

11.3.1 EU request to ICES on clarification of the advice on MSFD reviews of descriptors D3, 4, 6, and 11

Technical service summary

ICES was requested to clarify, through a technical service, the comments from EU Member States and stakeholders on the 2015 reviews of descriptors D3, D4, D6, and D11 of the MSFD. This document provides these clarifications in four annexes.

Request

ICES is requested by DGENV to complete a technical service.

Background

Advice released by ICES in March 2015 (EU request on revisions to Marine Strategy Framework Directive manuals for Descriptors 3, 4, and 6) was sent by the European Commission to EU Member States and stakeholders for comment and consultation. The review of descriptor 11, produced by the EU Technical Subgroup on Underwater Noise and other forms of energy (TSG-Noise) was also sent for comment and consultation. These comments were collated by Milieu and provided in a spreadsheet to ICES.

The request

ICES is requested to provide a service of clarification of the advice on MSFD review D3, 4, 6, and 11, compiled by Milieu for DGENV use.

The clarification of the advice will clarify issues raised by a consultation in relation to the spring 2015 ICES advice on the MSFD review of the decision.

Elaboration on the service

The following main issues were addressed for the individual descriptors.

D3 commercial fish and shellfish

Clarification on criteria D3.3 and D3.2, selection of stocks, alignment of MSFD and CFP, the use of exploitation rate, legal interpretation, development of methods, and wording.

D4 foodwebs

Clarification on micro-organisms and plankton, aggregation, GES assessment, definition of guilds, development and use of surveillance indicators, and the use of regional sea indicators.

D6 seafloor integrity

Clarification on baselines, criteria D6.2 and D6.1, guidance on scales, use of the word pressure, key functions, future input into the MSFD, and the definition of GES.

D11 energy, including underwater noise

Clarification on impact indicators, frequencies, the definition of average, data collection, other forms of energy, and wording.

Basis of the advice

Methods

The compiled national and stakeholder comments were provided to ICES by Milieu. The approach to the clarification was to group the requests for clarification by subject. These groupings are given in Annexes 1 to 4. Only questions for scientific clarification were addressed. The individual countries and stakeholders are not shown in this clarification, the comments have not been edited, other than spelling corrections.

Descriptor	Comments received	Number of EU Member States	Number of stakeholders
D3	41	8	1
D4	35	9	0
D6	28	10	1
D11	42	10	2

Sources and references

Spreadsheet provided by Milieu of compiled national comments to the review.

Annex 1 Clarification of grouped comments on MSFD GES descriptor 3 (commercial fish and shellfish)

* The EU Member States and stakeholder comments have been aggregated by type and addressed with a single response.

Type of comment	Comment number	Heading / Section / Page	Comment / Observation	ICES Technical Service response to MS consultation *
Agreement and/or no specific comment.	1	Chapter 3	OK.	No clarification required.
	3	Pages 10 and 11	Response to part “3. Analysis of the current text of the Decision”. The revision to Marine Strategy Framework Directive (MSFD) manual for Descriptor 3 took place within a transparent international process; since all statements and suggestions are based on current state of scientific understanding the recommendations are worth to be implemented within the current revision process 2016. Therefore, we welcome the work on Descriptor 3 and support the principal strategy chosen.	
	4	Pages 10 and 11	The first indicators (i.e. F (3.1.1) and SSB (3.2.1)) are well developed and they are in accordance with the requirements of the CFP. For the secondary indicators (3.1.2 and 3.2.2) there are currently no known reference points available. Under the prerequisite existing monitoring programmes allow a reliable value of the indicator to be calculated, reasonable trend-based GES boundaries are proposed.	
	11	General point	The UK agrees with the proposals for D3 but do have reservations as to whether criterion 3.3 is viable for the current round of assessments.	
	28		Finland supports the proposal for the criteria.	
	29	Page 10	Deletions are in line with simplifying the text without removing important content.	
	31	Page 9	We support that each criterion should be reported separately to ensure transparency.	
	32	Pages 10–11	We support the changes regarding 3.1 and 3.2.	
	34	Page 11, Criterion 3.3	We support the changes. The development needs to be aligned with fisheries advice.	

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Comments relating to D3.3.	5	Pages 10 and 11	<p>For Criterion 3.3 “Population age and size distribution” it is considered that further methodological indicator development is necessary. We welcome the work on this criterion. The recommendation should be followed that concrete indicators are needed for criterion 3.3 and the best indicators should be selected for each of the three as relevant identified properties (size distribution, selectivity patterns and genetic effects). In particular it is supported that by taking account of varying selectivity patterns to extend the assessment of the length structure from a purely state based assessment to an assessment which is based on state and pressure alike.</p> <p>It was consensus within the group of international scientists which developed the advice, that the further development of criterion 3.3 has to take place as a process involving one or more further international workshops. Germany supports an international coherent approach because most commercially used fish are distributed across national borders.</p>	<p>General support for a process to develop methods. It is acknowledged that an inclusive and internationally coordinated approach is required (and this will be carried out during the first quarter of 2016). Clarification is requested about the time line for bringing in new methods. With regards to the review and the following round of the MSFD, the idea of collecting data for the sake of having data is not appropriate, but should be seen as a transition and an approach to improving the knowledge base. The stakeholder suggests that methods are available and D3.3 can be included in the assessment of GES now. No methods currently known to STECF or ICES have been shown to be suitably robust as assessment tools.</p>
	10	Chapter 3, page 11, Criterion 3.3	<p>This paragraph is not complete yet and the working group still has to elaborate on this. We support that and urge the working group to check for consistency with the CFP and not develop new indicators which may render controversial results.</p>	
	12	Page 11, the first para on Criterion 3 says that “data collection for these [currently inadequate] indicators should be maintained for the time being, but the indicators should not be used in evaluating GES	<p>This contradicts the Commission’s new line on DCF, which the UK agrees with, that data should not be collected if it is not going to be used. It should only, perhaps, be defended as a transitional measure.</p>	

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	13	Criterion 3.3.	The ICES review correctly states that Criterion 1 (Fmsy) and Criterion 2 (SSB) are already in place, but that the same cannot be said for Criterion 3.3 "Population age and size distribution". To remedy this, the review (on p.2) proposes the development of three candidate indicators for Criterion 3.3 and "steps, involving a series of workshops,...required to make these proposals operational before 2017". We have no objection to this, but ask the Commission to confirm that this will be for the second cycle of MSFD as we do not think there is enough time left, given the resourcing constraints both at ICES and Member States, to put in place the steps to operationalise a new Criterion 3.3 for the current round of assessment.	
	16	Chapter 3, Page 11	Where it was written: "Data collection for these indicators should be maintained for the time being, but the indicators should not be used in evaluating GES." Even if these indicators will not be considered in the GES evaluation, their estimation should be maintained.	
	27	CRITERION 3.3 POPULATION AGE AND SIZE DISTRIBUTION	Other criteria should also reflect healthy status of stocks. The demographic structure of the populations is quite informative, and indicators of good health proceed for instance in particular when observing the presence of a high proportion of old, large individuals that should ensure the self-renewal of the stock. This as well as the other indicators currently proposed are difficult to use as they do not provide a clear way of assessing occurring changes.	
	S. 3	3. Analysis, page 11, Criterion 3.3 – Population age and size distribution	The D3.3 indicator must maintained in evaluating GES. At least one of the indicators should remain following the discussions in the respective MSFD working groups, to evaluate and monitor progress towards GES of fish stocks. Sufficient scientific work has been conducted and can now lead to the implementation.	

