Methodology, test case and recommendations for assessing the management effectiveness of the Baltic Sea Marine Protected Area (MPA) network

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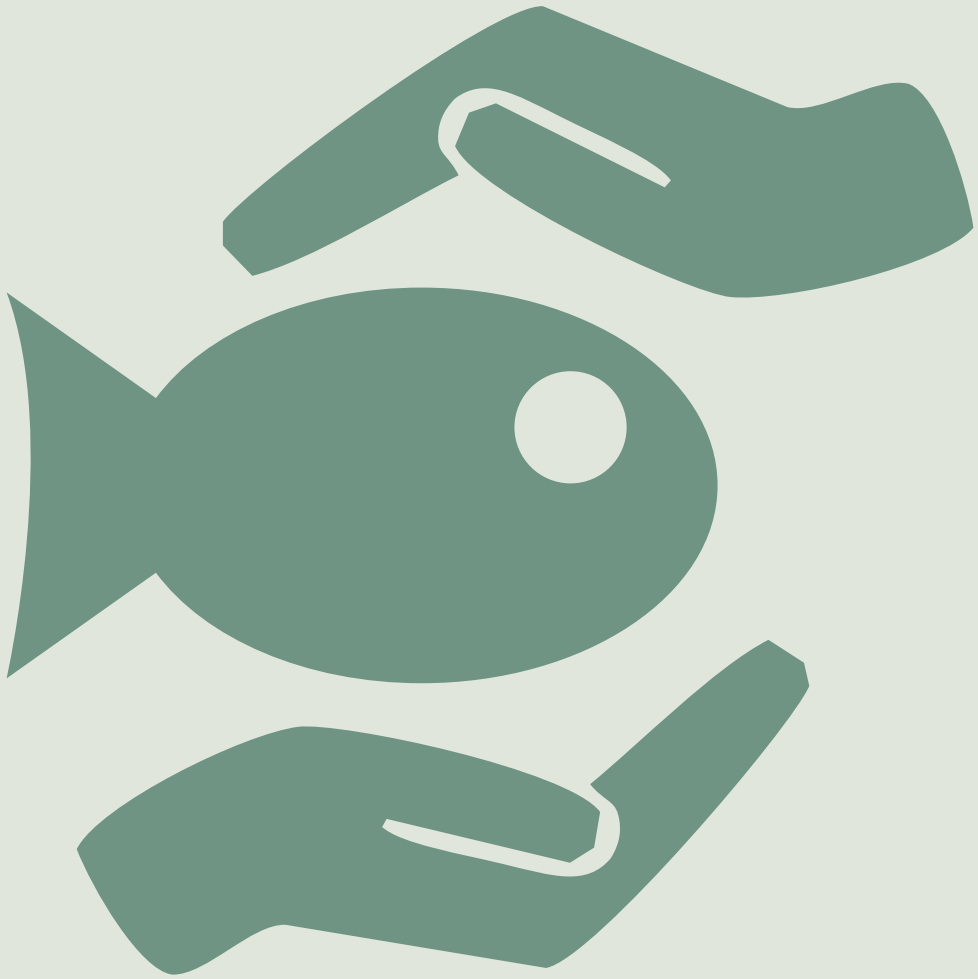
Marine protected areas

2021



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Methodology, test case and recommendations for assessing the management effectiveness of the Baltic Sea Marine Protected Area (MPA) network

Contents

1. Introduction

This study is a part of HELCOM co-ordinated ACTION project (Actions to evaluate and identify effective measures to reach GES in the Baltic Sea marine region) carried out with support of the EU and national governments. The project is designed to evaluate MSFD Programme of Measures and to contribute to the update of the HELCOM Baltic Sea Action Plan by 2021. The marine protected area (MPA) network (includes Natura 2000, HELCOM MPAs, and national MPAs designated under MSFD Programmes of Measures) is one of the concrete measures identified for advancing towards achieving GES in the Baltic Sea. Therefore, one of the aims of the ACTION project was agreed to be an analysis of the effectiveness of the existing MPA network.

In the context of the Baltic Sea, management effectiveness is understood as how successfully the MPA network is achieving its primary conservation goals of protecting important ecosystem features (i.e. species and habitats) by managing important threats (i.e. mitigating pressures). At the same time, the aim was that, in an ideal case, the management effectiveness assessment framework should be applicable at both the individual MPA and the entire MPA network level.

This report provides information on three deliverables of the project work package "Marine protected areas":

1. Development of a methodology for assessing management effectiveness (ME) of Baltic Sea MPAs;
2. Application of the ME method and assessment of effectiveness of the Baltic Sea MPA network;
3. Recommendations for improvement of MPA network effectiveness in reaching Good Environmental Status for protected species and habitats.

The information on the progress of this work at the different stages was presented at SOM Platform 1-2019 and 2-2019, State and Conservation 10-2019 and 11-2019, and the expert workshop "Assessment of MPA management effectiveness", 19 – 21.11.2019 (Vilm, Germany). A two-day dedicated project workshop (HELCOM ACTION Workshop 3: MPA network effectiveness) was organized at the HELCOM Secretariat in February 2020 in order to present the ME assessment method, the results of its application, and to develop recommendations for effective MPAs and the regular application of the ME assessment method. The latter being submitted as 'synopses' within the Baltic Sea Action Plan updater process.

2. Management effectiveness assessment framework

Worldwide many terrestrial or marine protected areas have been designated to conserve key values of certain areas e.g. biodiversity, ecosystem types, landscape features, or historical sites. Many nations have, through the Convention on Biological Diversity (CBD), committed to assess and report management effectiveness of a minimum 30 % of their protected areas by 2010. This type of assessment is needed in order to determine whether the desired aims of the protected areas and the desired objectives of the management are achieved. This information can then be used to inform relevant international organisations, governments, funders, and stakeholders what has been achieved with the available resources, and that results are commensurate with the resources used. Furthermore, the assessment of the management effectiveness can be used as a tool for managers to identify potential shortcomings and highlight if resources can be used more efficiently, important information which can, and should, be used in iterative updates of management plans (adaptive management).

To have a common basis for the assessment, a shared generic framework for evaluating management of protected areas was needed. This led the world's leading global network of protected area specialists, WCPA, a Commission of the World Conservation Union or the International Union for the Conservation of Nature (IUCN), to develop a management effectiveness evaluation framework in 2000 (Hockings et al. 2000). This framework has since been updated in 2006 (Hockings et al. 2006).

The assessment of management effectiveness of protected areas according to the IUCN-WCPA framework consist of an evaluation of the following six elements (Figure 1): context, planning, inputs, process, outputs and outcomes.

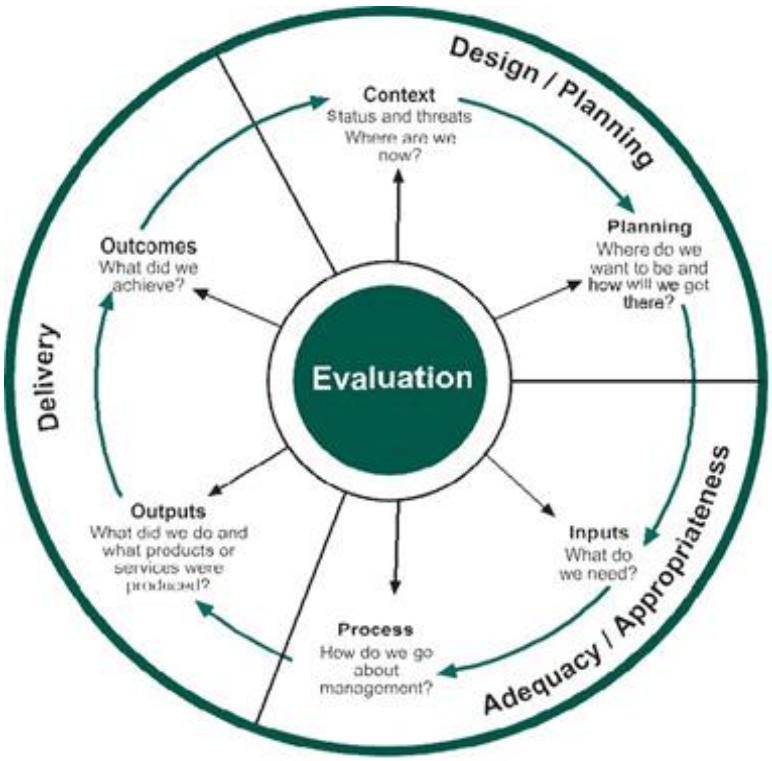

Figure 1. The framework for assessing management effectiveness of protected areas developed by IUCN-WCPA (from Hockings et al. 2006).

Context – Status and Threats. Identification of key features for protection as well as understanding the potential and actual threats and their impact is essential to establish a management plan. Management effectiveness should assess if all relevant features are identified, if their prioritization is correct, and how well these features are protected by the management plan. This includes evaluation if the management plan handles threats and external influences. Local communities and stakeholders can be involved in the assessment of the management effectiveness of protected areas.

