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Agenda Item	4 – Implementation and update of the HELCOM Baltic Sea Action Plan
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Reference	

Background

HELCOM 40-2019 agreed to develop a HELCOM science agenda, concomitantly with the update of the BSAP. The agenda is to outline existing and foreseen HELCOM regional science needs. It will serve the development of activities in HELCOM as well as to inform external funding mechanisms on the research needs of HELCOM. The development of the agenda will also be an opportunity to provide regional input to the [BANOS CSA process](#) and can also contribute to support processes under the [UNESCO Decade of Ocean Science](#).

To initiate the development of a HELCOM science agenda, a survey on knowledge and research needs has been circulated to HELCOM Working Groups and associated Expert Groups, networks etc. The primary aim of the survey is to harvest knowledge and research needs to support the implementation of HELCOM objectives and strategies, both in terms of shorter-term knowledge needs as well as longer-term research needs.

Once the survey has been completed the results will be summarized to provide an overview that can form the basis for the development of a HELCOM science agenda which is envisioned to take the form of a brief report. Such report will highlight issues of major relevance for HELCOM work and the results of the survey are foreseen to be associated to the report, e.g. as a supplement.

HOD 56-2019 agreed on the steps for finalizing the science agenda, including the formation of a Task Group consisting of 1-2 national representatives from each Contracting Party (para 2.32, Outcome of the meeting). The tasks of the group will consist of:

- 1) check the proposals received through the survey and complement as needed if any central topics are found to be missing
- 2) agree on the outline and content of the final report
- 3) identify issues of particular importance for HELCOM work e.g. in the short-term and longer-term
- 4) identify important external processes that could support the implementation of the Science Agenda
- 5) develop a text proposal on the role of the Contracting Parties in supporting the implementation of the HELCOM Science Plan and on major future policy milestones that could be supported by the plan, as a potential HELCOM voluntary commitment to the UN 2020 Conference

The input to the survey from HELCOM subsidiary bodies will be considered by the Task Group at a meeting to be held in late 2019 (date not set yet). Further information on the Task Group can be found in [document 2.6, HOD 56-2019](#). By 13 October input was submitted by:

- Denmark with regard to non-indigenous species,
- Germany (Bfn), focusing on monitoring and nature conservation, with additional input from Germany related to non-indigenous species from shipping,
- Poland, focusing on agriculture,

- EN Benthic; the proposals have been prepared by the chair, and network representatives from Finland, Germany and Sweden. Note that proposals will be discussed and amended at the upcoming meeting of EN Benthic (14-15 November, 2019),
- Litter from the Danish representative of EN marine litter,
- EN ESA, prepared by the chair, Finland, Estonia, Latvia, Lithuania and Germany,
- JWG Birds, prepared by the chair and with input from Germany and Sweden,
- EN Noise, prepared by the chair,
- EG MAMA,
- RedCore/PLC,
- EN Hazardous substances.

The document includes a superficial overview of the input received so far and also lists the title of proposals. For more in-depth information see [Attachment 1](#). Since many of the proposals are cross-cutting all input received by 13 October 2019 is included in Attachment 1. Proposals marked in yellow in Annex 1 and Att 1. are indicative of what could be of most interest to consider for the HELCOM GEAR Group.

Action requested

The Meeting is invited to

- consider if there are additional knowledge and research needs linked to the tasks and mandate of the GEAR Group,
- agree as relevant on how the input from HELCOM GEAR can be completed by 30 November with the view of submitting the proposals as an input to the HELCOM Science Agenda.

Background

The survey on knowledge and research needs to support HELCOM objectives is structured around four areas of work (activities, pressures, state, ecosystem-based management) and a number of fixed categories to facilitate the sorting of responses. The proposals have so far been kept according to the incoming reporting. In future compilations and development of the science agenda some topics could benefit from a coherent presentation of the four areas of work.

