



Marine Strategy Framework Directive (MSFD)

Common Implementation Strategy

17th meeting of the

Working Group on Good Environmental Status (WG GES)

10 March 2017

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Agenda Item:	5a
Document:	GES_17-2016-02
Title:	Draft guidance for assessments under Article 8 of the MSFD
Prepared by:	ABPmer, in consultation with EU-Commission and DG GES lead
Date prepared:	28.02.2017
Background	<p>In October 2015 WG GES 14 agreed that technical guidance on Art. 8 MSFD assessments should be prepared in close conjunction with the revision of Commission Decision 2010/477/EU. WG GES asked DGGES to submit a proposal on the scope of the proposed technical guidance and arrangements for its preparation (MSCG-17-2015-07). It was clarified that the work on preparing this guidance should be closely linked to the revision of Decision 2010/477/EU and the revision of MSFD Annex III.</p> <p>WG GES considered a first draft guidance during its workshop on 20/21 April 2016, identifying a number of technical issues that needed further discussion, in particular in relation to Descriptors 1 and 6. Plans to progress this technical work in autumn 2016 were postponed by the EU Commission to 2017 in order to allow finalisation of the revised Decision on GES criteria and MSFD Annex III.</p> <p>As a result, the draft guidance was updated in December 2016 to align it with the final agreed text of the Commission Decision and for editorial improvement (GES_16-2016-02). Issues requiring further development, discussion and technical work were highlighted in grey boxes throughout the guidance.</p> <p>WG GES 16 discussed the document and agreed to invite further comments on it by 13 January 2017, which should focus in particular on those issues that needed follow-up work. It agreed that the Commission would update the document on the basis of comments received and release it for use and testing by Member States and the Regional Sea Conventions in their preparation of the 2018 MSFD reports. It was concluded that the document would not be forwarded to MSCG in 2017 for adoption as it was not yet mature enough.</p> <p>Following WG GES 16, comments were received on the draft guidance from Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Poland, Portugal, Spain, Sweden, the United Kingdom, HELCOM, OSPAR, JRC, NAVI and a group of NGOs (Seas At Risk, Coalition Clean Baltic, Birdlife International). All comments were compiled (see GES_16-2017-03), indicating how they have been addressed. Except for some of the very late comments from Italy, all comments were addressed. Any issues requiring discussion were included into the “issue boxes” in each chapter to guide follow-on work.</p> <p>The outstanding open questions and issues will be progressively resolved through the MSFD CIS work plan, assisted by JRC, ICES, TG Litter, TG Noise and DG GES. It is expected that the results of this follow-on work should be fed back into the draft guidance, with a next version to be prepared in 2018.</p> <p>This present version shows revisions in track changes compared to the previous version (GES_15-2016-02). A clean version is also released for testing by Member States and Regional Sea Conventions.</p>

The WG GES is invited to:

- Note the updated guidance and encourage Member States and Regional Sea Conventions to test it in preparing their 2018 updates of Articles 8, 9 and 10 MSFD and to report back experiences to the next meeting of WG GES.

DRAFT



Marine Strategy Framework Directive (MSFD)

Common Implementation Strategy

**Guidance for assessments under Article 8 of the
Marine Strategy Framework Directive**

Integration of assessment results

February 2017

Draft document released for testing

DRAFT

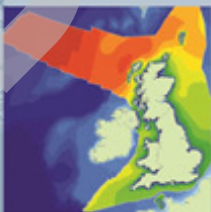
Guidance for Assessments Under Article 8 of the Marine Strategy Framework Directive

Integration of assessment results

DG Environment

February 2017

Creating sustainable solutions for the marine environment



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Guidance for Assessments Under Article 8 of the Marine Strategy Framework Directive

Integration of assessment results

February 2017



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1 Introduction

This document is work in progress:

This document reflects the state of discussion (February 2017) presented to WG GES on 10th March 2017 on the development of practical guidance for the implementation of Article 8 MSFD to assess the extent to which GES has been achieved in Member State's marine waters. The document has not been endorsed by Member States. It documents open issues that require further discussion among EU Member States and the European Commission.

Text highlighted in grey and placed in boxes in the text summarise outstanding issues. This includes issues where it has not been possible to reach agreement among Member States on approaches to the assessments. Where possible a recommended interim approach is provided.

The open issues will be taken forward in 2017/2018 through cooperation within the MSFD Common Implementation Strategy (CIS) process, assisted by JRC, ICES, TG Litter, TG Noise and the Drafting Group GES. WG GES will consider progress and provide steer. The Guidance will be revised in the light of the results of this further work. It is planned to do so and provide a next version in 2018. In the interim, Member States and Regional Sea Conventions are encouraged to test the recommendations in the document in the process of developing their Article 8 MSFD assessments for reporting due in 2018 and feedback their experiences to WG GES in autumn 2017 so that these can be taken into account in further development of the Guidance.

1.1 Purpose and Scope

The Marine Strategy Framework Directive (MSFD, 2008/56/EU) requires assessment of the current environmental status of Member States' marine waters and of the predominant pressures and impacts upon them (Article 8 MSFD)¹. These assessments need to be linked closely to the Member State's determinations of good environmental status (GES) under Article 9(1) MSFD, so that they indicate whether GES has been achieved or how close they are to achieving GES. The criteria and methodological standards, laid down by the EU Commission in accordance with Article 9(3) MSFD, provide the basis for assessing the extent to which GES has been achieved. They therefore provide the basis for both the determinations of GES and the assessment of whether GES has been achieved. In undertaking the assessments, Member States are required to cooperate within each MSFD region or subregion to ensure that the assessments are coherent and coordinated, and endeavour to follow common approaches (Article 5(2) MSFD). This regional coordination is expected to be done through existing institutional cooperation structures, including the Regional Sea Conventions (RSCs) (Article 6 MSFD).

The EU Commission document on cross-cutting issues ('cross-cutting issues document', MSCG-17-2015-06) sets out conceptual approaches to a suite of assessments required under Article 8 MSFD, including a concept for an integrated presentation of the extent to which GES is achieved. To operationalise these concepts, the present Guidance provides a set of key principles and practical

¹ Additionally, an economic and social analysis of the uses of the marine waters and of the cost of degradation of the marine environment is required under Article 8(1)(c) MSFD.

technical approaches for use by Member States and Regional Sea Conventions to provision of consistent assessments on the extent to which GES has been achieved. The Guidance is intended as a manual, guiding implementers step-by-step through the assessment process and is to include illustrative worked examples.

The Guidance is developed in two phases in order to take account of existing timelines that Member States and Regional Sea Conventions are already engaged in, noting that the assessment processes for the 2018 update of the Article 8 MSFD assessments have already started. A phased approach also recognises that the 2018 update of Article 8 MSFD assessments will be a transitional step towards more consistent and regionally-coherent future assessments. This is due in part because the Commission Decision 2010/477/EU on criteria and methodological standards for environmental status and the closely linked Annex III MSFD were revised in 2016/2017² and will take time to fully implement, but is also due to there being remaining gaps in assessment tools (cf. development of scientific indicators in support of GES assessment).

The phased approach is as follows:

- In the first phase (2016), this Guidance document has summarised the possible approaches for integrating assessment results across scientific indicators and the GES Decision criteria for testing by Member States and Regional Sea Conventions in the 2018 update of Article 8 MSFD assessment. This aims to support the presentation, in a consistent way, of the overall extent to which good environmental status is being achieved. This Guidance addresses Article 8(1)(a) and 8(1)(b), but not Article 8(1)(c).
- In the second phase (from 2017 onwards), the Guidance will be further developed to address the remaining technical questions and to develop technical guidance on the individual assessments of activities, pressures, impacts and status and how they link up in future assessments, building *inter alia* on the latest experiences of Member States and Regional Sea Conventions gained in the 2018 update of the Article 8 MSFD assessments.

Section 1 'Introduction' will be further developed by DG GES by 2018 as a contribution of Member States to a common understanding of the Article 8 MSFD assessment. For the time being, the subsections exemplify the items to be covered and developed by DG GES.

1.2 About this Guidance

This Guidance has been developed alongside the revised Commission Decision on Criteria and Methodological Standards and is based on the version on which the Article 25 MSFD Regulatory Committee gave its positive opinion on 10 November 2016³. It is also informed, where appropriate, by:

- the outputs from the technical review process that contributed to the revision of the Commission Decision;
- technical work on Descriptors 1, 3, 4 and 6 assisted by the International Council for the Exploration of the Sea (ICES);
- technical work on Descriptors 1, 2, 5, 7, 8 and 9 assisted by the Joint Research Centre (JRC);

² The Art. 25 MSFD Regulatory Committee delivered a positive opinion on the draft revised Commission Decision on GES criteria methodological standards and the revision of MSFD Annex III on 10 November 2016; there follows a period of scrutiny by the European Parliament and Council. Formal adoption and publication is anticipated by spring 2017.

³ <https://circabc.europa.eu/sd/a/8f66679e-6dd6-4b59-8fa2-e446e0ee934f/Link%20to%20DRAFT%20Commission%20Decision%20GES%20criteria.pdf.url>

- technical work on Descriptor 10 through the Task Group on Litter (TG Litter);
- technical work on Descriptor 11 through the Task Group on Underwater Noise (TG Noise);
- discussions and contributions of the Working Group on Good Environmental Status (WG GES) Workshop on Article 8 MSFD assessments on 20-21 April 2016;
- feedback from Member States and stakeholders following the presentation of integration approaches at WG GES on 21 June 2016 and a draft version of this Guidance presented to WG GES on 6 December 2016; and
- contributions from WG GES's Drafting Group (DG GES).

The purpose of this Guidance is to support Member States, working together in each region or subregion including through the Regional Sea Conventions where appropriate, in the production of compatible outputs from assessments so that they:

- can contribute to regional and EU-scale compilations of information, presenting the extent to which GES is achieved;
- facilitate communication of the environmental status of the marine environment to managers and the public.

The Guidance is not legally binding but seeks to improve the coherence of Article 8 assessments across Member States, within as well as across subregions and regions, by providing recommended approaches to the integration of indicators and criteria, and examples for presenting assessment results. The aim is that assessments are consistent, coherent, transparent and repeatable.

It is recognised that the underlying data and methods of the assessments will vary. Member States will be at varying stages in the development of scientific indicators (national, regional and Europe-wide), based on the monitoring data available, and assessment processes within some Regional Sea Conventions are well advanced. Therefore, it is likely that Member States and the Regional Sea Conventions will have differing abilities to produce assessments against each criterion of the revised Commission Decision for 2018 and, where appropriate, integration of these within Descriptors to indicate the extent to which GES has been achieved.

Furthermore, the integration and aggregation of indicators and criteria is technically complex, and the science is still at an early stage with no clear consensus yet about how best to do it for all topics. It is therefore recognised that when Member States carry out their Article 8 assessments for 2018, the practical experience gained on integration, both nationally and at regional level may result in the use of modified or different versions of the suggested integration methods. These should be reported, and fed into the refinement of this Guidance at a later stage.

Sections on 'Visualising assessment results' provide initial outlines and illustrative examples for expressing the outcomes of the assessment. Tabular formats to present the outputs for each assessment were developed within this Guidance document in 2016 but have now been transferred to the 2018 Guidance on reporting for Articles 8, 9 and 10 under development by Working Group on Data, Information and Knowledge Exchange (WG DIKE). The Reporting Guidance provides the agreed reporting formats to be used for Article 8 assessments.

Any references to specific articles refer to Directive 2008/56/EC unless otherwise specified.

1.3 Policy Context

Section to cover (and may later be combined with section 1.5 if appropriate, to avoid overlaps):

- Brief summary of the development of an assessment framework (Article 12 MSFD assessment of 2012 reports, Common Understanding document (WG GES, 2011), Cross-cutting issues paper (European Commission, 2015a), revision of Annex III and the Commission Decision, follow-up work on the revised Commission Decision assisted by ICES and JRC.
- Drive for EU and regional consistency.

1.4 Links Between Article 8 and Articles 9, 10, 11 and 13

Section to cover the approach to determining and assessing GES [See MSCG_17-2015-05, p7-8.]:

- Art 8 assessment has a direct link with Art 9 descriptors:
 - Article 8(1)(a) – State descriptors/criteria;
 - Article 8(1)(b) – Pressures and Impacts descriptors/criteria;
- Approach to assessing whether GES has been achieved, based on criteria in the revised Commission Decision and the set of characteristics determined by MS according to Art 9(1);
- See also Fig 2 in MSCG_17-2015-06.
- Article 8 refers to the Annex III characteristics and pressures and impacts. For the initial assessment in 2012, this framework was adopted by some Member States, and the assessment was used to determine GES. The subsequent implementation cycles of the MSFD require assessment of environmental status, against the determination of GES. For these assessments (2018, 2024 etc.), structuring the assessment according to the GES descriptors and criteria, as laid out in the revised Commission Decision, is appropriate.

1.5 Overview of Article 8 MSFD Assessment Components

Section to cover:

- Overview of the individual assessments to be undertaken under Article 8(1)(a) and (b) and Article 9 MSFD and a structured approach on how to bring together different aspects of the initial assessment:
 - Assess the spatial distribution, intensity and frequency of human activities;
 - Assess the spatial distribution, intensity and frequency of pressures resulting from human activities;
 - Assess the impacts of the pressures on the ecosystem elements;
 - Assess the status of ecosystem elements;
- The differentiation between activities, pressures and impacts on the ecosystem should be followed as far as possible, but there may be situations where a strict delineation is not possible.
- Integrated presentation of assessment results as a tool to communicate the extent to which GES is being achieved;
- Assessing change, i.e. in moving towards GES (including the relevance of trend assessments and distance to target);
- Assessing progress towards environmental targets and distance to target.

1.6 Terminology

The terms 'integration' and 'aggregation' are sometimes used interchangeably (e.g. Prins *et al.*, 2014⁴), and clarity is needed on their meaning. The Cross-Cutting Issues document discusses an 'integrated approach to assessing GES', and the revised Commission Decision refers to the spatial and temporal aggregation of data in relation to assessments. The Drafting Group on Good Environmental Status (DG GES) Common Understanding process defined aggregation as the combination in space and time, and integration as the combination across indicators and criteria.

This Guidance uses the following definitions:

- Integration: the combining of information from different (scientific) indicators into one higher-level indicator or to criterion-level, or the combining of information from two or more criteria to descriptor level or to an alternative grouping of criteria (e.g. for an ecosystem component, or for a grouping of criteria below descriptor level).
- Aggregation: the spatial and/or temporal combining of information on the same scientific indicator (or higher-level indicator, or species group, or criterion etc.).
- Spatial scale: the geographical scale at which assessments should be carried out, for example, region or subregion, national waters (i.e. under a country's jurisdiction), coastal water bodies etc.
- Assessment area: an individual, defined area that is used for assessments. These may be defined at different spatial scales as part of a nested approach. For an assessment at a specified spatial scale, some assessment areas may not be relevant and would not need to be assessed.

Integration of indicators and criteria requires that all elements to be integrated are assessed for the same assessment area. Where this is not the case, either aggregation to larger areas, or down-scaling to smaller assessment areas will be necessary.

⁴ Prins, T.C., Borja, A., Simbora, N., Tsangaris, C., Van der Meulen, M.D., Boon, A.R., Menchaca, I., Gilbert, A.J. (2014). Coherent geographic scales and aggregation rules in assessment and monitoring of Good Environmental Status – analysis and conceptual phase. Towards a Guidance document. Deltares/AZTI/HCMR, report 1207879-000-ZKS-0014 to the European Commission, Delft, 47 pages..

2 Over-arching Principles and Approaches

This section sets out general principles to provide step-wise guidance on the assessments to be undertaken for Article 8(1)(a) and (b), based on application of the revised Commission Decision criteria and methodological standards and Member State determinations of GES under Article 9(1), which lead to a consistent presentation of assessment results across marine regions and Member States.

The assessments under Article 8(1)(a) and (b) should be undertaken in relation to the determinations of GES under Article 9(1) and using the criteria and methodological standards set by the Commission in accordance with Article 9(3) (i.e. the 2017 revised Commission Decision).

This section will be further developed by 2018. Possible topics in addition to those already included are:

- Linking indicators with criteria: avoiding assessing a single aspect more than once, e.g. benthic indicators (cumulative impact) and pressure indicators;
- How to integrate different geographic scales in the assessment?
 - Some indicators operate at small assessment scales (e.g. WFD water bodies) while others operate at larger scales. This may require scaling down and up from an agreed regional assessment area. This means that the same assessment result for a big area (e.g. region) is applied to various small assessment units (e.g. basins). Results for smaller areas may need to be aggregated together, or assessment results could be provided as a percentage of areas achieving good status.
- How to deal with spatially-explicit assessment requirements (e.g. proportion of area subject to pressure).
- How to deal with gaps in the integration process: In cases where assessment results for individual scientific indicators or criteria (or components thereof) are not available, how should integration across indicators/criteria take place?
- How to deal with assessments for which there is a trend-based outcome but a judgement of status for the criterion has not been made?
- Any other common problems and solutions identified in sections 3 and 4.
- Compatible presentations.

2.1 Approach to Assessments

The cross-cutting issues document sets out a two-step process for assessments under Article 8(1)(a) and (b):

- Step 1: assess the predominant pressures and their impacts on the marine environment (to fulfil Article 8(1)(b) requirements); this can be informed, where appropriate, by a mapping of the uses and activities in the marine environment, and may include other pressures and impacts set out in Annex III;
- Step 2: assess the environmental status of marine ecosystems (including species and habitats), informed by the pressure and impact assessments under step 1 (to fulfil Article 8(1)(a) requirements).

These two steps allow for an assessment of the extent to which GES has been achieved, addressing all eleven GES descriptors of MSFD Annex I.

Given the number of criteria that Member States need to monitor and assess, applying a risk-based approach can help focus efforts on the main anthropogenic pressures affecting their waters and on the associated environmental impacts. A generalised approach to a prioritised implementation of the

MSFD is set out in section 3.6 of the Commission's Cross-Cutting Issues Paper (European Commission, 2015a). This involves *inter alia* assessing at specified spatial scales:

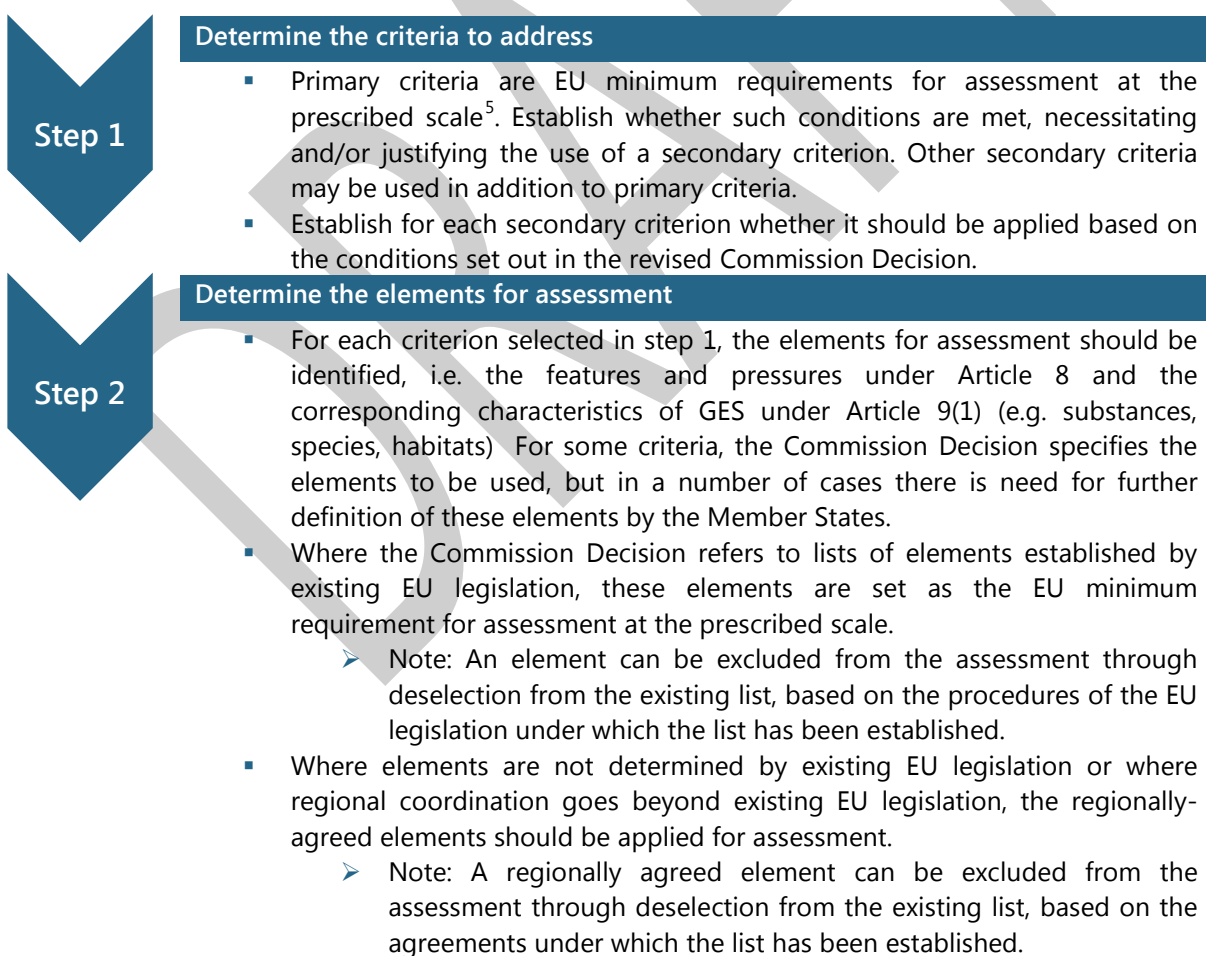
- the spatial distribution, intensity and frequency of human activities;
- the spatial distribution, intensity and frequency of pressures resulting from human activities;
- those aspects of the marine environment which are most likely affected by these pressures.

The assessments should yield a clear indication of:

- the extent and spatial distribution of the different predominant pressures (using first a mapping of human activities, if appropriate) and possible impacts;
- how each pressure and impact could affect the status of the different ecosystem elements by assessing those elements;
- those pressures that are more likely to pose a significant risk to the achievement of GES.

The described approach can inform decisions under step 2 and 3 in the assessment as set out in the following assessment flow.

The basic steps in the assessment of each Descriptor under Article 8(1)(a) and 8(1)(b) are described below. This provides the generic approach; specific details for each Descriptor are provided in Sections 3 and 4. The Descriptor-specific sections elaborate on the integration process and methods.



⁵ The revised Commission Decision allows for the primary criterion D5C5 to be substituted by the secondary criterion D5C8.

Step 3

- Member States may choose to select additional elements for assessment which are specific for assessing GES in their national waters.

Determine scales and areas for assessment

- Determine the areas for which the elements should be assessed based on the specification of scales of the revised Commission Decision, agreeing these at (sub)regional level using a 'nested approach' as far as possible.
- Where possible, elements to be integrated should be assessed at the same spatial scale and in the same assessment areas.
- Where the selected elements are assessed at different geographic scales, up- or down-scaling of results may be necessary before integrating results.
- For principles on determining areas of assessment see Section 2.3.

Step 4

Assign indicators to criteria

- Establish which regionally agreed indicators address each criterion in the revised Commission Decision. Establish whether the indicator covers all the required elements and scales determined in steps 2 and 3.
- Where there are gaps in the coverage of criteria, elements or scales, determine the need for additional national assessment, pending the development of regionally coordinated assessments. Existing assessments may be used where appropriate, such as those under EU legislation, e.g. WFD, CFP, Habitats Directive, and assessments developed for national purposes. This may cover the following situations:
 - Gaps in the set of RSC indicators which should be filled regionally, but for which national assessments (if available) can fill the gap in the interim;
 - Elements that are specific to national waters (i.e. have no regional dimension), which are assessed nationally and are complementary to the regional assessment.
- Where additional national elements are being assessed, they should be assigned to the relevant revised Commission Decision criteria. These need to have a threshold value, where appropriate, and should follow the agreed structure for reporting indicators⁶.
- For principles on relating national assessments to regional assessments, see Section 2.5.
- If, after assigning all relevant regional, EU (e.g. WFD) and national indicators to the revised Commission Decision criteria, there are still gaps (either in relation to criteria or to elements to be addressed within the criteria), these gaps should be identified and addressed in the next implementation cycle. Indicators should follow the agreed structure for reporting indicators⁷, noting that formal reporting requirements will be determined through the Working Group on Data, Information and Knowledge Exchange, WG DIKE.

Step 5

Establish levels and thresholds

- Threshold values should be established for each element, indicator or criterion, as appropriate.
- Depending on the criterion, the revised Commission Decision requires Member States to use existing threshold values established under EU legislation or, in the absence of existing EU-values, to establish threshold

⁶ MSFD CIS Guidance Document No. 13 – Guidance on a structure for MSFD-related indicator assessment reports, 7 April 2016, as endorsed by MSCG 17-2015. https://circabc.europa.eu/sd/a/0557a440-3dd7-489c-893e-2062fce7ce5d/GD13_CommonStructureForIndicator-basedAssessments_20160407_Final.doc

⁷ MSCG_17-2015-04. As before

values at Union level, or through regional or subregional cooperation. Threshold values should be developed through an inclusive scientific process, using best-available evidence.

- Where it has not been possible to establish threshold values for the 2018 assessments, the revised Commission Decision provides for use of national threshold values, trends and pressure-based proxies. The establishment of national threshold values, trends and pressure-based proxies should follow the principles laid down in Article 4(1) of the revised Commission Decision including on the basis of the precautionary principle and on the best available evidence.

Step 6

Assess status

- The status of each indicator should be determined, for each relevant assessment area, based on the value of the indicator compared to the levels and thresholds established in step 5.

Step 7

Integrate indicators and criteria

- The indicators relating to each criterion should be brought together to provide a judgement on each criterion, and criteria or assessed elements should be integrated to an appropriate level for an overall judgement on the extent to which good environmental status is achieved in relation to the descriptors.
- Note that for some descriptors the integration of information to descriptor level is not envisaged, but integration may stop at criteria level. The level of integration is specified for each descriptor in the respective 'Level of integration' sections in Sections 3 and 4, which record the state of discussion in relation to the specified integration rules.

As with the six-year cycles of implementation of the MSFD, the lists of elements to be assessed, and the threshold values, should also be periodically reviewed to ensure they remain relevant, in line with the best-available evidence, and that any gaps are being progressively addressed.

Note that for some descriptors (e.g. D1 Species and D1/D6 Habitats), the selection of elements (species or habitats) to be assessed comes prior to the selection of criteria, since the type of species or habitat (e.g. whether it is covered by the Habitats Directive, whether it is a commercially exploited fish species) determines whether criteria are primary or secondary.

The table in Appendix B provides a simplified overview per criterion of the lists of criteria elements, threshold values and integration rules for which, according to the revised Commission Decision, standards exist (status November 2016) and should apply, or for which the revised Commission Decision provides for Member States to establish them through Union, regional or subregional cooperation.

Some of the steps above, such as identification of relevant elements and threshold values, have links through to the determination of GES under Article 9.1 MSFD, demonstrating the close relationship between the two aspects of the 2018 updating process.

More detailed guidance will be required on integration at level 1, for example: the time frame for the data to be used in the assessment (last 6 years, or latest year only); how to calculate whether the threshold has been achieved (average of measurements over the period compared to the threshold, or individual measurements compared to the threshold, with a single exceedance indicating failure).

Further guidance will also be needed on spatial aggregation between reporting areas. These issues require Descriptor-specific technical guidance and will be taken forward separately.

2.2 Overall Assessment Approach

The extent to which GES is achieved for a specific geographic area needs to be clearly communicated. This involves the aggregation and integration across the many individual assessments and data sets relating to the eleven descriptors in order to reach conclusions on whether GES has been achieved or not. Aggregation and integration need to take into consideration and be balanced with appropriate details and scales for identifying and implementing any necessary management actions via national Programmes of Measures (Article 13).

The cross-cutting issues document has set out a conceptual scheme for organising and presenting the assessment relating to pressure/impacts and to the state of ecosystem components with a view to providing a conclusion on the overall state of the marine environment (Figure 1). It encompasses the eleven descriptors and shows how these relate to the different aspects of Article 8(1)(a) and 8(1)(b). While GES is only met if all descriptors are in good status, the scheme suggests that integration stops at the level of pressure-related descriptors and at the level of the individual ecosystem components. This approach allows the identification of the main pressures/impacts and the main ecosystem components which are responsible for a specific area failing GES, with any other pressures considered important but not incorporated under the pressures descriptors being included in 'other pressures'. Integration is not anticipated across descriptors or across biological elements (broad species groups or habitats).

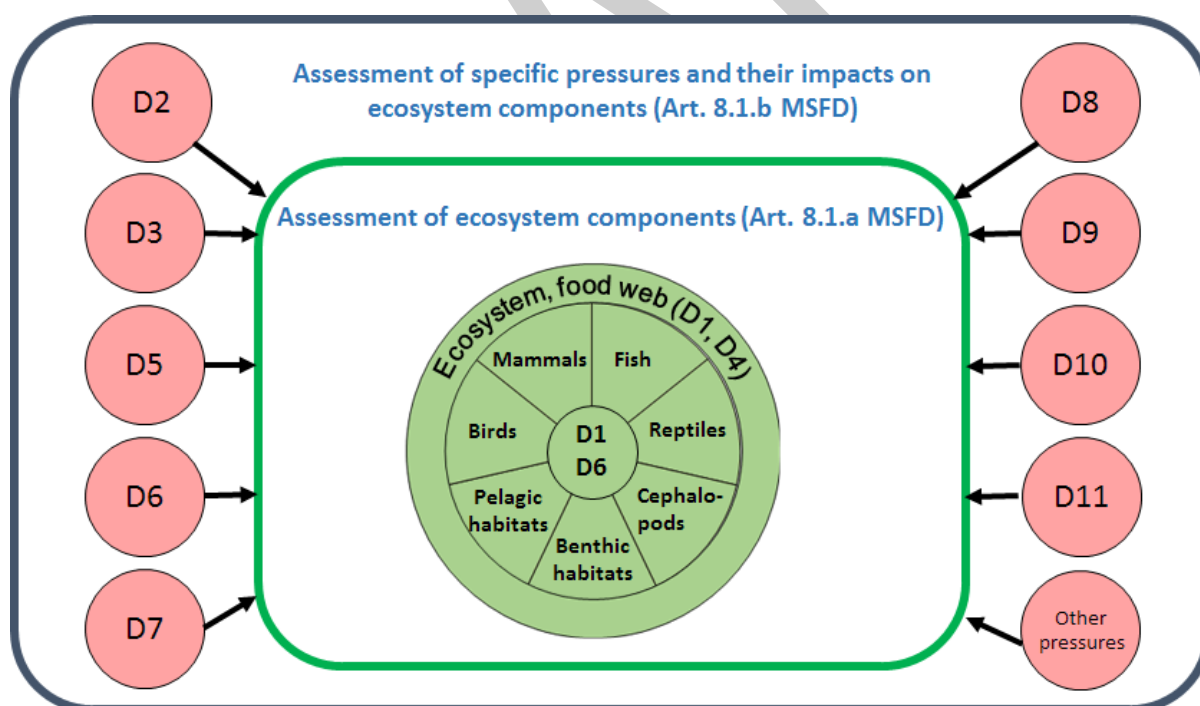


Figure 1. Integrated scheme for presenting assessment results (adapted from MSCG-17-2015-06 to the revised Commission Decision)

This Guidance document specifies integration to achieve consistent conclusions on the extent to which GES is achieved for each of the different topics set out in Figure 1. To this end, it describes for each topic:

- the envisaged level of integration of indicators, criteria and elements;
- the flow/sequence of assessment and integration steps;
- the nodes of integration and the associated integration rules;
- the assessment outputs for presenting the extent to which GES is achieved.

The Guidance does not address the aggregation of assessments across spatial assessment areas, focussing instead on the integration of indicators (e.g. elements for different criteria) and criteria within an assessment area. A number of research projects have developed options for integration and aggregation of indicators for GES assessments under MSFD, for example:

- The Life+ Marmoni project developed a biodiversity tool that is aligned with the existing MSFD descriptor requirements (2010 Commission Decision), focusing on descriptor 1 (Biodiversity)⁸.
- The EU 7th framework project DEVOTES has developed a flexible, hierarchical and modular tool for assessment of 'biodiversity status', including some additional structures, such as flexible aggregation principles, several weighting principles and confidence assessments⁹.
- Baltic BOOST Biodiversity Assessment Tool (BEAT).

The integrated scheme (Figure 1) is the top-level assessment output summarising the state of the marine environment at a high level. Comparable outputs should be agreed to be delivered as part of the assessment process in the RSCs. Figure 2 illustrates how a hierarchy of output products could look in order to serve the different national, regional and EU purposes. Additional assessment outputs of individual elements and at different scales are likely to be needed for purposes of the management of pressures in national waters.

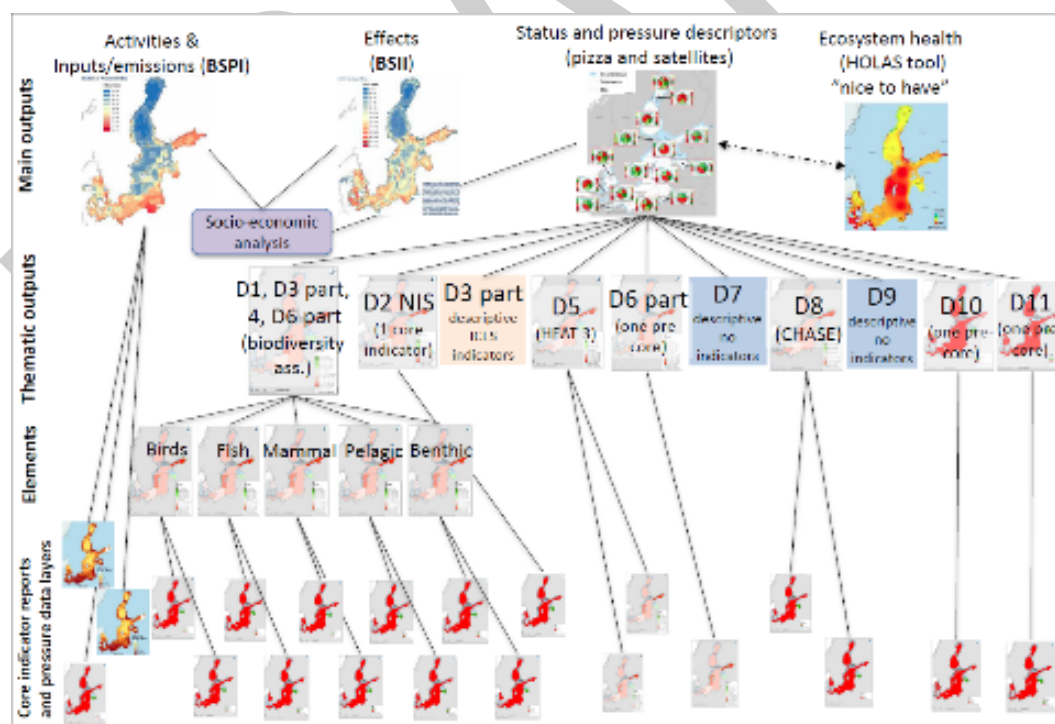


Figure 2. Example of assessment outputs

⁸ www.sea.ee/marmoni/index.php

⁹ www.devotes-project.eu/neat

Assessments will typically start with the assessment of a single element (e.g. species, habitat, contaminant) for which there is a dataset for the assessment area in the assessment period. This could, for example include multiple stations and repeated sampling within or across years for a nutrient or contaminant. These will then go through several steps in an assessment process. The sequence of those steps is specific to each descriptor/element and dependent on the scientific indicators used which may act at different levels of integration — some scientific indicators correspond directly to the revised Commission Decision criteria, whereas others are one of a number of scientific indicators that contribute to a criterion and therefore require integration to criterion level. The sequence of those steps may include integration across indicators, criteria and elements.

The data used for scientific indicator assessments should be quality assured and collected in line with relevant guidelines for the scientific indicator. The data that will be used for any given assessment may vary considerably between regions and Member States. RSCs have developed first routines for the indicator assessments, for the purpose of supporting EU Member States in the update of assessments under Article 8 due by 2018, The Guidance therefore does not address the first steps in each assessment process which lead to a 'scientific indicator' assessment. For the time being, the Guidance focuses on the later steps of integration across scientific indicators, criteria and elements which lead to conclusions on the overall status of the main components of Figure 1. This aims to ensure consistent application of the revised Commission Decision criteria, and the production of assessment outputs (i.e. the extent to which GES has been achieved) that can be presented in a common way across Member States and regions.

The assessment outputs for presenting the extent to which GES is achieved can take different forms depending on the purpose of the presentation and communication. The current Guidance sets out for each descriptor and ecosystem component the preferred common assessment output for comparing status classification across the EU.

Additional assessment outputs still need to be discussed and agreed depending on communication purposes. These options include:

- To provide detail on transferring the assessment outputs into the integrated scheme for presenting assessment results (Figure 1) which provides a concise communication of the status of GES in relation to all descriptors and ecosystem components at the relevant geographic scales.
- To provide detail on the assessment results which are relevant for management. Need and options are specific for the descriptor and criteria. In general, possible approaches include:
 - distinction between elements accessible to management and those that are not (e.g. banned legacy contaminants vs contaminants in use);
 - distinction between matrices where this helps address management.
- To express change in status as improving, stable or deteriorating compared to the previous reporting period.
- To express distance to the threshold value / good status in order to provide insight into the magnitude of the problem and also into progress i.e. changes in status between MSFD cycles. Options are specific for the descriptor and criteria. In general, possible approaches include:
 - bar chart presentations of the assessment values against threshold, possibly normalised on a scale 0 – 1; differentiated classification on both sides of the boundary good/not good.

Section on assessment outputs to be revised and further defined in light of experience through RSC cooperation on additional outputs as part of their assessment products. Assessment outputs will depend on national management needs and EU reporting requirements. Reporting needs in turn depend on how the Commission intends to assess implementation and success of MSFD (e.g. linking status assessment with targets and Programmes of Measures) and accordingly to determine the type of, and the level at which, information should be reported under Article 8.

Issues identified that need to be addressed are:

- If required, a method to express the change in status (improving, stable, deteriorating) compared to the previous cycle may need to be developed.
- Detail, per descriptor, on temporal aspects of assessments (e.g. whether to use the latest year of data only, or data from the last 6 years), and how to combine temporally if required (e.g. averaging across years).
- Further guidance on spatial aggregation of assessments.
- Whether the same indicator can be used in more than one Descriptor.
- How up- or down-scaling should be applied, whether weighting is appropriate (e.g. by size of area, ecological relevance).
- How to assess, and express, the confidence in the assessment (based on data quality and gaps in the assessment).
- How trend-based indicators can be used in integrating assessments (e.g. HELCOM BEAT).

2.3 Geographic Scales of Assessment

General principles:

- The Article 8 assessments need to address the whole of a Member State's marine waters within each marine region or subregion¹⁰, although individual assessments may cover only a part of this area.
- Assessments of the elements can be undertaken at different geographical scales, using appropriate scales for each element (e.g. assessment at the regional or subregional scale, or suitable subdivisions of these). Generic scales for assessment are given in the revised Commission Decision. Member States may wish to assess in their waters and later aggregate the results to regional or subregional scale together with other Member States.
- In some situations, data are summarised per grid area (e.g. underwater noise), and then reported at a broader level (e.g. percentage of grid cells in an assessment area below the threshold value).
- A combination of the element to be assessed and the appropriate scale for its assessment allows for the identification of the specific areas to be used for assessment and reporting within each region and subregion; the 'nested assessment areas' being used or developed by HELCOM and OSPAR provide schemes for integrated assessments of a region or subregion;
- Scales for state-based assessments should be ecologically relevant, reflecting the different characteristics of species, habitats and ecosystems within each region or subregion.
- Scales for pressure-based assessments need to be compatible with those used in state-based assessments, to allow for the linkage of assessment of impacts, but also consider management needs (as pressures may need to be addressed via programmes of measures);
- The outcomes of Article 8 assessments can thus be considered as assessments for a given element in a given area; this lends itself to presentation of the outcomes on maps to help illustrate the extent to which GES has been achieved.

¹⁰ The MSFD marine regions and subregions are listed in MSFD Article 4

- Sections 3 and 4 of this Guidance illustrate the practical application of these principles per descriptor.

2.4 Regional Assessments

This section will provide background on the regional assessment processes and indicators:

- Individual section for each RSC on their approach;
- Regional or subregional assessments should be used where they exist;
- Regional or subregional assessments should take account of assessments under relevant EU-legislation (Water Framework and Habitats Directive);
- Regional or subregional assessments can be supplemented by additional national indicators where required;
- Regional and subregional assessments can be prepared by Member States (i.e. cover only their waters within the region/subregion) and do not necessarily need to involve non-EU countries in the region/subregion.
- Mapping of RSC indicators into the new structure of the Commission Decision on criteria and methodological standards provided in Appendix A.

2.4.1 Helsinki Convention/Helsinki Commission (HELCOM)

The HELCOM Second Holistic Assessment of the Ecosystem Health of the Baltic Sea (HOLAS II) aims to provide an update on the overall state of ecosystem health in the Baltic Sea. The results of the assessment will support reporting under the MSFD by Contracting Parties to the Helsinki Convention that are also EU Member States. HELCOM is anticipating potential changes in requirements for reporting for the 2018 Article 8 MSFD assessment for Member States, and therefore the assessment tools are being developed to give a variety of options for the level at which outputs are provided (e.g. for biodiversity assessment, at the level of biological elements, criteria and descriptors)¹¹.

HELCOM's regionally-agreed core indicators form the basis for the assessment of environmental status. HOLAS II is developing assessment tools to provide integrated regional-scale assessments. HELCOM has been discussing whether and how to incorporate additional national indicators within the assessment processes, such as by neighbouring countries agreeing on the use of certain indicators for a sub-basin. A first version of the 2nd Holistic Assessment of the Baltic Sea Ecosystem will be prepared by mid-2017 and an updated version by mid-2018.

HELCOM has a history of using integrated assessment tools, having previously developed and is currently updating:

- BEAT – Biodiversity assessment tool;
- HEAT – Eutrophication assessment tool;
- CHASE – Hazardous substances assessment tool;
- Baltic Sea Pressure and Impact Indexes.

HELCOM's core indicators, and their relation to the MSFD descriptors and revised Commission Decision criteria, are shown in Appendix A.

¹¹ HELCOM (2016). Document 1 - Overview of the HOLAS II Biodiversity assessment with timeline. HELCOM BalticBOOST Workshop on the HOLAS II Biodiversity assessment tool. Copenhagen, Denmark, 11-12 February 2016.

2.4.2 OSPAR Convention/OSPAR Commission

The OSPAR Intermediate Assessment 2017 will present indicator assessments and six thematic assessments, which aim to support Contracting Parties that are also EU Member States in reporting in 2018 under Article 8 MSFD. The assessments will address some of the criteria relating to pressure-based descriptors and to status-based descriptors. An assessment of the distribution and intensity of human activities and associated pressures and impacts is not planned. To date (February 2017) OSPAR common indicators have not been integrated to express the extent to which GES is achieved. However, the following thematic reports provide a more comprehensive view on thematic assessment results:

1. The integrated eutrophication assessment under the OSPAR Common Procedure;
2. Assessment of certain pressures from trends in discharges, spills and emissions from offshore oil and gas installations;
3. Fourth Periodic Assessment of trends in discharges of radioactive substances from nuclear and non-nuclear sources;
4. Trend assessments of annual data on dumping of waste or other matter at sea;
5. Marine Protected Areas; ecological coherence.
6. Marine Protected Areas; management effectiveness.

The Intermediate Assessment will aim at summarising indicator assessments per theme, in order to link the assessments with OSPAR strategic objectives and potentially with MSFD descriptors. To date (February 2017), OSPAR work has focused on providing regional-scale assessment products; complementary products with higher resolutions are under consideration but may be delivered only for future and not the 2018 MSFD reporting round. OSPAR's common indicators, and their relation to the MSFD descriptors and revised Commission Decision criteria, are shown in Appendix A.

2.4.3 Barcelona Convention/UNEP-MAP

At the 18th Meeting of the Conference of the Parties of the Barcelona Convention held in 2013, an integrated list of Mediterranean Good Environmental Status common indicators and related targets, associated with the 11 Operational Objectives and Indicators were agreed. UNEP-MAP's Integrated Monitoring and Assessment Programme (Decision IG.22/7) (IMAP) was adopted by the 19th COP of the Barcelona Convention and is the framework for monitoring and assessment in the Mediterranean. This sets out 27 Common and Candidate Indicators which are related to the Ecological Objectives for the region. A Quality Status Report (QSR) is planned for 2017, which will contribute towards MSFD monitoring and reporting requirements on a regional level.

2.4.4 Bucharest Convention/Black Sea Commission

In the Black Sea Commission (BSC), only Bulgaria and Romania are EU Member States with the obligation to implement the MSFD.

The MSFD was adopted shortly before the Black Sea Strategic Action Plan (BS SAP) 2009 was approved. The underlying philosophies of the MSFD and the BS SAP are different but complementary. The BS SAP is based on targeting environmental priority problems for the Black Sea; its management targets do not directly state what the environmental status should be as a result of the activities undertaken under the BS SAP. In the framework of the Final Diagnostic Report 2010 (produced by the BSC Permanent Secretariat (PS) with the financial support of the European Environment Agency (EEA)), a summary of the suitability of Black Sea data (of BSIS and external data sources) for calculation of BSC and EEA indicators and MSFD descriptors was prepared. As a result, some indicators were identified for almost all MSFD descriptors (except Descriptor 10). In 2015, the BSC approved regional

reporting indicators, to be reported annually to the BSC by the Advisory Groups to the BSC. The indicators are grouped in six tables, according to the thematic focus of Advisory Groups (e.g. Biodiversity, Land-based pollution etc.). Some of the agreed indicators are also quite relevant for the MSFD implementation process.

The BSC approved the Black Sea Integrated Monitoring and Assessment Programme (BSIMAP) in October 2016. BSIMAP was developed in the light of the MSFD, taking into account descriptors, GES and targets. The regional reporting indicators identified previously became part of BSIMAP. Its adoption is a positive step, as it contributes to the harmonisation of the reporting format across countries and could provide the basis for comparing general environmental trends of the Black Sea marine environment. However, more efforts are needed towards harmonisation of methodological approaches in determining GES by descriptors, criteria and/or indicators at the regional level, in order to better align the MSFD, BS SAP 2009 and BSIMAP implementation processes in the future.

As a result, at the present moment, Bulgaria and Romania do not consider that the BSC regional reporting indicators would provide an adequate basis for MSFD monitoring and assessment and are therefore progressing with the identification of common indicators under the MSFD. In the scope of regional coordination, Romania and Bulgaria have jointly identified and set up a number of common indicators specifically for MSFD which cover some aspects (criteria) of most descriptors. They are working towards providing common assessments for these indicators in a regional roof report for the 2018 assessment, taking into account the revised Commission Decision. These common indicators were set up under the project 'Administrative and technical support for MSFD implementation in Bulgaria and Romania', funded by the European Commission. Both Member States have a willingness to share the data and knowledge gained during the implementation of the MSFD with other Black Sea countries, to support the integration process between MSFD and the regional BSIMAP as far as possible.