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Comments relating to D3.2.	25	Criterion 3.2 REPRODUCTIVE CAPACITY OF THE STOCK Spawning-stock biomass (3.2.1).	In descriptor 3 (Spawning-stock biomass 3.2.1) it is proposed a reference point based on a level of spawning stock biomass (SSB) to be used for European fisheries management. Any observed SSB value equal to or greater than SSB MSY is considered to meet this criterion. Where it is not possible to determine a reliable value for SSB MSY, the MSFD states that an appropriate reference point (identical for all regions) needs to be identified by the authoritative institutions. ICES has proposed a SSB-based reference Point (SSBtrigger) considered by this International Council as a suitable reference value. In the ICES Acronyms and terminology we can find the following definition of SSBtrigger Btrigger: Value of Spawning Stock Biomass (SSB) that triggers a specific management action. So, it is not a target but a limit reference point. The idea is that is necessary to be above such level and in the case to drop down up to such limit, some measure should be enforced to drive biomass to a safer level.	The issue of B_{MSY} targets remains an ongoing scientific and policy discussion. There is a mix of concepts within the directive and the decision. In the directive, to achieve GES stocks should be “within safe biological limits” which is a conservation concept. In the decision, descriptor 3.2 “ <i>Reproductive capacity of the stock</i> ” says that SSB is the primary indicator with a reference value SSB_{MSY} , which is further described as “ <i>the spawning stock biomass that would achieve MSY under a fishing mortality equal to F_{MSY}</i> ” which is a sustainable exploitation concept (maximizing yield). SSB_{MSY} (or B_{MSY} as it is more commonly called) is not a metric derived from a framework of protecting reproductive capacity, but rather from a framework of maximizing the catch (yield). Within the ICES advice framework, it is the precautionary reference points

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	26	Criterion 3.2 REPRODUCTIVE CAPACITY OF THE STOCK Spawning-stock biomass (3.2.1).	<p>The Common Fisheries Policy and the Marine Strategy Framework Directive ask for exploited fish stocks be at sustainable levels but the idea which is behind the MSY concept should be the driver of any decision. ICES suggests the use of the mentioned reference point that is systematically below SSBMSY (MSYB trigger). While we can accept that the SSBMSY is not a fixed value, as it may fluctuate due to different reasons when a stock is fished at FMSY level, using a limit Reference Point value there is a risk to fail to get the Marine Strategy objective.</p> <p>The MSY Btrigger is supposed to be the lowest boundary associated with SSB MSY and is set as the border of safe biological limits (Bpa) (Biomass precautionary approach). The value of MSY B trigger corresponds with the lower boundary in the range of SSBMSY. For example, for some stocks MSYBtrigger is defined as “the lower 95% confidence limits (of SSB) with exploitation at FMSY from long-term simulations”. In situations of high variability/uncertainty, such level might be extremely much lower than BMSY</p> <p>In mixed fisheries, as are most of the Mediterranean fisheries targeting demersal resources, it is very difficult (or probably impossible) to exploit all the stocks at MSY levels and in such circumstances there are two possible options: the first one is to manage to the weakest stock (Hilborn & Walters, 1986), that imply to use the harvest rate that permits the weakest stock to meet its optimum (MSY?) escapement. Is such circumstances, it is likely that such strategy will be “unproductive”. Other alternative strategies have been proposed, but all of them do not follow the principle of fishing all the stocks at MSY levels. ICES concern is related to the possible losses in yield derived from an application of the MSY principle. Its proposal, however, completely upsets the MFSD original idea.</p>	<p>(conservation) that are used to ensure the reproductive capacity of the stock (B_{pa}), whilst the MSY approach creates reference points to achieve maximum long-term sustainable harvest of fish stocks.</p> <p>In 2014, ICES provided advice on D3, which stated: <i>“Even when a stock is fished at a constant F value, the SSB will fluctuate due to natural factors. For most data-rich stocks, assessed with analytical methods, information on the lower bound of SSB fluctuations around B_{MSY} (e.g. MSY $B_{trigger}$ for ICES stocks) is available to be used as a reference level for Criterion 3.2. ICES considers a stock fulfils the criterion (“green status”) if the spawning-stock biomass is above MSY $B_{trigger}$. An appropriate choice of B_{MSY} requires contemporary data with fishing at F_{MSY} to experience the normal range of fluctuations in SSB. Until this experience is gained, B_{pa} has, for the time being, been adopted for many of the stocks assessed by ICES as MSY $B_{trigger}$ even though B_{pa} and MSY $B_{trigger}$ correspond to different concepts. Therefore, MSY $B_{trigger}$ marks the lowest boundary associated with SSB_{MSY}, and in practice this is set as the border of safe biological limits (B_{pa}).”</i></p> <p>Operationally, most European fisheries scientists struggle to determine robust and reliable estimates of B_{MSY}, especially in dynamic ecosystems and where stocks are fished by mixed fisheries.</p>
	9	Chapter 3, page 10, Criterion 3.2	We find this criterion redundant, suggest to delete this in order to keep the new Commission decision as concise as possible.	The CFP (2014) approach is for an aspirational B_{MSY} (the biomass that comes with fishing at F_{MSY}), which is usually greater than the limit of avoiding the minimum biomass (conservation limit) under the precautionary approach. The main management tool is fishing mortality. As mentioned by EU Member States, in mixed fisheries you will rarely achieve F_{MSY} for all
	15	Chapter 3, page 11	The Secondary indicator of criterion 3.2 is now defined as:— Biomass indices (Indicator 3.2.2). The early definition of indicator 3.2.2, used also in the Initial assessment, was referred to the fraction of mature individuals of stock population. The biomass indices of entire population cannot represent the mature fraction.	

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	23	Chapter 5, page 15	The current clear GES boundaries makes it difficult for EU Member States to assess GES. The GES boundary should be defined for each primary indicator based on the selected reference points. However, the nature of reference points proposed is different (target or limit) and also different relationships with GES main objective linked to the MSY concept can be established. The assessment against GES must be based on the first proposed indicator 3.1 and relative reference points. In principle, the precautionary approach considers two attributes that have to be used for assessing stocks against safe biological limits: sustainable exploitation ($F \leq F_{MSY}$; $F \leq F_{0.1}$) and full reproductive capacity ($B \geq B_{pa}$). The use of $B_{trigger}$ is not consistent with the MFSD principles, not in line with the precautionary approach when using the lowest 95% confidence limit value and is only an operative practical compromise facing to frequent unsolvable issues when dealing with mixed fisheries management.	stocks at any one time, and it is required to maintain stocks within safe biological limits. The suggestion to drop D3.2 assumes that fishing at F_{MSY} will always be precautionary. Recent studies have shown this not to be the case; it is therefore necessary to have extra protection of biomass (reproductive capacity) to ensure sustainable exploitation, i.e. it is necessary to keep D3.1 and D3.2.
Comments relating to the selection of stocks or the list.	7	Chapter 1, page 6 and page 7	Two different definitions are used. First commercially exploited fish are described as all stocks targeted for economic reasons. Later (bottom page 7) it says all DCF stocks. This is not the same! We suggest to refer to the DCF, as these are all stocks for which data is collected.	The question of how the stocks/species are selected has been addressed by ICES in previous advice. The new request to ICES (due May 2016) will further clarify the potential mechanism for selecting stocks.
	18	Chapter 4, page 12	The text of the Decision 2010/477/EC should clarify which species must be considered. Should this selection include all stocks of Council Regulation (EC) No. 199/2008?	
	22	Chapter 4, page 12	The selection of species for which exploitation is considered to have significant importance for each region cannot be based only on their relative contribution to the landings. There are several species that do not meet certain thresholds based on amounts of landings but can be considered important and should be included. In particular, there are species showing different productivity based on life history characteristics that make them more or less vulnerable and needing of paying to them some particular attention. Moreover, there are species currently at a low biomass level and showing consequent low landings due to past due to overexploitation or to other environmental forces that should be included in the list of species.	