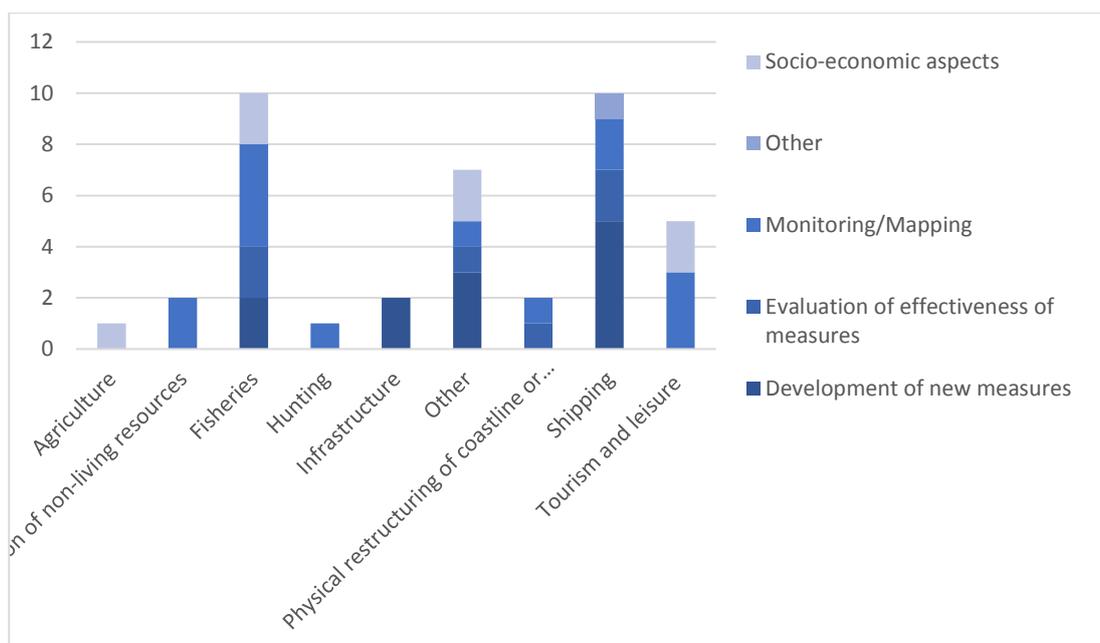
All input received by 13 October 2019 is included in Attachment 1. **Note that the top row in each sheet of the attachment can be used to filter the information in the columns with fixed response categories**, e.g. in order to get an overview of all proposals related to fisheries, input of nutrients, indicators and threshold values etc.

HELCOM GEAR Group is expected to review the contributions submitted of relevance to the Group as well as identify tentative needs to resolve overlaps and gaps. Proposals related socio-economic aspects can be found among all main areas.

