



Marine Strategy Framework Directive (MSFD)
Common Implementation Strategy

**Background document on the determination of good environmental status
and its links to assessments and the setting of environmental targets**

SEPTEMBER 2017

Foreword

The Marine Directors of the European Union (EU), Acceding Countries, Candidate Countries and EFTA Countries have jointly developed a common strategy for supporting the implementation of the Directive 2008/56/EC, “the Marine Strategy Framework Directive” (MSFD). The main aim of this strategy is to allow a coherent and harmonious implementation of the Directive. Focus is on methodological questions related to a common understanding of the technical and scientific implications of the Marine Strategy Framework Directive. In particular, one of the objectives of the strategy is the development of non-legally binding and practical documents, such as this guidance, on various technical issues of the Directive. These documents are targeted to those experts who are directly or indirectly implementing the MSFD in the marine regions.

The document has been sent for consultation to the Working Group on Good Environmental Status. It has been agreed by the Marine Strategy Coordination Group (in accordance with Article 6 of its Rules of Procedures).

[The Marine Directors of the European Union and associated countries to this process have also endorsed this Document during their informal meeting under the [....] Presidency (DATE).]

Disclaimer:

This technical document has been developed through a collaborative framework (the Common Implementation Strategy) involving the Member States, EFTA countries, and other stakeholders including the European Commission. The document reflects the informal consensus position on best practice endorsed by the EU Marine Directors. However, the document does not necessarily represent the position of any of the partners.

To the extent that the European Commission's services provided input to this technical document, such input does not necessarily reflect the views of the European Commission.

The technical document is intended to facilitate the implementation of Directive 2008/56/EC and is not legally binding. Any authoritative reading of the law should only be derived from Directive 2008/56/EC itself and other applicable legal texts or principles. Only the Court of Justice of the European Union is competent to authoritatively interpret Union legislation.

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1. INTRODUCTION

In 2012 Member States prepared the first elements of their marine strategies for the Marine Strategy Framework Directive (MSFD, [Directive 2008/56/EC](#)). This comprised an initial assessment (Art.¹ 8), the determination of good environmental status (GES) (Art. 9) and the establishment of a set of environmental targets (Art. 10). This first stage in MSFD implementation was supported by the Commission Decision on criteria and methodological standards on good environmental status of marine waters ([Decision 2010/477/EU](#)), which provided a framework for Member States to determine their GES and to assess current environmental status. To aid the preparation of the 2012 reports, the Commission released a Staff Working Document which aimed to clarify the relationship between the initial assessment of marine waters and the criteria for good environmental status ([SEC\(2011\) 1255](#)). In addition the 2011 [Common Understanding \(CU\) of Articles 8, 9 and 10](#), prepared within the MSFD Common Implementation Strategy, provided support to the first implementation of these articles in 2012.

The Commission's assessment of this first implementation stage (Art. 12, [COM\(2014\)97](#)) found a considerable divergence in approaches amongst the Member States and across the regions, particularly regarding the determination of GES, the use of Decision 2010/477/EU and the relationship between the determination of GES under Art. 9 and the setting of environmental targets under Art. 10. The Commission's assessment recommended that Decision 2010/477/EU together with MSFD Annex III, which provided indicative lists of ecosystem characteristics, pressures and impacts, be reviewed and if necessary revised as one key mechanism to help overcome this lack of coherence. This review led to both the 2010 Decision and MSFD Annex III being revised in 2017².

The technical work of the review raised various generic or cross-cutting issues, particularly concerning the use of the GES Decision in Member State's determinations of GES under Art. 9(1) and for assessments under Art. 8. Further, Annex IV of Staff Working Document ([SWD/2014/049](#)), which accompanied the Commission's 2014 Art. 12 report, set out some principles which are considered essential in the further implementation of the Directive. This document aims to further develop and substantiate these principles, taking into account expert discussions since it was published, to provide guidance on the future updates of Art. 8, 9 and 10 and implementation of the MSFD more generally.

To assist in understanding the present document, key messages have been highlighted as boxed text. Definitions of terms are provided in Annex 1 and shown in ***italic bold red text*** at their first mention.

2. GENERAL PERSPECTIVES ON MSFD IMPLEMENTATION

2.1. Main implementation stages in a six-year cycle

Member States implement the MSFD via the development of a 'marine strategy' for each of their marine regions and subregions (section 2.3.2). These strategies are prepared in stages and reported at specified times, starting in 2012 (Art. 5(2)).

Updates of these individual stages are undertaken on a six-year cycle, enabling adaptive management and new understanding to be accommodated into the MSFD implementation process. The linkages between the main ***elements*** of the strategies and the overall cyclical process of the MSFD are illustrated in Figure 1.

¹ Hereafter, all references in this paper to 'Directive' and to particular articles (Art.) refer to the MSFD (Directive 2008/56/EC), unless specifically indicated otherwise.

² Hereafter, all references in this paper to 'GES Decision' and 'Annex III' refer to the 2017 versions of the GES Decision ([Commission Decision \(EU\) 2017/848](#)) and MSFD Annex III ([Commission Directive \(EU\) 2017/845](#)), unless specifically indicated otherwise.

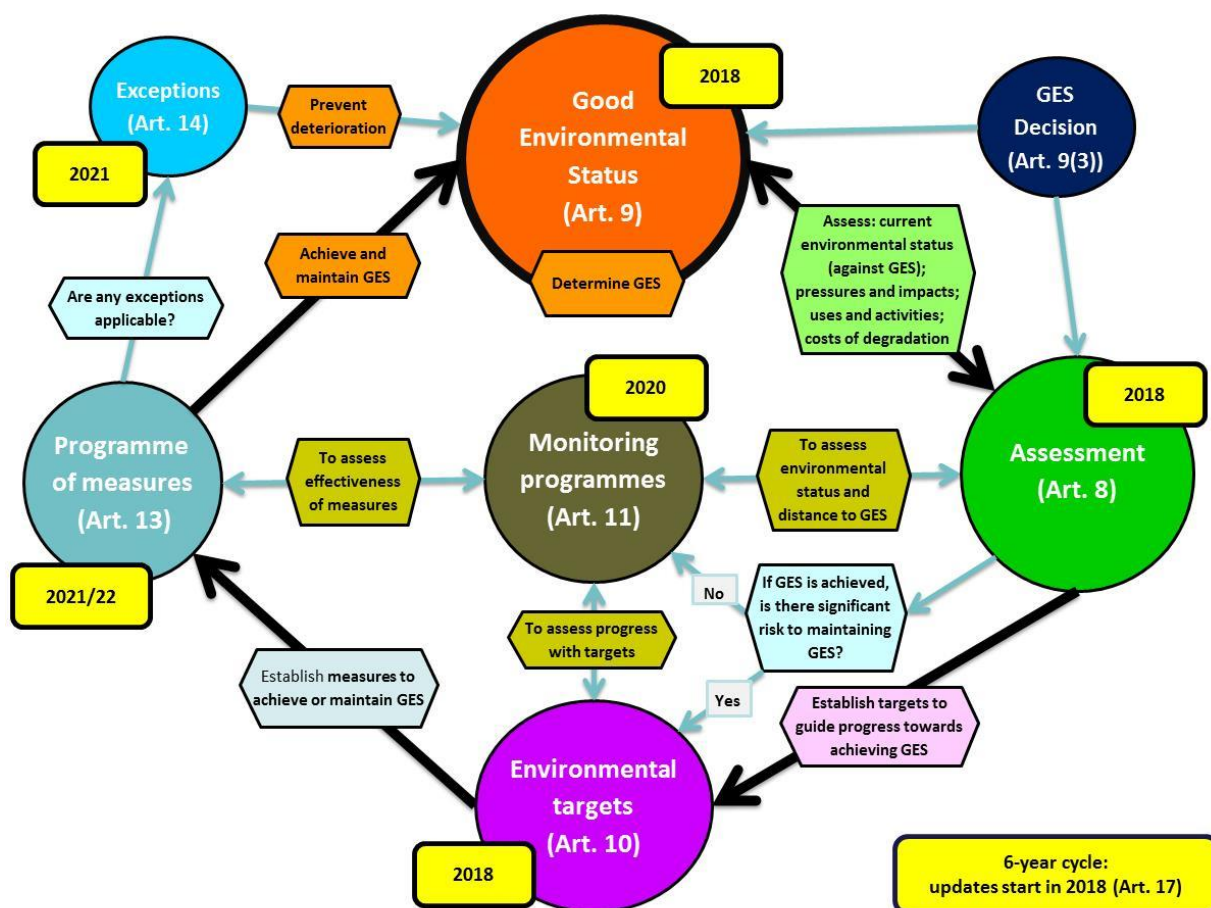


Figure 1: The MSFD implementation process encompassing the main stages in the six-year implementation cycle, and showing the delivery dates of the second cycle.

This document focuses on the determination of GES (Art. 9) and associated **assessments of (current) environmental status**³ (Art. 8), but also addresses relationships to the setting of environmental targets (Art. 10) and to the monitoring programmes (Art. 11) which collect the data needed to monitor progress towards achieving GES and the environmental targets. The outcomes of the assessments under Art. 8 inform whether there is need for environmental targets and consequently lead to the measures (Art. 13) which are established to achieve (or maintain) GES.

2.2. The determination of GES is central to MSFD implementation

Key message

Good environmental status (GES) is the core concept of what has to be achieved by Member States in implementing the MSFD.

All operational provisions of the Directive are in one way or another linked to GES.

Successful implementation depends on having sufficient clarity in the determination of GES to enable adequate decision-making in implementation of the Directive.

Good environmental status (GES) is the core concept of what has to be achieved by Member States in implementing the MSFD⁴. All operational provisions of the Directive are in one way or another linked to GES, which is the central objective allowing the measurement of progress and success in its implementation:

³ The [Guidance on MSFD Art. 8 assessments](#) is provided in GES_17-2017-02 and is currently in test phase.

⁴ SWD/2014/049 <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014SC0049>

- a. It is needed as the benchmark⁵ against which to assess current environmental status (Art. 8, particularly Art. 8(1)(a) and 8(1)(b));
- b. It determines whether and what environmental targets are needed under Art. 10 in order to achieve GES;
- c. These targets, in turn, determine what measures are needed under Art. 13 to achieve and/or maintain GES;
- d. It guides the monitoring needed under Art. 11, which provides the data and information needed to assess whether GES has been achieved or is being maintained, and to assess progress in delivery of the environmental targets and for assessing the effectiveness of measures.
- e. It provides the benchmark for assessing if an exception is needed under Art. 14(1) and, read in conjunction with the precautionary principle, for assessing if there is significant risk to the marine environment which could warrant the application of Art. 14(4).

It is therefore paramount that Member States can determine GES, and monitor and assess whether it has been achieved (ideally in a quantitative way)⁶. The associated implementation of related articles depends on having sufficient clarity in this determination to enable adequate decision-making in implementation of the Directive. Further details are given in section 5.

2.3. Geographic scope

2.3.1. Member State marine waters (Art. 3(1))

The Directive applies to the 'marine waters' of Member States, which are defined in Art. 3(1) as:

- (a) *"waters, the seabed and subsoil on the seaward side of the baseline from which the extent of territorial waters is measured extending to the outmost reach of the area where a Member State has and/or exercises jurisdictional rights⁷, in accordance with the Unclos⁸".* This is understood to include territorial waters (0-12nm⁹), contiguous zones (12-24nm), exclusive economic zones (out to 200nm or median lines with neighbouring states) and other types of jurisdictional designation; additionally where a Member State has informed the Commission that it possesses and/or exercises jurisdictional rights on a Continental Shelf area which extends beyond these zones, the directive applies also to the seabed and subsoil of these areas.
- (b) *"coastal waters as defined by Directive 2000/60/EC¹⁰, their seabed and their subsoil in so far as particular aspects of the environmental status of the marine environment are not already addressed through that Directive or other Community legislation".* This indicates that waters

⁵ Cf Article 9(1): "By **reference to the initial assessment made pursuant to Article 8(1)**, Member States shall, in respect of each marine region or subregion concerned, determine, for the marine waters, a set of characteristics for good environmental status, ..." (emphasis added).

⁶ SWD/2014/049 <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014SC0049>.

⁷ As jurisdictional issues are a matter of national competence, it is for Member States to define the jurisdictional area over which the MSFD applies, in accordance with this definition of marine waters in Art. 3(1). There may be cases where these jurisdictional areas overlap with those claimed by neighbouring states, such that no agreement on marine borders has yet been agreed between the states concerned.

⁸ 'with the exception of waters adjacent to the countries and territories mentioned in Annex II to the Treaty and the French Overseas Departments and Collectivities.'

⁹ In some states the territorial waters extend only to 3nm or 6nm, rather than 12nm.

¹⁰ Coastal water means **surface water** on the landward side of a line, every point of which is at a distance of one nautical mile on the seaward side from the nearest point of the **baseline** from which the breadth of territorial waters is measured, extending where appropriate up to the **outer limit of transitional waters** (Water Framework Directive (2000/60/EC), Art. 2(7)) (emphasis added).

inside the baseline and extending up to the landward boundary of coastal waters¹¹ are within the scope of the MSFD. This is also understood to mean that waters designated as Transitional Waters under the Water Framework Directive (WFD) are excluded from the geographic scope of the MSFD.

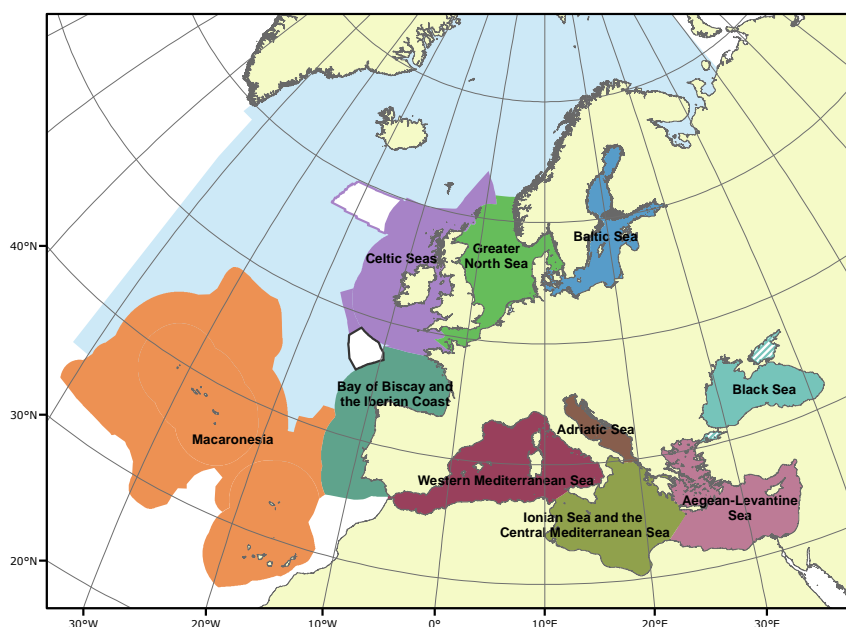
Beyond these areas of national jurisdiction there is a need to cooperate with neighbouring states in the same marine region or subregion (sections 2.3.2 and 2.4).

2.3.2. MSFD marine regions and subregions (Art. 4)

Key message

The MSFD regions, subregions and subdivisions provide an important tool for an ecosystem-based approach to delivery of the Directive.

In support of an **ecosystem-based approach** to delivery of the Directive, Art. 4 indicates that Member State waters form an integral part of four marine regions of Europe, two of which (North-East Atlantic Ocean, Mediterranean Sea) are each divided into four subregions. These MSFD regions and subregions are illustrated in Figure 2.



Representation of the marine regions and subregions of MSFD Article 4

- Baltic Sea
- North-east Atlantic Ocean
- Greater North Sea, incl. the Kattegat and the English Channel
- Celtic Seas
- Bay of Biscay and the Iberian Coast
- Macaronesia
- Mediterranean Sea**
 - Western Mediterranean Sea
 - Adriatic Sea
 - Ionian Sea and the Central Mediterranean Sea
 - Aegean-Levantine Sea
 - Black Sea

 See Note 1. See Note 2. See Note 3.

This map serves as a working tool only and shall not be considered as an official or legally-binding map representing marine borders in accordance with international law. This map shall be used without prejudice to the agreements that will be concluded between Member States or between Member States and non-EU states in respect of their marine borders

¹¹ Highest Astronomical Tide is the landward boundary for WFD coastal waters ([WFD Guidance Document no. 5](#)).

Figure 2: Representation of the marine regions and subregions of MSFD Art. 4. Note: Within the North-East Atlantic Ocean region, the four subregions listed in MSFD Art. 4(2) are shown, without addressing the remaining parts of the region (e.g. waters in the Iceland Sea, Norwegian Sea and Barents Sea).

Note 1: The area shaded in purple and white indicates an area to which both the United Kingdom and the Government of the Kingdom of Denmark together with the Government of the Faroes have transmitted overlapping submissions to the Commission on the Limits of the Continental Shelf (CLCS) in fulfilment of their respective rights and obligations under Art. 76 and Annex II to the United Nations Convention on the Law of the Sea in order to determine entitlement of outer continental shelf areas. This map should not be used in any way to prejudice the determination of that question by the CLCS in due course.

Note 2: The area shaded in black and white shows the delineation of the outer limits of the continental shelf beyond 200 M from the territorial sea baselines of France, Ireland, Spain and the United Kingdom in respect of the area of the Celtic Sea and the Bay of Biscay, as provided by the four countries to the Commission on the Limits of the Continental Shelf (CLCS) and included in its recommendations issued on 24 March 2009. The map of the continental shelf's extent shall be used without prejudice to the agreements that will be concluded in due course between these Member States on their marine borders in this area.

Note 3: The seas of Azov and Marmara are shown as shaded as they do not fall within the geographic scope of application of the Bucharest Convention.

The regions and subregions provide the basis for defining *scales* and areas for assessment and reporting. Art. 4 further provides for subdivision of each region or subregion, thus providing an important tool for delivery of an ecosystem-based approach below the scale of region and subregion (see section 4.5).

2.4. Regional and subregional implementation (Art. 5 and Art. 6)

Key message

Member States are required to cooperate within each region or subregion to ensure their marine strategies are coherent and coordinated, and endeavour to follow common approaches to their delivery.

Art. 5(1) sets out the need for Member States to implement the Directive in respect of each region or subregion in which it has marine waters. This regional or subregional approach can be considered to have two aspects: a) those related to cooperation between Member States and b) those related to cooperation with non-EU states in the region or subregion.

This regional or subregional approach of the Directive provides an essential framework for the successful implementation of the Directive. It is particularly important because the *characteristics* of marine waters and their biodiversity are shared across each region or subregion and because many of the issues which need to be addressed to achieve GES can only be effectively addressed through joint or common actions within the region or subregion. In addition, the implementation could differ in each region or subregion, for example, to reflect the differing characteristics of each region or subregion and the differing (degrees of) anthropogenic *pressure* it faces.

Within each region or subregion, there is a requirement for Member States to cooperate amongst themselves to ensure their marine strategies are coherent and coordinated, and to endeavour to follow a common approach to their implementation (Art. 5(2)). This applies to each element of Member States' marine strategies (also referred to as 'plan of action' in Article 5(2)): assessment (Art. 8), determination of GES (Art. 9), establishment of environmental targets (Art. 10), establishment and implementation of monitoring programmes (Art. 11), development and entry into operation of programmes of measures (Art. 13).

The practical delivery of Art. 5(2) requirements can be at regional or subregional level, or a mixture of the two. Because Member States are obliged to implement the Directive in their marine waters and these may form only part of the whole region or subregion, some aspects can be achieved through direct cooperation between several Member States in the region or subregion, rather than always involving all states in the region or subregion.

The link to non-EU states within a region or subregion is important because achieving GES may be dependent on actions by other states within the region or subregion, due to the inter-connectedness of their waters. This is particularly relevant where anthropogenic pressures arise outside Member States' waters but which have transboundary effects which prevent the achievement of GES within their waters¹². In such situations, cooperation is necessary to address the issues. There may, however, also be situations where it is appropriate to collect data and undertake assessments, for example for commercial fish and other species whose ranges extend beyond national borders, and for which joint management of them is important to secure their good **status**.

Art. 6 indicates that this regional or subregional cooperation process should, wherever practical and appropriate, use existing regional institutional structures, including the Regional Sea Conventions (RSC). The four RSCs dealing with seas around Europe (Helsinki Convention, OSPAR Convention, Barcelona Convention and Bucharest Convention) correspond to the four MSFD marine regions. These provide a key mechanism for such cooperation, bringing together the states which share the region and having broadly similar objectives to protect the marine environment. For regional cooperation issues related to commercial fishing, the Regional Fisheries Management Organisations (RFMOs), including the General Fisheries Commission for the Mediterranean (GFCM) and the International Commission for the Conservation of Atlantic Tunas (ICCAT), have an important role.

Because the need for cooperation does not just extend across the marine waters of a region or subregion, but also to the freshwater catchment areas, particularly for land-based sources of pollution, the Directive also indicates a need for coordination and cooperation with land-locked Member States. Here it makes the links with the WFD, where the River Basin District Management Plans should provide an important mechanism for addressing land-based sources of pollution.

Overall this indicates that there is not a single way in which regional and subregional aspects of the Directive could be implemented, but a variety of approaches depending on the particular needs. Hereafter the term **(sub)regional** is used to reflect the multiple approaches that may be appropriate.

2.5. Integration with other EU legislation

Key message

Integration between other relevant EU policies and the MSFD marine strategies will help ensure coherence across policies and reduce administrative burden.

Art. 1(4) states *"This Directive shall contribute to coherence between, and aim to ensure the integration of environmental concerns into, the different policies, agreements and legislative measures which have an **impact** on the marine environment."* The directive explicitly mentions the following Union legislation:

- a. Urban Waste Water Treatment Directive 91/271/EEC
- b. Habitats Directive 92/43/EEC
- c. Water Framework Directive 2000/60/EC
- d. Environmental Information Directive 2003/4/EC
- e. Bathing Water Directive 2006/7/EC
- f. INSPIRE Directive 2007/2/EC
- g. Birds Directive 2009/147/EC

The directive refers also to the need to encompass international and regional agreements (e.g. regarding protected species and **habitats**, and marine protected areas) and, due to the topics addressed by the Directive, needs to engage in further policies, such as the Common Fisheries Policy and the Common Agriculture Policy, in order to achieve its goals effectively.

¹² Art. 15 has provisions relating to this issue.

This linkage with other policies is illustrated in Figure 3.

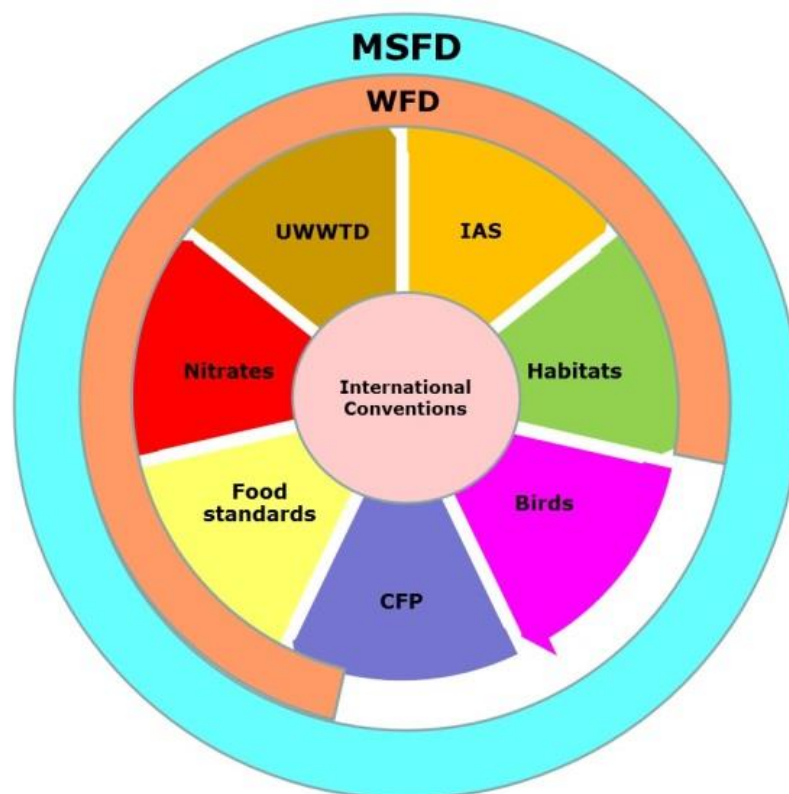


Figure 3: Illustration of the MSFD and WFD's framework nature through association with various other policies and international conventions (only a selection of relevant policies are shown: UWWTD - Urban Waste Water Treatment Directive; IAS - Regulation (EU) No 1143/2014 on invasive alien species; Habitats - Habitats Directive; Birds - Birds Directive; CFP - Common Fisheries Policy; Food standards - Regulation (EC) No 1881/2006 on contaminants in foodstuffs; Nitrates - Nitrates Directive).