2.5 Relationship between Regional and National Assessments

Member States are expected to deliver the assessment of the environmental status of the four marine regions through regional cooperation and common regional assessment frameworks. It is recognised that Member States may assess additional aspects at a national level for various reasons:

- Regional assessments are not ready but additional national assessments are available (e.g. under the Habitats Directive, supplementary indicators, or Red Lists) which partly address the issue;
- There is no plan for a regional assessment of the element because there is no political agreement;
- An element is only of national relevance.

It remains, however, the responsibility of Member States to report to the Commission and this can be a mixture of regional and national information.

This raises a question about how the assessment of additional aspects are taken into account when presenting the overall extent to which good environmental status is being achieved.

Relationship between regional and national assessments

Options for how the assessment of additional national-level indicators could be taken into account include:

- The national indicator is incorporated into the assessment for each regional assessment unit. This means e.g. that national indicators are no longer visible and regional assessments become very heterogeneous (i.e. no common assessment basis).
- The national indicator is presented separately next to the regional assessment result. This means e.g. the national assessment results are visible. Clear and transparent methods for an overall conclusion on the extent to which GES is achieved are necessary and need to be followed. This is achievable where 'one-out-all-out' (OOAO) applies but is difficult where more complex integration rules apply.
- National assessments refer to or reuse regional assessments as they are, and complement them with additional elements, whilst seeking harmonisation with neighbouring countries.

For further discussion and development:

- The need to include assessment results derived under existing EU-legislation (WFD, HD, BD) into regional assessments (difference between EU-relevant indicators and assessment results and "national" (= other, supplementary) indicators).
- Options for combining national and regional assessments: there may be several approaches, according to specific descriptors. To be explored through examples.
- Whether a generalised approach can be agreed for combining national and regional assessments or whether this needs a case-by-case decision for each element or criterion.
- How reporting of national and regional assessments should be taken forward (issue for WG DIKE).

3 Pressure-Related Descriptor Assessments

This section provides guidance for assessments for each pressure-related descriptor (2, 3, 5, 6, 7, 8, 9, 10 and 11) and relates to Part I of the revised Commission Decision. Section 4 provides guidance for assessments of state-related descriptors (1, 4 and 6).

Pressure-related assessments need, wherever possible, to assess impacts in a way which relates directly to the ecosystem state elements being assessed under Article 8(1)(a). This is because the assessments under Article 8(1)(a) of species/species groups, habitats and ecosystems including food webs should reflect the range of pressures and impacts to which they are subject and therefore, wherever possible, draw from the assessments of these pressures and impacts made under Article 8(1)(b). As a result, some of the Article 8(1)(b) outcomes need to be directly useful for the state-based assessments. This relates to:

- clearly understanding the state assessment elements (species groups/broad habitat types) and the scales at which they are being assessed that will be informed by the pressure/impact assessments; and
- considering the needs for targets and measures – where is the impact, over what spatial extent, is it a big enough issue to lead to a need for targets and measures?

Worked examples may be included for some descriptors. These are yet to be developed.

Guidance on the spatial aggregation of assessment areas still needs to be developed for each Descriptor section.

3.1 Descriptor 2: Non-Indigenous Species

Descriptor 2: Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.

The primary and secondary criteria for Descriptor 2, and their relationship to the indicators of 2010/477/EU, are shown in Table 1. There are two aspects to Descriptor 2:

- **Pressure:** D2C1 and D2C2 relate to the level of pressure from non-indigenous species (NIS) in terms of the number of newly-introduced NIS and the abundance and spatial distribution of existing NIS;
- **Impacts:** D2C3 relates to the adverse effects of non-indigenous species on species groups and broad habitat types.

Table 1. Criteria for assessment of non-indigenous species (Descriptor 2)

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators
Pressure	D2C1 Newly-introduced NIS		–
		D2C2 Quantification of established NIS (abundance and spatial distribution)	2.1.1
Impact		D2C3 Adverse effects of NIS on species groups and broad habitat types	2.2.1, 2.2.2

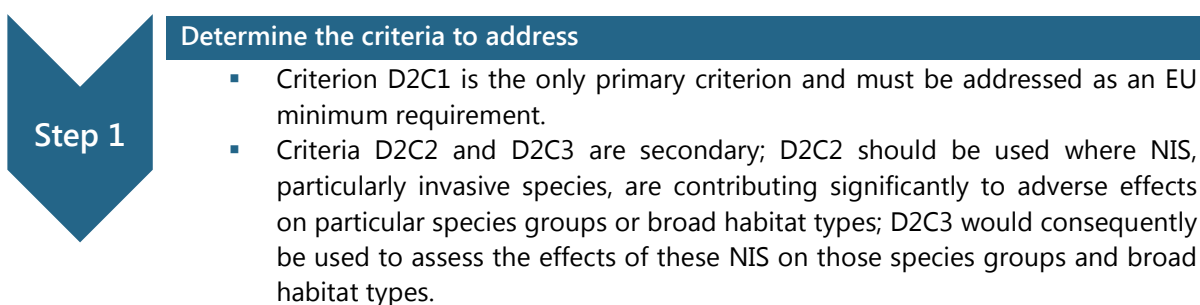
Degree of Integration

D2C1 is used to monitor introductions of non-indigenous species. D2C2 (quantification of abundance and spatial distribution of non-indigenous species) should contribute to the assessment of D2C3. D2C3 (impacts of non-indigenous species) should provide the extent of impact for each relevant species group and broad habitat type, contributing to their assessments under Descriptors 1 and 6. The integration therefore stops at criteria level:

- D2C1 (primary) – no integration;
- D2C2 (secondary) – no integration (contributes to the assessment of D2C3);
- D2C3 (secondary) – no integration (contributes to the assessment of D1 and D6).

3.1.1 Assessment Flow

The assessment flow for Descriptor 2 is described below.



Step 2

Determine the elements for assessment

The elements for assessment are distinct for each of the criteria:

- **D2C1** should cover all non-indigenous species that were not known to be present in the area in the previous assessment period, and were newly introduced via human activity into the wild. If it is not known whether a new arrival is due to human activity or natural dispersal from neighbouring areas, it shall be counted under D2C1;
- **D2C2**: a list of established non-indigenous species, particularly invasive non-indigenous species, should be established by Member States through regional or subregional cooperation. Member States should decide which species to assess under D2C2, bearing in mind the link to D2C3. The list should include relevant species on the list of invasive alien species of Union concern adopted in accordance with Article 4(1) of Regulation (EU) No 1143/2014¹² and should, in particular, include species considered relevant for assessment under D2C3 (those species selected should have significant effects);
- **D2C3**: species groups and broad habitat types (from those assessed under Descriptors 1 and 6) that are at risk from NIS should be selected by Member States through regional or subregional cooperation.

Step 3

Determine scales and areas for assessment

The revised Commission Decision indicates the following spatial scales for assessment:

- **D2C1**: Subdivisions of each region or subregion, divided where needed by national boundaries;
- **D2C2 and D2C3**: The same spatial scale as used for the corresponding species group or broad habitat type under Descriptor 1.

Step 4

Assign indicators to criteria

- Relevant regional indicators that are available should be identified and allocated to the revised Commission Decision criteria and the relevant species groups or broad habitat types (mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A).
- Any remaining gaps should be identified. Use national assessments (taking into account existing assessments e.g. under EU legislation such as WFD, Habitats Directive), where available, pending the development of regionally coordinated assessments.
- Additional national indicators for elements that are specific to national waters, if any, can also be incorporated and allocated to the relevant criteria and assessment areas. These need to have a threshold value, where appropriate, and should follow the agreed structure for reporting indicators (MSCG_17-2015-04), pending guidance on reporting requirements from WG DIKE.

Step 5

Establish threshold values

- **D2C1**: The threshold value for the number of new introductions of non-indigenous species shall be established by Member States through regional or subregional cooperation. The revised Commission Decision specifies that the number of new introductions should be minimised and where possible reduced to zero.
- **D2C2**: No threshold values are required. The criterion contributes to the assessment of D2C3.

¹² Note that to date (February 2017), no marine species are included on the list. The European Alien Species Information Network's (EASIN) database may provide a starting point for the population of NIS lists.

- **D2C3:** The threshold values for the proportion of each species group and the extent of change in condition of each broad habitat type that indicates they are adversely altered due to NIS shall be established by Member States through regional or subregional cooperation.



Determine if threshold values are achieved

- **D2C1 and D2C3:** The outcome the assessment of each criterion should be determined, as specified in the revised Commission Decision and based on the values achieved compared to the threshold values established in step 5.
- **D2C2:** Status is not assessed, but the criterion assessment feeds into the assessment of D2C3.



Integrate indicators and criteria

- The indicators relating to each criterion should be brought together as described in Section 3.1.2.

3.1.2 Levels and Methods of Integration

Figure 3 shows the levels of integration and integration methods for Descriptor 2. The figure is representative of a single assessment area. There is no need to aggregate across spatial areas.

Scale:

D2C1 – regional or subregional, if necessary divided by national boundaries

D2C2 & D2C3 – as used for Descriptors 1 and 6

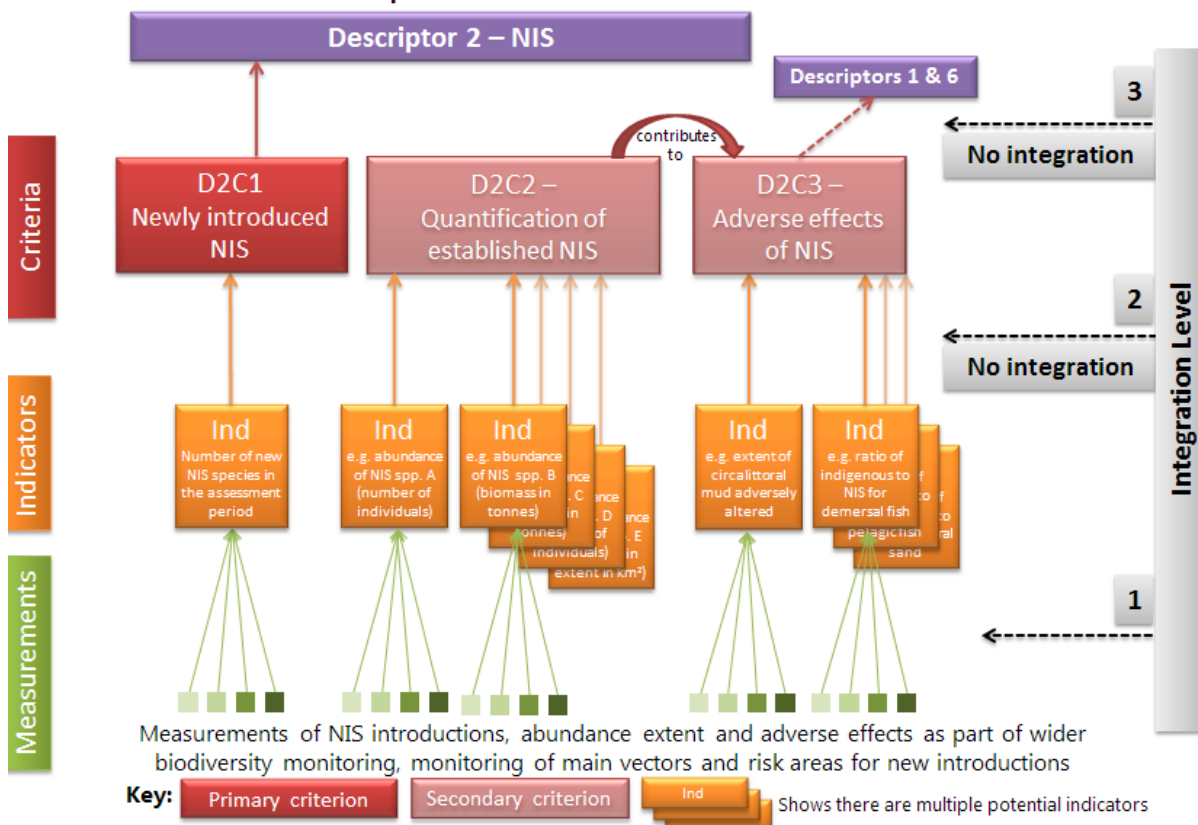


Figure 3. Levels and methods of integration for Descriptor 2

The integration methods of Figure 3 are:

- **Level 1:** measurements of individual elements — for example, introductions of non-indigenous species, abundance and impacts of non-indigenous species (likely to be implemented as part of broader biodiversity monitoring, or through targeted ‘hotspot’ monitoring) — are combined to produce information on specific indicators related to non-indigenous species. This level of integration is not addressed in this Guidance.
- **Level 2:** For **D2C1** there will be only one indicator for D2C1 (number of newly-introduced NIS) covering the scope of the criterion, i.e. the result for the indicator will be the result for the criterion. Therefore there is no need for an integration method for D2C1. The assessment outputs for **D2C2 and D2C3** are for each existing NIS species assessed (D2C2) and for each species group and broad habitat type assessed (D2C3). Therefore there is no need for integration of indicators for D2C2 and D2C3.
- **Level 3:** For D2, the extent to which GES is achieved is expressed by D2C1. D2C2 informs D2C3, which in turn informs the assessment of D1 and D6. The three criteria are therefore not integrated for D2.

Outstanding issues for D2

The role of, and associated assessment methods for, D2C2 and D2C3 in the assessment of D2 and D1 require further clarification.

Missing indicators

In the event of no indicators or data being available to assess the primary criterion (D2C1), this is a gap in the assessment and should be indicated as ‘not assessed’. This means that no statement on the extent to which GES is achieved can be made for D2. It also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken.

3.1.3 Visualising Assessment Results

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme.

The assessment output for Descriptor 2 is expressed for each criterion assessed, for each assessment area. For D2C2 and D2C3, results are expressed for each species assessed, and/or each species group or broad habitat type. For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

In addition to the presentation of results by criteria, maps showing distribution may be useful, and a summary can be provided in graphical format (Figure 4) as the ‘satellite’ for Descriptor 2 in the scheme for integrated presentation of assessment results (pizza-satellite scheme).

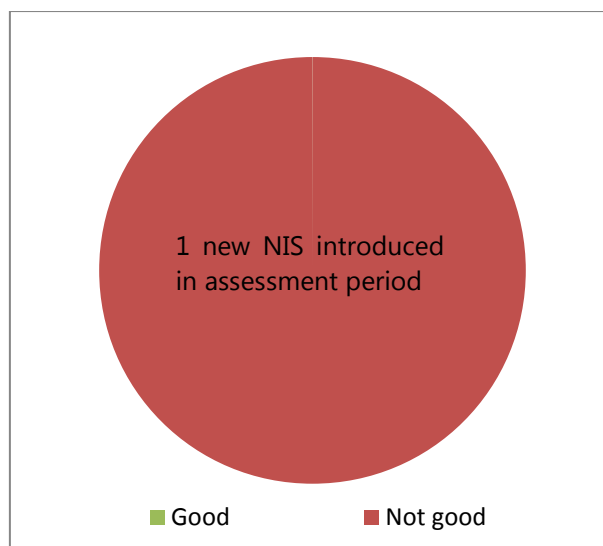


Figure 4. Illustrative example of a visual summary of assessment output for non-indigenous species, based only on D2C1 (Descriptor 2 'satellite')

3.2 Descriptor 3: Commercially Exploited Fish and Shellfish

Descriptor 3: 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.

The criteria for Descriptor 3, and their relationship to the indicators of 2010/477/EU are shown in Table 2. There are two aspects to the criteria under Descriptor 3:

- **Pressure/Impact:** D3C1 relates to the level of fishing pressure (mortality) per commercial fish or shellfish population (stock). Note that the Decision does not provide a criterion for the 'pressure' as a whole (i.e. the total catch of all individuals of commercial and non-commercial species in the assessment area). As fisheries data are typically collected per species, they can already be assigned to D3C1 (and D1C1 for incidental by-catch).
- **State:** D3C2 and D3C3 relate to the state of commercial species. They are state-based criteria but are included under the pressure descriptors (Part I of revised Commission Decision) for clarity reasons.

Species should be assessed, where appropriate, at the population level. For commercial fish and shellfish species, the assessments under the CFP should be used, wherever possible, to ensure the same assessments are used for CFP and MSFD purposes¹³.

Table 2. Criteria for assessment of commercially exploited fish and shellfish (Descriptor 3)

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators
Pressure/ Impact	D3C1 Fishing mortality (F)		3.1
State	D3C2 Spawning stock biomass (SSB)		3.2
	D3C3 Age and size distribution		3.3

Degree of Integration

All criteria should be within the specified levels or established threshold values. The envisaged degree of integration across criteria is as follows:

- Commercially exploited species: D3C1, D3C2 and D3C3 are primary and are integrated for each population (stock).

3.2.1 Assessment Flow

The assessment flow for Descriptor 3 is described below.

¹³ The revised Commission Decision uses the terminology 'populations' as in the descriptor. Point 3 under 'Specifications and standardised methods for monitoring and assessment' of the revised Commission Decision clarifies that the term 'populations' shall be understood as the term 'stocks' within the meaning of Regulation (EU) No 1380/2013'.

Step 1

Determine the criteria to address

- All criteria are primary and should be addressed.
- D3C3 may not be available for use for all populations for the 2018 update of the initial assessment and determination of GES. Member States should make every effort to enable an assessment of D3C3.

Step 2

Determine the elements for assessment

- A list of commercially exploited species in each assessment area should be drawn up by Member States through regional or subregional cooperation. This shall take into account the points in 'Specifications and standardised methods for monitoring and assessment' in the revised Commission Decision. The purpose of these specifications is to provide a consistent methodology for defining the list in each region, and to result in a list which reflects the most important populations of the region whilst avoiding undue effort on populations that are caught in small quantities (and potentially have limited data). Specifically, the list should include:
 - All stocks managed under the CFP (Reg (EU) No 1380/2013);
 - The species for which fishing opportunities are set by Council under Art. 43(3) of the Treaty on the Functioning of the European Union;
 - The species for which minimum conservation reference sizes are set under Regulation (EC) No 1967/2006;
 - The species under multiannual plans according to Article 9 of Regulation (EU) No 1380/2013;
 - The species under national management plans according to Article 19 of Regulation (EC) No 1967/2006;
 - Any important species on a regional or national scale for small-scale/local coastal fisheries.
- ICES advice suggests considering the regional list of commercially exploited stocks listed under the Data Collection Framework (DCF) (2010/477/EU and 2010/93/EU), and the national list of commercially exploited stocks from the national DCF sampling programmes. A minimum threshold for landings (e.g. >1% or >0.1%) in the last five (or more) years from the ICES FishStat and/or FAO annual statistics for the inclusion of stocks (ICES, 2016a) may provide a practical means to prepare the list of species to be assessed, bearing in mind the MSFD obligation for D3 concerns all commercially-exploited species.
- Previously important species (e.g. European eel, salmon in the Baltic Sea) should not be excluded on the basis of minimal catches due to stock status. Annual landings over a longer time period (e.g. 20-30 years can be used to check that all relevant stocks have been included.
- Non-indigenous species that are commercially exploited shall be excluded.

Step 3

Determine scales and areas for assessment

The revised Commission Decision indicates the following spatial scales for assessment:

- **D3C1, D3C2, D3C3:** Populations of each species are assessed at ecologically relevant scales within each region or subregion, as established by appropriate scientific bodies as referred to in Article 26 of Regulation (EU) No 1380/2013, based on specified aggregations of ICES areas and General Fisheries Commission for the Mediterranean (GFCM) geographical sub-areas and Food and Agriculture Organisation (FAO) fishing areas for the Macaronesian biogeographic region, i.e. the stock assessment areas used under CFP.

The assessment for the purposes of the MSFD should be done on the basis of the marine region or subregion, or further subdivision if appropriate, presenting the status

of each population (stock) that is present in that region or subregion. If several stocks of a single species are present in an assessment area, each should be presented separately. If the stock assessment areas do not align perfectly with the MSFD regions or subregions, each stock assessment area should be either:

- Allocated to one or the other region or subregion (for example, where the majority of the area falls within one region or subregion);
- Considered in the assessment of both regions or subregions that it overlaps.

ICES (2016b) advised that widely distributed stocks (that fall within several subregions or regions) should be considered in each region or subregion in which they occur, i.e. a single stock assessment is assigned to both/all relevant subregions or regions for the purposes of the D3 assessment.

Step 4

Assign indicators to criteria

- The available information on stock assessment and advice provided by ICES, the Scientific, Technical and Economic Committee for Fisheries (STECF), GFCM and International Commission for the Conservation of Atlantic Tunas (ICCAT) should be used and take precedence in assessments.
- This should be supplemented by national stock assessment outputs and monitoring where appropriate (i.e. nationally-important species that are not assessed through regional or international mechanisms).
- Estimates of fishing mortality (F) relate to D3C1, estimates of spawning stock biomass (SSB) relate to D3C2, and estimates of age and size distribution relate to D3C3.
- Where quantitative stock assessments yielding values for F or SSB are not available, other variables or indices may be used (see point 5 of the 'Specifications and standardised methods for monitoring and assessment' in the revised Commission Decision).
- Any remaining gaps (e.g. of information on F, SSB or age and size distribution for individual populations) should be addressed as soon as possible in the next implementation cycle.
- Mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A.

Step 5

Establish levels and thresholds

- **D3C1:** Fishing mortality (or other variable) is at or below levels which can produce MSY. For stocks managed under a multiannual plan according to Article 9 of Regulation (EU) No 1380/2013, in situations of mixed fisheries, the levels for F shall be in accordance with the relevant multiannual plan. For the Mediterranean and Black Seas, appropriate proxies may be used. Where other variables are used (such as the catch/biomass index), an appropriate method for trend analysis shall be adopted to set the level.
- **D3C2:** Spawning stock biomass (or other biomass-related index) is above levels capable of producing MSY. For stocks managed under a multiannual plan according to Article 9 of Regulation (EU) No 1380/2013, in situations of mixed fisheries, the level for SSB shall be in accordance with the relevant multiannual plan. For the Mediterranean and Black Seas, appropriate proxies may be used. Where biomass indices are used (such as catch per unit effort or survey abundance index), an appropriate method for trend analysis shall be adopted to set the level.
- **D3C3:** threshold values should be established by Member States through regional or subregional cooperation for each indicator for each population. ICES are currently (2016/2017) developing advice on this criterion.

Step 6

Determine if levels and threshold values are achieved

- The status of each population (stock) for each criterion should be determined, based on the current values compared to the levels and threshold values established in step 5.
- These values should be obtained from the latest existing stock assessment outputs and/or fishery independent surveys, and brought together for the MSFD assessment.
- Where data are not sufficient to set levels or thresholds and/or to assess against them, the population is 'not assessed'. The number of populations assessed and not assessed (without enough data to carry out an assessment) should be presented.

Step 7

Integrate indicators and criteria

- The status of each population (stock) should be determined, based on the integration methods in Section 3.2.2.
- The number of populations that are 'not assessed' must also be expressed in the outcome.

3.2.2 Levels and Methods of Integration

Figure 5 shows the levels of integration and different integration methods for Descriptor 3. The figure is representative of a single assessment area (region or subregion), for which the outputs of the assessment can be presented. There is no need to aggregate across spatial areas.

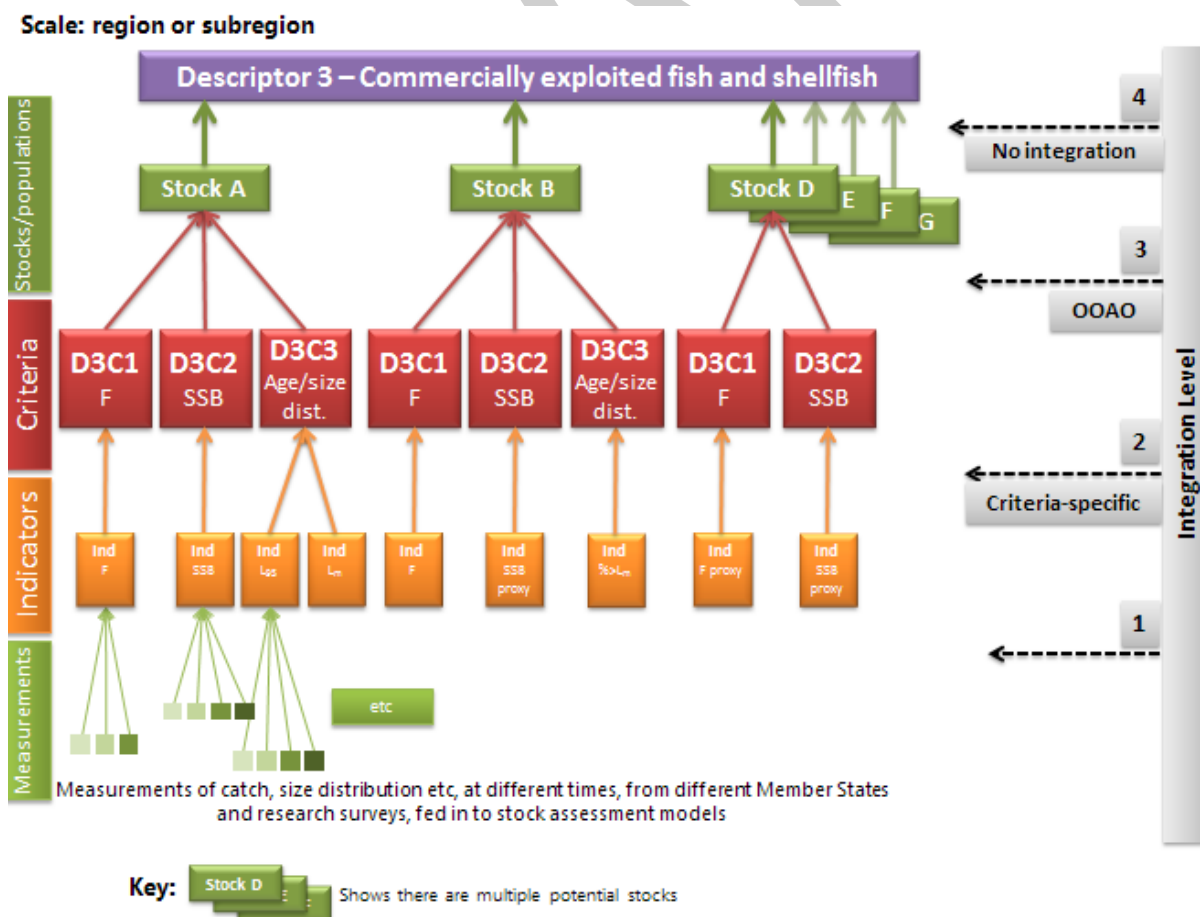


Figure 5. Levels and methods of integration for Descriptor 3

The integration methods of Figure 5 are:

- **Level 1:** measurements of individual elements — for example, catches of different species by different Member States, over time, length distribution of catches, length and maturity information from research surveys — are combined through stock assessments and other analyses to produce information on fishing mortality, stock status and age/size distribution (here named 'indicators'). This level of integration requires detailed technical consideration and is not addressed in these guidelines.
- **Level 2:** The indicators are integrated to each criterion for each stock. The integration method depends on the criterion.
 - For **D3C1 and D3C2** there is likely to be only one indicator per stock per criterion, therefore the result for the indicator will be the result for the criterion.
 - For **D3C3**, if more than one indicator is used for a stock, there will need to be an integration method. See box below.
- **Level 3:** Criteria are brought together for each stock. The integration method is OAO. This means that all relevant indicators/criteria must be within threshold values for the stock to be in good status. In the absence of operational indicators and associated results for D3C3, the assessment for D3 in 2018 is likely to be based on D3C1 and D3C2 only for most stocks, using OAO. The integration figure therefore shows some stocks with D3C3 information, and one stock without.
- **Level 4:** The overall status of each stock is presented; the stocks are not integrated for Descriptor 3. The number of stocks (populations) that are not assessed is also presented.

Outstanding issues for D3

- Integration methods need to take account of the lack of data for criterion D3C3:
 - The integration method for D3C3 (if more than one indicator is used) still needs to be determined in conjunction with finalising and operationalising the assessment tools for D3C3 based on forthcoming ICES advice.
 - Until such an integration method is agreed, this Guidance suggests averaging of standardised values (e.g. by normalisation or to a scale of 0–1), as described in ICES (2016a).
- Other issues:
 - How short-lived species managed according to the escapement strategy are considered in the assessment needs further guidance.
 - The interplay between (sub)regional/national assessments, e.g. how national stocks included in the list should be reflected in the assessments ((sub)regionally, or only nationally), and how Member States should report the assessment in relation to stocks that are included on the (sub)regional list but not caught by the Member State in question.

Missing indicators

If quantitative stock assessments providing values and levels for F and SSB are not available for a stock, other variables such as the catch/biomass ratio (in place of F) or an abundance index (in place of SSB) may be used. In these cases, an appropriate method for trend analysis should be adopted (e.g. current value compared to long-term average) for assessment purposes (i.e. to set a (target) level or threshold value).

If no information for a stock is available (neither from quantitative assessments, nor other variables from alternative methods as outlined above), the stock should be reported as 'not assessed'.

If information on a particular criterion is not available for a stock:

- If information for D3C1 is not available, and D3C2 is in poor status, the stock is in poor status; if D3C2 is in good status, the lack of information on D3C1 means the stock cannot be classified as 'good status' (ICES, 2016b) and overall status of the stock should be expressed as 'not assessed';
- If information for D3C2 is not available, and D3C1 is in poor status, the stock is in poor status; if D3C1 is in good status, the lack of information on D3C2 means the stock cannot be classified as 'good status' (ICES, 2016b) and status should be expressed as 'not assessed';
- For the 2018 implementation cycle, if information for D3C3 is not available, but information on D3C1 and D3C2 is available, the status of the stock should follow the classification according to D3C1 and D3C2, with D3C3 reported as 'not assessed'. This is the proposed approach for the 2018 implementation cycle, due to the large number of stocks for which information on D3C3 is not yet available. The recommended approach may differ in subsequent cycles, when further information should be available. Member States should make all efforts to improve the data and assessments available for D3C3.

3.2.3 Visualising Assessment Results for Descriptor 3

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme.

The assessment output for Descriptor 3 is presented for each region or subregion, per population (stock). The assessment output is presented as the number of assessed stocks meeting (target) levels or threshold values, the number of assessed stocks not achieving the (target) levels or threshold values and the number of stocks not assessed. For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

In addition to the presentation of results by criteria and overall for individual populations, a summary can be provided in graphical format (Figure 6) as the 'satellite' for Descriptor 3 in the scheme for integrated presentation of assessment results (pizza-satellite scheme).

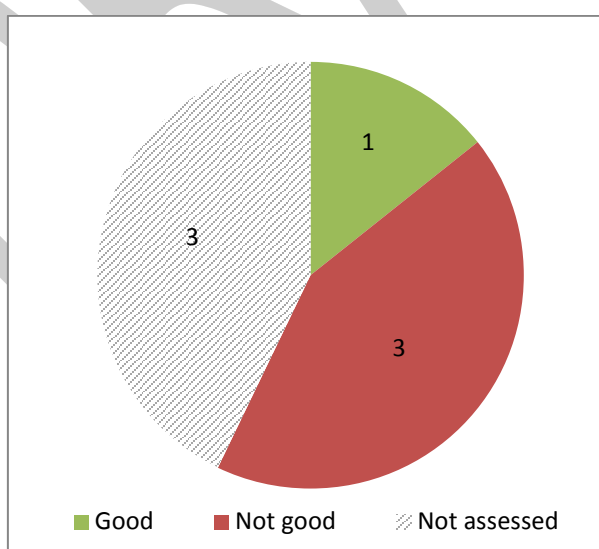


Figure 6. Illustrative example of a visual summary of assessment output for commercially exploited stocks (Descriptor 3 'satellite')

Note: Numbers on the figure show the number of populations (stocks) in each status category.

3.3 Descriptor 5: Eutrophication

Descriptor 5: 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.

The primary and secondary criteria for Descriptor 5, and their relationship to the indicators of 2010/477/EU are shown in Table 3. There are two aspects to Descriptor 5:

- **Pressure:** D5C1 relates to the level of the pressure (nutrients) in the marine environment;
- **Effects:** D5C2–8 address the effects of the pressure (loads of nutrients) in the water column and on the seabed.

Table 3. Criteria for assessment of eutrophication (Descriptor 5)

	Primary Criteria* Relating to:	Secondary Criteria* Relating to:	2010/477/EU Criteria or Indicators	Comments
Pressure	D5C1 Nutrients in the water column		5.1.1	
Effects	D5C2 Chlorophyll a		5.2.1	
		D5C3 Harmful algal blooms	5.2.4	
		D5C4 Photic limit	5.2.2	
	D5C5 Dissolved oxygen in the bottom of the water column		5.3.2	May be substituted by D5C8
		D5C6 Opportunistic macroalgae of benthic habitats	5.2.3	
		D5C7 Macrophyte communities of benthic habitats	5.3.1	
	D5C8 Macrofaunal communities of benthic habitats		--	May substitute D5C5

When setting up the assessment for Descriptor 5 at a regional level, the cause-and-effect relationship should be established. The link between the pressure (enrichment of nutrients in the water column) and its effects on the accelerated growth of phytoplankton and on macrophyte communities, resulting in undesirable disturbance to the balance of organisms present and on water quality, is necessary. Additionally, these effects can lead to oxygen depletion in waters near the seabed and consequent adverse effects on macrofauna communities. Identifying the causal relationship can be done at different stages of the preparation for the assessment. For example, it may be shown at the point of choosing the set of indicators/elements used in the assessment (as is done in the HELCOM approach); or may be structured in the assessment tool, at the criteria-level or groupings of criteria. Existing assessment frameworks distinguish between causes (nutrient concentrations), direct effects and indirect effects of nutrient enrichment. Other important factors to investigate are the sources for nitrogen and phosphorus, the time-lag between nutrient reductions and improvements in environmental quality, and the influence of climate change on the process.

The revised Commission Decision indicates that the effect criteria are related to effects in the water column and/or on the seabed, and thus contribute to the assessments of habitats under Descriptors 1 and 6. Regionally- or subregionally-agreed approaches to assessment and integration may choose to group the criteria into direct effects and indirect effects as an additional step in the integration.

The revised Commission Decision requires Descriptor 5 to be implemented in accordance with assessments under the Water Framework Directive (WFD) (Directive 2000/60/EC) in WFD coastal waters (i.e. the integration follows the WFD methods). It requires Member States to agree at regional or subregional level the use of secondary criteria beyond coastal waters, and to establish threshold values for the criteria. Beyond coastal waters, these need to be consistent with those used in coastal waters under WFD. For integration methods beyond coastal waters, these should be agreed at Union level as far as possible, but at least at regional or subregional level.

Tools for the assessment of eutrophication have been developed by the RSCs and, while they differ in detail, there is evidence that they may produce consistent results in the overall context of how the tools are used to support management decisions.

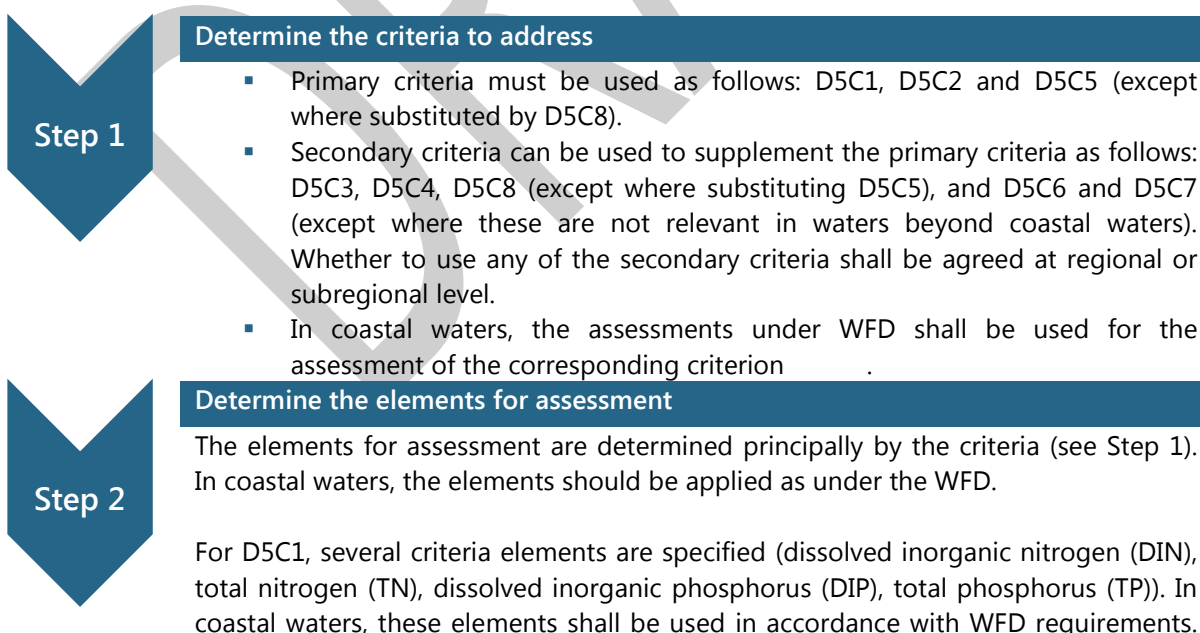
Degree of integration

The envisaged degree of integration across criteria is as follows:

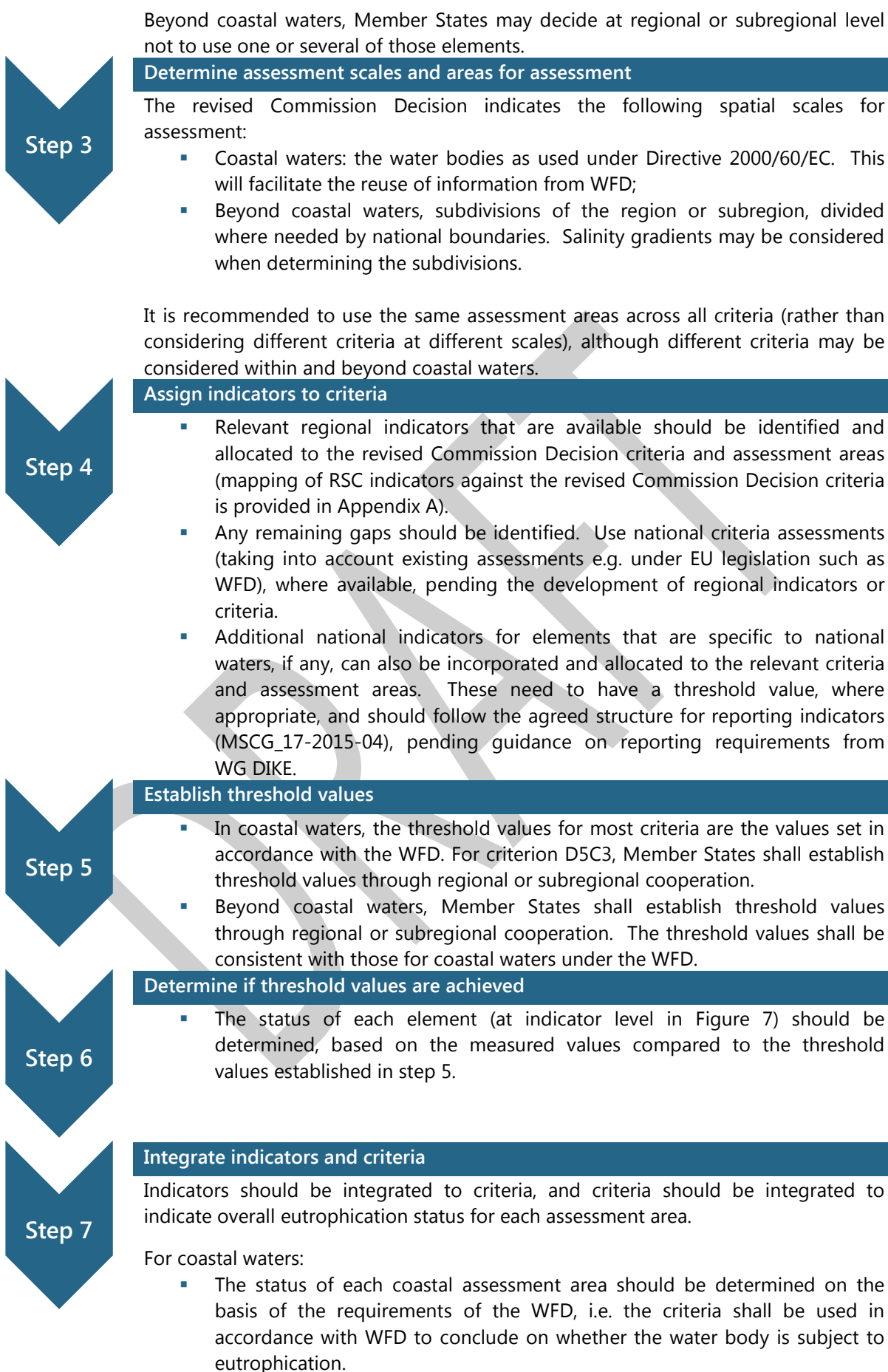
- All criteria used are integrated to a judgement on status for Descriptor 5 on eutrophication;
 - For coastal waters, the integration is in accordance with the requirements of the WFD¹⁴;
 - Beyond coastal waters, the integration should follow the approach in Section 3.3.2.
- In addition, results for individual criteria are also presented separately.

3.3.1 Assessment Flow

The assessment flow for Descriptor 5 is described below.



¹⁴ Guidance documents published in the context of the Common Implementation Strategy for Directive 2000/60/EC may be relevant in this assessment (e.g. 'N° 13 – Overall Approach to the classification of Ecological Status and Ecological Potential' and 'N° 23 – Eutrophication Assessment in the Context of European Water Policies').



Beyond coastal waters:

- The status of each assessment area should be determined, based on the integration methods in Section 3.3.2. These methods shall be agreed where possible at Union level, but at least at regional or subregional level.

Criteria also need to be integrated to provide information on the extent of impact on the water column and on the seabed, as these are important outputs for the assessments under D1 and D6 in some areas.

3.3.2 Levels and Methods of Integration

Figure 7 shows levels of integration and integration methods for Descriptor 5 for areas beyond coastal waters (areas in WFD coastal water bodies follow the integration rules under the WFD). The figure is representative of a single assessment area, for which the assessment results can be presented for the Descriptor. There is no need to aggregate across spatial areas.

Scale: subdivisions of the region or subregion, divided where needed by national boundaries

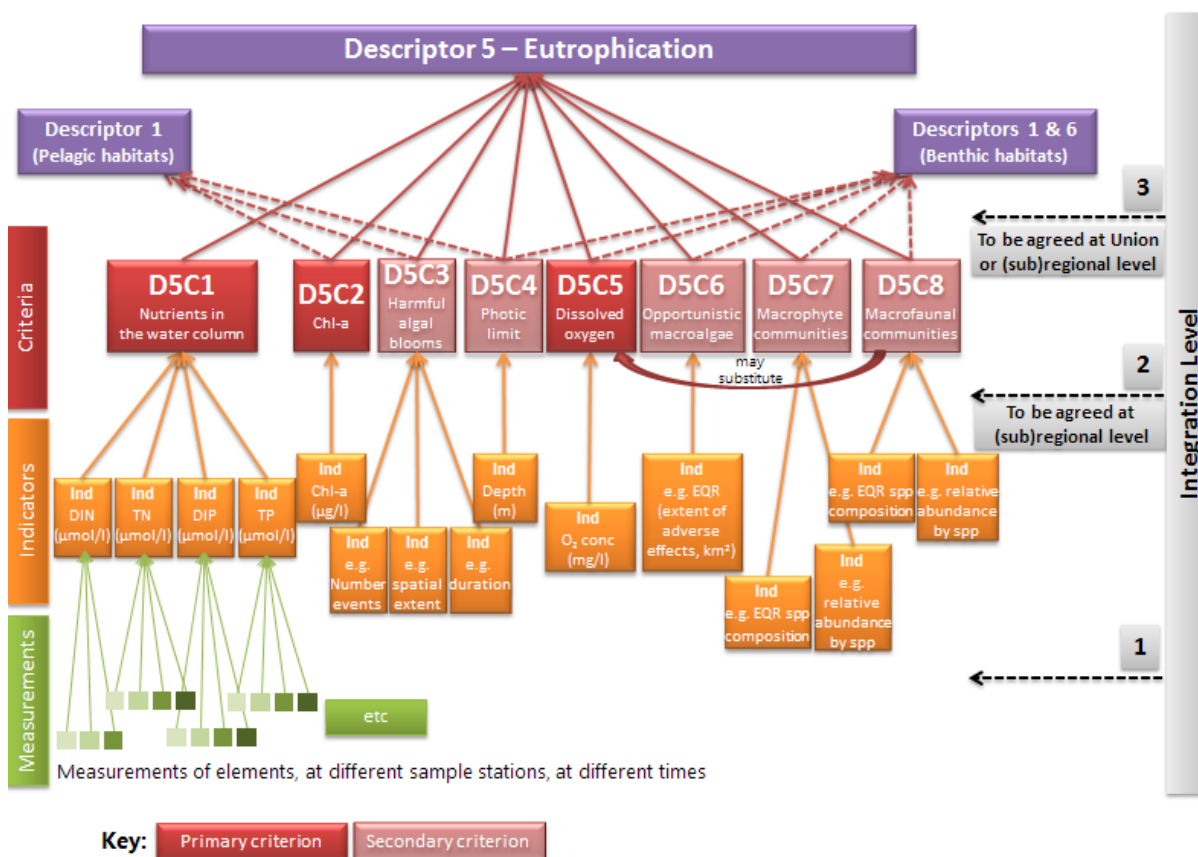


Figure 7. Levels and methods of integration for Descriptor 5 (beyond coastal waters)

The integration methods of Figure 7 are (for those criteria that are addressed):

- **Level 1:** Measurements of individual elements (for example, the concentration of chlorophyll-a, different forms of nitrogen or phosphorus, at different sample stations, in different time periods) are combined into a single indicator, such as dissolved inorganic nitrogen (DIN), dissolved inorganic phosphorus (DIP) etc. Integration at this level follows established methods under WFD and RSCs; it requires technical consideration and is not addressed in this Guidance.

- **Level 2:** The results for various elements (indicators) are integrated to form a judgement of the status for each criterion. Where there is more than one element or indicator used per criterion, an integration method will be required. The integration method is to be agreed at regional or subregional level, but should be developed keeping in mind the integration approach across criteria at level 3. See box below.
- **Level 3:** The criteria are integrated to the overall status of D5. The integration method is to be agreed at Union level where possible, but at least at regional or subregional level. Some criteria also provide information on the extent of impact on the water column and on the seabed, which contribute to the assessments under D1 and D6 in some areas (see box below).

In cases where elevated nutrient concentrations do not result in eutrophication effects, status for Descriptor 5 may be considered good, but measures may still be required if the increased nutrient enrichment in these areas contributes to eutrophication problems elsewhere.

Outstanding issues for D5

- Integration approaches:
 - Integration methods are well advanced. The methods presented at WG GES 15 seem to accommodate both the OSPAR and HELCOM systems.
 - There was however no agreement about a common approach nor about the final integration between criteria (groups).
 - The methods chosen to integrate indicators to criteria level (if required) should take into account, and be coordinated with, the integration approaches to be agreed across criteria. This is because the integration approach chosen at a lower level influences the possible integration approaches at higher levels.
- Minimum elements to be considered for D5C1.

The revised Commission Decision provides for integration methods for Descriptor 5 beyond coastal waters to be agreed at EU level as far as possible, but at least at regional or subregional level. Until such integration methods are agreed, this Guidance suggests the following approaches:

- Level 2: To use the currently-agreed regional method (see below). This may use, for example, weighted averaging, scoring or conditional rules, but should avoid expert judgement.
- Level 3: To use the currently-agreed regional method (see below). Expert judgement should be avoided.

