

Til: abdellah.srou@fao.org (abdellah.srou@fao.org), kloeppe@waddensea-secretariat.org (kloeppe@waddensea-secretariat.org), Nicola.Ferri@fao.org (Nicola.Ferri@fao.org), anne.christine@ices.dk (anne.christine@ices.dk), Miguel.Bernal@fao.org (Miguel.Bernal@fao.org), UllaLi.Zweifel@helcom.fi (UllaLi.Zweifel@helcom.fi), hermanni.backer@helcom.fi (hermanni.backer@helcom.fi), monika.stankiewicz@helcom.fi (monika.stankiewicz@helcom.fi), secretariat@ospar.org (secretariat@ospar.org), jo.foden@ospar.org (jo.foden@ospar.org), sc@bsrac.org (sc@bsrac.org), hlavray@eurelectric.org (hlavray@eurelectric.org), almut.bonhage@eureau.org (almut.bonhage@eureau.org), mc@europeanboatingindustry.eu (mc@europeanboatingindustry.eu), konstantinos.kokosis@ebcd.org (konstantinos.kokosis@ebcd.org), kathleen.laissy@ebcd.org (kathleen.laissy@ebcd.org), alec.taylor@rspb.org.uk (alec.taylor@rspb.org.uk), wwisser@visned.nl (wwisser@visned.nl), Bruna.Campos@birdlife.org (Bruna.Campos@birdlife.org), giuseppe.sciacca@crpm.org (giuseppe.sciacca@crpm.org), ral@alum.mit.edu (ral@alum.mit.edu), volodymyr.myroshnychenko@blacksea-commission.org (volodymyr.myroshnychenko@blacksea-commission.org), Philip.Stamp@defra.gsi.gov.uk (Philip.Stamp@defra.gsi.gov.uk), dominic.pattinson@defra.gsi.gov.uk (dominic.pattinson@defra.gsi.gov.uk), anna.donald@scotland.gsi.gov.uk (anna.donald@scotland.gsi.gov.uk), tamsin.brown@wales.gsi.gov.uk (tamsin.brown@wales.gsi.gov.uk), Eamon.Murphy@scotland.gsi.gov.uk (Eamon.Murphy@scotland.gsi.gov.uk), Karin.Pettersson@havochvatten.se (Karin.Pettersson@havochvatten.se), philip.axe@smhi.se (philip.axe@smhi.se), ljr@bodc.ac.uk (ljr@bodc.ac.uk), richard.moxon@defra.gsi.gov.uk (richard.moxon@defra.gsi.gov.uk), susan.cramer@doeni.gov.uk (susan.cramer@doeni.gov.uk), kristinlinda@umhverfisstofnun.is (kristinlinda@umhverfisstofnun.is), gaetano.leone@unepmap.gr (gaetano.leone@unepmap.gr), murat.turan@csb.gov.tr (murat.turan@csb.gov.tr), Gyorgyi.Gurban@unepmap.gr (Gyorgyi.Gurban@unepmap.gr), kiril.iliev@blacksea-commission.org (kiril.iliev@blacksea-commission.org), irina.makarenko@blacksea-commission.org (irina.makarenko@blacksea-commission.org), eirik.drablos.pettersen@miljodir.no (eirik.drablos.pettersen@miljodir.no), Eva.Degre@DIRNAT.NO (Eva.Degre@DIRNAT.NO), olle-morten.grini@sft.no (olle-morten.grini@sft.no), nazliyenal@gmail.com (nazliyenal@gmail.com), Marianne.Kroglund@sft.no (Marianne.Kroglund@sft.no), info@ecmar.eu (info@ecmar.eu), Eva.Gelabert@eea.europa.eu (Eva.Gelabert@eea.europa.eu), Constanca.Belchior@eea.europa.eu (Constanca.Belchior@eea.europa.eu), Gunnar.Norén@gunnar.noren@ccb.se, edward.vernon@gov.mt (edward.vernon@gov.mt), Fournier,Nicolas (nfournier@oceana.org), bstockhausen@seas-at-risk.org (bstockhausen@seas-at-risk.org), adom@seas-at-risk.org (adom@seas-at-risk.org), stephan.lutter@wwf.de (stephan.lutter@wwf.de), Trine.Christiansen@eea.europa.eu (Trine.Christiansen@eea.europa.eu), Idodds@wwf.org.uk (Idodds@wwf.org.uk), "a.pod >> Andrzej.Podscianski" (a.podscianski@gios.gov.pl), Sandra.SANMARTIN (Sandra.SANMARTIN@ebcd.org), Info.egy@prv.ypeka.gr (Info.egy@prv.ypeka.gr), lioel@mst.dk (lioel@mst.dk), Anne-Mette.Hjortebjerg.Lund (anhlu@mst.dk), Ane-Marie.Løvendahl.Raun (anlra@mst.dk), Imhoff, Heike (Heike.Imhoff@bmub.bund.de), baiba.zasa@varam.gov.lv (baiba.zasa@varam.gov.lv), Poutanen.Eeva-Liisa (eeva-liisa.poutanen@ymparisto.fi), Darius.Campbell@ospar.org (Darius.Campbell@ospar.org), nils.hoglund@ccb.se (nils.hoglund@ccb.se), slueber@oceanicare.org (slueber@oceanicare.org), info@europeche.org (info@europeche.org), daniel.voces@europeche.org (daniel.voces@europeche.org), kathryn.stack@europeche.org (kathryn.stack@europeche.org), bv@iogp.org (bv@iogp.org), Annelie.Brand@fishsec.org (Annelie.Brand@fishsec.org), NMcDonough@esf.org (NMcDonough@esf.org), klarkin@esf.org (klarkin@esf.org), b.guillaumie@cnc-france.com (b.guillaumie@cnc-france.com), javiergarat@cepesca.es (javiergarat@cepesca.es), pducloy@comite-peches.fr (pducloy@comite-peches.fr), info@icomia.com (info@icomia.com), vlachogianni@mio-ecsde.org (vlachogianni@mio-ecsde.org), scoullos@mio-ecsde.org (scoullos@mio-ecsde.org), bruno.meola@medpan.org (bruno.meola@medpan.org), chloe.webster@medpan.org (chloe.webster@medpan.org), marie.romani@medpan.org (marie.romani@medpan.org), csiti@dredging.org (csiti@dredging.org), v.bain@hrwallingford.co.uk (v.bain@hrwallingford.co.uk), D.C.Rijks@hydronamic.nl (D.C.Rijks@hydronamic.nl), jan@janbrooke.co.uk (jan@janbrooke.co.uk), albertw@icomia.com (albertw@icomia.com), ekougea@gmail.com (ekougea@gmail.com), m.kapari@prv.ypeka.gr (m.kapari@prv.ypeka.gr), ppanag@ath.hcmr.gr (ppanag@ath.hcmr.gr), apc@apc.gr (apc@apc.gr), alex.lascaratos@gmail.com (alex.lascaratos@gmail.com), britta.knefelkamp@melur.landsh.de (britta.knefelkamp@melur.landsh.de), vera.knoke@melur.landsh.de (vera.knoke@melur.landsh.de), christine.wenzel@melur.landsh.de (christine.wenzel@melur.landsh.de), atsik@bio.auth.gr (atsik@bio.auth.gr), k.triantis@prv.ypeka.gr (k.triantis@prv.ypeka.gr), nbourdaniotis@apc.gr (nbourdaniotis@apc.gr), ludovic.schultz@developpement-durable.gouv.fr (ludovic.schultz@developpement-durable.gouv.fr), isabelle.terrier@developpement-durable.gouv.fr (isabelle.terrier@developpement-durable.gouv.fr), emilie.pleyber@developpement-durable.gouv.fr (emilie.pleyber@developpement-durable.gouv.fr), peter.kovacs@kvvm.gov.hu (peter.kovacs@kvvm.gov.hu), karakassis@biology.uoc.gr (karakassis@biology.uoc.gr), Soile.Kulmala@ymparisto.fi (Soile.Kulmala@ymparisto.fi), jan-erik.bruun@ymparisto.fi (jan-erik.bruun@ymparisto.fi), Maria.Laamanen@ymparisto.fi (Maria.Laamanen@ymparisto.fi), Antti.Lappalainen@rktl.fi (Antti.Lappalainen@rktl.fi), Sara.Viljanen@ymparisto.fi (Sara.Viljanen@ymparisto.fi), jan.witt@nlwkn-ol.niedersachsen.de (jan.witt@nlwkn-ol.niedersachsen.de), bdvarna@bsbd.org (bdvarna@bsbd.org), y.dimitrov@bsbd.org (y.dimitrov@bsbd.org), bdvarna@bsbd.org (bdvarna@bsbd.org), nevia.kruzic@mzoip.hr (nevia.kruzic@mzoip.hr), bogdanovam@moew.government.bg (bogdanovam@moew.government.bg), Ernst.Ueberreiter@lebensministerium.at (Ernst.Ueberreiter@lebensministerium.at), karl.schwaiger@lebensministerium.at (karl.schwaiger@lebensministerium.at), michael.kyramarios@environnement.belgique.be (michael.kyramarios@environnement.belgique.be), s.scory@mumm.ac.be (s.scory@mumm.ac.be), saskia.vangaever@milieu.belgie.be (saskia.vangaever@milieu.belgie.be), Barbara.Skevin-Ivosevic@mzoip.hr (Barbara.Skevin-Ivosevic@mzoip.hr), joachim.heidemeier@uba.de (joachim.heidemeier@uba.de), ulrich.claussen@uba.de (ulrich.claussen@uba.de), Joerg.Rechenberg@uba.de (Joerg.Rechenberg@uba.de), stefan.schmolke@bsh.de (stefan.schmolke@bsh.de), andrea.weiss@uba.de (andrea.weiss@uba.de), smichaelides@dfmr.moa.gov.cy (smichaelides@dfmr.moa.gov.cy), margyrou@dfmr.moa.gov.cy (margyrou@dfmr.moa.gov.cy), (maravrou@dfmr.moa.gov.cy), veronika.klapsiova@mzo.cz (veronika.klapsiova@mzo.cz), iochen.krause@bfn-

vilm.de (jochen.krause@bfn-vilm.de), ingo.narberhaus@bmub.bund.de (ingo.narberhaus@bmub.bund.de), Richard.cronin@environ.ie (Richard.cronin@environ.ie), eberecibar@emepc-portugal.org (eberecibar@emepc-portugal.org), conceicao.santos@dgpm.mam.gov.pt (conceicao.santos@dgpm.mam.gov.pt), margarida.almodovar@dgpm.gov.pt (margarida.almodovar@dgpm.gov.pt), asimao@dgrm.mam.gov.pt (asimao@dgrm.mam.gov.pt), joao.ribeiro@dgpm.gov.pt (joao.ribeiro@dgpm.gov.pt), elzbieta.lysiak-pastuszek@imgw.pl (elzbieta.lysiak-pastuszek@imgw.pl), przemyslaw.gruszecki@kzgw.gov.pl (przemyslaw.gruszecki@kzgw.gov.pl), m.marciniewicz@gios.gov.pl (m.marciniewicz@gios.gov.pl), jmarques@dgrm.mamaot.pt (jmarques@dgrm.mamaot.pt), Adriana.Dembowska@kzgw.gov.pl (Adriana.Dembowska@kzgw.gov.pl), otília.mihail@mmediu.ro (otília.mihail@mmediu.ro), Gunilla.Ejdung@havochovatten.se (Gunilla.Ejdung@havochovatten.se), charlotta.sorqvist@gov.se (charlotta.sorqvist@gov.se), bertil.hakansson@havochovatten.se (bertil.hakansson@havochovatten.se), Kerstin.Blyh@naturvardsverket.se (Kerstin.Blyh@naturvardsverket.se), tobias.porsbring@havochovatten.se (tobias.porsbring@havochovatten.se), tanja.bolte@gov.si (tanja.bolte@gov.si), Barbara.Breznik@gov.si (Barbara.Breznik@gov.si), juan.bellas@vi.iew.es (juan.bellas@vi.iew.es), alejandromaceira@iagua.es (alejandromaceira@iagua.es), sarrieta@magrama.es (sarrieta@magrama.es), tina.kelder@rws.nl (tina.kelder@rws.nl), cecilia.silvestri@isprambiente.it (cecilia.silvestri@isprambiente.it), gianna.casazza@isprambiente.it (gianna.casazza@isprambiente.it), juris.aigars@lhei.lv (juris.aigars@lhei.lv), Agnes.Villmann@envir.ee (Agnes.Villmann@envir.ee), NST - Vandplaner og havmiljø postkasse (vandplanlaegning@mst.dk), Philip.Donovan@environ.ie (Philip.Donovan@environ.ie), donal.cronin@environ.ie (donal.cronin@environ.ie), Eugene.Nixon@marine.ie (Eugene.Nixon@marine.ie), montanaro.oliviero@minambiente.it (montanaro.oliviero@minambiente.it), leonie.dransfeld@marine.ie (leonie.dransfeld@marine.ie), silver.vahtra@envir.ee (silver.vahtra@envir.ee), lisette.enserink@rws.nl (lisette.enserink@rws.nl), Wim.van.Urk@minienm.nl (Wim.van.Urk@minienm.nl), reinier.goud@rws.nl (reinier.goud@rws.nl), rob.vander.veeren@rws.nl (rob.vander.veeren@rws.nl), sandra.van.der.graaf@rws.nl (sandra.van.der.graaf@rws.nl), Anne-Marie.Reckinger@eau.etat.lu (Anne-Marie.Reckinger@eau.etat.lu), a.kniezaitte-gofmane@am.lt (a.kniezaitte-gofmane@am.lt), Helene.Margue@eau.etat.lu (Helene.Margue@eau.etat.lu), carmen.mifsud@mepa.org.mt (carmen.mifsud@mepa.org.mt), marine@mepa.org.mt (marine@mepa.org.mt)

**Cc:** Ana-Teresa.CAETANO@ec.europa.eu (Ana-Teresa.CAETANO@ec.europa.eu), Attilio.GAMBARDELLA@ec.europa.eu (Attilio.GAMBARDELLA@ec.europa.eu), Haitze-J.Siemers@ec.europa.eu (Haitze-J.Siemers@ec.europa.eu), Anne-France.WOESTYN@ec.europa.eu (Anne-France.WOESTYN@ec.europa.eu), Nuala.Carson@defra.gsi.gov.uk (Nuala.Carson@defra.gsi.gov.uk), Helen.Hanratty@doeni.gov.uk (Helen.Hanratty@doeni.gov.uk), Rene.reisner@envir.ee (Rene.reisner@envir.ee), andrew.scarsbrook@defra.gsi.gov.uk (andrew.scarsbrook@defra.gsi.gov.uk), ana-cristina.cardoso@jrc.ec.europa.eu (ana-cristina.cardoso@jrc.ec.europa.eu), Ernesto.Bianchi@ec.europa.eu (Ernesto.Bianchi@ec.europa.eu), mark.dowell@jrc.ec.europa.eu (mark.dowell@jrc.ec.europa.eu), francesca.somma@jrc.ec.europa.eu (francesca.somma@jrc.ec.europa.eu), Kenneth.Patterson@ec.europa.eu (Kenneth.Patterson@ec.europa.eu), Iain.SHEPHERD@ec.europa.eu (Iain.SHEPHERD@ec.europa.eu), Sylvain.GAMBERT@ec.europa.eu (Sylvain.GAMBERT@ec.europa.eu), Franz.Lamplmair@ec.europa.eu (Franz.Lamplmair@ec.europa.eu), Sørderberg, Lone Munk (lomu@MST.DK), 'Aljona.Karloseva@seit.ee' (Aljona.Karloseva@seit.ee), bastiaan.vermonden@milieu.be (bastiaan.vermonden@milieu.be), sarine.barsoumian@milieu.be (sarine.barsoumian@milieu.be), Annick.DE-LOMBAERDE@ec.europa.eu (Annick.DE-LOMBAERDE@ec.europa.eu), jacob.hagberg@regeringskansliet.se (jacob.hagberg@regeringskansliet.se), Frans.Verstraete@ec.europa.eu (Frans.Verstraete@ec.europa.eu), Frank.SWARTENBROUX@ec.europa.eu (Frank.SWARTENBROUX@ec.europa.eu), David.CONNOR@ec.europa.eu (David.CONNOR@ec.europa.eu), Beth.Stoker@jncc.gov.uk (Beth.Stoker@jncc.gov.uk), atila.uras@unepmap.gr (atila.uras@unepmap.gr), Anna.CHEILARI@ec.europa.eu (Anna.CHEILARI@ec.europa.eu), claire.dupont@milieu.be (claire.dupont@milieu.be), eleonora.panella@milieu.be (eleonora.panella@milieu.be), manuel.lago@ecologic.eu (manuel.lago@ecologic.eu), alice.belin@milieu.be (alice.belin@milieu.be), monika.peterlin@izvrs.si (monika.peterlin@izvrs.si), darja.stanic@gov.si (darja.stanic@gov.si), Sartori.silvia@minambiente.it (Sartori.silvia@minambiente.it), marine@mepa.org.mt (marine@mepa.org.mt), ylva.engwall@havochovatten.se (ylva.engwall@havochovatten.se), Fabio.PIROTTA@ec.europa.eu (Fabio.PIROTTA@ec.europa.eu), CDanes@magrama.es (CDanes@magrama.es), laura.piriz@havochovatten.se (laura.piriz@havochovatten.se), maud.casier@developpement-durable.gouv.fr (maud.casier@developpement-durable.gouv.fr), nicolas.rouyer@developpement-durable.gouv.fr (nicolas.rouyer@developpement-durable.gouv.fr), maplikioti@dfmr.moa.gov.cy (maplikioti@dfmr.moa.gov.cy), mmarcou@dfmr.moa.gov.cy (mmarcou@dfmr.moa.gov.cy), thierry.davy@scarlet.be (thierry.davy@scarlet.be), axel.kreutle@bfn-vilm.de (axel.kreutle@bfn-vilm.de), helene.syndique@developpement-durable.gouv.fr (helene.syndique@developpement-durable.gouv.fr), sebastien.flores@developpement-durable.gouv.fr (sebastien.flores@developpement-durable.gouv.fr), Patrick.MURPHY@ec.europa.eu (Patrick.MURPHY@ec.europa.eu), Vedran.NIKOLIC@ec.europa.eu (Vedran.NIKOLIC@ec.europa.eu), Michail.Papadoyannakis@ec.europa.eu (Michail.Papadoyannakis@ec.europa.eu), Morena.TERMINI@ext.ec.europa.eu (Morena.TERMINI@ext.ec.europa.eu), Juan-Pablo.Pertierra@ec.europa.eu (Juan-Pablo.Pertierra@ec.europa.eu), Hugo.De-Groof@ec.europa.eu (Hugo.De-Groof@ec.europa.eu), Fotios.Papoulias@ec.europa.eu (Fotios.Papoulias@ec.europa.eu), Angelika.Rubin@ec.europa.eu (Angelika.Rubin@ec.europa.eu), Anna.KARASSZON@ec.europa.eu (Anna.KARASSZON@ec.europa.eu), Cecile.LEROY1@ec.europa.eu (Cecile.LEROY1@ec.europa.eu), Celine.GILLOT@ec.europa.eu (Celine.GILLOT@ec.europa.eu), Guenter.HOERMANDINGER@ec.europa.eu (Guenter.HOERMANDINGER@ec.europa.eu), Marijana.MANCE@ec.europa.eu (Marijana.MANCE@ec.europa.eu), Lydia.MARTIN-ROUMEGAS@ec.europa.eu (Lydia.MARTIN-ROUMEGAS@ec.europa.eu), Clementine.LEROY@ec.europa.eu (Clementine.LEROY@ec.europa.eu), Matjaz.MALGAJ@ec.europa.eu (Matjaz.MALGAJ@ec.europa.eu)

**Fra:** Morena.TERMINI@ext.ec.europa.eu (Morena.TERMINI@ext.ec.europa.eu)

**Titel:** Consultation on the outcomes of the technical and scientific review of the GES Decision 2010/477/EU and MSFD Annex III

**Sendt:** 12-06-2015 16:10:40

**Bilag:** Consultation letter.pdf; ComDecRev\_D01.pdf; ComDecRev\_D02.pdf; ComDecRev\_D03.pdf; ComDecRev\_D04.pdf; ComDecRev\_D05.pdf; ComDecRev\_D06.pdf; ComDecRev\_D07.pdf; ComDecRev\_D08.pdf; ComDecRev\_D09.pdf; ComDecRev\_D10.pdf; ComDecRev\_D11.pdf; ComDecRev\_MSFDAnnexIII.doc; ComDecReview\_Consultation\_Template\_05062015.docx.xlsx; List of relevant chapters per descriptor for the review.docx;

Dear Members of Marine Strategy Coordination Group,

Please find enclosed a letter by Mr. Matjaž Malgaj, Head of Unit of Marine Environment and Water Industry, DG Environment, for your consideration.

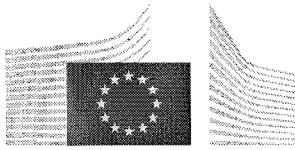
Kind regards  
The marine team

Letter of consultation

Enclosures

1. Review manual for Descriptor
2. Review manual for Descriptor 2
3. Review manual for Descriptor 3
4. Review manual for Descriptor 4
5. Review manual for Descriptor 5
6. Review manual for Descriptor 6
7. Review manual for Descriptor 7
8. Review manual for Descriptor 8
9. Review manual for Descriptor 9
10. Review manual for Descriptor 10
11. Review manual for Descriptor 11
12. MSFD Annex III
13. Feedback form (excel spreadsheet)

14. List of relevant chapters per descriptor on which to focus consultation comments



**EUROPEAN COMMISSION**  
DIRECTORATE-GENERAL  
ENVIRONMENT  
Directorate C - Quality of Life, Water & Air  
**ENV.C.2 - Marine Environment & Water Industry**

Brussels,  
AC/mt Ares (2015)

**Subject: Consultation on the outcomes of the technical and scientific review of the  
GES Decision 2010/477/EU and MSFD Annex III**

Dear Member of the MSFD Common Implementation Strategy,

You will be aware that we have recently finalised the technical and scientific review of the Commission Decision 2010/477/EU and for MSFD Annex III (phase 1 of the Decision review process). This was undertaken with the help of experts from the Member States, Regional Sea Conventions and other stakeholder groups of the MSFD Common Implementation Strategy, under the coordination of JRC and ICES, and has resulted in technical review documents (11 Descriptor manuals and an MSFD Annex III document) which include recommendations for revision of the Decision and Annex III.

The MSFD Regulatory Committee agreed on 5 May 2015 that the review process should move to the second phase which involves a formal consultation and discussion of the results of the technical and scientific review. This is the opportunity for Member States and stakeholders of the MSFD Common Implementation Strategy to provide their consolidated opinions on the documents.

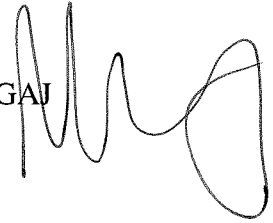
The aim of this consultation is to highlight which elements of these Descriptor manuals and Annex III document you would recommend be considered in the short term when reviewing the Commission Decision and MSFD Annex III (subject to Commission's internal decision making process) and which elements would need further work in the medium as well as longer-term. Part I of the Descriptor manuals mainly compiles background information and need not to be commented upon. Thus, we suggest that you focus your comments on Part II of the documents that refer to Conclusions and Recommendations (details on the specific chapters per descriptor manual are included in the enclosed list).

The consultation will be open for comment until the 31<sup>st</sup> of July 2015. Member States and the other approved stakeholders of the MSFD Common Implementation Strategy are invited to provide a consolidated opinion (i.e. one set of views per country/stakeholder) on the consulted documents. The consultation documents are available at Circabc (<https://circabc.europa.eu/w/browse/46d2b7ba-d2fd-4b3c-9eaf-18c7cb702b53>), which also includes the feedback form to be used for your comments. Full instructions for the consultation response are given in the feedback form.

Please send your responses to Sarine Barsoumian ([sarine.barsoumian@milieu.be](mailto:sarine.barsoumian@milieu.be)), copy to Anna Cheilari ([anna.cheilari@ec.europa.eu](mailto:anna.cheilari@ec.europa.eu)), David Connor ([david.connor@ec.europa.eu](mailto:david.connor@ec.europa.eu)) and Fabio Pirotta ([fabio.pirotta@ec.europa.eu](mailto:fabio.pirotta@ec.europa.eu)).

If you have any questions related to this consultation process, please do not hesitate to contact me or my colleagues David Connor (+32-2299.0391) or Anna Cheilari (+32-2296.5348).

Matjaž MALGAJ



Enclosures: Consultation documents: (available for download from circabc

<https://circabc.europa.eu/w/browse/46d2b7ba-d2fd-4b3c-9eaf-18c7cb702b53>)

1. Review manual for Descriptor 1
2. Review manual for Descriptor 2
3. Review manual for Descriptor 3
4. Review manual for Descriptor 4
5. Review manual for Descriptor 5
6. Review manual for Descriptor 6
7. Review manual for Descriptor 7
8. Review manual for Descriptor 8
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# **Review of the Commission Decision 2010/477/EU concerning MSFD criteria for assessing good environmental status**

## **Descriptor 1**

**Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with the prevailing physiographic, geographic and climate conditions.**

This report represents the result of the scientific and technical review of Commission Decision 2010/477/EU in relation to Descriptor 1. The review has been carried out by the EC JRC together with experts nominated by EU Member States, and has considered contributions from the GES Working Group in accordance with the roadmap set out in the MSFD implementation strategy (agreed on at the 11th CIS MSCG meeting).

The report is one of a series of reports (review manuals) including Descriptor 1, 2, 5, 7, 8, 9, 10 that conclude phase 1 of the review process and, as agreed within the MSFD Common Implementation Strategy, are the basis for review phase 2, towards an eventual revision of the Commission Decision 2010/477/EU.

The report presents the state of the technical discussions as of 30 April 2015 (document version 6.0), as some discussions are on-going, it does not contain agreed conclusions on all issues.

The views expressed in the document do not necessarily represent the views of the European Commission.

## **Foreword**

The MSFD Committee (Art. 25 of the MSFD) discussed and concluded an approach and an outline for the review and possible revision of the Commission Decision 2010/477/EU on criteria and methodological standards on Good Environmental Status (GES) of marine waters and of MSFD Annex III (see Committee/07/2013/03rev for details). Based on the template in the annex to the mandate of the MSFD Committee, a more detailed manual for the technical phase relating to the review of Commission Decision 2010/477/EC has been developed to guide the parallel preparatory process and discussions per descriptor. 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 assessment in particular as regards temporal and spatial aggregation. The review of Annex III will be carried out as a parallel process. The review of the Common Understanding Document is also taking place alongside these two processes. Close coordination between these three processes should be ensured.

**MSFD D1 expert group:** António Teixeira, Georg Martin, Lauri Saks, Laura Uusitalo , Lena Avellan, Laurent Guérin, Wojciech Kraśniewski, Peter Heslenfeld, Tobias Porsbring, Jochen Krause, Alberto Serrano, Francisco Velasco, Jane Hawkrige, Simon Greenstreet, Valeria Abaza, Laura Boicenco, Ioannis Karakassis, Antonina Santos

**EC JRC:** Andreas Palialexis, Ana Cristina Cardoso, Heliana Teixeira, Joana Patricio, Fernando Tempera.

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<b>1. Approach</b>
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### 1.1 General guiding principles for the review

The review aims to analyse the results from the first MSFD reporting round on Articles 8, 9, and 10 with a view to update and simplify the Com Decision 2010/477/EU. Based on the Information in the Art 12 assessment reports (COM(2014)97 final) and the JRC in-depth assessments (Palialexis et al., 2014<sup>1</sup>) a template has been prefilled by Milieu for the DG ENV, commented by DG ENV and completed by JRC which should enable the experts group to analyse current shortcomings, propose ways forward, such as e.g. needs for further guidance and development, but eventually also to develop proposals for amending the Decision 2010/477/EU, based on scientific knowledge and experience in the implementation process.

The current review should lead to a new GES Decision which is:

- Simpler
- Clearer
- Introducing minimum requirements (to be enhanced by regions and MS, if necessary)
- Self-explanatory
- Coherent with other EU legislation
- Coherent with regional assessment methods (where EU does not exist)
- Have a clear and minimum common list of criteria and methodological standards and related characteristics (Table 1, Annex III), at least at a sub-regional scale
- Ensure that criteria and methodological standards are adequately addressing the Descriptors are covered by the proposed criteria, to lead to complete assessments
- Coherent with the MSFD terminology

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<sup>1</sup> Palialexis A., Tornero A. V., Barbone E., Gonzalez D., Hanke G., Cardoso A. C., Hoepffner N., Katsanevakis S., Somma F., Zampoukas N., 2014. In-Depth Assessment of the EU Member States' Submissions for the Marine Strategy Framework Directive under articles 8, 9 and 10. EUR – Scientific and Technical Research series. Luxembourg: Publications Office of the European Union. EUR 26473 EN, 149 pp. doi: 10.2788/64014.

This review should lead to a more coherent approach to the definition of GES based on agreed criteria and methodological standards that allow for determining the distance of the current state from GES. Figure 1 shows an example on the link between MSFD terminology and existing practical approach taken from EU legislations. This can be used as guide for the characteristics/elements to be addressed under Annex III and the revised Decision and to streamline the discussion to be carried out through the review process.

MSFD provision	Role/contents	Applied example
<b>Art. 3 (5)</b> GES definition	Goal	GES by 2020: "the environmental status of marine waters where ... "
<b>Annex I</b> GES descriptor	Quality objective	<b>D1:</b> "Biological diversity is maintained. The quality and occurrence of ..."
<b>Annex III</b> GES elements	Assessment elements	Birds, <b>mammals</b> , reptiles, fish, seabed habitats, water column habitats
<b>Art. 9(3)</b> GES criteria and methodological standards	EU-wide minimum specifications: <b>Criteria:</b> a. Assessment elements b. Assessment parameters c. Reference points (baseline and GES boundary values) <b>Methodological standards:</b> d. Assessment tools and procedures e. Assessment scale (generic)	<b>Example: Mammals</b> a. List of mammal functional groups (e.g. seals, small cetaceans) b. Distribution, population size, health condition c. Reference condition and acceptable deviation values (cf FCS target levels of Habitats Directive) d. FCS aggregation procedures/methods e. Cetaceans at subregional scale; seals at subdivision scale (nested approach)
<b>Art. 9(1)</b> Determination of GES	Sub(regional) specification by MS: a. Further specify criteria and methodological standards (e.g. RSC region/subregion-specific assessment elements, common indicators and assessment tools) b. Additional characteristics for region/subregion	<b>Example: North-East Atlantic</b> a. Harbour seal, grey seal b. OSPAR common indicators: • M-1 Distribution of seals • M-3 Abundance of seals • M-5 Seal pup production c. OSPAR-defined subdivisions of subregions (nested approach)
<b>Art. 11(4)</b> – Specifications and standardised methods for monitoring and assessment: e.g. EU-wide minimum specifications for spatial and temporal resolution of monitoring, monitoring methods (sampling, analysis, QA/QC), scaling, aggregation rules		

Figure 1. Interpretation of Art. 9 of the MSFD for Descriptor 1<sup>2</sup>

The following points are summarising the role of GES in MSFD. According to the Directive GES is:

- starting and end point of MSFD
- reference point for the other MSFD provisions
- determined at the level of marine (sub)regions
- specified by common criteria and methodological standards
- legally time bound (2020) and subject to legally defined exceptions where this is not feasible

<sup>2</sup> Cross-cutting meeting Copenhagen 21-22 January 2015. [https://circabc.europa.eu/d/a/workspace/SpacesStore/c47780cf-3fd6-4807-92c1-15a78a3ee29b/1501\\_GES\\_CCworkshop\\_Session%201.ppt](https://circabc.europa.eu/d/a/workspace/SpacesStore/c47780cf-3fd6-4807-92c1-15a78a3ee29b/1501_GES_CCworkshop_Session%201.ppt)

GES needs to ideally be quantified/quantifiable or measurable to allow for determining the distance of the current state from GES and targets to monitor the progress towards GES<sup>3</sup>. According to the Com Decision 2010/477/EU GES Art. 9(1) MS should determine GES at the level of criteria for each assessed element at a certain scale. This is the lowest quantifiable assessment block, which will be aggregated to provide the overall GES for the marine ecosystem (see section 6.2 for aggregation rules).

## 1.2 Overall reflection of the type of descriptor and descriptor criteria (e.g. state/pressure, quantitative/qualitative) and its relationship with Article 3(5).

According to MSFD Annex I for the biological diversity descriptor D1, GES means the environmental status of marine waters, where “Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climate conditions”. An ICES/ JRC expert Task Group (TG1) established in 2009 prepared the scientific basis for developing the Commission Decision (2010/477/EC) and has in this context addressed the definition/interpretation of key terms included in the descriptor of biodiversity, i.e. biological diversity and maintained.

The Group adopted for the purpose of the Task the definition of the Convention on Biological Diversity (CBD) for **‘biological diversity’**: “the variability among living organisms from all sources including, *interalia*, [terrestrial,] marine [and other aquatic ecosystems] and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems”<sup>4</sup>. Table 1 in Annex III of the MSFD lists biodiversity related features that should be considered in the implementation.

The term **‘maintained’** is key to the quantification of GES for D1 and thus for the elaboration of recommendations on criteria and methodological standards. The TG1 has associated the condition (‘maintained’) to three determining factors: “a) no further loss of the diversity within species, between species and of habitats/ communities and ecosystems at ecologically relevant scales, b) any deteriorated attributes of biological diversity are restored to and maintained at or above target levels, where intrinsic conditions allow (cf. Art. 1.2 a) and c) where the use of the marine environment is sustainable”.

The term **‘habitat’** in this Descriptor addresses both the abiotic characteristics and the associated biological community, treating both elements together in the sense of the term biotope (Commission Decision 2010/477/EU), whereas ‘quality’, ‘occurrence’, ‘distribution’, ‘extent’ and ‘abundance’ form the basis of the criteria standards to assess GES.

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<sup>3</sup> From DG ENV’s presentation in March’s 2014 WG GES group: [https://circabc.europa.eu/d/a/workspace/SpacesStore/2e3f1f2f-c1ef-407f-a433-12cf73e9e61b/GES\\_11-2014-13\\_CommonUnderstanding.ppt](https://circabc.europa.eu/d/a/workspace/SpacesStore/2e3f1f2f-c1ef-407f-a433-12cf73e9e61b/GES_11-2014-13_CommonUnderstanding.ppt)

<sup>4</sup> Task Group 1 Report Biological diversity (2010) – text in [...] shows where the definition is less relevant to the marine environment.

Descriptor 1 has a broad scope, requiring assessment at several ecological levels: species, habitats (addressing both the abiotic characteristics and the associated biological community, treating both elements together) and ecosystems. At the species level, GES shall be defined for the full range of functional and taxonomic groups occurring in the marine environment, including the native angiosperms, macro-algae and invertebrate bottom fauna, phytoplankton, zooplankton, fish, mammals, reptiles, seabirds and cephalopods (Annex III, Table 1 of the MSFD).

The MSFD requires Member States to understand and assess the condition of the typical species associated with the seabed and the pelagic habitats and the representative species of the functional groups (MSFD, TG1, CSWD 2011). Special attention is given to the listed species under EU Directives (the Birds Directive, the Habitats Directive) (MSFD paragraph 6; COM DEC 2010/477/EU paragraph 5) and international conventions (Helsinki, OSPAR, Barcelona, Bucharest) - also referred to Annex III Table I of the MSFD.

At the habitat level, determination of GES is required for the predominant habitat types (as defined in Annex III, Table 1 of the MSFD, in TG1 report and in the SWD 2011/1255) and the special habitat types listed under EU legislation or international conventions.

The determination of GES for biological diversity at the ecosystem level shall be based on evaluation of the structure (composition and proportion) and interaction between the ecosystem components, the processes and functioning, connectivity and resilience of the ecosystem. This would be the level for biological traits and ecosystem services. Some of the aforementioned ecosystem attributes are also tackled by other descriptors (e.g. 4 and 6) and these links have to be specified and clarified, consisting one of the major issues in the review process.

It is recognized that there are strong links between D1 (biodiversity per se), D4 (food webs) and D6 (sea-floor integrity), which are frequently addressed together as the “biodiversity theme” since requirements for monitoring and assessment of these descriptors partially overlap (see e.g. Zampoukas et al., 2012<sup>5</sup>, Table 1). Thus, it is necessary to ensure a coherent approach across the descriptors to avoid overlapping, contradictory and double assessments. Besides, all other descriptors include, more or less explicitly, effects on “state” of various biodiversity components in at least one criterion (except actually implicitly for D11). Thus, GES of “pressure” descriptors should be defined and assessed in line with the GES of “biodiversity” descriptors. This to optimize: i) integrated indicators/monitoring standards (across criteria within and/or between Descriptors), ii) associated monitoring, and iii) efficient guidance for measures (pressure/state relationships).

Overall, for the MSFD, assessments of status are focused on the following groups of highly mobile marine species: birds, mammals, reptiles, fish and cephalopods, and on predominant habitat types of the water column and seabed together with their associated biological communities (SWD 2014/49). In

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<sup>5</sup> Zampoukas N, Piha H, Bigagli E, Hoepffner N, Hanke G, Cardoso AC. 2012. Monitoring for the Marine Strategy Framework Directive: Requirements and options. JRC Scientific and Technical Reports. <http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/23169/1/lbna25187enn.pdf>

addition to these broad categories, attention is directed also to specific species and habitat types which are listed for protection under the Birds and Habitats Directives and under international agreements. Genetic- and ecosystem-level aspects are also important for the status characterization.

### **1.3 Linkages with existing relevant EU legal requirements, standards and limit values, such as the WFD, and the identification of potential incoherence.**

#### ***The Habitats Directive (92/43/EEC)***

The main aim of the Directive is to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora. It requires that EU MS take measures to ensure that the species and habitats “of community interest” listed in its annexes are protected so as to be in “favourable conservation status” (FCS).

The Habitats Directive specifically establishes the network of Special Areas of Conservation (SACs), which together with the Special Protection Areas (SPAs) under the Birds Directive form the Natura 2000 network of protected areas, including marine areas, as a mean to achieving FCS for the listed species and habitats. In the network each site contributes to the attainment of FCS, but this objective is to be attained at the scale of the natural range of species or habitat type. The site level conservation objectives are set upon identification of the contribution of the particular site to the Member States’ achievement of FCS for the habitats and species present in the whole area of the Member States.

Site objectives should be established for SACs under the Habitats Directive and also for special protected areas (SPAs) under the Birds Directive. The conservation objectives at the site level must take in consideration the following elements (COM Note on establishing conservation objectives for the Natura 2000 sites 23/11/2012):

- the ecological requirements of the species and habitat types listed in the Natura 2000 Standard Data Form and whose presence is significant
- the local, regional, national conservation status of the habitats and species
- the overall coherence of the Natura 2000 network
- the higher level conservation objectives at national/ biogeographical level and the contribution of the site to them.

Member States are required to report on the status of the species and habitats including their distribution within the territory of the Member State and measures taken and their impact on the conservation status of concerned habitats and species every six years. Assessment of whether a species or habitat is in FCS is based on specified criteria with principle threshold values<sup>6</sup>, with failure of any one criterion giving a ‘below-FCS’ outcome (one-out-all-out principle). Assessment of FCS is by biogeographic regions. Where Member State's territories lie in several biogeographic regions, separate assessments

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<sup>6</sup> Annex C and E of the following report:

[http://www.bfn.de/fileadmin/MDB/documents/themen/monitoring/Art\\_17\\_Reporting\\_Formats.pdf](http://www.bfn.de/fileadmin/MDB/documents/themen/monitoring/Art_17_Reporting_Formats.pdf)

are required for their territory within each region. There is then an aggregation of assessments across the Member States to give the overall status per species and habitat at the biogeographic region level.

### ***The Birds Directive (2009/147/EC)***

The Birds Directive (BD) refers to the need for a sufficient diversity and area of habitats for listed bird species (Annex I of the BD) and migratory species not listed. It requires the establishment of measures to maintain the populations of these species including the designation of protected areas (Special Protection Areas)<sup>7</sup>. These measures should be reported every six years. The establishment of conservation measures should take into account trends and variations in populations. In 2007 bird species were assessed for the first time using the same FCS criteria and methodology as under the Habitats Directive. However, no threshold values had to be submitted in the 2007 report.

### ***The Water Framework Directive (2000/60/EC)***

In the marine environment, the Water Framework Directive (WFD) spatially covers ‘transitional waters’ and ‘coastal waters’, of which coastal waters are also covered by MSFD. The Directive aims to achieve good water status, which is assessed at the ‘water body’ scale. It considers both the good chemical status (whose specifications are relevant for other descriptors, but not D1) and the good ecological status (GECS), which is defined in terms of the quality of the biological communities, the hydrological characteristics and the chemical characteristics (WFD, Annex V). The WFD does not explicitly mention biodiversity. However, taxonomic composition of phytoplankton, macrophytes and zoobenthos and their abundance/biomass are assessed as quality elements for the classification of ecological status<sup>8</sup>.

### ***Specifying linkages across EU legislations***

Even if the assessment classifications (FCS and GES) are different, the criteria for species and habitats in MSFD and HBD are very similar (Table 1) and offer good opportunity for optimization of assessments (i.e. coherent methods based on common criteria). These criteria provide a ‘framework’ where for each species or habitats only relevant criteria should be allocated (e.g. habitat distributional range is not suitable for physically-defined habitats).

**Table 1.** Pairing MSFD species and habitats criteria with the Nature Directives criteria (from the cross-cutting workshop’s presentation<sup>9</sup>).

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<sup>7</sup> Special Areas of Conservation (HD) and Special Protection Areas (BD) together comprise the **Natura 2000** network of protected areas.

<sup>8</sup> JRC, 2014. In-Depth Assessment of MS’ submissions for MSFD Art. 8, 9 & 10

<sup>9</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/b91483a7-e849-4664-b391-6bb6a667d39e/1501\\_GES\\_CCworkshop\\_Session%202-3.ppt](https://circabc.europa.eu/d/a/workspace/SpacesStore/b91483a7-e849-4664-b391-6bb6a667d39e/1501_GES_CCworkshop_Session%202-3.ppt)



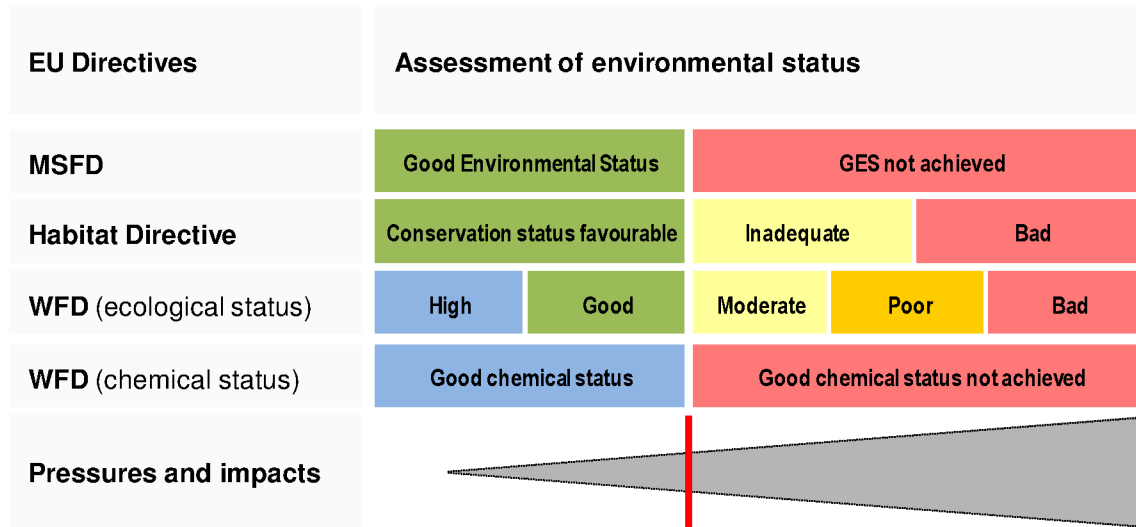
	MSFD (D1, 3, 4, 6)	BD & HD	IUCN Red List
Species	<b>Distribution (1.1)</b>	<b>Range</b>	Range (EEO, AOO)
	<b>Population size (1.2); reproductive capacity (3.2)</b>	<b>Population</b>	Population size Small population
	<b>Population condition (1.3); age &amp; size distribution (3.3)</b>		Mature individuals incl. above
		<b>Habitat for species</b>	Habitat quality incl. in Range
		Future prospects	Included above
Habitats	<b>Distribution (1.4)</b>	<b>Range</b>	Quantity (extent of occurrence; area of occupancy)
	<b>Extent (1.5)</b>	<b>Area covered</b>	
	<b>Condition (1.6, 6.2)</b>	<b>Structures &amp; functions</b>	Quality (biotic, abiotic)
		Future prospects	Included above

According to the “Links between MSFD and the Nature Directives<sup>10</sup>”, if FCS is not achieved at a particular level (MS territory/region), and given that FCS and GES objectives are mutually supportive and assessed at similar scales, it could influence whether GES for biodiversity components is achieved on the same scale. Consequently it should be acknowledged that achieving FCS for the relevant marine species and habitats is likely to be a key aspect in assessing the achievement of GES for the biodiversity component of the MSFD. Equally, measures taken under the Habitats Directive outside Natura 2000 sites to avoid deterioration of the features within SACs are likely to contribute to achieving GES. Despite the different set objectives across these Directives, their assessments on habitats and species are comparable and MSFD has to consider existing Community Legislations’ assessments.

<sup>10</sup>

<https://circabc.europa.eu/d/a/workspace/SpacesStore/e67df5e9-21e0-4dbd-9778-ac4fb08fe1f7/Doc%209%20Links%20MSFD%20HBD%20FAQ.doc>

The Common Understanding document<sup>11</sup> encourages MS to follow the matching of the relevant Directives classification that is presented in Figure 2. In waters with overlapping regimes, the boundary for Good Environmental Status should preferably coincides with the boundaries/thresholds of “favourable conservation status” for the Habitats Directive and “good ecological status” and “good chemical status” for the Water Framework Directive. This is illustrated in relation to the degree of pressures and impacts from human activities. It is to be noted however that these regimes are applied at differing scales and there may be cases where good status under the MSFD and WFD may not be sufficient to meet the specific objectives of the Birds and Habitats Directive<sup>10</sup>, and vice versa.



**Figure 2:** Classifications of the assessment of the environmental status under EU Directives. In waters with overlapping regimes, the boundary for Good Environmental Status should coincide with the boundaries for “Favourable Conservation Status” of the Habitats Directive and “Good Ecological Status” and “Good Chemical Status” of the Water Framework Directive (from the MSFD CIS document<sup>11</sup>).

#### 1.4 Linkages with international and RSC norms and standards

The **HELCOM CORESET** project developed first proposals for core indicators that the CORESET II project (2013-2015) continue developing and potentially developing additional indicators to strengthen for example, the coverage e.g. of the plankton. The core indicators have been developed using the common principles agreed by HELCOM (HOD 35/2011). Currently, 20 core indicators are under development for

<sup>11</sup> MSFD CIS, Common Understanding of (Initial) Assessment, Determination of Good Environmental Status (GES) & Establishment of Environmental Targets. [https://circabc.europa.eu/d/a/workspace/SpacesStore/ae13d0d6-8787-4d62-b2b6-1718cf760fe8/CommonUnderstandingArt.8-9-10\\_Nov2011.doc](https://circabc.europa.eu/d/a/workspace/SpacesStore/ae13d0d6-8787-4d62-b2b6-1718cf760fe8/CommonUnderstandingArt.8-9-10_Nov2011.doc)

biological diversity: five core indicators cover benthic habitats and communities<sup>12</sup>, four indicators cover mammals, five cover birds (one shared with mammals) and five cover fish. The pelagic or planktonic features have a weaker representation - with only one zooplankton indicator. The 20 biodiversity indicators relate to three MSFD descriptors, D1, D4 and D6 and not just to D1. As a separate exercise, HELCOM has recently assessed the status of its species and habitats according to modified IUCN criteria and leading to Red Lists of species and habitats for the Baltic (HELCOM 2013).

For **OSPAR**, the Intersessional Correspondence Group on the Coordination of Biodiversity Assessment and Monitoring (ICG-COBAM) is responsible for the coordination of OSPAR's biodiversity assessment and monitoring work under the guidance of the Biodiversity Committee, and has a particular focus on the requirements of the MSFD in relation to biodiversity aspects. In March 2015, ICG COBAM has adopted 15 common biodiversity indicators (3 for mammals, 2 for Birds, none for turtles, 2 for fish, 2 for benthic habitats, 2 for pelagic habitats, 2 for food webs, 1 common to pelagic and food webs, and 1 for non-indigenous species), all relevant for D1, but some also for D2, D4 or D6. These common indicators have been tested in the 2014/2015 meeting cycle. Relevant common indicators will deliver to OSPAR's Intermediate Assessment in 2017, which will be recommended, to EU Member States, to be integrated in the 2018 reporting of MSFD Article 8, 9 and, where feasible, article 10. Further, several candidate biodiversity indicators may be promoted to common indicators in the future. The ICG COBAM continues the work on improving regional coordination for assessing and monitoring biodiversity descriptors under OSPAR.

The Ecosystem Approach (EcAp) of the Contracting parties in **Barcelona Convention** will gradually implement the ecosystem approach to the management of human activities in the Mediterranean, aiming to attain "A healthy Mediterranean with marine and coastal ecosystems that are productive and biologically diverse for the benefit of present and future generations"<sup>13</sup> by May 2015. One of the three main goals of this approach is focused on the preservation and restoration of marine biodiversity in the region. Indicators and monitoring programmes to support the 11 Ecological Objectives of EcAp, including biodiversity objectives similar to those of MSFD, are currently being developed; the process follows a similar approach to that of HELCOM and OSPAR, notably through the Integrated Correspondence Groups of GES and Targets (CORGEST) and the Correspondence Group on Monitoring, (CORMON) Biodiversity and Fisheries. These recent groups work on issues in line with D1, D2, D3, D4 and D6.

Within the **Black Sea** the policy on biodiversity is outlined in two key legally binding documents: the Black Sea Biodiversity and Landscape Conservation Protocol 2002 (BSBLCP), which entered into force in 2011, and the Black Sea Strategic Action Plan (BSSAP, 2009) for environmental protection and rehabilitation of the Black Sea. The purpose of the BSBLCP is "to maintain the Black Sea ecosystem in good ecological state and its landscape in favourable conditions, to protect, to preserve and to sustainably manage the biological and landscape diversity of the Black Sea in order to enrich the

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<sup>12</sup> The HELCOM biodiversity CORESET indicators final report, 2013. An updated list of indicators will be found in the HELCOM Meeting Portal (<https://portal.helcom.fi/meetings/STATE-CONSERVATION%202015-232/default.aspx>) by the end of May 2015.

<sup>13</sup> Decision IG.17/6, Spain, 2008.

biological resources”. This Protocol stipulates a number of regional measures that are consistent with D1 “biodiversity is maintained”. Towards this goal, in 2014, the contracting states “shall adopt a list of species of Black Sea importance that may be threatened or important by reason of their role in ecosystem functioning or other significance for the region”. The listed species “will be subject to special measures”. The regional states “shall adopt a list of important landscapes and habitats of the Black Sea that may be threatened of destruction, or important by their nature, cultural or historical value, which constitute the natural, historical and cultural heritage or present other significance for the Black Sea region”. In addition to BSBLCP provisions, the BSSAP determines the “Conservation of Black Sea Biodiversity and Habitats” as the second of four Ecosystem quality objectives (ECOQOs) towards achieving the overall long-term desired ecosystem state called “Vision for the Black Sea”. A couple of sub-objectives are formulated with regards to the native biodiversity: EcoQO 2a- Reduce the risk of extinction of threatened species and EcoQO 2b- Conserve coastal and marine habitats and landscapes. The management targets defined to achieve the EcoQOs of BSSAP are conceptually equivalent to the “operational targets” sensu MSFD for GES achievement.<sup>14</sup>

### **1.5 Clarification of the relevant scientific, technical and policy terminology in relation to the descriptor.**

The revision of the Common Understanding document is taken forward through the drafting group GES (WG GES 12/2014)<sup>15</sup>. The revision includes a new section on ‘Basic understandings’, which aims at a common interpretation of MSFD concepts and terminology. Annex 1 of the document is an expanded glossary of MSFD terms. The TG1 report provides definition of key terms for Descriptor 1 (see also section 1.2 of this document) and an analytical glossary of relevant terms to biological diversity and MSFD implementation. An agreed glossary of terms based on existing practices and documents would definitively be required to enhance common understanding. Biodiversity glossaries for the MSFD and D1 implementation are also included in documents coming from the RSCs (e.g. the OSPAR’s MSFD Advice Manual and Background Document on Biodiversity 2012<sup>16</sup>, annex 8.2 ),) and research projects’ deliverables (e.g. DEVOTES recommendations for the implementation of the Marine Strategy Framework Directive, annex<sup>17</sup>; HARMONY’s glossary of terms commonly used in the Marine Strategy Framework Directive<sup>18</sup>).

The GES definition for Descriptor 1 is split into three ecological levels in the Commission Decision (2010) addressing GES at species, habitat and ecosystem levels. The elements to be addressed under these

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<sup>14</sup> KnowSeas, Knowledge-based Sustainable Management for Europe’s Seas, 2013.

<sup>15</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/d0c8db99-676b-4e79-937f-4bee634e8daf/GES\\_12\\_2014\\_06\\_Common\\_Understanding\\_final.doc](https://circabc.europa.eu/d/a/workspace/SpacesStore/d0c8db99-676b-4e79-937f-4bee634e8daf/GES_12_2014_06_Common_Understanding_final.doc)

<sup>16</sup> OSPAR (2012). MSFD Advice Manual and Background Document on Biodiversity. London, Publication Number: 581/2012, 141 pp. (available at: [http://www.ospar.org/v\\_publications/download.asp?v1=p00581](http://www.ospar.org/v_publications/download.asp?v1=p00581))

<sup>17</sup> Patricio et al., 2014. DEVOTES recommendations for the implementation of the Marine Strategy Framework Directive. [http://www.devotes-project.eu/wp-content/uploads/2014/10/DEVOTES\\_Deliverable-1-5.pdf](http://www.devotes-project.eu/wp-content/uploads/2014/10/DEVOTES_Deliverable-1-5.pdf)

<sup>18</sup> Andersen, J.H., Hansen, J.W., Mannerla, M., Korpinen, S. & Reker, J. 2013: A glossary of terms commonly used in the Marine Strategy Framework Directive. Aarhus University, DCE – Danish Centre for Environment and Energy, 32 pp. Technical Report from DCE – Danish Centre for Environment and Energy No. 16. <http://www.dmu.dk/Pub/TR16.pdf>,

three levels should take into account Annex III of the MSFD and be coherent with the requirements laid down in Directives 92/43/EEC and 2009/147/EC. The indicative lists of characteristics in Annex III of the MSFD (Table 1) can however be improved to promote consistency in their use by MS (Patricio et al., 2014<sup>17</sup>).

### **1.6 Descriptor specificities should be highlighted and justified (e.g. if it is recommended to combine several descriptors together).**

Assessments at ecosystem level can be considered to have links to the assessment of food webs (Descriptor 4). The assessment of seabed habitats has links to Descriptor 6 on sea-floor integrity and also to Descriptor 7 (criteria on habitats affected by permanent hydrological changes). The status of commercial fish and shellfish under Descriptor 3, as part of fish and benthic community's biodiversity (but only for commercial species), may have input and linkages to the assessment of fish and seabed habitats under this descriptor (SWD 2014/49). Descriptor 1 has links to all the pressure-related descriptors (i.e. Descriptors 2, 3, 5, 6, 7, 8, 9, 10 and 11), due to the range of threats related to it. The selected elements (species, habitats, functional groups) in D1 should where possible be directly linked with the pressure descriptors, as the pressures and impacts have to be linked with specific ecosystem elements, to the extent that current knowledge allows.

Attention should be drawn on the fact that a clear separation between state and pressure descriptors is somewhat artificial, as the current Commission Decision stands. Several descriptors include both criteria of state and pressure, and there are even examples of criteria mixing both types of indicators, state and pressure (Berg et al., 2015<sup>19</sup>).

Table 2 presents the overlapping/similar state criteria (or state indicators included in pressure criteria) and the level of the common assessed elements under those criteria. These overlaps have to be clarified, either by merging or synchronizing the assessments or by simply eliminating the overlapped attributes. The review process and the directions given after the cross-cutting workshop<sup>20</sup> in respect of the integration of assessments are contributing to tackle the aforementioned issues.

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<sup>19</sup> Berg T, Fürhaupter K, Teixeira H, Uusitalo L, Zampoukas N. 2015. The Marine Strategy Framework Directive and the ecosystem-based approach - pitfalls and solutions. Mar. Pollut. Bull., <http://dx.doi.org/10.1016/j.marpolbul.2015.04.050>

<sup>20</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/9daafb84-fe4f-42ad-864f-21b338c8269b/CCWorkshop\\_Summary%20Notes\\_20022015\\_Final.docx](https://circabc.europa.eu/d/a/workspace/SpacesStore/9daafb84-fe4f-42ad-864f-21b338c8269b/CCWorkshop_Summary%20Notes_20022015_Final.docx)

**Table 2<sup>21</sup>**. Descriptors sharing common assessment elements, criteria and indicators. The review process needs to avoid overlaps, streamline the, in any case, artificial distinction of the state descriptors towards an ecosystem-based management to human activities.

Descriptors	Elements → common lists	Overlapping Criteria
D1, D4 (ecosystem scale)	Species, Functional groups, Ecosystems	1.1, 1.2 + 4.2 & 1.7 + 4.2
D1, D6 (seabed habitats)	Habitats (predominant, special)	1.5, 1.6 + 6.1 & 1.7 + 6.2
D1, D3 (species groups)	Species, Functional groups	1.2 + 3.2 (3.2.2) 1.3 + 3.3
D1, D2 (species groups)	Species	2.1+1.2
D1, D5 (species groups)	Species, Functional groups	1.2 + 5.2 (5.2.3), 5.3 (5.3.1)
D1, D7 (habitats)	Habitats (predominant, special)	1.5, 1.6 + 7.2

Not only the overlaps presented in Table 2, but also the links across the Descriptors' criteria should be clarified to support a holistic assessment based on the ecosystem approach, which is further discussed in section 6. Annex V of the SEC 2011/1255 provides a comprehensive basis that links pressure-impact and state indicators of the COM DEC 2010/477/EU with the MSFD's Annex III (Table 1) attributes. This table has to be updated accordingly to support the review process and to be in-line with the proposed changes. At the level of criteria Figure 3 allocates the main pressures (P), to main state elements (S) through the main impacts criteria. Distinction at criterion level between pressure and state is not so clear e.g. D6 is more pressure/impact, while D7 is more an impact descriptor than a pressure descriptor (hydrological changes typically stem from physical infrastructures (i.e. a consequent impact). Assessments of impacts from pressures need to be clearly related to state components (i.e. at similar resolution to state elements being assessed).

			Physical damage	Hydrological	Energy, incl. UW noise	Nutrients	Contaminants	Litter	Fishing/by-catch	NIS
		P S	6.1	7.1	11.1, 11.2	5.1	8.1, 9.1	10.1	3.1	2.1
Ecosystem 1.7, 4.1-4.3	Birds	1.1-1.3					8.2	10.2	3.2, 3.3	2.2
	Mammals	1.1-1.3								
	Reptiles	1.1-1.3								
	Fish	1.1-1.3								
	Water	1.4-1.6				5.2, 5.3				
	Seabed	1.4-1.6	6.2	7.2			8.2		3.2	

**Figure 3:** 2010/477/EU Decision criteria allocated to main pressures (P) and main state elements (S) through the main impacts (modified from the cross-cutting workshop presentation<sup>21</sup>).

More effort is needed for the identification of particular impacts on the assessed state elements, which can be better facilitated at a lower than the criteria level, such as through particular methodological standards that are able to quantify the level of the impact.

### 1.7 An analysis of whether the criteria and/or indicators and/or methodological standards for the particular descriptor are likely to be common across the EU or need aspects to be specific at region or other scales.

The criteria for D1 -also considering MS reports for 2012 reporting (COM(2014)97; Palialexis et al. 2014<sup>22</sup>)- have and should have an EU-wide implementation, since they are general enough to cover all

<sup>21</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/b91483a7-e849-4664-b391-6bb6a667d39e/1501\\_GES\\_CCworkshop\\_Session%202-3.ppt](https://circabc.europa.eu/d/a/workspace/SpacesStore/b91483a7-e849-4664-b391-6bb6a667d39e/1501_GES_CCworkshop_Session%202-3.ppt).

<sup>22</sup> Palialexis A., Tornero A. V., Barbone E., Gonzalez D., Hanke G., Cardoso A. C., Hoepffner N., Katsanevakis S., Somma F., Zampoukas N., 2014. In-Depth Assessment of the EU Member States' Submissions for the Marine Strategy Framework Directive

biodiversity aspects and there are no particular regional specificities that would require an alternative approach under another criterion. On the other hand, the elements to be assessed (species, functional groups, habitats, ecosystems) have a strong regional character and their selection should consider the existing lists on either EU legislations (e.g. CFP, HD, BD) or RSCs. The list of characteristics in Table 1 of the Annex III of the MSFD should therefore be revised to set the guidelines and regional requirements in support of a coherent approach to the selection of such elements across MS (Patricio et al., 2014<sup>17</sup>). The use of EU-wide lists, such as EUNIS for habitats classification, and SWD 2011/1255 for functional groups classification would facilitate a coherent and comparable assessment. RSCs have started working on the implementation of MSFD criteria and methodological standards, optimizing them on their regional specificities and taking stock of the work they have previously done on their marine waters. Their experiences will be used on the generation of basic regional lists of the various components, while existing lists have to be taken into account. Section 2.3 includes existing lists of species, habitat types and functional groups that should be considered in the selection of assessment elements, e.g. representative (sub)regional species and habitat community to be assessed for practical issues (monitoring, indicators), according to relevant and commonly agreed selection criteria. Further work is required to reach an agreement on selection and de-selection criteria of elements included in those lists, as well as generating an EU-wide or regional lists of elements that are already assessed under other assessment frames (EU legislations, RSCs' agreements).

Functional groups and habitats types (predominant/special/particular) should be the level of agreement and reporting, and lists of representative species/habitat community should be used as living documents and tools to enhance cooperation and joint monitoring (e.g. through RSC where works on such lists have been, and are still, in progress).

## **1.8 The "climate sensitivity" for D1 (or criteria/indicators)**

Descriptor 1 has a high sensitivity to climate change; hence the Annex I descriptor text states that the quality and occurrence of habitats and the distribution and abundance of species should be in line with the prevailing climatic conditions. Due to climatic changes the prevailing conditions will potentially change, which can also affect the distribution and ranges of habitats and species as well as other attributes. Therefore, where biological diversity targets have been set that do not take into account changing prevailing conditions, some biological diversity objectives might not be achievable in the long term or should be adapted over time to take into account changing conditions. An explicit analysis on the effects of climate change on GES determination for D1 is included in Elliott et al. (2015)<sup>23</sup>.

Consideration should also be given to the combined effects of changing prevailing conditions and the effects of human pressures. Climate change in its own right is a pressure and will exacerbate the effects of other pressures, thus it should be considered when GES boundaries and thresholds are established to avoid "shifting baselines". This has particular relevance as climate change is regarded as an exogenic

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under articles 8, 9 and 10. EUR – Scientific and Technical Research series. Luxembourg: Publications Office of the European Union. EUR 26473 EN, 149 pp. doi: 10.2788/64014.

<sup>23</sup> Elliott M., A. Borja, A. McQuatters-Gollop, K. Mazik, S. Birchenough, J. H. Andersen, S. Paintin, M. Peck, 2015. Force majeure: Will climate change affect our ability to attain Good Environmental Status for marine biodiversity? Marine Pollution Bulletin, <http://dx.doi.org/10.1016/j.marpolbul.2015.03.015>



unmanaged pressure, i.e. operating outside the control of management measures employed in a regional sea and where the management measures can only address the consequences rather than the causes (for more details see Patrício et al. 2014<sup>24</sup>). Making the distinction between changes due to climatic changes and other pressures is likely to pose a challenge in the delimitation of their synergistic and cumulative effects. Environmental status should therefore be considered at the slightly broader level of functional groups of species, functional habitats and their relationships, within which a suitable degree of fluctuation in species composition and relative abundance can be anticipated (OSPAR's ICG-COBAM Advice Manual<sup>25</sup>).

A “network” of reference population (e.g. mobile species) and habitats, along biogeographic gradient in Europe could be good information to comprehend/estimate effects of climate/global change at wide scale and help interpretation of other changes at more or less finer scale.

### **1.9 An indication of whether a quantitative GES definition for the descriptor will be possible or whether a qualitative/normative definition only should be used (on the basis of Article 3(5))**

It is envisaged that a quantitative definition of GES at the criterion level for each assessment element is feasible, considering the definitions of FCSs - Favourable Reference Values - provided by the HD. Generally, a quantitative definition of GES for biological diversity seems to be difficult, considering also the variety of the assessment elements, which cannot be homogeneously captured by a single quantity. A potential conceptual approach for a quantitative GES can be framed in a way that the resilience of the ecosystem is suited to accommodate the quantified biodiversity, or in other words, it will be accounted in the determination of the GES boundaries as the “naturally” allowed deviation from the reference point. Where GES cannot be quantified it could be at a first step qualitatively defined, notably according to the actual lacks of knowledge for many species or habitats. For example, benthic habitat condition could be defined qualitatively (based on species composition and proportions) and the GES/no GES could be a deviation (qualitative or semi-quantitative-range) around this qualitatively defined reference. Considering the dynamic ecosystems and the naturally varying environmental conditions GES deemed to be directly quantified for certain scales, species and habitats. To that end, lists of elements and common classification systems of elements can facilitate a coherent and comparable quantitative determination of GES, at least regionally. Qualitative definitions of GES may deviate from FCS provided by HD. There may be species that are not in FCS for (coastal and/or) marine waters, but they are in FCS on a national level. In this case the Member State is not obligated to undertake action to change the status in marine waters (e.g. gulls, terns, waders that are breeding in coastal and further inland habitats)

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<sup>24</sup> Patrício J, Teixeira H, Borja A, Elliott M, Berg T, Papadopoulou N, Smith C, Luisetti T, Uusitalo L, Wilson C, Mazik K, Niquil N, Cochrane S, Andersen JH, Boyes S, Burdon D, Carugati L, Danovaro R, Hoepffner N. 2014. DEVOTES recommendations for the implementation of the Marine Strategy Framework Directive. Deliverable 1.5, 71 pp. DEVOTES project. JRC92131

<sup>25</sup> [http://www.ospar.org/documents/dbase/publications/p00581/p00581\\_advice%20document%20d1\\_d2\\_d4\\_d6\\_biodiversity.pdf](http://www.ospar.org/documents/dbase/publications/p00581/p00581_advice%20document%20d1_d2_d4_d6_biodiversity.pdf)

## 2. Analysis of the implementation process

### **2.1 Based on the Commission/Milieu Article 12 reports and the JRC in-depth assessments, a detailed summary of the findings of Article 12 relating to the determination of GES and specifically the use of the Decision criteria and indicators should be made.**

All MSs of the four marine regions have defined GES for Descriptor 1 but none have defined it in the same way (or even similarly); the levels of detail vary enormously, GES definitions are not comparable, not linked with boundaries and the degree to which GES is achieved is not measurable (COM(2014)97 ; Palialexis et al. 2014). More than half of the MSs defined GES on the basis of criteria often in agreement with the Commission Decision specifications, although not all the Commission Decision criteria are always used. The majority of MSs covered species, habitats and ecosystems but at varying levels of detail. Habitat criteria (1.4-1.6) are reported less often than species criteria and the ecosystem structure criterion 1.7 is applied the least (Palialexis et al., 2014<sup>1</sup>).

The level of integration between MSFD D1 and other EU legislations (i.e. HD, BD, WFD), other international agreements (e.g. conventions – Bern, CITES, Bonn) and RSC agreements was assessed; it is characterized by a wide variation (Palialexis et al., 2014). The HD was more often taken into account compared to other legislations, but the general overview of the level of integration is relatively low, despite the overlap between MSFD and assessed legislations and agreements and the associated data availability (Palialexis et al., 2014). Regarding the RSC, the MSs have indicated intention to follow the corresponding agreements, especially in the RSC that are more advanced in assessing biodiversity.

