European Commission

JRC TECHNICAL REPORT

Alignment of the Marine Strategy Framework Directive and the Habitats Directive: current state and future perspectives

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2020

EUR 30260 EN

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EU Science Hub
https://ec.europa.eu/jrc

JRC120771

EUR 30260 EN

PDF ISBN 978-92-76-19634-1 ISSN 1831-9424 doi:10.2760/581087

Luxembourg: Publications Office of the European Union, 2020

How to cite this report: Palialexis Andreas, Simona Boschetti, Paris Vasilakopoulos and Francesca Somma, Alignment of the Marine Strategy Framework Directive and the Habitats Directive: current state and future perspectives. EUR 30260 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-19634-1, doi:10.2760/581087, JRC120771.

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Abstract

The Marine Strategy Framework Directive (MSFD) foresees the contribution of several European Union (EU) policies to complete the ambitious assessment of 'Good Environmental Status' (GES). For biodiversity Descriptor (D1), the contribution of the Habitats and Birds Directives (HBD) is critical considering that there is a huge overlap in species which are of the MSFDs concern, and which the HBD includes in both their assessments and well-established monitoring programmes which generate information for the MSFD. The GES Decision encourages EU Member States (MS) to re-use the HBD assessments.

Despite the overlaps across those policies, there is still room to improve the alignment of key concepts, timing, methodological standards for assessments, threshold values, scales, and integration rules. Moreover, the evaluation of MS' MSFD reports revealed an inadequate exploitation of existing assessments for common species. However, MS' justification for not fully exploiting existing Habitats Directive (HD) assessments is not always clear, raising issues concerning their suitability for the MSFD objectives.

The multidimensional overlap of the MSFD and HD was explored by the Joint Research Centre (JRC) through several efforts to support the MSFD implementation. These efforts include the JRC's work on methods to set threshold values for species, the evaluation of MS reports for the MSFD (monitoring and GES assessment), and the determination of species which are of MSFD D1 concern. This technical report collates the knowledge derived from such efforts to pave the road towards an MSFD-HD scientific, political and technical alignment. The analysis is based on a comparison of the policy documents' key concepts, and on a comparison of assessments and reported information from the MS.

Introduction

The Marine Strategy Framework Directive's (MSFD's) clarifications for species groups, criteria, and threshold values

Part I of the Commission Decision (EU) 2017/848 provides guidelines for implementing the MSFD and sets the key concepts on which the implementation should be based (e.g. ecosystem approach to management, threshold values, and links with other environmental policies). The more specific Part II of the Commission Decision (EU) 2017/848, and in particular the species group theme that relates to MSFD Descriptor 1, provides more detailed guidelines on setting threshold values for the species assessments. The guidelines, originally produced following the adoption of Commission Decision 2010/477/EU, were amended to comply with the Commission Decision 2017/848/EU (repealing and replacing the 2010 Decision), following the recommendations from the D1 review process (Palialexis et al., 2015; Palialexis et al., 2016). This chapter provides the threshold setting requirements from the Commission Decision (EU) 2017/848, including comments and clarifications.

The assessment for each species should be done per criterion (MSFD Common Implementation Strategy (CIS), 2017) for each Marine Reporting Unit (MRU). **Table 1** provides an overview of the level at which threshold values should be established, which values should be considered, and which criteria should be taken into account from the D1 species criterion perspective according to the GES Decision (European Commission, 2017).

Table 1. Overview from the D1 species criteria perspective regarding the level at which, threshold values should be set, which values should be considered, and which criteria should be considered, according to the GES Decision (European Commission, 2017).

Criterion	Threshold values shall be established…	Consider values from…	Criteria to take into account:
D1C1	…for the mortality rate from incidental bycatch per species, through regional or sub-regional cooperation.		
D1C2	…for each species, through regional or sub-regional cooperation.	…species covered by Directive 92/43/EEC; these values shall be consistent with the Favourable Reference Population (FRP) values established by the relevant MS under Directive 92/43/EEC.	Natural variation in population size, and mortality rates derived from D1C1, D8C4, D10C4, and other relevant pressures.
D1C3	…for specified characteristics of each species, through regional or sub-regional cooperation.		Adverse effects on their health derived from D8C2, D8C4, and other relevant pressures.
D1C4	…for each species, through regional or sub-regional cooperation	…species covered by Directive 92/43/EEC; these values shall be consistent with the FRP values established by the relevant MS under Directive 92/43/EEC.	
D1C5	…consistent with D1C2 & D1C4.	…Directive 92/43/EEC.	

The GES Decision (European Commission, 2017), states that *"Member States shall establish threshold **values for each species** through **regional or [sub-regional] cooperation**,* […]*"*, and as such, the aim of this analysis is to review the threshold values and developed methods from the Regional Sea Conventions (RSC), and examine their suitability for the MSFD D1 assessment.

Regarding the consideration of the Habitats and Birds Directives (HBD), the Commission Decision (EU) 2017/848 states that "[…] [for] species covered by Directive **92/43/EEC**, these values shall be consistent with the **Favourable Reference Population values** established by the relevant Member States under Directive 92/43/EEC". The HBD is an important source of information on the establishment of threshold values. Even though they can directly provide threshold values for the species that are assessed under them, there are several issues to be solved through the alignment process of the three Directives, to fully exploit the developed methods and reported values. The outcome of this work provides significant input to the alignment of the three Directives, by indicating the extent to which elements are already assessed, and the conceptual discrepancies that might arise from directly reporting information using the HBD.

The selection of species (step 1 of the species assessment flow in **Figure 1**) is guided by the reference list (Palialexis et al., 2018) and the compiled list (based on the reference list and MS experts' suggestions) generated to support the reporting process for the MSFD. This provides an informative overview on the species to be considered, per species group, and region or subdivision. The number of species to be assessed, and how well they represent each ecosystem or subdivision is an important factor in the assessment process, and for selecting methods to consistently determine thresholds.

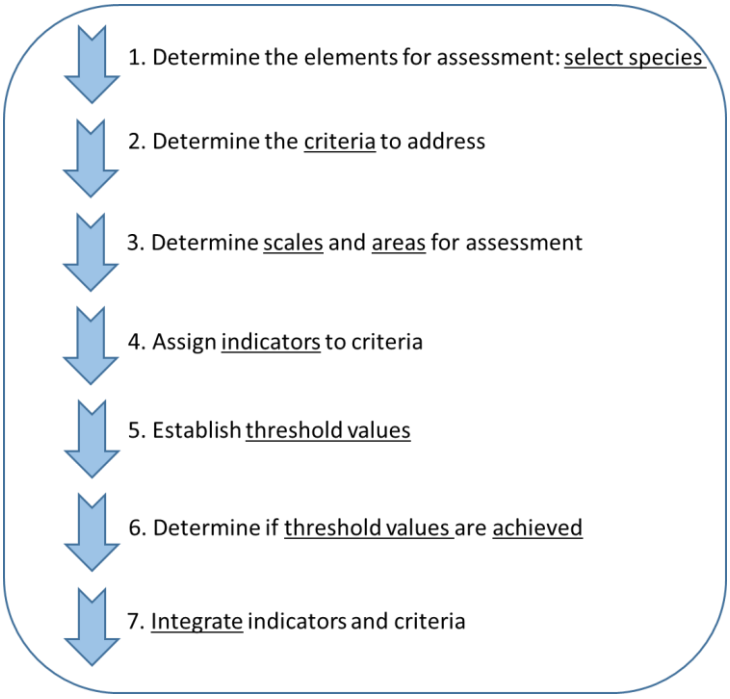

Figure 1. The general assessment flow for species ecosystem components, from the Article 8 guidance document (adjusted from Walmsley et al, 2017).

The Commission Decision (EU) 2017/848 presents a species criteria table with a "Methodological Standards" column, which provides guidelines on the use of criteria, such that "[…] *[the] status of each species shall be assessed individually,* […]*"*; both the individual assessment of each species, and the establishment of threshold values for each species per criterion exclude community indicators. However, such indicators (e.g. proportion of large fish) are more relevant to the "Ecosystem, including food webs" theme. In any case, these assessments should be considered within the species criteria assessments, since they give a different perspective on the pressures acting on a single species. The guidelines continue to state that species' status shall be assessed *"*[…] *on the basis of the criteria selected for use* […]", as described in Step 2 of **Figure 1**. While harmonising criteria

selection may seem irrelevant to this process, it is data dependent like the threshold setting process, and should be regionally coordinated to achieve comparable assessments.