Integration of the MSFD with these other policies can be considered in relation to the environmental objectives to be achieved, assessments against these objectives, spatial overlaps, monitoring requirements and the measures implemented to achieve the objectives. This paper focuses on the first three issues (in relation to Art. 9 and 8).

Following the overarching principle that other EU legislation should be used as much as possible for MSFD purposes, the GES Decision has set out specifically how the determination and assessment of GES is linked with the standards and assessments under other EU policies (such as WFD, Habitats Directive, Birds Directive and CFP).

In cases where the standards in these other EU policies are set only at national level the GES Decision requires the development of (sub)regional standards which are consistent with those national standards. This is to ensure compliance with Art. 5(2). Such (sub)regional standards have usually been or are being developed under the RSCs and other international agreements and could, where appropriate, contribute to ensuring consistency across these policies. This would achieve both coherence between policies (through not having different assessment outcomes for the same topic¹³) and reduce administrative burden (by assessing once, using for several policy needs).

Further details are given in section 5.8.

¹³ Provided that the same criteria and assessment scales are used for each policy.

2.6. An ecosystem-based approach and use of the DPSIR framework

The Directive calls for “an ecosystem-based approach to the management of human activities, which should ensure that the collective pressure of such activities is kept within levels compatible with the achievement of GES and that the capacity of marine **ecosystems** to respond to human-induced changes is not compromised, whilst enabling the sustainable use of marine goods and services by present and future generations” (Art. 1(3)).

Whilst the ecosystem-based approach has a number of facets, only its relevance in relation to the determination and assessment of GES is explored here.

The relationship between human activities, their pressures and the consequent **state** of the environment is encompassed within the well-established DPSIR (**D**rivers-**P**ressure-**S**tate-**I**mpact-**R**esponse) framework¹⁴ for environmental management.

Figure 4 shows a DPSIR framework with links to relevant MSFD articles. The framework has been modified¹⁵ for MSFD purposes to address ambiguities in use of the terms ‘driver’ and ‘impact’ and to accommodate the concept of **ecosystem services** more explicitly as the DAPSES-MMM framework.

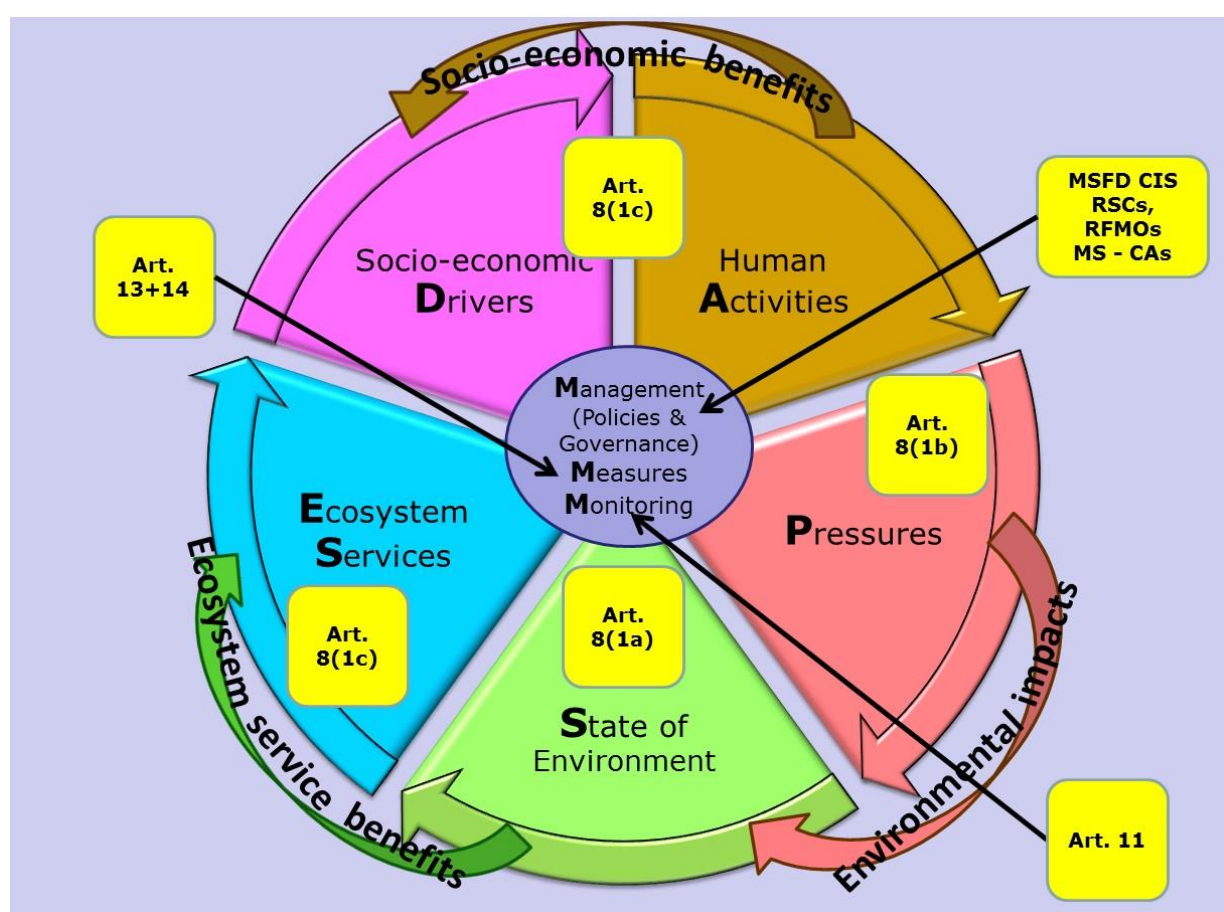


Figure 4: Modified DPSIR framework (DAPSES-MMM), showing links to relevant MSFD articles. MSFD CIS=MSFD Common Implementation Strategy, RSCs=Regional Sea Conventions, RFMOs=Regional Fisheries Management Organisations; MS-CAs=Member State Competent Authorities (based on [MSCG 11-2013-16](#)).

This model can be closely associated with the different main stages of MSFD implementation and thus follows much of the established understanding of how to improve environmental quality. The

¹⁴ See for example http://www.integrated-assessment.eu/guidebook/dpsir_framework.

¹⁵ Further explanation for this modified DPSIR framework is provided in [MSCG 11-2013-16](#), whilst a more detailed reflection is provided in the [State of Europe's seas](#) (EEA, 2015, Figure I.1).

Directive requires an economic and social analysis of uses of the marine waters and of the **cost of degradation** (Art. 8(1c), ~Drivers, Impacts on ecosystem services), pressures and impacts (Art. 8(1b), ~Pressures, Impacts on **environmental state**), and current environmental status (Art. 8(1a), ~State). In Art. 10 a set of environmental targets are to be established and in Art. 13 the Directive calls for a programme of measures to achieve these targets and consequently achieve or maintain GES (~Response).

Further details are given in section 4.1.

2.7. Priorities for MSFD implementation and use of risk-based approaches

Key message

Implementation, including use of risk-based approaches, will be most effective when focused on the anthropogenic pressures that are preventing the achievement of GES.

Management actions which help reduce these pressures should allow the marine environment to recover towards GES.

The broad subject matter and wide geographic scope of the Directive present significant challenges in its implementation, to ensure it can deliver satisfactorily according to its objectives in an effective and efficient manner. The complex and very broad scope of its biodiversity objectives and the offshore areas of Europe's marine waters, sometimes extending up to 350 nautical miles out from the coast and to depths of 5000m, present particularly challenging aspects. There remain many scientific uncertainties, especially to fully understand the relationships between anthropogenic pressures and their impacts on the marine environment, and on how the ecosystems will respond to particular management actions. In addition, there are many aspects where data and monitoring systems are not sufficiently developed or lack sufficient time series, giving uncertainties in how best to implement the directive.

The overall goal of the Directive, good environmental status, is expressed in high-level terms in the Art. 3(5) definition and through the eleven descriptors of MSFD Annex I. These provide for a potentially very wide need for monitoring and assessment, particularly concerning biodiversity, food webs and sea-floor integrity (descriptors 1, 4 and 6) and especially for those Member States where the marine waters are very extensive. At the same time, the mechanisms for Member States to achieve GES lie primarily in the control of the anthropogenic pressures which are causing **adverse effects** on the marine environment and hence preventing the achievement of GES. The alternative management mechanism, that of direct intervention to improve the status of the marine environment (such as restoration of species, habitats and areas), is unlikely to be possible or cost-efficient in other than a minority of situations. Both of these approaches are delivered via the programmes of measures (Art. 13).

With this reasoning, the implementation of the Directive can be most efficient when it is clearly focused on the anthropogenic pressures which are considered to be adversely affecting environmental status in each region or subregion, and on assessing the nature and scale of associated environmental impacts. With this approach, attention is drawn towards assessing the scale of the pressures and their impacts on particular aspects of the marine environment, rather than attempting to monitor and assess every possible aspect of the environment in all areas of marine waters. Such an approach can allow the majority of resources in Member States to be focused on those issues which can make the biggest contribution towards achieving GES, with lesser resources focused on lesser issues (pressures) and wider surveillance of the marine environment. The latter is however important in the role of monitoring 'unimpacted' areas and wider ecosystem changes, which help in understanding monitoring results that are focused on specific pressures and impacted ecosystem elements and areas.

The following provides a generalised step-wise approach to a prioritised implementation of the Directive:

- a. Assess the distribution and intensity of human activities which are generating pressures on the marine environment;

- b. Assess the distribution and intensity of the resulting pressures in the sea, identifying those which are of greatest concern;
- c. Identify those aspects of the marine environment (species, habitats, ecosystem functions and processes, areas) most (likely to be) affected by these pressures;
- d. Focus monitoring and assessment on those aspects (e.g. species, habitats, ecosystem functions and processes, areas) considered to be most at risk of adverse effects (environmental impact), in order to determine whether GES has been achieved or not. Monitoring can be focused on the boundary zone between 'good status' and 'not good status', with reduced efforts in areas where status is known to be good or known to be poor. This more limited monitoring in areas of good status however provides important reference data with which to compare the impacted areas and any change in status over time.
- e. Direct management responses (measures) towards those pressures and areas which are considered to be causing the greatest adverse effects (in terms of intensity and/or extent) and contributing most to any failure to achieve GES.

Member States may wish to focus implementation, in the short term, towards those aspects which will contribute most to improving the status of the marine environment and to reaching the overall goal of GES by 2020. The use of risk-based approaches can also play an important part in the delivery of the Directive, allowing a focus on those aspects (pressures, impacts and areas) which provide most risk to Member State's achievement or maintenance of GES.

Refer to section 7 for more specific information on application of risk-based approaches.

3. DETERMINATION OF GOOD ENVIRONMENTAL STATUS (ART. 3(5) AND 9, ANNEXES I AND III)

This section focuses on the provisions of the directive that relate to GES. The assessments of environmental status (Art. 8) in relation to the determination of GES are considered in section 4, whilst section 5 addresses how environmental status and progress towards GES can be defined. Section 6 addresses the establishment of environmental targets (Art. 10), which are needed when GES has not yet been achieved.

Sections 3 and 4 outline the main issues and framework for determining GES using the GES Decision. The actual updated determinations of GES, as required by Art. 17(2)(a), are to be prepared by Member States (working together in each (sub)region), leading to a more explicit, and where possible quantitative, determination of GES, together with an assessment of current environmental status (under Art. 8) in relation to this determination of GES.

3.1. Overall objectives of the Directive

Art. 1 sets the wider context within which GES is to be determined. This includes that:

- a. *"Member States shall take the necessary measures to achieve or maintain good environmental status in the marine environment by the year 2020 at the latest."* (Art. 1(1));
- b. *"[...] marine strategies shall be developed and implemented in order to:*
 - a. *protect and preserve the marine environment, prevent its deterioration or, where practicable, restore marine ecosystems in areas where they have been adversely affected;*
 - b. *prevent and reduce inputs in the marine environment, with a view to phasing out pollution [...], so as to ensure there are no significant impacts on or risks to marine biodiversity, marine ecosystems, human health or legitimate uses of the sea."* (Art. 1(2));
- c. *"Marine strategies shall apply an ecosystem-based approach to the management of human activities, ensuring that the collective pressure of such activities is kept within levels compatible with the achievement of good environmental status and that the capacity of*

marine ecosystems to respond to human-induced changes is not compromised, while enabling the sustainable use of marine goods and services by present and future generations." (Art. 1(3))

3.2. Provisions of the Directive in relation to GES

Key message

The determination of GES is progressively refined from its overall definition in MSFD Art. 3(5), through the descriptors of MSFD Annex I, elements in MSFD Annex III and criteria of the GES Decision to the region and subregion-specific determinations of Art. 9(1).

GES is defined in Art. 3(5) and further elaborated by the descriptors in MSFD Annex I. GES is further determined through the provisions of Art. 9. This is based firstly on EU-level criteria and **methodological standards** which are set out in the GES Decision, adopted under Art. 9(3), and secondly by Member States when determining the characteristics of GES in accordance with Art. 9(1). The determination of GES under Art. 9 is additionally guided by the indicative list of elements provided in MSFD Annex III.

GES is thus progressively refined from its high-level definition in Art. 3(5) via the Descriptors of MSFD Annex I, the elements of MSFD Annex III and the criteria and methodological standards of Art. 9(3) through to the more specific determinations of Art. 9(1). This is illustrated, with a worked example, in Figure 5. In this context, the term '**determination**' is taken to mean a more precise definition of GES than is provided in the Directive or the GES Decision, that allows for an assessment of whether GES has been achieved or not.

MSFD provision	Role/contents	Applied example
Art. 3(5) GES definition	Goal	GES by 2020: "the environmental status of marine waters where ..."
Annex I GES descriptor	Quality objective	Descriptor 1: "Biological diversity is maintained. The quality and occurrence of ..."
Annex III GES elements	Elements for determination of GES	Birds, mammals , reptiles, fish, cephalopods, pelagic habitats, benthic habitats, ecosystem
Art. 9(3) GES criteria and methodological standards	EU-wide minimum specifications: Criteria: a. Assessment elements b. Assessment parameters c. Threshold values Methodological standards: d. Assessment scale (generic) e. Criteria integration rules f. Output – extent to which GES is achieved	Example: Mammals a. List of mammal species groups (e.g. seals, small toothed cetaceans) b. By-catch rates, population size and condition, distribution, habitat c. (Sub)regional threshold values (consistent with values for FCS criteria in Habitats Directive) d. Region, subregion or subdivision scale e. FCS criteria integration rules f. Assessment values, status per species and overall for species group
Art. 9(1) Determination of GES	Sub(regional) specification by MS: a. Further specify criteria and methodological standards (e.g. RSC region/subregion-specific assessment elements, common indicators and assessment tools) b. Additional characteristics for region/subregion	Example: North-East Atlantic & Seals a. Harbour seal, grey seal (species agreed at (sub)region level) b. OSPAR common indicators: • M-3 Seal abundance and distribution • M-5 Grey seal pup production c. Subdivisions of subregions (nested approach) defined by MS via OSPAR
Art. 11(4) – Specifications and standardised methods for monitoring and assessment: e.g. EU-wide minimum specifications for spatial and temporal resolution of monitoring, monitoring methods (sampling, analysis, QA/QC), spatial and temporal aggregation of data for assessment		

Figure 5: Relationship of MSFD provisions for determining GES. The specificity of what constitutes GES increases from Art. 3(5) through to Art. 9(1). The generic role outlined in the central column is applied and worked through with an example for Descriptor 1 and the ecosystem component 'Mammals' in the right-hand column. Note that MSFD Annex III must also be taken into account.

Figure 5 presents an architecture for how the GES Decision under Art. 9(3) relates to determination of GES. This has been developed to ensure the role and contents of each provision are fully compatible and avoid overlap. This overall structure has arisen from the ongoing experiences in implementation of the Directive at EU, regional and national levels and is aimed at promoting greater coherence and consistency in the determination and assessment of GES in the next implementation cycles, including through the common use of particular terminology.

3.2.1. The definitions of environmental status and good environmental status (Art. 3)

The definition of environmental status in Art. 3(4) provides a holistic perspective on what needs to be taken into account in the 'state' of the environment, including:

- The structure, functions and processes of marine ecosystems;
- Natural physiographic, geographic, biological, geological and climatic **factors**;
- Physical, acoustic and chemical conditions, including those resulting from human activities.

The definition of good environmental status (GES) in Art. 3(5) further elaborates on this by defining the high-level goal of the Directive, i.e. what is 'good', by requiring the need to achieve or maintain GES, including¹⁶:

- Ecologically diverse and dynamic seas which are clean, healthy and productive;
- Use of the marine environment which is at a level that is sustainable;

¹⁶ The Directive also indicates the need to prevent deterioration (Art. 1(2a), 14(4)).

- c. Ecosystems which function fully and maintain their **resilience** to human-induced environmental change;
- d. Protection¹⁷ of marine species and habitats;
- e. Prevention of human-induced decline in biodiversity;
- f. Diverse biological **components** which function in balance;
- g. Hydro-morphological, physical and chemical properties of the ecosystems, including those properties which result from human activities, which support the ecosystems;
- h. Anthropogenic inputs of substances and energy, including underwater noise, do not cause pollution effects.

Good environmental status is 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), MSFD Annex I, MSFD Annex IV.2, IV.3, IV.10, IV.12, MSFD Annex V.1, V.4 and MSFD Annex VI.6.

3.2.2. GES Descriptors (MSFD Annex I)

Key message

The qualitative Descriptors of Annex I provide the basis for determining GES, either in relation to particular pressures and their impacts or directly for particular aspects of the state of the marine environment.

MSFD Annex I provides a set of eleven qualitative Descriptors for use in the determination of GES under Art. 9 (Table 1). These provide more specific objectives for GES than is provided in the Art. 3(5) definition.

Table 1: Qualitative descriptors for determining GES (from MSFD Annex I).

No.	Short name	MSFD Annex I text
D1	Biodiversity	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.
D2	Non-indigenous species (NIS)	Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.
D3	Commercial fish and shellfish	Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.
D4	Food webs	All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.
D5	Eutrophication	Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation , harmful algae blooms and oxygen deficiency in bottom waters.
D6	Sea-floor integrity	Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.
D7	Hydrographical conditions	Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.
D8	Contaminants	Concentrations of contaminants are at levels not giving rise to pollution effects.

¹⁷ Art. 1(2a) also refers to restoration of marine ecosystems, where practicable, in areas where they have been adversely affected.

No.	Short name	MSFD Annex I text
D9	Contaminants in seafood	Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.
D10	Litter	Properties and quantities of marine litter do not cause harm to the coastal and marine environment.
D11	Energy, including underwater noise	Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

The qualitative descriptors can be broadly characterised as relating to:

- Particular aspects of marine ecosystem state (which are potentially subject to any or multiple pressures): D1 (biodiversity), D3 (commercial fish and shellfish), D4 (food webs) and D6 (sea-floor integrity);
- Particular anthropogenic pressures (which can potentially affect any aspect of marine ecosystem state): D2 (non-indigenous species), D5 (eutrophication); D7 (hydrographical conditions); D8 (contaminants), D9 (contaminants in seafood), D10 (litter) and D11 (energy, including underwater noise).

It should be noted that this state and pressure categorisation at Descriptor level is not maintained at the criteria level in the GES Decision, where a more mixed pressure/impact/state approach per descriptor is followed, and where impact is, in effect, a particular reflection of state (see section 3.7).

3.2.3. GES elements (ecosystem elements and pressures of MSFD Annex III)

Key message

MSFD Annex III provides an indicative list of elements (state and pressure) to be used in determining GES and for assessing the extent to which it has been achieved.

It also provides an indicative list of uses and human activities in or affecting the marine environment, for use in relation to Art. 8(1)(b) and 8(1)(c).

MSFD Annex III provides indicative lists of ecosystem elements, anthropogenic pressures and human activities. In relation to GES, the first two lists provide the basis (together with the MSFD Annex I descriptors) for defining criteria and methodological standards under Art. 9(3) and are to be taken into account when GES is determined under Art. 9(1). These indicative lists comprise:

- Species groups** (of marine birds, mammals, reptiles, fish and cephalopods); **broad habitat types** of the water column (pelagic) and seabed (benthic) and other habitat types; ecosystem structure, functions and processes (physical and **hydrological**, chemical and biological characteristics, functions and processes) (MSFD Annex III Table 1), and
- Anthropogenic pressures (biological, physical, substances, litter and energy) which can adversely affect the state of the marine ecosystems and their elements (MSFD Annex III Table 2a).

Whilst the descriptors of MSFD Annex I provide the basis for determining the environmental quality (GES) which is to be achieved, the lists of MSFD Annex III can be considered as providing an indicative set of broadly-defined elements to be used for determining GES and consequently for assessments of whether GES has been achieved. These broadly-defined elements are further specified at EU level in the GES Decision and at (sub)region level by Member States under Art. 9(1) in order to provide clarity and consistency in how GES is determined and assessed (Figure 5).

The relationship between MSFD Annex I and the original MSFD Annex III was not explicit. The review of the Decision 2010/477/EU was therefore accompanied by a review of the original MSFD Annex III¹⁸, leading to both being updated in 2017. These revisions provide clarity on the relationships

¹⁸ [GES 14-2015-05](#), [GES 14-2015-06](#)

between MSFD Annex I, MSFD Annex III and the GES Decision, following the approach outlined in Figure 5. The role of MSFD Annex III is as follows:

- a. To provide an indicative list of elements and **parameters** for monitoring and assessment of state, pressure and impacts under Art. 8(1)(a), (b) and Art. 11, linked explicitly to the descriptors of MSFD Annex I. All eleven descriptors have been specifically linked to elements in MSFD Annex III. However MSFD Annex III includes additional pressures, which are not explicitly referred to in a descriptor but which should be considered where relevant under Art. 8(1)(b) assessments;
- b. To provide an additional indicative list of elements and parameters for monitoring which may be needed to support environmental assessments (e.g. physical and hydrological parameters useful for indicating wider climatic variation);
- c. To provide a new indicative list of uses and activities to be considered under MSFD Art. 8(1)(b). The list also distinguishes those uses and activities, which are 'sea-based' and thus relevant for Art. 8(1)(c) from those which are 'land-based' and thus only relevant for Art. 8(1)(b) in the context of the pressures they may generate on the marine environment.

In updating the lists for the revised MSFD Annex III, a review was made of other key policies and those used by the RSCs to ensure the lists were comprehensive.

GES elements are further specified in the GES Decision (section 4.4).

3.2.4. GES criteria and methodological standards (Art. 9(3); GES Decision)

Key message

The criteria and methodological standards under Art. 9(3) and specifications and standardised methods under Art. 11(4) provide EU-wide minimum requirements for the determination and assessment of GES.

The Commission has delegated powers under Art. 9(3), and in accordance with the provisions of Art. 25, to lay down criteria and methodological standards to be used by Member States *“to ensure consistency and to allow for comparison between marine regions or subregions of the extent to which GES is being achieved”*.

Art. 3(6) defines 'criteria' as *“distinctive technical **features** that are closely linked to qualitative descriptors”*. To fulfil their role these criteria need to include quality elements, parameters and quality standards (criteria threshold values). Therefore, criteria cannot be less distinctive than the descriptors given in MSFD Annex I and they should enable assessment of the status of the elements in MSFD Annex III. Monitoring and assessment in relation to these criteria should follow the **specifications and standardized methods** set in accordance with Art. 11(4).