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	36	Table 3a, note 3	Clarification is needed. How could the species be assessed if only one of several stocks are assessed? There is a risk that different MS assess different stocks of the same species in the same area.	
	S. 5	4. GES methodological standards, pages 16–18, Tables 3a–3c	The MSFD (2008) clearly states that the quality descriptor 3 comprises "Populations of all commercially exploited fish and shellfish". Therefore, the selection of stocks in the recommendation document also needs to follow this wording and has to be adjusted accordingly.	
Comments relating to the alignment of CFP and MSFD.	6	Overall	We should take care to use the same definitions as in the CFP, to avoid confusion.	There is no scientific clarification for this policy objective. The link between D1 and D3 is addressed below.
	30	Horizontal	It is important that D3 is aligned with the new DCF that is developing and also accounts for depleted stocks and nationally important commercial species. It is also important that locally exploited stocks and depleted stocks (e.g. elasmobranchs) should either be evaluated under D3 or D1. Stocks depleted by fishery and not considered commercial anymore may otherwise be ignored.	
Comments relating to use of the exploitation rate as a proxy.	14	Chapter 3, page 10	Where it was written: "F and FMSY need to be estimated using standardized procedures (e.g. analysis of catch-at-age or at length) and ancillary information. Where the knowledge of the population dynamics of the stock do not allow such assessments to be carried out, scientific judgement of F and (proxy of) FMSY values associated to the yield-per-recruit curve (Y/R), combined with other information on the historical performance of the fishery or on the population dynamics of similar stocks, may be used. All stocks for which a value of F and an agreed value for FMSY is available can be included in the assessment against GES, using this indicator." This definition should also include the Exploitation rate (E) as a proxy of F for small pelagic fishes (i.e., anchovy and sardine) together with its limit reference point EMSY = 0.4.	The exploitation rate (E) is a precautionary exploitation rate. It is not designed to maximize yield. This is why ICES has not included E as a proxy for F _{MSY} . With regards to other proxies, of course they can and should be used if no alternative can be found.
	19	Chapter 4, page 13 and Chapter 5, page 15	The definition of fishing mortality should also include its proxies F < F _{0.1} and, in the case of small pelagic fishes (i.e., anchovy and sardine), the Exploitation rate (E) with E < EMSY (where EMSY = 0.4).	

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	20	Chapter 5, page 15	Reference levels in tables 1 and 2. It is necessary to specify that F0.1 and E could be used instead of FMSY when such a limit is not available; moreover it is necessary to highlight that Regional Sea Conventions or appropriate institutions (e.g. GFCM) should provide appropriate Reference levels that are functionally equivalent to SSB MSY Trigger in the context of the Mediterranean Sea, where this limit is not available.	
Comments related to interpretation of the legal documents.	S. 1	3. Analysis, page 10, Criterion 3.1 – Level of pressure of the fishing activity	It is actually possible that in MAPs the exploitation level for all harvested species is set below FMSY. In fact, following the wording of the CFP Article 2, it is necessary to set F below FMSY to achieve stocks above BMSY ("In order to reach the objective of progressively restoring and maintaining populations of fish stocks above biomass levels capable of producing maximum sustainable yield") and should therefore be reflected also in the MSFD discussion. We therefore propose to change the text to: "Achieving or maintaining good environmental status requires that F values for stocks are equal to or lower than FMSY."	This is an ongoing policy discussion; there is no scientific clarification.
	S. 2	3. Analysis, pages 10–11, Criterion 3.2 – Reproductive capacity of the stock	Following the argumentation above (CFP Article 2: "In order to reach the objective of progressively restoring and maintaining populations of fish stocks above biomass levels capable of producing maximum sustainable yield"), the wording used in the advice does not adhere to the CFP text. We therefore propose to change the text to: "Achieving or maintaining good environmental status requires that SSB values are equal to or above SSBMSY."	
	S. 4	4. GES methodological standards, page 17, Table 3b	The parameter used for B in this table differs from the one used in the sections before (3. Analysis). The GES boundary is described as "A species/stock should have an SSB >MSY Btrigger". As outlined above, the CFP (and MSFD) wording requires that this is changed to "A species/stock should have an SSB >BMSY."	
Comments relating to methods for analysis and secondary indicators.	33	Page 10, Criterion 3.1 secondary indicator	Further guidance is needed for the use of secondary indicators, otherwise we risk to get stuck using them only as "surveillance indicators". Specifically on 3.1.2 a clarification is needed regarding if the fishery effort is included or not. If not, there is a risk that a decrease in the stock is compensated by an increased effort and not reflected in the trend analysis.	Further guidance is required on secondary indicators. Effort data are not routinely collected or stored by ICES.

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	8	Chapter 3, page 10, indicator 3.1.2	Catch/biomass ratio: this is not used or calculated by ICES which means every MS has to calculate this manually. This could lead to inconsistencies. We suggest to use 'Catch per unit Effort', which is a parameter that is part of the standard ICES assessment procedure for stocks for which FMSY cannot be set.	
	17	Chapter 3, page 11	It is necessary to clearly define the method for trend analysis for secondary and trend based indicators to allow for consistency between MS.	
	24	Criterion 3.1 LEVEL OF PRESSURE OF THE FISHING ACTIVITY - Fishing mortality (F) (3.1.1 and 3.1.2)	The MSFD proposes F values which are equal to or lower than FMSY, as levels of fishing mortality rate capable of producing maximum sustainable yield (MSY) (indicator 3.1.1). In this case there is a reference value consistent with the MSY concept and estimates of current F (whenever available) may be easily compared with the F-reference value (FMSY) Whenever FMSY is not available or difficult to estimate, an alternative indicator directly linked to fishing mortality is proposed: the ratio between catch and biomass index (C/B) (indicator 3.1.2). The catch/biomass ratio yielding MSY can be taken as an indicative reference. Such value not necessarily represents the ratio between absolute amount of catch and absolute biomass, as in most of the cases biomass estimates is only an index of the actual biomass at sea. In any case, the monitoring of such an index can be useful as indicator of changes in theory attributable to occurred changes in F. In recent years, scientists have proposed approaches mainly based on time series of catches aimed at defining sustainable levels for such rates linked to MSY.	
Comment relating to clarification of the approach.	2	All text in general	The German response is restricted to part “3. Analysis of the current text of the Decision”, because there is no consensus within the German authorities on how to evaluate part “4. Methodological standards for monitoring and assessment in relation to GES)” and part “5. GES methodological standards (pages 16–18)”.	No clarification required.
Comment relating to D3 and D1.	35	Page 12, final paragraph under “Selection of commercially..”	It is important to consider past fishing pressures and past fish communities, in order to allow for restoration of severely affected stocks, either under D3 or D1. Coordination of the species lists between D1 and D3 is important.	The aggregation workshop and the use of elements in the assessments of D1, D3, D4, and D6 will help to resolve this issue.

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Comment relating to the choice of words.	21	Chapter 3, page 10	<p>Where it was written: “F and FMSY need to be estimated using standardized procedures (e.g. analysis of catch-at-age or at length) and ancillary information. Where the knowledge of the population dynamics of the stock do not allow such assessments to be carried out, scientific judgement of F and (proxy of) FMSY values associated to the yield-per-recruit curve (Y/R), combined with other information on the historical performance of the fishery or on the population dynamics of similar stocks, may be used. All stocks for which a value of F and an agreed value for FMSY is available can be included in the assessment against GES, using this indicator.”</p> <p>It should be written: F and FMSY are often formally estimated using standard procedures (i.e. VPA, statistical catch-at-age) and using ancillary information. Where the quality of commercial catch data and lack of a well defined stock–recruitment relationship do not allow such assessments and in particular the estimation of FMSY, the use of a proxy (i.e. F0.1) derived from a yield-per-recruit curve may be used. All stocks for which a value of F and an agreed value for FMSY or proxy is available can be included in the assessment against GES, using this indicator.</p>	This difference requires legal interpretation; no clarification is possible.