Palialexis et al. (2014) assessed the coherence of the reported characteristics e.g. list of species, habitats, ecosystems, functional groups within and between the RSC and against the list in SEC (2011)1255<sup>26</sup>. The discrepancy across the reported lists and groups did not allow for conclusive comparison, increasing the incoherence and inability for adequately assessing GES at any spatial level.

An additional element of complexity in the assessment of the reports is the different allocation of methodological standards either to an indicator, criterion or descriptor. MSs should, ideally, report GES at the same level (criterion according to MSFD and COM DEC 477/2010/EU) in order to reduce the heterogeneity in reporting and the different interpretations of the COM DEC 477/2010/EU amongst the MSs (Palialexis et al., 2014). The inclusion of generic indicators in the COM DEC 477/2010/EU instead of specific methodological standards gave room for several interpretations of the criteria and a vast number of non-comparable methodological standards for D1. The lack of a common list of

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<sup>26</sup> Relationship between the initial assessment of marine waters and the criteria for good environmental status. Commission Staff Working Paper. SEC(2011) 1255 final.  
[http://ec.europa.eu/environment/marine/pdf/SEC\\_2011\\_1255\\_F\\_DTS.pdf](http://ec.europa.eu/environment/marine/pdf/SEC_2011_1255_F_DTS.pdf)

characteristics associated with common GES boundaries hindered the goal established by the MSFD for comparable and coherent assessment of GES.

Three MSs use functional groups, in addition to species groups, in their GES definition. One MS covers both cephalopods and reptiles in its GES definition and two MS have included shellfish in the scope of their GES definition. Seven MS have included a specific reference to listed/protected species and habitats in their GES definitions. These include species covered by the Habitats and Birds Directives and species protected by the OSPAR Convention, the Barcelona Convention, the IUCN list of endangered species and the ASCOBANS and ACCOBAMS Agreements. Six MS have defined quantitative threshold values with their GES definition, but often using different thresholds for different biological features. 3 MS have included the notion of 'restoration' of biodiversity in their GES definition. Two Member States have acknowledged natural/climatic variations and ecosystem dynamics and have not sought a rigid state for particular biodiversity components. Finally one MS has clearly stated that it will tend towards achieving FCS for all ecosystem features however its achievement is not considered realistic in the timeframe of the MSFD.

#### **Species (Criteria 1.1 Species distribution, 1.2 Population size, 1.3 Population condition)**

There is a large variation in the approaches to defining GES for species. Some MSs have defined GES using species groups, functional groups, species with specific life history traits (e.g. long-lived slowly reproducing), and/or individual species, while others apply GES on species with no further specifications. A few MSs also refer to protected species; these included references to species covered by the Habitats and Birds Directives, those protected by the OSPAR convention and IUCN lists of endangered species and those covered by ASCOBANS and ACCOBAMS agreements.

#### **Habitat (Criteria 1.4 Habitat distribution, 1.5 Habitat extent, 1.6 Habitat condition)**

The approach to defining GES for habitats is heterogeneous and there is little coherence within regions. Many MSs are not specific in regards to the habitats covered by the definition, which in most cases implies that all habitats are covered equally. In a few cases it is clear that only benthic habitats are covered, thus excluding those of the water column. Less than half of the MSs have included a specific reference to listed/protected habitats. Some of these references specifically referred to those covered from the Habitats Directive and/or relevant RSC lists while others referred to protected habitats in general. A few MSs have included specific habitats in their definition of GES, including protected habitats. For example, in the Mediterranean three MSs refer specifically to *Posidonia oceanica* sea-grass habitats. Finally a number of countries also use WFD type specific Good Ecological Status boundaries to assess GES.

#### **Ecosystem (Criterion 1.7 Ecosystem structure)**

Only ten MS have defined GES for Criterion 1.7 either in a way that it covers the whole ecosystem structure or some specific ecosystem aspects such as the fish community.

For Art.9, the wide variance of the reported approaches for GES determination led to low level of coherence within each of the four regional seas (COM(2014)97 final). For Art. 8 and regarding the highly mobile species groups (birds, mammals, reptiles, fish, cephalopods) MSs' reports varied, from species group assessments to single species. MSs had the option to report species assessments under BD and HD, in fulfilling also their legal obligation for the MSFD reporting, however this option has just increased the incoherence in assessing D1 and hindered any effort for comparable assessments. RSC's lists of species are considered by some of their contracted parties. The information available for assessment appeared to be most readily available for species, and in particular for species specifically listed for protection, or commercially exploited species. MSs also reported the most frequently associated pressures on these species groups; in the Baltic these were extraction of species and physical loss of habitat and in the North East Atlantic and Mediterranean the extraction of species and biological disturbance (COM(2014)97 final).

## **2.2 Identification of any questions arising from the application of the current Decision, including those identified by the Article 12 assessment**

The main issues pointed out through the COM Article 12 assessment and the JRC in-depth assessment are the following:

- a. many GES characteristics have not been set in a measurable way, in some cases not going beyond what Annex I and the GES Decision already describes; and in other cases revealing an apparent confusion between definition of GES and the setting of targets (MSFD Art. 9 and 10 respectively);
- b. a large diversity in understanding and approaches amongst Member States reflecting differences in the interpretation and application of Article 9;
- c. MSs have not built adequately upon other EU legislation and have adopted a "pick-and-choose" approach from the work undertaken (and agreed) in the RSCs to which they are Parties.

A common and minimum level of determined characteristics (Art, 9(1)) should be established to ensure an adequate assessment for biodiversity and comparable and coherent implementation of the MSFD, at least on regional level, while those lists of characteristics that are already included in other legislations (e.g. List of habitats and species in HD and BD, CSWD (SEC, 2011)1255 final) must be considered, recognizing that there may be differences in implementing BHD on national level. MSs should be encouraged to further support the RSC actions for a harmonized biodiversity assessment on a regional scale, since there is still room for improving the level of integration in this perspective (COM(2014)97 ; Palialexis et al. 2014).

Adequacy and coherence for D1 can be improved by following the specifications laid down by the Habitats and Birds Directives (potentially also the WFD) for an agreed list of species and habitats covering each Directive (and taking into account Annex III MSFD) that would constitute a consistent standard for assessments across the biodiversity criteria. The RSCs can play an important role in this process, since the HD and BD do not have a requirement for regional cooperation (COM(2014)97 ; Palialexis et al. 2014).

A common concept for defining GES boundary values, which accommodates sustainable use, should be applied, which should follow the 'acceptable deviation from a reference' approach (if possible) already encompassed within the standards for the WFD and the Nature Directives. In this common concept should, however, be avoided that this will lead to differences between regional defined GES boundaries and national objectives of the WFD and Natura Directives.

The definition of GES should clearly address *all* biodiversity components, although its assessment can be based on selected representative species and habitats (COM(2014)97 final). The specific elements to be addressed should reflect the differing biodiversity characteristics of each region, but should be selected in such a way as to maintain consistency within (sub)regions. Regarding predominant seabed habitats, the determination of GES and its assessment should be fully aligned with that required for Descriptor 6 (with reference to the different substrates of the seabed). For ecosystem-level assessments, the approaches should be aligned with that required under Descriptor 4 on food webs, aiming to address the overall balance of components in the ecosystem and their functioning (COM(2014)97 final). This aligning between D1, D4 and D6 should be also guaranteed by making use of the work of RSCs.

### **2.3 Relevant data from other sources, specific to every descriptor and recent findings from MS should also be considered.**

Sources to provide information and data for the D1 assessment can include other EU legislation and agreements, but also e.g. research programmes, monitoring programmes or existing databases. Such sources can guide the adoption of common methodological standards for MSFD purposes, namely regarding: 1) data and parameters surveyed or sampled across Europe; 2) lists of relevant species or groups and lists of habitats, compiled for several purposes; and 3) operational indicators available and in use within and across marine regions. Below we highlight some of the most relevant sources relevant for D1.

#### **2.3.1 Sources of monitoring data**

The main data source for GES assessment is going to be the national/regional monitoring activities that MS have to implement for the WFD, HD, BD and MSFD. For the time being MSs' monitoring programmes reported for the MSFD are under evaluation according to the MSFD Art. 12.

Regional Sea Conventions:

Data and parameters for D1 derived from RSCs are comprehensively listed in the report “Development of a shared data and information system between the EU and the Regional Sea Conventions<sup>27</sup>” (presented in WG DIKE, CIRCABC) which examines the data and information holdings within each of the four Regional Sea Conventions (RSCs) as well as the European Environment Agency (EEA), with the aim of characterizing the present data and information holdings and flow processes in place across Europe.

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<sup>27</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/aff9880d-df5e-44ec-854e-8f098fcff2e5/DIKE\\_10-2014-05b\\_RSCDataReporting\\_Report.pdf](https://circabc.europa.eu/d/a/workspace/SpacesStore/aff9880d-df5e-44ec-854e-8f098fcff2e5/DIKE_10-2014-05b_RSCDataReporting_Report.pdf)

This report covers methodological standards, parameters that are linked with criteria and monitoring programmes. Most of RSCs don't have yet an operational information system to compile data nor compute indicators at regional scales for most of MSFD issues on Biodiversity (D1, D4 and part of D6). These standards and further developments should be taken into account and included in this section.

*Other sources:*

DEVOTES FP7 project has produced an in-depth analysis of marine monitoring networks in Europe aiming to assess the status of marine biodiversity monitoring for D1, D2, D4 and D6 (Patricio et al., 2014b)<sup>28</sup>. The **Catalogue of Monitoring Networks** provides an initial overview of the potential for effective implementation of the MSFD assessment of GES. This DEVOTES survey has allowed 1) to critically evaluate the European marine monitoring activities related to biodiversity (i.e. what monitoring is being currently performed, why it is being performed, which biodiversity descriptors, biological components and habitats are addressed and to what pressures it is linked); 2) to identify potential gaps in monitoring based in the information compiled; 3) to identify needs for further development for marine biodiversity monitoring to improve and optimise the MSFD implementation, and 4) to promote or foster harmonisation among countries sharing marine regions for joint GES assessments.

The catalogue includes 285 monitoring programmes reported by 15 EU Member States and 14 countries that share European Regional Sea boundaries. There are details at the European, regional and subregional sea levels, as well as the four-biodiversity descriptors, 11 biodiversity components, 22 habitats and the 37 pressures addressed. A recent version of this catalogue (June 2014) is publically available in DEVOTES website<sup>29</sup>.

Importantly, the catalogue includes details on key contacts, data sources and timescales for data collection associated with each monitoring activity. This information should enable MS to optimise their sampling scheme by collating details on the spatial coverage, measured parameters and sampling frequency associated with other monitoring programmes, thus producing an optimal sampling design to complement (rather than duplicate) existing monitoring efforts. Potentially this could also help MS, through the Regional Sea Conventions, to coordinate their monitoring in terms of timing of their sampling, the parameters/data being collected and the geographical location, resulting in large, coordinated datasets for the (sub)regions of each Regional Sea. Hereby, it is important that this contributes to the implementation of the biodiversity indicators of the RSCs.

### **2.3.2 Sources for species and habitats lists**

*MSFD supporting documents:*

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<sup>28</sup> Patrício J, Little S, Mazik K, Thomson S, Zampoukas N, Teixeira H, Solaun O, Uyarra MC, Papadopoulou N, Kaboglu G, Bucas M, Churilova T, Kryvenko O, Moncheva S, Stefanova K, Borja A, Alvarez M, Zenetos A, Smith C, Zaiko A, Danovaro R, Carugati L, Elliott M (2014b) Report on SWOT analysis of monitoring. Deliverable 1.4 100pp + 4 Annexes. DEVOTES FP7 Project. JRC89561 <http://www.devotes-project.eu/report-on-swot-analysis-of-monitoring/>

<sup>29</sup> <http://www.devotes-project.eu/devotool/>

The SWD 2011/1255 includes lists of predominant habitat types and functional groups that should be considered by the MS. The categories adopted for habitat types in this Commission's document were agreed so that their use could provide "a direct link between the habitats assessed under Descriptor 1 and the substrate types to be assessed for Descriptor 6 (indicator 6.1.2 – different substrate types affected by physical damage) and to the European EUNIS habitat classification scheme" (SWD 2011, p 18).

*Other EU pieces of legislation:*

Species and habitat types compiled in the framework of the **Habitats and Birds Directives** are available through the European Nature Information System EUNIS<sup>30</sup> databases - an additional useful tool to be taken into consideration. The MSFD CIS document on "Links between MSFD and the Nature Directives"<sup>31</sup> identifies lists of:

- Marine species for Article 17 reporting of the HD;
- Seabirds and waterbird species for which SPAs should be considered under the Birds Directive (Annex I and migratory species)<sup>32</sup>;
- Potential overlap between MSFD predominant habitats and habitat types listed in Annex 1 of the HD and considered 'marine' for Article 17 reporting;

The EUNIS pan-European classification system for habitats that could be the basis for a coherent assessment across MSFD marine regions. Although, adjustments to the current EUNIS classification scheme might be needed to better fit the needs of the MSFD assessments (Patricio et al. 2014a)<sup>33</sup>. The marine section of EUNIS has been restructured and is expected to become available in 2015.

Under the **Common Fishery Policy** and the Community framework for the collection, management and use of data in the fisheries sector the Commission Decision 2010/93/EC<sup>34</sup> in Appendix VII provides a list of Biological variables with species sampling specification that covers widely marine species and monitoring parameters that can directly be assessed for the MSFD D1 criteria.

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<sup>30</sup> <http://eunis.eea.europa.eu/about>

<sup>31</sup> <https://circabc.europa.eu/d/a/workspace/SpacesStore/e67df5e9-21e0-4dbd-9778-ac4fb08fe1f7/Doc%209%20Links%20MSFD%20HBD%20FAQ.doc>

<sup>32</sup> Reference: Table 3: Seabirds and waterbird species for which SPAs should be considered. Guidelines for the establishment of the Natura 2000 network in the marine environment. Application of the Habitats and Birds Directives, Appendix 2: Lists of existing marine Habitat types and Species for different Member States, European Commission 2007, [http://ec.europa.eu/environment/nature/natura2000/marine/index\\_en.htm](http://ec.europa.eu/environment/nature/natura2000/marine/index_en.htm)

<sup>33</sup> see discussion in Patricio et al. 2014a, pp 4-9

<sup>34</sup> [http://datacollection.jrc.ec.europa.eu/c/document\\_library/get\\_file?uuid=296dff3-9c81-4759-b691-9b1654ea66b9&groupId=10213](http://datacollection.jrc.ec.europa.eu/c/document_library/get_file?uuid=296dff3-9c81-4759-b691-9b1654ea66b9&groupId=10213)

Non-Indigenous Species (NIS) are part of the ecosystems and habitats and as such have to be considered and assessed. NIS inventories, such as the **European Alien Species Information Network** (EASIN<sup>35</sup>) can be the basis to provide information on the presence/distribution of NIS in particular ecosystems and habitats.

*Other international initiatives:*

The **IUCN Red List of Threatened Species**<sup>36</sup> is widely recognized as the most comprehensive, objective global approach for evaluating the conservation status of plant and animal species and can provide a source of marine threatened species in the European waters. However, it should be recognized that the MSFD aims at achieving a GES and is not focused on protection of individual species. In other words, selected rare species (e.g. Roseate Tern) should in general not be used to indicate the environmental status. Species protection should be done through the nature directives.

*Other databases:*

DEVOTES FP7 Project listed the potential European Keystone Species (Smith *et al.*, 2014) and listed also indicator species, taxa or groups frequently included in indicators (Teixeira *et al.*, 2014). This information is available through two catalogues that can support MS during the MSFD implementation process. The catalogues potential application in the context of supporting the selection of relevant biological features is explained below. We highlight, however, that these catalogues cannot replace or overcome the lack of clear and agreed general guidance on how to select biological features by MS.

The **DEVOTES Catalogue of Indicators** (Teixeira *et al.* 2014<sup>37</sup>; freely available as software **DEVOTool**<sup>38</sup>) includes so far 557 indicator entries with respective metadata information, including the biodiversity components (sensu SWD, 2011) to which the indicators apply or focus on. This catalogue provides a good insight into the most relevant biological features usually considered in marine biodiversity assessments. The catalogues show that most of the indicators available have been developed specifically for assessing state change of biodiversity components, subcomponents or specific taxa (using categories for biological features as indicated in Table 1 of Annex III MSFD and in SWD 2011). However, some indicators have defined groups independently of biodiversity components, such as functional groups, keystone species or non-indigenous species. The later categories reflect more closely those considered in some of the Commission Decision criteria (e.g. of indicators reported in the catalogue: 'Abundance of functional groups', 'Number of bioconosis/facies' or 'Rate of new introduction of non-indigenous species (per defined period)'). The information in this catalogue can facilitate knowledge transfer across countries and marine regions. It can be used e.g. to identify operational indicators within neighbouring

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<sup>35</sup> <http://easin.jrc.ec.europa.eu/>

<sup>36</sup> <http://www.iucnredlist.org/>

<sup>37</sup> Teixeira *et al.*, 2014. Existing biodiversity, non-indigenous species, food-web and seafloor integrity GEnS indicators. DEVOTES FP7 Project; 2014. JRC89170. DEVOTES public Deliverable 3.1 [http://www.devotes-project.eu/wp-content/uploads/2014/02/D3-1\\_Existing-biodiversity-indicators.pdf](http://www.devotes-project.eu/wp-content/uploads/2014/02/D3-1_Existing-biodiversity-indicators.pdf)

<sup>38</sup> <http://www.devotes-project.eu/devotool/>



countries that focus on the same biodiversity components, enhancing comparability and broader scale assessments of relevant species or groups of species within marine regions. It can also highlight indicators that could be potentially adapted to other areas or applied at a higher EU scale, for example, by identifying relevant species or groups of species widely surveyed by all MS.

The **DEVOTES Catalogue of Keystone species** and associated report is a review of potential keystone species in European marine habitats (Smith et al. 2014<sup>39</sup>). The catalogue includes 210 distinct species and 19 groups classified by major habitat in the EU Regional Seas and the Norwegian Sea. The keystones in the catalogue are identified from several sources, such as published work, expert opinion and models (high 'keystoneness index' values in Ecopath with Ecosim models). The keystone species originate from a wide range of faunal/floral groups and trophic levels and many are invasive species. Gaps exist partially from a lack of expertise in specific areas (for certain groups or certain habitats), but also from the very limited information available on keystone species in general.

Although the scientific community is aware that important difficulties remain in the definition of keystone species (Smith et al. 2014), for example, at what point does a species become keystone?, are keystone species promoters or reducers (through primary or secondary impacts)?, can a prey species be a keystone?, can a keystone species be a species group (e.g. a genus, a family), functional group or even a habitat? and what is the scale (primarily spatial but also temporal) that the keystone works over?; many of these species are already considered to some extent as key/important species, and DEVOTES noted an overlap between species included in the indicator and keystone catalogues. Also a number of keystone species were reported in the MS Initial Assessments. Specifically for keystone habitat species, many operational indicators already exist (Teixeira et al. 2014) and have long been applied in the context of environmental assessment and conservation initiatives such that these species can be tracked as indicators for GES. These indicators are, however, mostly structural indicators that provide little information on the interaction or the role of the species in the ecosystem. DEVOTES discussed the possibility of using keystone species as indicators in monitoring programmes and suggested that keystone can provide relevant information for the future consequences of environmental changes in the entire ecosystem (Smith et al. 2014). In supporting the MSFD functional approach, the Catalogue of Keystone Species promotes keystone functional groups where a group of species/taxa may have a keystone function, for example, rich coralligenous communities or mixed coral and sponge fields. This catalogue can be used to help select relevant biological features for assessment.

### 2.3.3 Sources of indicators

#### *Regional Sea Conventions:*

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<sup>39</sup> Smith C, Papadopoulou N, Sevastou K, Franco A, Teixeira H, Piroddi C, Katsanevakis S, Furhaupter K, Beauchard O, Cochrane S, Ramsvatn S, Feral J, Chenuil A, David R, Kiriakopoulou N, Zaiko A, Moncheva S, Stefanova K, Churilova T, Kryvenko O (2014) Report on the identification of keystone species and processes across regional seas. Deliverable 6.1 105pp + 1 Annex. Devotes FP7 Project. JRC91370 <http://www.devotes-project.eu/wp-content/uploads/2014/07/DEVOTES-D6-1-Keystones.pdf>

Core and candidate indicators for D1 derived from RSCs are comprehensively listed in the report “Development of a shared data and information system between the EU and the Regional Sea Conventions<sup>40</sup>” (presented in WG DIKE, CIRCABC). Links of these indicators with monitoring frameworks and technical specifications are also provided.

#### *Other databases:*

DEVOTES has compiled two databases as an inventory of existing methods to support the choice of methodological standards in the scope of the MSFD. These scientific indicators are potential tools that can be used to assess the environmental status of European seas within the MSFD. The list of available indicators and indices potentially valuable for the implementation of the four biodiversity related descriptors, including D1 Biological Diversity, can be found in the **DEVOTES Catalogue of Indicators** (Teixeira et al. 2014; freely available as software **DEVOTool**<sup>38</sup>) and in the **Catalogue of Model-derived Indicators** (Piroddi et al. in prep). The DEVOTool software allows navigating a database of indicators of marine biodiversity, within all European Regional Seas but also from other seas. Currently, the catalogue includes 557 entries (version 6) which have been collected from Member States, Regional Sea Conventions and scientific literature. One of the aims of the catalogue is to foster transfer of know-how across countries and marine regions, so that indicators operational in one area could be potentially adapted to other areas and used in the environmental assessment. The catalogue contains information on metadata ranging from indicator descriptions, data requirements, developmental status, reference values and quality thresholds, to geographical coverage and applicable habitats, biodiversity components and related human pressures.

Specifically for D1, a search in the DEVOTool Catalogue of Indicators showed that, except for indicator 1.3.2 ‘Population genetic structure’, all other criteria and associated indicators could be addressed by at least 30 operational indicators. The Catalogue of Model-derived Indicators (Piroddi et al. in prep) also revealed that, except also for indicator 1.3.2, all D1 criteria and associated indicators could potentially be addressed by existing modelling approaches.

## **2.4 Good examples and approaches applied by MS, especially if used by multiple Member States, and shortcomings should be listed systematically.**

RSCs are developing initiatives towards common monitoring and assessment on a regional scale. For example, OSPAR ICG COBAM is working on assessments for indicators on a (sub)regional scale. ICG COBAM has set up seven expert groups on the relevant biodiversity elements (e.g. birds, mammals, benthic habitats, etc). Over 100 experts in ten Member States are involved in this work. The HELCOM

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<sup>40</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/aff9880d-df5e-44ec-854e-8f098fcff2e5/DIKE\\_10-2014-05b\\_RSCDataReporting\\_Report.pdf](https://circabc.europa.eu/d/a/workspace/SpacesStore/aff9880d-df5e-44ec-854e-8f098fcff2e5/DIKE_10-2014-05b_RSCDataReporting_Report.pdf)

CORESET is also considered as a good example. The ECAP process in the Barcelona convention has also created an expert group on biodiversity and fisheries, for the development of the monitoring and assessment guidance, to make operational the biodiversity indicators that were approved in the COP meeting in Istanbul (2015). Within Member States it is good to gather all national experts concerned with MSFD in working groups to achieve coherence across ecosystem components, criteria and descriptors. Expert consultation is critical for policy decisions.

## 2.5 Differences and similarities between regions.

Flora and fauna change enormously not only due to the latitudinal gradient<sup>41</sup> but also within areas in the same latitude. These changes are mainly driven by the different local water mass characteristics and other factors such as human activities.

### *3. Analysis of the current text of the Decision*

#### **3.1 Analysis of the current text of the Decision, identifying in particular those parts which are best placed in guidance, those parts which are interpretative or explicative information and those parts which need to be kept in the Decision in accordance with the mandate provided by the Directive**

In Part B of the Commission Decision, the first paragraph as well as the paragraphs introducing the criteria and standards for the species and habitats level could be considered for integration within the criteria and standards as they relate to the definition of the scope of these criteria (in terms of the biological features to consider for D1). The assessment criteria and methodological standards associated to the legislative instruments listed in point 2 of Part A, which are relevant for biological diversity, should also be considered for potential input in the criteria and standards for clarification or instead include reference to the relevant document where these are established. It should be noted that similar information about the scope of the criteria has not been included for criterion 1.7.

The paragraphs below in copy from the Commission Decision include a proposal for changes.

~~“Assessment is required at several ecological levels: ecosystems, habitats (including their associated communities, in the sense of biotopes) and species, which are reflected in the structure of this section, taking into account point 2 of Part A. For certain aspects of this descriptor, additional scientific and technical support is required (5). To address the broad scope of the descriptor, it is necessary, having~~

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<sup>41</sup> Fisher, J., Frank, K. T., and Leggett, W. C. 2010. Global variation in marine fish body size and its role in biodiversity–ecosystem functioning. *Marine Ecology Progress Series*, 405: 1–13

regard to Annex III to Directive 2008/56/EC (MSFD), to prioritise among biodiversity features at the level of species, habitats and ecosystems. This enables the identification of those **biological** features and those areas where impacts and threats arise and also supports the identification of appropriate indicators among the selected criteria, adequate to the areas and the features concerned (6). The obligation of regional cooperation contained in Articles 5 and 6 of Directive 2008/56/EC (MSFD) is directly relevant to the process of selection of **biological** features within regions, sub-regions and subdivisions, including for the establishment, where appropriate, of reference conditions pursuant to Annex IV to Directive 2008/56/EC. ~~Modelling using a geographic information system platform may provide a useful basis for mapping a range of biodiversity features and human activities and their pressures, provided that any errors involved are properly assessed and described when applying the results. This type of data is a prerequisite for ecosystem-based management of human activities and for developing related spatial tools (7).~~ **Assessment methods and standards, to address each criterion should reflect the actual knowledge, and should evolve according to scientific and technical improvements.**

### ***Species Level***

“For each region, sub-region or subdivision, taking into account the different species and communities (e.g. for phyto-plankton and zooplankton) contained in the indicative list in Table 1 of Annex III to Directive 2008/56/EC, it is necessary to **assess all functional groups (SWD 2011) by a selection of representative sets of species or population to cover actual MSFD requirements, having regard to point 2 of Part A of the COM Dec 2010/477/EU. The identification of the “relevant species” should be based on harmonized methodology applied to a common agreed list of species or group of species, in accordance to other EU legislations and RSCs agreements.**<sup>42</sup> ~~The three criteria for the assessment of any species are species distribution, population size and population condition. As to the later, there are cases where it also entails an understanding of population health and inter- and intra-specific relationships. It is also necessary to assess separately subspecies and populations where the initial assessment, or new information available, identifies impacts and potential threats to the status of some of them. The assessment of species also requires an integrated understanding of the distribution, extent and condition of their habitats, coherent with the requirements laid down in Directive 92/43/EEC (8) and Directive 2009/147/EC, to make sure that there is a sufficiently large habitat to maintain its population, taking into consideration any threat of deterioration or loss of such habitats. In relation to **biological diversity** at the level of species, the three criteria for assessing progress towards good environmental status, as well as the indicators **methodological standards** related respectively to them, are the following:...~~”

### ***Habitat level***

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<sup>42</sup> Functional groups and rules to select species/populations should be discussed, agreed and described here.

“For the purpose of Directive 2008/56/EC, the term habitat addresses both the abiotic characteristics and the associated biological community, treating both elements together in the sense of the term biotope. For each region, sub-region or subdivision, taking into account the different habitats types contained in the indicative list in Table 1 of Annex III to Directive 2008/56/EC, it is necessary to assess all habitat types, by a selection of representative habitats, to cover the MSFD requirements.<sup>43</sup> A set of habitat types needs to be drawn up for each region, sub-region or subdivision, taking into account the different habitats contained in the indicative list in Table 1 of Annex III and having regard to the instruments mentioned in point 2 of Part A. Such instruments also refer to a number of habitat complexes (which means assessing, where appropriate, the composition, extent and relative proportions of habitats within such complexes) and to functional habitats (such as spawning, breeding and feeding areas and migration routes). Additional efforts for a coherent classification of marine habitats, supported by adequate mapping, are essential for assessment at habitat level, taking also into account variations along the gradient of distance from the coast and depth (e.g. coastal, shelf and deep sea). The three criteria for the assessment of habitats are their distribution, extent and condition (for the latter, in particular the condition of typical species and communities), accompanied with the indicators related respectively to them. The assessment of habitat condition requires an integrated understanding of the status of associated communities and species, coherent with the requirements laid down in Directive 92/43/EEC ( 9 ) and Directive 2009/147/EC, including where appropriate an assessment of their functional traits. In relation to biological diversity at the level of habitats, the criteria for assessing progress towards good environmental status, as well as the methodological standards related respectively to them, are the following:”

***Ecosystem level [This level might change after adopting the proposals in chapter 5]***

In addition, the interactions between the structural components of the ecosystem are fundamental for assessing ecosystem processes and functions for the purpose of the overall determination of good environmental status, having regard, inter alia, to Articles 1, 3(5) and 9(1) of Directive 2008/56/EC. Other functional aspects addressed through other descriptors of good environmental status (such as descriptors 4 and 6), as well as connectivity and resilience considerations, are also important for addressing ecosystem processes and functions. [Need to be updated after defining and agreeing on the content of the current 1.7 criterion and on the integration approach amongst the state descriptors].

### **3.2 Identification of needs for guidance**

To summarize the previous conclusions guidelines are needed on the following issues for supporting the scope of the review process and of the overall MSFD implementation:

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<sup>43</sup> Predominant habitats (e.g. level EUNIS 3-4) and rules to select habitats (community level, e.g. level EUNIS 5-6) should be discussed, agreed and described here.

- How the habitat assessment criteria should be related to the species criteria. The Commission Decision mentions, in relation to the species level, the need for ‘an integrated understanding of the distribution, extent and condition of their habitats’; however, habitat assessment criteria are not clearly related to the species criteria. Whilst there is some consideration of species level within the habitat level (criterion 1.6), the two assessments are likely to be carried out by different people which may make cross-over problematic. It either needs to be made clearer that the two needs to be supplementary assessed, or there needs to be some replication to ensure that habitat types are adequately linked to species, where possible, according to the MSFD objectives. On the other hand species should be assessed in association with particular habitats –essential species habitats- related with their GES status (spawning, nursery, feeding grounds).
- How the assessment at the ecosystem level should be done, including how to handle the connections with other descriptors (e.g. D3, D4, D5, D6). The assessments for MSFD’s Article 12 showed that Member States used criterion 1.7 “ecosystem structure” the least. Clarification is needed as to what is an ecosystem as an assessment unit for the MSFD and what should be the content of 1.7. To this end the ecosystem approach to management has to be interpreted and raised at the level of state Descriptors –including the current state criteria and indicators from all Descriptors-that would come through an efficient integration amongst them.
- How to adopt existing habitat classification systems for MSFD purposes. The EEA’s EUNIS habitat classification system for the marine environment is currently being revised. It would be sensible if there is some cross-over between the Commission Decision and EUNIS revisions to allow comparisons and exchange of data to ensure that MSFD predominant habitat types equate clearly to EUNIS types. The issue will be to specify the need to use EUNIS and the resolution of the habitat types to be assessed (i.e. the predominant types). Need also to equate the ‘different substrate types’ of D6 to D1 predominant habitats.

### **3.3 An analysis of what to keep should take place, including specification on what may be out dated or may need to be aligned with other or new legislation, etc.**

The review of the current Commission Decision (and associated methodological standards), which is foreseen in its paragraph 4, would guarantee the exploitation and adoption of the scientific knowledge, technical improvements and evolution in environmental management. Examples, criteria and selecting or deselecting methods of assessment elements (species, habitats, and functional groups) should be specified to improve the clarity and coherence of the Com Dec 2010/477/EU.

Specifications on the integration of the state descriptors and their links with the impact and pressure aspects of the others should be included in the decision, aiming to streamline the assessment across the descriptors. The state-impact-pressure definition of the criteria in the revised COM Decisions can be linked with the targets to enhance the associations and clarity amongst articles 8, 9 and 10 of the MSFD. Additionally, guidelines on the exploitation of existing legislations (mostly HD and BD for D1) and convergence of their status classifications can improve the implementation of the MSFD, avoiding double assessments and leading to a cost-effective and simpler implementation.

## 4. Identification of issues

### 4.1 Main findings and information that will be used in the next step of the revision process.

The recent MSFD assessment carried out in relation to Article 12 concluded the following:

- Low integration with the WFD and BD, relatively good integration with the HD. **MSs can exploit methods, data and characteristics derived from other legislations more efficiently** (see Evans and Arvela, 2011 for HD<sup>44</sup>). Besides, MSFD has specific issues. Optimisation in monitoring (methods and spatial/temporal designs) and data management should be enhanced, but some aspects are new in MSFD and require additional specific and coherent assessments. This can be reflected in the GES determination and in the computation of statistical indicators (optimized common data and additional ones), which can lead to (slightly) different threshold and targets (and characteristics).
- Low/Moderate integration with the RSC. An **active involvement of the MSs on regional level is required** for the establishment of coherent and comparable approaches to the assessment. This could be feasible after establishing coherent objectives and assessments between MSFD-RSC-WFD and other relevant legislations
- Assessing biodiversity (from species to ecosystems) should **ensure a coherent list of characteristics (species, habitats and ecosystems levels)** highlighting characteristic common for neighbouring MS.
- Reduction of the heterogeneity in the definition of GES both at European level and at regional level. **MSFD terminology should be clarified and commonly interpreted**. GES should be defined on a criterion level and criteria should be quantifiable and linked with specific methodological standards and boundaries to provide measurable, comparable and operational GES definitions.
- Gap in biodiversity knowledge was reported by most of the MSs. Bilateral and regional cooperation through RSCs should be encouraged to set a more comprehensive background on biodiversity, taking into account the environmental similarities. Scientific and pilot projects at regional and sub-regional level could facilitate this issue.
- High heterogeneity in the number and type of methodological approaches, thresholds and limits in MS reports has been observed. **Common agreed and comparable (pragmatic and fully operational) methodological standards and relevant boundaries on a regional or EU scale** should be established. The most frequently used methods could be the starting point for defining a coherent list of methodological approaches. Besides, it should be kept in mind that most frequently used methods are used for specific issues (and scales). (Sub)regional

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<sup>44</sup> Evans D. and M. Arvela (2011): Assessment and reporting under Article 17 of the Habitats Directive. Explanatory Notes & Guidelines for the period 2007-2012. ETC, Paris

specificities may also require adaptation of possible methods (e.g. observation by imagery or divers depends of water clarity). Finally, some new issues (and/or cost-efficiency) require new methods or adaptation of existing one, and should take into account (and facilitate) scientific and technical Research & Developments (e.g. molecular tools for systematic, applied to Non indigenous species detection).

- Specific issues include **the risk of double counting** (Teixeira *et al.* 2014<sup>45</sup>), i.e. the accounting of the same ecosystem feature in different contexts **within and across descriptors**. This needs to be considered in a subsequent step of the process.
- Ecosystem is ambiguous, as much as criterion 1.7. According to the apparent increasing biological level, this criterion should assess biodiversity and functional links between previous levels: (mobile) species and habitats. Function can be trophic but also connectivity (notably between “species habitats” *sensus* HD and implied under Decision indicator D7.2.2) or material flow (e.g. calcareous).

Recommendations (from Berg *et al.* 2015<sup>46</sup>): The Berg *et al.* (2015) manuscript from DEVOTES public Deliverable 3.1 provides specific evidence that can complement and support many of the findings of the “In-depth Assessment” (Palialexis *et al.*, 2014)

- a) “Clearly define terms and use them consistently”. An updated Common Understanding document will highly contribute to that end. In this case, “‘*area*’ is only meaningful for immobile components and mainly associated to the habitat level and as such it is covered in the Decision by parameter 1.5.1 (Habitat area). This would lead resolving the issue of the ambiguous use of the term ‘*distribution*’ between species and habitat level”;
- b) “Criteria of Descriptor 1 should be specified following an approach to avoid overlaps and guidelines should be provided along with the criteria. It could be suggested that the **species level** criteria (1.1-1.3) are used only on mobile species that are wide-ranging and typically not associated to a single habitat, as already suggested by (Cochrane *et al.*, 2010<sup>47</sup>), and the habitat level criteria (1.4–1.6) would be used for the (often immobile) components tightly associated to a single or a few related habitats”.
- c) “Since the term ‘habitat’ is used in the sense of ‘biotope’ (Olenin and Ducrotoy, 2006) in Commission Decision, criteria 1.4–1.6 would assess the combination of the physical habitat and its associated communities. As such ‘Habitat extent’ should relate to the whole community [and its abiotic characteristics]. Some habitats (e.g. biogenic reefs as seagrasses, *Sabellaria* reefs,

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<sup>45</sup> Teixeira *et al.*, 2014. Existing biodiversity, non-indigenous species, food-web and seafloor integrity GENs indicators.DEVOTES FP7 Project; 2014. JRC89170. DEVOTES public Deliverable 3.1 [http://www.devotes-project.eu/wp-content/uploads/2014/02/D3-1\\_Existing-biodiversity-indicators.pdf](http://www.devotes-project.eu/wp-content/uploads/2014/02/D3-1_Existing-biodiversity-indicators.pdf)

<sup>46</sup> Berg T, Fürhaupter K, Teixeira H, Uusitalo L, Zampoukas N. 2015. The Marine Strategy Framework Directive and the ecosystem-based approach - pitfalls and solutions. Mar. Pollut. Bull., <http://dx.doi.org/10.1016/j.marpolbul.2015.04.050>

<sup>47</sup> Cochrane S.K.J., D.W. Connor, P. Nilsson, I. Mitchell, J. Reker, J. Franco, V. Valavanis, S. Moncheva, J. Ekebom, K. Nygaard, R. Serrão Santos, I. Narberhaus, T. Packeiser, W. van de Bund & A.C. Cardoso, 2010. Marine Strategy Framework Directive Task Group 1 Report Biological diversity EUR 24337 EN – 2010. <http://ec.europa.eu/environment/marine/pdf/1-Task-group-1-Report-on-Biological-Diversity.pdf>



oyster beds, *Crepidula* banks, etc.) may require an assessment at this “engineering” species level, as this structures the whole habitat (abiotic and biotic structure). Also, this would result in removing parameter 1.1.3 completely since it is superfluous under this definition.”

- d) A clear differentiation is needed on which aspects are assessed within descriptors 1, 4 and 6 respectively in order to avoid **double counting (over-weighting of assessments) across descriptors**. The criteria/indicators in other descriptors contributing to a risk of “**double counting**” are:

- *(in relation to D4 Food web)* 4.3 Abundance/distribution of key trophic groups/species / 4.3.1 Abundance trends of functionally important selected groups/species;

“The assessment of abundance/area of key trophic groups like habitat-defining species may not have a high indicator value for D4 food web” since it “does not target the processes and linkages within and between the food webs but is restricted to the state of a particular node of that web, much like the indicators already in place for Descriptor 1”.

- *(in relation to D6 Sea floor integrity)* 6.2 Condition of benthic community / 6.2.2 Multi-metric indexes assessing benthic community condition and functionality;

There is a high opportunity that “indicators addressing criterion 6.2 (Condition of benthic community) are also used under criterion 1.6 Habitat condition / 1.6.1 Condition of the typical species and communities of Descriptor 1, because the benthic communities are also regarded as being the biotic components of benthic habitats”.

- e) It is recommended to integrate all criteria and parameters relating to condition or state of the benthic communities and species functionally important groups into the habitat level of D1 (this was a common approach across MSs for the Art. 8 assessments in the first phase of the MSFD implementation). Alternatively, the scope and aim of each criterion should be re-defined in order to reflect the specificities in relation to each descriptor.
- f) RSCs have gathered, and are still gathering, various practical experiences in developing, testing, assessing and implementing biodiversity indicators, e.g. data flows (access to governmental private owned data), reporting, gap analysis, practical (e.g. division of tasks amongst Member States, financial consequences), etc. It is recommended to use these practical experiences.

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

**5.1 Conclude on the use of the existing Decision criteria and indicators, in the light of the "refined" common understanding, the findings of the Article 12 assessment and relevant international, EU and RSC legislation and approaches.**

*Clarification of the GES concept:*

- D1 covers all biodiversity – how to handle this in practice (currently via functional groups and predominant habitat types) needs to be clearer. The lists of functional groups and predominant habitats in SWD 2011 aim to cover all biodiversity, but would benefit from review to ensure they are a suitable practical set. Define which (sets of) species should be assessed to represent each group (including also threatened/sensitive species or groups).
- Key terms and concepts (e.g. links across the state descriptors, aggregation of descriptors to the overall-ecosystem assessment, etc) used in GES definitions are often insufficiently clear so guidelines and agreements are needed for the specification of their exact meaning.

*Regional coherence:*

- Guidelines specifying the EU desired level of ambition could be necessary to ensure that implementation requires a comparable level of GES adequacy while taking into account regional and sub-regional differences. The aim should be an EU coherence on the assessment criteria, high level thresholds and baselines, whilst expecting the specific species/habitats/values to be defined at regional -through RSCs- (or national) level to reflect ecological variation and also the species and habitats that are most suitable to assess considering the differences in pressures.
- Within and across the RSCs (in particular HELCOM and OSPAR), the work to develop and agree upon a core set of indicators is currently on-going, increasing coherence within these regions, especially on setting boundaries for GES.
- Criteria – HBD, RSCs, European Red List assessments (on-going) – can be broadly aligned – centred on quantity and quality. These criteria for habitats and the Member States’ obligation to monitor and report, should be aligned between neighbouring Member States and if possible standardised to be coherent and comparable. Quantifying attributes for species and habitats can be costly and technically difficult, this need however to be considered when designing the protected areas network and monitoring. However patterns can be determined/modelled on the basis of presence data.

## **5.2 Recommendation on which criteria to retain, which to amend and any to remove**

### ***Species Level***

Biodiversity component and species groups to be considered, at species biological level, are listed in Table 3 (from SEC 2011/1255).

**Table 3:** Functional groups of highly mobile and widely dispersed species of marine birds, mammals, reptiles, fish and cephalopods (Table 3 of SEC(2011)1255).

Biodiversity components	Species group
Birds	Intertidal benthic-feeding birds
	Inshore surface-feeding birds
	Inshore pelagic-feeding birds
	Inshore benthic-feeding birds
	Inshore herbivorous-feeding birds
	Offshore surface-feeding birds
	Offshore pelagic-feeding birds
	Ice-associated birds
Mammals	Toothed whales
	Baleen whales
	Seals
	Ice-associated mammals
Reptiles	Turtles
Fish	Diadromous fish
	Coastal fish
	Pelagic fish
	Pelagic elasmobranchs
	Demersal fish
	Demersal elasmobranchs
	Deep-sea fish
	Deep-sea elasmobranchs
	Ice-associated fish
	Cephalopods
Deep-sea pelagic cephalopods	

These elements should be defined and be in line with all Descriptors and criteria implying assessment of state or impacts on species (cf. 1.6). These elements have to be updated after the review process and be harmonised with potential changes in the content of afore-mentioned Descriptors, criteria and indicators. Standards for inclusion or exclusion of assessment elements for the needs of the MSFD should be developed in accordance to HD criteria (Appendix III of the HD).

Relevant species allocated to the species groups and functional groups of SWD 2011/1255 Table 3 include, *interalia*:

- a) species listed under EU Directives and international agreements<sup>48</sup>;

<sup>48</sup> For an indicative list of elements see: Tables in page 23 of the following LIFE III document: [http://ec.europa.eu/environment/nature/natura2000/marine/docs/appendix\\_4\\_life.pdf](http://ec.europa.eu/environment/nature/natura2000/marine/docs/appendix_4_life.pdf) & Annexes in the N. Zampoukas, A. Palialexis, A. Duffek, J. Graveland, G. Giorgi, C. Hagebro, G. Hanke, S. Korpinen, M. Tasker, V. Tornero, V. Abaza, P. Battaglia, M. Caparis, R. Dekeling, M. Frias Vega, M. Haarich, S. Katsanevakis, H. Klein, W. Krzyminski, M. Laamanen, J.C. Le Gac, J.M. Leppanen, U. Lips, T. Maes, E. Magaletti, S. Malcolm, J.M. Marques, O. Mihail, R. Moxon, C. O'Brien, P. Panagiotidis, M. Penna, C. Piroddi, W.N. Probst, S. Raicevich, B. Trabucco, L. Tunesi, S. van der Graaf, A. Weiss, A.S. Wernersson, W. Zevenboom, (2014). Technical guidance on monitoring for the Marine Strategy Framework Directive. EUR – Scientific and Technical Research series. Luxembourg: Publications Office of the European Union 166pp, doi: 10.2788/70344.

- b) Key species (as representatives of key structural components or functions of the ecosystem);
- c) commercially exploited species (in relation to Descriptor 3);
- d) genetically distinct forms of indigenous species;
- e) non-indigenous species, particularly those which are invasive.

The RSCs can play herein an important role by defining the species to be assessed on the level of region or subregion. Species with populations that are well-characterized by survey data should be highly considered in this process.

Section 2.3 refers to lists of marine species that are included in other legislations. Their assessments has to be adapted to the MSFD D1 assessment.

### **1.1. Species ~~distribution~~ geographic distribution**

GES determination: species geographic distribution should be in line with the assessments conducted for the HD, BD and RSCs agreements and not deteriorated significantly by human activities. For species distribution where specific thresholds have been set, these should be considered (e.g. a threshold of Y% of natural range).

GES for the listed species in HD can be assessed based on similar criteria as for the “favourable conservation status” assessment defined by the Habitats Directive and discussed in section 1.3<sup>49</sup>. In addition to typical and endangered species, GES is required for the commercially-exploited species addressed by the Common Fisheries Policy (EC 2008b); the criteria and indicators for healthy commercial stocks are detailed in Descriptor 3.

The methodological standards to support criterion 1.1 could derive (to include) the approach from the HD, which follows. The conservation status for the species (Directive provisions, Art. 1) will be taken as 'favourable' when (the second bullet is relevant to MSFD criterion 1.1):

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis;

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<sup>49</sup> It should be noted that qualitative definitions of GES may deviate from FSCs provided by HD. There may be species that are not in FCS for (coastal and/or) marine waters, but they are in FSC on a national level. In this case the Member State is not obligated to undertake action to change the status in marine waters (e.g. gulls, terns, waders that are breeding in coastal and further inland habitats). Further, differences have to be avoided between regional defined GES boundaries and national objectives of the WFD and Natura Directives.

Proposed methodological standards could include:

- distributional range
- distributional pattern, where relevant
- area covered by species, where relevant
- species distribution models
- ...

Depending on the species and the monitoring programmes several types of data can be generated including occurrence data, presence-absence data and abundance per sampling station. Species distribution models are able to link species distributions with preferable environmental conditions bridging this criterion to the habitat condition criterion (1.6), in line also with the HD criterion for natural habitats and the conservation status of its typical species (Directives provisions, Art.1). RSCs should play an important role in coordinating these monitoring programmes and modelling.

The most common methodological standards reported for D 1.1 according to Palialexis et al. (2014) were:

- Location and distribution of species or species groups
- Distributional range of species or species groups
- Area covered by species or species groups

These were reported for specific species or species groups.

Boundaries associated with these methodological standards and links with GES:

GES boundaries for species geographic distribution should be in line with boundaries defined for other legislations and agreements and in line with the GES determination. Due to the variety of elements-species only general rules for GES boundaries can be defined according to the Common Understanding document and the cross-cutting workshop conclusions. Species distribution subjects to natural processes (e.g. intra-, inter-species competition) that cannot always be distinguished from the effects of anthropogenic activities hindering any attempt to include deterioration of species distribution into the general GES definition or into boundaries. Endangered and vulnerable species, though, should be treated more strictly, if is needed to be included in the assessment, due to their direct threat. A similar approach should also be applied for relevant habitats. For such elements it is suggested to include the maintenance of distributional range in their GES assessment. In any case, endangered and vulnerable species are assessed by the nature Directives.

*Distributional range (1.1.1)*

*Distributional pattern within the latter, where appropriate (1.1.2)*

*Area covered by the species (for sessile/benthic species) (1.1.3)*

## **1.2. Population size**

GES determination: species population abundance and/or biomass should be in line with the assessments conducted for the HD, BD and RSCs agreements and not be deteriorated significantly by human activities. Where abundance and/or biomass specific thresholds have been or can be set, these should be considered.

Methodological standards:

In line with criterion 1.1, the methodological standards to support criterion 1.2 could derive (to include) the approach from the HD, as is presented above.

Proposed methodological standards could include:

- Population abundance and/or biomass, as appropriate

The Data Collection Framework of the Common Fisheries Policy provides data for the assessment of biomass and abundance for a number of marine species (see also section 2.3).

The most common methodological standards reported for D 1.2 according to Palialexis et al. (2014) were:

- Size (biomass, number, coverage) of the population of individual species or species groups

Boundaries associated with these methodological standards and links with GES:

GES boundaries for population size should be in line with boundaries defined for other legislations and agreements and in line with the GES determination. Due to the variety of elements-species only general rules for GES boundaries can be defined according to the Common Understanding document and the cross-cutting workshop conclusions.

Good practices for GES determination for 1.2: A MS for MSFD Art. 9 determined GES considering existing assessments: "Good conditions according to the Water Framework Directive (i.e. good ecological status), Habitats and Birds Directives (i.e. favourable conservation status) and OSPAR (i.e. ecological quality objectives) are attained. Rare and threatened habitat types and species, included in existing legislation and conventions, are protected to the level envisaged by that legislation or convention". Another good practice for a quantitative determination of GES coming from the 2012 reporting includes: "GES is achieved when values of abundance and biomass in the assessment area of the species X, Y and Z, which have been selected as suitable indicators for the status of coastal fish communities, are equal to or exceed the threshold value (quantitatively expressed)".

### **1.3. Population condition**

*GES determination: species population condition should be in line with the assessments conducted for the HD, BD and RSCs agreements and not be significantly and adversely affected by human activities. The population's structure and health status can safeguard reproduction and genetic variation to such an extent that the viability of the population can be maintained.*

Methodological standards:

- Population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity rates, survival/ mortality rates)
- Population genetic structure, where appropriate

Proposed methodological standards:

- Productivity
- survival rate,
- breeding success
- .....

The most common methodological standards reported for D 1.2 according to Palialexis et al. (2014) were:

- Productivity
- survival rate,
- breeding success
- genetic structure of the population

*Boundaries associated with these methodological standards and links with GES:*

*GES boundaries for species population conditions should be in line with boundaries defined for other legislations and agreements and in line with the GES determination. Due to the variety of elements-species only general rules for GES boundaries can be defined according to the Common Understanding document and the cross-cutting workshop conclusions.*

*Good practices for GES determination for 1.3: A MS determined GES as: "The population's structure and health status can safeguard reproduction and genetic variation to such an extent that the viability of the population can be maintained". Several MS referred to assessments from other EU legislations (BD, HD) for the particular criterion.*

## **Habitat level<sup>50</sup>**

For a consistent and coherent assessment of habitats it is proposed to follow specific classification schemes. Table 7 of the SWD 2011/1255 lists predominant habitats. The criteria for selecting sites eligible for identification as sites of community importance and designation as special areas of conservation (Appendix III of the HD) should be considered to extend the proposed list of habitats. Additionally, the EUNIS classification system may facilitate a consistent assessment, especially because of its pan-EU coverage. To that end, direct links between the SWD 2011/1255 predominant habitats and the 2015 EUNIS classes have to be adjusted. Regional sea specific habitat/biotope classifications based on EUNIS can further improve a regionally coherent assessment taking into account particular spatial specificities (see HELCOM HUB as good practice<sup>51</sup>).

*(scope) A set of habitats needs to be drawn up (based on EUNIS and considering the SWD 2011/1255 predominant habitats) for each region, sub-region or subdivision, taking into account the different habitats contained in the indicative list in Table 1 of Annex III and having regard to the instruments mentioned in point 2 of Part A. Such instruments also refer to a number of habitat complexes (which means assessing, where appropriate, the composition, extent and relative proportions of habitats within such complexes) and to functional habitats.*

### **1.4. Habitat geographic distribution and extent.**

GES determination: Habitat geographic distribution and extent *should be in line with the assessments conducted for the HD and RSCs agreements and shall not be significantly and adversely affected by human activities. For habitats distribution and extent where specific thresholds have been set, these should be considered (e.g. maintain a threshold of Y% of natural range not affected or Y% of natural range able to provide sustainable services).*

Methodological standards to assess habitats distribution:

The methodological standards to support criteria 1.4 & 1.5 could derive (to include) the approach from the HD, which follows. In the case of natural habitats, favourable conservation status (ref Article 1(e)) is achieved when:

- *its natural range and the areas it covers within that range are stable<sup>52</sup> or increasing<sup>53</sup>, and*
- *the specific structure and functions which are necessary for its long-term maintenance are exist and are likely to continue to exist for the foreseeable future, and*
- *the conservation status of its typical species is favourable as defined in Article 1(i).*

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<sup>50</sup> Marine habitat types included in Annex I of the HD should be considered.

<sup>51</sup> <http://helcom.fi/baltic-sea-trends/biodiversity/helcom-hub>

<sup>52</sup> MSFD doesn't require conservation towards achievement of a pristine habitat, but achievement of sustainable use. To that end, stable is referring to habitats sensitive to human impacts. "Increasing" refers to heavily impacted habitats that are under a restoration framework, towards natural extent.

<sup>53</sup> According to the MSFD objectives "increasing" refers to heavily impacted habitats that are under a restoration framework, towards natural extent.



The last two points are more relevant to the MSFD D1 habitat condition criterion.

#### Proposed Methodological standards

- *Distributional range:* *Habitat distributional range* is the geographical region where occurrences of a habitat can be found within the waters of each MS. They should be typically bound by habitat range limits, defined as the spatial boundaries beyond which there is no occurrence of a habitat in a Member State. Range is the actual distribution of a habitat and not the potential distribution delineated by environmental limitations and reflected in the habitat extent.
- *Distributional pattern:* Habitat distributional pattern is the manner in which a habitat is spatially arranged. Random, regular/uniform and clumped are the three traditional patterns considered. The pattern of habitat distribution may not be permanent. Seasons influence environmental conditions and resource availability (e.g., position of pelagic features), therefore influencing the location and even existence of certain habitats. They may depend of the scale at which the pattern is analysed therefore occurrences need to be binned at defined harmonized resolution to ensure comparability of results between countries and throughout MSFD regions and sub-regions. The particular methodological standard is more relevant to specific habitats (e.g. coral reefs), but can potentially indicate fragmented habitats resulting from anthropogenic activities that can threaten biodiversity.
- *Habitat extent (area and volume):* Habitat extent refers to the area or volume effectively occupied by the habitat within its range. Typically, accurate habitat extent delimitation results from the analysis of ground-truth remote sensing images (aerial, satellite or acoustic). Alternatively, habitat extent may result from validated statistical models. An effort should be made to report on the current habitat extent as well as on that prior to anthropogenic impacts. Anthropogenic pressures typically related to major habitat losses or damage include construction of coastal infrastructures and aggregate dredging. Other pressures affecting both habitat extent and condition include sediment disposal, non-indigenous species invasions, opportunistic species development, global warming, ocean acidification and changes in predator-prey balance. Despite aiming to prevent any further deterioration of the habitat extent, the two latter approaches provide less scope for recovery of the populations as deterioration of habitat extent has already occurred (adapted from WG GES 2011<sup>54</sup>).

The most common methodological standards reported for D1.4 & D1.5 according to Palialexis et al. (2014) were:

- Distributional range of habitats
- Distributional pattern of habitats
- Area occupied by habitat

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<sup>54</sup> WG GES 2011. Draft Common Understanding of (Initial) Assessment, Determination of Good Environmental Status (GES) and Establishment of Environmental Targets (Art.s 8, 9 & 10 MSFD). Version 5.

- Sites or volume occupied by certain species (e.g. *Posidonia* meadows)

GES boundaries for habitat geographic distribution and extent should be in line with boundaries defined for other legislations and agreements, while more effort is needed to streamline the existing boundaries towards consistent ones for all habitats. Due to the variety of elements-habitats only general rules for GES boundaries can be defined according to the Common Understanding document and the cross-cutting workshop conclusions. Such rules have been already set by HD, IUCN and RSCs (i.e. OSPAR). Habitats subject to natural variation that cannot always be distinguished from the effects of anthropogenic activities hindering any attempt to include maintenance and reduction of habitat areas into the general GES definition or into boundaries. Threatened and sensitive to pressures habitats, though should be treated more strictly, due to their direct danger for degradation and when their sustainability of services is not maintained. A similar approach should also be applied for relevant habitats. For such elements it is suggested to include the maintenance of distributional extent and range in their GES assessment.

*Good practices for GES determination for 1.4 & 1.5:* A MS determined GES including the followings: GES is achieved when Good conditions according to the Water Framework Directive (i.e. good ecological status), Habitats and Birds Directives (i.e. favourable conservation status) and RSC's (i.e. ecological quality objectives) are attained. Rare and threatened habitat types and species, included in existing legislation and conventions, are protected to the level envisaged by that legislation or convention". Another MS determined GES for particular species reporting: "GES is achieved when no significant reduction of the area occupied by the maerl-type sediments and other coralligenous habitats". Unfortunately, there was no GES determination for 1.4 & 1.5 to include a quantifiable parameter, other than the maintenance of the area (trend based quantification).

### **1.5. Habitat condition**

GES determination: Habitat conditions should be in line with the assessments conducted for the HD (in terms of structure and functions), BD (in terms of quality-biotic & abiotic) and RSCs agreements and not be significantly and adversely affected by human activities.

*Methodological standards to assess habitats conditions:*

Condition means the actual environmental state of a habitat in a given geographical area. The assessment of state can be derived by taking direct measurements of the particular biodiversity component, such as a typical species or communities. In practice it is nearly impossible to measure the condition of all habitats in a given marine region by field sampling and a risk based approach is suggested including, *interalia*, selection of representative habitats affected by each pressure.

In line with criterion 1.4, the methodological standards to support criterion 1.5 could derive (to include) the approach from the HD, as is presented above.

Proposed methodological standards:

- *Condition of the typical species and communities*
- *Relative abundance and/or biomass, as appropriate*

The most common methodological standards reported for D1.6 according to Palialexis et al. (2014) were:

- Diversity indices (e.g. Shannon-Wiener)
- Benthic Quality Index (BQI)
- species ratios
- Abundance or biomass of species or groups of species
- Oxygen saturation (under the "physical, hydrological and chemical conditions")

BQI was also reported under D 5.2. Some MS reported habitat extent (1.4) as an indication of 1.5 habitat condition. Specific abiotic parameters of the habitats have to be assessed through the pressure Descriptors reflecting the level of certain pressures to habitats.

GES boundaries for habitat condition should be in line with boundaries defined for other legislations and agreements, while more effort is needed to streamline the existing boundaries towards consistent ones for all habitats. Due to the variety of elements-habitats only general rules for GES boundaries can be defined according to the Common Understanding document and the cross-cutting workshop conclusions. Habitats subject to natural variation, which cannot always be distinguished from the effects of anthropogenic activities, hindering any attempt to include maintenance and reduction of habitat areas into the general GES definition or into boundaries. Threatened and sensitive to pressures habitats, though should be treated more strictly, due to their direct danger for degradation. A similar approach should also be applied for relevant habitats. For such elements it is suggested to include condition maintenance in their GES assessment.

Good practices for GES determination for 1.4 & 1.5: A MS determined GES using a diversity index for specific group of species providing a quantitative definition for habitats condition.

Typical species and communities should be defined and listed, at least regionally.

### **1.6. Ecosystem structure**

The Ecosystem structure criterion was not reported by all MSs. The lack of specification in its content, which is also reflected in the lack of an introductory note in the COM DEC 2010/477/EU in contrast to the other two levels, led to different interpretations and assessments.

#### **[Currently there are two prevailing approaches]:**

The ecosystem assessment refers to the ultimate goal of the MSFD and there is no need to be included in D1. This will be achieved by a global assessment of the state descriptors including the impacts of the pressure Descriptors, in line with the ecosystem approach dictated by the MSFD (Figure in 6.1). Under

this perspective, it is suggested by some MS to eliminate this level. The fact that some ecosystem's attributes -e.g. functions and resilience- are assessed under other Descriptors (D4 and D6) enhances the elimination of the particular criterion for the sake of simplicity and to avoid duplicated assessments. In addition, difficulties to assess this criterion were obvious in the JRC's IDA, but also in the RSCs core indicator work (see table 3.1 & 3.6 of the "Development of a shared data and information system between the EU and the Regional Sea Conventions"<sup>55</sup>) where the lack of indicators for 1.7 is highlighted across the RSCs). Another argument denotes that "ecosystem processes and functions" are high-level consideration of assessment (e.g. under Art. 8), rather than a criterion under D1. This high-level gets input from a set of descriptors (e.g. D4, D6). Finally, monitoring programmes for biodiversity have not been designed to adequately cover ecosystem processes and functions.

**[The second approach is presented in section 5.3 as a proposal for a criterion to substitute and clarify criterion 1].**

*Methodological standards to assess ecosystem structure:*

- *Composition and relative proportions of ecosystem components (habitats and species)*

The most common methodological standards reported for D1.7 according to Palialexis et al. (2014) were:

- Ecological Evaluation Index (EEI),
- BENTIX,
- PREI,
- species diversity indices (e.g. Hill's N1)

These methods reported also under other Descriptors (4, 6, 5) or under other criteria of D1 (1.6).

### **5.3 Proposals for new criteria**

In an effort to cover aspects related to *Ecosystem processes and functions*, the current EC Decision 2010/477/EU includes the following text:

*"In addition, the interactions between the structural components of the ecosystem are fundamental for assessing ecosystem processes and functions for the purpose of the overall determination of good environmental status, having regard, inter alia, to Articles 1, 3(5) and 9(1) of Directive 2008/56/EC. Other functional aspects addressed through other descriptors of good environmental status (such as descriptors 4 and 6), as well as connectivity and resilience considerations, are also important for addressing ecosystem processes and functions."*

Given the importance of this level and the continued progress in the field, it is possible that presently more specific criteria can be identified to address these aspects. The proposals presented by the TG1 report (Cochrane et al., 2010<sup>56</sup>) are following. Operational indicators and methodological standards that

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<sup>55</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/aff9880d-df5e-44ec-854e-8f098fcff2e5/DIKE\\_10-2014-05b\\_RSCDataReporting\\_Report.pdf](https://circabc.europa.eu/d/a/workspace/SpacesStore/aff9880d-df5e-44ec-854e-8f098fcff2e5/DIKE_10-2014-05b_RSCDataReporting_Report.pdf)

<sup>56</sup> Cochrane S.K.J., D.W. Connor, P. Nilsson, I. Mitchell, J. Reker, J. Franco, V. Valavanis, S. Moncheva, J. Ekebom, K. Nygaard, R. Serrão Santos, I. Narberhaus, T. Packeiser, W. van de Bund & A.C. Cardoso, 2010. Marine Strategy Framework Directive Task

address, for instance, the estimation of connectivity, patchiness, fragmentation, integrity and resilience, between habitat occurrences and species meta-populations at MSFD region and sub-region level could be included at the ecosystem level. Note that these indicators should be complementary (rather than overlapping) to ecosystem functioning elements already addressed in descriptors D4 (food webs) and D6 (sea-floor integrity). In addition, these should complement to the indicator work of the RSCs.

#### 1.6. Ecosystem processes and functions

- Interactions between the structural components of the ecosystem (1.6.1)
- Services provided by biological diversity within ecosystems (1.6.2)

Services provided by biological diversity within ecosystems, could be linked with the implementation of the EU Biodiversity Strategy and more specific with ecosystem assessments under Action 5 of the EU Biodiversity Strategy by 2020. According to this “Member States, with the assistance of the Commission, will map and assess the state of ecosystems and their services in their national territory by 2014, assess the economic value of such services, and promote the integration of these values into accounting and reporting systems at EU and national level by 2020”.

#### Proposed Methodological standards

- Conservation Status of Species by numbers<sup>57</sup>
- Mean Maximum Length of fish community<sup>58</sup>
- Large Fish Indicator (LFI)<sup>59,60</sup>
- .....

### **5.4 Rationale and proposal, where appropriate, for defining GES threshold values and reference points, based on established and agreed scientific methods for quantifying and applying GES boundaries, or for a normative definition of GES;**

Experts’ input on defining reference points (after clarification of quantifying GES): At least for marine benthos, the high percentile method is standard used in the intercalibration process to estimate reference values for biotic indicators such as species richness, Shannon index and AMBI. Percentile values in the range of 95 to 99 percentile of a sufficiently large dataset (>10 years) are used. The 99 percentile seems to be used increasingly, and appears (at least for marine benthos) NOT to overestimate reference values. Expert judgment remains necessary to evaluate the estimated reference values and resulting EQR values. For example, it appears that this percentile method gives too low estimates of

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Group 1 Report Biological diversity EUR 24337 EN – 2010. <http://ec.europa.eu/environment/marine/pdf/1-Task-group-1-Report-on-Biological-Diversity.pdf>

<sup>57</sup> Dulvy, N., Jennings, S., Rogers, S.I., Maxwell, J.D., 2006. Threat and decline in fishes: an indicator of marine biodiversity. *Canadian Journal of Fisheries and Aquatic Sciences* 63, 1267

<sup>58</sup> Jennings, S., Greenstreet, S. P. R., and Reynolds, J. D. 1999. Structural change in an exploited fish community: a consequence of differential fishing effects on species with contrasting life histories. *Journal of Animal Ecology*, 68: 617-627

<sup>59</sup> Greenstreet, S.P.R., Rogers, S.I., Rice, J.C., Piet, G.J., Guirey, E.J., Fraser, H.M., Fryer, R.J., 2011. Development of the EcoQO for the North Sea fish community. *ICES Journal of Marine Science: Journal du Conseil* 68, 1–11.

<sup>60</sup> Modica, L., Velasco, F., Preciado, I., Soto, M., and Greenstreet, S. P. R. Development of the large fish indicator and associated target for a Northeast Atlantic fish community. – *ICES Journal of Marine Science*, doi: 10.1093/icesjms/fsu101.

reference values, if a benthic community is a poor or low moderate state. In this case, suitable simple and pragmatic correction methods of these reference values have to be designed and used.

HELCOM CORESET and HOLAS II are working towards the quantification of indicators, which is strongly dependent on the type of indicator, while for some types the determination of reference points might not be feasible.

Agreed and established references and thresholds from other legislations and RSCs should be considered for the MSFD assessments. D1 elements should be linked with pressure Descriptors and pressure thresholds that affect GES of the state elements. Annex V of the SEC 2011/1255 can guide such links between pressure and state criteria, through impacts.

Despite the complexity to provide a general qualitative definition of GES at the level of criterion, due to the heterogeneity of the elements, it is much easier to determine a quantitative GES for specific selected species, groups of species and habitats, as shown in the good practices provided in 5.2.

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

**6.1 Proposals for (new) methodological standards to be applied to the criteria in order to assess whether GES has been achieved for the descriptor (e.g. aggregation/integration methods across the criteria and across the quality elements, e.g. across contaminants, species, habitats), using JRC / ICES / RSC protocols, Article 12 findings and guidance from the Scales project, as appropriate.**

On aggregation methods and scales the recent report by Deltares<sup>61</sup> has given a good overview of the key questions that need to be addressed, provided examples and gives advantages and disadvantages for the different approaches. The One-Out-All-Out (OOAO) is not suitable for D1, due to the large number of assessment elements under each criterion. It could be useful for certain groups of elements (e.g. endangered species, sensitive habitats, engineering species) either within each relevant criterion or across the species/habitats criteria. For large group of elements a percentage of elements to be in GES could be a useful approach to provide quantitative GES and monitor the progress towards its achievement through the targets and programmes of measures.

The cross-cutting workshop outcome<sup>62</sup> on assessment scales, in relation to elements, is that multiple scales would need to be selected so that data being collected ensures appropriate coverage of the needs and no data gaps are observed. Overall, one scale does not fit all elements, and there is a need for a system that address the different needs.

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<sup>61</sup> Prins, T.C., Borja, A., Simboura, N., Tsanagaris, C., Van der Meulen, M.D., Boon, A.R., Menchaca, I., & Gilbert, A.J. 2014 in prep. Coherent scales and aggregation rules for environmental status assessment with the Marine Strategy Framework Directive. Towards a draft guidance. Deltares/AZTI/HCMR, Report 1207879-000-ZKS-0014 to the European Commission, Delft, 47pp.

