Baltic Marine Environment Protection Commission

Project for the development of the second holistic assessment of the Baltic Sea

HOLAS II 1-2014

Helsinki, Finland, 16-17 December 2014

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Code	3-3
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Background

The 2nd HELCOM holistic assessment should be developed so that it can serve as a regional "roof report" that can be used by Contracting Parties also being EU Member States as part of the reporting obligations under MSFD Articles 8, 9 and 10 in 2018. Article 9 (Determination of Good Environmental Status) requires consideration of common criteria and methodological standards. The current Commission decision on criteria and methodological standards on good environmental status of marine waters (2010/477/EU) is being reviewed with the possibility of revision. The review is linked to the review of MSFD Annex III.

This document contains a draft MSFD CIS document (GES_12-2014-03) distributed at the WG-GES meeting held 20-21 October 2014. It provides guidance and addresses cross-cutting issues in the review of Annex III and the Commission decision. It furthermore addresses integrated approaches for assessments. The document will be updated by January 2015.

Action required

The Meeting is invited to

- take note of the document and the ongoing review of the Commission decision 2010/477/EU.

Marine Strategy Framework Directive (MSFD)

Common Implementation Strategy

12th meeting of the Working Group on Good Environmental Status (WG GES)

20 October 2014, 11.00-18:00

21 October 2014, 9.00-17:00

Maison des Associations Internationales (MAI), Rue Washington 40, B-1050 Brussels

Agenda Item:	6a
Document:	**GES_12-2014-03**
Title:	**Review of the GES Decision 2010/477/EU and MSFD Annex III – cross-cutting issues**
Prepared by:	DG Environment
Date prepared:	07/10/2014
Background	This document has been prepared to provide overarching guidance for the review of Decision 2010/477/EU and of MSFD Annex III, in particular to address cross-cutting issues of relevance to the technical reviews being led by JRC and ICES. The document draws upon the Common Understanding document on MSFD Articles 8, 9 and 10 and the recent work of the GES Drafting Group to update it. This document provides a Commission perspective for the purposes of the review. It may need updating to take account of progress made in the review, such that it remains part of a package of documents which guide forward implementation of the MSFD, particularly Articles 8, 9 and 10.

The WG GES is invited to:

a. Note this document and its links to the Decision review process and the Common Understanding of MSFD Art. 8, 9, and 10 document;

b. Comment in particular on:

   i. The architecture described for determining GES (section 3.1)

   ii. The Understanding of key terms (section 3

   iii. The initial considerations on integrated approaches to assessment (section 4)

   iv. The linkages to other EU legislation (section 6)

Review of the GES Decision 2010/477/EU and MSFD Annex III

Cross-cutting issues

(Version 1.0: 07/10/2014)

1. INTRODUCTION

The review and possible revision of the Commission Decision on criteria and methodological standards on good environmental status of marine waters (GES Decision 2010/477/EU) and of MSFD Annex III was discussed at the MSFD Committee meetings in February and November 2013 and a mandate for the review was agreed (see documents Committee/6/2013/3 and Committee/7/2013/3rev). Since then, the technical phase of the review has been organised by the JRC and ICES and discussed with WG GES in March 2014 and with MSCG in May 2014. A "manual" was prepared which aimed to structure the assessment of the different descriptors in a similar, consistent and coherent way (GES_11-2014-04 with revisions).

2. OBJECTIVES OF THE REVIEW

The review of the Decision will be one element of a package, together with technical clarifications on the application of the Decision, and the further development of the November 2011 version of the Common Understanding of MSFD Art. 8, 9 and 10, to help overcome shortcomings identified by the Commission's Article 12 assessment and prepare for the next cycle of reporting in 2018. The review of the Decision is taking place in conjunction with a review of MSFD Annex III and should clarify their roles and inter-relationships (see Figure 2).

It is useful to agree at the outset on the purpose and objective of the revision. Preliminary findings of the Commission's Article 12 assessment indicated that Member States have implemented the provisions of Article 9 “Determination of good environmental status” in a very different way and that one of the overriding objectives of the MSFD, namely the comparability and coherence of the determination and assessment of GES, has not been achieved to date. This consequently does not lead to an effective and coherent approach to achieving the objectives of the Directive. Furthermore, the current Decision does not make communication of what is GES an easy task. Finally, there have been significant developments and advances on methods or approaches for certain descriptors since the Decision was adopted in 2010.

The review exercise has the following objective:

“The review and possible revision of the GES Decision shall aim at a clearer, simpler, more concise, more coherent and comparable set of GES criteria and methodological standards. The review shall propose, in accordance with Article 3(5), an EU-wide and, where relevant for certain descriptors, a marine region-specific set of criteria and methodological standards, incorporating the available work of the Regional Sea Conventions (RSCs) where appropriate. It shall also propose options to clarify and harmonise terminology and, by amending, if necessary, MSFD Annex III, aim to ensure greater consistency between MSFD Annex I and Annex III as well as propose elements of methods for assessment and monitoring (and methodological standards) which, in accordance with Article 11(4), are not yet covered and can help improve coherence and comparability. Finally, it shall ensure that existing criteria set out in relevant EU legislation are incorporated and, where appropriate, rules or guidance for monitoring and assessment are proposed in order to further improve consistency and streamlining between different pieces of EU legislation, including the Water Framework Directive, Birds and Habitats Directives and Common Fisheries Policy. All of this shall be based on the latest available science and, where a scientific foundation is not fully available, the precautionary principle. Finally, it shall aim at being the basis for the revision of the national/regional GES determinations and environmental targets and the assessment of current environmental status in 2018.”

In operational terms, this means that a revised GES Decision, together with a revised MSFD Annex III, should be:

- Simpler;
- Clearer;
- Introducing minimum requirements (to be enhanced by regions and MS, if necessary);
- Self-explanatory;
- Coherent with other EU legislation;
- Coherent with regional assessment methods (where EU methods do not exist);
- Including a clear and minimum list of elements and/or parameters per descriptor (e.g. specified lists of contaminants, species, litter types, etc.).

The revised Decision and MSFD Annex III should be accompanied by a clearer common understanding guidance document. The linking of EU, regional and national elements for determining GES is illustrated in Figure 1.

Figure 1: The GES Decision review should enable a clearer distinction between minimum specifications (or requirements) that are laid down at EU level, regional specifications which ensure the necessary level of regional coherence and national specifications which allow for the necessary flexibility. These three levels have to be linked in a clear way.

3. COMMON UNDERSTANDING OF KEY TERMS

A revised Decision and MSFD Annex III should also be based on a clearer common understanding on the implementation of, in particular, MSFD Articles 8, 9 and 10. This requires close coordination of this exercise with the parallel discussions on the revision of the Common Understanding (CU) guidance document for Articles 8, 9 and 10 which is being discussed by the WG GES. Without prejudice to the further discussions and agreements on this CU document, DG Environment proposes to base the current descriptor-level reviews of the GES Decision on the following definitions and understandings of particular terms in the Directive. This should allow for a validation and broader discussion with the various experts and a feedback from the expert discussions to the WG GES on how these definitions work in different circumstances (e.g. across the eleven descriptors).

3.1. Good environmental status

GES is defined in MSFD Art. 3(5) and further elaborated by the descriptors in MSFD Annex I. GES is further determined through the provisions of MSFD Art. 9. This is based firstly on EU-level criteria and methodological standards which are set out in accordance with MSFD Art. 9(3), and secondly by Member States as characteristics of GES in accordance with MSFD Art. 9(1). This second task is done in collaboration with other Member States in order to ensure GES is determined at the level of the marine region or subregion in accordance with MSFD Art. 3(5), i.e. that GES is determined consistently across each region or subregion. Ecosystem differences may, however, lead to GES determinations being different between regions and subregions, reflecting for example, the differing ranges of species present and different environmental conditions such as water clarity and sea temperature.

The determination of GES is thus progressively refined from its high-level definition in Art. 3(5) through to the (sub)regionally-specific determinations of Art. 9(1), via the Descriptors of Annex I, the elements of Annex III and their properties (parameters) and the criteria and methodological standards of Art. 9(3). This is illustrated, with a worked example, in Figure 2.