The first use of Art. 9(3) led to Decision 2010/477/EU which guided, in particular, the 2012 stage of implementation and the 2014 monitoring programmes. The application of Decision 2010/477/EU revealed that it provided insufficient detail and clarity to support the determination of GES¹⁹ leading to its revision in 2017. The following specifications are included in the revised GES Decision:

- a. Elements for assessment (of whether GES has been achieved) (section 4.4);
- b. Criteria for assessment of the elements, including parameters to be used (section 4.3);
- c. Reference levels for assessing quality and trends (threshold values between GES and not in GES) (sections 5.4-5.5);
- d. Assessment scales (section 4.5);

¹⁹ Commission's Art. 12 report: [Commission Report on the first phase of implementation of the MSFD](#) and [Commission Staff Working Document on the first steps in the implementation of the MSFD - Assessment in accordance with Art. 12](#).

- e. Use of the criteria (e.g. to express the extent to which GES is achieved, or for other descriptor assessments) (section 4.3, 5.9);
- f. How the output of the assessments should be presented to express the extent to which GES has been achieved (section 5.9);
- g. Approaches to and methods for monitoring to collect the data needed for assessment;
- h. Aggregation methods for the data (spatial, temporal);
- i. Units of measurement for the criteria.

Where available, the elements, threshold values and methods for use of criteria are drawn from existing EU policies (section 2.5 and section 5.8) and where not the GES Decision makes provision for these to be set at EU, regional or subregional level. The information provided for points (g) and (h) is not complete.

The criteria and methodological standards under Art. 9(3) and specifications and standardised methods under Art. 11(4) provide EU-wide minimum requirements for the determination and assessment of GES.

To avoid confusion between the use of the term ‘criteria’ in this specific context and its use in other respects (such as criteria used to guide *indicator* selection or selection of species for assessments), it is recommended that these specific criteria be referred to as ‘GES criteria’.

3.3. Relationship between the Directive and the GES Decision

Key message

The GES Decision provides a common EU-level framework for determining GES.

The determination of a set of characteristics of GES under Art 9(1) by Member States provides specificity to these criteria and methodological standards for each region or subregion.

The interrelationships between Articles 8 and 9, Annexes I and III and the GES Decision are illustrated in Figure 6. The integrated implementation of these provisions is described in section 4.

Art. 9(3) provides for criteria and methodological standards to be laid down *“in such a way as to ensure consistency and to allow for comparison between marine regions or subregions of the extent to which good environmental status (GES) is being achieved”*, whilst Art. 9(1) provides for Member States to determine a set of characteristics of GES, without specific reference to the criteria set under Art. 9(3).

The inter-relationship between these two provisions can be considered as follows:

- a. The GES Decision provides a common EU-level framework for determining GES, thereby helping to ensure consistency across the marine regions in the determinations of GES; it does this through specifying (in generic terms or providing for these to be specified at EU or (sub)regional level) the elements, parameters and geographic scales of assessment, the threshold values for each criterion and methods for use of the criteria;
- b. The determination of a set of characteristics of GES under Art 9(1) by Member States provides specificity to these criteria and methodological standards for each region or subregion, thereby reflecting the particular ecological characteristics and differing nature of pressures in each region or subregion. Additional characteristics, not included in the GES Decision, can be included in this determination.

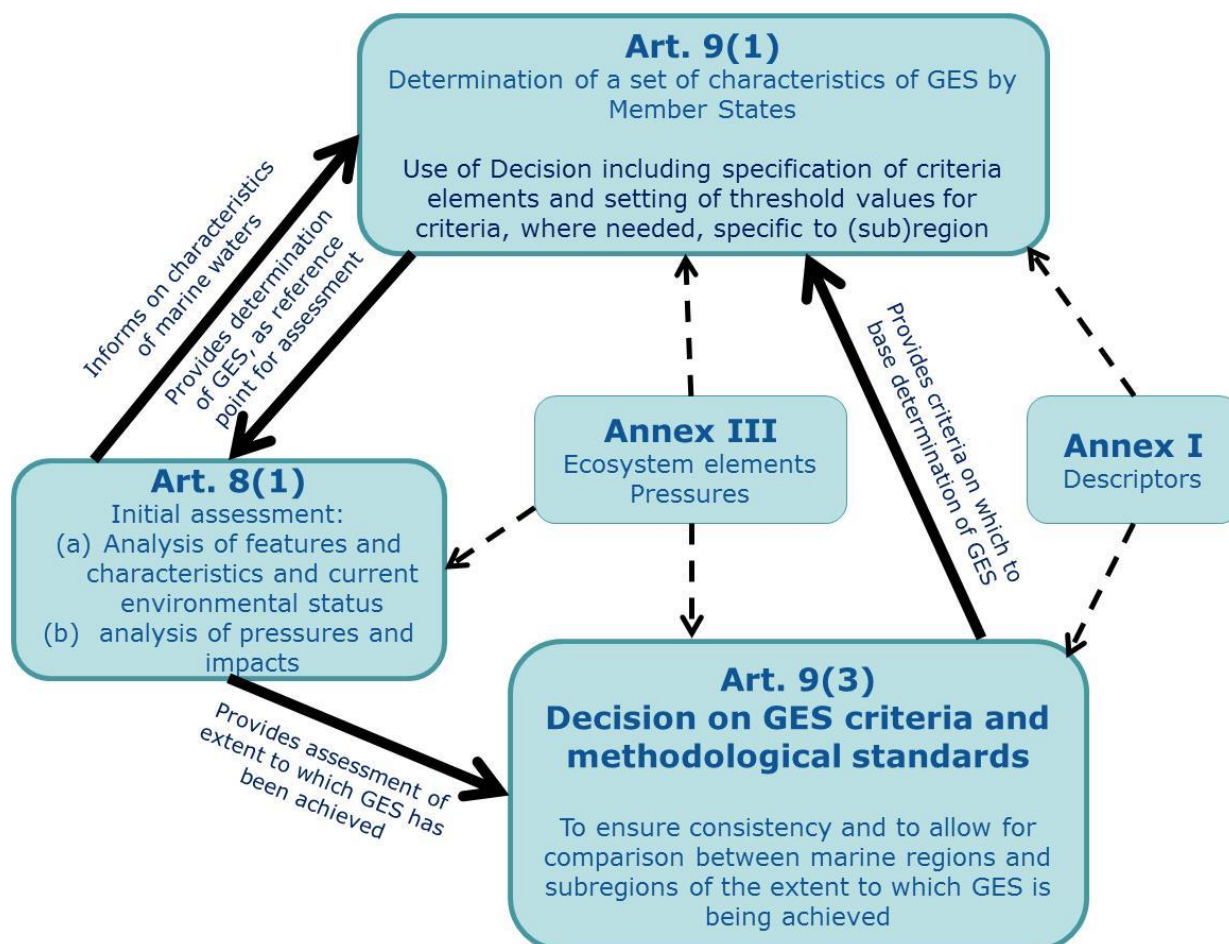


Figure 6: Relationship between the GES Decision and MSFD Art. 9(1), 8(1) and Annexes I and III.

The GES Decision therefore provides a basis and structure for determining GES, providing a further level of detail to that of Annexes I and III. However, it does not in itself provide a determination of GES, as this requires the additional specificity to be set by Member States for each region or subregion.

3.4. Relationship between GES (Art. 9) and assessments (Art. 8)

Key message

Updating of the determination of GES and of the initial assessment, required under Art.17(2)(a), should be coherent and consistent.

The determination of GES forms the benchmark against which to assess current environmental status.

The determination and assessment to be reported in 2018 should be based on Decision (EU) 2017/848, to the extent possible given the timing of its adoption, and allow for comparison between marine regions or subregions of the extent to which GES is being achieved.

In the 2012 stage of the first implementation cycle, the determination of GES needed to take account of the initial assessment, as well as the criteria in Decision 2010/477/EU. The initial assessment was particularly relevant for identifying the specific ecological characteristics and pressures and impacts for each region or subregion, thus providing a basis upon which to determine GES. In this sense the determination of GES in 2012 could be considered as dependent upon firstly undertaking the initial assessment and therefore considered as a subsequent step in the implementation process. In practice, most Member States followed this approach and thus did not specifically use the 2012 determination of GES as the benchmark for their assessment of current environmental status in 2012.

The Directive does not make clear the relationship between the determination of GES under Art. 9 and the assessments (of current environmental status and of the pressures and their impacts) under Art. 8. However, from the overall purpose of the directive, it is logical that the determination of GES forms the benchmark against which to assess current status.

In subsequent implementation cycles (Art. 17(2)(a)) the updating of the GES determination should be done in close association with updating of the initial assessment, as the two elements are intricately linked. The updated assessments of current environmental status and of the pressures and their impacts should reflect the most recent GES determinations, including use of the 2017 GES Decision.

3.5. Relationship between GES (Art. 9) and environmental targets (Art. 10)

Key message

Art. 9 and Art. 10 have distinct roles in the MSFD implementation process, each with different legal obligations which are not interchangeable.

Art. 9 and Art. 10 have distinct roles in the MSFD implementation process, each with different legal obligations which are not interchangeable. The main purpose of Art. 9 is to determine the specific environmental objectives of the Directive (i.e. what is GES) in sufficient (and where possible quantifiable) detail to be able to know whether they have been achieved or not for the different descriptors and in accordance with the overall definition in Art. 3(5). The main purpose of Art. 10 is to establish a set of environmental targets to guide progress towards achieving these objectives (GES). This indicates that Art. 10 provides a declaration of intent to take action, compared with the objective-led role of Art. 9. For example, setting an environmental target for the maximum allowable input of nutrients to the sea in order to lead to nutrient levels in the sea which do not give eutrophication effects.

This 'declaration' is then taken up through the Programmes of Measures (Art. 13) as the *“measures shall be devised on the basis of the initial assessment ... and by reference to the environmental targets”* (Art. 13(1)). To continue the example above, nutrient input reduction targets could be achieved through various possible measures, such as controls on the use of fertilisers in agriculture or the use of phosphates in detergents, and by improving urban waste water treatment.

Targets thus provide an operational tool, used in conjunction with the programme of measures, for the management of human activities and for actions which should lead to improvements in the environmental status of marine waters and ultimately to GES.

3.6. Consistency between Member States in the determination of GES (Art. 3(5), 5(2))

Key message

GES shall be determined at the level of the region or subregion (Art. 3(5)).

The provisions of the Directive and the GES Decision provide for levels of consistency in the determination of GES, partly at EU level and partly at (sub)regional level.

This EU and (sub)regional consistency is important to ensure a ‘level playing field’ across Member States in the different stages of the MSFD implementation process.

From the overview given in Figure 5 it can be seen that some aspects of GES determinations are laid down in the Directive and in the GES Decision, whereas further specifications are determined, where needed, at regional and subregional level via Art. 9(1). This task under Art. 9(1) is the responsibility of Member States and should be undertaken in collaboration with other Member States, as required under Art. 5(2), in order to ensure GES is determined at the level of the marine region or subregion in accordance with Art. 3(5). This should be achieved using, where practical and appropriate, existing regional institutional cooperation structures, including those under the RSCs (Art. 6). The provisions of the Directive thus provide for levels of consistency in the determination of GES, partly at EU level and partly at (sub)regional level. This EU and (sub)regional consistency is important to ensure a ‘level playing field’ across Member States in the different stages of the MSFD implementation process.

3.7. The nature of a GES determination – state, impact and pressure

Key message

The determination of GES addresses, through the eleven descriptors, aspects relating to the state of the marine environment, and to the levels of pressures in the marine environment and their associated impacts.

Assessments of progress towards achieving GES are therefore encompassed within both Art. 8(1)(a) and 1(b).

The determination of GES concerns the desired state of the marine environment, including the structure, functions and processes of its constituent marine ecosystems. This is reflected in the state-based definition of GES in Art. 3(5) and in the general theme of the descriptors in MSFD Annex I, which either express a particular state which is to be achieved or a particular state to be achieved in relation to a specific pressure.

Because the environment can be adversely affected (impacted) by pressures from human activities, GES can also be expressed in relation to specific environmental impacts (i.e. a more specific way to express the desired state which relates directly to the particular anthropogenic pressures). For example, nutrient enrichment can lead to changes in plankton biomass (chlorophyll-a concentrations) and to oxygen depletion, and thus provide a focus for how to determine GES for Descriptor 5 on eutrophication.

Determining GES can also include defining the acceptable levels of pressures in the marine environment. This is because:

- a. the 'pressures' may be deviations from natural conditions (e.g. nutrients, certain contaminants, underwater noise) and thus can also be considered state elements²⁰;
- b. there can be a known causal relationship between the level of the pressure and its adverse effects (impacts) on marine ecosystem elements, enabling a level of pressure to be determined which should ensure acceptable levels of impact on ecosystem elements. For example, the levels of nutrient enrichment and hazardous substances in the sea (for Descriptors 5 and 8) which are considered to 'equate' to GES, can be determined based on established effects (impacts) on particular ecosystem elements²¹;
- c. an 'acceptable pressure level' in the marine environment is needed for situations where the pressure-impact relationship is not yet fully understood. This should follow the precautionary principle, by using precautionary levels of the pressure until the knowledge gaps for determining the pressure-impact relationship are closed, allowing for refinement of the 'acceptable pressure level' over time, based on improved understanding. For litter (D10) and underwater noise (D11), scientific understanding of impacts on the environment is currently more limited and so setting precautionary pressure levels may be the only feasible option at present.

This approach is relevant for each of the pressure-based descriptors, such that the desired levels in the marine environment of non-indigenous species (D2), fishing mortality (D3), enriched nutrients and organic matter (D5), physical disturbance (D6), physical loss and associated alteration of hydrographical conditions (D6, D7), contaminants (D8, D9), litter (D10) and inputs of energy, including underwater noise (D11) should be determined under Art. 9. It can also be relevant where the pressure is easier to measure than the associated/affected ecosystem elements. Further pressures, such as those listed in MSFD Annex III Table 2a but which are not specified in one of the

²⁰ This is in line with SWD(2014) 49 Annex IV, as determining and assessing levels of pressures in the marine environment can also be expressed as 'state' measurements.

²¹ For contaminants, the levels set for application under WFD (Environmental Quality Standard values) relate to an effect level shown in laboratory testing of certain animal species rather than effects detected in the marine environment itself.

descriptors, could also be included in a GES determination. This consequently means that levels of nutrients, contaminants, litter and noise in the sea are referred to as the level of the pressure in the marine environment and are needed to assess their impacts²² on state elements (species, habitats, food webs or wider ecosystem) of the marine environment²³.

It is common practice to determine both the acceptable pressure level and the associated state characteristics which are considered to be good status (e.g. for D5 eutrophication, for D3 commercial fish and shellfish). It seems likely that both aspects will continue to be needed in the forward implementation process, enabling responses to measures to be assessed (via reductions in the level of pressure in the sea) and consequent improvements in environmental status to be seen (via reductions in impacts and recovery of the ecosystem).

From the above, and due to the nature of the Annex I Descriptors which focus on pressures and their impacts, assessments of environmental status (in relation to the determination of GES) are not confined to Art. 8(1a), but can also include those under Art. 8(1b)²⁴.

3.8. Updating the determination of GES (Art. 17(2))

Key message

Updates of the determination of GES should take account of:

- a. Decision (EU) 2017/848;**
- b. Advances in scientific and technical understanding;**
- c. Changes in ecosystem dynamics since the last determination.**

The directive provides in Art. 17 for a six-year updating of each element of the marine strategies. For GES, this is a key mechanism to refine the determinations to take account of developments since the previous determination in 2012²⁵ including:

- a. The 2017 GES Decision;
- b. Advances in scientific and technical understanding since the last reporting under Art. 9;
- c. Changes in ecosystem dynamics which justify a modification to the 2012 determination of GES (section 5.7).

This update should be considered as a refinement of the determination (e.g. making it more clear and precise), rather than changing the overall quality level that is to be achieved.

The updates can be considered at two levels of detail:

- a. A generic level which sets out the objectives to be achieved by the Member State within each (sub)region. This is likely to be a qualitative description of GES, expressed at descriptor and/or criterion level, based respectively on the Annex I Descriptors and the GES Decision criteria. This qualitative description should express GES in a way which is adjusted to the characteristics of the (sub)region and be consistent with that of other Member States in that (sub)region.
- b. A specific level which sets out the particular characteristics of GES, including the threshold values for each relevant criterion, in each (sub)region. It should also express the proportion of each assessment area (or **criteria element**, where appropriate) that should achieve these

²² For 'analysis of predominant pressures and impacts' for Art. 8(1b) assessments.

²³ The rationale behind this pressure/impact/state terminology is further explored in GES_13-2015-02 Annex 2.

²⁴ Note, Art. 8(1b) may also include assessments in relation to environmental targets, e.g. targets to reduce the input of pressures to the marine environment.

²⁵ Some Member States prepared updates of their GES determinations (and environmental targets) following the specific recommendations of the Commission's 2014 assessment of the 2012 reporting ([COM\(2014\)97](#)).

threshold values (GES Decision, Recital 16) (see section 5.3). This level of specificity is closely linked to the assessments under Art. 8 and should enable an assessment of the extent to which GES has been achieved (section 5.9).

The updated set of characteristics for GES should include:

- a. Identification of the specific characteristics for each region or subregion, such as the specific criteria elements relevant or not relevant to the (sub)region;
- b. Determination of threshold values where these are not yet provided in the GES Decision;
- c. Determination of the proportion of marine waters or proportion of criteria elements per assessment area over which the threshold values are to be achieved to constitute GES.

It should also be clear, via reporting of methodological standards under Art. 8, how the criteria will be integrated to conclude on the overall status of particular descriptors (e.g. D5) or particular criteria elements (e.g. D3 species and D1 species and species groups).

4. INTEGRATED APPROACHES TO DETERMINING GES AND ASSESSMENTS

Key message

The determination of GES (Art. 9) and assessments (Art. 8) are intricately linked, indicating a need to structure both assessment and determination in a mutually compatible way.

Assessments need to be on specified topics (elements) in defined parts of marine (sub)regions/marine waters.

Each assessment needs a clear means to express the extent to which GES has been achieved in each assessment area.

The intricate link between Articles 8 and 9 and with the GES Decision (section 3.3 and 3.4, Figure 6) indicates a need to structure both assessment and determination in a mutually compatible way. Assessments need to be on specified topics (elements) in defined parts of marine (sub)regions/marine waters (**Marine Reporting Units** – see section 4.5) and should lead to a clear expression of the extent to which GES has been achieved. This structuring is shaped by MSFD Annex I (i.e. the descriptors) and the requirements of Art. 8(1) (particularly Art. 8(1)(a) and 8(1)(b)), and supported by MSFD Annex III and the GES Decision, the latter indicating how the extent to which GES has been achieved should be expressed.

4.1. General framework - activities, pressures, impacts and state

Section 2.6 introduced the DAPSES (DPSIR) framework as an underlying basis for implementation of the Directive. In section 3.4, the inter-relationships between the determination of GES and its assessment were outlined. In this section, these two aspects are further elaborated.

The activity-pressure-(impact)-state part of the DAPSES framework can be directly related to the needs of the Art. 8 assessments, where an integrated approach to the assessments, across all GES descriptors and between pressures and state, is needed. This is because an assessment of current environmental status (Art. 8(1)(a)) is, in effect, an assessment of the state of the environment that reflects the range of environmental impacts (adverse effects), including cumulative impacts/effects, acting upon it. As these impacts are in turn caused by the pressures exerted on the environment by human activities (Art. 8(1)(b)), these elements of the initial assessment can be considered to be intricately linked. These relationships, for multiple activities, pressures and state elements, are illustrated in Figure 7.

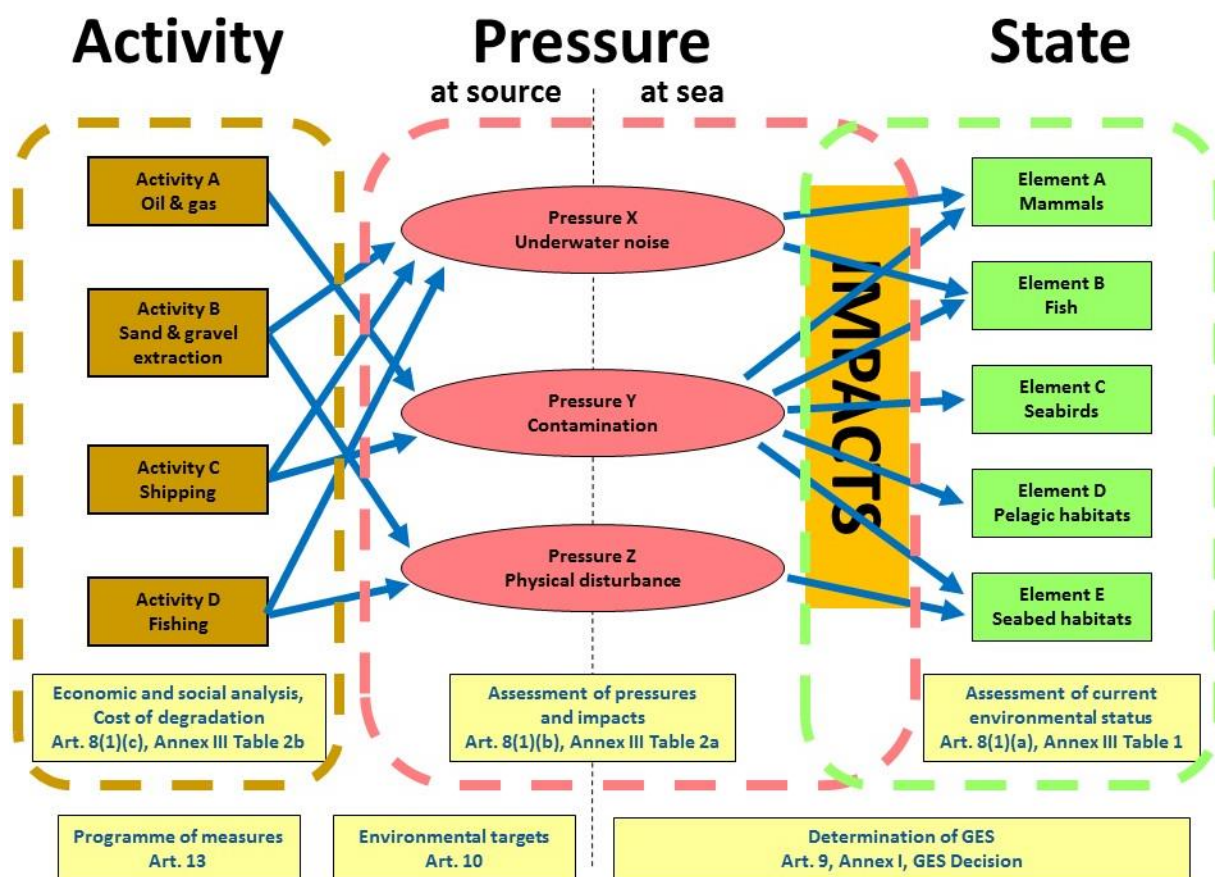


Figure 7: Conceptual relationship between human activities, the pressures they exert on the environment and the consequent state of the environment, taking account of the impacts (adverse effects) from the pressures. Each is indicated with illustrative examples. The links to the three parts of Art. 8(1) assessments and the associated Tables in MSFD Annex III are shown, together with the main scope for Art. 9 (determination of GES), Art. 10 (targets) and Art. 13 (programme of measures). Modified from [European Commission \(2012\)](#).

Pressures can be considered in two ways:

- a. At source – i.e. close to the activity generating the pressure. This aspect is particularly relevant for setting environmental targets and for measures as these need to focus on reducing the pressures in order to achieve or maintain GES. Some pressures, such as nutrients, contaminants and litter, are generated on land and enter the marine environment as diffuse sources (including via the atmosphere). Pressures generated by sea-based activities may remain closely associated to those activities (e.g. extraction of species by fishing and physical disturbance by dredging), while others may dissipate away from the activity (e.g. contamination from oil extraction activities, noise from shipping);
- b. At sea – i.e. the level of the pressure in the marine environment (to which the different elements of the ecosystem are subjected). This aspect is particularly relevant for determining GES (for the pressure-based descriptors) and for assessment of environmental status in relation to GES.