Gaps

Activities

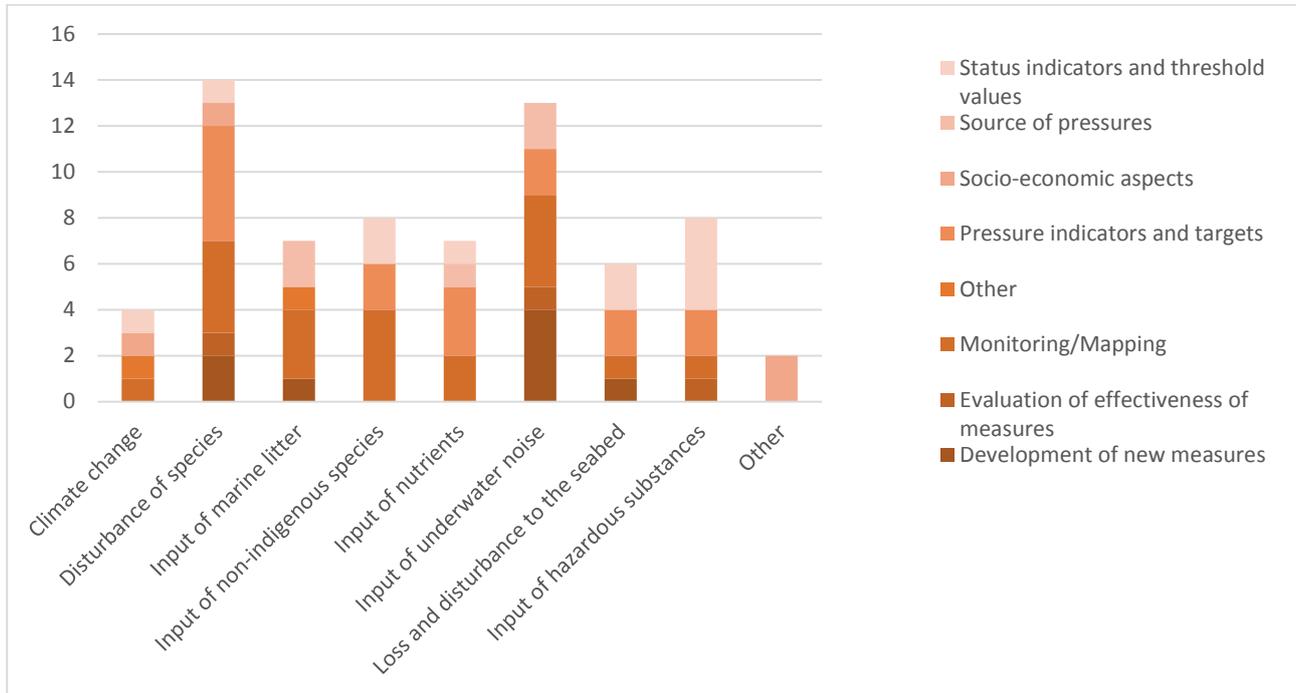
40 proposals are linked to activities. The proposals received are mainly linked to fishing, shipping, and 'other'. The last category typically refers to studies on multiple activities, including proposals from HELCOM EN ESA.



Number of identified knowledge and research needs by different type of activities.

Pressures

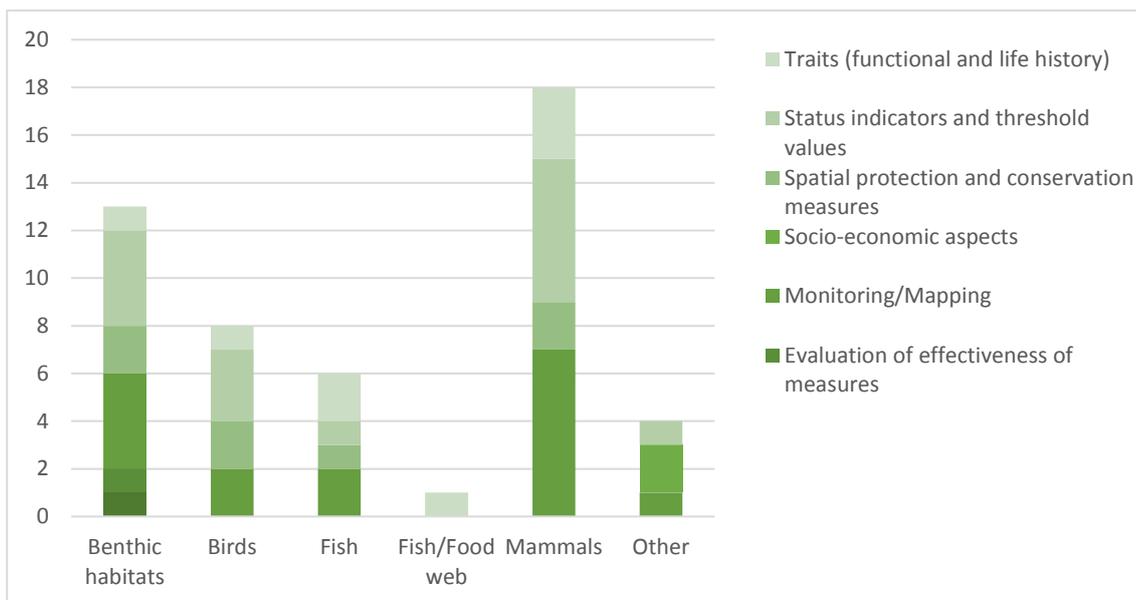
69 proposals are linked to pressures. A majority of proposals are related to disturbance of species and underwater noise. Development of indicators and threshold values/pressure targets make up on third of the proposals.