<sup>62</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/9daafb84-fe4f-42ad-864f-21b338c8269b/CCWorkshop\\_Summary%20Notes\\_20022015\\_Final.docx](https://circabc.europa.eu/d/a/workspace/SpacesStore/9daafb84-fe4f-42ad-864f-21b338c8269b/CCWorkshop_Summary%20Notes_20022015_Final.docx)

Define scales at each stage of process<sup>46</sup>:

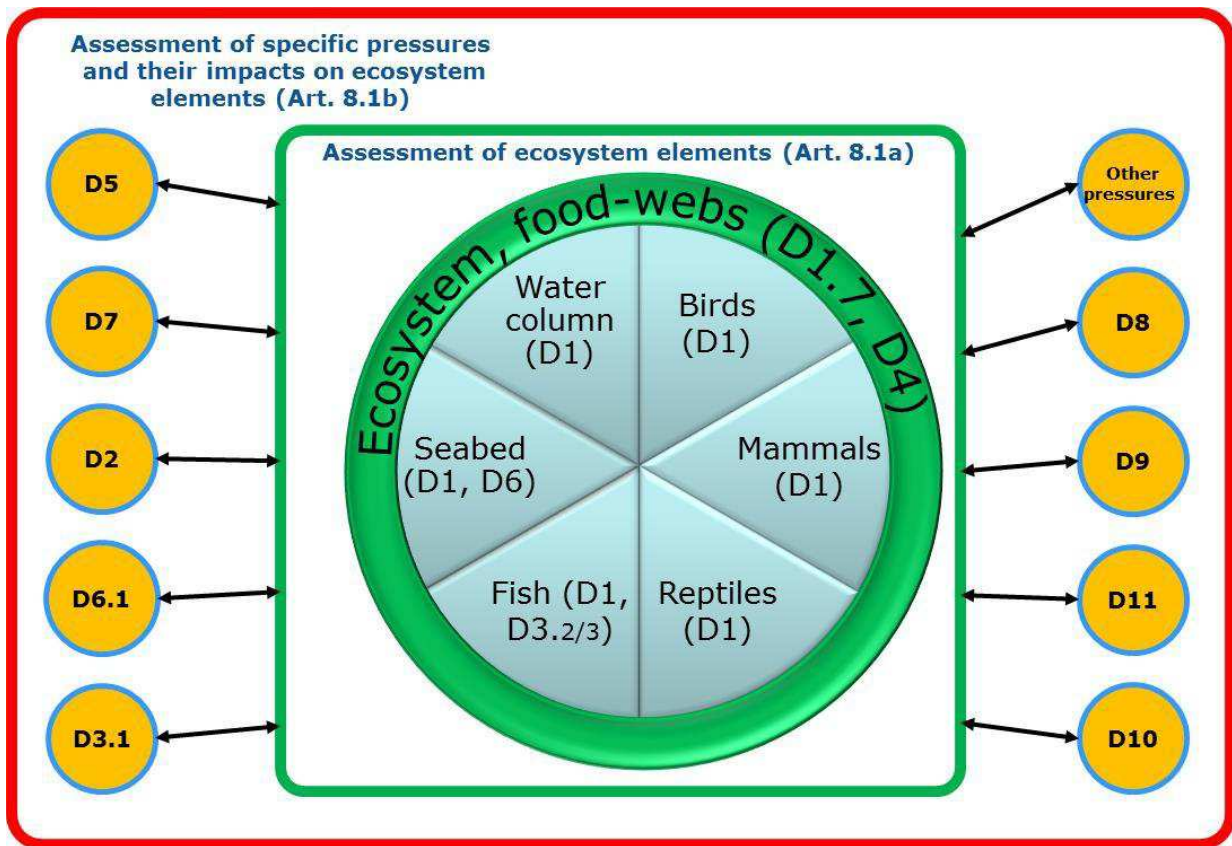
	Process	Scale
1	Define GES	(sub)Region
2	Define 'indicators' for assessment	(sub)Region and possibly EU level
3	Collect the data (monitoring)	National, considering WFD for coastal waters and MSFD offshore
4	Process the data for use in indicator assessment	National, considering WFD for coastal waters and MSFD offshore
5	Aggregate the data and assess indicator	Sub(Regional) ('national' sub-basins)

Scales are an important aspect for the MSFD implementation that should be defined in several processes. Generally, the assessment elements (species, habitats and ecosystems) embed this attribute and can potentially direct scales determination for several steps (assessment, monitoring, measures). In any case, scales have to be representative for all ecosystem elements and to reflect the spatial extent of the pressures. For the sake of coherence and consistent/comparable implementation a common approach can be suggested. As a starting point, the "nested approach" (as developed and applied in HELCOM) should be introduced to all marine regions, being already attempt by OSPAR.

For the D1 the specified elements for assessment (species, habitats) can, generally, define the assessment scales. For instance, large cetacean should be assessed regionally, pelagic and demersal fish species on a sub-regional level, seabed habitats on a sub-division level. Following the agreed lists of elements to be assessed under D1 a corresponding scale assessment can be predefined.

### ***Integration across descriptors and the ecosystem-based approach of MSFD***

The artificial distinction of pressures, state and impact attributes to the 11 descriptors led unavoidably to overlaps across them in terms of assessments. For a holistic state assessment of the ecosystem-in line with the ecosystem-based approach to management Art. 1(3) the state descriptors and the state criteria of some pressure descriptors should be bridged. The review process, even if it was organised on a descriptor level following the structure of the COM DEC 2010/477/EU, provided the floor to also discuss cross-cutting issues in a workshop held in Copenhagen 21-22 January 2015. The ecosystem-based approach to MSFD implementation (Fig. 4) can be framed through an integration of the GES criteria for the state-based descriptors (overall state assessment) where the impact of the pressure-based descriptors will feed the state assessment. In this process an essential part is the definition of the state elements to be assessed (internal cycle) and their links, functions and structure (external cycle) that bridge D4 and D6 with D1.



**Figure 4<sup>63</sup>:** An ecosystem-based approach to determination and assessment of GES follows the main elements of the ecosystem (state-based descriptors, centre) and is closely linked to the effects of pressures from human activities (pressure-based descriptors, satellite circles). Note that descriptors D2, D3, D5, D6, D7, D8, D9 and D10 include both a pressure criterion and an impact criterion in the 2010 Decision; the impact criteria should be closely linked to the state-based assessments.

***7. Specifications and standardized methods for monitoring and assessment  
(in accordance with Art. 11(4))***

**7.1 Proposals for specifications on methods for monitoring (i.e. the collection of data needed for assessment of each criterion, including parameters, units of measurement and data quality requirements), which aim at ensuring the comparability of monitoring results,**

<sup>63</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/b391ea98-1dbb-4080-8c4a-a0e2d661f4ea/CCworkshop\\_conclusions\\_final%20revised%2030032015.ppt](https://circabc.europa.eu/d/a/workspace/SpacesStore/b391ea98-1dbb-4080-8c4a-a0e2d661f4ea/CCworkshop_conclusions_final%20revised%2030032015.ppt)



**on the basis of existing survey protocols and relevant European/international standards (e.g. ISO/CEN).**

The report “Development of a shared data and information system between the EU and the Regional Sea Conventions<sup>64</sup>” (presented in WG DIKE, CIRCABC) is examining the data and information holdings within each of the four Regional Sea Conventions (RSCs) as well as the European Environment Agency (EEA), with the aim of characterizing the present data and information holdings and flow processes in place across Europe. This is specifically to evaluate how these data could be used to support the reporting objectives of the Marine Strategy Framework Directive and other related EU Directives. Table 3.6 provides a comprehensive list of the parameters used or proposed by the RSCs for assessment of their biodiversity indicators in relation to the MSFD indicators for D1. This exercise is an important step for taking stock of the on-going assessments and their parameters and align these parameters with the MSFD needs.

In 2013, three Pilot-Projects (BALSAM in the Baltic, IRIS-SES in the Mediterranean and Black Sea, JMP NS/CS in the North Sea) were launched as part of DG ENV initiative for coordination and support action to support coherent and comparable implementation of MSFD with focus on monitoring programmes. The objectives are to show benefits and challenges of joint monitoring network and multi-use of existing platform, increasing efficiency and reducing costs, and promote cooperation among research institutions within selected regions. A specific objective (e.g. IRIS-SES) is to elaborate guidelines for sampling across the various disciplines in order to meet MSFD requirements. It is expected that these projects (ending in May 2015) will provide recommendations for better harmonization and coordination of monitoring efforts and collection of data to support MSFD needs.

In principle, the set-up of the methodological standards for monitoring and assessment for D1 components should be developed in the following steps, considering also the coordinated work of Member States through RSCs:

- 1) Identification of representative, threatened and functional groups for predominant and special habitats and species according to Table 1 Annex III MSFD (Plankton, macrophytes, invertebrates, fish, reptiles, mammals, birds and other regional important species groups).
- 2) Establish distribution and abundance sampling system for different groups, if necessary and where not existing.
- 3) Establish sampling stations to analyze locally the impact of relevant pressures (by-catch, extraction, toxicities, etc. using Annex III table 2).
- 4) Develop thresholds or trends for each habitat or species category on the measured local analyses (assuming that the GES quantification has meanwhile adequately developed).

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<sup>64</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/aff9880d-df5e-44ec-854e-8f098fcff2e5/DIKE\\_10-2014-05b\\_RSCDataReporting\\_Report.pdf](https://circabc.europa.eu/d/a/workspace/SpacesStore/aff9880d-df5e-44ec-854e-8f098fcff2e5/DIKE_10-2014-05b_RSCDataReporting_Report.pdf)

- 5) Develop models for the effect of important pressures
- 6) Model distribution of pressure and its effect for the relevant marine regions
- 7) Define GES or at least describe range for a good and a bad ecological state or trend for each marine region
- 8) If appropriate develop areal analysis of the distribution of good and bad ecological states in each marine region.

These steps are indicative and might be more appropriate adapted to the specific biodiversity elements.

Generally, standardized methods are relevant to monitoring programmes. WFD works on the standardization of such methods and these should be also considered for MSFD, where relevant. The use of ISO method 16665 (2005): (Water quality — Guidelines for quantitative sampling and sample processing of marine soft-bottom macrofauna) can be proposed for the MSFD.

For monitoring of phytoplankton, zooplankton, macroalgae, benthic invertebrates and coastal fish joint guidelines for monitoring exists in the HELCOM COMBINE manual, while MS are currently working towards joint documentation of the monitoring guidelines for other biological components such as birds, mammals, non-indigenous species and benthic habitats in the HELCOM Monitoring Manual. The manual aims to support MSFD Article 11 reporting for those Contracting parties that are also EU Member States.

**7.2 Proposals for specifications on methods for assessment, which aim at ensuring comparability of assessment results, including aggregation of monitoring data within an assessment area for a particular criterion and if necessary aggregation across assessment areas up to larger areas (e.g. (sub) region scales), and based on general guidance prepared on scales and aggregation rules<sup>23</sup> and taking account of JRC / ICES / RSC inventories and Article 12 findings.**

In the Baltic Sea, HELCOM assessment units are used to support spatial aggregation dividing the Baltic Sea into four assessment levels; 1) the whole Baltic Sea 2) 17 sub basins, 3) sub-basins divided into coastal and offshore areas, 4) further division of coastal areas into WFD water types or water bodies. Methods for aggregating monitoring data within an assessment unit will be developed as part of the development of HELCOM core indicators in the CORESET II project. Aggregation of assessment units to larger areas as well as several different topical assessments towards holistic assessments will be elaborated under the planned HELCOM HOLAS II project. However, scaling up is in general only considered as useful when ecologically relevant e.g. for populations that are distributed over larger areas.

## ***8. Rational and technical background for proposed revision***

### **8.1 Justification and technical background justifying the above proposals.**

Covered in previous sections

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

**9.1 Where aspects are identified which should be usefully laid down but not as part of the decision, these elements should be specified and a proposal should be made in which way they should be laid down, e.g. interpretative guide for the application of the future Decision or CU guidance document or technical background document.**

- **Outstanding issues identified during the review process of D1 in phase I and were not completely tackled in this document:**

### ***1. Changes in criteria and indicators***

**Issue:** Criterion 1.7 “ecosystem structure” to be eliminated or re-defined with a clearer content

**Issue:** Identification of criteria and indicators overlaps across Descriptors

**Expected outcome:** To eliminate overlaps in the assessments by better clarifying the content of "state" sides of the "pressure" descriptors and D4 and D6. Interaction with experts from other Descriptors will be required.

### ***2. Common lists of elements for the biodiversity assessments***

**Issue:** Agreement for the compilation of existing lists from other legislations, MSFD documents and RSCs. Specification of elements to be assessed under the three levels. Link with monitoring parameters. Proposal for using EU-wide classifications for Habitats (EUNIS).

### ***3. Habitat/Bird Directives, Common Fisheries Policy and D1***

**Issues:** Practical use of HBD assessments to MSFD; links of their status classification approaches; Streamlining of assessments, “indicators” and directives’ objectives

### ***4. Proposal for changes in the COM Decision text regarding D1 implementation***

**Issue:** Clarification of biodiversity terms, proposal for a common GES determination and GES boundaries, proposal for common methodological standards under each criterion.

- **Lists of elements and selection/deselecting criteria to be considered for the generation of lists of habitats and species, to support a coherent implementation between neighbouring Member States.**

For species (e.g. selection criteria from Texel-Faial):

- Listed elements in Directives and Conventions, etc. & section 2.3 of this document
- Vulnerable species (exposed to pressure which impact (or could impact) them at a level, which could lead, at short or longer term, to no GES)
- Links to pressure Descriptors, notably D2, D3
- rare, declining, natural heritage value
- functional role: (i) common (= widely occurring, even at low abundances AND/OR high abundances, even if less widely distributed) Trophic (important link in the food chain) - Link to D4

For habitats:

- listed (Directives, Conventions, etc.) = special habitats
- Vulnerable habitats (exposed to pressure which impact (or could impact) them at a level, which could lead, at short or longer term, to no GES). = „particular“ area habitats: Links to pressure Descriptors, notably D2, D5, D6
- rare, declining, natural heritage value
- functional role:
  - \* common (= widely occurring, even at low abundances AND/OR high abundances, even if less widely distributed)
  - \* Trophic (important link in the food chain). Link to D4
  - \* High biodiversity (e.g. biogenic reefs. Link to D6.)

These issues could be tackled and feed a guidance document, in parallel with phase II of the review process of the Com DEC 2010/477/EU to further support the implementation of the MSFD.

## *10. Reference Documents*

- Review of the GES Decision 2010/477/EU and MSFD Annex III Approach and outline for the process, (EC- Committee/07/2013/03rev, 2013);
- First steps in the implementation of the Marine Strategy Framework Directive - Assessment in accordance with Article 12 of Directive 2008/56/EC, (CSWD, 2014);
- Article 12 Technical Assessment, (Milieu ltd, 2014);
- Marine Strategy Framework Directive - Descriptor 3, (ICES, 2012);

- Common Understanding of (Initial) Assessment, Determination of Good Environmental Status (GES) & Establishment of Environmental Targets (Articles 8, 9 & 10 MSFD), (DG GES, 2014);
- Coherent geographic scales and aggregation rules in assessment and monitoring of Good Environmental Status – analysis and conceptual phase, (Deltares, 2014);
- In-depth assessment of the EU Member States' Submissions for the MSFD under articles 8,9 and 10, EUR26473EN (JRC 2014)
- Review of Methodological Standards Related to the Marine Strategy Framework Directive Criteria on Good Environmental Status (JRC, 2011)
- Guidance / Terms of Reference for the task groups 'criteria and methodological standards for the Good Ecological Status (GES) descriptors' (JRC, 2010)
- CSWP (2011) on the Relationship between the initial assessment of marine waters and the criteria for good environmental status.
- OSPAR (2012b). MSFD Advice Manual and Background Document on Biodiversity. London, Publication Number: 581/2012, 141 pp. (available at: [http://www.ospar.org/v\\_publications/download.asp?v1=p00581](http://www.ospar.org/v_publications/download.asp?v1=p00581))



EUROPEAN COMMISSION  
JOINT RESEARCH CENTRE

Institute for Environment and Sustainability  
Water Resources Unit

# **Review of the Commission Decision 2010/477/EU concerning MSFD criteria for assessing good environmental status**

## **Descriptor 2**

### **Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem**

This report represents the result of the scientific and technical review of Commission Decision 2010/477/EU in relation to Descriptor 2. The review has been carried out by the EC JRC together with experts nominated by EU Member States, and has considered contributions from the GES Working Group in accordance with the roadmap set out in the MSFD implementation strategy (agreed on at the 11th CIS MSCG meeting).

The report is one of a series of reports (review manuals) including Descriptor 1, 2, 5, 7, 8, 9, 10 that conclude phase 1 of the review process and, as agreed within the MSFD Common Implementation Strategy, are the basis for review phase 2, towards an eventual revision of the Commission Decision 2010/477/EU.

The report presents the state of the technical discussions as of 30 April 2015 (document version 6.0), as some discussions are on-going, it does not contain agreed conclusions on all issues.

The views expressed in the document do not necessarily represent the views of the European Commission.

## **Foreword**

The MSFD Committee (Art. 25 of the MSFD) discussed and concluded an approach and an outline for the process of a review and possible revision of the Commission Decision 2010/477/EU on GES criteria and of MSFD Annex III (see Committee/07/2013/03rev for details). Based on the template in the annex to the mandate of the MSFD Committee, a more detailed manual for the technical phase relating to the review of Commission Decision 2010/477/EC has been developed to guide the parallel preparatory process and discussions per descriptor. 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 assessment in particular as regards temporal and spatial aggregation. The review of Annex III will be carried out as a parallel process. The review of the Common Understanding Document is also taking place alongside these two processes. Close coordination between these three processes should be ensured.

**MSFD D2 expert group:** João Canning Clode, Henn Ojaveer, Maiju Lehtiniemi, Laurent Guérin, Iwona Bubak, Saa Kabuta, Sofia Brockmark, Kai Hoppe, Francisco Alemany, Paul Stebbing, Argyro Zenetos, Ioannis Karakassis, Miriam Guerra

**EC JRC:** Ana Cristina Cardoso, Andreas Palialexis, Stelios Katsanevakis, Konstantinos Tsiamis

**Acknowledgments for contributions to:** WG GES

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## 1. Approach

### 1.1 General guiding principles for the review

The review aims to analyse the results from the first MSFD reporting round on Articles 8, 9 and 10 with a view to update/improve and simplify the Com Decision 2010/477/EU.

Based on the information in the Art 12 assessment reports (COM(2014)97 final) and the JRC in-depth assessments (JRC, 2014) a template was prefilled by Milieu for DG ENV, commented by DG ENV and completed by JRC to enable the experts groups to analyse current shortcomings, propose ways forward, such as e.g. needs for further guidance and development, but eventually also to develop proposals for amending the Decision 2010/477/EU, based on scientific knowledge and experience developed through the implementation process.

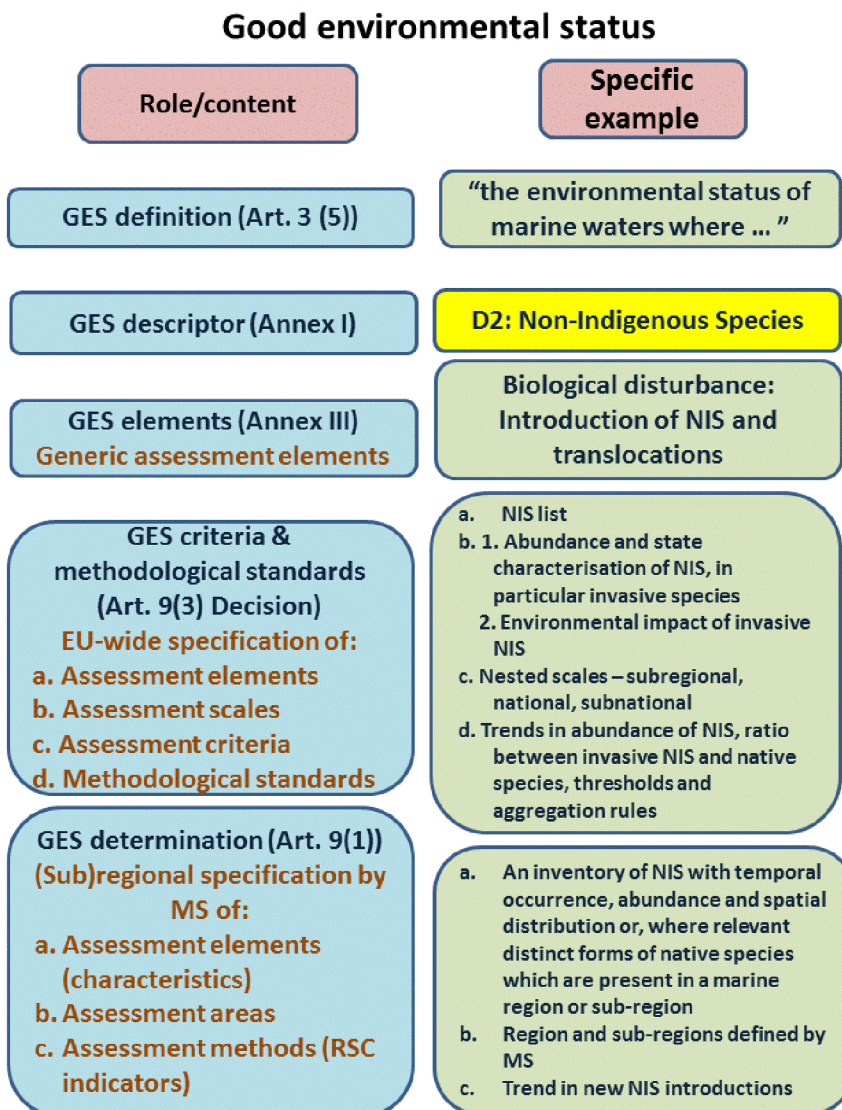
The current review should lead to a new GES Decision which is:

- Simpler
- Clearer
- Introducing minimum requirements (to be enhanced by regions and MS, if necessary)
- Self-explanatory
- Coherent with other EU legislation
- Coherent with regional assessment methods (where EU does not exist)
- Have a clear and minimum list of criteria and methodological standards and related characteristics (Table 1, Annex III)
- Ensure that criteria and methodological standards are adequately addressing the Descriptors and these are covered by the proposed criteria, to lead to complete assessments
- Coherent with the MSFD terminology

The Figure 1<sup>1</sup> show an example based on descriptor 2 to test the proposed architecture of the MSFD. This can be used as guide for the characteristics/ elements to be addressed under Annex III and the revised Decision and to streamline the discussion to be carried out through the review process.

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<sup>1</sup> Modified from DG ENV's presentation in June's 2014 DG GES group: <https://circabc.europa.eu/w/browse/f3953f48-f965-43d4-93a5-075f82cc1f12>



**Figure 1.** Relationship of MSFD provisions for determining GES. The specificity of the requirements increase from Art. 3(5) through to Art. 9(1) MSFD. The generic role for D2 is outlined.

The role of GES in MSFD can be summarised as the following:

- starting and end point of MSFD
- reference point for the other MSFD provisions
- determined at the level of marine (sub)regions
- specified by common criteria and methodological standards
- legally time bound (2020) and subject to legally defined exceptions where this is not feasible

Furthermore, GES needs to be established in a way as to allow determining the distance of the current state from GES and for defining targets to guide progress towards GES<sup>2</sup>.

<sup>2</sup> From DG ENV's presentation in March's 2014 WG GES group:  
[https://circabc.europa.eu/d/a/workspace/SpacesStore/2e3f1f2f-c1ef-407f-a433-12cf73e9e61b/GES\\_11-2014-13\\_CommonUnderstanding.ppt](https://circabc.europa.eu/d/a/workspace/SpacesStore/2e3f1f2f-c1ef-407f-a433-12cf73e9e61b/GES_11-2014-13_CommonUnderstanding.ppt)

## 1.2 Overall reflection of the type of descriptor and descriptor criteria and its relationship with Article 3(5).

There are currently over 1 300 non-indigenous marine species in the European seas (Katsanevakis et al. 2013a<sup>3</sup>). About 6% of these species have been documented to have high impact on marine ecosystem services and biodiversity; in many cases non-indigenous marine species impact keystone/protected species and habitats and substantially modify ecosystem processes or wider ecosystem functioning (Katsanevakis et al. 2014<sup>4</sup>).

Invasive non-indigenous species (IAS) cause adverse effects on environmental quality resulting in changes in biological, chemical and physical properties of aquatic ecosystems. They can displace native species, cause the loss of native genotypes, modify habitats, change community structure, affect food-web properties and ecosystem processes, impede the provision of ecosystem services, impact human health, and cause substantial economic losses (Grosholz, 2002<sup>5</sup>; Wallentinus and Nyberg, 2007<sup>6</sup>; Molnar et al., 2008<sup>7</sup>; Vilà et al., 2010<sup>8</sup>; Katsanevakis et al., 2014a<sup>4</sup>). The magnitude of impacts may vary from low to massive and they can be sporadic, short-term, mid-term or permanent.

According to Art.3 (5) of the MSFD, D2 is referring to the environmental status of marine waters where non-indigenous species (NIS) introduced by human activities are at levels that do not adversely alter the ecosystem. Thus, D2 pressure level should be accompanied by measurable criteria. However, this could be difficult to accomplish due to e.g. lack of linear correlation between the numbers/ abundance of NIS and their impacts.

Invasive non-indigenous species don't pollute the marine environment in the same way as occurs with chemical pollution or eutrophication<sup>9</sup>. The later can be effectively tackled provided that appropriate measures are taken. For IAS, prevention by identification and risk analysis of different pathways and vectors for species introductions is by far more cost-effective and environmentally desirable than post-introduction measures, such as eradication or long-term containment (recital (15) of IAS Regulation 1143/2014/EU). In the marine environment, prevention seems to be in most cases the only feasible alternative, as with current understanding eradication is unfeasible with established species, but there has been some successes in the early stages of introduction (e.g. the eradication of *Caulerpa taxifolia* in California, Anderson, 2005<sup>10</sup>, which was a success according to Final *Caulerpa taxifolia* Eradication Report, May 2006<sup>11</sup>). The risk of new biological invasions could be

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<sup>3</sup> Katsanevakis S, Gatto F, Zenetos A, Cardoso AC, 2013a. How many marine aliens in Europe? Management of Biological Invasions 4(1): 37–42.

<sup>4</sup> Katsanevakis S, Wallentinus I, Zenetos A, Leppäkoski E, Çinar ME, Oztürk B, Grabowski M, Golani D, Cardoso AC, 2014. Impacts of marine invasive alien species on ecosystem services and biodiversity: a pan-European critical review. Aquatic Invasions 9(4): 391–423.

<sup>5</sup> Grosholz, E, 2002. Ecological and evolutionary consequences of coastal invasions. *Trends Ecol. Evol.* 17, 22–27.

<sup>6</sup> Wallentinus I, Nyberg CD, 2007. Introduced marine organisms as habitat modifiers. *Mar. Pollut. Bull.* 55, 323–332.

<sup>7</sup> Molnar JL, Gamboa RL, Revenga C, Spalding MD, 2008. Assessing the global threat of invasive species to marine biodiversity. *Front. Ecol. Environ.* 6, 458–492.

<sup>8</sup> Vilà M, Basnou C, Pysek P, Josefsson M, Genovesi P, Gollasch S, et al., 2010. How well do we understand the impacts of alien species on ecosystem services? A pan-European, crosstaxa assessment. *Front. Ecol. Environ.* 8, 135–144.

<sup>9</sup> Task Group 2 Report Non-indigenous species JOINT REPORT, 2010.

<sup>10</sup> Anderson LWJ, 2005. California's reaction to *Caulerpa taxifolia*: a model for invasive species rapid response. *Biol. Invasions* 7, 1003–1016.

<sup>11</sup> Merkel & Associates. 2006. Final report on eradication of the invasive seaweed *Caulerpa taxifolia* from Agua Hedionda Lagoon and Huntington Harbour, California. Prepared for Steering Committee of the Southern California *Caulerpa* Team.

effectively minimized by precautionary measures such as the IMO Convention on ballast water management.

The Descriptor 2 (MSFD, 2008/56/EU) is a pressure descriptor that focuses on assessing the scale of the pressure and the scale of the impacts of marine non- indigenous species. New introductions of NIS and increases in the abundance and spatial distribution of established NIS should be prevented. Descriptor 2 interacts with several other GES pressure Descriptors (D3, 5, 6 7, 8, 9, 10) which have impact on native biodiversity, ecosystem functioning and seabed habitats as well as commercial marine resources (seafood). Indeed, perturbations induced by pressure on ecosystem state, may facilitate installation and/or spread of NIS, which are often opportunistic. In particular, impacts that result from NIS should be managed, where feasible, so that the achievement of GES for the biodiversity Descriptors 1, 4 and in part 3 and 6 is not compromised.

### **1.3 Linkages with existing relevant EU legal requirements, standards and limit values and identification of potential incoherence.**

With the exception of the EU Regulation concerning the use of alien and locally absent species in aquaculture (EU, 2007<sup>12</sup>) and its implementing rules (EU, 2008b<sup>13</sup>), no comprehensive instrument existed on EU level to tackle alien species until recently. The EC Communication 'Towards an EU Strategy on Invasive Species'<sup>14</sup> published in 2008 addressed the need for coordinated action to tackle the spread of invasive NIS. In 2013, the European Commission published a proposal for an EU Regulation<sup>15</sup> designed to respond to the increasing problems caused by the impacts of IAS on the environment and the economy and as a follow up an EU regulation has been recently published (Regulation No 1143/2014/EU<sup>16</sup>).

The Regulation No 708/2007/EU establishes a framework for the management of aquaculture practices in relation to NIS, to assess and minimise their potential impact and that of any associated non-target species on aquatic habitats. The information collected under this Regulation, e.g. introduced species, location of aquaculture facility, species risk assessment and monitoring results should be considered in relation to the MSFD D2. Furthermore, this Regulation could be an instrument to tackle identified pressure from NIS in relation to the MSFD.

The Regulation No 1143/2014/EU establishes rules to prevent, minimise and mitigate the adverse impact on biodiversity of the intentional and unintentional introduction and spread within the EU of IAS. It indicates three types of interventions; prevention, early warning and rapid response, and management to tackle the problem. It is expected that a list of invasive non-indigenous species of EU concern will be developed, so as to guide implementation of the Regulation. With this aim, the Regulation on IAS specifically requests action plans on the main pathways of invasive non-indigenous

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<sup>12</sup>EU, 2007. Council Regulation Concerning Use of Alien and Locally Absent Species in Aquaculture. Regulation 708/2007, OJ L 168.

<sup>13</sup>EU, 2008b. Commission Regulation Laying Down Detailed Rules for the Implementation of Council Regulation (EC) No 708/2007 Concerning Use of Alien and Locally Absent Species in Aquaculture. Regulation 535/2008, OJ L 156.

<sup>14</sup>Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions 'Towards an EU Strategy on Invasive Species', COM(2008) 789 final.

<sup>15</sup> Proposal for a Regulation on the prevention and management of the introduction and spread of invasive alien species, (COM(2013) 620).

<sup>16</sup> Regulation (EU) No 1143/2014 OF THE European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species. OJ:L317/35/2014 .

species (Article 13). Member States can also take emergency measures when there is evidence concerning the presence, or imminent risk of introduction into its territory of an invasive non-indigenous species, which is not included on the Union list (Art. 10 of IAS Regulation 1143/2014/EU) but were found during surveillance or monitoring. Furthermore, the Member State has the obligation to build a surveillance system for IAS of Union concern or include it in their existing systems (Art. 14 of IAS Regulation 1143/2014/EU), as such systems offer the most appropriate means for early detection and rapid eradication at an early stage of invasion as is stipulated in articles 16 and 17 of the IAS Regulation 1143/2014/EU to prevent the spread of IAS into or within the Union.

It is yet not known which marine species or if marine species will be included in the list of species as "of Union concern" to be developed by the Commission in cooperation with the Member States. The list derived by evidence-based risk assessments will be of dynamic nature and will potentially include species (Art. 4, Regulation 1143/2014 on IAS) across all environments and taxonomic groups. Species of Union concern will be the ones whose negative impact requires concerted action at Union level.

Also, as with EU Regulation concerning the use of alien and locally absent species in aquaculture, the information collected under the Regulation 1143/2014 e.g. species risk assessment and monitoring results should be considered in relation to the MSFD D2 for the assessment of non-indigenous species impacts. Furthermore, the efficient implementation of both the Regulation and the MSFD for D2 would require the coordination of the respective monitoring programs and programme of measures.

Other relevant EU legislations are: (i) the Birds Directive (2009/147/EC), (ii) the Habitats Directive (92/43/EC), (iii) the Phytosanitary Directive (2000/29/EC), (iv) the Regulation on wild species trade (1997/338/EC), (v) the Water Framework Directive (2000/60/EC) and the Directive on animal health requirements for aquaculture animals and products thereof (2006/88/EC). These six legislative instruments are not focused on NIS but partly cover the issue by requiring their consideration in the frame of restoration of biodiversity conservation status, ecological conditions and animal health.

In the context of the Water Framework Directive (WFD), EU Member States have developed pressure-based assessments of the ecological status of their water bodies, including coastal water bodies. Invasive non-indigenous species are recognised to constitute a major pressure in many aquatic ecosystems, yet they are not explicitly accounted for by the majority of WFD assessment methods. Most Member States argue that no explicit assessment of IAS is required, assuming that significant IAS pressures will affect the WFD biological quality elements (BQEs), and be detected by generic WFD status assessments. Thus, these are in most cases not specifically targeted in the WFD monitoring and assessment; no specific ecological quality ratio have been agreed for non-indigenous species.

#### **1.4 Linkages with international and RSC norms and standards**

At the **international level**, the United Nation Convention on the Law of the Sea (UNCLOS, 1982<sup>17</sup>) explicitly places a general requirement on Parties to take measures *“to prevent, reduce and control*

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<sup>17</sup> United Nations Convention on the Law of the Sea, 1982. United Nations Treaty Series.

*pollution of the marine environment resulting from...the intentional or accidental introduction of species alien or new, to a particular part of the marine environment, which may cause significant and harmful changes thereto*" (Article 196). The Convention on the Conservation of European Wildlife and Native Habitats (Bern Convention, 1979<sup>18</sup>) recommends a European strategy on IAS. Furthermore, the Convention on Wetlands (Ramsar Convention, 1994<sup>19</sup>) and the Bonn Convention on Migratory Species (1979<sup>20</sup>) have both adopted resolutions regarding alien species. The Convention on Biological Diversity (CBD) recognised the need for the "compilation and dissemination of information on alien species that threaten ecosystems, habitats, or species, to be used in the context of any prevention, introduction and mitigation activities", and calls for "further research on the impact of alien invasive species on biological diversity" (CBD 2000<sup>21</sup>). CBD in its Strategic Plan for Biodiversity 2011–2020 agreed on a set of targets (Aichi targets), including Target 9 on alien species: 'By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.' This Aichi Target 9 has been widely adopted, e.g. by the EU in its 'EU Biodiversity Strategy 2020' (COM (2011) 244<sup>22</sup>).

The International Maritime Organisation's (IMO) International Convention on the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention – BWMC, 2004<sup>23</sup>) aims to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments. The Convention will enter into force 12 months after ratification by 30 States, representing 35 per cent of world merchant shipping tonnage. To-date, the Convention is not in force as the current ratifications do not represent yet 35 per cent of the world merchant shipping tonnage.

Although the best strategy is to prevent introduction of NIS, this is extremely difficult as ships move constantly in and out of an area, especially for species introduced through growth on the ship's hull (hull fouling or biofouling) that is open to the environment. Recently, voluntary guidelines have been adopted by the IMO to avoid the introduction of NIS through the ship's hull for commercial and recreational ships (IMO Hull Fouling guidelines. MEPC.1/Circ.792 12 November 2012<sup>24</sup>).

**The Regional Sea Conventions** have taken various initiatives in relation to NIS.

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<sup>18</sup> Convention on the Conservation of European Wildlife and Natural Habitats, 1979. <http://conventions.coe.int/Treaty/en/Treaties/Html/104.htm>

<sup>19</sup> Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1994. Ramsar, Iran, 2.2.1971 as amended by the Protocol of 3.12.1982 and the amendments of 28.5.1987. [http://www.ramsar.org/library/field\\_date/%5B1971-01-01T00%3A00%3A00Z%20TO%201972-01-01T00%3A00%3A00Z%5D/field\\_tag\\_body\\_event/establishing-the-convention-566](http://www.ramsar.org/library/field_date/%5B1971-01-01T00%3A00%3A00Z%20TO%201972-01-01T00%3A00%3A00Z%5D/field_tag_body_event/establishing-the-convention-566)

<sup>20</sup> Convention on the Conservation of Migratory Species of Wild Animals (CMS), 1979. <http://www.cms.int/en/node/3916>

<sup>21</sup> CBD, 2000. Executive Secretariat to the CBD, Climate Change and Biological Diversity: Cooperation between the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change (UNEP/CBD/SBSTTA/6/11), available at <<http://www.biodiv.org>>

<sup>22</sup> EU, 2011. Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the regions. Our life insurance, our natural capital: an EU biodiversity strategy to 2020. COM (2011) 244.

<sup>23</sup> Available at the following link: <http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-%28BWMC%29.aspx>

<sup>24</sup> IMO Hull Fouling guidelines, 2012. Guidance for minimising the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft [MEPC.1/Circ.792 12 November 2012].

**HELCOM** parties have agreed to ratify the BWMC following the adoption of a HELCOM Ballast Water Road Map by the HELCOM Ministerial Meeting (2007) in Krakow. A Joint HELCOM/OSPAR Task Group on NIS is working to develop a common framework on the specific issue of exemptions for the BWMC, for both the Baltic Sea and the North-East Atlantic regions (HELCOM, 2013a<sup>25</sup>). A list of non-indigenous, cryptogenic and harmful native species in the Baltic Sea was compiled for the needs of HELCOM Ballast Water Road Map, HELCOM HABITAT and MONAS and is continuously edited and updated by various HELCOM subsidiary bodies, expert workshops and projects (list of taxa identified from ports surveyed within HELCOM ALIENS- projects in HELCOM, 2014a<sup>26</sup>). Since 2008 the list has been modified by HELCOM HABITAT (11/2009 and 12/2010), HELCOM MONAS (12/2009), the HELCOM HOLAS project and, most recently, by the HELCOM CORESET project. HELCOM ALIENS projects focused on NIS (ALIENS 3 was the most recent project that ended in 2013 and aimed to support the ratification of BWMC by developing NIS monitoring in ports and the risk assessment methods) (HELCOM, 2014a<sup>31</sup>, b<sup>27</sup>). HELCOM CORESET stated that in 2012 there were 118 NIS reported in the Baltic Sea and 90 of those were considered to be established (Rolke et al., 2013<sup>28</sup>). In addition, the HELCOM CORESET project developed a set of core indicators in the Baltic Sea. Currently, 20 core indicators are established for biodiversity, covering the needs of MSFD including NIS (HELCOM, 2013b<sup>29</sup>).

NIS introductions are identified as a relevant pressure from human activities in the **OSPAR** Maritime Area (OSPAR, 2009 (draft)<sup>30</sup>). Recently the OSPAR Intercessional (OSPAR ICG COBAM) has proposed a D2 indicator which will be likely promoted by the Environmental Impacts of Human Activities Committee (EIHA) from a candidate to a common indicator for OSPAR Regions II, III, and IV. The OSPAR Quality Status Report (QSR, 2010<sup>31</sup>) states that over 160 NIS have been identified in the OSPAR area, acknowledging ships' ballast water as the main vector of introduction. Other main vectors are aquaculture and fouling on ships. The QSR provides a detailed list of NIS (taxonomic group, common names, regions affected, vector, first reported and probable impacts) and highlights the necessity of the OSPAR countries to ratify and implement the IMO BWMC. At the last update (03/09/2014), there are 38 biodiversity indicators under development by OSPAR, one is dedicated to NIS or invasive NIS (D2): trends in the arrival of new non-indigenous species (adopted as common indicator in February 2015).

The **Barcelona Convention's** Action Plan on Invasive Species deals with the growing number of IAS in the Mediterranean (2005) and aims at strengthening the capacities of the Mediterranean countries with regards to the prevention and control of introductions of non-indigenous species into the

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<sup>25</sup> HELCOM, 2013a. Joint HELCOM/ OSPAR Guidelines on the granting of exemptions under the International Convention for the Control and Management of Ships' Ballast Water and Sediments Regulation A-4. This document is a part of the 2013 HELCOM Ministerial Declaration and was adopted by the 2013 HELCOM Ministerial Meeting.

<sup>26</sup> HELCOM, 2014a, HELCOM ALIENS 3 – Tests of the harmonized approach to ballast water management exemptions in the Baltic Sea. 56 pp.

<sup>27</sup> HELCOM, 2014b. HELCOM guide to Alien Species and Ballast Water Management in the Baltic Sea.

<sup>28</sup> Rolke M, Michalek M, Werner M, Lehtiniemi M, Strake S, Antsulevich A, Zaiko A, 2013. Trends in arrival of new non-indigenous species. HELCOM Core Indicator of Biodiversity. Online, viewed on 09/03/2015, [http://www.helcom.fi/Core%20Indicators/HELCOM-CoreIndicator-Trends\\_in\\_arrival\\_of\\_new\\_non-indigenous\\_species.pdf](http://www.helcom.fi/Core%20Indicators/HELCOM-CoreIndicator-Trends_in_arrival_of_new_non-indigenous_species.pdf)

<sup>29</sup> HELCOM, 2013b. HELCOM core indicators: Final report of the HELCOM CORESET project. BALT. Sea Environ Proc. No. 136.

<sup>30</sup> OSPAR, 2009 (draft). Trend analysis of maritime human activities and their collective impact on the OSPAR maritime area. Prepared by the Intersessional Correspondence Groups for the BA6 Assessment and the Cumulative Effects Assessment.

<sup>31</sup> OSPAR, 2010. Quality Status Report 2010. OSPAR Commission. London. 176 pp.



Mediterranean Sea. About 1000 non-indigenous species have been identified in the Mediterranean Sea, of which 500 are well established, with a new species being introduced roughly every ten days (UNEP/ MAP, 2012<sup>32</sup>). A large portion has been introduced through the Suez Canal (47% according to UNEP/MAP, 2009<sup>33</sup>). The Ecosystem Approach (EcAp) in the Mediterranean will gradually implement such an approach for management and is expected to include an integrated monitoring programme on non-indigenous species. The process follows a similar approach to that of HELCOM and OSPAR, notably through the Integrated Correspondence Groups of GES and Targets (CORGEST) and the Correspondence Group on Monitoring, (CORMON) Biodiversity and Fisheries. These recent groups work on issues in line with D1, D2, D3, D4 and D6.

The **Black Sea Commission (BSC)** has committed to the Black Sea Strategic Action Plan (BSSAP, 2009)<sup>34</sup> adopted in Sofia. The action plan set out four Ecosystem Quality Objectives (ECOQs) in relation to the MSFD descriptors of Good Environmental Status. The BSSAP ECOQs encompass several MSFD descriptors: ECOQ 2 covers MSFD descriptors 1, 2, 4, 6 and 11 together. Finally, a Memorandum of Understanding (MOU) to increase mutual support between IMO and BSC, was signed (2010) to cover several environmental aspects of shipping, including ballast water management.

### 1.5 Clarification of the relevant scientific, technical and policy terminology in relation to the descriptor.

A discussion on general policy terminology in the frame of the MSFD WG GES is on-going in parallel to the review exercise.

Regarding D2 terminology, specific definitions can be found in scientific literature, legal documents and associated reports and in RSC reports.

A variety of definitions of the term “non-indigenous species” exists both in scientific literature (e.g. Leppäkoski et al., 2002<sup>35</sup>; Occhipinti Ambrogi and Galil, 2004<sup>36</sup>; Carlton, 2009<sup>37</sup>) and legislative/administrative (e.g. IAS Regulation 1143/2014/ EU) documents.

**The following definition of non-indigenous species (NIS)** was proposed by TG2<sup>38</sup>: “Non-indigenous species (NIS; synonyms: alien, exotic, non-native, allochthonous) are species, subspecies or lower taxa introduced outside of their natural range (past or present) and outside of their natural dispersal potential. This includes any part, gamete or propagule of such species that might survive and

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<sup>32</sup> UNEP/MAP, 2012. State of the Mediterranean marine and coastal environment, UNEP/ MAP- Barcelona Convention, Athens, 2012.

<sup>33</sup> UNEP/MAP/BP/RAC, 2009. The State of the Environment and Development in the Mediterranean 2009. United Nations Environment Programme, Mediterranean Action Plan, Blue Plan Regional Activity Centre, Vallbone.

<sup>34</sup> <http://www.blacksea-commission.org/ bssap2009.asp# Toc22222324> (accessed on 09/03/2015)

<sup>35</sup> Leppäkoski E, Gollasch S, Olenin S, 2002. Introduction: alien species in European waters, in: Leppäkoski E et al. (Ed) (2002). Invasive aquatic species of Europe: distribution, impacts and management 1-6.

<sup>36</sup> Occhipinti A and Galil B, 2004. A uniform terminology on bioinvasions: a chimera or an operative tool? Marine Pollution Bulletin 49:688–694.

<sup>37</sup> Carlton JT, 2009. Deep invasion Ecology and the assembly of communities in historical time, in: Rilov G et al. (Ed) (2009). Biological invasions in marine ecosystems. Ecological, management and geographic perspectives. Ecological studies 204: 13-48

<sup>38</sup> Task Group 2 Report Non-indigenous species JOINT REPORT, 2010

subsequently reproduce. Their presence in the given region is due to intentional or unintentional introduction resulting from human activities. Natural shifts in distribution ranges (e.g. due to climate change or dispersal by ocean currents) do not qualify a species as a NIS. However, secondary introductions of NIS from the area(s) of their first arrival could occur without human involvement due to spread by natural means.”

A subset of NIS are **invasive NIS** (synonym ‘**invasive alien species’ (IAS)**), which are defined by TG2 as “a subset of established NIS which have spread, are spreading or have demonstrated their potential to spread elsewhere, and have an adverse effect on biological diversity, ecosystem functioning, socio-economic values and/or human health in invaded regions”.

These definitions are equivalent to the concept of ‘invasive non-indigenous species’ underlining the Com Decision 2010/477/EU.

In addition, TG2 described the key terms “...**levels that do not adversely alter the ecosystems**” as the absence or minimal level of “biological pollution”. **Biological pollution** is defined by TG2 as the impact of IAS at a **level that disturbs environmental quality** by effects on: an individual (internal biological pollution by parasites or pathogens), a population, a community, a habitat or an ecosystem. It means that impacts can be observed at different levels, but it does not mean that any impact is produced directly and exclusively at a given level. Thus, the sum of a given impact at individual level will result in an impact at population level, which in its turn can produce changes in the community and finally affect the ecosystem functioning. Conceptually, any impact in the lower levels would produce, in larger or lesser degree, some change at ecosystem level. Therefore, biological pollution can be defined by impacts at different levels, but GES according to MSFD could be considered as not achieved only when the effects are observable at ecosystem level. However, to be coherent with Descriptor 1 and other relevant policies it is necessary to establish how to define GES in cases when the impact on ecosystem as a whole apparently is minimal but e.g. there is a strong impact on e.g a protected species.

In the new IAS Regulation on the prevention and management of the introduction and spread of invasive alien species the following definitions are given:

'alien species' means any live specimens of a species, subspecies or lower taxon of animals, plants, fungi or micro-organisms introduced outside its natural range; it includes any part, gametes, seeds, eggs, or propagules of such species, as well as any hybrids, varieties or breeds that might survive and subsequently reproduce;

'invasive alien species' means an alien species whose introduction or spread has been found to threaten or adversely impact upon biodiversity and related ecosystem services;

'invasive alien species of Union concern' means an invasive alien species whose adverse impact has been deemed such as to require concerted action at Union level pursuant to Article 4(3);

'invasive alien species of Member State concern' means an invasive alien species other than an invasive alien species of Union concern, for which a Member State considers on the basis of scientific evidence that the adverse impact of its release and spread, even where not fully ascertained, is of significance for its territory, or part of it, and requires action at the level of that Member State.

'pathways' means the routes and mechanisms of the introduction and spread of invasive alien species;

The definition of 'alien species' given in the EU Regulation on IAS is similar to the one by TG2, although less complete. Including aspects of intentional/unintentional introduction, natural shifts and secondary introductions would be useful. Also, it could also be completed by including genetically modified organisms, according to definition in the Regulation (EC) 708/2007 concerning use of alien and locally absent species in aquaculture (<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32007R0708&from=EN>).

A definition including these different aspect would be: 'alien species' means any live specimens of species, subspecies or lower taxon of animals, plants, fungi or micro-organisms introduced outside its natural past or present distribution; it includes any part, gametes, seeds, eggs, or propagules of such species, as well as any genetically modified organisms, hybrids, varieties or breeds that might survive and subsequently reproduce. Their presence in the given region is due to intentional or unintentional introduction resulting from human activities. Natural shifts in distribution ranges (e.g. due to climate change or dispersal by ocean currents) do not qualify a species as a NIS. However, secondary introductions of NIS from the area(s) of their first arrival could occur without human involvement due to spread by natural means.

There is the necessity to agree on a single (MSFD) definition per term to avoid confusion. This requires taking into consideration definitions underlining the Com Decision 2010/477/EU with those in the IAS Regulation (see above) to ensure expected coherence across the two policies.

Terminology should be carefully taken into account and harmonized across MSs. Among other, this requires that issues arising from translations to the official languages of the MSs for publication in the EU Official Journal must be addressed (e.g. the term "invasive" became *invasivo/a*, when translated to Portuguese but it should be *invasor/a/es/s*). It is recommend that official translations should be reviewed by scientific experts of every MS.

Also, the relationships between certain management and scientific terminologies are required to reduce the level of discrepancies between scientists, ecosystem managers and policy makers in the EU Member States: Some relevant terminologies to be revisited under this vision include: normal ecosystem quality and functioning, and an impacted ecosystem function and quality.

For definitions not yet covered by policy or the MSFD GES Common Understanding Document, definitions established in the context of relevant initiatives should be considered, e.g. the background document produced by OSPAR<sup>39</sup> including definitions on biodiversity issues.

### **1.6 Descriptor specificities should be highlighted and justified.**

The main specificity of this descriptor, already highlighted in many documents, is that non-indigenous species constitute a pressure on the ecosystems, which should be evaluated through

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<sup>39</sup> OSPAR, 2012. MSFD Advice Manual and Background Document on Biodiversity. London, Publication Number: 581/2012, 141 pp. (available at: [http://www.ospar.org/v\\_publications/download.asp?v1=p00581](http://www.ospar.org/v_publications/download.asp?v1=p00581))

pressure indicators; but at the same time the non-indigenous species, once established, become a new element of the bioceonosis of the invaded ecosystems, and their impact on state could potentially be evaluated with indicators applied for assessing other descriptors, e.g. via multi-metric indicators for plankton and benthos.

The descriptor requires for development of specific and independent criteria and indicators, and hence monitoring systems, to evaluate what has been defined as “propagules pressure” in relation to the diverse introduction and spreading pathways; but the monitoring and evaluation of their impacts when they are already established should be, to get more sound and reliable conclusions and also coherent evaluations, integrated with those of the biodiversity descriptors (see table 1).

		Assessments of pressures for Article 8(1b)									
		Physical loss	Physical damage	Energy, incl. UV noise	Nutrients	Contaminants	Litter	Fishing/by-catch	NIS		
		<b>S</b>	<b>P</b>	6.1	6.1	11.1, 11.2	5.1	8.1, 9.1	10.1	3.1	2.1
Assessments of state for Article 8(1a)	Ecosystem 1.7, 4.1-4.3	Birds	1.1-1.3					8.2	10.2	?	2.2
	Mammals	1.1-1.3			?		?				
	Reptiles	1.1-1.3			?		?				
	Fish	1.1-1.3			?		3.2, 3.3				
	Water	1.4-1.6	7.1			5.2, 5.3					
	Seabed	1.4-1.6	7.2	6.2			?	3.2			

**Table 1.** Relationship of broad ecosystem elements to main pressures, indicating which criteria from the 2010 Decision are relevant to each state (S) and pressure (P) element, and which are associated to impacts from pressures upon particular state components (orange cells). The boxes with a ? indicate most likely gaps in impact criteria compared with the 2010 Decision. The blank boxes have no impact criteria in the 2010 Decision but impacts may still occur (e.g. physical loss and/or damage leading to loss of breeding grounds for birds, reptiles and fish). Refer to 2010 Decision for details about the criteria (from GesDecision Review \_Cross-cuttingIssues\_V4, can be accessed at the following [link https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp?FormPrincipal:\\_idcl=FormPrincipal:\\_id3&FormPrincipal\\_SUBMIT=1&id=be6cb95f-0d58-401e-a89d-7dc4b0b19a3d&javax.faces.ViewState=r00ABXVyABNbTGphdmEubGFuZy5PYmpY3Q7kM5YnxBzKWwCAAB4cAAAAAN0AAIxMnBOACsvanNwL2V4dGVuc2lvbi93YWkvbmF2aWdhdGlvbi9jb250YWluZXIuanNw](https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp?FormPrincipal:_idcl=FormPrincipal:_id3&FormPrincipal_SUBMIT=1&id=be6cb95f-0d58-401e-a89d-7dc4b0b19a3d&javax.faces.ViewState=r00ABXVyABNbTGphdmEubGFuZy5PYmpY3Q7kM5YnxBzKWwCAAB4cAAAAAN0AAIxMnBOACsvanNwL2V4dGVuc2lvbi93YWkvbmF2aWdhdGlvbi9jb250YWluZXIuanNw)).

**1.7 An analysis of whether the criteria and/or indicators and/or methodological standards for the particular descriptor are likely to be common across the EU or need aspects to be specific at region or other scales.**

The problem of NIS is a trans-regional one and therefore needs common standards for assessing, monitoring, prevention and management of targeted species. However, some specific standards need to reflect specific regional risks associated to exposure to vectors, pathways and sensitivity of

ecosystems to the species introductions, and the ecosystem characteristics, e.g. in the Baltic Sea with its salinity gradient, these standards need to be adapted to a differing set of freshwater invaders in the eastern and northern parts.

An analysis of the coherence amongst MS, especially amongst those sharing the same region, was performed for the needs of the Art. 12 in-depth assessment (IDA, JRC, 2014). This work provides crucial information for the feasibility of having common criteria and methodological standards across EU and the identification of areas requiring regional approaches. The results of this analysis are summarised in a chapter 2 (analysis of the implementation process).

### **1.8 The "climate sensitivity" for D2**

Descriptor 2 has a range of climate sensitivities that can increase the risk of NIS secondary spreading and the level of this pressure. Changes such as increased sea temperature can make conditions more suitable for NIS from specific geographic areas resulting in an increased that those NIS can more easily establish and spread in European waters. Lastly, some native species will naturally migrate into new areas due to the changing climatic conditions and consequently change their potential spatial habitats, which might be difficult to differentiate from human-induced introductions.

Thus, efforts are required to develop knowledge needed to distinguish between climate-change mediated alterations to species distributions and human introduced NIS. The ability to distinguish these two processes and categories of species enhances the formulation of cost-effective management measures directed at achieving the desired GES levels.

### **1.9 An indication of whether a quantitative GES definition for the descriptor will be possible or whether a qualitative/normative definition only should be used (on the basis of Article 3(5)).**

In theory it should be possible to determine quantitatively the status of NIS in a given ecosystem, but as indicated above this presents particularly challenges.

Abundance may be difficult to assess quantitatively due to difficulties associated to e.g. account for species with different life form strategies (e.g. single or colony forming) and low abundances in early stages of invasion. It must be considered that the GES will depend ultimately of the direct impacts of NIS on local biota, which is not necessarily related, at least linearly, with their abundance. Because of that, taking into account the variety of NIS and the variability of their potential impacts in different ecosystems, it will be difficult to define proper and widely accepted definitions of GES in relation to NIS presence merely fixing a unique and common abundance threshold.

More accurate and cost-effective is to perform species presence inventories or number of species encountered in widely spread locations in a subregion, e.g. Port of Rotterdam,, Wadden Sea. These assessments of species spatial occurrence/ distributions could be considered as surrogates of species abundance and of the level of invasiveness.

For other indicators, as Biopollution Level index (BPL), qualitative definitions could be easier to agree, but even so it is difficult to evaluate the GES in relation to NIS, since their mere presence may represent a potential threat to local biota. However, The BPL is not applicable in some MS's waters

(e.g. in France, according to French experts), due to the high level of uncertainty of this index at cost-effective effort for acquisition of required data. This is limiting its validity to few well studied places, or to some taxa and, thus it would not have any ecological meaning.

One option could be to use ADR (abundance and distribution range), which is the basis for the BPL but would be easier to assess as it does not need the impact information.

An alternative, or complement, to this approach would be to put the focus on the impacts, on the effects of the presence of NIS instead of their abundance. In this way, to evaluate the GES in relation to NIS results of the application of the indicators developed for the “biodiversity” descriptors, 1, 4 and 6. This would ensure the coherence of the evaluations from the point of view of the biodiversity conservation. Thus, any definition of GES referred to descriptor 2 should be linked to the achievement of the GES in the biodiversity descriptors, in such a way that the environmental status in relation to NIS would be defined as negative if it is also negative for these other descriptors, and vice-versa.

GES could be at a first step defined qualitatively, notably according to the actual lacks of knowledge for many species or habitats. For example, impacts on habitats or broader ecosystems condition and functions could be defined qualitatively (e.g. based on community structure changes) and the GES/no GES could be a deviation (qualitative or semi-quantitative=range) around this qualitatively defined reference. Ideally, this biological pressure (extent, intensity, frequency) should be estimate at least semi-quantitatively.

In parallel, taking into account the irreversibility of most of marine bio-invasions, a more dynamic and operative approach for GES definition could be adopted. Thus, any increasing trend in the presence and abundance of NIS in a given ecosystem, independently of their real impact, should be qualified as negative, whereas negative trends or stable situations, even if the environmental status cannot be defined as positive could be considered at least acceptable.

Due to lack of data and a full understanding everywhere of how NIS are introduced, where they occur, how abundant they are and factors influencing their survival, establishing baseline information for trend comparisons may be difficult.

## ***2. Analysis of the implementation process***

### **2.1 Based on the Commission / ‘Milieu’ Art.12 reports and the JRC in-depth assessments (IDA), a detailed summary of Art.12 findings related to the determination of GES and, specifically, the use of the Decision criteria and indicators, should be made.**

All Member States have defined GES for Descriptor 2. Most MS defined GES either at Descriptor and/or Criterion level. Only six Member States have also defined GES at indicator level, of which four defined GES only at indicator level. For a large proportion of MS the definitions were vague, with some MSs reproducing the description provided in Annex I of the MSFD verbatim or very close to it and did not provide measurable definition of GES and relative thresholds. There were significant differences on the level of detail and focus of the approach reported by MS, i.e. some focused on

NIS, others on invasive NIS and others on both categories; several adopted a risk-based approach, and some referred to impacts of NIS.

According to the Commission's SWD (2014/49), no Member State was judged to have an adequate definition of GES. Eleven Member States were considered to have a partially adequate definition of GES, while nine were considered inadequate.

**Criterion 2.1** was used more frequently than criterion 2.2. Several Member States explicitly adopted a risk-based approach, primarily addressing vectors and pathways for introductions of NIS. The MSs have in most cases indicated that GES could be achieved when the introduction of NIS does not adversely affect the ecosystem but very few relate this to trends in abundance of NIS introductions in order to achieve GES.

**Criterion 2.2** (Environmental impact of invasive non-indigenous species). Ten Member States referred to impacts of NIS. The types of adverse effects are generally not clarified.

The initial assessment (Art. 8) for Descriptor 2 was mostly based on existing literature, supplemented in some instances by expert judgment. All MS provided an inventory of NIS present, and generally the main vectors and pathways were described. Great variation was observed in the number of NIS reported even between neighboring MSs, and across regions (IDA, 2014), reflecting partly differences in the monitoring systems. Other potential reasons are: 1) variable number of specific studies on NIS carried out in each country and 2) the resources invested by each country in compiling information for the initial evaluation, since many information on this issue do not come from regular monitoring systems carried out by the Administrations, but from sparse scientific, peer reviewed or grey, literature.

It is suggested that to facilitate and harmonize the D2 implementation, regional and national NIS inventories should be linked. The European Alien Species Information Network (EASIN, <http://easin.jrc.ec.europa.eu/>) could serve for this purpose. EASIN was established with the scope of facilitating the exploration of existing alien species information in Europe to assist the implementation of European policies on alien species, including marine species.

Art. 9 implementation assessments concluded that the level of coherence in the definition of GES for Descriptor 2 within each of the four regional seas is considered to be low. That said there are exceptions at sub-regional level, with a moderate level of coherence between the three Member States in the Western Mediterranean Sea. Coherence in the Celtic Seas is also assessed as moderate. Clear links should be made between Art. 8, 9, 10, 11 and 13 of MSFD. Specific assessment methods and associated boundaries or thresholds should be reported to facilitate the evaluation of GES achievement, of targets' efficiency and the implementation of MSFD in general (IDA, 2014). Explicit guidelines for indicator development should be developed aiming to ensure harmonisation of assessments. As there has been very little information gathered on marine NIS from many MSs, the recent established monitoring programmes have gathered for the first time gathered national information on the current state of NIS. This will form a baseline from which further changes in relation to GES will be measured.

## **2.2 Identification of any questions arising from the application of the current Decision, including those identified by the Article 12 assessment.**

Mediterranean and North East Atlantic Member States on the whole described knowledge and data gaps in some detail and in some cases even (limited) plans to address them. This was not the case in the Baltic where only two MS analyzed knowledge gaps in any detail (SWD2014/49/EU).

Just three MS provided (or tend to establish) baseline and thresholds in their initial assessment. IDA (JRC, 2014) highlighted the need to link initial assessment (Art. 8) and definition of GES (Art. 9) with specific trends, boundaries and thresholds (Table 2).

D2 reports are poor in detailing the methodological approaches applied by the MSs. MSs focused on listing NIS and addressing the important vectors related to NIS, and less on assessing their impact in particular ecosystems (IDA, 2014).

Some MSs associated BPL (Olenin, 2007) to GES definition, indicating its applicability in some regions but also the need for better indicators and methodological standards related to NIS.



**Table 2.** MS reported baselines and indicators thresholds for non-indigenous species (JRC, 2014)

<b>Belgium</b>
<b>2.1.1</b> Introduction of new human induced non-indigenous species of macrofauna and macroflora (>1 mm) in relation to the 2012 baseline is prevented.
<b>Estonia</b>
<b>2.1.1</b> 80% of cases in time series abundance significantly higher than absolute minimum registered abundance
<b>2.2.1</b> no increase in abundance
<b>2.2.2</b> BPL index < 1
<b>Greece</b>
<b>2.1.1</b> No increase in proportion of NIS in the abundance or biomass of the respective community
<b>2.2.1</b> all NIS spp include <5% of biomass or space coverage
No algal blooms due to NIS

### **2.3 Relevant data from other sources, specific to every descriptor and recent findings from MS should also be considered**

The data gaps and inherent uncertainties existing information from sources prohibit to address all three existing D2 indicators even partially and this despite the largely availability of existing information through open access information systems such as the European Commission’s European Alien Species Information System (EASIN; <http://easin.jrc.ec.europa.eu/>), AquaNIS (<http://www.corpi.ku.lt/databases/index.php/aquanis/>), DAISIE (<http://www.europe-aliens.org/>), MAMIAS (<http://www.mamias.org/>) and NOBANIS (<http://www.nobanis.org/>). These information systems should be linked or unified to facilitate data access for MSs and properly address D2. However, their usefulness is strongly dependent on MS data input to regional databases. This should be highly recommended and regional organizations like OSPAR or HELCOM can have a major role.

Other issue that should be further discussed and analysed include the inclusion of pathogens in D2. The comments received express different opinions, but given that non-indigenous pathogens may strongly impact marine ecosystems the issue should be further discussed to be able to conclude.

## **2.4 Good examples and approaches applied by MS, especially if used by multiple Member States, and shortcomings should be listed systematically.**

On a regional level, HELCOM is highlighted for good practice in the way the Convention adopted the MSFD and for the progress achieved in developing relevant indicators (HELCOM, 2013b<sup>35</sup>).

HELCOM member countries applied the BPL for estimating the magnitude of the non-indigenous phytoplankton species effects on the native phytoplankton community, pelagic habitat and ecosystem functioning in the Baltic Sea (Olenina et al., 2009). BPL was reported by most of the HELCOM member countries (where it is already operational) and from a few non-HELCOM members that are going to evaluate BPL's utility in other regions. BPL was linked to all reported MSFD Articles (8, 9 and 10) at least once and to Criteria 2.2 of the COM DEC (2010/477/EC).

Estonia's approach could be considered as a good practice for linking well-defined metrics with indicators accompanied by specific thresholds. In addition, they presented high level of consistency in the way they reported for the three MSFD Articles (8, 9 and 10). However, this approach should be considered with caution, since GES and targets are defined similarly and that raises some doubts as to what exactly is the GES definition.

The Finish report on Art. 9 could be considered as an example of good practice, since they provided a variety of GES statements covering pressures, impacts on the basis of number, frequency and ratio of NIS, as well as species vectors.

The Greek and Portuguese's approaches are considered as a good practice for their implementation of Art 8. in respect to the NIS reported, because of the detailed information provided including NIS recorded in national waters, year of the first record, origin of NIS, pathways of introduction, population status (e.g. established, occasional, unknown) and NIS' taxonomic groups.

More working relationships are encouraged between MS and also development of new working relationships between Regional Convections.

## **2.5 Differences and similarities between the regions should be highlighted, where applicable.**

The regional coherence between the GES definitions is low in all sub-regions (SWD (2014) 47; IDA, 2014).

In respect to the methodologies listed in MS reports, BPL is referred by some HELCOM members but not all contracting parties accepted to use the indicator. Non-HELCOM MSs reported that careful studies are required to prove and advise on the applicability of the BPL in their areas of interest.

An OSPAR wide common indicator on NIS is being developed in relation to criterion 2.1.1. – 'Risk management of key pathways and vectors of introduction of NIS' (OSPAR, 2013<sup>40</sup>).

The OSPAR common indicator NIS3, developed by UK and Germany, has been adopted in subregions II, III and IV and its merging to the HELCOM Trend indicator is at the moment discussed by HELCOM CORESET II. Collaboration is planned to be opened up to other RSCs and it was proposed to develop a network of experts to connect the communities in the different convention areas (Back to back

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<sup>40</sup> OSPAR, 2013. Report of the EIHA Common indicator Workshop. (Accessed 11/03/2015).

meeting of CORESETII and ICG-COBAM, October 2014<sup>41</sup>). The HELCOM core indicator is expected to be adopted in June 2015.

### 3. Analysis of the current text of the Decision

#### 3.1 Analysis of the current text of the Decision, identifying in particular those parts which are best placed in guidance, those parts which are interpretative or explicative information and those parts which need to be kept in the Decision in accordance with the mandate provided by the Directive.

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

The following part of the Decision forms the core of the criteria and methodological standards. Revised text appears in Bold. Explanations in parentheses are provided for all suggested changes. In general, there is agreement on the proposed modifications to criterion 2.1 but there is still some controversy regarding the criterion 2.2. This will require to be further considered to decide if it is needed to adequately assess D2 and to agree on the revised version.

*COM Decision PART B- 'Criteria for good environmental status relevant to the descriptors of Annex I to Directive 2008/56/EC'*

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

2.1. Abundance ~~and state~~ and characterization of **non-indigenous species**, in particular invasive species (As D2 is a pressure and not a state descriptor, the 'state' in Criterion 2.1 is confusing and is better to be deleted. Other state descriptors by which the environments need to be assessed should reflect the state with consideration of pressures including alien species pressure).