Subsequently, regarding the GES achievement, the following options are set:

"(a) the assessments shall express the value(s) for each criterion used per species, and whether these achieve the threshold values set;

(b) the overall status of species covered by Directive 92/43/EEC shall be derived using the method provided under that Directive […]".

The alignment of the HBD and MSFD will throw more light on this, especially regarding the level of information and methods from the HBD that are relevant to the MSFD.

More information and clarifications to support the D1 species assessment can be found in the section of the Commission Decision (EU) 2017/848 entitled "Specifications and standardised methods for monitoring and assessment relating to theme 'Species groups of marine birds, mammals, reptiles, fish and cephalopods'". For the mortality rate caused by incidental bycatch, it states that "[…] *data shall be provided per species per fishing metier for each ICES [(International Council for the Exploration of the Sea)] area, or GFCM [(General Fisheries Commission for the Mediterranean)] Geographical Sub-Area, or FAO [(Food and Agriculture Organisation)] fishing areas for the Macaronesian biogeographic region, to enable its aggregation to the relevant scale for the species concerned, and to identify the particular fisheries and fishing gear most contributing to incidental catches for each species."* This is an essential specification to consider when establishing threshold values for this criterion, as it specifies the spatial scale (and partially the temporal scale, through the *métier* definition) at which the assessment should be performed.

In the same section of the GES Decision (European Commission, 2017), it is clarified that species may be assessed at population level, where appropriate. In many cases, it is more relevant from the species' perspective to assess populations than it is to assess species, especially for species with distinct populations and wide-ranging distribution. This requirement is well reflected in the existing methods for threshold setting (e.g. in the Baltic Marine Environment Protection Commission's (HELCOM's) population trends and abundance of seals indicator).

Once again, the input from other European Union (EU) Directives is acknowledged, and specific guidelines are set per species group:

"(a) for birds, criteria D1C2 (**population abundance**) and D1C4 (**distributional range and pattern**) equate to the 'population size' and 'breeding distribution map and range size' criteria of Directive 2009/147/EC (**BD**);

(b) for mammals, reptiles, and non-commercial fish, the criteria are equivalent to those used under Directive 92/43/EEC (**HD**) as follows: D1C2 (**population abundance**) and D1C3 (**population demographic characteristics**) equate to 'population', D1C4 (**distributional range and pattern**) equates to 'range' and D1C5 (**habitat extent and conditions for species**) equates to 'habitat for the species';

(c) for commercially-exploited fish and cephalopods, assessments under Descriptor 3 shall be used for Descriptor 1 purposes, using criterion D3C2 (**Spawning Stock Biomass**) for D1C2 (**population abundance**) and criterion D3C3 (**age/size distribution**) for D1C3 (**population demographic characteristics**)."

The alignment of the criteria across different policies clarifies the links between each of their assessments, and allows for the direct use of methods from Directives and regulations that have been in place for longer than the MSFD, and which in most cases are well developed. However, the relevance of these methods and assessments to the MSFD objectives and requirements needs to be further tested and compared.

HD general approach

The Commission Decision (EU) 2017/848 defines that "[for] species covered by Directive 92/43/EEC, these [threshold] values shall be consistent with the Favourable Reference [Range (FRR) and] Population [(FRP)] values established by the relevant Member States under Directive 92/43/EEC". Since the HBD covers all mammal species, reptiles, and some birds and fish that are considered under the MSFD (Palialexis et al., 2018), this section provides an overview of the methods and principles related to the FRR and FRP.

Overview of general principles for setting reference values for the HD

The guidance document for HD reporting (Directorate-General (DG) for Environment, 2017) provides a set of principles relating to the information required to understand species' ecological and historical contexts, to better determine the Favourable Reference Values (FRVs). The optimal data and information required is included in the following factors: (This is a numbered list.)

- Current situation and assessment of deficiencies, i.e. any pressures/problems;
- Trends (short-term, long-term, historical, i.e. well before the Directive came into force);
- Natural ecological and geographical variation (including genetic variation, inter- and intra-species interactions, variation in the conditions in which species occur);
- Ecological potential (potential extent of range, taking into account physical and ecological conditions);
- Natural range, historical distribution, and abundances and causes of change, including trends;
- Connectivity and fragmentation;
- Requirements for populations to accommodate natural fluctuations, allow a healthy population structure, and ensure long-term genetic viability;
- Migration routes, dispersal pathways, gene flow, population structure (e.g. continuous, patchy, meta-population).

General principles to be considered in the process of setting FRVs (DG Environment, 2017):

- FRVs should be set on the basis of ecological and biological considerations;
- FRVs should be set using the best available knowledge and scientific expertise;
- FRVs should be set whilst taking into account the precautionary principle, and should include a safety margin for uncertainty;
- FRVs should not, in principle, be lower than the values at the time the HD came into force, as most species have been listed in the Annexes because of their unfavourable status; yet, the distribution (range) and size (population) at the date of entry into force of the Directive does not necessarily equal the FRVs;
- The FRV for population is always bigger than the minimum viable population (MVP) for demographic and genetic viability;
- FRVs are not necessarily equal to 'national targets': "Establishing favourable reference values must be distinguished from establishing concrete targets: setting targets would mean the translation of such reference values into operational, practical and feasible short-, mid- and long-term targets/milestones. This obviously would not only involve technical questions, but be related to resources and other factors" (DG Environment, 2004);
- FRVs do not automatically correspond to a given 'historical maximum', or a specific historical date; historical information (e.g. a past stable situation before changes occurred due to reversible pressures) should, however, inform judgements on FRVs;
- FRVs do not automatically correspond to the 'potential value' (carrying capacity) which, however, should be used to understand the restoration possibilities and constraints.

These general principles are in line with or similar to Article 4 of the Commission Decision (EU) 2017/848 on setting threshold values.

The size of range FRVs and population FRVs should be set separately, however their clear direct relationship requires an iterative process in setting the FRVs to ensure that one value takes the other one into account. Examples of this would be a population that is large enough and has an appropriate enough range to include

and maintain the evolutionary potential of a species, or a species with a sufficiently large range, enabling the population to carry out all stages of its life cycle (DG environment, 2017).

Approaches to setting FRVs

There are two main approaches to setting FRVs: model-based, and reference-based (DG Environment, 2017):

- **Model-based methods** are built on biological considerations, such as those used in Population Viability Analysis (PVA), or on other estimates of Minimum Viable Population (MVP) size. This approach requires a good knowledge of the species' ecology and biology, and a spreading of viable populations across the species' natural range.
- **Reference-based approaches** are founded on an indicative historical baseline, corresponding to a documented (or perceived by conservation scientists) good condition of a particular species, or the restoration of a proportion of estimated historical losses.

Both approaches account for information about distribution, trends, and known pressures and declines (or expansions).

The DG Environment (2017) proposes a stepwise approach to harmonise the setting of FRVs across MS (**Figure 2**). The FRVs' and the proper approach largely depend on the data availability and knowledge for each species. There are three generic levels of data availability and knowledge (DG Environment, 2017):

- High: good data on actual distribution and ecological requirements/features; good historical data and trend information;
- Moderate: good data on actual distribution and ecological requirements/features; limited historical distribution data (only trend data available);
- Low: data on actual distribution and ecological requirements/features is sparse and/or unreliable; hardly any available historical data, and no trend information.