Planning. An important part of the planning element is the design of individual protected areas (features, size and shape), but also design of the network of protected areas, including consideration of features such as representativity, coverage and connectivity. The planning is based on legislation and policy of protected areas. An assessment procedure should evaluate the quality of the management plans, and whether the plan and objectives are adequate to cover all features and relevant threats in a protected area or its network, and finally if legal enforcement of the plan is implemented.

Inputs. This element focuses on resources to achieve the objectives of the protected area and to make the management most effective. The assessment of inputs should consider the level of resources needed, evaluate if available resources are adequate and if the resources could be used in a more efficient way.

Process. Management processes include definition and use of the best practice guidelines or benchmarks. The assessment should evaluate whether the standards, benchmarks, and best practices are implemented, how they perform, and if they are appropriate or need to be improved. This often involves not just the management staff but also experts, community representatives, and stakeholders.

Outputs. The outputs include key achievements of management plan implementation, such as an extent of monitored area, number of monitoring stations or frequency of monitoring surveys. Assessment of the outputs address whether stated actions, tasks, and strategies in the management plan have been implemented and to which degree.

Outcomes. This element addresses if the management has resulted in achievement of the objectives and the desired outcomes for the protected area. This includes evaluation if identified key features are conserved and a quantitative assessment of the feature status, and thus requires monitoring data for relevant indicators. A qualitative approach can use a questionnaire with defined ratings to report the status and outcomes. The assessment should consider whether the management plan is appropriate and adequate to fulfil the objectives and the aim of the protected area. Additionally, it is important to make clear what status elements of the protected features are considered by the conservation measures. For example, good environmental status (GES) is often dependent on a combination of management measures (e.g. fisheries restrictions, reducing toxic substances and nutrient leakage from land run-off) that together can create the desired status of the MPA.

The IUCN-WCPA framework aims to provide an overall guidance which can be adapted to fit to individual needs such as to specific geographic regions or environments. An adequate assessment of the management effectiveness can, therefore, still be done without necessarily including all six elements. A guidebook presented in 2004, jointly initiated by IUCN-WCPA Marine and the WWF and involving experts from 17 countries, was the first to describe a comprehensive methodology to evaluate the management effectiveness of MPAs (Pomeroy et al. 2004). The focus there was to evaluate outputs and outcomes based on indicators for all six elements.

Two of the most used methodologies based on the IUCN-WCPA framework are the Management Effectiveness Tracking Tool (METT) and the Rapid Assessment and Prioritization of Protected Area Management (RAPPAM). METT is a questionnaire type approach to track progress in achieving defined management objectives, while RAPPAM is designed to compare many protected areas that together make a network (Ervin 2003,

WWF-International and World-Bank 2007, Leverington et al. 2010, Stolton and Dudley 2016).

IUCN-WCPA have also published the Green List of protected and conserved areas - the global standards - which provide a global benchmark for protected areas to check if they have achieved successful outcomes (IUCN and WCPA, 2017). Regulating pressures resulting from human activities are the major challenge for successful management. Zupan et al. (2018) showed that understanding the effect of and link between human pressure and status of protected features in an MPA is of crucial importance for achieving conservation objectives and, therefore, for effective MPA management.

3. Screening of potential information sources for management effectiveness assessment

Diverse information on the management of MPAs is spread across numerous information sources and potentially can be made available for management effectiveness assessment (Table 1). The project team analysed this information in a context of potential value for the development of the ME method and assessed information of relevance based on expert experience in marine conservation, i.e. designation of sites, development of management plans, monitoring and status assessments, national reporting's for Habitat Directive and Marine Strategy Framework Directive. One of the common findings from this analysis is that the needed level of details on management of MPA is often accessible at the Member State or local MPA level only. Moreover, various Baltic wide assessments and country reportings with potentially valuable information for evaluation of MPA management, operate at a different spatial scale than MPAs and therefore have limited relevance for the MPA management assessments (Table 1). Having these limitations in mind, project team elaborated recommendations for improved information delivery or use.

Table 1. Type of information (or information source), its relevance and recommendation for improved use in the management effectiveness assessment.

Type of information or its source	**Relevance of information for management effectiveness assessment**	**Recommendation for improved information use**
Conservation aims for the network	Conservation aims based on coherence criteria exists in some countries like: Aichi target, size of MPA, distance between MPA's, representativity etc. All these criteria reflect 1'st (planning) phase of management cycle according to traditional ME framework, but are not relevant to the entire management cycle.	To update Baltic Sea Action Plan with submitted synopsis on: - functionally important ecosystem elements and ecologically significant areas; - management of the Baltic Sea MPA network by introducing key management elements.
MSFD national targets	No MPA specific targets are formulated in national MSFD reports except increase in total protected area and designation of offshore MPAs.	To include management effectiveness assessment and related activities into the Program of Measures process at the State level.
National reporting under MSFD Article 8	MSFD areas in DK (introduced as a measure in 2016) are assessed in terms of progress in status (only baseline survey)	To relate the status of conservation features of MPA's (not MSFD areas) to pressures / human activities (establishing

	and contribution to GES (no). PoM is under development. To our knowledge there is no information on status of conservation features within MPA's (or MSFD areas) in national reportings in the framework of MSFD Article 8.	causal relationships) for their later management by Program of Measures.
Progress in achieving favourable conservation status of different habitats, biotopes and species based on national reports under Article 17 on the conservation status of habitats and species under the Habitats Directive for both second (2007-2012) and third (2013-2018) assessment periods	Art. 17 reporting is based on status assessment for area and extent of selected habitat types / species. This cannot be related to the spatial resolution of MPA or MPA network	To extend existing reporting scheme to the status assessment of conservation features at the scale of individual MPA's. This will provided needed information to complete ME assessment cycle.
Data from existing monitoring on conservation features and human activities (pressures)	Monitoring of conservation features is limited and fragmented at the scale of individual MPA's and not carried out at the network level.	To improve the monitoring of conservation features in MPA's and report the MPA monitoring data at the regional HELCOM level for further assessment of MPA network. Recommendation to perform regular ME assessment based on standard procedure. Reporting of such assessment results will enable to monitor how well MPA network is reaching its aims.
HELCOM 'State of the Baltic Sea report' pressure layers	Information is in place and can be used for ME assessments if status components are at the relevant spatial scale (see above).	
HELCOM 'State of the Baltic Sea report' on the status of biodiversity features	State indicators are not related to the conservation features of MPAs. Status assessment is carried out on different spatial scale than MPA.	To merge HELCOM HOLAS and Baltic MPA coherence assessments.
HELCOM assessments (e.g. Red List assessments of species, biotopes and habitat complexes (HELCOM 2013a and 2013b)	Established Red-list assessment concept and methodology does not fit into management effectiveness framework. Red-list assessments (sub-basin scale) are not compatible with resolution of MPA network and conservation features.	

4. Methodology for assessing management effectiveness of the Baltic Sea MPAs

The project team agreed that the current study needs to be designed in the form of a questionnaire constructed to address the needed level of details (e.g. concrete conservation features and defined human activities) for further analysis. In order to design the questionnaire to account for the relevant information, detailed consideration and planning of the requirements was done prior to the production of the questionnaire. In addition, due consideration was given to what could be considered feasible and realistic within the frame of the project, both in terms of capacity within the project itself and to ensure that as many responses as possible would be available to support further analysis. Thus, a subset of parameters for the questionnaire was identified, allowing the work package team to test the method, identify subsequent needs for further development and use the study to develop a proof of concept for possible future, more comprehensive, assessments. Further information on the concept, structure and delineation of the questionnaire and analysis can be found in this chapter. The questionnaire was implemented (https://www.surveymonkey.com/r/KLLW5BY) and distributed via the HELCOM Secretariat to the country representatives (identified via State and Conservation Working Group) in early September 2019 and the outcomes were received by the end of October 2019.

4.1. Concept and structure

The overall concept for management effectiveness evaluation of the Baltic Sea MPA network is based on the management effectiveness assessment framework published by IUCN (2017). After analysis of various concept applications worldwide (e.g. Gubbay, 2005; Leverington et al., 2010; Tempesta, Otero, 2013) we recognized that including evaluation in achievements of MPA conservation objectives would not be possible. This is due to frequently missing quantitative targets of MPAs and limited information on the status of conservation features (see Table 1). Governance issues (i.e. MPA funding aspects, personnel and governance structure questions) were also omitted from the analysis due to very different management structures applied among the countries surrounding the Baltic Sea. It was decided to employ a holistic approach in addressing the existing conceptual framework (Hockings et al., 2006) and focus on an evaluation of human activities management.

In assessing the “design/planning” stage of an MPA according to the conceptual framework (Fig. 1) we examined the relevance of existing or potential human activities

for a given conservation feature and addressed the question of whether this activity is considered by a management plan or by other actions (e.g. statutory orders) (Fig. 2).

The “adequacy and appropriateness” stage of the overall framework is considered by evaluating the legal implementation of management measures of relevant human activities either using management plans or other actions (Fig. 2). Here we defined legal implementation as administrative action taken to transfer it from the management plan into the actual implementation (e.g. Ministerial Declarations, orders, etc.). Additionally, the “adequacy and appropriateness” stage of the general framework was considered by assessing the enforcement of proposed and legally implemented management measures. Here the enforcement of management measure means administrative instruments and defined control measures to ensure the application of measures.