— Trends in **new introductions**, abundance, temporal occurrence, and spatial distribution in the wild of **non-indigenous species**, notably in risk areas, in relation to the main vectors and pathways (2.1.1). (Trends in new introductions of alien species by pathway is an indicator closely related to the management of pathways as requested by the new Regulation 'on the prevention and management of the introduction and spread of invasive alien species'; such an indicator can reflect the effectiveness of measures to manage pathways)

2.2. Environmental impact of [invasive] **non-indigenous species**

— Ratio between [invasive] **non-indigenous species** and native species [in some well-studied taxonomic groups (e.g. fish, macroalgae, molluscs)] that may provide a measure of change in species

<sup>41</sup> HELCOM and OSPAR Commissions, 2014. Communication paper resulting from the joint meeting of HELCOM CORESET II and OSPAR ICG-COBAM. Back to back meeting of CORESET II and ICG-COBAM, 1 October 2014. (Accessed 11/03/2015)

*composition (e.g. further to the displacement of native species) (2.2.1) (If only IAS are included in the estimation of alien/native ratio then this is not a measure of community change)*

— *Impacts of non-indigenous invasive species at the level of species, habitats and ecosystem, where feasible (2.2.2)*

*Summary of comments received:*

- criterion 2.2 could be maintained, stating that GES could be evaluated through other biodiversity indicators. Thus, criteria 2.1 would consider potential impact from “internal pressure” of introduced NIS, taking into account presence and relative abundance of these NIS, providing a sort of risk assessment, whereas 2.2 would deal with demonstrated impacts, measured through state indicators related to other descriptors. However, 2.1, as mentioned before, deals with already established NIS, when in many cases too late to do something. A new criteria could be considered, dealing with the “external” pressure to a given ecosystem, it is the “propagules” pressure.
- Remove criterion 2.2 based on the reasoning that the impact of non-indigenous species should be considered in the status descriptors. The pressure level is measured by criterion 2.1 and should be such as to ensure GES for those descriptors.
- Remove the indicator ratio between alien and native species. This will only consider community changes rather than full ecosystem impact. Also, monitoring for all alien species will be operationally difficult to achieve and the cost would be disproportionate taking account that not all present an important risk to the marine environment. Furthermore, change of species composition is unlikely to be controllable and thus to relate to the programme of measures.
- 2.2.1 and 2.2.2 overlap; both measure impact from non-indigenous species. Suggest to remove 2.2.1.
- Change 2.2.1 to ‘Impacts of alien species, where feasible’

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

The following part of the Decision provides guidance on assessment and monitoring methodologies and would be better placed (after substantial revision) in a separate guidance document. In addition, it should be updated according to the entering into force of the new Regulation 1143/2014 and the latest research and the progress made at RSC-level and by IMO. Finally, it should also be updated with the findings from the first initial assessment of the MSFD.

*“The identification and assessment of pathways and vectors of spreading of non-indigenous species as a result of human activities is necessary to prioritize actions for the management of pathways and the prevention of new invasions. The initial assessment has to take into account that some introductions due to human activities are already regulated at Union level to assess and minimise their possible impact on aquatic ecosystems and that some non-indigenous species have commonly been used in aquaculture for a long time and are already subject to specific permit treatment within the existing Regulations. There is still only limited knowledge about the effects of the non-indigenous species on the marine environment. Additional scientific and technical development is required for*

*developing potentially useful indicators especially of impacts of invasive non-indigenous species, which remain the main concern for achieving good environmental status. The priority in relation to assessment and monitoring relates to state characterisation, which is a prerequisite for assessment of the magnitude of impacts but does not determine in itself the achievement of good environmental status for this descriptor.”*

However, the amended Decision would need to make reference to the guidance were this background information would be included.

### **3.2 The analysis should then include an overall identification of needs for guidance.**

Guidance might be needed to clarify and harmonize descriptors’ definitions, methodological standards under each criterion and their links.

In particular, detailed guidance for harmonized methodologies on how to assess particular impacts at ecosystem level is needed.

### **3.3 An analysis of what to keep should take place, including specification on what may be out dated or may need to be aligned with other or new legislation, etc.**

The following criterion and indicator should be kept with suggested modifications:

#### **2.1. Abundance ~~and state~~ and characterization of non-indigenous species.**

— Trends in **new introductions**, abundance, temporal occurrence, and spatial distribution in the wild of non-indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species (2.1.1).

This could be decomposed in two methodological standards (indicators) taking in consideration the already included NIS metrics.

Criterion 2.2 needs further consideration to agree if needed to enable an adequate assessment of D2 and if needed to agree on revised version (see section 3.1).

## **4. Identification of issues**

### **Main findings and information that will be used in the next step of the revision process.**

There is still lack of information and understanding of NIS impact on marine ecosystems, therefore its inclusion as a criterion in GES definition is difficult. In fact, types of impacts occurring due to NIS are hardly specified in the related GES definitions; it could be useful to create a stronger link between Descriptor 2 and the biodiversity Descriptors (see table 1 and e.g. Katsanevakis et al. 2014<sup>4</sup>).

Clarify and review inter-Descriptor links is definitively a task to further progress, notably through links between Art.8, 9, 10 and 11, and taking into account the “cross-cutting issues” workshop (21-23/01/2015, Copenhagen).

The link with D1 and D4 could be made by 2.2 (see table 1 ): Impacts of this biological pressure could be assessed by assessing D1.7 (impacted ecosystem structure and functions); D1.6 (impacted habitat condition); D6.2 (for benthic habitats, when IAS become an engineering species sensus Crooks, 2002<sup>42</sup>, 2009<sup>43</sup>); D1.3 (Impacted population condition) and D1.1 (distribution ); D4.1 (productivity of key species impacted by invasive non-indigenous species) and D4.3 (abundance/distribution of key species, for invasive non-indigenous species which impact trophic webs).

The regional coherence amongst countries when defining GES for D2 is low in regions and sub-regions; the relatively low level of operational approaches for D2 provides an opportunity to work for regional coherence through joint development of methodological standards and indicators. OSPAR and HELCOM (see above) have made initial plans towards a common indicator.

Although the transitional waters are beyond the scope of the MSFD (i.e. under remit of the WFD), NIS and notably IAS in transitional waters should be assessed as these constitute a potential biological pressure to surrounding marine waters. Coordination of the MSFD with other relevant legislations, in particular with the new IAS Regulation is required to avoid duplication of work and ensure through coordination of activities the achievement of GES and prevention and management of NIS.

The observed inconsistencies and uncertainties in the NIS lists included in the national reports may lead to inefficient management and it could be improved by linking regional and national species inventories. The European Alien Species Information Network (EASIN) is developing towards an information exchange mechanism to facilitate the EU policy on invasive alien species, thus, it could play a role linking all EU NIS databases. It is strongly recommended to keep updating national NIS lists and the regional databases.

The guidance to prepare in association to the Commission Decision should include a table of synonyms were terms such as NIS should be included.

It should be clarified that the reduction of the existing pressure (distribution and/or abundance of NIS) is often only possible in a few specific cases. This assertion leads to the following suggestions:

- The criteria trend in new introductions per vector should be kept. It allows to show clearly if the pressure from non-indigenous species has changed and it is also possible to relate to success/failure of management.
- Criterion 2.2 needs further consideration to agree if needed to enable an adequate assessment of D2 and if needed to agree on revised version (see section 3.1)

More information on ecosystem impacts of IAS, along with economic impacts, should be collected, in particular if criterion 2.2 is retained.

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<sup>42</sup> Crooks JA, 2009. The role of exotic marine ecosystem engineers. In Riloy G, Crooks JA (Eds). *Biological Invasions in Marine Ecosystems: Ecological management, and Geographic Perspectives*, Ecological Studies, vol. 204 (XXVI). Springer-Verlag, pp. 215-238.

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

### **5.1 Conclude on the use of the existing Decision criteria and indicators, in the light of the "refined" common understanding, the findings of the Article 12 assessment and relevant international, EU and RSC legislation and approaches.**

COM DEC Criteria have to be defined in a way to allow for a direct GES assessment that is related to the Descriptor (Art. 6). However, for D2 this requirement is currently not achieved. The lack of guidelines may lead to different interpretations to define GES in different levels (descriptor, criterion or indicator).

Several Regional Sea Conventions are developing indicators, both in line with criteria 2.1, and coherent between Regions:

HELCOM: Trends in arrival of new non-indigenous species (adopted as core indicator)

OSPAR: Trends in the arrival of new non-indigenous species (adopted as common indicator)

Barcelona: Trends in the abundance, temporal occurrence and spatial distribution of non-indigenous species, particularly invasive, non-indigenous species, notably in risk areas in relation to the main vectors and pathways of spreading of such species (adopted as common indicator).

Guidelines and methodological standards associated with these indicators should thus be integrated on a revised Decision

### **5.2 Recommendation on which criteria to retain, which to amend and any to remove;**

The criteria 2.1, once amended as "Trends in new introductions, abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species notably in risk areas, in relation to the main vectors and pathways of spreading of such species" should be retained, since it addresses the minimum information requirements for any risk assessment and rough evaluation of GES in relation to this descriptor. Criterion 2.2 needs to be further considered to agree if it is needed to enable an adequate assessment of D2 and if needed to agree on revised version (see section 3.1)

### **5.3 Proposals for new criteria, if needed.**

The current criteria address the pressure and impact exerted by the already established IAS. However, except in cases in which the bio-invasions have been detected in very early phases, little can be done with this information from the management point of view. As already stated, most of management actions should be taken in the field of prevention of primary and secondary spreading of NIS, acting on vectors.

Therefore, a new criteria dealing directly with "propagules pressure", could be considered, developing indicators and related monitoring systems in relation to the different vectors (fouling, ballast waters, aquaculture...), which would allow to evaluate the effectiveness of preventive management measures.

The rate of new introductions can be used as a proxy of this external pressure, but it is not a direct and reliable measure. Instead “Pathways management measures”, at present an OSPAR candidate indicator, could possibly be considered as criterion.

#### **5.4 Rationale and proposal, where appropriate, for defining GES threshold values and reference points, based on established and agreed scientific methods for quantifying and applying GES boundaries, or for a normative definition of GES**

See section 1.9. It will require further discussion.

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

**To further discuss and complete when other paragraphs clarified**

### ***7. Specifications and standardized methods for monitoring and assessment (in accordance with Art. 11(4))***

**7.1 Proposals for specifications on methods for monitoring (i.e. the collection of data needed for assessment of each criterion, including parameters, units of measurement and data quality requirements), which aim at ensuring the comparability of monitoring results, on the basis of JRC / ICES / RSC survey protocols, relevant European/international standards (e.g. ISO/CEN) and Article 12 findings.**

It is important to agree on a feasible and cost-effective monitoring standard that will provide results which are comparable between MS.

Monitoring of everything everywhere is not feasible. Focus dedicated monitoring on selected areas, habitats or species groups (either taxonomy or trait based) in relation to risk of new introduction through the various pathways (including, but not limited to ports)<sup>44</sup>. Use the regular monitoring for the different biodiversity elements to cover other areas/habitats/species groups. When needed amended with something like rapid assessment surveys.

Monitoring should use the standard methods for biological monitoring (e.g. HELCOM COMBINE guidelines for the Baltic Sea). HELCOM and OSPAR monitoring methods, e.g. port sampling protocol and RAS could be considered for use in other areas than those of their original applicability and in other European seas.

[http://helcom.fi/Documents/Ministerial2013/Ministerial%20declaration/Adopted\\_endorsed%20documents/Joint%20HELCOM\\_OSPAR%20Guidelines.pdf#search=Helcom%20Ospar%20guidelines](http://helcom.fi/Documents/Ministerial2013/Ministerial%20declaration/Adopted_endorsed%20documents/Joint%20HELCOM_OSPAR%20Guidelines.pdf#search=Helcom%20Ospar%20guidelines)

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<sup>44</sup> Lehtiniemi M, Ojaveer H, David M, Galil B, Gollasch S, McKenzie C, Minchin D, Occhipinti-Ambrogi A, Olenin S, Pederson J 2015: Dose of truth- Monitoring marine non-indigenous species to serve legislative requirements. Marine Policy, 54: 26–35.



Another bottleneck in NIS monitoring is the lack of taxonomic expertise. New molecular methods are being developed (e.g. by Cefas in the UK and by Denmark) on the use of molecular tools to get around this issue.

## **7.2 Proposals for specifications on methods for assessment, which aim at ensuring comparability of assessment results, including aggregation of monitoring data within an assessment area for a particular criterion and if necessary aggregation across assessment areas up to larger areas (e.g. (sub) region scales), and based on general guidance prepared on scales and aggregation rules<sup>45</sup> and taking account of JRC / ICES / RSC inventories and Article 12 findings.**

Links should be established between MSs and EASIN database, which is the Commission's NIS inventory and can promote a coherent approach in the reporting of NIS. EASIN (European Alien Species Information Network; <http://easin.jrc.ec.europa.eu/>) aims to facilitate the exploration of existing alien species information in Europe from distributed sources, and to assist the implementation of European policies on biological invasions. This is planned to be the information support mechanism in relation to the new regulation on IAS.

Monitoring, methodological standards and assessment methodologies should also be linked with the specifications of the regulation for alien species (1143/2014). The alien species database should be fulfilling the following conditions: Be regularly updated by all MS, compatible with early warning and rapid response tools.

More NIS databases that could contribute to harmonize MS' reporting are listed in the IDA (2014).

See also: Ojaveer H, Eero M (2011) Methodological Challenges in Assessing the Environmental Status of a Marine Ecosystem: Case Study of the Baltic Sea. PLoS ONE 6(4): e19231.  
doi:10.1371/journal.pone.0019231

## ***8. Rational and technical background for proposed revision***

### **8.1 Justification and technical background justifying the above proposals.**

Covered in previous sections

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

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<sup>45</sup> Deltares SCALES project is developing guidance for WG GES.

**9.1 Where aspects are identified which should be usefully laid down but not as part of the decision, these elements should be specified and a proposal should be made in which way they should be laid down, e.g. interpretative guide for the application of the future Decision or CU guidance document or technical background document.**

- **Outstanding issues identified during the review process of D2 in phase I and were not completely tackled in this document:**

1. Changes in Criterion 2.2

**Issue:** Needs to be further considered, i.e. is it needed? If yes, agree on a revised version. This requires considering links with other descriptors, in particular D1, D4 and D6

2. Exchange of information on indicators/ methodological standards

**Issue:** Discuss and evaluate national and regional on-going work to develop indicators for D2

3. New criteria dealing directly with “propagules pressure”?

**Issues:** Current criteria address pressure and impact exerted by the already established IAS

4. GES threshold values

**Issue:** Proposal for a coherent GES determination and GES threshold values

These issues could be tackled and feed a guidance document, in parallel with phase II of the review process of the Com DEC 2010/477/EU to further support the implementation of the MSFD.

## **10. Background Documents**

- Review of the GES Decision 2010/477/EU and MSFD Annex III Approach and outline for the process, (EC- Committee/07/2013/03rev, 2013);
- First steps in the implementation of the Marine Strategy Framework Directive - Assessment in accordance with Article 12 of Directive 2008/56/EC, (CSWD, 2014);
- Article 12 Technical Assessment, (Milieu ltd, 2014);
- Marine Strategy Framework Directive - Descriptor 3, (ICES, 2012);
- Common Understanding of (Initial) Assessment, Determination of Good Environmental Status (GES) & Establishment of Environmental Targets (Articles 8, 9 & 10 MSFD), (DG GES, 2014);
- Coherent geographic scales and aggregation rules in assessment and monitoring of Good Environmental Status – analysis and conceptual phase, (Deltares, 2014);
- In-depth assessment of the EU Member States’ Submissions for the MSFD under articles 8,9 and 10, EUR26473EN (JRC, 2014)
- Review of Methodological Standards Related to the Marine Strategy Framework Directive Criteria on Good Environmental Status (JRC, 2011)
- Guidance / Terms of Reference for the task groups ‘criteria and methodological standards for the Good Ecological Status (GES) descriptors’ (JRC, 2010)

- CSWP (2011) on the Relationship between the initial assessment of marine waters and the criteria for good environmental status.
- OSPAR (2012b). MSFD Advice Manual and Background Document on Biodiversity. London, Publication Number: 581/2012, 141 pp. (available at: [http://www.ospar.org/v\\_publications/download.asp?v1=p00581](http://www.ospar.org/v_publications/download.asp?v1=p00581))



### 1.6.2.1 EU request on revisions to Marine Strategy Framework Directive manuals for Descriptors 3, 4, and 6

#### Advice summary

Revisions to three MSFD manuals were carried out based on the results of three workshops. These revisions are annexed in the requested format to this advice. Broadly these revisions have followed the templates and texts supplied to ICES following discussion by the EU's Working Group on Good Environmental Status. For Descriptors 3 and 4, no major changes were made to the manuals, but revision was deeper for Descriptor 6 following comments from many EU Member States. EU Member States (supported by the European Commission) asked also for advice on the next steps for implementation of the Descriptors for the period 2015–2018.

#### Request

*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 organised and steered the process. ICES has been responsible for the relevant work related to the review of the descriptors D1 (biodiversity), D3 (fisheries), D4 (food webs), D6 (sea-floor integrity) and D11 (noise). For D1, ICES had to coordinate the process with JRC and for D11 the work has built on the continued work of the Technical Group on Noise (TG Noise). During the first phase of the review process ICES had to prepare draft documents for each of the above-mentioned descriptors, provide recommendations for revision of the technical issues of the Decision with a proposed draft text with changes and the rationale for these changes to the Commission and provide feedback to WG GES which is the forum to oversee the organisation and planning of the technical review process.*

*For the finalisation of the first phase of the GES review, ICES is therefore requested to provide an offer covering the following tasks:*

- a) consolidate all comments (technical and on policy issues) received from WG GES and DG ENV on the draft documents for each of the above-mentioned descriptors;*
- b) if necessary, organise targeted meetings of expert groups from all interested EU member states and Regional Sea Conventions to address outstanding technical issues identified in the review process (particularly following DG ENV guidance on the ToR and agenda of the meetings);*
- c) provide reports of the targeted expert meetings;*
- d) revise documents after input received during the cross-cutting workshop (see (ii) below) and during the targeted expert meetings;*
- e) finalise draft documents per descriptor (or via combined descriptors, where agreed), providing recommendations for revision of the Decision with a proposed draft text with changes and the rationale for these changes to the Commission by 25 March 2015;*
- f) provide feedback on the work undertaken to WG GES in April 2015 which is the forum to oversee the technical review process.*

#### Elaboration on ICES advice

The manuals for the Descriptors 3, 4, and 6 were revised (from versions provided in October 2014) to differing extents, dependent largely on feedback received from EU Member States and the Regional Seas Conventions, and on comments from the European Commission.

For Descriptor 3, the greatest changes were in the approaches to Criterion 3.3 on fish population, age and size distribution. This criterion requires further development; monitoring should continue, but the results cannot presently be used to evaluate GES. An approach is suggested for the development of this criterion.

For Descriptor 4, the concept of “trophic guild” was clarified; further guidance was provided on GES criteria and methodological standards.

Descriptor 6 required considerable further revision. The suggestion for a fairly radical overhaul of the criteria met much resistance in feedback and was difficult to support with current science. The concept of switching to an approach based on functionality and recoverability should not be lost for future work. These concepts though are difficult to make

operational with the current evidence base. The manual has therefore been rewritten to update and improve the current approach of damage to the seafloor and condition of benthic community. In particular, forms of pressure on the seafloor other than physical damage and functional aspects of the benthic community have been further emphasized.

The work on Descriptor 1 was taken over by JRC and that on Descriptor 11 has been carried out by TG Noise.

## Suggestions

### Next steps for implementation of the GES Descriptors for the period 2015–2018

In response to requests from EU Member States, and informally from the European Commission, ICES recommends the following as next steps to aid implementation of Descriptors 1, 3, 4, and 6 of the MSFD.

#### Cross-cutting work

1. Gaps and overlaps across descriptors. The challenges when considering state (including biodiversity) and function need to be considered across Descriptors 1, 3, 4, and 6. The concepts of trophic guild, taxonomic grouping, habitat type, and fish stock need to be combined in a way that accounts for the functional requirements of the state descriptors to ensure efficient implementation of the MSFD. This scientific work is needed before the revision of the Commission decision is finalized; it is therefore relatively urgent. ICES recommends a preparatory project, followed by a final 4- to 5-day workshop to agree ways to reconcile functionality with conservation objectives in state descriptors. The outcomes of the workshop should be internationally peer-reviewed.
2. Aggregation within Descriptors 3, 4, and 6 (including spatial integration). Further guidance is required by EU Member States (and European bodies) on approaches to aggregate indicators proposed to assess Descriptors 3, 4, and 6. Aggregation of assessments of different indicators should take the varying qualities of each indicator into account, both in terms of their pressure–state relationships and to the levels of uncertainty in their estimation. The issue of spatial extent in relation to overall assessment should also be considered. This guidance is needed for the 2018 reporting round and should be carried out by the Regional Seas Commissions as a combination of science and management decisions. ICES would be able to help in providing science support and comparing regional responses.

#### Descriptor 3

ICES recommends developmental work to underpin the implementation of Criterion 3.3 and proposes a preliminary suite of candidate indicators (see Annex 1). These indicators capture three relevant properties representing the state of fish populations and pressure exerted on those populations: i) size distribution of the species (state), ii) selectivity pattern of the fishery exploiting the species (pressure), and iii) genetic effects of exploitation on the species (state).

The following steps, involving a series of workshops, are required to make these proposals operational before 2017:

1. Indicator selection and evaluation against ICES criteria (ICES, 2014a, 2014b) using selected representative fish stocks. The selected stocks should exhibit different characteristics (e.g. long-lived, short-lived, pelagic, demersal, elasmobranchs) and be selected from a range of regions with the aim to select one validated indicator per property. The selection of example stocks should consider data availability, the stock dynamics should exhibit contrast (both in terms of productivity and exploitation). Data will be collated using a formal data call and should include both catch/landings and age-at-length data, and survey information. Guidelines will be provided on the type of stocks for which each indicator is relevant. Workshops with scientists with experience in fisheries science from across Europe will be needed. The properties of underlying data, knowledge base, construction of operational indicators, and sensitivities to underlying assumptions will be explored.
2. Evaluation of GES for Criterion 3.3 for selected stocks. Primary indicators will be processed similar to those in criteria 3.1 and 3.2; where the knowledge on the characteristics of the indicator and its reference level should enable the identification of the requirements for GES. Secondary indicators will also be considered. Workshops will be needed and would follow step 1.
3. Applying methods for Criterion 3.3 to regional evaluations. Taking the methods developed to make an evaluation of GES using example regions to further test the applicability of the approaches. This may be possible at a workshop under Step 2 above or could be included as part of the work of ICES integrated ecosystem assessment groups.

## Descriptor 4

ICES recommends further developmental work to underpin the implementation of Descriptor 4 and proposes that the challenges need to be addressed in the following ways:

1. Uncertainty and GES. Three major sources of uncertainty affect the ability to determine Descriptor 4 indicator bounds (and similarly for other descriptors) and the interpretation of change in indicators in relation to GES: i) statistical uncertainty with respect to measuring indicators, ii) uncertainty reflecting whether the values for indicators relate to desirable or undesirable states, and iii) how direct and indirect linkages between indicators and pressures affect Descriptor 4 indicator behaviour. Building upon existing projects, ICES recommends an international peer-reviewed advisory process to provide methods to address these issues for all recommended indicators (see Annex 2) in 2016.
2. Consistent regional and pan-regional interpretations of indicators, limits, and estimation methods. ICES notes the suggestion to bring together experts to progress consistency in interpretation is important both within and between regional seas (HELCOM–OSPAR, 2014). If requested, existing ICES working groups could be tasked with developing agreed international guidelines to ensure consistent interpretations of indicators, limits, and estimation methods in 2016–2017 in order to feed through to EU-wide assessments.
3. Further development of Descriptor 4 indicators. This work is required to consider the differing influences of environmental variability and anthropogenic activity on considerations of GES for Descriptor 4. Indicator development should specifically investigate the role of lower trophic guilds on the likely assessment of GES for Descriptor 4, the role of size in foodweb stability, and management strategy evaluations of the sensitivity of Descriptor 4 indicators to anthropogenic pressures. Much of this work should be carried out through projects, but a workshop to bring together the outputs of the projects and updating the foodweb advice should be planned for 2017.

## Descriptor 6

ICES recommends further developmental work to underpin the implementation of D6 and proposes the following actions:

1. Develop and test standards for assessing human pressures on benthic habitats within and between MSFD regions. ICES in collaboration with the RSCs can provide peer-reviewed guiding principles that ensure alignment between GES boundaries for seafloor integrity to support regional indicator development and to avoid conflicting results between regions.
  - Identify where the collection of additional information is needed (ICES working groups are evaluating this for the OSPAR area; similar processes are needed for other regional seas);
  - Agree the list of key functions to be addressed across and within MSFD regions using the recommended Descriptor 6 indicators;
  - For each indicator, evaluate the applicability of existing concepts for setting GES boundaries and where possible identify critical values that could be used for these boundaries. This will need a dedicated workshop in 2017.
2. Habitats and issues of scale. Long-term action is needed to select habitats and address the role of scale and of connectivity in setting GES boundaries for the sea-floor. This work could take place in one workshop in 2018 and would include:
  - Agreeing the list of habitats to be assessed;
  - Resolving issues of scale by defining, e.g. at what EUNIS hierarchical level habitats are going to be addressed.
3. Assessment of recoverability of seafloor integrity. No standards or methods exist for this key attribute of marine ecosystems. Development of such standards could be carried out in a project.

## Basis of the advice

The European Commission is in the process of reviewing and potentially revising the Decision on criteria and methodological standards on good environmental status of marine waters (EU, 2010).

As part of this process, ICES was tasked in early 2014 with Descriptors 3 (Populations of commercially exploited fish and shellfish), 4 (Foodwebs), and 6 (Sea-floor integrity). A series of workshops held in autumn 2014 provided guidance reports with dedicated recommendations (ICES, 2014a, 2014c, 2014e). The results of the workshops were used to update “templates” provided by the European Commission to form first drafts of Descriptor “manuals” (ICES, 2014b, 2014d, 2014f). Following a meeting of the MSFD Common Implementation Strategy Working Group on Good Environmental Status (WGGES) in October 2014, further work and clarification was requested from ICES in December 2014 (see request

below). As a result further workshops were held in Copenhagen in February 2015 (ICES, 2015a, 2015b). The results of these second workshops have been used in updating the templates (attached as Annexes 1–3).

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**Annex 1**

## Possible approach to amend Decision 2010/477/EC

Descriptor 3: Commercially exploited fish and shellfish

<b>Author</b>	<b>Version</b>	<b>Date</b>
Milieu	V1	2 May 2014
DG Environment	V2	30 May 2014
ICES Core group	V3	1 October 2014
ICES advice (Annex 1)	V4	20 March 2015



## Possible approach to amend Decision 2010/477/EC

### Descriptor 3: Commercially exploited fish and shellfish

Title of Descriptor
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*Good environmental status for Descriptor 3 – Commercially exploited fish and shellfish*

Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.

1. Approach
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#### Definition of the Descriptor

Descriptor 3 deals specifically with the state of all commercially exploited fish and shellfish. The descriptor definition contains a number of specific attributes that require further specification.

**Commercially exploited fish and shellfish** are all marine biological resources which are targeted for economic reasons, including the bony fish (teleosts), sharks and rays (elasmobranchs), crustaceans such as lobsters and shrimps, and molluscs (including bivalves and cephalopods). Other marine biological resources (e.g. jellyfish and starfish) might be included in the circumstances of being commercially exploited and managed under the Common Fisheries Policy (CFP).

**Population** usually refers to a reproductively isolated biological unit. We propose to use “species” for the wider population, which may consist of several stocks, i.e. the functional unit for management/assessment purposes, while recognizing that a stock may consist of several “subpopulations”.

ICES uses “stock” when the methodology to assess the status of Descriptor 3 against good environmental status (GES) is based specifically on stock assessments; in other cases “species” is used, acknowledging that sometimes higher taxonomic groupings (e.g. genus) may be used.

The CFP provides a definition for “stock” – “a marine biological resource that occurs in a given management area”.

For the Northeast Atlantic and Baltic region ICES has defined a stock as being part of a fish population, usually with a particular migration pattern, specific spawning grounds, and subject to a distinct fishery. However, fishery management units rarely match the scale of populations and research has frequently found that more than one population occurs within a stock boundary. There has been considerable recent improvement in the understanding of population structuring and some boundaries for assessed stocks now reflect this understanding.

In the Mediterranean, the limited biological knowledge leads stocks to be defined largely by area and not on the basis of well-established biological knowledge of population units.

**All.** The Descriptor applies to all the species covered by Council Regulation 199/2008 (the Data Collection Framework (DCF)) within the scope of Directive 2008/56/EC (MSFD), including internationally managed stocks as well as stocks managed regionally and nationally.

Council Regulation (EC) 199/2008 (DCF) establishes the Community framework for the collection, management, and use of data in the fisheries sector. Pursuant to the Regulation, the Commission Decision (2010/93/EU) set forth the multiannual Community programme for the collection, management, and use of data in the fisheries sector. It determines which stocks are considered under the DCF for the period covered by the Decision (2011–2013). The species listed by region in Annex VII of 2010/93/EU are therefore the commercial species of fish and shellfish that, as a minimum, should be considered under Descriptor 3.

In addition to this, EU Member States can include other commercially exploited species such as inshore species not covered by the CFP or DCF, as well as other species. Because it is impossible to include every species that has occurred in the catches at some point in time (or are otherwise deemed to be of commercial interest), a pragmatic interpretation of “all” needs to result in a “selection” (i.e. in line with the phrase “selected commercially exploited fish and shellfish” in the Barcelona Convention (UNEP/MAP) objective related to fisheries) which needs to be agreed upon at a (sub)regional level. This selection should include all species for which exploitation is considered to have significant social or economic importance for the (sub)region.

**Safe biological limits.** European Parliament and Council Regulation 1380/2013 (CFP) defines a “stock within safe biological limits” as “a stock with a high probability that its estimated spawning biomass at the end of the previous year is higher than the limit biomass reference point ( $B_{lim}$ ) and its estimated fishing mortality rate for the previous year is less than the limit fishing mortality rate reference point ( $F_{lim}$ )” (Article 4(18)).

Following the precautionary approach the two attributes that have been used by ICES and GCFM to assess stocks against safe biological limits specify that stocks should:

1 ) be exploited sustainably (e.g.  $F \leq F_{pa}$  or  $F \leq F_{0.1}$ )

and

2 ) have full reproductive capacity ( $B \geq B_{pa}$ ).

In order to align with CFP aiming “to restore and maintain populations of harvested species above levels which can produce maximum sustainable yield”, the first attribute of GES, i.e. exploited sustainably, was extended into “be exploited sustainably with high long-term yield” and including the requirement  $F \leq F_{MSY}$ .

With respect to reproductive capacity of the stock, ICES (2014a) advised that:

*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  $F$  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 ( $B_{pa}$ ).*

While ICES initially adopted  $B_{pa}$  as a proxy for  $MSY B_{trigger}$ , a process is now underway to update the value of  $MSY B_{trigger}$  so that it corresponds with the lower boundary in the range of  $SSB_{MSY}$ . For example,  $MSY B_{trigger}$  has for some stocks been defined as “the lower 95% confidence limits (of SSB) with exploitation at  $F_{MSY}$  from long-term simulations”.

Hence, concerning stocks for which ICES advice is used as the basis for the assessment of GES, and to fulfil the GES Criterion 3.2, ICES recommends that  $SSB \geq MSY B_{trigger}$ , where  $MSY B_{trigger}$  marks the lowest boundary associated with  $SSB_{MSY}$ .

Updated estimates of reference levels for criteria 3.1 and 3.2 will be reviewed periodically and adopted by ICES, GFCM, ICCAT, and STECF, as relevant.

**Exhibiting a population age and size distribution that is indicative of a healthy stock** introduces a requirement to manage the demographics of fish stocks. At present there is uncertainty about how to interpret and implement this aspect and a scientific debate is ongoing on relevant indicators and reference points. While several criteria have been put forward that characterize a “healthy stock”, i.e. high resistance and/or high resilience, the Commission Decision 2010/477/EU states that “Healthy stocks are characterized by a high proportion of old, large individuals”.

#### **Linkages with existing relevant EU legal requirements**

European Parliament and Council Regulation (EU) 1380/2013. The Common Fisheries Policy (CFP) is closely linked to the MSFD and the achievement of GES for Descriptor 3 relies on the measures taken under the CFP. When the MSFD was adopted the CFP was still in the reform process. The new CFP includes specific links to the MSFD; Article 11(1) in particular creates a direct link from the CFP to the MSFD.

Council Regulation (EC) 199/2008 establishes the Community framework for the collection, management, and use of data in the fisheries sector (Data Collection Framework (DCF)). Pursuant to the Regulation, the Commission Decision (2010/93/EU) set forth the multiannual Community programme for the collection, management, and use of data in the fisheries sector. It determines which stocks are considered under the DCF for the period covered by the Decision (2011–2013). Descriptor 3 applies at least to all DCF stocks as laid out in the multiannual Community programmes for the relevant time period, but also to regionally important stocks currently not listed under the DCF.

#### **Linkages with international and RSC norms and standards**

The Regional Seas Conventions (RSCs) vary in their approach to fisheries.

OSPAR had an ecological quality objective (EcoQO) that aims to maintain the spawning-stock biomass above precautionary reference points for commercial fish stocks where those were agreed by the competent authority for fisheries management. This EcoQO is strongly linked to the requirement of Descriptor 3 for stocks to remain within safe biological limits, and to Indicator 3.2.1 of Commission Decision 2010/477/EU.

HELCOM adopted the Baltic Sea Action Plan (BSAP) in 2007, which urges the “competent fisheries authorities to take all the necessary measures to ensure that, by 2021, populations of all commercially exploited fish species are within safe biological limits, reach maximum sustainable yield (MSY), are distributed through their natural range, and contain full size/age range.” The BSAP text was clarified during the Ministerial Declaration in 2013: “populations of all commercially exploited fish and shellfish should be within safe biological limits, exhibiting a population age and size distribution indicative of a healthy stock and that Maximum Sustainable Yield shall be achieved by 2015 where possible and on a progressive, incremental basis at the latest by 2020 for all stocks”. The updated text shows consistency between the BSAP and the MSFD D3 in that it requires all species to be within safe biological limits, fish populations should reach MSY and exhibit a population that is indicative of a healthy stock.

In the Mediterranean, 11 ecological objectives are set by the Barcelona Convention (UNEP/MAP, 2012) and one objective applies to fisheries: Populations of selected commercially exploited fish and shellfish that are within biologically safe limits, exhibiting a population age and size distribution that is indicative of a healthy stock. The text is almost the same as that for Descriptor 3. The only difference is that instead of applying it to all commercially exploited stocks it applies only to selected stocks.

For the Black Sea the Strategic Action Plan (SAP) aims to preserve commercial marine living resources. The relevant EcoQO is split into two generic components:

- EcoQO 1a: Sustainable use of commercial fish stocks and other marine living resources;
- EcoQO 1b: Restore/rehabilitate stocks of commercial marine living resources.

### **The "climate sensitivity"**

Fish stocks have a high level of climate and subsequent environmentally driven sensitivity. Short- and long-term trends in weight and maturity are frequently observed across a range of species, especially in recent years. The difficulty in predicting the trends in future climate-driven effects means that reference points should be based on recent productivity. Brunel *et al.* (2010) have shown how environmental Harvest Control Rules (eHCRs) can be developed with  $F_{MSY}$  varying according to environmental conditions. They tested such eHCRs and found that the benefits were the greatest for stocks with the strongest environment–recruitment relationship.

Distribution has been shifting northwards for many fish stocks. This may be linked to changes in sea temperature, although the trend is not uniform across stocks (ICES, 2013). Furthermore, in areas where species cannot shift their range further, it is possible that some species will be lost. The Mediterranean, for example, might become a more homogenous tropical-like ecosystem with likely loss of cold-water species (MARBEF, 2013). Regular updates of assessments and management reference points ensures that such variation is taken into account.

### **Definition of GES**

#### **Aggregation method(s) considered**

In relation to GES, aggregation criteria have not been considered previously. A recent study by Borja *et al.* (2014) discusses the various aggregation issues. For the MSFD in general and Descriptor 3 in particular, these issues may apply to the following:

- Across stocks per indicator;
- Across indicators within criteria;
- Across criteria within descriptors;
- Across descriptors.

Several relevant examples of aggregation in the context of Descriptor 3 exist (e.g. Probst *et al.*, 2013; ICES, 2014a, 2014b).

Prioritization of criteria (e.g. 3.1 vs. 3.2 or 3.3) can be considered for simplicity, communicability and cost-efficiency in analysis and monitoring. However, this should not compromise comprehensiveness (state indicators) or integration of cumulative effects (pressure indicators).

## Reporting

The methodological standards to report on the status of Descriptor 3 against GES contain guidance on:

- 1) The selection of a pragmatic suite of species that represent “all commercially exploited fish and shellfish” for each MSFD (sub)region. It is important to note that for stocks that straddle national boundaries there should not be a national selection of species alone;
- 2) The recording of all relevant sources of information that provide information for the assessment of status against three criteria of GES;
- 3) The reporting of the status against GES for each of these criteria separately.

Article 9(3) of the MSFD states: *“Criteria and methodological standards to be used by the Member States, which are designed to amend non-essential elements of this Directive by supplementing it, shall be laid down, on the basis of Annexes I and III, in accordance with the regulatory procedure with scrutiny referred to in Article 25(3) by 15 July 2010 in such a way as to ensure consistency and to allow for comparison between marine regions or subregions of the extent to which good environmental status is being achieved.”*

The proposed reporting fulfils the requirements of the methodological standards in that it (1) ensures consistency, (2) allows comparison between marine regions or subregions, and (3) reports the extent to which good environmental status is being achieved over time.

Reporting of each criterion separately also has the advantage of avoiding the need to take arbitrary decisions on the preferred aggregation method. Each aggregation method will deliver a different outcome and there is no scientific basis to favour one method over another.

Moreover, from a transparency point of view and also as a guide to management, aggregation across criteria may obscure or hide the reasons for failing to reach GES. Applying the proposed reporting approach for each criterion separately therefore seems the best solution. Examples of this kind of reporting can be found in ICES advice on Descriptor 3 (ICES, 2014a).

## 2. Results of the Article 12 assessment (including in-depth assessment)

### Descriptor

All EU Member States defined GES for Descriptor 3; however, only four did so at the descriptor level. Although GES definitions were not directly comparable between EU Member States, none were defined in a way that significantly deviated from those provided in the Commission Decision 2010/477/EU. Most EU Member States applied criteria 3.1 and 3.2 and a more limited, but still noticeable, number applied Criterion 3.3.

#### Criterion 3.1 – Level of pressure of the fishing activity

All EU Member States applied Indicator 3.1.1 “Fishing mortality (F)” and each of these used the fishing mortality at maximum sustainable yields ( $F_{MSY}$ ) in their GES definition, except one Member State that used a proxy for  $F_{MSY}$  ( $F_{0.1}$ ). Most countries have GES definitions which do not require either explicitly or implicitly that all stocks are exploited at or below  $F_{MSY}$ . Two EU Member States used  $F_{MSY}$  as an environmental target value rather than as a limit or boundary for GES. For those stocks for which F could not be determined seven EU Member States applied the secondary Indicator 3.1.2 “Catch/biomass ratio”. One Member State also provided a third indicator, “Catch per unit effort (cpue)”. Moreover, three EU Member States included the “exploitation rate” indicator and set a threshold level of  $E = 0.4$ , which is appropriate for small pelagic species. This approach is followed for the GFCM assessed stocks.

#### Criterion 3.2 – Reproductive capacity of the stock

For Criterion 3.2, most EU Member States have covered the primary Indicator 3.2.1 “Stock-spawning biomass SSB”, but using different reference points:  $SSB_{MSY}$ ,  $SSB_{pa}$ , or  $MSY B_{trigger}$ . Other EU Member States implicitly applied precautionary approach levels by stating that stocks need to be within safe biological limits. Six EU Member States also applied the secondary Indicator 3.2.2 “Biomass indices”. One Member State proposed an alternative secondary indicator based on trends of survey abundance.

#### Criterion 3.3 – Population age and size distribution

Criterion 3.3 is the least developed criterion for Descriptor 3 and still needs further methodological development.

### Regional coherence for Descriptor 3

There are few specific regional differences to highlight. Only Mediterranean EU Member States applied the indicator exploitation rate (E) for small pelagic species. Criterion 3.3 was proportionally used least in the Northeast Atlantic; the Mediterranean and Baltic Member Countries applied this criterion more often.

### 3. Analysis of the current text of the Decision

Taking into account that the Decision text should be simplified and contain legal text only it is recommended that some sections providing background information or technical explanations should be deleted and moved to a guidance document (e.g. Staff Working Paper) where they can be further developed. **Such text is marked with strike-through text below. Amendments have been made both in the strike-through text sections and in the remaining text.**

Furthermore, a major revision of Criterion 3.3 is proposed based on three properties of the “population age and size distribution that is indicative of a healthy stock” and at least three (primary) indicators for these properties. Each of the initial indicators for 3.3 (except 3.3.2) are potential candidates, while at least one new indicator describing the “Selectivity pattern of the fishery exploiting the species” (pressure indicator) should be selected. The Indicator 3.3.2 “Mean maximum length across all species found in research vessel surveys” was considered not appropriate to Descriptor 3 and possibly more relevant to describe biodiversity of the wider fish community (i.e. beyond the commercial fish species) addressed in Descriptor 1 (ref. Section 4.2.1).

With these comments the present Decision text could be amended as follows:

**Descriptor 3:** Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.

This section applies for all the stocks covered by Council Regulation (EC) No. 199/2008 (within the geographical scope of Directive 2008/56/EC) and similar obligations under the common fisheries policy. For these and for other stocks, its application depends on the data available (taking the data collection provisions of Council Regulation (EC) No. 199/2008 into account), which will determine whether it is appropriate to use primary or secondary indicators. For Descriptor 3, the three criteria for assessing progress towards good environmental status, as well as the indicators related respectively to them, are mentioned below.

#### Criterion 3.1 – Level of pressure of the fishing activity

*Primary indicator.* The primary indicator for the level of pressure of the fishing activity is the following:

- Fishing mortality (F) (Indicator 3.1.1).

Achieving or maintaining good environmental status requires that F values for stocks are equal to or lower than  $F_{MSY}$ , the level capable of producing maximum sustainable yield (MSY). In mixed fisheries and where ecosystem interactions are important, long-term management plans may result in exploiting some stocks more lightly than at  $F_{MSY}$  levels in order not to prejudice the exploitation at  $F_{MSY}$  of other species (EU, 2006).

~~F and  $F_{MSY}$  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)  $F_{MSY}$  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  $F_{MSY}$  is available can be included in the assessment against GES, using this indicator.~~

*Secondary indicators* (if analytical quantitative assessments yielding values for F are not available):

- Ratio between catch and biomass index (hereinafter “catch/biomass ratio”) (Indicator 3.1.2).

This is a typical secondary indicator for which there is a limited scientific basis to set any reference points. For assessment purposes an appropriate method for trend analysis can be adopted (e.g. the current value can be compared against the long-term historical average).

#### Criterion 3.2 – Reproductive capacity of the stock

*Primary indicator.* The primary indicator for the reproductive capacity of the stock is:

- Spawning-stock biomass (SSB) (Indicator 3.2.1).

Achieving or maintaining good environmental status requires that SSB values are equal to or above  $SSB_{MSY}$ , the level capable of producing maximum sustainable yield (MSY).

~~SSB and  $SSB_{MSY}$  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 SSB and (proxy of)  $SSB_{MSY}$  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.~~

~~Further research is needed to address the fact that the values of SSB corresponding to MSY, estimated for each stock in isolation, may not be achieved for all stocks simultaneously due to possible interactions between them.~~

~~Where current knowledge does not allow for estimation of a reliable value for  $SSB_{MSY}$ , an alternative reference point at which there is a high probability that the stock is able to replenish itself under the prevailing exploitation conditions may be set by the international scientific bodies, to be used for the purpose of this criterion in the assessment against GES with this indicator.~~

~~Only stocks for which a recent value of SSB and an agreed value for  $SSB_{MSY}$  is available can be included in the assessment against GES, using this primary indicator.~~

*Secondary indicators* (if quantitative assessments yielding values for SSB are not available):

— Biomass indices (Indicator 3.2.2).

This is a typical secondary indicator for which there is as yet limited scientific basis to set any reference points. For assessment purposes an appropriate method for trend analysis needs to be adopted (e.g. the current value can be compared against the long-term historical average).

~~Alternative indices may be obtained for the fraction of the population that is sexually mature.~~

### **Criterion 3.3 – Population age and size distribution**

This criterion should reflect that healthy stocks of many species are characterized by a high proportion of old, large individuals. The current four indicators are difficult to use at present to assess GES; however, they do provide a way of assessing change. Data collection for these indicators should be maintained for the time being, but the indicators should not be used in evaluating GES.

Specifically, new indicators for Criterion 3.3 are needed to take account of varying selectivity patterns in commercial catches. This new suite of indicators should aim to capture three relevant properties that describe or are directly linked to this criterion.

Size distribution of the species (state)

- Proportion of fish larger than the mean size of first sexual maturation (former Indicator 3.3.1).
- 95th percentile of the fish length distribution observed in research vessel surveys (former Indicator 3.3.3).

Selectivity pattern of the fishery exploiting the species (pressure)

- Length (or age depending on data availability) at first capture (length/age at which 50% of fish are vulnerable to/retained by the gear).
- Proportion of fish in the catch larger than size at which 50% is mature.
- Mean length in the catch.

Genetic effects of exploitation on the species (state)

- Size at first sexual maturation (former Indicator 3.3.4).
- Length at which half of the (female) population are mature (50% of total length – TL50).

#### 4. Methodological standards for monitoring and assessment in relation to GES

Different aspects of the methodological standards required for the assessment of Descriptor 3 in relation to GES are considered in each of the sections below. The assessment should be based on a common four-step approach:

- 1) Prepare a list of commercially exploited fish and shellfish stocks in the relevant marine region, to be used for the assessment of Descriptor 3, and provide the rationale for the selection of species/stocks.
- 2) Catalogue and document the available information for each of the species/stocks selected for the Descriptor 3 assessment.
- 3) Evaluate the stock status against the three GES criteria mentioned in EC Decision 2010/477/EU (EU, 2010), i.e. Criterion 3.1 (level of pressure of the fishing activity), Criterion 3.2 (reproductive capacity of the stock), and Criterion 3.3 (population age and size distribution) by stock and/or species-functional group (i.e. pelagic, demersal/benthic, shellfish, elasmobranch, deep water).
- 4) Determine the overall status and identify issues, problems, gaps, and links to other MSFD descriptors (e.g. D1 – Biodiversity and D4 – Food webs), together with any additional monitoring needs.

#### **Selection of commercially exploited fish and shellfish**

It is important to adopt a practical and common sense approach based on the commercial species monitored under the DCF, potentially involving three spatial scales:

- Local species relevant at a national level;
- (Sub)regional species with a distribution area that maps entirely or sufficiently to that region;
- Straddling or highly migratory species occur in several subregions and may be exploited by fisheries based in remote MSs (outside the subregion). Because of their often high landings compared to the (sub)regional species inclusion of these species may severely affect the outcome of the assessment.

This should result in the selection of a suite of species for which exploitation is considered to have significant importance for the (sub)region.

The ICES FishStat and/or FAO annual statistics can be used as an aid to determine the importance of each species based on their relative contribution to the landings. To that end a minimum threshold (e.g. >1% or >0.1%) over the landings in the last five (or more) years can be applied. Species that do not meet this threshold but are considered important (e.g. salmon in the Baltic Sea) can still be included. With the full introduction of the landings obligations, the process used to support the determination of the importance of each species should be reviewed to ensure that proper quantities in terms of catches are being used.

Finally, consideration could be made as to whether a species that presently occurs at a low level (e.g. due to overexploitation) but with historically high landings, should be included in the suite of species.

#### **Available information**

For each of the species in the selected suite of species, the available sources of information need to be recorded (Table 1).

**Table 1. Methodological standards for commercially exploited fish and shellfish. I: Assessment of the status of the marine environment, II: monitoring, and III: environmental targets.**

CRITERIA	AVAILABLE STANDARDS FOR	SOURCE	REFERENCE	REGIONAL COVERAGE/ COMMENTS
Fishing mortality (F) (3.1.1).  F values are equal to or lower than $F_{MSY}$ , the level capable of producing maximum sustainable yield (MSY).	I, II, III	CFP	Quantitative stock assessment done by ICES, GFCM, STECF, and ICCAT on data collected under DCF (EU, 2008a)	EU/Quantitative stock assessments are not available for all stocks and considerable differences in data availability exist between (sub)regions. Data deficiencies often result in the use of agreed approximations of $F_{MSY}$ rather than $F_{MSY}$ .
Ratio between catch and biomass index (hereinafter catch/biomass ratio) (3.1.2).  The catch/biomass ratio yielding MSY can be taken as an indicative reference.	II	CFP	Data collected under DCF (EU, 2008a)	EU/Stock production-based assessments are not available for all stocks.
Spawning-stock biomass (3.2.1).  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 $SSB_{MSY}$ , an appropriate reference point (identical for all regions) needs to be identified by the authoritative institutions. ICES has selected $MSY B_{trigger}$ for this purpose.	I, II, III	CFP	Quantitative stock assessment done by ICES, GFCM, STECF, and ICCAT on data collected under DCF (EU, 2008a)	EU/Quantitative stock assessments are not available for all stocks and considerable differences in data availability exist between (sub)regions.
Biomass indices (3.2.2).  For assessment purposes an appropriate method for trend analysis needs to be adopted (e.g. the current value can be compared against the long-term historical average).	II	CFP	National and international data collection and monitoring programmes under DCF (EU, 2008a)	There is limited scientific basis to set reference points for GES assessment. Time-series of indicators are not available for all stocks.

At present there is no boundary in terms of the proportion of species and/or landings that needs to be met for any of the criteria to meet a quality standard. However, each EU Member State should report for each MSFD (sub)region these metrics of quality together with the indicators for each of the criteria.

#### Further development of indicators

##### Criteria 3.1 and 3.2

The indicators listed under criteria 3.1 and 3.2 are operational and can be implemented.

- Fishing mortality (F) (Indicator 3.1.1);



- Catch/biomass ratio (Indicator 3.1.2);
- Spawning-stock biomass (SSB) (Indicator 3.2.1);
- Biomass indices (Indicator 3.2.2).

### Criterion 3.3

The current four indicators are difficult to use at present to assess GES, but do provide a way of assessing change. Data collection for these indicators should be maintained for the time being but not used in evaluating GES.

Any new indicators should capture three relevant properties that describe or are directly linked to this criterion:

- **Size distribution of the species** (state);
- **Selectivity pattern of the fishery exploiting the species** (pressure);
- **Genetic effects of exploitation on the species** (state).

The indicators proposed in the initial Commission decision are related to the newly proposed properties of Criterion 3.3 as described above. One “best indicator” needs to be selected for each property based on appropriate criteria. This may be a new and better indicator or one of the previous indicators.

These three properties of the “population age and size distribution that is indicative of a healthy stock” and the provisional suggestions for indicators from the workshop (ICES, 2014c) should be the basis for a process involving one or more further workshops aimed to select at least one “best” indicator for each property. If problems are expected in terms of data availability to calculate these preferred (primary) indicators for enough species/stocks to be representative for the (sub)region, an additional (secondary) indicator should be proposed similar to the approach for criteria 3.1 and 3.2.

**Reference points**

For the primary indicators (i.e. F and SSB) the appropriate reference points are adopted from international scientific bodies (i.e. ICES, GFCM, STECF, and ICCAT) for internationally managed stocks.

**5. GES methodological standards (in accordance with Art. 9.3)**

There are several issues to consider when assessing Descriptor 3 against GES and reporting on the status for as many as possible of the species identified, based on the best available information. The main issues involve (1) the selection of species/stocks to be included in the analysis, (2) the assessment against GES based on the proposed indicators and their reference points, and (3) the aggregation method(s) used. The first two issues are addressed in the tables below.

**Table 2. Selection of indicators.**

CRITERIA	CRITERION 3.1 LEVEL OF PRESSURE OF THE FISHING ACTIVITY	CRITERION 3.2 REPRODUCTIVE CAPACITY OF THE STOCK	CRITERION 3.3 POPULATION AGE AND SIZE DISTRIBUTION
INDICATORS	<p><b>Primary indicators</b> The GES boundary should be defined for each primary indicator (see below), based on the selected reference points. The nature of this reference point (e.g. target or limit) and thus the setting of the GES boundary is directly related to the proportion of the stocks that should meet this boundary. The current lack of guidance on regional GES boundaries makes it difficult for EU Member States to assess GES.</p>		<p>The process of selecting (new) indicators (i.e. for Criterion 3.3) is ongoing. For some of these potential indicators it is possible to determine reference points. This needs to be considered in the selection process.</p>
	$F \leq F_{MSY}$	$SSB > MSY B_{trigger}$	
INDICATORS	<p><b>Secondary indicators</b> If the status of a species is already reported based on the primary indicator, no secondary indicator is required for that criterion. For the secondary indicators there are currently no known reference points.</p>		

**Table 3a. Recommendations for proposed status and quality of reporting (Criterion 3.1).**

CRITERION 3.1 PRIMARY INDICATOR	
Selection of stocks	All stocks for which a recent <sup>1</sup> value of F and an agreed <sup>2</sup> value for $F_{MSY}$ is available.
GES boundary	A species/stock should be exploited sustainably, consistent with high long-term yields. For the primary indicator this implies $F \leq F_{MSY}$ .
Status reporting	Aggregated to: Proportion of stocks (%) that meet GES. Aggregated to: Annual mean value of $F/F_{MSY}$ across all stocks.
Quality reporting	Aggregated to: Proportion of species <sup>3</sup> assessed against GES in relation to a suite of "All" commercial species. Aggregated to: Proportion of landings assessed against GES in relation to total landings.
<p><sup>1</sup> Preferably these should be annual values, but if this is not possible there needs to be an agreed<sup>2</sup> species-specific threshold lag of what can still be considered "recent".</p> <p><sup>2</sup> Agreed by the relevant international scientific institution. In the case of regional or widely distributed stocks this authority is ICES/GFCM/ICCAT, in the case of national stocks this is the EU Member State.</p> <p><sup>3</sup> If only one stock of a species consisting of several stocks is assessed against GES, this species is considered assessed.</p>	
CRITERION 3.1 SECONDARY INDICATOR	
Selection of stocks	All species for which a reliable <sup>1</sup> value of the indicator (i.e. catch/biomass ratio) can be calculated.
GES boundary	The mean of the most recent three years should be below the long-term historical average <sup>2</sup> .
Status reporting	Aggregated to: Proportion of species (%) that meet GES. Aggregated to: Annual mean of the indicator value/long-term mean indicator value across species.
Quality reporting	Aggregated to: Proportion of species <sup>3</sup> assessed against GES in relation to a suite of "All" commercial species. Aggregated to: Proportion of landings assessed against GES in relation to total landings.
<p><sup>1</sup> This requires an appropriate monitoring programme covering a large enough extent of the (sub)region in order to be representative, and with a catchability that allows an accurate estimation of species abundance. What can be considered "appropriate" needs to be determined by the relevant international scientific body. In the case of regional or widely distributed stocks this is ICES/GFCM/ICCAT.</p> <p><sup>2</sup> Appropriate period depending on the monitoring programme.</p> <p><sup>3</sup> If only one stock of a species consisting of several stocks is assessed against GES, this species is considered assessed.</p>	

**Table 3b. Recommendations for proposed status and quality of reporting (Criterion 3.2).**

CRITERION 3.2 PRIMARY INDICATOR	
Selection of stocks	All stocks for which a recent <sup>1</sup> value of SSB and an agreed <sup>2</sup> value for SSB <sub>MSY</sub> is available.
GES boundary	A species/stock should have an SSB >MSY B <sub>trigger</sub> <sup>3</sup> .
Status reporting	Aggregated to: Proportion of stocks (%) that meet GES. Aggregated to Annual mean value of SSB/MSY B <sub>trigger</sub> across all stocks.
Quality reporting	Aggregated to: Proportion of species <sup>4</sup> assessed against GES in relation to a suite of "All" commercial species. Aggregated to Proportion of landings assessed against GES in relation to total landings.
<p><sup>1</sup> Preferably these should be annual values, but if this is not possible there needs to be an agreed<sup>2</sup> species-specific threshold lag of what can still be considered "recent".</p> <p><sup>2</sup> Agreed by the relevant international scientific body (ICES/GFCM/ICCAT).</p> <p><sup>3</sup> Other reference points (&gt;MSY B<sub>trigger</sub>) can also be applied. In that case, however, it is not realistic to require ALL stocks to meet this reference point. The proposed "Reporting" indicators can still be calculated, albeit resulting in different values.</p> <p><sup>4</sup> If only one stock of a species consisting of several stocks is assessed against GES, this species is considered assessed.</p>	
CRITERION 3.2 SECONDARY INDICATOR	
Selection of stocks	All species for which a reliable <sup>1</sup> value of the indicator (i.e. biomass index) can be calculated.
GES boundary	The mean of the most recent three years should be above the long-term historical average <sup>2</sup> .
Status reporting	Aggregated to: Proportion of species (%) that meet GES. Aggregated to: Annual mean of the indicator value/long-term mean indicator value across species.
Quality reporting	Aggregated to: Proportion of species <sup>3</sup> assessed against GES in relation to a suite of "All" commercial species. Aggregated to: Proportion of landings assessed against GES in relation to total landings.
<p><sup>1</sup> This requires an appropriate monitoring programme covering a large enough extent of the (sub)region to be representative, and with a catchability that allows an accurate estimation of species abundance. What can be considered "appropriate" needs to be determined by the relevant international scientific body (ICES/GFCM/ICCAT).</p> <p><sup>2</sup> Appropriate period depending on the monitoring programme.</p> <p><sup>3</sup> If only one stock of a species consisting of several stocks is assessed against GES, this species is considered assessed.</p>	

**Table 3c. Recommendations for proposed status and quality of reporting (Criterion 3.3).**

CRITERION 3.3 INDICATORS	
Selection of stocks	All species for which a reliable <sup>1</sup> value of each of the indicators can be calculated.
GES boundary	GES boundaries cannot be set for these indicators at present.
Status reporting	Monitoring should be maintained.
Quality reporting	Not applicable at present.

<sup>1</sup> This requires an appropriate monitoring programme covering a large enough extent of the (sub)region to be representative, and with a catchability that allows an accurate estimation of species abundance. What can be considered “appropriate” needs to be determined by the relevant international scientific body (ICES/GFCM/ICCAT).

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

Addressed above.

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

Addressed above.

**8. Rationale and technical background for proposed revision**

Core group and Workshop discussions.

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

Common Understanding Document, draft 22 September 2014.

ICES. 2014. Advice basis, May 2014. *In* Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 1, Section 1.2. <http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2014/2014/1.2 Advice basis 2014.pdf>.

**10. Reference documents**

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- ICES. 2015. Report of the Workshop on guidance for the review of MSFD decision descriptor 3 – commercial fish and shellfish II (WKGMSFDD3-II), 10–12 February 2015, ICES Headquarters, Denmark. ICES CM 2015\ACOM:48. 31 pp.
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### 1.6.2.1 EU request on revisions to Marine Strategy Framework Directive manuals for Descriptors 3, 4, and 6

#### Advice summary

Revisions to three MSFD manuals were carried out based on the results of three workshops. These revisions are annexed in the requested format to this advice. Broadly these revisions have followed the templates and texts supplied to ICES following discussion by the EU's Working Group on Good Environmental Status. For Descriptors 3 and 4, no major changes were made to the manuals, but revision was deeper for Descriptor 6 following comments from many EU Member States. EU Member States (supported by the European Commission) asked also for advice on the next steps for implementation of the Descriptors for the period 2015–2018.

#### Request

*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 organised and steered the process. ICES has been responsible for the relevant work related to the review of the descriptors D1 (biodiversity), D3 (fisheries), D4 (food webs), D6 (sea-floor integrity) and D11 (noise). For D1, ICES had to coordinate the process with JRC and for D11 the work has built on the continued work of the Technical Group on Noise (TG Noise). During the first phase of the review process ICES had to prepare draft documents for each of the above-mentioned descriptors, provide recommendations for revision of the technical issues of the Decision with a proposed draft text with changes and the rationale for these changes to the Commission and provide feedback to WG GES which is the forum to oversee the organisation and planning of the technical review process.*

*For the finalisation of the first phase of the GES review, ICES is therefore requested to provide an offer covering the following tasks:*

- a) consolidate all comments (technical and on policy issues) received from WG GES and DG ENV on the draft documents for each of the above-mentioned descriptors;*
- b) if necessary, organise targeted meetings of expert groups from all interested EU member states and Regional Sea Conventions to address outstanding technical issues identified in the review process (particularly following DG ENV guidance on the ToR and agenda of the meetings);*
- c) provide reports of the targeted expert meetings;*
- d) revise documents after input received during the cross-cutting workshop (see (ii) below) and during the targeted expert meetings;*
- e) finalise draft documents per descriptor (or via combined descriptors, where agreed), providing recommendations for revision of the Decision with a proposed draft text with changes and the rationale for these changes to the Commission by 25 March 2015;*
- f) provide feedback on the work undertaken to WG GES in April 2015 which is the forum to oversee the technical review process.*

#### Elaboration on ICES advice

The manuals for the Descriptors 3, 4, and 6 were revised (from versions provided in October 2014) to differing extents, dependent largely on feedback received from EU Member States and the Regional Seas Conventions, and on comments from the European Commission.

For Descriptor 3, the greatest changes were in the approaches to Criterion 3.3 on fish population, age and size distribution. This criterion requires further development; monitoring should continue, but the results cannot presently be used to evaluate GES. An approach is suggested for the development of this criterion.

For Descriptor 4, the concept of “trophic guild” was clarified; further guidance was provided on GES criteria and methodological standards.

Descriptor 6 required considerable further revision. The suggestion for a fairly radical overhaul of the criteria met much resistance in feedback and was difficult to support with current science. The concept of switching to an approach based on functionality and recoverability should not be lost for future work. These concepts though are difficult to make

operational with the current evidence base. The manual has therefore been rewritten to update and improve the current approach of damage to the seafloor and condition of benthic community. In particular, forms of pressure on the seafloor other than physical damage and functional aspects of the benthic community have been further emphasized.

The work on Descriptor 1 was taken over by JRC and that on Descriptor 11 has been carried out by TG Noise.

## Suggestions

### Next steps for implementation of the GES Descriptors for the period 2015–2018

In response to requests from EU Member States, and informally from the European Commission, ICES recommends the following as next steps to aid implementation of Descriptors 1, 3, 4, and 6 of the MSFD.

#### Cross-cutting work

1. Gaps and overlaps across descriptors. The challenges when considering state (including biodiversity) and function need to be considered across Descriptors 1, 3, 4, and 6. The concepts of trophic guild, taxonomic grouping, habitat type, and fish stock need to be combined in a way that accounts for the functional requirements of the state descriptors to ensure efficient implementation of the MSFD. This scientific work is needed before the revision of the Commission decision is finalized; it is therefore relatively urgent. ICES recommends a preparatory project, followed by a final 4- to 5-day workshop to agree ways to reconcile functionality with conservation objectives in state descriptors. The outcomes of the workshop should be internationally peer-reviewed.
2. Aggregation within Descriptors 3, 4, and 6 (including spatial integration). Further guidance is required by EU Member States (and European bodies) on approaches to aggregate indicators proposed to assess Descriptors 3, 4, and 6. Aggregation of assessments of different indicators should take the varying qualities of each indicator into account, both in terms of their pressure–state relationships and to the levels of uncertainty in their estimation. The issue of spatial extent in relation to overall assessment should also be considered. This guidance is needed for the 2018 reporting round and should be carried out by the Regional Seas Commissions as a combination of science and management decisions. ICES would be able to help in providing science support and comparing regional responses.

#### Descriptor 3

ICES recommends developmental work to underpin the implementation of Criterion 3.3 and proposes a preliminary suite of candidate indicators (see Annex 1). These indicators capture three relevant properties representing the state of fish populations and pressure exerted on those populations: i) size distribution of the species (state), ii) selectivity pattern of the fishery exploiting the species (pressure), and iii) genetic effects of exploitation on the species (state).

The following steps, involving a series of workshops, are required to make these proposals operational before 2017:

1. Indicator selection and evaluation against ICES criteria (ICES, 2014a, 2014b) using selected representative fish stocks. The selected stocks should exhibit different characteristics (e.g. long-lived, short-lived, pelagic, demersal, elasmobranchs) and be selected from a range of regions with the aim to select one validated indicator per property. The selection of example stocks should consider data availability, the stock dynamics should exhibit contrast (both in terms of productivity and exploitation). Data will be collated using a formal data call and should include both catch/landings and age-at-length data, and survey information. Guidelines will be provided on the type of stocks for which each indicator is relevant. Workshops with scientists with experience in fisheries science from across Europe will be needed. The properties of underlying data, knowledge base, construction of operational indicators, and sensitivities to underlying assumptions will be explored.
2. Evaluation of GES for Criterion 3.3 for selected stocks. Primary indicators will be processed similar to those in criteria 3.1 and 3.2; where the knowledge on the characteristics of the indicator and its reference level should enable the identification of the requirements for GES. Secondary indicators will also be considered. Workshops will be needed and would follow step 1.
3. Applying methods for Criterion 3.3 to regional evaluations. Taking the methods developed to make an evaluation of GES using example regions to further test the applicability of the approaches. This may be possible at a workshop under Step 2 above or could be included as part of the work of ICES integrated ecosystem assessment groups.



## Descriptor 4

ICES recommends further developmental work to underpin the implementation of Descriptor 4 and proposes that the challenges need to be addressed in the following ways:

1. Uncertainty and GES. Three major sources of uncertainty affect the ability to determine Descriptor 4 indicator bounds (and similarly for other descriptors) and the interpretation of change in indicators in relation to GES: i) statistical uncertainty with respect to measuring indicators, ii) uncertainty reflecting whether the values for indicators relate to desirable or undesirable states, and iii) how direct and indirect linkages between indicators and pressures affect Descriptor 4 indicator behaviour. Building upon existing projects, ICES recommends an international peer-reviewed advisory process to provide methods to address these issues for all recommended indicators (see Annex 2) in 2016.
2. Consistent regional and pan-regional interpretations of indicators, limits, and estimation methods. ICES notes the suggestion to bring together experts to progress consistency in interpretation is important both within and between regional seas (HELCOM–OSPAR, 2014). If requested, existing ICES working groups could be tasked with developing agreed international guidelines to ensure consistent interpretations of indicators, limits, and estimation methods in 2016–2017 in order to feed through to EU-wide assessments.
3. Further development of Descriptor 4 indicators. This work is required to consider the differing influences of environmental variability and anthropogenic activity on considerations of GES for Descriptor 4. Indicator development should specifically investigate the role of lower trophic guilds on the likely assessment of GES for Descriptor 4, the role of size in foodweb stability, and management strategy evaluations of the sensitivity of Descriptor 4 indicators to anthropogenic pressures. Much of this work should be carried out through projects, but a workshop to bring together the outputs of the projects and updating the foodweb advice should be planned for 2017.

## Descriptor 6

ICES recommends further developmental work to underpin the implementation of D6 and proposes the following actions:

1. Develop and test standards for assessing human pressures on benthic habitats within and between MSFD regions. ICES in collaboration with the RSCs can provide peer-reviewed guiding principles that ensure alignment between GES boundaries for seafloor integrity to support regional indicator development and to avoid conflicting results between regions.
  - Identify where the collection of additional information is needed (ICES working groups are evaluating this for the OSPAR area; similar processes are needed for other regional seas);
  - Agree the list of key functions to be addressed across and within MSFD regions using the recommended Descriptor 6 indicators;
  - For each indicator, evaluate the applicability of existing concepts for setting GES boundaries and where possible identify critical values that could be used for these boundaries. This will need a dedicated workshop in 2017.
2. Habitats and issues of scale. Long-term action is needed to select habitats and address the role of scale and of connectivity in setting GES boundaries for the sea-floor. This work could take place in one workshop in 2018 and would include:
  - Agreeing the list of habitats to be assessed;
  - Resolving issues of scale by defining, e.g. at what EUNIS hierarchical level habitats are going to be addressed.
3. Assessment of recoverability of seafloor integrity. No standards or methods exist for this key attribute of marine ecosystems. Development of such standards could be carried out in a project.

## Basis of the advice

The European Commission is in the process of reviewing and potentially revising the Decision on criteria and methodological standards on good environmental status of marine waters (EU, 2010).