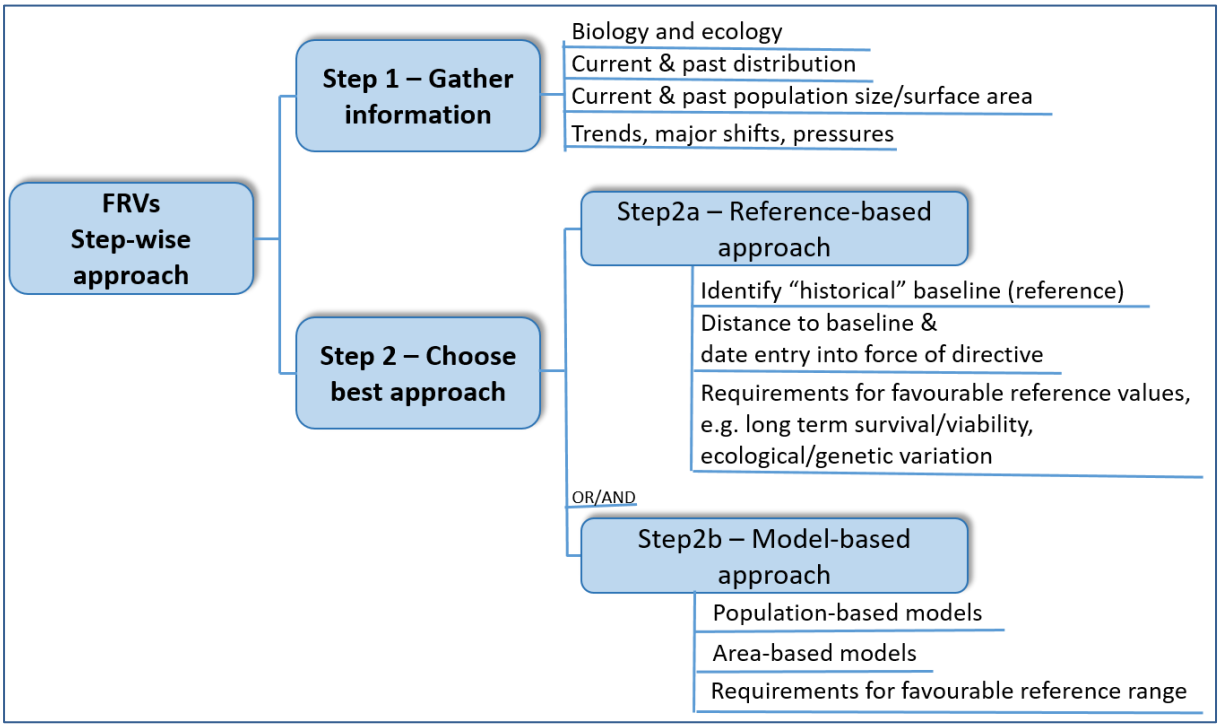

Figure 2. Illustration of the stepwise approach to set FRVs (adjusted from DG Environment, 2017).

The recommended approach (DG Environment, 2017) involves a certain number of steps, as indicated in **Figure 2**.

Step 1: Gather information

Collect all relevant information about a species necessary to understand their ecological and historical context: biology and ecology, natural range, current and past distribution (including before the Directive came into force), and population size/surface area, trends, their causes and when major changes occurred, and pressures.

Step 2: Choose best approach

Depending on the availability and quality of the data and information gathered, choose the best way of setting the FRVs.

- Step 2a: Use reference-based approach

Compare the current distribution and population size or surface area with those of a past favourable period, and at the date of the Directives' entry into force.

Check if the values above are enough to ensure long-term survival and viability, as well as coverage of ecological variations.

Set values or use operators to qualify how far the current value is from the favourable situation.

- Step 2b: Use model-based approach

Develop population-based models, or use available estimates derived from such models to assess the FRP, considering the requirements for a FRR.

Species' and habitats' resilience and sensitivity to stressors

The MSFD species assessments must consider the resilience and sensitivity of the populations to certain pressures and set threshold values or range of values accordingly. The GES Decision provides some relevant guidelines, but more testing is required at the species level to avoid moving thresholds, and to consider the system's characteristics.

Resilience and GES determination

In the context of GES, enhancing the resilience of a specific system state is desirable when that state satisfies the GES standards. This can be done by controlling the stressors which could push the system into a new, undesirable state (e.g. reduce nutrient flow into a marine ecosystem to avoid a shift towards a eutrophic state). However, there may be system states that do not meet the GES standards, but which are still quite resilient (e.g. a chronically overfished marine ecosystem). In the latter case, management would need to aim towards eroding that resilience to be able to assist the system's shift towards a more desirable state.

Definition of resilience

Complex natural systems do not always respond to changing stressors in a linear and predictable way, but they often exhibit abrupt, discontinuous shifts to different states (**Error! Reference source not found.**). This illustrates how, for the same set of conditions, a system can exhibit alternate states, each representing a different configuration, e.g. a different species composition. In this context, 'ecological resilience' describes the capacity of complex natural systems to absorb disturbance and persist within their original configuration as conditions change (Holling, 1973; Walker et al., 2004).

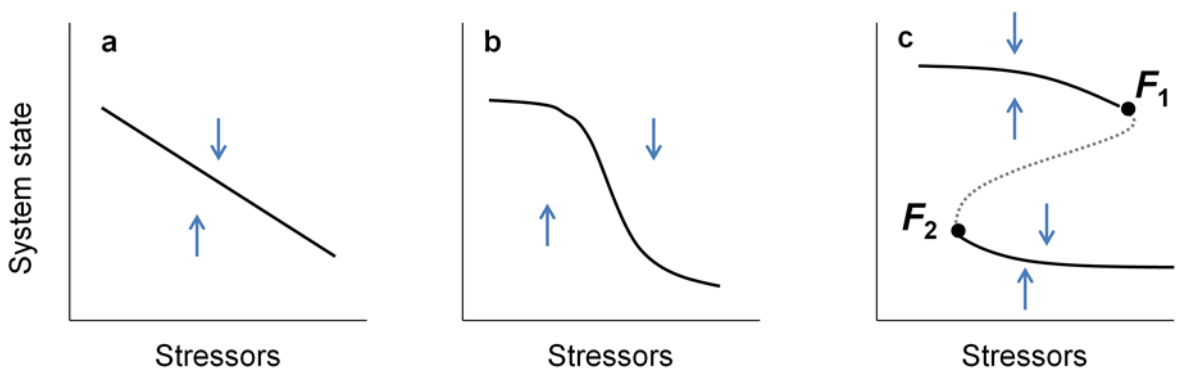

Figure 3. The possible ways that a complex natural system, such as a population, habitat, or ecosystem can respond to changing stressors, such as temperature, exploitation, nutrients etc. The system's response may be a continuous linear (a) or sigmoid (b) pattern, but it can also be discontinuous, where the response curve is folded backwards at the tipping points F1 and F2, forming distinct alternate states (c). Ecological resilience is relevant to these discontinuous responses. Arrows indicate the attraction forces towards the response curve (mean state). Adapted from Scheffer et al. (2001).

Resilience becomes lower the further the system moves from its mean original state, and the closer it moves towards a tipping point (**Figure 3**c); hence, resilience can be added as a third dimension to the system-stressor relationship, resulting in a stability landscape with two (or more) basins of attraction (**Figure 4**).

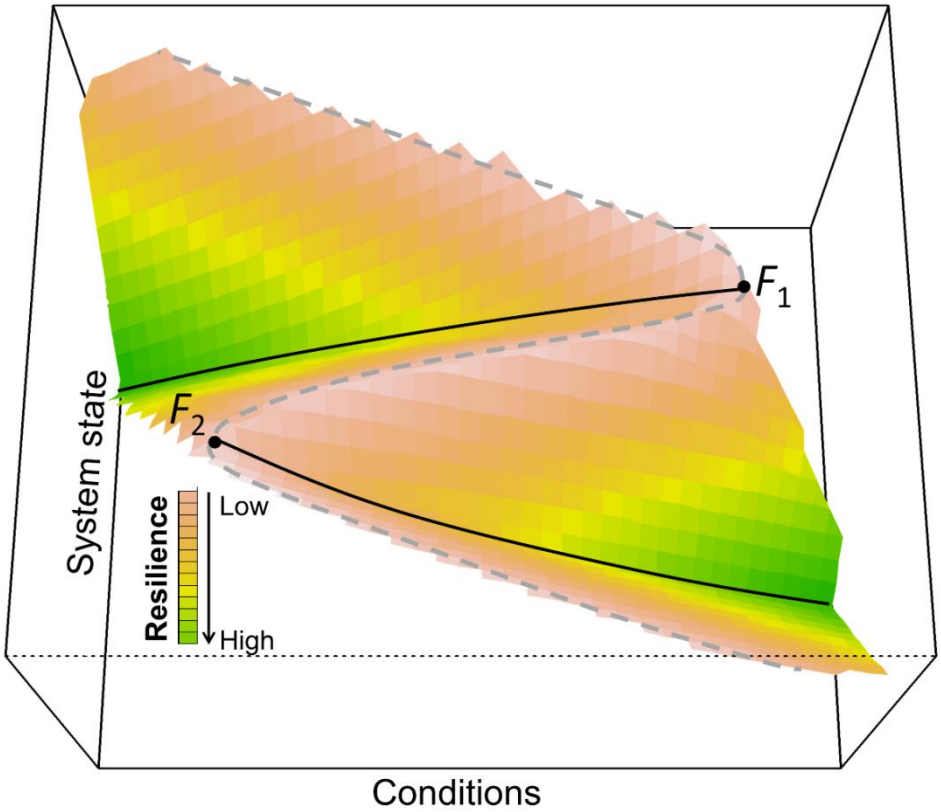

Figure 4: A theoretical folded stability landscape, with two basins of attraction. Mean states (attractors) and basins' borders are indicated by black continuous and grey dashed lines, respectively. As stressors change and the system approaches a tipping point (F1 or F2), resilience erodes. Adapted from Vasilakopoulos and Marshall (2015).