Number of identified knowledge and research needs by different type of pressures.

State

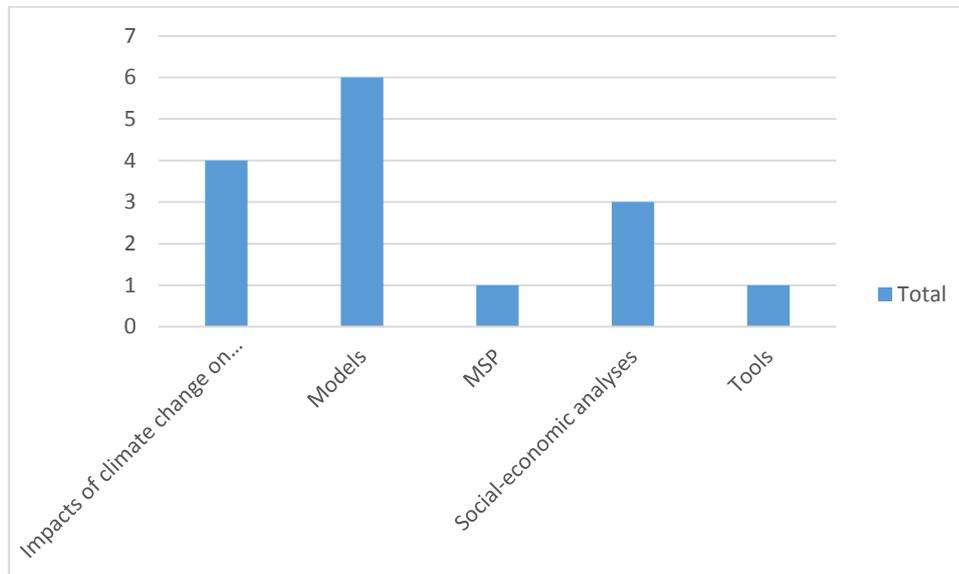
50 proposals are linked to state components. A majority of proposals are related to benthic habitats, mammals and birds. There are notable gaps for migratory fish, coastal fish, phyto- or zooplankton,



Number of identified knowledge and research topics by different type of state components.

Ecosystem-based management

15 proposals have been made as directly related to ecosystem-based management, mainly regarding models (covering nutrient input, food webs, noise, benthic habitats), socio-economic analysis and impact of climate change.



Number of identified knowledge and research needs by different type of state components.

Overlap

Some overlaps exist in the proposals received, however, not with regard to proposals with an immediate link to the GEAR Group.

Depth of description

It has been recommended that the description of the knowledge/research should use 100-150 words. Several proposals are significantly shorter, and it is doubtful if some of these brief descriptions provide sufficient detail to serve the purpose to inform HELCOM and external funding agencies. If the Working Group finds some of the descriptions too brief it is proposed request the submitting country, network etc for further information.

Summary of type of research needs

The survey asks that the proposals should be linked to a number of pre-defined 'aspects' (for full list of options see Attachment 1). Many proposals are related to monitoring and mapping (31%) or development of pressure or status indicators (20%). Other common proposals are the development of new measures or assessment of effectiveness of measures, making up half of the proposals related to Activities, and 19% of all proposals.

The survey has asked whether the proposals are expected to require new research or whether existing data and information already exists. A majority of responses, 80%, have indicated that new research is required.

The survey has also asked for expected time required to achieve the proposal, using categories <1 year, 1-5 years, >5 years. 88% have responded that the time required to achieve the proposals is likely within 1-5 years

Annex 1. Lists with title of proposals

Note; titles are often brief, please see Attachment 1 for further information.