As part of this process, ICES was tasked in early 2014 with Descriptors 3 (Populations of commercially exploited fish and shellfish), 4 (Foodwebs), and 6 (Sea-floor integrity). A series of workshops held in autumn 2014 provided guidance reports with dedicated recommendations (ICES, 2014a, 2014c, 2014e). The results of the workshops were used to update “templates” provided by the European Commission to form first drafts of Descriptor “manuals” (ICES, 2014b, 2014d, 2014f). Following a meeting of the MSFD Common Implementation Strategy Working Group on Good Environmental Status (WGGES) in October 2014, further work and clarification was requested from ICES in December 2014 (see request

below). As a result further workshops were held in Copenhagen in February 2015 (ICES, 2015a, 2015b). The results of these second workshops have been used in updating the templates (attached as Annexes 1–3).

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**Annex 2****Possible approach to amend Decision 2010/477/EC**

## Descriptor 4: Food webs

<b>Author</b>	<b>Version</b>	<b>Date</b>
Milieu-Nature Bureau	V 1	09 May 2014
DG Environment	V1.2	30 May 2014
ICES D4 science team	V2	15 August 2014
ICES D4 science team (post WK)	V3	30 September 2014
ICES D4 review	V4	20 March 2015

## Possible approach to amend Decision 2010/477/EC

### Descriptor 4: Food webs

Title of Descriptor
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*Good environmental status for Descriptor 4 – Food webs*

All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity (EU, 2008).

1. Approach
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#### Definition of the Descriptor

The Descriptors 1 (Biodiversity *per se*), 4 (Food webs), and 6 (Sea-floor integrity) are frequently addressed together as the “biodiversity theme.” They are all influenced by multiple pressures and impacts (as listed in Annex 3 of EU, 2010), 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, Descriptor 3 (Commercial fish and shellfish) is strongly linked to the biodiversity theme, especially in relation to the status of fish stocks and how these influence food webs. The Directive separates these issues into separate GES descriptors.

Descriptor 4 aims to cover the structure and function of marine food webs, including the abundance and productivity of species/groups at different trophic levels. Usually environmental influence has a high impact on food web structure and function. Current scientific understanding is such that the effects of anthropogenic pressures are often difficult to distinguish from 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 usually beyond current understanding and available tools (ICES, 2014a).

The following aspects of the Annex I definition (EU, 2010) are defined in further detail:

**‘All elements’** considers all components of the food webs, ‘i.e. all trophic and functional groups, comprising either one or several species. This potentially includes all living organisms and non-living organic components’ (Rogers *et al.*, 2010).

**‘Food webs’** are defined as ‘networks of feeding interactions between consumers and their food’ (Rogers *et al.*, 2010).

**‘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 food webs have already been adversely affected by humans. The thresholds set for indicators should ensure that the populations of selected food web 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.

**‘To the extent that they are known’** – This has been interpreted by the Task Group 4 (Rogers *et al.*, 2010) as follows: ‘While examination of food webs should in principle include “all elements”, for practical purposes it would include only those food web components that can effectively be sampled by established robust methods of monitoring’ (Rogers *et al.*, 2010).

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

There are few tools or frameworks in current use that focus specifically on food webs or trophic interactions between species. The **Habitats Directive (HD)**, **Birds Directive (BD)**, and the **Water Framework Directive (WFD)** do not explicitly refer to food webs, 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 food webs. Indicators of 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; Palialexis *et al.*, 2014).

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 (EU, 2013).

#### **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, Descriptors 3 (Commercial fish and shellfish), 5 (Eutrophication), and 8 (Contamination).

**HELCOM** is advanced in developing and agreeing on methods related to Descriptor 4. 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 (HELCOM, 2013): 20 core indicators have been developed for biodiversity, covering a range of aspects of Descriptors 1, 4, and 6. A number of HELCOM indicators relate directly to the Commission Decision indicators for Descriptor 4, 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** is developing ‘common indicators’ for MSFD assessments. To date three food web indicators have been adopted by the OSPAR Commission for one or more subregions. These are: Large Fish Indicator (FW3), Marine Trophic Index (FW4), and Plankton Lifeform Index (FW5). Work on more food web indicators and extension to more subregions is in progress. Indicators developed or under development for Descriptors 1 and 6 may also contribute to the assessment of Descriptor 4.

Both the **Black Sea** and the **Barcelona Conventions** have either not agreed on, or only just started a process to develop common indicators related to MSFD biodiversity descriptors (Descriptor 4 included); these are not yet operational.

#### **Definition of GES**

The current interpretation of the descriptor assesses whether the certain elements that make up the food web are present in a way that allow the ecosystem to be considered in good environmental status. Descriptor 4 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 food web. To achieve GES, the pressures from human activities should be managed in order to ensure the long-term abundance of the species in the food web and the retention of their full reproductive capacity. This poses a major challenge as scientific understanding is such that anthropogenic pressure is often difficult to distinguish from the environmentally influenced variability. In the absence of strong indicators reflecting pressure–state relationships, Descriptor 4 indicators can be treated as surveillance indicators (for monitoring change in the food web, see below for definition).

#### **The "climate sensitivity" for Descriptor 4 (or criteria/indicators)**

Marine food webs are extremely closely linked to natural variability. This makes Descriptor 4 particularly 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 Descriptor 4, together with associated considerations of GES, are very sensitive to climatic trends in a region.

## **2. Analysis of the implementation process**

### **GES definition**

According to the Commission Staff Working Document 2014 (EU, 2014), all EU Member States who have reported have defined GES for Descriptor 4. Only two EU 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 EU 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 subregions.

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/food webs were addressed.

Most EU Member States have referred to specific food web components in their GES definition, sometimes in addition to defining it for all food web components. In the Baltic region, most EU Member States have put an emphasis on fish

communities. Most EU Member States referred to components such as ‘key’ species or ‘functional groups’, and/or to ‘top predators’ or ‘species at the top of the food web’. Very few EU 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 EU Member States included a reference to the pressures of food web components, in particular fisheries.

#### **Criterion 4.1 – Productivity (production per unit biomass) of key species or trophic groups**

Three EU Member States have referred to energy transfers between trophic levels in their GES definition. Several EU 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 food webs**

Most EU 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 EU Member States. In the Mediterranean, three EU Member States have indicated that for Indicator 4.2.1 they will use the same threshold, requiring the weight of large fish caught by research vessels that are above a threshold length “ $L_{cut}$ ” to be above a percentage of the total weight “ $W_{lim}$ ”. 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 EU Member States. A few EU 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 EU Member States. 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 EU Member States has defined GES for Descriptor 4. To improve coherence, the Commission Report (EU, 2014) 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 State good practices**

A few EU Member States included specific species as indicators of change in their GES definition, including the harbour porpoise and the harbour seal. Some EU Member States have included a reference to the pressures on food web components, in particular fisheries (e.g. bycatch and discards). Some EU Member States have also included quantitative threshold values for certain criteria/indicators/species. Three EU Member States refer to energy transfers between trophic levels in their GES definition. Three EU 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 (“ $L_{cut}$ ”) to be above a percentage of the total weight (“ $W_{lim}$ ”). 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 Descriptor 4 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.

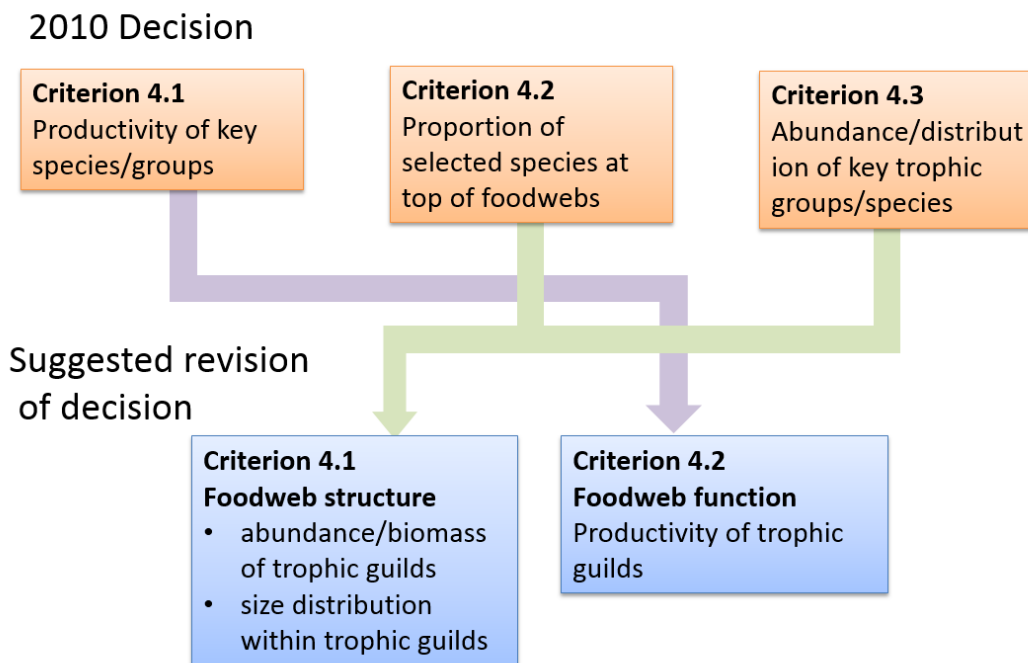
### **3. Analysis of the current text of the Decision**

- **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 food webs as described in the Directive and to create a simpler decision. The proposal is to merge the existing current three Descriptor 4 criteria to just two criteria (4.1 Food web Structure and 4.2 Food web Function). This is based on the current state of scientific

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understanding and a pragmatic approach to ongoing monitoring programmes. The categorization of food webs using taxonomy should be removed from the Decision and replaced with the concept of trophic guilds, meaning that the criteria should be applied across groups related to trophic interactions, e.g. trophic groups which are important recipients or providers of services to other trophic groups. 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:

Criterion 4.1 “Food web structure” – Abundance/biomass of, and size distribution within trophic guilds.

Criterion 4.2 “Food web 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 Criteria 4.2 and 4.3 into the new Decision Criterion 4.1, with associated explanation of the two new criteria.
- The concept of “trophic guild” and the indicative list of trophic guilds (ICES, 2014b). This is important as the guild approach is different from the taxonomic approach although it relies on almost identical monitoring information. Trophic guilds can refer to important prey groups (defined by who eats them) as well as predators (a group that eats the same thing).
- 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, preferably covering both lower and higher trophic levels. EU Member States can monitor as many guilds as deemed appropriate (with a minimum of three), but at least two non-fish guilds should be required to ensure that not only fish are 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 food web).
- The choice of trophic guilds is expected to reflect regional differences in priorities and ecosystem dynamics.
- Methodological standards for defining GES for Descriptor 4.

## 4. The issues

### Food webs characterized by structure and by function

The Task Group 4 report (Rogers et al., 2010), as well as the recent ICES Descriptor 4 advice (ICES, 2014a), have proposed that Descriptor 4 criteria should cover food web structure and function. The rationale for this is:

- A food web 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.

Food web structure and function are closely linked. There are several ways to characterize structure in a food web. For instance, by the relative abundances of its components or by the degree to which the components are connected to each other. The former can often be estimated and therefore could provide indicators. The connections in the structure of food webs may also provide information about transfer functions.

There are aspects of function that cannot be captured by structure indicators. For example, a given structure might exist and be consistent with differing rates of flow between components. Also, owing to delays in propagating perturbations through food webs, 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, where necessary, stimulate action.

The 2008 Directive wording for Descriptor 4 “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 food web 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 food web remains resilient. Further studies are needed to investigate this aspect, but current knowledge is insufficient to suggest appropriate indicators of resilience besides those related to structure and function.

### Trophic guilds and food webs

It would be exceedingly complex and very difficult to monitor and assess food web structure and function without considering trophic guilds. Food webs are complex, not only in structure but also in function. To monitor the degree to which they are affected by management therefore requires condensed information on food web status. This is most appropriately done by dividing the structure and function into compartments which share common features. For the food web, such compartments can be trophic guilds such as fish benthivores, fish planktivores, filter-feeding benthos, or omnivorous zooplankton (see Table 1 of indicative trophic guilds). The compartments can be classified as more or less important, depending on the services they supply, and are likely to vary regionally. There is some overlap between Descriptor 4 and Criterion 1.7 (Descriptor 1). Descriptor 4 is addressing functional aspects of ecosystems whereas Descriptor 1 is addressing the group’s “position” within ecosystem structure. The proposed approach does not exclude other approaches to determining trophic guilds, such as using information on taxonomy or habitat.



**Table 1. Indicative trophic guilds. X denotes where the taxonomic groups contribute significantly to each guild. Nekton includes bony fish, elasmobranchs, and squids.**

Guild\Taxonomic group	Phytoplankton <sup>1</sup>	Zooplankton	Benthos	Nekton excl. warm-blooded	Seabirds	Marine mammals
Primary producers	X					
Secondary producers		X				
Filter-feeders			X			
Deposit-feeders			X			
Planktivores			X	X	X	X
Sub-apex pelagic predators				X	X	X
Sub-apex demersal predators			X	X	X	X
Apex predators				X	X	X

<sup>1</sup>In shallower waters, macrophytes may also be important.

#### Descriptor 4 and criteria in relation to state/pressure

Descriptor 4 is classified as a state descriptor (see Common Understanding Document, draft 22 September 2014). There are direct links between some elements of marine food webs 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 the relationship between marine food webs and human pressures is complex and mainly indirect. Environmental influence has a high impact on food web 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 Descriptor 4 should be treated as surveillance indicators (for monitoring change in the food web); see definitions in Section 5 below.

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

Food web indicators differ from indicators of other descriptors in a number of ways. Many food web indicators have weak or indirect links to human pressure and may show substantial variation due to factors not related to anthropogenic activities. With such indicators, it is difficult or impossible to identify values of the indicator that are desirable or undesirable in relation to human impacts. Furthermore, indicators often reflect the desire to achieve a balanced ecosystem; having very high or very low indicator values can therefore be equally undesirable. This is in contrast to, for example, indicators for environmental contaminants, where an upper limit alone constrains the desired range of values. Finally, the desired level of a specific indicator may be related to avoiding undesirable effects on other ecosystem components and hence requires information and knowledge on the relationship between different food web components.

The aim of food web indicators is to monitor key aspects of the food web structure and function and, by doing so, gain evidence to better understand the relationship between the monitored aspect and other ecosystem components as well as pressure–state relationships for these indicators. Passing beyond limits of indicators should trigger action including, e.g. dedicated research to understand the cause of changes.

#### Definitions

**‘Food web surveillance indicators’** are defined as indicators of aspects of the structure or function of the food web, for which it is either not possible (through lack of evidence) to define limits based on knowledge of the system or where the link to anthropogenic pressures is weak or unclear, so direct management actions cannot be prescribed.

**'Limit'** defines the indicator value(s) at which a food web indicator changes between desirable and undesirable states. Food web indicators are defined as **'within limits'** when they are in the 'desirable state'. The target equates to the values or range of values that are 'within limits' and represent a 'desirable state'. Where limits are based on statistical analysis of time-series alone, or limited datasets, **'passing limits'** means moving into terra incognita, and not necessarily leaving the desirable state, thus requiring further research. See Section 6 for further guidance.

**'GES boundaries'** define the difference between GES and sub-GES in assessments of criteria and descriptors. The food web descriptor and the proposed criteria are considered essential and therefore GES boundaries apply to the descriptor as well as the criteria. GES boundaries are defined according to the assessments of an agreed set of indicators and according to agreed methods of aggregating these assessments. GES is measured for each food web criterion based on indicators under the criterion. The exact link between the number, level, and other aspects of the indicator that need to be 'within limits' in order to achieve GES depends on the specific aggregation methods that are used to combine indicator assessments and the methods used to set GES boundaries.

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

Limits for indicators can be determined by several methods.

A food web indicator may be associated with different combinations of available data with which to construct the indicator and knowledge about the relationship of the indicator with the food web components in the specific ecosystem. Each combination of knowledge and data availability requires associated guidance for setting indicator limits.

For many food web indicators, there is little knowledge about what values should be considered desirable or undesirable. In such cases, limits can be derived from the range of variation in the indicator, which is known from past time-series or from historical knowledge, where limits could be set at, for example, the maximum or minimum observed. Other options are available when more knowledge exists, including expert elicitation, empirical analysis, and modelling (see ICES, 2014a). Further statistical and modelling/simulation approaches are described in ICES (2015).

When the data and knowledge available is very limited, for example, when sampling has only just begun, appropriate limits can be suggested based on knowledge from similar ecosystems, theoretical considerations, or a desired direction of change. In all cases, the estimated limits are highly uncertain and this should be reported together with the indicator. Limits should be updated regularly as more information becomes available.

Where data exists and no undesirable effects have been observed, but knowledge of the direct relationship between the indicator and other ecosystem characteristics is limited, the indicator limits could be described by the observed range of known indicator values. Protocols should be in place such that when the indicator is not within limits, this triggers further investigation to determine the cause of the change as well as the effects on other ecosystem components. The likely impacting pressures should also be reviewed. As there is limited knowledge of the relationship between the indicator and other components, there is a possibility that undesirable effects occurred but were not recorded. This should be reflected in the reported uncertainty of assessments.

Where data exists and undesirable effects on other ecosystem components has been observed or is predicted based on solid knowledge of the direct relationship between the indicator and other ecosystem aspects, the range of indicator values associated with no (substantial) undesirable effects on other components should be used to set limits that denote the desirable range of indicator values. If the indicator is not within limits, action should be triggered. Action would involve further investigation to determine the cause of the deviation from the desired range, as well as the effect on other ecosystem components. The presence of (substantial) undesirable effects on ecosystem components can be determined based on a variety of measures. Ideally, the evaluation should include both analyses of historical data and investigation of model results.

Food web indicators are influenced by both natural and anthropogenic factors. To ensure that the limits continue to be relevant to the evaluation of GES, they should relate to current conditions of the ecosystem. For example, if the food web has exhibited pronounced regime shifts, the limit level should reflect the current regime rather than historical regimes. This conclusion also applies to the case where the regime shift is caused by excessive human pressure at an earlier time, for example when excessive removal of top predators has led to an increase in forage fish and a subsequent decrease of zooplankton (trophic cascade), but the system appears stable in the present regime. In this case, the current limit level for zooplankton biomass should reflect the current regime rather than a regime where predators have returned. If top predators are returning to the system, limit levels should be updated accordingly. When ecosystem trends are more gradual, which is often the case with the effect of climate change on food webs, a gradual change in the limit level should be implemented. Another example is the irreversible introduction of non-indigenous species with apparent disruption of food web structure and/or function. ICES suggests that "current conditions" might be re-evaluated once in the six-yearly MSFD cycle.

There are three types of uncertainty in determining the location of current state of the indicators relative to their limit or limits: uncertainty about the correct limit level, uncertainty about the bias and precision of the indicator estimated from data, and uncertainty about the effect of pressures on the indicator and hence about the potential effect of management measures. Ideally, the state of the indicator relative to the limit is determined from properly determined limit levels, an accurate estimate of the indicator, and a well-documented relationship between management, pressure, and indicator. In this case, pressures should be managed in accordance with the defined acceptable risk of falling outside limits.

In the case of food webs, one or more of these uncertainties are often considerable. In spite of this, the observed level of the indicator and the probability that the indicator is not within limits should be provided. If the estimated indicator is being measured with poor precision, there is a strong likelihood that the indicator will be recorded as outside the limits. It is important that this does not lead to revised (wider) limits. Instead, the frequent occurrence of indicators outside limits, or at high probability of being outside limits, should provide the incentive to improve the precision of the indicator. Where the link between management, pressure, and state of the indicator is poorly understood, assessments of such indicators should include explicit advice on (a) the probability of the indicator being outside the agreed limits, (b) the quality and reliability of the limits, and (c) the strength of the link with pressures and management.

#### **Interpretation of the term ‘to the extent that they are known’**

A strict interpretation of the requirement for all elements of the marine food webs 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 food web, 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 food web 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 food webs should be used, but the lack of detailed knowledge should not inhibit the monitoring of indicators of Descriptor 4. It is recommended that a minimum of at least three trophic guilds should be monitored by region, preferably covering both lower and higher trophic levels. Qualitative methods should be investigated where data is insufficient to estimate even the key aspects 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).

Further examples are explored in ICES (2015).

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

Food web indicators are grouped in two different types: surveillance indicators, where the limit levels are poorly defined or the link between state and manageable pressures is unclear or limited, and indicators with well-defined limit levels and well-described pressure–state relationships (management indicator). As a consequence of this, there are three options for defining GES for Descriptor 4:

- i. evaluating GES based only on indicators with clearly defined limit levels and well-described pressure–state relationships
- ii. providing separate evaluations for surveillance indicators and indicators with clearly defined limit levels and well-described pressure–state relationships
- iii. providing a joint evaluation of GES based on all indicators.

Each option has advantages and disadvantages (Table 2).

**Table 2. Advantages and disadvantages of the three potential options for evaluating GES.**

Option	Advantages	Disadvantages
GES evaluation based only on management indicators	GES is clearly linked to manageable pressures; management action therefore has the potential to affect the assessed status of Descriptor 4.	There are few management indicators for food webs and hence, GES for Descriptor 4 would be based on assessment of a small part of the food web, leading to potential misleading conclusions.
GES evaluation based on separate evaluations of management and of surveillance indicators	GES assessments based on management indicators is clearly linked to pressures and management action therefore has the potential to affect the assessed status of one aspect of Descriptor 4. GES assessments using surveillance indicators can provide information to help explain deviations from GES.	Having two types of indicator separately contributing to the evaluation of GES means that a single estimate of GES would be difficult. This could potentially complicate the presentation of GES across descriptors.
GES evaluation based on all indicators	One joint GES for Descriptor 4 can be estimated, integrating all indicators.	The GES assessment can be highly affected by non-manageable pressures. Descriptor 4 may be perceived as a descriptor that cannot be affected by management.

Regardless of which option is chosen, there are many indirect impacts and linkages between different food web components. For instance, rebuilt predator populations may cause cascading effects through the ecosystem or cyclic behaviour, in which case not even an undisturbed and perfectly monitored ecosystem will necessarily show all indicators within limits at a specific point in time. This aspect means that the application of simple aggregation or averaging rules across indicators (e.g. one out all out, % agreed targets) are not suitable for food web criteria. Indicators do not necessarily behave independently; many food web indicators are highly correlated. The degree of independence of indicators can be tested by quantifying the covariance and modelling indicator behaviour. Even where state indicators have clear links to pressures, there will be cases where pressure indicators are within limits, while state indicators are not. These mismatches may be due to lag periods (e.g. slow recovery times), other pressures, or different requirements for determining status.

Aggregation of assessments of different indicators should take the varying qualities of each indicator into account, in terms of their pressure–state relationships, levels of uncertainty in their estimation, and relationships with other food web indicators. Borja *et al.* (2014) reviewed methods for weighting, as well as considering the pros and cons of different methods, providing a useful guide for choosing the most appropriate aggregation method.

Although methods to aggregate indicators within the Descriptor 4 criteria might differ, both structure and function need to be at GES for overall GES to be achieved.

### 9. Rationale and technical background for proposed revision

The proposed revision comes from the development on food web GES descriptors from two ICES-led workshops in response to the requests from DGENV (ICES, 2014a)

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

See documents below.

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EUROPEAN COMMISSION  
JOINT RESEARCH CENTRE

Institute for Environment and Sustainability  
Water Resources Unit

# **Review of the Commission Decision 2010/477/EU concerning MSFD criteria for assessing good environmental status**

## **Descriptor 5**

**Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters**

This report represents the result of the scientific and technical review of Commission Decision 2010/477/EU in relation to Descriptor 5. The review has been carried out by the EC JRC together with experts nominated by EU Member States, and has considered contributions from the GES Working Group in accordance with the roadmap set out in the MSFD implementation strategy (agreed on at the 11th CIS MSCG meeting).

The report is one of a series of reports (review manuals) including Descriptor 1, 2, 5, 7, 8, 9, 10 that conclude phase 1 of the review process and, as agreed within the MSFD Common Implementation Strategy, are the basis for review phase 2, towards an eventual revision of the Commission Decision 2010/477/EU.

The report presents the state of the technical discussions as of 30 April 2015 (document version 6.0), as some discussions are on-going, it does not contain agreed conclusions on all issues.

The views expressed in the document do not necessarily represent the views of the European Commission.

## Foreword

The MSFD Committee (Art. 25 of the MSFD) discussed and concluded an approach and an outline for the process of a review and possible revision of Commission Decision 2010/477/EU on GES criteria and of MSFD Annex III (see Committee/07/2013/03rev for details). Based on the template in the annex to the mandate of the MSFD Committee, a more detailed manual for the technical phase relating to the review of Commission Decision 2010/477/EC has been developed to guide the parallel preparatory process and discussions per descriptor. 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 assessment in particular as regards temporal and spatial aggregation. The review of Annex III will be carried out as a parallel process. The review of the Common Understanding Document is also taking place alongside these two processes. Close coordination between these three processes should be ensured.

**MSFD D5 expert group:** Vivi Fleming-Lehtinen, Elżbieta Łysiak-Pastuszek, Marcel van den Berg, Philip Axe, Martin Hansson, Wera Leujak, Marta Martínez-Gil Pardo de Vera, Jesús Mercado, Irene del Barrio, Stephen Malcolm, Luminita Lazar, Ioannis Karakassis, Alain Lefebvre, Marta Nogueira

**EC JRC:** Nicolas Hoepffner, Andreas Palialexis, Wouter van de Bund, Sandra Poikane, Jean Noel Druon, Fuensanta Salas Herrero

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## Review (technical phase) of Part B of the Decision (per descriptor)

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## ***1. Approach***

### **1.1 General guiding principles for the review**

The review aims to analyse the results from the first MSFD reporting round on Articles 8, 9, and 10 with a view to update/improve and simplify the implementation of the Com Decision 2010/477/EU.

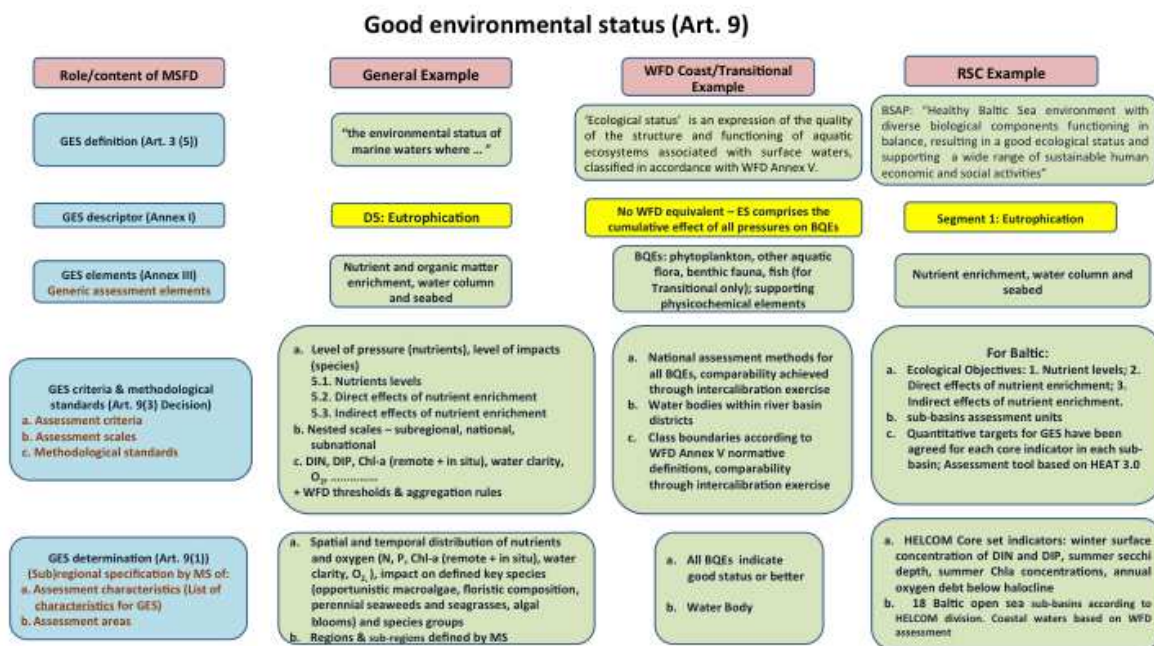
Based on the Information in the Art 12 assessment reports (COM(2014)97 final) and the JRC in-depth assessments (Palialexis et al., 2014) a template has been pre-filled by Milieu Ltd for the DG ENV, commented by DG ENV and completed by JRC which should enable the experts group to analyse current shortcomings, propose ways forward, such as e.g. needs for further guidance and development, but eventually also to develop proposals for amending the Decision 2010/477/EU, based on new scientific knowledge and experience in the implementation process.

The current review should lead to a new GES Decision which is:

- Simpler
- Clearer
- Introducing minimum requirements (to be enhanced by regions and MS, if necessary)
- Self-explanatory
- Coherent with other EU legislation
- Coherent with regional assessment methods (where EU does not exist)
- Have a clear and minimum list of criteria and methodological standards and related characteristics (Table 1, Annex III)

- Ensure that criteria and methodological standards are adequately addressing the Descriptors are covered by the proposed criteria, to lead to complete assessments
- Coherent with the MSFD terminology

This review should lead to a more coherent approach to the definition of GES based on agreed criteria and methodological standards that allow for determining the distance of the current state from GES. Figure 1 shows an example on the link between MSFD terminology and existing practical approach taken from EU and RSCs legislations. This figure aims to streamline the discussion to be carried out through the review process.



**Figure 1.** Interpretation of Art. 9 of the MSFD for Descriptor 5<sup>1</sup>.

The following points are summarising the role of GES in MSFD. According to the Directive, GES is:

- starting and end point of MSFD
- reference point for the other MSFD provisions
- determined at the level of marine (sub)regions
- specified by common criteria and methodological standards
- legally time bound (2020) and subject to legally defined exceptions where this is not feasible

GES should be supported by quantified/ quantifiable indicators to allow determining the distance of the current state from GES and for defining targets to guide progress towards GES. Furthermore, the review should strengthen and clarify the link across the Articles 8, 9 and 10.

<sup>1</sup> Modified from DG ENV's presentation in June's 2014 DG GES group: <https://circabc.europa.eu/w/browse/f3953f48-f965-43d4-93a5-075f82cc1f12>

## **1.2 Overall reflection of the type of descriptor and descriptor criteria (e.g. state/pressure, quantitative/qualitative) and its relationship with Article 3(5).**

The main cause of human-induced (anthropogenic) eutrophication is nutrient enrichment. This can have a severe negative effect on marine ecosystems and is, therefore, a key threat to achieving GES in some parts of EU marine waters. The main nutrients concerned are nitrogen (N) and phosphorus (P) compounds which are naturally present in our seas, but additional and excessive inputs of N and P come from diffuse and point sources, such as agriculture and waste water and, to some extent, caused by ammonia and NO<sub>x</sub> emissions, mainly from agriculture, aquaculture but also from ship and road traffic and industry via precipitation.

Eutrophication<sup>2</sup> (JRC 2010, Ferreira et al. 2011) is defined as: a process driven by the enrichment of water by nutrients especially compounds of nitrogen and/or phosphorus, leading to: increased growth, primary production and biomass of algae; changes in the balance of organisms in pelagic as well as in benthic habitats; and water quality degradation. The consequences of eutrophication are undesirable if they appreciably degrade ecosystem health and/or the sustainable provision of goods and services. The assessment of eutrophication starts with a description of the levels of nutrients present in the marine environment (assessment of pressure), and then by addressing nutrients direct and indirect effects on the marine environment.

GES with regard to eutrophication has been achieved when the biological communities remains well-balanced and retains all necessary functions in the absence of undesirable disturbance associated with eutrophication (e.g. excessive algal blooms, low dissolved oxygen, declines in seagrasses, kills of benthic organisms and/or fish) and where there are no nutrient-related impacts on sustainable use of ecosystem goods and services (JRC 2010).

The Commission Decision thus identified three criteria for Descriptor 5: (5.1) nutrient levels, (5.2) direct effects of nutrient enrichment and (5.3) indirect effects of nutrient enrichment. Descriptor 5 is considered a pressure-based descriptor, scientifically and operationally mature compared to other MSFD Descriptors and attributed with quantitative means. The scientific and applied background for D5 gained through the long standing work of RSCs and the Water Framework Directive assessment of ecological status are well developed (relative to other descriptors), something that was partially reflected in the first phase of the MSFD implementation.

## **1.3 Linkages with existing relevant EU legal requirements, standards and limit values, such as the WFD, and the identification of potential incoherence.**

A number of rules already exist at EU level that supports MS in the control of marine eutrophication. The MSFD explicitly mentions several legislative tools and among them, the most closely related to eutrophication are the Water Framework Directive (WFD, 2000/60/EEC), the Nitrates Directive (ND, 91/676/EEC), and the Urban Waste Water Treatment Directive (UWWTD, 91/271/EEC) (see also Table 7 of the TG 5 report<sup>3</sup>).

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<sup>2</sup> MSFD Task Group 5 Report on Eutrophication. Joint Research Centre (2010) See <http://ec.europa.eu/environment/marine/pdf/5-Task-Group-5.pdf>

WFD is not considering explicitly 'eutrophication'. However, WFD provides the definitions for high, good and moderate ecological status of biological quality elements (e.g. phytoplankton, macroalgae, angiosperms) using physico-chemical indicators as supporting quality elements (e.g. nutrient concentrations, oxygenation conditions and transparency). These quality elements are used for the assessment of eutrophication. In accordance with Commission Decision 2010/477/EC, the assessment of eutrophication in marine waters needs to take into account the assessment for coastal and transitional waters under the WFD and related guidance<sup>3</sup>, in a way which ensures consistency. The main issues addressed in the guidance document are i) a unified conceptual framework to understand eutrophication in all water categories, ii) a conceptual read across EU directives (mainly Water Framework, Urban Wastewater and Nitrates Directives) and international policies (e.g. OSPAR and HELCOM) addressing eutrophication and iii) an in-depth understanding of eutrophication in the context of WFD ecological status assessment. The guidance also includes an overview of current assessment methods and recommendations for harmonisation of classification criteria. Note that no specific nutrient threshold levels (boundaries) are specified in the WFD. MSs have to establish their own nutrient boundaries. However, the WFD CIS ECOSTAT- Nutrient steering group has started to work on better harmonization of these nutrient boundaries, including in transitional and coastal waters. WFD Ecological Status is limited in coastal waters to 1 nautical mile, representing a spatial overlap with the MSFD. As such, MSFD methodological standards and parameters, thresholds and reference points could differ for the offshore areas.

The Nitrate Directive includes eutrophication as one of the criteria to identify waters affected by pollution or at risk of pollution. The other criteria for the identification of those waters are nitrate concentration (50 mg/l) in groundwater and surface water. The Directive requires the establishment of mandatory measures at least in those areas (nitrate vulnerable zones) which drain into polluted waters or waters at risk of pollution.

The Urban Waste Water Directive (UWWTD) aims to protect the environment from the adverse effects of urban waste water and certain industrial discharges. UWWTD defines eutrophication and requires "more stringent treatment" for waste water discharges to eutrophic waters or waters that may become eutrophic in the near future.

The lack of a common definition of eutrophication across all Directives makes difficult the harmonization of its assessment. Although the Directives, specifically WFD and MSFD, have different assessment methodology (e.g. biological quality elements and supporting indicators for WFD) and classification schemes (WFD 5 classes vs MSFD 2 classes), they are generally consistent in identifying eutrophication problems and mitigating them. The Commission Decision should set the basis for better compatibility between both Directives.

#### **1.4 Linkages with international and RSCs norms, standards and indicators.**

Regional Sea Conventions (RSCs) have implemented their own methodological approaches for eutrophication assessment (HELCOM HEAT, OSPAR COMMON PROCEDURE, TRIX for UNEP/MAP,

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<sup>3</sup> Guidance Document on the Eutrophication Assessment in the Context of European Water Policies, Document No 23. European Commission (2009). See <http://circa.europa.eu/Public/irc/env/wfd/library>

BEAST<sup>4</sup> for Black Sea Convention). Generally, all methods include chlorophyll-a (Chl-a) and nutrient measurements but differ in the way indicators are combined (JRC 2014a).

**In the OSPAR** region, eutrophication status is assessed by using the OSPAR Common Procedure (COMP, OSPAR 2013) which comprises two steps: a Screening Procedure to identify areas that are obvious non-problem status for eutrophication, and a Comprehensive Procedure applied in those areas not identified as non-problem areas. The initial screening procedure is risk-based and requires consideration of relatively few parameters related to hydrodynamic characteristics and proximity to nutrient sources. If the initial screening or successive Comprehensive procedure assessments show the waters not to be impacted by eutrophication, a more robust assessment of its trophic status is not required. In the Comprehensive Procedure, variables/indicators to be monitored are grouped into four categories: 1) the degree of nutrient enrichment (riverine inputs/direct river discharges, nutrient concentrations, N:P ratio); 2) direct effects of nutrient enrichment (water column chlorophyll-a, phytoplankton, macrophytes); 3) indirect effects of nutrient enrichment (oxygen deficiency, zoobenthos and fish, organic carbon); and 4) other possible effects (e.g. algal toxins although this is recognised as not strongly linked to eutrophication). Each of these parameters may be considered area-specific or season-specific. The assessment parameters are integrated along a cause/effect scheme including all categories for a classification as 'problem areas', 'potential problem areas', and 'non-problem areas'. The integration is followed by an overall assessment of all relevant information related to harmonised assessment criteria, their corresponding assessment levels and supporting environmental factors to reach the final area classification.

**HELCOM's** thematic assessment of eutrophication 2007-2011 (HELCOM 2014) was adjusted to the MSFD and Commission Decision 477/2010/EU. The assessment of the open sea sub-basins is based on the integration of commonly agreed core indicators, grouped into three criteria: nutrient levels (indicators: inorganic nitrogen and phosphorus concentration), direct effects (indicators: chlorophyll-a and Secchi depth), and indirect effects (indicator: deep bottom oxygen debt). The assessment is done using the HEAT 3.0 assessment tool, which averaged indicators within criteria (allowing weighting), and using the one-out-all-out principle between criteria for determining final eutrophication status. Ecological status resulting from WFD is used where available to describe the state of coastal waters. HELCOM EUTRO-OPER group recently recommended extending the HEAT 3.0 assessment procedure to coastal waters to adequately cover the requirements of MSFD descriptor 5. HELCOM assesses nutrient levels (DIN and DIP) in relation to scientifically based and commonly agreed targets of good environmental status for eutrophication for specific Baltic areas: Maximum Allowable Inputs (MAI) and Country Allocated reduction Targets (CART) of the Baltic Sea Action Plan (HELCOM 2013)<sup>5</sup>.

**The Barcelona Convention:** MEDPOL's eutrophication monitoring strategy consists of identifying sites that are eutrophic or sensitive to eutrophication (together with reference sites) and the development of biological parameters/indicators of eutrophication to support the existing monitoring strategy. The list of mandatory monitoring parameters includes nutrients, transparency, chlorophyll, dissolved oxygen and phytoplankton (total abundance, abundance of major groups, bloom dominance) parameters. Other parameters such as macrophytes, organic matter in sediment and zooplankton are recommended. Recently (UNEP/MAP 2012) the Contracting Parties to the Barcelona Convention have adopted the ecosystem approach to the management of human

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<sup>4</sup> BEAST is based on HELCOM assessment tool HEAT and expected to be useful in providing harmonized assessments of the eutrophication status in the entire Black Sea.

<sup>5</sup><http://www.helcom.fi/Documents/Ministerial2013/Associated%20documents/Supporting/Summary%20report%20on%20MAI-CART.pdf>

activities that may affect the Mediterranean marine and coastal environment. Its implementation is based on a 6-years management cycle, relying on common strategic goals and the development of Ecological Objectives aligned with MSFD descriptors. Accordingly, Ecological Objective 5 (EO 5) is defined as: "*Human induced eutrophication is prevented, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms, and oxygen deficiency in bottom waters*". EO 5 is associated with 3 operational objectives (nutrients, direct and indirect effects) and 6 indicators similar to MSFD.

**The Black Sea Convention** has developed the Black Sea Integrated Monitoring and Assessment Programme (BSIMAP), within which each country is obliged to carry out ecological monitoring on marine stations, with particular emphasis given to eutrophication. BSIMAP has been developed according to BSAP (Black Sea Strategic Action Plan) and its EcoQO 3: Reduce eutrophication. The list of mandatory parameters from BSIMAP includes nutrients, transparency, dissolved oxygen, chlorophyll-a, phytoplankton and macrophytobentos. Note that the Black Sea Convention has recently developed its own assessment tool (BEAST) using similar methodological approach than HELCOM's HEAT 3.0.

Coordinated activities such as the EU Baltic2Black project are examples of good practices towards harmonized assessment of the eutrophication status in European seas.

### **1.5 Clarification of the relevant scientific, technical and policy terminology in relation to the descriptor.**

In addition to the definition of eutrophication (section 1.2), the Task Group report on the Descriptor 5 (JRC 2010) provides a set of scientifically agreed terms and processes (e.g. the definition of eutrophication and GES definition in, respectively, Table 6 and 8 of the report) in relation to eutrophication and provides a guidance for the interpretation and application of Descriptor 5.

A glossary of terms commonly used in the Marine Strategy Framework Directive, including terms related to D5, has been presented and published in the frame of the HARMONY project (2010-2011; Andersen et al. 2013). The glossary is based upon existing definitions from the Directive and takes into account terms related to qualitative descriptors, characteristics, and pressures and impacts, as well as generic terms associated with the implementation of the Directive.

The revision of the Common Understanding document is taken forward through the drafting group GES (WG GES 12/2014)<sup>6</sup>. The revision includes a new section on 'Basic understandings', which aims at a common interpretation of MSFD concepts and terminology. Annex 1 of the document is an expanded glossary of MSFD terms.

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<sup>6</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/d0c8db99-676b-4e79-937f-4bee634e8daf/GES\\_12\\_2014\\_06\\_Common\\_Understanding\\_final.doc](https://circabc.europa.eu/d/a/workspace/SpacesStore/d0c8db99-676b-4e79-937f-4bee634e8daf/GES_12_2014_06_Common_Understanding_final.doc)

### **1.6 Descriptor specificities should be highlighted and justified (e.g. if it is recommended to combine several descriptors together).**

Eutrophication is a well-defined pressure-based descriptor with clear causative factors and focuses on the determination of the cause-effect relationship between anthropogenic nutrient inputs and ecosystem functioning. D5 should be assessed in isolation, as eutrophication represents a main threat in some of the European regional seas, e.g. the Baltic Sea. As assessment parameters move further away from direct measurements of nutrient loads and concentrations (i.e. biological parameters), however, interactions with other descriptors become significant.

D5 is strongly linked with D1, as a pressure on biodiversity; with D6, as eutrophication effects are seen at the sea floor; and with D3 and D4 as eutrophication also affects fish and shellfish populations. Impacts from D5 should be taken into account in assessing status under these descriptors (i.e. cumulative impact assessment). Due to the strong links between the descriptors, and due to pragmatic considerations of having only a limited number of operational indicators available, it would be wise to allow the use of single indicators in several linked descriptors (such as bottom oxygen in D5 and D6, or macrophytes in D5 and D1), and when doing so, the possibility of double counting should be eliminated when making the initial assessment.

### **1.7 An analysis of whether the criteria and/or indicators and/or methodological standards for the particular descriptor are likely to be common across the EU or need aspects to be specific at region or other scales.**

In general, the evaluation of the first phase of the MSFD implementation showed that criteria, and to some extent indicators and methodological standards, were commonly used across the EU. There is a differentiation in the assessment methods developed and applied by the RSCs (see Table 1 in Chapter 3, p.61 in Palialexis et al., 2014), which reflects certain particularities on regional level in line with an ecosystem-based approach, but also different levels of ambition to achieve GES. Even if the existing criteria could commonly be applied across EU, the methodological standards might have operational limitation depending on the regions' specificities, e.g. the same nutrient level resulting in different effects depending on the regional hydromorphology and tolerance of the ecosystems in place.

### **1.8 The "climate sensitivity" per descriptor (or per criterion).**

Eutrophication is mainly caused by anthropogenic nutrient inputs. However, tolerance of the ecosystems to nutrient pollution can also be modified by climate change. With global warming, the maximum oxygen concentrations in warmer water would be lower than for colder waters, thus increasing the likelihood of oxygen depletion. Similarly, the intensification of the thermal stratification would favour oxygen depletion at depth (Rabalais et al. 2009). Climate change can affect the annual water flow of rivers potentially increasing or otherwise altering nutrient inflow into marine waters. Both changes in water temperature and salinity as a result of climate change will



affect the overall species composition in the pelagic and benthic environment, interacting thus with the eutrophication process. There is evidence that degraded water quality from increased nutrient inputs promotes the development and persistence of specific blooms, including harmful algal blooms (Heisler et al. 2008). However, under certain environmental conditions, higher water temperature could also favour the development of cyanobacteria and other planktonic algae, increasing the likelihood of toxic/anomalous blooms in offshore areas.

Climate sensitivity issues in the Baltic include changes in CDOM (Colored Dissolved Organic Matter) loads from land, which affect water transparency but also the relative importance of the pelagic and bacterial food webs. The major driver is the timing and frequency of large inflows, which affects the deep-water oxygen concentration and the availability of phosphorus for upwelling from the deep anoxic pool.

More research is needed on how climate change can affect eutrophication, particularly at the level of the different criteria/indicators.

### **1.9 An indication of whether a quantitative GES definition for the descriptor will be possible or whether a qualitative/normative definition only should be used (on the basis of Article 3(5)).**

According to CIS-WFD Guidance document on eutrophication assessment (§ 279), “ *it is a challenge to find quantitative expressions for the response in abundance and taxonomic composition for the different biological quality elements along the nutrient gradient*”. In addition, we can expect increasing difficulties when establishing concrete quantitative targets as going from criteria 5.1 (nutrients) to 5.3 (indirect effects), with difficulties to differentiate between natural variations and human impact on the associated criteria elements. For D5, it is thus appropriate to keep a normative definition of GES at the descriptor level.

## ***2. Analysis of the implementation process***

### **2.1 Based on the Commission/Milieu Article 12 reports and the JRC in-depth assessments, a detailed summary of the findings of Article 12 relating to the determination of GES and specifically the use of the Decision criteria and indicators should be made.**

#### **Findings per criterion and indicators for Descriptor 5**

All Member States defined GES for Descriptor 5 and most covered all three criteria of Commission Decision 2010/477/EU in their GES definition in a clear way. Only one Member State made no reference to these criteria. However, with the exception of one MS, none of the definitions could be

considered adequate. The main deficiencies relate to incomplete coverage of indicators, a lack of specificity and threshold or reference values, a lack of clarity on links with the WFD, including a lack of clarity on the relationship between Good Ecological Status (GECS) under the WFD and GES under the MSFD (Palialexis et al., 2014).

#### **Criterion 5.1 Nutrient levels**

The majority of Member States covered nutrient concentrations while nutrient ratios were one of the indicators most often excluded. The nutrient measurements used most frequently by Member State were dissolved inorganic nitrogen (DIN) and dissolved inorganic phosphorous (DIP).

#### **Criterion 5.2 Direct effects of nutrient enrichment**

All Member States included an indicator based on chlorophyll a (Chl-a) levels in the water column and the majority of the Member States also covered water transparency. A few excluded water transparency from their GES definitions due to the low proportion of variability in water (coastal, at least) that can be attributed to changes in chlorophyll levels. In the HELCOM area the indicators based on the abundance of opportunistic macroalgae, shifts in floristic composition, effects on macrophytes, are mostly covered. In the North East Atlantic (NEA), Member States referred to OSPAR's phytoplankton indicator species rather than benthic-pelagic shifts. A limited number of NEA countries also use a bottom invertebrate index in addition to or as an alternative to dissolved oxygen status. No standard approaches to cover indicators 5.2.3 and 5.2.4 were found in the Mediterranean although all Mediterranean Member States covered all three criteria of the Commission Decision, some only used pelagic indicators. In the Black Sea, both Member States covered all criteria but only one covered benthic indicators.

#### **Criterion 5.3 Indirect effects of nutrient enrichment**

Most of the MSs provided GES determinations for criterion 5.3. Dissolved Oxygen was the most common indicator reported under this criterion. This could contribute to a EU-wide list of potential methods for eutrophication assessment.

#### **Regional coherence and coherence with EU pieces of legislations for descriptor 5**

More than one third of the MS did not mention the WFD in each of the MSFD Articles (8, 9 and 10). Considerably fewer references have been made on Nitrate Directive and Urban Waste Water Treatment Directive. The type of reference varies across MS, from a detailed definition (e.g. reduction of 75% of nitrogen and phosphorus loads) to a more general reference. A direct link between the two Directives and MSFD Articles 8, 9 & 10 was not observed. Globally, 10% of the MS considered the Nitrate Directive and 25% the Urban Waste Water Treatment Directive.

References to assessment methods under Regional Sea Conventions were made by most Member States either in their GES definition or in the accompanying text (Palialexis et al., 2014). The relatively good level of regional coherence can be explained by the fact that a majority of Member States based their approaches on established methodologies developed by the Regional Sea Conventions. However the RSCs have different indicators, assessment methods, and threshold values and so are not fully compatible. For the Baltic Sea region, reference was made to the HELCOM

eutrophication assessment tool (HEAT) by all Baltic Member States except of two. For the North East Atlantic region, nearly all Member States made reference to the OSPAR Comprehensive Procedure. Certain Member States have defined GES in terms of achieving OSPAR's 'eutrophication non-problem' status and most countries appear to have adopted the OSPAR nutrient baseline/threshold levels, at least for offshore waters (OSPAR sets limits for winter DIN and/or DIP, which should not exceed 50% from background levels). For the Mediterranean region, only one Member State mentioned explicitly the MEDPOL approach, while the OSPAR approach appears to have been followed by two Member States. Romania and Bulgaria did not refer to the Black Sea Convention, since the Convention had not developed a regional assessment approach for eutrophication at that time (SWD 2014/49<sup>7</sup>).

Only seven Member States incorporated quantitative thresholds into their definition of GES and therefore in the majority of cases it is impossible to know whether GES is actually achieved. Overall, the level of coherence for Descriptor 5 was relatively high in the Baltic and North East Atlantic regions and moderate in the Black Sea and Mediterranean regions, although differences at sub-region level were noted (SWD 2014/49).

### Findings on methodological standards

As shown on Table 1, there is a great variation in the number of methods reported per indicator. A total of 16 methodological approaches have been reported for the indicator 5.1.1, while only two for 5.2.2. The nutrient concentration (5.1.1) and Chl-a concentration (5.2.1) in the water column have been reported by all MS. The lowest proportion of MS references concern the indicator of abundance of opportunistic macroalgae (5.2.3) and nutrient ratios (5.1.2). Table 1 is a good indication for the criteria and indicators that require more research, or data or those that are not frequently used by the MS and could be eliminated to increase the coherence in the implementation process. The consistency in reported methods across articles 8, 9 and 10 is limited to the most well studied and widely applied methodologies.

**Table 1.** Number of reported methods and percentage of MS reported per indicator and criteria. The last column shows the most frequent reported method per indicator (table from Palialexis et al., 2014).

Criteria	Indicator	No. Methods Reported	Percentage of MS reporting indicator	Most frequent
5.1	5.1.1	16	100	DIP & DIN
	5.1.2	2	50	N:P_ratio
5.2	5.2.1	3	100	Chlorophyll-a
	5.2.2	2	70	Water transparency
	5.2.3	3	40	Opportunistic macroalgae
	5.2.4	11	70	Pelagic shifts
5.3	5.3.1	6	75	Perennial seaweeds
	5.3.2	8	80	Dissolved Oxygen

<sup>7</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014SC0049>

At least one indicator per criterion with an EU-wide range of functionality was reported such as nutrient concentration (indicator 5.1.1), Chl-*a* (indicator 5.2.1), water transparency (indicator 5.2.2) and dissolved oxygen (indicator 5.3.2). This could be the basis for a common EU-wide assessment framework (i.e. core set of indicators), possibly adjusted to account for regional specificities. This framework would improve the coherence and comparability of MS' assessment. For eutrophication, indicators, such as Chl-*a*, water transparency and nutrients concentration (particularly DIN & DIP) presented high frequency of use (Palialexis et al., 2014).

## **2.2 Identification of any questions/issues arising from the application of the current Decision, including those identified by the Article 12 assessment.**

**Q1:** Heterogeneity of methodological approaches, thresholds and limits

*Possible Answer:* Common agreed and comparable methodological standards on a EU-wide level, but it should not be so strict that it prevents adaptive management and flexibility to regional and sub-regional conditions.

**Q2:** Different indicators reported per criterion

*Possible Answer:* Core set of indicators commonly used across RSCs to ensure the minimum level of coherence, even if thresholds may need to reflect regional specificities.

**Q3:** Spatial inconsistency within and between MS regarding coastal-offshore distinction or number of subregions reported.

*Possible Answer:* Assessment of both coastal and open-sea water with clear boundaries and thresholds. Coastal waters are assessed using WFD water bodies (using thresholds for biological quality elements and supporting elements). Several options can then be considered regarding the assessment of D5 in coastal waters (i.e. WFD waters overlapping with MSFD), according to whether WFD assessment of ecological status is or is not recognized as a full assessment of D5 (see section 5.3). Synergies in the definition of scales and assessment period between both Directives would facilitate common monitoring programmes.

**Q4:** *Need to screen standards at EU level or national level.*

*Possible Answer:* For example, the standard NF EN 15972 deals with temporal frequency to monitor phytoplankton (recommendation for a monthly or bimonthly sampling strategy at the minimum and a higher frequency during periods of main blooms)

**Q5:** *How to deal with local variations and local hydrodynamic effects in the proposed methodological standards.*

*Possible Answer:* A Pan European framework to assess eutrophication is possible at least using a common core set of parameters / indicators as minimum requirement, with potential adjustment to reflect regional and sub-regional differences in both the pressures and impacts. These differences need to be considered. RSCs have outstanding experience in dealing with eutrophication problems and identified methodological standards for their respective basin. Examples of good practices can be taken from their work.

Q6: Are the assessments of pressures and impact that derived from other EU legislations suitable for MSFD requirements for eutrophication?

*Possible Answer: The assessment of ecological status under WFD (2000/60/EC) is not an assessment of eutrophication as required by MSFD D5. However, WFD was also designed to reflect the main anthropogenic impacts in the coastal zone, including biological elements of direct relevance to eutrophication. MSFD assessment can then take advantage of these elements assessed under WFD (new Directive 2014/101/EU amending Annex V of the WFD), and it is most desirable that the WFD class boundary 'good/moderate' be in agreement with the MSFD GES boundary. In other words, where assessment of ecological status in coastal waters results in less than good status due to nutrient concentrations, this should be taken into account in carrying out MSFD assessment for D5.*

### **2.3 Relevant data from other sources, specific to every descriptor and recent findings from MS should also be considered.**

- WFD assessments
- Assessments of status, pressures and impacts pursued in Regional Sea Conventions
- Data from some relevant EU or regional monitoring programs should be considered in the assessment to contrast the link between pressures and impact. In particular EMEP (atmospheric pollution) and RID (river discharges)
- ICES Database: The ICES oceanographic database holds long time series of field observations from ICES member Countries (HELCOM COMBINE, OSPAR CEMP), of particular importance to eutrophication assessment.
- MED POL Database, particularly relevant for nutrient and oxygen in the Mediterranean Sea
- EMODNET / SeaDataNet
- Specific types of data (e.g. Earth Observation from satellite) at low and moderate resolution (1-4km) are freely available for all European Seas through different geoportals such as the Copernicus marine Monitoring Service<sup>8</sup>, and the JRC Environmental Marine Information System (EMIS)<sup>9</sup>. EMIS provides the users with basic navigation and data interrogation tools with a range of time-series and statistical analyses.

Under contract with DG ENV, Deltares Institute (The Netherlands) reported a study for "Development of a shared data and information system between the EU and the Regional Seas Conventions". The report includes a summary of major database in the 4 RSCs and EEA that could be used to support the reporting objectives under MSFD (incl. D5 eutrophication)<sup>10</sup>.

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<sup>8</sup> <http://marine.copernicus.eu>

<sup>9</sup> <http://emis.jrc.ec.europa.eu>

<sup>10</sup> [https://circabc.europa.eu/d/a/workspace/SpacesStore/aff9880d-df5e-44ec-854e-8f098fcff2e5/DIKE\\_10-2014-05b\\_RSCDataReporting\\_Report.pdf](https://circabc.europa.eu/d/a/workspace/SpacesStore/aff9880d-df5e-44ec-854e-8f098fcff2e5/DIKE_10-2014-05b_RSCDataReporting_Report.pdf)

## **2.4 Good examples and approaches applied by MS, especially if used by multiple Member States, and shortcomings should be listed systematically.**

- Good example: very specific reference about using WFD thresholds for good/moderate status to define MSFD GES in those coastal water bodies currently achieving High Ecological Status under the WFD.  
Shortcoming: only in one MS report in the 2012 MSFD reporting
- Good example: report stating in the GES definition that for MSFD GES to be achieved, the WFD coastal water bodies must be at least of 'good quality' for the WFD biological quality element 'phytoplankton' (but not 'phytobenthos').  
Shortcoming: only in one MS report
- Good example: some Member States have defined GES in terms of achieving OSPAR eutrophication non-problem status.
- Good example; Chl-a concentration and dissolved oxygen are the most frequent methods covering 5.2 and 5.3 criteria that were applied by most of the MS, indicating data availability and achieving a comparable and coherent implementation.
- Good example: Consideration of assessment methods developed and tested by RSCs.  
Shortcoming: different approaches in each region with difficulties for countries sharing waters in several regions.

## **2.5 Differences and similarities between the regions should be highlighted, where applicable.**

There are a number of reasons to observe major differences in sensitivity and vulnerability of coastal areas to anthropogenic loading of nutrients. Nutrient seasonal regime and consequently timing of the annual peak of phytoplankton differ among regions. Different coastal morphology and water dynamics will affect the functioning of a coastal unit with respect to nutrient inputs, and thus, their impacts on the ecosystem (Hakanson 2008). In addition, pressure levels (nutrient contaminant discharges) can be subjected to strong seasonal fluctuations depending of variations in economic activity (e.g. population level in the Mediterranean littoral fringe abruptly increases in summer). Consequently, each region and sub-region requires specific thresholds of the parameters that should take into account the time variability.

The Baltic Sea and the Black Sea are semi-enclosed water environments, which makes them very different from "true marine" seas like e.g. North Sea or North Atlantic, and very vulnerable to eutrophication. In addition, there is in the Baltic a pronounced salinity gradient from high salinities in the western part bordering the Skagerrak to very low salinities in the eastern parts. The differences

comprise physicochemical conditions as well as species composition. This is taken into account by HELCOM and WFD approaches for the Baltic Sea.

On the other hand, the continental shelf of Northeast Atlantic is largely open to ocean dynamics restricting eutrophication issues to coastal waters covered for a large proportion by the WFD boundaries. In countries with narrow continental shelf (e.g. Portugal), eutrophication assessment out of the WFD boundaries may not be a target for eutrophication assessment according to OSPAR COMP and its Screening Procedure.

### ***3. Analysis of the current text of the Decision***

#### **3.1 Analysis of the current text of the Decision, identifying in particular those parts which are best placed in guidance, those parts which are interpretative or explicative information and those parts which need to be kept in the Decision in accordance with the mandate provided by the Directive.**

The current text of the Decision, concerning D5, is very succinct, including a definition of eutrophication, some general considerations (interpretative and explicative) on the practical implementation of the Directive with respect to D5, and the list of criteria and indicators relevant to assess whether GES has been achieved.

*“Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters.”*

This part of the Decision is the objective for Descriptor 5 (see MSFD Annex I). This normative definition has to be kept in the Decision as there is no scope for revising Annex I MSFD.

The general consideration regarding the implementation of the Directive in relation to D5 is an attempt to recapture elements of Part A of the Decision that are essential to D5. Part of this text may need to be adjusted to new legislation documents, whereas other parts could benefit from more detailed guidance and/or slightly modified such that it becomes clearer that what is needed is a pan-European approach which can accommodate regional specificities. Such an approach should aim at a quantitative definition of GES at the level of the criteria or indicator, allowing regionally adjusted specifications on the assessment methodology within the criteria as long as they are ecologically justified. In addition, assessment and quantitative targets should draw upon the effort made in the frame of other EU legislations (specifically WFD) and the experience of the RSCs, recognizing that RSCs are engaged since many years, through regional Action Plans, to achieve healthy conditions in their respective seas.

The list of criteria and associated indicators has been set according to physical and chemical features listed under Annex III Table 1 of MSFD that are strongly related to eutrophication. Some elements of this list are not presently reported in the Decision under the criteria for D5 (e.g. TOC, invertebrate

bottom fauna) in spite of their relation to eutrophication (see section 5.2 for further comments on criteria and associated indicators).

### **3.2 The analysis should then include an overall identification of needs for guidance.**

The general description for the implementation of Descriptor 5 as provided in the Commission Decision is rather brief and could therefore benefit from additional guidance on specific issues.

The compatibility and consistency between the MSFD GES and the Good Ecological Status (GES) under the WFD in the zone where these two Directives overlap should be clarified with additional guidance, also considering the WFD CIS Eutrophication Guidance document No. 23<sup>11</sup>. Analyses and discussion on a common approach to handle WFD water bodies in MSFD assessment are on-going within RSCs through specific working group (e.g. HELCOM EUTRO-OPER, OSPAR ICG EUT). Conclusion on this issue is promptly required to enable reflection in revised Decision.

Assessment scales and data integration/aggregation are not so well defined in 2010/477/EU. Guidance is needed to ensure coherence on the identification of assessment units<sup>13</sup>. Work by Deltares Institute<sup>12</sup> under Service Contract with DG ENV aims at EU guidance for coherent geographical scales in assessment and monitoring GES and for sets of aggregation rules.

Transboundary issues<sup>13</sup> and cooperation with landlocked MSs and/or non-EU countries need to be further addressed in the context of MSFD taking into consideration on-going analysis under RSCs (e.g. OSPAR ICG-EMO modelling studies, HELCOM analysis on atmospheric transboundary loads).

### **3.3 An analysis of what to keep should be made, including specification on what may be outdated or may need to be aligned with other or new legislations**

The text of the Commission Decision regarding D5 could benefit from additional references to new Commission guidance documents (i.e. Guidance Doc. #23 on Eutrophication Assessment in the context of European Water Policies), and other policy documents (e. g. COM DEC 2013/480/EC) and RSCs best practices (e.g. OSPAR 2013, HELCOM 2014).

The number and nature of criteria should be kept as derived from commonly agreed conceptual models of eutrophication in coastal and marine waters, and adopted or in way to be adopted by RSCs, However, methodological standards and associated indicators within criteria may be revised such as to reflect Art. 12 assessment, and ensure better harmonization among MSs, while keeping enough flexibility of process with respect to regional characteristics.

## **4. Identification of issues**

<sup>11</sup> [https://circabc.europa.eu/sd/a/9060bdb4-8b66-439e-a9b0-a5cfd8db2217/Guidance\\_document\\_23\\_Eutrophication.pdf](https://circabc.europa.eu/sd/a/9060bdb4-8b66-439e-a9b0-a5cfd8db2217/Guidance_document_23_Eutrophication.pdf)

<sup>12</sup> <http://ec.europa.eu/environment/marine/publications/pdf/Analytical%20report.pdf>

<sup>13</sup> Outcome from MSFD GES workshop on D5, D8 and D9, JRC 23-24/10/2012



## 4.1 Main findings and information that will be used in the next step of the revision process

A harmonization process between coastal and open sea assessments is required. Moreover, RSCs should further work on their integration with WFD (for coastal water) and consequently with MSFD for eutrophication assessment. OSPAR and HELCOM initiatives to create common indicators and assessment methods, in line with EU legislations (WFD) could be seen as good practices. The identification of discrepancies in eutrophication assessment should be prioritized as well as the effort to align RSCs and EU approaches. A harmonization in MS actions for the MSFD implementation (e.g. HELCOM TARGREV) will reduce the transboundary deviations in the quantification of GES and targets (Palialexis et al., 2014).

The starting point for a better harmonization would be a consistent and agreed pan-European common approach (in a broader sense) for the eutrophication assessment with a core set of commonly used indicators and, possibly, similar aggregation rules. Methodological adjustments (e.g. optional indicators) at different spatial (e.g. marine regions/subregions, inshore/offshore, ecosystems) and temporal scales (e.g. seasonality) should be applied (e.g. baseline and threshold) by RSC/MS in order to reflect the different environmental characteristics (Palialexis et al., 2014) and notably as regard to the effect of hydromorphology on the eutrophication vulnerability.

The flexibility in the interpretation of MSFD implementation leads MS to select different approaches in their initial assessment, the definition of GES and the targets. Particularly, the GES and the targets are reported on pressure level, on impact or on a combination of both. In most cases, especially when GES and targets are applied on pressures, there are no measurable methodological approaches accompanied by thresholds and limits. This causes a twofold complication to the assessment of MSFD implementation: the incomparability to set GES/targets between neighbouring MS and the inability to assess whether the GES or the targets are achievable. In relation to GES and targets, MS presented different levels of ambition in the implementation of MSFD, which was clearly reflected in the number of targets, the precise qualitative metrics and the strict or loose definition of GES. Differences in ambition levels led to incoherence in the implementation of MSFD, even within the same region. In order to overcome these inconsistencies, more synergies amongst MS at a regional level are necessary, taking into account the dissimilarities in ecosystems, infrastructures and extent of marine waters under each MS jurisdiction (Palialexis et al., 2014). RSCs can play a crucial role in the development and application of coherent and consistent assessments and methodological standards.

Clear links should be made between pressures and impacts (Annex III, Table 2 of MSFD) and criteria and methodological standards (COM DEC 2010/477/EU) and thereafter between Art. 8, 9 and 10, taking into account the connection with Table 1 in Annex III of MSFD. This should be done in a way that any pressure or impact will be connected to specific methodological standards that consequently will be associated with the state elements affected.

Descriptor 5 assessments should be built on (i) fulfilment of WFD and MSFD requirements to produce, respectively, assessment of Good Ecological Status and D5 assessment for coastal water bodies; (ii) fulfilment of MSFD requirements to produce an assessment for offshore waters; (iii)

compilation of the information from the previous steps into a regional/national eutrophication assessment.

There is some degree of consistency in parameters used across the four regions (N, P, O<sub>2</sub>, Chl-a, water transparency) and these should be retained in the Decision, even though analytical methods to determine these parameters need better harmonization among MSs. There is much less consistency in the use of plankton and benthos indicators so that these should be further reconsidered as part of the D5 assessment methodology, bearing in mind the normative definition of MSFD Annex I.

The thresholds and limit values for assessing eutrophication status are largely dependent on the regional and sub-regional conditions. This requires appropriate threshold setting at certain scale. Such thresholds depend primarily on physico-chemical conditions and at different level on hydro-morphological conditions. Maps of shallow ocean vulnerability from the hydro-physical perspective and of chlorophyll-a (as a proxy for phytoplankton biomass) may guide the monitoring strategy towards hot spots of eutrophication (Druon et al. 2004, JRC 2005). These hydro-physical variables (e.g. vertical mixing and stratification, residence time and current intensity) can be extracted from validated ocean models at EU scale. As a first phase of its Common Procedure, OSPAR has adopted a Screening Procedure to identify non-problem areas with regard to eutrophication using less information related to hydrodynamic characteristics and proximity of nutrient sources. A full assessment is then conducted on areas that are not screened out using the screening procedure.

Currently most GES definitions in MS reports lack specific thresholds/reference conditions and therefore whether GES has been achieved can often not be determined. However, thresholds for the coastal waters are set for the WFD in the intercalibration exercise. The challenge is to find a common approach for a eutrophication assessment for all relevant regimes (EU and RSCs), where WFD thresholds (water body type) have their appropriate place and relevance also under the MSFD with its (sub)regional focus.

HELCOM and OSPAR have developed eutrophication assessment methodologies that provide a basis for defining and assessing GES within the Baltic and North East Atlantic. However their approaches differ and need further consideration on their relative merits. These approaches can provide the basis for assessing offshore eutrophication. The OSPAR approach is used for the entire OSPAR maritime area including estuaries (transitional waters), coastal and marine waters.

Commission Decision 2013/480/EU establishes boundaries for GES, e.g. for Chl-a for coastal/transitional waters and can be a starting point for setting thresholds for offshore waters in a comparable sense. Any updates derived from the intercalibration exercise should be considered by MSFD, accordingly.

## ***5. GES criteria (in accordance with Art. 9(3))***

## **5.1 Conclude on the use of the existing Decision criteria and indicators, in the light of the “refined” common understanding, the findings of Art.12 assessment and relevant international, EU and RSCs legislations and approaches**

The three existing criteria are adequately covering the assessment of eutrophication, although there is no direct link with the assessment of the pressures (e.g. assessment of sources of nutrient and organic matter enrichment).