Ecological resilience is distinct from 'engineering resilience', which is the recovery rate of a system to its original state after a perturbation, measured in units of time (Holling, 1996; van Nes and Scheffer, 2007).

Input from the MSFD cross-cutting document

The MSFD CIS (2017) document provides the following definitions in relation to the GES determination, and the consideration of resilience for ecosystems, habitats, and species.

The definitions of environmental status and good environmental status (Article 3(4)).

The definition of environmental status in Article 3(4) provides a holistic perspective on what needs to be considered in the 'state' of the environment, including but not limited to "[ecosystems] which function fully and maintain their resilience to human-induced environmental change". The "human-induced environmental change" described includes exploitation. For example, MSFD Descriptor 3 for commercial fish species considers

direct or indirect effects to the environment through anthropogenic activities, e.g. hydrological alteration as a result of a wind farm installation. Pressure, impact, and state criteria (see MSFD CIS, 2017) could be framed with tipping points, indicating the edge of a distinct alternate stage. However, for the state criteria, tipping points can be either modelled or proved after a regime shift occurred as a response to a pressure (e.g. species composition shift). The latter, nevertheless, constitutes an adverse effect to the state of the criterion.

MSFD glossary of terms: Resilience

Ecological resilience (MSFD CIS, 2017) refers to the ability of a complex natural system such as a population, community, habitat, or ecosystem to absorb disturbance and persist within their original configuration as conditions change. The recovery period (often measured in months and years) is used to assess sensitivity (to pressures or activities) for management purposes. In that sense, sensitivity coincides with engineering resilience/recovery rate.

Methods

1 Sources of assessments and threshold values; objectives, and GES definition

The MSFD foresees a management framework to achieve GES in European waters, which consists of the GES determination, assessment of the marine environment, evaluation the existing measures, and the introduction of new ones if needed. At the same time, this process has been designed to reflect the different biotic and abiotic characteristics of the regions and subdivisions. To this end, the role of the RSC became prominent during the first cycle of the MSFD implementation, and even more so after the review process which resulted in the new GES Decision (European Commission, 2017). Moreover, the MSFD came into force to provide an integrated assessment of the marine environment, putting together all of the relevant marine information generated by previous EU policies. For MSFD Descriptor 1, the HBD provides an essential input of information and methods, which are well reflected in the GES Decision (European Commission, 2017). The HBD implementation, along with the works of the RSCs, provides the major sources of methods which are used to set thresholds for the D1 criteria. Ultimately, MSFD-HBD harmonisation will contribute to achieving a consensus on one monitoring and assessment method, which will serve for all policy reporting requirements (MSFD CIS, 2017).

2 Scale of assessments

It is essential to consider the scales of assessment required from each Directive, since the scales can differently determine GES and threshold values. Assessment scales are provided in detail for each species group for the MSFD through the GES Decision (European Commission, 2017). These were built on the scales applied and tested by some of the RSCs, and they pay respect to the ecological relevance of assessment for each species group. The outcome of this analysis is to identify the similarities and differences in the scales of status assessments between the MSFD and other policy assessment requirements.

3 Progress in methods for setting thresholds for criteria and species groups

The previous sections cover the high-level objectives, determination of GES (or equivalent) and scales of assessment and provide an overview of the legal framework. In parallel, this section will set the basis for threshold setting at the level of the MSFD criteria, according to the GES Decision (European Commission, 2017). This section reviews the developed and agreed thresholds, and methods for setting thresholds by the RSC and other policies. We match those thresholds and methods with the MSFD criteria, by allocating the criteria[1] from the RSCs and HBD to MSFD D1 criteria. The outcome provides an additional indication of the gaps in thresholds and threshold setting methods, at the level of the indicators' coverage across the MSFD criteria. The allocated criteria are marked according to the level of:

i) having agreed thresholds which are already in use;

ii) having thresholds that are still under development; or,

iii) no thresholds exist.

The two-dimensional nature of criteria coverage and the existence of thresholds per MSFD species group, gives an overview of the methods, from which MSFD D1 GES determination should sought for best practices and broad use at EU level. In addition, gaps are highlighted for species groups and criteria where there is currently no or only partial information, to prioritise the need for further research/monitoring.

4 Existing thresholds for species; sources and comparison with the MSFD requirements

An overview of the marine species within species groups in each region shows that some indicators have already been developed at species/regional level. However, the HBD provides a more general methodology which is commonly applicable to all MS. A major part of the initial reporting for the MSFD was based on the HBD assessment (Palialexis, et al. 2014; European Commission, 2014). The HBD is undoubtedly the main source

[1] In this analysis, the OSPAR's common indicators, HELCOM's core indicators, UNEPMAP's common indicators, and the HBD parameters are allocated to the MSFD criteria. For the sake of clarity, all of these are referred to as criteria in this paragraph to avoid confusing criteria, indicators, scientific indicators, and parameters.

of marine species assessments with operational methods for threshold setting. Besides, the Commission Decision (EU) 2017/848 indicates that "[…] the overall status of species covered by Directive 92/43/EEC shall be derived using the method provided under that Directive […]". In practical terms, this includes all marine mammals, reptiles, and a large proportion of birds and fish across the four regions. Considering these, the HBD assessments (2012 reporting) are extracted to estimate the number of species and assessed parameters that can cover the MSFD requirements.

5 Use of HD assessment in the MSFD 2018 reporting

The extent of use of the HBD assessment in the second (2018) cycle of the MSFD was evaluated for marine mammals, based on the data provided by MS in their electronic reporting (Article 8 of the Commission Decision (EU) 2017/848). The available reports of 14 MS[2] (as of April 2020) were downloaded from the EEA repository on Marine WISE website (https://wise-test-p5.eionet.europa.eu/). Reported references to the HD assessment and methodological standards used (Palialexis et al., 2019) were searched in different fields of the reporting template (DG Environment, 2017), following and classified in two levels:

- Full use of HD assessment, where MS clearly stated that the data derived from Article 17 reporting under the HD in 2013; and
- Partial use of the HD assessment elements, where MS reported some HD assessment elements such as thresholds value, species source, and indicators, but they did not specify if the assessment was based on the 2013 HD report.

The results were analysed by region and by reported criteria, for the four species groups of the marine mammals.

[2] Belgium, Croatia, Germany, Denmark, Estonia, Finland, France, Latvia, Malta, Netherlands, Poland, Romania, Spain, Sweden

Results

Overview of the HBD-MSFD commonalities for species biodiversity

The following analysis provides an overview of thresholds' availability for species assessments, deriving from the HBD. In particular, it provides an outline of the species and criteria coverage in respect to developed or developing threshold values. Furthermore, the analysis identifies the main sources of methods for threshold setting for biodiversity in European waters and evaluates the contribution of the HBD thresholds to the MSFD requirements for species and criteria. These sources of information are compared with the MSFD at several levels, to identify the differences in approach and objectives.

1 GES objectives: comparison in EU policies and RSC

The GES determination, and consequently the methods to set thresholds are linked with the overall objectives of the assessments of their sources. **Table 2** presents the high-level GES determination (or equivalent) and threshold setting from the RSC and HBD. The GES working group explicitly refers to those sources, acknowledging the progress in the work that has been done on those forums, on which the MSFD should build.

Table 2. GES objectives from the Marine Strategy Framework Directive (MSFD), Birds Directive (BD), and Habitats Directive (HD) regarding marine species, and biodiversity.