In using regional approaches, consideration should be given to progressing towards the grouping of criteria in the Decision according to nutrients, water column and seabed, which deviates from existing assessment frameworks. The use of WFD integration methods in coastal areas based on MSFD criteria and linking WFD coastal areas with MSFD offshore water in the assessment may require further technical clarification. Integration rules exist for the three biological quality components phytoplankton, macrophytes and macrozoobenthos. These components do not match the primary criteria. The WFD decision tree does not include methods for integrating chemical parameters (nutrients and oxygen), which are only supporting parameters in WFD assessment — see WFD Guidance No. 23 and latest discussions of nutrient expert group of Ecostat in November 2016, which concluded that such rules still need to be developed.

Outputs contributing to D1 and D6

The methodologies for Descriptor 5 criteria to contribute to assessments of pelagic and benthic habitats under Descriptors 1 and 6 need to be developed at Union level. This concerns:

- D5C2, D5C3 and D5C4 (when used) contribute to the assessment of pelagic habitats under Descriptor 1, in terms of the distribution and an estimate of the extent of the area that is subject to eutrophication in the water column;

- D5C4, D5C5, D5C6, D5C7 and D5C8 (when used) contribute to the assessment of benthic habitats under Descriptors 1 and 6, in terms of the distribution and an estimate of the extent of the area that is subject to eutrophication on the seabed.

Existing assessment frameworks include:

Framework	Integration Approach
Eutrophication	
WFD	OOAO
HELCOM	HEAT: Levels 2 and 3: Averaging or weighted averaging of indicators of direct effects of nutrient enrichment and those of indirect effects, followed by OOAO between the criteria groups of nutrients, direct effects and indirect effects.
OSPAR	Common Procedure: Level 3: OOAO between criteria (harmonised assessment parameters) and criteria groups (nutrients, direct effects and indirect effects) to form an initial assessment and with the possibility of an appraisal of all relevant information to produce the final assessment result.
UNEP-MAP	TRIX has been used under the Barcelona Convention and the Programme for the Assessment and Control of Marine Pollution in the Mediterranean (MED POL), but has not been adopted as the integration method for the Implementation of the Ecosystem Approach (ECAP) and the Quality Status Report (QSR). An integration method has not yet been regionally agreed.
Black Sea	BEAST (being tested) – derived from HELCOM approach.

Missing indicators

If a primary criterion cannot be assessed due to a lack of data then the resultant eutrophication assessment cannot be assigned a status (i.e. it is 'not assessed'). It also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken. This does not apply where certain aspects have been scoped out on the basis of a risk assessment (e.g. areas of low risk beyond coastal waters).

3.3.3 Visualising Assessment Results

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme.

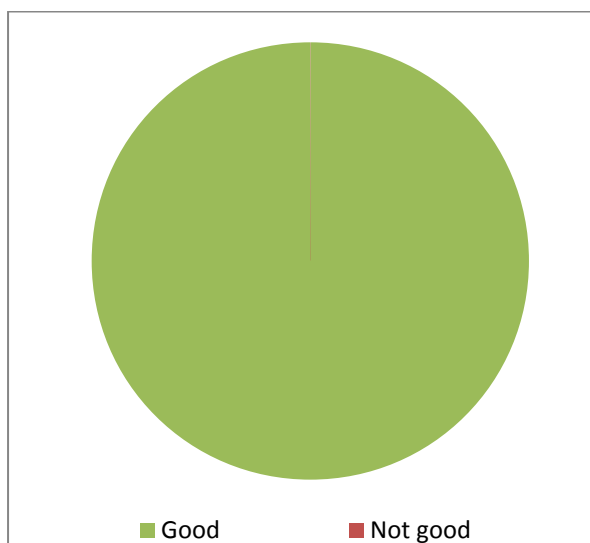
For each area assessed, the values achieved for each criterion used should be presented, and an estimate of the extent of national waters and/or the region or subregion over which the threshold values set have been achieved. For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE. A map showing the outcome of the assessment spatially is also likely to be a useful communication tool.

In addition to the presentation of results by criteria, a summary can be provided in graphical format (Figure 8) as the 'satellite' for Descriptor 5 in the scheme for integrated presentation of assessment results (pizza-satellite scheme). This may be illustrated as a single outcome per assessment area (Figure 8(a)), and as the percentage of the region or subregion, or of national waters that is and is not subject to eutrophication (Figure 8(b)).

The format of the outputs to contribute to assessments of pelagic and benthic habitats under Descriptors 1 and 6 are not addressed in detail here, but could include spatial maps showing the areas

where relevant criteria have/have not met the threshold values, which can be further analysed for the assessments of pelagic and benthic habitats.

(a) Single outcome per assessment area



(b) Percentage of (sub)region (or national) waters subject to eutrophication

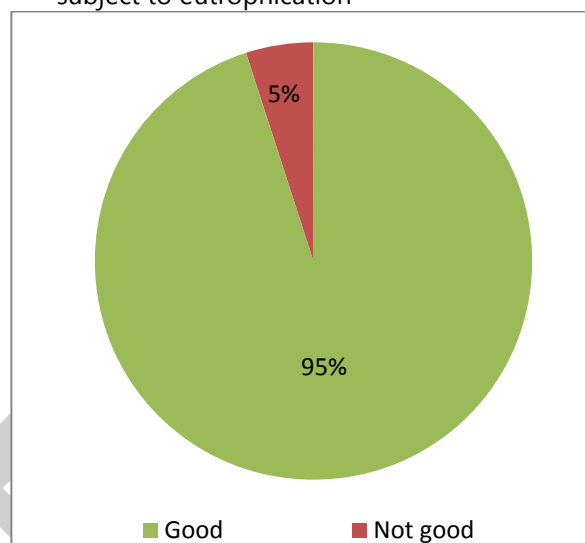


Figure 8. Illustrative example of a visual summary of assessment output for eutrophication (Descriptor 5 'satellite') (a) for a single assessment area; (b) for (sub)region or national waters, which could be split between coastal and beyond coastal waters

3.4 Descriptor 6: Sea-floor Integrity (Part 1: Physical Loss and Disturbance)

Descriptor 6: 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.

The criteria linked to Descriptor 6, and their relationship to the indicators of Commission Decision 2010/477/EU are shown in Table 4. These criteria address only the physical loss and physical disturbance (and associated impacts) aspects of assessing seabed habitats and sea-floor integrity. They provide an important component of assessing seabed habitats, due to the relative importance (spatial extent) of these pressures on the seabed across Europe.

See also Benthic Habitats (Descriptors 1 and 6) (Section 4.8) for details of benthic broad habitat types (which are based on EUNIS level 2 types) and how to assess seabed habitats as a whole.

Table 4. Criteria for assessment of sea-floor integrity, relating to physical loss and disturbance only (Descriptor 6); see Table 17 for remaining D6 criteria.

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators
Pressure	D6C1 Physical loss of the seabed (spatial extent and distribution)		6.1 in part
	D6C2 Physical disturbance to the seabed (spatial extent and distribution)		6.1 in part
Impact	D6C3 Spatial extent of adverse effects from physical disturbance on benthic broad habitats		6.1.2

Physical loss defines a permanent change to the seabed which has lasted or is expected to last for a period of two reporting cycles (12 years) or more. This includes changes in substrate from the natural seabed substrate to an anthropogenic substrate (e.g. made of concrete or metal, such as the foundations of oil, gas or renewable energy installations) or a man-made structure on the coast or offshore (e.g. land claim, artificial island). It is technically possible that such modifications can be reversed and, in some circumstances, anticipated that this will happen over time (e.g. through decommissioning of oil platforms and wind turbines).

Physical disturbance is a change to the seabed which can be restored if the activity causing the disturbance pressure ceases. This can include, for example, abrasion from towed benthic fishing gears, or marine aggregate dredging.

Degree of Integration

The three primary criteria for Descriptor 6 are focussed on assessing the scale of physical disturbance and associated impacts and on physical loss; they are not intended to lead directly to an assessment of status for D6, but to produce outputs for use in the assessment of seabed habitats/sea-floor integrity under the criteria D6C4 and D6C5 (see Section 4.8).

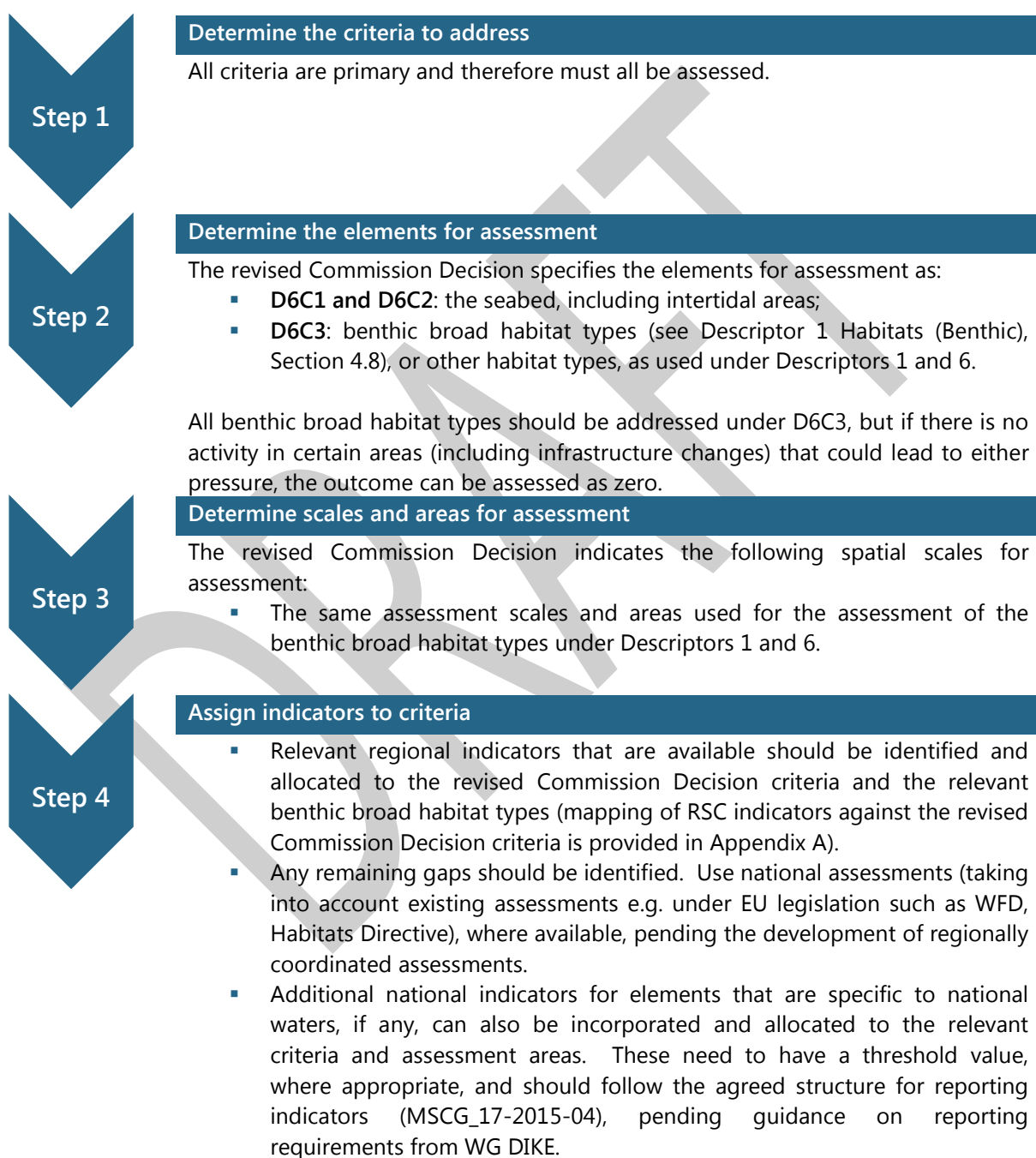
Consequently, D6C1 and D6C2 do not have threshold values, but are used to assess other criteria. D6C1 is used to assess habitat loss per habitat under D6C4 (habitat extent (loss)), and to assess D7C1

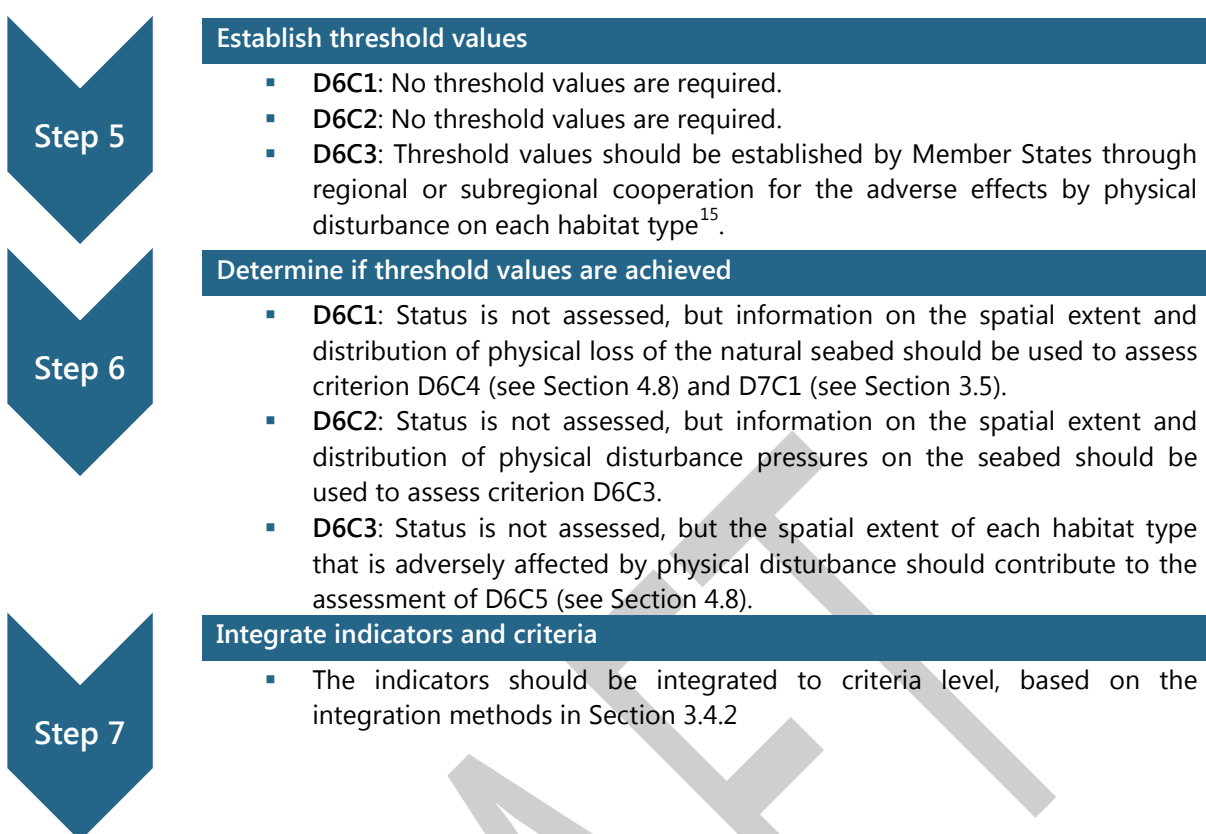
(spatial extent and distribution of permanent alteration of hydrographical conditions). D6C2 is used to assess impacts on broad habitat types under D6C3. D6C3 requires threshold values to define adverse effect per habitat type, and itself contributes to the assessment of D6C5.

Therefore no integration across the criteria is required.

3.4.1 Assessment flow

The assessment flow for Descriptor 6 criteria is described below.





3.4.2 Levels and Methods of Integration

Figure 9 shows the levels of integration and integration methods for Descriptor 6. The figure is representative of a single assessment area. There is no need to aggregate across spatial assessment areas (although within an assessment area, there may be a need to bring together sub-habitat types to the relevant broadscale habitat).

¹⁵ These threshold values concern the quality/condition of the subtypes, to enable an assessment of whether there is impact, based on the intensity of the pressure and the habitat's resilience to the pressure. The latter can be assessed via: a) modelling/expert judgement on the 'resistance' of the habitat to the pressure (as one aspect of the 'sensitivity' scoring method in common use for habitat assessments, the other aspect being 'resilience' which assess the length of time for the habitat to recover once the pressure is removed); or b) *in situ* ground-truth sampling to assess the condition of the habitat, via multimetric indices or other appropriate methods (for broad habitat types, the ground-truthing may need to be done on specified representative subtypes e.g. EUNIS level 4 or 5 classes); or c) a combination of approaches a) and b).

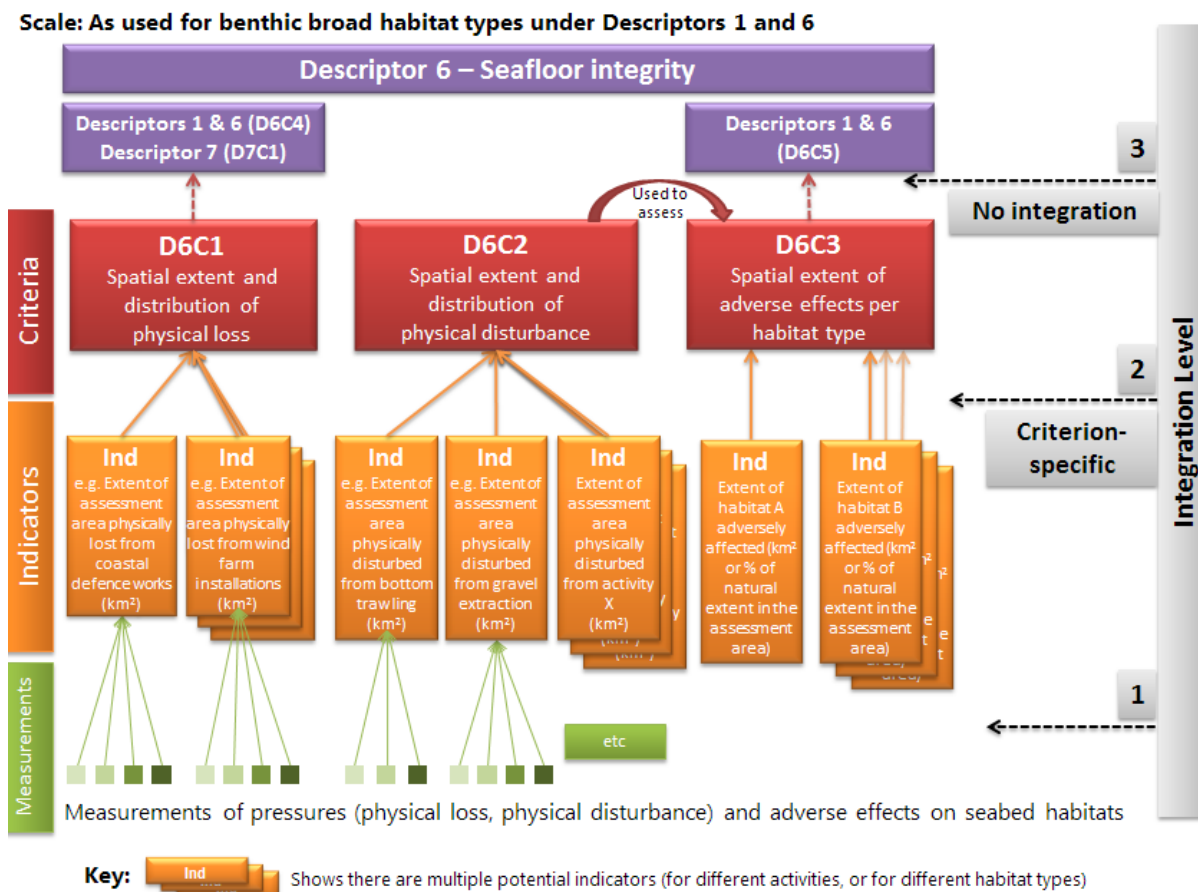


Figure 9. Levels and methods of integration for Descriptor 6

The integration methods of Figure 9 are:

- Level 1:** Measurements of individual elements, for example, extent of the pressures physical loss and physical disturbance and of impacts on benthic broad habitat types or other selected habitat types (in relation to their structure and function, such as species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function). This level of integration is not addressed in this Guidance.
- Level 2:** The integration approach differs across the criteria:

 - D6C1:** The results for several indicators, where used, are integrated by combining them as appropriate. This may be through summing areas across different activities, or by combining different spatial data layers for different types of activity that represent physical loss, such as coastal defence works, wind farm installations.
 - D6C2:** The results for several indicators, where used, are integrated by combining them. This may be through combining several spatial data layers for different types of activity/pressure causing physical disturbance, such as mobile demersal fishing, gravel extraction etc. Spatial overlaps in different pressures should be accounted for (i.e. not double-counted). This should provide, as an output, the total extent of seabed in the area that is subject to physical disturbance.
 - D6C3:** The results of the indicators of the spatial extent of each habitat type which is adversely affected by physical disturbance are not integrated; the outputs contribute to the assessment of benthic habitats under Descriptors 1 and 6 (see Section 4.8, Benthic Habitats). In order to determine the spatial extent of a habitat that is adversely affected, the output from D6C2 needs to be combined with a habitat map and any other indicators used, to determine the extent of adverse effect per habitat

type (per benthic broad habitat type, and per other habitat type if used, at appropriate EUNIS level). There may be a need to combine or integrate different ecological indicators for a particular habitat, such as the Ecological Quality Ratio (EQR), species composition etc. This is not addressed in this Guidance.

- **Level 3:** The criteria are not integrated. D6C1 is used to assess D6C4 and D7C1. D6C2 is used to assess D6C3. D6C3 contributes to the assessment of D6C5. The outputs for D6C1 and D6C3 should be directly used in the assessment of benthic habitat types under Descriptors 1 and 6 (see Section 4.8).

Outstanding issues for D6

The Member State workshop on the 20–21 April 2016 and subsequent comments by Member States raised several issues concerning clarification of the approach to assessment of benthic habitats. Many of these have already been addressed in the revised Commission Decision, some may require further consideration which will be taken forward in the course of further technical work e.g.:

- How to take account of the restoration of benthic habitats;
- Inclusion of qualitative assessments in the integration;
- Detail of how to estimate the spatial extent of activity-pressures, in the case where pressure data is point-based;
- Detail/indicative recommendations on how different pressure layers are integrated;
- How to aggregate sub-habitat-types to broad habitat types
- How to deal with variation in confidence of maps of modelled data (EUSeaMap);
- Whether an assessment of adverse effect from physical disturbance can be reported qualitatively (expert judgement) or quantitatively, see ICES advice on cumulative impact against assessment of BH3 in OSPAR;
- How to include and define habitat quality, sensitivity and resilience in the assessment;
- How to use WFD and Habitats Directive assessments.

The following provides the overall approach to assessment of these D6C1–D6C3 criteria, based on discussions at the Article 8 workshop on 20–21 April 2016 and ICES seafloor damage workshop on 31 May – 01 June 2016:

- **D6C1:** the distribution of physical loss pressures is closely associated with the different activities causing the pressure (i.e. infrastructure developments on the coast or offshore, or man-made modifications to the coast or seabed such as land claim or coastal modifications). Mapping the distribution of the relevant activities can be used directly to prepare spatial data sets on the distribution of the physical losses per area. Coastal data should be available from WFD hydromorphology assessments. Offshore data may be available from localised planning consents and EMODnet. In the future, data may also be available from the process of developing Maritime Spatial Plans for 2021 under the maritime spatial planning Directive (2014/89/EU).
- **D6C2:** the distribution and intensity of physical disturbance pressures is closely associated with the different activities causing the pressure. Mapping the distribution of the relevant activities can be used directly or via modelling (e.g. for VMS data) to prepare spatial data sets on the distribution and intensity of the physical disturbances per area. Where appropriate, the changes in this pressure over time (e.g. annual variation from VMS data) can also be determined.
- **D6C3:** The extent of impact per habitat type is typically assessed as follows:
 - Maps of the distribution of the benthic broad habitat types are required (e.g. as available from EMODnet, aggregated to the MSFD benthic broad habitat types which are equated to EUNIS level 2 types – see Table 2 of revised Commission Decision). Where ‘other habitat types’ are selected for a finer-scale assessment, maps can also be drawn from EMODnet (e.g. at EUNIS level 4) or from other sources (e.g. for special

habitat types). The 'other habitat types' (finer-scale) may be assessed either (i) to inform the assessment of the relevant broad habitat type of which they are a part; or (ii) because the specific habitat type is considered important and warrants a specific assessment of its status, e.g. seagrass beds.

- These habitat maps are interfaced (intersected) with the pressure maps from D6C2 to determine the extent of each habitat type that is subjected to the pressure (physical disturbance).
- An assessment is made of whether the habitat is impacted by the pressure (and over what extent); see Step 5 of the assessment flow regarding setting threshold values for defining this 'adverse effect'.

Existing assessment frameworks include:

Framework	Integration Approach
Seafloor Integrity	
HELCOM	HELCOM is developing a core indicator to assess the cumulative impact of activities on the seafloor. Pending the indicator development, a qualitative approach is taken in support of the 2018 reporting round by overlaying available data layers representing loss and damage of seabed habitats with benthic habitat maps. Impact estimates will also be used but no thresholds have been developed yet. Additional core indicators are expected to apply to benthic habitats under D1.
OSPAR	OSPAR common indicators include a number of indicators related to assessing seabed habitat quality and one indicator assessing the spatial extent of damage from human activities. Five benthic habitat (BH) indicators pertaining to Descriptor 6 are included in the OSPAR list of common indicators within an overall framework for habitat assessment. The method for integration of the indicators requires further work.
UNEP-MAP	EcAp indicators: initiated a process to agree on indicators; these are not yet operational.
Black Sea	No agreed indicators.

Source: ICES, 2015.

Missing indicators

If a primary criterion cannot be assessed due to a lack of data then the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken.

3.4.3 Visualising Assessment Results for Descriptor 6

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme.

The assessment output for Descriptor 6 (physical loss and disturbance, as part of the assessment of Descriptors 1 and 6 for Benthic Habitats) is presented for the criterion in each assessment area (subdivision of the region or subregion). For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

3.5 Descriptor 7: Hydrographical Changes

Descriptor 7: Permanent¹⁶ alteration of hydrographical conditions does not adversely affect marine ecosystems.

The criteria for Descriptor 7, and their relationship to the indicators of Commission Decision 2010/477/EU are shown in Table 5.

Table 5. Criteria for assessment of hydrographical changes (Descriptor 7)

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators
Pressure / Impact		D7C1 Spatial extent and distribution of permanent alteration of hydrographical conditions	7.1.1
		D7C2 Spatial extent of adverse effects on benthic habitats from permanent alteration of hydrographical conditions	7.2.1, 7.2.2

Degree of Integration

There are two secondary criteria for Descriptor 7, with no integration across the criteria. D7C1 does not have threshold values and informs D7C2. D7C2 requires threshold values for adverse effects of permanent alterations of hydrographical conditions per benthic habitat type and contributes to the assessment of benthic habitats under Descriptors 1 and 6 (D6C5, habitat condition). The envisaged degree of integration is therefore:

- D7C1 (secondary) – no integration, informs assessment of D7C2;
- D7C2 (secondary) – no integration with D7C1; results for individual benthic habitats (benthic broad habitat types or other habitat types) should be kept separate (no integration to criteria level), and contribute to the assessment of D6C5.

3.5.1 Assessment Flow

The assessment flow for Descriptor 7 is described below.

Step 1

Determine the criteria to address

Criteria D7C1 and D7C2 are both secondary criteria. They should be addressed in those assessment areas where the habitat types or broad habitat types are at risk of failing to be in good status and permanent alteration of hydrographical conditions is considered to make a significant contribution to this risk.

Permanent alteration of hydrographical conditions includes changes in wave action, currents, salinity and temperature, particularly as a result of physical loss of or

¹⁶ Permanent alteration of hydrographical conditions may be associated with physical loss of the natural seabed. In this context, point (3) of the specifications for Descriptor 6 in the revised Commission Decision defines physical loss as 'a permanent change to the seabed which has lasted or is expected to last for a period of two reporting cycles (12 years) or more'.

modifications to the natural seabed or upstream modifications which affect coastal waters. Hydrographical changes are likely to stem from physical infrastructure assessed under D6C1 or from infrastructure changes upstream (canalisation, etc.). This includes all offshore structures affecting hydrographical conditions, including those with small footprint on the seabed (anchoring mechanism). Other possible sources of hydrographical changes may be cables and pipelines (if not included in D6C1), but these would only need to be assessed where they are considered to contribute to the risk of habitat types failing to be in good status. It should be noted that activities and pressures should only be included where not already assessed under the WFD, e.g. 'physical restructuring of rivers' should not be considered under the MSFD. The wider ecosystem and climate change issues of temperature, current, storminess and acidification changes are not included in D7 assessments (these parameters are listed in Annex III and can be monitored and brought into any of the assessments if considered relevant).

Step 2

Determine the elements for assessment

The elements for assessment are:

- **D7C1:** Hydrographical changes to the seabed and water column (including intertidal areas), associated in particular with physical loss of the natural seabed;
- **D7C2:** Benthic broad habitat types or other habitat types (see Descriptors 1 and 6 Habitats (Benthic), Section 4.8).

The habitat types to be addressed under D7C2 are those benthic broad habitat types and other habitat types selected under D1/D6 which are at risk of failing to be in good status and permanent alteration of hydrographical conditions is considered to make a significant contribution to this risk.

Step 3

Determine scales and areas for assessment

The revised Commission Decision indicates the following spatial scales for assessment:

- The same assessment scales and areas as used for the benthic broad habitat types under Descriptors 1 and 6.

Step 4

Assign indicators to criteria

- Relevant regional indicators should be identified and allocated to the Commission Decision criteria (mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A).
- Any remaining gaps should be identified. Use national assessments (taking into account existing assessments e.g. under EU legislation such as WFD, Habitats Directive, EIA), where available, pending the development of regionally coordinated assessments.
- Additional national indicators for elements that are specific to national waters, if any, can also be incorporated and allocated to the relevant criteria and assessment areas.

Step 5

Establish threshold values

- **D7C1:** No threshold values are required.
- **D7C2:** Threshold values should be established by Member States through regional or subregional cooperation for the adverse effects of permanent alterations of hydrographical conditions on each habitat type.

Step 6

Determine if threshold values are achieved

- **D7C1:** Status is not assessed, but information on the spatial extent and distribution of permanent alteration of hydrographical conditions to the seabed and water column, associated in particular with physical loss of the natural seabed (from D6C1), should be used to assess criterion D7C2. The information from D6C1 needs to be complemented only with information on the spatial extent and distribution of permanent alteration of hydrographical conditions from other pressures (e.g. changes in near-field and far-field hydrographical conditions as a result of infrastructure developments such as renewable energy installations, oil and gas infrastructure, coastal defence infrastructure etc.).
- **D7C2:** The spatial extent of each benthic habitat type that is adversely affected by permanent alteration of hydrographical conditions in each assessment area. Status is not assessed, but the information contributes to the assessment of D6C5 (see Section 4.8).

Step 7

Integrate indicators and criteria

- The indicators should be integrated to criteria level, based on the integration methods in Section 3.5.2.

3.5.2 Levels and Methods of Integration

Figure 10 shows the levels of integration and integration methods for Descriptor 7. The figure is representative of a single assessment area. There is no need to aggregate across spatial areas.

The integration methods of Figure 10 are:

- **Level 1:** Measurements of individual elements (for example, extent of permanent alteration of hydrographical conditions from pressures other than physical loss (for which information is provided by D6C1), and impacts on benthic habitats (in relation to their physical and hydrographical characteristics and associated biological communities), are combined into individual indicators. This level of integration is not addressed in this Guidance.
- **Level 2:** The integration approach differs across the two criteria:
 - **D7C1:** The results from several indicators (representing different pressures — physical loss from D6C1, and other sources of changes to hydrological conditions), where used, are integrated by combining them as appropriate. This may be through combining several spatial data layers for different types of pressure causing hydrographical changes, such as physical loss (from D6C1), and other changes to hydrological conditions if relevant. Spatial overlaps in different pressures should be accounted for (not double-counted). This should provide, as an output, the extent of each habitat type that is subject to changes in hydrological conditions.
 - **D7C2:** The results of the indicators of the spatial extent of each habitat type which is adversely affected by changes to hydrological conditions are not integrated; the outputs contribute to the assessment of benthic habitats under Descriptors 1 and 6 (see Section 4.8, Benthic Habitats).
- **Level 3:** The two criteria represent complementary aspects (spatial extent of hydrographical changes and spatial extent of adverse effects on benthic habitats as a result of those hydrographical changes). The two criteria are not integrated. D7C1 contributes to the

assessment of D7C2, which contributes to assessments of benthic habitats under Descriptors 1 and 6 (see Section 4.8).

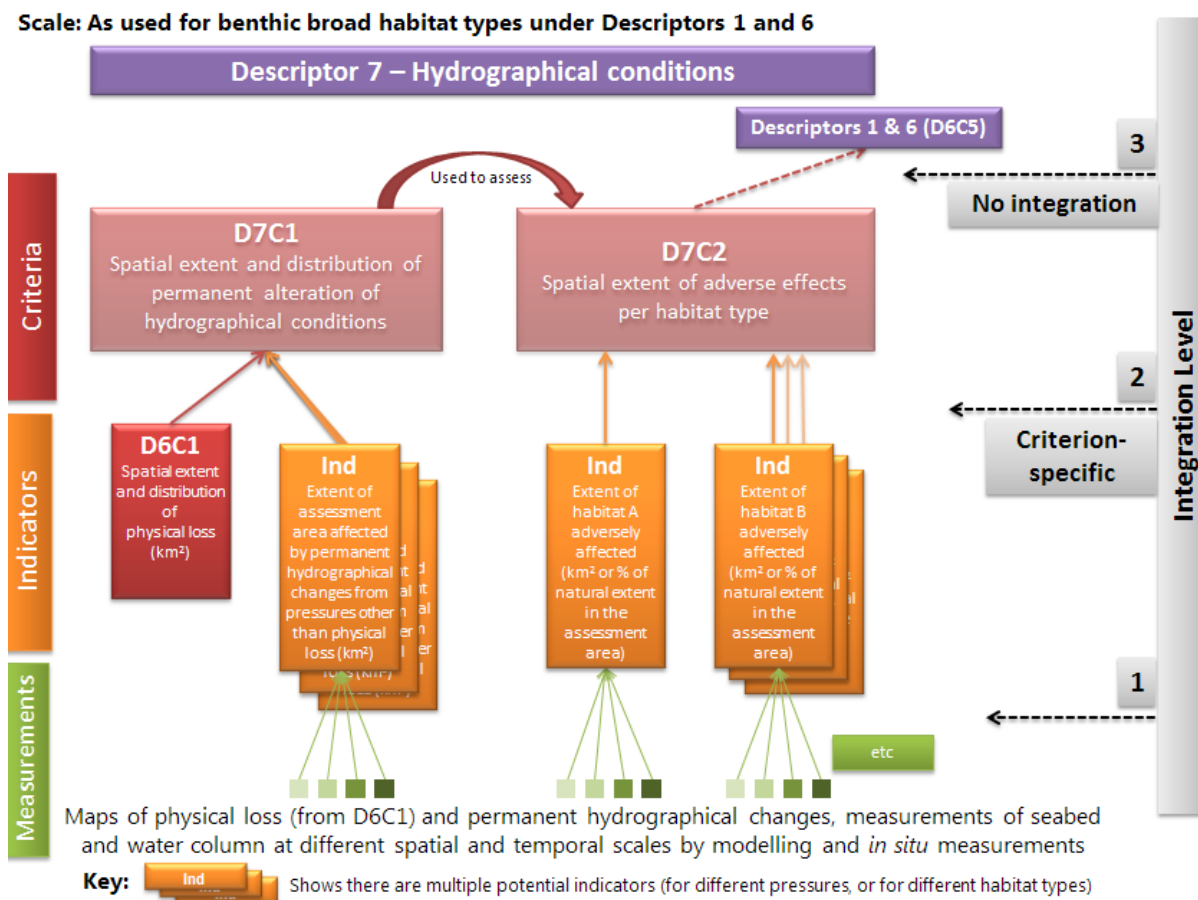


Figure 10. Levels and methods of integration for Descriptor 7

Missing indicators

If an aspect of Descriptor 7 cannot be assessed due to a lack of data then the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment can be undertaken.

Outstanding issues for Descriptor 7

Methodological standards for linking WFD assessments with MSFD assessments (e.g. related to scales of assessment) may require further development.

3.5.3 Visualising Assessment Results for Descriptor 7

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme.

The assessment output for Descriptor 7 is presented for each assessment area (as used for the assessment of the benthic broad habitat types) for each criterion assessed.

The assessment output is presented as the extent of hydrographical changes to the seabed and water column (for D7C1) and the extent of each benthic habitat type adversely affected due to permanent alternation of hydrographical conditions (D7C2).

For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

A spatial map of the areas of hydrographical changes to the seabed and water column will be a necessary output for D7C1. This will need to be intersected with a benthic habitat map to determine the areas of individual benthic habitat types that are adversely affected by hydrographical changes, for D7C2.

An overall assessment for Descriptor 7 is not anticipated. The assessment outputs feed in to the assessment of benthic habitats under Descriptors 1 and 6. However, a summary can be provided as the 'satellite' for Descriptor 7 (Figure 11), showing the overall spatial extent of hydrographical changes to the seabed and water column in the assessment area (in the scheme for integrated presentation of assessment results), without a judgement on whether this constitutes 'good' or 'not good' status.

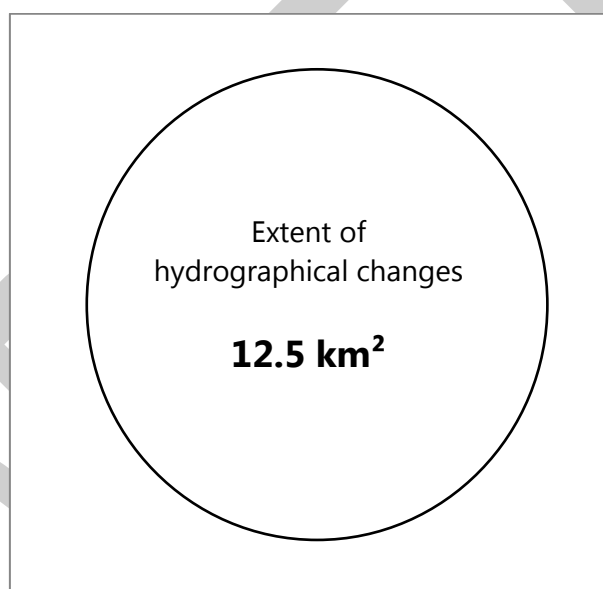


Figure 11. Illustrative example of a visual summary of assessment output for hydrographical changes, based on D7C1 (Descriptor 7 'satellite')

Note: No judgement on 'good' or 'not good' status is required.

3.6 Descriptor 8: Contaminants

Descriptor 8: Concentrations of contaminants are at levels not giving rise to pollution effects.

The primary and secondary criteria, and their relation to the Commission Decision 2010/477/EU indicators, are shown in Table 6. The assessments for D8 address two distinct aspects:

- Contaminants and adverse effects:
 - D8C1 relates to the levels of contaminants in the marine environment, which risk causing pollution effects on marine organisms;
 - D8C2 relates to the adverse effects (impacts) of these contaminants on species populations and biological communities;
- Significant acute pollution events:
 - D8C3 relates to the spatial extent and duration of significant acute pollution events¹⁷;
 - D8C4 relates to adverse effects from these significant acute pollution events on species and habitats.

Table 6. Criteria for assessment of contaminants (Descriptor 8)

		Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators	Comments
Contamination	Pressure	D8C1 Contaminant concentrations in the relevant matrix ¹⁸		8.1.1	
	Impact		D8C2 Effects of contaminants on health of species and condition of habitats	8.2.1	
Acute pollution	Pressure	D8C3 Significant acute pollution events		8.2.2	8.2.2 has two aspects (pressure and impact) which are now separated in the revised Decision
	Impact		D8C4 Adverse effects of significant pollution events on species and habitats	8.2.2	

Degree of Integration

The degree of integration across criteria is not yet determined. The revised Commission Decision requires outputs separately for each criterion, but also specifies that the use of D8C2 and D8C4 in the

¹⁷ As defined in Article 2(2) of Directive 2005/35/EC of the European Parliament and of the Council.

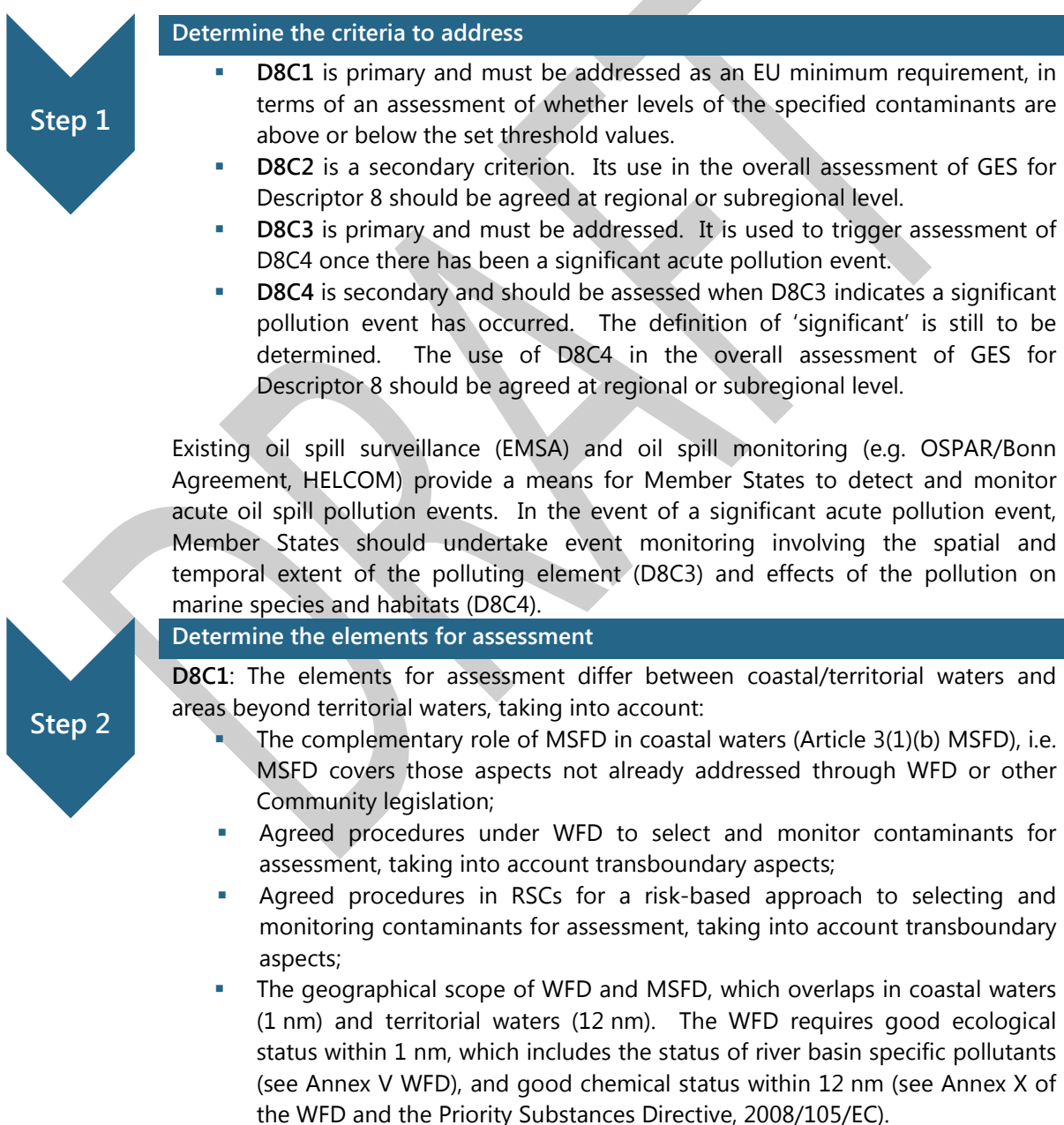
¹⁸ The relevant matrix is the matrix deemed to be the most relevant for monitoring and assessment, on the basis of the environmental fate of the substance and the critical pathway for environmental effects. When the relevant matrix is biota also the choice of species for monitoring and assessment is important, as WFD environmental quality standards for biota may relate to different trophic levels of the food chain.

overall assessment of GES for Descriptor 8 shall be agreed at regional or subregional level. This includes whether the criteria feed in to the assessment of Descriptor 8 or not, and the possible integration methods to be used.

For D8C1 and D8C2, each assessed criterion should be within threshold values. D8C3 requires the definition of a 'significant acute pollution event'; when this occurs, D8C4 should be assessed and reported on. There are no threshold values for D8C3 and D8C4. D8C2 and D8C4 should contribute, where appropriate, to the assessment under Descriptors 1 and 6.

3.6.1 Assessment Flow

The assessment flow for Descriptor 8 is described below.



Based on the foregoing considerations, the revised Commission Decision defines the elements for assessment for D8C1 as follows:

- (1) Within coastal and territorial waters:
 - (a) Contaminants selected in accordance with Directive 2000/60/EC (WFD):
 - Contaminants for which an environmental quality standard (EQS) is laid down in part A of Annex I of Directive 2008/105/EC (the Priority Substances Directive) (note that it has been updated by Directive 2013/39/EU; to ensure the correct list and standards, the latest consolidated version of the EQS Directive should be checked);
 - River Basin Specific Pollutants (RBSPs)¹⁹ that have been identified under Annex VIII to Directive 2000/60/EC (WFD) in coastal waters; and
 - (b) Additional contaminants, if relevant, which may give rise to pollution effects in the marine region or subregion. Member States shall establish the list of additional contaminants through regional or subregional cooperation. Some additional contaminants may already be identified for monitoring by RSCs. Additional contaminants may reflect, for example, offshore pollution and atmospheric deposition of contaminants.
- (2) Beyond territorial waters:
 - (a) The contaminants considered under point (1) where they still may give rise to pollution effects. Contaminants can be removed from the list of those monitored through a risk-based approach.
 - (b) Additional contaminants, if relevant, which are not already identified above and which may give rise to pollution effects in the region or subregion. The list of additional contaminants should be established through regional or subregional cooperation.

For criteria elements under D8C1, the selection of additional contaminants within and beyond coastal and territorial waters that may give rise to pollution effects shall be based on a risk assessment. For these contaminants, the matrix and threshold values used for the assessment shall be representative of the most sensitive species and exposure pathway, including hazards to human health via exposure through the food chain. The resulting lists of contaminants should be treated individually or as groups, as agreed at Union level.

D8C2: Member States should establish a list of species, and relevant tissues to be assessed, and (benthic) habitats, at risk of adverse effects from contaminants, including cumulative and synergistic effects, through regional or subregional cooperation.

D8C3: The elements for assessment are significant acute pollution events involving polluting substances, including crude oil and similar compounds. 'Polluting substances' are defined in Article 2(2) of Directive 2005/35/EC of the European Parliament and of the Council as the substances covered by Annexes I (oil) and II (noxious liquid substances in bulk) to MARPOL 73/78. The spatial extent and duration of such events needs to be monitored. Note that there is not yet an agreed definition of 'significant' in this context. This needs to be agreed.

¹⁹ River Basin Specific Pollutants are considered as part of ecological status under the WFD. They are substances of national or local concern that are selected by Member States for control at the relevant level (<http://ec.europa.eu/environment/water/water-dangersub/>). Identified as 'Pollution by other substances identified as being discharged in significant quantities into the body of water' under 'Chemical and physico-chemical elements' of ecological status in Annex V of the WFD.