The general character of the current COM DEC 2010/477/EU criteria is not easy to be quantified, leading to GES definitions on a lower level (indicators and methodological standards). The evaluation of significance of the current criteria and indicators for the D5 MSFD implementation and for the review process should also consider the results from the Art. 12 in-depth assessment (Palialexis et al., 2014) on the frequency of their use. The implementation of the eutrophication Descriptor for the 2012 MSFD reporting was more complete and coherent compared to other Descriptors, due to the maturity of the relevant scientific approaches and established assessment frameworks in RSCs and EU. The criteria and indicators in the COM DEC 2010/477/EU proved to be very important for the MS. Thus, we are framing our proposal for the review on the basis of the existing criteria and indicators for Descriptor 5. However, the evaluation of the implementation (Art. 12 reports and JRC's in-depth assessment) revealed that there is still room for a more coherent and comparable implementation towards GES achievement. The review process and particularly the following proposals are intending to cope with the aforementioned issues.

## **5.2 Recommendation on which criteria to retain, which to amend and any to remove.**

Proposed criteria and methodological standards:

### Criterion 5.1: Nutrients enrichment

GES definition: Nutrient concentrations should not exceed those boundaries leading to eutrophication in nearby coastal and marine areas, and elsewhere (transboundary effects).

Methodological standards and GES boundaries:

The analysis of the methodological standards reported for the first phase of the MSFD implementation (Palialexis et al., 2014) showed that all MS are assessing nutrient concentrations (5.1.1). Winter DIN and DIP are the most frequently assessment elements for nutrient concentration (although annual concentrations is used by some MSs). It is recommended to retain these concentrations (seasonal or annual means) in the methodology and to have defined thresholds at suitable scales.

In the frame of WFD, nutrient boundaries in coastal and transitional waters are established by each MS. WFD CIS ECOSTAT group is now working on evaluating whether these boundaries are consistent with biological boundaries set through the intercalibration process.

The ratio N:P (5.1.2) is also a commonly assessed indicator as it is readily derived from previous nutrient estimates (5.1.1). Its usefulness, however, may need additional investigation at regional

level before being used within operational assessment methods. There is evidence of high natural variability of N:P at different scales and large diversion from the standard “Redfield ratio”. The natural processes affecting this ratio cannot be easily separated from anthropogenic eutrophication effect, making this indicator less useful for management purpose. Suggestion is to remove it from the assessment methodology or to use it as supporting indicator.

#### Criterion 5.2: Direct effects of nutrient enrichment

GES definition: Direct effects of nutrient enrichment in the water column should not exceed thresholds established for the elements identified in the methodological standards

Methodological standards and GES boundaries:

Chlorophyll-a (5.2.1) is an important element of the assessment, sufficiently reported by MSs and more detailed guidance on this approach can be developed acknowledging the existing guidance and approaches for WFD (document No 23). In coastal waters, thresholds are set up for chlorophyll-a in the frame of WFD intercalibration. These thresholds need to be applied, and thresholds set up for Chlorophyll-a outside coastal waters should be harmonized with WFD. Satellite remote sensing, buoys and ships of opportunity should also be considered as cost-effective approaches for the estimation of chlorophyll-a concentration in the open waters.

Water transparency (5.2.2) is also used by most of the MSs in their initial assessment. Many evidences showed that water transparency is inversely related to phytoplankton biomass (Fleming-Lehtinen and Laamanen 2012). However, transparency is also depending on total suspended (inorganic) matter (TSM) and chromophoric (or colored) dissolved organic matter (CDOM). Water bodies loaded with material other than algae are not productive due to the reduction of light availability by, e.g., suspended sediments (e.g. Gironde estuary and main plume, rivers main plumes after a coastal flood). Caution should then be taken to assess water transparency only in relation to chlorophyll levels, provided a threshold can be identified. It is thus recommended to keep this indicator in the Decision revision, with option to use it as supporting element.

Abundance of opportunistic macroalgae (5.2.3): Less than 50% of MSs used this element in their assessment of eutrophication, even though this biological element should be fully covered by WFD in coastal waters. For consistency with WFD, it is recommended to keep this element in the MSFD assessment of D5 in coastal waters, and use WFD boundaries. The extension of this element in offshore waters depends on (sub)regional characteristics (e.g. nature of substrate, bathymetry, light penetration).

Species shifts...anomalous bloom events... (5.2.4): This indicator of D5 is not well defined and clarified in the Commission Decision. As a result, a large number of methods and parameters were reported, decreasing assessment comparability and consistency between MS. It is recommended to amend that element of the Decision on the basis of further guidance on specific methods and metrics that should be used.

Note: WFD considers Chl-a as one of the constituents of the biological quality element Phytoplankton in coastal and transitional waters; it also includes (or should consider to include) species shifts in floral composition and events of nuisance/toxic blooms. Specific and agreed thresholds in COM Decision 2013/480/EU cover this only partly, and work is on-going in WFD Intercalibration to fill the gap covering the full Phytoplankton BQE.

### Criterion 5.3: Indirect effects of nutrient enrichment

GES definition: Indirect effects of nutrient enrichment should not exceed thresholds established for the elements identified in the methodological standards

Methodological standards and GES boundaries:

Abundance of perennial seaweeds and seagrasses are adversely impacted by decreases in water transparency (5.3.1): This element has been reported by a substantial proportion of MSs. It is also an element within WFD assessment of Good Ecological Status. Commission Decision 2013/480/EU defines specific and agreed ecological quality ratio limits for national Macroalgae and Angiosperm evaluation methodologies. A better connection and identification of the overlaps between 5.3 criterion and WFD is needed. As for indicator 5.2.3, its application in offshore waters depends on (sub)regional characteristics.

Dissolved oxygen (5.3.2) concentration is an important element of the assessment in relation to D5, and was reported by most of the MS in the first phase of MSFD implementation. It should be kept in the Commission Decision, but better harmonisation of the methods/metrics between MSs is recommended. Oxygen in bottom layer is an important measurement as it controls the state of the fauna at the seabed. Note, however, that vertical profile of oxygen is also recommended to assess bottom/surface difference.

### **5.3 Proposals for new criteria, if needed.**

No new criteria are required. However proposal is to have a core set of indicators to be commonly used at EU level (pan-European approach) for operational assessment: nutrient concentrations (5.1.1), Chlorophyll-a (5.2.1), water transparency (5.2.2), oxygen level in bottom layer (5.3.2). Even though thresholds for these indicators may reflect regional specificities, their measurements and metrics should be better harmonized among MS.

In coastal waters (i.e. MSFD waters overlapping with WFD water bodies), MSFD assessment should be implemented so as to ensure consistency and complementarity with WFD. A number of quality elements used under WFD are highly relevant for eutrophication assessment such that WFD results can be directly adopted to provide D5 assessment (see also the Guidance Document # 23 on eutrophication assessment in the context of European water policies). This implementation option reflects the MSFD directive stating that coastal waters should be covered by MSFD only *in so far as particular aspects of the environmental status of the marine environment are not already addressed through the WFD*. On the other hand, WFD does not explicitly refer to eutrophication in the MSFD

sense, and its implementation cycle is different than for MSFD. Therefore, a direct use of WFD results in coastal waters would definitively require strengthening the coordination of implementation between WFD and MSFD. The on-going work of ECOSTAT to evaluate the compatibility between nutrient boundaries and biological elements, including in coastal waters, can be seen as a step toward consistency between both Directives.

Other implementation options in coastal (WFD) waters would be to use all marine observations made under WFD (in isolation or combination with offshore observation) and to re-assess these waters under MSFD, recognizing that the assessment of ecological status under WFD is not an assessment of eutrophication as required by MSFD, but it is nonetheless desirable that WFD and MSFD reach to a comparable assessment concerning eutrophication.

Independently of implementation options, it should be noted that this issue to handle WFD water bodies need further analysis/guidance taking into account the respective requirements of the two Directives in coastal waters such that duplication of work can be avoided in this extensive area of overlap.

Suggestions for criteria elements (not part of core set of indicators):

- Combining total nitrogen (TN) and total phosphorus (TP) with DIN and DIP as indicators in the assessment of criteria 5.1 may strengthen confidence in the eutrophication assessment. These are robust parameters that can be monitored throughout the year and with spatio-temporal variability complementing that of DIN and DIP.
- Proposal to better focus indicator 5.2.4 on anomalous/toxic bloom events (frequency, duration), as long as a direct relationship with excess of nutrient inputs can be established.
- Pelagic shifts are difficult to assess (long-term changes vs short-term and local events) and would require significant monitoring efforts. This indicator should not be kept in the assessment of D5.

It is recommended not to use zoobenthos or macrozoobenthos in the assessment of D5, as this indicator can react to other pressures than eutrophication (Kotta et al. 2009). In case the state of zoobenthos is indeed linked to eutrophication, it is directly associated with oxygen levels in bottom layer, and thus not so essential to be considered as an additional element of the assessment.

#### **5.4 Rationale and proposal, where appropriate, for defining GES threshold values and reference points, based on established and agreed scientific methods for quantifying and applying GES boundaries, or for a normative definition of GES**

MSFD criteria are partly consistent with the existing WFD elements/parameters, and ideally MSFD can take advantage of the WFD tools and thresholds and should use these observations for the MSFD GES assessment in coastal waters (i.e. overlapping waters between the two Directives), though additional parameters and harmonization in assessment methodology might be needed to fulfil also MSFD requirements for D5.

Annex V of the WFD (2000/60/EC) lists 6 European standards covering the biological and physico-chemical monitoring in transitional and coastal waters. A new Commission Directive (2014/101/EU)

amending this Annex V now includes 20 published standards that will be maintained and updated on a regular basis through the Harmonization work programme (2015-2021) and collaboration with the European Committee for Standardization (CEN).

More work on establishing thresholds is required for offshore assessment of eutrophication. In adapting to MSFD requirements, RSCs assessment methodologies are based (or will be based) on similar criteria structure. However, the way thresholds are set and aggregation/ integration is achieved slightly differ. Better alignment of these assessment procedures (e.g. aggregation rules) and threshold setting between MSs within their respective sea-areas or sub-basins is recommended to ensure harmonization and similar level of motivation to achieve GES.

Methods covering great spatial areas and providing low-cost comparable data (e.g. remote sensing,) could be applied for offshore eutrophication assessment.

### **5.5 Link to possible future EEA indicator.**

EEA maintains and updates two eutrophication indicators at a Pan-European scale:

CSI021 – Nutrients in transitional, coastal and marine waters – The indicator currently uses oxidized nitrogen (nitrite + Nitrate) and orthophosphate winter concentrations.

CSI023 – Chlorophyll in transitional, coastal and marine waters – The indicator considers the mean summer concentration of chlorophyll-a in the uppermost 10m of the water column.

For both indicators, the use of RSCs data and assessment methodology and WFD boundaries in their classification has been proposed as an improvement to the indicators.

## ***6. GES methodological standards (in accordance with Art. 9(3))***

### **6.1 Proposals for (new) methodological standards to be applied to the criteria in order to assess whether GES has been achieved for the descriptor (e.g. aggregation/integration methods across the criteria and across the quality elements).**

The cross-cutting workshop (January 2015) of the review process concluded on some general directions on aggregating assessments and scales<sup>14</sup>. It was suggested to assess GES through a number of building blocks and aggregate them at descriptor or other appropriate level. The building blocks for D5 are the criteria that would be initially assessed whether they are in GES or not by the

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<sup>14</sup> <https://circabc.europa.eu/w/browse/75f0a8e9-ec48-4957-bdb5-58169b934cc7>

associated methodological standards. There are two levels within the D5 where aggregation rules have to be applied: I) across the criteria and II) within each criterion across the methodological standards. For both levels, a number of different approaches can be used for combining indicators or criteria into an overall assessment of eutrophication (see Borja et al. 2014 for review of aggregation/integration methods). Within criteria, averaging or weighted averaging of indicators may be considered, as it is a simple method and commonly used. Across criteria, the One-Out-All-Out (OOAO) approach is commonly used by HELCOM CPs to assess eutrophication status for the Baltic Sea from the HEAT assessment tool (see below). Its application undeniably results in a worse case, as depending on the criteria with the lowest status, and thus reflects high ambition to achieve GES. Being also used in WFD, OOAO could contribute to a better harmonization between the two Directives.

As concluded in the cross-cutting workshop however, a general application of OOAO particularly within pressure-based descriptor is not straightforward, highly dependent on the quality of the data and with tendency to underestimate the 'real' status of the water body (Davey and Bewes 2011; Borja et al. 2014, Moe et al. 2015). Further guidance would be needed on aggregating scheme within each pressure-based descriptor, including D5.

#### RSCs example

HELCOM and its CPs use a transparent, commonly agreed assessment method that combines nutrient levels, direct and indirect eutrophication effects. The method is based on a revised version of the HELCOM Eutrophication Assessment Tool (HEAT 3.0; Fleming-Lehtinen et al. 2015). Assessment is carried out according to three steps:

- Step 1 (indicator level) with estimate of a 'eutrophication ratio' (ER) for each indicator element based on a defined indicator target and measured indicator status.
- Step 2 (criteria level) aggregation of indicator ratio for each D5 criterion using a weighted average of ER values within the criteria
- Step 3 (descriptor level) new criteria ER values are then combined into an integrated assessment of eutrophication status using the one-out-all-out principle

The method is applied for each assessment unit in the Baltic, and supplemented by a Final Confidence Rating by scoring the adequacy of the data used for estimating indicator targets and status<sup>9</sup>.

Recent testing and comparative exercise (EUTRO-OPER 4-2015) showed that HEAT 3.0 could also be used in coastal waters as most discrepancies with WFD assessment occur between the lower classes (i.e. moderate, poor and bad). Recommendation for these waters, however, is to combine HEAT assessment with the same parameters as those required by WFD. For the North Sea, a similar assessment tool based on HEAT has been developed by the HARMONY project – NEAT (North Sea Eutrophication Assessment Tool) – and is in principle ready for application in OSPAR maritime area.

***7. Specifications and standardized methods for monitoring and assessment (in accordance with Art. 11(4))***



**7.1 Proposals for specifications on methods for monitoring (i.e. the collection of data needed for assessment of each criterion, including parameters, units of measurement and data quality requirements), which aim at ensuring the comparability of monitoring results, on the basis of JRC / ICES / RSC survey protocols, relevant European/international standards (e.g. ISO/CEN) and Article 12 findings.**

Monitoring should provide relevant data to support suitable indicators in order to assess if GES has been achieved or is maintained, as well as to measure progress towards environmental targets and evaluate the effectiveness of measures to achieve or maintain GES. A specific guidance document (JRC 2014b) summarizes minimum standards and concepts to be considered in developing monitoring programmes with a series of agreed recommendations to be applied. One of the recommendations is that monitoring programmes have to be coordinated, compatible, coherent, consistent and comparable.

In 2013, three Pilot-Projects (BALSAM in the Baltic, IRIS-SES in the Mediterranean and Black Sea, JMP NS/CS in the North Sea) were launched as part of DG ENV initiative for coordination and support action to support coherent and comparable implementation of MSFD with focus on monitoring programmes. The objectives are to show benefits and challenges of joint monitoring network and multi-use of existing platform, increasing efficiency and reducing costs, and promote cooperation among research institutions within selected regions. A specific objective (e.g. IRIS-SES) is to elaborate guidelines for sampling across the various disciplines in order to meet MSFD requirements. Although IRIS-SES is mainly focused on monitoring programme, significant effort is being done in analyzing the methodological standards used by the several European Mediterranean countries implied in this cooperative project. It is expected that these projects (ending in May 2015) will provide recommendations for better harmonization and coordination of monitoring efforts and collection of data to support MSFD needs.

Some RSCs have already established coordinated monitoring plans (e.g. OSPAR 2014<sup>15</sup>, HELCOM Joint Coordinated Monitoring System<sup>16</sup>) applying the basic monitoring principles set out by a group of experts and consultation with WG GES<sup>17</sup> and summarized in JRC monitoring guidance (JRC 2014b)..

**7.2 Proposals for specifications on methods for assessment, which aim at ensuring comparability of assessment results, including aggregation of monitoring data within an assessment area for a particular criterion and if necessary aggregation across assessment areas up to larger areas (e.g. (sub) region scales), and based on general guidance prepared on scales and aggregation rules and taking account of JRC / ICES / RSC inventories and Article 12 findings.**

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<sup>15</sup> OSPAR 2014. OSPAR Coordinates Monitoring in the North-East Atlantic. OSPAR Commission, Publication # 622/2014.

<sup>16</sup> <http://helcom.fi/action-areas/monitoring-and-assessment/monitoring-and-assessment-strategy>

<sup>17</sup> <https://circabc.europa.eu/d/a/workspace/SpacesStore/6902dba0-53e4-4cf4-8483-689fc1daffdb/Recommendation%20for%20monitoring%20-%20202%20May%202013.doc>

The cross-cutting workshop outcome on **assessment scales**<sup>18</sup>, in relation to elements, is that multiple scales would need to be selected so that data being collected ensures appropriate coverage of the needs and no data gaps are observed. Overall, one scale does not fit all elements, and there is a need for a system that address the different needs.

Define scales at each stage of process:

	Process	Scale
1	Define GES	(sub)Region
2	Define 'indicators' for assessment	(sub)Region and possibly EU level
3	Collect the data (monitoring)	National, considering WFD for coastal waters and MSFD offshore
4	Process the data for use in indicator assessment	National, considering WFD for coastal waters and MSFD offshore
5	Aggregate the data and assess indicator	Sub(Regional) and 'national' sub-basins

For eutrophication, geographical scaling and spatial data aggregation may reflect regional differences in the DPSIR relationships. The degree of nutrient enrichment usually varies at the level of sub-region or even locally and its impact on the coastal zone and marine waters depends on the morphology and hydrodynamic characteristics of the area. Geographic scales for assessment of D5 should then consider all these aspects and need to be chosen to ensure that local impacts remain detectable, in order to inform measures (see Deltares 2013).

A risk-based approach (as referred in the Commission Decision 2010/477/EU) should be effective for D5 assessment, enabling geographical prioritization and efficient monitoring schemes over small and medium-scale areas impacted by nutrient enrichment. OSPAR Screening Procedure is identifying obvious non-problem areas with regard to eutrophication, allowing to better concentrate assessment and monitoring plans on other areas. It is important however that such 'screening procedure' be repeated at regular time intervals to ensure that the risk of eutrophication is not increasing. In the case of HELCOM, eutrophication is a regional issue affecting the entire Baltic. Contracting Parties have thus agreed to use a common nested, hierarchical approach allowing assessment at different scales depending on the needs (sub-basin scale for D5).

The report by Deltares Institute (Deltares 2013) analyses the different schemes adopted by regions and MSs, following the initial assessment reporting. This analysis should be followed by a guidance document on how to deal with spatial scales and aggregation in the context of MSFD.

<sup>18</sup> <https://circabc.europa.eu/w/browse/75f0a8e9-ec48-4957-bdb5-58169b934cc7>

## ***8. Rational and technical background for proposed revision***

### **8.1 Justification and technical background justifying the above proposals.**

The proposed revision of the Commission Decision with respect to D5 should focus on clarifying specific aspects of its implementation to ensure that a similar level of ambition to achieve or maintain GES is applied by all MS, taking into consideration recent/on-going exercises and methodological improvements conducted in the frame of RSCs.

Eutrophication is a well-defined environmental issue with clear causative factors. D5 is specifically focusing on the determination of the functional relationship between anthropogenic nutrients and ecosystem functioning. For this reason and on the basis of many years of studies, the criteria for D5 have been structured from the pressure (nutrients) to the direct and indirect effects. This structure reflects a well-established and commonly accepted conceptual model of eutrophication in coastal and marine waters (JRC 2010, Ferreira et al. 2011). There are no basic reasons to modify or revise this overall structure of the descriptor.

Resulting from the MS initial reporting and Article 12 assessment, a core set of indicators commonly applied at EU level and covering the three criteria can be identified, even though better harmonization of the metrics and measurements is needed. In coastal waters, MSFD assessment needs to consider WFD assessment elements, selecting best option for integrating WFD observations/ecological elements. In offshore waters, RSCs assessment methodological standards would be the basis for D5 assessment integrating the core set of indicators, possibly supported by additional indicators reflecting regional specificities. Aggregation rules and threshold setting need to be better harmonized among RSCs.

## ***9. Other related products (e.g. technical guidance, reference in Common Understanding document)***

**9.1 Where aspects are identified which should be usefully laid down but not as part of the decision, these elements should be specified and a proposal should be made in which way they should be laid down, e.g. interpretative guide for the application of the future Decision or CU guidance document or technical background document.**

A eutrophication assessment template could be laid down in a technical background document (e.g. HELCOM is currently preparing a HEAT assessment manual that could be generalized).

## **10. Background documents**

- Review of the GES Decision 2010/477/EU and MSFD Annex III Approach and outline for the process, (EC- Committee/07/2013/03rev, 2013);
- First steps in the implementation of the Marine Strategy Framework Directive - Assessment in accordance with Article 12 of Directive 2008/56/EC, (CSWD, 2014);
- Article 12 Technical Assessment, (Milieu ltd, 2014);
- Marine Strategy Framework Directive - Descriptor 3, (ICES, 2012);
- Common Understanding of (Initial) Assessment, Determination of Good Environmental Status (GES) & Establishment of Environmental Targets (Articles 8, 9 & 10 MSFD), (DG GES, 2014);
- In-depth assessment of the EU Member States' Submissions for the MSFD under articles 8,9 and 10, EUR26473EN (JRC 2014)
- Review of Methodological Standards Related to the Marine Strategy Framework Directive Criteria on Good Environmental Status (JRC, 2011)
- Guidance / Terms of Reference for the task groups 'criteria and methodological standards for the Good Ecological Status (GES) descriptors' (JRC, 2010)
- CSWP (2011) on the Relationship between the initial assessment of marine waters and the criteria for good environmental status.
- COM DEC (2013/480/EU). COMMISSION DECISION of 20 September 2013 establishing, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, the values of the Member State monitoring system classifications as a result of the intercalibration exercise and repealing Decision 2008/915/EC. Official Journal of the European Union, L 266
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### 1.6.2.1 EU request on revisions to Marine Strategy Framework Directive manuals for Descriptors 3, 4, and 6

#### Advice summary

Revisions to three MSFD manuals were carried out based on the results of three workshops. These revisions are annexed in the requested format to this advice. Broadly these revisions have followed the templates and texts supplied to ICES following discussion by the EU's Working Group on Good Environmental Status. For Descriptors 3 and 4, no major changes were made to the manuals, but revision was deeper for Descriptor 6 following comments from many EU Member States. EU Member States (supported by the European Commission) asked also for advice on the next steps for implementation of the Descriptors for the period 2015–2018.

#### Request

*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 organised and steered the process. ICES has been responsible for the relevant work related to the review of the descriptors D1 (biodiversity), D3 (fisheries), D4 (food webs), D6 (sea-floor integrity) and D11 (noise). For D1, ICES had to coordinate the process with JRC and for D11 the work has built on the continued work of the Technical Group on Noise (TG Noise). During the first phase of the review process ICES had to prepare draft documents for each of the above-mentioned descriptors, provide recommendations for revision of the technical issues of the Decision with a proposed draft text with changes and the rationale for these changes to the Commission and provide feedback to WG GES which is the forum to oversee the organisation and planning of the technical review process.*

*For the finalisation of the first phase of the GES review, ICES is therefore requested to provide an offer covering the following tasks:*

- a) consolidate all comments (technical and on policy issues) received from WG GES and DG ENV on the draft documents for each of the above-mentioned descriptors;*
- b) if necessary, organise targeted meetings of expert groups from all interested EU member states and Regional Sea Conventions to address outstanding technical issues identified in the review process (particularly following DG ENV guidance on the ToR and agenda of the meetings);*
- c) provide reports of the targeted expert meetings;*
- d) revise documents after input received during the cross-cutting workshop (see (ii) below) and during the targeted expert meetings;*
- e) finalise draft documents per descriptor (or via combined descriptors, where agreed), providing recommendations for revision of the Decision with a proposed draft text with changes and the rationale for these changes to the Commission by 25 March 2015;*
- f) provide feedback on the work undertaken to WG GES in April 2015 which is the forum to oversee the technical review process.*

#### Elaboration on ICES advice

The manuals for the Descriptors 3, 4, and 6 were revised (from versions provided in October 2014) to differing extents, dependent largely on feedback received from EU Member States and the Regional Seas Conventions, and on comments from the European Commission.

For Descriptor 3, the greatest changes were in the approaches to Criterion 3.3 on fish population, age and size distribution. This criterion requires further development; monitoring should continue, but the results cannot presently be used to evaluate GES. An approach is suggested for the development of this criterion.

For Descriptor 4, the concept of “trophic guild” was clarified; further guidance was provided on GES criteria and methodological standards.

Descriptor 6 required considerable further revision. The suggestion for a fairly radical overhaul of the criteria met much resistance in feedback and was difficult to support with current science. The concept of switching to an approach based on functionality and recoverability should not be lost for future work. These concepts though are difficult to make

operational with the current evidence base. The manual has therefore been rewritten to update and improve the current approach of damage to the seafloor and condition of benthic community. In particular, forms of pressure on the seafloor other than physical damage and functional aspects of the benthic community have been further emphasized.

The work on Descriptor 1 was taken over by JRC and that on Descriptor 11 has been carried out by TG Noise.

## Suggestions

### Next steps for implementation of the GES Descriptors for the period 2015–2018

In response to requests from EU Member States, and informally from the European Commission, ICES recommends the following as next steps to aid implementation of Descriptors 1, 3, 4, and 6 of the MSFD.

#### Cross-cutting work

1. Gaps and overlaps across descriptors. The challenges when considering state (including biodiversity) and function need to be considered across Descriptors 1, 3, 4, and 6. The concepts of trophic guild, taxonomic grouping, habitat type, and fish stock need to be combined in a way that accounts for the functional requirements of the state descriptors to ensure efficient implementation of the MSFD. This scientific work is needed before the revision of the Commission decision is finalized; it is therefore relatively urgent. ICES recommends a preparatory project, followed by a final 4- to 5-day workshop to agree ways to reconcile functionality with conservation objectives in state descriptors. The outcomes of the workshop should be internationally peer-reviewed.
2. Aggregation within Descriptors 3, 4, and 6 (including spatial integration). Further guidance is required by EU Member States (and European bodies) on approaches to aggregate indicators proposed to assess Descriptors 3, 4, and 6. Aggregation of assessments of different indicators should take the varying qualities of each indicator into account, both in terms of their pressure–state relationships and to the levels of uncertainty in their estimation. The issue of spatial extent in relation to overall assessment should also be considered. This guidance is needed for the 2018 reporting round and should be carried out by the Regional Seas Commissions as a combination of science and management decisions. ICES would be able to help in providing science support and comparing regional responses.

#### Descriptor 3

ICES recommends developmental work to underpin the implementation of Criterion 3.3 and proposes a preliminary suite of candidate indicators (see Annex 1). These indicators capture three relevant properties representing the state of fish populations and pressure exerted on those populations: i) size distribution of the species (state), ii) selectivity pattern of the fishery exploiting the species (pressure), and iii) genetic effects of exploitation on the species (state).

The following steps, involving a series of workshops, are required to make these proposals operational before 2017:

1. Indicator selection and evaluation against ICES criteria (ICES, 2014a, 2014b) using selected representative fish stocks. The selected stocks should exhibit different characteristics (e.g. long-lived, short-lived, pelagic, demersal, elasmobranchs) and be selected from a range of regions with the aim to select one validated indicator per property. The selection of example stocks should consider data availability, the stock dynamics should exhibit contrast (both in terms of productivity and exploitation). Data will be collated using a formal data call and should include both catch/landings and age-at-length data, and survey information. Guidelines will be provided on the type of stocks for which each indicator is relevant. Workshops with scientists with experience in fisheries science from across Europe will be needed. The properties of underlying data, knowledge base, construction of operational indicators, and sensitivities to underlying assumptions will be explored.
2. Evaluation of GES for Criterion 3.3 for selected stocks. Primary indicators will be processed similar to those in criteria 3.1 and 3.2; where the knowledge on the characteristics of the indicator and its reference level should enable the identification of the requirements for GES. Secondary indicators will also be considered. Workshops will be needed and would follow step 1.
3. Applying methods for Criterion 3.3 to regional evaluations. Taking the methods developed to make an evaluation of GES using example regions to further test the applicability of the approaches. This may be possible at a workshop under Step 2 above or could be included as part of the work of ICES integrated ecosystem assessment groups.



## Descriptor 4

ICES recommends further developmental work to underpin the implementation of Descriptor 4 and proposes that the challenges need to be addressed in the following ways:

1. Uncertainty and GES. Three major sources of uncertainty affect the ability to determine Descriptor 4 indicator bounds (and similarly for other descriptors) and the interpretation of change in indicators in relation to GES: i) statistical uncertainty with respect to measuring indicators, ii) uncertainty reflecting whether the values for indicators relate to desirable or undesirable states, and iii) how direct and indirect linkages between indicators and pressures affect Descriptor 4 indicator behaviour. Building upon existing projects, ICES recommends an international peer-reviewed advisory process to provide methods to address these issues for all recommended indicators (see Annex 2) in 2016.
2. Consistent regional and pan-regional interpretations of indicators, limits, and estimation methods. ICES notes the suggestion to bring together experts to progress consistency in interpretation is important both within and between regional seas (HELCOM–OSPAR, 2014). If requested, existing ICES working groups could be tasked with developing agreed international guidelines to ensure consistent interpretations of indicators, limits, and estimation methods in 2016–2017 in order to feed through to EU-wide assessments.
3. Further development of Descriptor 4 indicators. This work is required to consider the differing influences of environmental variability and anthropogenic activity on considerations of GES for Descriptor 4. Indicator development should specifically investigate the role of lower trophic guilds on the likely assessment of GES for Descriptor 4, the role of size in foodweb stability, and management strategy evaluations of the sensitivity of Descriptor 4 indicators to anthropogenic pressures. Much of this work should be carried out through projects, but a workshop to bring together the outputs of the projects and updating the foodweb advice should be planned for 2017.

## Descriptor 6

ICES recommends further developmental work to underpin the implementation of D6 and proposes the following actions:

1. Develop and test standards for assessing human pressures on benthic habitats within and between MSFD regions. ICES in collaboration with the RSCs can provide peer-reviewed guiding principles that ensure alignment between GES boundaries for seafloor integrity to support regional indicator development and to avoid conflicting results between regions.
  - Identify where the collection of additional information is needed (ICES working groups are evaluating this for the OSPAR area; similar processes are needed for other regional seas);
  - Agree the list of key functions to be addressed across and within MSFD regions using the recommended Descriptor 6 indicators;
  - For each indicator, evaluate the applicability of existing concepts for setting GES boundaries and where possible identify critical values that could be used for these boundaries. This will need a dedicated workshop in 2017.
2. Habitats and issues of scale. Long-term action is needed to select habitats and address the role of scale and of connectivity in setting GES boundaries for the sea-floor. This work could take place in one workshop in 2018 and would include:
  - Agreeing the list of habitats to be assessed;
  - Resolving issues of scale by defining, e.g. at what EUNIS hierarchical level habitats are going to be addressed.
3. Assessment of recoverability of seafloor integrity. No standards or methods exist for this key attribute of marine ecosystems. Development of such standards could be carried out in a project.

## Basis of the advice

The European Commission is in the process of reviewing and potentially revising the Decision on criteria and methodological standards on good environmental status of marine waters (EU, 2010).

As part of this process, ICES was tasked in early 2014 with Descriptors 3 (Populations of commercially exploited fish and shellfish), 4 (Foodwebs), and 6 (Sea-floor integrity). A series of workshops held in autumn 2014 provided guidance reports with dedicated recommendations (ICES, 2014a, 2014c, 2014e). The results of the workshops were used to update “templates” provided by the European Commission to form first drafts of Descriptor “manuals” (ICES, 2014b, 2014d, 2014f). Following a meeting of the MSFD Common Implementation Strategy Working Group on Good Environmental Status (WGGES) in October 2014, further work and clarification was requested from ICES in December 2014 (see request

below). As a result further workshops were held in Copenhagen in February 2015 (ICES, 2015a, 2015b). The results of these second workshops have been used in updating the templates (attached as Annexes 1–3).

## Sources and references

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ICES. 2014a. Report of the Workshop on guidance for the review of MSFD Decision Descriptor 3 – commercial fish and shellfish (WKGMSFDD3), 4–5 September 2014, ICES HQ, Denmark. ICES CM 2014\ACOM:59. 47 pp.

ICES. 2014b. EU request to ICES for review of the Marine Strategy Framework Directive Descriptor 3 – Commercially exploited fish and shellfish. *In* Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 11 (Technical services), Section 11.2.1.3.

ICES. 2014c. 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.

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ICES. 2014e. Report of the Workshop to review the 2010 Commission Decision on criteria and methodological standards on good environmental status (GES) of marine waters; Descriptor 6, 2–3 September 2014, ICES Headquarters, Denmark. ICES CM 2014\ACOM:61. 37 pp.

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ICES. 2014g. EU request on draft recommendations for the assessment of MSFD Descriptor 3. *In* Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 1, Section 1.6.2.1.

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ICES. 2015a. Report of the Workshop on guidance for the review of MSFD decision descriptor 3 – commercial fish and shellfish II (WKGMSFDD3-II), 10–12 February 2015, ICES Headquarters, Denmark. ICES CM 2015\ACOM:48. 31 pp.

ICES. 2015b. Report of the Workshop on guidance for the review of MSFD decision descriptor 4 – foodwebs II (WKGMSFDD4-II), 24–25 February 2015, ICES Headquarters, Denmark. ICES CM 2015\ACOM:49. 48 pp.

## Possible approach to amend Decision 2010/477/EC

### Descriptor 6: Sea-floor integrity

Title of Descriptor
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*Good environmental status for Descriptor 6 – Sea-floor integrity*

Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and that benthic ecosystems, in particular, are not adversely affected.

1. Approach
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#### Definitions

**Sea-floor** includes both the physical and chemical parameters of seabed and the benthic community. Different kinds of habitats for fixed or mobile marine species are formed inside, on, and above the sea-floor.

**Integrity** is interpreted as both covering spatial connectivity and ecosystem processes functioning within their natural variability.

Assessing environmental status of the sea-floor is particularly challenging for four reasons:

- The large range of human pressures that may degrade the status of the sea-floor;
- Pressures and impacts from human activities are patchy;
- Habitat distribution on the sea-floor is patchy; and,
- The monitoring of the different range of sea-floor types is also irregular and not homogenous (e.g. lack of information about the sea-floor in the deep sea).

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

Sea-floor integrity as set out in the Directive is a relatively new concept, but one which encompasses aspects of the physical attributes and the functioning of seabed habitats and communities that have a long history of scientific study and environmental assessment, e.g. in the Water Framework Directive and the Habitats Directive. The Habitats, Birds, and Water Framework Directives do not explicitly define biodiversity and sea-floor integrity includes much more than just biodiversity. Special habitats are covered by a range of protected area measures, e.g. Natura 2000 sites. Sea-floor integrity must be achieved for widespread/predominant habitats, not just special (usually sensitive) ones.

#### Linkages with international and RSC norms and standards

HELCOM's CORESET II project has developed a suite of indicators which will form the core of the commonly agreed indicators among the HELCOM Contracting Parties. CORESET II also allows for the development of pre-core and candidate indicators relevant for Descriptor 6. Both state- and pressure-indicators are under development, and the work will build on relevant previous HELCOM products such as the reports from the HELCOM Red List project where a EUNIS compatible habitat classification system (HUB) was developed and threatened biotopes were identified.

Development of a set of common biodiversity indicators by OSPAR includes a number related to assessing seabed habitat quality and one assessing the spatial extent of damage from human activities. Five benthic habitat (BH) indicators pertaining to Descriptor 6 are included in the OSPAR list of common indicators: BH1 "Typical species composition", BH2 "Multi-metric indices", BH3 "Physical damage of predominant and special habitats", BH4 "Area of habitat loss", and BH5 "Size-frequency distribution of bivalve or other sensitive/indicator species". None of these indicators are yet fully operational, but offer a logical way of bringing information together, covering several attributes which are now being tested and validated to make them operational, at least in some areas.

The **Bucharest and Barcelona Conventions** have respectively not agreed or have just started a process to agree on indicators; these are not yet operational.

To the extent that these international and RSC norms and standards focus on specific, often highly sensitive habitats, or solely on biodiversity rather than ecological functions provided by all aspects of the sea-floor substrate and biota, they would be an incomplete basis for evaluating sea-floor integrity.

## Definition of GES

ICES interprets GES for this descriptor to mean that the cumulative effect of pressures associated with human activity is at a level that ensures that sea-floor ecosystems maintain their structure and functioning. Any disturbance (intensity, frequency, and spatial extent) should not exceed a level that significantly and permanently jeopardises recovery.

The Decision 2010/477/EU Descriptor 6 Criterion 6.1 “Physical damage” does not cover all aspects of sea-floor integrity with regard to substrate characteristics. Other pressures (e.g. eutrophication) are not explicitly included. Some indicators under this criterion (e.g. OSPAR’s BH3) address some of these further pressures, but it is recommended that the criterion be adjusted to be more explicit on these aspects. The criterion is not clear in that both pressures and impacts are to be assessed. Only a few EU Member States incorporated functional aspects of sea-floor integrity in their implementation of Criterion 6.2 “Condition of benthic community”.

It is recommended to adapt the Decision 2010/477/EU Descriptor 6 criteria and indicators to accommodate the inclusion of further pressures and their impacts, and to provide an effective and clearer transposition of functional aspects of the sea-floor integrity.

## The “climate sensitivity” for Descriptor 6 (or criteria/indicators)

Climate changes can lead to changes in sea temperature and sea level as well as to ocean acidification, all of which can have an effect on sea-floor integrity, mainly on benthic species and communities, but potentially also on the physical habitat. One potential impact is due to a reduced exchange of nutrients between surface waters and deeper waters. It is expected that surface waters will receive fewer nutrients which will reduce the growth of phytoplankton and eventually the amount of organic matter that sinks down to sea-floor communities. This is expected to affect the composition, functioning, and biomass of deep-sea communities.

## 2. Results of the Article 12 assessment (incl. In-depth assessment)

### Descriptor

All EU Member States but one who submitted a report have defined GES for Descriptor 6, with definitions applying to their entire marine waters. The definitions were formulated at descriptor level by most EU Member States.

### Criteria

Most EU Member States provided additional detail at the criterion level, often with a close relationship to the Commission Decision 2010/477/EU criteria. In general, depending also on data availability, it seems that the contribution of each indicator into the implementation of MSFD differs; however, some EU Member States have not used both criteria mentioned in the Decision. Other EU Member States provided additional details at the indicator level, with a close relationship to the Commission Decision indicators although every indicator was not always used. The definitions varied considerably in their content and level of detail; most were qualitative and were lacking definitions of key terms used or specificity of the sea-floor types to be addressed.

#### Decision 2010/477/EU Criterion 6.1 “Physical damage, having regard to substrate characteristics”

A majority of EU Member States refer to the reduction of physical pressures from human activities on the sea-floor, either directly or indirectly (through reference to impacts). Only four EU Member States included an indicator on the percentage of area occupied by biogenic substrate affected by human pressures, but three of these indicators did not specify a threshold value. Three out of these four EU Member States also have quantified indicators for non-biogenic habitat impacted by human pressures, but none of them have set a threshold yet.

#### Decision 2010/477/EU Criterion 6.2 “Condition of benthic community”

Across the EU Member States, the coverage of Criterion 6.2 on the condition of the benthic community is rather limited. In the Northeast Atlantic marine region, two EU Member States have included a quantitative indicator in their GES definition in relation to Indicator 6.2.2. In the Baltic region, several EU Member States have used quantitative indicators in their GES definition. In the Mediterranean, two EU Member States have indicated that the assessment of GES will be based on multi-metric indices, one of whom specifically refers to the WFD and good environmental status. The definitions for Criterion 6.2 from the other fourteen EU Member States are generally vague and only two of them make reference to the WFD good ecological status. Very few EU Member States consider how their indicators are linked to functionality in their consideration of the condition of the benthic community.

## Regional coherence

The regional coherence for Decision 2010/477/EU Descriptor 6 is low in all regions except the Black Sea, where only one Member State has defined Decision 2010/477/EU Descriptor 6.

## MS good practices

Four EU Member States have included an indicator on the percentage of area occupied by biogenic substrate affected by human pressures. One has associated the indicator with a quantitative threshold value. Four EU Member States have included a quantitative indicator as indicator for 6.2.2. Three additional EU Member States refer to the WFD good ecological status. Two EU Member States have specified the substrate types covered by the GES definition.

### 3. Analysis of the current text of the Decision

#### ➤ To be kept in the Decision, but amended

The following amended text is recommended to meet the issues identified above (strike-through = deleted, underline = inserted):

6.1. *Physical Damage to the sea-floor, having regard to both pressure(s) on, and sensitivity of, habitats ~~substrate~~ characteristics*

— *Extent of pressure(s) on the sea-floor (single, multiple, or cumulative)*

*Type, abundance, biomass and areal extent of relevant biogenic substrate (6.1.1)*

— *Extent of the seabed-floor significantly affected by human activities for the different substrate types (including biogenic) (6.1.2).*

6.2. *Structural and functional condition of benthic community*

— *Presence of a particular species providing a key function ~~provided by sensitive and/or tolerant species~~ (6.2.1)*

— *Multi-metric indexes assessing benthic community structure and function, such as species diversity and richness, proportion of opportunistic to sensitive species (6.2.2)*

— *Proportion of biomass or number of individuals in the macrobenthos above some specified length/size (6.2.3)*

— *Parameters describing the characteristics (shape, slope and intercept) of the size spectrum of the benthic community (6.2.4).*

#### ➤ To be taken out of the Decision and included in guidance

The following parts of the Decision describe qualitatively what the criteria and indicators refer to and provide limited guidance as to which elements should be assessed and the assessment methods that should be used. These sections should be moved to guidance:

*The objective is that human pressures on the seabed do not hinder the ecosystem components to retain their natural diversity, productivity, and dynamic ecological processes, having regard to ecosystem resilience. The scale of assessment for this descriptor may be particularly challenging because of the patchy nature of the features of some benthic ecosystems and of several human pressures. Assessment and monitoring needs to be carried out further to an initial screening of impacts and threats to biodiversity features and human pressures, as well as an integration of assessment results from smaller to broader scales, covering where appropriate a subdivision, sub-region or region. (The following two paragraphs would need to be modified if the recommendations provided above are followed)*

*(6.1) The main concern for management purposes is the magnitude of impacts of human activities on sea-floor substrates structuring the benthic habitats. Among the substrate types, biogenic substrates, which are the most sensitive to physical disturbance, provide a range of functions that support benthic habitats and communities.*

*(6.2) The characteristics of the benthic community such as species composition, size composition, and functional traits provide an important indication of the potential of the ecosystem to function well. Information on the structure and dynamics of communities is obtained, as appropriate, by measuring species diversity, productivity (abundance or biomass), tolerant or sensitive taxa, and taxocene dominance and size composition of a community, reflected by the proportion of small and large individuals.*

➤ **Outdated**

N/A

**4. GES criteria (in accordance with Art. 9.3)**

Minor amendments to the existing GES criteria are recommended:

Criterion 6.1 “Damage to the sea-floor, having regard to both pressure(s) on, and sensitivity of, habitats”

- Extent of pressure(s) on the sea-floor (single, multiple, or cumulative);
- Extent of the sea-floor significantly affected by human activities for the different substrate types (including biogenic) (Indicator 6.1.2).

Criterion 6.2 “Structural and functional condition of benthic community”

- Presence of a particular species providing a key function (Indicator 6.2.1);
- Multi-metric indexes assessing benthic community structure and function (Indicator 6.2.2);
- Proportion of biomass or number of individuals in the macrobenthos above some specified length/size (Indicator 6.2.3);
- Parameters describing the characteristics (shape, slope, and intercept) of the size spectrum of the benthic community (Indicator 6.2.4).

**5. GES methodological standards (in accordance with Art. 9.3)**

No additional guidance.

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

A joint HELCOM CORESET II and OSPAR ICG-COBAM workshop (HELCOM-OSPAR, 2014) on biodiversity indicators identified particular opportunities for synergies for three indicators related to benthic habitats:

- 1) BH3 “Physical damage/cumulative effects” – the first steps could be sharing of progress and information via the workshop to see the potential for a common concept for Baltic/NEA; coordination of data calls (e.g. VMS data calls, sensitivity assessment); common standards for QA/QC.
- 2) BH2 “State of sea-floors composed of soft sediments (multi-metric index)” – exchanging of information would be appropriate for this indicator as an initial step. Cooperation could be helpful for development and testing, but it should be noted that the systems in the Northeast Atlantic and Baltic are sufficiently different that the calculation of the indicator would be different;
- 3) BH5 “Population structure” - there is potential here for common concepts across RSC areas, although species may differ. This would likely be a longer term action.

Further cooperation on concept development and testing could occur in the medium and long term.

This initiative should provide useful standardized methods for monitoring in northern and western European seas that could be adopted in other European seas.

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

None.

**8. Rationale and technical background for proposed revision**

In early 2014, ICES was tasked with assessing Descriptor 6 “Sea-floor integrity” issues, focusing on methods and bounds for setting GES. A workshop held in September 2014 provided a guidance report with dedicated recommendations (ICES, 2014a). The results of this workshop were used to update a “template” provided by the European Commission to form a first draft of a Descriptor 6 “manual” (ICES, 2014b). Following a meeting of the MSFD Common Implementation Strategy Working Group on Good Environmental Status (WG-GES) in October 2014, further work and clarification was requested

from ICES in December 2014. As a result a further workshop was held in Copenhagen on 16–19 February 2015 (ICES, 2015). The results of this second workshop have been used in updating the current document.

Indicators on sea-floor functioning do not need more data to be collected. It would require the interpretation of structural data from a function perspective (i.e. assessing the functioning potential from structural data rather than directly measuring the actual process itself). These data are already being collected in ongoing monitoring programmes.

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

None.

#### **10. Reference documents**

HELCOM–OSPAR. 2014. Communication paper from the joint biodiversity indicator expert meeting of HELCOM CORESET II and OSPAR ICG–COBAM, 1 October 2014, Gothenburg, Sweden.

ICES. 2014a. Report of the Workshop to review the 2010 Commission Decision on criteria and methodological standards on good environmental status (GES) of marine waters; Descriptor 6: seafloor integrity, 2–3 September 2014, ICES Headquarters, Denmark. ICES CM 2014\ACOM:61. 37 pp.

ICES. 2014b. EU request to ICES for review of the Marine Strategy Framework Directive: Descriptor 6 – Seafloor integrity. *In* Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 11 (Technical services), Section 11.2.1.5.

ICES. 2015. Report of the Workshop on guidance for the review of MSFD decision descriptor 6 – seafloor integrity II (WKGMSFDD6-II), 16-19 February 2015, ICES Headquarters, Denmark. ICES CM 2015\ACOM:50. 56 pp.



EUROPEAN COMMISSION  
JOINT RESEARCH CENTRE

Institute for Environment and Sustainability  
Water Resources Unit

## **Review of Commission Decision 2010/477/EU concerning MSFD criteria for assessing good environmental status**

### **Descriptor 7**

#### **Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems**

This report represents the result of the scientific and technical review of Commission Decision 2010/477/EU in relation to Descriptor 7. The review has been carried out by the EC JRC together with experts nominated by EU Member States, and has considered contributions from the GES Working Group in accordance with the roadmap set out in the MSFD implementation strategy (agreed on at the 11th CIS MSCG meeting).

The report is one of a series of reports (review manuals) including Descriptor 1, 2, 5, 7, 8, 9, 10 that conclude phase 1 of the review process and, as agreed within the MSFD Common Implementation Strategy, are the basis for review phase 2, towards an eventual revision of the Commission Decision 2010/477/EU.

The report presents the state of the technical discussions as of 30 April 2015 (document version 7.0: ComDecRev\_D7\_V7), as some discussions are ongoing, it does not contain agreed conclusions on all issues.

The views expressed in the document do not necessarily represent the views of the European Commission.



## **Foreword**

The review of MSFD Descriptor 7 has been performed through a collaborative work among experts of the network for MSFD Descriptor 7, led by JRC (Adolf Stips and Daniel Gonzalez). The current state of these discussions is being reflected in this document. Discussions have not been concluded and final recommendations are being prepared in the second review phase (Part 2 of the present draft).

**MSFD Expert Network on D7:** Ad Stolk, César González-Pola, Isabel M. Moreno Aranda, Giordano Giorgi, Jon Rees, Lorenza Babbini, Marta Manca Zeichen, Pekka Alenius, Valérie Cariou, Vassilis Zervakis, Wlodzimierz Krzyminski.

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

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# PART I: COMPILATION OF INFORMATION

## 1. Approach

### 1.1 Introduction

The MSFD Committee discussed and concluded an approach and an outline for the process of a review and possible revision of Commission Decision 2010/477/EU on GES criteria (COM DEC) and of MSFD Annex III (see Committee/07/2013/03rev for details). Based on the template in the annex to the mandate of the MSFD Committee, a more detailed manual for the technical phase relating to the review of COM DEC has been developed to guide the parallel preparatory process and discussions per descriptor. The review manual and the potential structure were decided and agreed by the WG GES in March 2014. These are common for all descriptors to ensure coherence in the review approach.

Experts should comment on the review template following the approach outlined in the review manual and the general guiding principles laid out below. It is very important to understand that this review template is not a closed document. It has been prefilled in an attempt to highlight relevant aspects and issues that are important for the review of COM DEC. Please keep in mind that experts are free to add any relevant points, questions and information that are not yet included. Input and comments are expected from the experts for all sections, including those that have been prefilled.

Part I of the review template comprises 4 sections to be developed in accordance with the review manual:

- Approach
- Analysis of the implementation process
- Analysis of the current text of the Decision
- Identification of issues

Part II of the review template comprises 5 sections that will describe conclusions, recommendations and proposals resulting from the work developed in Part I. Experts were asked to start providing input to this part in parallel with Part I.

### 1.2 General guiding principles for the review

The review aims to analyse the results from the first MSFD reporting round on Articles 8, 9, and 10 with a view to update/improve and simplify the COM DEC.

Based on the Information in the Art 12 assessment reports (COM(2014)97 final; SWD(2014) 49 final) and the JRC in-depth assessments (JRC IDA D7, 2014) the review template has been prefilled by Milieu, DG ENV and JRC. This should enable the experts group to analyse current shortcomings and propose ways forward, e.g., needs for further guidance and development, but eventually also to develop proposals for amending the COM DEC based on scientific knowledge and experience in the implementation process.

The current review should lead to a new COM DEC which (is):

- Simpler
- Clearer
- Introduces minimum requirements (to be enhanced by regions and MS, if necessary)
- Self-explanatory
- Coherent with other EU legislation
- Coherent with regional assessment methods (where EU does not exist)
- Has a clear and minimum list of criteria and methodological standards and related characteristics, pressures and impacts (MSFD Annex III)
- Ensures that criteria and methodological standards adequately address coverage of the descriptors by the proposed criteria, to lead to complete assessments
- Coherent with the MSFD terminology

This review should develop a more coherent approach to the definition of GES based on agreed criteria and methodological standards that can enable assessment of the current state and hence establish whether GES has been achieved and, if not, the gap between the current state and GES.

### 1.3 Definition of Descriptor 7

**Hydrography** is the branch of applied sciences that deals with the measurement and description of the **physical features** of oceans, seas, coastal areas, lakes and rivers, as well as with the prediction of their change over time, for the primary purpose of safety of navigation and in support of all other marine activities, including economic development, security and defence, scientific research, and environmental protection<sup>1</sup>.

**Hydrology** (from the Greek word *hydrologia*, the "study of water") is the study of the movement, distribution, and quality of water throughout the Earth, including the hydrologic cycle, water resources and environmental watershed sustainability<sup>2</sup>.

**Hydromorphology** is that new subfield of hydrology that deals with structure and evolution of Earth's water resources. It deals with the origin and dynamic morphology of water resource systems as caused by both natural and anthropogenic influences<sup>3</sup>. The MSFD and WFD do not define hydromorphology. The WFD considers hydromorphological quality elements for the classification of ecological status. The COM DEC refers to the WFD 'hydromorphological objectives', although this term is not explicitly mentioned in the WFD text.

**Hydrographical conditions** include the bathymetry of the seabed, sea level, temperature, salinity, currents, tides, waves and turbidity. This strict definition of hydrography would exclude chemical features like pH, alkalinity, oxygen and nutrients from consideration under D7. The definition builds mainly on cases from Water Framework Directive (WFD) and the Flood Directive. Some **hydrographical conditions**

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<sup>1</sup>International Hydrographic Organization, [www.iho.int](http://www.iho.int)

<sup>2</sup><http://www.newworldencyclopedia.org/entry/Hydrology>

<sup>3</sup><http://engineering.tufts.edu/cee/people/vogel/documents/hydromorphologyEditorial.pdf>

outlined under the Marine Strategy Framework Directive (MSFD) are comparable to the hydromorphological conditions referred to under the WFD (Annex II “Characterisation of surface water types” section 1.2.4 coastal waters system B).

The MSFD text does not define what ‘physical features’ are. Table 1 of MSFD Annex III includes an indicative list of elements (features and characteristics) with no further specification on which ones should apply for Descriptor 7. This table would also include other features or characteristics typical of or specific to the marine region or subregion considered. The text of the COM DEC refers to the physical and chemical characteristics listed in Table I Annex III of the MSFD. In terms of comparing and clarifying the definition, some other sources might need to be consulted. Table 2 of MSFD Annex III, regarding pressures and impacts, includes interference with hydrological processes, but these processes are not defined and they only refer to changes in thermal and saline regimes.

*Comments:*

- *Do hydrographical conditions and physical features refer to the same term? Hydrographical conditions and physical features are considered as different terms, but there is no agreement on the definitions. Guidance is needed to set up agreed definitions.*
- *Suggestion to clarify the definition for physical features, considering also that many features are scale-dependent*
- *It is not clear if features and characteristics refer to the same term. There is no agreement on the definitions. Guidance is needed to set up agreed definitions. Pelagic features such as eddies, fronts and/or river plumes should/must be considered because of their important role on pelagic habitats.*
- *Discussion is needed on the adequacy of considering certain elements as physical features under Descriptor 7 (e.g. turbidity – linked to plankton, so not independent from Descriptor 5)*
- *Inclusion of hydrochemical conditions (like pH, alkalinity, oxygen or nutrients) would significantly change and extend the parameters and goes beyond what the Directive requires. On the other hand, many experts consider that chemical features should be considered under D7, including pH, pCO<sub>2</sub>, alkalinity and oxygen in the monitoring programmes.*
- *Needs definition for hydrological processes and a clarification of the specific hydrological processes that should be considered under the MSDF framework (Pressures and impacts, Table 2 ANNEX III of MSFD)*
- *There’s a need to define all parameters and units used, links to calibration and standards, spatio-temporal scales and permanent alteration.*

Under the WFD, water bodies may be classified as ‘heavily modified water bodies’ when, as result of physical alterations by human activity, their character has been substantially changed and specific requirements must be applied to achieve ‘good ecological potential’, i.e. waters affected by permanent changes to hydrographical conditions such as coastal defence works, land reclamation or building activities. On the other hand, the terms ‘permanent changes’ or ‘hydrographical conditions’ are not referred to in the WFD. This makes it difficult to determine the interaction between assessments under both WFD and MSFD, e.g. if only permanent hydrographical changes will be considered in MSFD. The term ‘permanent’ implies a situation that is not going to be reversed, but it is not defined under the MSFD, although OSPAR has proposed a temporal threshold.#

**Permanent hydrographical changes** can occur due to changes in the thermal or salinity regimes, changes in the tidal regime, sediment and freshwater transport, current or wave action and changes in turbidity. The degree of change and the period over which such change occurs varies considerably, depending on the type of modification. Assessment of the degree of change can be related to both the water column and the sea-floor, and consequently to their biological communities. These types of change are normally triggered by infrastructure building activities, such as extensions or alterations to the coast, or the building of artificial islands and other infrastructural works in the marine environment (such as outfalls from power stations, bridges and causeways to islands, offshore installations). This descriptor addresses all such developments (existing and new infrastructures) and both large- and small-scale structures. Cumulative impact assessment should be considered for assessing the significance of the aggregated effect of many small-scale changes. Importance is given to new planning activities that will have to fulfil Environmental Impacts Assessments (EIA).

*Comments:*

- *Whether or not a temporal threshold is defined for ‘permanent’ has consequences for a harmonized approach to assess GES for D7.*
- *Does this mean that temporary hydrographical changes would be excluded from Descriptor 7? Based on CIS Guidance Document 20, where it is confirmed that the WFD is not concerned with ‘temporary’ changes, expert’s feedback suggests it would seem reasonable to take the same approach for the MSFD.*
- *The timescale for definition of permanent could be location specific.*
- *To assess permanent changes we need reliable reference data, this point is missing in all papers! The definition of a 30-year reference period is mandatory. A useful interval is 1981-2010, because this interval includes the regime shift to higher temperatures beginning in the 1990s. Hydrographical conditions can exhibit a strong natural variability depending on time-scale due to strong interaction with bigger scale environmental features. As an example, the North Sea interaction with the Northeast Atlantic involves existence of temperature differences in the southern North Sea related to different NOA index periods. This natural variability with a period of about 7 years masks every human impact. In other words: to assess a “permanent change”, very long time series are required to provide the proof that the change is permanent and not a signal of natural variability.*
- *There is a lack of specification and coherence between the MSFD text (indicative list of characteristics, pressures and impacts in table 2, Annex III, MSFD) and the COM DEC text. Some pressures listed under physical loss could and have been applied for assessment of D7. In order to assure comparability between MSs, a harmonization/agreement of the activities/pressures under D7 should be considered/reached and a clearer link between the COM DEC and the Directive should be set for this descriptor.*

**Descriptor 7** is primarily a ‘pressure’ descriptor that focuses on permanently altered hydrographical conditions (often at a localized scale), which predominantly arise from pressures causing structural alteration of the coast or seabed: coastal activities causing topographical changes (e.g. land claim, barrages, sea defences) and coastal and offshore infrastructures (e.g. ports, wind farms, oil rigs, pipelines,

heat and brine outfalls). Hence, the pressure is the change in morphology of the seabed/coast or change in habitat (e.g. from sediment to concrete/metal) that causes hydrographical changes. These changes of the hydrographical conditions consequently will act as a pressure that is impacting the habitat or even the ecosystem. Assessment for this descriptor should take into account the cumulative 'impact' of all these 'localized activities' that act as pressures, linking them also to the associated physical loss and damage. In this sense the total pressure from D7 needs to be considered with other impacts in the assessments of each seabed and water column habitat under D1 and D6.

Considering the intention of MSFD to prevent significant negative effects on marine ecosystems (habitats and species) the defining of GES for D7 must be intimately linked to GES in descriptors D1 and D6, and to a lesser extent to D4 and D5, where impacts can occur from changes to the water column and seabed habitats. Changes, such as altered erosion patterns or residence time can modify local conditions in a way that negatively impact sensitive species and habitats and can therefore compromise the achievement of the biodiversity and eutrophication descriptors D1, D4, D5 and D6. Consequently the cumulative impact on the ecosystem from pressures resulting from the alteration of hydrographical conditions should ultimately be assessed in these relevant descriptors (D1, D4, D5 and D6).

#### Comments:

- *General comment: Proposition to consider the D7 as a "state" and "pressure" descriptor. Hydrographic conditions are an inherent part of marine ecosystems and thus contribute to describe the state. But in parallel, human activities modifying these hydrographic conditions, can lead to changes in these same hydrographic conditions (pressure) that induce impacts on marine ecosystems. Consideration of D7 as a 'pressure' descriptor, but also as a 'status' descriptor is under discussion. MSFD uses EBM that implies to consider the whole ecosystems and/or habitats including the biotope and marine life. Therefore, D7 would also be a 'status' descriptor.*
- *The list of possible human activities/pressures to be considered in D7 is not exhaustive. There is a need to define an indicative list, and there is a need for clarification on how to deal with additional pressures, i.e. Inland activities like river damming can also modify the sediment and freshwater transport, giving rise to changes in the hydrographical conditions in the coastline. On the other hand, although inland activities can affect the coastline, they should already be addressed by the WFD. Thus reference should be made to the role of the WFD rather than risking duplication.*
- *It is difficult to attribute ecosystem changes to a specific cause or mix of causes. Some guidance on cumulative impacts is recommended.*
- *Local changes 'can' but often won't compromise the achievement of D1 or D5... The impact of such changes and any in-combination effects will be site specific. But, D7 should not be treated in isolation from other impacts.*
- *Regarding 'negative effects', the term 'significant' should be clearly defined as 'adversely affect the marine ecosystem' in order to prevent effects that are negative by themselves but at much smaller scales.*
- *There would also be the possibility that some changes could bring favourable effects to the ecosystem. Further, existing structures can be very important for e.g. coastal protection, nature reservation or economic reasons.*
- *Evidence of a pressure-impact relationship is needed before measures are imposed*

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

The WFD is referred to in the MSFD and specifically in the Commission Decision for Descriptor 7. The WFD explicitly applies to coastal waters (< 1 nautical mile from the baseline). A significant proportion of activities that could cause permanently altered hydrographical conditions take place within coastal waters. It provides definitions for high, good and moderate ecological status for a set of hydrographical conditions (e.g. temperature, salinity, current velocity) that are to a large extent similar to the hydrographical parameters referred to in Annex III of the MSFD. To ensure coherence between WFD and MSFD, the link between GES under the MSFD and Good Ecological Status (GECS) for coastal waters under the WFD should be clearly stated; including whether it is meant to be linked at assessment level and GES definition, or simply in terms of sharing information and data to be applied under independent assessment methodologies.

There are also a number of tools at EU level that support Member States with the control of activities that can result in permanent alterations of hydrographical conditions. Some of these tools are referred to explicitly in the MSFD, such as Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA) and Maritime Spatial Planning (MSP).

EIAs and SEAs are regulated, respectively, by Directive 2011/92/EU and Directive 2001/42/EC. These directives require that the impacts from the implementation of new projects or strategic plans in the environment are assessed prior to their approval or authorisation. A new EU directive on Maritime Spatial Planning (2014/89/EU) has been recently adopted with the aim of establishing a framework for maritime spatial planning to promote the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources.

The effects of hydrographical changes (such as enhanced erosion) could have a direct impact on (protected) habitats; therefore a clear linkage to the Habitats Directive 92/43/EEC exists.

#### Comments:

- *Associating D7 with the GECS of coastal water under WFD could be inadequate in the context of the requirement of the MSFD (need measurements along the water column and not only integrated values as in WFD).*
- *How should assessment under MSFD on hydromorphology take into account the benthic assessment done under WFD? Should other sensitive receptors be taken into account? Which ones? WFD could cover 0-1 nm as hydromorphology and leave MSFD to address issues beyond 1nm.*
- *In coastal water bodies, physical modifications caused by infrastructure building activities are already assessed under WFD Article 4(3) (existing modifications) or Article 4(7) (new modifications). Care will therefore be required to ensure that duplication of efforts is avoided between MSFD and WFD.*
- *In coastal water bodies, reference should first be made to the compliance assessment carried out for the WFD and any exemptions granted (e.g. through Article 4(7)) as a result. Care needs to be taken to ensure that the requirements of the two Directives remain compatible, (referring to scale of the effects).*



- *For heavily modified water bodies, whilst the MSFD does not have such a provision, WFD outcomes must be respected.*
- *Care is required not to undermine or contradict the provisions of the WFD in coastal water bodies e.g. Article 4(3).*
- *Cumulative impacts indeed represent a significant challenge for MSFD implementation. In coastal water bodies, the local / water body level effects of an individual modification should have been assessed for compliance with the WFD. However, it is quite possible that, for such developments, the in-combination effects may not have been adequately assessed at a scale of relevance to the MSFD, either by the WFD compliance assessment or by an EIA.*
- *Regarding EIA and SEA, the MSFD refers to the implementation of new projects or strategic plans, but what about existing activities? (e.g. cases where they were not subject to these regulations at the planning stage).*
- *MSFD needs to encompass total impacts (past) to assess contribution to status – then new plans and projects can be assessed against the GES boundary.*
- *The suggested possibility to include GES D7 in future EIA seems to go way beyond what is required under the newly-revised EIA. It is not even clear if EIA would be useful for MSFD GES assessment.*

### 1.5 Linkages with international and RSC norms and standards

**OSPAR** has produced a guidance document for the assessment of GES for Descriptor 7: “MSFD Advice document on Good environmental status - Descriptor 7: Hydrographical conditions, a living document - Version 17 January 2012” (OSPAR Advice Doc. GES D7, 2012). OSPAR advises that changes in hydrographical conditions are analysed in a broader context, where not only human-induced changes are taken into consideration but also the cumulative effects of multiple impacts. OSPAR suggests that the use of EIA and SEA processes is important to enable existing and new proposals to be considered in the light of their cumulative impacts on any particular ecosystem components. For coastal waters, OSPAR links the GES under the MSFD with the Good Ecological Status (GES) under the WFD. For the setting of targets, OSPAR recommends that emphasis is placed on new and large-scale developments and on the links with descriptors 1, 4 and 6 covering biodiversity, food webs and sea-floor integrity. OSPAR has also adopted guidelines on marine sediment extraction (OSPAR Agreement 03/17/1). OSPAR advises that the most appropriate scale for assessing D7 is one equivalent to EUNIS level 3. They recommend that under the condition that the effects of the permanent changes of hydrographical conditions are restricted to coastal waters; D7 does not need further work, provided these alterations are fully assessed in WFD or EIA and that cumulative effects on marine waters are included.

**HELCOM, the Barcelona Convention and the Black Sea Convention** have not produced any guidance documents specifically for Descriptor 7. However, both the HELCOM HOLAS 2010 and the MEDPOL Assessment 2012 refer, even if briefly, to changes in hydrographical conditions. HELCOM has adopted guidelines on marine sediment extraction (HELCOM Recommendation 19/1), and the Barcelona Convention has adopted the Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil.

### 1.6 Definition of GES

Considering the relative novelty of this descriptor, along with the substantial lack of data and knowledge, so far quantitative boundaries for GES have not been established.

With regard to the indicators provided in the COM DEC for Descriptor 7, European or international conventions are mostly without methodological standards, and these need developing. According to OSPAR, the definition of MSFD GES for coastal waters in relation to D7 should, in the first place, be associated with the definition of Good Ecological Status of coastal waters under the WFD (OSPAR Advice Doc. GES D7, 2012). The physical characteristics to be addressed under these criteria should take into account Annex III of the MSFD.

At present there is no broadly agreed definition of “**permanent**”. OSPAR recommends that alterations lasting for more than ten years should be considered permanent. Following this approach, human activities whose effect in terms of hydrographical alteration is reversible and lasting less than 10 years, should not be considered for GES of D7. In addition to timescale, potential for recovery from impacts should also be factored in.

OSPAR recommends that emphasis is placed on new and large-scale developments, but existing activities/infrastructure may also have produced, and continue to produce, significant impacts and should be considered. “Large-scale” is not defined, but could be at a scale that considers effects at the ecosystem level, or just simply effects over a large spatial area. Many human activities occur on smaller scales, but even these activities can produce effect at larger scale, particularly in the case of aggregated impacts. Although there may not be many examples of installations that would be removed in the future, it is not the scale of the installations that is important but rather the scale of the effects. Where appropriate, these changes are considered under the WFD and other Directives (Birds Directive, Habitats Directive, EIA, and SEA). There appears to be a gap in guidance for dealing with situations that may occur where the WFD does not apply (e.g. outside of coastal waters) or where EIA is not sufficient, i.e. in identifying cumulative effects. OSPAR recognised the effects of aggregated “small-scale” impacts as important and at the spatial scale of the MSFD and recommends that any cumulative effects of the impact should be part of the GES definition of the Descriptor. However, no guidance on assessing cumulative impacts exists and the development of methodological standards is needed.

A pure quantitative definition of GES in D7 (as for example <1% of permanently altered area) without considering the impact on the related ecosystem and habitat does not seem to be the intention of MSFD. Instead the extent of damage from relevant activities to a habitat (or ecosystem) could be quantified and the resultant loss or damage to the habitat could then be assessed under D1 and D6. This would relate GES for D7 to the maximum allowable loss and damage to habitat as set under D1 and D6. Definition of GES for D7 should include what is impacted state from hydrographical changes (e.g. altered sediment type leading to changed benthic communities) and to give a spatial extent of this impact as input to a seabed habitat assessment under D1/D6.