Source	Descriptor	GES	Thresholds setting
MSFD (2008/56/EC)	D1 Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.	'good environmental status' means the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations.	**Specific per criterion**. Generally, MS shall establish threshold values for each species through regional or sub-regional cooperation
HD (92/43/EEC)	Favourable conservation status is the overall objective to be reached for all habitat types and species of community interest (i.e. the habitats and species listed in Annexes I, II, IV and V of the Directive).	The conservation status of a species in the HD (Article 1(i)) will be taken as 'favourable' when: — population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and — the natural range of the species is neither being reduced, nor is it likely to be reduced for the foreseeable future; and — there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. The conservation status of a habitat in the HD (Article 1(e)) will be taken as 'favourable' when:	

		— its natural range and areas it covers within that range are stable or increasing; and — the specific structures and functions exist, which are necessary for its long-term maintenance and are likely to continue stay in place for the foreseeable future; and — the conservation status of its typical species is favourable as defined in (i).	
BD (2009/147/EC)	In line with Article 17 of HD, BD Article 12 includes, amongst others, reports on the size and trend of populations and distribution of individual bird taxa.	IUCN criteria (IUCN, 2012)	IUCN thresholds (IUCN, 2012)

2 Scale of assessments

It should be considered that the MSFD and HBD (as well as the Water Framework Directive (WFD)) set their objectives according to the spatial extent of their assessment units. The RSCs have established hierarchical or nested approaches for the division of their assessment and monitoring units, which has also proved useful in the management process, and is in line with the MSFD framework (MSFD CIS, 2017). As the threshold values could be a function of the spatial extent of the assessment area, the reference scales of assessments should be considered in monitoring, GES determination, and threshold setting.

The Commission Decision (EU) 2017/848 requires the **scale of assessment** to be ecologically relevant for each species group, as shown in the upper part of Table 3. The level of scales is in accordance with the HELCOM's nested approach (HELCOM, 2013), the Convention for the Protection of the Marine Environment of the North-East Atlantic's (OSPAR) (OSPAR, 2018) and the United Nations Environment Programme Mediterranean Action Plan's (UNEPMAP) nesting system (UNEPMAP, 2017) in the lower part of **Table 3**.

Table 3. Scales of assessment based on the Commission Decision (EU) 2017/848 requirements.

Elements for assessment	Region	Sub-region	Subdivision	National part of subdivision	Coastal waters (WFD)
State elements					
Species groups (D1): Birds	BAL & BLK	MED & NEA	BAL & BLK		
Species groups (D1): Mammals	(ALL) Deep-diving toothed cetaceans, baleen whales. (BAL & BLK) small toothed cetaceans, seals	(MED & NEA) small toothed cetaceans, seals	(BAL & BLK) small toothed cetaceans, seals		

Species groups (D1): Reptiles	BAL & BLK	MED & NEA	BAL & BLK		
Species groups (D1): Fish (except commercial species - see D3)	Deep-sea fish	Pelagic & demersal fish	Coastal fish		
Species groups (D1): Cephalopods (except commercial species - see D3)	BAL & BLK	MED & NEA	BAL & BLK		
Commercial fish and shellfish (D3)	C2, C3: ecologically relevant scales, based on GFCM, and ICES areas				

Elements for assessment	Region	Sub-region	Subdivision	National part of subdivision	Coastal waters (WFD)
HBD	Marine regions: Atlantic, Mediterranean, Black Sea, Macaronesia and Baltic Sea			National level	
HELCOM	1st level		2nd level sub-basins	3rd level with coastal and offshore division	4th level: HELCOM sub-basins with coastal WFD water types of water bodies
OSPAR Reporting Units;	Level 0 – OSPAR area, Level 1 – OSPAR regions	Level 2 – Subset of OSPAR regions	Level 3 – Zone of coastal influence		Level 4 – WFD regions/amalgam of WFD regions
UNEPMAP	Depending on the state element in line with the MSFD scales				
Black Sea Commission (BSC)	Not determined				

3 Criteria perspective, and the current status of developed thresholds per indicator

In **Table** indicators developed under the RSC and HD parameters are allocated to the GES criteria per species group (shown on the left column). Each entry is marked with green, orange, or red, according to whether there are agreed thresholds in use, thresholds are still under development, or there is no threshold, respectively (see legend in **Table** 4). White cells correspond to non-applicable (N/A) combinations of species groups and available threshold methods, or lack of methods (-), to prioritise the need for further research and monitoring.

Table 4. The MSFD criteria per species group with the relevant indicators from HELCOM, OSPAR, and UNEPMAP indicators, and the HDB parameters. Fish and cephalopods are divided into non-commercially exploited (4.4-4.5) and commercially exploited (4.6) in these tables. Colours are explained in the legend below. The criteria in grey font refer to the MSFD secondary criteria for each species group.

	Thresholds agreed at the region/sub-regional scale
	HD guidance for selecting FRVs for species at the scale of national waters
	Thresholds under development, and not yet agreed at the region/sub-regional scale
	No available thresholds
	N/A

3.1 Marine Mammals

Species group 2017/848/EU	Criteria 2017/848/EU	OSPAR common indicators	HELCOM core indicators	UNEPMAP common indicators	HD parameters
Seal	D1C1 mortality rate bycatch	-	Number of drowned mammals and waterbirds in fishing gear	-	-
	D1C2 population abundance	M3 seal abundance & distribution	Population trends and abundance of seals	CI4: Population abundance of selected species (related to marine mammals)	Population
	D1C3 demographic characteristics	M5 Grey seal pup production	Reproductive status; Nutritional status of seals	CI5: Population demographic characteristics	
	D1C4 distributional range and pattern	M3 seal abu & distribution	Distribution of seals	CI3: Species distributional range - Marine Mammals	Range
	D1C5 habitat for the species	-	-	-	Habitat for the species

Cetaceans (Whale - baleen Small toothed cetaceans Deep diving toothed cetaceans)	D1C1 mortality rate bycatch	M6 Marine mammal bycatch	-	-	-
	D1C2 population abundance	M4 Cetacean Abundance and Distribution	-	CI4: Population abundance of selected species (related to marine mammals) - Marine Mammals	Population
	D1C3 demographic characteristics	-	-	CI5: Population demographic characteristics	
	D1C4 distributional range and pattern	M4 Cetacean Abundance and Distribution	-	CI3: Species distributional range - Marine Mammals	Range
	D1C5 habitat for the species	-	-	-	Habitat for the species

3.2 Birds

The Commission Decision (EU) 2017/848 states that "for birds, criteria D1C2 and D1C4 equate to the 'population size' and 'breeding distribution map and range size' criteria of Directive 2009/147/EC". This suggests that the reports of species submitted under the BD could also be used to assess each species against criteria D1C2 and DC14 under the MSFD. However, as ICES (2017) point out, the species-specific reports of population size and trends, and the distribution map and range sizes do not go far enough to assess the relevant GES criteria under the MSFD. Nevertheless, the BD reporting, and the MSFD bird assessments can certainly make use of the same data on population size and distribution, collected by the same monitoring schemes.

Species group 2017/848/EU	Criteria 2017/848/EU	OSPAR common indicators	HELCOM core indicators	UNEPMAP common indicators	BD parameters[3]
Birds	D1C1 mortality rate bycatch	B5 Marine bird bycatch	Number of drowned mammals and waterbirds in	-	-

[3] The reporting of BD parameters uses the same data as the RSC indicators, but differs because: a) it does not include an assessment against thresholds; and b) is done at a national scale and not at a regional/sub-regional scale.

			fishing gear		
	D1C2 population abundance	B1 Marine bird abundance	Abundance of waterbirds in the breeding season; Abundance of waterbirds in the wintering season	CI4: Population abundance of selected species - seabirds	Population size
	D1C3 demographic characteristics	B3 Marine Bird Breeding Success / Failure; B2 Breeding success of kittiwake	-	CI5: Population demographic characteristics - seabirds	-
	D1C4 distributional range and pattern	B6 Distribution marine birds	-	CI3: Species distributional range - seabirds	Breeding distribution map and range size
	D1C5 habitat for the species	B4 Non-native/ invasive mammal presence on island seabird colonies	-		-

3.3 Marine reptiles

Species group 2017/848/EU	Criteria 2017/848/EU	OSPAR common indicators	HELCOM core indicators	UNEPMAP common indicators	HD parameters
Reptiles	D1C1 mortality rate bycatch	-	N/A	-	-
	D1C2 population abundance	-	N/A	CI4: Population abundance of selected species – Marine Reptiles	Population
	D1C3 demographic characteristics	-	N/A	CI5: Population demographic characteristics - Marine Reptiles	
	D1C4	-	N/A	CI3: Species	Range

	distributional range and pattern			distributional range - Marine Reptiles	
	D1C5 habitat for the species	-	N/A	-	Habitat for the species

3.4 Fish (not commercially exploited)

Species group 2017/848/EU	Criteria 2017/848/EU	OSPAR common indicators	HELCOM core indicators	UNEPMAP common indicators	HD parameters
Fish (not commercially exploited)	D1C1 mortality rate bycatch	-	-	-	-
	D1C2 population abundance	FC1 Recovery in the population abundance of sensitive fish species[4]	Abundance of salmon spawners and smolt; Abundance of key coastal fish species; Abundance of sea trout spawners and parr	-	Population
	D1C3 demographic characteristics	-	-	-	
	D1C4 distributional range and pattern	-	-	-	Range
	D1C5 habitat for the species	-	-	-	Habitat for the species

3.5 Cephalopods (not commercially exploited)

The table for the cephalopods species is only relevant to the non-commercial species. In practical terms, the cephalopods in the list of Palialexis et al., (2018) are either commercial species or species with no sufficient data to describe their status, depending on the (sub)region.