Annex 2 Clarification of grouped comments on MSFD GES descriptor 4 (foodwebs)

* The EU Member States and stakeholder comments have been aggregated by type and addressed with a single response.

Type of comment	Comment number	Heading / Section / Page	Comment / Observation	ICES Technical Service response to MS consultation *
Agreement and/or no specific comment.	8	Chapter 3, page 24	We agree with the restructuring of the 3 'old' criteria into the two new criteria, as well as the emphasis on trophic guilds. We see this as a huge improvement, which gives a clear structure and will thus enhance comparability and regional coherence.No clarification required.
	12	Chapter 3, page 23	We accept the revision made in the text.	
	13	Chapter 4, page 25	Completely in agreement.	
	14	Chapter 5, page 26	Completely in agreement.	
	15	Chapter 6, page 27	Completely in agreement.	
	16	Generally	We support the proposed new D4 criteria.	
	23	3/ To be taken out of the Decision and included in guidance document/ page 24	This change seems feasible.	
	24	"3/ To be taken out of the Decision and included in guidance document/ page 24	The overall idea of making the descriptor simpler and more operational and using guilds instead of taxonomic groups is commendable.	
	25	Page 24	Changing the three criteria to the two criteria 'structure' and 'function' is a simplification and clarification which makes the descriptor criteria closely linked to scientific knowledge.	
	29	Page 26	Trophic guilds seems to be the most appropriate way to address D4 and should be introduced as suggested. Similarly, surveillance indicators are an important new addition, which will be required to ensure that D4 measures what is important even where this does respond directly to pressure. The suggested methodological standards seem sound.	
	30	Horizontal	We welcome the new approach with trophic guilds.	

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	31	Horizontal	Some guilds might be hard to define, e.g. deposit feeders. Some species may be part of several guilds depending on environmental factors. Despite these problems the definition of trophic guilds is welcomed and even the demand to include different guilds in the assessment.	
	35	6. GES methodological standards / page 27	Suggestion to re-evaluate current conditions once in the six-yearly MSFD cycle is welcomed.	
Comments relating to micro-organisms and/or plankton.	1	General comment - importance of food webs	An important aspect of any marine ecosystem is its foodweb, i.e. the network of feeding interactions between coexisting species and populations. There is a well-established need to use indicators of foodwebs that reflect characteristics of energy flow, resilience, structure, and functioning in the management of marine ecosystems. Foodweb indicators better and more directly represent key features of marine ecosystems and living resources that are often missed with less integrative measures. Very often GES descriptor 4 – Foodwebs is based on top predators (marine mammals, seabirds, big fish) which are doubtless important to maintain trophic structure through the strong top-down control. However, microorganisms which are in the base of the trophic pyramid are at least as important if not more important in regulating carbon and energy flux through the whole foodweb. Therefore, by ignoring these organisms we miss out an important part of the planktonic foodweb, which is responsible for a large proportion of the total biomass and production, as well as for carbon flux towards higher trophic levels.	There is no doubt that micro-organisms and plankton play a crucial role in the marine foodweb. The revision suggests that EU Member States choose at least three guilds; EU Member States (or regional bodies) could then agree to include these organisms. The state-of-the-art in our understanding of the pressure-state relationships make it difficult to include any further types of indices. These four comments do not offer any additional methods or alternatives.
	2	Importance of microbial food web	Life in the oceans is dominated by microbes (e.g. < 0.1 mm in size), comprising viruses, bacteria, protozoa, and some phytoplankton. Microbial community is responsible for more than 50% of the primary production and oxygen production on Earth (Li <i>et al.</i> , 1983; Stockner, 1988; Campbell <i>et al.</i> , 1994). Their abundances amounts to several billions in a litre of seawater, and their total biomass is 10 times greater than the biomass of all the other living creatures in the sea, representing 95% of the biologically active surface in the sea (Whitman <i>et al.</i> , 1998). The potential metabolic dominance of microorganisms is even greater than their biomass would	

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			<p>suggest. In fact microorganisms are thought to account for 90% of the respiration in the water column (Robinson and Williams, 2005), and their essential driving forces for biogeochemical cycles with established impacts on overall marine productivity. These small, singled-celled organisms are integral to all major biogeochemical cycles, fluxes, and processes occurring in marine systems. Heterotrophic bacteria and photosynthetic cyanobacteria (Prochlorococcus, Synechococcus) represent the major components of marine picoplankton community, especially in oligotrophic areas such as the Mediterranean Sea (Zubkov <i>et al.</i>, 2000; Li and Harrison, 2001; Grob <i>et al.</i>, 2007; Chisholm <i>et al.</i>, 1992; Magazzu and Decembrini, 1995; Li, 1998). Heterotrophic bacteria play an important role in aquatic ecosystems through their assimilation of dissolved organic matter to sustain their metabolism and produce new biomass (Cole <i>et al.</i>, 1988) and by the decomposition of organic matter and through the transformation of inorganic compounds into forms suitable for primary producers (Ducklow <i>et al.</i>, 1986). All these organisms are consumed by heterotrophic nanoflagellate grazers, which are consumed in turn by larger ciliated protozoa, forming a link to higher trophic levels.</p>	
	3	Suggestion to include bacteria as an additional taxonomic group and decomposers as an additional guild	<p>"Primary producers: Photosynthetic cyanobacteria (Synechococcus, Prochlorococcus) make a large contribution to carbon production biomass and energy transfer, especially in oligotrophic waters (Li <i>et al.</i>, 1983; Stockner, 1988; Campbell <i>et al.</i>, 1994). Decomposers: Decomposition of organic matter and transformation of inorganic compounds are ecosystem processes which are equally important for ecosystem functioning as primary and secondary production. Heterotrophic bacteria are important in both, decomposition of organic matter and transformation of inorganic compounds into forms suitable for primary producers in seawater (Ducklow <i>et al.</i>, 1986). Secondary producers: Heterotrophic bacteria are the only organisms that can use dissolved organic matter (DOM) in seawater (DOM makes 95% of the total organic matter in the sea). Through the assimilation of DOM they sustain their metabolism and produce new biomass (Cole <i>et al.</i>, 1988), which is then channelled throughout the</p>	

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			heterotrophic flagellates and ciliates toward higher trophic levels."	
	32	Horizontal	It should be noted that phytoplankton is a very diverse group (see also comment under descriptor 1) and may need to be handled as several guilds. The same is applicable concerning zooplankton.	
Comment relating to choice of metric and aggregation.	34	6. GES methodological standards / page 27	What is meant by variation in the indicator? Is it meant that we aim for stable conditions, e.g. abundance is stable, or community structure is stable? Should it be possible to weight different trophic guilds in terms of cascade effects, i.e. bottom-up or top-down effects? Could undesirable effects be connected to D1? For example if the state of populations of top predators (e.g. nutritional state of marine mammals) are sub-GES then D4 cannot be GES. In general the linkage to different criteria under D1 should be mentioned.	The aggregation within D4 and across descriptors was not fully covered within the review. An ongoing process through WGGES and a request to ICES will further explore these issues in 2016. The choice of metric to measure variation was not described as it was assumed to be the choice of the individual EU Member State. GES issues are further discussed below.
Comments relating to GES assessment.	5	Chapter 5/ GES boundaries/ page 27	The environmental state is not divided into several categories. The term "sub-GES" introduces a new category that doesn't exist. Please, replace the term "sub-GES" by "non-GES".	The review did not conclude whether to include D4 and surveillance indicators in a GES assessment or not. This was seen as a policy decision and also required further scientific exploration. The EU Member States are probably right that the terminology used is less well defined. This is due to the only recent exploration of the concepts and should be addressed in the aggregation work planned for 2016.
	20	Chapter 5, page 27	We agree that a surveillance indicator may not have exact GES boundaries and therefore a 'limit' may be more appropriate. One should however consider how surveillance indicators with 'limits' can be combined by aggregation rules. Perhaps the limits could be tentatively considered as GES boundaries (but given lower weight in an assessment?) The definition of "limit" is, however, unclear. The proposal seems to have two types of limits, the type that is equal to being (or not) in a desirable state (is this equal to GES?), and the other type that is defined by historical observation range but does not imply being (or not) in a desirable state. These two types of limits should be clearly communicated and named so that the type is immediately distinguishable. Otherwise, confusion will ensue.	
	21	Chapter 5, page 27	The definition of "GES boundaries" is very unclear in this document (and goes beyond defining into talking about aggregation/integration rules). The definition of "GES boundary" should be the same across all of MSFD. It needs	