Finally, the “delivery stage” is oriented towards an assessment of achievement of the wanted objectives and the desired outcomes reached. This stage was not covered by our assessment due to limited information regarding management effects on protected habitats and species for the majority of the Baltic Sea MPAs. Therefore, the application of the framework in this study covers the evaluation of the management status. A full management effectiveness assessment will require that all stages of the framework are fulfilled.

Having in mind hundreds of sites spread over 8 countries, all having a majority of information in national language, we use a common and simple questionnaire format, followed by explanatory notes to ensure it was applicable for any level of expertise.

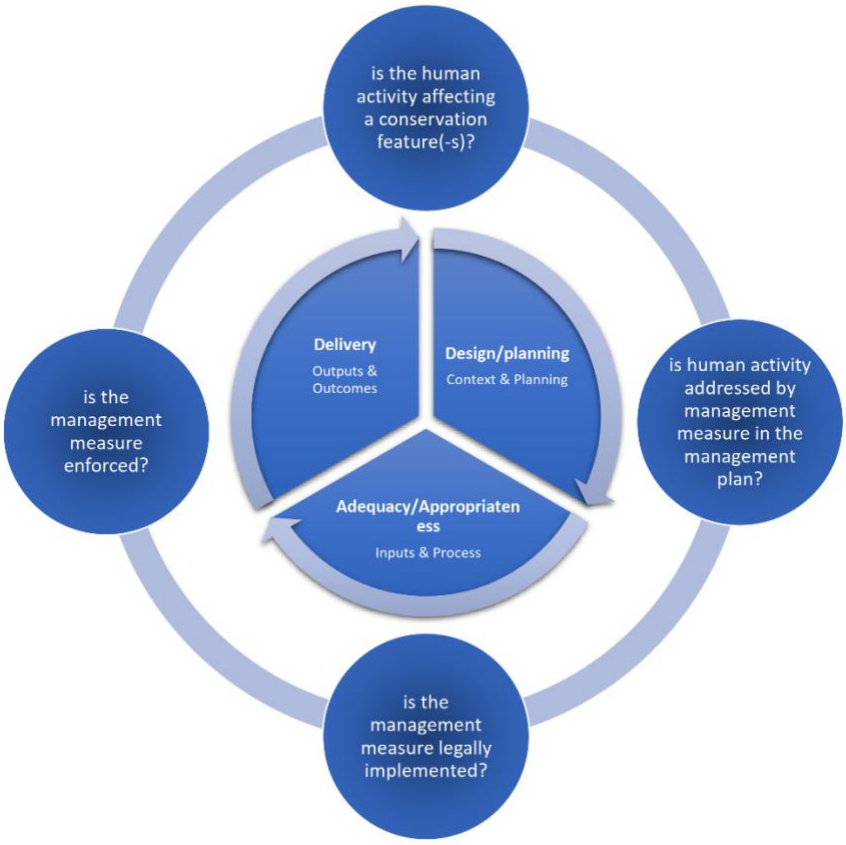

Figure 2. Schematic visualisation of the concept of methodology in this study in a context of management effectiveness assessment framework described by Hockings et al. (2006). The smaller peripheral circles outline the four main questions identified as the basis of this MPA management effectiveness assessment.

4.2. Selection of MPAs

The analysis focused on MPAs, which have been reported and included into the EEA database (893 sites) or recently designated by countries under MSFD PoMs (6 sites, below referred as MSFD sites). Within the context of this study it was not deemed possible to evaluate the full extent of the network and thus a representative subset of MPAs needed to be identified. The priority in selection of MPAs for assessment was given to NATURA 2000 sites, which are also HELCOM sites. For the purpose of the questionnaire, MPAs with management plans were pre-selected taking into account proportion of their distribution among countries, location along the Baltic latitudinal/longitudinal gradients and the proportion of the marine part of the total MPA

area. MPAs were selected for inclusion into the questionnaire investigation according to country, geographic distribution and proportion of the marine part.

In total, 200 MPAs were pre-selected based on the criteria described above (Table 2). Additionally, all Danish MSFD sites (6) that have legally approved management plans, have been included into the assessment.

Table 2. Characteristics of MPA network and number of sampled MPAs for management effectiveness assessment.

Country	Number of Natura 2000 sites with management plans	Number of MPAs selected for assessment by the questionnaire	Number of MPAs assessed by questionnaire
Sweden	448	114	0
Denmark	105	40	40
Finland	59	18	13
Germany	41	14	3
Estonia	37	12	12

4.3. Selection of human activities

A decision was taken to use human activities instead of pressures when assessing the relevance of management measures. This decision was justified by the fact that activities are the primary focus when it comes to mitigation measures and are also more concretely presented in management plans. The list of human activities generating pressure to specific conservation features was compiled based on the "HELCOM Sufficiency of Measures (SOM) Platform shortlist of activities and pressures" and cross-linked with the list of pressures/activities/threats used in the reporting on the Habitats Directive Article 17. It is worth nothing that the link between activity and resulting pressure was maintained outside of the questionnaire, through the activity-pressure matrix developed as part of the State of the Baltic Sea report, and further developed for use in the HELCOM SOM platform, was utilized.

4.4. Selection of conservation features

The subset of conservation features considered by the Questionnaire was agreed and included all Habitat Directive Annex I marine habitat types: Sandbanks (1110), Estuaries (1130), Mudflats and sandflats (1140), Coastal lagoons (1150), Large shallow inlets and bays (1160), Reefs (1170), Submarine structures made by leaking gases (1180). It was also decided to include species listed under the categories "Endangered" or "Critically endangered" in the HELCOM Red List assessment (HELCOM, 2013), which are also included in the Annexes of the Bird Directive or Habitat Directive (Table 3).

Table 3. Selected species for the management effectiveness assessment of MPAs and their characteristics regarding Red List assessment and European Directives.

Species	HELCOM Red List 2013	EU Habitats Directive	EU Bird Directive
Macrophytes:			
1. Hippuris tetraphylla	EN	Annex II, IV	
2. Persicaria foliosa	EN	Annex II, IV	
Fishes:			
3. Thymallus thymallus	CR	Annex V	
Baltic Sea birds:			
4. Anser fabalis	EN		Annex II
5. Clangula hyemalis	EN		Annex II
6. Gavia stellata	CR		Annex I
7. Gavia arctica	CR		Annex I
8. Polysticta stelleri	EN		Annex I
Marine mammals:			
9. Phocoena phocoena	CR (Baltic Sea subpopulation)	Annex II, IV	

*Red List categories according to IUCN criteria: EN – endangered species; CR – critically endangered species.

4.5. Assessment criteria

In order to get a qualitative description of the status of the management measures, that address human activities affecting conservation features in a given MPA, the following four categories were formulated:

- category 1: human activity is not addressed by management measure;
- category 2: human activity is addressed by management measure, but not legally implemented, *i.e.* no administrative action was taken to transfer management measure from the legal decision to the implementation;
- category 3: human activity is addressed by management measure, legally implemented but not enforced legally;
- category 4: human activity is addressed by management measure, legally implemented and enforced *i.e.* using administrative instruments and defined control measures.

All human activities, independently of their occurrence, either before or after approval of the management plans, were considered in the evaluation. At the same time, only those human activities (and resulting pressures), that were relevant for a given conservation feature in the MPA according to expert judgement by the respondent, scientific evidence or indirect information, were included into the assessment.

The survey considered two types of human activity management: 1) management through a specific MPA management plan valid within MPA area, and 2) management using other legal acts (e.g. EIA procedures, sector specific regulation, WFD etc.) which typically take place also outside the MPA.

5. Results of method application for the assessment of effectiveness of the Baltic Sea MPAs

In total 68 evaluations (questionnaire responses) of individual MPAs were received from 9 experts from 4 countries (Table 3). Out of them, 65 MPAs were assessed in a context of habitat types and 64 MPAs were analysed considering pre-defined species. Two species (*Persicaria foliosa* and *Thymallus thymallus*) were not covered by received responses and other species, with the exception of *Anser fabalis* and *Phocoena phocoena,* received less than 5 responses each. Harbour porpoise was covered by management evaluations for 38 MPAs, all being located in Danish waters except for one MPA located in German waters.

Four habitat types, “Sandbanks”, “Reefs”, “Coastal lagoons” and “Large shallow inlets and bays” were covered by the majority (38-42) of analysed MPAs. Nearly half of MPAs (26) included “Mudflats and sandflats”, while “Estuaries” and “Submarine structures made by leaking gases” were present only in 5 and 3 MPAs respectively (Figure 4.1). 20% of analysed MPAs represented one habitat type only, while more than half (53%) covered from 2 to 4 habitat types and quarter of MPAs had 5 habitat types in their territory (Figure 3).