Species group 2017/848/EU	Criteria 2017/848/EU	OSPAR common indicators	HELCOM core indicators	UNEPMAP common indicators	HD parameters

[4] This indicator will need to be disaggregated into individual species, thus the existing thresholds might not be applicable. The fish species assessed under the HD are included in this indicator currently. The HD species are diadromous, and so their assessments are based on info from both the freshwater and marine environment.

Cephalopods (not commercially exploited)	D1C1 mortality rate bycatch	-	N/A		-
	D1C2 population abundance	-	N/A		-
	D1C3 demographic characteristics	-	N/A		-
	D1C4 distributional range and pattern	-	N/A		-
	D1C5 habitat for the species	-	N/A		-

3.6 Commercially exploited fish & Cephalopods

Note that for commercially exploited species, D1C3 is primary. For fish not covered by Annexes II, IV, or V of the HD, the D1C4 & D1C5 criteria are secondary. The column on the right corresponds to MSFD Descriptor 3, on which the assessment of the commercially exploited fish and cephalopods is based upon.

Species group 2017/848/EU	Criteria 2017/848/EU	OSPAR common indicators	HELCOM core indicators	UNEPMAP common indicators	MSFD D3
Commercially exploited fish & Cephalopods	D1C1 mortality rate bycatch	-	-		
	D1C2 population abundance	D3C2 SSB>MSY	ICES MSY and SSB assessments		D3C2
	D1C3 demographic characteristics	D3C3 (ICES)	ICES MSY and SSB assessments		D3C3
	D1C4 distributional range and pattern	-	-		Range
	D1C5 habitat for the species	-	-		Habitat for the species

Generally, not all of the MSFD criteria are covered by the existing RSC indicators. However, relevant developments are underway in the RSCs, to cover some of these gaps and should be coordinated with the MSFD developments. The HBD partially covers species abundance and distribution range and pattern, with the main barriers to include:

a) Birds – the BD does not set thresholds, and requires reports on a national scale only;

b) Marine mammals – the HD national reporting scale is not ecologically relevant;

c) Non-commercial fish – the list of species assessed under the HD is limited to a few diadromous species, which are not representative of the regional fish communities;

d) The HD assessment and BD reporting do not address criteria D1C1 or D1C3.

However, the HBD parameters data usually coincides with the RSCs input for their indicators, which is usually species-specific, and refers to the same criteria. The major source of information for this table comes from the RSCs indicators, and from their roof reports, namely the OSPAR's Intermediate Assessment (OSPAR, 2017), the UNEPMAP Mediterranean Ecological Status Report (Barcelona Convention, 2017), and the HELCOM's State of the Baltic Sea (HELCOM, 2018h). The BSC is not included since there are no available assessments and methods for threshold setting after the MSFD starting point for assessments (2012, for most of the MS).

4 Species perspective; existing thresholds per species (marine mammals)

We extracted the assessments from the marine mammals' reported (https://bd.eionet.europa.eu/article17/reports2012/) for the HD (2007-2012) at the national and marine region level. These were compared with the species in the MSFD reference list (Palialexis et al., 2018), to estimate the extent of coverage from the HD. In total, 17 out of 40 species of marine mammals in the MSFD reference list were assessed for the HD. Six more species had at least one parameter assessed, but not complete assessments. 17 species were assessed as unknown. All species are listed in Annex 1. The HD assessments of the marine mammals per region are listed in **Table 4**.

Table 4. Marine mammal species assessed for the HD per region and status of assessment, according to HD thresholds (favourable reference values).

Atlantic	Macaronesia	Baltic	Mediterranean	Black Sea
Halichoerus grypus	*Monachus monachus*	*Halichoerus grypus*	*Physeter macrocephalus*	Delphinus delphis
Phoca vitulina	*Tursiops truncatus*	*Phoca hispida botnica*	*Ziphius cavirostris*	Phocoena phocoena
Delphinus delphis	*Balaenoptera musculus*	*Phoca vitulina*	*Monachus monachus*	
Lagenorhynchus acutus	*Megaptera novaeangliae*	*Phocoena phocoena*	*Delphinus delphis*	
Lagenorhynchus albirostris			*Orcinus orca*	
Phocoena phocoena			*Phocoena phocoena*	
Balaenoptera acutorostrata			*Tursiops truncatus*	
			Globicephala melas	
			Grampus griseus	

	Favourable
	Unfavourable-Inadequate
	Unfavourable-Bad

Most species were assessed for the same criteria (D1C2 population abundance, and D1C4 distribution) from both the MSFD and HD, verifying the hypothesis that most of the existing information in the MSFD reporting comes from monitoring programmes for the HBD requirements.

5 Possible input from MS reports 2018

The use of the HD assessments in the 2018 MSFD reporting was limited. Only three MS (Germany, Denmark, and Finland) out of seven in the Baltic Sea, and three MS out of seven in the North-East Atlantic (Germany, Denmark, and The Netherlands) clearly reported to have used the HD assessment to report for the MSFD (see **Figure 5**). Estonia and Sweden mentioned the HD assessment in the methodology elements, and 4 out of 7 in the North-East Atlantic (three MS are in both the Baltic Sea and North-East Atlantic) based their assessment on HD.

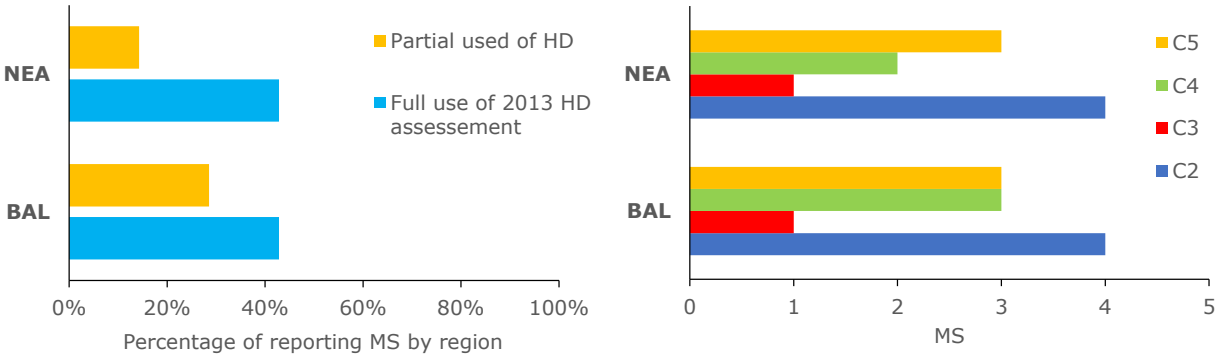

Figure 5. Percentage of HD assessment use in the 2018 cycle of MSFD assessment on Article 8 (left), and of HD assessment use in the marine mammals reporting in the 2018 MSFD by criteria (right).

It should be noted that we analysed the reported information without interpreting or making inferences based on our deep knowledge of methodological standards and assessments across regions and policies (e.g. Palialexis et al., 2014; Palialexis et al., 2019). However, we noticed inconsistencies in the way this information was reported. For instance, the HD assessments were reported as national assessments from some MS, and as RSC assessments in other cases. While some MS provided adequate information to identify the source of data and the obligation of assessment, this was not feasible or reliable for all. The reporting guidance (European Commission, 2018) encouraged MS to report regionally coordinated assessment. Indeed, some of the HD assessment requirements are regionally coordinated, but inconsistently reported in the recent MSFD reporting.

