invitation to participate in the SOM expert survey on the effectiveness of measures for non-indigenous species, beginning 16.12.2019. Experts represented TG Ballast or were nationally nominated to contribute. In addition to the survey, a literature review has been conducted to provide additional data on effectiveness of measures. The review includes both data that can be included in the SOM model (requires information on effectiveness in percent (%) pressure reduction) or as qualitative input into the interpretation of the model outcomes.

Table 2 shows the responses received for the non-indigenous species effectiveness of measures expert survey.

Table 2. Number of experts contributing to the survey on effectiveness of measures (EoM) on non-indigenous species (updated 1.3.2020)

| Survey | DE | DK | EE | FI | LT | LV | PL | RU | SE | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **NIS EoM** | 5 | 2 | 1 | 2 | - | 2 | 1 | - | 3 | 16 |

Values are counts of contributing experts, not survey responses, i.e. multiple experts contributing to a single survey response are each counted individually. Responses returned by Observers are included in the value of the hosting Contracting Party. EoM = effectiveness of measures.

## Data collection on potential loss and disturbance to the seabed

Note: The information in this section on the number of responses and experts is current as of 1.3.2020.

### *Activity-pressure contributions*

To determine the activity contributions to the relevant pressures, Potential loss of the seabed and Potential disturbance to the seabed, data previously reported to the Secretariat and used in the Baltic Sea Pressure Index (BSPI) and HOLAS II were used. The contributing activities listed in the database are a close match to the standard SOM activity list. These data and methodology were presented to STATE & CONSERVATION 11-2019 and PRESSURE 11-2019 for comments and approval. The methodology was amended accordingly and will be reintroduced as part of the intersessional validation process.

### *Effectiveness of measures*

Based on the activity-pressure contributions, measure types were designed to cover loss and disturbance to the seabed from a selection of the top contributing activities. The measure types and structural relationships between the measure types, activities and pressures were drafted by the Secretariat and presented in a workshop setting during EN Benthic 3-2019 for further development. The measure types were informed by the existing measures list, but were also designed to acknowledge the full breadth of potential measures.

For Potential loss and disturbance to the seabed, the survey structure comprised 17 unique measure types covering eight activities and habitat restoration. There is significant overlap in the measure types covering each activity, resulting in 16 measure type-activity combinations for Potential loss of seabed and 27 measure type-activity combinations for Potential disturbance to the seabed. One measure type covers habitat restoration. Covered activities include extraction of minerals, commercial shipping, coastal defense and flood protection, and dredging.

50 experts received an invitation to participate in the SOM expert survey on the effectiveness of measures for benthic habitats, beginning 16.12.2019. Experts represented EN Benthic, HELCOM ACTION project, or were nationally nominated to contribute. In addition to the survey, a literature review is being conducted to provide additional data on effectiveness of measures. The review will include both data that can be included

in the SOM model (requires information on effectiveness in percent (%) pressure reduction) or as qualitative input into the interpretation of the model outcomes.

Table 3 shows the responses received for the benthic habitats effectiveness of measures expert survey. Benthic habitats are also assessed for state improvements.

Table 3. Number of experts contributing to the survey on effectiveness of measures (EoM) on benthic habitats (updated 1.3.2020)

| Survey | DE | DK | EE | FI | LT | LV | PL | RU | SE | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **Benthic habitats EoM** | 7 | 4 | - | 4 | 2 | - | - | 2 | 4 | 23 |

Values are counts of contributing experts, not survey responses, i.e. multiple experts contributing to a single survey response are each counted individually. Responses returned by Observers are included in the value of the hosting Contracting Party. EoM = effectiveness of measures.

## Data collection on input of underwater noise

Note: The information in this section on the number of responses and experts is current as of 1.3.2020.

### *Activity-pressure contributions*

To determine the activity contributions to the relevant pressures, Input of continuous noise 63/125 Hz, Input of continuous noise 2 kHz, and Input of impulsive noise with peak energy below 10 kHz, an expert survey was distributed to EN Noise covering the Baltic Sea in 5 distinct geographic areas. Table 4 shows the responses received for the activity-pressure survey on underwater noise.

Table 4. Number of responses received from experts based in each Contracting Party.

| Pressure | DE | DK | EE | FI | LT | LV | PL | RU | SE |
|---|---|---|---|---|---|---|---|---|---|
| **Input of underwater noise** | 1 | | 1 | | | | 2 | | 2 |

### *Effectiveness of measures*

Based on preliminary activity-pressure survey results, measure types were designed to cover the three pressures related to the input of underwater noise (Input of continuous noise 63/125 Hz, Input of continuous noise 2 kHz, Input of impulsive noise with peak energy below 10 kHz). The measure types were drafted by the Secretariat and further developed by the Noise Topic Team, led by Denmark. EN Noise and the Noise Topic Team defined the structural relationships between activities and pressures in collaboration with HELCOM ACTION WP6. The measure types were informed by the existing measures list, but were also designed to acknowledge the full breadth of potential measures.

For the three pressures, the survey structure comprised 23 unique measure types covering eight activities. There is significant overlap in the measure types covering each activity, resulting in 22 measure type-activity combinations for Input of continuous noise 63/125 Hz, 21 measure type-activity combinations for Input of continuous noise 2 kHz, and 20 measure type-activity combinations for Input of impulsive noise with peak energy below 10 kHz. Covered activities include commercial shipping, extraction of minerals, dredging, marine and coastal construction, research and survey activities, and military activities.