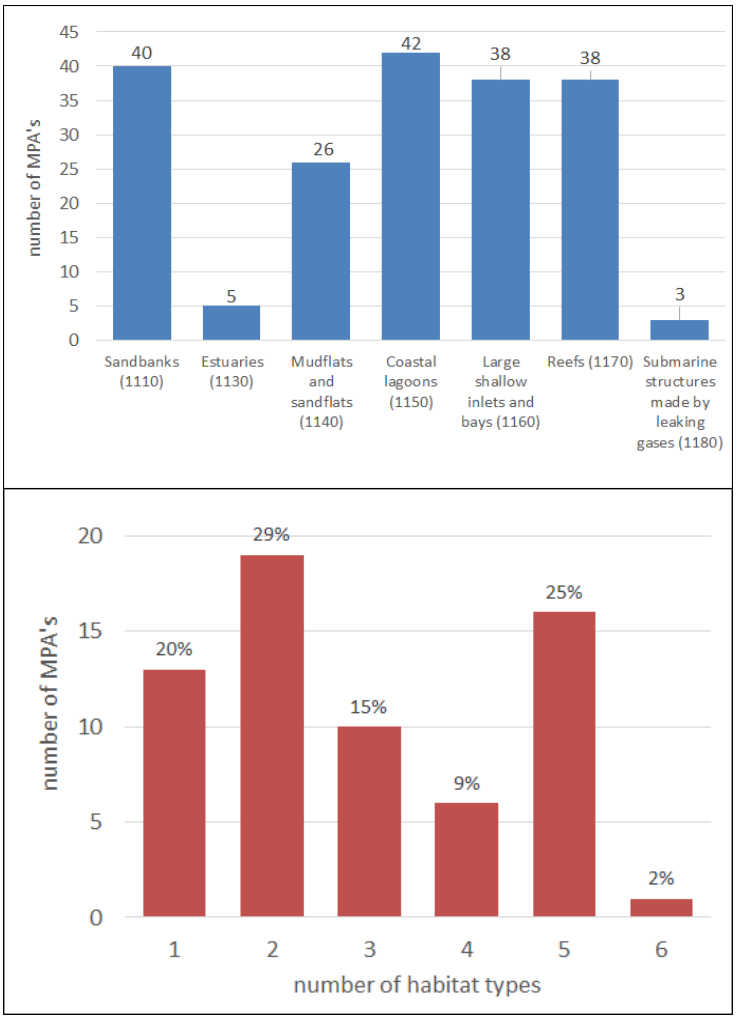

Figure 3. Coverage of different habitat types (upper histogram) and number of co-occurring habitat types (lower histogram) in the 65 MPAs assessed in this study.

One MPA was assessed as fully managed with management category "4" assigned to all relevant human activities for all habitat types present in the area. Four MPAs were not managed neither by management plans nor other legal instruments and all relevant human activities were scored by category "1". The majority of analysed sites, *i.e.* 60 MPAs were considered partly managed, meaning at least one human activity of relevance is present, but is not addressed by management measure or addressed by management measure without enforcement for any of the present habitat types.

5.1 Management instruments

One surprising finding was that most of the activities of relevance in the chosen MPAs are in fact not managed through specific MPA management plans but by other instruments (Figure 4). In Denmark, for example, different human activities are managed by specific sector ministries using general regulations that are also applicable within MPAs. On the other hand, in Denmark, "Fishery with towed bottom contacting gear" differs from the other human activities by having MPA specific management plans in an increasing number of sites, as the process of implementing Danish regulation negotiated with foreign countries is still not completed.

Evaluation of the received questionnaires revealed different interpretations in how to assign the management status category to human activities depending on their relevance for the conservation feature. In the Danish answers, either the category "Other Instruments" or "Management plans" have been given for all combinations of human activities (including potential ones in future) for a given habitat type, whereas in Estonia and Finland the assignment of the management type was only given for already existing human activities (*i.e.* assigned entries with the management effectiveness assessment category from "1" to "4").

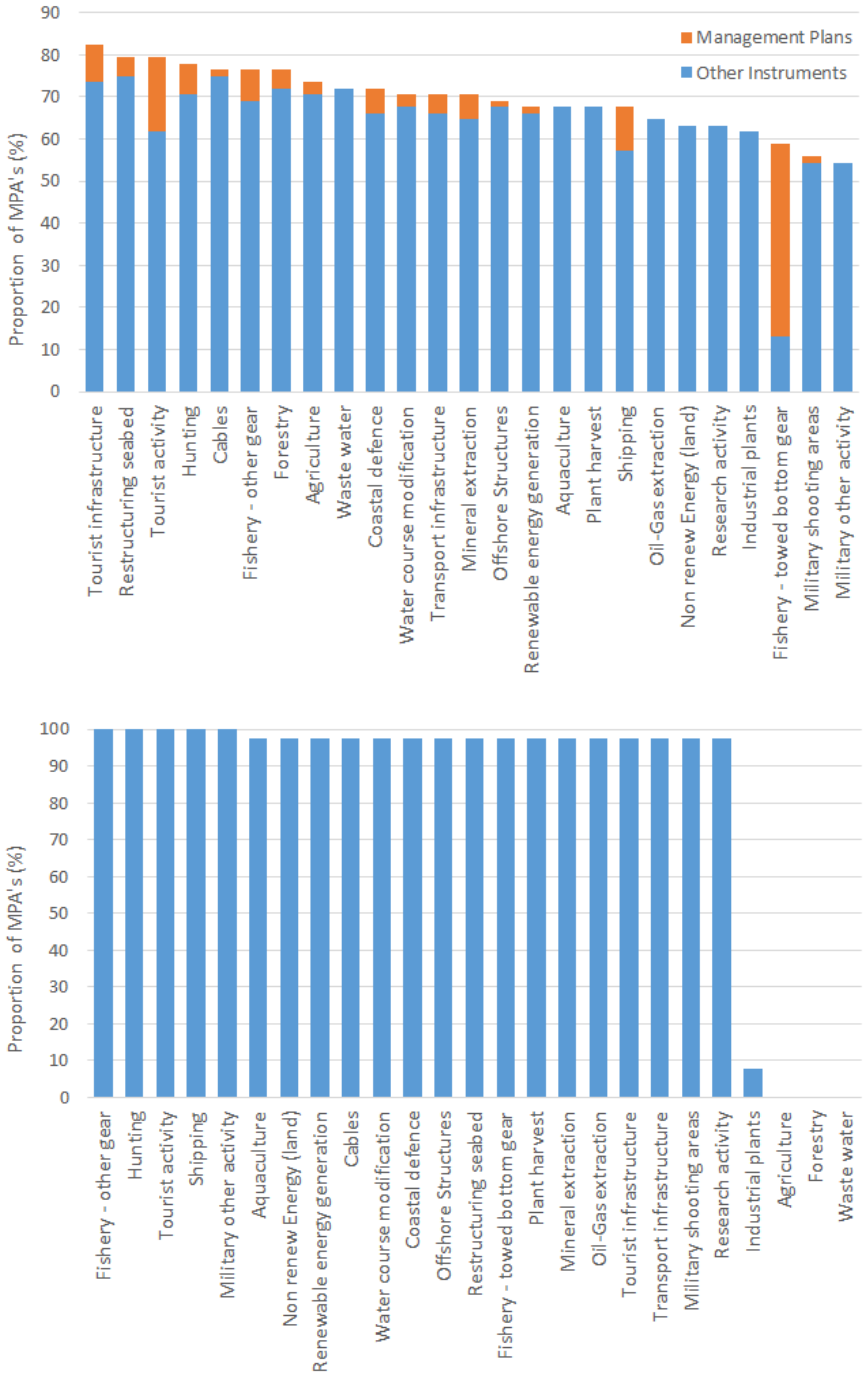

Figure 4. The relative use of management instruments ("Management plans" or "Other instruments", see description in section 3) for different human activities relevant to habitat types (upper figure, n=65 MPAs) and harbour porpoise (lower figure, n=38 MPAs).

5.2 Management of human activities

To get an overall idea of the management effectiveness in the selected Natura 2000 sites we calculated the relative distribution of the four management categories for each human activity (Figure 5). Human activities were only included when they were identified as relevant by the managers/MPA authorities. Additionally, in case of multiple habitat type presence in an MPA, the calculations were made irrespective of the specific habitat being the reason for designation of Natura 2000 site.

Four human activities, “Industrial plants”, “Military activities”, “Coastal defense” and “Oil and gas extraction” are completely or almost completely managed up to category “4” in MPAs they are identified as relevant activities for a given habitat type (Figure 5). One out of the four received responses, all from Finland, regarding the human activity “Non-renewable energy” were categorized as a category “3”. This was a surprising result, as one would expect public infrastructure projects to be fully managed. The less managed activities are “Shipping”, “Forestry”, Tourist activities”, and the two categories of fishing activities. In those cases, less than 50% is managed. Research activities is a special case managed only to category “3”. This activity which could include the use of powerful acoustic instruments seems solely dependent on compliance with regulations in all MPAs from all four responding countries.