Step 3

D8C4: The species of the species groups assessed under Descriptor 1 (see Section 4.1) and benthic broad habitat types assessed under Descriptors 1 and 6 (see Section 4.8).

Determine scales and areas for assessment

The revised Commission Decision indicates the following spatial scales for assessment:

- **D8C1 and D8C2:**
 - Within coastal and territorial waters: as used under Directive 2000/60/EC. This implies the use of WFD water bodies in coastal waters, and other polygons if defined for territorial waters, and will facilitate the reuse of information from WFD. Note that for good ecological status, WFD requires Member States to define water bodies for assessment (i.e. assessment units) within 1 nm²⁰.
 - Beyond territorial waters: subdivisions of the region or subregion, divided where needed by national boundaries.
- **D8C3:** Region or subregion, divided where needed by national boundaries.
- **D8C4:** The same assessment scales and areas as used for the species groups or benthic broad habitat types under Descriptors 1 and 6.

The scales for assessment take into account the different approaches of Member States to monitoring beyond 1 nm and/or 12 nm, such as offshore monitoring, modelling, or extrapolation of WFD results from within 1 nm and/or 12 nm to larger areas.

Step 4

Assign indicators to criteria

- Relevant regional indicators that are available should be identified and allocated to the selected contaminants, biological effects and associated assessment areas. Mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A.
- Any remaining gaps should be identified. Use national assessments (taking into account existing assessments e.g. under EU legislation such as WFD, Habitats Directive), where available, pending the development of regionally coordinated assessments.
- Additional national indicators for elements that are specific to national waters, if any, can also be incorporated and allocated to the relevant criteria and assessment areas. These need to have a threshold value, where appropriate, and should follow the agreed structure for reporting indicators (MSCG_17-2015-04), pending guidance on reporting requirements from WG DIKE.

Step 5

Establish threshold values

The threshold values for assessment are:

D8C1:

Within coastal and territorial waters:

- For contaminants selected in accordance with Directive 2000/60/EC, the values set in accordance with Directive 2000/60/EC, i.e.:
 - the environmental quality standards (EQS) for WFD priority

²⁰

See Common Implementation Strategy for the Water Framework Directive (2000/60/EC) Guidance Document No 5 Transitional and Coastal Waters, Typology, Reference Conditions and Classification System (page 24). Available online at http://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm [Accessed 17.05.2016].

substances established by WFD and Directive 2008/105/EC (as amended);

- the national values set by Member States for RBSPs.
- When a WFD priority substance or RBSP is measured in a matrix for which no value is set under Directive 2000/60/EC, Member States should set the threshold values for the concentrations in that matrix through regional or subregional cooperation.
- For additional contaminants listed through regional or subregional cooperation, threshold values for the concentrations in the specified matrix (water, sediment or biota), which may give rise to pollution effects, shall be established by Member States through regional or subregional cooperation.

Beyond territorial waters:

- For contaminants selected in accordance with Directive 2000/60/EC and additional contaminants within coastal and territorial waters (point 1 of the criteria elements of the revised Commission Decision), the values as applicable within those waters. For contaminants selected in accordance with Directive 2000/60/EC for which no threshold values have been set under WFD for the matrix (sediment, biota) relevant offshore, the values should be used that are already established through regional or subregional cooperation. In the absence of existing offshore values, values for the relevant matrix (sediment, biota) should be agreed through regional or subregional cooperation;
- For additional contaminants listed through regional or subregional cooperation for waters beyond territorial waters (point 2(b) of criteria elements of the revised Commission Decision), threshold values for concentrations in the specified matrix (water, sediment or biota), which may give rise to pollution effects, established by Member States through regional or subregional cooperation.

For improved consistency, the matrices used for monitoring under WFD and MSFD should be aligned where appropriate, taking into account the purpose of monitoring.

Threshold-setting may take into consideration existing thresholds already developed at regional level, such as the Ecological Assessment Criteria (EAC) and Background Assessment Concentrations (BAC).

D8C2: Threshold values for adverse effects (including cumulative and synergistic effects) on the health of species and the condition of habitats (e.g. species composition and their relative abundance at locations of chronic pollution), should be set by Member States through regional or subregional cooperation.

D8C3: No threshold values are required.

D8C4: No threshold values are required.

Determine if threshold values are achieved

- **D8C1:** The status of each contaminant in each relevant matrix should be determined, based on its concentration compared to the relevant threshold value established in Step 5. Normalisation should follow relevant EU technical guidance documents e.g. no. 25 and 32.
- **D8C2:** The status of each species or habitat assessed should be determined, based on the selected indicators for adverse effects and their estimated current state compared to the threshold values established in Step 5.

Step 6

- **D8C3:** No status assessment required, but there is need to quantify the extent and duration of significant pollution events. The occurrence of a significant pollution event (identified from monitoring this criterion) should trigger the assessment of criterion D8C4.
- **D8C4:** No status assessment required. The adverse effects of significant pollution events on the health of species and the condition of habitats should be monitored and, where the cumulative spatial and temporal effects are significant, the outputs should contribute to assessments under Descriptors 1 and 6. This is in the form of the number of each species and/or the extent of each broad habitat type that is adversely affected.

Step 7**Integrate indicators and criteria**

- The indicators should be integrated, based on the integration methods in Section 3.6.2.

3.6.2 Levels and Methods of Integration

Figure 12 shows the levels of integration and integration methods for Descriptor 8. It builds on the assessment of single substances which are combined to indicators of single substances (e.g. individual metals) or groups of substances (e.g. PAHs, PCDBs) per matrix or across matrices at the relevant assessment scale. The revised Commission Decision states that 'contaminants shall be understood to refer to single substances or to groups of substances' and 'the grouping of substances shall be agreed at Union level' so that a consistent approach is used. The figure is representative of a single assessment area, for which the outputs of the assessment can be presented. There is no need to aggregate across spatial areas. Spatial and temporal aggregation within assessment areas should follow WFD CIS Guidance or other appropriate guidance.

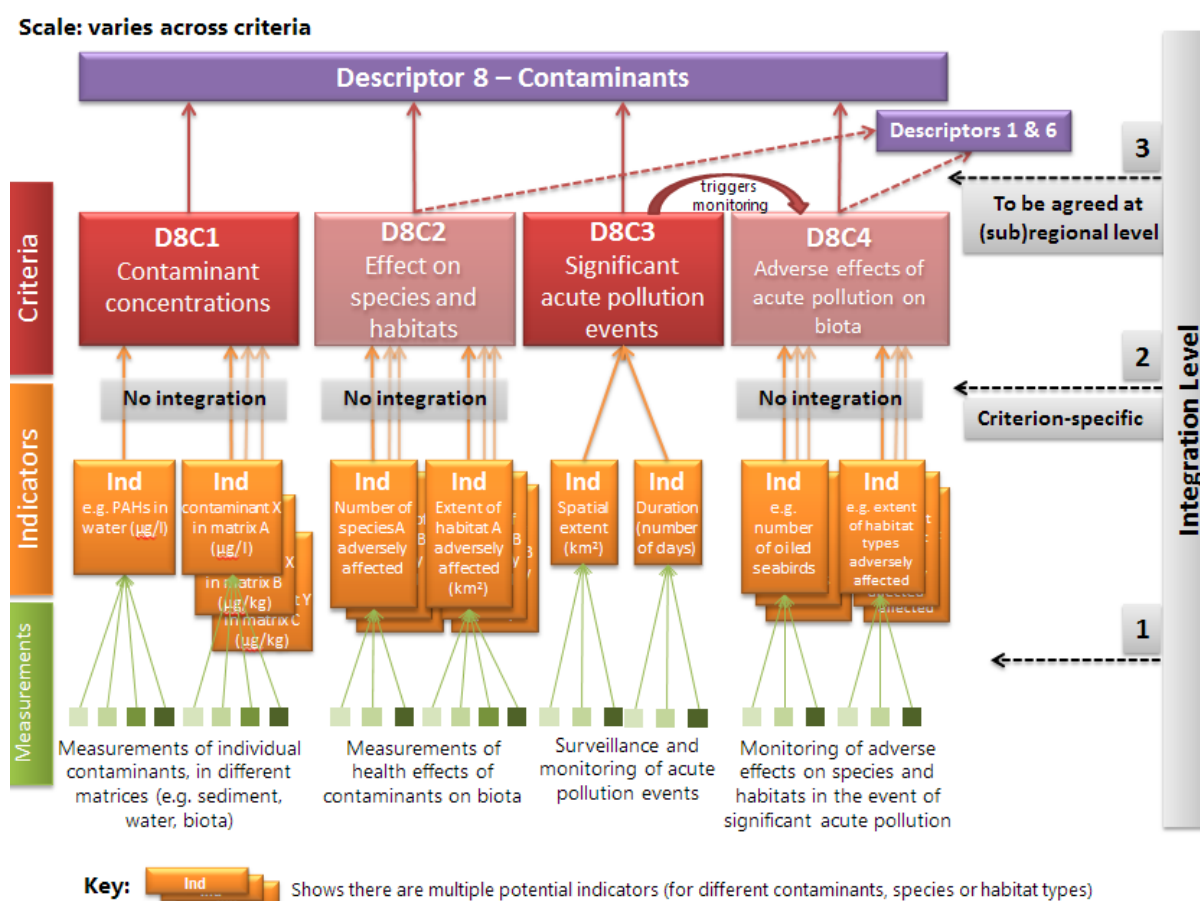


Figure 12. Levels and methods of integration for Descriptor 8

The integration methods of Figure 12 are:

- **Level 1:** Measurements of individual elements, i.e. each substance is measured in the relevant matrices (sediment, water, biota) and compared to the matrix-specific threshold value. For the purpose of D8C1 'contaminants' are understood to refer to single substances or to groups of substances. For consistency in reporting, the grouping of substances (which substances and the method for combining them in one group) shall be agreed at Union level²¹. This concerns the grouping of individual substances to a group of substances, for example, polyaromatic hydrocarbons (PAHs) or polychlorinated biphenyls (PCBs).
- **Level 2:** The integration method differs between the criteria:
 - **D8C1:** The results for the various contaminants under D8C1 are not integrated. They are presented individually and as a proportion of contaminants meeting the threshold values. The persistent, bioaccumulative and toxic substances (PBTs) (listed in Directive 2013/39/EU²²) should be presented separately.
 - **D8C2:** The results for the species and habitat types assessed under D8C2 are presented per species and per habitat type for each parameter. The species- and habitat-specific outputs contribute to the assessment of species and habitats under Descriptors 1 and 6 (see Section 4). The use of the criterion in the overall assessment

²¹ See point 3 under 'Specifications and standardised methods for monitoring and assessment' in the revised Commission Decision.

²² Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy.

- of GES for Descriptor 8, and any additional output presentation, shall be agreed at regional or subregional level.
- **D8C3:** The outcome shall be expressed as an estimate of the total spatial extent of significant pollution events and their distribution and total duration for each year. The use of the criterion in the assessment of GES for D8 requires agreement. This could be agreed at regional or subregional level alongside the use of D8C4 in the overall assessment for Descriptor 8.
 - **D8C4:** The results for the species and habitat types assessed under D8C4 are not integrated; the outputs contribute to the assessment of species and habitats under Descriptors 1 and 6 (see Section 4). The use of the criterion in the overall assessment of GES for Descriptor 8 shall be agreed at regional or subregional level.
- **Level 3:** Good environmental status for Descriptor 8 is expressed for each criterion individually. The possible integration of criteria to descriptor level, and whether and how the criteria contribute to the overall Descriptor 8 assessment needs to be agreed at regional or subregional level.

Outstanding issues for D8

The following open issues remain:

- **D8C1 :**
 - Grouping of substances (which substances and the method for combining them in one group) to be agreed at Union level.
 - Where a Member State or RSC opt for further integration of (groups of) substances to criterion level, this should take account of WFD methodological standards and the need for consistency, and should be agreed at regional or subregional level.
 - For improved consistency, the matrices used for monitoring under WFD and MSFD should be aligned where appropriate, taking into account the purpose of monitoring.
 - Should trend-based assessments be included in the presentation of assessment results for D8C1 and if so how can this be achieved?
- What does it mean to use the WFD assessment “where available”? Clarify requirements and limitations to linking WFD assessment areas and results to MSFD offshore waters and assessments. D8C2: The use of the criterion in the overall assessment of GES for Descriptor 8, and any additional output presentation to this end, shall be agreed at regional or subregional level.
- D8C3: The use of the criterion in the assessment of GES for Descriptor 8 requires agreement. This could be taken forward alongside the consideration of D8C4 at regional or subregional level. A definition of what constitutes ‘significant’ acute pollution requires agreement at Union level.
- D8C4: A definition of what constitutes ‘significant’ cumulative spatial and temporal effects requires agreement. The use of the criterion in the overall assessment of GES for Descriptor 8 requires agreement at Union level.
- Potential to use dose/concentration addition model to account for combination effects.

Until such issues are agreed, this Guidance suggests the following approaches:

- Level 2: No integration;
- Level 3: No integration.

Existing assessment frameworks include:

Framework	Integration Approach
D8C1 Concentration of Contaminants	
WFD	OOAO: All priority substances must comply with Environmental Quality Standards (EQS).
HELCOM	CHASE: Substances' ratios (measurement/threshold) are averaged (sum of substances multiplied with reciprocal root of number of substances) per compartment (biota, sediment, water) and one out all out is used between compartments (matrices).
OSPAR	CEMP: Integration of single substance assessments to group of substances (e.g. PCBs, PAHs, PBDEs) per matrix. No integration of indicator results to a single status statement on contaminants.
UNEP-MAP	No integration of substance assessments.
Black Sea	No integration of substance assessments.
D8C2 Biological effects of contaminants	
HELCOM	CHASE: No integration of indicators representing biological effects.
OSPAR	CEMP: No integration of indicator assessments (individual assessment techniques).
UNEP-MAP	Several biological effects indicators being used in MEDPOL.
Black Sea Commission	Not used

Missing indicators

If any aspect of a primary criterion cannot be assessed due to a lack of data or lack of established threshold value for the relevant matrix, then the resultant assessment cannot be assigned a status (i.e. it is 'not assessed'). It also means that the Member State should take action on monitoring and assessment tools and establishing threshold values to ensure that at the next update under Article 8 MSFD an assessment can be undertaken.

3.6.3 Visualising Assessment results for Descriptor 8

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme.

For each area assessed, the outcomes for each criterion used should be presented. Maps showing the outcomes of the assessments spatially (e.g. for individual contaminants, groups of contaminants, or overall for a criterion) are also likely to be a useful communication tool.

D8C1

The assessment output for D8C1 is presented:

- For each contaminant (or group of contaminants) — its concentration, the matrix used (water, sediment or biota), whether the threshold value has been achieved;
- Overall, the proportion of contaminants assessed which have achieved the threshold values, including indicating separately the number of ubiquitous, persistent, bioaccumulative and toxic substances (uPBTs), as referred to in Article 8(1)(a) of Directive 2008/105/EC.

For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

D8C2

The assessment output for D8C2 is expressed for each species or habitat assessed. For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

D8C3

The assessment output for D8C3 is expressed in terms of the spatial extent, distribution and duration of significant acute pollution events in each year:

- Spatial extent: x km²
- Distribution: provide a map or series of maps showing the distribution
- Duration: y days

D8C4

The assessment output for D8C4 is expressed for each species or habitat assessed.

Overall assessment of Descriptor 8

The use of criteria D8C2 and D8C4 in the overall assessment of good environmental status for Descriptor 8 shall be agreed at regional or subregional level. It is therefore not yet clear how the summary should be prepared for the 'satellite' for Descriptor 8 in the scheme for integrated presentation of assessment results (pizza-satellite scheme). A proposal is therefore provided in Figure 13, based on the outcome of D8C1 and D8C3. This may depend on the data available for the assessment and the integration approaches to be agreed.

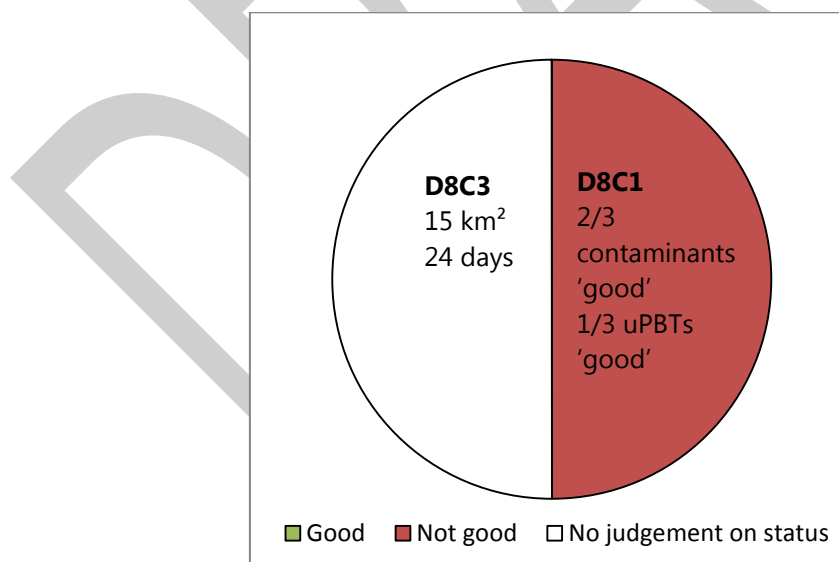


Figure 13. Illustrative example of a visual summary of assessment output for contaminants, based only on D8C1 and D8C3 (Descriptor 8 'satellite')

3.7 Descriptor 9: Contaminants in Seafood

Descriptor 9: Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.

The only criterion for Descriptor 9, and its relationship to the indicators of Commission Decision 2010/477/EU is shown in Table 7.

Table 7. Criteria for assessment of contaminants in seafood (Descriptor 9)

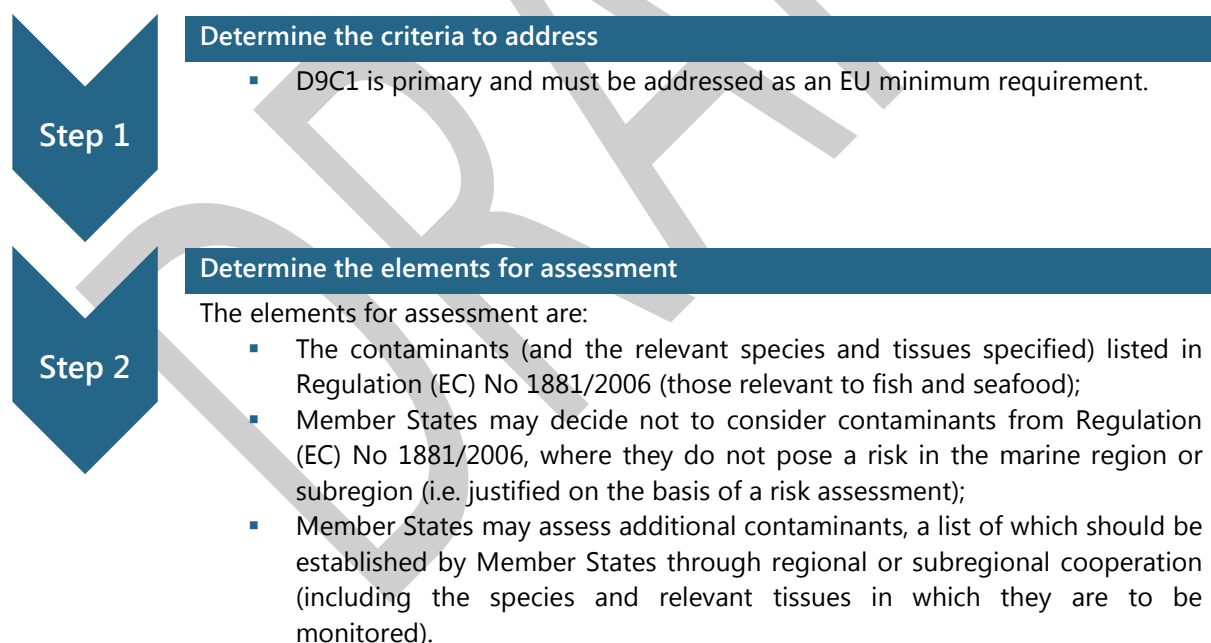
	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators
Pressure	D9C1 Level of contaminants in edible tissues of seafood		9.1.1

Degree of Integration

There is only one criterion for Descriptor 9, and therefore no integration among criteria is required.

3.7.1 Assessment Flow

The assessment flow for Descriptor 9 is described below.



Only limits for unprocessed seafood should be used (JRC, 2015a), and not limits relating to, for example, PAHs in smoked seafood, since the levels of PAHs may be affected by the smoking process, and unrelated to contaminants in the marine environment.

Where Member States establish a list of contaminants and the species and relevant tissues in which they are to be assessed, in addition to those in Regulation (EC) 1881/2006, the revised Commission Decision sets out specifications for the species, which shall:

Step 3

- be relevant to the marine region or subregion concerned;
- fall under the scope of Regulation (EC) No 1881/2006; and
- be suitable for the contaminant being assessed;
- be among the most consumed in the Member State or the most caught or harvested for consumption.

Determine scales and areas for assessment

The revised Commission Decision indicates the following spatial scales for assessment:

- The catch or production areas in accordance with Article 38 of Regulation (EU) No 1379/2013 (common organisation of the markets).

Article 38 of Regulation (EU) No 1379/2013 states the catch or production area is 'the sub-area or division listed in the FAO fishing areas'. For reference, the relevant sub-areas and divisions can be found at the following links:

- North East Atlantic and Baltic Sea (Area 27): www.fao.org/fishery/area/Area27/en
- Mediterranean and Black Sea (Area 37): www.fao.org/fishery/area/Area37/en

These are smaller areas than those recommended for the assessment of Descriptor 3. For the purposes of the assessment, these catch or production areas can be aggregated to the level of the region or subregion, as recommended for the assessment under Descriptor 3 (see Step 3 in Section 3.2.1).

Step 4

Assign indicators

- Relevant regional indicators that are available should be identified and allocated to the Commission Decision criteria (mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A). These should make use of the results of sampling and testing under Reg (EC) No 1881/2006 where appropriate, but may require additional sampling for any additional substances selected.
- Where regional assessments are not available, national assessments making use of the results of sampling and testing under Reg (EC) No 1881/2006 should be used.
- Additional national indicators for elements that are specific to national waters, if any, should be incorporated into the assessment. These need to have a threshold value, where appropriate, and should follow the agreed structure for reporting indicators (MSCG_17-2015-04), pending guidance on reporting requirements from WG DIKE.

Step 5

Establish threshold values

- For contaminants listed in Regulation (EC) No 1881/2006, the maximum levels for different fish and shellfish species (in specific tissue types);
- For additional contaminants, Member States shall establish threshold values (in specific species and tissue types) through regional or subregional cooperation.

Step 6

Determine if threshold values are achieved

- The status of each element/contaminant should be determined, based on the value compared to the thresholds established in step 5.

Step 7

Integrate indicators

- The indicators (contaminants) should be integrated to criteria level, based on the integration methods in Section 3.7.2. As there is only one criterion, the outcome for the criterion is the same as for the descriptor.

3.7.2 Levels and Methods of Integration

Figure 14 shows the levels of integration and integration methods for Descriptor 9. The figure is representative of a single assessment area. There is no need to aggregate across spatial areas.

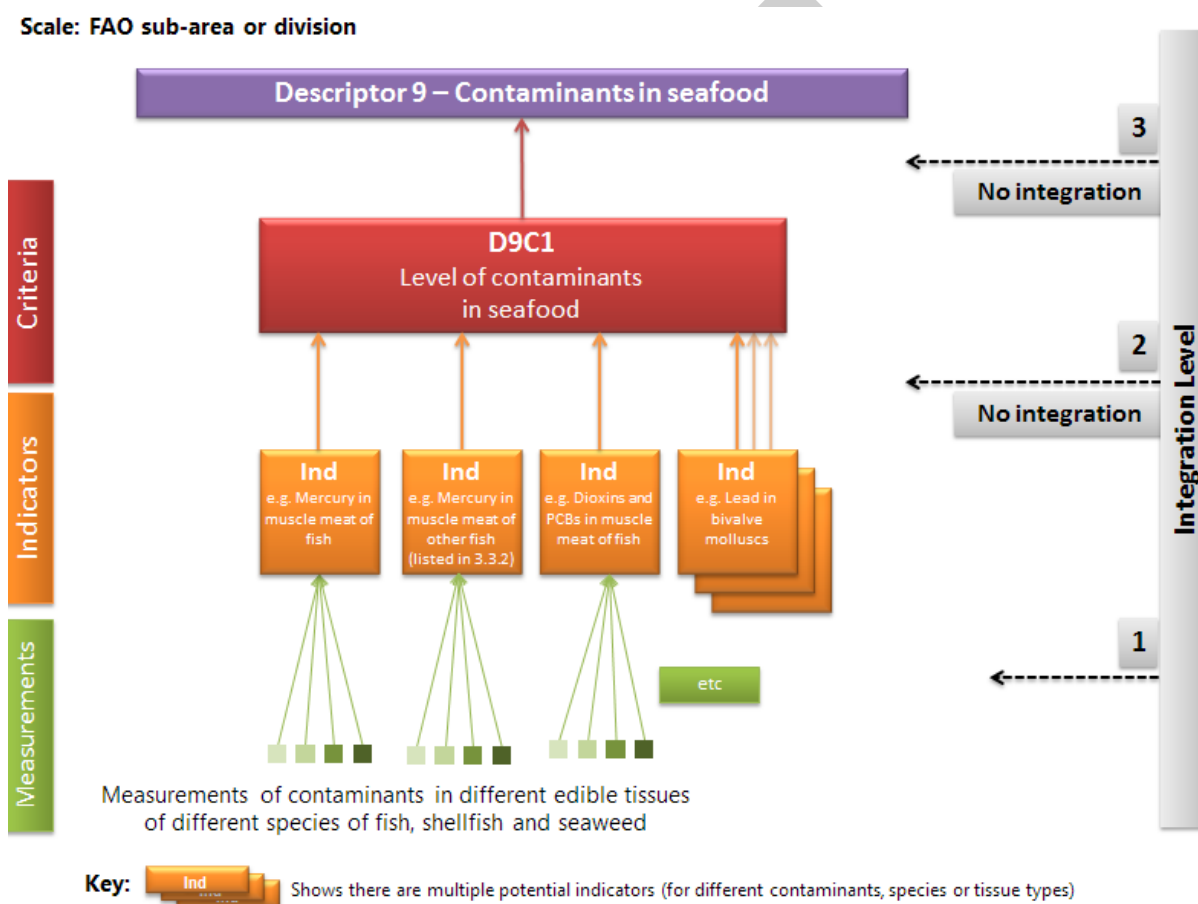


Figure 14. Levels and methods of integration for Descriptor 9

The integration methods of Figure 14 are:

- **Level 1:** Measurements of individual elements i.e. each substance is measured in the relevant matrix (species and tissue) and compared to the matrix-specific threshold value. For example, concentrations of mercury in the muscle tissue of different species of fish, concentrations of dioxins and PCBs in fish liver, are combined to produce information on levels of contaminants in different tissues of different species of fish and shellfish, which can be assessed against the maximum permitted levels under Regulation (EC) No 1881/2006, or levels for additional contaminants and matrices agreed through regional or subregional cooperation. This level of integration is not addressed in this Guidance.

- **Level 2:** The results for the various contaminants and matrices are not integrated. They are presented individually and as a proportion of contaminants assessed achieving the threshold values (see Section 3.7.3).
- **Level 3:** There is only one criterion therefore the outcome for the criterion represents the outcome for the descriptor and there is no integration.

Missing indicators

If a primary criterion cannot be assessed due to a lack of data then the resultant assessment cannot be assigned a status (i.e. it is 'not assessed'). It also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken.

Outstanding issues for D9:

- Mechanism for regional or subregional cooperation on Descriptor 9, given that OSPAR and HELCOM do not address such health issues related to seafood.
- Consideration of integration of results within the same substance (e.g. % of samples that exceed the TV for lead/mercury/cadmium etc), or possible within the same species (e.g. % substances exceeding TV in hake).
- Should the results consider each sample individually (whether met or exceeded threshold values), or average the concentrations for a set of samples (same species/contaminant)? The former risks a huge amount of data that is difficult to interpret; the latter risks masking samples with high concentrations that would have been unfit for human consumption. An alternative approach would be to summarise, by contaminant, the number of samples that have met or exceeded the threshold (species/matrix is not relevant).
- Related to the above, additional summary presentation of results, in terms of number or proportion of samples exceeding thresholds for each contaminant? This should also express e.g. number of monitoring stations/total number of samples, also possibly standard deviation or 95 percentile of the measured reported concentration.

3.7.3 Visualising Assessment Results for Descriptor 9

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme.

The assessment output for Descriptor 9 is expressed for each assessment area for each contaminant. The expression of the number of assessed substances meeting the threshold values compared to the total number of assessed substances provides a means to express distance from GES and change in status/progress. Alternatively, the proportion of samples for which the threshold was exceeded for each contaminant may be a useful expression of the status for D9. For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

In addition to the presentation of results by contaminant and species, a summary can be provided in graphical format (Figure 15) as the 'satellite' for Descriptor 9 in the scheme for integrated presentation of assessment results (pizza-satellite scheme).

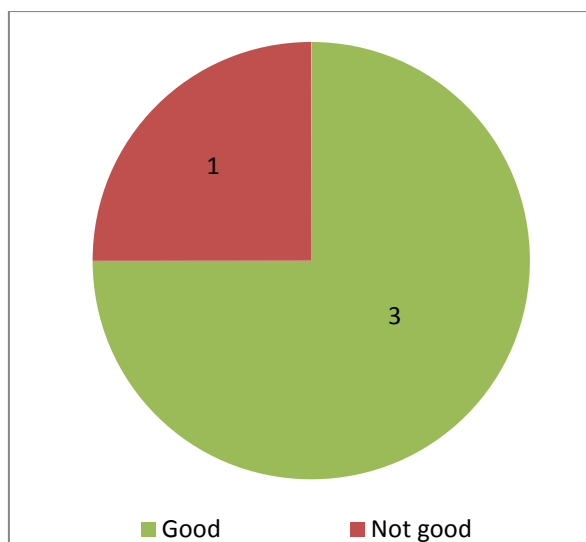


Figure 15. Illustrative example of a visual summary of assessment output for contaminants in fish and other seafood for human consumption (Descriptor 9 'satellite')

Note: Numbers show the number of contaminant-matrix combinations in good/not good status.

3.8 Descriptor 10: Marine Litter

Descriptor 10: Properties and quantities of marine litter do not cause harm to the coastal and marine environment.

The primary and secondary criteria for Descriptor 10, and their relationship to the indicators of Commission Decision 2010/477/EU are shown in Table 8. There are two aspects to Descriptor 10:

- **Pressure:** D10C1 and D10C2 relate to the level of the pressure (litter and micro-litter) in the marine environment (coastline, surface layer of the water column, sea-floor and sea-floor sediment, as appropriate). D10C3 provides an indication of the amount of litter and micro-litter ingested by marine animals;
- **Impacts on biota:** D10C4 address some of the impacts of litter on biota.

Table 8. Criteria for assessment of marine litter (Descriptor 10)

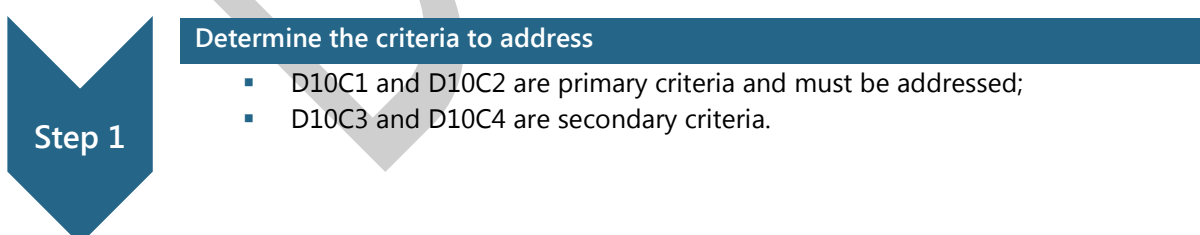
	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators	Comments
Pressure	D10C1 Litter		10.1.1 10.1.2	
	D10C2 Micro-litter		10.1.3	
		D10C3 Litter ingested	10.2.1	
Impacts		D10C4 Effects on biota	10.2	

Degree of Integration

The outcomes are expressed for each of the four criteria separately. Any integration between criteria is to be agreed at Union level.

3.8.1 Assessment Flow

The assessment flow for Descriptor 10 is described below.



Step 2

Determine the elements for assessment

The revised Commission Decision lists elements for assessment. These are:

- **D10C1:** artificial polymer materials, rubber, cloth/textiles, paper/ cardboard, processed/worked wood, metal, glass/ceramics, chemicals, undefined, and food waste²³ (Member States may define further sub-categories).
- **D10C2:** micro-litter (particles <5 mm), classified in the categories 'artificial polymer materials' and 'other'.
- **D10C3:** Litter and micro-litter from the categories 'artificial polymer materials' and 'other', in any species of birds, mammals, reptiles, fish or invertebrates.
- **D10C4:** Species of birds, mammals, reptiles, fish or invertebrates which are at risk from litter.

For **D10C1** and **D10C2**, these must be monitored in the following matrices:

- **D10C1:** the coastline must be monitored for litter; the surface layer of the water column and the seabed are optional
- **D10C2:** the surface layer of the water column and the seabed sediment must be monitored for micro-litter; the coastline is optional.

For **D10C3**, Member States should establish a list of species to be assessed for this criterion (if the criterion is assessed) through regional or subregional cooperation.

For **D10C4**, Member States should establish a list of species for assessment (if the criterion is assessed) through regional or subregional cooperation. It should be based on the risk from marine litter (e.g. from entanglement, other types of injury or mortality or health effects). The species may be any species of birds, mammals, reptiles, fish or invertebrates.

Step 3

Determine scales and areas for assessment

The assessment scales are:

- **D10C1, D10C2, D10C3:** subdivisions of the region or subregion, subdivided where needed by national boundaries.
- **D10C4:** the scales and areas used for the corresponding species groups under Descriptor 1.

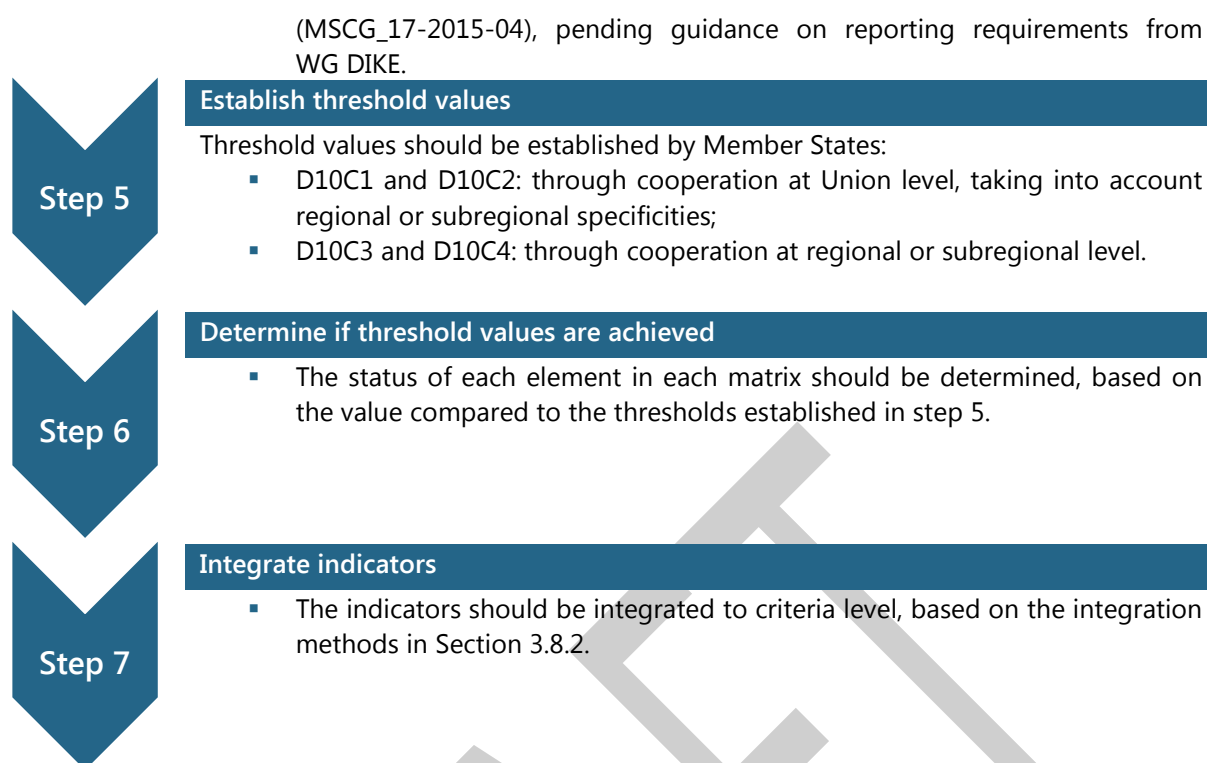
Step 4

Assign indicators

- Identify the relevant regional indicators that are available and can contribute to the assessment in relation to the types of litter and matrices, and allocate them to the revised Commission Decision criteria. Mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A.
- Any remaining gaps should be identified. Use national assessments (taking into account existing assessments e.g. under EU legislation), where available, pending the development of regionally coordinated assessments.
- Additional national indicators for elements that are specific to national waters, if any, can also be incorporated and allocated to the relevant criteria and assessment areas. These need to have a threshold value, where appropriate, and should follow the agreed structure for reporting indicators

²³

These are the 'Level 1 – Material' categories from the Master List of categories of litter items from the Joint Research Centre 'Guidance on Monitoring of marine litter in European seas' (JRC, 2013). The Master List specifies what is covered under each category, for instance 'Chemicals' refers to paraffin, wax, oil and tar.



3.8.2 Levels and Methods of Integration

Figure 16 shows the levels of integration and integration methods for Descriptor 10. The figure is representative of a single assessment area (areas may differ across criteria and within criterion D10C4). There is no need to aggregate across spatial areas.

The integration methods of Figure 16 are:

- **Level 1:** Measurements of individual elements — for example, of the quantity of litter of different subcategories in the different matrices in different time periods — are combined into individual indicators. Comparability of this level of integration requires technical consideration and is not addressed in this Guidance.
- **Level 2:** The results for various indicators relating to the criteria D10C1 (litter), D10C2 (micro-litter), D10C3 (ingestion) and D10C4 (effects on biota) are integrated to the criterion level. The integration method varies by criterion:
 - **D10C1 and D10C2:** Assessment methods, indicators and definition of threshold values are to be developed at Union level (by the Technical Group on Marine Litter). See box below.
 - **D10C3 and D10C4:** The level of ingestion and adverse effects (lethal and sub-lethal) on species should be kept separate for the individual species, so that they can contribute to assessments under Descriptor 1 if required.
- **Level 3:** The use of the criteria for the assessment of good environmental status for Descriptor 10 is to be agreed at Union level. The outputs from D10C3 and D10C4 may also feed into assessments under Descriptor 1 for particular species.

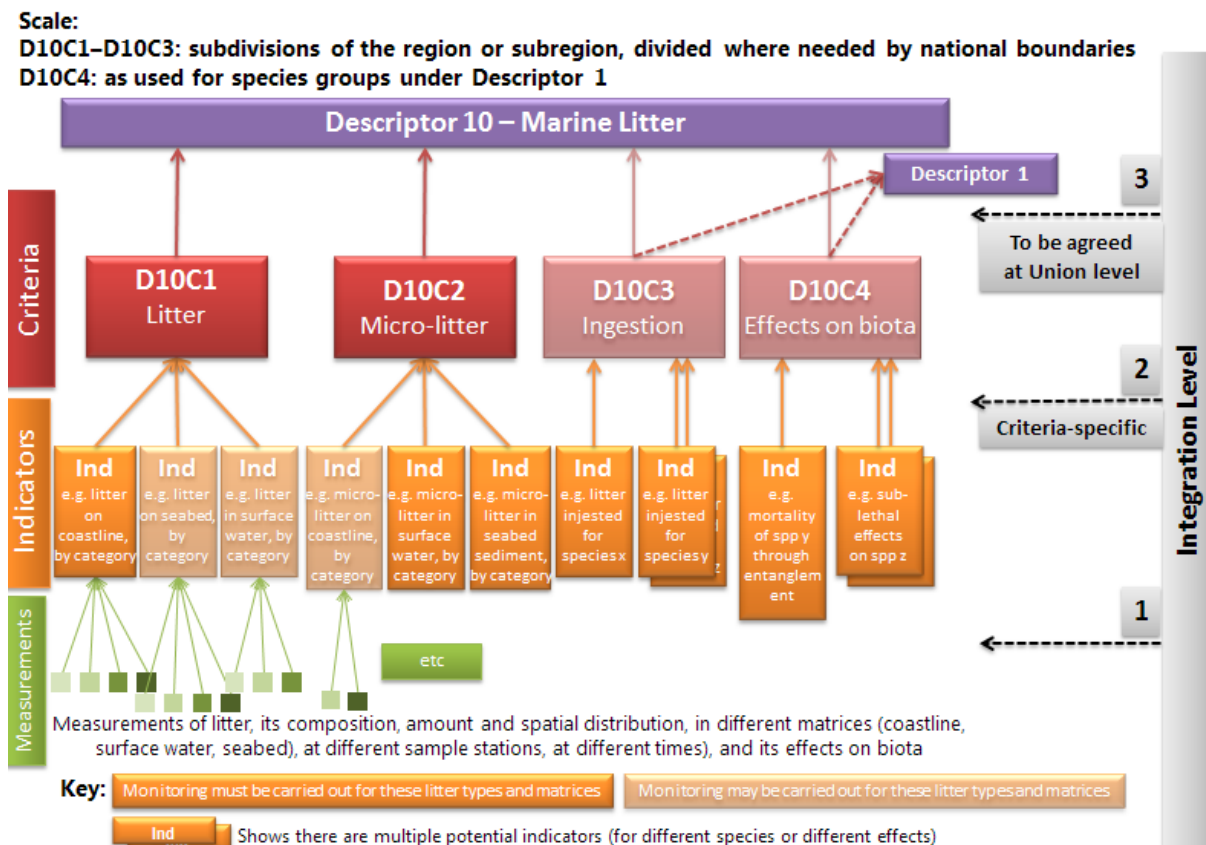


Figure 16. Levels and methods of integration for Descriptor 10

Outstanding issues for D10

- The integration methods for Descriptor 10 still need to be determined.
- The revised Commission Decision has provided the scope for the use of criteria in the assessment of Descriptor 10 to be agreed at Union level.
- In relation to the integration method for D10C1 and D10C2 at level 2, this includes whether the distribution of litter or micro-litter needs to be integrated with the composition of litter or micro-litter, and whether different matrices need to be integrated.
- Further guidance is needed refining the master list of elements for its relevance and practical application in each matrix. This includes clarification:
 - of "undefined" litter relevant for litter monitoring since not attributable to source;
 - that food waste is not included yet and if required in what form it should be included (HELCOM also notes that food waste is not recommended for the 'beach' matrix in JRC (2013).
 - These specifications in relation to and the appropriateness of the master list should be developed by Task Group on Marine Litter (TG Litter) and agreed at Union level for EU-wide use.
- Further consideration of how secondary impact indicators are to be developed at regional level, if there is no trigger through an according EU provision.
- Further guidance is needed how the requirements of the revised Commission Decision could practically be applied. This guidance should be developed by the TG Litter and agreed at Union level, this includes practical application of the assessment of micro-plastics in seabed sediments.

Until such integration methods are agreed, this Guidance suggests the following approach, in line with the conclusions of the Member State workshop on 20-21 April 2016:

- No integration: the outcomes for the different categories of litter or micro-litter, in the different matrices assessed, and the distribution of litter or micro-litter, are presented separately.

Missing indicators

If any aspects of a primary criterion cannot be assessed due to a lack of data then the resultant assessment cannot be assigned a status (i.e. it is 'not assessed'). It also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of all relevant aspects can be undertaken.

3.8.3 Visualising Assessment Results for Descriptor 10

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme.

Further work is required on graphical presentation of assessment outputs, and on how the different criteria contribute to the overall status of D10 for the 'satellite' in the scheme for integrated presentation of assessment results (pizza-satellite scheme).

The assessment output for Descriptor 10 is presented for each criterion assessed, for each assessment area. D10C1 (litter) and D10C2 (micro-litter) are shown together. For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

Maps showing the spatial distribution of litter and micro-litter may also be useful for communication purposes.

3.9 Descriptor 11: Energy, Including Underwater Noise

Descriptor 11: Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

The criteria for Descriptor 11, and their relationship to the indicators of 2010/477/EU are shown in Table 9. The criteria defined so far only address the pressure of underwater noise. Further criteria relating to impacts of underwater noise on biota, and pressure from other forms of energy input (e.g. thermal energy, electromagnetic fields, light) have not yet been defined.

Table 9. Criteria for assessment of energy including underwater noise (Descriptor 11)

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators
Pressure	D11C1 Anthropogenic impulsive sound		11.1.1
	D11C2 Anthropogenic continuous low-frequency sound		11.2.1

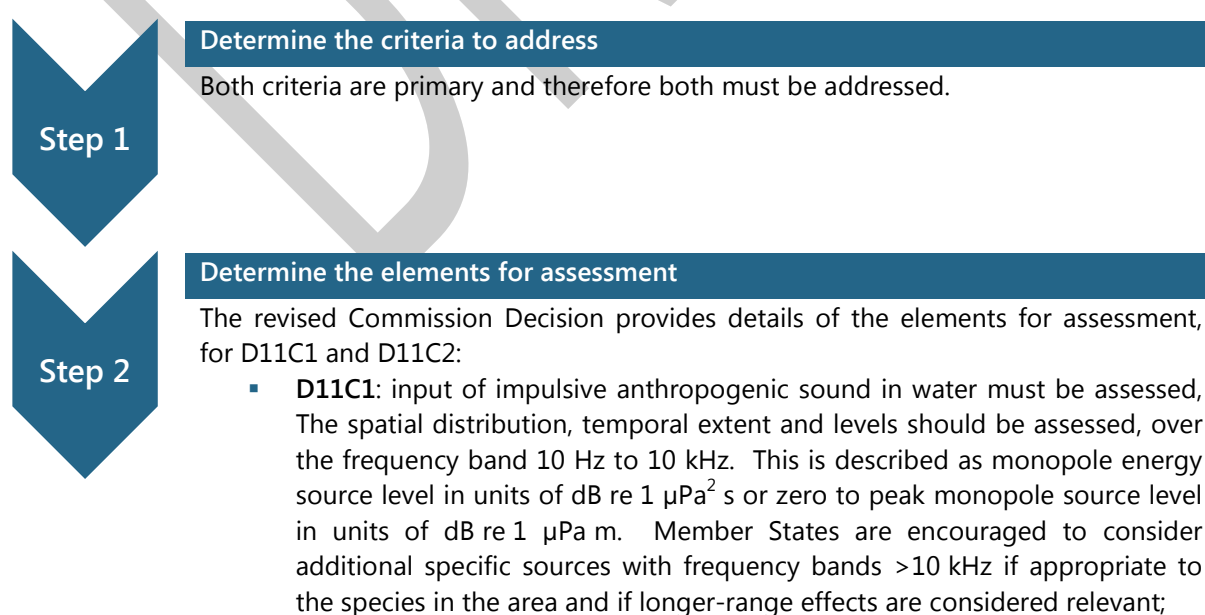
Degree of Integration

Criteria D11C1 and D11C2 should be within threshold values. They are presented separately for the status of Descriptor 11:

- D11C1 (primary) – no integration;
- D11C2 (primary) – no integration.

3.9.1 Assessment Flow

The assessment flow for Descriptor 11 is described below.



- **D11C2:** continuous low-frequency anthropogenic sound in water must be assessed. The spatial distribution, temporal extent and levels should be assessed. This should be as the annual average²⁴ (or other suitable metric agreed at regional or subregional level) of the squared sound pressure in each of two '1/3-octave bands', one centred at 63 Hz and the other at 125 Hz, expressed as a level in decibels in units of dB re 1 µPa. Member States may agree at regional or subregional level to monitor for additional frequency bands. This may be particularly important for e.g. small cetaceans, which have good hearing in the 2 kHz range.

Step 3

Determine scales and areas for assessment

The revised Commission Decision indicates the following spatial scales for assessment:

- Region, subregion or subdivision.

In relation to D11C2, the annual average should be calculated at a suitable spatial resolution in relation to the pressure. This means that an appropriate grid size should be used for aggregating data within the region or subregion.

Step 4

Assign indicators

- Identify the regional indicators that can contribute to the assessment and allocate them to the revised Commission Decision criteria (mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A).
- Any remaining gaps should be identified. Use national assessments, where available, pending the development of regionally coordinated assessments.
- Additional national indicators for elements that are specific to national waters, if any, can also be incorporated and allocated to the relevant criteria and assessment areas. These need to have a threshold value, where appropriate, and should follow the agreed structure for reporting indicators (MSCG_17-2015-04), pending guidance on reporting requirements from WG DIKE.

Step 5

Establish threshold values

Threshold values should be established by Member States through cooperation at Union level, taking into account regional or subregional specificities, for both criteria. It should be noted that thresholds will need to be determined for three aspects for each criterion:

- spatial distribution;
- temporal extent;
- level.

Step 6

Determine if threshold values are achieved

- The status of each indicator should be determined, based on the value compared to the thresholds established in step 5.

²⁴ There are some concerns about the annual average indicator – see outstanding issues box.

Step 7

Integrate indicators

- The indicators should be integrated, based on the integration methods in Section 3.9.2.

3.9.2 Levels and Methods of Integration

Figure 17 shows the levels of integration and integration methods for Descriptor 11. The figure is representative of a single assessment area. There is no need to aggregate across spatial areas.

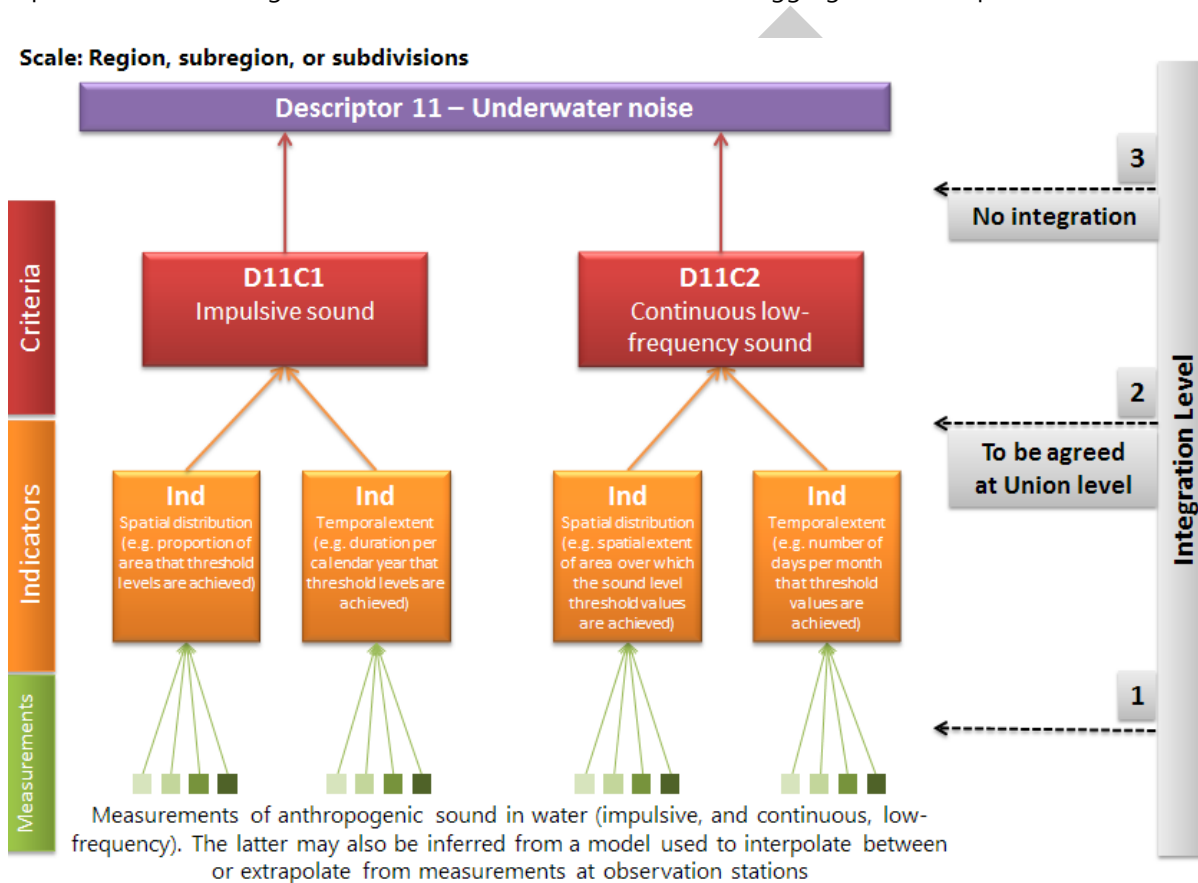


Figure 17. Levels and methods of integration for Descriptor 11

The integration methods of Figure 17 are:

- **Level 1:** Measurements of individual elements — for example, monopole source levels, observations of continuous low-frequency sound — are combined into individual indicators. Indicators may reflect the parameters identified in the criteria, such as the level, spatial extent (e.g. the area over which levels have been achieved), and temporal extent (e.g. the number of days in which levels have been achieved, for specific months). This level of integration requires technical consideration and is not addressed in this Guidance.
- **Level 2:** The results for various indicators relating to the criteria D11C1 and D11C2 are integrated to the criterion level. Assessment methods, indicators and definition of threshold values are still being developed for underwater noise, therefore it is not yet possible to define the integration method for this level. See box below.

- **Level 3:** Status for Descriptor 11 is expressed for each criterion individually; with the use of each criterion in the overall assessment of D11 to be agreed at Union level. The outputs from D11C1 and D11C2 may feed in to assessments under Descriptor 1 for particular species.

Existing assessment frameworks include:

Framework	Integration Approach
Underwater Noise	
HELCOM	No operational indicator for D11. The Life+ BIAS project in the Baltic Sea region has provided annual average for 2014 and in full water column for 63, 125, 2000 Hz frequencies. A regionally-organised registry of impulsive events in the Baltic Sea region has recently been launched and countries are in the process of reporting their national data according to the agreed reporting format.
OSPAR	The impulsive noise indicator (11.1.1) has been accepted as common indicator for all OSPAR areas. The ambient noise indicator (11.2.1) is a (priority) candidate indicator, using annual average levels focussed on 63 and 125 Hz frequencies. An OSPAR working group (ICG Noise), co-working with ICES, has developed a proposal for an impulsive noise registry that would be managed by ICES and became operational in 2016.
UNEP-MAP	Not addressed, but a proposal has been submitted for a basin-wide strategy for monitoring.
Black Sea	Not addressed.
Note that the soundscapes and environmental variables are very specific of regional seas. Therefore the results of HELCOM's BIAS project will not be transferrable to other seas. Different measurement methods and models may have to be applied in different areas.	

Source: European Commission, 2015b.

Missing indicators

If a primary criterion cannot be assessed due to a lack of data then the resultant assessment cannot be assigned a status (i.e. it is 'not assessed'). It also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken.

Outstanding issues for D11

- The integration methods for Descriptor 11 still need to be determined. The revised Commission Decision has provided the scope for the use of the criteria in the assessment of good environmental status for Descriptor 11 to be agreed at Union level.
- Integration methods for level 1 may be required (e.g. to combine results for individual months).
- Information on impulsive sounds (step 2, D11C1): In order to be in line with dual criteria in existing noise exposure criteria both source levels (SLs) (sound exposure level, SEL, and 0-peak) should be described rather than the option of one or the other.
- Measurement and analysis of continuous sound (step 2, D11C2): Recent research from the BIAS project has found that annual average is not a suitable metric for describing continuous noise in the sea when measured by noise loggers. A finer temporal resolution (e.g. months) may also be required from a biological perspective. The statistical analysis and modelling also needs further detailed guidance.
- For D11C2, how can anthropogenic sound be discriminated from natural sound in the measurements/assessment, as seems to be required from the wording.
- Need for the development of impact indicators (for sensitive species).

- Establishment of threshold values including how to weight different types of impact and separate effects of temporary impacts such as offshore constructions, and recurring event such as navy exercises and seismic surveys.

Until such integration methods are agreed, this Guidance suggests the following approach:

- OAO: each indicator should meet threshold values for the criterion to be considered in good status.

3.9.3 Visualising Assessment Results for Descriptor 11

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme.

The outputs require further consideration by TG Noise to confirm and agree appropriate assessment outputs and reporting formats.

The assessment output for Descriptor 11 is expressed for each criterion, for each region, subregion or subdivision.

D11C1

The assessment outputs can be presented as the duration of impulsive sound sources throughout the year and spatially within the assessment area. For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

Maps showing the spatial distribution of impulsive sound sources may also be helpful.

D11C2

The assessment output of the annual average of the sound level (or other suitable temporal metric agreed at regional or subregional level), per unit area and its spatial distribution within the assessment area, would be best presented as a map. This can also be summarised in terms of the extent of the assessment area over which the threshold values have been achieved. For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

In addition to the presentation of results by criteria, a summary can be provided in graphical format (Figure 18) as the 'satellite' for Descriptor 11 in the scheme for integrated presentation of assessment results (pizza-satellite scheme).

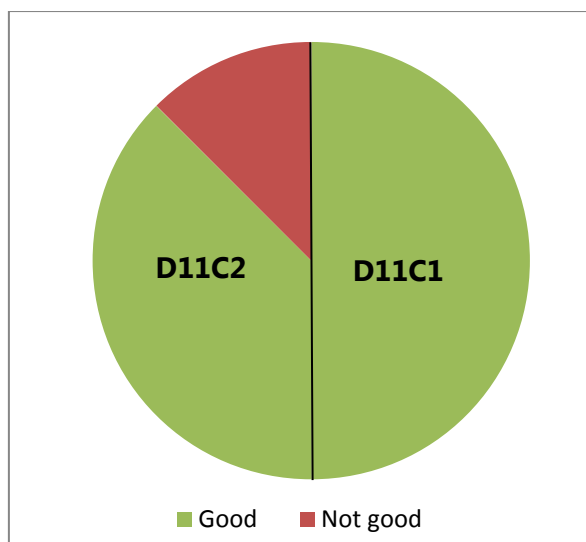


Figure 18. Illustrative example of a visual summary of assessment output for underwater noise (Descriptor 11 'satellite')

4 State-Related (Biodiversity) Descriptor Assessments

State-related assessments should reflect the impacts upon each state element from all the (main) pressures to which the state elements are subject. They should therefore take into account the outcomes of the relevant pressure-related assessments wherever possible. In some cases this will be specific (e.g. the extent of impact on a habitat type from D2, D5, D7 and D8) whilst in other cases it may provide relevant information. State-based Descriptors (1, 4 and 6) have been combined to assess ecosystem elements in a more integrated manner, by ecosystem component (birds, mammals, fish, benthic habitats etc.). Biodiversity assessments to address the needs of Descriptors 1, 4 and 6 should be made for the following themes:

- Species groups of birds, mammals, reptiles, fish and cephalopods (relating to Descriptor 1) (Section 4.1);
- Pelagic habitats (relating to Descriptor 1) (Section 4.7);
- Benthic habitats (relating to Descriptors 1 and 6) (Section 4.8);
- Ecosystems and food webs (addressing Descriptor 4 and wider aspects of Descriptor 1) (Section 4.9).

It is not anticipated that each theme will be integrated further to provide an overall assessment for 'biodiversity' — the integration stops at species group level.

Worked examples may be included for some descriptors. These are yet to be developed.

Guidance on the spatial aggregation of assessment areas still need to be developed for each component section.

4.1 Species (Descriptor 1) – Overview

Descriptor 1 (Species): 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.

There are three aspects to Descriptor 1:

- Pressures on the species, which may affect their state: D1C1, and other pressure criteria that may be relevant (e.g. D8C2, D8C4, D10C4 and others);
- State of species in the marine environment: D1C2, D1C3 and D1C4;
- State of the supporting habitats for species: D1C5.

Species-level aspects of biodiversity are considered in relation to five 'ecosystem components' and their 'species groups' (Table 10). Each species group is to be assessed using a set of representative species, each of which is assessed using one or more criteria. These criteria will be integrated within an individual species, and species will be aggregated to species groups to assess the overall status of each species group. The details of the integration steps and methods are addressed in the sections for each species ecosystem component (Sections 4.2 to 4.6).

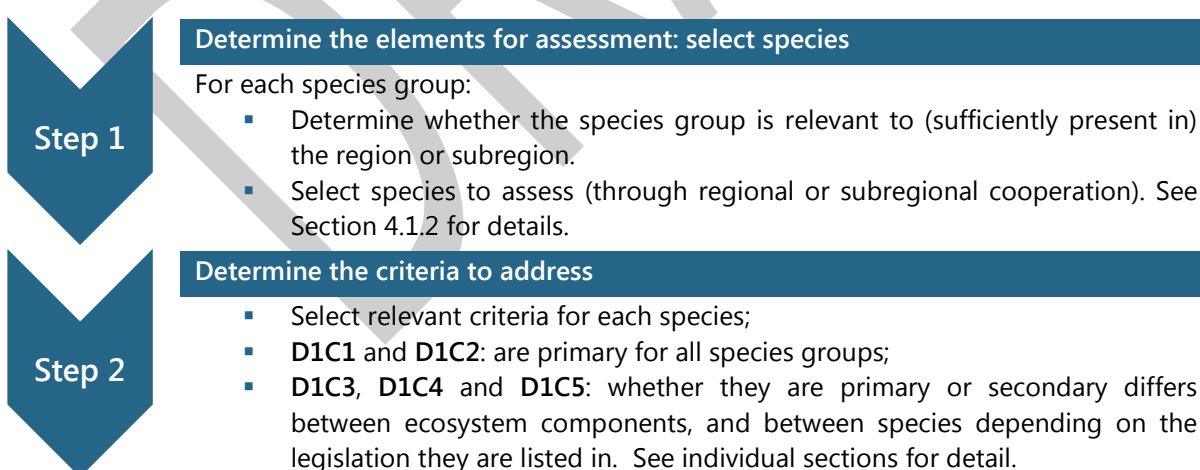
Different criteria under Descriptor 1 are relevant for the various ecosystem components and species, depending on the species type (linked to assessment approaches under Birds Directive, Habitats Directive and, via Descriptor 3, the CFP) and therefore the integration rules are also different. Each ecosystem component is therefore considered separately here. However, the general flow of assessment for species is common to all the species groups, and is presented in Section 4.1.1 below.

Table 10. Ecosystem components and their species groups, for consideration under the 'species' aspects of Descriptor 1

Ecosystem Component	Species Group
Birds	Grazing birds
	Wading birds
	Surface-feeding birds
	Pelagic-feeding birds
	Benthic-feeding birds
Mammals	Small-toothed cetaceans
	Deep-diving toothed cetaceans
	Baleen whales
	Seals
Reptiles	Turtles
Fish ²⁵	Coastal fish
	Pelagic shelf fish
	Demersal shelf fish
	Deep-sea fish
Cephalopods	Coastal/shelf cephalopods
	Deep-sea cephalopods

4.1.1 Assessment Flow

The general assessment flow for species ecosystem components is described below. Specific details are provided for birds, mammals, reptiles, fish and cephalopods in separate sections.



²⁵ Includes elasmobranchs.

Step 3

Determine scales and areas for assessment

- Appropriate spatial scales differ according to the ecosystem component, see individual sections for details.
- Wherever possible use the same scale for all species within a species group. If species within a species group are assessed at different scales, results may need to be aggregated across spatial areas, or down-scaled to smaller spatial areas, to allow for integration of indicators and criteria on a harmonised spatial scale (see Section 4.1.3).
- It is recommended to select as few scales as possible within each region or subregion in order to reduce overall complexity of assessments, whilst still representing appropriate ecological scales for the different species groups.

Step 4

Assign indicators to criteria

- Draw on assessments carried out under other legislation for the species selected.
- First, relevant regional indicators that are available should be identified and allocated to the revised Commission Decision criteria for the species (mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A);
- Any remaining gaps should be identified. Use national assessments (taking into account existing assessments e.g. under EU legislation such as Habitats and Birds Directives or Red Lists), where available, pending the development of regionally coordinated assessments.
- Additional national indicators for elements that are specific to national waters, if any, can also be incorporated and allocated to the relevant criteria for the species. These need to have a threshold value, where appropriate, and should follow the agreed structure for reporting indicators (MSCG_17-2015-04), pending guidance on reporting requirements from WG DIKE.

Step 5

Establish threshold values

- Threshold values for each species assessed should be established for each relevant criterion (except D1C5).
- For D1C2, this should consider natural variation in population size and amongst others the mortality rates derived from D1C1, D8C4 and D10C4 and other relevant pressures.
- For species covered by Directive 92/43/EEC (Habitats Directive), threshold values for D1C2 and D1C4 should be consistent with the Favourable Reference population values established by the relevant Member States under that Directive. In the future, similar reference values may be available for birds under the Birds Directive, but these are not yet operational.
- For D1C3, this should take account of adverse effects on the health of species derived from D8C2, D8C4 and other relevant pressures.

Step 6

Determine if threshold values are achieved

- The status of each relevant criterion for each species should be determined, based on the value of the indicator compared to the levels and thresholds established in step 5.

Step 7

Integrate indicators and criteria

- The overall status of each species should be determined based on the outcomes for each relevant criterion, according to the integration methods for each ecosystem component. D1C1 contributes to the assessment of D1C2 for each corresponding species;
- The overall status of the species group should be determined, based on the outcomes for the representative species, according to the integration methods for each ecosystem component.

4.1.2 Selecting Species to Assess

For Step 1 'Determine the elements for assessment: select species' in the assessment flow, the revised Commission Decision sets out a number of 'scientific criteria (ecological relevance)' and 'additional practical criteria' for selecting representative species for each species group. They are:

- Representative of the species group and of ecosystem functioning, being relevant for assessment of state/impacts, such as having a key functional role within the component (e.g. high or specific biodiversity, productivity, trophic link, specific resource or service) or particular life history traits (age and size at breeding, longevity, migratory traits);
- Relevant for assessment of a key anthropogenic pressure to which the ecosystem component is exposed, being sensitive to the pressure and exposed to it (vulnerable) in the assessment area;
- Present in sufficient numbers or extent in the assessment area to be able to construct a suitable indicator for assessment²⁶;
- The set of species selected should cover, as far as possible, the full range of ecological functions of the ecosystem component and the predominant pressures to which the component is subject;
- If species of species groups are closely associated to a broad habitat type they may be included within that habitat type for monitoring and assessment purposes; in such cases the species shall not be included in the assessment of the species group.

Additional practical criteria for selecting species (which shall not override the main scientific criteria) are monitoring/technical feasibility, monitoring costs, and existence of an adequate time series of the data.

In practice, many of the species selected are likely to be those already assessed under Birds and Habitats Directives or the CFP, as these often fulfil the scientific criteria above and have established monitoring and assessment processes. However, additional species should be included where appropriate. If separate populations of a species exist within a particular region or subregion, they should be assessed individually.

If regional lists of species are not available, national lists may be used, as provided for in Article 3(4) of the revised Commission Decision, provided that regional cooperation is pursued as required by Articles 5 and 6 of the MSFD.

For D1C1: The incidental by-catch species (birds, mammals, reptiles and non-commercially exploited species of fish and cephalopods) that should be monitored for levels of mortality should be established through regional or subregional cooperation, taking account of the obligations laid down

²⁶ Rare or endangered species should not be excluded on this basis, and all mammals and reptiles listed in Annex II to Directive 92/43/EEC must be included.

in Article 25(5) of Regulation (EU) No 1380/2013 and taking into account the list of species in Table 1D of the Annex to Commission Implementing Decision (EU) 2016/1251. Not all species in Table 1D need to be included on the list, and additional species may also be added — the list of species to be assessed under D1C1 should reflect the métiers causing the greatest by-catch problems, and those species most threatened by bycatch, allowing efforts on data collection and assessment to be prioritised. The Scientific, Technical and Economic Committee for Fisheries (STECF) noted that it should be up to the Regional Coordination Groups (RCGs) to identify and prioritise the fishery/species combinations that need to be monitored and sampled for by-catch of non-commercial species including protected, endangered and threatened species (PETS) under the revised Data Collection Framework (DCF) (STECF, 2014). In this process, there should be an adequate involvement of environmental managers as well as conservation-oriented end users (such as HELCOM in the Baltic Sea RCG), to ensure that adequate data are available for assessments under the MSFD. Assessing D1C1 for a species would involve aggregating (summing) by-catch estimates from different métiers to give a mortality level per species or population. All species that are assessed under D1C1 should be included on the lists of species for the relevant species groups for D1C2–D1C5.

4.1.3 Integration Sequence – Spatial Scales

The integration methods presented for each ecosystem component are representative of a single assessment area, for which the results of the species group assessments can be presented. It is recommended to use the same spatial scale across all species in a species group. However, where this is not possible, the assessment units should be ecologically relevant for the respective species and indicator. Further, if species within a species group are assessed at different spatial scales, there may be a need to harmonise the spatial scales (i.e. assessment units) of all indicators and species within each ecosystem component. The two options are:

- Aggregate across spatial areas to the region or subregion, then carry out the integration at the regional or subregional scale;
- Down-scale indicator assessments to smaller spatial areas, and carry out the integration at the level of the smaller assessment areas.

4.1.4 Integration Levels and Methods

Figure 19 shows the levels of integration and integration methods for species under Descriptor 1 and is representative of a single assessment area. It is shown generically for 'ecosystem components' (birds, mammals, reptiles, fish, cephalopods) – the criteria used, and whether criteria are primary or secondary, differ between ecosystem components and between species. The Guidance does not address the issue of aggregation across spatial areas, should this be required. Aggregating across spatial areas can be avoided if all species and criteria are assessed at the same spatial scale and in the same assessment areas.

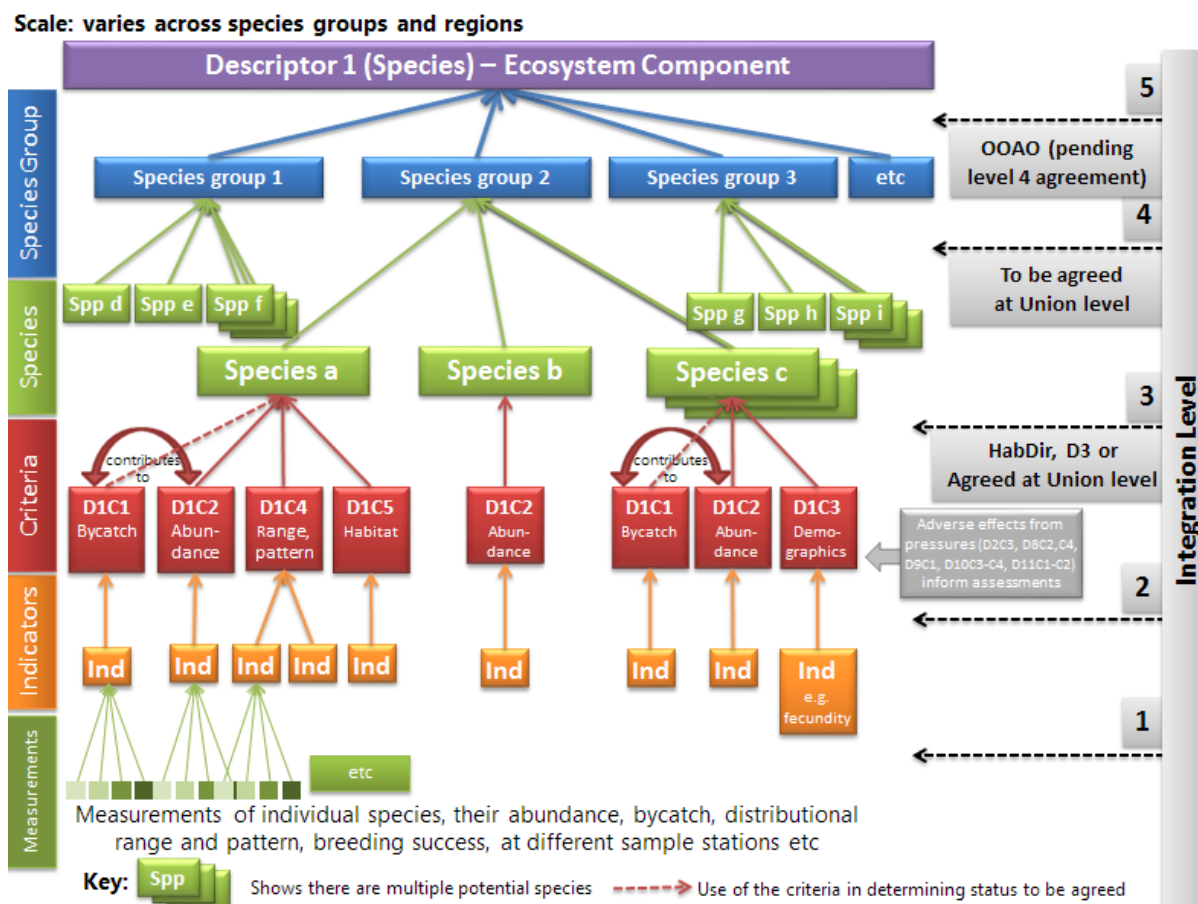


Figure 19. Levels and methods of integration for species under Descriptor 1. Note that integration at level 5 is not required by the revised Commission Decision, and is thus optional.

The integration methods of Figure 19 are:

- Level 1:** Measurements of individual parameters — for example abundance of individual species at different times of year (if appropriate) in different locations etc. — are combined into a single indicator for individual species. Integration at this level currently follows rules under development by Regional Sea Conventions, or under the Habitats Directive. Comparability of this level of integration requires technical consideration and is not addressed in this Guidance.
- Level 2:** Where there is more than one indicator for a particular criterion for a species, the indicators should be combined to form a judgement on the status of the criterion. An integration method is required (as conducted for ‘Habitat for the species’ under the Habitats Directive), or the integration of multiple indicators for a criterion should be considered in the level 3 integration; this should be agreed at regional or subregional level. However, in many cases, the ‘indicators’ will be equivalent to the criteria, and no integration will be required.
- Level 3:** The relevant criteria for each species are integrated to form a judgement on the status of each species. Different species may be represented by different numbers of criteria. The integration method for species covered by Annexes II, IV and V of the Habitats Directive (92/43/EEC) follows the integration method of that Directive, to provide a conclusion on status for the species. For commercially exploited species, the overall status is as assessed under Descriptor 3. For other species, the integration method should be agreed at Union level, taking into account regional or subregional specificities. D1C1 contributes to the

assessment of D1C2 for the corresponding species; the use of D1C1 in determining the status of the species needs further consideration.

- **Level 4:** The results for each species are brought together to assess the species group. The integration method shall be agreed at Union level, taking into account regional or subregional specificities.
- **Level 5:** The revised Commission Decision only requires reporting of the status of the species group (not ecosystem component), but expressing the overall status of the ecosystem component may be helpful for communication of assessment results and is included here as an option for that purpose. The applicability of the one-out-all-out approach at this level is dependent on the integration method agreed upon for level 4.

The integration methods follow the 'species approach', as used for the Habitats Directive and D3 (integrating the various criteria for a single species to determine the status of that species). However, Member States may wish additionally to integrate or aggregate the information in alternative ways (such as aggregating species for a particular criterion) to investigate pressures and/or management responses required, or for reporting against specific targets or indicators at national level.

For D1C1, the levels of mortality are expressed for each species assessed. D1C1 needs to be addressed for those species at risk from incidental by-catch in the region or subregion. The underlying data need to provide details on the levels of mortality from individual fisheries and fishing gear to enable those *métiers* most contributing to incidental by-catches of each species to be identified. Data should be available through Commission Implementing Decision (EU) 2016/1251, and subsequent legislation, and any data deficiencies should be addressed through those legislation.

Outstanding issues for D1 Species

- Integration:
 - The integration approaches presented are based on the 'species approach' (rather than 'criteria approach') as required by the revised Commission Decision. Some integration methods for particular integration levels and species types are still to be agreed at Union level, taking into account regional or subregional specificities. This may require further technical work which will be taken forward in due course.
 - The use of D1C1 in determining the status of a species (where integration methods are not already specified for D3 species or species assessed under the Habitats Directive) needs further technical consideration.
 - How the pressure criteria (D2C3, D8C2, D8C4, D9C1, D10C3-C4, D11C1-C2) and any other pressures not covered by these criteria inform the assessment of D1 species in practice.
- Where aggregation or down-scaling of assessments is necessary, this is likely to require further testing.
- Species groups – consideration of marine otters as a separate species group.
- Harmonisation of assessment/reporting intervals for different directives, where assessments from other directives are expected to be used in MSFD assessments.
- Region-specific approach required for some species (seals, harbour porpoise) in the Baltic.
- Methods for obtaining estimates of abundance, how to calculate confidence intervals, and whether a threshold has been reached only if the lower confidence limit is exceeded, also considering what data are available for the assessment in terms of geographical and temporal coverage.
- Applicability of threshold values for bycatch in declining populations.

4.2 Birds

The primary and secondary criteria for birds for Descriptor 1, and their relationship to the indicators of Decision 2010/477/EU, are shown in Table 11.

Table 11. Criteria for assessment of birds (Descriptor 1)

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators	Comments
	D1C1 Mortality rate from by-catch ¹		–	
State	D1C2 Population abundance		1.2.1	
		D1C3 Population demographic characteristics	1.3.1	
		D1C4 Distributional range and pattern	1.1.1 1.1.2	
Supporting habitat		D1C5 Habitat for the species	–	Supporting habitat for species was mentioned in the D1 chapeau text in 2010/477/EU but not specifically included as an indicator

(1) For species of birds which are at risk from incidental by-catch in the region or subregion

Degree of Integration

For Descriptor 1, criteria should be integrated within species, before species are integrated to species group. The integration stops at the species group level; species groups are not integrated to ecosystem component.

4.2.1 Assessment Flow

The assessment flow for birds under Descriptor 1 is described below.

Step 1

Determine the elements for assessment: select species

Member States should first draw up a list of the bird species that need to be considered for each bird species group, through regional or subregional cooperation. The main scientific criteria for selecting species should be taken into account (see Section 4.1.2). These species may be drawn from:

- Directive 2009/147/EC (the Birds Directive);
- Regional Sea Conventions;
- Other sources.

In relation to **D1C1**, Member States should draw up a list of the bird species at risk from incidental by-catch in the region or subregion, through regional or subregional cooperation. This should take into account the species in Table 1D of the Annex to

Commission implementing Decision (EU) 2016/1251, and can include other additional species, but does not need to include all the species. For the species on that list, D1C1 is a primary criterion. It contributes to the setting of threshold values for abundance under D1C2, and also contributes to the assessment of the corresponding species under D1C2 (for example, if D1C1 mortality exceeds the threshold value, this may influence the assessment of abundance of the species under D1C2).

Step 2

Determine the criteria to address

For bird species, the criteria are as follows:

- **D1C1:** Primary for bird species which are at risk from incidental by-catch in the region or subregion;
- **D1C2:** Primary;
- **D1C3:** Secondary;
- **D1C4:** Secondary;
- **D1C5:** Secondary.

Step 3

Determine scales and areas for assessment

Member States should determine the appropriate ecologically-relevant scales of assessment and assessment areas for each bird species group. The following are provided in the revised Commission Decision:

- Baltic Sea – region or subdivisions;
- North-East Atlantic Ocean – subregion;
- Mediterranean Sea – subregion;
- Black Sea – region or subdivisions.

If separate populations of a species exist within a particular region or subregion, they should be assessed individually.

Step 4

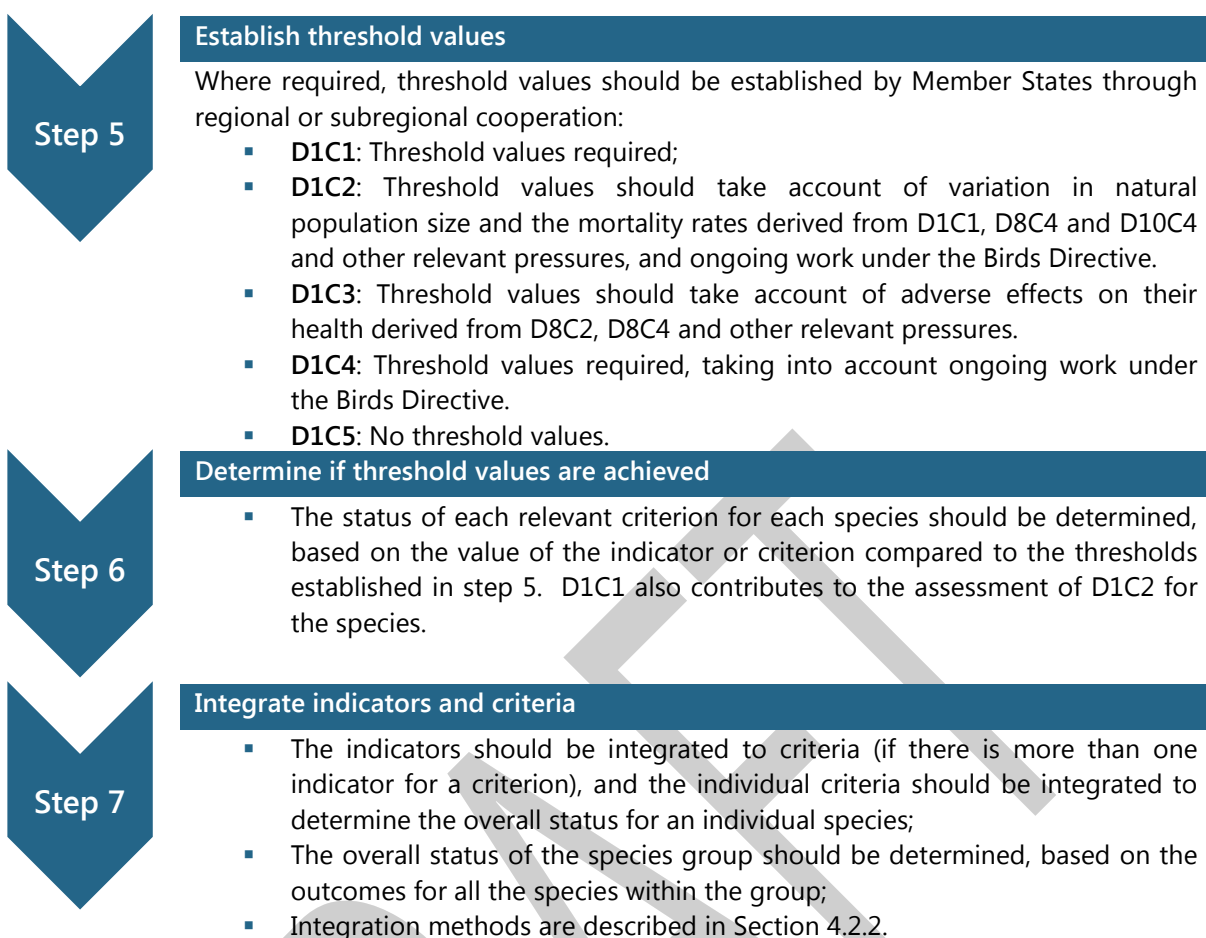
Assign indicators

- First, relevant regional indicators that are available should be identified and allocated to the relevant species and criteria (mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A).
- Assessments carried out under the Birds Directive should be used for those species, taking account of the different scales used for the Birds Directive and the MSFD²⁷.
- Any remaining gaps should be identified. Use national assessments where available, pending the development of regionally coordinated assessments.
- Additional national indicators for elements that are specific to national waters, if any, can also be incorporated and allocated to the relevant species and criteria. These need to have a threshold value, where appropriate, and should follow the agreed structure for reporting indicators (MSCG_17-2015-04), pending guidance on reporting requirements from WG DIKE.

Information from the Birds Directives can be used directly in the assessments:

- D1C2 corresponds to 'population size' under the Birds Directive;
- D1C4 corresponds to 'breeding distribution map and range size' under the Birds Directive.

²⁷ Birds Directive assessments are carried out at national scale, whereas the MSFD assessments should be carried out at regional or subregional level, at ecologically relevant scales to the species (may involve assessment of smaller population units).



4.2.2 Levels and Methods of Integration

Figure 20 shows the levels of integration and integration methods for birds under Descriptor 1. The figure is representative of a single assessment area.

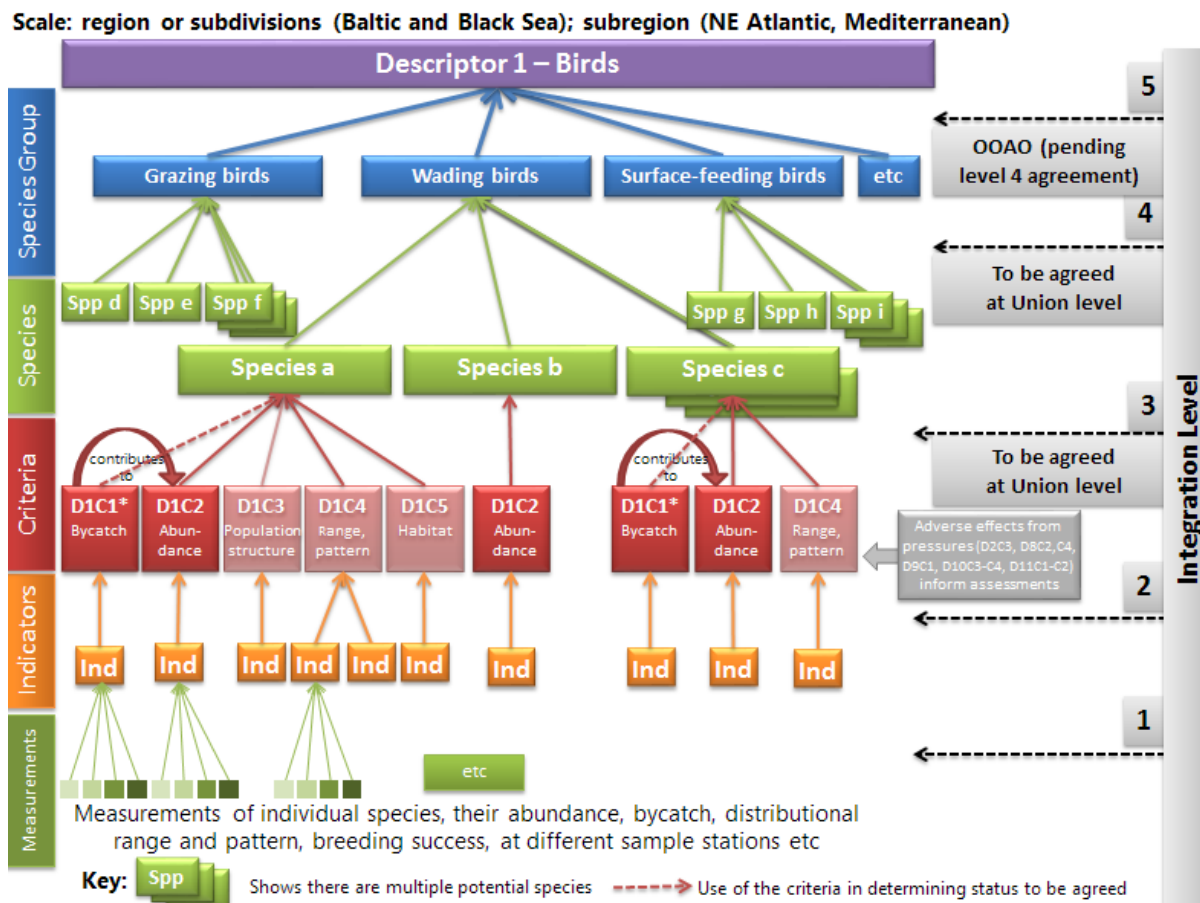


Figure 20. Levels and methods of integration for birds under Descriptor 1. Note that integration at level 5 is not required by the revised Commission Decision, and is thus optional.

Notes: * D1C1 is primary for species identified as being at risk from incidental by-catch in the region or subregion, (i.e. also included on the list of species for D1C1). Criteria from other pressure descriptors may also be taken into account when setting threshold values for D1C2 (e.g. C8C4, D10C4).

The integration methods of Figure 20 are:

- **Level 1:** Measurements of individual parameters are combined into a single indicator, such as 'breeding status of marine birds'. Integration at this level currently follows rules under development by the RSCs. Comparability of this level of integration requires technical consideration and is not addressed in this Guidance.
- **Level 2:** Where there is more than one indicator for a particular criterion for a species, the indicators should be combined to form a judgement on the status of the criterion. An integration method is required, or the integration of multiple indicators for a criterion should be considered in the level 3 integration; this should be agreed at regional or subregional level. However, in many cases, the 'indicators' will be equivalent to the criteria, and no integration will be required.
- **Level 3:** The relevant criteria for each species are integrated to form a judgement on the status of each species. D1C1 contributes to the assessment of D1C2 for the corresponding species. Different species may be represented by different numbers of criteria. The integration method should be agreed at Union level, taking into account regional or subregional specificities. See box below.

- **Level 4:** The results for each species are brought together to the species group. The integration method shall be agreed at Union level, taking into account regional or subregional specificities. See box below.
- **Level 5:** The revised Commission Decision only requires reporting of the status of each species group (not the overall ecosystem component), but integration of species groups to express the overall status of the birds ecosystem component may be helpful for communication of assessment results and is included here for that purpose. The applicability of the OAO approach at this level is dependent on the integration method agreed upon for level 4.

Outstanding issues for D1 Birds

- Integration methods:
 - The integration methods for Descriptor 1 (Birds) still need to be determined, and the revised Commission Decision has provided the scope for this to be taken forward and agreed at Union level, taking into account regional or subregional specificities.
 - For the North-East-Atlantic and the Baltic Sea this can be further developed with the help of expert recommendation from the Joint OSPAR/HELCOM/ICES Expert Group on Seabirds (JWGBIRD).

Until such an integration method is agreed, this Guidance suggests the following approaches:

- Level 2: OAO, (weighted) averaging or expert judgement;
- Level 3: All criteria used should be within threshold values;
- Level 4: To use the currently-agreed regional method (if available), or a conditional rule, based on a specific number or proportion of species in a species group achieving good status. For example, if x of y species are in good status, the species group is considered to be in good status. The value of x would be defined by Member States. Safeguards may be needed (e.g. a conditional rule) to ensure that a species group is not assessed as 'good' status if some species are in a critical state.

Missing indicators

If a primary criterion cannot be assessed for a species due to a lack of data then the resultant assessment of that criterion for the species cannot be assigned a status (i.e. it is 'not assessed'). Where the species is only assessed with the primary abundance criterion, if data are missing for this criterion, the species cannot be assigned a status. It also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment can be undertaken.

4.2.3 Visualising Assessment Results for Birds

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme.

The assessment output for Descriptor 1 component 'Birds' is presented for the region or subdivisions or subregion:

- By criterion for each species;
- The overall status of each species;
- The overall status of the species group.

In addition to the presentation of results by criteria, overall for individual species, and overall for the species group, a summary can be provided in graphical format (Figure 21(a)) for the individual species groups of the Birds ecosystem component.

In addition, if desired, the overall status of the ecosystem component can be presented, for the purposes of communication of assessment results, as the 'pizza slice' for the Birds ecosystem component in the scheme for integrated presentation of assessment results (pizza-satellite scheme) (Figure 21(b)).

For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

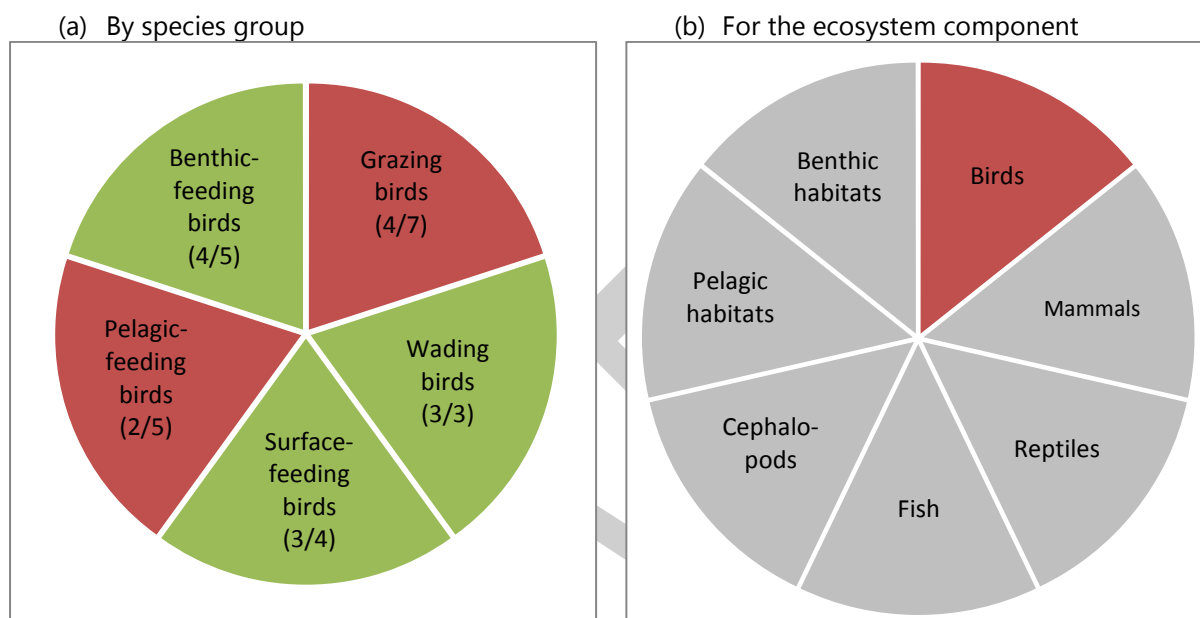


Figure 21. Illustrative example of a visual summary of assessment outputs for Descriptor 1 Birds

Note: Numbers in brackets in (a) show the number of species in good status, compared to the total number of species assessed in the species group. In this example, a threshold of 75% has been used, i.e. 75% of species assessed in the species group need to be in good status for the species group to be considered in good status.

4.3 Mammals

All marine mammal species in European waters are listed in Annex II, IV or V of Directive 92/43/EEC, therefore the primary and secondary criteria for mammals under Descriptor 1 are shown in Table 12.