Figure 7 additionally shows the main scope of Art. 9, 10 and 13 in relation to activities, pressures, impacts and state:

- a. Art. 9 GES should be determined by reference to both state elements covered by Art. 8(1)(a) and pressure and impact elements covered by Art. 8(1)(b), noting that this refers to the levels of pressure in the marine environment (at sea);

- b. Art. 10 environmental targets should focus on addressing the pressures which are preventing GES from being achieved, or which risk the maintenance of GES. In this case, the targets should focus on the pressures at source, although pressure reduction at sea may also be desirable (e.g. for litter);
- c. Art. 13 programmes of measures are likely to be most effective when directly addressing those activities contributing to the generation of the pressures (which are preventing GES from being achieved).

These links to the DAPSES (DPSIR) model are important regarding the application of the terms pressure, impact and state (status) as used in the directive. Because the prime focus of the Directive is the achievement of GES, requiring assessments of environmental status and progress towards achievement of GES, these terms need to be used in this context²⁶. Table 2 provides illustrated examples of each term to help demonstrate their application, differences and relationships.

Table 2: Selected examples of the terms activity, pressure, impact and state, as relevant to different MSFD descriptors.

Descriptor	Activity	Pressure at source	Pressure at sea	Environmental impact (adverse effect)	State (status)
D2	Ship/boat transport	Introductions of non-indigenous species via ship hulls and ballast water	Populations of NIS established in marine waters	Changed composition of native marine communities, displacement of native species	Altered condition of pelagic and benthic communities, and bird, mammal and fish communities.
D3	Fishing	Removal of commercial fish and other (non-commercial) species		Mortality of fish and other species	Reduced population size, altered age/size structure of population
D5	Agriculture	Introduction of nutrients through rivers or directly from land	Raised nutrient levels (enrichment) in sea	Increased algal productivity, oxygen depletion, benthic mortality, fish mortality	Altered condition of plankton and benthic communities, hypoxia/anoxia
D6	Fishing (demersal/ benthic)	Physical disturbance of seabed		Changes in sediment structure, injury and mortality of species	Altered benthic community and habitat condition
D6/D7	Infrastructure developments	Change in seabed substrate (e.g. to concrete, metal)		Loss of natural habitat, altered hydrological conditions (D7)	Habitat loss, altered habitat condition (hydrological conditions and community)
D8/D9	Industry (emissions)	Contaminants in atmosphere	Contaminants in water, sediment and biota	Effects of contaminants on life history aspects of species; accumulation of contaminants in seafood and human health effects	Altered condition of species (e.g. reproductive ability)
D10	Tourism	Input of litter – discarded on beach	Litter on seabed	Smothering of benthic habitats, injury to marine animals	Altered habitat condition, affected condition or population size of

²⁶ In other situations, the terms are used in different ways, such as referring to the levels of contaminants in water as a 'state' measurement.

Descriptor	Activity	Pressure at source	Pressure at sea	Environmental impact (adverse effect)	State (status)
					species
D11	Pier-piling for wind farms	Noise from piling	Noise level in sea	Disturbs cetaceans, moving away from noise	Altered species distribution

Because the use of these terms across policies and countries is quite variable, it is important for MSFD purposes to apply them in a consistent manner. 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 by the RSCs²⁷, the term pressure in this document is as defined in Annex I.

4.2. Integrated approaches: descriptor level

Key message

The pressure-based descriptors can be assessed as predominant pressures and their impacts to contribute to the needs of Art. 8(1)(b).

The state-based descriptors can be assessed as specified elements of marine ecosystems (e.g. birds, mammal, seabed habitats) to fulfil the needs of Art. 8(1)(a), taking into account the impacts from the pressures assessed under Art. 8(1)(b).

This structured approach can provide clarity on how to assess the extent to which GES is achieved, and is supported by the structure of the GES Decision.

The eleven GES descriptors and their separate treatment in (now repealed) Decision 2010/477/EU fostered processes for MSFD implementation in the first cycle which typically maintained the descriptors in 'silos' without a strong integration that reflects their inter-connectedness and the ecosystem-based approach which is sought in Art. 1(3).

The assessment (Art. 8(1))²⁸ and the descriptors (section 3.2.2) fall into two broad themes:

- Assessments of pressures and their impacts - Art. 8(1)(b), descriptors 2, 5, 8, 9, 10 and 11, together with the additional main pressures of MSFD Annex III Table 2a: 'extraction of wild species' (descriptor 3), 'physical disturbance' (descriptor 6), 'physical loss' and associated 'hydrological changes' (descriptors 6 and 7)²⁹. The other pressures listed in MSFD Annex III Table 2a should be assessed where relevant;
- Assessments of ecosystem state – Art. 8(1)(a), descriptors 1, 3, 4 and 6 and MSFD Annex III Table 1.

Figure 8 illustrates how these two broad themes can be organised. Art. 8(1)(b) is undertaken as a set of pressure-impact assessments ('satellites'), with the outcomes concerning impacts being used to feed into assessments of a specified set of ecosystem elements for Art. 8(1)(a) ('pizza slices').

²⁷ [GES 13-2015-02](#)

²⁸ There is additionally an economic and social analysis of the use of marine waters and of the cost of degradation of the marine environment (Art. 8(1c)). These uses are relevant as they can generate pressures, whilst the costs of degradation can relate to costs for recovery from impacts and of reducing pressures, where needed.

²⁹ In the GES Decision, Descriptors 3 and 6 include pressure and impact criteria and are therefore addressed firstly under Art. 8(1b), due to the significance of these pressures/impacts, before considering them under Art. 8(1a) as state-based descriptors.

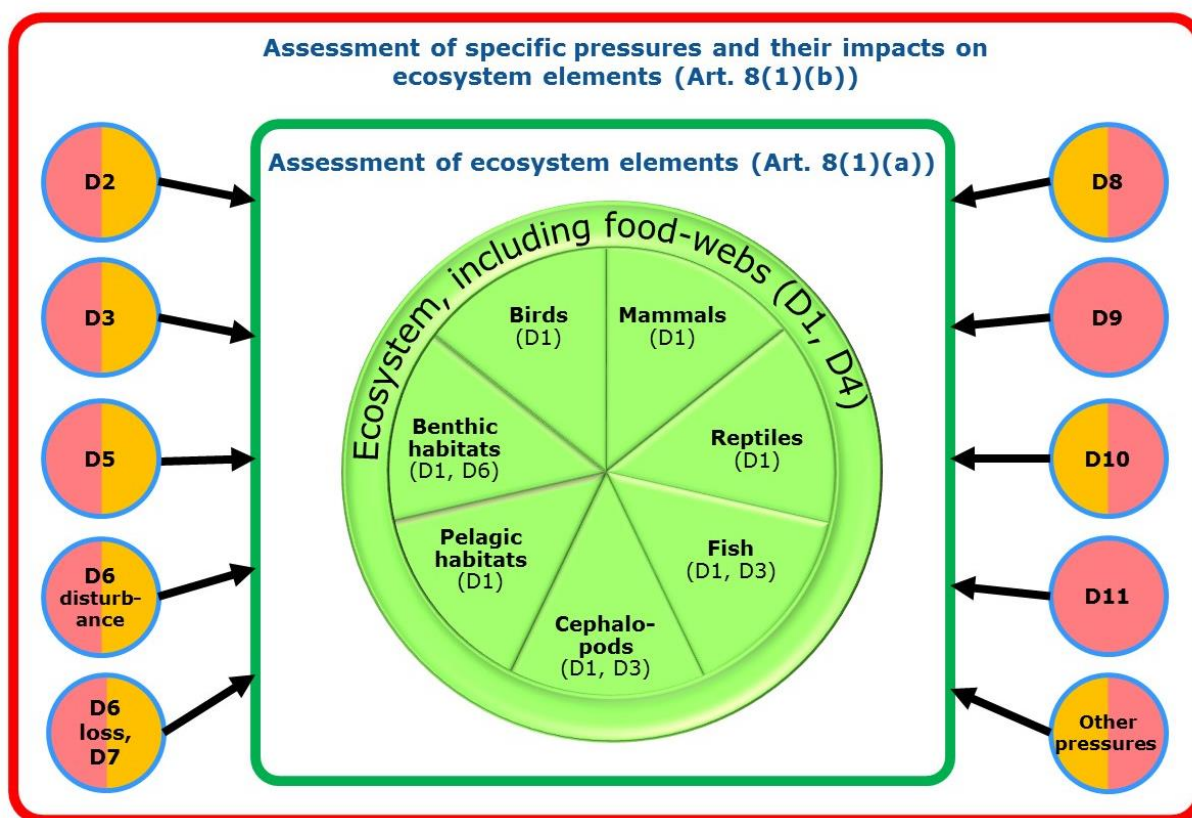


Figure 8: An ecosystem-based approach to determination and assessment of GES follows the main elements of the ecosystem (state-based descriptors, centre) and is closely linked to the adverse effects of pressures from human activities via their environmental impacts (pressure-based descriptors, satellite circles, in which pink depicts pressure and orange the impact). Note that descriptors D2, D3, D5, D6, D7, D8 and D10 include both pressure and impact criteria in the GES Decision. For D11, impact criteria are not yet available. For D9 the 'impact' is built into the 'pressure' via the setting of the environmental quality standard (EQS) levels for the contaminants³⁰ and is not assessed separately.

The main elements of marine ecosystems from MSFD Annex III (birds, mammals, reptiles, fish and cephalopods, and pelagic and benthic habitats including their biological communities) structure the state-based assessments, integrating the state-based descriptors. These elements are complemented by the whole ecosystem perspective, reflected by structure and functional aspects of Descriptors D1 and D4.

This approach has the following benefits:

- It brings structure and functional aspects of ecosystems together at an appropriate resolution (i.e. within each main ecosystem element rather than only at the whole ecosystem level);
- It relates more readily to practical monitoring and assessment processes (e.g. monitoring of birds, mammals and fish is typically undertaken separately using different techniques);
- It links more effectively to management needs, relating more specifically to pressures and human activities which can be managed in specified areas in order to achieve a desired outcome;
- It facilitates assessment of cumulative effects of multiple pressures on the ecosystem, whereby the impacts assessed under individual pressures (Art. 8(1)(b)) can be considered collectively for the assessments of each element under Art. 8(1)(a).

³⁰ This is also the case for D8 contaminants; however the GES Decision includes an impact criterion (effects on biota) for D8 but not for D9.

A focus on a specific set of assessments thereby provides a way of dividing the complexity of marine ecosystems in each (sub)region into a set of more manageable units for monitoring, assessment, target setting and measures.

The structure outlined here and Figure 8 (for assessments), which is reflected in the GES Decision, sets out the level at which to assess whether GES has been achieved or not. With this overall approach, the achievement of the goals of the directive is not encompassed within a single overall assessment, but spread over a number of defined components. This has the following key advantages:

- a. It ensures that achieving GES can be measured as a set of smaller goals, which together contribute to the overall goal laid down in Art. 1(1), thereby allowing progress towards GES to be expressed in a more tangible manner;
- b. It provides an indication of whether there is need for particular (additional) environmental targets under Art. 10 and (additional) measures under Art. 13 in order to reach GES (bearing in mind that in some cases all necessary targets and measures may have been put in place but the ecosystem may not yet have reached GES due to slow response times);
- c. It provides an important means to express to stakeholders and the public the progress being made in implementation of the Directive and achievement of its overall goals.

Whilst this structure has these practical advantages, this compartmentalisation may mask some elements of an ecosystem-based approach; these could be addressed by more holistic assessments of ecosystem structure and functions (including food webs).

4.3. Integrated approaches: criteria level (GES Decision)

Key message

The pressure-impact assessments under Art. 8(1)(b) should, where possible, provide outcomes on impacts which are directly relevant to assessments of ecosystem elements under Art. 8(1)(a).

These state-based assessments need to reflect the impacts upon each state element from all the (predominant) pressures to which each is subject.

To support this connection, the scales of assessment and resolution of the ecosystem elements used under Art. 8(1)(a) and (1)(b) should be compatible.

The following provides a logical sequence for Art. 8 assessments:

- a. **Map the distribution and intensity of human uses and activities;**
- b. **Assess the spatial distribution and intensity (and temporal aspects, where necessary) of each (predominant) pressure;**
- c. **Assess the extent of environmental impacts from these pressures in relation to the elements to be used for the state-based assessments;**
- d. **Assess the state, bringing together the relevant assessments of impacts from (c) to lead to an overall assessment of status per ecosystem element.**

The GES Decision has been structured to make explicit its relationship to MSFD Annexes I and III, and to the assessments required under Art. 8(1)(a) and (1)(b). It also supports a more integrated approach to the determination and assessment of GES (section 4.2, Figure 8), as does the structure and content of the revised MSFD Annex III. This has been achieved by:

- a. Structuring the GES Decision in two parts, each referring explicitly to the relevant Descriptors of MSFD Annex I, to the indicative elements of MSFD Annex III and to the relevant paragraphs of Art. 8(1);
- b. Part I of the GES Decision supports the assessments required under Art. 8(1)(b) concerning an analysis of the predominant pressures on the marine environment and their impacts; it

includes the criteria and methodological standards for the pressure-related descriptors which are directly linked to the indicative list of pressures in MSFD Annex III Table 2a; there are additional pressures in this table which are not linked to a pressure-based descriptor and thus have no GES criteria defined. They, nevertheless, may be of importance in some areas and for some ecosystem elements and therefore warrant assessment;

- c. Part II of the GES Decision supports the assessments required under Art. 8(1)(a) concerning an analysis of the essential *features* and characteristics and current environmental status; it includes the criteria and methodological standards for the state-related descriptors which are directly linked to the indicative list of ecosystem elements in MSFD Annex III Table 1;
- d. The pressure-related descriptors are presented first (Part I), as logically these should be considered first under the Art. 8 assessments in order to provide information on the level of impacts from each of the pressures assessed. These assessments of impacts should then inform the assessments of the different ecosystem elements (Part II), whose overall status effectively reflects the sum of the impacts from all the pressures to which they are subject.
- e. To ensure the predominant pressures of MSFD Annex III Table 2a are adequately addressed under Part I, the criteria relating to fishing pressure (extraction of species) and to physical loss and disturbance have been placed in this part, even though labelled in relation to the state-based descriptors D3 and D6. Criterion D3C1 addresses the impacts of fishing on commercial species (the level of mortality), whilst criteria D3C2 and D3C3 address the state of commercial fish and shellfish to be considered also under Part II. Criteria D6C1, D6C2 and D6C3 have their origins in the D6 criteria of Decision 2010/477/EU, and are focused only on the assessment of the pressures 'physical loss' and 'physical disturbance'; they provide an important component to the broader assessment needed for Descriptor 6, which is addressed fully in Part II (in combination with assessments of seabed habitats of Descriptor 1).

The interrelationships between the relevant parts of Art. 8, the MSFD Annex I Descriptors, the ecosystem elements and pressures of MSFD Annex III, and the criteria in the GES Decision are provided in the framework for assessment shown in Figure 9.

This framework leads to two sets of assessments as shown in Figure 8:

- a) Undertaking a set of pressure-impact assessments to fulfil the requirements of Art. 8(1)(b) and the pressure-based descriptors (columns in Figure 9). These need to assess impacts in a way which relates directly to the ecosystem state elements being assessed under Art. 8(1)(a), and to provide outcomes which are directly useful for the state-based assessments. For example, for the assessment of impact on non-commercial species, incidental by-catch needs to be separated into at least the specified species groups of birds, mammals, reptiles and fish and preferably at species level, in order to feed into species-level assessments.
- b) combining the state-based descriptors to assess a set of ecosystem elements in a more integrated manner; this overcomes some of the inherent overlaps between the descriptors (e.g. benthic habitats under D1 and sea-floor integrity under D6). These state-based assessments need to reflect the impacts upon each state element from all the (predominant) pressures to which each is subject (rows in Figure 9). For example, assessment of a benthic habitat should encompass where appropriate the impact assessments from the pressures: physical loss, physical disturbance, non-indigenous species, nutrient enrichment, removal of species and, if appropriate, other pressures.

GES criteria				Assessments of pressures for Article 8(1)(b)									
				GES Decision Part I									
				D2	D3	D6	D6, D7	D5	D8, D9	D10	D11	-	
				Non-Indigenous Species	Extraction of wild species	Physical disturbance	Physical loss & hydrological changes	Nutrients & organic matter	Contaminants	Litter	Sound and other energy	Other	
Primary criterion Secondary criterion				<div>P</div> <div>S</div>	D2C1 D2C2	(Total catch)	D6C2	D6C1 D7C1	D5C1	D8C1 D8C3 D9C1	D10C1 D10C2 D10C3	D11C1 D11C2	Annex III Table 2a
Assessments of state for Article 8(1)(a) GES Decision Part II	D1, D3	Species of birds, mammals, reptiles, fish & cephalopods	D1C2 D1C3 D1C4 D1C5 D3C2 D3C3	D2C3	D3C1 D1C1	?	?			D8C2 D8C4	D10C4	?	?
	D1	Pelagic habitats	D1C6	D2C3	?		?	D5C2 D5C3 D5C4	D8C2 D8C4	?		?	
	D1, D3, D6	Benthic habitats	D6C4 D6C5 D3C2 D3C3	D2C3	D3C1 D1C1	D6C3	D7C2	D5C5 D5C6 D5C7 D5C8	D8C2 D8C4	?		?	
	D1, D4	Eco-systems, including food webs	D4C1 D4C2 D4C3 D4C4	?	?	?		?	?				

Figure 9: Outline framework for the GES Decision, showing the primary and secondary criteria (D*C* codes³¹) in relation to the predominant pressures for use under Art. 8(1b) and the ecosystem elements for use under Art. 8(1a), each associated to particular Descriptors (D* codes). Criteria in the pink cells concern pressures (P), criteria in orange cells concern impacts (I) and criteria in green cells concern state (S) assessments. In several cases, the impact criteria are repeated (e.g. D2 and D8 criteria) because they are applicable to several ecosystem elements (species groups, pelagic and benthic habitats). Cells marked '?' indicate an impact from the pressure is possible in some situations but the GES Decision does not provide a criterion.

In addition there is a clear need to ensure as far as possible that the state and pressure-based assessments are compatible, in terms of scales of assessment and resolution of the ecosystem elements which are assessed under state (Art. 8(1)(a)) and as impacts (Art. 8(1)(b)) (section 4.5).

In order to make best use of this integrated framework, the following logical sequence of assessments is recommended:

- Map the distribution and intensity of human uses and activities (identifies main areas of activity, potential for use as proxy pressure assessment, supports later identification of measures³²); This approach is most relevant for sea-based activities, especially those on or affecting the seabed, but is also relevant for fishing and shipping activities (with regard to fishing and underwater noise pressures).
- Assess the pressures – spatial distribution and intensity (and temporal aspects, where necessary) of each pressure; this may be somewhat less relevant for assessments of mobile

³¹ See GES Decision for further details on each criterion.

³² The mapping of activities can also be a contribution to the assessments under Art. 8(1c) and support the ecosystem-based approach to management of activities in order to achieve GES. This should, wherever possible, be linked to work in support of the Maritime Spatial Planning Directive (2014/89/EU).

species such as birds, seals and cetaceans, as these can be wide-ranging and thus more difficult to know where and when they are exposed to particular pressures.

- c. Assess the environmental impacts – extent of impacts in relation to the elements to be used for the state-based and the pressure assessments.
- d. Assess the state – bringing together the relevant assessments of impacts from (c) to lead to an overall assessment of status.

4.4. Elements for assessment of progress towards GES

Section 3.2 and Figure 5 outline that elements for assessment of progress towards GES are progressively defined from the broad topics provided in MSFD Annex III to finer topics in Art. 9(1), via the elements which are specified in the GES Decision. This hierarchical approach provides both consistency and flexibility, accommodating the need for coherent approaches at EU and regional levels whilst also reflecting the differences in characteristics at (sub)regional and national levels.

4.4.1. Elements for Art. 8(1)(b) assessments: pressures and impacts

A set of pressures on the marine environment is provided in MSFD Annex III Table 2a. Criteria in the GES Decision address a number of these for the pressure-based descriptors and other key pressures (extraction of species, physical disturbance, physical loss), together with associated impact criteria (Table 3). Other pressures (listed in MSFD Annex III Table 2a) should also be assessed where they cause risk to the species, habitats and ecosystems of a (sub)region. The selection of pressure elements (and criteria) to assess in each (sub)region may follow a risk-based approach (section 7).

Table 3: Indicative list of pressures to be considered for Art. 8(1b) assessments. Certain pressures are directly relevant for particular descriptors and have associated criteria in the GES Decision (primary criteria are in bold), whilst other pressures may need to be considered in relation to Art. 8(1a) assessments.

MSFD Annex III Table 2a		GES Decision		Art. 9(1) Determination of GES
Theme	Pressure	Criteria elements (pressures)	Criteria elements (impacts)	Elements
Biological	Input or spread of non-indigenous species	D2C1 - Newly-introduced NIS D2C2 - Established NIS	D2C3 - Species groups and broad habitat types at risk	<u>Primary criteria:</u> criteria elements relevant to (sub)region
	Input of microbial pathogens			
	Input of genetically modified species and translocation of native species			
	Loss of, or change to, natural biological communities due to cultivation of animal or plant species			<u>Secondary criteria:</u> criteria elements at risk in (sub)region
	Disturbance of species (e.g. where they breed, rest and feed) due to human presence			<u>Pressures without GES Decision criteria:</u> where relevant (causing risk) for (sub)regional species, habitats and ecosystems
	Extraction of, or mortality/injury to, wild species (by commercial and recreational fishing and other activities)	D3 – commercially-exploited fish and shellfish	D3C1 - commercially-exploited fish and shellfish D1C1 – incidentally by-caught species at risk	
Physical	Physical disturbance to seabed (temporary or reversible)	D6C2 – Physical disturbance to seabed	D6C3 – Benthic broad habitat types used for D1/D6	

MSFD Annex III Table 2a		GES Decision		Art. 9(1) Determination of GES
Theme	Pressure	Criteria elements (pressures)	Criteria elements (impacts)	Elements
	Physical loss (due to permanent change of seabed substrate or morphology and to extraction of seabed substrate)	D6C1 – Physical loss of seabed		
	Changes to hydrological conditions	D7C1 – Alteration of hydrographical conditions of the seabed and water column	D7C2 – Benthic broad habitat types used for D1/D6	
Substances , litter and energy	Input of nutrients – diffuse sources, point sources, atmospheric deposition	D5C1 – Nutrients (DIN, TN, DIP, TP)	D5C2 -C3-C4- D5C5 -C6-C7-C8 – Chlorophyll-a, harmful algal blooms, photic limit, dissolved oxygen, opportunistic macroalgae, macrophyte and macrofaunal communities	
	Input of organic matter – diffuse sources and point sources		D5C8 - macrofaunal communities	
	Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) – diffuse sources, point sources, atmospheric deposition, acute events	D8C1 – contaminants from WFD and other contaminants which may give rise to pollution effects D8C3 – acute pollution events D9C1 – contaminants in food regulation; additional contaminants	D8C2 – species and habitats at risk D8C4 – species of species groups and benthic broad habitats	
	Input of litter (solid waste matter, including micro-sized litter)	D10C1 - litter (10 categories) D10C2 -C3 – micro-litter (2 categories)	D10C4 - species at risk	
	Input of anthropogenic sound (impulsive, continuous)	D11C1 – anthropogenic impulsive sound D11C2 – anthropogenic continuous low-frequency sound		
	Input of other forms of energy (including electromagnetic fields, light and heat)			
	Input of water – point sources (e.g. brine)			

4.4.2. Elements for Art. 8(1)(a) assessments: ecosystem structure, functions and processes

The set of ecosystem elements given in Figure 8 is based on the structural elements of marine ecosystems provided in MSFD Annex III Table 1 and the set of species groups and pelagic and benthic broad habitat types, including their biological communities, provided in the GES Decision (Tables 4 and 5).

Table 4: Species groups (for species which are not associated to specific habitat types, which should be encompassed with the broad habitat types of Table 5) to be used for determination and assessment of GES.