*Comments:*

- *For harmonization a precise definition of permanent is required.*
- *A ‘permanent’ alteration could be related to its potential triggering of natural positive feedback processes, or at least when there is no natural negative feedback process to return to the previous conditions. There are difficulties related to this approach, and simply determining an absolute time scale of change as permanent would be actually realizable. However, maybe such processes should be identified, quantified and mentioned in the framework of MSFD within future EIAs.*

- Definition of 'permanent' could also be related to the biological cycles, processes. For instance, excavation for submersed tunnel could be considered as temporal allowing for further habitats restoration after construction work, while periodic dredging of navigational channel would be a permanent activity etc.
- Can quantitative boundaries be defined for GES? Effects could be quantified from EIA studies and modelling? Issues of definitions of scale should be sort out in relation to specified habitats types in D1 and D6.
- 'Area' is indeed an appropriate parameter and necessary for a first approach in the definition of quantitative boundaries. It is necessary first to define the scale of the effect, e.g. by modelling, and then decide what has to be monitored. But other parameters, like 'volume', can be added.
- 'Area' of changes in e.g. currents are, in themselves, less useful metrics. A change doesn't necessarily affect the ecosystem. It is more important to look at the overall % of a vulnerable receptor that is impacted by the pressure – link to Criterion 7.2.
- Guidance on cumulative impacts is needed. Modelling is a tool that can be used to investigate the accumulation of small-scale impacts. Regional Environmental Assessment type modelling can indicate envelopes of changes on MSFD scale – significance of these depends on distribution and sensitivity of receptors.
- Care is needed on use of 'cumulative'. It is often used to consider multiple pressures/impacts on the same spot (which is highly complex and we need first the basic single pressure/impact assessments to be operational), whilst what is needed here is simply to add up all the small-scale impacts from D7 (and impacts from other pressures) in relation to each seabed type to define the proportion of the habitat which is impacted (against a defined GES value).
- Should D7 be interested only in large-scale impacts and not localised ones? Then, how would it be its relationship with cumulative small-scale impacts?
- Habitats vs. Ecosystem - OSPAR recommends that the most appropriate scale for assessing this Descriptor is one equivalent to EUNIS level 3. It should be possible to assess effects on each habitat type, but this could be complicated for ecosystems comprising multiple habitats. On the other hand, assessing at the habitat level could imply smaller scales. Moreover, assessing on the scale of the habitat level is only meaningful if it is necessary for a judgment on ecosystem level, since the descriptor is about ecosystem level for assessment of D7. On the other hand, the monitoring should be done at EIA/operational stages once the operation is licensed.
- There must be a judgment on the impact on the ecosystem first, e.g. by modelling, to avoid unnecessary and costly monitoring on habitat level.
- If a "permanent alteration of hydrographical conditions", caused by changes in the morphology is considered as irreversible (because of safety or economic reasons) then the baseline for the hydrographical conditions should be the current situation. However this would mean that the baseline for D1, D3, D4 and D6 should incorporate the effect of the change in these hydrographical conditions. (cross-cutting issue)

### 1.7 The "climate sensitivity"

The issues covered under Descriptor 7 are likely to be exacerbated by climate change, namely due to increased sea temperatures and rising sea levels that are the consequences of global warming. Defining of GES for this descriptor takes place within the context of global hydrographical changes, such as increased temperatures and wave action. Therefore adequate monitoring of these large-scale changes is

an implicit requirement for this descriptor. Also, there is a need for periodic review of the GES definition if, for example, climate change has led to altered extents of coastal habitat (due to sea level rise).

## 2. Analysis of the implementation process

### 2.1 Summary of the findings relating to the determination of GES and specifically the use of the Decision criteria and indicators, based on the Commission/Milieu Article 12 reports and the JRC in-depth assessment

#### **Descriptor 7**

Five Member States have not defined GES for Descriptor 7 while for the rest there was large variability in the definitions. Most of the definitions were made at a general level and only few countries provided further specification beyond the definition in Annex I of the MSFD by providing lists of features or pressures addressed by GES. Very few countries defined baselines, referring to the present situation as regards to the Initial Assessment 2012. Additionally, OSPAR Quality Status Report 2010 and Report WISE WFD I cycle 2010 were each referred to on only one single occasion. References to thresholds were almost non-existent. Some MSs managed to provide an assessment or judgement on their GES for D7, but these assessments were mostly qualitative, subject to a lack of appropriate data sets and knowledge rather than based on cogent Initial Assessment results. According to the MSFD article 12 report, only one Member State reported a GES definition that was considered adequate; the remaining GES definitions were almost equally divided between partially adequate and inadequate.

Few Member States mentioned links to the WFD normative definitions of ecological status classifications for coastal water. Although most of the pressures covered by Descriptor 7 occur in coastal zones, the development and integration of such WFD's hydromorphological conditions in the Initial Assessment reports was surprisingly very low. On the other hand, some Member States referred to other existing EU regulatory regimes that should be complied with (e.g. EIA, SEA, Habitats Directive and Birds Directive). However, the process on how to integrate information from other EU legislation into the assessment is missing. Further, the use of biological assessment elements implies a link with the biological descriptors, e.g. descriptors 1, 4 and 6. Moreover, descriptors 3 (fisheries), 5 (eutrophication) and 11 (underwater noise) were mentioned occasionally as having links with hydrographical conditions.

A few North-East Atlantic Member States mentioned the OSPAR Advice Doc. GES D7 (2012). This document considers terms that should be included in the definition of GES (e.g. large-scale human activities that take place against a background of broader scale hydrographical changes, or the inclusion of cumulative effects of impacts). Further, advice is given on parameters, monitoring and targets, considering the implementation of indicators by modelling the changes in hydrographical conditions like currents, waves, bottom shear stress and salinity to assess the extent of the possible affected area and the intensity of the changes to determine the effect on habitats.

### **Criterion 7.1 Spatial characterisation of permanent alterations**

Information on relevant pressures to be considered as causing permanent alterations was limited or non-existent in many cases. When available, lists of relevant pressures showed variability among countries. In general, quantitative data was limited regarding both pressures on the water column and on the seabed. Additionally, some countries included acidification as an issue to be considered in Descriptor 7, although its role in the assessment of GES is not well defined and its links to D7 need further consideration. One possible option would be the use of climate change data aimed to identify shifts in existing baselines, allowing appropriate assessment of human activities causing impacts on hydrographical conditions in order to differentiate it from global changes.

As the effects on the ecosystem from a change in hydrographical conditions can be caused by change in chemical conditions that are caused by a change in physical conditions, hydro-chemical variables cannot be excluded a priori. But in order to avoid extra complications in assessing GES for D7 changes in hydro-chemical conditions should be only considered, when caused by permanent alterations of the hydrographical conditions.

The OSPAR Advice Doc. GES D7 (2012) suggests using as a parameter the area (e.g. km<sup>2</sup>) where significant, regional scale changes in currents, waves, salinity and temperature occur or are expected (modelling or semi-quantitative estimation).

However the impact on the ecosystem under D7 explicitly considers the full water column (in contrast to D6 and to WFD). Hydrographical changes are not restricted to the sea floor, therefore the volume where significant changes do occur, could be a more adequate parameter/indicator than area.

#### *Comments:*

- *Criteria 7.1 and Indicator 7.1.1 refer to the extent of the physical area or volume where there is evidence of permanent alterations in the hydrographical conditions: area for benthic systems and volume for pelagic systems. But it has to be done carefully, because the pelagic habitats must not be only characterized by their volume.*
- *It might be worth noting that the volume of change of hydrographic conditions could be different from the volume of the impact caused by that change (for example, a change in the surface mixed-layer temperature could affect stratification, thus changing the conditions over the whole water column).*
- *Considering the spatial characterization of the alterations: River damming may be related to small alterations related to each river dam, however a significant shift of the freshwater budget of the whole of the Mediterranean when considering the cumulative impact of all rivers dammed. Furthermore, the impact might be spatiotemporal and not just spatial.*

### **Criterion 7.2 Impact of permanent hydrographical changes**

Few member States included references to the impacts on habitats of permanent hydrographical changes. The understanding of impacts caused by the pressures considered under Descriptor 7 is rather restricted, with limited available data and knowledge. Some Member States included lists of potentially impacted environment components (such as specific seabed habitats, oxygen levels or current velocity), linking this descriptor to the biodiversity descriptors (descriptors 1, 4 and 6).

For indicator 7.2.1, the OSPAR Advice Doc. GES D7 (2012) suggests to use as a parameter the area of habitats and the proportion of the total habitat if that type is significantly affected by the permanent change, for example, in bottom shear stress, waves, temperature or salinity (modelling or semi-quantitative estimation). The suggestion for indicator 7.2.2 is to use as parameter, where not already covered by Natura 2000 in coastal waters, key species and habitat types (including benthic communities – listed by ICG COBAM) significantly affected by the changes in hydrographical conditions, which would need to be determined on a case-by-case basis. Links with other descriptors would also need to be determined on a case-by-case basis; for example, the definition of functional habitats within the biodiversity and food web descriptors could help to define these key species and habitat types.

### **Regional coherence descriptor 7**

Member States in the North East Atlantic region have not fully followed OSPAR Advice Doc. GES D7 (2012) and usually only in its restrictive considerations, focusing only on new activities. Notwithstanding, the regional coherence in this region is considered high. In the Mediterranean the coherence is moderate and in the Baltic it is low. In the Black Sea region, only Bulgaria has defined GES for Descriptor 7 and therefore it was not possible to assess regional coherence. It should be noted that no references are made by MS to existing work carried out under UNEP/MAP (Barcelona Convention) in the Mediterranean Region, or under HELCOM in the Baltic Region, possibly due to the timing of that work in relation to the submission of the initial evaluations.

### **MS good practices**

Some countries have specified the environmental components to be taken into account and have given a list of relevant parameters or activities. Some Member States have referred to existing regulatory regimes (other than the WFD) that are to be complied with (e.g. EIA, SEA, Habitats Directive and Birds Directive). Some Member States have included lists of potentially impacted environment components such as specific seabed habitats, oxygen levels or current velocities, linking this descriptor to the biodiversity descriptors (descriptors 1, 4 and 6).

## 3. Analysis of the current text of the Decision

*This section contains the original COM DEC text. Experts are asked to analyse the whole text and identify those parts to be kept in, to be placed in a guidance document and any improvements or modifications that could be made. Suggested changes are made in red. Suggested deletions are struck through.*

### ➤ **Original text in COM DEC**

*Good Environmental Status for Descriptor 7: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems. (Annex I of MFSD)*

Permanent alterations of the hydrographical conditions by human activities may consist for instance of changes in the tidal regime, sediment and freshwater transport, current or wave action, leading to modifications of the physical and chemical characteristics set out in Table 1 of Annex III to Directive 2008/56/EC. Such changes may be particularly relevant whenever they have the potential to affect marine ecosystems at a broader scale and their assessment may provide an early warning of possible impacts on the ecosystem. For coastal waters, Directive 2000/60/EC sets hydromorphological objectives that need to be addressed through measures in the context of river basin management plans. A case by case approach is necessary to assess the impact of activities. Tools such as environmental impact assessment, strategic environmental assessment and maritime spatial planning may contribute to evaluate and assess the extent and the cumulative aspects of impacts from such activities. It is however important to ensure that any such tools provide for adequate elements to assess potential impacts on the marine environment, including transboundary considerations.

#### 7.1. Spatial characterisation of permanent alterations

- Extent of area affected by permanent alterations (7.1.1)

#### 7.2. Impact of permanent hydrographical changes

- Spatial extent of habitats affected by the permanent alteration (7.2.1)
- Changes in habitats, in particular the functions provided (e.g. spawning, breeding and feeding areas and migration routes of fish, birds and mammals), due to altered hydrographical conditions (7.2.2).

#### ➤ **Suggested modifications to the Original text in COM DEC**

- Extent of area/**volume** affected by permanent alterations (7.1.1)
- Indicator 7.2.2. Changes in habitats **that affect the ecosystem**, in particular the functions provided (e.g. spawning, breeding and feeding areas and migration routes of fish, birds and mammals), due to altered hydrographical conditions (7.2.2).

#### ➤ **To be taken out of the Decision and included in guidance**

#### *Comments*

- *Regarding Indicator 7.2.2, UK expert suggests to change COM DEC text to a more simple sentence like: "...impacts of key dominant habitats and those identified as having local conservation sensitivity..."*
- *The pelagic habitats must not be only characterized by their volume.*

## 4. Identification of issues

### 1) Scope and guidance for D7 is lacking

- a) Due to the lack of common understanding on the scope of this descriptor there are not harmonized approaches. A 'best practice' document based on the previous assessment could facilitate convergence of approaches;
- b) Descriptor 7 lacks specific guidance document at EU level. In particular guidance is needed to determine scales and processes;
- c) There is a need to provide clear guidance in the Decision on how to integrate the existing minimum requirements under existing EU legislation (e.g. WFD, EIA, SEA) in the GES definition, in particular on where other legislation is invoked to identify and mitigate any impacts to avoid double accounting for these types of activities. Some member states focused entirely outside of the WFD domain, but this could be too restrictive in terms of consideration of the whole water column (hydrographic conditions under WFD relate only to the quality of surface waters). Guidance on where the gaps in other legislation should be covered by MSFD is needed;
- d) It has been suggested that GES for D7 could be included in future EIAs so that the required EIA assessment studies should determine whether MSFD applies. In this case all EIAs in the marine environment would be required to assess the effects regarding GES for D7;
- e) Guidance on monitoring requirements for D7 is lacking. This document should allow MSs to adapt their monitoring plans depending on the existing pressures and states.

### 2) The pressure impact relation is unclear

- a) Clarification of the pressure impact chain: the original pressures are the human constructions/developments that can cause changes to the hydrographical conditions. Significant changes act then as a pressure on the ecosystem and could impact on that ecosystem (negatively or positively).
- b) Regarding the MSs reports for Articles 8, 9 and 10, differentiation between 'pressures' and 'impacts' needs to be improved to avoid confusion. A clearer link between the Directive and the Decision is needed;
- c) Clarify the concept that D7 is effectively a pressure descriptor whose impacts need to be considered as part of the assessments of GES (habitat types, eutrophication) under D1, D4, D5 and D6 (would make it impossible to define only GES within D7); it would be primarily a pressure descriptor, however not necessarily effectively or adversely influencing other components of marine ecosystems;
- d) There is a need to clarify which activities/pressures should be included in the context of D7 with a focus on activities resulting in localized impacts (pressures causing impacts at local scale, e.g. piers, harbours). The characterization of localized activities would allow assessment of cumulative impacts. Note that it is not the scales of the activities that is important – it is the scale of the effects;
- e) A large number of Member States focus only on the impacts of new activities, however existing installations or activities can have resulted in or also result in further alteration or degradation of the current environmental status;

### 3) Time and space scales for assessment are not defined

- a) There is a need to clarify the concept of 'permanent alteration' (potentially by defining a simple time scale as "permanent");



- b) The link between functional groups and hydrographical conditions is still in the research phase and therefore a challenging aspect of D7. This could be referred back to D1/D6 to create a joint framework to assess functional impacts on benthic and pelagic habitats;
- c) Scales need to be defined: local/intermediate vs. large scales and should be linked to scales used for D1/D6 habitat assessments; D7 is referring to GES at the ecosystem level, but the pressure is typically coming from small scale constructions, so there is a large gap in the scales from pressure to impact;
- d) It is suggested to align with WFD and use the 1 nm limit to differentiate coastal waters from off-shore waters. On the other hand, this limit is not related with any environmental reasoning or background. A different option would be to consider bathymetry to define the extension of coastal waters. In any case, it is important to keep in mind that environmental processes, pressures and impacts are variable and independent from these zoning approaches. Further, definition of coastal waters extension could be dependant to the process considered: in terms of surface waves, it would be half the wavelength of the longest waves; in terms of currents the Rossby radius; in terms of the coastal ecosystem, probably the isobaths of the maximum depth of the euphotic zone. However, this has nothing to do with the WFD.
- e) Clarify if the impacts of localized activities should be assessed under consideration of a changing environment (climate change - several MS have done this). It should be addressed in that context, especially as in many cases it would be required to differentiate between global scale anthropogenic effects and interregional-scale anthropogenic effects (i.e. river damming in the BS catchment area affecting the freshwater budget and thermohaline functioning of the Med).
- f) Should impacts be assessed on habitats or on ecosystems? Presumably the first assessment can be only done at the habitat level, and afterwards a cumulative IA would be needed to arrive at the ecosystem level? It will depend on the capabilities to identify and monitor such impacts. One suggestion is to stick to habitat level.

#### 4) **Baseline, parameters and GES are not well defined**

- a) Is it a quantitative or qualitative descriptor? How could it be made quantitative? Modelling could be used to help quantify the effects; however there are still regional scale changes in ecosystem processes that cannot be predicted using ecosystem models at present (e.g., regime changes). EIA procedures should have standard modelling approaches to quantify the effects;
- b) Thresholds for GES/non GES are almost non-existent. The strong natural variability masks anthropogenic impact, and thus it is very difficult to set thresholds. It should be possible to define 'impact' (i.e. when a habitat has been altered by changes in hydrology);
- c) In the case where the current situation already compromises the achievement of GES for other descriptors, in particular D1 and D6, additional measures affecting existing activities/ installations might be necessary;
- d) Only few countries defined explicit baselines. Most of them used the current situation (Initial Assessment 2012) as their baseline and considered D7 at GES at the baseline; however, this ignores the extent of past hydrographical changes on particular habitat types (which can be significant in some coastal areas). Deciding how far back to set the baseline is a complicating factor and combining this with the cost of removing old constructions explain why most member states considered the IA 2012 as their baseline and only considered new developments; this however is not in accordance with the intention of MFSD to achieve GES. If permanent changes occur within 1nm they could be assessed under WFD hydromorphology and potentially as 'heavily modified water bodies';
- e) There is the need to clarify if descriptor D7 "permanent alteration of hydrographical conditions" should be extended (or not) to include also hydrochemical conditions (like pH, alkalinity, oxygen,

nutrients) as already done by some MS; possibly to the extent that the hydrochemical conditions reflect a change in the hydrographic conditions and possibly a shift in the functioning of the ecosystem.

- f) Chemical processes are not within the present definition of hydrographical processes; however several member states included acidification. If not modified by infrastructural works, it does not seem appropriate to include parameters such as acidification in the assessment of D7;
- g) Features, pressures and physico-chemical parameters are not well defined nor harmonized for comparability;

## PART II: CONCLUSIONS AND RECOMMENDATIONS

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

The existing Criteria are appropriate for assessment of D7 and serve as a starting point for implementation of the descriptor. The feasibility of the assessment will depend on data availability. Data are needed on human activities (location and intensity of exploitation) for assessment of Criterion 7.1. Habitat classification has to be improved for assessment of Criterion 7.2 (e.g. pelagic habitats not well defined in comparison with EUNIS3 benthic habitats). Assessment should focus on the geographical extent of alterations in hydrographical conditions and their implications at habitat level effects, before being able to assess at ecosystems level. Further, determination of 'prevailing conditions' would be more of a complex issue.

In general, the existing Indicators are appropriate for assessment of D7, but obviously, feasibility will depend on data availability. The difficulties are implicit in the definition of limits between 'altered/not altered' areas or habitats.

Criteria 7.1 and Indicator 7.1.1 refer to the extent of the physical area or volume where there is evidence of permanent alterations in the hydrographical conditions: area for benthic systems and volume for pelagic systems.

Regarding Criteria 7.2, there is a lack of knowledge on how to develop the assessment of impacts; the major concern would be on how to aggregate assessment results from habitat to ecosystems levels. In any case, most comments indicate that assessments should be done at both habitats and ecosystem levels under D7, by using a stepwise approach. However, in the current situation, it is more important to focus on habitat level effects.

The assessment of impacts is a cross-cutting issue for D1, D6 and D7. It is suggested to keep Indicator 7.2.2 under D7. One option would be to develop a joint assessment of impacts in relation to biological elements for D1, D6 and D7, considering their common assessment elements.

The suggested modifications in the original text in COM DEC are mostly accepted by experts, although the inclusion of 'that affects the ecosystems' under Indicator 7.2.2 might seem redundant, since changes in habitats will always affect ecosystems to some extent. On the other hand, this modification could make it less operational. Other considerations would be as follows:

- Developments and impacts within WFD have no implications (other than potentially cumulative) with D7
- The boundary to consider is from WFD waters to MSFD waters – is there a significant "impact flux" across the boundary on an individual or cumulative scale?
- Even within MSFD waters, scale issues are massively important – is there an impact on regional scales? A relatively small incursion into MSFD waters will not cause the whole assessment area to fail D7.

## **HARMONIZATION**

Due to the lack of common understanding on the scope of this descriptor there are **not harmonized approaches**.

**There is a need for common and agreed methodology for monitoring and assessment.**

## **GUIDANCE DOCUMENT**

**A guidance document at EU level is needed. Some subjects to be considered are: ‘best practices’ from previous assessments, determination of scales and processes to be considered, clarify scope of D7, integration of existing minimum requirements under existing EU legislation (e.g. WFD, EIA, SEA) in the GES definition, monitoring requirements, assessment of cumulative impacts,...**

## **DUPLICATION OF EFFORTS**

**Coordination between WFD and MSFD has to be defined to avoid duplication efforts. Guidance document needed.**

## **GLOSSARY TERMS**

**Key terms have to be defined and agreed: hydrographical conditions vs. physical features, features vs. characteristics, hydrological processes, permanent alterations, coastal vs. off-shore, and others.**

## **PRESSURES/IMPACT relationship**

**Clarification of the pressure impact chain: the original pressures are the human constructions/developments that can cause changes to the hydrographical conditions. Significant changes act then as a pressure on the ecosystem and could impact on that ecosystem (negatively or positively).**

## **ACTIVITIES**

**In order to limit and guide the scope of D7, inventories or lists of human activities that could lead to ‘permanent alterations of the hydrographical conditions’ should be defined and provided.**

The COM DEC text should not include a closed list of human activities, but just an indicative list, in order to be able to adapt to new or unforeseen relevant activities (for flexibility and future proofing). The COM DEC text should include as **minimum requirements** the following: MSs have to provide lists with clear inventories of human activities, location, intensities, maps, etc. for the assessment of D7. It would be necessary to revise the timescale of providing such list, since the determination of all human activities

potentially affecting the coastal and marine zone further away from 1 mile from the coast can be quite demanding on resources and time for MSs.

### **EXISTING/NEW ACTIVITIES**

**Although WFD outcomes must be respected (e.g. designation of heavily modified and artificial water bodies), both existing and new activities must be considered for assessment of cumulative impacts under D7 within whole marine areas. At the same time, both positive and negative impacts should be taken into account.**

### **CROSS-CUTTING ISSUES: D7 VS OTHER DESCRIPTORS**

**Need to clarify the concept that D7 is effectively a pressure descriptor, a state descriptor, or both.**

The French experts encourage strongly considering the D7 as a state and pressure descriptor.

**Need to clarify if D7 impacts need to be considered as part of the assessments of GES under D1, D4, D5 or D6.**

D7 impacts are part of the assessment of other descriptors. D7 impacts must be considered under D7, in collaboration with other descriptors.

The preparation of a guidance document can provide input to clarify on these issues.

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

### **No methodological standards have been defined for assessment of GES**

The determination of GES for D7 should not depend on the definition of an explicit baseline. Due to the nature of this descriptor, the difficulty to provide a quantitative assessment (assessments based mostly on experts judgment) and the lack of common methodology, it is difficult to define clear baselines (neither thresholds nor trends). Further, the Initial Assessment 2012 report shouldn't be used as baselines because of the lack of common methodological approaches.

Due to the nature of this descriptor and its current state of development, it is not possible to make D7 a quantitative descriptor at the moment; or to define an objective threshold between GES and non-GES at the moment.

Modelling will be a key tool to be used to quantify effects from permanent alterations. Research efforts should be dedicated to develop modelling, applying a common methodology, and in order to reduce uncertainties in the assessment of impacts.

In order to improve understanding the effect of D7 related impacts on other descriptors (D1/D6), some additional research efforts would be necessary on habitat modelling, pressure mapping and cumulative impacts, along with monitoring of potentially affected areas and possibly other specific parameters (e.g. impacts on rates of energy and carbon flows due to changes on hydrographical conditions).

The features and characteristics considered for assessment under D7 can be key elements for the assessment of descriptors such as D1 and D6. Therefore, additional measures might be needed if current situation (baseline) could compromise the achievement of GES for other descriptors.

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

**No standardised methods have been defined for monitoring**

### **CUMULATIVE IMPACTS**

**Guidance is needed for the assessment of cumulative impacts and to ensure coordination across descriptors. The characterization of localized activities would allow assessment of cumulative impacts. Note that it is not the scale of the activities that is important – it is the scale of the effects.**

### **TIME AND SPACE SCALES**

**A guidance document at EU level is needed to determine scales and processes.**

Local scales shouldn't be excluded for the assessment of D7.

### **'PERMANENT ALTERATION'**

**No definition has been proposed for 'permanent' alteration. Setting an arbitrary temporal threshold could be a solution (e.g. OSPAR advice document on D7), but there is no agreement on this issue so far; further discussion and reasoning is needed.**

According to experts' feedback, the concept of 'permanent alteration' should not be associated to a simple time scale (e.g. a certain number of years). 'Permanent' could be considered simply when an activity or construction is not expected to be discontinued or removed; or related to biological cycles, processes.

Our concern is that, if no temporal threshold is defined for 'permanent alteration' or any other appropriate definition based on a different approach, many activities or infrastructures could be legally out of the assessment of D7 while causing impacts in the marine environment. As an example, if

'permanent' would be considered as not expected to be discontinued or removed, infrastructures could be legally declared as temporal (e.g., an activity with an exploitation time of 14 years), although existing and causing impacts for a long period.

## **LIST OF CHARACTERISTICS, PRESSURES AND IMPACTS**

**In order to limit and clarify scope, indicative lists of characteristics, pressures and impacts to be considered for assessment under D7 have to be defined. The link between MSFD text and COM DEC text has to be clarified.**

### **Hydrological processes**

Table 2 of MSFD Annex III (pressures and impacts) includes interference with the following hydrological processes: Significant changes in thermal regime and saline regime; which are considered to be appropriate for assessment of D7. Further, a list with additional potential hydrological processes to be considered should be established in order to keep flexibility and future proofing. Some additional processes would be: sea currents, waves, wave exposure, sediment transport, erosion, accumulation and turbidity regimes.

### **Chemical parameters**

Permanent alterations caused by humans can lead to chemical modifications at both local scale and bigger scale. Examples: anti-biofouling chemicals (local scale), iron enrichment IRONEX experiment (local to medium scale), warmer waters have lower oxygen saturation levels (any scale)

Chemical features should be considered under D7, including pH, pCO<sub>2</sub>, alkalinity and oxygen in the monitoring programmes.

### **Acidification**

Marine acidification is not included specifically under D7 and would go beyond the scope of this descriptor. Coastal and offshore permanent alterations caused by humans are not expected to influence the global climate conditions related to marine acidification.

There is no clear feedback from experts on the inclusion of acidification in the assessment of D7 or any other appropriate MSFD descriptor. At the same time, it is clear that the possible consequences of marine acidification are an important issue for marine ecosystems and therefore a prerequisite for MSFD. In fact, this is a cross-cutting issue, since marine acidification is mentioned in the MSFD (Annex II, table 1, Characteristics), but it is not considered explicitly in any single indicator out of the 11 MSFD descriptors.

### **Physical loss/Physical Damage**

Table 2 of MSFD Annex III, regarding pressures and impacts, includes Physical loss and Physical Damage, which have been mostly associated to D1 and D6 regarding habitat assessment elements. On the other hand, they have been mentioned occasionally under D7 Member States Initial Assessments.

There is no clear feedback on the adequacy of considering Physical loss and Physical Damage as pressures/impacts for assessment of D7, or to keep them only under D6. In any case coordination is needed on this cross-cutting issue to avoid duplication of indicators between descriptors.

## **MONITORING**

**No monitoring strategies have been defined or agreed at regional or European scales.**

A potential list of characteristics/features for D7 should be developed/provided to facilitate and harmonise selection of monitoring parameters. Examples:

- Temperature, salinity, current, waves, turbidity, bottom friction, etc.
- Static Bathymetric Features (continental shelf breaks, seamounts, submarine canyons, areas of high slope, channels, etc.)
- Persistent Hydrographic and Ephemeral Features (coastal upwelling, fronts and frontal systems, eddies, currents...)

Results from WFD and EIA should be used to assess D7 under MSFD.

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

**No standardised methods have been defined for assessment.**

## **RELATIONSHIP BETWEEN MSFD D7 and WFD**

**Both directives need to remain compatible.**

We should aim for compatibility of approaches between WFD and MSFD such that the latter covers issues beyond 1nm (the WFD limit for coastal waters). Hydromorphology assessments under WFD could do the same job as D7 beyond 1nm and be fully complementary, avoiding overlaps. However, there might be certain issues that have not been considered under WFD so far, whether their scale affects both coastal and offshore areas (if 1 nm limit is considered) or just simply gaps (e.g. missing parameters).

The actual coverage of MSFD, which is mostly based on WFD, should be enough at present to define GES. MSFD should provide an integrated view of hydrographical conditions, including not only coastal but also large-scale monitoring, since WFD does not consider ocean dynamics. Some gaps to be covered by MSFD (in relation to WFD) could be: coupling between coastal dynamics and offshore dynamics; impact of waves in the systems; and transport of suspended matter.



In order to cover possible gaps resulting from WFD - and assuming local activities affecting coastal waters are individually assessed under other regulations (WFD, EIA) - the scope of D7 would have to consider: individual offshore activities; and cumulative impacts originating from both coastal and offshore activities. The assessment of cumulative impacts could also provide an integrated assessment of trends in the local impacts.

## **AGGREGATION**

**No aggregation rules have been defined.**

In relation to comparability of assessments at different spatial scales (ecosystem scale, subregional scale regional scale or inter-regional scale), a common basic methodology is necessary first. It is also necessary to define the scales. Further, although an integrated view would be necessary, the characteristics (biological, physic-chemical and hydrodynamics) and the presence of different problems at different scale and in the different assessment areas would hinder comparability.

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

#### 9.1 Proposed way forward for identified issues

<b>Issue</b>	<b>Way forward</b>	<b>Timeline</b>
No standards for GES assessment existing	Agree and define methodological standards for the assessment of GES under D7 (minimum requirements including list of relevant human activities)	<u>2015/2016</u>
Space and time scales are not well defined	Define and agree (based on the GES definition) on space and time scales (including the meaning of “permanent”) of relevant processes for monitoring and assessment of GES	<u>2016</u>
Cumulative impact and aggregation rules are not defined	Agree and define aggregation rules and methodological standards for cumulative impact assessment of GES	<u>2017</u>
No common monitoring strategies are existing	Agree and define a common monitoring strategy at regional and European scales for D7 (minimum list of variables to be monitored)	<u>2018</u>

## 10. Reference Documents

- Review of the GES Decision 2010/477/EU and MSFD Annex III Approach and outline for the process, (EC- Committee/07/2013/03rev, 2013);
- First steps in the implementation of the Marine Strategy Framework Directive - Assessment in accordance with Article 12 of Directive 2008/56/EC, (CSWD, 2014);
- COM(2014)97 final. REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT The first phase of implementation of the Marine Strategy Framework Directive (2008/56/EC) The European Commission's assessment and guidance (EC, 2014);
- SWD(2014) 49 final. COMMISSION STAFF WORKING DOCUMENT Annex Accompanying the document Commission Report to the Council and the European Parliament. The first phase of implementation of the Marine Strategy Framework Directive. The European Commission's assessment and guidance (EC, 2014);
- Common Understanding of (Initial) Assessment, Determination of Good Environmental Status (GES) & Establishment of Environmental Targets (Articles 8, 9 & 10 MSFD), (DG GES, 2014);
- Coherent geographic scales and aggregation rules in assessment and monitoring of Good Environmental Status – analysis and conceptual phase, (Deltares, 2014);
- Review of Methodological Standards Related to the Marine Strategy Framework Directive Criteria on Good Environmental Status (JRC, 2011);
- Guidance / Terms of Reference for the task groups ‘criteria and methodological standards for the Good Ecological Status (GES) descriptors’ (JRC, 2010);
- CSWP (2011) on the Relationship between the initial assessment of marine waters and the criteria for good environmental status;
- OSPAR Advice Doc. GES D7. MSFD Advice document on Good environmental status - D7: Hydrographical conditions, a living document - Version 17 January 2012. OSPAR Commission. ISBN 978-1-909159-16-7;
- Technical guidance on monitoring for the Marine Strategy Framework Directive. JRC Scientific and Technical Reports. Publications Office of the European Union. JRC88073;
- JRC IDA (2014). In-Depth Assessment of the EU Member States’ Submissions for the Marine Strategy Framework Directive under articles 8, 9 and 10. EUR – Scientific and Technical Research series. Luxembourg: Publications Office of the European Union. EUR 26473 EN, 149 pp. doi: 10.2788/64014;
- JRC IDA D7 (2014). In-Depth Assessment of the EU Member States’ Submissions for the Marine Strategy Framework Directive under articles 8, 9 and 10 on Hydrographical Conditions Descriptor 7. Luxembourg: Publications Office of the European Union. EUR 26800 EN, 15 pp. doi: 10.2788/1124;
- Guidance Document No 3. Analysis of Pressures and Impacts. CIS Guidance Documents. Luxembourg: Office for Official Publications of the European Communities, 2003;
- Guidance Document No 4. Identification and Designation of Heavily Modified and Artificial Water Bodies. CIS Guidance Documents. Luxembourg: Office for Official Publications of the European Communities, 2003;
- Guidance Document No 5. Transitional and Coastal Water - Typology, Reference Conditions and Classification Systems. CIS Guidance Documents. Luxembourg: Office for Official Publications of the European Communities, 2003;
- Guidance Document No 7. Monitoring under the Water Framework Directive. CIS Guidance Documents. Luxembourg: Office for Official Publications of the European Communities, 2003;

- Guidance Document No 20. Exemptions to the environmental objectives. CIS Guidance Documents. Luxembourg: Office for Official Publications of the European Communities, 2003.



EUROPEAN COMMISSION  
JOINT RESEARCH CENTRE  
Institute for Environment and Sustainability  
Water Resources Unit

# **Review of Commission Decision 2010/477/EU concerning MSFD criteria for assessing good environmental status**

## **Descriptor 8**

### **Concentrations of contaminants are at levels not giving rise to pollution effects**

This report represents the result of the scientific and technical review of Commission Decision 2010/477/EU in relation to Descriptor 8. The review has been carried out by the EC JRC together with experts nominated by EU Member States, and has considered contributions from the GES Working Group in accordance with the roadmap set out in the MSFD implementation strategy (agreed on at the 11th CIS MSCG meeting).

The report is one of a series of reports (review manuals) including Descriptor 1, 2, 5, 7, 8, 9, 10 that conclude phase 1 of the review process and, as agreed within the MSFD Common Implementation Strategy, are the basis for review phase 2, towards an eventual revision of the Commission Decision 2010/477/EU.

The report presents the state of the technical discussions as of 30 April 2015 (document version 8.0: ComDecRev\_D8\_V8), as some discussions are ongoing, it does not contain agreed conclusions on all issues.

The views expressed in the document do not necessarily represent the views of the European Commission.

## **Foreword**

The review of MSFD Descriptor 8 is being performed by the MSFD Expert Network on Contaminants, led by JRC. The review process was kicked-off during the working meeting of the MSFD Expert Network on Contaminants on 2-4.7.2014 in Ispra, Italy. Based on the exchanges there, a discussion document was prepared and circulated. The state of these discussions was reflected in the draft template document that was presented in October 2014 at the 12th WG GES meeting. These activities allowed the compilation and analysis of all necessary information for the identification of main issues and gaps and initial recommendations for the way forward, and with it the first part of the review process was completed.

The second part of the review process should then allow the finalization of conclusions and recommendations (which may include proposals for dedicated work items for better harmonization, need for additional guidance and eventually proposals for amendments to the Commission Decision). To this end, a questionnaire with specific questions on the main issues identified was circulated among experts and the outcome was analysed and discussed in the second working meeting of the MSFD Expert Network on Contaminants held on 23-24.2.2015 in Ispra. The current state of the discussions is reflected in the second part of the present template.

**MSFD Expert Network on Contaminants:** Andra Oros, Andreja Ramšak, Anja Duffek, Ann-Sofie Wernersson, Antonella Ausili, Chiara Maggi, Craig Robinson, Daniela Tiganus, Dorien ten Hulscher, Evin McGovern, Grozdan Kušpilić, Ivana Ujević, Jacek Tronczynski, Jean-Cedric Reninger, Jaakko Mannio, Jo Foden, Koen Parmentier, Lena Avellan, Lucía Viñas, Nevenka Bihari, Norman Green, Oliver Bajt, Paul Whitehouse, Patrick Roose, Peter Lepom, Robin Law, Stefan Schmolke, Valentina Coatu, Vesna Milun, Víctor León, Victoria Besada.

**EC JRC:** Victoria Tornero, Georg Hanke.

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

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## PART I: COMPILATION OF INFORMATION

The first part of the review process has allowed the compilation of all necessary information to detect possible shortcomings, inconsistencies and gaps, and then to identify and discuss main issues and prepare initial recommendations. The information compiled here served as the basis for the discussions which were then held during the second part of the review process to shape the final conclusions and recommendations presented in the Part II of this template.

### 1. Approach

#### 1.1 General guiding principles for the review

The review of the Com Dec 2010/477/EU for D8 considers experiences made so far in the practical implementation, analyses the Commission Decision text in view of the current state of science and prepares recommendations for action in the MSFD Common Implementation Strategy (CIS) (Working Group on GES and Marine Strategy Coordination Group, MSCG), including the possible revision of the Commission Decision. The MSFD Competence Centre, in close collaboration with ICES and dedicated expert networks, will operate in partnership to deliver scientific and technical support for the MSFD implementation as identified in the CIS. EC JRC is responsible for coordinating the review process of Descriptor 8.

There are some keywords and concepts which should be considered when performing the review. The MSFD Commission Decision should be:

- Simpler
- Clearer
- Introducing minimum standards (to be enhanced by regions and MS, if necessary)
- Self-explanatory
- Coherent with other EU legislation
- Coherent with regional assessment methods (where EU methods do not exist)
- Include a clear and minimum list of elements and/or parameters per descriptor

Furthermore the development of additional common understanding within the MSFD Drafting Group GES during the review can lead to an adaptation of terms and concepts, aiming at an enhanced harmonization of the MSFD implementation. The focus of the Expert Network should be on technical scientific items and discussions. Ideally, the text of the Commission Decision should leave little space for individual interpretation by providing specific technical details on the parameters to be considered.

## 1.2 Definitions

According to the WFD, **pollutants** mean ‘any substance liable to cause pollution’. The definition adds ‘in particular those listed in Annex VIII’. In addition, in the WFD, **hazardous substances** are defined as “substances (i.e. chemical elements and compounds) or groups of substances that are toxic, persistent and liable to bio-accumulate, and other substances or groups of substances which give rise to an equivalent level of concern”. This definition is in line with the definition of hazardous substances used in Regional Sea Conventions (RSCs), like OSPAR and HELCOM. Moreover, the WFD defines **priority substances** as “substances identified in accordance with Article 16(2) and listed in Annex X”. Among these substances there are **priority hazardous substances**, which means substances identified in accordance with Article 16(3) and (6) for which measures have to be taken in accordance with Article 16(1) and (8).

As per Annex III of the MSFD, **contaminants** are synthetic compounds, non-synthetic substances and compounds, and radio-nuclides<sup>1</sup>. Therefore, the term "contaminant" relevant to the scope of Descriptor 8 of the MSFD encompasses hazardous substances, including priority substances and priority hazardous substances, but excludes three classes of pollutants from Annex VIII of the WFD, namely ‘materials in suspension’, ‘substances which contribute to eutrophication (in particular, nitrates and phosphates)’ and ‘substances which have an unfavourable influence on the oxygen balance (and can be measured using parameters such as BOD, COD, etc.)’. These are covered under other Descriptors (namely 5).

**Pollution effects** are deleterious effects, such as harm to living resources and marine ecosystems, including loss of biodiversity, hazards to human health, the hindering of marine activities, including fishing, tourism and recreation and other legitimate uses of the sea, impairment of the quality for use of sea water and reduction of amenities or, in general, impairment of the sustainable use of marine goods and services, which result or are likely to result from the direct or indirect introduction into the marine environment, as a result of human activity, of substances or energy (MSFD Art 3.8).

**Acute pollution events** are events which can cause short time and severe pollution to the marine environment. They can be deliberate or accidental, e.g. illegal discharges and oil spills.

**Environmental quality standards (EQS)** are concentrations of pollutants which should not be exceeded in order to protect human health and the environment, as established in the context of the WFD, and thereby represent criteria for assessing whether Member States are in compliance (WFD Article 2, paragraph 24).

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<sup>1</sup> JRC (2010), Task Group 8 Report, Contaminants and pollution effects



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

Contaminants have a long history of being addressed through EU legislation and actions at the level of the Regional Sea Conventions. Directive 76/464/EEC on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community was one of the first water-related Directives to be adopted. The Directive covered discharges to inland surface waters, territorial waters, coastal waters and ground water. Directive 76/464/EEC has now been integrated into the Water Framework Directive.

The Water Framework Directive (WFD) (2000/60/EC) and its related Directives on Environmental Quality Standards (2008/105/EC as amended by 2013/39/EU) play an important role also for MSFD implementation and provide a reference point for the assessment of adequacy of implementation and facilitate coherence in MSFD implementation. The Directive on Environmental Quality Standards (2008/105/EC as amended by Directive 2013/39/EU) establishes Environmental Quality Standards (EQSs) in the field of water policy, requirements for good surface water<sup>2</sup> chemical status. Chemical status is defined in terms of compliance with EQSs (measured in water or in biota), established for chemical substances at European level. The Directive also provides a mechanism for renewing these standards and establishing new ones by means of a prioritization mechanism for polluting substances. MS are required to take actions to meet those quality standards by 2015.

Directive 2013/39/EU introduced a number of revised and new EQS into Directive 2008/105/EC, in particular for concentrations in biota (e.g. for benzo[*a*]pyrene, dioxins, fluoranthene). The role of other standards in the context of the MSFD, such as OSPAR's Environmental Assessment Criteria (EAC – see next section), which have set threshold values for measurements in biota for the same substances, needs to be evaluated. This issue already arose with Directive 2008/105/EC for three substances (Hg, HCB and HCBd), for which a WFD EQS exists and an OSPAR EAC was set for biota.

The WFD is backed up by other EU legislation, such as the REACH regulation on chemicals, Urban Waste Water Treatment Directive (UWWTD), and the Industrial Emissions Directive (IED).

### 1.4 Linkages with international and Regional Sea Conventions (RSCs) assessment criteria and standards

The integration of the results of chemical monitoring programmes, and combination of data from chemical and biological effects monitoring, is an active area of science within the Regional Conventions (i.e. OSPAR, HELCOM, Barcelona Convention and Bucharest Convention). Current experience indicates that integration is greatly facilitated by coherent and consistent sets of environmental quality levels (EQSs, EACs, etc). Further development work is necessary, through the EU, RSCs or MS, to expand the range of required quality levels to include a greater number of contaminants and biological effects, and to take account of mixture effects.

**OSPAR** has a framework with agreed monitoring programmes and associated assessment criteria to focus work on those chemicals which complement relevant activities under other frameworks (e.g. the Water Framework Directive, HELCOM). OSPAR has already made substantial progress in addressing those hazardous substances which pose a risk to Convention waters through implementing its Strategy on Hazardous Substances. A list of Chemicals for Priority Action has been agreed, and these chemicals have been evaluated to determine the risks they pose, what actions are needed to address

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<sup>2</sup> Surface waters with regard to chemical status are defined as inland waters, except groundwater; transitional, coastal and territorial waters.

those risks, and what monitoring strategies are required to evaluate the status of the North-East Atlantic with respect to those chemicals of key concern. In particular, in preparation of its Quality Status Report of 2010, OSPAR has established Environment Assessment Criteria (EAC) for the measurement of certain substances in sediment and biota. While these criteria do not represent legal standards under the OSPAR Convention, they can still guide Member States that wish to establish Good Environmental Status (GES) boundaries for contaminants in sediment and biota that are not covered by the EQS Directive. In addition, OSPAR has also been developing a number of Ecological Quality Objectives (EcoQOs), e.g. on oiled birds, which provide a set of clear environmental indicators defining a healthy North Sea as part of the ecosystem approach. As part of its role in coordinating MSFD monitoring, OSPAR has recently been developing Common Indicators to be used by Contracting Parties in their MSFD monitoring programmes. Several Common Indicators, or candidate Common Indicators, have been proposed for use under criteria 8.1 and 8.2.

In the **HELCOM** Baltic Sea Action Plan (BSAP), the objectives defined by HELCOM related to hazardous substances include:

- Concentrations of hazardous substances close to natural levels
- All fish are safe to eat
- Healthy wildlife
- Radioactivity at the pre-Chernobyl level

As part of the project HELCOM CORESET, a number of common indicators have been developed for the purpose of common monitoring and assessment in the Baltic. This set of core indicators includes indicators for hazardous substances and their biological effects, covering criteria 8.1 and 8.2 of the Commission Decision (apart from oil pollution). The substances in the HELCOM core indicators are mostly the same as in the OSPAR Quality Status Report. With regard to acute pollution events, HELCOM has been working for a long time on maritime activities within HELCOM MARITIME and has defined a number of objectives relevant to Descriptor 8, including the enforcement of international regulations (no illegal discharges), safe maritime traffic without accidental pollution and zero discharges from offshore platforms. An indicator for oiled water birds has also been developed within HELCOM.

The **Barcelona Convention** (UNEP/MAP) aims to prevent, abate, combat and to fullest possible extent eliminate pollution from the Mediterranean Sea. The Programme for the Assessment and Control of Marine Pollution in the Mediterranean region (MEDPOL) is the environmental assessment component of the Mediterranean Action Plan (MAP). The objectives of the monitoring activities implemented as part of MEDPOL Phase IV are to present periodic assessments of the state of the environment in hot spots and coastal areas, to determine temporal trends of some selected contaminants in order to assess the effectiveness of actions and policy measures, and to enhance the control of pollution by means of compliance with national/international regulatory limits.

The Barcelona Convention has given rise to seven Protocols addressing specific aspects of Mediterranean environmental conservation. Among those, the Dumping Protocol, the Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea and the Protocol Concerning Specially Protected Areas, the Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal and Biological Diversity in the Mediterranean. Countries that are

parties to the Convention report on the implementation of the protocols through their National Action Plans. The UNEP/MAPs EcAp (Ecological Approach) process has agreed on indicators to follow the MSFD Decision, with the aim to manage human activities, conserve natural marine heritage and protect vital ecosystem services. The objective related to pollution is described in the Ecological Objective number 9: "Contaminants cause no significant impact on coastal and marine ecosystems and human health."

The Black Sea is covered by the Convention on the Protection of the Black Sea against Pollution (the **Bucharest Convention**). In the Black Sea Integrated Monitoring and Assessment Programme (BSIMAP), each country is obliged to carry out ecological monitoring on marine stations, with particular emphasis given to eutrophication. BSIMAP include also contaminants (water/sediments/biota), with heavy metals, petroleum hydrocarbons as mandatory parameters, and others (OCPs, PAHs, etc.) as optional parameters.

#### 1.5 Descriptor specificities should be highlighted and justified (e.g. if it is recommended to combine several descriptors together)

As with Descriptor 8, MSFD Descriptor 9 tackles the issue of marine chemical pollution but with the protection of human consumers as its goal. There have been discussions about the conceptual differences between the descriptors. Even a possible joining (though the MSFD is not up for revision) has been discussed but not been supported. Both descriptors are dealing with contaminants, they should therefore be discussed together, but have different objectives and characteristics. The conclusions about the differences and commonalities between the two descriptors are presented in the template for the review of Decision 2010/477/EU for Descriptor 9.

Moreover, the Descriptor 8 presents potential synergies with other MSFD descriptors:

Litter-associated contaminants: D8-D10; Biological Effects: D8-D1, D3, D4, D6; Biota sampling: D8-D3, D4, D6; Oiled seabirds: D8-D1, D4.

Coordination among the different descriptors and at an organisational level will be needed for efficient implementation. Discussion fora and responsibilities should be well defined.

#### 1.6 Analysis of whether the criteria and/or indicators and/or methodological standards for the particular descriptor are likely to be common across the EU or need aspects to be specific at region or other scales

There are already analyses available which enable the identification of gaps and needs regarding the implementation of MSFD Descriptor 8. The MSFD GES workshop on Eutrophication and Contaminants held in October 2012 highlighted several technical issues that need to be jointly considered between MSFD and WFD for coherence of approaches, language and concepts and for effective information exchange. The issues that were discussed there included the identification and selection of the chemical pollutants and best matrices for monitoring and the quantitative criteria for GES determination/assessment. Moreover, the importance of designing monitoring programmes compatible and integrated with WFD and RSCs was also stressed, along with the need to cover open and deep sea areas in an appropriate, representative and efficient way.

Subsequently, the Commission's Article 12 assessment and the JRC in-depth assessment of the Member States (MS) reports for MSFD Articles 8, 9, and 10, published in February 2014, revealed a significant lack of coherence of approaches within and between Marine Regions. There were also great

inconsistencies in the definitions of GES and environmental targets, both in their level of ambition and coverage and the ways (if provided) in which they are to be measured or achieved.

The results obtained in all these analyses can support the technical review of the Commission Decision on criteria and methodological standards as well as help to make suggestions for improvement in the next phase of MSFD implementation. This needs to be completed with experience available in the expert network on contaminants and is the scope of this work.

### 1.7 An indication of whether a quantitative GES definition for the descriptor will be possible or whether a qualitative/normative definition only should be used (on the basis of Article 3(5))

Considering the extensive and long-lasting EU legal framework on contaminants, particularly in water, it is expected that GES can be quantitatively defined in a coherent manner by all MS and across the regions, using similar criteria and methodological standards.

### 1.8 Climate sensitivity

Climate change might affect contaminant exposure and toxic effects. A changing climate may influence contaminant fate and transport, release contaminants currently stored in abiotic media, such as snow and ice, affect the partitioning of contaminants between matrices and affect the transfer of pollutants through food chains to humans (Schiedek et al., 2007).

## 2. Analysis of the implementation process

### 2.1 Summary of the findings relating to the determination of GES and specifically the use of the Decision criteria and indicators, based on the Commission/Milieu article 12 reports and the JRC in-depth assessment of the EU Member States' Submissions for the Marine Strategy Framework Directive under articles 8, 9 and 10

#### **Descriptor 8**

All but one of the assessed MS defined GES for Descriptor 8. There was however a considerable variation in the level of detail and the specific elements used. Most MS covered one or both criteria set out in the Commission Decision 2010/477/EEU and only four gave a more generic descriptor text largely reproducing the definition provided in Annex I of the MSFD.

#### **Criterion 8.1 Concentration of contaminants**

All MS that defined GES at Criterion level applied criterion 8.1. Many of them directly or indirectly mentioned the list of WFD priority substances (Directive 2008/105/EC), although they did not refer to all the listed priority substances. Moreover, a significant proportion of MS did not mention the substances to be evaluated when defining GES and environmental targets. It has been suggested that the level of coherence and comparability in the MSFD GES assessment in different regions of European seas might be improved by selecting an appropriate core set of contaminants of concern and ensuring they are well covered and monitored by countries. Even if every country has a different situation, this core group of contaminants should provide an adequate base for comparable approaches among MS, at least, at regional level.

For some parts of the marine environment there is an overlap in areas that are regulated under the WFD and the MSFD, and areas to which RSC apply. This is the case for coastal waters (1 nautical mile) for WFD priority substances and specific pollutants, and for WFD priority substances in territorial waters (usually 12 nautical miles). Most monitoring of hazardous substances, including that

undertaken for RSCs, occurs in this coastal/inshore zone, reflecting the importance of land-based sources.

The selection of substances has to take into consideration the relevant provisions of the WFD for territorial and/or coastal waters as well as the special needs for the marine environment and prior knowledge of the degree of risk posed. We can assume that some WFD priority substances are also relevant in the marine environment, while others may not be (e.g. volatile solvents, some pesticides). The potential exclusion of WFD priority substances from the MSFD assessment should be justified. Within MSFD-WFD there should be no gaps regarding the consideration of relevant pollutants. At the same time, it must be ensured that only reasonable monitoring, and in the appropriate matrix, is done. This particularly concerns legacy and emerging pollutants, and the consideration of how monitoring should be linked also to the measures for pollution reduction.

The Commission/Milieu article 12 reports and the JRC in-depth assessment of the EU Member States' Submissions for the MSFD under articles 8, 9 and 10 have also shown a high variability in the matrices chosen to perform the assessments of contaminants. Most MS mentioned the three key matrices (sediments, water and biota) in their GES definitions, but some countries only referred to one or two of them, in different combinations. Moreover, almost one third of MS did not specify the matrix in which measurements should be conducted.

Furthermore, the establishment of a common contaminant assessment approach is essential for the harmonious implementation of the MSFD Descriptor 8 within the EU. The WFD EQS should be used as a starting point, but, conversely, they were not included in the definitions of GES of a significant proportion of MS. Moreover, in many cases, MS did not specify their evaluation criteria and, if mentioned, it was not clear for which matrix and substance they were to be utilized. Despite potential differences in priorities and/or pressures, all MS should ensure they use coherent and comparable standards and harmonize their actions with neighbouring countries in order to facilitate the achievement of GES in their particular marine region. Moreover, WFD EQS are mainly defined only for water and GES should also consider adequate environmental criteria for sediments and biota as many MS have applied in their MSFD Initial Assessments reports. The application of OSPAR and HELCOM EAC has achieved a quite advanced level of harmonization in the North East Atlantic Ocean and the Baltic Sea, but harmonization is still lacking for the Mediterranean and the Black Seas.

It has also been questioned if freshwater species toxicological data and the biota-EQS derived from them can be applied for the protection of marine species. Marine species have different characteristics from freshwater species and might require a different level of protection. The water-EQS values take account of possible greater sensitivity of marine species by increasing of the assessment factor, e.g. ten-fold. For the biota-EQS, assessment factors have been applied where there was doubt, e.g. due to limited datasets. However, the biota-based EQSs themselves do not take the length of the food chain (longer in the marine environment) and the risks of biomagnification into account. Instead, the CIS Supplementary Guidance (No 32) on biota monitoring indicates how trophic level might be taken into account in applying the EQS, according to the species monitored.

The application of international standards still requires building up consensus on which standard the countries will use. However, so far there is no a single approach suitable for all key matrices/substances that allows comparability and an equal level of protection, so a number of questions still need to be addressed and agreed.

The Commission/Milieu article 12 reports have shown that a common feature across almost all MS is the lack of definition of aggregation rules. The temporal and spatial aggregation of data should be harmonised. Only two MS defined clear aggregation rules in their GES definition for D8 and one MS mentioned that they would be defined at a later stage.

### **Criterion 8.2 Effects of contaminants**

Most MS provided very limited information on the biological effects of contaminants and some MS did not report any data in this regard. These scarce available data showed a high variability in the biological effects methods reported (with the exception of the occurrence of imposex in gastropods, which was reported by many MS) and the specific substances determined.

The information with regard to the standards utilized to evaluate the effects of contaminants was also very limited and revealed little consistency. The OSPAR criteria, namely EcoQOs and EACs, were mainly used, even by countries outside the OSPAR Convention area. The reference levels developed in the Barcelona Convention and HELCOM were also considered by some MS and, in some cases, the issue of biological effects was addressed only from the perspective of concentrations in biota. The inconsistencies and scarcity of information in the Initial Assessments can be related to the lack of common understanding on the issue of Biological Effects in relation to contaminant exposure. Indeed, a number of MS mentioned that the distinction between criterion 8.1 “Concentration of contaminants” and criterion 8.2 “Effects of contaminants” is confusing, considering that the standards used for criterion 8.1 (e.g. EQS or EAC) are defined taking into account the effects of pollutants on the marine environment.

There are still important gaps and needs that must be met to address the issue of biological effects and the lack of a legal framework in this regard may make it difficult to define GES boundaries. The aspects on which more research and scientific discussion are particularly needed seem to be the selection of proper and consistent biological effects methods and the criteria to assess them, and the coordination with programmes on biological effects monitoring conducted under RSCs.

The issue of acute pollution events (8.2.2) was almost totally neglected in the definitions of GES, since only four MS addressed it. The way to assess the potential impacts was practically reduced to the use of OSPAR EcoQO for oiled guillemots, which is targeted primarily at oil pollution from multiple sources, not a single incident.

While oil spills are a well-known and investigated threat in marine waters (IMO, Bonn agreement, EMSA, national emergency plans...), significant operational oil spills and discharges of other substances are an issue. There is a need to review relevant activities and gaps in spatial and temporal coverage. Moreover, the long-term impact of acute exposure from spills is also an important research topic.

Consideration under MSFD would be expected to be straightforward, as results from dedicated activities would only needed to be reported as an aspect of GES.

### **Regional coherence for descriptor 8**

A very high variability was found among MS with regard to the contaminants and matrices for which information was provided. No one substance was assessed by all MS and even for some priority substances listed in the WFD and the WFD river basin specific pollutants, information was quite

limited. There were also great inconsistencies in the definitions of GES and environmental targets, both in their level of ambition and coverage and the ways (if provided) in which they are to be measured or achieved.

Coherence in the North East Atlantic was found to be high, in the Baltic and Mediterranean to be moderate and in the Black Sea to be low. The level of coherence in the NEA marine region is higher in the North than in the South. In the Mediterranean Sea coherence is low for two out of four sub-regions.

The methodologies and data used by the MS sharing the North East Atlantic and Baltic regions were mostly based on the available assessments in OSPAR (Quality Status Report) and HELCOM (Holistic Assessment, HOLAS), respectively.

Another factor identified as a major source of uncertainty was the existence of different evaluation criteria for the same matrix and substance. None of the MS that are parties to the OSPAR Convention and which used in their GES definition both the WFD EQS and the OSPAR's EAC, defined a priority order between these two standards.

## 2.2 Identification of any questions arising from the application of the current Decision, including those identified by the Commission/Milieu Article 12 reports

The inconsistencies encountered in the initial assessments could be explained taking into account that the EU MS "Submissions for the MSFD under articles 8, 9 and 10" used available information and data prior to MSFD implementation, thus it could be expected that inconsistencies will decrease in the next cycle. However, this cannot be taken for granted. In fact, inconsistencies have also been found at regional and subregional level, despite the longstanding experience in the RSCs. Consistency should, therefore, be searched as much as possible at European level, for example, by defining the minimum requirements (common set of indicators) as discussed later.

The lack, incompleteness or inadequacy of data found in some MS reports might partly be associated to the constraints of the provided reporting process.

In some cases, the inconsistencies and scarcity of information in the reports might be related to the lack of common understanding on some issues, for example, the issue of Biological Effects in relation to contaminant exposure.

Moreover, it is not easy to ascertain the lessons learnt from the WFD and identify what MSFD can do better according to WFD experience. It has been recognized that, while land-based issues should be tackled by the WFD, the marine environment needs, within the MSFD, provisions which go beyond the WFD.

## 2.3 Good examples and approaches applied by MS, especially if used by multiple MS, and shortcomings should be listed systematically

Criterion 8.1:

One MS included radionuclides in the scope of their GES definitions. Four MS covered additional substances to the WFD priority substances, including substances relevant for HELCOM or OSPAR and some contaminants specifically for the purpose of the MSFD.

Three MS integrated aggregation rules directly in their GES definitions.

The question of hierarchy between the WFD EQS Directive and the EACs was not addressed by any MS, but one MS discussed the issue of complementarity between the two standards and mentioned the need to apply the precautionary principle.

Five MS mentioned that, in order to maintain GES, concentrations of contaminants should not increase, even if they remain below the threshold values.

Criterion 8.2:

Two MS covered acute pollution events by looking at both the extent/frequency of events and the impact of oil on species.

Some MS directly mentioned the OSPAR EcoQOs in their GES definition (oiled guillemots, imposex).

### 3. Analysis of the current text of the Decision

The text of descriptor 8 has been analysed by highlighting the Com. Dec. text in order to check and identify where there may be terms or topics that need to be made more explicit, removed or incorporated.

- The following part of the Decision could be taken out and included in a guidance document, e.g. on how coordination between the MSFD and WFD could be achieved:

*The **concentration of contaminants** in the marine environment and their effects need to be assessed taking into account the **impacts and threats** to the ecosystem. Relevant provisions of Directive 2000/60/EC in **territorial and/or coastal waters** have to be taken into consideration to ensure proper coordination of the implementation of the two legal frameworks, having also regard to the information and knowledge gathered and approaches developed in **regional sea conventions**.*

- The following part of the Decision should be kept in the Decision as it defines the scope of Descriptor 8:

*The Member States have to consider the substances or groups of **substances**, where relevant for the marine environment, that:*

*(i) exceed the relevant Environmental Quality Standards set out pursuant to Article 2(35) and Annex V to **Directive 2000/60/EC** in coastal or territorial waters adjacent to the marine region or sub-region, be it in **water, sediment and biota**; and/or*

*(ii) are listed as **priority substances in Annex X** to Directive 2000/60/EC and further regulated in Directive **2008/105/EC**, which are discharged into the concerned marine region, sub-region or subdivision; and/or*

*(iii) are **contaminants** and their total releases (including losses, discharges or emissions) may entail **significant risks** to the marine environment from **past and present** pollution in the marine region, sub-region or subdivision concerned, including as a consequence of acute pollution events following incidents involving for instance hazardous and noxious substances.*

#### 8.1. Concentration of contaminants



— *Concentration of the contaminants* mentioned above, measured in the *relevant matrix* (such as biota, sediment and water) in a way that ensures *comparability* with the assessments under *Directive 2000/60/EC* (8.1.1)

#### 8.2. *Effects of contaminants*

— *Levels of pollution effects* on the ecosystem components concerned, having regard to the selected biological processes and taxonomic groups where a *cause/effect relationship* has been established and needs to be monitored (8.2.1)

— *Occurrence, origin (where possible), extent of significant acute pollution events* (e.g. slicks from oil and oil products) and their *impact* on biota physically affected by this pollution (8.2.2).

However, the text should be revised in order to address the lack of accuracy and to clarify certain terms:

- The “substances” to be covered under D8 could potentially be integrated in the definition for criterion 8.1 rather than stand on its own as an introduction.
  - Point (ii) refers to substances discharged and (iii) refers to total releases (including losses, discharges or emissions). These terms should be clarified and harmonized.
  - In Indicator 8.2.1, “Contaminant-related effects” might be more appropriate than “pollution effects”.
  - The term “contaminant-related effect” has a very broad meaning and should be clearly defined. *An example has been provided, although it stills requires agreement: “Contaminant-related effects on biological responses at or below individual level, to chemical or chemical mixtures that give a measure of exposure to certain class of contaminants and/or sublethal adverse effects in the target species”.*
  - The term “living ecosystem components (target species)” might be more appropriate than “ecosystem components concerned”.
  - Indicator 8.2.2 should say “source” instead of “origin”.
  - Indicator 8.2.2 should say “spatial/geographical extent” and not only “extent”.
  - The meaning of “significant” when referring to acute pollution events should be clarified.
  - Beside oil and oil products, other substances should also be mentioned.
- The following part of the Decision is a normative definition for Descriptor 8, and might affect the way EQSs are implemented:

*Progress towards good environmental status will depend on whether pollution is progressively being phased out, i.e. the presence of contaminants in the marine environment and their biological effects are kept within acceptable limits, so as to ensure that there are no significant impacts on or risk to the marine environment.*

Suggestions:

- This text appears complicated and unclear, and might profit from rewording.
- The meaning of “Acceptable limits” should be clarified.
- The term “trends” should be included in the text.
- Such a normative definition might not be needed if quantitative GES boundaries can be defined through the Commission Decision criteria and methodological standards. On the

other hand, it might be useful because it can provide a steer to MS in defining or updating their environmental targets.

➤ Outdated

(ii) are listed as priority substances in Annex X to Directive 2000/60/EC and further regulated in Directive 2008/105/EC...

Directive 2008/105/EC has recently been amended by “Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy”.

#### 4. Identification of issues

This section presents the main issues and findings resulting from the previous assessments (the Commission/Milieu article 12 reports and the JRC in-depth assessment of the EU Member States’ Submissions for the MSFD under articles 8, 9 and 10), and from discussions held within the MSFD Expert Network on Contaminants during the first phase of the review process for Descriptor 8. The identified issues are accompanied by initial recommendations for the way forward in addressing them and diverse comments, which could support further decisions and actions.

##### 1. THE RELATIONSHIP BETWEEN THE WFD AND MSFD

**Issue: The conceptual relationship between the WFD and MSFD.**

Recommendation: The MSFD programme should be built upon existing networks under other Directives, particularly the WFD. The relationships between WFD and MSFD should be described in order to understand what additional elements need to be considered in MSFD beyond WFD (e.g. areas outside WFD zone, other substances/matrices or the biological effects of contaminants).

Comments: Key marine-relevant issues include: the marine environment as a final receptor of contaminants, the marine environment to assess trans-(MS + EU) boundary contamination, specific ecotoxicology of marine species, contamination from sea-based sources (e.g. ship wrecks, ship lanes, dumped ammunition, offshore activities, etc.), the coverage of the open/deep sea and the marine bioaccumulation and biomagnification processes.

##### 2. “CONTAMINANTS”, “POLLUTANTS”, AND “HAZARDOUS SUBSTANCES”

**Issue: The clarification of these terms.**

Recommendation: Hazardous substances, priority substances and priority hazardous substances, as defined under WFD, are encompassed by the term contaminants.

Comments: The term “pollutant” could not be appropriate in the MSFD context, because it is defined under WFD as including substances other than the type of substances to be considered under MSFD Descriptor 8.

##### 3. SUBSTANCES FOR WHICH GES CRITERIA SHOULD BE ESTABLISHED

**Issue: The selection of a European core set of substances.**

Recommendation: A list of contaminants for GES assessment should be established based on:

- Minimum Requirements: core set of substances are the WFD Priority Substances (+ current and future amendments).
- A clear and justified mechanism for excluding WFD priority substances from the MSFD assessments if not relevant (see proposals below).
- Binding provisions for protection against other additional substances (marine region-specific substances, but also national/local) that might be relevant and would also need to be monitored.

Comments: The selection of a European core set of substances to be monitored by all MS would enhance harmonization, but the inclusion in the Commission Decision text of such list might also reduce the flexibility of future revisions.

The frequency of monitoring would be important in this context. For example, many substances which cause problems are legacy chemicals, and therefore their regular monitoring is appropriate and necessary, but the sampling frequency can be lower than for other compounds, particularly if measures are already in place to ban or restrict their usage.

It might be necessary to also select a core set of substances to be monitored in sediments and biota, taking especially into consideration the minimum requirements proposed by RSCs. The physicochemical properties of the contaminants, persistence and their interaction with sediments and biota should be considered.

**Issue: The criteria to include or exclude the substances to be monitored under Descriptor 8.**

Comments: According to the MSFD, it is for MS to define GES and harmonisation will therefore have to be at a high level. Instead of using an established list of substances, a risk-based approach may lead to a more flexible approach. Several conditions have been proposed to include/exclude the substances to be monitored and are summarized below:

- If the substance exceeds the PS EQS in riverine/estuarine inputs to coastal waters, it has to be monitored in coastal waters.
- If the substance exceeds the PS EQS in coastal/territorial waters, it has to be monitored beyond WFD waters.
- If the substance does not exceed the PS EQS in coastal/territorial waters but it is released into the region/subregion, or subdivision, it has to be monitored. However, there are probably numerous substances ending up in the sea in different ways and it would not be feasible to monitor all of them. Therefore, the term “released” has to be well clarified.
- If there are significant known sources beyond WFD waters, the substance should be monitored.
- Check if something affects the marine environment even if the theory says not. This point is controversial. Some experts propose, for example, implementing periodic screening of water or sediment samples using rapid, sensitive bioassays as early warning, as recommended by OSPAR. Other experts consider this bioassay example is not useful as a specific tool for MSFD monitoring.
- The legacy pollutants should be monitored and the appropriate frequency of monitoring established. There is a need to develop a remediation/protection concept as measures might not be possible for historical pollution or have already been taken.
- Aligning opting-out options with WFD: allow MS to exclude a substance.