Table 12. Criteria for assessment of mammals (Descriptor 1)

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators	Comments
	D1C1 Mortality rate from by-catch (1)		–	
State	D1C2 Population abundance		1.2.1	
		D1C3 Population demographic characteristics	1.3.1	
	D1C4 Distributional range and pattern		1.1.1 1.1.2	
Supporting habitat	D1C5 Habitat for the species		–	Supporting habitat for species was mentioned in the D1 chapeau text in 2010/477/EU but not specifically included as an indicator

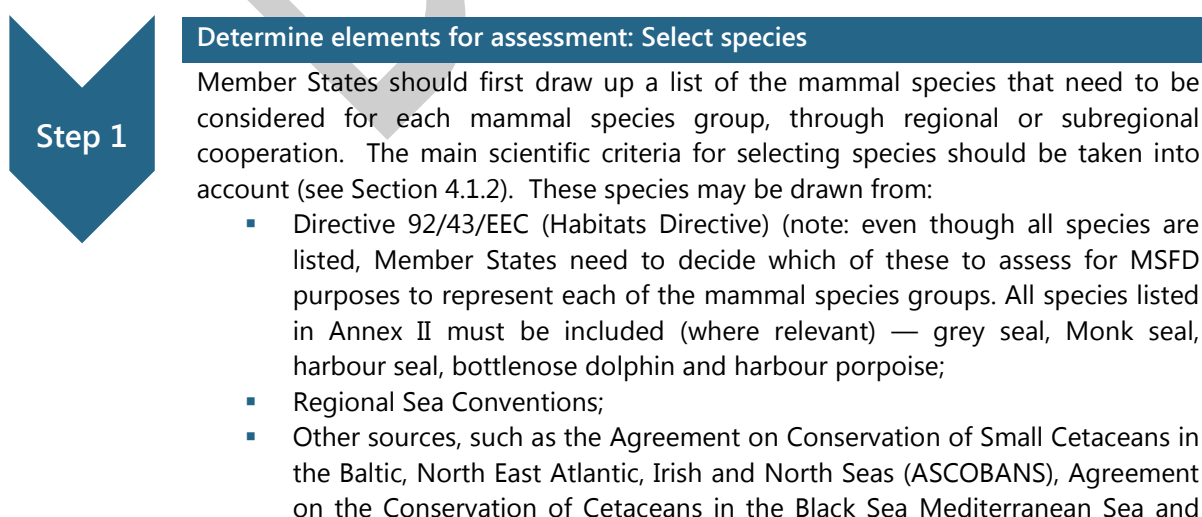
(1) For species of mammals which are at risk from incidental by-catch in the region or subregion

Degree of Integration

For Descriptor 1, criteria should be integrated within species, before species are integrated to species group. The integration stops at the species group level; species groups are not integrated to ecosystem component.

4.3.1 Assessment Flow

The assessment flow for mammals under D1 is described below.



Contiguous Atlantic Area (ACCOBAMS) and Red Lists.

In relation to **D1C1**, Member States should draw up a list of the mammal species at risk from incidental by-catch in the region or subregion, through regional or subregional cooperation. This should take into account the species in Table 1D of the Annex to Commission implementing Decision (EU) 2016/1251, and can include other additional species, but does not need to include all the species. For the species on that list, D1C1 is a primary criterion. It contributes to the setting of threshold values for abundance under D1C2, and also contributes to the assessment of the corresponding species under D1C2 (for example, if D1C1 mortality exceeds the threshold value, this may influence the assessment of abundance of the species under D1C2).

Step 2

Determine criteria to address

All mammals are covered by Annexes II, IV or V to Directive 92/43/EEC, therefore, the criteria are as follows:

- **D1C1:** Primary for mammal species which are at risk from incidental by-catch in the region or subregion;
- **D1C2:** Primary;
- **D1C3:** Secondary;
- **D1C4:** Primary;
- **D1C5:** Primary.

Step 3

Determine scales and areas for assessment

Member States should determine the appropriate ecologically-relevant scales of assessment and assessment areas for each mammal species group. The following are provided in the revised Commission Decision:

- Baltic Sea:
 - For small-toothed cetaceans: Region or subdivisions;
 - For seals: Region or subdivisions;
- North-East Atlantic Ocean:
 - For deep-diving toothed cetaceans and baleen whales: Region;
 - For small-toothed cetaceans: Subregion;
 - For seals: Subregion;
- Mediterranean Sea:
 - For deep-diving toothed cetaceans and baleen whales: Region;
 - For small-toothed cetaceans: Subregion;
 - For seals: Subregion;
- Black Sea:
 - For deep-diving toothed cetaceans whales: Region;
 - For small-toothed cetaceans: region or subdivisions.

If separate populations of a species exist within a particular region or subregion, they should be assessed individually.

Step 4

Assign indicators

- First, relevant regional indicators that are available should be identified and allocated to the relevant species and criteria (mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A).
- Assessments carried out under the Habitats Directive should be used, taking account of the different assessment scales of the Habitats Directive and the MSFD²⁸:
 - D1C2 and D1C3 equate to 'population' under the Habitats Directive;
 - D1C4 equates to 'range' under the Habitats Directive;
 - D1C5 equates to 'habitat for the species' under the Habitats Directive.
- Any remaining gaps should be identified. Use national assessments where available, pending the development of regionally coordinated assessments.
- Additional national indicators for elements that are specific to national waters, if any, can also be incorporated and allocated to the relevant species and criteria. These need to have a threshold value, and should follow the agreed structure for reporting indicators (MSCG_17-2015-04), pending guidance on reporting requirements from WG DIKE.

Step 5

Establish threshold values

Where required, threshold values should be established by Member States through regional or subregional cooperation:

- **D1C1**: Threshold values required;
- **D1C2**: Threshold values should be consistent with the Favourable Reference Population values. They should take account of variation in natural population size and the mortality rates derived from D1C1, D8C4 and D10C4 and other relevant pressures.
- **D1C3**: Threshold values should take account of adverse effects on their health derived from D8C2, D8C4 and other relevant pressures.
- **D1C4**: Threshold values should be consistent with the Favourable Reference Range values.
- **D1C5**: No threshold values.

Step 6

Determine if threshold values are achieved

- The overall status for each species should be derived using the method provided under the Habitats Directive. D1C1 also contributes to the assessment of D1C2 for the species.

Step 7

Integrate species

- The overall status of the species group should be determined, based on the outcomes for the assessed species;
- Integration methods are described in Section 4.3.2.

²⁸ Habitats Directive assessments are carried at national or subnational scale, whereas the MSFD assessments should be carried out at regional or subregional level, at ecologically relevant scales to the species (may involve assessment of smaller population units).

4.3.2 Levels and Methods of Integration

Figure 22 shows the levels of integration and integration methods for mammals under Descriptor 1. The figure is representative of a single assessment area.

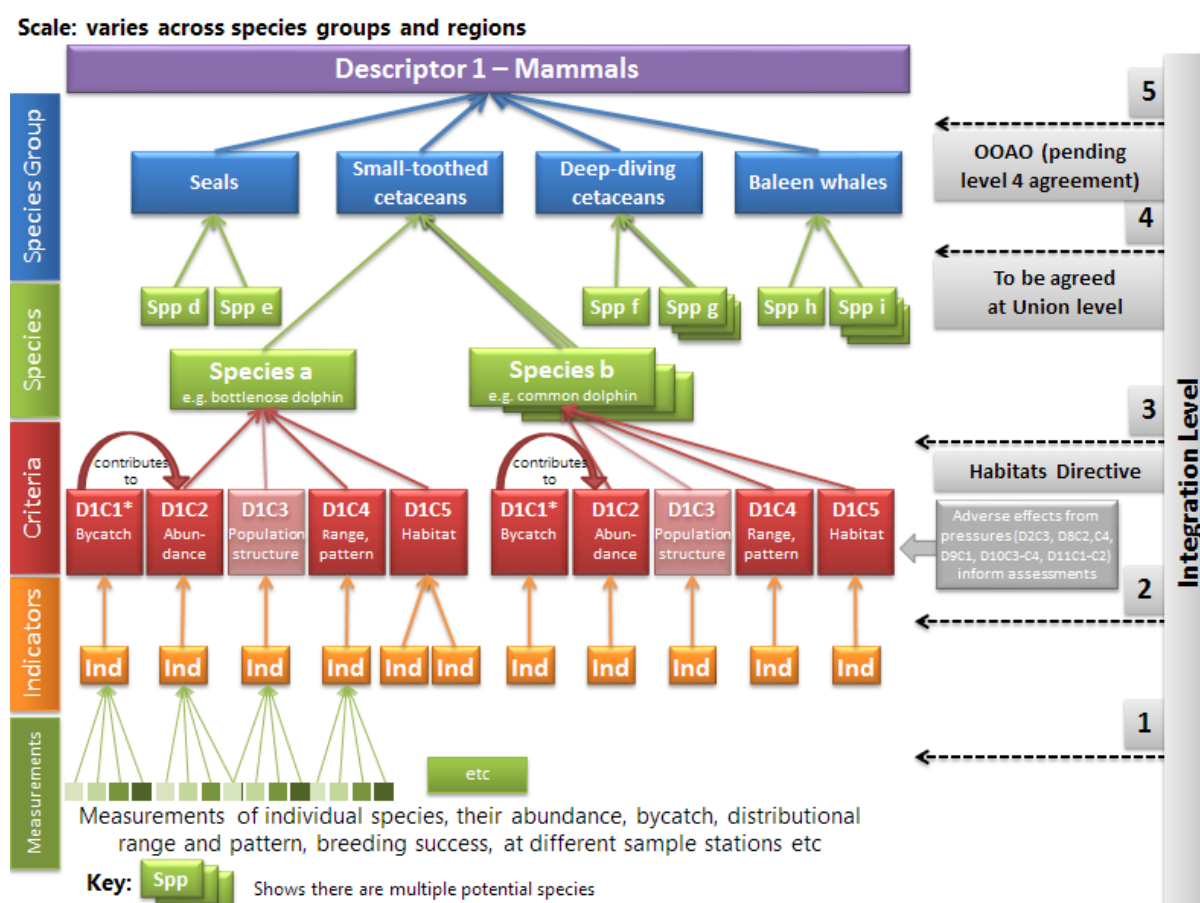


Figure 22. Levels and methods of integration for mammals under Descriptor 1. Note that integration at level 5 is not required by the revised Commission Decision, and is thus optional.

Notes: * D1C1 is primary for species identified as being at risk from incidental by-catch in the region or subregion, (i.e. also included on the list of species for D1C1). Criteria from other pressure descriptors may also be taken into account when setting threshold values for D1C2 (e.g. C8C4, D10C4).

The integration methods of Figure 22 are:

- **Level 1:** Measurements of individual parameters are combined into a single indicator, such as 'abundance of grey seals at breeding and haul-out sites, respectively'. This level of integration is not addressed in these guidelines.
- **Level 2:** Where there is more than one indicator for a species for a particular criterion (e.g. habitat extent and habitat quality), the indicators are combined to form a judgement of the status for each criterion. The integration method is as applied under the Habitats Directive.
- **Level 3:** The relevant criteria for each species are integrated to form a judgement on the status for each species (different species may be represented by different numbers of criteria). The integration method is that used under the Habitats Directive (OOAO, and there must be information on at least three parameters (criteria) to provide a judgement of Favourable Conservation Status for a species), such that the species' status is consistent with that under

the Habitats Directive (see Table 13). D1C1 contributes to the assessment of D1C2 for the corresponding species.

- **Level 4:** The results for each species are brought together to the species group. The integration method shall be agreed at Union level, taking into account regional or subregional specificities. See box below.
- **Level 5:** The revised Commission Decision only requires reporting of the status of the species group (not ecosystem component), but integration of species groups express the overall status of the mammals ecosystem component may be helpful for communication of assessment results and is included here for that purpose. The applicability of the OOAO approach at this level is dependent on the integration method agreed upon for level 4.

Where regional indicators group species together for a single criterion, the outcomes for the individual species can be incorporated into the assessment for a species level assessment. The regional indicators focused on a single criterion may reveal additional information which is useful for management purposes (e.g. many species are failing to achieve good status due to persistent breeding failures or due to habitat loss or deterioration).

Table 13. Habitats Directive status categories and corresponding status for MSFD assessment

Habitats Directive Status	Corresponding Status for MSFD Assessment	Trends for MSFD Assessment
(FV) - Favourable	Good	
(U1) - Inadequate	Not good	
(U1-) - Inadequate and deteriorating	Not good	Deteriorating
(U1+) - Inadequate but improving	Not good	Improving
(U2) - Bad	Not good	
(U2-) - Bad and deteriorating	Not good	Deteriorating
(U2+) - Bad but improving	Not good	Improving
(XX) - Unknown	Not known	

Outstanding issues for D1 Mammals

- Integration methods:
 - The integration method for Descriptor 1 (Mammals) at level 4 still needs to be determined, and the revised Commission Decision has provided the scope for this to be taken forward and agreed at Union level, taking into account regional or subregional specificities.
 - BALTIC BOOST project's report about challenges and possible solutions for the Habitats Directive and MSFD assessments of marine mammals in the Baltic Sea may provide useful contribution to this.

Until such an integration method is agreed, this Guidance suggests the following approach:

- Level 4: All species assessed should be at good status for the species group to be at good status (in line with recommendations of ICES WKD1Agg).

Existing assessment frameworks include:

Framework	Integration Approach (level 3)	Integration Approach (level 4)
Mammals		
Habitats Directive	Integration of criteria within species, using OOAO. There must be information on at least three parameters to provide a judgement on favourable conservation status for a species.	N/a

Missing indicators

If a primary criterion cannot be assessed for a species due to a lack of data then the resultant assessment of that criterion for the species cannot be assigned a status (i.e. it is 'not assessed'). Under the Habitats Directive, a judgement of status can be provided for a species if there is information on at least three parameters (criteria), therefore a judgement of status for the species may be possible if information on only one criterion is missing. However, it also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken.

4.3.3 Visualising Assessment Results for Mammals

A similar approach to birds can be used, using the relevant criteria for mammals, and appropriate integration approaches.

For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

4.4 Reptiles

All marine reptile species are listed in Annex II, IV or V of Directive 92/43/EEC, therefore the primary and secondary criteria for reptiles under Descriptor 1 are the same as for mammals and are shown in Table 12.

Degree of Integration

For Descriptor 1, criteria should be integrated within species, before species are integrated to species group. There is only one species group for reptiles (turtles).

4.4.1 Assessment Flow

The assessment flow is the same as for mammals. For 'Step 3 – Determine scales and areas for assessment', Member States should determine the appropriate scale of assessment and assessment areas for the marine reptile species group. The following are provided in the revised Commission Decision²⁹:

- Baltic Sea – region or subdivisions;
- North-East Atlantic Ocean – subregion;
- Mediterranean Sea – subregion.

4.4.2 Levels and Methods of Integration

Figure 23 shows the levels of integration and integration methods for reptiles under Descriptor 1. The figure is representative of a single assessment area.

The integration methods of Figure 23 are:

- **Level 1:** Measurements of individual parameters — for example of distributional range, abundance of individual species at different times of year in different locations etc. — are combined into a single indicator. This level of integration is not addressed in these guidelines.
- **Level 2:** Where there is more than one indicator for a species for a particular criterion (e.g. habitat extent and habitat quality), the indicators are combined to form a judgement for each criterion. The integration method is as applied under the Habitats Directive.
- **Level 3:** The relevant criteria for each species are integrated to form a judgement on the status for each species (different species may be represented by different numbers of criteria). The integration method is that used under the Habitats Directive (OOAO, and there must be information on at least three parameters (criteria) to provide a judgement of Favourable Conservation Status for a species), such that the species' status is consistent with that under the Habitats Directive (see Table 13). D1C1 contributes to the assessment of D1C2 for the corresponding species.
- **Level 4:** The results for each species are brought together to the species group. The integration method shall be agreed at Union level, taking into account regional or subregional specificities. See box below.
- **Level 5:** There is no integration across species groups to the ecosystem component, as there is only one species group.

²⁹ There are no reptiles in the Black Sea.

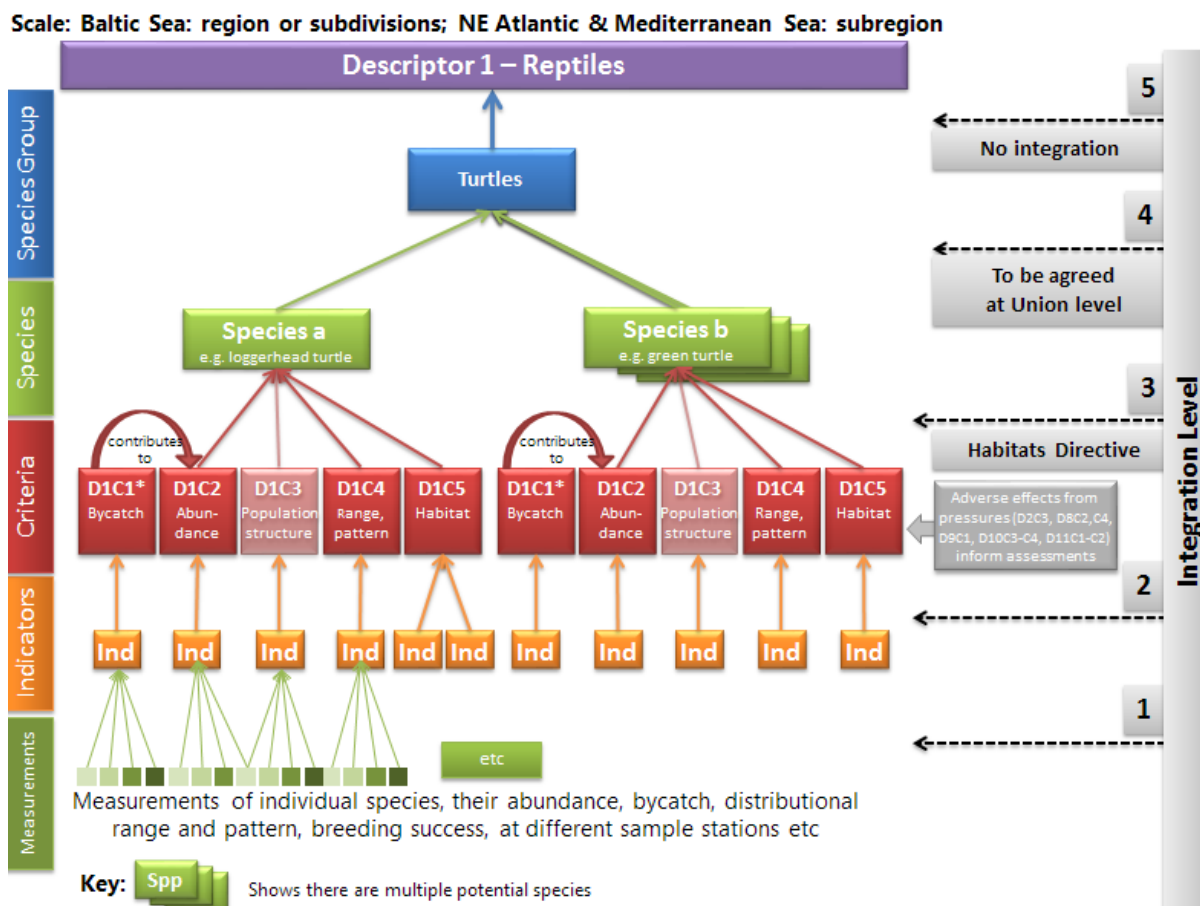


Figure 23. Levels and methods of integration for reptiles under Descriptor 1

Notes: * D1C1 is primary for species identified as being at risk from incidental by-catch in the region or subregion, (i.e. also included on the list of species for D1C1). Criteria from other pressure descriptors may also be taken into account when setting threshold values for D1C2 (e.g. C8C4, D10C4).

Outstanding issues for D1 Reptiles

- Integration methods:
 - The integration method for Descriptor 1 (Reptiles) at level 4 still needs to be determined, and the revised Commission Decision has provided the scope for this to be taken forward and agreed at Union level, taking into account regional or subregional specificities.

Until such an integration method is agreed, this Guidance suggests the following approach:

- Level 4: All species should be at good status for the species group to be at good status.

Missing indicators

If a primary criterion cannot be assessed for a species due to a lack of data then the resultant assessment of that criterion for the species cannot be assigned a status (i.e. it is 'not assessed'). Under the Habitats Directive, a judgement of status can be provided for a species if there is information on at least three parameters (criteria), therefore a judgement of status for the species may be possible if information on only one criterion is missing. However, it also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken.

4.4.3 Visualising Assessment Results for Reptiles

A similar approach to birds can be used, using the relevant criteria for reptiles, and appropriate integration approaches.

For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

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4.5 Fish

The primary and secondary criteria for fish under Descriptor 1 depend on whether the species is listed in Annex II, IV or V of Directive 92/43/EEC, or is a commercially-exploited species that is assessed under Descriptor 3 (Table 14). For commercially-exploited species, the overall status shall be assessed under Descriptor 3.

Table 14. Criteria for assessment of fish (Descriptor 1)

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators	Comments
	D1C1 Mortality rate from by-catch (1)			
State	D1C2 Population abundance (2)		1.2.1	
	D1C3 Population demographic characteristics (2)	D1C3 Population demographic characteristics (3)	1.3.1	
	D1C4 Distributional range and pattern (4)	D1C4 Distributional range and pattern (5)	1.1.1 1.1.2	
Supporting habitat	D1C5 Habitat for the species (4)	D1C5 Habitat for the species (5)	–	Supporting habitat for species was mentioned in the D1 chapeau text in 2010/477/EU but not specifically included as an indicator
(1) For species which are at risk from incidental by-catch in the region or subregion. (2) For commercially exploited fish species. D3C2 is used for D1D2 and D3C3 is used for D1C3. (3) For non-commercially exploited fish species. (4) For fish species listed in Annex II, IV or V to Directive 92/43/EEC. (5) For fish species not listed in Annex II, IV or V to Directive 92/43/EEC.				

Criterion D1C3 is either primary or secondary, depending on whether the fish species is commercially exploited or not. Criteria D1C4 and D1C5 are either primary or secondary, depending on whether the fish species is covered by Annexes II, IV or V to Directive 92/43/EEC (see Step 2 in Section 4.2.1).

Degree of Integration

For Descriptor 1, criteria should be integrated within species, before species are integrated to species group. The integration stops at the species group level; species groups are not integrated to ecosystem component.

4.5.1 Assessment Flow

The assessment flow for fish under Descriptor 1 is described below.

Step 1

Determine the elements for assessment: select species

Member States should first draw up a list of the fish species that need to be considered for each fish species group, through regional or subregional cooperation. The main scientific criteria for selecting species should be taken into account (see Section 4.1.2). These species may be drawn from:

- Directive 92/43/EEC (Habitats Directive);
- The Common Fisheries Policy (Regulation (EU) No 1380/2013);
- Regional Sea Conventions;
- Other sources such as Red Lists.

Several fish species groups include commercially-exploited species, therefore it is expected that Descriptor 3 species will be included in the species lists for Descriptor 1 Fish assessments.

In relation to **D1C1**, Member States should draw up a list of the fish species at risk from incidental by-catch in the region or subregion, through regional or subregional cooperation. This should take into account the species in Table 1D of the Annex to Commission Implementing Decision (EU) 2016/1251, and can include other additional species, but does not need to include all the species. For the species on that list, D1C1 is a primary criterion. It contributes to the setting of threshold values for abundance under D1C2, and also contributes to the assessment of the corresponding species under D1C2 (for example, if D1C1 mortality exceeds the threshold value, this may influence the assessment of abundance of the species under D1C2).

Step 2

Determine the criteria to address

For fish species, the criteria are as follows:

- **D1C1**: Primary for fish species which are at risk from incidental by-catch in the region or subregion;
- **D1C2**: Primary;
- **D1C3**: Primary for commercially-exploited species (assessed under Descriptor 3), otherwise secondary;
- **D1C4**: Primary for fish species covered by Annexes II, IV or V to the Habitats Directive, otherwise secondary;
- **D1C5**: Primary for fish species covered by Annexes II, IV or V to the Habitats Directive, otherwise secondary.

Step 3

Determine scales and areas for assessment

Member States should determine the appropriate ecologically-relevant scales of assessment and assessment areas for each fish species group. The following are provided in the revised Commission Decision:

- Baltic Sea:
 - Coastal fish: Subdivision of region;
 - Pelagic shelf fish and demersal shelf fish: Region or subdivisions;
 - Deep-sea fish: Region;
- North-East Atlantic Ocean:
 - Coastal fish: Subdivision of subregion;
 - Pelagic shelf fish and demersal shelf fish: Subregion;
 - Deep-sea fish: Region;
- Mediterranean Sea:
 - Coastal fish: Subdivision of subregion;
 - Pelagic shelf fish and demersal shelf fish: Subregion;
 - Deep-sea fish: Region

- Black Sea:
 - Coastal fish: Subdivision of region;
 - Pelagic shelf fish and demersal shelf fish: Region or subdivisions;
 - Deep-sea fish: Region;

If separate populations of a species exist within a particular region or subregion, they should be assessed individually.

Populations of commercially-exploited species should be assessed at the same scales as under Descriptor 3 (ecologically-relevant scales for each population (stock) with the overall assessment presented for each region or subregion for those populations that occur within it. The outcome for each population should be incorporated into the Descriptor 1 (Fish) assessment in the appropriate species group.

Step 4

Assign indicators

- First, relevant regional indicators that are available should be identified and allocated to the relevant species and criteria (mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A).
- Assessments carried out for commercially-exploited species under Descriptor 3 should be used for those species, with the overall status as assessed under Descriptor 3.
- Assessments carried out under the Habitats Directive should be used for those species³⁰:
 - 'population' should be used for D1C2 and D1C3;
 - 'range' should be used for D1C4;
 - 'habitat for the species' should be used for D1C5.
- Any remaining gaps should be identified. Use national assessments where available, pending the development of regionally coordinated assessments.
- Additional national indicators for elements that are specific to national waters, if any, can also be incorporated and allocated to the relevant species and criteria. These need to have a threshold value, and should follow the agreed structure for reporting indicators (MSCG_17-2015-04), pending guidance on reporting requirements from WG DIKE.

Step 5

Establish threshold values

Where required, threshold values should be established by Member States through regional or subregional cooperation:

- **D1C1:** Threshold values required;
- **D1C2:** Threshold values required. They should take account of variation in natural population size and the mortality rates derived from D1C1, D8C4 and D10C4 and other relevant pressures. For commercially-exploited species, they should be the values under Descriptor 3. For species covered by the Habitats Directive, they should be consistent with the Favourable Reference Population values.
- **D1C3:** Threshold values should take account of adverse effects on their health derived from D8C2, D8C4 and other relevant pressures. For commercially-exploited species, they should be the values under Descriptor 3.

³⁰

This needs to take into account the different assessment scales for Habitats Directive and MSFD: Habitats Directive assessments are carried at national or subnational scale, whereas the MSFD assessments should be carried out at regional or subregional level at ecologically relevant scales to the species (may involve assessment of smaller population units).



Step 6

- **D1C4:** Threshold values should be consistent with the Favourable Reference Range values.
- **D1C5:** No threshold values.

Determine if threshold values are achieved

- The status of each relevant criterion for each species (or population/stock for commercially exploited species) should be determined, based on the value of the indicator or criterion compared to the thresholds established in step 5. D1C1 also contributes to the assessment of D1C2 for the corresponding species.
- For commercially exploited species, the population status should be as assessed under Descriptor 3.



Step 7

Integrate indicators, criteria and species

- The indicators should be integrated to criteria (if there is more than one indicator for a criterion), and the individual criteria should be integrated to determine the overall status for an individual species;
- The overall status of the species group should be determined, based on the outcomes for the representative species;
- Integration methods are described in Section 4.5.2.

4.5.2 Levels and Methods of Integration

Figure 24 shows the levels of integration and integration methods for fish under Descriptor 1. The figure is representative of a single assessment area.

The integration methods of Figure 24 are:

- **Level 1:** Measurements of individual parameters — for example of distributional range, spawning stock biomass, length distribution etc. — are combined into a single indicator. This level of integration is not addressed in this Guidance.
- **Level 2:** Where there is more than one indicator for a particular criterion for a species, the indicators are combined to form a judgement on the status of the criterion. An integration method is required (as conducted for 'Habitat for the species' under the Habitats Directive), or the integration of multiple indicators for a criterion should be considered in the level 3 integration; this should be agreed at regional or subregional level. However, in many cases, the 'indicators' will be equivalent to the criteria, and no integration will be required.
- **Level 3:** The relevant criteria for each species are integrated to form a judgement on the status for each species. D1C1 contributes to the assessment of D1C2 for the corresponding species. Different species may be represented by different numbers of criteria. The integration method depends on the species type (whether under the Habitats Directive or not, or commercially exploited). For Habitats Directive species, the method is that used under the Habitats Directive (OOAO, and there must be information on at least three parameters (criteria) to provide a judgement of Favourable Conservation Status for a species) (see Table 13). For commercially-exploited species, the status from the assessment under D3 should be used. For other species, the integration method shall be agreed at Union level, taking into account regional or subregional specificities (see box below).
- **Level 4:** The results for each species are brought together to the species group. The integration method shall be agreed at Union level, taking into account regional or subregional specificities. See box below.
- **Level 5:** The revised Commission Decision only requires reporting of the status of the species group (not ecosystem component), but integration of species groups to express the overall

status of the fish ecosystem component may be helpful for communication of assessment results and is included here for that purpose. The applicability of the OOA approach at this level is dependent on the integration method agreed upon for level 4.

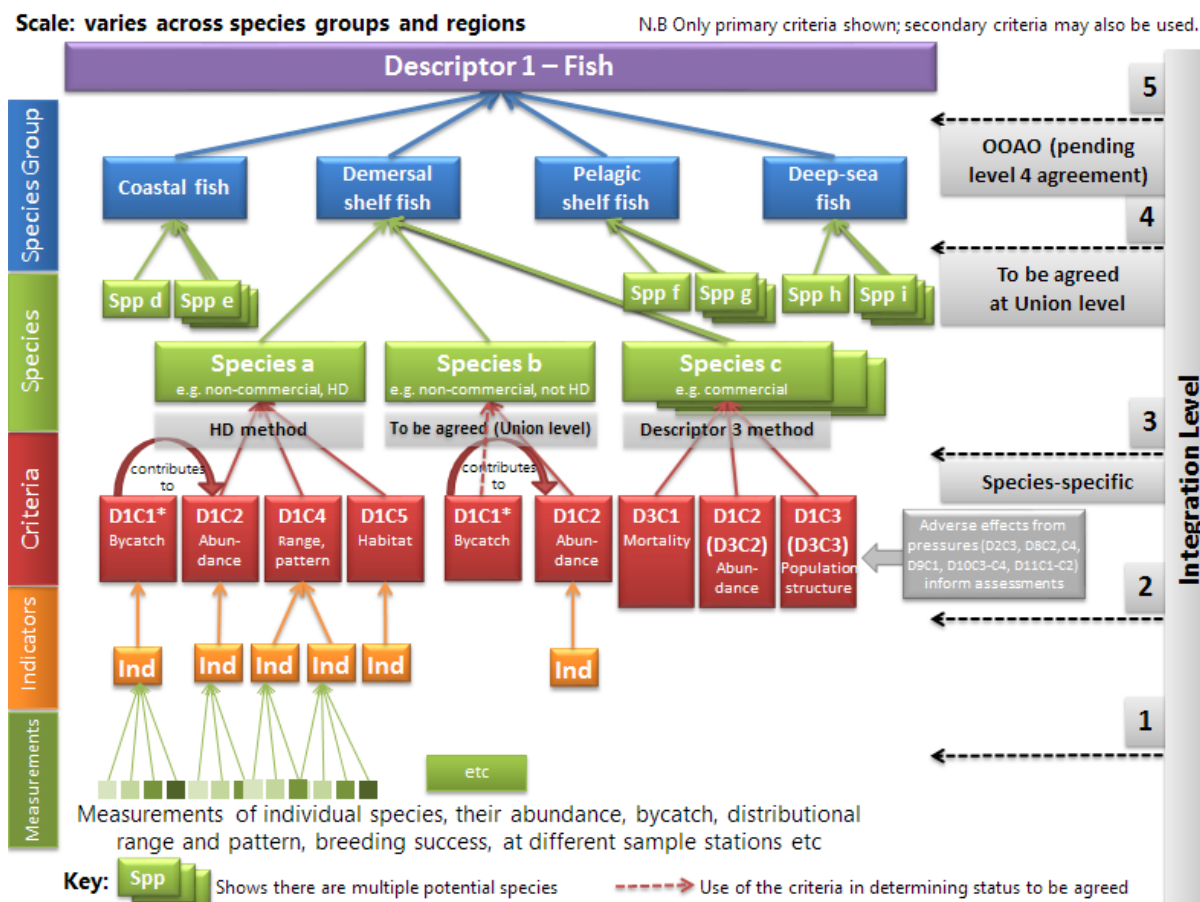


Figure 24. Levels and methods of integration for fish under Descriptor 1. Note that integration at level 5 is not required by the revised Commission Decision, and is thus optional.

Notes: * D1C1 is primary for species identified as being at risk from incidental by-catch in the region or subregion, (i.e. also included on the list of species for D1C1). Criteria from other pressure descriptors may also be taken into account when setting threshold values for D1C2 (e.g. C8C4, D10C4). Where by-catch information for commercially-exploited species is taken into account in stock assessments which are used to assess D3C2 (and hence D1C2), it is not necessary to consider this information again.

Missing indicators

If a primary criterion cannot be assessed for a species due to a lack of data then the resultant assessment of the criterion for that species cannot be assigned a status (i.e. it is 'not assessed'). For Habitats Directive species, a judgement of status can be provided for a species if there is information on at least three parameters (criteria), therefore a judgement of status for the species may be possible if information on only one criterion is missing. It also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken.

Outstanding issues for D1 Fish

- Integration methods:
 - The integration methods for Descriptor 1 (Fish) still need to be determined for species that are not covered by the Habitats Directive or commercially exploited, and the revised Commission Decision has provided the scope for this to be taken forward and agreed at Union level, taking into account regional or subregional specificities.
- How should species be allocated to species groups where different life stages use different habitats (e.g. *Solea solea* juveniles are coastal and adults are demersal-shelf).

Until such an integration method is agreed, this Guidance suggests the following approach:

- Level 3: For non-commercially exploited species that are not covered by the Habitats Directive: OOA across the criteria used. In many cases this is likely to be only one criterion (D1C2) therefore the outcome for the criterion would be the outcome for the species.
- Level 4: Use the currently-agreed regional method (if available), or a conditional rule, based on a specific number or proportion of species in a species group achieving good status. For example, if x of y species are in good status, the species group is considered to be in good status. The value of x would be defined by Member States. Safeguards may be needed (e.g. a conditional rule) to ensure that a species group is not assessed as 'good' status if some species are in a critical state.

4.5.3 Visualising Assessment Results for Fish

A similar approach to birds can be used, using the relevant criteria for fish, and appropriate integration approaches.

For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

4.6 Cephalopods

No cephalopod species are listed in Directive 92/43/EEC, therefore the primary and secondary criteria depend on whether the species is commercially exploited and therefore also assessed under Descriptor 3 (Table 15).

Table 15. Criteria for assessment of cephalopods (Descriptor 1)

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators	Comments
	D1C1 Mortality rate from by-catch (1)			
State	D1C2 Population abundance		1.2.1	
	D1C3 Population demographic characteristics (2)	D1C3 Population demographic characteristics (3)	1.3.1	
		D1C4 Distributional range and pattern	1.1.1 1.1.2	
Supporting habitat		D1C5 Habitat for the species	–	Supporting habitat for species was mentioned in the D1 chapeau text in 2010/477/EU but not specifically included as an indicator
(1) For species of non-commercially exploited cephalopods which are at risk from incidental by-catch in the region or subregion. (2) Commercially exploited cephalopod species (3) Non-commercially exploited cephalopod species				

Degree of Integration

For Descriptor 1, criteria should be integrated within species, before species are integrated to species group. The integration stops at the species group level; species groups are not integrated to ecosystem component.

4.6.1 Assessment Flow

The assessment flow is the same as for fish, noting that:

- No cephalopod species are listed in Table 1D of the Annex to Commission Implementing Decision (EU) 2016/1251;
- No cephalopod species are covered by the Habitats Directive.
- For 'Step 3 – Determine scales and areas for assessment', Member States should determine the appropriate scale of assessment and assessment areas for the cephalopod species group.

The following are provided in the revised Commission Decision³¹:

- Baltic Sea – region or subdivisions;
- North-East Atlantic Ocean – subregions;
- Mediterranean Sea – subregions.

4.6.2 Levels and Methods of Integration

Figure 25 shows the levels of integration and integration methods for cephalopods under Descriptor 1. The figure is representative of a single assessment area.

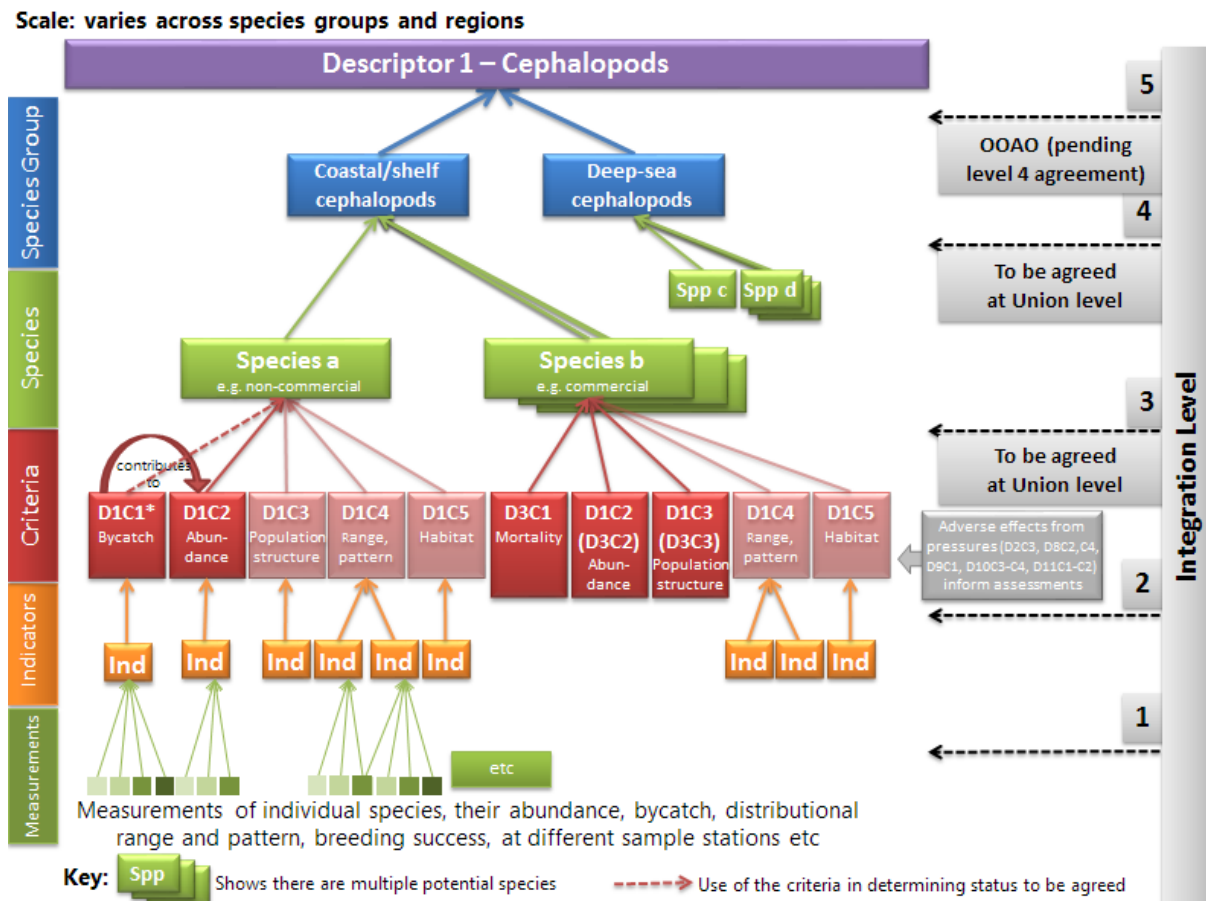


Figure 25. Levels and methods of integration for cephalopods under Descriptor 1. Note that integration at level 5 is not required by the revised Commission Decision, and is thus optional.

Notes: * D1C1 is primary for species identified as being at risk from incidental by-catch in the region or subregion, (i.e. also included on the list of species for D1C1). Criteria from other pressure descriptors may also be taken into account when setting threshold values for D1C2 (e.g. C8C4, D10C4). Where by-catch information for commercially-exploited species is taken into account in stock assessments which are used to assess D3C2 (and hence D1C2), it is not necessary to consider this information again.

³¹ There are no cephalopods in the Black Sea.

The integration methods of Figure 25 are:

- **Level 1:** Measurements of individual parameters — for example of distributional range, abundance etc. — are combined into a single indicator. This level of integration is not addressed in this Guidance.
- **Level 2:** Where there is more than one indicator for a particular criterion for a species, the indicators should be combined to form a judgement on the status of the criterion. An integration method is required, or the integration of multiple indicators for a criterion should be considered in the level 3 integration; this should be agreed at regional or subregional level. However, in many cases, the 'indicators' will be equivalent to the criteria, and no integration will be required.
- **Level 3:** The relevant criteria for each species are integrated to form a judgement on the status for each species. D1C1 contributes to the assessment of D1C2 for the corresponding species. Different species may be represented by different numbers of criteria. The integration method depends on whether the species is commercially exploited (for which the D3 assessment should be used) or not. The integration method shall be agreed at Union level, taking into account regional or subregional specificities (see box below).
- **Level 4:** The results for each species are brought together to the species group. The integration method shall be agreed at Union level, taking into account regional or subregional specificities. See box below.
- **Level 5:** The revised Commission Decision only requires reporting of the status of the species group (not ecosystem component), but integration of species groups to express the overall status of the cephalopods ecosystem component may be helpful for communication of assessment results and is included here for that purpose. The applicability of the OAO approach at this level is dependent on the integration method agreed upon for level 4.

Outstanding issues for D1 Cephalopods

- Integration methods:
 - The integration methods for Descriptor 1 (Cephalopods) still need to be determined, and the revised Commission Decision has provided the scope for this to be taken forward and agreed at Union level, taking into account regional or subregional specificities.
- Catchability of cephalopods in trawl surveys is highly variable and indicators based on these data are likely to be very highly variable.

Until such an integration method is agreed, this Guidance suggests the following approaches:

- Level 3: For non-commercially exploited species: OAO across the criteria used. In many cases this is likely to be only one criterion (D1C2) therefore the outcome for the criterion would be the outcome for the species.
- Level 4: Use the currently-agreed regional method (if available), or a conditional rule, based on a specific number or proportion of species in a species group achieving good status. For example, if x of y species are in good status, the species group is considered to be in good status. The value of x would be defined by Member States. Safeguards may be needed (e.g. a conditional rule) to ensure that a species group is not assessed as 'good' status if some species are in a critical state.

Missing indicators

If a primary criterion cannot be assessed for a species due to a lack of data then the resultant assessment cannot be assigned a status (i.e. it is 'not assessed'). It also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken.

4.6.3 Visualising Assessment Results for Cephalopods

A similar approach to birds can be used, using the relevant criteria for cephalopods, and appropriate integration approaches.

For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

DRAFT

4.7 Pelagic Habitats (Descriptor 1)

Habitat aspects of biodiversity are considered in relation to two 'ecosystem components' (pelagic and benthic habitats) and their 'broad habitat types'. Different criteria are relevant for the two ecosystem components, and therefore the integration rules are also different. Benthic habitats components are distinguished and explained separately in Section 4.8.

For pelagic habitats, there is one descriptor:

Descriptor 1 (Pelagic habitats): 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.

The criterion for pelagic habitats, and its relation to the 2010/477/EU indicators, is shown in Table 16.

Table 16. Criteria for assessment of pelagic habitats (Descriptor 1)

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators	Comments
	D1C6 Habitat condition (spatial extent of adverse effects)		1.6.1 1.6.2 1.6.3	

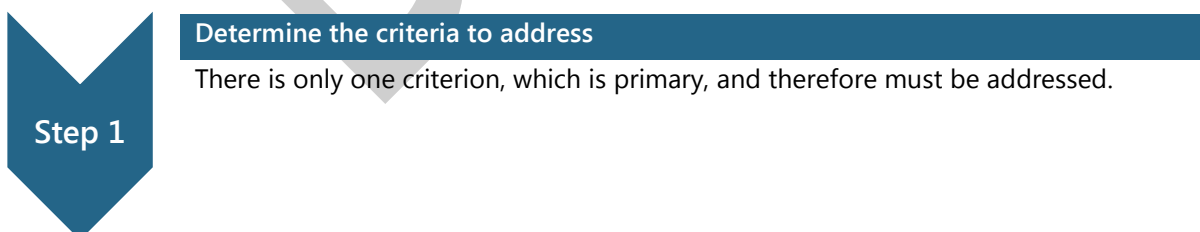
Under criterion D1C6, the 'absence of particularly sensitive or fragile species or species providing a key function' should be considered as negative attributes when assessing the condition of pelagic habitats.

Level of Integration

For **pelagic habitats**, the **final** level of integration is the criterion D1C6. Because there is only one criterion, the outcome will be the same as for the Descriptor.

4.7.1 Assessment Flow

The assessment flow for **Descriptor 1** (Pelagic Habitats) is described below.



Step 2

Determine the elements for assessment: select habitats

According to the revised Commission Decision, the elements to be assessed for pelagic habitats are:

- Pelagic broad habitat types (specified as the criteria elements to be assessed in the revised Commission Decision):
 - Variable salinity³²
 - Coastal
 - Shelf
 - Oceanic/beyond shelf
- Additional habitat types (selected by Member States through regional or subregional cooperation, according to the criteria laid down in 'specifications for the selection of species and habitats' in the revised Commission Decision) (see 'Selection of habitat types' in Section 4.8 (Benthic Habitats)). It is recommended to use a suitable habitat typology such as ecohydrodynamic types (Figure 27).

Step 3

Determine scales and areas for assessment

The revised Commission Decision indicates the following spatial scales for assessment:

- Subdivision of the region or subregion as used for assessments of benthic broad habitat types, reflecting biogeographic changes in species composition of the habitat.

Step 4

Assign indicators

- Relevant regional indicators that are available should be identified and allocated, to the relevant criteria and assessment areas (mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A).
- Any remaining gaps should be identified. Use national assessments (taking into account existing assessments e.g. under EU legislation such as WFD), where available, pending the development of regionally coordinated assessments.
- Additional national indicators for elements that are specific to national waters, if any, can also be incorporated and allocated to the relevant criteria and assessment areas. These need to have a threshold value, where appropriate, and should follow the agreed structure for reporting indicators (MSCG_17-2015-04), pending guidance on reporting requirements from WG DIKE.

Step 5

Establish threshold values

Member States should establish threshold values through regional or subregional cooperation, for the following:

- The condition of each habitat type, ensuring compatibility with values set under Descriptors 2, 5 and 8.
- Note that the 'absence of particularly sensitive or fragile species or species providing a key function' should be considered as negative attributes when assessing the condition of pelagic habitats.

³² Retained for situations where estuarine plumes extend beyond waters designated as Transitional Waters under Directive 2000/60/EC.

Step 6

Determine if threshold values are achieved

- The condition of each pelagic broad habitat type should be determined in each assessment area, based on the value of the indicator compared to the thresholds established in step 5.
- The assessment should provide an estimate of extent (in km²) of each habitat type that is **adversely affected** in the assessment area, and as a proportion (percentage) of the total extent of the habitat type. Note that habitat extent in km² is used instead of volume to simplify assessments by avoiding the need to take into account the depth of the water column.
- For expressing the extent to which good environmental status has been achieved, this should be an estimate of the extent and proportion of each habitat type that **has achieved the threshold value set**.
- This should take into account assessments of the adverse effects from pressures, including under D2C3, D5C2, D5C3, D5C4, D7C1, D8C2 and D8C4.

Step 7

Integrate indicators

- If there is more than one indicator for the condition of each habitat type, the indicators should be integrated to criterion level for the pelagic broad habitat type;
- Integration methods are described in Section 4.7.2.

4.7.2 Levels and Methods of Integration

The assessment of pelagic habitats under Descriptor 1 should focus on the assessment of plankton communities in the water column. The assessment of the extent (volume) of pelagic habitats affected by anthropogenic pressures is practically challenging and not feasible for the assessment process. Therefore it is recommended to assess pelagic habitats with the help of indicators describing community structure and productivity of the plankton community in the water column. Other relevant ecosystem components, e.g. fish, for the pelagic habitats are assessed under other criteria under Descriptors 1, 3 and 4.

The abiotic structure of the pelagic habitats is integrated in the assessment of the plankton communities. Species and size composition as well as abundance and distribution of plankton communities depend mostly on water temperature, nutrient availability and water clarity. Anthropogenic pressures affect the plankton community in a cumulative way and a differentiation of effects from single pressures may not be possible in this assessment, but the assessments of the adverse effects from pressures including under D2C3, D5C2, D5C3, D5C4, D7C1, D8C2 and D8C4 should be taken into account in the assessments of pelagic habitats under D1C6.

Habitat sub-types can be defined by eco-hydrodynamic areas (see van Leeuwen *et al.* 2015 for the North Sea, Figure 26). The eco-hydrodynamic regions are defined according to the degree of stratification and the influence of freshwater.

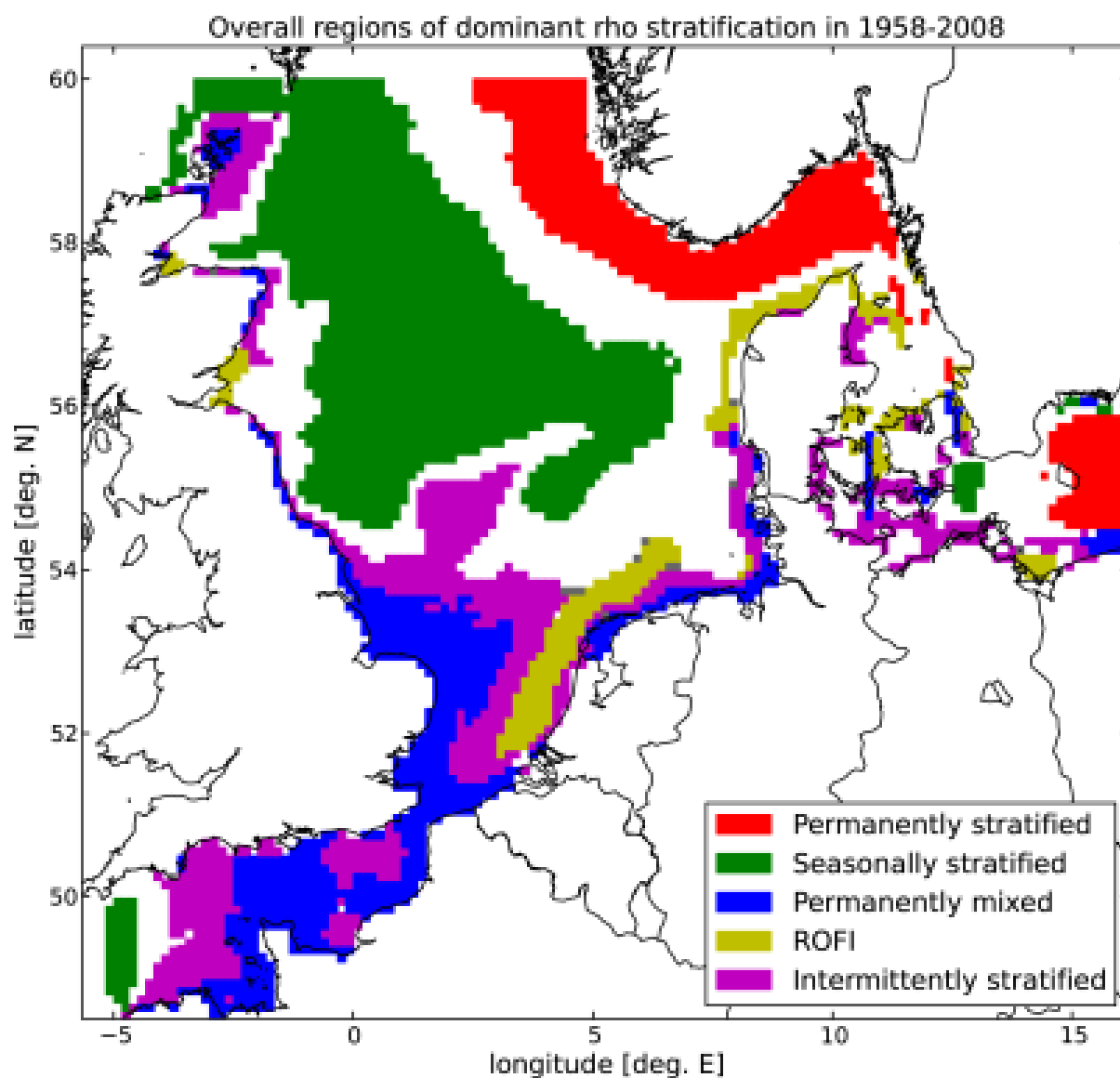


Figure 26. Eco-hydrodynamic areas in the Greater North Sea (van Leeuwen *et al.*, 2015) can be used as 'habitat types'

Figure 27 shows the levels of integration and integration methods for pelagic habitats under Descriptor 1. The figure is representative of a single assessment area.

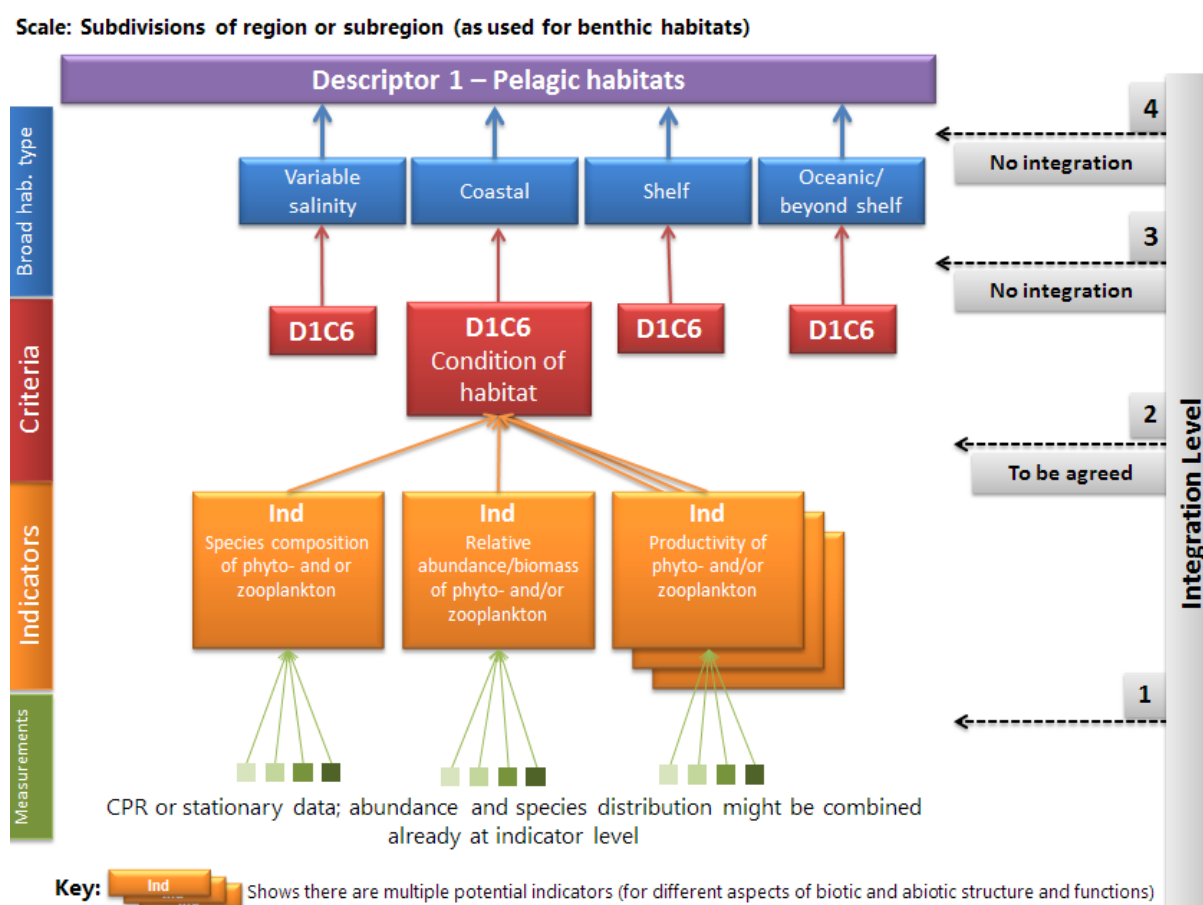


Figure 27. Levels and methods of integration for pelagic habitats under Descriptor 1

The integration of the indicators might not be possible quantitatively, since not all indicators describing the plankton communities will have indicator thresholds. Pressures affecting the pelagic habitats should be considered in the assessment of pelagic habitat. But since the pressure/state link in pelagic systems is not well defined, except for fishing mortality, the integration of pressure-based assessments (criteria D2C3, D5C2, D5C3, D5C4, D7C1, D8C2 and D8C4) should be done qualitatively, rather than quantitatively. The assessment of the pressure/impact criteria could be used to either strengthen or weaken the assessment of function within D1C6.

The integration methods of Figure 27 are:

- **Level 1:** Measurements of individual parameters — for example continuous plankton recorder (CPR) or stationary data samples. These are combined into indicators of biotic and abiotic structure and function (e.g. species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species, productivity). This level of integration requires technical consideration and is not addressed in this Guidance.
- **Level 2:** The integration method is not yet defined. See box below.
- **Level 3:** There is only one criterion (D1C6) for pelagic habitats, therefore no integration is required.
- **Level 4:** The broad habitat types under D1 (pelagic habitats) are not integrated.

Outstanding issues for D1 Pelagic Habitats

The integration methods for Descriptor 1 (Pelagic Habitats) require further discussion to reach a proposal.

Until such an integration method is agreed, this Guidance suggests the following approaches:

- Level 2: The individual indicators are combined to criterion level using averaging (of normalised values) (integration method proposed by the workshop break-out group).

Further consideration of the presentation of assessment outputs is required.

Missing indicators

If the primary criterion cannot be assessed for a broad habitat type due to a lack of data then the resultant assessment cannot be assigned a status (i.e. it is 'not assessed'). It also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken.

4.7.3 Visualising Assessment Results for Pelagic Habitats

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme..

The assessment output for Descriptor 1 Pelagic Habitats is expressed for each pelagic broad habitat type in each area (subdivision of region or subregion, as used for assessments of benthic broad habitat types). If several different measures of 'condition' are used, an overall consideration of the condition of the habitat type will be necessary. For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

In addition to the presentation of results by pelagic broad habitat type, a summary can be provided in graphical format (Figure 28(a)) for the overall extent of pelagic habitats achieving threshold values in the assessment area.

In addition, if desired, the overall status of the ecosystem component can be presented, for the purposes of communication of assessment results, as the 'pizza slice' for the Pelagic Habitats ecosystem component in the scheme for integrated presentation of assessment results (pizza-satellite scheme) (Figure 28(b)).

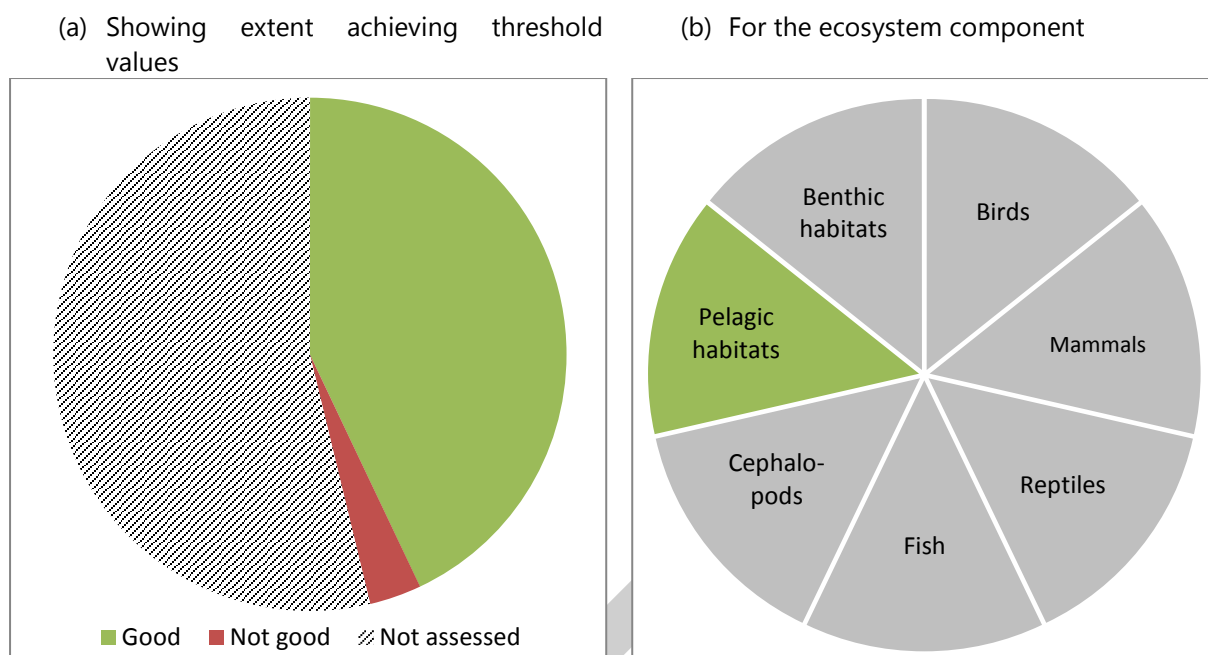


Figure 28. Illustrative example of a visual summary of assessment outputs for Descriptor 1 Pelagic Habitats

4.8 Benthic Habitats (Descriptors 1 and 6)

There are two Descriptors directly addressing the state of benthic habitats:

Descriptor 1 (Habitats): 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.

Descriptor 6: 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.

The requirements for both descriptors are addressed through a single set of assessments on broad habitat types and on other habitat types, for example those listed in the Habitats Directive or international agreements such as RSCs. The assessments of the physical loss and physical disturbance pressures under criteria D6C1–D6C3 (see Section 3.4) are to be used, together with outcomes of assessments for other pressure-based Descriptors (D2, D5, D7, D8). The criteria for assessing benthic habitats, and their relation to the 2010/477/EU indicators, are shown in Table 17.

Table 17. Criteria for assessment of benthic habitats (D1 and D6)

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators	Comments
D1	D6C4 Habitat extent (loss)		1.5.1 6.1.1	Biogenic habitat types (6.1.1) now included within broad habitat types
	D6C5 Habitat condition		1.6.1, 1.6.2, 1.6.3 6.2.1, 6.2.2, 6.2.3, 6.2.4	Aspects relating to the condition of the benthic community (6.2) are considered under D6C5.

There are two main aspects to the assessment of benthic habitats:

- Extent of habitat (D6C4): assessed as the extent of habitat loss and expressed as a proportion of the overall extent;
- Condition of the habitat (D6C5): assessed as the extent of the remaining habitat (i.e. after any habitat loss) which is in a good condition (biotic and abiotic structure, and function) (or, conversely, the extent of habitat that is assessed as being in a poor condition).

The assessments are undertaken per habitat type in a given assessment area, leading to an assessment per habitat type based on an integration of the two criteria.

Criteria D6C4 and D6C5 correspond to the 'range/area covered by habitat type within range' and 'specific structure and functions' criteria of the Habitats Directive (Directive 92/43/EEC), and information on these can be used from the reporting for that Directive where it relates to habitat types selected for MSFD assessments.

The state of benthic habitats may be adversely affected by several pressures, depending on the different activities and associated pressures in each region or subregion. Consequently the

assessments of impacts from the relevant pressures should be taken into account in the assessments of benthic habitats. The most relevant criteria are as follows:

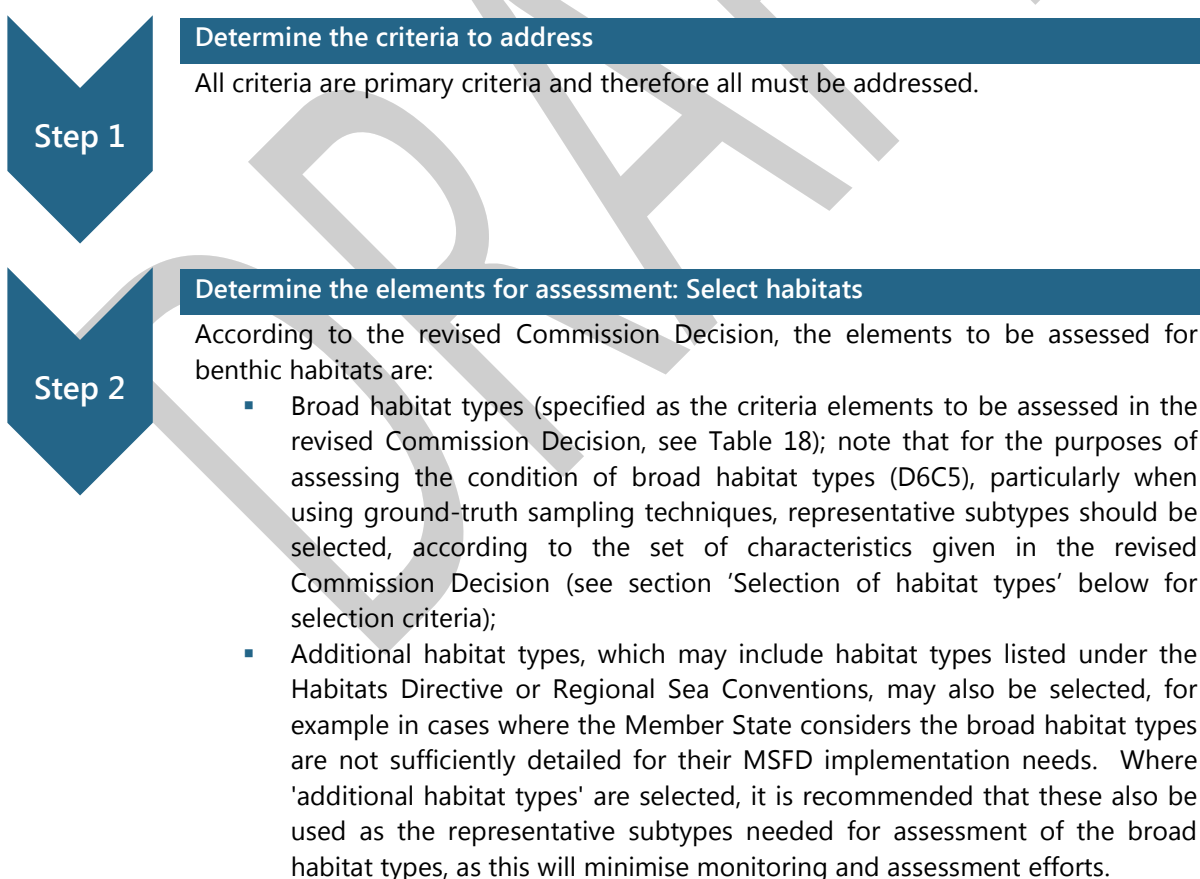
- In relation to assessment the extent of the habitat (loss) (D6C4):
 - D6C1 (extent of loss);
- In relation to assessing the condition of the habitat (D6C5):
 - D2C3 (adverse effects from non-indigenous species);
 - D5C4, D5C5, D5C6, D5C7, D5C8 (adverse effects from nutrient enrichment);
 - D6C3 (adverse effects from physical disturbance);
 - D7C2 (adverse effects from hydrographical changes);
 - D8C2, D8C4 (adverse effects at locations of chronic pollution and from acute pollution events);
 - Also potentially relevant: D1C5 (habitats for species of birds, mammals, reptiles, fish or cephalopods) and D3C2, D3C3 (state of benthic commercially-exploited species).

Degree of Integration

For benthic habitats, the final level of integration is the level of benthic broad habitat type (Figure 30).

4.8.1 Assessment Flow

The assessment flow for D1/D6 benthic habitats, incorporating criteria on physical pressures, is described below.



These are described in more detail below.

Step 3

Determine scales and areas for assessment

The revised Commission Decision indicates the following spatial scales for assessment:

- Subdivision of the region or subregion, reflecting biogeographic changes in species composition of the broad habitat type, i.e. each region or subregion is divided into a set of subdivisions which reflect the main water masses that influence biogeographic (species composition) changes in habitats (this will typically be temperature and salinity driven changes in the sub(region) and lead to a small number of subdivisions only). A single set of subdivisions of each region or subregion should be used for the assessment of all habitat types (i.e. the scale of assessment is the same for every habitat type, and the individual habitat types are considered within each subdivision/assessment area).

Step 4

Assign indicators

- Relevant regional indicators that are available should be identified and allocated, to the relevant criteria and assessment areas (mapping of RSC indicators against the revised Commission Decision criteria is provided in Appendix A).
- Assessments carried out under the Habitats Directive should be used for those habitats, taking account of the different assessment scales.
- Any remaining gaps should be identified. Use national assessments (taking into account existing assessments e.g. under EU legislation such as Habitats Directive), where available, pending the development of regionally coordinated assessments.
- Additional national indicators for elements that are specific to national waters, if any, can also be incorporated and allocated to the relevant criteria and assessment areas. These need to have a threshold value, where appropriate, and should follow the agreed structure for reporting indicators (MSCG_17-2015-04), pending guidance on reporting requirements from WG DIKE.

Step 5

Establish threshold values

Member States should establish maximum allowable extents and threshold values through cooperation at Union level, taking into account regional or subregional specificities, for the following:

- **D6C4:** The maximum allowable extent of habitat loss as a proportion of the total natural extent of the habitat type in the assessment area.
- **D6C5:** Threshold values for adverse effects on the condition of each habitat type, ensuring compatibility with values set under Descriptors 2, 5, 6, 7 and 8. This is likely to be set as an acceptable deviation from reference condition, probably in the form of an EQR (as under the WFD).
- **D6C5:** The maximum allowable extent of adverse effects as a proportion of the total natural extent of the habitat type in the assessment area. A common value across all habitat types should be used (Habitats Directive and IUCN assessment methods use a common value for all habitat types), but there may be justifiable scientific rationales to deviate from this common approach in specific cases.

Step 6

Determine if threshold values are achieved

- **D6C4:** The status of each benthic broad habitat type should be determined in each assessment area, based on the extent of loss compared to the maximum allowable extent values established in step 5. This should be expressed as an estimate of the proportion and extent of loss per habitat type and whether this is within the maximum allowable extent value set.
- **D6C5:** The condition of each benthic broad habitat type should be determined in each assessment area, based on the values of indicators compared to the thresholds established in step 5. This should be expressed as an estimate of the proportion and extent of adverse effects (including the extent lost from D6C4) per habitat type, and whether this is within the maximum allowable extent value set.
- The overall status of each habitat type in the assessment area should be determined, using a method to be agreed at Union level based on the extent lost and the extent of adverse effects.
- This should take into account assessments of the adverse effects from pressures, including under D2C3, D3C1, D3C2, D3C3, D5C4, D5C5, D5C6, D5C7, D5C8, D7C2, D8C2 and D8C4.
- A list of the broad benthic habitats in the assessment area that were not assessed should also be provided.

Step 7

Integrate indicators and criteria

- Integration methods are described in Section 4.7.2.

Benthic habitat types

Broad habitat types³³: The assessment of benthic habitats and seafloor integrity is to be carried out for the 22 'broad habitat types', listed in Table 18, if they occur within the region or subregion. The broad habitat types are defined on the basis of EUNIS level 2 habitat types, although some level 2 categories are aggregated to provide a resolution of habitat types more suited to MSFD scales of assessment and management of predominant pressures (e.g. combining rock and biogenic reef categories, combining littoral sediment, bathyal sediment and abyssal sediment and rock categories).

The assessment of broad habitat types can be undertaken with reference to a selection of representative sub-habitat types for each broad habitat type; this is particularly relevant where broad-scale mapping or modelling of pressures needs to be validated with ground-truth data (e.g. from grab or video samples). Such sampling is used to assess the biological characteristics (condition) of the seabed and needs to compare impacted sites with unimpacted sites; it is typically necessary to do this using finer-scale habitat types (e.g. EUNIS level 4 or 5 classes).

Representative sub-habitat types (of a broad habitat type) need to be defined by Member States at regional or subregional level, and may include habitat types assessed under the Habitats Directive or international agreements such as RSCs ('special habitats' – see below). The Member State Workshop on the development of the Article 8 Guidance recommended that the representative habitats should be defined on the basis of EUNIS level 4–5.

³³ Previously 'predominant' habitats in MSFD Annex III.

Other habitats, including ‘special habitats’: Member States may, in addition to the assessment of broad habitat types, select other habitat types for assessment; this may be particularly relevant in cases where the broad habitat types do not provide sufficient discrimination for the assessment and management of their waters.

These other habitat types can include ‘special habitats’³⁴ which are habitats listed for protection under other directives, i.e. the Habitats Directive or by Regional Sea Conventions or other international agreements.

Special habitats may also be representative of a broad habitat type, if they match the scientific selection criteria. The specific characteristics and properties of this habitat (e.g. sensitivity, proportion, etc.) should then be carefully taken into account for its representativeness.

Table 18. Benthic broad habitat types, for consideration under ‘benthic habitats’ for D1 and D6

Ecosystem Component	Broad Habitat Type
Benthic 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
	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	

Note: Relevant EUNIS habitat codes (version 2016) are provided in the revised Commission Decision.
Note: in the 2016 version of EUNIS, supralittoral rock habitats (splash zone) are included under the littoral zone. This means that the littoral rock and biogenic reef broad habitat type of the revised Commission Decision has a broader definition compared with the littoral rock predominant habitat type in CSWP (2011).

Selection of habitat types

The revised Commission Decision sets out a number of ‘main scientific criteria (ecological relevance)’ for the selection of representative habitats to be assessed under the broad habitat types:

³⁴ Previously ‘special habitats’ in the original MSFD Annex III.

- Representative of the broad habitat type and of ecosystem functioning, being relevant for assessment of state/impacts, such as having a key functional role within the component (e.g. high or specific biodiversity, productivity, trophic link, specific resource or service);
- Relevant for assessment of a key anthropogenic pressure to which the broad habitat type is exposed, being sensitive to the pressure and exposed to it (vulnerable) in the assessment area (the Member State Workshop noted that since it is difficult to identify a key anthropogenic pressure for most of the pelagic ecosystem components, this scientific criterion is of lower priority for pelagic habitats);
- Present in sufficient extent in the assessment area to be able to construct a suitable indicator for assessment. This does not exclude rare or endangered habitats; any habitat types can be assessed;
- The set of habitats selected should cover, as far as possible, the full range of ecological functions of the broad habitat type and the predominant pressures to which the component is subject;
- If species or species groups are closely associated to a broad habitat type they may be included within that habitat type for monitoring and assessment purposes; in such cases the species shall not be included in the assessment of the species group.

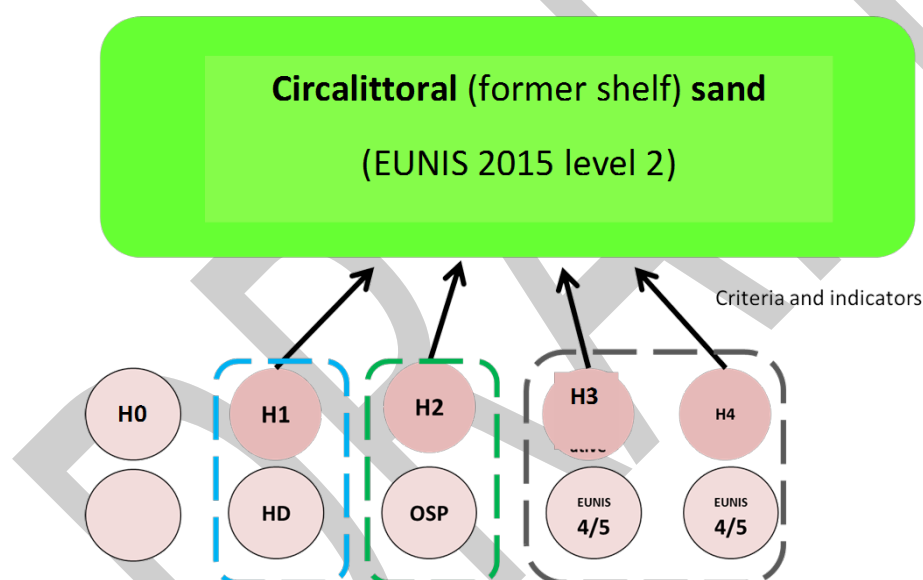


Figure 29. Illustration of the assessment of a broad habitat type (circalittoral sand) showing the aggregation of representative sub-habitat types to the broad habitat type (EUNIS level 2).

Notes: Broad habitat type: example used is circalittoral (formerly 'shelf') sand. Representative habitats = circles H1, H2, H3 and H4. HD = H1 listed habitat from Habitats Directive. OSP = H2 listed habitat from OSPAR (Regional Sea Convention). H3 and H4 = not listed but representative EUNIS level 4 or 5 habitats for MSFD. H0 = habitat (EUNIS level 4/5) of this broad habitat type, but not selected as representative, according to selection criteria. Further work is needed to detail the aggregation process (method and rules) (work in progress in RSCs).

Source: JRC D1 workshop Sept. 2015.

4.8.2 Levels and Methods of Integration

Figure 30 shows the levels of integration and integration methods for benthic habitats addressing Descriptor 1 and Descriptor 6. It represents the assessment of the extent and condition of each broad habitat type, combining indicators to represent the cumulative area lost or damaged of each broad habitat type, which are then expressed as a proportion of the total extent of the broad habitat type

within the assessment area. The figure is representative of a single assessment area, for which the status should be presented for each broad habitat type. There is no need to aggregate across spatial areas.

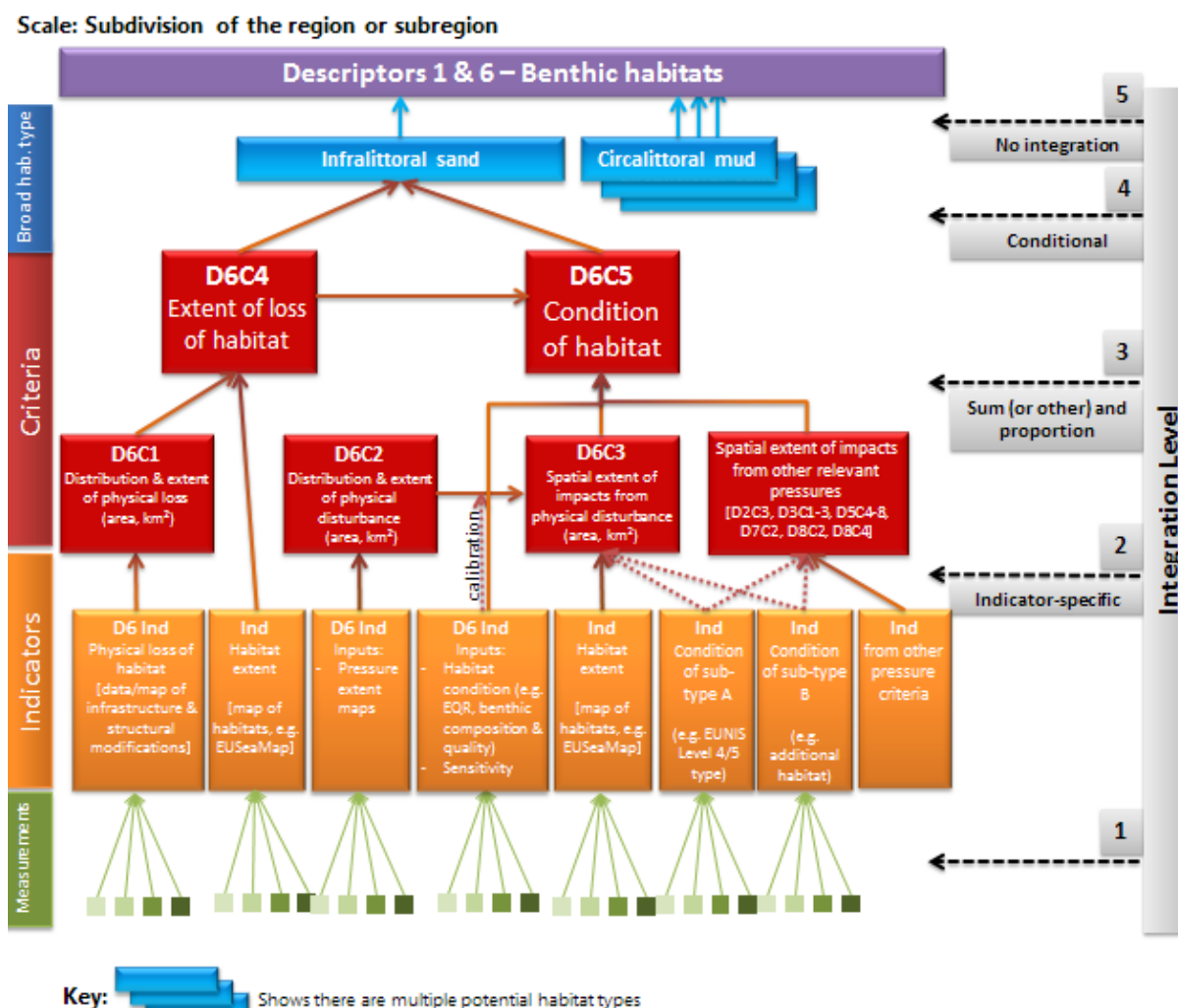


Figure 30. Levels and methods of integration for benthic habitats under Descriptors 1 and 6

The assessment of loss of benthic habitats should be based, as far as possible, on outputs of assessments for the relevant pressure-based descriptors, expressed as the extent of impact per pressure. The level 1 and 2 integration rules below relate primarily to these other assessments. The integration methods are (see also box below):

- **Level 1:** Measurements of individual parameters — for example seabed grab or video samples, acoustic surveys etc. These are combined into indicators and maps (often based on modelled data) of habitat types, extent and condition, and the spatial extent, distribution and intensity of physical and other pressures.
- **Level 2:** The individual indicators and maps (see list in level 1) and benthic composition and quality (to assess the extent of adverse effects from different pressures etc.), are combined to inform the criteria D6C1, D6C2 and D6C3. The latter criteria are outputs from the assessment of the pressure-based descriptors: D6C3 (extent of adverse effects from physical disturbance) and from other relevant pressure descriptors (e.g. extent of adverse effects from nutrient enrichment or hydrographical changes). Where representative subtypes of the broad habitat

type are assessed, they may be used to inform/validate the assessments of the other pressure-based criteria (e.g. D6C3), but could also be used directly for D6C5.

- **D6C1:** This is directly from Descriptor 6, (a map of) the spatial extent and distribution of physical habitat loss);
- **D6C2:** This is directly from Descriptor 6, (maps of) the spatial extent and distribution of physical disturbance. Individual pressure maps can be produced for smothering, abrasion, extraction etc.
- **D6C3:** The extent and distribution of broad and other habitat types (habitat maps) is the basis for the assessment of impacts from physical disturbance identified in D6C2. Combining these, together with information on the sensitivity of the habitat types to the pressures, and/or information on the condition of the habitat, provides information on the spatial extent of impacts by physical disturbance. The condition of habitat is assessed e.g. by multimetric indices and can be used both to feed in directly to the condition of the habitat (D6C5) as well as to calibrate the pressure-sensitivity relationship between D6C2 and D6C3 (as well as for other pressures).
- **Level 3:**
 - D6C4: the output from D6C1 (total extent of physical loss in assessment area) is interfaced with the extent of the broad habitat type in the assessment area to derive the extent of loss for the habitat as a proportion (%) of the total habitat area. This should incorporate physical loss from physical infrastructure as well as from e.g. physico-chemical changes or biological exclusion.
 - D6C5: the total extent of adverse effects on the broad habitat type from physical disturbance (D6C3) are brought together with the extent of adverse effects from other pressure criteria (e.g. D2C3, D5C5-8, D7C2, D8C2, D8C4), for example by overlaying impact maps on the habitat map. This impact extent is then related to the overall extent of the broad habitat to estimate the proportion (%) of the habitat area which is considered to be adversely affected. In some cases it may be appropriate to simply sum the areas affected by the pressures, but where there are cumulative or synergistic effects, or overlapping pressures, other approaches may be required.
 - The extent of habitat loss and the extent of habitat in poor condition can be expressed as the proportion of the total extent of the habitat type or an equivalent value (e.g. km²).
- **Level 4:** The results for criteria D6C4 and D6C5 are brought together for each broad habitat type. A conditional rule is used, where both criteria must be within the levels set for the extent of habitat which may be lost and adversely affected; the sum of the area lost and area adversely affected must not exceed the threshold for the area adversely affected, i.e. area lost should be taken into account in the area adversely affected, as loss is considered the most severe (irreversible) form of adverse effect.
- **Level 5:** The broad habitat types under D1/D6 (benthic habitats) are not integrated.

Assessments of other habitat types, e.g. special habitats, should follow the same overall process, except they will not have supporting subtypes to inform their assessment.

Missing indicators

If a primary criterion cannot be assessed for a broad habitat type due to a lack of data then the resultant assessment cannot be assigned a status (i.e. it is 'not assessed'). It also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken.

Outstanding issues for D1 Benthic Habitats

The integration methods for Descriptor 1 (Benthic Habitats) proposed above are in line with the revised Commission Decision. However, the Member States Workshop break-out group on habitats concluded that detailed approaches to integration and links between the different elements required further development, and further work was required to propose integration methods, for example:

- There was neither consensus nor agreed method to integrate cumulative pressures' effects on the state of habitats, in particular considering the overlapping (extent) of pressures and possible synergistic or antagonist effects (intensities) on damages to the state.
- The main physical pressure actually assessed is abrasion by bottom-trawling fisheries, but the method (and relevance) to integrate all physical pressure sub-types still needs to be further developed.

Further work on Benthic Habitats assessments and integration approaches should be taken forward in due course. This may include:

- Table linking broad habitat types and information of their occurrence in the different sea regions, and alignment with Natura 2000 types, HELCOM HUB types etc.
- Proposal for an integration method: the extent and condition of each broad habitat type or other habitat type is assessed, combining indicators evaluating the spatial extent and/or intensity of physical and other pressures and the habitat condition related to various pressures.
- Further guidance about how the HD habitats and EUNIS habitats can be linked; and guidance on the assessment of threatened or rare habitats.
- Addressing spatial aspects, and how to deal with point samples of habitats in relation to D6C5 which should be expressed as an estimate of the proportion and extent of adverse effects per habitat type.
- How to align the Habitats Directive and MSFD assessments? Sensitivity/resilience might be different of certain habitat types with one broad habitat type — would threshold values be the same across subtypes of the broad habitat type, or might they vary?
- How the link to other pressures can be implemented in practice.

4.8.3 Visualising Assessment Results for Benthic Habitats

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme. .

A spatial map of the areas of loss and of adverse effects on the seabed will be outputs for D6C1 and D6C3, that will feed in to D6C4 and D6C5. For D6C3, this will have already been intersected with a benthic habitat map to determine the areas of individual benthic habitat types that are adversely affected. The map of areas lost will also need to be intersected with a map of natural benthic habitat types (or the benthic habitat types that were lost would need to be otherwise identified), to determine the area of each benthic habitat type that is lost.

The outcomes are presented for each broad benthic habitat type or additional habitat type, in each assessment area (subdivision of the region or subregion). For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

In addition to the presentation of results by benthic broad habitat type, a summary can be provided in graphical format (Figure 31(a)) showing the overall extent of benthic habitats achieving good status, the area adversely affected, and the area lost in the assessment area. For the purposes of assessment and more detailed information for management, information per habitat type is also likely to be necessary. This is not illustrated here.

In addition, if desired, the overall status of the ecosystem component can be presented, for the purposes of communication of assessment results, as the ‘pizza slice’ for the Benthic Habitats ecosystem component in the scheme for integrated presentation of assessment results (pizza-satellite scheme) (Figure 31(b)).

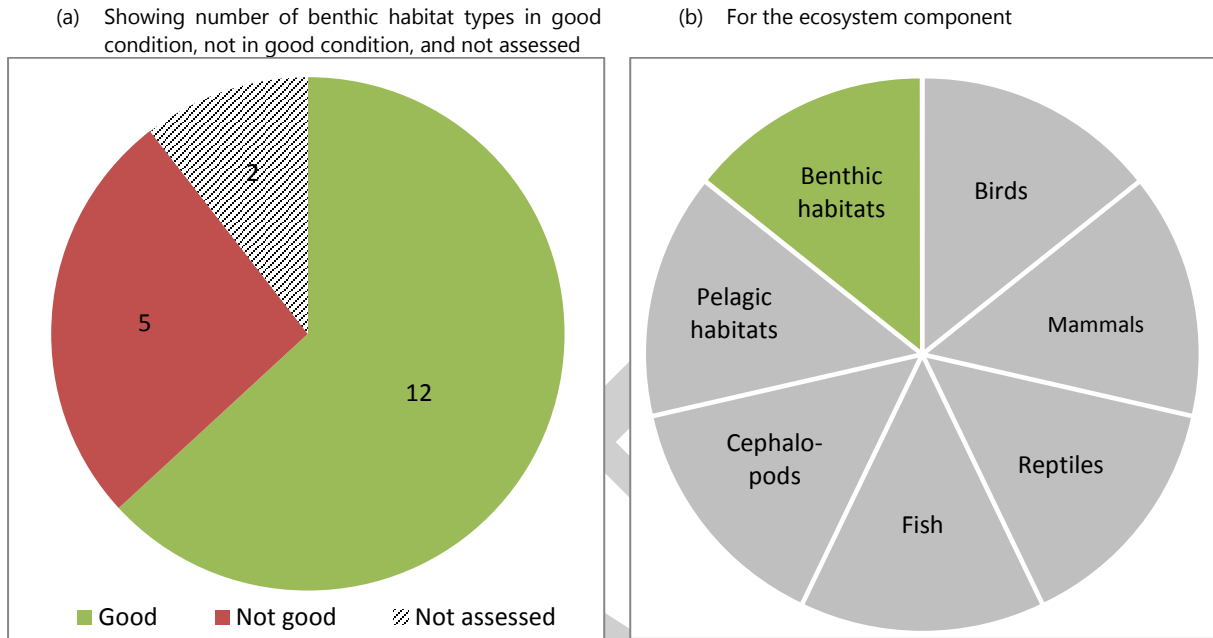


Figure 31. Illustrative example of a visual summary of assessment outputs for Descriptor 1 Benthic Habitats (number of benthic broad habitats in each category). Note: special habitat types should be shown separately.

4.9 Ecosystems, Including Food Webs (Descriptors 1 and 4)

Descriptor 4: 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.

The primary and secondary criteria for Descriptor 4, and their relationship to the indicators of 2010/477/EU, are shown in Table 19.

Table 19. Criteria for assessment of ecosystems (Descriptor 4)

	Primary Criteria Relating to:	Secondary Criteria Relating to:	2010/477/EU Criteria or Indicators	Comments
State (biological)	D4C1 Diversity		1.7.1 in part	1.7.1 (composition and relative proportions of ecosystem components) may relate to D4C1 (species composition and their relative abundance within trophic guilds)
	D4C2 Abundance		1.7.1 in part, 4.3.1	
		D4C3 Size distribution	4.2.1	
State (functional)		D4C4 Productivity	4.1.1	Functional aspects of the state of marine food webs in terms of their productivity (European Commission, 2016)
Note: The revised criteria for Descriptor 4 and the trophic guild approach expand the Descriptor from its previous focus on fish, to cover wider ecosystem aspects such as phytoplankton, benthos and non-fish top predators.				

Descriptor 4 addresses structural and functional aspects of ecosystems as a whole, whereas Descriptor 1 addresses a species group within the ecosystem. It addresses ecosystem aspects through food webs by dividing the structure and function of food webs into compartments which share common features, i.e. 'trophic guilds' (ICES, 2014b). Trophic guilds may refer to important prey groups (defined by who eats them) as well as predators (a group that eats the same thing) (ICES, 2015). Examples of trophic guilds include fish benthivores, fish planktivores, filter-feeding benthos, or omnivorous zooplankton (see Table 20 showing indicative trophic guilds and their composition).

Table 20. Example of a division of trophic guilds, and the main taxonomic groups that may contribute to each guild

Guild/ Taxonomic Group	Phyto-plankton	Zoo-plankton	Benthos	Nekton Excl. Warm-Blooded	Seabirds	Marine Mammals
Primary producers	X					
Secondary producers		X				
Filter-feeders			X			
Deposit-feeders			X			
Planktivores			X	X	X	X
Sub-apex pelagic predators				X	X	X
Sub-apex demersal predators			X	X	X	X
Apex predators				X	X	X

Note: X denotes where the taxonomic groups contribute significantly to each guild. Nekton includes bony fish, elasmobranchs and squids, amongst others. In shallower waters, macrophytes may also be important primary producers in addition to phytoplankton.

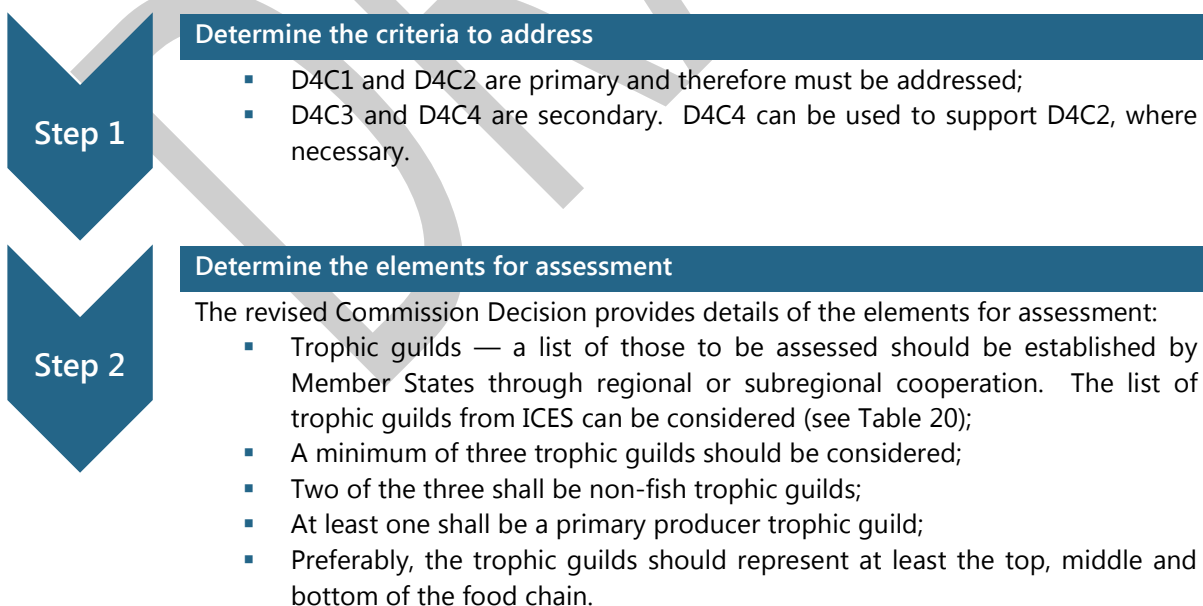
Source: ICES, 2014b.