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			to be clarified whether the "desirable state" (mentioned in the definition of "limit", see previous comment), can be considered to reflect GES or not.	
	33	5. GES criteria / page 26	It should be defined further what implications the absence of GES-boundaries has for the assessment. How could a "desirable state" be defined without boundaries? See also below.	
Comments relating to the definition of guilds.	26	3/ To be taken out of the Decision and included in guidance document/ page 24	Definitions of guilds could be better, for example organisms maintaining the same ecosystem key processes	The use of guilds should be seen as tools for management. It is especially true in the marine system that organisms shift through various trophic guilds as they develop. This does not preclude the development of the guild approach as a surveillance/ management tool. Size, life strategy, and habitat could be incorporated into the definition of the guild, if required. There was no intention to suggest that similar trophic guilds should be chosen for criteria 4.1 and 4.2. This was left for the consideration of the EU Member States.
	27	"3/ To be taken out of the Decision and included in guidance document/ page 24	If member states to some extent are free in choice to include guilds, guidance should address issues about collaboration of neighbouring member states (sharing the same sea area).	
	28	"4/ The issues, Issues, Trophic guilds and food webs / page 25	The suggestion to define "guilds" need to be explicit how to handle the fact that many benthic species change guilds during the life cycles or from habitat to habitat: For example starting as planktivorous ending up demersal or pelagic predatory. What is the primary input from monitoring data and what are criteria for assigning the species to a certain guild? Is it needed to have size/age distributions etc.? Furthermore, how should habitat-forming species be treated?	
	18	Chapter 3, page 24	In addition to the bullet points presented, the guidance document also should clarify whether the trophic guilds selected for criteria 4.1 and 4.2 should be the same.	
	11	Table 1, page 26	Benthos should be marked as primary and secondary producers.	

Type of comment	Comment number	Heading / Section / Page	Comment / Observation	ICES Technical Service response to MS consultation *
Comments relating to the development and use of surveillance indicators.	6	All text relevant to Descriptor 4	<p>The revision to Marine Strategy Framework Directive (MSFD) manual for Descriptor 4 took place within a transparent international process; since all suggestions are based on the current state of scientific understanding the recommendations are worth to be included within the current revision process. No suggestions should be withdrawn.</p> <p>The proposal to merge the existing current three Descriptor 4 criteria to just two criteria (4.1 Food web Structure and 4.2 Food web Function) is strongly supported, as it is based on a pragmatic approach to ongoing monitoring programmes. Monitoring the degree to which Foodwebs are affected by management requires condensed information on foodweb status, as these are complex, not only in structure but also in 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 Descriptor 4 should be treated as surveillance indicators (for monitoring change in the foodweb). The recommendation should be followed that although Member States can monitor as many guilds as deemed appropriate, a minimum of three with at least two non-fish guilds should be required. Existing monitoring programmes can already provide the majority of the information requirements for these criteria (biomass and size of three trophic guilds and productivity of the foodweb).</p> <p>EU legal requirements (HD, BD, WFD) as well as regional seas conventions norms and standards (e.g., HELCOM CORESET) were considered during the process.</p> <p>Feasible steps are recommended to develop the implementation of Descriptor 4 by international, peer-reviewed advisory processes, ensuring at the same time consistency in interpretation of indicators, limits, and estimation methods both within and between regional seas (HELCOM-OSPAR), over the years 2016–2017.</p>	No clarification required.
	17	Generally	We also support the proposal to have surveillance indicators for D4. This is a practical first step before more quantitative indicators can be developed.	

Type of comment	Comment number	Heading / Section / Page	Comment / Observation	ICES Technical Service response to MS consultation *
Comment relating to justification for the change and role of existing RSC indicators.	9	General comments	The UK is broadly happy with the amendments to D4 and agree to the proposed changes. But we would ask the Commission to confirm our understanding that we would be able to use existing indicators such as those agreed by OSPAR, for example the FoodWeb1 indicator (reproductive success of birds) and FoodWeb3 indicator (Size composition fish). The manual would be strengthened by a clearer signposted analysis of reasoning behind the merger of the criteria and explanation of the figure on page 24 as to why the criteria have been merged, what the benefits of this are, and what this will result in.	This requires a management strategy evaluation. The review requested a simplification, and this has been proposed. The review did not suggest that the RSC indices be ruled out; individual EU Member States can choose to add these.
Comment relating to methods for assessing D4.2 productivity.	19	Chapter 3, page 24	In addition to the bullet points presented, the guidance document also should clarify or give examples of how the productivity is to be measured. This would increase comparability between MS and regional seas.	This was not provided by the review, as it was seen as the next steps. This could be dealt with in 2016/2017.
Comment relating to contradiction with D1.	7	Chapter 3, page 24, third bullet	This is in contradiction to the paper on Descriptor 1 (see page 30, 2nd para).	Yes, this is a contradiction. The D1 review suggests that all functional groups need to be monitored. The D4 review suggests that selected guilds be monitored.
Comment relating to the location of text.	4	Chapter 3	The text should be moved in part to a guidance document, but the minimum requirements, in particular the third bullet point of the list on page 24 should not be left behind, especially if they are part of the guidance document and not of the revised decision text.	No clarification required as this is a drafting issue.
Statement about marine mammals.	22	Marine mammals in general	With respect to marine mammals DK finds that marine foodwebs are generally extremely difficult to monitor in a simple way.	No clarification required. Many groups are difficult to monitor.
Comment relating to wording.	10	Criteria 4.1 and 4.2	To avoid the potential for a rigid interpretation and any ensuing legal complications should this go forward into a revised Commission Decision we make the following suggestion. Criterion 4.1 "Foodweb structure" – for example abundance/biomass of, and size distribution within trophic guilds, and Criterion 4.2 "Foodweb function" – for example productivity of trophic guilds.	This suggestion provides an opt out to recommended approach. It is not related to a scientific clarification.

Annex 3 Clarification of grouped comments on MSFD GES descriptor 6 (seafloor integrity)

* The EU Member States and stakeholder comments have been aggregated by type and addressed with a single response.

Type of comment	Comment number	Heading / Section / Page	Comment / Observation	ICES Technical Service response to MS consultation *
Agreement and/or no specific comment.	4	General	ICES recommends further developmental work to underpin the implementation of D6. It is strongly advised that Germany encourages the EU-COM to follow the three ICES recommendations required to operationalise D6: 1. Develop and test standards for assessing human pressures on benthic habitats. 2. Agreeing the list of habitats to be assessed and resolving issues of scale by defining, e.g. at what EUNIS hierarchical level habitats are going to be addressed. 3. Development of such standards for assessment of recoverability of seafloor integrity. No standards or methods exist for this key attribute of marine ecosystems.	No clarification required.
	6	Chapter 3, page 34	We are happy with the pressure-based approach of Criterion 6.1.	
	12	Chapter 3, page 34	Completely in agreement.	
	13	Chapter 4, page 35	Completely in agreement.	
	18	Page 34	The changes to the criteria text improves clarity and should be adopted. As stated on the subsequent page, D6 indicators are still under development.	
	3	4. GES criteria	OK with the document.	
Comment relating to baselines.	S7	Chapter4/ Criterion 6.1 The physical substrate and biotic community are in a condition where the various major ecosystem functions served by the seafloor are within their historic range of natural variability / page 35	When is the historic range measured from - what is the baseline year?	This relates to decisions about the setting of GES. The science is as yet not advanced enough, and the policy decisions have not been made to provide a clear response to this question. The report from the workshop highlights four different options on how to define GES (pages 17–20).
Comment relating to D6.2.	15	3. Analysis of the current text of	We support the proposed criteria and methodological standards. There seems to be however a slight overlap	This relates to size spectra for the community or a particular species. The issue

Type of comment	Comment number	Heading / Section / Page	Comment / Observation	ICES Technical Service response to MS consultation *
		the Decision / page 34	between 6.2.3 and 6.2.4 (both dealing with size spectrum). For the sake of simplicity, we propose to combine them; e.g. the former is a natural component of the latter or describe the difference in the text.	of whether this is a duplication should be considered within the context of all chosen indicators, once the process is more mature.
Comment relating to climate text.	20	Horizontal	This paragraph is speculative and doesn't add anything without a reference. Probably climate changes have different impacts in different parts of Europe. In Sweden we expect increased flow in the rivers and thereby increased transport of nutrients.	It is assumed this comment relates to the section on climate on page 6. The text provides an example which could probably be replaced by other clearer examples.
Comment relating to the word "condition".	8	Page 34, criteria 6.1 and 6.2	The UK supports the proposed redrafting of D6 and agrees with the rewording of criteria 6.1 and 6.2 with the following exception: We would suggest deleting the word "condition" on 6.2 as it is not needed and can be misinterpreted as just assessing the condition of benthic communities, instead of assessing the structure and function of the benthic communities.	The use of the word "condition" here implies that you are putting a value on the structure and function, thus giving direction on the intent of the indicator.
Comments relating to guidance on scales.	S1	Chapter 3/ 6.1 Damage to the sea-floor, having regard to both pressure(s) on and sensitivity of habitats / page 34	There is a large amount of patchiness in any marine region in terms of pressure and sensitivity. This therefore seems a difficult challenge for assessing on a regional scale.	The intent of the MSFD is for EU Member States to lead the regional assessments. A recommendation in the ICES advice (page 3, D6 recommendation 2) describes a process to investigate habitat and scale, including patchiness.
	S2	Chapter 3/ 6.1 Extent of the seafloor significantly affected by human activities for different substrate types (including biogenic) / page 34	Difficult to assess the significance of the effect on a regional or sub-regional basis. How would we aggregate assessments of small scale significance within a region?	
	S3	Chapter 3/ 6.2 Structural and functional condition of benthic community / page 34	Is it practical to measure this at a regional / sub-regional scale?	
	S5	Chapter 3/ 6.1 Damage to the	Scales of assessment are very important – if we're talking about regional / sub-regional scale then dredging is unlikely	

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		sea-floor ... and 6.2 Structural and functional condition of benthic community / page 34	to have an effect as the scale of operation is small compared with regional scales.	
	56	General comment	The Function and Recoverability criteria link the physical nature and the biology of the seabed but there is still the question of whether it is possible to actually do this for a marine region.	
Comments relating to wording of pressure and explanation.	2	3. Analysis of the current text of the decision	Ok with propositions regarding guidance documents. But The following wording should be changed: "pressures induced by human activity" instead of "human pressures". Comment: (6.1) : magnitude of "pressures due to human activity". An activity could be intense but with a low effect depending of the hydrodynamic environment.	This is a communication issue and does not required scientific clarification. It is a commission and EU Member State decision as to the level of detail required.
	1	3. Analysis of the current text of the decision	6.1 criteria : the word pressure should be explained with a comment in brackets: proposition "damage(s) to the sea floor having regard to pressure (physical, chemical or biological) and ...".	
Comments relating to key function or key species.	7	Chapter 3, page 34	We want to point out a dilemma concerning 6.2.1 'species providing a key function'. Key species is a very difficult concept. In OSPAR experts have not reached conclusions about which species these are. You run a risk that every country uses its own definition and comes to different key species. Hence you lose the comparability that we strive to achieve with the revision of the Commission Decision. There is also a very strong overlap with D4. On the other hand, conceptually, we like the concept of key species: it is informative about the function of the habitat. The text of the old commission decision (sensitive/tolerant species) lacks this, because sensitive species may not be important for the functioning of the habitat.	It is important that key functions are maintained (regardless of contributing species), e.g. bioturbation, nutrient cycling. Implementation should emphasize regional coherence. The challenge should be noted. It may be premature to remove sensitive species for the decision, but the presence or absence of a species may not prove useful as a management tool.
	19	Page 34, section 3	6.1.: "Physical" damage should be kept. 6.1.1: Are pleased to see that 6.1.1 is recommended deleted. 6.2.2: the recommended amendment makes sense but sensitive species should be kept, as they can be used as an indicator for disturbance. OK to all other amendments.	
Comments relating to methods.	21	Horizontal	Is it necessary to restrict this indicator to macrobenthos or could it include all benthos? In e.g. the Gulf of Bothnia both the temporal and seasonal variation in macrobenthos are very large and the indicator will not be reliable.	The definition of macrobenthos is not clear; this can probably be amended to benthos, with regional definitions. The review suggested that it is possible to define

Type of comment	Comment number	Heading / Section / Page	Comment / Observation	ICES Technical Service response to MS consultation *
	S4	Chapter 3/ 6.2 Structural and functional condition of benthic community / page 34	Is it possible to define suitable indicators for functionality, and do we have the knowledge to assess whether the functionality is improving or deteriorating?	suitable indicators for functionality and this is an advisable approach for assessing GES. The review made suggestions about applicable approaches although it acknowledged the challenges.
	17	General comment on the full text	We do agree with the proposal of indicators under a theoretical point of view, but it remains some doubts about their applicability, because we are far to know the functions of species and their sensibility to the pressures. The new proposal increases complexity and further research, but maybe not an additional data collection.	
Comments relating to next round of review and revision.	16	3. Analysis of the current text of the Decision / page 34	We consider that the D6 criteria and methodological standards are very much focused on benthic biota while the seafloor integrity could also be assessed by using chemical, physical, or geological parameters, which set the conditions for biota. Finland is exploring ways of using such parameters as proxies for the proposed methodological standards and recommends that the further development suggested by ICES (page 3 of the Advice section) would take this approach into account.	ICES did not propose the research plan for this round of review and possible revision. The proposals are a road map for future input. Additional comments are welcomed. There is disagreement about the importance of habitat classification, but not on scale. This can be addressed at any future workshops.
	9	Page 3, 1, third bullet point	It is not clear how this is going to be fed into the revision of the commission decision. Is ICES proposing a further revision of D6 and a workshop in 2017?	
	10	Page 3, 2, second bullet point	A similar suggestion has been rejected by the UK before. We see no merit in this exercise, we should be focusing on benthic ecosystems and not on habitats, and most importantly we should avoid getting entangled on habitat classification and different interpretations from Member States. It could also be a pointless exercise because some indicators are applicable to more than one habitat, for example the IQI can be applied to soft sentiments in general, and OSPARS' BH3 applies to all. In the past we have said that any discussions on habitat types for assessment purposes should be part of indicator development. More general lists are not necessary as there are already several lists of habitats for the OSPAR, MPAs and Habitats Directive. There is no added value in developing more.	
Comment relating to definition of GES.	5	33/ Definition of GES	The sentence "Any disturbance (intensity, frequency, and spatial extent) should not exceed a level that significantly and permanently jeopardises recovery." can be misunderstandable and has been misunderstood in the	The issue is neither specific, clear, nor understandable; therefore it is difficult to provide a clarification.

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			<p>past, because as phrased here all seafloor areas could be below good status as long as they can in principle recover in a not defined future. This was not agreed at the Descriptor workshop.</p> <p>Therefore, the sentence needs to be adapted. Possible solution: "Disturbance of the seafloor is at a specific rate adequate for the sensitivity and resilience for a given habitat (special and pre-dominant according to Annex III)."</p>	
Comment relating to the word "pristine".	14	General	Many of the Irish comments for D1 apply to D6 as well.	The MSFD assumes that GES is different from pristine. This is clear.
Comment relating to the word "patchy".	11	Page 32, third bullet point	Reword this sentence as patchy is not a good word to use. Suggest heterogenous.	Heterogeneous is a suitable replacement.

Annex 4 Clarification of grouped comments on MSFD GES descriptor 11 (energy, including underwater noise)

* The EU Member States and stakeholder comments have been aggregated by type and addressed with a single response.

Type of comment	Comment number	Heading / Section / Page	Comment / Observation	ICES Technical Service response to MS consultation *
Agreement and/or no specific comment.	1	Part II/ GES criteria	OK with the precautionary principle.	No clarification required.
	2	General	The revision of the Marine Strategy Framework Directive (MSFD) manual for Descriptor 11 took place within a transparent international process which was substantially influenced by the work of the TG Noise. Since all statements and suggestions are based on the current state of scientific understanding the recommendations are worth to be implemented within the current revision process 2016. No suggestions should be withdrawn. In our opinion René Dekeling as the most recent author did a good job and considered the comments of the different parties in an appropriate way.	
	9	Part II/Ges criteria/page 12	Agree with no inclusion of new criteria, no combination of existing criteria, and no hard settings for levels, frequencies, impacts, or types of inputs (impulsive or long-term ambient).	
	13	General	The UK agrees with the conclusions made in part II of the D11 manual and make the following points.	
	27	Horizontal	No comments: we support the proposed technical changes to make the decision clearer.	
Comments relating to impact indicators.	16	Page 13	We agree that further work is needed to either define an impact indicator or determine whether one is required. While the methodology proposed by the Netherlands may provide a suitable route, we would consider that a conference presentation does not provide the required scrutiny for this to be adopted without considerable further development and justification.	All comments reflect the paucity of knowledge on impact of underwater noise. As supported by TG Noise, there are requests for further studies and maintaining monitoring. Caution is raised about coherence between EU Member States and monitoring. Until further knowledge is created issues such as weighting of impact cannot be addressed.
	19	Page 12	It seems unusual that no effort appears to be made to offer a definition of the text “...that do not adversely affect the marine environment”. It is therefore unclear for example in relation to marine mammals whether Permanent Threshold Shift, Temporary Threshold Shift, or No Threshold Shift is the aim of the directive. The resolution of this higher issue in the descriptor would create a context within which the further more detailed issues could be resolved. Similarly, much is already being applied via regulation of industry (with corresponding resource implications) in some MSs	

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			under Art 12 of the Habitats Directive to fold in a risk profile and mitigation/management approach to avoid introducing levels of sound to areas that are likely to have adverse effects on marine mammals. Yet none of this part of the descriptor appears to have been opened up to detailed examination and/or development under the MSFD and it would seem MSs are missing an opportunity – some consistency between directives might be a constructive step and address one of the key objectives of this exercise (namely coherence with other EU legislation).	
	14	Page 8 – D11.1.1. Also page 12	We agree that a definition of "exceeds a value that is likely to entail significant impact on marine animals" in D11.1.1 is required to remove ambiguity. While waiting for a definition for this, MS need to be recording data in a noise registry and run the risk of collecting incomparable data if the level selected is different between MS.	
	26	GES criteria/ Impact indicator / page 13	The respondents strongly disagree with the statement: "... the present impulsive noise indicator (11.1.1) can be used to determine impact...". True impact must be based on effects on population parameters (reproductive success and survival), yet no-one has so far been able to establish such links for any marine organism. Agent-based modelling, such as the PCoD and DEPONS initiatives may provide insights into these questions, but they are not yet operational and were not part of the Dutch assessment referred to. Thus, the use of a pressure indicator rather than an impact indicator is by necessity alone. With the current indicators it cannot even be concluded that a decrease in the indicators will lead to improved GES!	
	7	Page 13 – Impact Indicator	As for now there is no proposal for an impact indicator. The present information collected for impulsive noise should in the future be used to assess impact using sophisticated propagation models and tools that are becoming available at this moment. For now priority should be on the current indicators and starting the monitoring/assessment for those.	
	11	Part II/page 13	Agree that no impact indicator should be indicated at this stage due to the current lack of understanding.	
	23	Analysis of the current text of the Decision/ Indicator 11.1.1 Distribution in	The current way the indicator is defined is biased such that repetitive sound emissions are weighted less than single emissions when it comes to impact. This is because assessment is made day by day. A day with a single explosion of a moderate amount of explosives is thus	

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		time and place... / page 8	weighted the same as one entire day with seismic shooting (1 loud pulse every 5–10 s.) or one day with pile driving (1–2 hours with ~1 loud pulse per second). There is no easy solution to this problem, but it should at least be acknowledged.	
	24	GES criteria / page 12 (second para)	For noise it is even unclear how precautionary levels can be set, as it is entirely unknown to what degree current levels of noise affect the ecosystems. The only thing which can be said with some confidence is that less noise is probably better than more noise. This highlights the need for monitoring and even more the need for impact studies, where the link between noise and effects on marine life can be established.	
Comments relating to frequencies.	5	Page 9 – frequency bands	We recommend to stick to the frequency bands as stated in the Commission Decision (63 Hz and 125 Hz). Other frequency bands can be monitored when this is agreed in a region, but should not be mandatory for all regions.	Comments from EU Member States agree with the general context of the review, although no consensus was agreed by the review for monitoring of additional frequency bands. Associated stakeholder comments are policy oriented and thus do not require clarification.
	10	Part I/ page 8	Agree with the setting of 10 kHz as the frequency band upper limit for monitoring purposes.	
	S1	Page 9, paragraph 3	The BIAS project choice of frequency based on 'hearing of sensitive species' is not in line with the concept of indicator 11.2.1 which is a pressure indicator. The indicator is designed to provide an adequate 'footprint' of shipping intensity in an area. This confusion between 'pressure' and 'receiver' (i.e. the sensitive species) is a very common misunderstanding. If we based the choice of frequencies that are monitored on the 'sensitive species' we will have to monitor many frequencies and these could also differ between regions based on the hearing capabilities of marine life. This is the reason why – during the very first meeting of the TG noise back in 2009 – the concept of basing GES on receivers was skipped. It is unfortunate that such a prominent project as BIAS follows this misconception. Its also a bit puzzling as BIAS is represented well in TG Noise and thus should have known better.	
	S2	Page 9, paragraph 5	This again is an example of misinterpreting the intention of 11.2.1. The focus should be on frequencies that are representative for shipping, NOT the hearing characteristics of marine life.	
Comment relating to average in D11.2.1	3	Indicator 11.2.1	Concerning the proposed change of wording in regard to Indicator 11.2.1 two amendments should be taken into regard: the annotations concerning the definition of the	As a metric, the average represents the central tendency; variability is another metric. Both comments request the

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			average as the average of the squared pound pressure should be augmented: - The average was called arithmetic mean by TG Noise and this should be mentioned here. - It must be mentioned that indicating only this average is insufficient if the signals are variable. If so, another statistical value such as the median should be given. A final decision concerning this point hasn't been taken in the TG Noise up to now.	addition of arithmetic mean to the definition.
	15	Page 8 – D11.2.1	A definition of average would make this less ambiguous. Mean, median, or mode.	
Correction.	20	Page 12	Drafting change: the cross cutting issues meeting in January 2015 was held in the EEA offices and not the ICES office.	The location was EEA HQ.
Comments relating to data collection.	8	Page 14 – monitoring impulsive noise	Focus should be on collecting all the data identified in the TG Noise monitoring guidance. These should be the minimum requirements at EU level in the future.	Support the review findings.
	12	Part I/ Approach/ page 2	Agree with TG Noise recommendations regarding the urgent need main priority for initiating actual monitoring of current indicators, for future proof .	
Comment relating to climate sensitivity.	22	Approach/ The "climate sensitivity" for D11 / page 6	The most important possible effect of climate change on D11 is not mentioned: the change in shipping patterns due to changes in ice conditions. An area where this could be of particular importance is the Baltic, as warmer winters with less ice predicted in future climate scenarios would likely lead to increased shipping into the northern part of the Baltic and Gulf of Finland in winter months, which would lead to increased ship noise, also in the remaining parts of the Baltic and Danish Straits, as ships would pass out into the North Sea.	This factor is missing from the climate section (page 6).
Comments relating to other forms of energy.	6	Page 12 – Other forms of energy	There is no new information that would justify including other forms of Energy as a criterion. However, the MARVEN project may give new insight; results of this project could be included if available soon.	The review states that if more knowledge and information is available, especially from the MARVEN project, it could be considered.
	25	GES criteria/ Other forms of energy / pages 12–13	Electromagnetic fields can impact marine life. Especially migrating fish could potentially be affected by static electromagnetic fields surrounding subsurface power cables. The knowledge about this issue is limited.	
Comment relating to the use of the word "precautionary".	S3	Page 12, paragraph 2	We object to the last statement. Setting precautionary pressure levels is not an option if knowledge is so limited as is the case here.	This is a policy comment and requires no clarification.
Comment relating to spatial monitoring.	21	Chapter "Analysis of the current text of the	Regarding the indicators 11.1.1 and 11.2.1, in the Com Decision revision it would be necessary to reach an agreement on the term "spatial distribution" (pages 7–10,	Request for input on the spatial nature of modelling. This is not included in the review.

Type of comment	Comment number	Heading / Section / Page	Comment / Observation	ICES Technical Service response to MS consultation *
		Decision"/ pages 7–10	chapter "Analysis of the current text of the Decision"), providing a specific shape and area for the grid in order to visualize the indicator of impulsive noises with the aim to facilitate the coordination between different marine regions, and the comparability of data.	
Generic comments.	S4	Page 12, paragraph 4	The proposal of TG Noise (Dekeling <i>et al.</i> , 2014d) for ISO Standards as a priority, should be taken into account before any proposals for new criteria.	There are no proposals for new criteria.
	S5	Page 13, Section Other indicators of noise	No new indicators can be proposed before knowledge gaps are filled by TG Noise.	No clarification required.
	S11	Definition of GES, page 6, first paragraph	References to research (military and offshore wind) programmes should also include the Oil and Gas industry JIP on E&P sound and marine life which since 2006 has funded studies to a total of about \$50 million (including PCoD and its predecessor PCAD).	No clarification required.
	4	Indicator 11.1.1	Concerning Indicator 11.1.1 exists a brief description that it will be hard to establish a 'monopole source level'. This applies in principle to all sources (as long as determined metrological) and not only as described to a few.	This comment is not understood.
	17	Page 5 Approach "linkages with international and RSC Norms and Standards	<i>"It might be useful to the achievement of GES "input noise" undertake a study, following the example of the HELCOM 2010 approach, which considers 4 indicators level for the effects of noise (in addition to the frequencies released) recognizing the noise as other disorder physical (p.5)"</i>	This is mentioned in page 5 of the review.
	18	Page 7 – Criteria to be kept in the Decision/11.1	<i>"is supported the reporting of a lack of data on the distribution in space and time of anthropogenic sources that exceed levels that determine impacts on marine animals."</i>	Not clear what the comment or question is.
	S12	Recommended improvements to wording of Criteria/ "...improving indicator 11.1.1 to:"	<i>at end of Definition: "...exceeds a value that may entail significant impact on marine animals at the population level."</i>	Not clear what the comment or question is.
Comments relating to textual changes.	S6	Definition of the descriptor/4th paragraph/first sentence	The sentence makes an unsubstantiated link between levels of sound input and potential effect. The sentence should be recast to read <i>"Most commercial activities entailing high noise levels that have the potential to affect relatively broad areas of sea...etc."</i>	No clarification required.
	S7	Definition of the descriptor/4th	Sentence 3 is inaccurate as not all "Chemical pollution" persists in the environment. Many substances degrade, others transform or are removed from biological cycles by	

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		paragraph/3rd and 4th sentences	irreversible adsorption on to particulate material. Moreover, just as is suggested for sound, reduction of inputs of substance may lead directly to reduction in adverse effects (i.e. pollution). It might be preferable to not make the comparison but simply to state " <i>Underwater sound does not persist in the environment</i> ".	
	S8	Definition of the descriptor/ 4th paragraph/ 5th sentence to end of paragraph	These sentences make a rather convoluted link between observed and presumed sound levels from shipping. They also intertwine impulsive and continuous sources. The cited evidence for the north Pacific Ocean addresses only shipping and for balance any inference for European waters should also only refer to shipping. Also it is increasingly recognised that 'ambient' sound levels vary significantly depending on location and method of measure. It is probably inaccurate to say that piling sound has not reduced given the mitigation work done (and published) in Germany.	
	S9	Linkages with existing relevant EU legal requirements etc/ page 4/ second paragraph	As "pollution" is defined implies "damage" and as the demonstration of adverse effects has not been given, the sentences should be recast to say " <i>...consider sound as a potential source of pollution that may affect the marine environment.... The Guidelines identify several sources of potential underwater sound pollution...</i> ".	
	S10	Linkages with existing relevant EU legal requirements etc/ page 4/ 4th full paragraph	Unclear what is meant by "permanent" monitoring. Monitoring of activity through mechanisms such as a register or some form of in water measure? It might be better to say " <i>established monitoring programme</i> ". Even then, the statement is inaccurate as some OSPAR Contracting Parties that are also EU member states are using impulsive sound registers to monitor. Further the OSPAR QSR 2010 also considers the potential negative effects. these were not demonstrated in any sense.	
	S13	Conclusions (Part I)/ page 11	Add a bullet to seek classification on "Mistranslation" in GES indicators (page 7), thus: "Seek to align MS definitions of GES".	
	S14	Impact indicator/ page 13/ final paragraph	Propose replacing the first sentence with: " <i>The interim conclusion is that an impact indicator cannot be proposed at this stage, but it should also be noted that the current 'pressure indicator' for impulsive sound might be a component in an assessment of impact in the future.</i> " if deemed necessary definition of an impact indicator could be considered a priority for the work programme of TG Noise recognising however, that it might not be possible to	

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			<i>conclude on the item within the time frame of establishing ES or GES.</i>	
	S15	Conclusions (part II):/ page 15/ final bullet	To reflect the comment immediately above, this could be reworded to: <i>"There is no agreed impact indicator available at this stage, but the present pressure indicator for impulsive sound might be used as a component of an assessment of impact."</i>	