- Contaminants with land-based inputs should be regulated by the WFD. This is effective for reducing input to the marine environment. MSFD needs to monitor/assess the elements not covered by the WFD. This point, however, is controversial. This suggestion might be valid, with the exception of the assessment of higher trophic levels for those substances whose biota EQS are based on human consumption of fish as the most critical route, so might not be sufficient to protect marine top predators.

**Issue: The role of radionuclides in the MSFD.**

Comments: There has been a lot of work in the radiological community to define thresholds for both human and wildlife protection. The thresholds are expressed as doses of ionising radiation so are not specific to a particular nuclide (or even the type of radiation). The EU ERICA and PROTECT programmes cover all this. OSPAR has considered knowledge available on the impact of environmental radioactivity on marine life and its application to the OSPAR area. According to the data available, calculated dose rates to marine biota are below the screening value at which effects at the ecosystem level are likely to occur. The OSPAR Radioactive Substances Committee has also done work on the development of environmental quality criteria for the protection of the marine environment against adverse effects of radioactive substances. In HELCOM, and for Cs137, the target/GES is pre- Chernobyl level. The MSFD should follow the developments in these groups and use the criteria developed there.

**4. RELEVANT MATRIX IN WHICH MEASUREMENTS SHOULD BE CONDUCTED**

**Issue: The selection of the relevant matrix where a particular substance should be monitored.**

Recommendation: There is no reason to exclude a priori any applicable matrix to assess the concentration of contaminants: biota, water, sediment. Coherence with WFD is desirable.

Comments: Water presents large spatial and temporal variability (although this is not the case for certain large uniform water masses) and very low concentrations of many non-polar contaminants. Sediment or biota display often less temporal variability and seem to be more relevant, although they also present difficulties and some limitations. When adequate sampling and analysis techniques are present, water is a relevant matrix. For biota and sediment similar arguments are valid.

In the WFD, in addition to chemical and ecological status assessment, the prevention of further deterioration of the status of aquatic ecosystems is another important objective. Monitoring of contaminants in sediment and biota may be used to assess the long-term impacts of anthropogenic activity and thus, to assess the achievement of the above mentioned objective. To ensure coherence with WFD (as well as with OSPAR assessments), substances that tend to accumulate in sediment and biota may be monitored in these matrices for trend monitoring in the MSFD. Nevertheless, sediments and biota analysis give information about the spatial distribution of the contaminants, and can be also useful for the assessment of GES. Indeed, some MS have set standards for compliance assessment in sediments as equivalently protective for certain priority substances and applied them in the MSFD Initial Assessment.

The recent Priority Substances directive amendment places more emphasis on biota standards. The CIS Supplementary Guidance (No 32) on biota monitoring gives the possibility to choose relevant species and tissues for monitoring purposes, and means to recalculate the obtained values to a value that can be compared to the biota EQS of the new daughter directive.

**Issue: The uncertainties regarding the species that have to be considered under D8.**

Comments: In the WFD context, biota refers to fish or lower trophic levels, not to mammals or birds. Therefore, the EQSs in the amended priority substance directive might not be directly applicable to the latter, but might be after recalculation and adjustment of monitoring data to account for differences in trophic status and lipid content of the sampled species.

There are uncertainties in the consideration or not of migratory species under MSFD, for which interpretation of results requires the knowledge of seasonal migratory patterns, or the use of alternate biota matrices (e.g. mammals) as integrative matrices to provide a broader picture of the contaminant status in a region or seabird eggs for trend assessments.

Recommendation: The sampling strategy for biota must take into account not only the species but also the organ/tissue analysed and the frequency and seasonality of when biota should be sampled in order to minimize natural variability and to take account of the protection goal.

Comments: Guidelines for sampling biota (size, sex, maturation state, sampling period etc.) and sediments (fraction, etc.) are already available in RSCs, such as OSPAR, and there are also integrated guidelines (Davies and Vethaak, 2012, ICES advice, 2013, WFD Guidance document No. 25). Moreover, the CIS Supplementary Guidance (No 32) on biota monitoring covers sampling of biota for assessing compliance with new WFD biota EQSs. It does not specify species/age etc., but gives guidance on how to allow for differences. The guidance is supposed to cover both freshwater and marine biota.

## **5. METHODOLOGICAL STANDARDS**

**Issue: The appropriate thresholds for the assessment of GES.**

Comments: It is not clear whether to introduce WFD EQS in the text, and recommend the use of other standards (e.g. OSPAR EAC, national standards) when no EQS are available or when EQS were not derived from environmental toxicity data, or whether to define a coherent, ideally single, chemical assessment regime across waters under RSC, WFD and MSFD.

The establishment of EQS has been limited for the majority of priority substances to water only, so the principle matrix for assessing compliance with respect to EQS is whole water, or for metals, the liquid fraction obtained by filtration of the whole water sample. However, many pollutants are present in water at very low concentrations, often below the limit of detection and hydrophobic contaminants tend to accumulate in biota and sediments. Therefore, the development of specific EQS for these latter matrices is recommended.

Furthermore, specific attention has been focused on why EQSs are sometimes lower than calculated Background Concentrations (BCs), which is an ongoing discussion under WFD. The reasons for this need to be better understood (e.g. because no environmental toxicology criteria were used for the EQS establishment and/or because of the assessment factors applied when few data are available?).

Sediments are the last recipient of many pollutants but there are no EQS for sediments set at EU level. OSPAR EACs are assessment tools intended to represent the contaminant concentration in sediment and biota below which no chronic effects are expected to occur in marine species, including the most

sensitive species. EAC can be environmentally representative reference data, and consequently they might fill the current gaps, i.e., when WFD EQS are not available.

There are close similarities between OSPAR EACs and the EQSs developed under the WFD, though they are not interchangeable. The OSPAR 2004 EAC methodology defined EACs to relate to EQSs under the WFD, so that they were based on the EC Technical Guidance Document (TGD) on risk assessment and WFD frameworks for deriving PNECs or QS values. The EAC methodology, however, focused on ecological risks and had less emphasis than EQSs on human health considerations (e.g. through food consumption or drinking water abstraction). As for EQSs, the OSPAR EAC methodology does not take into account specific long-term biological effects such as carcinogenicity, genotoxicity and reproductive disruption due to hormone imbalances, and does not include combination toxicology. For organic contaminants (PCBs, PAHs), OSPAR initially determined EACs for water, following the EQS TGD procedure, and then converted the water EACs to lipid or organic carbon concentrations based upon partitioning theory. EACs for organics in mussels/oysters were further converted from being expressed on a lipid-weight basis to being expressed on a dry weight basis, assuming 1% lipid and 20% dry matter content. It should be noted that EACs have not been agreed for all substance/matrix combinations that OSPAR assessed in the 2010 Quality Status Report (OSPAR QSR2010). For metals in fish, fish liver and mussels/oysters, OSPAR EACs were not agreed and the EU Food Health Regulations (1881/2006) were used for assessing Cd, Hg and Pb in biota for the QSR2010; the food limits for bivalves were applied to data on Cd and Pb in fish liver.

There are other environmental criteria, such as the US Effects Range Low values (ERL) (Long et al. 1995), which are applied in other countries (USA, Canada, etc.). These criteria were used for assessing metals in sediments for the OSPAR QSR2010 since OSPAR EACs were not agreed. However, the procedure by which ERL criteria are derived is very different from the methods of derivation of EACs and EQSs, and a precise equivalence between the two sets of criteria should not be expected. Moreover, in practice, the use of these environmental criteria is not common in Europe.

**Issue: The relevance of the WFD EQSs for the MSFD.**

**Comments:** The most relevant addition would be to include more marine taxa, but only for those EQSs which are now derived with an additional assessment factor because of a lack of data for marine species. It should be noted that for taxa that include marine and freshwater species, there is no clear evidence that marine representatives are more sensitive than their freshwater relatives. The taxonomic position rather than the habitat seems to be important. For the marine environment, testing species from exclusively marine taxa such as sea urchins may have added value.

The generation of new toxicological data from marine species should be a priority as a way to get useful criteria for the assessment of marine environment. Marine toxicity data should become a requirement under REACH for new and current-use substances, but will not cover all relevant substance categories.

**Issue: “Comparability with WFD”.**

**Recommendation:** To define what needs to be comparable (matrix, substances, analytical methods, quality control...) and where (territorial waters, open sea...). This “comparability” is incongruent for sediments and/or biota when there is no available EQS.

Comments: For sediment, no EQS are set at EU level, but there might be  $QS_{sed}$  (some are more preliminary than others though).  $QS_{sed}$  should be based only on predicting risks to benthic organisms, although if based on equilibrium partitioning, they might be based on risk to human health or other organisms.  $EQS_{biota}$  were developed when the highest risk has been considered to be related to secondary poisoning or human risk from consumption. If sediment (or biota) matrix is used for assessing risk to whole marine environment, then the standard should be protective of the most vulnerable species in that environment, and could (should?) be derived by calculation from the EQS for water.

Seven out of eleven  $EQS_{biota}$  laid down in Directive 2013/39/EU have been set to protect humans from adverse health effects via consumption of fish products. Moreover, the monitoring in the CIS Supplementary Guidance (No 32) on biota monitoring is designed according to how these EQS biota values have been derived, i.e. to protect the top predator and/or human health, focusing on a high trophic level, and so analysing the whole fish (as eaten by a top predator) or the fillet (as predominantly eaten by humans). Therefore, these EQS might be not relevant for contaminant monitoring under D8. Furthermore, EC Food Regulation limits for protecting humans are derived using an assessment of the risk based upon dietary intakes – it is not clear that this is the case for EQSs intended to protect human health (e.g. for PBDEs). There are some recommendations in the CIS Supplementary Guidance (No 32) on biota monitoring about converting between fillet and whole body concentrations, but these cannot currently be used to perform a valid assessment due to the lack of the required species-specific conversion factors.

As some of these substances (such as PBDEs and PFOS) are indicators in OSPAR and HELCOM, and don't have EAC or BAC in fish defined, the  $QS_{biota\ secondary\ poisoning}$  derived under the WFD could be useful for compliance checking under MSFD D8 as well.

## 6. BIOLOGICAL EFFECTS

**Issue: The distinction between criterion 8.1 "Concentration of contaminants" and criterion 8.2 "Effects of contaminants".**

Recommendation: There is a clear difference between criterion 8.1 "Concentration of contaminants" and criterion 8.2 "Effect of contaminants", i.e., pressure and impact. The concentration of contaminants provides the information about the presence of a certain contaminant in the marine environment that might cause effects on marine organisms or human health. The effect of contaminants provides information on the exposure and impact of contaminants (including mixtures) on marine organisms and can respond to contaminants which are not being monitored individually by chemical means.

**Issue: The assessment of the effects of contaminants for the MSFD.**

Recommendation: Contaminant-related effects have to be clearly defined.

Comments: Contaminant related effects has a very broad meaning. It can refer to one particular chemical or chemical mixtures as well as contaminant-specific (e.g. imposex and TBT) and general stress responses including contaminants (e.g. fish diseases, lysosomal membrane stability in mussel, etc.). Moreover, clarification is also need regarding the lowest biological organisational level that should be assessed: sub/cellular, tissue or individual...

Contaminant effect monitoring in the WFD is an investigative tool, and not to check compliance of levels of contaminant-related effects. EQS values can be derived from laboratory toxicity studies with water organisms, but can also be derived from observed effects in fish eating birds or mammals. In both cases, the observed effect concentrations are translated to the proper trophic level and safety factors are applied. These values do not protect individual fish, but do protect a population. EQS values are derived for single contaminants and do not take into account the effect of other stressors. So looking at bioeffects may provide additional and relevant information.

Contaminant-related effects in the MSFD could be defined in line with the biomonitoring programmes developed in RSCs, which are based on the integrated use of chemical and biological measurements (biomarkers and bioassays). A key issue here is whether the specific biomonitoring technique is being used as a diagnostic tool (to identify the likely cause of an impact) or a broad spectrum screen (to determine whether or not there is an impact, but whose cause may be unknown).

*Recommendation:* A range of effects methods is needed in order to investigate the range of organism responses, however a core set of biological effects to be monitored at European level (and also their methodologies, thresholds, and the level of QA/QC needed) should be yet further discussed and eventually selected.

*Comments:* “Substance specific” tools are valuable to confirm assessments based on chemical data, whereas tools that respond to larger groups of substances (such as “oestrogenic substances”, “PAHs”, “metals”), but still primarily contaminants, are valuable to cover also substances not being monitored individually by chemical means (for economic or technical reasons), and can also take the combined effects into account. The fact that some of these “general” tools might also respond to other types of pressures and other factors, should not be sufficient reason for “disqualification”. However, some types of effects are perhaps too general and could really respond equally well to other stressors than contaminants, and such types of analyses could also be considered under other descriptors (probably Descriptor 1). As said before, a key issue is to choose between diagnostic or broad spectrum tools.

It has been also suggested that all types of effects monitored and observed are of value. But in the assessment of status, focus should be on risks to higher levels (individual, population, community). Therefore, instead of assessing GES based on certain types of individual endpoints, it might be appropriate to adopt integrated assessment schemes, to assess/predict effects/risks on individual and population/community levels when the actual data stem from lower level monitoring data (such as cellular/enzymatic responses). Individual threshold levels might be suitable for imposex and eelpout malformations, which could probably be assessed in a “stand alone” manner, but not for EROD, vitellogenin (VTG) induction etc., which should be assessed together with other lines of evidence. In the first case, the risks to populations are clear. But EROD and VTG are rather considered “early warning” signals, so deviations should trigger further investigations. Together with other data, sufficient background would be available to assess not only status but frequently also give an idea about what type of compounds are involved.

External fish diseases, certainly not substance specific, have been mentioned as indicators of biological effects that could/should be considered for incorporation in monitoring under D8, although it has been also said that this issue could be tackled under D3 and D1 (species condition).



The choice of a limited number of biological effect-based indicators to investigate the range of organism responses was proposed by Davies and Vethaak (2012) with the following criteria: i) validated methods; ii) integrated QA/QC scheme (e.g. Bequalm project); iii) EAC/BAC determined for each indicator. A list of core biomarkers indicators exists and is the result of the work done within ICES (Davies and Vethaak, 2012). The Barcelona Convention also relies on the limited number of these biomarker indicators.

**Issue: The establishment of cause/effect relationships in the marine environment.**

Comments: The establishment of unequivocal cause/effect relationships in the marine environment is unfeasible since effects include consequences of exposure to multiple contaminants and indeed combined with multiple stressors. However, unequivocal cause/effect relationships have been demonstrated in laboratory exposures for the biological effects recommended by ICES (except, possibly, external fish disease). Certainly, some biological effects reflect the presence of certain contaminants or group of contaminants (e.g. imposex /TBT, PAH metabolites and DNA adducts...), but it is still difficult to ascribe a specific effect to a given chemical. As most biological effects can be caused by several substances (as well as by other stressors not related to chemicals), the main utility of effects measurement is often to provide assurance against cumulative effects due to contaminant mixtures and give an integrated picture of health status.

It should be underlined that the biomarkers responses established as mandatory or recommended by RSC like OSPAR have a cause/effect established after validation in laboratory and field studies, although many of them are not specific to a given chemical but to group of contaminants.

**Issue: The available guidance on effect-based monitoring.**

Comments: The available guidance on effect-based monitoring tools seems to be insufficient to meet the MSFD requirements. The technical report on aquatic effect-based monitoring tools elaborated by the subgroup Chemical Monitoring and Emerging Pollutants (CMEP) under the CIS WFD (Wernersson et al., 2014) is very generic and presents many effect methods since its main aim is to present the state of the art of aquatic effect-based monitoring tools for toxic substances from a broader WFD perspective. The list of biological effects recommended by ICES (Davies and Vethaak, 2012) is shorter and presents detailed guidance on techniques, assessment thresholds and integration / aggregation. Moreover, the Joint Assessment and Monitoring Programme (JAMP) of the OSPAR Commission also includes a substantial biological effects monitoring component (JAMP 1998a, 1998b, 2007).

**Issue: The ways to address biological effects coherently between MSFD and WFD.**

Comments: So far, there are no or few tools implemented at national levels to assess effects from contaminants by biological means in the WFD context (Wernersson et al., 2014). However, by performing the MSFD assessment of contaminant effects on risks to higher organisational levels, such as populations and communities, the protection goals should be the same.

The use of fast and cheap bioassays in water or passive sampling extracts or biomarkers recommended by RSCs in target species from coastal and open sea waters should be applied to link WFD with MSFD.

**Issue: The implications for MSFD in cases where the relation between effects with potential measures should be clarified.**

Comments: It is not always necessary to know the exact identities of the individual compound/s behind an effect to adopt suitable measures, as long as there is an idea about most likely sources. By monitoring effects before and after such measures, it is still possible to assess whether the measures were effective. If an effect is observed, the next step would be to trigger MSFD investigative monitoring to identify the chemical substance causing the effect and, if the substance is identified and land-based sources are suspected, to trigger WFD investigative monitoring.

**Issue: The appropriateness of obligatory monitoring without necessarily checking compliance, i.e., separating compliance from risk assessment.**

Comments: In that case, the appropriate quality elements must be defined. Perhaps by identifying two different criteria, those used for status assessments, and those used to trigger investigations (e.g. fish tumours). There is a key difference between compliance and a status assessment. Status assessment is whether environmental health is acceptable, whereas compliance is comparison with a legal standard (EQS).

## **7. ACUTE POLLUTION EVENTS**

**Issue: The minimum requirements for indicator 8.2.2.**

Recommendation: Apart from petroleum spills, vegetable oil spills are quite frequent, usually due to washing out of tanks in product tankers, and other chemicals can be spilled as well and damage the environment, so they would also need to be considered.

Comments: Reporting on acute pollution events is practically based only on what has been done under the Bonn Agreement / HELCOM. Reporting accidents, including frequency of occurrence and spatial coverage in order to determine the magnitude of the spills, and OSPAR EcoQO on oiled birds to assess impacts on biota could be considered as the minimum requirements for indicator 8.2.2. However, this would need further clarifications, e.g. whether the magnitude of the spill refers to HELCOM statistics or whether EcoQO on oiled birds would be applied by all MS taking into account that it is a North Sea EcoQO and it is not even applied throughout OSPAR and it is not specific for acute pollution events.

It has been also suggested that the assessment of dangers of oil spills is described under the Bonn Agreement and, therefore, no new criteria or assessments should be introduced. However, the Bonn agreement does not apply to much of the North Atlantic Sea (including Bay of Biscay), nor to the Mediterranean or Black Sea.

**Issue: The selection of appropriate reporting units to make this indicator quantitative.**

Comments: Apart from the International Convention for the Prevention of Pollution from Ships (MARPOL) obligations, there is no other EU framework for occurrence, origin and extent of acute pollution events, so quantitative GES boundaries would be based on the obligations for reporting under national registers or related to the target impact group, e.g. seabirds.

**Issue: The selection of sampling sites for monitoring, i.e. whether monitoring should be associated to already known spills or whether modelling should be used to identify prospective monitoring areas.**

Comments: Sampling for acute pollution events should be directed by occurring incidents, and should not be put into a standard monitoring network. Sampling sites should not be selected in advance.

There are guidelines for this issue developed by ICES and OSPAR and published in Martínez-Gómez et al. (2010).

**Issue: The meaning of “impact on biota physically affected” in indicator 8.2.2.**

Comments: The fact that the indicator 8.2.2 says “impact on biota physically affected” implicitly limits the assessment to oil and chemicals which exert smothering effects and excludes the direct toxicity of chemicals. It is important to know whether this means that an accident at sea with chemical spill wouldn’t have to be considered under 8.2.2 and would be already covered under 8.1. Acute toxicity should be considered under 8.2.2, whilst chronic toxicity (including repeated minor spills) should be considered under 8.2.1.

**Issue: The consideration or not of “minor spills” under Indicator 8.2.2.**

Comments: Oil spill events which are too small or less acute to be considered under multinational frameworks, can be frequent and, taken together, be quite significant, (on national scale, volume has been estimated to correspond to at least one large oil tanker each year). However, there are not established guidelines on what has to be reported (e.g. minimum size) and perhaps they are covered through e.g. PAH or sea bird monitoring and then assessed through Indicators 8.1 and 8.2.1.

## **8. MONITORING**

### **8.1. TRENDS**

**Issue: The consideration of trends.**

Recommendation: Trends must be considered. They could be considered for the assessment of GES and effectiveness of measures, in line with WFD provisions. Trend monitoring is necessary:

- For substances of category iii (with no EQS) in order to obtain indications about risks for these type of substances (when not (yet) possible to evaluate concentrations in “absolute terms”).
- When the concentration of a substance is above EQS in order to ensure the trend in concentrations is decreasing.
- For some PS even if they are below EQS but when their concentrations/inputs are expected to increase (align with WFD non-deterioration principle, and perhaps even more clearly related to Art. 3 in 2008/105/EC, by which trend monitoring of accumulating substances is required and measures undertaken if increasing significantly). However, what is meant by “significant increase” and with which statistical power need to be clarified.
- Sediment trends monitoring.

**Issue: The monitoring frequency to assess reliable trends.**

Comments: The monitoring frequencies (including retrospective analysis of archives samples, if available) should be established attending to pollution sources, physicochemical properties of pollutant groups and the hydrodynamic conditions (sedimentation rate in the case of sediments, etc.). Trend analysis could be done on a very few sites representative of the wider (sub-)region, but would need to be done regularly (annually, biannually or every X years) to have any statistical meaning; or done very infrequently using dated sediment cores. If performing the trend analysis according to the priority substance directive (analysing once every third year as a minimum), the “trend” needs to be

very steep in order to detect a significant change compared to the previous water management cycle (within 6 years).

**Issue: The acceptable limits to control that concentrations do not reach EQS.**

Comments: This could refer to identify concentrations (for example, 75% of the EQS) at which any significant increasing trend needs to be turned. However, it has been also said that the trend assessment just represents a safeguard mechanism and this approach might seem more a speculative research than a useful tool for the correct implementation of the MSFD.

## **8.2. SAMPLING STRATEGY**

**Issue: The role of passive sampling.**

Comments: Passive sampling is a methodology to assess dissolved concentrations in water and in sediment porewater and so the bioavailability and exposure by that route. Passive sampling of hydrophobic contaminants (e.g. PAHs, dioxins, etc.) can provide information on lipid concentrations that would be found in biota, if they were at equilibrium. By acting as an abiotic reference phase, passive sampling provides a measure of pollutant pressure in the environment, in the way that a thermometer measures heat; furthermore, passive sampling is able to provide information on what the level of exposure to (e.g.) PAHs is, even though they cannot be measured meaningfully in whole fish/ fish fillet due to metabolism.

Passive sampling derived concentrations can be representative in low concentration of suspended solids waters. Passive sampling of porewaters / sediments can inform on the bioavailability of substances in sediments, and (by being equilibrium sampling), it integrates over the same time period as the sediment itself.

Passive sampling should not be regarded as an additional matrix or as mimicking biota, at least not when the protection goal is related to secondary poisoning. The “food pathway” is not present in a passive sampler. For substances that are rather of concern because of accumulation in invertebrates (lower trophic level biota to be monitored), this could be an alternative, but taking into account that passive sampling actually measures chemical activity, that is the “pressure” for pollutants to move from one phase (e.g. particulate matter or water) into another (e.g. organism lipids or passive sampler). It is this measurement (chemical activity) that is relevant in determining potential exposure, particularly for lower trophic level organisms, including most fish spp.

## **8.3. SCALES AND AGGREGATION**

**Issue: The scale for selecting the substances that are relevant for the marine environment (national, regional, European).**

Recommendation: Typically, marine pollution is expected to represent a transboundary problem, as ocean hydrodynamics can carry the contaminants far from their source and, therefore, regional coherence is essential. Minimum set of substances should be agreed among EU MS in the region/subregion and neighbouring countries, preferably through RSC.

Comments: Harmonization in the Mediterranean and Black Sea is still an issue. In these regional areas, assessment of D8 data could be done by using assessment criteria developed in other RSCs or those

developed at national level as it has been performed by several countries in their Initial Assessments. Moreover, due to the transboundary nature of marine pollution, the best possible identification of pollution sources and pathways should be looked for.

**Issue: The eventual use of combined weight of evidence approaches to provide integrated assessments of GES.**

**Comments:** If there are separate indicators and targets for concentrations and effects, the eventual use of combined weight of evidence approaches to provide integrated assessments of GES should be discussed. There are examples in Davies and Vethaak (2012), although maybe they are resource intensive. Other suggestions include the use of Weight of Evidence (WOE) approach.

It has been also mentioned that the integration in WFD is performed at water body level, which is coherent and possible, but in MSFD Initial Assessments, integration has been performed at demarcation levels, which are higher and more complex. Consequently, it is not recommended to integrate at this level and the criteria of maximum protection should be applied. Within OSPAR and HELCOM the integration / aggregation is proposed to be nested at appropriate scales, e.g. water body, coastal waters, national waters, sub-regional. A basic and common procedure to integrate contaminant or pollution indicators should be proposed (e.g. Davies and Vethaak, 2012).

**Issue: The appropriate aggregation rules.**

**Comments:** There are some guidance documents for data aggregation methodologies: Deltares report (2014), Davies, and Vethaak (2012), ICES advice (2013).

The approach of establishment of a % as a threshold level for the total GES of the interested area, can follow as starting point the integrated assessment methodology proposed by ICES/OSPAR (Davies and Vethaak, 2012). There are, however, serious and complex issues with this approach. The level of the GES threshold must depend on the design of the sampling programme – if sampling is risk-based and targeted at coastal hotspots (i.e. ignoring most of the sub-region), then the GES threshold should be lower (or a weighting factor needs applying) compared to if sampling is randomised across the whole of the sub-region.

#### **8.4. MONITORING PROGRAMMES**

**Issue: The harmonization of the monitoring programmes.**

**Comments:** Monitoring programmes have been already designed by MS with a differing degree of consultations at regional and EU level, so there could still be a lack of consideration of the lessons learnt (in-depth assessment, article 12 report). An insufficiency in harmonization among MS at regional or EU level might lead to new inconsistencies in the second MSFD reporting cycle, if not addressed before the establishment of the monitoring programme for that cycle.

There is not much specification on the sampling grids used and, in fact, sampling grids might not be necessarily the best approach.

**Issue: The appropriate coverage of deep/open sea areas.**

Recommendation: Deep/Open Sea areas have been found to be scarcely considered. There is a need to cover also these areas in a representative and efficient way, where risk warrants coverage.

Comments: Clear definitions of Open/Deep Sea are needed, as well as of “where risks warrant coverage”.

**Issue: Quality assurance/Quality control.**

Recommendation: The WFD provides data quality requirements for chemical analysis (Commission Directive 2009/90/EC), and could be taken into account for marine monitoring. Proficiency testing schemes must consider the properties of marine matrices.

While MS have mostly submitted their monitoring programmes under MSFD Art. 11, the MSFD Expert Network on Contaminants was consulted during the first meeting held in Ispra on the state and content of the MSFD monitoring programmes of Descriptor 8 in their respective countries:

Belgium: Monitoring programmes under public consultation: Coordination with institutions for D8 and with Food safety legislation for D9. No deep sea to be considered.

Croatia: Public consultation of monitoring programmes is finished. For D8 concentrations of contaminants will be measured in sediment and biota (mussels and fish). Information for concentrations in water will be obtained from national, WFD-harmonized, monitoring programme. Contaminant effects in seawater, sediment and biota (mussels and fish) will be investigated. How to access acute pollution effects is still open. Monitoring will be performed from coastal to open sea areas. Deep sea areas are foreseen only for fish sampling.

France: a) Monitoring programmes under public consultation: For D8, assessment of contaminants covers four monitoring sub-programmes i) contaminants in the marine biota, ii) contaminants in the marine environment (sediments and water), iii) contaminant effects in marine organisms, and iv) acute pollution events. b) Discussion of the Revision Commission Decision. c) Preparation of the response to Article 12. Periodic fishery cruises under D3, which can provide biota samples for analysis of contaminants under D8. Sampling of sediment every 1/6 years. There are research projects which determine metals, POPs and PAHs in deep sediments and some of these elements and compounds in deep sea sharks. Using of existing monitoring network stations with additional sampling for offshore waters.

Germany: Not much considerations on deep sea. There are two stations for collecting deep sediments in the North Sea. Research on marine mammals.

Ireland: a) Working on drafting the monitoring programmes: For D8, monitoring will be risk based with the primary focus on coastal areas and alignment in terms of substances with WFD (water) and OSPAR (molluscs, sediments). At present, imposex is the sole biological effect parameter proposed for monitoring. There is a gap on how to sample higher trophic levels. b) Comments to Article 12.

Intends to develop a single monitoring programme for substances in the marine environment to address WFD, OSPAR and MSFD requirements in a more coherent and aligned approach. A risk-based approach dictates primarily inshore monitoring but any offshore monitoring would probably utilise passive sampler deployment and possibly add a focus on biota at higher trophic levels.

Italy: a) Preparation of monitoring programmes for the three Mediterranean subregions, taking into account the weak points, particularly quantitative aspects, of GES and targets, as suggested by Art. 12 Assessment. For D8 there will be subprogrammes on assessment of contaminants in water, sediments, and biota and contaminant effects on biota. b) GES and targets will be converted to legislation.

Trying to fill the gaps in open seas.

The Netherlands: Monitoring programmes decided. Monitoring is mainly risk-based, for D8 in the coastal waters in alignment with WFD and OSPAR Common indicators for sediment and biota. Focus on imposex to monitor biological effects and the monitoring of fish diseases and PAH metabolites in fish bile. Exploring the possibilities of combining the current food safety monitoring programme at sea (D9) and the environmental monitoring programme (D8).

No deep sea to be considered.

Norway: Alignment with WFD, and probably also with MSFD, though Norway does not implement the MSFD. Arctic issues to be addressed through OSPAR/AMAP.

Romania: Monitoring programmes under public consultation. For D8, concentrations of contaminants (heavy metals, OCP, PCB, TPH, PAH) are measured by NIMRD in all relevant matrices: water, sediment and biota (mussels, snails, and fish), taking into account EQS (water), EAC/OSPAR (sediments, biota), ERL (sediments). Periodic fishery cruises under D3, which can provide biota samples for analysis of contaminants under D8 and D9. Contaminant effects (in term of bioaccumulation in biota) are included. Monitoring of other biological effects (biomarkers of pollution, such as metallothioneine, vitellogenin content, catalase, SOD, acetylcholin esterase) is under early stages of development. Existing monitoring is performed by NIMRD on national marine waters (transitional /Danube influenced area, coastal /hot-spots, and open sea/ up to 30-40 nm from baseline). Long-term contaminants data from this network to determine trends are available. Offshore data are available from other projects.

Spain: Monitoring programmes soon under public consultation: For D8, two integrative monitoring programmes will be developed, one for coastal waters and offshore waters, taking into account the WFD and RSCs (OSPAR and Barcelona Convention) (mussels, fish and sediments).

Maximum depths for sediment sampling in Atlantic and in Mediterranean were 500 m. Red mullet covered part of the open waters in Mediterranean and they are considering the inclusion of dogfish or other species in Atlantic areas. In the Mediterranean, programmes are based on coastal species and it would be necessary to identify and sample representative deeper species. Using fixed stations (OSPAR/MEDPOL) to determine trends. Improving of spatial coverage, especially in Mediterranean areas because the higher frequency sampling was developed in higher impacted areas (hotspots).

Sweden: MSFD monitoring programme has been published and reported. For D8 the monitoring programme covers activities and pressures, and status (concentrations in biota and sediment and effects). The aim is to use as a minimum those common/core indicators (substances/effect methods) under development in HELCOM and OSPAR. The monitoring conforms with RSCs coordinated monitoring programmes. Taking into account some planned development the monitoring is considered as sufficient to inform the upcoming assessment in 2018.

United Kingdom: Broad monitoring programmes have been consulted upon: For D8 this is risk-based and mainly related to OSPAR common indicators. A good description of UK marine monitoring can be found at the UKDMOS (UK Directory of Marine Observing Systems) website. This includes monitoring that is not MSFD-related. For D8, the relevant programme is the Clean Safe Seas Environment Monitoring Programme (CSEMP). The entries in UKDMOS are being updated but will not include work relating to acute spills, which are one-off studies. The detailed descriptions of the sub-programmes are not yet decided. The substances will be WFD PSs for water in coastal waters (<1 nm) and OSPAR Common indicators for sediments and biota. Effects will be imposex, and some of the OSPAR candidate common indicators (e.g. fish disease, micronucleus), related to the OSPAR MIME working group. An inventory of shipping accidents is held by the Marine Accident Investigation Branch of the

Department for Transport and there are the PREMIAM guidelines on monitoring in the event of a spill of oil or chemicals.

OSPAR data are the baseline data. Limited open/deep-sea sampling in England/Wales/Northern Ireland because high risks are not expected. In Scotland, there is a research project on deep-sea fish populations including analysis of POPs. In the North Sea, some limited sampling offshore to determine contaminants and their effects. Sediments randomly sampled from within geographic strata in offshore areas or from fixed sites in inshore areas.

## PART II: CONCLUSIONS AND RECOMMENDATIONS

After completion of the information compilation, a questionnaire with specific questions on the main issues identified was circulated among experts and the outcome was analysed and discussed in the second working meeting of the MSFD Expert Network on Contaminants. Based on these findings and discussions, this section compiles and presents the final conclusions and recommendations derived from the review process, including the reasoning behind the recommendations and the proposed way forward.

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

#### 5.1 Conclusions on the use of the existing Decision criteria and indicators

The basic structure of the Descriptor 8 is proposed to be retained, although some modifications are suggested based on the discussions during the review process and in order to clearly differentiate between the assessment of pressure and the assessment of impacts.

#### **Concentration of Contaminants (8.1)**

##### **Concentration of Contaminants and their trends (8.1.1)**

**Recommendation 1:** Establish an EU-wide minimum list of elements and/or parameters for assessing GES, based on:

- WFD Priority Substances (including amendments).
- A clear and justified mechanism for excluding WFD priority substances from MSFD assessments where they are not relevant in the marine environment.
- Other substances (marine region specific substances (selected through RSC mechanisms), or river basin specific pollutants) that might be relevant and would need to be monitored.

**Recommendation 2:** GES threshold values are the WFD EQS. In absence of EQS for specific substances and/or matrices other than those specified under Directive 2000/60/EC, MS could apply other assessment criteria such as those developed by Member States at national level or within RSC, provided they offer the same level of protection as the WFD EQS.

**Recommendation 3:** Member States shall also monitor trends in concentrations of contaminants.

##### **Acute Pollution events (8.1.2)**

**Recommendation 4:** The occurrence, source and spatial/geographical extent of significant acute pollution events involve assessment of pressure and therefore, it is recommended to include this part as a new indicator of pressure and separate it from the effects caused by this pollution.



**Recommendation 5:** Establish an EU-wide minimum list of elements and/or parameters for assessing GES for acute pollution events:

- Number and extent of petroleum/oil related (hydrocarbons) and analogous oil compounds (paraffin, vegetable oils) slicks.

### **Effects of contaminants (8.2)**

#### **Biological effects (8.2.1)**

**Recommendation 6:** Methods may currently be regionally different but shall be selected at regional level.

#### **Acute Pollution events (8.2.2)**

**Recommendation 7:** Member States shall assess the significance of the impact of acute pollution events.

### **Tentative revised Commission Decision text taking into account the above recommendations**

*There is not final agreement among experts on specific wording. Therefore, further discussions are needed in the eventual revision of the Commission decision text.*

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

#### *8.1. Concentration of contaminants*

*— Concentration of contaminants and their trends, measured in the relevant matrix (such as biota, sediment and water) in a way that ensures comparability with the assessments under Directive 2000/60/EC (8.1.1)*

*The Member States shall consider the substances or groups of substances, that:*

*(i) are listed as priority substances in Annex X to Directive 2000/60/EC and further regulated in Directive 2013/39/EU and further amendments, where relevant for the marine environment; and/or*

*(ii) are contaminants (chemical and radiological) and their total releases (including losses, discharges or emissions) which may entail significant risks to the marine environment from past and present pollution in the marine region, sub-region or subdivision concerned, including as a consequence of acute pollution events involving for instance hazardous and noxious substances.*

*— Occurrence, source (where possible), spatial/geographical extent of significant acute pollution events caused by crude oil and similar compounds (8.1.2)*

#### *8.2. Effects of contaminants*

*The Member States shall consider monitoring:*

*— Contaminant-related adverse effects on biological responses at or below individual level in the target species in the region, sub-region or subdivision concerned (8.2.1)*

*— Significance of the impact on biota affected by acute pollution events caused by crude oil and similar compounds (8.2.2).*

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

### 6.1 Aggregation rules

**Recommendation 8:** Aggregation across criteria and across quality elements (contaminants, matrices) should be set through common guidance.

## 7. Specifications and standardized methods for monitoring and assessment (in accordance with Art. 11(4))

### 7.1 Specifications on methods for monitoring

#### 7.1.1 Collection of data

**Recommendation 9:** Member States should select the appropriate matrix (biota, water, sediments) for the assessment of GES for D8. MSFD should align with WFD developments. When adequate sampling and analysis techniques are present, water is a relevant matrix.

**Recommendation 10:** Migratory fish, marine mammals and seabird eggs are relevant for the assessment of GES for D8, but they should not be included as minimum elements and/or parameters.

**Recommendation 11:** The applicability to MSFD of available sampling guidelines developed under WFD and RSCs must be verified.

**Recommendation 12:** Common understanding on the consideration of the Open Sea and Deep Sea Environment is required.

#### 7.1.2 Data quality requirements

**Recommendation 13:** Where appropriate, the Commission Decision should refer to the requirements of Directive 2009/90/EC.

**Recommendation 14:** The applicability of existing European/international standards at EU level should be verified.

### 7.2 Specification on methods for assessment

#### 7.2.1 Scales

**Recommendation 15:** The approaches developed within RSCs could be followed to ensure consistency in the selection of the scale (region, sub-region, subdivision, national, local) at which representativity can be achieved adequately.

## 8. Rational and technical background for proposed revision

### 8.1 Justification and technical background justifying the above recommendations

#### **Explanation for Recommendation 1**

The MSFD programme should be built upon existing networks under other Directives, particularly the Directive 2000/60/EC (WFD) and its amendments. The WFD provides for measures against chemical pollution of surface waters, including two components: (EU)-wide concern substances (priority

substances, WFD PS) in coastal and territorial waters (< 12nm) and substances of national or local concern (river basin specific pollutants, RBSP) selected by Member States for control at the relevant level (<1 nm).

The WFD defines:

“‘Coastal water’ as surface water on the landward side of a line, every point of which is at a distance of one nautical mile on the seaward side from the nearest point of the baseline from which the breadth of territorial waters is measured, extending where appropriate up to the outer limit of transitional waters.”

“‘Territorial waters’ are the breadth of waters extending out to 12 nautical miles from the baseline defined under the United Nations Convention on the Law of the Sea, 1982.”

By protecting these surface waters, the WFD contributes to the protection of MSFD 'marine waters'.

The Commission Decision should not be prescriptive of substances, but of approach. Under MSFD, Member States shall consider:

- 1) **WFD Priority Substances (WFD PS)**. However, some WFD PS might not be relevant for the marine environment and, consequently, should not be necessarily assessed in the marine environment (including coastal waters). Therefore, Member States can exclude the non-relevant WFD PS for their own situation. The WFD PS exclusion process has to be clearly documented and justified, based on predefined situations:

- Chemical/ physical properties of the contaminant (e.g. volatility and persistence in the marine environment).
- Monitoring data evidence.
- Significance of sources and inputs

- 2) **Pollutants relevant at regional level (Marine Region Specific Contaminants)**, selected on the basis of the information and knowledge gathered and approaches developed in Regional Sea Conventions (RSCs). The RSC reference lists of priority substances are available (OSPAR-CEMP, HELCOM- Baltic Sea Action Plan (BSAP), Barcelona Convention- UNEP MAP). The RSC priority substances lists largely overlap with the WFD PS list, but also include other contaminants specifically relevant for the marine environment and are not part of the WFD list (see the attached up-to-date draft joint list of RSC substances lists). The selection of regional contaminants relevant for marine monitoring and assessment is reflected in the regional indicators for hazardous substances:

OSPAR Common Indicators on contaminants and biological effects are proposed by the OSPAR Working Groups on Monitoring and on Trends and Effects of Substances in the Marine Environment (MIME) and adopted (or otherwise) by the Hazardous Substances and Eutrophication Committee (HASEC). Candidate indicators in OSPAR are still under investigation, and will be only adopted if sufficient Contracting Parties agree that they are fit for purpose, and can be taken up in joint OSPAR monitoring programmes.

The substances of special concern for the Baltic Sea Region in the frame work of the Baltic Sea Action Plan as well as the core indicators agreed on in the HELCOM projects CORESET I and CORESET II are selected based on expert assessment taking into account the results of HELCOM thematic assessment on hazardous substances and the WFD priority substances list. HELCOM is developing a set of core indicators as a basis for assessments of the status of the

environment. The indicators do not cover all the substances of specific concern. The core indicators will be the focus of HELCOM work on hazardous substances in the near future and form the basis for assessments of the status of the environment. The 'core set' is relevant to all HELCOM Contracting Parties and is assumed to provide a relevant evaluation of the status of the environment. Core indicators are adopted by the highest decision making bodies in HELCOM.

In the Mediterranean, the Barcelona Convention in collaboration with UNEP, a Mediterranean expert consultation on monitoring, including Contaminants (CORMON) has been recently established.

#### Considerations:

River Basin Specific Pollutants (RBSP) are considered under WFD in the transitional waters and coastal waters (1 nm). There might be a provision to make a RBSP EQS non-compliance trigger further investigation in marine waters.

Legacy pollutants are present in the marine environment. Their basic monitoring and assessment is needed to assess GES, even if direct mitigation measures cannot be provided.

Radionuclides are monitored in the marine environment through different programmes (HELCOM MORSE Expert Group, OSPAR Radioactive Substances Committee, MS specific programmes), with the main goal of human protection. At a European level, standards have been laid down for radioactive substances (e.g. in Council Regulation (EURATOM) no. 3954/87 of 22 December 1987). Overall it is assumed that little risk is related to the presence of radionuclides in the marine environment, but updated baseline information is required. On the basis of Article 8, radionuclides must be considered contaminants in the meaning of the MSFD. The following aspects need to be considered:

- 1) Radionuclides must be addressed in the framework of Articles 8, 9 and 10. However, the setting of GES and environmental targets for contaminants is only necessary where "there total releases (...) may entail significant risks to the marine environment from past and present pollution (...)". This consideration of radionuclides in the MSFD must be based, whenever possible, on the assessments carried out for those radionuclides in the context of provisions of the EURATOM Treaty, and any GES and environmental target must be compatible with these provisions.
- 2) The same applies for the implementation of Article 11, for which MS must take into account radionuclides in the monitoring programmes taking into account how radionuclides have been considered in the context of the Articles 8, 9 and 10 MSFD but with due consideration of the monitoring established and carried out under the EURATOM Treaty, in particular Articles 35 and 36 thereof.
- 3) The establishment of measures already covered by the EURATOM Treaty is not necessary under the MSFD and must therefore not be addressed in the context of Article 13 MSFD (see recital 39).
- 4) The work of the Regional Sea Conventions on radionuclides should be used, as much as possible, as a basis for the implementation of the MSFD.
- 5) Consistency between the provisions of the MSFD and the EURATOM Treaty should be promoted to the maximum possible extent.

#### ***Explanation for Recommendation 2***

GES threshold values are the WFD EQS, which provides comparability with the assessments under Directive 2000/60/EC.

The selection of contaminants to be monitored under Descriptor 8 should be generally complemented by the selection of the appropriate matrix for monitoring (water, biota, and sediments). For WFD PS, this currently implies mainly water as the explicit environmental compartment to be monitored.

When there are no available EQS, the national standards established by Member States for sediment and/or biota, e.g. based on WFD QS, could also be applied if they offer at least the same level of protection as the EQS for water.

The assessment criteria developed in RSC might be used for MSFD in order to provide additional tools for GES assessment when EQSs are not available. However, it should be kept in mind that the scope of RSC criteria can be different from EQS.

### ***Explanation for Recommendation 3***

The WFD provisions require both the achievement of particular standards, and the identification and reversal of significant and sustained upward trends in the concentration of pollutants.

Under MSFD, Member States shall also monitor trends in contaminant concentrations in order to:

- 1) Identify risks of failing to achieve Good Environmental Status (GES) for substances (measured in the relevant matrix) for which Environmental Quality Standards (EQSs) have not yet been set at the European level.
- 2) Prevent further deterioration of their marine environments, in line with Art. 14.4 MSFD and WFD.
- 3) Provide und early warning in case of concentrations still being below EQS but with an upward trend.
- 4) Assess the effectiveness of measures to control pollution.

The specifications for comparable trend assessment and monitoring under MSFD should include the selection of the appropriate matrix for trend monitoring, the spatial variability and the monitoring frequency to assess reliable trends, the appropriate statistical method for trend assessment, the determination of the minimum requirements for calculation, and the determination of the acceptable limits before a significant upward trend needs to be reverted.

The WFD provides some guidelines for trend assessment and monitoring (e.g. Technical Report No. 1 prepared by CIS Working Group 2.8, WFD CIS Guidance Documents No. 7, No. 18, No. 25, and No. 32). Guidance is also available within the OSPAR Co-ordinated Environmental Monitoring Programme (CEMP) and at the COMBINE programme of HELCOM.

### ***Explanation for Recommendation 4***

There is a clear difference between criterion 8.1 “Concentration of contaminants” and criterion 8.2 “Effect of contaminants”, i.e., pressure and impacts. The concentration of contaminants provides the information about the presence of a certain contaminant in the marine environment that might cause effects on marine organisms or human health. The effect of contaminants provides information on

the exposure and impact of contaminants (including mixtures) on marine organisms and can respond to contaminants which are not determined chemically.

Therefore, the occurrence, source and extent of acute pollution events should be included in the first part of the descriptor (assessment of pressure) and be separated from the assessment of their effects.

#### ***Explanation for Recommendation 5***

“Acute Pollution Event” implies short time and severe pollution: It can be deliberate or accidental. Therefore, the sampling sites cannot be selected in advance, and the establishment of environmental targets is not possible. EMSA provides oil spill satellite surveillance to the EU coastal states. National aerial and vessel surveillance patrols can then target the area to verify the possible spill and potentially identify the polluter. This communication and verification process can be triggered through the Commission Decision. The EU-wide minimum list of elements and/or parameters for assessing GES proposed for acute pollution events are the number and extent of petroleum/oil related (hydrocarbons) and analogous oil compounds (paraffin, vegetable oils) slicks, and the reporting units would be based on obligations for reporting under national registers. Other chemical’s spills might be difficult to monitor (no visual identification), unless very obvious (e.g. from a shipwreck). Moreover, if the chemical spill is big enough and long-term enough, the substance would be covered under 8.1 and their toxic effects under 8.2.1.

Furthermore, minor frequent spills result in chronic pollution and, therefore they would be covered by 8.2.1.

#### ***Explanation for Recommendations 6***

The assessment of biological effects is crucial for MSFD; they have the potential to provide signals on the health of the ecosystem and will trigger further research to identify problems and substances associated. Biological effects methods can be useful:

- as a screen to judge whether an area is subject to pollution, the nature of which is then investigated;
- to judge whether environmental protection standards/controls (based on information derived under controlled-laboratory conditions) are over- or under- protective of organisms in the real environment;
- to provide assurance that there are no cumulative impacts occurring, e.g. in an area where several substances are close to EQS levels, or where there are multiple known inputs;
- to assess whether an area is actually adversely impacted when there are EQS failures.

However, there is currently no EU-wide list of set minimum required methods for 8.2.1 and there are difficulties in the harmonized application of biological effects methods throughout Europe. The current scientific development (ICES/OSPAR, MEDPOL...) is not mature enough to recommend it as an EU-wide minimum list of elements and/or parameters for assessing GES. Therefore, the Commission Decision should leave the selection of available methods (harmonization and obligations through RSC work) open for Member States as a voluntary and complementary tool to investigate into diffuse problems. Coherence among regions and between MSFD/WFD should be ensured. Guidance on

biological effects is available (WFD compilation, ICES) and has been mainly developed in the inshore area.

***Explanation for Recommendation 7***

The assessment of impacts on biota affected by oil and analogous compounds is necessary to evaluate the impacts of acute pollution events. However, the mechanism and the way to address this issue have yet to be determined. The monitoring of beached birds, as indicators of marine oil pollution as developed under OSPAR, cannot be widely used due to the survey logistics and therefore should not be included in the minimum list of elements and/or parameters for assessing GES at EU level.

***Explanation for Recommendation 8***

Aggregation rules are key. The available guidelines on aggregation methods (ICES integrated monitoring guidelines, DELTARES...) provide a possible mechanism for integrating multiple determinants in a common assessment framework and could be also applied for MSFD. However, consideration should be given as to whether to assess the different geographical areas (coastal/territorial waters, continental shelf and open seas areas) separately, as this gives a closer relationship to the measures required to achieve GES.

***Explanation for Recommendation 9***

There is no reason to exclude a priori any applicable matrix (biota, water, sediments) for the assessment of GES for D8. Coherence with WFD is required. When adequate sampling and analysis techniques are present, water is a relevant matrix, but with a lower spatial and temporary representativity than other matrices in coastal areas. For biota and sediment similar arguments are valid.

***Explanation for Recommendation 10***

Migratory fish, marine mammals and seabirds bioaccumulate contaminants and have high concentrations, but they do not match WFD criteria in the sense that EQS derivation considers a different scenario (WFD EQS biota refer to fish or lower trophic levels), so they might not be effective for deriving measures. However, they may be informative on the ecosystem health status of larger marine areas and can be needed for the assessment of GES by Member States at regional/European geographical scale. Moreover, these species can also provide information about potential risks associated with bioaccumulation.

It is important to consider the spatial representativeness of the monitored species. The interpretation of results would require the knowledge of migratory patterns, or the use of alternate biota matrices (e.g. mammals) as integrative matrices to provide a broader picture of the contaminant status in a region or seabird eggs for trend assessments. There are available guidelines for the establishment of the area of migratory species (ICES).

***Explanation for Recommendation 11***

There are comprehensive and widely applied guidelines addressing sampling strategies developed under WFD and RSCs, and their applicability for MSFD purposes should be verified:

For sediments, the OSPAR “JAMP Guidelines for Monitoring Contaminants in Sediments” (OSPAR agreement 2002-16), ICES Advice 2013, book 1, 1.5.6.8 on the “Spatial design of a regional monitoring programme for contaminants in sediment”, the WFD CIS Guidance document No. 25, might be also applicable to MSFD.

For biota, the sampling strategy must take into account not only the species but also the organ/tissue analysed and the frequency and seasonality of when biota should be sampled in order to minimize natural variability. Guidelines for sampling biota are also already available in RSCs, such as OSPAR, and there are also integrated guidelines (Davies and Vethaak, 2012, ICES advice, 2013, WFD CIS Guidance document No. 25, No. 32).

Passive sampling is an innovative sampling technique and guidelines exist or are under development. Passive sampling has significant potential for future application for MSFD, but so far its use is limited, and recommended only for hydrophobic compounds in water or sediment, or metals in water.

#### ***Explanation for Recommendation 12***

Open/deep-sea areas are the least considered areas. Most monitoring activities are carried out in the coastal area and there is no different strategy or specific approach for the open sea and deep sea environment. Therefore, a major challenge for the implementation of the MSFD is the consideration of these areas.

The lack of specific monitoring in open/deep-sea areas has been often related to the fact that there is little risk in these areas (apart from that coming from specific activities such as oil platforms). However, results from research monitoring have evidenced very high concentrations of contaminants in deep-sea living organisms (e.g. Koenig et al., 2013, HERMIONE project). Biota in deep seas tend to be long-lived and thus more susceptible to bioaccumulation of contaminants, many are also of high trophic level making them susceptible to biomagnification. Consequently, coverage and monitoring in these areas is needed for an appropriate assessment of the state of the environment. Harmonization of selected species/matrices at regional or sub-regional level should be desirable, as a way to get comparable data.

A clear understanding of what open/deep-sea areas refer to is needed. For example, it should be clarified that open seas can be shallow and deep-sea areas (400 m+) may exist relatively near-shore, i.e., within the area covered by WFD (e.g. in Southern Europe 2000 m water depth at 5 nm from the coastline). The ecosystem is different between deep water and surface waters in the same area; surface waters and deep waters should be considered separately, even in the same location.

#### ***Explanation for Recommendation 13***

According the QA/QC Directive (2009/90/EC) “The quality and comparability of analytical results generated by laboratories appointed by competent authorities of the Member States to perform water chemical monitoring pursuant to Article 8 of Directive 2000/60/EC should be ensured”.



The QA/QC Directive should be applied to MSFD contaminant concentration monitoring in the same way as for contaminant concentration monitoring under the WFD.

**Explanation for Recommendation 14**

The network on WFD proficiency test providers does not exist any longer. A survey on available water, biota and sediment matrix Certified Reference Materials (CRMs) for the 33 WFD Priority Substances (and the 8 "other certain pollutants") was published in 2012 (Richi et al., 2012).

There are also international quality assurance programmes for chemical and biological effects monitoring (e.g. QUASIMEME, BEQUALM, IAEA, from RSCs are available for the most common pollutants in marine sediment and biota). Data used for MSFD assessments at EU level should follow common quality standards. Requirements under the MSFD would drive the development of regular and routine proficiency test exercises.

**Explanation for Recommendation 15**

There is ongoing work within RSCs in relation to the selection of the scale level for each indicator. The close collaboration between OSPAR and HELCOM and the contacts with UNEP MAP should allow for a common and harmonized approach at EU level.

**9. Other related products**

**9.1 Proposed way forward for identified issues**

Issue	Way forward	Timeline
Exclusion process of WFD PS which are not relevant for the marine environment.	Common guidance needed.	<i>Started/Finalized 2015.</i>
Selection of marine region specific contaminants through RSC mechanism.	Common approach needed. Compilation of up-to date joint list of RSC contaminant lists.	<i>Started 2015.</i>
WFD EQSs for the marine environment (development of EQSs for other matrices than total water concentrations, what to do when EQS is lower than the calculated background concentrations).	Exchange of information between the MSFD Expert network on Contaminants and the WFD Chemicals Groups and the RSC groups.	<i>Continuous (Not directly related to the review process).</i>
Technical specifications for comparable trend assessment and monitoring under MSFD.	Guidance needed.	<i>Until 2018.</i>
Applicability of available biological effects methods for WFD/MSFD.	Guidance needed. Communication to WFD CIS WG chemicals.	<i>Until 2018.</i>
Occurrence of acute pollution events.	Common understanding needed. Communication with EMSA.	<i>Until 2018.</i>
Assessment of impacts of acute pollution events on biota.	Discussions within the MSFD Expert Network on Contaminants.	<i>Until 2018.</i>

Significance of minor, frequent spills.	Reference in common understanding document.	<i>To be decided (Not directly related to the review process).</i>
Aggregation rules for different geographical areas (coastal/territorial, continental shelf and open seas).	Common guidance needed.	<i>Started/Finalized 2015.</i>
Applicability of existing sampling guidelines for MSFD purposes.	Verification of applicability of CIS Supplementary Guidance (No 32) on biota monitoring (the Implementation of EQS <sub>biota</sub> ).	<i>Finalized 2015.</i>
Coverage and monitoring of open/deep-seas areas.	Common understanding and guidance needed.	<i>Started 2015.</i>
Technical questions regarding the QA/QC Directive (background values, uncertainty at EQS levels, etc.).	Common understanding needed. Communication to WFD CIS WG chemicals.	<i>Continuous (Not directly related to the review process).</i>
Applicability of existing European/International Standards.	Verification of suitability for MSFD.	<i>Until 2018.</i>

## 10. Reference Documents

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- Common Implementation Strategy for the Water Framework Directive (2000/60/EC). 2014. Guidance Document No. 32 on biota monitoring (the implementation of EQS<sub>biota</sub>) under the Water Framework Directive. Technical Report - 2014 – 083.
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- OSPAR MSFD Advice Document on Contaminants (OSPAR, 2012).

- Review of Methodological Standards Related to the Marine Strategy Framework Directive Criteria on Good Environmental Status (JRC, 2011).
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# **Review of Commission Decision 2010/477/EU concerning MSFD criteria for assessing good environmental status**

## **Descriptor 9**

### **Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards**

This report represents the result of the scientific and technical review of Commission Decision 2010/477/EU in relation to Descriptor 9. The review has been carried out by the EC JRC together with experts nominated by EU Member States, and has considered contributions from the GES Working Group in accordance with the roadmap set out in the MSFD implementation strategy (agreed on at the 11th CIS MSCG meeting).

The report is one of a series of reports (review manuals) including Descriptor 1, 2, 5, 7, 8, 9, 10 that conclude phase 1 of the review process and, as agreed within the MSFD Common Implementation Strategy, are the basis for review phase 2, towards an eventual revision of the Commission Decision 2010/477/EU.

The report presents the state of the technical discussions as of 30 April 2015 (document version 8.0: ComDecRev\_D9\_V8), as some discussions are ongoing, it does not contain agreed conclusions on all issues.

The views expressed in the document do not necessarily represent the views of the European Commission.

## **Foreword**

The review of MSFD Descriptor 9 is being performed by the MSFD Expert Network on Contaminants, led by JRC. The review process was kicked-off during the working meeting of the MSFD Expert Network on Contaminants on 2-4.7.2014 in Ispra, Italy. Based on the exchanges there, a discussion document was prepared and circulated. The state of these discussions was reflected in the draft template document that was presented in October 2014 at the 12th WG GES meeting. These activities allowed the compilation and analysis of all necessary information for the identification of main issues and gaps and initial recommendations for the way forward, and with it the first part of the review process was completed.

The second part of the review process should then allow the finalization of conclusions and recommendations (which may include proposals for dedicated work items for better harmonization, need for additional guidance and eventually proposals for amendments to the Commission Decision). To this end, a questionnaire with specific questions on the main issues identified was circulated among experts and the outcome was analysed and discussed in the second working meeting of the MSFD Expert Network on Contaminants held on 23-24.2.2015 in Ispra. The current state of the discussions is reflected in the second part of the present template.

**MSFD Expert Network on Contaminants:** Andra Oros, Andreja Ramšak, Anja Duffek, Ann-Sofie Wernersson, Antonella Ausili, Chiara Maggi, Craig Robinson, Daniela Tiganus, Dorien ten Hulscher, Evin McGovern, Grozdan Kušpilić, Ivana Ujević, Jacek Tronczynski, Jean-Cedric Reninger, Jaakko Mannio, Jo Foden, Koen Parmentier, Lena Avellan, Lucía Viñas, Nevenka Bihari, Norman Green, Oliver Bajt, Paul Whitehouse, Patrick Roose, Peter Lepom, Robin Law, Stefan Schmolke, Valentina Coatu, Vesna Milun, Víctor León, Victoria Besada.

**EC JRC:** Victoria Tornero, Georg Hanke

**Acknowledgments for contributions to:** Andrea Houben, Christer Larsson, Concepción Martínez-Gómez, Daniel Gonzalez, David Mortimer, Dick Vethaak, Jessica Hjerpe, Juan A. Campillo, Karl Lilja, Maria Linderöth, Marie Aune, Stefan van Leeuwen, Tobias Porsbring, Tove Lundeberg, Will Munro, ICES MCWG.

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## PART I: COMPILATION OF INFORMATION

The first part of the review process has allowed the compilation of all necessary information to detect possible shortcomings, inconsistencies and gaps, and then to identify and discuss main issues and prepare initial recommendations. The information compiled here served as the basis for the discussions which were then held during the second part of the review process to shape the final conclusions and recommendations presented in the Part II of this template.

### 1. Approach

#### 1.1 General guiding principles for the review

The review of the Com Dec 2010/477/EU for D9 considers experiences made so far in the practical implementation, analyses the Commission Decision text in view of the current state of science and prepares proposals for action in the MSFD Common Implementation Strategy (CIS) (Working Group on GES), including the eventual revision of the Commission Decision. EC JRC is responsible for coordinating the review process of Descriptor 9.

Descriptor 9 considers the presence of hazardous substances (i.e. chemical elements and compounds) or groups of substances that are toxic, persistent and liable to bio-accumulate, and other substances or groups of substances which give rise to an equivalent level of concern, in edible tissues (muscle, liver, roe, flesh, soft parts as appropriate) of fish, crustaceans, molluscs and echinoderms, as well as seaweed, caught or harvested in the wild in the different (sub) regions destined for human consumption against regulatory levels set for human consumption.

#### 1.2 Definitions

The term **contaminants** in Descriptor 9 is interpreted as "substances for which regulatory levels have been set for human consumption or for which their presence in fish is relevant"<sup>1</sup>. Hazardous substances are substances (i.e. chemical elements and compounds) or groups of substances that are toxic, persistent and liable to bio-accumulate, and other substances or groups of substances which give rise to an equivalent level of concern.

**Fish and other seafood** are interpreted as including fish, crustaceans, molluscs, echinoderms, and seaweed or plants caught or harvested in the wild as well as farmed shellfish in the different (sub) regions,

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<sup>1</sup> JRC, 2010. Task Group 9 Contaminants in fish and other seafood



which are destined for human consumption. This excludes farmed fish since their contaminant burden is linked to their feed and additives.

**Levels established by Community legislation** are considered to be the regulatory levels set in European Community legislation for public health reasons.

**Other relevant standards** are other national and international (e.g. WHO, FAO...) standards and recommendations set for substances and/or for fish and other seafood which are not covered by and are not in contradiction with the European legislation.

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

Descriptor 9 is directly linked in the Decision to other European legislation, relating to food safety.

Member States need to monitor and assess the possible presence of substances, for which maximum levels are established at European level for seafood products meant for human consumption, in particular through Regulation (EC) No 1881/2006 and amendments. This framework provides also the basis for setting GES for this descriptor.

The potential use of an alternative approach, such as assessments using WFD EQSs (some of which are based on food legislation values, e.g. PCBs/dioxins) and environmental assessment criteria (EACs) or levels of biological effects response, is discussed further in this template.

### 1.4 Linkages with international and Regional Sea Conventions (RSCs) assessment criteria and standards

With its CORESET project, **HELCOM** indicates that the ecological objective for the seafood safe to eat of the Baltic Sea Action Plan (BSAP) could be measured using the same biota sampled for the purpose of core indicators for the concentrations of hazardous substances in the environment (D8). The quality boundaries recommended by HELCOM are those used in the EU legislation. In addition, HELCOM mentions that seafood safety can also be assessed by other safety limits, which are not based on legislation but on research by the European Food Safety Authority, for example.

Similarly, **OSPAR** has not developed specific standards related to seafood safety and also recommends the application of EU legislation.

### 1.5 Descriptor specificities should be highlighted and justified (e.g. if it is recommended to combine several descriptors together)

As with MSFD Descriptor 8 ("Concentrations of contaminants are at levels not giving rise to pollution effects"), MSFD Descriptor 9 tackles the issue of marine chemical pollution but with the protection of human consumers as its goal. Both descriptors are dealing with contaminants, so they should be discussed together. However, it is important to note that they have different objectives and characteristics:

- Protection of the environment (D8) versus protection of human health (D9).
- The thresholds and methodologies for assessment of GES are different.
- The considered substances and investigated matrices do not always coincide. Sampling in environmental programmes may be carried out in different tissues, including muscle and liver, depending on the contaminant studied, while human health programmes focus on edible parts of

the fish (mainly muscle). Moreover, the trophic level and the size of the organisms considered under D8 are not necessarily the same as under D9.

- The organizational bodies in charge are different.

For these reasons, although there is a strong link between Descriptor 8 and Descriptor 9, they require a separate approach under the MSFD.

Moreover, there are a number of issues related to Descriptor 9 that could also be related to other MSFD descriptors:

Microbial Pathogens: D9- D1, D2, D4, D5; Litter-associated contaminants: D9- D10, Biota sampling D9-D3, Biotoxins: D9-D5.

Coordination among the different descriptors and at an organisational level will be needed for an efficient implementation. Discussion fora and responsibilities should be well defined.

### 1.6 Analysis of whether the criteria and/or indicators and/or methodological standards for the particular descriptor are likely to be common across the EU or need aspects to be specific at region or other scales

Considering the strict EU legal framework on contaminants in foodstuffs, there is a strong element of commonality across MS, as demonstrated through the Article 12 assessment and JRC in-depth assessment. It is therefore likely that the definition of GES, at least for indicator 9.1.1, will be common across the EU.

### 1.7 An indication of whether a quantitative GES definition for the descriptor will be possible or whether a qualitative/normative definition only should be used (on the basis of Article 3(5))

Considering the nature of Descriptor 9, quantitative boundaries for GES are expected at least at criterion level.

### 1.8 Climate sensitivity

Climate change might affect contaminant exposure and toxic effects. A changing climate may influence contaminant fate and transport, release contaminants currently stored in abiotic media and affect the transfer of pollutants through food chains to humans (Schiedek et al., 2007).

## 2. Analysis of the implementation process

### 2.1 Summary of the findings relating to the determination of GES and specifically the use of the Decision criteria and indicators, based on the Commission/Milieu Article 12 reports and the JRC in-depth assessment **Descriptor 9**

All but two of the assessed MS defined GES for Descriptor 9. Information was very heterogeneous amongst MS, in terms of the substances, the species and the tissues analyzed and the regulatory levels considered for the assessments. Nevertheless, most assessments were carried out for the substances included in the Regulation (EC) No. 1881/2006 and consequently, the limits proposed there were the most commonly utilized. A number of other standards were also mentioned, sometimes without a clear specification of the regulation to which they relate and two MS did not define GES in a way that would allow it to be measurable.

Three MS defined aggregation rules and five MS highlighted the importance of the traceability of the samples in order to know where at sea the detected pollution occur. One MS stressed the necessity of coordination with food authorities and neighbouring countries and the establishment of a specific monitoring programme for this descriptor.

### **Criterion 9.1. Levels, number and frequency of contaminants**

Only six MS defined GES to cover all components of criterion 9.1, which includes the frequency of regulatory levels being exceeded. The remaining MS defined GES only to cover the levels of contaminants.

The existence of a strong EU legal framework for the protection of human health from the contamination of foodstuff means that GES boundaries for the actual levels of contaminants should be quantitatively defined for the substances covered by the legislation. The relevant standards for other substances should, as far as possible, be agreed and their use harmonised.

There is no specific EU recommendation or threshold about the number of contaminants which exceed maximum regulatory levels and the frequency of regulatory levels being exceeded and, consequently, MS basically did not provide any data in this regard. Under food legislation, batches of food exceeding the limits have to be removed from sale – there is a 100% compliance requirement.

### **Regional coherence for descriptor 9**

All MS except those from the Black Sea defined GES for Descriptor 9. The coherence in the Mediterranean and North East Atlantic is high while in the Baltic it is moderate. In the Baltic region, three MS defined GES only by providing limit values which are consistent with the current EU foodstuffs limit values instead of having a direct or inferred reference to relevant EU legislation (i.e. compliance with Regulation 1881/2006). In the North East Atlantic and Mediterranean regions almost none of the countries provided details about the specific substances or species covered in the GES definition while in the Baltic many of the MS provided such information. Only some MS from the Mediterranean region added a specification regarding the origin of the seafood. In the North East Atlantic two MS added restrictions, one excluded migratory species from its GES and the other excluded measurements using the livers of fish (because the limit is not related to safety and the level of non-compliance would be expected to be high).

## **3. Analysis of the current text of the Decision**

The text of descriptor 9 has been analysed by highlighting Com. Dec. text in order to check and identify where there may be terms or topics that need to be made more explicit, removed or incorporated.

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

*In the different regions or sub-regions, Member States need to monitor in **edible tissues** (muscle, liver, roe, flesh, soft parts as appropriate) of **fish, crustaceans, molluscs and echinoderms**, as well as **seaweed, caught or harvested in the wild**, the possible presence of **substances** for which **maximum levels are established at European, regional, or national level** for products destined to **human consumption**.*

### 9.1. Levels, number and frequency of contaminants

- *Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels (9.1.1)*
- *Frequency of regulatory levels being exceeded (9.1.2).*

The text should be revised in order to address the lack of accuracy and to clarify certain terms:

- Indicator 9.1.1 should say “actual concentrations” instead of “actual levels”.
- The relevance of “frequency of regulatory levels being exceeded” should be clarified.
- Inclusion of “location” or “traceability” in the text.
- The appropriate combination/elimination of the terms “actual levels”, “number” and “frequency” has to be decided. Options include:
  - