ECOREGION Introduction and general advice
SUBJECT EU request to ICES for review of the Marine Strategy Framework Directive: Descriptor 4 – Foodwebs

Introduction

Preparatory to a revision of the Decision on criteria and methodological standards on good environmental status of marine waters (Commission Decision 2010/477/EU) the European Commission has set up a process to produce a science-based evaluation and amendment proposal for the descriptors described in the Decision.

ICES was asked to facilitate this process regarding descriptors 3 (Populations of commercially exploited fish and shellfish), 4 (Foodwebs), 6 (Seafloor integrity), and 11 (Energy, including underwater noise). ICES has in this respect received a request from the European Commission:

The MSFD Committee discussed in 2013 and concluded an approach and an outline for the process of a review and possible revision of Commission Decision on criteria and methodological standards on good environmental status of marine waters (2010/477/EU) and of MSFD (2008/56/EC) Annex III.

The Commission (DG ENV and JRC) in association with ICES will organise and steer the process. At technical level a systematic analysis of the current GES Decision needs to be carried out reviewing all parts of the Decision, taking into account latest scientific and other developments. The review will aim to define GES criteria more precisely, including setting quantifiable boundaries for the GES criteria where possible and specifications and standardised methods for GES assessments in particular as regards temporal and spatial aggregation. The first phase of the exercise is scheduled from May to October 2014. Subsequent work will be decided then.

ICES will be responsible for the relevant work related to the review of the descriptors D3 (fisheries), D4 (food webs), D6 (seafloor integrity) and D11 (noise). For D11 the work will build on the continued work of the Technical Group on Noise (TG Noise).

ICES is therefore requested to provide an offer covering the following tasks for the first phase of the GES review:

a) prepare draft documents for each of the above-mentioned descriptors (see outline enclosed);
b) organise open workshops with experts from all interested EU member states to consult of the draft documents;
c) provide recommendations for revision with a proposed draft text with changes and the rational for these changes to the Commission;
d) provide feedback to WG GES (and the preparatory drafting group) which is the forum to oversee the organisation and planning of the technical review process.

ICES will also have to participate and contribute actively in the internal coordination process with the JRC, the EEA and DG ENV.

The process to produce the amendment text regarding Descriptor 4 was:

- A template for evaluation and amendment proposal was provided by the European Commission.
- ICES established a core group of experts, based on personal expertise, geographical coverage, and insights into the MSFD framework.
- The core group of experts produced a background document discussing the descriptor from a scientific perspective.
- An open workshop was conducted where the background document was discussed. The report of this workshop is available as a background document (ICES, 2014).
- The core group of experts finalized the draft text for the amendment, based on the outcomes of the workshop.

- The draft text for amendment was posted to the ICES Advisory Committee (ACOM) for information and comments.
- The amendment text was then finalized by the core group of experts and delivered to the European Commission.

The outcome of this process is enclosed and will be published by the European Commission.

Sources

EU. 2010. Commission Decision on criteria and methodological standards on good environmental status of marine waters. Commission Decision 2010/477/EU of 1 September 2010. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:232:0014:0024:EN:PDF.

ICES. 2014. Report of the Workshop to review the 2010 Commission Decision on criteria and methodological standards on good environmental status (GES) of marine waters; Descriptor 4 Foodwebs, 26–27 August 2014, ICES Headquarters, Denmark. ICES CM 2014\ACOM:60. 23 pp

Possible approach to amend Decision 2010/477/EC

Descriptor 4: Foodwebs

Author	Version	Date
Milieu-Nature Bureau	V1	09.05.2014
David Connor	V1.2	30.05.2014
ICES D4 science team	V2	15.08.2014
ICES D4 science team (post WK)	V3	30.09.2014

Annex I

Possible approach to amend Decision 2010/477/EC

Descriptor 4: Foodwebs

Descriptor 4: Foodwebs *Good Environmental Status for Descriptor 4.*

All elements of the marine foodwebs, 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 (Annex I of the MSFD).

1. Approach

Definition of the Descriptor

The descriptors D1 (Biodiversity *per se*), D2 (Non-indigenous species), D4 (Foodwebs), and D6 (Seafloor integrity) are frequently addressed together as the "biodiversity theme." They are all influenced by multiple pressures and impacts (as listed in MSFD Annex 3), in addition to the natural variations in the ecosystems. There is significant overlap of the data requirements for each of these descriptors when addressing the state and/or alteration of biodiversity. Furthermore, D3 (Commercial fish and shellfish) is strongly linked to the biodiversity theme, especially in relation to the status of fish stocks and how these influence foodwebs. The Directive separates these issues into separate GES descriptors.

Descriptor 4 aims to cover the structure and function of marine foodwebs, including the abundance and productivity of species/groups at different trophic levels. Usually environmental influence has a high impact on foodweb structure and function. Current scientific understanding is such that anthropogenic pressure is difficult to distinguish from the environmentally influenced variability. This difficulty creates many challenges to monitor and assess GES for this descriptor as the identification of simple pressure–state relationships is beyond current understanding and available tools[1].

The following aspects of the Annex I definition are defined in further detail:

'All elements' considers all components of the foodwebs, 'i.e. all trophic and functional groups, comprising either one or several species. This potentially includes all living organisms and non-living organic components'[2].

'Foodwebs' are defined as 'networks of feeding interactions between consumers and their food'[3].

'Reproductive capacity' is defined as the 'maintenance of fertility and avoidance of reduction in population genetic diversity.'

'Normal abundance' – judgements of what normal abundances are will need to be determined as foodwebs have already been adversely affected by humans. The thresholds set for indicators should ensure that the populations of selected foodweb components occur at levels that are within acceptable ranges to ensure their long-term viability. This means that thresholds should be sufficient to maintain the full reproductive capacity of selected components.

[1] ICES WKGMSFD D4 report 2014.
[2,3] ICES/JRC Task Group 4 (TG 4), 2010.

'To the extent that they are known' – This has been interpreted by TG 4 as follows: 'While examination of foodwebs should in principle include "all elements", for practical purposes it would include only those foodweb components that can effectively be sampled by established robust methods of monitoring'[4].

Linkages with existing relevant EU legal requirements, standards, and limit values

There are few tools or frameworks in current use that focus specifically on foodwebs or trophic interactions between species. The **Habitats Directive (HD), Birds Directive (BD),** and the **Water Framework Directive (WFD)** do not explicitly refer to foodwebs, but state that the structure and function of habitats and ecosystems need to be restored and/or conserved, thus implicitly requiring the maintenance of healthy foodwebs. Indicators on the structural components (taxonomic groups) of the ecosystem such as the abundance/biomass of selected species at different trophic levels are used for assessments within all three directives (e.g. phytoplankton, macrobenthos for WFD, annexed species for BD and HD)[5].

The reformed **Common Fisheries Policy** makes specific reference to the trophic linkages between fish stocks in its requirement for multiannual plans. These are to cover fisheries exploiting several stocks and, in the case of mixed fisheries or where the dynamics of stocks impact on one another, to take into account knowledge about the interactions between fish stocks, fisheries, and marine ecosystems.[6]

Linkages with international and RSC norms and standards

Standards related to biodiversity in general are less well-developed at EU and regional levels, compared to, for instance, Descriptor 3 (Commercial fisheries), Descriptor 5 (Eutrophication), and Descriptor 8 (Contamination).

HELCOM is advanced in developing and agreeing on D4-related methodologies[6]. The HELCOM CORESET project developed a set of core indicators for biodiversity along with quantitative targets to allow an assessment of the status of the Baltic Sea in relation to the biodiversity ecological objectives[7]: 20 core indicators have been developed for biodiversity, covering a range of aspects of D1, D4, and D6. A number of HELCOM indicators relate directly to the Commission Decision indicators for D4, such as the indicator on the "Abundance of key functional fish groups" (related to Indicator 4.3.1) or the "Proportion of large fish in the community" (related to Indicator 4.2.1).

OSPAR Ecological Quality Objectives (EcoQOs) for seabirds and fish communities in the North Sea – and other applications elsewhere in Europe – have been developed as tools to help OSPAR fulfil its commitment to apply the ecosystem approach. In relation to Descriptor 4, the EcoQO on the proportion of large fish, which describes the proportion by weight of fish above a selected size threshold in the fish community in a region or subregion, covers fully Indicator 4.2.1 "Large fish (by weight)." This EcoQO therefore covers partially Criterion 4.2 on the proportion of selected species at the top of the foodweb. The JRC states that: "the OSPAR EcoQO (Proportion of large fish), provides a protocol that can be applied in other regional seas"[8]. Two other EcoQOs are related to Criterion 4.1, namely "Seal population size and pup production" and "Seabird survival/breeding success and the availability of key prey species". A set of D4 indicators are under development as part of OSPAR's common MSFD biodiversity indicators.

Both the **Black Sea** and the **Barcelona Conventions** have not agreed on, or just started a process to develop common indicators related to MSFD biodiversity descriptors (D4 included), but these are not yet operational.

Definition of GES

[4] ICES/JRC Task Group 4, 2010.
[5] IA JRC, 2011.
[6] EU Regulation 1380/2013.
[6] IA JRC, 2011.
[7] Helcom Coreset final report, 2013.
[8] ICES/JRC Task Group 4, 2010.

The current interpretation of the descriptor assesses whether the certain elements that make up the foodweb are present in a way that allow the ecosystem to be considered in good environmental status. D4 is a descriptor of state. The assessment in the current Decision is based on productivity, the abundance of top predators, and the abundance and distribution of other functionally important groups/species in the foodweb. To achieve GES, the pressures from human activities should be managed in order to ensure the long-term abundance of the species in the foodweb and the retention of their full reproductive capacity. This poses a major challenge as scientific understanding is such that anthropogenic pressure is difficult to distinguish from the environmentally influenced variability. In the absence of strong indicators reflecting pressure–state relationships, the indicators of D4 should be treated as surveillance indicators (for monitoring change in the foodweb).

The "climate sensitivity" for D4 (or criteria/indicators)

Marine foodwebs are extremely closely linked to natural variability. This makes Descriptor 4 particular sensitive to climate change as the changing climate superimposes further trends onto prevailing natural conditions. Both structure and function can be influenced by these shifts, thus perturbing the ability to distinguish whether changes are climate induced or resulting from anthropogenic activity. Therefore it is likely that D4, and associated considerations of GES, are very sensitive to climatic trends in a region.

2. Analysis of the implementation process

GES definition

According with the Commission Staff Working Document 2014[9], all Member States who have reported have defined GES for Descriptor 4. Only two Member States were judged to have an adequate definition of GES, six were found to have a partially adequate definition whilst eight were found to be inadequate. Four Member States have not defined GES for this descriptor. The definitions provided applied to their entire marine waters, with one exception where a Member State makes a minor differentiation between its sub-regions.

The definitions vary enormously in their content and level of detail; most were qualitative and many were rather vague, lacking definitions of key terms used or specificity as to which elements of food/foodwebs were addressed.

Most Member States have referred to specific foodweb components in their GES definition, sometimes in addition to defining if for all foodweb components. In the Baltic region, most Member States have put an emphasis on fish communities. Most Member States referred to components such as 'key' species or 'functional groups', and/or to 'top predators' or 'species at the top of the foodweb'. Very few Member States included in their GES definitions specific species or habitats as indicators of change. Indicator species include the harbour porpoise and the harbour seal and indicator habitats include *Posidonia* meadows. Only three Member States included a reference to the pressures of foodweb components, in particular fisheries.

Criterion 4.1: Productivity (production per unit biomass) of key species or trophic groups

Three Member States have referred to energy transfers between trophic levels in their GES definition. Several Member States have covered Criterion 4.1 using metrics for the reproductive performance (success, ability, rate) of birds, marine mammals, etc., by using the biomass and abundance of higher trophic-level species and/or the structure of populations of main trophic groups.

Criterion 4.2: Proportion of selected species at the top of foodwebs

Most Member States have covered Criterion 4.2, although there was a large variation regarding the methodological approaches that were applied. The Indicator 4.2.1 "Large fish (by weight)" was reported by a few Member States. In the Mediterranean, three Member States have indicated that for Indicator 4.2.1 they will use

[9] European Commission, 2014. Staff working document Accompanying the document "The first phase of implementation of the Marine Strategy Framework Directive (2008/56/EC) – The European Commission's assessment and guidance".

the same threshold, requiring the weight of large fish caught by research vessels that are above a threshold length "Lcut" to be above a percentage of the total weight "Wlim". In other marine regions, there is no similar coherence in the thresholds used.

Criterion 4.3 Abundance/distribution of key trophic groups/species

The approaches for addressing Criterion 4.3 and the associated indicators varied greatly across the Member States. A few Member States considered only higher trophic levels; others covered all trophic levels, including plankton. Reference to pressures in the GES definition (e.g. bycatch, eutrophication) was made by only a very small number of Member States. The JRC In-depth report identified that Indicator 4.3.1 (Abundance trends of functionally important selected species and functional groups) was reported almost twice as frequently as indicators 4.2.1 and 4.1.1.

Regional coherence descriptor

The level of coherence for Descriptor 4 is low in the Northeast Atlantic, Mediterranean, and Baltic regions. In the Black Sea region, neither of the two Member States has defined GES for Descriptor D4. To improve coherence, the Commission Report[10] suggests that further scientific and methodological developments should occur at the regional level to improve the possibilities for setting GES and environmental targets, and also to consider a more holistic setting of GES through integrating Descriptor 4 with other descriptors, particularly descriptors 1 and 6.

Member Country good practices

A few Member States included specific species as indicators of change in their GES definition, including the harbour porpoise and the harbour seal. Some Member States have included a reference to the pressures on foodweb components, in particular fisheries (e.g. bycatch and discards). Some Member States have also included quantitative threshold values for certain criteria/ indicators/ species. Three Member States refer to energy transfers between trophic levels in their GES definition. Three Member States from the same region (Mediterranean) have defined the same threshold for Indicator 4.2.1, requiring the weight of large fish caught by research vessels that are above a threshold length ("Lcut") to be above a percentage of the total weight ("Wlim"). One Member State included a condition related to recycling processes of organic matter for the achievement of GES.

Identification of issues arising from the application of the current Decision, including those identified by the Article 12 assessment

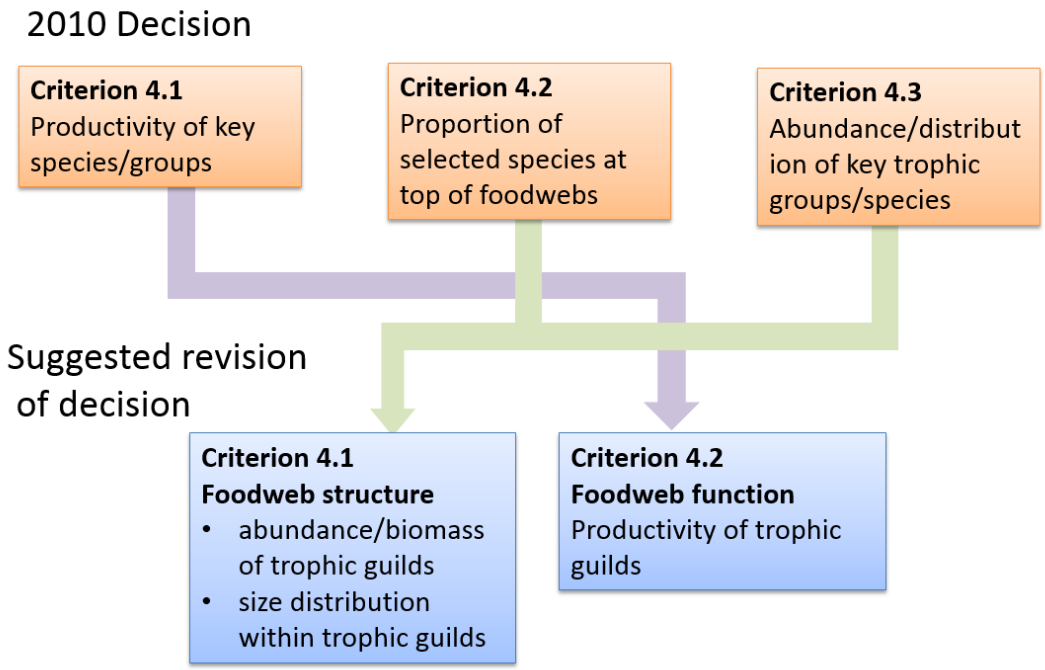
1) Need to set minimum requirements.
2) Need to increase integration levels between D4 and EU legislation.
3) Need for further scientific and methodological developments to improve the possibilities for setting GES and environmental targets, both at the EU and the regional level.

[10] European Commission, 2014. Staff working document, accompanying the document "The first phase of implementation of the Marine Strategy Framework Directive (2008/56/EC) – The European Commission's assessment and guidance"

3. Analysis of the current text of the Decision

- **To be kept in the Decision, in accordance with the mandate provided by the Directive**

A revision of the criteria is necessary to provide a closer relation to the important aspects of foodwebs as described in the Directive and to create a simpler decision. The proposal is to merge the existing current three D4 criteria to just two criteria (4.1 Structure and 4.2 Function of foodwebs). This is based on the current state of scientific understanding and a pragmatic approach to ongoing monitoring programmes. The categorization of foodwebs using taxonomy should be removed from the Decision and replaced with the concept of trophic guilds, meaning that the criteria should be applied across specific trophic guilds. The new Criterion 4.1 Structure should be subdivided into biomass of guilds over time and size structure within those guilds.



It is therefore suggested that the Decision text for Descriptor 4 be changed to:

4.1 Foodweb structure – Abundance/biomass of, and size distribution within trophic guilds.

4.2 Foodweb function – Productivity of trophic guilds.

- **To be taken out of the Decision and included in guidance document**

The guidance document should clarify:

- The combining of the 2010 Decision D4.2 and D4.3 into the new Decision D4.1, with associated explanation of the two new criteria.

- The concept of "trophic guild" and the indicative list of trophic guilds[11]. This is important as the guild approach is different from the taxonomic approach although it relies on almost identical monitoring information.
- The recommendation that not all trophic guilds in each ecosystem need to be assessed but that, by region, a minimum of at least three trophic guilds should be monitored. Existing monitoring programmes and many proposed indicators can already provide the majority of the information requirements for these criteria (biomass and size of three trophic guilds and productivity of the foodweb). Of the minimum requirement of three trophic guilds per region, a maximum of one should be an exclusive fish guild.
- The choice of trophic guilds is expected to reflect regional differences in priorities and ecosystem dynamics.
- Methodological standards for defining GES for D4.

➢ **Outdated**

The following parts of the Decision refer to the state of knowledge prior to the first cycle of implementation of the Directive. Following the first initial assessment and the development of the monitoring programmes, it could be assumed that they are not needed anymore.

The criteria are re-ordered to two issues: structure and function. The specification of indicators within the criteria descriptions of the decision are moved to the guidance document.

4. The Issues

Foodwebs characterized by structure and by function

The Task Group 4 report, as well as the recent ICES D4 advice, have proposed that D4 criteria should cover foodweb structure and function. The rationale for this is:

- A foodweb depicts feeding connections in an ecological community.
- Structure – the manner in which the elements or parts of something are organized.
- Function – the way something works or operates.

Foodweb structure and function are closely linked because a "foodweb" is an abstract concept that summarizes myriads of events. What we want to maintain (or restore) is function, bringing food to all consumers; but the way the web works is also embedded in its structure. If transfer is efficient there is much consumer biomass. If structure is loose there is variability in transfer. There are several ways we understand "structure" in a foodweb. It may be the relative abundances of the web components; or the way they are connected. The former might be something we feel able to estimate; that is, an attribute that provides good candidate indicators. Under some hypotheses, this structure also provides us with information about connections, and the transfer function.

There are aspects of function that cannot be captured by structure indicators. For example, a given structure might exist and be consistent with different rates of flow between components. Also, owing to delays in propagating perturbations across foodwebs, changes in structure caused by alteration to functions may take time. Therefore, criteria are needed for both attributes. The criteria must be complementary to increase the likelihood that they will inform of change and stimulate the need for action.

[11] ICES. 2014. Report of the Workshop to review the 2010 Commission Decision on criteria and methodological standards on good environmental status (GES) of marine waters; Descriptor 4 Foodwebs, 26–27 August 2014, ICES Headquarters, Denmark. ICES CM 2014\ACOM:60. 23 pp.

The 2008 Directive wording for D4 "capable of ensuring long-term abundance and the retention of their full reproductive capacity" is in essence about maintaining resilience (the ability to recover from perturbations). Resilience of a foodweb might depend on many of its attributes, so that any structure or function indicator can be considered an indicator of resilience, but it may not be sufficient to maintain this indicator at a GES level to ensure that the foodweb remains resilient. Further studies are needed to investigate this aspect, but the current knowledge is insufficient to suggest appropriate indicators of resilience besides those related to structure and function.

Trophic guilds and foodwebs

It would be almost impossible to monitor and assess foodweb structure and function without considering trophic guilds. The foodweb is complex not only in structure but also in function. To monitor the degree to which it is affected by management therefore requires us to condense information on foodweb status. This is most appropriately done by dividing the structure and function into compartments which share common structural or functional aspects. For the foodweb, such compartments can be trophic guilds such as fish benthivores, fish planktivores, filter feeding benthos, or omnivorous zooplankton. The compartments can be classified as more or less important, depending on the services they supply to other compartments. The distinction of a functional guild from a taxonomic group overlaps with Criterion D1.7 (Ecosystem structure) although it is subtly different because it is concerned with function within the ecosystem (including goods and services) rather than the group's "position" within the ecosystem structure.

Descriptor 4 and criteria in relation to state/pressure

Descriptor 4 is classified as a state descriptor (see common understanding document). There are links between some elements of marine foodwebs and human pressures, such as primary production relating to the input of nutrients or fishing in relation to the abundance and distribution of forage fish. Overall, however, the relationship between marine foodwebs and human pressures is complex and mainly indirect. Environmental influence has a high impact on foodweb structure and function. Current scientific understanding is such that anthropogenic pressure is difficult to unequivocally distinguish from the environmentally influenced variability. In the absence of strong indicators reflecting pressure–state relationships, the indicators of D4 should be treated as surveillance indicators (for monitoring change in the foodweb).

Part II

5. GES criteria (in accordance with Art. 9.3)

The combination of GES criteria for D4 should reflect that proposed indicators are currently surveillance indicators of systems with high natural variation. Thus they track marine foodwebs, monitoring whether changes are happening and whether these changes are out of bounds. Marine foodwebs react to pressures that are already documented in other descriptors, including fishing, contaminants, and eutrophication as well as natural drivers such as the environment. This complicates the construction of a joint GES criterion for D4.

"One out, all out" was considered appropriate at the criterion level. Hence, there can only be GES of D4 if both structure and function are at GES. However, the effect of the "one out, all out" method within each criterion would likely be a permanent state of D4 outside GES, with management action unlikely to succeed in bringing the indicator inside GES. This might be counterproductive as the perception of an indicator which is always outside bounds of management action will likely lead to ignoring the issues which can be addressed through management.

The surveillance indicators that will feed into criteria 4.1 and 4.2 exhibit large variation due to environmental conditions and potential long time lags. As reference points are set from historical observations, falling outside these is not necessarily a danger to the foodweb (e.g. rebuilding predatory fish stocks) and even changes which are not outside the boundary of GES may be required to elicit responses if several indicators are persistently approaching their limits. A more prescribed framework needs to be developed on how to determine GES of D4, with input from policy-makers and managers to identify the preferred interpretation of GES of D4.

6. GES methodological standards (in accordance with Art. 9.3)

Methodological standards for defining GES should describe a state (from past or present) with prescribed bounds based on our known experience of natural variability in that foodweb's state. Movement beyond those bounds should be seen as leaving GES, and an investigation into the cause or the change in GES status should, when relevant, trigger a more precautionary management.

GES methodological standards should follow best practice principles in both the definition of indicators and of the GES reference levels within which GES is achieved. Two aspects are particularly relevant for D4 indicators; the interpretation of the precautionary principle for surveillance indicators, and the interpretation of the term 'to the extent that they are known'.

Interpretation of the precautionary principle for surveillance indicators

Drawing on experience from the precautionary framework of ICES, limit reference points to define GES should be set to define the border beyond which serious and irreversible harm to foodweb structure or functioning has been observed. Serious and irreversible harm can be identified in several ways, but the most frequent interpretation is that of a break point beyond which dependent functions in the foodweb are affected. In cases where no breakpoint is observed, periods identified as having undesirable indicator levels can be used to set reference points. In cases where no harm or undesirable periods have been observed, limit reference points could be identified as the lowest and/or highest observed value in the observed data series. This does not mean that environmental status may not be good outside this range, but rather that knowledge of what would happen beyond these limits is unavailable. In a management cycle, management procedures are often required to ensure that there is low probability of unknowingly falling outside the desirable area (outside GES). However, when the link with direct human pressures is less direct, as is often the case with foodweb indicators, it is unclear what the acceptable probability of falling outside GES is. Even under perfect management, it is unclear which proportion of surveillance indicators is likely to be incompatible with GES due to natural variation alone.

Interpretation of the term 'to the extent that they are known'

A strict interpretation of the requirement for all elements of the marine foodwebs to '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' would indicate a requirement to monitor all elements of the foodweb, an impractical and unfeasible task. However, the term 'to the extent they are known' may be interpreted as leaving the option that not knowing about the foodweb automatically leads to GES. This is an equally unacceptable interpretation. A balance between the two extremes seems to be the most appropriate way forward. When possible, the best available knowledge of foodwebs should be used, but the lack of detailed knowledge should not be an excuse for not producing indicators of D4. Often selected key guilds of the foodweb can be followed, and combined with aggregated indicators may be used to derive GES of a foodweb even when this is poorly known. Thus it is recommended to monitor and assess three representative trophic guilds from the foodweb. Qualitative methods should be investigated where data is insufficient to estimate even key aspect or aggregated indicators.

7. Standardized methods for monitoring for comparability (in accordance with Art. 11.4)

Three standardized methods for selected example indicators are proposed in the ICES report on the review of MSFD decision 2010 (ICES, 2014b). These are:

- Biomass of regionally important trophic guilds (Section 4.3.1);
- Primary production (Section 4.3.2);
- Seabird breeding success (Section 4.3.3).

8. Standardized methods for assessment for comparability (in accordance with Art. 11.4 GES)

No standardized methods for the assessment for comparability are proposed for D4 as yet.

9. Rational and technical background for proposed revision

The proposed revision comes from the development on foodweb GES descriptors from two ICES-led workshops in response to the requests from DGENV[12]

10. Other related products (e.g. technical guidance, reference in common understanding document)

See documents below.

11. Reference documents

ICES. 2014. Report of the Workshop to develop recommendations for potentially useful Food Web Indicators (WKFooWI), 31 March–3 April 2014, ICES Headquarters, Copenhagen, Denmark. ICES CM 2014\ACOM:48. 75 pp.

ICES. 2014. Report of the Workshop to review the 2010 Commission Decision on criteria and methodological standards on good environmental status (GES) of marine waters; Descriptor 4 Foodwebs, 26–27 August 2014, ICES Headquarters, Copenhagen, Denmark. ICES CM 2014\ACOM:60. 23 pp.

[12] ICES WKFooWI report 2014 (ICES, 2014a) and ICES WKGMSFD D4 report 2014 (ICES, 2014b).