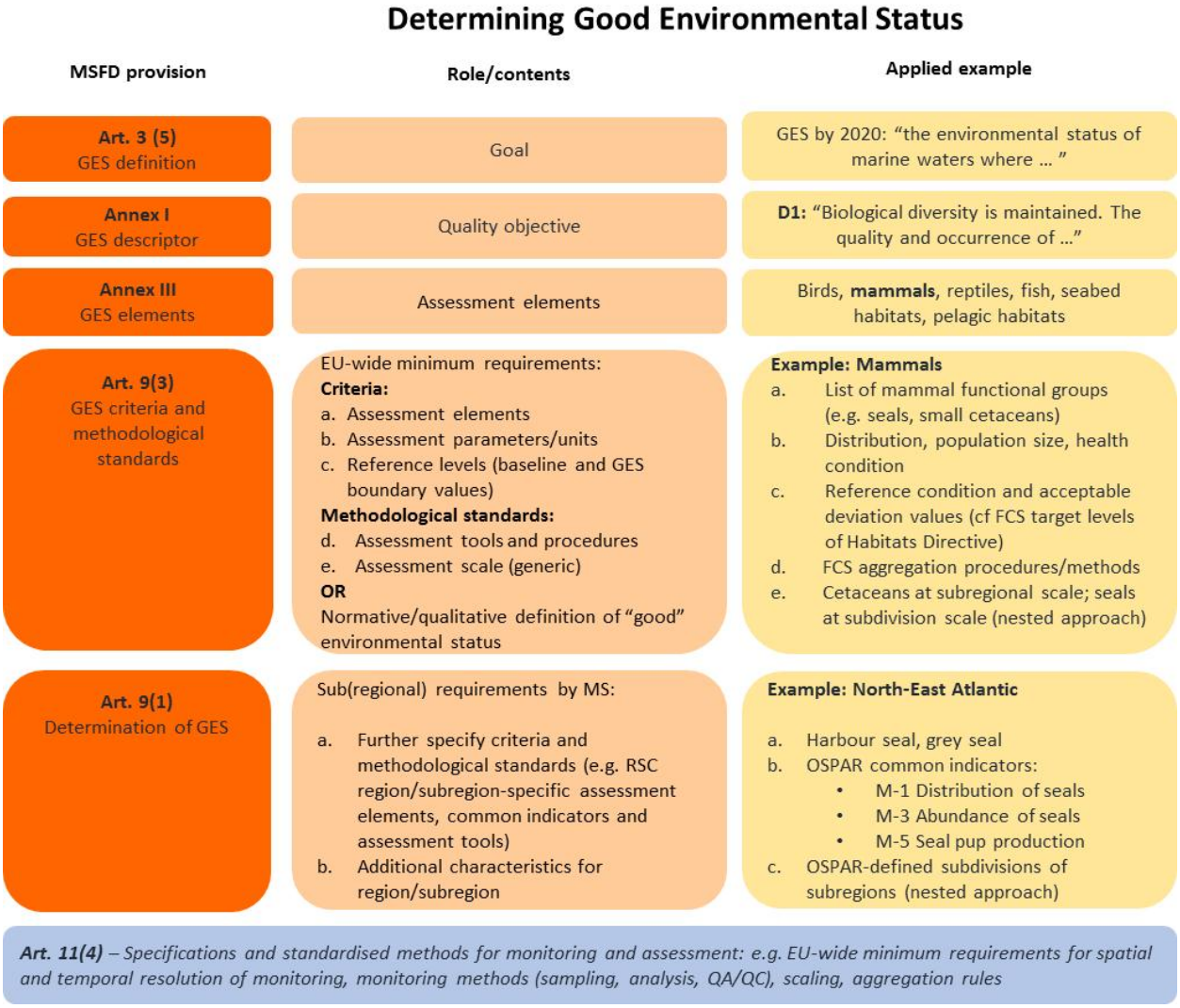

***Figure 2**: Relationship of MSFD provisions for determining GES. The specificity of the requirements increase from Art. 3(5) through to Art. 9(1) MSFD. The generic role outlined in the central column is applied and worked through with an example for Descriptor 1 and the element "Mammals" in the right-hand column.*

The determination of GES concerns the desired state of the environment and its components, functions and processes. It does not include defining the levels of pressures emanating from human activities (i.e. at their source), which should be expressed as environmental targets under Art. 10 MSFD, but can include defining the levels of these pressures in the marine environment which are compatible with the desired environmental state, or which are set on a precautionary basis where causal links to state are not yet known.

It may not be possible in all cases to determine GES in relation to state in a quantifiable way. Where this is the case, different options can be used as proxies, such as quantifying the impacts from the pressures, i.e. by describing what is considered not good status, or by determining a desired level of a pressure in the environment which is considered will lead to an improved and eventually the desired state. Use of such proxies can bridge the time whilst the knowledge gaps for determining the desired state of the marine environment or its components (i.e. what is GES) are closed.

From this overview given in Figure 2 it can be seen that some aspects of GES determinations are laid down in the Directive and in the Decision, respectively, whereas further specifications may still be needed and are determined at regional and national level. It will be important to set out the integrated approach at EU and regional level to the necessary level of detail so that it can be applied in a consistent, coherent and adequate way in line with the MSFD requirements. This would thus fulfil the requirement of the directive in Art. 3(5)) that GES is determined at the level of the marine region or subregion.

3.2. Criteria and methodological standards

MSFD Art. 9(3) vests the EU Commission with delegated powers to lay down criteria and methodological standards to be used by EU Member States to ensure consistency and to allow for comparison between marine regions or subregions of the extent to which good environmental status is being achieved.

MSFD Art. 3(6) defines ‘criteria’ as '*distinctive technical features that are closely linked to qualitative descriptors'.* To fulfill their role criteria need to include the quality elements, parameters and associated reference levels (baseline and GES boundary values) that are to be used to assess whether the environmental status is ‘good’ or not. Therefore, criteria cannot be less distinctive than the descriptors given in Annex I and they should enable assessment of the status of the elements in Annex III. Monitoring and assessment in relation to criteria should follow the specifications and standardized methods set in accordance with MSFD Art. 11(4).

Methodological standards are understood as being the agreed and established scientific or technical methods for assessing and classifying environmental status. Methodological standards can include, for example, assessment tools or methods for aggregation / integration across assessment parameters, assessment elements (e.g. across contaminants, species, habitats), criteria or even descriptors, and methods or approaches to defining assessment scales. Examples of such assessment methods could be the HEAT (HELCOM) and COMP (OSPAR) tools/assessment methods for eutrophication, and the methodology for integrating Favourable Conservation Status criteria under the Habitats Directive.

3.3. GES boundary

'GES boundary’ is not a term used by the MSFD, but is introduced here in the context of determining GES and the need to determine, in a quantified / quantifiable way, whether the elements assessed for each descriptor are in good environmental status or not.

This 'boundary' between the two classes (in GES/not in GES) could thus be a value or values for specific parameters of a quality element for a descriptor. Technically this can be expressed in different ways, e.g. as a value that must be reached or exceeded (such as for habitat extent), as a value that must not be exceeded (such as for contaminant levels) or as a range with upper and lower

values that must not be exceeded (such as population size). For each of these there can be a margin of variance, depending on the parameter concerned, natural variability and other factors. These GES boundaries need to be set by reference to a baseline (see section 7 concerning general approaches to this).

In addition to the notion of determining boundaries for specific quality elements and parameters (as is being done with the scientific indicators being developed by the Regional Sea Conventions), the concept of a GES boundary needs also to be applied where quality elements (e.g. species, habitats, contaminants) and criteria (e.g. habitat extent and habitat condition) are aggregated, for example, up to descriptor level.

The current degree of scientific knowledge and understanding varies across the descriptors, affecting considerably the ability to define clear GES boundaries for all descriptors and in all regions (Figure 3). When it is not feasible to define a GES boundary, for example due to a lack of sufficient knowledge at present, the precautionary principle should apply (see section 3.4). Increased scientific knowledge and understanding should lead to progressively more quantifiable determinations of the GES boundary for all descriptors.

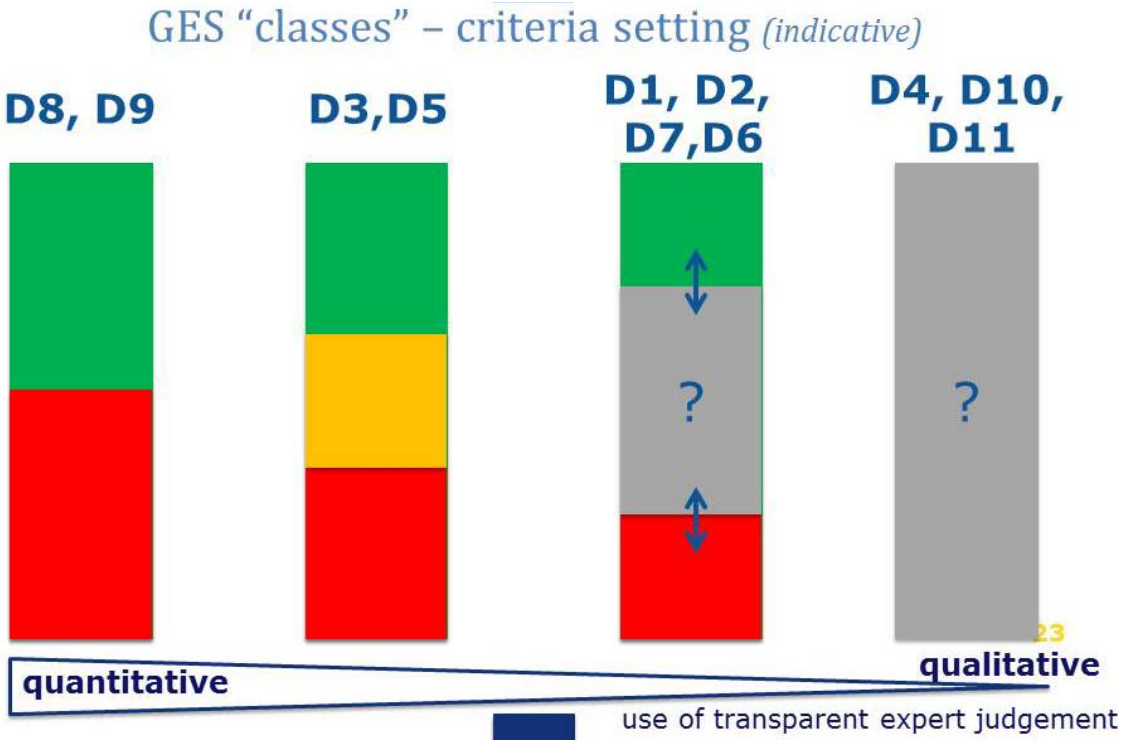

***Figure 3**: The current ability to define what is GES (green) and what is not GES (red) varies by descriptor, leading to a gradation from fully quantitative approaches to more qualitative approaches at present. The orange represents a more broadly-determined GES boundary, whilst the grey indicates a boundary cannot be set at present (from presentation 2a to 9th meeting of WG GES, 5-6 March 2013, Brussels).*

Lastly, but importantly, the setting of a GES boundary needs to respect the dynamic nature of ecosystems and their components, which can change in space and time through climatic variation, predator-prey interactions and other factors, and should thus be set in a way which accommodates these dynamics.

The six-year updating cycle for the determination of GES, provided in MSFD Art. 17, is one mechanism to adjust these GES boundaries to accommodate increased scientific understanding and reflect any long-term ecosystem changes, if appropriate.

3.4. GES and the precautionary principle[1]

Quantifying GES needs to be built incrementally in relation to a relevant set of characteristics for a marine region (MSFD Art. 9(1)). Shifting from a qualitative approach to a quantitative boundary between GES and non-GES faces a number of challenges such as lack of methodologies, data, knowledge and other uncertainty. Yet, the MSFD provides only two status classes (in GES or not in GES). Cases of uncertainty must be resolved within this two-class system, as there is no third class such as "potentially not in GES" for cases where a firm quantitative boundary cannot be set or assessed e.g. due to increased uncertainties the closer one gets to the GES boundary.

In a number of cases it will not be possible to identify a status which is clearly within or clearly outside GES. Where, based on the current best available knowledge, interim boundaries or proxies can be determined, the environmental state within the range is to be classed as not GES. Where proxies and interim boundaries cannot be determined, classification needs to rely on qualitative description and expert judgement. According to the precautionary principle, uncertainty of classification must not be used for postponing action. Resulting actions will depend on the shortcomings in the individual case. Actions include at least those to address the shortcomings, e.g. through improved methods, more monitoring, complementary research, as well as proportionate measures (e.g. "no regret" measures), with a view to shifting to a quantitative approach to determining a GES boundary.

3.5. Elements, components, features, factors, properties, characteristics

The terms elements, components, features, factors, properties and characteristics are used a number of times in the MSFD, particularly but not exclusively, in relation to determining GES. A detailed analysis of their use in the Directive is provided in Annex 1.

The directive does not provide specific definitions for these terms, and they are used inconsistently and sometimes interchangeably throughout the directive. Additionally, the interpretations given in Annex I are based on the English version of the Directive; other language versions do not always use the same terms or translate the terms consistently. Consequently, for practical implementation purposes, it is proposed to use the following terms in relation to determining GES and associated assessments:

a. Elements – refers to the ecosystem components/features and pressures to be used in assessments under Art. 8 and determinations of GES under Art. 9. Indicative lists of elements are provided in MSFD Annex III.

b. Parameters – these are specific properties or attributes of an element which can be measured and thus used in an assessment of environmental status.

The elements and their parameters can be used to determine the characteristics of GES of marine waters for a particular (sub)region, in the sense of Art. 9(1).

3.6. Environmental targets

MSFD Art. 3(7) defines 'environmental target' as '*a qualitative or quantitative statement on the desired condition of the different components of, and pressures and impacts on, marine waters in respect of each marine region or subregion. Environmental targets are established in accordance with Article 10*'. MSFD Art. 10(1) states that Member States shall establish '*a comprehensive set (…) so as to guide progress towards achieving good environmental status in the marine environment, taking into account the indicative list of pressures and impacts set out in Table 2 of Annex III, and of characteristics set out in Annex IV*'.

[1] EU Commission Communication COM(2000)1final

The main purpose of environmental targets is to guide progress towards achieving or maintaining GES. MSFD Art. 3(7) makes reference to pressures and impacts on marine waters and MSFD Art. 10(1) makes explicit reference to the pressures and impacts in Table 2 of MSFD Annex III for setting targets. According to MSFD Art. 13(1) measures shall be devised by reference to the environmental targets. In these three references it can be deduced that the key focus of targets should be on pressures, as these can be managed (reduced) via measures in order to lead to reduced environmental impacts and consequently to the achievement of GES. Targets should thus provide an operational tool, in conjunction with the programme of measures adopted under MSFD Art. 13, for adaptive management of human activities and for actions to improve the state of marine waters (e.g. targets to reduce the spatial extent or intensity of a pressure). The aim should be to define a set of targets which collectively will reduce the pressures to levels that are considered will lead to GES being achieved (i.e. the ecosystem can recover or be restored to the desired state).

According to MSFD Annex IV(2), targets can also be an expression of state ('desired conditions'); this type of target should not be used as an alternative to defining GES under Article 9, as in legal terms the two articles have different functions. However, such state-based targets may be appropriate for setting interim targets, for example, defining a target for oxygen levels in relation to eutrophication which are below the levels considered to equate to GES.

3.7. Indicators

The term ‘indicator‘ is an established term which is used in different ways. In general, ‘indicators‘ are understood as a scientific or technical assessment tool. An indicator aims to represent a certain situation or aspect and to simplify a complex reality. The following text is meant to clarify the different uses and meanings but not to change the established uses of the term.

For MSFD legal purposes, the term ‘indicator‘ refers only to their use in association with environmental targets (MSFD Art. 10), where they are used to monitor progress and guide management decisions with a view to achieving these targets (MSFD Annex IV(7)).

For the purposes of assessing environmental status in relation to GES, the Decision 2010/477/EU on criteria and methodological standards refers to ‘indicators’ which further specify the criteria and support their assessment. This use of the term ‘indicator‘ has proved to cause confusion with its use under MSFD Art. 10. Such confusion should be avoided in any revision of the Decision.

Under MSFD Art. 9(1), the determination of GES can be achieved by reference to scientifically-based indicators which provide a means to assess whether GES has been achieved or not (e.g. referring to quality elements and parameters which are specific to a (sub)region). The development of common or core indicators by the Regional Sea Conventions fulfills this role.

When the term ‘indicator‘ is used, it should be clarified whether this is a ‘target indicator‘ in the meaning of MSFD Art. 10 or a scientific ‘GES indicator‘ in the meaning of criteria and methodological standards according to MSFD Art. 9(3) (EU-wide) or determined under MSFD Art. 9(1) ((sub)regionally or nationally specific). Indicators may also be set up specifically for monitoring and assessing progress on and effectiveness of programmes of measures under MSFD Art. 13 (‘measure indicator‘).[2]

3.8. Reference points

In the indicative list of characteristics to be taken into account for setting environmental targets, MSFD Annex IV(8) refers to, where appropriate, specification of reference points (target and limit

[2] Cf. EU MSFD CIS Guidance “Programmes of measures under MSFD – Recommendations for establishment / implementation and related reporting” (Status 27 May 2014).

reference points). This relates to setting values, which are to be achieved or not exceeded respectively, in order to bring a pressure or impact to a level that achieves the environmental target.

3.9. Specifications and standardised methods

MSFD Art. 11(4) vests the EU Commission with delegated powers to adopt *'specifications and standardised methods for monitoring and assessment which …. ensure comparability between monitoring and assessment results'*. 'Specifications' are understood to relate to minimum requirements for the design of monitoring (e.g. minimum frequency, spatial resolution). 'Standardised methods' are understood to relate to:

a. methods for monitoring which aim at ensuring comparability of monitoring results., including for the collection of data needed for assessments, data quality requirements and suitable ways of taking these measurements or samples, This includes agreed international standards (e.g. CEN/ISO standards) for monitoring, including quality assurance and control, statistical uncertainties and agreed use of Quality Control mechanisms (e.g. QUASIMEME, BEQUALM).

b. methods for assessment, which aim at ensuring comparability of assessment results, including agreed rules for spatial and temporal aggregation of monitoring data within an assessment area.

4. INTEGRATED APPROACHES FOR ASSESSMENTS: STATE-BASED AND PRESSURE-BASED DESCRIPTORS

The review of the GES Decision allows for developing a more integrated approach to the determination of GES and consequently to assessments of whether GES has been achieved. Such an approach would combine the biodiversity- or ecosystem-related descriptors through an integrated set of criteria which define an "ecosystem GES"; this would overcome some of the current problems of overlap between descriptors (e.g. seabed habitats under D1 and sea-floor integrity under D6), whilst noting that it may not be possible to eliminate all overlaps (e.g. between D5 and D1/6).

The conceptual approach to integrating certain descriptors is illustrated with Figure 4. The descriptors 1 (biodiversity), 4 (food webs) and 6 (sea-floor integrity) would be combined, possibly with parts of other descriptors which aim at assessing similar features of the ecosystem (e.g. parts of descriptor 3 which assesses the health of commercially-exploited fish and shellfish species and other descriptors which address the state (impacts) of parts of the ecosystem).

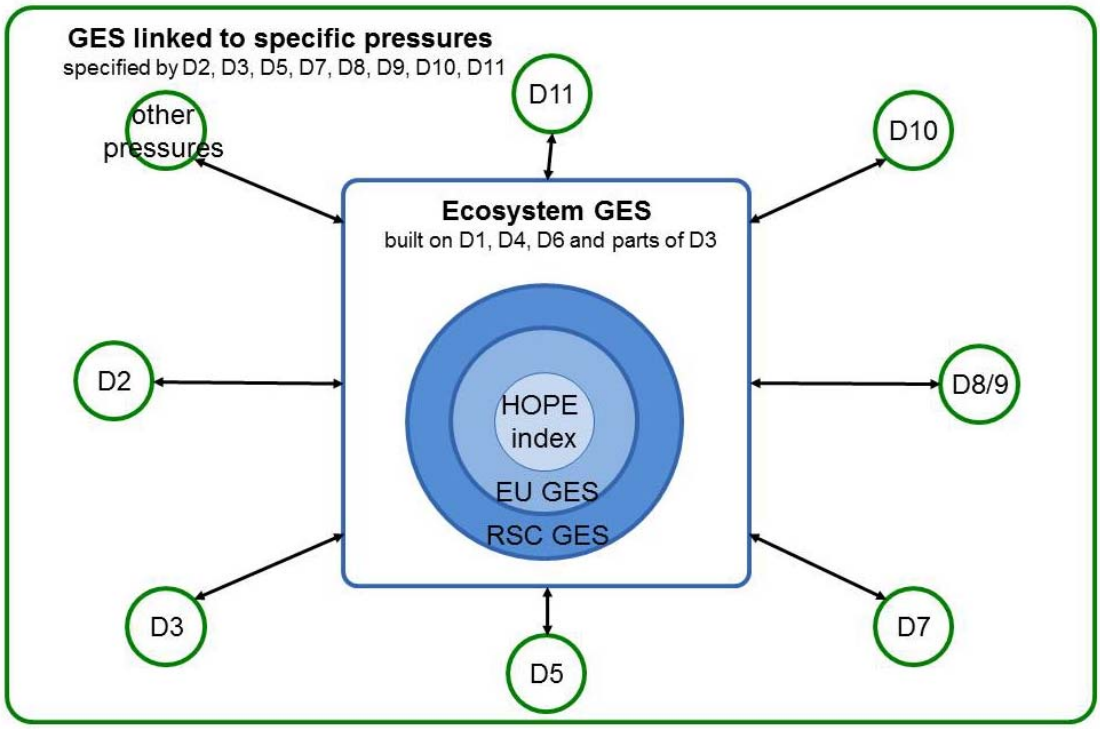

***Figure 4**: Proposed integrated approach which joins up the descriptors defining biodiversity components and thereby the "ecosystem health" and the other descriptors which are directly linked to a particular pressure ("pressure-based" descriptors). The HOPE index ("healthy oceans, productive ecosystems") will be developed on the basis of this integrated approach.*

In concrete terms, the combination of relevant descriptors and criteria is outlined in Table 1 and should be specified in the revised GES Decision.

***Table 1**: Outline approach to integration of descriptors and elements to be determined in a revised Decision, following the proposed role for Decision criteria and methodological standards given in Figure 2. Note: the table is not fully developed and needs expansion plus discussion of these initial proposals.*

Descriptors	Element	Decision	Content
D1, 3, 4	Species	Criteria: assessment elements	Combined list of species for the mobile species groups (birds, mammal, reptiles, fish, cephalopods) and relevant benthic species (e.g. commercial shellfish): • Listed species (Habitats and Birds Directives, International conventions) • Commercial species • 'Indicator' species of functional groups for D1/D4 (e.g. large fish/predators) – regionally specific
		Criteria: assessment parameters	**Criterion 1:** Distribution (area covered by the species, including overall range) 1.1 **Criterion 2:** Population size (population abundance and/or biomass, as appropriate). Includes SSB (3.2.1), 1.2, 3.2, 4.1, 4.3 **Criterion 3:** Population condition (demographic characteristics e.g. body size or age class structure, sex ratio, fecundity rates, survival/mortality rates). Includes 1.3, 3.3

Descriptors	Element	Decision	Content
			Criterion 4: Habitat of the species Criteria equated to Favourable Conservation Status **(**FCS) criteria and those for fish stock assessments.
		Criteria: reference levels (baseline/ GES boundary)	**Harmonised with FCS boundary values**: needs refinement of boundaries to accommodate marine/MSFD aspects and some level of association with fish stock assessments developed (i.e. relationship of MSY and SSB levels to the FCS population size criterion)
		Methodological standards: tools/procedures	**Harmonised with FCS**: joint methodological development for marine species with the Habitats Directive will be needed. **Aggregation rules for criteria are defined:** is "ONE-OUT-ALL-OUT" appropriate?
		Methodological standards: assessment scales	Appropriate ecosystem-based scales (e.g. use of HELCOM sub-basins and OSPAR's North Sea biodiversity proposal): if possible, a limited number of assessment areas/scales would be used per (sub)region to accommodate all species, preferably combining these with areas used for habitat assessments.
		Presentation of results	% of species on the pre-defined list per assessment area or (sub)region which are in GES (= FCS)
D1, D6, (D7)	Habitats	Criteria: assessment elements	Combined list of habitats: • Listed habitats (Habitats Directive, International conventions) • Predominent habitats (2012 list to be reviewed)
		Criteria: assessment parameters	**Criterion 1:** Habitat extent – incorporates 1.4, 1.5 **Criterion 2:** Habitat condition (biotic characteristics – species composition/abundance, abiotic characteristics) 1.6, 6.1, 6.2 Criteria equated to FCS and Red List criteria.
		Criteria: reference levels (baseline/ GES boundary)	Extent: harmonised with FCS boundary values (needs refinement of boundaries to accommodate marine/MSFD). Condition: harmonized with WFD (but adapted for offshore/different pressures).
		Methodological standards: tools/procedures	**Harmonised with FCS**: joint methodological development for marine habitats with the Habitats Directive will be needed. A**ggregation rules for criteria are defined:** is "ONE-OUT-ALL-OUT" appropriate?
		Methodological standards: assessment scales	Appropriate ecosystem-based scales (e.g. use of HELCOM sub-basins and OSPAR's North Sea biodiversity proposal): if possible, a limited number of assessment areas/scales would be used per (sub)region to accommodate all habitat types, preferably combining these with areas used for species assessments.
		Presentation of results	% of habitat types on the pre-defined list per assessment area or (sub)region which are in GES (= FCS)
D1, D4	Species group/ functional group level assessments	Criteria: assessment elements	Functional groups of birds, mammal, reptiles, fish, cephalopods (2012 list, to be reviewed)
		Criteria: assessment parameters	**Criterion:** Community condition (species composition/abundance); 4.1, 4.3 for specified groups, 4.2 Similar concept to habitats – does the functional group have its typical species for the (sub)region and in a relatively natural balance of abundances?

Descriptors	Element	Decision	Content
			Guidance on use of 'indicator' species to represent functional groups (perhaps as alternative to 'community' assessment) is needed.
D1, D4	Ecosystems, including food webs	Criteria: assessment parameters	**Criterion:** Ecosystem structure and function (e.g. balance of species/functional groups/habitats in subregion/sub-basin) 1.7, 4.2 Needs development!
Rest of table needs completion:			
D2, D5, D8/9, D10, D11	Pressure-based descriptors	Criteria	Each descriptor needs a pressure-based criterion to define level of pressure in environment (which is compatible with acceptable levels of impact and the ecosystem-based descriptors) Each descriptor needs an impact-based criterion to define acceptable levels of impact (which is compatible with the ecosystem-based descriptors) Where there is insufficient knowledge at present to define precise levels for GES, precautionary levels could be used on an interim basis. The assessments should, where possible, directly contribute to assessments of the state-based descriptors, particularly by addressing the same ecosystem elements at the same scales. For example, the assessment of the level of impact of nutrient enrichment under D5 (e.g. oxygen depletion zones) should contribute to the assessment of the extent of damage to each habitat type.
D2	Non-indigenous species	Criteria: assessment elements	List of marine species in new IAS Regulation + identification of additional list of species per marine (sub)region
D5	Eutrophication	Criteria: assessment elements	N, P, Chl a , Oxygen, ?water clarity, ?phytoplankton, ?benthos
		Methodological standards: tools/procedures	GES (Coastal waters) = WFD GEcS (phytoplankton + macroalgae and angiosperms) + identification of additional physico-chemical parameters per marine (sub)region GES (offshore) – build upon RSC approaches (comparable with WFD)
D7	Hydrographical changes		
D8, D9	Contaminants	Criteria: assessment elements	WFD priority substances + region-specific substances for offshore (mainly measured in biota and sediment)
		Criteria: reference levels	EQS, EAC (clarify relationship)
		Methodological standards: tools/procedures	GES in Coastal/Territorial waters = WFD GChS (priority chemicals - mainly biota) + WFD GEcS (river-specific substances, mainly sediment) - to be developed) GES (offshore) – build upon RSC approaches (comparable with WFD)
D10	Litter		
D11	Energy, incl. underwater noise		

The inclusion of species and habitats on policy instruments, including the Habitats and Birds Directives and those on international agreements, is typically as a consequence of their being in poor status and thus in need of protection. In principal this would suggest that each was not in GES when listed. Their assessment under MSFD can thus be seen as a contribution to assessing GES for biodiversity, and actions to improving their status seen as part of achieving GES. Many of these

species and habitats are rare and data concerning their status can be scarce; in this context, full application of the criteria in Table 2 may be challenging, especially where their scarcity means monitoring is not fully practical. In such cases, consideration of risk is important, such that focus is on criteria that are considered most at risk from anthropogenic pressures (e.g. focus on incidental catches from fisheries, whilst giving limited consideration to other criteria if there is no or limited risk to them failing the criteria). Such approaches are necessary to support ongoing assessments within the above framework.