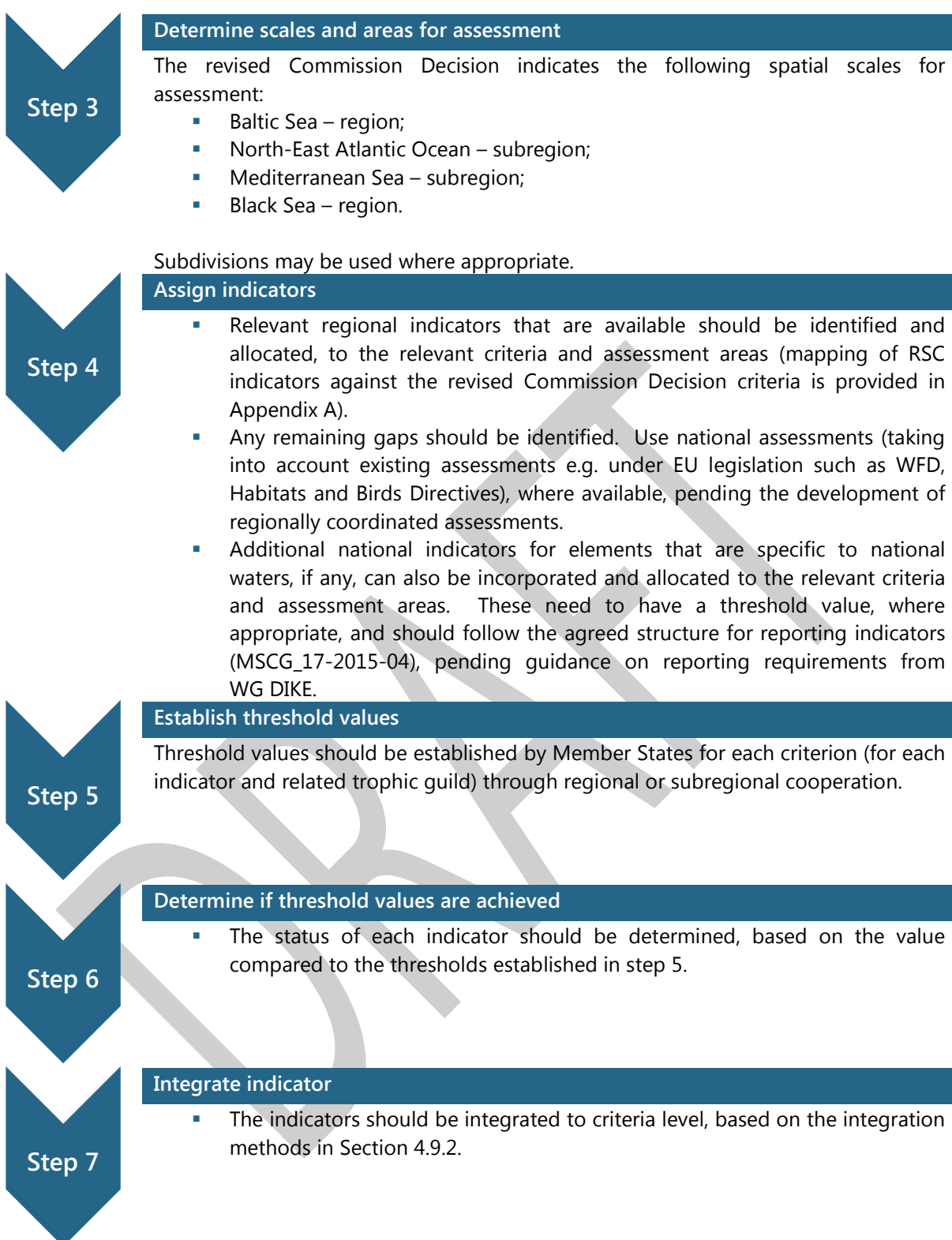
Level of Integration

For Descriptor 4, threshold values should be set, but the criteria are not expected to provide a judgement on status; rather, they are to be used for 'surveillance' to monitor changes in the food web, rather than responding tightly to manageable pressures (ICES, 2014b). As such, where values do not fall within the threshold values, the revised Commission Decision states that this should trigger the need for further research and investigation to understand the causes of the failure.

4.9.1 Assessment Flow

The assessment flow for D4 is described below.





4.9.2 Levels and Methods of Integration

Figure 32 shows the levels of integration and integration methods for Descriptor 4. The figure is representative of a single assessment area.

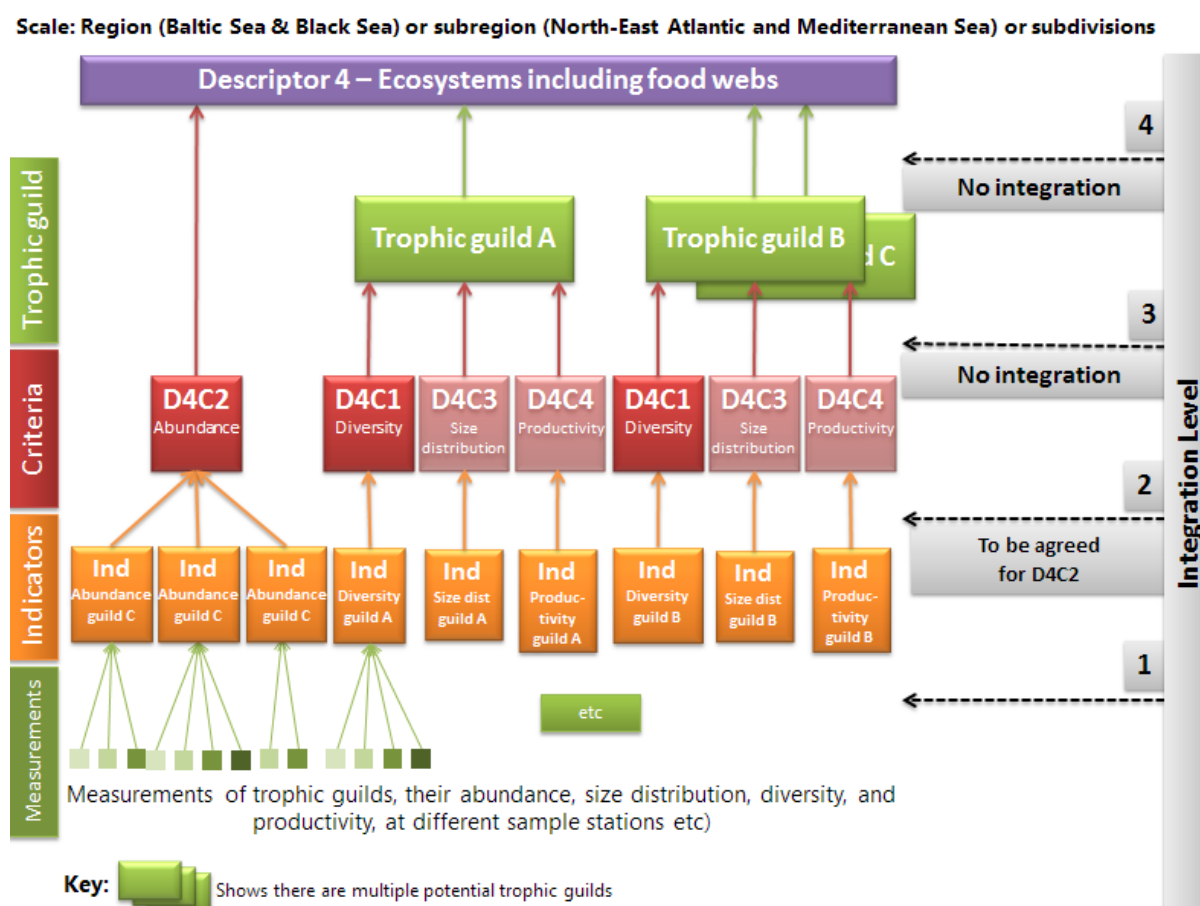


Figure 32. Levels and methods of integration for Descriptor 4

The integration methods of Figure 32 are:

- **Level 1:** Measurements of individual parameters — for example abundance of trophic guilds at different times of year in different locations etc. — are combined into single indicators. This level of integration requires technical consideration and is not addressed in the Guidance.
- **Level 2:**
 - **D4C2:** This criterion addresses the balance of total guild abundance (or biomass) across the trophic guilds and therefore requires indicators of abundance of each trophic guild to be integrated to criterion level. The method needs to be agreed.
 - **D4C1, D4C3, D4C4:** Where there is more than one indicator for a trophic guild for a particular criterion, the indicators are combined to form a judgement on the status of each criterion. The integration method should be agreed at regional level. However, in practice, it is likely that in many cases there will be only one indicator for a criterion for each trophic guild, therefore no integration would be required.
- **Level 3:** The relevant criteria for each trophic guild are not integrated to the trophic guild. Different trophic guilds may be represented by different numbers of criteria.
- **Level 4:** The results are expressed for each trophic guild individually, and the results for D4C2 are expressed separately; there is no integration to descriptor level. Any deviations from threshold values should trigger the need for further research and investigation to understand the causes for the failure.

Outstanding issues for D4

- The integration methods for Descriptor 4 require further discussion to reach a proposal.
- Several issues raised in comments on the Draft Guidance that require further consideration:
 - Assessing GES for trophic guilds at a final level of integration for D4C1/D4C3/D4C4 is not most relevant from a scientific point of view, considering that an assessment of food webs as a whole is needed. All the trophic guilds assessed under one criteria should be considered together to determine the GES of this criteria;
 - How to incorporate indicators encompassing several trophic guilds in criteria D4C1, D4C3 and D4C4, that are currently being developed (e.g. OSPAR indicators FW3, FW9);
 - For the assessment of food webs, GES would in the long run be with multi-trophic guilds indicator(s) (food web modelling). Under an ecosystem approach, food webs assessment encompasses trophic functions such as competition, predation and recycling. Therefore, an aggregation based on biological components (either trophic guilds or habitats/species) reduces the assessment of ecosystem functioning (e.g. fluxes, biomass quantities, omnivory).
 - Incorporation of information on whole food web structure and functioning.
 - Use of D4C4, in addition to supporting D4C2.
 - Consideration of integration of criteria to trophic guild.

Until such an integration method is agreed, this Guidance suggests the following approaches:

- Level 2:
 - D4C2: OAO.
 - D4C1, D4C3, D4C4: If there is more than one indicator per criterion, integration method to be regionally-agreed. Averaging of normalised values may be considered to combine related indicators for a particular criterion.

Missing indicators

If a primary criterion cannot be assessed due to a lack of data then the resultant assessment cannot be assigned a status (i.e. it is 'not assessed'). It also means that the Member State should take action on monitoring and assessment tools to ensure that at the next update under Article 8 MSFD an assessment of the criterion can be undertaken.

4.9.3 Visualising Assessment Results for Ecosystems Including Food Webs

Initial suggestions of visualising assessment results based on revised Commission Decision and for the pizza-satellite scheme.

Further work is required on graphical presentation of assessment outputs, and on how the different criteria contribute to the overall status of D4 for the 'satellite' in the scheme for integrated presentation of assessment results (pizza-satellite scheme).

The assessment output for Descriptor 4 is presented for the region or subregion, or subdivisions where appropriate:

- For each assessed criterion for each trophic guild;
- For D4C2.

For the detailed presentation of the assessment results see Reporting Guidance for 2018, under development of WG DIKE.

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6 Abbreviations

ABPmer	ABP Marine Environmental Research Ltd
ACCOBAMS	Agreement on the Conservation of Cetaceans in the Black Sea Mediterranean Sea and Contiguous Atlantic Area
ASCOBANS	Agreement on Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas
BAC	Background Assessment Concentrations
BEAT	Biodiversity Assessment Tool
BSC	Black Sea Commission
BSC PS	BSC Permanent Secretariat
BS SAP	Black Sea Strategic Action Plan
BSIMAP	Black Sea Integrated Monitoring and Assessment Programme
CFP	Common Fisheries Policy
CIS	Common Implementation Strategy
DCF	Data Collection Framework
DG GES	Drafting Group on Good Environmental Status
DIN	Dissolved inorganic nitrogen
DIP	Dissolved inorganic phosphorus
EAC	Ecological Assessment Criteria
EASIN	European Alien Species Information Network
ECAP	Implementation of the Ecosystem Approach
EEA	European Environment Agency
EQR	Ecological Quality Ratio
EQS	Environmental Quality Standards
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
GES	Good Environmental Status
GFCM	General Fisheries Commission for the Mediterranean
HELCOM	Baltic Marine Environment Protection Commission – Helsinki Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
Ind	Indicator
IUCN	International Union for the Conservation of Nature
JRC	Joint Research Centre
JWGBIRD	Joint OSPAR/HELCOM/ICES Expert Group on Seabirds
MED POL	Programme for the Assessment and Control of Marine Pollution in the Mediterranean
MSCG	Marine Strategy Coordination Group
MSFD	Marine Strategy Framework Directive
OOAO	One-out-all-out
OSPAR	Oslo-Paris Convention
QSR	Quality Status Report
PAHs	Polyaromatic hydrocarbon
PBTs	Persistent, bioaccumulative and toxic substances
PCBs	Polychlorinated biphenyls
PETS	Protected, endangered and threatened species
RBSPs	River Basin Specific Pollutants
RCG	Regional Coordination Group
RSC	Regional Sea Convention
TG Litter	Task Group on Litter

TN	Total nitrogen
TP	Total phosphorus
TV	Threshold value
UNEP-MAP	United Nations Environment Programme – Mediterranean Action Plan
Spp.	Species
STECF	Scientific, Technical and Economic Committee for Fisheries
WFD	Water Framework Directive
WG GES	Working Group on Good Environmental Status
WG DIKE	Working Group on Data, Information and Knowledge Exchange

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

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Appendices



A Mapping of RSC Indicators Against Revised Commission Decision

The following tables summarise the regional indicators relevant to each of the criteria in the revised Commission Decision, split into Part I and Part II as in the Decision. It is based on the information available as of 22 November 2016. Indicators may be subject to revision. If an indicator is allocated to a criterion, this does not imply that all aspects of the criterion are adequately covered by the indicator. Some indicators may require disaggregation or further modification to align to the revised Commission Decision criteria.

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Table A1. Part I: Assessment of predominant pressures and impacts under Article 8(1)(b) MSFD

	Criteria	HELCOM ¹	OSPAR ²	UNEP-MAP ³	BSC ⁴
D2	D2C1	<ul style="list-style-type: none"> Trends in arrival of new non-indigenous species 	<ul style="list-style-type: none"> Rate of new introductions of NIS (II, III, IV) <i>Non-native/invasive mammal presence on island seabird colonies (CI, NP) (OSPAR identifies this under D1 Birds)</i> 	<ul style="list-style-type: none"> Trends in abundance, temporal occurrence, and spatial distribution of non-indigenous species, particularly invasive, non-indigenous species, notably in risk areas (in relation to the main vectors and pathways of spreading of such species in the water column and seabed, as appropriate) (Common Indicator 6) 	<ul style="list-style-type: none"> Number of new introduced non-indigenous species (for each 6 years) Gelatinous macrozooplankton biomass and abundance (relating to NIS <i>Mnemiopsis leidyi</i> and <i>Beroe ovata</i>) <i>Mnemiopsis leidyi</i> biomass
	D2C2				
	D2C3				
	D3C1	<ul style="list-style-type: none"> ICES – Fmsy Brill ICES – Fmsy Cod (2 stocks) ICES – Fmsy Dab ICES – Fmsy Flounder (4 stocks) ICES – Fmsy Herring (5 stocks) ICES – Fmsy Plaice ICES – Fmsy Salmon (2 stocks) ICES – Fmsy Sole ICES – Fmsy Sprat ICES – Fmsy Sea trout ICES – Fmsy Turbot ICES – Fmsy Eel 		<ul style="list-style-type: none"> Fishing mortality (Common Indicator 9) Catch per unit of effort (CPUE) or Landing per unit of effort (LPUE) as a proxy (Common Indicator 11) 	<ul style="list-style-type: none"> Fishing mortality Number and name of stocks below biological safety limits (BSL)
	D3C2	<ul style="list-style-type: none"> ICES – SSB Brill ICES – SSB Cod (2 stocks) ICES – SSB Dab ICES – SSB Flounder (4 stocks) ICES – SSB Herring (5 stocks) ICES – SSB Plaice ICES – SSB Salmon (2 stocks) ICES – SSB Sole ICES – SSB Sprat ICES – SSB Sea trout ICES – SSB Turbot ICES – SSB Eel 		<ul style="list-style-type: none"> Spawning stock biomass (Common Indicator 7) 	<ul style="list-style-type: none"> Stock assessment: total biomass Stock assessment: spawning biomass Catches per unit of effort (CPUE) on surveys Number and name of stocks below biological safety limits (BSL)
	D3C3		The following OSPAR indicators currently evaluate both commercial and non-commercial species. As such they will need to be evaluated for suitability		

Criteria	HELCOM ¹	OSPAR ²	UNEP-MAP ³	BSC ⁴
		against this criterion: <ul style="list-style-type: none"> Fish abundance (Regions II, III) Mean maximum length of demersal fish and elasmobranchs (CI, NP) Proportion of mature fish (CI, NP) Distributional range (CI, NP) Fish distributional pattern (CI, NP) 		
D5		<ul style="list-style-type: none"> Atmospheric and riverine nutrient inputs (II, IV) 		
D5C1	<ul style="list-style-type: none"> Dissolved Inorganic Nitrogen (DIN) Dissolved Inorganic Phosphorus (DIP) Total nutrients 	<ul style="list-style-type: none"> Winter nutrient concentrations (II, III, IV) 	<ul style="list-style-type: none"> Concentration of key nutrients in water column (Common Indicator 13) 	<ul style="list-style-type: none"> TRIX eutrophication index (combines nutrients, chlorophyll and oxygen)* BEAST (Black Sea Eutrophication Assessment Tool): Core set indicators grouped as causes - inorganic nitrogen, inorganic phosphorus (phosphates) Inorganic N, P, Si in the surface layer, end of winter-spring * N_{inorganic}/P_{inorganic} in surface layer
D5C2	<ul style="list-style-type: none"> Chlorophyll-a concentrations 	<ul style="list-style-type: none"> Chlorophyll concentration (II, III, IV) 	<ul style="list-style-type: none"> Chlorophyll-a concentration in water column (Common Indicator 14) 	<ul style="list-style-type: none"> BEAST (Black Sea Eutrophication Assessment Tool): Core set indicators grouped as causes - direct effects - chlorophyll a Chlorophyll-a (seasonal trends for the last 3 years)
D5C3	<ul style="list-style-type: none"> Cyanobacterial bloom index 	<ul style="list-style-type: none"> Species shift/indicator species: Nuisance species <i>Phaeocystis</i> (II) 		<ul style="list-style-type: none"> Biomass of <i>Noctiluca</i> (%)
D5C4	<ul style="list-style-type: none"> Average Secchi depth during summer 			<ul style="list-style-type: none"> Water transparency, where relevant
D5C5	<ul style="list-style-type: none"> Oxygen debt Shallow water oxygen 	<ul style="list-style-type: none"> Concentrations of dissolved oxygen near the sea floor (Regions I, II, IV) 		<ul style="list-style-type: none"> Oxygen saturation level at critical depth: in bottom layer in coastal waters (up to 50 m depth) in late summer Oxygen saturation level at critical depth: for deep water column sigma-T equals to 15,4-15,5 in late summer BEAST (Black Sea Eutrophication Assessment Tool): Core set indicators grouped as causes - indirect effects - bottom oxygen (where available), Secchi.*
D5C6				
D5C7	<ul style="list-style-type: none"> WFD indicators on macrophytes 			<ul style="list-style-type: none"> Macrophytobenthos (EEIc)

	Criteria	HELCOM ¹	OSPAR ²	UNEP-MAP ³	BSC ⁴
	D5C8	<ul style="list-style-type: none"> WFD indicators on macrofauna collated in EUTRO-OPER State of the soft-sediment macrofauna community (BQI) 			<ul style="list-style-type: none"> Macrozoobenthos (M-AMBI)
D6	D6C1	<ul style="list-style-type: none"> Baltic Sea Pressure Index – 'loss of seabed' spatial pressure layer 	<ul style="list-style-type: none"> Area of habitat loss (CI, NP) 		
	D6C2	<ul style="list-style-type: none"> Baltic Sea Pressure Index – 'physical disturbance to seabed' spatial pressure layer 	<ul style="list-style-type: none"> Physical damage of predominant and special habitats (II, III, IV) 		
	D6C3	<ul style="list-style-type: none"> Cumulative impact on benthic biotopes (under development, not available for HOLAS II); in the interim: the Baltic Sea Impact Index will be used – providing spatial presentation of range of impacts, but no evaluation against threshold. 	<ul style="list-style-type: none"> Condition of benthic habitat defining communities (multi-metric indices) (II, III, IV) Size-frequency distribution of bivalve or other sensitive/indicator species (CI, NP) 		
D7	D7C1	<ul style="list-style-type: none"> Qualitative description from Baltic Sea Impact Index 	<ul style="list-style-type: none"> Extent of area affected – physical (CI, NP) 	<ul style="list-style-type: none"> Length of coastline subject to physical disturbance due to the influence of man-made structures (Common Indicator 16) Land use change (CI 25) 	
	D7C2	<ul style="list-style-type: none"> Qualitative description from Baltic Sea Impact Index 	<ul style="list-style-type: none"> Spatial extent of habitats affected (CI, NP) Changes in habitat functions (CI, NP) 	<ul style="list-style-type: none"> Location and extent of the habitats impacted directly by hydrographic alterations (Common Indicator 15) 	
D8	D8C1	<ul style="list-style-type: none"> WFD national chemical status assessments (coastal and territorial waters only) WFD national ecological status assessments (coastal waters only) Contaminant concentrations in water, biota and sediment: <ul style="list-style-type: none"> Hexabromocyclododecane (HBCDD) Metals (Cd, Pb, Hg) Polybrominated biphenyl ethers (PBDE) Polychlorinated biphenyls (PCB) and dioxins and furans Polyaromatic hydrocarbons (PAH) and their metabolites (also relevant to D8C2) TBT and imposex (also relevant to D8C2) 	<ul style="list-style-type: none"> Metal (Hg, Cd, Pb) concentrations in biota (II, III, IV) Metal (Hg, Cd, Pb) concentrations in sediment (II, III, IV) PCB concentrations in biota (II, III, IV) PCB concentrations in sediments (II, III, IV) PAHs concentrations in biota (II, III, IV) PAHs concentrations in sediments (II, III, IV) Organotin concentrations in biota (CI, NP) Organotin concentrations in sediments (II, III, IV) PBDE concentrations in biota (II, III, IV) PBDE concentrations in sediments (II, III, IV) HCB (hexachlorobenzene) 	<ul style="list-style-type: none"> Concentration of key harmful contaminants measured in the relevant matrix (related to biota, sediment, seawater) (Common Indicator 17) 	Standards for priority substances have been proposed for common use in the Black Sea

	Criteria	HELCOM ¹	OSPAR ²	UNEP-MAP ³	BSC ⁴
		<ul style="list-style-type: none"> Perfluorooctane sulphonate (PFOS) Radioactive substances 	<p><i>concentrations in biota (CI, NP) (HCB concentrations in sediment also being considered as a possible future indicator)</i></p> <ul style="list-style-type: none"> <i>HCBD (hexachlorobutadiene) concentrations in biota (CI, NP)</i> <i>HCBD (hexachlorobutadiene) concentrations in sediments (CI, NP)</i> 		
	D8C2	<ul style="list-style-type: none"> TBT and imposex White-tailed eagle productivity (coastal waters only) <i>Reproductive disorders: malformed eelpout and amphipod embryos (FI&SE supplementary indicator)</i> 	<ul style="list-style-type: none"> Imposex/intersex (II, III, IV) <i>Externally visible fish diseases (CI, NP)</i> <i>Lysosomal stability (LMS) (CI, NP)</i> <i>Bile metabolites (of PAHs) (CI, NP)</i> <i>Micronuclei (MN) (CI, NP)</i> <i>EROD (CI, NP)</i> 	<ul style="list-style-type: none"> Level of pollution effects of key contaminants where a cause and effect relationship has been established (Common Indicator 18) 	
	D8C3	<ul style="list-style-type: none"> Operational oil-spills from ships 		<ul style="list-style-type: none"> Occurrence, origin (where possible), extent of acute pollution events (e.g. slicks from oil, oil products and hazardous substances), and their impact on biota affected by this pollution (Common Indicator 19) 	<ul style="list-style-type: none"> Number, volume, location and causes of accidental pollution/spills (from ships) Number, volume and location of illegal pollution/spills (from ships)
	D8C4				
D9	D9C1			<ul style="list-style-type: none"> Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood (Common Indicator 20) Percentage of intestinal enterococci concentration measurements within established standards (Common Indicator 21) 	
D10	D10C1	<ul style="list-style-type: none"> <i>Beach litter (not operational; descriptive approach)</i> <i>Litter on the seafloor (not operational; descriptive approach)</i> 	<ul style="list-style-type: none"> Beach litter (I, II, III, IV) Litter on the sea floor (II, III, IV) 	<ul style="list-style-type: none"> Trends in the amount of litter washed ashore and/or deposited on coastlines (Common Indicator 22) Trends in the amount of litter in the water column including microplastics and on the seafloor Common Indicator 23) 	

	Criteria	HELCOM ¹	OSPAR ²	UNEP-MAP ³	BSC ⁴
	D10C2		<ul style="list-style-type: none"> ▪ <i>Microplastics (CI)</i> 	<ul style="list-style-type: none"> ▪ Trends in the amount of litter in the water column including microplastics and on the seafloor (Common Indicator 23) 	
	D10C3		<ul style="list-style-type: none"> ▪ Fulmar litter ingestion (impact and floating litter) (II) ▪ <i>Ingestion of litter by turtles (IV) (CI)</i> 	<ul style="list-style-type: none"> ▪ Trends in the amount of litter ingested by or entangling marine organisms focusing on selected mammals, marine birds, and marine turtles (CI 24) 	
	D10C4			<ul style="list-style-type: none"> ▪ Trends in the amount of litter ingested by or entangling marine organisms focusing on selected mammals, marine birds, and marine turtles (CI 24) 	
D11	D11C1	<ul style="list-style-type: none"> ▪ <i>Distribution in time and space of loud low- and mid-frequency impulsive sounds (not operational; descriptive approach)</i> 	<ul style="list-style-type: none"> ▪ Impulsive noise (II, III, IV) 	<ul style="list-style-type: none"> ▪ Proportion of days and geographical distribution where loud, low, and mid-frequency impulsive sounds exceed levels that are likely to entail significant impact on marine animals (CI 26) 	
	D11C2	<ul style="list-style-type: none"> ▪ <i>Continuous low frequency anthropogenic sound (not operational; descriptive approach)</i> 	<ul style="list-style-type: none"> ▪ <i>Ambient noise (CI)</i> 	<ul style="list-style-type: none"> ▪ Levels of continuous low frequency sounds with the use of models as appropriate (CI 27) 	

* Indicator may require disaggregation, or includes elements that are not specified in the Commission Decision criteria elements, and therefore might require further modification.

1 Core and pre-core indicators, under consideration for inclusion in HOLAS II included. Indicators in italics are not yet (regionally) operation and development is ongoing with the aim to use in HOLAS II. Candidate indicators are not included.

2 OSPAR regions for which the indicator will be operational for the Intermediate Assessment 2017 are indicated in brackets. Indicators in italics are candidate indicators, not prioritised indicators or indicators without an assessment value.

3 UNEP-MAP indicators shown are agreed common indicator or candidate indicators (CI), which may be revised.

4 BSC indicators are those for annual reporting to the Black Sea Commission. They have been allocated to the revised Commission Decision criteria as closely as possible. It should be noted that Bulgaria and Romania have concerns over the applicability of BSC indicators and thresholds to MSFD objectives and are therefore working on separate common agreed indicators on a bilateral level.

CI Candidate indicator
 NP Not prioritised

Sources: HELCOM, 2016; OSPAR, 2016; UNEP-MAP, 2016; BSC, 2016.

Table A2. Part II: Assessment of essential features and characteristics and current environmental status under of marine waters under Article 8(1)(a) MSFD

	Criteria	HELCOM ¹	OSPAR ²	UNEP-MAP	BSC ³
D1 Birds	D1C1	<ul style="list-style-type: none"> Number of drowned mammals and waterbirds in fishing gear (not operational; descriptive approach) 	<ul style="list-style-type: none"> Marine bird bycatch (CI, NP) 	<ul style="list-style-type: none"> Bycatch of vulnerable and non-target species (Common Indicator 12) 	
	D1C2	<ul style="list-style-type: none"> Abundance of waterbirds in the breeding season (grazing, wading, surface-feeding, pelagic-feeding and benthic-feeding bird species groups) Abundance of waterbirds in the wintering season (grazing, wading, surface-feeding, pelagic-feeding and benthic-feeding bird species groups) 	<ul style="list-style-type: none"> Marine bird abundance (II, III, IV, case study for I) 	<ul style="list-style-type: none"> Population abundance of selected species (related to marine mammals, seabirds, marine reptiles) (Common Indicator 4) 	
	D1C3		<ul style="list-style-type: none"> Breeding status of marine birds (II, III, IV, case study for I) 	<ul style="list-style-type: none"> Population demographic characteristics (body size or age class structure, sex ratio, fecundity rates, survival/mortality rates related to marine mammals, seabirds, marine reptiles) (Common Indicator 5) 	
	D1C4		<ul style="list-style-type: none"> Distribution marine birds (CI, NP)* 	<ul style="list-style-type: none"> Species distributional range (related to marine mammals, seabirds, marine reptiles) (Common Indicator 3) 	
	D1C5				
D1 Mammals	D1C1	<ul style="list-style-type: none"> Number of drowned mammals and waterbirds in fishing gear (not operational; descriptive approach) 	<ul style="list-style-type: none"> Marine mammal bycatch (II) 	<ul style="list-style-type: none"> Bycatch of vulnerable and non-target species (Common Indicator 12) 	<ul style="list-style-type: none"> By-catches: cetaceans
	D1C2	<ul style="list-style-type: none"> Population trends and abundance of seals 	<ul style="list-style-type: none"> Seal abundance and distribution (II)* Cetacean abundance and distribution (II, III, IV)* 	<ul style="list-style-type: none"> Population abundance of selected species (related to marine mammals, seabirds, marine reptiles) (Common Indicator 4) 	
	D1C3	<ul style="list-style-type: none"> Nutritional status of seals Reproductive status of seals 	<ul style="list-style-type: none"> Grey seal pup production (II, III) 	<ul style="list-style-type: none"> Population demographic characteristics (body size or age class structure, sex ratio, fecundity rates, survival/mortality rates related to marine mammals, seabirds, marine reptiles) (Common Indicator 5) 	

	Criteria	HELCOM ¹	OSPAR ²	UNEP-MAP	BSC ³
	D1C4	<ul style="list-style-type: none"> ▪ Distribution of Baltic seals 	<ul style="list-style-type: none"> ▪ Seal abundance and distribution (II)* ▪ Cetacean abundance and distribution (II, III, IV)* 	<ul style="list-style-type: none"> ▪ Species distributional range (related to marine mammals, seabirds, marine reptiles) (Common Indicator 3) 	
	D1C5				
D1 Reptiles	D1C1	N/a		<ul style="list-style-type: none"> ▪ Bycatch of vulnerable and non-target species (Common Indicator 12) 	N/a
	D1C2	N/a		<ul style="list-style-type: none"> ▪ Population abundance of selected species (related to marine mammals, seabirds, marine reptiles) (Common Indicator 4) 	N/a
	D1C3	N/a		<ul style="list-style-type: none"> ▪ Population demographic characteristics (body size or age class structure, sex ratio, fecundity rates, survival/mortality rates related to marine mammals, seabirds, marine reptiles) (Common Indicator 5) 	N/a
	D1C4	N/a		<ul style="list-style-type: none"> ▪ Species distributional range (related to marine mammals, seabirds, marine reptiles) (Common Indicator 3) 	N/a
	D1C5	N/a			N/a
		D1C1		<ul style="list-style-type: none"> ▪ <i>By-catch rates of Chondrichthyes (CI, NP)</i> 	<ul style="list-style-type: none"> ▪ Bycatch of vulnerable and non-target species (Common Indicator 12)
D1 Fish	D1C2	<ul style="list-style-type: none"> ▪ Abundance of key coastal fish species ▪ Abundance of coastal fish key functional groups ▪ Abundance of seatrout spawners and parr ▪ Abundance of salmon spawners and smolt ▪ See also D3C2 	<ul style="list-style-type: none"> ▪ Fish abundance (II, III)* ▪ <i>Conservation status of elasmobranch and demersal bony-fish species (IUCN) (CI)</i> 		
	D1C3 Primary or secondary	<ul style="list-style-type: none"> ▪ See D3C3 	<ul style="list-style-type: none"> ▪ Fish abundance (II, III) ▪ OSPAR EcoQO proportion of large fish (LFI) (II, III) ▪ <i>Mean maximum length of demersal fish and elasmobranchs (CI, case study for II, III, IV)*</i> ▪ <i>Proportion of mature fish (CI, NP)*</i> ▪ <i>Conservation status of elasmobranch and demersal bony-fish species (IUCN) (CI, NP)</i> 		

	Criteria	HELCOM ¹	OSPAR ²	UNEP-MAP	BSC ³
	D1C4 Primary or secondary		<ul style="list-style-type: none"> ▪ <i>Distributional range (CI, NP)*</i> ▪ <i>Fish distributional pattern (CI, NP)*</i> 		
	D1C5 Primary or secondary				
D1 Cephalopods	D1C1	N/a			N/a
	D1C2	N/a			N/a
	D1C3 Primary or secondary	N/a			N/a
	D1C4	N/a			N/a
	D1C5	N/a			N/a
D1 Pelagic habitats	D1C6	<ul style="list-style-type: none"> ▪ Zooplankton mean size and total stock ▪ <i>Seasonal succession of functional phytoplankton groups</i> ▪ <i>Diatom-Dinoflagellate index</i> ▪ <i>Phytoplankton community composition as a foodweb indicator</i> 	<ul style="list-style-type: none"> ▪ Changes of plankton functional types (life form) index Ratio (II, III, IV) ▪ Plankton biomass and/or abundance (II, III, IV) ▪ Changes in biodiversity index(s) (III) 		<ul style="list-style-type: none"> ▪ Phytoplankton biomass (seasonal trends for the last 3 years) (CBD indicator) ▪ Phytoplankton abundance (seasonal trends for the last 3 years) ▪ Max concentration of blooming species ▪ Diatoms/Dinoflagellates biomass ratio (only for spring) ▪ H-Shannon 95 (biomass) ▪ Mesozooplankton biomass (for 3 years) ▪ Mesozooplankton H-Shannon (biomass, abundance) ▪ Gelatinous macrozooplankton biomass and abundance
D1&6 Benthic habitats	D6C4		<ul style="list-style-type: none"> ▪ <i>Area of habitat loss (all pressure) (CI, NP)</i> 	<ul style="list-style-type: none"> ▪ Habitat distributional range to also consider habitat extent as a relevant attribute (Common Indicator 1)* 	
	D6C5	<ul style="list-style-type: none"> ▪ <i>Condition of benthic habitats</i> ▪ Status of the soft bottom macrozoobenthos (BOI) 	<ul style="list-style-type: none"> ▪ <i>Typical species composition (CI, NP)</i> ▪ Condition of benthic habitat defining communities. (Multi-metric indices) (II, III, IV) ▪ <i>Size-frequency distribution of bivalve or other sensitive/indicator species (CI, NP)</i> 	<ul style="list-style-type: none"> ▪ Condition of the habitat's typical species and communities (Common Indicator 2) 	

	Criteria	HELCOM ¹	OSPAR ²	UNEP-MAP	BSC ³
D4	D4C1 Diversity	NB linkage of HELCOM core indicators with D4 criteria has not yet been discussed in the HELCOM expert community. <ul style="list-style-type: none"> ▪ <i>Status of the soft-bottom macrozoobenthos (BQI)</i> ▪ <i>Phytoplankton community composition as a foodweb indicator</i> 	<ul style="list-style-type: none"> ▪ Changes in diversity indices (III) 		<ul style="list-style-type: none"> ▪ H-Shannon 95 (biomass) (phytoplankton) ▪ Mesozooplankton H-Shannon (biomass, abundance)
	D4C2 Balance of abundance between guilds	NB linkage of HELCOM core indicators with D4 criteria has not yet been discussed in the HELCOM expert community.	<ul style="list-style-type: none"> ▪ Changes of plankton functional types (Lifeform) index ratio (II, III, IV) ▪ Plankton biomass/abundance (II, III, IV) ▪ Changes in average trophic level of marine predators (cf MTI) (IV) ▪ <i>Biomass, species composition and spatial distribution of zooplankton (CI, NP)</i> ▪ <i>Fish biomass and abundance of dietary functional groups (CI, NP)</i> ▪ <i>Biomass trophic spectrum (CI, NP)</i> 		
	D4C3 Size distribution	NB linkage of HELCOM core indicators with D4 criteria has not yet been discussed in the HELCOM expert community.	<ul style="list-style-type: none"> ▪ Size composition in fish communities (LFI) (II, III, IV) ▪ OSPAR EcoQO proportion of large fish (LFI) ▪ Changes of plankton functional types (Lifeform) index ratio (II, III, IV) ▪ <i>Size-frequency distribution of bivalve or other sensitive/indicator species (CI, NP)</i> 		
	D4C4 Productivity	NB linkage of HELCOM core indicators with D4 criteria has not yet been discussed in the HELCOM expert community.	<ul style="list-style-type: none"> ▪ <i>Reproductive success of marine birds in relation to food availability (CI, NP)</i> ▪ <i>Production of phytoplankton (case studies for regions II, III, IV)</i> ▪ <i>Ecological Network Analysis (diversity (CI, NP)</i> 		<ul style="list-style-type: none"> ▪ Phytoplankton abundance (seasonal trends for the last 3 years) ▪ Diatoms/Dinoflagellates biomass ratio (only for spring) ▪ Mesozooplankton biomass (for 3 years) ▪ Gellatinous macrozooplankton biomass and abundance

	Criteria	HELCOM ¹	OSPAR ²	UNEP-MAP	BSC ³
<i>Those in italics have been added from an EEA compilation of RSC indicators and may be subject to revision.</i>					
* Indicator may require disaggregation, or includes elements that are not specified in the Commission Decision criteria elements, and therefore might require further modification.					
1	Core and pre-core indicators, under consideration for inclusion in HOLAS II included. Indicators in italics are not yet (regionally) operational and development is ongoing with the aim to use in HOLAS II. Candidate indicators are not included.				
2	OSPAR regions for which the indicator will be operational for the Intermediate Assessment 2017 are indicated in brackets. Indicators in italics are candidate indicators, not prioritised indicators or indicators without an assessment value.				
3	BSC indicators are those for annual reporting to the Black Sea Commission. They have been allocated to the revised Commission Decision criteria as closely as possible. It should be noted that Bulgaria and Romania have concerns over the applicability of BSC indicators and thresholds to MSFD objectives and are therefore working on separate common agreed indicators on a bilateral level.				
CI	Candidate indicator				
NP	Not prioritised				

Sources: HELCOM, 2016; OSPAR, 2016; UNEP-MAP, 2016; BSC, 2016.

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B Lists of Criteria Elements, Threshold Values and Integration Rules

The following tables summarise the requirements for establishing criteria elements, threshold values and criteria integration rules under the revised Commission Decision, split into Part I and Part II as in the Decision. Primary criteria are shown in **bold**; secondary criteria are shown in normal font.

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Table B1. Part I: Assessment of predominant pressures and impacts under Article 8(1)(b) MSFD

	Criteria	List of elements	Threshold values	Criteria integration rules
D2	D2C1 Primary	Defined in Decision	Establish: (sub)region	Used to assess D2
	D2C2 Secondary	Establish: (sub)region	None	Contributes to D2C3
	D2C3 Secondary	Establish: (sub)region	Establish: (sub)region	Contributes to D1 Species, D1 Pelagic habitats and D1 & D6 Benthic habitats
D3	D3C1	Establish: (sub)region	Existing: consult scientific bodies in accordance with Reg (EU) No 1380/2013	Establish: Union level
	D3C2	Establish: (sub)region	Existing: consult scientific bodies in accordance with Reg (EU) No 1380/2013	Establish: Union level
	D3C3	Establish: (sub)region	Establish: (sub)region in accordance with Reg (EU) No 1380/2013	Establish: Union level
D5	D5C1	Establish: (sub)region	Coastal waters: Existing: Directive 2000/60/EC Beyond coastal waters: Establish: (sub)region consistent with Directive 2000/60/EC	Coastal waters: in accordance with Directive 2000/60/EC Beyond coastal waters: Establish: where possible at Union level, but at least at regional or subregional level
	D5C2	Defined in Decision	See D5C1	See D5C1 Contributes to D1 Pelagic habitats
	D5C3	Defined in Decision	Establish: (sub)region	See D5C1 Contributes to D1 Pelagic habitats
	D5C4	Defined in Decision	See D5C1	See D5C1 Contributes to D1 Pelagic habitats and D1 & D6 Benthic habitats
	D5C5	Defined in Decision	See D5C1	See D5C1 Contributes to D1 & D6 Benthic habitats
	D5C6	Defined in Decision	See D5C1	See D5C1 Contributes to D1 & D6 Benthic habitats
	D5C7	Defined in Decision	See D5C1	See D5C1 Contributes to D1 & D6 Benthic habitats
	D5C8	Defined in Decision	See D5C1	See D5C1 Contributes to D1 & D6 Benthic habitats
D6	D6C1	Defined in Decision	None	Used to assess D6C4 and D7C1
	D6C2	Defined in Decision	None	Used to assess D6C3
	D6C3	As used for benthic habitats under D1 & D6 (see Part II)	Establish: (sub)region	Contributes to D6C5
D7	D7C1	Defined in Decision	None	Used to assess D7C2
	D7C2	As used for benthic habitats under D1 & D6 (see Part II)	Establish: (sub)region	Contributes to D6C5

	Criteria	List of elements	Threshold values	Criteria integration rules
D8	D8C1	<u>Coastal and territorial waters:</u> As used in WFD (those with an EQS and RBSPs) Additional contaminants: establish: (sub)region <u>Beyond territorial waters:</u> As for coastal waters if appropriate; Additional contaminants, establish: (sub)region	As defined under WFD, or if no value is set, then establish: (sub)region	Contributes to D8
	D8C2	Establish: (sub)region	Establish: (sub)region	Use in D8 assessment, establish: (sub)region Contributes to D1 Species and D1 & D6 Benthic habitats
	D8C3	Defined in Decision ('significant' still requires definition)	None	Contributes to D8 Triggers assessment of D8C4
	D8C4	As used for species groups under D1 and benthic habitats under D1 & D6 (see Part II)	None	Establish: (sub)region
D9	D9C1	As listed in Reg (EC) No 1881/2006. Additional contaminants, establish: (sub)region	As defined in Reg (EC) 1881/2006 Additional contaminants, establish: (sub)region	None
D10	D10C1	Defined in Decision (Member States may define further subcategories)	Establish: Union level, taking into account (sub)regional specificities	Establish: Union level
	D10C2	Defined in Decision	Establish: Union level, taking into account (sub)regional specificities	Establish: Union level
	D10C3	Establish: (sub)region	Establish: (sub)region	Establish: Union level Contributes to D1 Species
	D10C4	Establish: (sub)region	Establish: (sub)region	Establish: Union level Contributes to D1 Species
D11	D11C1	Defined in Decision	Establish: Union level, taking into account (sub)regional specificities	Establish: Union level Contributes to D1 Species
	D11C2	Defined in Decision	Establish: Union level, taking into account (sub)regional specificities	Establish: Union level Contributes to D1 Species

Table B2. Part II: Assessment of essential features and characteristics and current environmental status under of marine waters under Article 8(1)(a) MSFD

	Criteria	List of elements	Threshold values	Criteria integration rules
D1 Birds	D1C1	Establish: (sub)region	Establish: (sub)region	Contributes to D1C2
	D1C2	Establish: (sub)region	Establish: (sub)region	Establish: Union level, taking into account (sub)regional specificities (for species' status, and for species group status)
	D1C3		Establish: (sub)region	
	D1C4		Establish: (sub)region	
	D1C5		None	
D1 Mammals	D1C1 Primary or secondary	Establish: (sub)region	Establish: (sub)region	
	D1C2	Establish: (sub)region	Establish: (sub)region Consistent with Directive 92/43/EEC	<u>Species status:</u> the method provided under Directive 92/43/EEC <u>Species group status:</u> Establish: Union level, taking into account (sub)regional specificities
	D1C3		Establish: (sub)region	
	D1C4		Establish: (sub)region Consistent with Directive 92/43/EEC	
	D1C5		None	
D1 Reptiles	D1C1 Primary or secondary	Establish: (sub)region	Establish: (sub)region	
	D1C2	Establish: (sub)region	Establish: (sub)region Consistent with Directive 92/43/EEC	<u>Species status:</u> the method provided under Directive 92/43/EEC <u>Species group status:</u> Establish: Union level, taking into account (sub)regional specificities
	D1C3		Establish: (sub)region	
	D1C4		Establish: (sub)region Consistent with Directive 92/43/EEC	
	D1C5		None	
D1 Fish	D1C1 Primary or secondary	Establish: (sub)region	Establish: (sub)region	
	D1C2	Establish: (sub)region	Establish: (sub)region Consistent with Directive 92/43/EEC where appropriate	<u>Species status:</u> For species under Directive 92/43/EEC: the method provided under that Directive For commercially exploited species status: as assessed under Descriptor 3 Other species: establish: Union level, taking into account (sub)regional specificities <u>Species group status:</u> Establish: Union level, taking into account (sub)regional specificities
	D1C3 Primary or secondary		Establish: (sub)region	
	D1C4 Primary or secondary		Establish: (sub)region Consistent with Directive 92/43/EEC where appropriate	
	D1C5 Primary or secondary		None	
D1 Cephalopods	D1C1 Primary or secondary	Establish: (sub)region	Establish: (sub)region	
	D1C2	Establish: (sub)region	Establish: (sub)region	<u>Species status:</u> For commercially exploited species status: as assessed under Descriptor 3 Other species: establish: Union level, taking into account (sub)regional specificities <u>Species group status:</u> Establish: Union level, taking into account (sub)regional specificities
	D1C3 Primary or secondary		Establish: (sub)region	
	D1C4		Establish: (sub)region	
	D1C5		None	

	Criteria	List of elements	Threshold values	Criteria integration rules
D1 Pelagic habitats	D1C6	Defined in Decision Additional habitat types, establish: (sub)region	Establish: (sub)region	To level of broad habitat type
D1&6 Benthic habitats	D6C4	Defined in Decision Other habitat types. Establish: (sub)region	Establish: Union level, taking into account (sub)regional specificities	<u>Status of the habitat type</u> establish: Union level
	D6C5		Establish: Union level, taking into account (sub)regional specificities (for adverse effects on condition, and for the maximum allowable extent of adverse effects)	
D4	D4C1	Establish: (sub)region	Establish: (sub)region	None
	D4C2		Establish: (sub)region	None
	D4C3		Establish: (sub)region	None
	D4C4		Establish: (sub)region	None



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