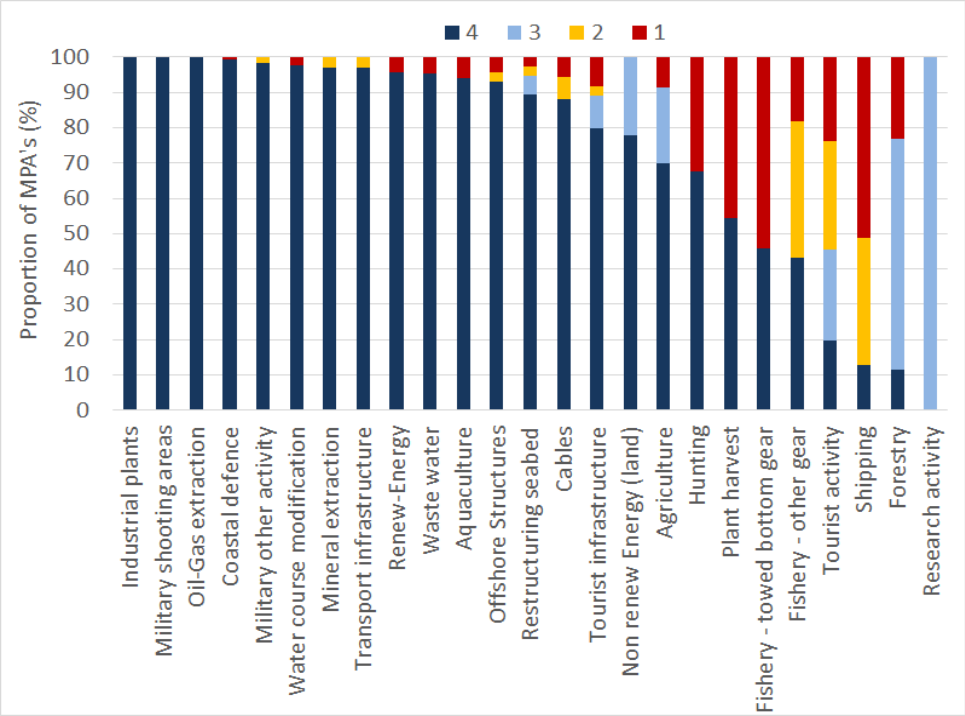

Figure 5. Management of human activities (four categories scale, see Section 4. Project methodology. 4.5 Assessment criteria) for protection of habitat types distributed in Danish, German, Estonian and Finnish MPAs.

Harbour porpoise protection

Assessment of management effectiveness for the protection of harbour porpoise was carried out on data delivered from Danish MPA questionnaires and one German MPA questionnaire. This strongly reflects the spatial distribution of western Baltic sub-population with a core area in the Danish Straits and Kattegat. Three human activities are not considered relevant, “Agriculture”, “Waste water” and “Forestry” (Figure 6). A large number of human activities are managed to category “4” but the most important pressure “Fishery other gear”, including gillnet that are known to cause significant bycatch, are in most cases managed only to category “2”. Shipping causing underwater noise that can disturb the animals is not managed at all in MPAs.

National differences in management level of targeted human activities

Looking at the national level, the management situation is very diverse. The study shows that the distribution of activities also varies geographically. Some human activities are relevant in the north-eastern part of the Baltic Sea while others are only relevant in the western part. At the same time the level of management differs among the received

assessments from the four countries (Figure 7). Estonia have 6 human activities judged to be irrelevant for management that are well managed in the Danish MPAs, and the other way around Denmark have 5 activities found irrelevant where 4 of them are found relevant in Estonia. The responses from Finland also shows 5 human activities found not to be relevant.

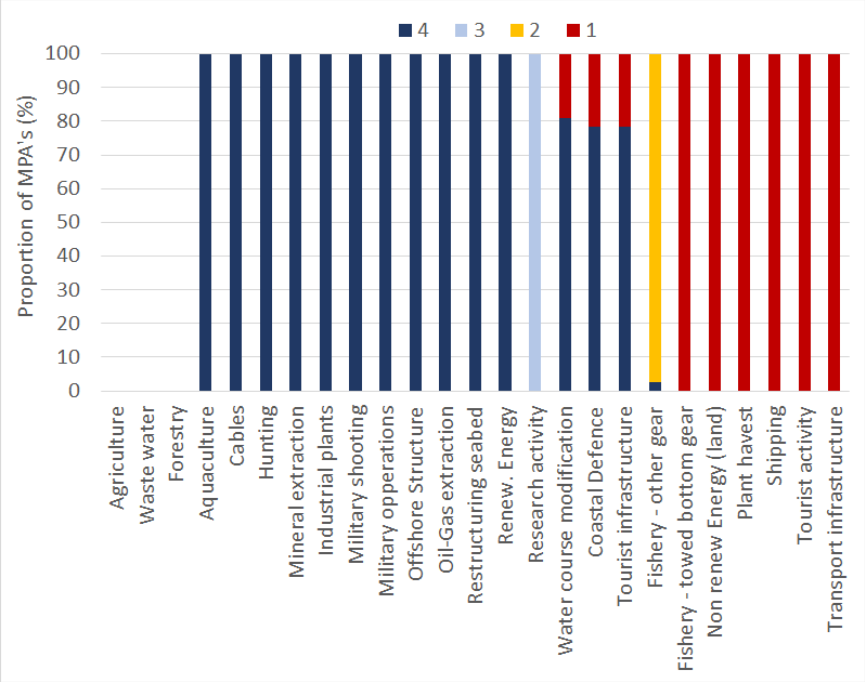

Figure 6. Management of human activities for protection of Harbour porpoise for 37 Danish and one German MPA (four categories scale, see Section 4. Project methodology. 4.5 Assessment criteria).

The management level differs between the responses received from the different countries. In Denmark fishing activities and shipping is less managed. In Finland it is “Fishery with bottom contacting gear” and “Shipping” that lags behind and in Estonia it is “Renewable energy”, “Waste water”, “Offshore structures”, “Aquaculture” and “Cables” that are less managed.

Differences in management level of targeted human activities in MPAs with different proportion of marine area

Most of the analysed MPAs had the proportion of marine area higher than 50% of the total territory. MPAs having 100% of marine area exhibit a slightly different set and lower number of managed activities than those also having a terrestrial component. At the same, the level of management in fully marine MPAs was generally higher (in most cases human activities are managed at category “4” level) compared to sites with terrestrial part (Figure 8). MPAs with a higher proportion of terrestrial share have a more diverse set of relevant human activities and increasing diversity in management categories with decreasing share in marine area. Hence, a higher number of unmanaged or partly managed human activities is observed in areas with higher terrestrial component.

Figure 7. Management of human activities affecting protected habitat types regardless of habitat features included for protection in Danish (upper), Finnish (middle) and Estonian (lower) MPAs (four categories scale, see Section 4. Project methodology. 4.5 Assessment criteria).