It will be necessary to develop these elements further and discuss them in the JRC/ICES descriptor groups and in WG GES. Once the overall approach has been laid down, a specific meeting/workshop could address any outstanding issues and make a proposal for an integrated approach.

5. SCALES AND AGGREGATION

It has long been clear that the assessment of GES will require choices as regards scale (for assessments) and aggregation (e.g. of monitoring data or between indicators and criteria). Some progress on these issues has been made by Member States and in the regions for the 2012 reporting round, but the Commission's Article 12 assessment found that the approaches, if they are clearly mentioned, are very different between countries and therefore lead to a marked lack of coherence in the implementation. The recent report by Deltares[3] has given a good overview of the key questions that need to be addressed, provided examples and gives advantages and disadvantages for the different approaches. It is now possible to take this work and the work at regional and national levels to make a number of arrangements at EU level to ensure a minimum level of consistency and coherence in the assessment approaches when it comes to scales and aggregation rules. Note that the Commission has the mandate to introduce such minimum requirements into the GES Decision (in particular on the basis of Article 11(4)).

Before addressing the solutions, some principle requirements need to be discussed and further developed, in particular:

a. Defining scales and areas for assessment of environmental status – regions, subregions and subdivisions (required for the different assessment elements – species, habitats, pressures; need to accommodate ecosystem-based scales and practical assessment needs; need to relate these scales/areas to monitoring data – rules for aggregation of samples);

b. Developing suitable mapping/dissemination tools to show the environmental status of the different descriptors across EU waters (use of nested scale systems, such as HELCOM's, for the different descriptors, accommodating state and pressure aspects to provide a reference layer for information management at EU level; display of assessment outcomes via a grid-based approach to accommodate different scales for different descriptors);

c. Linking the scales of assessment to management issues (the management of pressures via measures, the assessment of cumulative impacts on ecosystem components and its links to decision-making processes for licencing new developments).

It is clear from the Directive that GES must be determined at a (sub)regional scale (Article 3(5)). However, this does not imply that GES must be assessed at this scale or that GES must be met at every local point within the (sub)region. The Directive refers to '*restore marine ecosystems in areas where they have been adversely affected*' (Article 1(1a)); this acknowledges that environmental status can vary across a (sub)region; and that areas that are not in GES at present should be restored

[3] Prins, T.C., Borja, A., Simboura, N., Tsanagaris, C., Van der Meulen, M.D., Boon, A.R., Menchaca, I., & Gilbert, A.J. 2014 in prep. Coherent scales and aggregation rules for environmental status assessment with the Marine Strategy Framework Directive. Towards a draft guidance. Deltares/AZTI/HCMR, Report 1207879-000-ZKS-0014 to the European Commission, Delft, 47pp.

to GES (by 2020). Consequently, the scaling and aggregation rules must not hide where there are areas of environmental degradation (i.e. that an area of high degradation is not averaged against an area of low degradation to hide the degradation).

As a starting point, the "nested approach" (as developed and applied in HELCOM) should be introduced to all marine regions. In addition, it would still need an agreement on the smallest entity for assessment (which could be a grid cell). This may well vary between descriptors but pragmatic approaches are needed which allow assessment and management at all levels. It is probably best to start developing these questions on the basis of concrete examples. For eutrophication, the results of the GES assessment can be represented as X% of the assessment area which is affected by eutrophication (i.e. not meeting GES for D5). However, the assessment is typically based on discreet monitoring data (from specific monitoring stations) which are taken at different levels of density across countries. Modelling could play a role in order to extrapolate the data. Also expert assumptions could be derived when extrapolating the monitoring data. In any case, a clear specification for the aggregation rules of the monitoring data for a particular criterion are needed. Furthermore, it is clear that if, for example, a waste-water discharge introduces nutrients to the marine environment, assessment rules should be laid down that allow the effect of this increased nutrient pollution on the environmental status to be evaluated at specified scales (e.g. a given assessment area or grid cell, similar to WFD approach).

The descriptor-level reviews should address these types of questions and come forward with proposals which are feasible to be implemented for that particular descriptor. These, however, should lead to an integrated approach across the descriptors which accommodates state, pressure and measure-based aspects in an ecologically relevant but pragmatic system.

6. LINKS TO OTHER EU LEGISLATION

When developing the recommendations for the GES review per descriptor it will be important to ensure more concretely how the determination and assessment of GES is linked with assessments under other pieces of EU legislation. For this purpose, it will be necessary to distinguish between different parts of the marine waters where different pieces of legislation may apply. For example, the WFD is relevant for coastal waters (and as regards chemical status, i.e. D8, also territorial waters). The assessment of GES will have to take this into account (in particular bearing in mind that MSFD Art. 3(1b) lays down that the WFD assessments take precedent). There is a need to clarify which aspects of environmental status are addressed under WFD and thus do not need to be addressed under MSFD in coastal waters.

The overarching principle should be that assessments already undertaken under other EU legislation (such as WFD, Habitats and Birds Directives or CFP) should be used as much as possible for assessing GES under the MSFD. Additional criteria would then be defined to complement these assessments only when necessary and if justified because the area of protection is not covered by the other piece of legislation. This approach should, however, consider whether assessment methods in other legislation need any adaptation to ensure overall compatibility with MSFD and GES, for instance to ensure they are 'marine relevant' or to facilitate integration with other MSFD descriptor assessments. For a given assessment (for a descriptor) and a given assessment area, the ultimate aim should be to undertake a single assessment that will meet the needs of all relevant policies, including those of the Regional Sea Conventions. This will achieve both coherence between policies (through not having different assessment outcomes for the same topic) and reduce administrative burden (by assessing once, use for several policy needs).

Table 2 sets out an initial proposal on how assessments under other EU legislation could be used; this will need to be further developed and validated in the discussions on the Decision review. Each descriptor review should look specifically into these questions and make recommendations that take account of the overall principle set out above.

Table 2: *Initial overview of how other existing legislation could be used when assessing GES (differentiated between different parts of marine waters).*

	Coastal waters (0-1nm)	**Territorial waters** (1-12nm)	**EEZ** (12-200nm)	**Continental shelf** (beyond EEZ[4])
Biodiversity (D1)	GES = Habitats and Birds Directives listed habitats and species + identification of additional list of habitats and species per marine region - all in FCS. 'Habitat condition' criterion uses/adapts WFD GEcS benthic invertebrate/macrophyte assessment			GES = FCS for seabed habitats
Non-indigenous species (D2)	GES = list of marine species in new IAS Regulation + identification of additional list of species per marine region			
Fish (D3)	GES includes Maximum sustainable yield (MSY) + Spawning Stock Biomass (SSB) of CFP for all commercial species			
Eutrophication (D5)	GES = WFD GEcS (phytoplankton + macroalgae and angiosperms)			
Seafloor integrity (D6)	GES = WFD GEcS (benthic communities) for 'habitat condition' + FCS for distribution/extent criteria and overall assessment per habitat type (as per D1)	WFD GEcS for benthic invertebrates adapted to offshore benthic communities for the habitat condition criterion; assessments same as D1 habitats.		
Hydrological changes (D7)	GES = WFD GEcS (Hydromorphological conditions)			
Contaminants (D8)	GES = 1. WFD GChS: priority chemicals (mainly biota) 2. WFD GEcS: river-specific substances (mainly sediment; to be developed)	GES = WFD GChS (mainly biota)	GES build on WFD GChS (mainly biota + sediments)	GES = WFD GChS (sediments)

7. USE OF REFERENCE LEVELS IN DEFINING GES

The Commission's Article 12 assessment revealed that there was considerable variation in the approaches used by Member States to defining reference levels for GES, relating both to baseline and GES boundary values. This can significantly affect the basis for defining GES and hence substantially alter the quality levels to be achieved by each Member State and for each topic (Descriptor), leading to the lack of a 'level playing field' and associated socio-economic consequences.

In addition, the terminology applied for the different values is quite varied and the same terms can be applied with different meanings. This results in the lack of a common language on these issues leading to confusion in the dialogue of implementers and with stakeholders.

This lack of consistency in approach and terminology is therefore a key drawback for ongoing implementation of the Directive. In recognition of this the SWD accompanying the Article 12 report[5] provided the following guidance (section 9.5):

[4] Or beyond Territorial Waters, if no EEZ or similar designation is in place for the water column.

[5] COMMISSION STAFF WORKING DOCUMENT Annex Accompanying the document Commission Report to the Council and the European Parliament The first phase of implementation of the Marine Strategy Framework Directive (2008/56/EC) - The European Commission's assessment and guidance. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014SC0049.

It is common practice in EU Directives and in regional assessment methodologies to define environmental objectives (i.e. the target quality, such as GES, to be achieved) in relation to a reference level. For example, target quality levels for contaminants and eutrophication are typically set in relation to 'background' or 'natural' levels in the environment, with target levels set as a specified deviation from these conditions. This philosophy is typical for setting objectives for other pressures, such as litter and noise. For assessing the environmental status of biodiversity components, a similar approach is also used in the WFD and Habitats and Birds Directives, whereby target values are set in relation to natural characteristics, such as the distributional range of a species, the extent of a habitat or the condition of its biological community. This overall philosophy for setting environmental objectives is often termed the 'reference condition and acceptable deviation' approach. This 'deviation' is important, particularly to allow for sustainable uses of the marine environment whereby some levels of pressures and their impacts can be accommodated, provided the overall quality of the environment is maintained.

In the reports provided by Member States for Articles 8, 9 and 10, the approach to using reference points and setting target GES values was very varied, both across the different descriptors and across Member States for the same descriptor. In some cases, the current state in the 2012 assessment was used as the reference point (from which to a particular quality is to be maintained), without fully assessing whether that state was adequate to begin with. In many cases, the reference points to be used for the determinations of GES and environmental targets were not documented.

This degree of variation and lack of clarity can be expected to lead to substantial problems in subsequent implementation phases, as differences in approach lead to conflicts between descriptors (e.g. between state and pressure assessments) and the lack of a common understanding of what constitutes GES. It is there recommended that a common approach, based on the reference condition plus acceptable deviation philosophy, be used across descriptors to achieve a suitable level of consistency in future implementation phases.

Further guidance on defining baselines is given in European Commission (2012)[6].

8. REVISION OF MSFD ANNEX III

The revision of MSFD Annex III is needed to compliment a revision of the GES Decision. Annex III forms a key part of the implementation of Articles 8, 9 and 10, where it provides indicative lists of elements of the marine environment and of pressures and impacts upon it. However, its relationship to the Annex I descriptors and to the GES criteria was not made explicit in the directive or in the 2010 GES Decision. The 2011 CSWP[7], however, established relationships between the three elements, but could provide only a partial answer due to their inherent content.

The present review offers an opportunity to further clarify these relationships and thus support future implementation. The role of Annex III is proposed as follows:

a. To provide an indicative list of elements for assessment (state, pressure), linked explicitly to the descriptors and the criteria in a revised Decision, as outlined in Figure 2. There should preferably be a 1:1 relationship between Art. 8 and Art. 9 elements;

b. To provide additional pressures (and impacts) (where not explicitly referred to in a descriptor) that should be considered under MSFD Art. 8.1b assessments;

[6] European Commission. 2012. Guidance for 2012 reporting under the MSFD, using the MSFD database tool. Version 1.0. DG Environment, Brussels. pp164. MSFD 2012 reporting guidance_incl_database_v1.0.doc; section 6.2.3.6.

[7] Commission Staff Working Paper SEC(2011)1255.pdf

c. To provide an indicative list of uses and activities to be considered under MSFD Art. 8.1c assessments.

9. THE HOPE INDEX

[to be completed]

10. LINK TO REPORTING AND INFORMATION MANAGEMENT (INCL. ART. 19.3)

[to be completed]

11. REVIEW OF PART A OF DECISION 2010/477/EU

[to be completed]

12. PRODUCTS FROM THE REVIEW

The review of the 2011 Common Understanding, the 2010 Decision and the MSFD Annex III should lead to a coherent set of products, as follows:

a. Proposal for a revised Commission Decision;

b. Proposal for a revised MSFD Annex III;

c. Commission guidance on the application of the Decision and Annex III and on cross-cutting issues;

d. Revised common understanding (guidance) on MSFD Articles 8, 9 and 10;

e. Technical reports on the review process, outlining the work done and technical and scientific reasoning for the proposals.

Annex 1: On the use of certain terms in the MSFD

1. INTRODUCTION

In addition to the terms for which the directive provides a definition (in MSFD Article 3), there is frequent use of other terms in the directive which refer to important aspects of the implementation process, particularly the determination of good environmental status (GES) and its assessment, but for which there is no definition provided.

An analysis of these terms has been undertaken so as to arrive at an understanding of their use across the directive and thus to a proposed interpretation of their intended meaning (for full analysis, see Appendix). This should assist ongoing implementation of the directive, particularly through consistent use and understanding of the different words.

2. ELEMENTS, COMPONENTS, FEATURES, FACTORS, PROPERTIES, CHARACTERISTICS

2.1. Elements

The term ‘elements’ is used in the following ways:

a. 'Elements of the marine strategies' are listed in Art. 5(2) as the initial assessment, determination of GES, setting of environmental targets, establishment of monitoring programmes and programmes of measures, and referred to again Art. 12, 14(4), 17(2) and 19(2).
b. ‘Elements regarding coastal, transitional and territorial waters covered by relevant provisions of existing Community legislation' in Art. 8(2) refers to aspects of other assessments, for example the Water Framework Directive.
c. An 'indicative list of elements' are the characteristics, pressures and impacts listed in Annex III Tables 1 and 2, with further references in Art. 8(1), 9(1), 11(1), Annex IV.1, Annex IV.3 and Annex V.12.
d. 'Elements of the marine food webs' from descriptor 4 in Annex I refers to the different components of food webs (e.g. producers, consumers, decomposers).
e. 'Non-essential elements of the Directive’ is used in Art. 9(3), 11(4).

From the above, it can be concluded that the term ‘element’ is used simply to refer to the different parts or topics of the marine strategies, of Annex III, of the Directive or other assessments, of food webs.

2.2. Components, features

These terms are used as follows:

a. 'Components' is used in Art. 3(5), 3(7), Annex VI.2 and Annex VI.7 to refer to the constituent elements of an ecosystem, particularly its biological elements (species, habitats and their communities), or of marine waters.
b. 'Features' (physical, hydrological, oceanographic, chemical, biological, biogeographic, habitat types, other, transboundary) refers to abiotic and biotic elements of the marine regions or marine waters (i.e. species, habitats, physical structures, physical and chemical elements) and are used in Art. 3(2), 8(1), 8(3), 9(1), 10(1), 11(2) and Annex III, Table 1. Annex III Table 1 also refers more specifically to physical and chemical features of habitat types. The reference to 'transboundary' implies that features (referred to elsewhere) can occur across national boundaries and thus are a physical entity (can include species).

'Features' and 'components' can be considered more or less synonymous, and are the constituent parts (elements) of a marine ecosystem, region or MS's marine waters (i.e. its species/species groups, habitats/communities and physical, hydrological and chemical elements).

Each of these can be further characterised by their 'properties' (e.g. the population size of a species, the concentration or distribution of a nutrient) which are often termed parameters in a monitoring context.

2.3. Features (GES criteria)

The term 'feature', as used in the Art. 3(6) definition of criteria, seems to be used in a different sense to all other places in the Directive (e.g. Annex III Table 1 features) as it is qualified by 'distinctive technical' and applied in relation to descriptors and criteria.

These 'features' provide further 'distinctive technical' definition to the GES Descriptors that will enable the assessment of whether GES has been met or not. They could thus refer to 'features' and their 'properties', and to pressures and impacts (as provided in Annex III), as the elements of each descriptor that will enable their assessment. To 'allow for comparison between marine regions or subregions of the extent to which GES is being achieved', the criteria should where possible provide a quantified GES boundary.

2.4. Factors, properties

'Factors' is used in Art. 3(4) and 3(5) as a technical term concerning the physiographic, geographic, biological, geological and climatic properties/characteristics of marine ecosystems.

'Properties' (Art. 3(5)), Annex I.10, Annex IV.3) refers to specific aspects of physical, hydrological, chemical or biological features or of litter - these can typically be measured and hence monitored to show how these features change.

'Factors' and 'properties' are similar in essence, relating to technical/scientific attributes of marine ecosystems or their components/features which can generally be measured/monitored to characterise them or to assess change in space and time (e.g. the speed of water flows, the clarity of water, the concentration of nutrients) as a means to assess environmental status.

2.5. Characteristics

The term 'characteristics' is used is a number of places in the directive, relating to different topics:

a. 'Characteristics' in Art. 8(1) is distinguished from 'features' and can be understood to refer to particular/specific attributes of the marine waters;
b. 'Characteristics' in Art. 14(1) refers to particular/specific attributes of the physical features of marine waters;
c. Annex III Table 1 provides a list of 'characteristics' of marine waters and appears to refer collectively to the 'features' ('components') of the marine ecosystem and their 'properties' plus any particular/specific attributes of an area/(sub)region. In this sense, it confuses matters by encompassing features (whilst Art 8(1) separates features and characteristics).
d. 'Characteristic(s)' is also associated to elements of Annex III Table 1, referring to something that is particular/specific about a habitat type, an area or a (sub)region.
e. 'Characteristics' in Art. 9(1) and Annex I refers to something that is particular/specific about the determination of GES (including specifically about the Annex I descriptors) in the marine waters [of a MS] of a (sub)region.
f. 'Characteristics' in Art. 10(1) and Annex IV refers to the range of possible attributes of an environmental target.

The term 'characteristics' is thus used in different contexts in the directive, but overall refers to defining further specific or typical details/attributes for features/components (Art. 8), GES/descriptors (Art. 9), and targets (Art. 10), particularly in the context of (sub)regional or Member State/area-specific differences.