Activities

Agriculture

Economic impacts of measures

Extraction of non-living resources

Data availability

Loss of habitat

Fisheries

Data availability

Develop and test bycatch mitigation measures

Development of measures to reduce seabird bycatch in fisheries

Effectiveness of fisheries closures

Evaluation of enclosed areas

Evaluation of fisheries affecting benthic habitats and their contribution to livelihood and economy

Record fishing efforts (all métiers and vessel sizes) with the highest possible resolution

Recording fishing effort in high spatial and temporal resolution

Use of acoustic deterrence devices

Use of existing models and data from fisheries economics

Hunting

Spatio-temporal occurrence of seabird hunting

Infrastructure

Assessment of the impacts of OWFs on (migrating) seabirds for coordinated marine spatial planning

Development of miniaturized transmitter

Other

Alternative exploration technologies for seismic surveys

Co-ordinated spatial planning in order to minimize impact of offshore wind farming on seabirds and bird migration

Effects of pleasure boat traffic on breeding coastal birds

Linking activities to measures and cost effectiveness of measures

Mitigation of impact from explosions

Relation between the state of the Baltic and all activities

Spatial distribution of the socioeconomic impacts and values of all activities

Physical restructuring of coastline or seabed

Mapping of constructions

What legal instruments are there to limit/monitor physical restructuring of coastline or seabed?

Shipping

Adaptive use of echosounders

Data availability

Database of ship underwater noise emission

Hull fouling management

Indicative sampling of ballast water for compliance with IMO D-2 standards

Measures for underwater noise reduction

Real-time emission feedback

Reduce noise emission of large vessels

Routing and speed

Technical sonar modification

Tourism and leisure

Boats without AIS

Cruiseships

Leisure boat traffic

Relation between the state of the Baltic and tourism and leisure activities

Pressures

Climate change

Climate change effects on marine biota

Economic impacts from climate change

Species responses to climate change

Winter distribution of seabirds in relation to climate change

Disturbance of species

Anthropogenic impacts on marine mammals

Bycatch mitigation measures

Bycatch risk assessment

Comparison of historic and current pressure patterns

Comparison of individual and cumulative anthropogenic impacts on the ecosystem

Effects of electromagnetic fields on marine biota

Effects of local populations

Geographical overlap between activities/pressures and species or biotopes

Impact of hunting on seabird populations

Rates of drowned seabirds in fishing gear

Regional coordinated bycatch monitoring (combined with data collection of fishing effort, see "activities")

Thresholds for disturbed biotopes

Input of marine litter

Degradation of microplastic

Determine litter sources and pathways

Micro-plastic long term studies and standardization of methods

Population changes caused by marine litter

Sources of macrolitter

Sources of microplastic

Standardized assessment of beach litter abundance and composition

Input of non-indigenous species

Develop standardized monitoring for NIS (also for pelagic species)

Development of an NIS impact indicator... (considering impact on environment, ecosystem services, health, and economy including socioeconomic aspects. Definition of GES)

Identification and mapping.

Impact of non-indigenous invasive mammalian predators on seabird populations

Improvement of species identification methods for reliable taxonomic lists, especially for non-indigenous species

Quantitative estimates of non-indigenous species affecting seafloor composition or function

The use of eDNA for NIS monitoring and risk assessments

Early detection of NIS and threshold values

Input of nutrients

Alignment of nutrient input reduction targets for individual rivers basins with related targets of BSAP.

Developing common modelling approach for quantifying nutrient sources in the Baltic Sea catchment

Hypoxic areas

Impact of climate change on nutrients retention in inland waters

Integrated system of risk assessment of phosphorus losses from agricultural soils to surface water

Indicator on near-bottom oxygen concentrations in shallow waters**Input of underwater noise**

Acoustic traumas of stranded marine mammals
 Conduct sonication and sound propagation trials
 Cumulative impacts of underwater noise on seabirds and marine mammals
 Echosounders and sonars
 Geoacoustic instruments
 Improve efficiency of monitoring
 Improve impulsive noise register
 Mapping
 Military sonars
 Quick hearing screening for harbour porpoise stranded alive
 Ramp-up and soft-start procedures
 Smart monitoring of underwater noise emission
 Technical noise abatement systems

Loss and disturbance to the seabed**Extent and distribution of pressures causing loss and disturbance****Extent of adverse effects****Extent of disturbance from activities.**

Measures to counteract adverse effects
 Recovery period of benthic communities and changes in sediment composition

Definition of thresholds**Other****Cost effectiveness analysis of measures to reduce pressures****Integrated assessment of pressures and other components of EBA****Input of hazardous substances**

Inputs of hazardous substances from marine sources
 Non-target screening for new/emerging substances
 Occurrence and spread of resistant microorganisms
 Improved calibration of atmospheric deposition
 Effects directed analyses in combination with identified new/emerging substances
 Improved biological effects evaluation, including common indicators and/or calibration of relevant indicators across the region
 PFAS - address more than simply PFOS and PFOA
 Sediment stratigraphy

State**Benthic habitats**

Assessment of ecosystem function
 Biocenosis on geogenic and biogenic reefs
 Biological indicators of ecosystem state
 Coherence of MPA network
 Off shore habitat maps
 Regionally coordinated HELCOM project for habitat and biotope mapping,
 Response of biological indicators to measures
 Restoration of seagrass beds
 Substrate maps
 Susceptibility of benthic invertebrates to underwater noise
Definition of thresholds
Shifting baselines

Birds

Breeding success in relation to environmental changes
 Co-ordinated regional surveys of wintering seabirds
 Habitat selection and feeding strategy of sea birds and water birds
 Habitat selection and feeding strategy of seabirds and waterbirds
 Preparation of underwater-audiograms for diving birds
 Regional monitoring programm/surveys of wintering birds
 Reproductive success of seabirds
 Underwater hearing and use of sound

Fish

Acoustic communication and sensitivity for electromagnetic fields
 Distribution and habitat use
 Effects of turbidity plumes on (migratory) fish
 Population dynamics of migratory species
 Reporting and assessment of non-commercial species
 Susceptibility to underwater noise

Fish/Food web

Fish population, community and trophic shifts

Mammals

Blubber thickness data evaluation and statistics
 By-catch detection
 Characterization of parasites of harbour porpoise and harbour seal
 Distribution and habitat use
 Energetic consequences of exposure to underwater noise
 Habitat selection of harbour porpoise and seals
 Health indicator and GES development
 Integrated management of status and population
 Masking of hearing by low frequency noise
 Potential impact of increasing seal stock on fish health
 Preparation of underwater-audiograms and expansion of stationary acoustic monitoring
 Provide guidance on direct takes and other anthropogenic removal, especially bycatch
 Provide guidance on establishing an abundance and distribution indicator for porpoises and establish monitoring schemes
 Providing at sea distribution maps of marine mammals
 Providing correction factors for seal abundance indices
 Regional monitoring programme for ringed seal in Gulf of Riga and Gulf of Botnia
 Scientific support for the evaluation of PAL.
 Subpopulation structure of grey and ringed seals in the Baltic Sea
 Underwater hearing and use of sound

Other

Costs and benefits of changes in the state of the environment
 Harmful effects of marine litter
 Linking state to the provision of ecosystem services
 Monitoring methods for microplastic/microlitter

Eco-system based management**Impacts of climate change on ecosystem level**

Biogeochemical cycling in a changing climate
 Coherence of MPA network
 Invasive species

Time lags and Climate change aspects to the HELCOM Nutrient Reduction Scheme**Models**

Food web models

Improving the scientific basis for calculation of Maximum Allowable Inputs

Models on species distribution of Seals in Baltic Sea

Population effects of noise exposure

Scenario models for benthic habitats

Combination of existing models (hydrographic and ecosystem model) to reproduce and extrapolate monitoring results, coupled with existing monitoring data

MSP

Identification of spawning habitats of fish species considered as noise sensitive and modelling of noise impact on these. Taking these habitats into account in MSP.

Social-economic analyses

Ecosystem services approach

Internationally coordinated new economic valuation studies

Marine ecosystem accounting

Tools

Soundscape planning tool

Other

Understanding effects of multiple drivers and role of hazardous substances within that context.