39 experts received an invitation to participate in the SOM expert survey on the effectiveness of measures for underwater noise, beginning 31.1.2020. Experts represented EN Noise or were nationally nominated to contribute. In addition to the survey, a literature review is being conducted to provide additional data on effectiveness of measures. The review will include both data that can be included in the SOM model (requires information on effectiveness in percent (%) pressure reduction) or as qualitative input into the interpretation of the model outcomes.

Table 5 shows the responses received for the underwater noise effectiveness of measures expert survey.

Table 5. Number of experts contributing to the survey on effectiveness of measures (EoM) on underwater noise (updated 1.3.2020)

| Survey | DE | DK | EE | FI | LT | LV | PL | RU | SE | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **Noise EoM** | 3 | - | 2 | - | 1 | 2 | - | - | 3 | 11 |

Values are counts of contributing experts, not survey responses, i.e. multiple experts contributing to a single survey response are each counted individually. Responses returned by Observers are included in the value of the hosting Contracting Party. EoM = effectiveness of measures.

## Data collection on input of marine litter

Note: The information in this section on the number of responses and experts is current as of 1.3.2020.

### *Activity-pressure contributions*

To determine the activity contributions to the pressure Input of top litter items to the beach, a survey was distributed to EN Noise covering the Baltic Sea in 6 distinct geographic areas. The survey covers both litter in general and the top 10 litter items by beach type. The combination of surveys allows for a by-litter type approach to the topic. Table 6 shows the responses received for the activity-pressure survey on marine litter.

Table 6. Number of responses received from experts based in each Contracting Party.

| Pressure | DE | DK | EE | FI | LT | LV | PL | RU | SE |
|---|---|---|---|---|---|---|---|---|---|
| **Input of marine litter** | 1 | 1 | 1 | 1 | | | 1 | | 1 |

### *Effectiveness of measures*

Based on preliminary activity-pressure survey results, measure types were designed to cover the input of marine litter. The measure types were drafted by the Secretariat and further developed by the Noise Topic Team, led by Estonia. EN Noise and the Noise Topic Team defined the structural relationships between activities and pressures in collaboration with HELCOM ACTION WP6. The measure types were informed by the existing measures list, but were also designed to acknowledge the full breadth of potential measures.

For input of marine litter, the survey structure comprised 27 unique measure types covering 4 activities. There is significant overlap in the measure types covering several activities, resulting in 39 measure type-activity combinations. Covered activities include commercial shipping.

48 experts received an invitation to participate in the SOM expert survey on the effectiveness of measures for marine litter, beginning 31.1.2020. Experts represented EN Litter or were nationally nominated to contribute. In addition to the survey, a literature review is being conducted to provide additional data on effectiveness of measures. The review will include both data that can be included in the SOM model (requires information on effectiveness in percent (%) pressure reduction) or as qualitative input into the interpretation of the model outcomes.

Table 7 shows the responses received for the marine litter effectiveness of measures expert survey.

Table 7. Number of experts contributing to the survey on effectiveness of measures (EoM) on marine litter (updated 1.3.2020)

| Survey | DE | DK | EE | FI | LT | LV | PL | RU | SE | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **Noise EoM** | 2 | 1 | 2 | 1 | 1 | 1 | 1 | - | - | 9 |

Values are counts of contributing experts, not survey responses, i.e. multiple experts contributing to a single survey response are each counted individually. Responses returned by Observers are included in the value of the hosting Contracting Party. EoM = effectiveness of measures.

## Data collection for the input of nutrients

Majority of the data for the input of nutrients come from ACTION Work Package 4, including information on activity-pressure contributions and the effectiveness of measures for wastewater treatment, atmospheric nitrogen emissions and scattered dwellings. Information on the effectiveness of measures for nutrient runoff from agriculture was collected via expert surveys.

ACTION WP4 provides an overview of the division of activities and pressures related to eutrophication (i.e. nutrient inputs) and of source apportionment and identifying activity-pressure contributions (Step 3). This aspect is developed based on the national data reported to the HELCOM Pollution Load Compilation (PLC).

For the effectiveness of measures (Step 4), information on load reductions due to full implementation of existing measures is required. The information on effectiveness of measures is provided per activity by ACTION WP4: wastewater treatment (reductions achieved by implementing the HELCOM Recommendation 28E/5 on municipal wastewater treatment), atmospheric nitrogen emissions (based on EMEP data and predictions), and scattered dwellings (joint survey with the PLC-7 project). Inclusion of the estimated reduction from scattered dwellings is uncertain due to the development timeline for PLC-7. Reductions from agricultural runoff are estimated through a survey circulated to Agri contacts and national nominations.

Expected reductions to atmospheric nitrogen emissions (including from ship traffic) will come from the Envired II project with an adjustment made to the data to change the base year used in the estimates. The data and methodology will be made avaliable for validation.

## Validation of SOM data by the Maritime Group

The Maritime Group will be requested to validate the data on the activity-pressure contributions and effectiveness of measures for non-indigenous species from the surveys and the literature review. The validation of SOM data is detailed in this document. The validation will take place intersessionally, likely in April or May 2020.