The use of the term as a header for Table 1 Annex III is somewhat confusing in relation to Art. 8(1) as it refers to the features as well as their specific attributes.

For Art. 9(1), the characteristics are further defining GES in relation to the specific MS/(sub)region, based on what is defined in the Decision (Art 9(3)).

2.6. Summary schema of these terms

Table A.1 below provides an overview of the terms and their use in different sections of the Directive. It is laid out in a way which shows a possible way to associate their use to three main aspects of the directive (the marine strategies, the marine regions/waters/ecosystems and the parts of the directive). The terms used are thus general (elements), related to specific entities (components, features) or related to attributes of these entities (factors, properties, characteristics).

Table A.1*: Summary of the use of the terms elements, features, components, characteristics, factors and properties in the MSFD (note: italicised text is additional interpretation).*

	Elements	**Features, components**	**Characteristics, factors, properties**
Relating to parts of the marine strategies	**Elements of marine strategies** (Art. 5(2), 12, 14(4), 17(2), 19(2)) - initial assessment		
	- determination of GES	**Distinctive technical features** (criteria) (Art. 3(6) - closely linked to quantitative descriptors	**Characteristics for GES** (Art. 9(1), Annex I) - in respect of each marine region or subregion - on the basis of the qualitative descriptors listed in Annex I
	- setting of environmental targets		**Characteristics of targets** (Art. 10(1), Annex IV) - indicative list of characteristics (Annex IV)
	- establishment of monitoring programmes		
	- establishment of programmes of measures		
	Elements of other assessments (Art. 8(2)) - e.g. WFD		
Relating to marine regions, waters and ecosystems		**Features of marine regions** (Art. 3(2)) - hydrological, oceanographic, biogeographic features	**Factors of marine ecosystems** (Art. 3(4), 3(5)) - physiographic, geographic, biological, geological, climatic
		Components of ecosystems (Art. 3(5), Annex VI.2, Annex VI.7) - biological *(i.e. species, habitats)*	**Properties of ecosystems** (Art. 3(5)) - hydro-morphological, physical, chemical, including those which result from human activities
	Elements of food webs (Annex I.4)		**Properties of marine litter** (Annex I.10)

	Elements	Features, components	Characteristics, factors, properties
	Elements of Annex III, Table 1 (Art. 8(1), 9(1), 11(1), Annex IV.1, Annex IV.3, Annex V.12) - characteristics	**Features of marine waters** (Art. 8(1), 8(3), 9(1), 10(1), 11(2), Annex III, Table 1) - Physical, chemical, habitat types, biological, hydro-morphology, other, transboundary features	**Properties of elements of marine waters** (Annex IV.3) - measurable
		Components of marine waters (Art. 3(7))	**Characteristics of marine waters** (Art. 8(1), 14(1), Annex III, Table 1) - physical (e.g. mixing characteristics) - of areas - typical of or specific to the marine region or subregion
		Physical and chemical features of habitat types (Annex III, Table 1) Depth, water temperature regime, currents and other water movements, salinity, structure and substrate composition of the seabed	**Characteristic features** (Annex III, Table 1) - *typical of or specific to each habitat type*
	Elements of Annex III, Table 2 (Art. 8(1), 11(1), Annex V.12) - pressures and impacts		
Relating to parts of the Directive	**Non-essential elements** of the Directive (Art. 9(3), 11(4))		

3. PRESSURE, IMPACT, STATE AND STATUS

The terms pressure, impact, state and status are in common use in environmental protection, but are often used in different ways, sometimes interchangeably by different users for the same purpose or policy. It is thus very important, in the context of MSFD implementation, to develop a clear and common understanding of their meaning and differences.

3.1. Interpretation in MSFD – Pressure

From references in the directive (Art. 1(3), 3(7), 8(1b), 9(1), 10(1), Annex III) it is clear that 'pressures' arise from human activities and can have an adverse effect on the marine environment. One can deduce that 'impacts' on the environment arise from these pressures and consequently can adversely affect its state.

The directive does not define what a pressure is. However, one can deduce from Table 2 of Annex III that they are concerning the topics in the table (e.g. physical damage, nutrient enrichment, biological disturbance). The term pressure is thus used in the sense of physical, chemical and biological consequences of human activities which can lead to environmental impacts.

3.2. Interpretation in MSFD – Impact

There are many references to impact in the directive, with most referring to environmental impact (Art. 1(2), 1(4), 3(7), 5(2), 8(1b), 8(3), 9(1), 10(1), 11(2), 13(5), 13(8), 14(1), 15(1), Annex III Table 2). 'Impact' here is referring to environmental effects. These are associated with pressures from human activities (i.e. resulting from these pressures) and by implication are considered to be having an adverse effect on environmental state.

In Art. 13(3) 'impacts' refer to the effects (positive or negative) of measures taken and thus refers to social and economic issues. Also in Art. 13(3), as well as in Annex V.3, the use of 'impact' seems to refer to both environmental and socioeconomic impacts.

The term impacts is thus used in two different ways in the directive; firstly in relation to the adverse effects of anthropogenic pressures on environmental state (and which thus might affect reaching or maintaining GES), and secondly in relation to effects (positive or negative) on socio-economic issues.

When referring to impacts it is thus important to be clear whether the reference is to environmental impacts or socio-economic impacts and whether they are negative or positive effects or both.

3.3. Interpretation in MSFD – Environmental status (good, current)

The following considerations are focused on the relationship of status to pressures and impacts, as needed for this paper (and do not address the many aspects of how environmental status is determined and assessed).

Environmental status is defined in Art. 3(4) and further mentioned in Art. 3(1b). The definition indicates that a number of elements need to be considered. This includes physical, acoustic and chemical conditions which result from human activities, indicating that these types of pressures, when measured in the marine environment, are to be considered when assessing environmental status.

Current environmental status is mentioned in Art. 5(2), 8(1), 8(2), 11(1), 19(3), 20(3) and in Annex III. Assessment of the 'current' environmental status, undertaken by Member States (and by the EEA in 2019), comprises a number of components (indicative list in Table 1 of Annex III) and is based on data from monitoring programmes and from other assessments (e.g. WFD, by RSCs).

The assessment of current status is accompanied by an assessment of the effects of pressures and impacts from human activities on the status (Art. 5(2i), 8(1b)), implying that these are somewhat distinct from the assessment of environmental status.

Good environmental status is defined in Art. 3(5) and further referenced in Art.5(2), 5(3), 9(1), 9(3), 10(1), 13(1), 14(1), 14(2), 14(4), 15(1), 17(2), 19(2), Annex I, Annex IV.2, IV.3, IV.10, IV.12, Annex V.1, V.4 and Annex VI.6.

The directive provides a definition of Good Environmental Status, and makes provision for further refinement of the definition (via a Decision on criteria in Art. 9(3) and via Member States' 'determinations' in Art. 9(1)). Achieving GES is the overarching objective of the Directive.

Various articles then give provisions on how to achieve and maintain GES.

3.4. Interpretation in MSFD – State

The directive makes only one reference to the term state (in Art. 3(4)) where the term is used to qualify the term 'environmental status', by indicating it comprises a number of elements, processes and properties of marine ecosystems.

3.5. Application of the terms in DPSIR

The terms are commonly applied in the DPSIR model (Drivers-Pressure-State-Impact-Response) for environmental management[8]. This model can be closely associated with the different main steps or elements of MSFD implementation: the directive requires an assessment of uses and activities of the marine waters and of the costs of degradation (Art. 8(1c) (~Drivers, Impacts), pressures and impacts (Art. 8(1b) (~Pressures, Impacts), and current environmental status (Art. 8(1a)) (~State). In Art. 13 the

[8] See for example http://www.integrated-assessment.eu/guidebook/dpsir_framework

directive calls for a programme of measures to achieve or maintain good environmental status (~Response).

In the examples above for MSFD, it can be seen that Impacts in DPSIR is reflected twice (impacts on uses/activities and impacts on the environment); additionally, the term drivers is conceptually broader/different to the 'uses and activities' of MSFD, and the concept of 'marine good and services' (in Art. 1(3), 3(8), and more widely termed ecosystem goods and services) is not embraced by the DPSIR model. For these reasons, an adaptation of the model to overcome these drawbacks has been developed (MSCG 11/2013/16, Annex 2).

Because of the close links between the directive's implementation process and the DPSIR model, the assessment and reporting system developed for MSFD has been based on this model, as outlined in Table A.2 and Figure A.1 (EC 2012[9], 2014[10]), and is being extended for future reporting on the programmes of measures.