MSFD Annex III Table 1		GES Decision Table 1	Art. 9(1) Determination of GES
Theme	Ecosystem elements	Species groups	Elements
Species	Birds	Grazing birds Wading birds Surface-feeding birds Pelagic-feeding birds Benthic-feeding birds	Species groups relevant for the (sub)region Specific species per species group (selected according to the scientific and practical criteria in the GES Decision)
	Mammals	Small toothed cetaceans Deep-diving toothed cetaceans Baleen whales Seals	
	Reptiles	Turtles	
	Fish	Coastal fish Pelagic shelf fish Demersal shelf fish Deep-sea fish	
	Cephalopods	Coastal/shelf cephalopods Deep-sea cephalopods	

Table 5: Broad habitat types to be used for determination and assessment of GES.

MSFD Annex III Table 1		GES Decision Table 2	Art. 9(1) Determination of GES
Theme	Ecosystem elements	Broad habitat types	Elements
Habitats	Pelagic broad habitats	Variable salinity ³³ Coastal Shelf Oceanic/beyond shelf	Broad habitat types relevant for the (sub)region Other habitat types (e.g. from Habitats Directive, RSCs, EUNIS levels 4-6), selected according to the scientific and practical criteria in the GES Decision, which are used for assessment of the broad habitat type (criterion D6C5) and/or for assessment in their own right
	Benthic broad habitats	Littoral rock and biogenic reef Littoral sediment Infralittoral rock and biogenic reef Infralittoral coarse sediment Infralittoral mixed sediment Infralittoral sand Infralittoral mud Circalittoral rock and biogenic reef Circalittoral coarse sediment Circalittoral mixed sediment Circalittoral sand Circalittoral mud Offshore circalittoral rock and biogenic reef Offshore circalittoral coarse sediment	

³³ Retained for situations where estuarine plumes extend beyond waters designated as WFD Transitional Waters

MSFD Annex III Table 1		GES Decision Table 2	Art. 9(1) Determination of GES
Theme	Ecosystem elements	Broad habitat types	Elements
		Offshore circalittoral mixed sediment Offshore circalittoral sand Offshore circalittoral mud Upper bathyal rock and biogenic reef Upper bathyal sediment Lower bathyal rock and biogenic reef Lower bathyal sediment Abyssal	

For Art. 9(1), the set of species groups and broad habitat types needs to be adjusted (reduced) to those types which are present in each (sub)region. The GES Decision indicates that each species group should be represented by a set of species and provides selection criteria for this purpose. Similarly, the assessment of each broad habitat type can be supported by assessments of specified sub-types, according to these selection criteria, although they can also be assessed directly. The selection criteria aim to ensure both representivity of the ecosystem component and risk from the main pressures.

At the ecosystem level, a set of at least three trophic guilds should be selected, based on the selection criteria provided in the GES Decision. Ecosystems in this context should be considered as broad-scale parts of a region or subregion, each encompassing a set of species groups and broad habitat types. It might be appropriate to consider coastal, shelf and open ocean/deep sea zones separately. The definition of GES refers to ecosystem functions and processes; these are only partly addressed via the trophic guilds to be included under D4 (food webs) and may therefore need further specification.

4.5. Scales of assessment and assessment/reporting areas

It is clear from the Directive that GES must be determined at a (sub)regional scale (Art. 3(5)). However, assessments of whether GES has been achieved can be at a finer scale, as provided in the GES Decision.

The broad range of topics to be assessed across the eleven descriptors calls for a variety of scales to be used as part of an ecosystem-based delivery of the directive. For example, wide-ranging species such as baleen whales are more appropriately assessed at the regional scale, whilst nutrient enrichment and litter may be more appropriately assessed at finer scales linked to their land-based sources and management needs. Also, there may be several populations of particular species (e.g. commercial fish) in a region and subregion; each should be assessed separately.

A variety of assessment scales are therefore necessary to reflect:

- Ecologically-relevant scales for the various ecosystem elements (species, habitats, ecosystems);
- Management and administratively-relevant scales for pressure elements.

Additionally, the outcome of the assessment, i.e. whether GES has been achieved, is intrinsically linked to the scale of assessment. For example, assessing pressures and their impacts at too broad a scale can mask significant areas of impact in certain parts of a region or subregion and render the directive ineffective. On the other hand, the directive must be applied across the entire area of marine waters and adoption of too fine a scale for assessments could lead to burdensome assessment processes.

The GES Decision sets out a generic nested set of scales to be used for assessment of each descriptor, criterion or element, applicable across all marine regions (Figure 10). This generic scheme needs adaptation to regional and subregional needs.

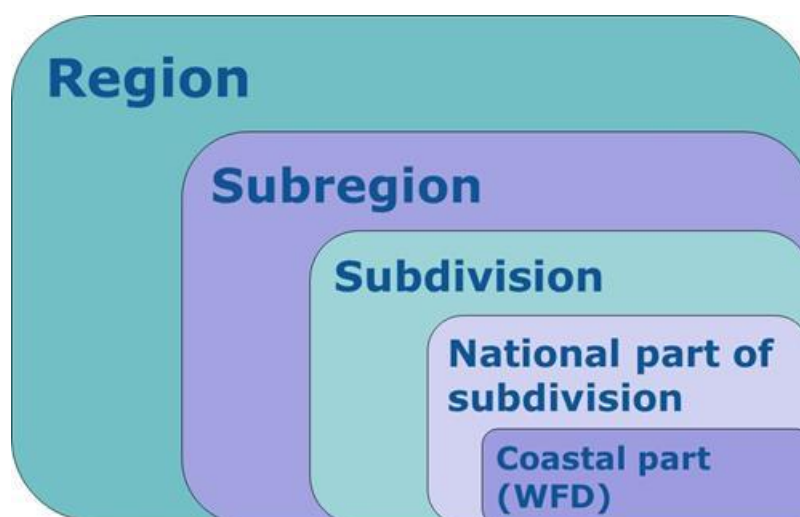


Figure 10: Schematic representation of a nested set of assessment scales to be used to cover all assessment needs for MSFD. Region, subregion and subdivision are provisions of Art. 4³⁴. 'National part of a subdivision' should be delineated using national borders of marine waters. 'Coastal part' refers to the coastal waters defined under WFD (MSFD Art. 3(1b)) extending to 1nm for ecological status and 12nm for chemical status.

Table 6 summarises the scales for assessment in the GES Decision, in which scales for particular pressures are linked to the state elements for which they are most relevant (e.g. extraction of fish and fish stock assessments, physical disturbance and benthic habitats, underwater noise and cetaceans).

Table 6: Scales of assessment for elements and criteria as specified in the GES Decision.

Elements for assessment	Region	Subregion	Subdivision (of region or subregion)	National part of subdivision	Coastal waters (WFD)
Pressure elements	Pressure criteria				
Non-indigenous species (D2)			C1, C2		
Nutrient enrichment (D5)			C1 (beyond WFD coastal waters)		C1: as WFD
Physical loss and disturbance (D6)	C1, C2: as used for broad habitat types under D1 and D6				
Hydrographical conditions (D7)	C1: as used for broad habitat types under D1 and D6				
Contaminants (D8)	C3 (divided by national borders, where needed)		C1 (beyond WFD territorial waters)		C1: as WFD (to 12nm)
Contaminants in seafood (D9)	C1: catch or production areas of Reg. No 1379/2013				
Litter (D10)			C1, C2, C3		
Underwater noise (D11)	C1, C2				
Impact elements	Impact (adverse effect) criteria				
D1 (incidental by-	C1: as used for species groups under D1C2-D1C5				

³⁴ Stock assessments under CFP use specified areas based on ICES/GFCM/FAO assessment areas which can be broadly related to the above scales.

Elements for assessment	Region	Subregion	Subdivision (of region or subregion)	National part of subdivision	Coastal waters (WFD)
catch)					
D2	C3: as used for corresponding species groups and broad habitat types under D1 and D6				
D3	C1: ecologically-relevant scales for each population, based on ICES, GFCM and FAO areas				
Nutrient enrichment (D5)			C2-C8 (beyond WFD coastal waters)	C2-C8: As WFD	
Physical loss and disturbance (D6)	C3: as used for broad habitat types under D1 and D6				
Hydrographical conditions (D7)	C2: as used for broad habitat types under D1 and D6				
Contaminants (D8)			C2 (beyond WFD territorial waters)	C2: as WFD (to 12nm)	
	C4: as used for species groups and broad habitat types under D1 and D6				
D10 (Litter)	C4: as used for species groups under D1				
State elements					
Species groups (D1): Birds	Baltic & Black Sea regions or subdivisions: all groups	NE Atlantic & Mediterranean: all groups			
Species groups (D1): Mammals	Deep-diving toothed cetaceans, baleen whales. Baltic & Black Sea regions or subdivisions: small toothed cetaceans, seals (latter not present in Black Sea)	NE Atlantic & Mediterranean: small toothed cetaceans, seals			
Species groups (D1): Reptiles		Turtles			
Species groups (D1): Fish (excepting commercial species - see D3)	Deep-sea fish Baltic & Black Sea regions or subdivisions: pelagic & demersal fish	NE Atlantic & Mediterranean: pelagic & demersal fish	Coastal fish		
Species groups (D1): Cephalopods (excepting commercial species - see D3)	Baltic & Black Sea regions or subdivisions: all groups	NE Atlantic & Mediterranean: all groups			
Commercial fish and shellfish (D3)	C2, C3: ecologically-relevant scales, based on ICES, GFCM and FAO areas (same as C1)				
Pelagic and benthic habitats (D1, 6)			Biogeographically-relevant scales		
Ecosystems/food webs (D1/D4)	Baltic & Black Sea	NE Atlantic & Mediterranean			

From this definition of the scale of assessment to be used comes the need to define the specific areas of each region or subregion to which each assessment applies and for which the extent to which GES has been achieved is reported. These have been termed the Marine Reporting Units (MRU), each being the area over which a judgement is made on whether GES has been achieved for a specified element or Descriptor. Within a single MRU, there may be multiple observations, of

relevant parameters (e.g. in point, transect or grid type monitoring) over specified timeframes, which are aggregated to conclude on the extent to which GES has been achieved.

Given the number of different assessments to be undertaken, there is potential to develop a complex unconnected set of MRUs which may lead to confusion in their use (e.g. presentation of assessments, communication to stakeholders). The following approach is therefore recommended:

- a. use a nested system of MRUs, based on the same set of smallest areas and aggregating these where needed;
- b. minimise the number of areas defined, e.g. by using the same areas for several species groups, pelagic and benthic habitats. This can still respect the need for ecologically-relevant scales as the characteristics of water masses influence species composition in the pelagic and benthic habitats and associated mobile species;
- c. associate the areas used for pressure-based and ecosystem-based assessments to each other (e.g. areas for assessment of physical disturbance are the same as used for the assessment of seabed habitats or nested within the area);

The following boundaries for a nested system of MRUs are already defined:

- a. marine regions (Figure 2)
- b. marine subregions (Figure 2)
- c. national borders³⁵
- d. WFD coastal and territorial waters (for D5 and D8 assessments)

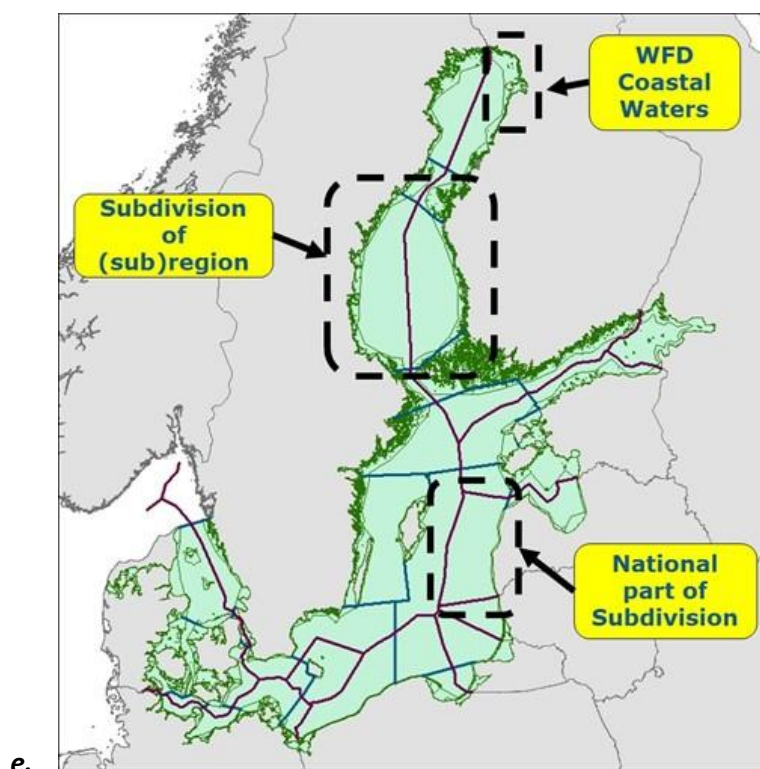


Figure 11: HELCOM system of nested assessment areas³⁶. Blue lines show the subdivisions of the region. The 'national part of a subdivision' is delineated using national borders of marine waters (dark pink lines)³⁷. WFD Coastal Waters extending to 1nm from baselines are shown (green lines).

³⁵ Although reaching formal agreements between states on marine borders may lead to their modification over time.

³⁶ [HELCOM Monitoring and assessment strategy](#)

³⁷ This national part of a subdivision is not formally part of HELCOM's system.

This leaves the main consideration as to whether there is need to subdivide each (sub)region into a suitable (and preferably low) number of subdivisions. Art. 3(2) provides criteria which are relevant for defining subdivisions. Additionally, some Member States have used the provisions of Art. 4(2) to define national subdivisions.

Whilst an outline approach to defining and using such a nested system is presented here, it is necessary for Member States, working together in each region, to develop this into an operational mechanism. This has already been achieved for the Baltic Sea region by HELCOM (Figure 11); similar systems are under development by other RSCs.

4.6. Time period for assessment

MSFD has a six-year cycle, with reporting for each part of the marine strategy set at intervals within each six-year period (Figure 1). The determination and assessment of GES under Art. 9 and 8 respectively (together with the setting of environmental targets under Art. 10) effectively marks the start of each cycle (2012, 2018, 2024, etc). It is necessary to update the assessments of environmental status at least once every six years, in order to assess and report on the current status in relation to the determination of GES and to show progress achieved since the previous report six years before (also against targets set and measures established). This does not preclude the updating of assessments at more frequent intervals, where this is feasible and desirable. The latter situation could arise, for example, where monitoring is undertaken on an annual or more frequent timescale and processing of the data has become routine or because of other obligations. Annual assessments are, for example, undertaken for commercial fish stocks under CFP.

When undertaking assessments there is a need to:

- a. Consider data over as long a time period as possible, so as to help understand changes in the data, including natural variability as well as anthropogenic influences. This can be particularly relevant for setting **baseline** values;
- b. Use the latest available data from monitoring programmes in the assessment to ensure the assessments reflect the most recent situation;
- c. Update the data to be used at least once in the six-year period, so that the status and trend assessments are based on the latest available data;
- d. Use, as far as possible, data from the same time period when considering combinations of data (e.g. pressure and state/impact data, background oceanographic data);
- e. Compare the most recent six-year assessment period with the previous six-year assessment period in order to report progress in achieving GES (trends) and targets.

5. PROVIDING CLARITY ON WHETHER GES HAS BEEN ACHIEVED

A number of stages in the Directive's implementation process require knowledge of whether GES has been achieved or not (section 2.2). In the absence of a clear determination of GES, it is not always possible to determine by how much the pressures which are causing impacts on or risks to the marine environment, human health and legitimate uses of the sea, should be reduced, giving uncertainty to both policy makers and users of the sea.

5.1. Determining GES: pressure, impact and state

Section 3.7 sets out that addressing all eleven descriptors leads to GES determinations that address pressures (levels in the marine environment), their impacts and the overall state of the marine environment (biodiversity, seafloor integrity, ecosystems and food webs).

5.2. Determining GES: criteria elements

For each Descriptor, the GES Decision makes clear the elements to be assessed and the scale of assessment, such that the use of the criteria should lead to assessments per element per assessment area (MRU); in some cases the elements or criteria are aggregated to draw conclusions per

Descriptor (or per species group for D1) but the need for 'super aggregation' of assessments across descriptors is not sought. Section 4.4 sets out the elements to be used in relation to the different descriptors and criteria.

5.3. Determining GES: criteria on quality, proportion, distribution and duration

Key message

Determinations of GES should, where possible, set both the quality of the pressure, impact and state elements that is to be achieved and the proportion of the element (in the assessment area) that should achieve such quality levels, so that it is clear whether GES has been achieved or not.

The GES Decision sets out the criteria to be used and how to express the extent to which GES has been achieved for each descriptor. These can be categorised into four principle types:

- Quality:** the quality to be achieved for each element assessed, whether it is a state element, a pressure or its impacts (e.g. contaminant concentration, condition of a habitat in relation to a particular pressure, age and size structure of a population).
- Proportion:** the proportion of certain criteria elements (e.g. populations of species, habitats) that should achieve those quality threshold values. This includes criteria related to population size and mortality rates (e.g. SSB and F for commercial fish) and benthic habitat criteria that include thresholds for the proportion of allowable habitat loss and proportion of habitat to achieve an acceptable condition.
- Distribution:** the distribution of certain pressures, for instance to avoid certain sensitive areas for species, or impacts;
- Duration:** the duration of certain pressures, such as to avoid particular pressures at sensitive periods for species, or impacts.

The distribution of the GES Decision criteria according to these four types is given in Table 7, which also indicates where threshold values for the GES criteria need to be set (see section 5.4).

Table 7: Categorisation of the GES Decision criteria requiring threshold values ('p' indicates part of the criterion applies to the category).

Type	Pressure criteria	Impact criteria	State criteria
Quality	D2C1 ³⁸ D5C1 D8C1 D9C1 D10C1p, C2p, C3 D11C1p, C2p	D2C3 D5C2, C3p, C4, C5, C6, C7p, C8 D6C3 D7C2 D8C2 D10C4	D1C3, C6 D3C3 D6C5p D4C1, C2, C3, C4
Proportion		D1C1 D3C1 D5C3p	D1C2 D3C2 D6C4, C5p
Distribution	D10C1p, C2p D11C1p, C2p	D5C7p	D1C4
Duration	D11C1p, C2p	D5C3p	
No threshold value (contributes to other assessments)	D2C2 D6C1, C2 D7C1 D8C3	D7C2 D8C4	D1C5

Most criteria do not express the extent of the assessment area, or the proportion of a species population or habitat type, over which the defined quality threshold value should be achieved.

³⁸ Allocated to 'quality' in the sense that the criterion assesses a reduction in quality (species composition) of the assessment area in relation to the native and existing non-indigenous species.

Where it is not explicit in the criterion, such proportion values should be expressed as part of the determination of GES under Art. 9(1) (GES Decision Recital 16).

Figure 12 provides a generic depiction of the relationship between quality and proportion. Some worked examples are provided in Annex 2.

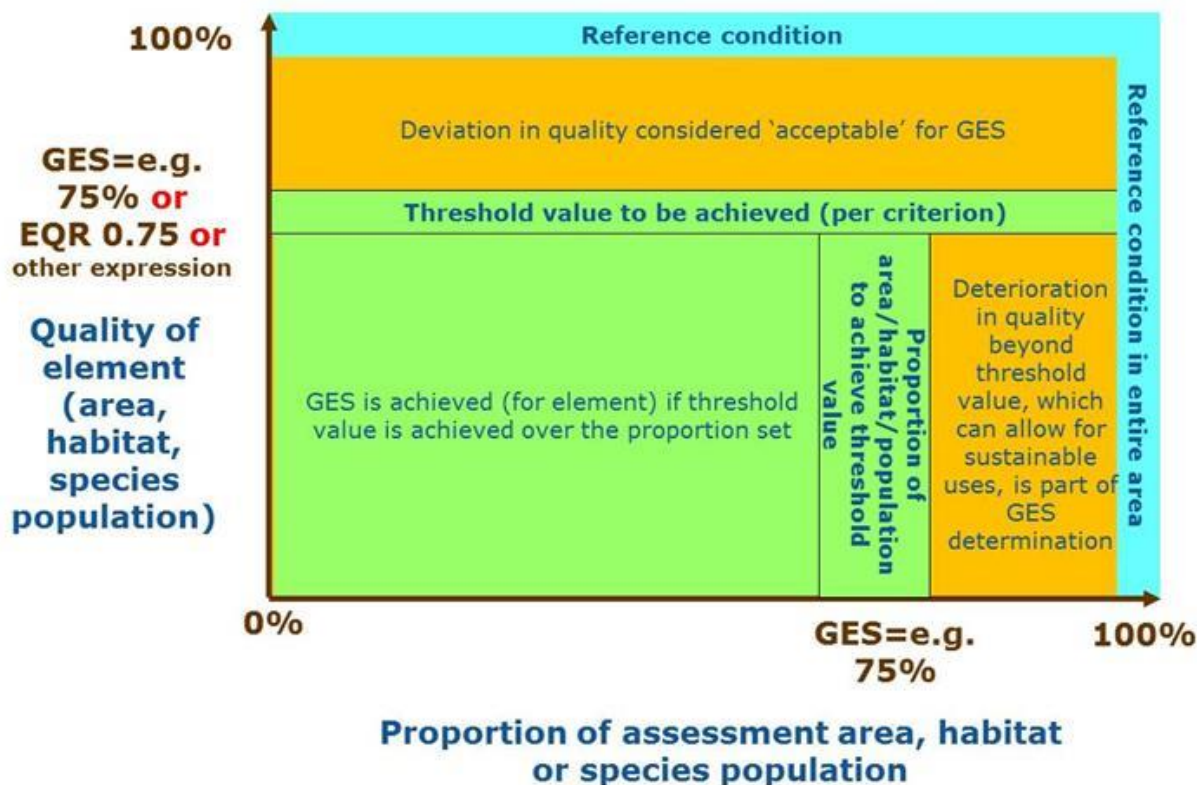


Figure 12: Generic quality and proportion framework for determining GES. The threshold and proportion values shown are for illustrative purposes only. These values are set per criterion and/or element in accordance with the GES Decision. See text for explanation.

The quality threshold is typically set on scientific grounds in relation to the degree of change in quality (deviation from reference condition; see section 5.5) that can be tolerated before the element is considered to be adversely affected (impacted). For pressures, this represents the level of pressure that would give rise to such adverse effects. The proportion value set for population levels and mortality rates for species is typically set on a scientific basis in relation to their long-term viability.

Determinations of GES should, where possible, be clear about both aspects (quality and extent/proportion) so that it is clear whether GES has been achieved or not. This can also be important in giving clear boundaries within which industry can operate, allowing for sustainable uses of the sea, especially where the industry exerts certain pressures and impacts on the environment.

5.4. Setting of threshold values

The Commission's Art. 12 assessment revealed that there was considerable variation in the approaches used by Member States to defining reference levels for GES, relating both to the baseline used and the criteria threshold values to be achieved. These reference levels significantly affect the basis for determining GES and hence can substantially alter the level of GES to be achieved for each Descriptor in each (sub)region. This consequently leads to the lack of a 'level playing field', and associated socio-economic consequences, with and across regions.

GES Decision (Art. 4.) provides requirements for the setting of threshold values (through Union, regional or subregional cooperation). The points set out in this article are further reflected in this document, as threshold values shall:

- a. be part of the determination of GES (section 5.3);

- b. be consistent with other Union policies (section 5.8);
- c. be set in relation to reference conditions (section 5.5);
- d. be set at appropriate geographic scales (section 5.6);
- e. be set on the basis of the precautionary principle (sections 2.2, 3.7, 6.1);
- f. be consistent across different criteria. Assessment of the pressure-based descriptors includes an assessment of the level of the pressure and of the impacts on ecosystem state³⁹; the quality levels set for these two aspects should correlate (GES Decision Art. 4(1)(f)), such that both criteria fail or pass GES at the same time; in situations where one passes and the other fails, it suggests the two aspects may not be sufficiently correlated and may need adjustment of the threshold values set (unless the state is still recovering following a reduction in the pressure, e.g. fishing mortality rates for D3 or nutrient levels for D5);
- g. make use of the best available science (section 5.3);
- h. be based on long-time-series data (section 5.5);
- i. reflect natural ecosystem dynamics (section 5.7)
- j. be consistent, where practical and appropriate, with relevant values set regionally (e.g. by RCSs).

For some aspects of GES, particularly assessments at ecosystem level including food-webs (D1, D4), it may not currently be possible to make quantitative judgements on GES. Scientific understanding is such that anthropogenic pressure is often difficult to distinguish from the environmentally-influenced variability. It is either not possible (through lack of evidence) to define limits based on knowledge of the system or where the link to anthropogenic pressures is weak or unclear, so direct management actions cannot be prescribed. In the absence of strong indicators reflecting pressure–state relationships, the scientific indicators used can be treated as 'surveillance indicators' (e.g. for monitoring change in state of aspects of the structure or function of ecosystems).

5.5. Use of reference condition in determining GES

Key message

The setting of threshold values should be done in relation to a reference condition, and can include an 'acceptable deviation' from reference condition, thereby allowing for sustainable uses of the marine environment whereby some level of pressures and their impacts can be accommodated, provided the overall quality of the environment is maintained.

The GES Decision (Art. 4(1)(c)) indicates that threshold values should be set in relation to a reference condition; this is illustrated in Figure 12.

Following a lack of consistency in approach (and terminology) to this issue in the 2012 reporting the Commission provided the following guidance as part of its Art. 12 assessment⁴⁰:

It is common practice in EU Directives and in regional assessment methodologies to define environmental objectives (i.e. the threshold value to be achieved) in relation to a reference condition. For example, threshold values for contaminants and eutrophication are typically set in relation to 'background' or 'natural' levels in the environment, with threshold values 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 threshold 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

³⁹ Excepting D8 and D9 where EQS values for the pressure (contaminant) are set under laboratory conditions and do not necessarily relate to impacts apparent in the environment.

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 level of pressures and their impacts can be accommodated, provided the overall quality of the environment is maintained, or for other reasons (e.g. because achieving a reference condition is not technically feasible).

In the reports provided in 2012 by Member States for Art. 8, 9 and 10, the approach to using reference condition and setting threshold 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 baseline (from which a particular quality is to be maintained), without fully assessing whether that state was adequate to begin with. In many cases, the reference levels 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. Instead, a common approach, based on the reference condition plus acceptable deviation philosophy, could be used across descriptors to achieve a suitable level of consistency in future implementation phases.

Guidance on determining baselines is given in the [2012 MSFD reporting guidance section 6.2.3.6](#):

The baseline from which to set GES threshold values should be the reference condition (sometimes referred to as reference state or background levels). These can be determined using the following approach:

A state of the environment considered largely free from the adverse effects of anthropogenic activities (*i.e.* negligible impacts from pressures). This can be defined in relation to aspects of environment state (physical, chemical and/or biological characteristics), or to levels of pressure or impact (*e.g.* an absence of contaminants or certain impacts). This type of baseline is typically used to allow an acceptable deviation in state to be determined which acts as the quality threshold value to be achieved. Reference condition can be determined using a variety of methods, including:

- a. Historic conditions, based on various evidence about conditions before there was significant anthropogenic activity;
- b. Past date/period, based on time-series datasets in which a time that is considered to best equate to 'reference condition', is selected;
- c. Current conditions, in areas considered substantively free from anthropogenic pressures;
- d. Modelling, to predict current state in the absence of pressures.

In all these approaches, there is often a need to use expert judgement, but this should be used in a well-documented and transparent manner, consistently across the (sub)region.

The use of baselines which are a specified/known state (of the environment, or the pressures and impacts acting upon it) is appropriate in setting environmental targets (section 6), where it can be used to set the baseline from which to assess progress, but is not appropriate for a determination of GES. This is because it usually implies, due to the methods used to derive it, that it is not a reference condition.

5.6. On setting threshold values at an appropriate scale

On a number of occasions the GES Decision asks that Member States set threshold values through Union, regional or subregional cooperation. This specifically refers to the process by which these thresholds need to be set and not the scale.

GES Decision Art.4(1)(d) clearly indicates that the thresholds need to be set at appropriate geographical scales, to reflect the different biotic and abiotic characteristics of regions, subregions and subdivisions. This, for example means, when setting threshold values for D11 at Union level,

these values may differ from one region/subregion to another, or from one subdivision to another, to take into account the specific characteristics of the area in question, but they are nevertheless set through a Union-level process (through the work of Technical Group on Noise in the MSFD Common Implementation Strategy). Similarly, those thresholds being set through a regional/subregional process – for example through work carried out by the RSCs – may vary from one subregion/subdivision to another to take into account the specificities of the area.

In establishing such threshold values, it would be logical for these to be consistent with the scales of assessment used (section 4.5).

5.7. GES in relation to ecosystem characteristics, dynamics and climate change

Key message

The setting of threshold values needs to respect the dynamic nature of ecosystems and their elements, 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.

Differences in the characteristics of ecosystems between regions and subregions will likely lead to different GES determinations especially for state-based descriptors being different in order to reflect, for example, the differing ranges of species present and different environmental conditions, such as water clarity and sea temperature. There may also be instances where such ecosystem differences warrant adjustments to the determination of GES at national level, such as via selection of specific species and habitats to be assessed, but such cases should be within the overall level of consistency determined at (sub)regional level. In contrast, there is not the same reasoning for determining acceptable levels of pressures upon the environment in different ways according to the (sub)region, as the levels to be reached in order to achieve GES should be consistent across all Member States.

Climate change is influencing the characteristics of the marine environment and can be expected to affect hydrological conditions (e.g. sea level, wave action from increased storminess, water temperature, water circulation patterns), water chemistry (increased acidification) and biodiversity (e.g. species distribution changes due to sea temperature changes).

Assessing the effects of climate change is not a specific objective of the MSFD. However, it is important to be able to distinguish wider climate-change effects (e.g. temperature, acidification, biodiversity) from more local effects caused by other anthropogenic pressures, as these latter cases can and should be addressed within the context of the MSFD. It is therefore important to monitor wider changes in the ecosystem and use this to help interpret monitoring data which is focused on assessment of GES. For efficiency, this wider monitoring can be coupled with monitoring of reference sites used for descriptor-specific monitoring.

The setting of threshold values needs to respect the dynamic nature of ecosystems and their elements, 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. For example, determining good status for a benthic or pelagic community could focus on the functional components and trophic guilds (e.g. filter feeders, deposit feeders) which are typical of the community in (near) unimpacted state, rather than specifying the precise species composition which is more prone to fluctuation. The presence of sensitive/fragile/long-lived species can be good indicators of (near) unimpacted state, but if lost from a community due to anthropogenic pressures, the community may not recover to the same species composition but could still be judged to have recovered to GES if the community has all the functional components, similar diversity and alternative sensitive, fragile or long-lived species of a (near) unimpacted state.

The determination of GES should consequently be done in a way that takes account of ongoing changes in species composition, abundance and distribution due to the dynamics of marine ecosystems, some of which may be affected by climate-induced effects.

5.8. Links to quality standards of other policies

The GES Decision sets out how standards and assessments under other EU legislation are to be used for MSFD purposes. This is summarised in Table 8.

Table 8: Overview of how other existing legislation is to be used when determining and assessing GES, as provided in the GES Decision.

Descriptor	Criteria elements	Criteria threshold values	Scales of assessment	Use of criteria
D1 – Biodiversity (species)	Incidental bycatch species via CFP Data Collection Framework Regulation (EU) No 1380/2013 and Commission Implementing Decision (EU) 2016/1251. Species to include Annex II species of Habitats Directive 92/43/EEC, and may use species from other Habitats Directive Annexes, Birds Directive 2009/147/EC, and CFP Regulation (EU) No 1380/2013.	Criteria aligned with Habitats Directive, Birds Directive and D3 (CFP) assessments. Threshold values consistent with Favourable Reference Population and Favourable Reference Range values for species of Habitats Directive 92/43/EEC. For commercially-exploited species, threshold values as used under D3 (CFP)	For commercially-exploited species, areas as used under D3 (CFP)	For species from Habitats Directive 92/43/EEC, overall status as per Habitats Directive. For commercially-exploited species, overall status as per D3
D1 – Biodiversity (pelagic habitats)				
D1 – Biodiversity (benthic habitats) and D6 – seafloor integrity	May include habitats under Habitats Directive 92/43/EEC	Criteria aligned with Habitats Directive 92/43/EEC		Reuse of assessments under Habitats Directive 92/43/EEC and WFD 2000/60/EC where possible
D2 – Non-indigenous species	Invasive alien species in Regulation (EU) No 1143/2014			
D3 – Commercial fish & shellfish	Species under Common Fisheries Policy Regulation (EU) No 1380/2013 and associated instruments: Data collection framework Council Regulation (EC) No 199/2008; Species with TACs and quotas under Art. 43(3) of TFEU; Species with minimum conservation reference sizes and species under national plans in Regulation (EC) No 1967/2006	F and SSB values under CFP Regulation (EU) No 1380/2013	As used under CFP Regulation (EU) No 1380/2013	
D4 – Food webs				
D5 - Eutrophication	Elements equivalent to Water Framework Directive 2000/60/EC quality elements	Threshold values of WFD Directive 2000/60/EC for coastal waters	As used under WFD Directive 2000/60/EC for coastal waters	As used under WFD Directive 2000/60/EC for coastal waters
D6 – Seafloor integrity	Criteria for physical loss and disturbance: Data and assessments from Water Framework Directive 2000/60/EC for coastal waters			
D7 – Hydrographical conditions	Data and assessments from Water Framework Directive 2000/60/EC for coastal waters			
D8 - Contaminants	Contaminants from Water Framework Directive 2000/60/EC, including EQS	Threshold values of WFD Directive 2000/60/EC for coastal	As used under WFD Directive 2000/60/EC for	uPBTs distinguished as under EQS

Descriptor	Criteria elements	Criteria threshold values	Scales of assessment	Use of criteria
	Directive 2008/105/EC Acute pollution events involving substances under Directive 2005/35/EC	and territorial waters	coastal and territorial waters	Directive 2008/105/EC
D9 – Contaminants in seafood	Contaminants listed in Contaminants in foodstuffs Regulation (EC) No 1881/2006	Threshold values of Contaminants in foodstuffs Regulation (EC) No 1881/2006	Catch or production areas of Regulation (EU) No 1379/2013	
D10 - Litter				
D11 – Energy, including underwater noise				

Where EU legislation standards are not available, the GES Decision provides for their development through Union, regional or subregional cooperation, depending on the descriptor. These processes should, as far as possible, draw from standards set or under development by the RSCs and in other international agreements.

Assessments of species and habitats under different policies and conventions are undertaken according to a variety of criteria and methodologies. Annex 3 summarises the relationships between the criteria used under key instruments of relevance.

5.9. Expressing the extent to which GES is being achieved

Key message

The GES Decision sets out the way in which the extent to which GES is achieved shall be expressed. The ways in which the underlying data, indicators and criteria are processed and aggregated, and the threshold values and rules for use of criteria adopted, have important implications for the ultimate outcomes of the assessments.

Where such methodological standards and specified methods are not defined at Union level, they should be agreed at regional or subregional level in order to ensure consistency in the outcomes.

Due to the often slow change in the state of the marine environment and the pressures upon it, reporting on trends in status is important to demonstrate progress towards achieving GES.

The GES Decision sets out a number of ways in which this ‘extent to which GES is being achieved’ should be expressed.

Each assessment entails the use of a number of component elements (e.g. contaminants, nutrients, species and habitats), criteria, scientific indicators and monitoring data. These need to be interpreted and aggregated in specified ways in order to reach conclusions on the extent to which GES has been achieved for each assessment. The Art. 8 guidance⁴¹ provides further details on how this can be achieved as part of a structured assessment process. The ways in which data are processed and aggregated, and the threshold values and rules for use of criteria adopted, have important implications for the ultimate outcomes of the assessments. For transparency and repeatability, these processes need to be documented, when not already defined in other EU policies or provided in the GES Decision. The methods also need to be consistent across Member States to ensure the outcomes of the assessments are comparable (Art. 5(2) and Art. 11).

Bearing in mind the range of topics to be considered and the large areas of marine waters to be assessed, there are the following considerations:

- a. Where possible, it is preferable to avoid expressing outcomes in which a single failure to meet a threshold value for a criterion or element leads to the entire area being expressed as

‘not in GES’ as this is often seen as an unduly negative approach when dealing with the very large areas of the MSFD; instead use of a proportion of the total (for the descriptor in the assessment area) is preferred as this shows how much has been achieved, even if the overall ambition has not yet been achieved. Note however that some assessment methodologies provide an average outcome per assessment area, effectively giving an ‘in GES’ or ‘not in GES’ outcome (e.g. eutrophication assessments in several RSCs);

- b. The degree of precision needed or which is possible will vary; it is likely that some assessments will provide only a coarse evaluation (e.g. an estimate to nearest 10 or 20%); however this may be adequate, especially if the area is clearly achieving GES or conversely clearly not achieving GES. Greater precision is likely to be needed if the area/element is close to the border between ‘being in GES’ and ‘not being in GES’.
- c. Due to the often slow change in the state of the marine environment and the pressures upon it, such as following the introduction of measures, the assessments of status may often not change from one reporting period to the next, despite there being underlying improvements in their status. This is particularly exaggerated under MSFD with its two status classes (in GES, not in GES) compared with, for example, the Water Framework Directive which has five status classes. In order to provide additional evidence of progress towards GES it is therefore important to indicate the trend in status (i.e. whether the status has improved, is stable or has deteriorated) compared with the previous reporting period.

6. ENVIRONMENTAL TARGETS (ART. 10)

6.1. Follow-up actions to Art. 8 assessments depend on the environmental status

The Art. 8 assessments should inform whether there is need for environmental targets (Art. 10) and consequently for measures (Art. 13).

The classification of environmental status can be considered to have three possibilities:

- a. In GES – for which monitoring is needed to check pressures do not increase to a point where impacts become unacceptable and status begins to deteriorate; this should be coupled with measures to maintain GES.
- b. Not in GES – If GES has not been achieved, it is necessary to identify the pressure or pressures which are causing the failure in environmental quality; where this is not possible, further investigative action is necessary to better understand the reasons for not achieving GES. The follow-up action should focus primarily on managing and reducing the anthropogenic pressures which are considered to be causing this failure. In the marine environment, the option to take direct management action on the environment itself (e.g. to restore a species or habitat) is typically less appropriate and usually more costly. The MSFD provides Art. 10 (environmental targets) and Art. 13 (measures) as the mechanisms to be used to achieve GES. It follows that assessing whether GES has been achieved should place a strong emphasis on whether anthropogenic pressures are affecting the status of species, habitats or the wider ecosystem. This approach also acts as a helpful guide in assessing status and in monitoring (focusing efforts towards the most likely problems). In situations where GES is clearly not yet achieved, but threshold boundaries are not yet available, actions to reduce measures should be taken in accordance with the precautionary principle⁴².

⁴² EU Commission Communication COM(2000)1final

- c. **Unknown status** (potentially not in GES) - it will not be possible in all cases to identify a status which is clearly within or clearly outside GES. According to the precautionary principle, **uncertainty of classification must not be used for postponing action**. Resulting actions should depend on the shortcomings in the individual case. Actions should include at least those to address the shortcomings, e.g. through development of improved assessment methods, **more monitoring or complementary research**. Under the precautionary principle **proportionate measures should be undertaken to reduce pressures which are considered to be causing impacts on or risks to the marine environment, human health and legitimate uses of the sea, and to prevent further deterioration** (Art. 1(2a, b) and Art. 14(4)). However, in the absence of a clearly determined GES, it is not always possible to determine by how much such pressures need to be reduced, giving uncertain implications to both policy makers and users of the sea.

6.2. The nature of environmental targets

Key message

The purpose of environmental targets and their relationship to measures under Article 13 suggests that they should primarily focus on the pressures from human activities which are considered to be responsible for the failure to achieve GES.

They can do this by defining the necessary level of reduction in each anthropogenic pressure that is needed to achieve GES.

Environmental targets should not be used as an alternative to determining GES under Art. 9, but as a support tool for the achievement of GES.

Environmental targets need to be specific, measurable, achievable, realistic and time-bound (SMART).

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 Art. 10*". 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*".

The Directive's definition of targets, together with the indicative set of characteristics of targets provided, indicates a wide scope for the type of targets that can be defined. However, the purpose of targets and their relationship to measures suggests that they should primarily focus on the pressures from human activities which are considered to be responsible for the failure to achieve GES. Most pressures arise from specific human activities and can be controlled, reduced or eliminated through management of the associated activities. Such actions are the primary management tool to achieve improvements in environmental quality. The aim should be to set targets in relation to all relevant pressures so that it could be assumed that by reaching all targets GES would be achieved.

Environmental targets should therefore define the necessary level of reduction in each anthropogenic pressure that is needed to achieve GES. There should be a particular focus on establishing targets for the reduction in the spatial extent, intensity or frequency of anthropogenic pressures at their source or entering the marine environment.

Targets can include setting levels for the inputs of nutrients and pollutants into the marine environment via riverine or atmospheric sources. Generalised targets per pressure (e.g. nutrient input levels to the sea) can then lead to specific actions as Art. 13 measures towards one or more human activities/sectors (e.g. waste water treatment, fertilizer use, detergent compounds). A

regional example of an environment target is the MAI/CART⁴³ target of HELCOM to address nutrient enrichment. Another example is the setting fish catch levels (under CFP) in relation to Descriptor 3 in order to manage the quantity of fish stocks removed.

According to Art. 3(7), targets can also be an expression of the desired condition of the different components of marine waters, indicating a more state-based focus. Such state-based targets may be appropriate as interim targets. For example, establishing a target for the proportion of each assessment area to achieve its defined quality threshold values as a stepping stone to the overall proportion to be achieved as defined under Art. 9(1)), or establishing restoration targets where these are deemed necessary and feasible. However, targets should not be used as an alternative to determining GES under Art. 9, such as targets which determine a desired species composition and/or abundance that cannot be directly achieved by management actions, but as a support for the achievement of GES.

Environmental targets can be defined even in situations where Member States have not determined GES. For example, it is possible to set targets for reductions in pressures (e.g. for litter) in the absence of a clear determination of GES. In such cases, the current state (or a specified/known state in the past) can be used as the baseline from which to measure progress with the environmental target.

The MSFD leaves considerable flexibility for Member States in setting environmental targets; however, in order to make them fully operational in relation to their specified role in their Directive, targets need to be specific, measurable, achievable, realistic and time-bound (SMART) (SWD(2014) 49).

Art. 10 does not make specific provision for assessment of progress in achieving the environmental targets; rather this should be taken up within the context of Art. 8 assessments as follows:

- a. Directly, as part of the assessment of anthropogenic pressures under Art. 8(1)(b), focusing on whether the input levels of a pressure (pressure at source) (e.g. nutrient input levels from land-based or atmospheric sources) have been reduced in accordance with the target set.
- a. Indirectly, by assessing whether the levels of pressure in the marine environment (at sea), their impacts or the state of ecosystem elements is moving towards GES.

6.3. Indicators

The term indicator is an established term which is used in different ways (see glossary in Annex 1).

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

The quantitative (SMART) aspect of a target should be reflected in the indicator(s) chosen to track progress with the target.

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

The use of baselines which are a specified/known state (of the environment, or the pressures and impacts acting upon it) is appropriate in setting environmental targets, where it can be used to set the baseline from which to assess progress, but is not appropriate for a determination of GES. This is

⁴³ Maximum Allowable Inputs/Country Allocated Reduction Targets – <http://helcom.fi/baltic-sea-action-plan/nutrient-reduction-scheme/targets>

because it usually implies, due to the methods used to derive it, that it is not a reference condition. This specified state can be determined using a variety of methods, including:

- a. Past state, at a specified time (e.g. when a policy or programme was adopted);
- b. Past state, based on time-series data, but where the data are known to reflect certain levels of impact;
- c. Current state.

6.5. Links to measures (Art. 13)

The delivery of the environmental targets set under Art. 10 is via the Programme of Measures defined under Art. 13. Where the targets are focused on the main pressures and could be rather generic (e.g. reduce litter or physical disturbance by X% or by Y amount), it would follow that the measures should address the uses and activities which are generating the pressure and, in this sense, be oriented to particular sectors (e.g. tourism and urban waste management for litter; aggregate dredging and bottom trawling for physical disturbance) and be more specific than the associated environmental target.

7. USE OF RISK-BASED APPROACHES IN MSFD IMPLEMENTATION

This section provides some outline guidance, with examples, on how a risk-based approach can be used in the context of the GES Decision and implementation of Art. 9, 8, 11 and 13.

Art. 9(3) – criteria and methodological standards for GES (GES Decision)

The GES Decision makes explicit reference to the risk-based approach and has been drafted to focus on setting out criteria for good environmental status in relation to the predominant pressures and their impacts and on state elements which can best reflect these pressures and impacts.

- a. Selection of criteria: for several descriptors, use of particular criteria should take risk (and hence relevance to the region or subregion) into consideration. For example, use of criteria D5C3 and D5C4 where the effects of nutrient enrichment are not adequately assessed via use of criterion D5C2 and use of criteria D7C2, D1C4 and D1C5 only in cases where there may be particular risk from certain pressures.
- b. Selection of criteria elements: these are selected or, in cases where these still need to be defined, should be selected with a clear focus on risk, firstly through focusing on predominant pressures in each region or subregion and, secondly, through focusing on those ecosystem elements (species, habitats) which are most indicative of impacts from these pressures. For example, selection of additional contaminants for criteria D8C1 and D9C1 should be on the basis of risk; similarly, selection of species, species groups and habitat types for criteria D10C4, D2C2 and D2C3, D7C2 and species for Descriptor 1 species groups.
- c. 'De-selection' of criteria elements: Criterion D8C1, via established processes under the WFD, and criterion D9C1 anticipate the de-selection of contaminants in cases where there is low risk.
- d. Parameters for assessment of the criteria: the parameters to be used for each criteria are those identified from the scientific and technical review process for Decision 2010/477/EU to best reflect the needs for assessment of environmental status, considering the most relevant aspects of the pressures and their impacts, and those aspects of ecosystem state for species and habitats considered most relevant. In this sense, the criteria generally reflect a risk-based approach. In cases where the criteria are less-well specified, for example for assessing the effects of contaminants on biota (D8C2) and assessing the health of species (D1C3), Member States should focus their efforts on particular species and parameters of most relevance to the criterion.

In addition, the GES Decision also provides for the possibility not to use certain criteria in justified circumstances (Art. 3 of the GES Decision): whilst the primary criteria are intended

to be used by all Member States, there is provision to not use one or more of these criteria. This could, for example, be relevant in cases where the activities (and hence pressures) are not present in the waters of a Member State.

Art. 9(1) – determination of GES

- a. The determination of GES should focus on expressing the desired state of the environment in relation to aspects which are (potentially) impacted by anthropogenic pressures. This can be done by identifying the elements (e.g. species and habitats) and parameters (e.g. population size, species composition, biomass) which will most effectively indicate environmental status in relation to specific pressures (e.g. chlorophyll-a and oxygenation levels in relation to nutrient enrichment; mortality rates in relation to fishing).
- b. In cases where the GES Decision anticipates the identification at regional or subregional level of criteria elements and threshold values, these should focus on those aspects which are most relevant to each area in question. In some cases, for example criteria D10C4, D7C2, D2C2 and D2C3, the number of species/species groups/habitat types selected could be rather limited and focused on key elements of relevance rather than aiming to be more exhaustive.

Art. 8 - assessments

- a. Given that GES will most effectively be achieved through the management of human activities and reductions in anthropogenic pressures where needed, the assessments under Art. 8 should aim, as a priority, to assess the distribution and intensity of the predominant pressures in each region and subregion (using first a mapping of human activities, if appropriate), together with their associated impacts.
- b. From this, it follows that assessments can focus on areas which are subject to anthropogenic pressure and, on the basis of low risk, provide less focus on areas which are not subject to the pressure (excepting where these act as reference sites). Where the source of a pressure is land-based (e.g. nutrients) and the coastal zone is assessed to be in good status (e.g. from WFD assessments) it may indicate the offshore zone can also be expected to be in good status (unless there is reason to consider atmospheric or sea-based sources of nutrients as a potential risk). This type of screening process is used in the OSPAR Common Procedure for eutrophication and offers a measured way to focus assessment efforts towards areas of higher risk and reducing the need for assessments in areas of low risk (provided there is some continued surveillance of the issue which would identify possible change in risk in the future).