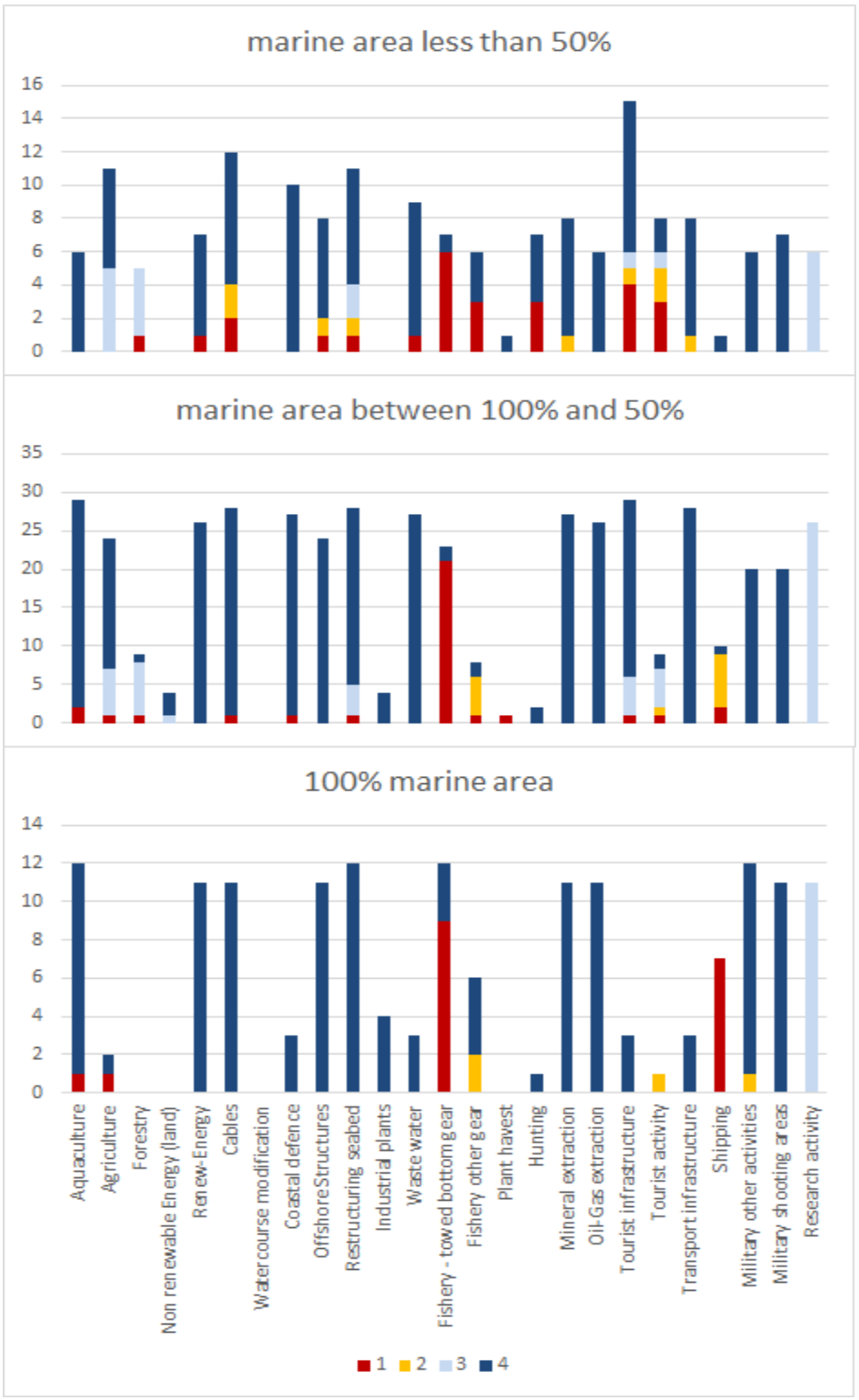

Figure 8. Management of human activities in three groups of MPAs with different territorial shares of marine area (four categories scale, see Section 3. Project methodology. 3.5 Assessment criteria). Left axis refers to the number of MPAs in the given group exposed to indicated human activity.

Comparative management between habitat types and closely associated human activities

We also looked at the reported management status of human activities for specific habitats being part of the designated Natura 2000 sites (Figure 9). Management of the two classes of fishery activities differ substantially among the seven habitats. Unlike other habitat types, the habitats “Estuaries” and “Submerged structures made by leaking gasses” (bubbling reefs) are fully managed to category “4” for aquaculture and fishery by other than bottom towed gears in all sites. Despite those two habitats being present in only 5 and 3 questionnaire responses respectively, the answers for “Bubbling reefs” are also valid for other Danish Natura 2000 sites in the HELCOM waters having this habitat type in their territories.

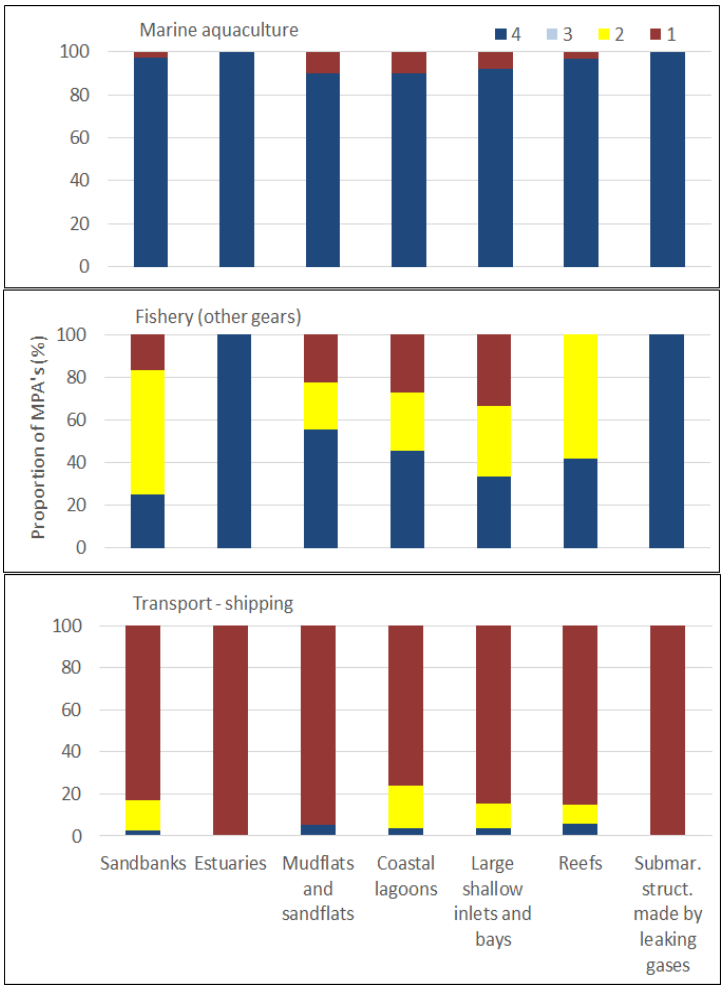

Figure 9. Management of human activities for different habitat types (four categories scale, see Section 4. Project methodology. 4.5 Assessment criteria).

In most cases relevant human activities are managed to the same level irrespective of the habitat type. Most activities are managed to category "4" as it is demonstrated for "Marine aquaculture" (Figure 9). Management degree of a few activities differ between habitat types (e.g. "Fishery with other than demersal gears") and a few activities are managed to a lesser degree for all habitat types, e.g. "Shipping".

The questionnaire replies also indicated that infrastructure based human activities are better managed compared to more spatially diffuse human impacts, even if the two could be considered directly associated (Figure 10). However, the observed difference regarding tourism is driven by a large number of Danish replies assessing tourist infrastructure whereas tourist activities are found unimportant and not reported in accordance with the guideline.

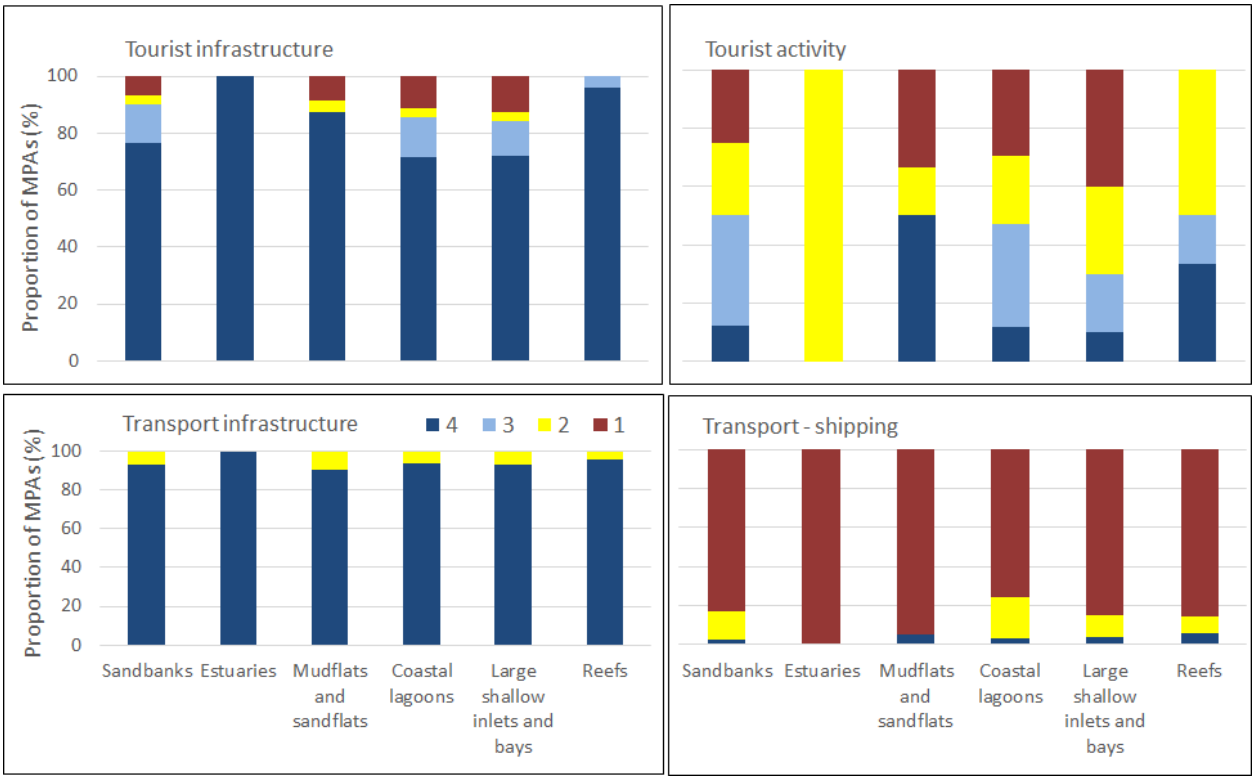

Figure 10. Two examples (top: tourism; bottom: transport) of management to highlight the dependence of management (and the human impacts) related to infrastructure (left) and diffuse activities (right) associated with the same infrastructure (four categories scale, see Section 4. Project methodology. 4.5 Assessment criteria).

6. Conclusions of the Management Effectiveness assessment method application for the Baltic Sea region

Three quarters of human activities are relevant to more than half of the analysed MPAs. The majority of these activities are relatively well managed and half of the relevant human activities received management category “4” in more than 90% of MPAs. This is valid in a context of both, habitat types and the harbour porpoise test case. Only “Fishery with towed bottom contacting gear” differs from the other human activities by having MPA specific management plans, but this is largely applicable to Danish waters only. The prolonged process of implementing Danish fishery regulation was caused by a need for high resolution habitat maps and negotiated with foreign countries with fishing rights. This process is still not completed (January 2021).