Discussion

1 Sources of assessments and threshold values; objectives and GES definition

The MSFD high-level objectives refer to sustainable human activities and uses of resources for the current and future generations. The HD focuses on the conservation status of species, similarly to the BD, which uses the International Union for Conservation of Nature (IUCN) criteria. On a first read, the MSFD sounds less conservative than the HBD. However, regarding species biological diversity, it is important to consider that the MSFD relies on the HBD for the selection of species, threshold setting, and GES assessment. To maintain the biological diversity (Descriptor 1), the MSFD is fully aligned with the HBD objectives, since the selection of the HBD species (Annex II) is made on criteria encompassing species under potential or major threat. Therefore, despite the differences in definitions of the high-level objectives for species, the ultimate objectives are similar. They all aim to safeguard the biological diversity and prioritise the populations under risk.

Despite the differences in the nomenclature of the MSFD and HBD, during the first cycle of the MSFD implementation, the two forums were working together to align these Directives. The European Commission (EC) has launched a contract to define the possible alignment of the HBD and MSFD assessments and reporting. These efforts may eventually harmonise the common processes and requirements towards an effective use of resources and coordinated measures for the marine environment.

Conclusion: For marine species, the Commission Decision (EU) 2017/848 urges the use of the HBD assessments for the species listed in their Annexes. Significant progress was made during the first cycle of the MSFD in the alignment of the assessments for the marine species. Despite the progress made in the conceptual alignment of the objectives across the Directives and the RSC, more work is needed on the technical aspect. This work contributes to the technical discussion for the capacity of the criteria and the thresholds setting methods.

Suggestions: Common monitoring programmes and data are used for the MSFD-HBD overlapping assessments of species. The harmonisation of the methods to set thresholds will allow a single, well-coordinated, assessment to effectively inform the suitability of current or new programmes of measures. The collaboration of all actors (MS, EC, EEA) could facilitate this effort.

2 Scale of assessments

The HBD deviates from the “nesting” approach and requires MS to assess species and habitats at national/biogeographical (or marine) region and EU/biogeographical (or marine) region. This should be considered when HBD parameters, thresholds and assessments are reused for the MSFD. The remarkable convergence between the MSFD and RSC assessments, as well as across them, facilitates a coherent monitoring and assessment of species status. In any case, for marine species, the assessment must be ecologically relevant to their distributional pattern/range and must reflect natural ecosystem dynamics (predator-prey relationship).

Conclusion: The HBD deviates from the highly convergent definition of scales between the MSFD and the RSC.

Suggestions: Assessment scales and reporting units should be further discussed between the HBD and MSFD communities to explore the possibilities to spatially harmonise species assessments, towards a more ecologically relevant mode.

3 Progress in methods for threshold setting for criteria and species groups

Not all of the MSFD criteria for species are sufficiently covered from the existing indicators developed from the RSC or HBD parameters. Moreover, only some of the RSC indicators, relevant to the MSFD criteria, have developed and agreed threshold values. In most cases, these indicators are species-specific, corresponding to well-studied species, with rich datasets and a long time-series (i.e. Baltic seals). The data availability and the long time-series allow for the development of dedicated methods adapted to the life history of those species and for accurate threshold setting for their status classification. On the other hand, in regions having numerous species with wide distribution, i.e. the marine mammals in the Northeast Atlantic, lack of qualitative dataset hinders the development of sophisticated methods for assessments and threshold setting. Despite the fact that some indicators are allocated to the MSFD criteria, they only cover one or a few species from the number of species that could be assessed within a certain species group. The optimal number of species per region/subdivision that should be assessed to support a robust analysis for the GES assessment at species group level is still open. Palialexis et al. (2018) list species that can potentially be assessed under each species

group, providing an overview of the MSFD requirements in terms of species. This list can also support the decision on aggregation rules. In some cases, e.g. population abundance for birds, threshold values are estimated from more than one source (the BD, and RSC indicators). Such thresholds should be compared from the perspectives of the assessments' scales and policies' objectives, to identify which fits better to the MSFD requirements.

Conclusion: The HBD covers D1C2, D1C4 and D1C5. For D1C1, there is a gap in developed thresholds. For D1C5, there is no input from the RSC. Most of the RSC indicators are species specific, developed for species, with adequate information of their life history and adequate monitoring programmes. The findings indicate the extent to which GES criteria could be assessed by RSC indicators or HD assessments. As such, we can identify the gap to the optimum number of criteria to be assessed for a robust GES assessment. The optimum number of criteria is determined by the relevant pressures that could affect the GES of each species.

Suggestions: The ongoing work of the RSC on the development of indicators, assessment methods, and thresholds, should be constantly followed. When these developments are in line with the MSFD requirements and well-coordinated at regional or EU level, they can immediately facilitate the MS reporting needs. This requires the constant communication and coordination of all stakeholders, where EC coordinates the implementation at EU-wide level. The CIS Technical Groups, and the expert networks ensure the constant flow of information and the development of policy tailor made methodological standards.

4 Existing thresholds for species; sources and comparison with the MSFD requirements

During the first cycle of the MSFD implementation, and the review of the repealed GES Decision (European Commission, 2010), significant progress was made to align the MSFD with the HBD assessments. Analogous progress was also made in aligning the two reporting obligations (DG Environment, 2017a). This analysis shows that the existing monitoring programmes and assessments under the HD do not provide data to fully assess the marine mammals in all regions. Missing data do not allow threshold values to be set, while in some cases threshold values are reported for a single parameter, but not for the minimum of the parameters needed to assess the overall status of the species. This gap should be considered for the alignment of the MSFD and HBD, but also for the update of MS' monitoring programmes.

All marine mammals are assessed in the Baltic, and two out of three are assessed in the Black Sea. For the other regions, some species with wide distribution and occurrence are assessed. Most of the species that are assessed as unknown have monitoring programmes at a frequency and spatial extent unable to generate enough data, although they are included in the HD Annexes. Furthermore, this partially reflects the different monitoring needs and challenges derived from the special characteristics of the marine regions, especially from the extent of the area under EU jurisdiction, and the number of species to be monitored and assessed per region. Most of the species were assessed for the same criteria (D1C2 population abundance, and D1C4 distribution) for the MSFD and HD. This verifies that most of the existing information comes from the HBD monitoring programmes for marine mammals, rather than from new MSFD dedicated monitoring programmes.

Conclusion: It is obvious that the sources of information, data, and species are common for both policies, despite the remaining conceptual divergences in their objectives. The basic assessments for the marine mammals include population abundance and distribution. These should be the starting points to further align the assessments across the MSFD, HD, and RSC in terms of species and methodological standards. Moreover, regional coordination and collaboration across MS is required to cover the gaps in species and criteria, at least for marine mammals with wide distributional range. This exercise is more demanding for MS with extended area under their jurisdiction.

Suggestions: Common monitoring programmes and regional coordination could further improve the quality and quantity of assessments and fill in the gaps of currently available assessments.

5 Possible input from MS reports 2018

The HD assessment was mainly used for the D1C2 criterion. Only one MS reported using the HD assessment for the secondary criterion D1C3; this MS reports for both the Baltic and the North-East Atlantic.

In the Mediterranean region, none of the four MS with available data for mammals used HD assessments. In the North-Atlantic region, two out of four MS report using the HD assessment. One Mediterranean MS made some interesting comparisons between the HD and MSFD assessments. For D1C5, they noted that the outcome of the assessment was "not assessed" for the MSFD, which is inconsistent with the HD assessment, where it was stable. They justified the inconsistency with the fact that any assessment at a local scale (HD) may not contribute to a robust assessment of status or achievement of GES for this species at a sub-regional level (MSFD). For instance, *T. truncatus* is widely distributed across this MS's MRU, and is likely to use the national waters as migratory routes; however, the status of the habitat extent, and the quality at the national level would not reflect this at the sub-regional level.

Conclusion: The number of MS which reported HD assessments for the overlapped parameters is relatively low, not fulfilling the MSFD requirement. Comparing the 2018 reporting (14 MS reports currently available) with the 2012 reporting (20 MS; Palialexis et al., 2014), less MS referred to the HD. This finding can be partially explained from the way the assessments were reported. For instance, some MS reported assessments and threshold values as national or RSC assessments, but looking further into the reports, they refer to HD assessments or thresholds. In any case, there is a lot of room for improvement towards one monitoring and assessment method for all reporting obligations. This is indeed the high-level objective of the alignment of the three Directives.

An additional outcome of the analysis of the MSFD 2018 reports for marine mammals revealed the variety in interpretations of reporting requirements by MS. Specifically, those MS that referred to the HD, didn't do so in a consistent way. Some made references to threshold values, other to relevant sources, and others to parameters. Despite the general agreement and acceptance that reusing the HD assessment would ease the ambitious MSFD reporting, this was not well reflected in the first MSFD cycle.