Art. 10 – environmental targets

- a. Environmental targets should focus on the predominant pressures, in terms of their intensity, frequency or extent, as identified on the basis of the initial assessment made under Art. 8, identifying the reductions in their intensity, frequency or extent that are needed to achieve GES.

Art. 11 - monitoring

- a. It follows from the above approaches to risk that monitoring should focus on priority areas affected by the predominant pressures, with monitoring in areas considered to be at low risk from a pressure used as reference sites generally undertaken at lower intensity (cf for instance D10 where there is a possibility to choose the monitoring matrix on the basis of risk).
- b. Further, particular attention is needed on the boundary zone between good status and poor status (particular areas and ecosystem elements selected to assess this status boundary); if an area is clearly in a poor status, there is limited benefit in continued monitoring unless to follow its recovery following introduction of measures.

- c. This is likely to also focus on gathering data regarding pressure-impact relationships to improve confidence in assessments. Monitoring in areas considered to be unimpacted by the pressure is needed as reference sites, but could be undertaken at lower intensity.

Art. 13 - measures

- a. Measures should focus on actions which will directly or indirectly reduce the pressures and their impacts identified as contributing most to poor status.

From the above considerations, application of a risk-based approach can be expected to focus implementation efforts towards those aspects (areas, pressures, impacts, ecosystem elements) which are of most importance in understanding the current state of marine waters and hence to efforts to improve its state, where needed. Use of a risk-based approach can be expected to reduce efforts particularly for monitoring and assessment, but this should stem from its application to the GES Decision and to the determination of Art. 9(1).

8. RESEARCH NEEDS

The implementation of the Directive raises a range of questions which require increased scientific knowledge and understanding and/or further survey and monitoring data. An initial set of topics is given here:

- a. Determining pressure levels which clearly equate to acceptable levels of environmental impact on state elements is needed for a number of marine pressures. A key priority for future research should be to further our understanding of these pressure-state (impact) relationships in the marine environment.
- b. develop more quantifiable determinations of GES, based on specific scientific indicators, and more quantitative reference conditions, particularly for benthic habitats;
- c. identify long-term ecosystem changes not or only indirectly influenced by human activities that may make it necessary to adjust GES boundaries accordingly;
- d. distinguish wider climate-change effects (e.g. temperature, acidification, biodiversity) from more local effects caused by other anthropogenic pressures, as these latter cases are the most practical to address within the context of the MSFD.

Whilst continued research and survey is needed and should lead to improved understanding of how best to implement the directive, it is important to acknowledge that a considerable wealth of scientific knowledge already exists and can already be used to effectively support implementation and decision-making processes for the directive. The lack of scientific understanding should not be used as an excuse for inaction where there are (suspected) risks to the marine environment or evidence of deterioration in environmental quality.

9. ANNEX 1: GLOSSARY OF TERMS

The definitions provided in the Directive and in Decision (EU) 2017/848 are not repeated here, but are of relevance to this document.

Adverse effect

'Adverse effect' is the term used in the MSFD GES Descriptors, and hence in the GES Decision, to refer to environmental impacts (that need to be avoided or reduced in order to achieve or maintain GES). The term (or similar wording) is referred to in Art. 1(2)(a) and in MSFD Annex I (Descriptors 2, 5, 6, 7 and 11). See definition under 'impacts'.

Assessment

For the purposes of the MSFD, an assessment is a process and a product. As a process, an assessment is a procedure by which information is collected and evaluated following agreed methods, rules and guidance. It is carried out from time to time to determine the level of available knowledge and to evaluate the environmental status. As a product, an assessment is a report which synthesizes and documents this information, presenting the findings of the assessment process, typically according to a defined methodology, and leading to a classification of environmental status in relation to the determination of GES. Art. 8 sets out what needs to be analyzed in the MSFD assessment, whilst the GES Decision provides the criteria and methodological standards for assessment.

Baseline

From an assessment perspective, a baseline is a specified environmental state against which subsequent/other values of state, impact or pressure can be compared. The most appropriate type of baseline to use depends on the purpose.

Baselines can be:

- a. an unimpacted environmental state (often termed the reference condition – see definition). The setting of GES threshold values should be done in relation to (e.g. as an acceptable deviation from) reference condition (GES Decision Art. 4(1)(c)).
- b. a known state in the past, such as the beginning of a data time series. This can be used to show trends in status and, if suitable, to define a reference condition.
- c. the current state. This can be used for setting an environmental target (e.g. a reduction in the intensity, frequency or extent of a pressure) or for assessing change in environmental status.
- d. a potential (future) state (e.g. a predicted/modelled state in the absence of pressures). This can be used as a predicted reference condition.

The term baseline is also used in the context of jurisdictional boundaries of marine waters (see section 2.3.1).

Characteristics

The term 'characteristics' is used in 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. MSFD Annex III Table 1 provides a list of possible parameters and 'characteristics' of the listed ecosystem elements for monitoring and assessments.
- d. 'Characteristics' in Art. 9(1) and MSFD Annex I refers to something that is particular/specific about the determination of GES (including specifically about the MSFD Annex I descriptors) in the marine waters [of a MS] of a (sub)region.

- e. 'Characteristics' in Art. 10(1) and MSFD Annex IV refers to the range of possible attributes of an environmental target.

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

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

Component and feature

The terms components and features are used in the Directive as follows:

- a. 'Components' is used in Art. 3(5), 3(7), MSFD Annex VI.2 and MSFD 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) and 11(2). The reference to 'transboundary' implies that features (referred to elsewhere) can occur across national borders and thus are a physical entity (can include species). The term was also used in MSFD Annex III Table 1 (2008 version), where is also referred more specifically to physical and chemical features of habitat types.

In MSFD, components 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). 'Components' can be considered more or less synonymous with the MSFD term 'Features'.

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.

See also **Feature (of criteria)**.

Cost of degradation

The cost of degradation (as per Art. 8(1)(c)) can be reflected in two ways: i) the reduction in the value of the **ecosystem services** provided compared to another state; and ii) the efforts/costs needed to restore the quality of the marine environment to a level which achieves GES.

Degradation

Degradation is the reduction in the quality status of the marine environment, or any part (element) of it, or in the provision of ecosystem services compared to a more healthy environmental status.

Driver

Drivers, as per the Driver-Pressure-Impact-State-Response (DPSIR) framework, are aspects of human society which lead to uses of and activities in the (marine) environment, some of which may consequently give rise to pressures upon the natural environment. Drivers include social and economic goals of society (e.g. for human health and well-being, for wealth and for food provision) as well as policies and governance systems (such as subsidies and regulations).

The DPSIR framework does not clearly distinguish the societal issues, as expressed above, from the uses and activities which result from them; however the MSFD specifically requires an analysis of the uses and activities under Art. 8(1c); it is therefore helpful to distinguish them, not least because uses

and activities are more readily quantified and closer to the pressures, which also need to be assessed and managed under the MSFD (see [MSCG-11 2013 16](#) for further details).

Ecosystem

For the purposes of assessments of environmental status under MSFD, the term 'ecosystem' is considered to mean all the component species groups, pelagic and benthic habitats within a suitably-defined and ecologically-relevant area; such 'ecosystems' could be at the scale of a (sub)region or suitable subdivision; it may be appropriate to consider assessment of coastal, shelf and open ocean/deep sea ecosystems as these comprise quite different suites of species and habitats and are subject to different ranges of pressures.

The use of the term ecosystem in scientific research is often much wider, being applied at a wider range of ecological and spatial scales.

Ecosystem-based approach (to management)⁴⁴

An 'ecosystem-based approach' or 'ecosystem-based management' is an integrated approach to management of human activities that considers the entire ecosystem including humans. The goal is to maintain ecosystems in a healthy, clean, productive and resilient condition, so that they can provide humans with the services and goods upon which we depend. It is a spatial approach that builds around acknowledging connections, b) cumulative impacts and c) multiple objectives. In this way, it differs from traditional approaches that address single concerns e.g. species, sectors or activities.

A comprehensive integrated management of human activities, based on best available scientific knowledge about the ecosystem and its dynamics, can lead to the identification and action on influences which are critical to the health of marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity.

Ecosystem service⁴⁵

Ecosystem services are the final outputs or products from ecosystems that are directly consumed, used (actively or passively) or enjoyed by people.

The Common International Classification of Ecosystem Services (CICES) is the 'EU reference' typology for all ecosystem services. CICES considers that the generation of ecosystem services must involve living organisms; therefore, abiotic environmental outputs (e.g. sea salt) are not services under this typology.

CICES separates ecosystem services (e.g. fish biomass) from the benefits they can provide to people (e.g. the nutritional value of the fish biomass). Marine ecosystem services include provisioning services (such as food from fish); regulation and maintenance services (such as the sea's ability to absorb greenhouse gases, thus regulating the climate); and cultural services (such as the availability of charismatic marine species to observe or to research). We get many benefits from these services such as nutrition, reductions in anthropogenic CO₂, and recreation.

Element

The term 'elements' is used in the Directive 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).

⁴⁴ European Environment Agency. (2014). Marine messages – our seas, our future – moving towards a new understanding. Copenhagen and http://ia2dec.pbe.eea.europa.eu/knowledge_base/Frameworks/doc101182

⁴⁵ EEA (2015) State of Europe's Seas. <http://www.eea.europa.eu/publications/state-of-europes-seas>

- b. 'Elements regarding coastal, transitional and territorial waters covered by relevant provisions of existing Community legislation' in Art. 8(2) refer to aspects of other assessments, for example the Water Framework Directive.
- c. An 'indicative list of elements', referred to in Art. 8(1), 9(1), 11(1), MSFD Annex IV.1, MSFD Annex IV.3 and MSFD Annex V.12, is the list of ecosystem elements and anthropogenic pressures in MSFD Annex III Tables 1 and 2a.
- d. 'Elements of the marine food webs' from descriptor 4 in MSFD 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) and 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 MSFD Annex III (to be used for assessments), of the Directive or other assessments, and of food webs.

Element (criteria)

'Criteria elements' is a collective term for the ecosystem elements and pressures which are referred to in the GES Decision (EU) 2017/848 to be used in the determination of GES under Art. 9 and hence for assessments under Art. 8. Broadly-defined indicative lists of criteria elements are provided in MSFD Annex III; these are more precisely defined in the GES Decision or via Art. 9(1).

More generally, the MSFD uses the term 'element' to refer to the different parts or topics of the marine strategies, of MSFD Annex III, of the Directive or other assessments, and of food webs.

Environmental status (current)

Current environmental status is mentioned in Art. 5(2), 8(1), 8(2), 11(1), 19(3) and 20(3). Assessment of the 'current' environmental status, undertaken by Member States, comprises a number of elements (indicative list in MSFD Annex III Table 1) and is based on current/latest data from monitoring programmes (Art. 11) 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(2)(i), 8(1)(b)), implying that these are somewhat distinct from the assessment of environmental status. However, both are encompassed within the GES Decision and determination of GES and hence should fall within the scope of assessments of current environmental status under Art. 8.

Factor

'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)), MSFD Annex I.10, MSFD 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.

Feature (of 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 (see Components and features). These 'features' provide further 'distinctive technical' definition to the GES Descriptors that enable the assessment of whether GES has been achieved or not. In this sense the term feature can be broadly equated to the criteria of the GES Decision.

See also **Components and features**.

Habitat (types of)

The term habitat has two distinct uses:

- a. firstly, to refer to the environment used and occupied by a single species (termed 'habitat of a species' under Directive 92/43/EEC); in this case, the nature and scale of the habitat can vary markedly according to the particular needs of the species across all stages of its life history (e.g. a seal or bird may need breeding, resting, feeding and migratory areas which are very different in nature and location; some invertebrate species have a pelagic juvenile phase and a benthic adult phase);
- b. secondly, to refer to particular areas which are characterized by specific communities of species (i.e. a multi-species concept of habitat); in this case the habitat comprises particular biotic and abiotic characteristics (often referred to as a biotope and termed 'natural habitats' under Directive 92/43/EEC); which make it distinguishable from surrounding habitat types. In contrast to the habitat of a single species, this use of the term habitat refers to something that is more uniform in its character, leading to the definition and classification of habitat types and the ability to produce maps of habitats. The EEA's EUNIS habitat classification provides a Europe-wide classification of marine (and terrestrial) habitats in a 6-level hierarchical system. The Habitats Directive and several international conventions (e.g. HELCOM, OSPAR) have developed lists of habitat types which require protection.

MSFD Annex III and the GES Decision refer to 'broad' and 'other' habitat types, in the sense of the second meaning of habitat above:

- a. Broad habitat types (formerly referred to as 'predominant habitats' in the 2008 MSFD Annex III and CSWP (2011): these are a set of broadly-defined habitat types which together cover all benthic and pelagic habitat types of EU marine waters. A list of benthic broad habitat types is provided in Table 2 of the GES Decision, including their equivalence to classes in the revised EUNIS marine habitat classification⁴⁶; for pelagic broad habitat, the GES Decision refers simply to four classes (variable salinity, coastal, shelf, oceanic/beyond shelf) as the EUNIS classification is not currently useful for MSFD purposes;
- b. Other habitat types: this refers to habitat types which are more finely-defined EUNIS types, defined in other classification systems or which are listed for protection under the Habitats Directive and international conventions (formerly referred to as 'special habitats' in the 2008 MSFD Annex III). Their typologies are often not easily related to those in EUNIS. Special habitats are encompassed within the broad habitat types, although due to their definitions they may not always sit within a single broad habitat type.

Hydrographical conditions

Hydrographical conditions refers to the measurement or description of the physical characteristics of marine waters, including the topography and morphology of the seabed and coastline.

Hydrological processes (conditions)

Hydrological processes refer to the movement, distribution and properties of water. They include the temperature, salinity, tidal, current and wave regimes, upwelling, mixing and residence time, sediment and freshwater transport, and the turbidity and transparency of the water. Changes in hydrological conditions can lead to permanent alteration of hydrographical conditions.

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), MSFD Annex III

⁴⁶ Evans, D. 2016. Revising the marine section of the EUNIS habitat classification – report of a workshop held at the European Topic Centre on Biological Diversity, 12 & 13 May 2016. ETC/BD Working Paper No. A/2016.

Table 2a). 'Impact' here is referring to adverse effects on the environment. These are caused by pressures from human activities (i.e. resulting from these pressures) and by implication can be measured as changes in environmental state.

Environmental impact is an alteration from natural conditions, whether permanent or temporary, in a physical, chemical or biological aspect of environment state that is considered undesirable. In applying the GES Decision, this undesirable state (for a GES criterion) is distinguished from the desirable state by a threshold value.

Impact is used in Art. 13(3) to refer to the social and economic effects (positive or negative) of measures taken. These socio-economic impacts could include the degradation of ecosystem goods and services, resulting from a degraded (impacted) environment, with its consequences for human welfare and for use of the marine environment. Also in Art. 13(3), as well as in MSFD Annex V.3, the use of 'impact' seems to refer to both environmental and socio-economic 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 to socio-economic impacts; it is also important to be clear whether the impacts are negative or positive effects or both.

In the DPSIR framework, the term impact is used in this dual way (environmental, socio-economic), leading to considerable confusion in its use. This document has focused on its use as environmental impact, whilst socio-economic impact can alternatively be referred to as loss or degradation in ecosystem services (see [MSCG-11 2013 16](#) for further details).

Indicator

'Indicator' is an established term which is used in different ways. In general, an indicator consists of one or several parameters chosen to represent ('indicate') a certain situation or aspect and to simplify a complex reality.

The term 'indicator' is used in different contexts:

- For the legal purposes of the MSFD, the term 'indicator' refers only to environmental targets (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, the Decision 2010/477/EU on criteria and methodological standards referred to 'indicators' to specify the criteria and support their assessment. This use of the term 'indicator' caused confusion with its use under Art. 10 and so only the term 'criteria' is used in Decision (EU) 2017/848.
- Under Art. 9(1), the determination of GES can be expressed by reference to scientifically-based indicators which provide an operational expression of a GES Decision criterion and hence the means to assess the extent to which GES has been achieved. The 'common' or 'core' indicators developed by the RSCs fulfil this role. Such indicators typically refer to quality elements and parameters which are specific to a (sub)region. There is often a 1:1 relationship between a (sub)regional indicator and the GES Decision criterion; however, in some cases several indicators may be used to assess as single Decision criterion.
- Within the DPSIR framework, there is a need for 'pressure indicators' in the meaning of Art. 10, for scientific 'state indicators' in the meaning of criteria and methodological standards according to Art. 9(3) (EU-wide) or as determined under Art. 9(1) ((sub)regionally or nationally specific) and for 'response indicators' used specifically for monitoring and assessing progress on and effectiveness of measures under Art. 13 are needed⁴⁷. The MSFD

⁴⁷ [GD10 - MSFD recommendations on measures and exceptions - final.pdf](#)

system for 2018 reporting has been developed to accommodate such multiple use of indicators for Articles 8, 10 and 13, via a common indicator structure.

Marine Reporting Unit

Marine Reporting Units (MRUs) (formerly termed Marine Units or assessment areas in 2012 reporting) are defined areas of the marine regions to which MSFD reporting information is associated and applicable. To accommodate the different articles to be reported, these areas are of differing scales, such as the entire marine region or subregion, the area of a Member State's marine waters or subdivisions of these areas.

In relation to Art. 8 assessments, an MRU is a specified area of a marine region for which a judgement is made on whether GES has been achieved for a specified element or Descriptor. Within a single MRU, there may be multiple observations, of relevant parameters (e.g. in point, transect or grid type monitoring) over specified timeframes, which are aggregated to conclude on the extent to which GES has been achieved.

Methodological standard

Methodological standard means a scientific or technical method, developed at Union or international level, including regional or subregional level, for assessing and classifying environmental status and the predominant pressures and impacts thereon.

Art. 9(3) provides for a regulatory process to lay down criteria and methodological standards as EU-wide minimum requirements for assessing GES.

Methodological standards can include, for example, assessment tools or methods for aggregation / integration across assessment parameters, assessment elements (e.g. across contaminants, species, habitats), or criteria, and methods or approaches to defining assessment scales. Examples of such assessment methods are the HEAT (HELCOM) and COMP (OSPAR) tools/assessment methods for eutrophication, and the methodology for integrating Favourable Conservation Status criteria under the Habitats Directive.

Parameter

Parameters are the specific properties or attributes of an **element** (e.g. population size, biomass, concentration). An indicative list of parameters for monitoring and assessment of ecosystems and pressures is given in MSFD Annex III. The GES Decision specifies the particular parameters to be used for each GES criterion.

Pressure

Pressure, in the sense of the DPSIR framework and MSFD, is *an input, alteration or extraction, in relation to natural conditions, of physical, chemical or biological elements or properties which results directly from human activities. The pressure can be measured at its source (i.e. close to the activity generating it) or away from its source in the different parts of the environment (land, air, water, sea). When the pressure is sufficiently intense, widespread or frequent it can lead to environmental impacts (adverse effects) on particular aspects of natural ecosystems.*

From references in the Directive (Art. 1(3), 3(7), 8(1b), 9(1), 10(1), MSFD 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' ('adverse effects') on the environment arise from these pressures and consequently can be measured through changes in state.

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

A pressure acts directly or via pathways on physical, chemical or biological elements of the marine ecosystem, or on its natural functions and processes, e.g. inputs to the sea (e.g. substances, litter, energy, non-indigenous species), extractions from the sea (catch of target and non-target species,

extraction of sand and gravel) and interferences or changes to the elements of the ecosystem (e.g. mechanical disturbances from trawling, alterations of water flows).

A pressure, at particular levels of intensity, has the potential to have a direct or indirect impacts on parts of the ecosystem. For example, the introduction of non-indigenous species as a consequence of human activities (such as via shipping or aquaculture) may provide a pressure on the native biodiversity through the displacement of and competition with the native species. When such NIS species become abundant within habitats, they can alter the structure and functioning of the habitat and its native biodiversity and thus be considered to be causing an impact (adverse effect).

A pressure can be a natural characteristic of the environment which is altered by anthropogenic activity or refer to the input of anthropogenically-generated substances, matter (e.g. litter) and energy (e.g. sound) which are not natural.

Reference condition (or reference state)

Reference condition describes the state of the environment (or a component) in which there is considered to be no, or very minor, disturbance from the pressures of human activities. This is sometimes referred to as an unimpacted state, although it is widely acknowledged that no part of the marine environment is likely to be completely free of such influences.

For assessment purposes, it is often necessary to define a baseline against which current and future state is compared. Reference state/condition is one type of baseline. It plays a central role in the concept of the Water Framework Directive (WFD) and other environmental assessment tools (e.g. HELCOM's HEAT system). It is common in such assessment systems to then determine an 'acceptable deviation' from this reference state to allow for a specified level of disturbance from the pressure(s) and hence to determine the threshold value(s) which distinguish between an acceptable state (GES) and an unacceptable state for a given criterion (or associated scientific indicator).

For the purposes of MSFD, the reference condition and GES threshold values are used in the determination of GES. Other equivalent terms are adopted in other policies (e.g. favourable reference area and range in Habitats Directive, reference levels in ICES advice for CFP, background levels for hazardous substances in OSPAR), noting that there is considerable variance in their use and definition. The term reference point is avoided in the context of Art. 9, as it is used under Art. 10.

Reference point

In the indicative list of characteristics at MSFD Annex IV to be taken into account for setting environmental targets, point (8) refers to specification of reference points (target and limit reference points). This relates to values which must either be achieved or not exceeded in order to bring a pressure or impact to a level that achieves the environmental target and consequently allows the marine waters concerned to recover towards GES.

Resilience

From an ecological perspective, resilience means the ability of an ecosystem or component, such as a habitat, to return to its original state after being disturbed. The recovery period (often measured in months and years) is used to assess sensitivity (to pressures or activities) for management purposes.

Response

Response, as per the Driver-Pressure-Impact-State-Response (DPSIR) framework, refers to the management response, such as actions and measures, taken in environmental management systems, in order to reduce the adverse effects (impacts) of pressures and restore the state of ecosystems.

Scale (of assessment)

The spatial resolution at which GES is assessed for the different ecosystem and pressure elements. The GES Decision allows for different scales to be used depending on the Descriptor and elements being assessed. These scales can differ to the scale for determination of GES, which is required at regional or subregional level (Art. 3(5)). From identification of the appropriate scale for assessment,

there is a need to define the specific areas of each region or subregion for subsequent assessment (termed Marine Reporting Units).

Species group (formerly functional group of species)

As a way of simplifying and categorizing biodiversity, species can be assigned to groups. Such groups comprise species with similar structural, functional or taxonomic characteristics, such as their mode of feeding or their habitat. Each group represents an ecological role (e.g. surface-feeding birds, demersal fish) within the marine ecosystem.

For MSFD purposes, the term 'functional group' was specifically applied to groups of bird, mammal, reptile, fish and cephalopod species to provide a set of groups for the assessment of status of these often highly mobile or widely-dispersed species groups. A working list of functional groups was provided in CSWP (2011) in order to provide consistency in the assessments of birds, mammals, reptiles, fish and pelagic cephalopods in the first implementation cycle. Because the term is also used in a more specific manner (e.g. within habitats – see definition), it has been replaced by the more neutral term 'species group'. The list of species groups to be assessed was revised in the GES Decision (Table 1).

Within a habitat (benthic or pelagic), the term functional group is used in the context of assessing community condition, through assessment of the range of functional groups present (e.g. filter feeders, deposit feeders, grazers).

Specifications and standardised methods

Art. 11(4) provides for a regulatory process to adopt specifications and standardised methods as EU-wide minimum requirements for monitoring and assessment performed under the MSFD.

'Specification' means an element for the design of monitoring and assessment performed under Directive 2008/56/EC.

'Standardised method' means a method for the monitoring and assessment performed under Directive 2008/56/EC:

- (a) 'standardised method for monitoring' refers to a method for field sampling, and other types of data collection, and for laboratory analysis, including quality assurance and quality control mechanisms (e.g. standards from the European Committee for Standardization (CEN) and the International Standardisation Organisation (ISO));
- (b) 'standardised method for assessment' refers to a method for the spatial and temporal aggregation of data and their use, agreed at Union or international level, including regional or subregional level;

State/status

The term 'state', in the context of the DPSIR framework and MSFD, refers to the quality/condition of species/habitat/ecosystem elements. This can be determined through measurements in the environment of relevant parameters for such elements; such measurements, by definition, will reflect any impacts (individual and cumulative) to which the element has been subjected.