Most of the listed human activities were managed by other instruments and not by the MPA management plans. This was a somewhat surprising finding. One explanation could be that most of the listed human activities have significant impact on the marine environment and therefore are recognised and regulated by international and national legislation, or as is the case in Denmark, that regulation of human activities in MPAs is also handled sector-wise in different ministries/agencies.

There is a difference in level of management of listed human activities depending on the share of the marine area in the MPA. MPAs having larger terrestrial component have a higher diversity of management categories for different activities. In fully marine MPAs the number of relevant human activities is smaller, but they are managed to larger extent.

Fishery by bottom gears and shipping are the worst managed activities. There are several obstacles and they are likely operating differently in individual countries and MPAs. Lack of precise mapping has, as an example, been a major obstacle for fishery management in Denmark. Many offshore MPAs are located in areas where international fishing rights exist and introduction of fisheries restrictions need a time consuming hearing process under EU governance. Management of shipping also operates on very different scales in different parts of the Baltic Sea, from many private harbours along the rocky coastlines to large international shipping routes with large economic consequences if redirected.

We did find important national differences in evaluation of what human activities are relevant to selected conservation features. This stresses the importance of a proper stratification in data sampling covering all countries and regions if a full assessment of the entire Baltic MPA network is to be possible.

The applied approach provides important insights into the possibility to assess management effectiveness of the Baltic Sea MPA network. The targeted pilot

application offers clear messages and highlights gaps in knowledge or regional differences which can all provide good perspectives for further development. The absence of responses in some sub-regions of the Baltic Sea may also need to be considered when interpreting the data and ensuring full special coverage in the future to further unpick trends will be key.

7. Recommendations for the development and use of the Management Effectiveness assessment method for the Baltic Sea region

Three aspects of the method development and application are of importance for further development and application of ME assessments at the regional scale: i) level of details in a guidance for the questionnaire, ii) transfer of the questionnaire request to the relevant administrative units and/or experts, iii) timely consultation of the experts when filling the questionnaire for the assessment. Although a large effort was dedicated to the development of the explanatory text for the questionnaire and the overall procedure was tested before running the exercise (by two experts from different countries), interpretation of the management option "other management instruments" was not always straightforward.

Thus serious divergence in considering a human activity as relevant for a selected conservation feature was associated in case of existing threats only, or potentially relevant effects if such human activities are likely and may take place in the area in the future. Misinterpretations in evaluating human activities were also likely when located outside the areas of assessed conservation features (e.g. agriculture). All these discrepancies should be resolved with a higher degree of clarity of background information and/or providing assessment examples, however a balance between the length of guidance and assessment itself is important. Such efforts would harmonise the responses across the region and enable stronger evaluation of the results.

Other remarks for development and use of the elaborated method are as follows:

1. The method elaborated by the ACTION project follows the common framework of management effectiveness assessments and provides interpretable results. The method in its current format provides a good platform to assess management performance. It can be broadened for the assessment of management effectiveness covering the full management cycle.
2. The method is suitable for management effectiveness analysis of the regional MPA network. Addition of an integration algorithm can be considered to enhance the method applicability for assessment of an individual MPA and/or for assessment of the network on a sub-regional level, at the costs of increased assessment effort.
3. The amount of effort to fill in information required by the method for MPA ME assessment has to be compromised with the level of requested details. It is recommended that method stays implemented in the online format and can be applied by MPA managers without extensive guidance, but clear explanation of key terms used in the questionnaire (e.g. "relevant pressure", "enforcement" etc.) will be important in further assessments.

4. The method allows the incorporation of weighting for the importance of human activities and increases in possibility of detecting the largest perceived or proved impacts. Such extension, however, will require increased assessment effort, higher level of expertise, more subjectivity and loss in comparability of MPAs at the network scale.
5. The method focuses on Habitat Directive, Bird Directive and HELCOM Red Listed conservation features, however it can be extended to include other ecologically relevant conservation features, e.g. Baltic HUB biotopes, food web components or key habitats that are not red-listed.
6. The method allows extension to complete a full management cycle to assess the status of conservation features. Adding this step will allow assessment of management effectiveness instead of management performance. Currently there is a gap in data on the status of conservation features in individual MPAs, which can be partly eliminated through incorporation of Management Effectiveness assessment into Habitat Directive Article 17 reporting.

8. Recommendations for improvement of MPA network effectiveness in reaching GES

Recommendations for improvement of MPA network effectiveness in reaching GES were developed to support the selection of new measures and actions for the updated Baltic Sea Action Plan. Submission of recommendations (synopses) as potential new HELCOM actions for the Baltic Sea Action Plan were discussed during the HELCOM ACTION project workshop on MPA network effectiveness (HELCOM ACTION WS3-2020) in February 2020. Proposals for three recommendations (synopses) were elaborated by workshop participants and submitted to the HELCOM Secretariat for further considerations:

- designate no-use marine protected areas, that also function as scientific reference areas;
- strengthening the management of the Baltic Sea MPA network by introducing key management elements to increase effectiveness of protection;
- protect functionally important ecosystem elements and ecologically significant areas in order to create a regionally coherent network.

Title

Designate no-use marine protected areas, that also function as scientific reference areas

Submitted by:

HELCOM ACTION project, WP 3

Description of measure

The current MPA Baltic Sea network largely focuses on protecting and conserving specific, targeted features, such as reefs or harbor porpoise, and there is a lack of the entire ecosystem protection where nature has room to recuperate and exist freely, without human impact or with human impact minimized as far as at all possible. Therefore, the MPA network should be expanded to include so called no-use marine protected areas that also act as scientific reference areas.

Since different activities are allowed in almost all of the Baltic Sea we do not currently know what is the actual biological potential of the sea. Therefore we should aim at protection of large enough areas (minimum size is recommended to be 100 km^2, e.g. Edgar et al. 2014) that are left to develop freely, with regular scientific research to monitor the development of changes in status of biodiversity and functioning. By protecting the area in its entirety and not allowing for any other human activities besides leisure traffic passing the area at a slow pace, we will extend protection beyond the usual specific and restricted conservation features, thus covering aspects that are now lacking from the current network as e.g. genetic diversity, different life history stages of species, common species and common habitats.

This type of protection is even more important than ever in the light of the increase in biodiversity loss (IPBSES report 2019), continuing habitat degradation (Article 17 reporting) and the impacts of climate change. Knowledge gained from monitoring of reference areas can also be used as background information when assessing management effectiveness of other MPAs.

Reference areas can be core areas of larger MPAs and form a coherent, Baltic wide network. Modelling the location of such areas should therefore be carried out on a regional scale, whilst implementation will be national. Criteria for the areas should be based on the best available expert knowledge and modelling their location should be data driven as far as possible.

Activity:

Offshore structures (other than for oil/gas/renewables)
Restructuring of seabed morphology (dredging, beach replenishment, sea-based deposit of dredged material)
Extraction of minerals (rock, metal ores, gravel, sand, shell)
Extraction of oil and gas, including infrastructure (e.g. pipelines)
Renewable energy generation (wind, wave and tidal power), including infrastructure
Non-renewable energy generation (fossil fuel and nuclear powerplants)
Transmission of electricity and communications (cables)
Fish and shellfish harvesting (bottom-touching towed gears, professional, recreational)
Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)
Fish and shellfish processing
Marine plant harvesting
Hunting and population control
Aquaculture – marine, including infrastructure
Transport – shipping (incl. anchoring, mooring)
Transport – shipping infrastructure (harbours, ports, ship-building)
Transport – air, including infrastructure
Tourism and leisure activities (boating, beach use, water sports, etc.)
Military operations (infrastructure, munitions disposal)

Research, survey and educational activities (seismic surveys, fish surveys)

Pressure:

Loss of, or change to, natural biological communities due to cultivation of animal or plant species
Disturbance of species: Visual, presence, boating, recreational activities, above-water noise
Disturbance of species: Other (e.g. barriers, collision)
Extraction of target fish and shellfish species and incidental fish catches
Extraction of bird and mammal species
Incidental catches of birds and mammals
Physical disturbance to seabed (temporary or reversible and recovers within 12 y)
Physical loss (due to permanent change of seabed substrate or morphology and to extraction of seabed substrate)
Changes to hydrological conditions
Input of organic matter — diffuse sources and point sources
Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) — diffuse sources, point sources, atmospheric deposition, acute events
Input of litter (solid waste matter, including micro-sized litter)
Input of anthropogenic sound (impulsive, continuous)
Input of other forms of energy (including electromagnetic fields, light and heat)
Input of water — point sources (e.g. brine)

State:

The measure is addressing the state of the Baltic Sea ecosystem when implemented on a regional scale.

Seabed habitats, Pelagic habitats, Birds, Mammals, Fish, Red listed species and habitats, Hazardous substances, Noise, Litter

Extent of impact:

The measure will have a Baltic wide impact if fully regionally implemented.

Effectiveness of measure

No-use zones are a key tool for nature conservation and the protection of biodiversity. Current studies (e.g. Dureil et al. 2018) have shown that MPAs without no-take zones have limited capacity to achieve the objectives for which they were designated. Therefore, zoning concepts with exclusion of all human activities are a prerequisite for reaching conservation goals of HELCOM, OSPAR, HD and MSFD (FCS, GES).

Healthy marine ecosystems enhance the resilience of the ocean and mitigate the effects of climate change. Moreover, the full implementation of the proposed measure would contribute to the protection of (migratory) species as it preserves areas that connect important habitats and functions (e.g. refuge areas, reproduction areas, feeding grounds, resting areas). In this respect, no-use areas within the MPA network will substantially contribute to the protection of species and habitats by creating refuge areas and recovery space. Furthermore, they represent scientific reference areas on a regional scale.

Reference areas will allow better understanding of A) effects of human activities on the marine environment, B) definition of (close to) natural conditions of ecosystem components (baseline) and C) the recovery duration of marine ecosystem components after disturbance. A) to C) can be assessed by using the data gathered from scientific monitoring within the reference areas. This scientifically based knowledge can be used to inform decision-makers and improve MPA management measures as well as marine spatial planning (MSP). In marine spatial plans possible buffer zones would need to be taken into account for human activities which have a long-distance effect.

Cost, cost-effectiveness of measure:

Monitoring constitutes the main costs for the proposed measure. Studies show that no-take areas often lead to increases in fish stocks and biomass, and an increase in different ecosystem services, thus leading to an increase in revenue.

Feasibility:

The measure could be timely implemented. However, it depends on administrative and scientific capacities (financial and human resources), which are subjected to the political will to enforce the measure (and social acceptance). The measure will have an immediate effect on state components. However, periods until the full effects become visible depends on the habitats and species inventory, e.g. on the growth and reproduction rate of species, their life span and tolerance against disturbances.

Measure should be tied to the proposed expansion of the MPA network in the Baltic Sea (see other submitted synopses on MPAs).

Follow-up of measure:

Update management plans based on the knowledge from the monitoring of reference areas and management effectiveness assessment (adaptive management).

Background material:

The Swedish government's proposal for no-use areas: https://www.havochvatten.se/hav/uppdrag--kontakt/vart-uppdrag/regeringsuppdrag/regeringsuppdrag/marina-skyddade-omraden-utan-lokal-mansklig-paverkan-2018.html

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Edgar et al. 2014. Global conservation outcomes depend on marine protected areas with five key features. Nature 506:216-220

Title

Strengthening the Baltic Sea MPA network by introducing key management elements to increase effectiveness of protection

Submitted by:

HELCOM ACTION project, WP 3

Description of measure

Approximately 2/3 of the current Baltic MPA network is covered by approved management plans. However, only a few sites can be considered as effectively managed. The overall target for the Baltic MPA network is 30% of the network to be effectively managed by 2025. Updated standard (guidelines) for the MPA management plans should be developed by 2023, and implemented via national management plans and assessment, monitoring and evaluation structures by 2025. The standards should include the following elements:

1. quantitative conservation objectives for marine areas and conservation features (i.e. ecological systems/habitats and specific species that are chosen to represent and encompass the full suite of biodiversity in the area);
2. measures eliminating or reducing pressures and/or human activities, that are impacting the status of conservation features;
3. agreed list of relevant indicators for monitoring of management performance and status of conservation features;
4. established strategy of monitoring and evaluation of conservation features and human activities/pressures;
5. technical implementation of common assessment methodology for MPA management effectiveness;
6. implement adaptive management methods based on the results of the management effectiveness assessment;

Funding has to be secured in order to develop and implement the above mentioned standard and achieve effective MPAs with quantitative, clearly defined, harmonized and monitored measures.

Activity:

Activities below were identified in the recent MPA management effectiveness assessment to be the least managed:

Transport – shipping (incl. anchoring, mooring)

Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Fish and shellfish harvesting (bottom-touching towed gears, professional, recreational)

Pressure:

Disturbance of species: Visual, presence, boating, recreational activities, above-water noise

Physical disturbance to seabed (temporary or reversible and recovers within 12 y)

Incidental catches of birds and mammals

Disturbance of species: Visual, presence, boating, recreational activities, above-water noise

State:

Seabed habitats

Pelagic habitats

Birds

Mammals

Red listed species and habitats

Extent of impact:

Impact of the action is expected at the Baltic wide MPA network level, which currently accounts for 177 HELCOM MPAs (incl. nearly 900 Natura 2000 sites) and sites designated according to Marine Strategy

Framework Directive (MSFD), distributed over 18% of the Baltic area, including both coastal and offshore waters.

Effectiveness of measure

The measure is oriented towards reaching effective MPAs both at single site and whole network level. It addresses key elements, that support management effectiveness (sensu Hockings et al., 2006) and allow its monitoring and update following adaptive management principles. It will address all the marine and coastal habitats and species covered by MPA's through implementation of Habitat Directive, Bird Directive and MFSD, but also other ecologically relevant conservation features.

Cost, cost-effectiveness of measure:

This measure will mainly generate costs for improving or developing MPA management plans as well as implementation of effective monitoring systems in the MPA network. On the long-term run, costs of loss of ecosystem functioning due to ineffective management and subsequent restoration are higher than introduction of effective measures and gaining benefits through supported ecosystem functioning (EEA, 2010). A regionally harmonised approach dealing with the most important human activities as well as application of common management guidelines for the entire network should secure cost-effective implementation of the action at the countries' level.

Feasibility:

Technical implementation is feasible within 5 year involving expertise of researchers and MPA managers from HELCOM contracting parties. HELCOM administrative and technical support using existing infrastructures (HELCOM Network for Marine Protected Area Management, HELCOM MPA database, etc.) will be needed for coherent progress at regional level.

Follow-up of measure:

Establishment of routine management effectiveness evaluation at the network and individual site level will be necessary in order to follow-up success of undertaken measures. This will need to be realised at regional level under the agreed scheme, frequency and reporting format (incl. update of the HELCOM MPA database).

Background material:

The background information for this proposal comes from conclusions and recommendations drawn by HELCOM MPA Management Workshop (2018), and knowledge gained via reviewing multiple management plans of the Baltic marine protected areas distributed in different countries. Part of information on limited management extent is derived through the analysis of questionnaire data received from several countries in the end of 2019 during implementation of HELCOM ACTION project (not published).

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Title

Protect functionally important ecosystem elements and ecologically significant areas in order to create a regionally coherent network

Submitted by:

ACTION project WP3

Description of measure

1. complement the list of currently prioritized conservation features with the key representative habitats identified based on function for the ecosystem/provisioning of ecosystem services.
2. produce an improved map of habitats and species distribution on a regional scale including where the habitats would exist under climate scenarios.
3. regional scale planning to ensure coherence at the network level Ensure that marine spatial plans are based on the ecosystem approach (EBA), recognise the benefits of individual MPAs and MPA networks beyond nature protection, and include them as an integral part of the plans. Ensure that MSP plans contribute significantly to mitigation of impacts from blue economy activities exerted on MPAs, and that marine spatial plans are duly taken into account in more detailed sector plans and zoning.
4. recommendation on how to expand the existing network (designating at least 30% of the Baltic Sea as MPAs by latest 2030)
5. provision broadened national legislation to ensure protection of additional conservation features.

Activity:

Not applicable

Pressure:

Not applicable

State:

The measure will contribute to an improvement 1) of a specific element (e.g. species, habitat, substance, type of litter) and 2) of a specific feature (e.g. abundance, concentration, amount, population condition)]

If implemented and properly managed the measure will contribute to the improved state of biodiversity in general, as well as specifically to the Baltic sea species abundance and distribution both inside and outside the network of protected areas. It will secure higher resilience and provisioning of ecosystem services.

Pelagic habitats
Birds
Mammals
Fish
Red listed species and habitats
Seabed habitats

Extent of impact:

Impact of this measure would be regional. The measure would increase both the added value of the existing MPA sites and of the network as a whole and the contribution of spatial conservation measures towards achieving GES.

Effectiveness of measure

The measure would help to

- update information about key functional elements and habitats that may be common but have an important role in sustaining the biodiversity and resilience of the Baltic Sea.
- mitigate effects of climate change and would, by increasing coherence of the network, also provide flexibility in the face of climate change and its effects on habitats and species distribution.

Cost, cost-effectiveness of measure:

By using the existing network as a basis and modifying it in order to optimize the effectiveness should minimize costs and improve cost effectiveness. Various studies show that effectively managed MPAs lead to increases in ecosystem services and therefore are cost-effective (e.g. Sala, Giakoumi, 2018).

Feasibility:

The first 3 steps are regionally considered feasible and would build on existing national mapping data and modelling methods. They would also bring added value to a number of existing HELCOM processes. The designation of the proposed MPA network and changes in national legislation is for national implementation, but HELCOM can help support this work and come with recommendations on how to carry out these steps, if needed

Follow-up of measure:

[*Optional: indicate information potential or existing follow-up system for the measure, e.g. indicators, monitoring programme*]

Background material:

A process of appointing additional MPAs is ongoing in Denmark to fulfil the obligations set by MSFD (Edelvang et al., 2017a,b). Denmark also identified gaps in their current network, both in terms of coherence and in what habitats and species are protected (Göke et al, 2019).

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