***Table A.2**: Outline of the main elements of the MSFD management cycle in the context of the DPSIR framework, indicating the links to and between the relevant Articles and to the associated reporting sheets. Monitoring of progress towards achieving or maintaining GES is via monitoring programmes (Art. 11). From European Commission (2012).*

DPSIR element	Drivers	Pressures	State	Impacts	*GES & targets*	Responses
Description	Analysis of uses of marine environment (economic and social)	Analysis of pressures on marine environment from human activities Assessment of impacts from pressures	Assessment of current state of marine environment (ecosystem structure and functioning) Take account of impacts from pressures	Assessment of costs of degradation, based on impacts on environment and to human welfare (ecosystem goods and services)	Define good environmental status (GES) Assess gap between current state and GES Define targets to achieve or maintain GES	Development of programme of measures to deliver targets
Links to MSFD Articles	Art. 8(1c)	Art. 8(1b)	Art. 8(1a)	Art. 8(1c)	Art. 9 Art. 10	Art. 13
Links (to be made explicit in the reporting sheets)	Identify the main pressures from each activity	Link pressures to main activities. Identify main ecosystem components being impacted	Identify main pressures and impacts – link to main pressures			
Link to Reporting sheets	Reported in ***Economic and social reporting sheets***	Reported in ***Pressures and impacts reporting sheets***	Reported in ***Characteristics reporting sheets***	Costs of degradation reported in ***Economic and social reporting sheets***	GES reported in ***GES reporting sheets*** Targets reported in ***Targets reporting sheets***	Programmes of measures reporting to be developed for 2015 reporting

[9] European Commission. 2012. *Approach to reporting for the Marine Strategy Framework Directive*. DG Environment, Brussels. pp26.

[10] European Commission. 2014. R*eporting on monitoring programmes for MSFD Article 11*. DG Environment, Brussels. pp49.

An assessment of current environmental status is, in effect, an assessment of the state of the environment that reflects the range of impacts, including cumulative impacts, acting upon it. As these impacts are in turn derived from the pressures exerted on the environment by human activities, the three elements of the initial assessment can be considered to be intricately linked. These multiple relationships are illustrated in Figure 1, which additionally shows the links to the three main elements of initial assessment required in Art. 8(1) (EC, 2012).

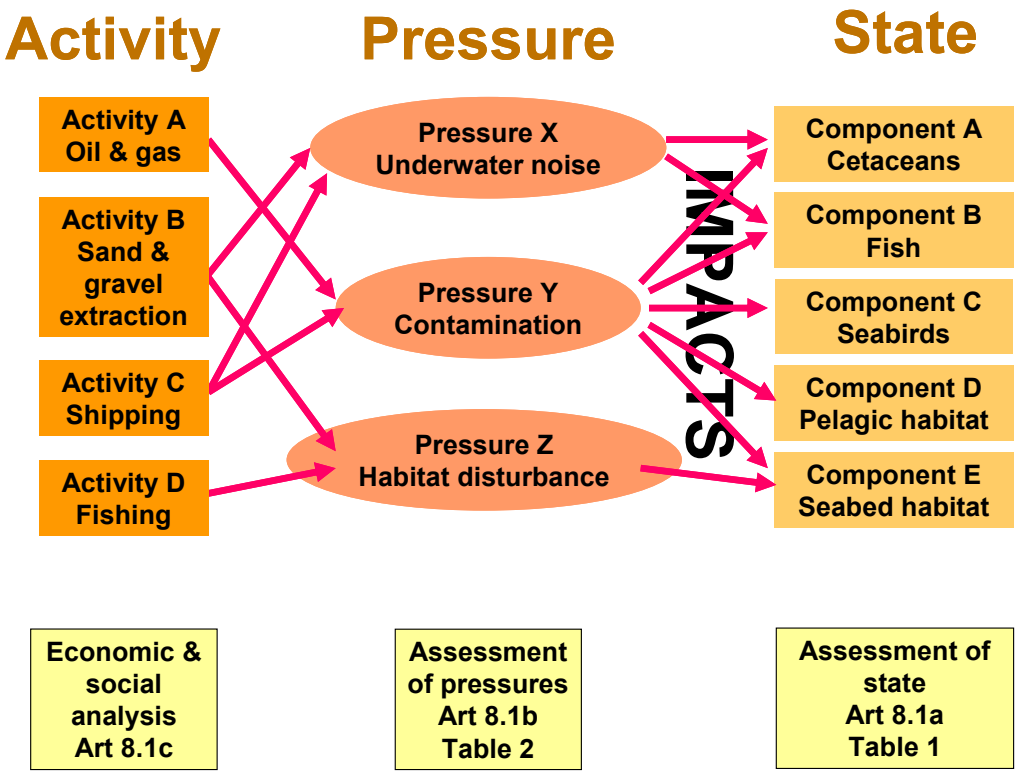

***Figure A.1**: Relationship between human activities, the pressures they exert on the environment and the consequent state of the environment, taking account of the impacts (adverse effects) from the pressures. Each is indicated with illustrative examples. The links to the three main elements of Article 8(1) and the associated Tables in Annex III of the MSFD are also shown. From European Commission (2012).*

These links to the DPSIR model serve as an important step in the application of the terms for MSFD purposes and the links to wider application of these terms. Because the prime focus of the directive is the achievement of GES, requiring assessments of environmental status and progress towards achievement of GES, the use of these terms needs to be in this context. Table A.3 provides illustrated examples of each term to help demonstrate their application, differences and relationships. Because the use of these terms across policies and countries is quite variable, a key issue for MSFD purposes is to settle upon an agreed use which can be followed by everyone.

***Table A.3**: Examples of the terms activity, pressure, impact and state, as relevant to different MSFD descriptors.*

	Activity	Pressure at source	Pressure at sea	Impact	State
D5	Agriculture	Nutrient enrichment to soil	Raised nutrient levels in sea	Increased algal productivity, oxygen depletion, benthic mortality	Altered condition of plankton and benthos, hypoxia/anoxia

	Activity	Pressure at source	Pressure at sea	Impact	State
D10	Tourists drinking from cans	Litter – discard of can on beach	Litter on seabed	Smothering of seabed, injury to animals	Altered habitat condition, reduced reproductive capacity
D11	Pier-piling for wind farm	Noise from piling	Noise level in sea	Disturbs cetaceans, move away	Changed species distribution
D3	Fishing	Removal of fish		Mortality of fish, loss of population	Reduced population size
D6	Fishing	Disturbance of seabed		Changes sediment structure, damages and kills species	Altered habitat condition
D6	Infrastructure developments	Change in seabed substrate (e.g. to concrete, metal)		Loss of natural habitat, altered water flows	Habitat loss, altered hydrological conditions

Based on the application of the term 'pressure' in the MSFD and upon a review of the types of pressures in use under other directives and regional sea conventions (see separate paper on proposal for a revised list of MSFD pressures), the following definition of a pressure is proposed:

Definition:

Anthropogenic pressure = an input, alteration or extraction of physical, chemical or biological elements or properties which results directly or indirectly from human activities.

3.6. Separating use of the terms pressure and state

A key issue in the application of the term pressure for the directive has been its use 'at source' versus 'in the marine environment'.

For example, nutrients from agricultural fertilizers drain into rivers and lead to a higher input load of nutrients from rivers into the sea; measurement of this load is typically referred to as the level of the pressure (on the marine environment); however, when these same nutrients are measured in the marine environment (in the water column) this is sometimes referred to as a 'state' measurement (particularly if the objective of the assessment is water quality/nutrient status), in part because nutrients are a natural part of seawater chemistry. However, the same change from pressure to state has been applied to hazardous substances, which are not a natural part of the environment. These examples are for pressures arising from land-based sources. For pressure arising from sea-based sources, there are two scenarios: firstly those that arise from a point source (e.g. noise from a ship or pier piling operation, chemicals from aquaculture and oil production facilities) where they could be measured as input loads to the environment but can spread across the environment and be measured as levels 'in the environment'; secondly, where the pressure effectively does not spread from source, and where its measurement as 'pressure' and 'state' is inseparable (for example, physical disturbance of the seabed, removal of fish).

These examples serve to illustrate that the adverse effects of human activities can be measured at/close to their source or at a distance from their source 'in the environment'. The practice of whether to call both these measurements 'pressure' or to call one pressure and one state is varied amongst practitioners. Further, the input load to the marine environment (from rivers or the atmosphere) could be termed a pressure on the marine environment, but when considered in freshwater or air policy terms it could be termed the state, thus adding to a confused use of the terms.

In the context of the DPSIR model and for MSFD application, the term pressure is used specifically in relation to the impacts they have on environmental state, and in this sense is clearly meant to be distinguished from state. Thus the practice of calling a substance or effect from anthropogenic activities a pressure at its source but the state when measured at sea is confusing and is best avoided; in effect, it would mean measuring the level of nutrients or hazardous substances in the sea (as state) and assessing their effects (impacts) on the biodiversity and ecosystem (also state). As such, it is therefore proposed that:

1. In the use of the DPSIR model for MSFD purposes, the overall objective is to assess environmental state (status), and that this encompasses impacts from anthropogenic pressures;
2. An anthropogenic pressure is an input, alteration or extraction of physical, chemical or biological elements or properties which results directly or indirectly from human activities;
3. The term 'pressure' is applied to effects both at source and at a distance from the activity (i.e. as measured in any part of the environment – land, freshwater, air, sea);
4. The term 'state' is applied to measurements and assessments of the natural [marine] environment; these can include specific impacts from pressures, but may also be more non-specific measurements and assessments of natural components, processes and functions;
5. This protocol is for use of the terms for MSFD purposes and in the context of the DPSIR model, in order to avoid confusion in the use of the terms pressure and state.
6. In this context, the desired/acceptable levels of non-indigenous species, nutrients, contaminants, litter and noise in the marine environment should be determined as part of the process for defining Good Environmental Status for the pressure-based descriptors (D2, D5, D8, D9, D10, D11).

4. APPENDIX

The full analysis of the terms described here is given in the embedded spreadsheet.

1408_MSFDkeyterms .xls