The Directive makes only one reference to the term state (of the environment) (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.

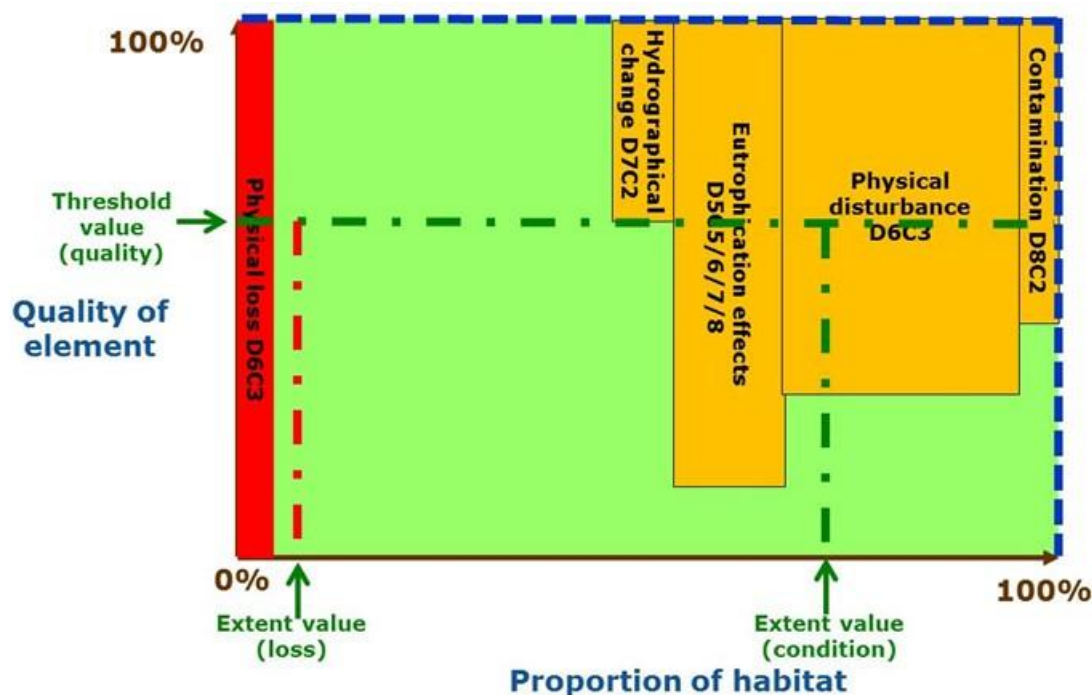
The word 'status', as used in the context of Environmental Status (Art. 3(4)), draws together assessments of the 'state' of individual ecosystem elements, through use of particular criteria and methodological standards, to assess the overall 'status' of the marine environment. This status can be classified as 'good' (in GES) or 'not good' (not in GES) according to the determination of GES under Art. 9(1). For WFD five classes are used, for Habitats Directive three classes are used. 'Status' can either be applied to the overall quality/condition of the marine environment, at the level of the individual descriptors of GES (for pressure-based descriptors) or at the level of individual species groups, habitat types, species or populations.

(Sub)region

Art. 4 defines four regions for MSFD implementation, two of which (North-East Atlantic Ocean and Mediterranean Sea) are further divided into four subregions each. The expression '(sub)region' is used to indicate application of the Directive at either regional or subregional scale.

10. ANNEX 2: QUALITY AND PROPORTION ASPECTS OF GES – WORKED EXAMPLES

See section 5.3 for an introduction to this annex.



Figure

A2.1: Illustrative example of GES quality/proportion for D6 benthic habitat.

Figure A2.1 shows a hypothetical example for a single habitat type in an assessment area (MRU).

In the GES Decision, the quality threshold values, and the extent of loss and extent of condition values are to be set by Member States.

Habitat loss (D6C4)

1. Loss of the habitat is essentially non-reversible and represents the most severe form of habitat degradation (the habitat has '0%' of its original quality). In the example shown, the extent of loss is within the extent threshold value set for D6C4 (red vertical dashed line) (i.e. the criterion has achieved the value set for the habitat in this assessment area). However, this extent of loss should also be taken into account as part of the total extent of adverse effect under criterion D6C5.

Habitat condition (D6C5)

1. Other pressures acting upon habitats can alter/degrade the condition of the habitat – possible examples are shown (contamination D8C2, physical disturbance D6C3, eutrophication D5C5-C6-C7-C8 and alteration of hydrographical conditions D7C2).
2. The 'depth' of each orange bar indicates the severity of the change in habitat quality. In the figure the alteration of hydrographical conditions (D7C2) is shown within quality threshold values, whilst eutrophication such as from oxygen depletion (D5 criteria), contamination such as from chronic pollution from oil platforms (D8C2) and physical disturbance such as from benthic trawling or aggregate extraction (D6C3) have exceeded the quality threshold value (horizontal green dashed line). Eutrophication is shown in the slide as more severe in its effects on the condition of the habitat than physical disturbance.
3. The 'width' of the orange bars represents the extent (footprint) of adverse effect on the habitat from each pressure. In the example, physical disturbance has a larger footprint than the other pressures.

4. The total extent of habitat adversely affected (i.e. below the quality threshold value) comprises:
 - a. Extent of loss (D6C4);
 - b. Extent affected by contaminants (D8C2);
 - c. Extent affected by eutrophication (D5C5, C6, C7 and C8);
 - d. Extent affected by physical disturbance (D6C3).
5. In this illustration, the extent of alteration of hydrographical conditions (D7C2) is excluded as it does not cause sufficient change to exceed the quality threshold value.
6. In this illustration, the total extent of adversely affected habitat (i.e. a+b+c+d) exceeds the 'extent value' set for D6C5 (habitat condition) (green vertical dashed line) - this can be seen as the proportion of adversely affected habitat which lies within the vertical and horizontal green dashed lines.

Assessment of current status (against the determination of GES) and follow-up actions

1. In this scenario, the habitat in the assessment area has failed to achieve GES.
2. Given that this failure results from several sources (pressures), there could be different management responses to reducing the impacts and thereby achieving achieve GES (e.g. some reduction in eutrophication, some on physical disturbance, some on contamination), depending on, for example, the feasibility of addressing the issues and cost-benefit analyses.

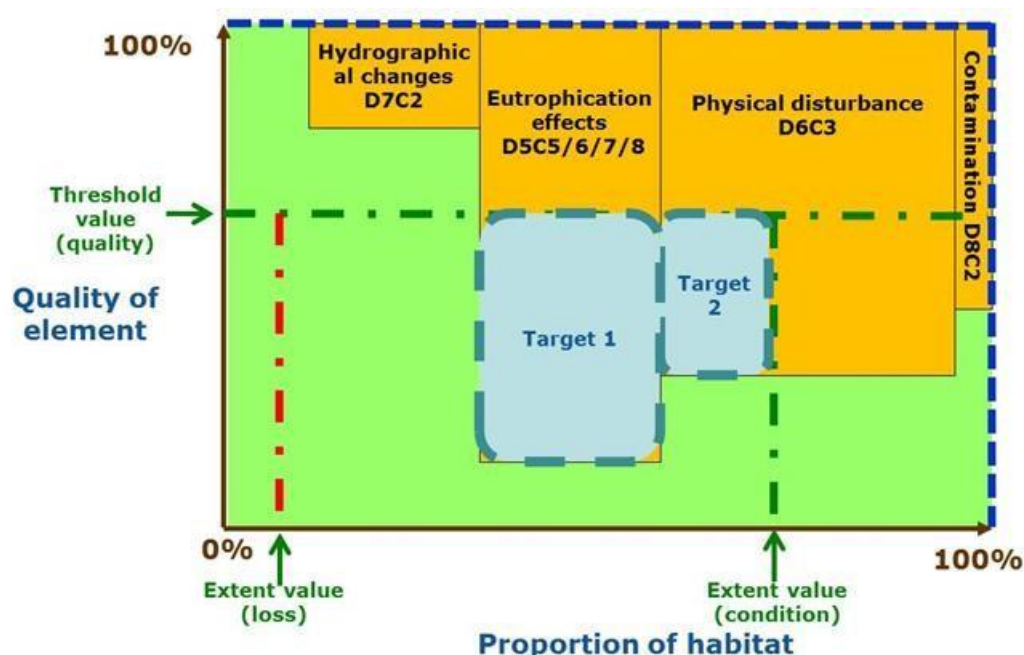


Figure A2.2: Determination of GES and links to targets for pressures and associated impacts

Figure A2.2 shows a similar scenario for a benthic habitat as shown in Figure A2.1, excepting there is no habitat loss (D6C4).

Environmental targets (MSFD Art 10) are intended to be used to 'guide progress towards achieving GES'. A key way to do this is for targets to focus on the scale of reduction in pressures needed to achieve GES. In this example, two targets are needed to reduce the impacts by a sufficient amount to allow the habitat to recover to the threshold values set: target 1 on nutrient enrichment and target 2 on physical disturbance.

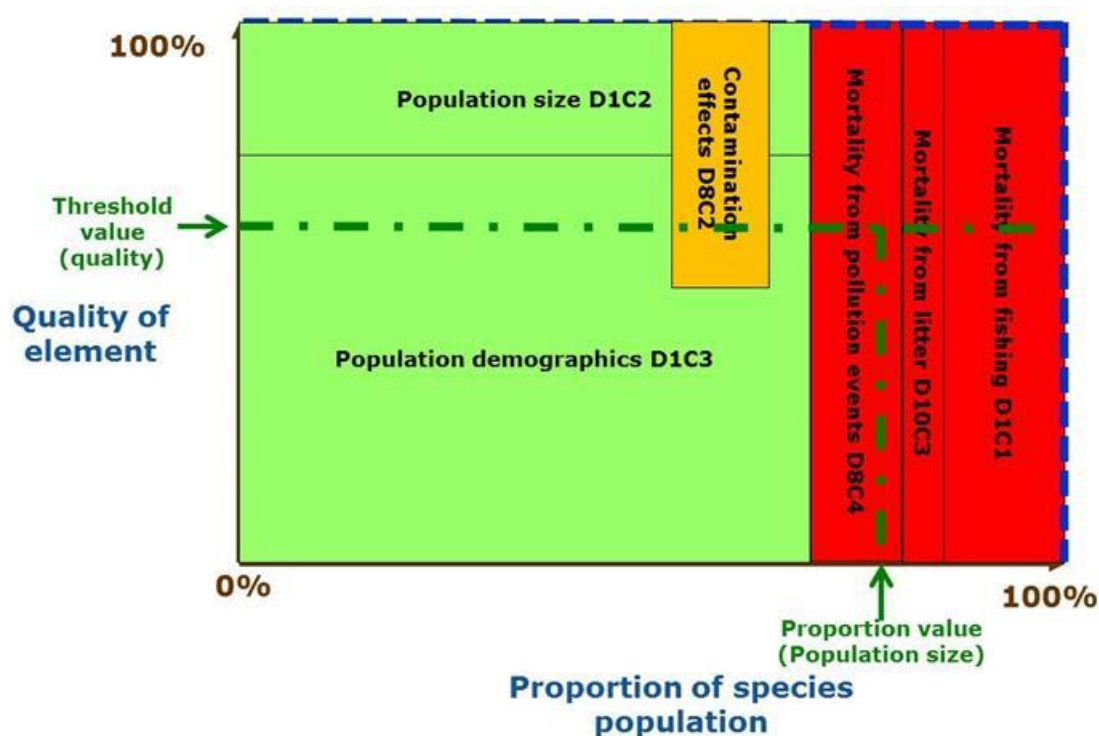


Figure A2.3: Illustrative example of GES quality/proportion for the population of a D1 species (e.g. a turtle).

In this example:

- Anthropogenic mortality from fishing incidental catch (D1C1), litter (D10C3) and acute pollution events (D8C4) is preventing the population (D1C2) from achieving its population size threshold;
- Population demographic assessments under D1C3 are OK;
- Part of the population is suffering from chronic contamination effects (D8C2) (possible link to D1C3 assessments);
- D1C5 assessment of the species' habitat is not shown.

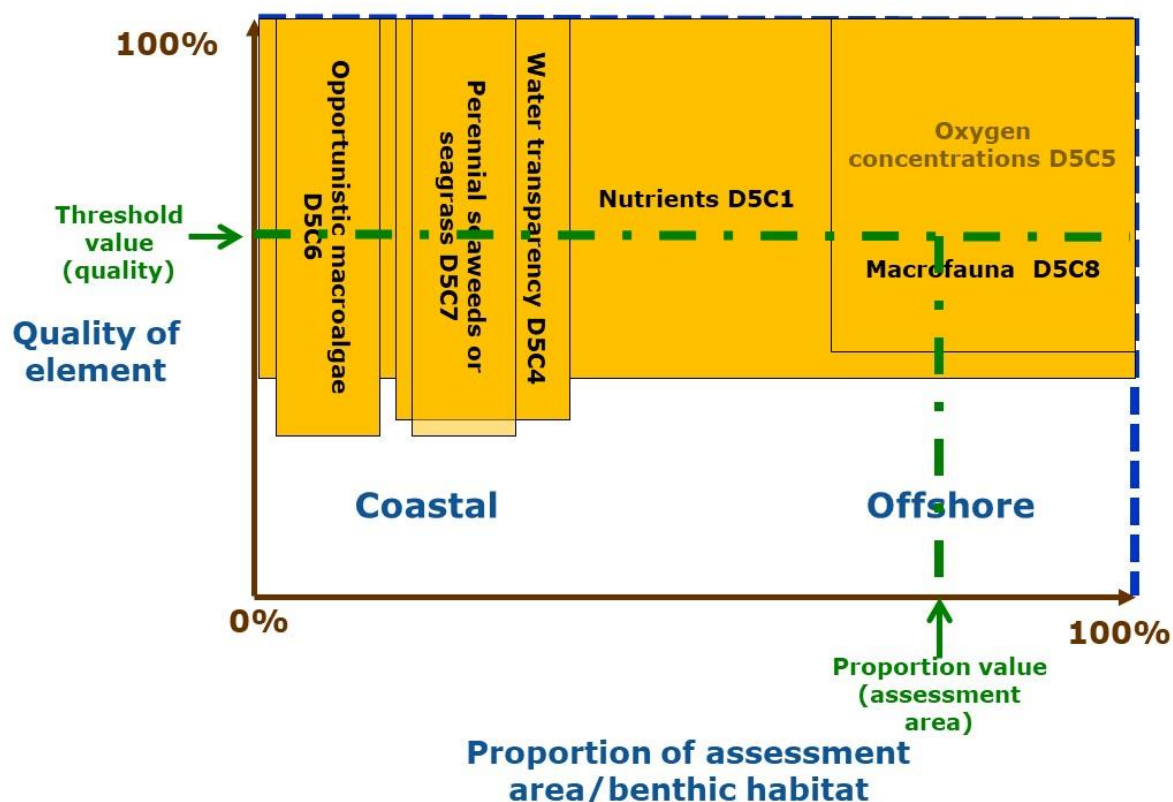


Figure A2.4: Illustrative example of GES quality/proportion for D5 criteria and benthic habitats.

In this example:

- The pressure (nutrients) D5C1 is shown as spread throughout the assessment area and failing to meet the threshold value;
- Criteria for the impacts on the seabed are also failing:
- In the coastal waters, opportunistic macroalgae (D5C6) fail in part of the area and perennial seaweeds or seagrasses (D5C7) fail in another part. The latter correlates with water transparency (D5C4);
- In offshore waters, oxygen levels (D5C5) are below threshold levels, supported by the secondary criterion macrofaunal composition D5C8 which also fails in the same area and to a similar degree;
- The degree of failure of the criteria (how far beyond threshold values) is shown as similar because the pressure C1 should auto-correlate with the impacts C4, C6 and C7 (coastal) and C5 and C8 (offshore).

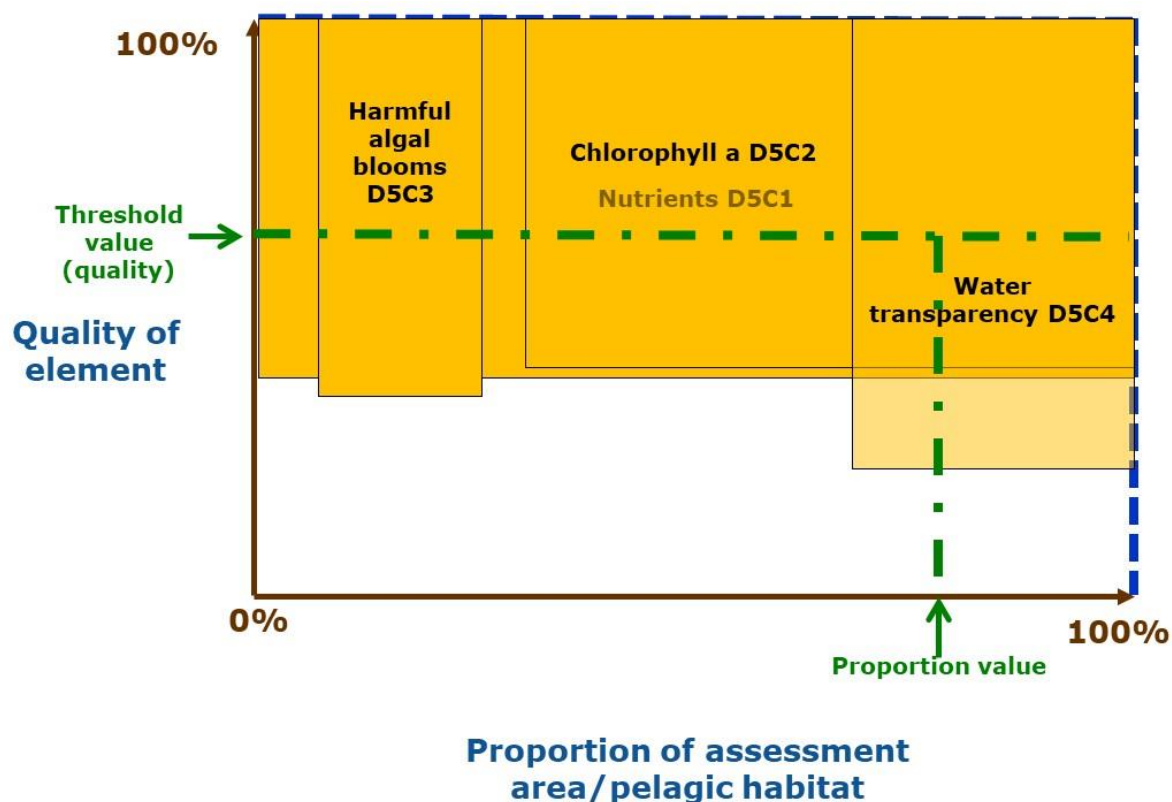


Figure A2.5: Illustrative example of GES quality/proportion for D5 criteria and pelagic habitats.

In this example:

- The pressure (nutrients) D5C1 is shown as spread throughout the assessment area and failing to meet the threshold value;
- Criteria for the impacts on the water column are also failing: Chlorophyll-a (D5C2) in part of the area and harmful algal blooms (D5C3) in another part;
- The degree of failure of the criteria (how far beyond threshold values) is shown as similar because the pressure C1 should auto-correlate with the impacts C2 and C3;
- Water transparency (D5C4) also shows a failure but to a deeper extent and over less area, perhaps indicating the thresholds are not well correlated (or the criterion is more relevant to seabed affects).

11. ANNEX 3: CRITERIA FOR BIODIVERSITY AND LINKS TO OTHER POLICIES

Assessment of the status of biodiversity (species and habitats) is undertaken in a number of fora, via both formal and informal mechanisms. Tables A3.1 (species) and A3.2 (habitats) set out a correlation of criteria used for assessment under related policies.

Table A3.1: Correlation of criteria used for assessment of species in the 2010 GES Decision (first column) and under other relevant policies with those in the 2017 GES Decision (last column) where 1=primary criterion and 2=secondary criterion.

MSFD 2010 Decision (D1, 3)	Habitats Directive ⁴⁸	Birds Directive	HELCOM ⁴⁹ (IUCN 2008 criteria)	OSPAR Texel-Faial criteria ⁵⁰	UNEP/MAP EcAp	IUCN Red List	GES Decision
Distribution (1.1)	Range	Breeding distribution map and range	Geographic range size and fragmentation	Decline (occurrence in area/ extent)	Species distributional range	Range (EOO, AOO)	Distribution (2)
Population size (1.2); reproductive capacity (3.2)	Population	Population size	Declining population, small or very small population size	Decline (numbers)	Population abundance	Population size Small population	Population size (1)
Population condition (1.3); age & size distribution (3.3)				Decline (quality)	Population demographic characteristics	Mature individuals incl. above	Population condition (2)
	Habitat for species					Habitat quality included in Range	Habitat for species (2)
	Future prospects		Included above	Included above		Included above	Not used as Art. 8 requires current status ⁵¹
			Quantitative analysis of extinction risk (e.g. population viability analysis)	Global proportion Regional importance Rarity Sensitivity Keystone species			

⁴⁸ <https://circabc.europa.eu/w/browse/0de47902-0a08-41dd-943c-520066a3c529>

⁴⁹ HELCOM, 2013 HELCOM Red List of Baltic Sea species in danger of becoming extinct. Balt. Sea Environ. Proc. No. 140. <http://helcom.fi/Lists/Publications/BSEP140.pdf>

⁵⁰ OSPAR. 2003. Criteria for the Identification of Species and Habitats in need of Protection and their Method of Application (The Texel-Faial Criteria). Reference no. 2003-13.

⁵¹ To be taken into account in implementation process, e.g. risk-based approach and measures.

Table A3.2: Correlation of criteria used for assessment of habitats in the 2010 Decision (first column) and under other relevant policies, with those in the 2017 GES Decision (last column) where both are primary criteria (1).

MSFD 2010 Decision (D1, 6, 7)	Habitats Directive ⁵²	HELCOM ⁵³ (IUCN criteria)	OSPAR Texel-Faial criteria ⁵⁴	UNEP/MAP EcAp	EU Red List (IUCN approach)	GES Decision
Distribution (1.4)	Range	Declining distribution (quantity)	Decline (extent)	Habitat distributional range [extent]	Quantity, restricted distribution (Extent Of Occurrence)	-
Extent (1.5)	Area covered	Restricted distribution			Quantity, restricted distribution (Area Of Occurrence)	Extent (1)
Condition (1.6, 6.2, 7.2)	Structures & functions	Qualitative degradation	Decline (quality)	Condition of habitat's typical species and communities	Quality (abiotic, biotic)	Condition (1)
	Future prospects		Included above		Historic & future trends included above	Not used as Art. 8 requires current status ⁵⁵
			Global proportion Regional importance Rarity Sensitivity Ecological significance		Probability of collapse	-

Whilst the criteria used for these assessments are often similar, the precise methodology adopted (e.g. threshold values, assessment scales, rules for use of criteria, timing) often differs, leading to inconsistencies in the outcomes of the assessments. This is further exacerbated when the same species and habitat types are listed for protection (and hence needing assessment) in several policies, leading to multiple assessments of the same species or habitat, sometimes with differing outcomes.

To ensure equivalent outcomes from assessments (i.e. whether the species and habitat is in good status or not) and to reduce administrative burden (through undertaking multiple assessments of the same species or habitat), further harmonisation of different approaches within and across each region is needed, as each policy is overall aiming to ensure the biodiversity is protected and the long-term viability of the species and habitats listed. Further detailed discussion is therefore needed with the other policies to work towards a closer harmonisation of assessment methods.

⁵² <https://circabc.europa.eu/w/browse/0de47902-0a08-41dd-943c-520066a3c529>

⁵³ HELCOM 2013. Red List of Baltic Sea underwater biotopes, habitats and biotope complexes. Baltic Sea Environmental Proceedings No. 138. <http://helcom.fi/Lists/Publications/BSEP138.pdf>.

⁵⁴ OSPAR. 2003. Criteria for the Identification of Species and Habitats in need of Protection and their Method of Application (The Texel-Faial Criteria). Reference no. 2003-13.

⁵⁵ To be taken into account in implementation process, e.g. risk-based approach and measures.