Suggestions: Considering the variety of ways that the HD assessments were either reused or reported for marine mammals, we need to explore how to harmonise HD input to the MSFD. The starting point should be a case-by-case analysis to identify:

- Why MS did not use HD assessments?
- What information was reported by MS that made use of HD assessments (parameter, trend, threshold value, complete assessment)?
- How this information was reported for the MSFD?
- What is the overlap between the HD species assessments, and the MSFD species?

Each of the above questions can provide good practices, and their analysis could lead to recommendations to harmonise the use and reporting of HD assessments. Moreover, regional coordination and national coordination across competent authorities could improve the exploitation of existing assessments for the MSFD, monitoring, and reporting. Eventually, the MSFD-HD policy alignment can facilitate harmonisation by providing clarification on basic concepts and their links (e.g. GES-FCS, scales of assessment, and threshold setting). The synchronisation of the reporting and assessment period can significantly facilitate a single assessment for both obligations. It should be noted that the HD provides assessments at the species level, to ensure the viability of the populations in a conservation mode, while the MSFD can build on this by introducing the assessments to a more holistic/ecosystem framework. In this framework, species status is evaluated against pressures derived from anthropogenic activities, and ultimately achieves sustainable use of the resources, avoiding reassessing HD species.

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Annexes

Annex 1. Marine mammals species assessed for HD 2012

Table 1. Marine mammal species assessed for HD 2012; the table includes the overall assessment of the species. The colour codes and assessment results are explained below the table.

Species group	Species name	Author	Common name	MATL	MBAL	MMAC	MBLS	MMED
Deep diving toothed	*Globicephala melas*	*(Traill, 1809)*	Long-finned pilot whale	MTX	N/A	MTX	N/A	MTX
Deep diving toothed	*Grampus griseus*	*(Cuvier, 1812)*	Risso's dolphin	MTX	N/A	MTX	N/A	MTX
Deep diving toothed	*Hyperoodon ampullatus*	*(Forster, 1770)*	Northern bottle-nose whale	MTX	N/A	MTX	N/A	MTX
Deep diving toothed	*Kogia breviceps*	*(Blainville, 1838)*	Pygmy sperm whale	MTX	N/A	MTX	N/A	N/A
Deep diving toothed	*Kogia simus*	*(Owen, 1866)*	Dwarf sperm whale	MTX	N/A	MTX	N/A	MTX
Deep diving toothed	*Mesoplodon bidens*	*(Sowerby, 1804)*	Sowerby's beaked whale	MTX	N/A	MTX	N/A	N/A
Deep diving toothed	*Mesoplodon densirostris*	*(de Blainville, 1817)*	Blainville's beaked whale	MTX	N/A	MTX	N/A	N/A
Deep diving toothed	*Mesoplodon europaeus*	*(Gervais, 1855)*	Gervais' beaked whale	MTX	N/A	MTX	N/A	N/A
Deep diving toothed	*Mesoplodon mirus*	*True, 1913*	True's beaked whale	MTX	N/A	MTX	N/A	N/A
Deep diving toothed	*Peponocephala electra*	*(Gray, 1846)*	Melon-headed whale	MTX	N/A	N/A	N/A	N/A
Deep diving toothed	*Physeter macrocephalus*	*Linnaeus, 1758*	Sperm whale	MTX	N/A	MTX	N/A	MTX
Deep diving	*Ziphius*	*Cuvier,*	Cuvier's beaked	MTX	N/A	MTX	N/A	MTX

toothed	*cavirostris*	*1823*	whale					
Seal	*Cystophora cristata*	*(Erxleben, 1777)*	Hooded seal	N/A	N/A	N/A	N/A	N/A
Seal	*Erignathus barbatus*	*(Erxleben, 1777)*	Bearded seal	N/A	N/A	N/A	N/A	N/A
Seal	*Halichoerus grypus*	*(Fabricius, 1791)*	Grey seal	MTX	MTX	MTX	N/A	N/A
Seal	*Monachus monachus*	*(Hermann, 1779)*	Mediterranean monk seal	N/A	N/A	MTX	N/A	MTX
Seal	*Phoca (Pagophilus) groenlandica*	*Gray, 1844*	Harp seal	N/A	N/A	N/A	N/A	N/A
Seal	Phoca hispida botnica	*Gmelin, 1788*	Ringed seal	N/A	MTX	N/A	N/A	N/A
Seal	*Phoca vitulina*	*Linnaeus, 1758*	Common or Harbour seal	MTX	MTX	MTX	N/A	N/A
Small toothed cetaceans	*Delphinapterus leucas*	*(Pallas, 1776)*	Beluga	MTX	N/A	N/A	N/A	N/A
Small toothed cetaceans	*Delphinus delphis*	*Linnaeus, 1758*	Short-beaked common dolphin	MTX	N/A	MTX	MTX	MTX
Small toothed cetaceans	*Globicephala macrorhynchus*	*Gray, 1846*	Short-finned pilot whale	MTX	N/A	MTX	N/A	MTX
Small toothed cetaceans	*Lagenodelphis hosei*	*Fraser, 1956*	Fraser's dolphin	MTX	N/A	MTX	N/A	N/A
Small toothed cetaceans	*Lagenorhynchus acutus*	*(Gray, 1828)*	Atlantic white-sided dolphin	MTX	N/A	N/A	N/A	N/A
Small toothed cetaceans	*Lagenorhynchus albirostris*	*(Gray, 1846)*	White beaked dolphin	MTX	N/A	N/A	N/A	N/A
Small toothed cetaceans	*Monodon monoceros*	*Linnaeus, 1758*	Narwhale	MTX	N/A	N/A	N/A	N/A
Small toothed cetaceans	*Orcinus orca*	*(Linnaeus, 1758)*	Killer whale	MTX	N/A	MTX	N/A	MTX

Small toothed cetaceans	*Phocoena phocoena*	*(Linnaeus, 1758)*	Harbour porpoise	MTX	MTX	MTX	MTX	MTX
Small toothed cetaceans	*Pseudorca crassidens*	*(Owen, 1846)*	False killer whale	3GD	N/A	MTX	N/A	3GD
Small toothed cetaceans	*Stenella coeruleoalba*	*(Meyen, 1833)*	Striped dolphin	MTX	N/A	MTX	N/A	MTX
Small toothed cetaceans	*Stenella frontalis*	*(G. Cuvier, 1829)*	Atlantic spotted dolphin	N/A	N/A	MTX	N/A	N/A
Small toothed cetaceans	*Steno bredanensis*	*(Cuvier in Lesson, 1828)*	Rough-toothed dolphin	N/A	N/A	MTX	N/A	MTX
Small toothed cetaceans	*Tursiops truncatus*	*(Montagu, 1821)*	Bottle-nosed dolphin	MTX	N/A	MTX	MTX	MTX
Whale - baleen	*Balaenoptera acutorostrata*	*(Lacépède, 1804)*	Minke whale	MTX	N/A	MTX	N/A	MTX
Whale - baleen	*Balaenoptera borealis*	*(Lesson, 1828)*	Sei whale	MTX	N/A	MTX	N/A	N/A
Whale - baleen	*Balaenoptera edeni*	*Anderson, 1878*	Bryde's whale	N/A	N/A	MTX	N/A	N/A
Whale - baleen	*Balaenoptera musculus*	*(Linnaeus, 1758)*	Blue whale	MTX	N/A	MTX	N/A	N/A
Whale - baleen	*Balaenoptera physalus*	*(Linnaeus, 1758)*	Fin whale	MTX	N/A	MTX	N/A	MTX
Whale - baleen	*Eubalaena glacialis*	*(Müller, 1776)*	Northern right whale	MTX	N/A	MTX	N/A	N/A
Whale - baleen	*Megaptera novaeangliae*	*(Borowski, 1781)*	Humpback whale	MTX	N/A	MTX	N/A	MTX

	Favourable
	Unfavourable-Inadequate

MTX	MTX: Overall conclusion assessed from assessments using methods 1 or 2 of the 4 parameters, using the last row of the evaluation matrix (only used for overall Conservation Status) (ETC/BD, 2014)
3GD	Overall conclusion weighted by area of distribution from GIS data (ETC/BD, 2014)

	Unfavourable-Bad		N/A	Not available
	Unknown			

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KI-NA-30260-EN-N

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doi:10.2760/581087

ISBN 978-92-76-19634-1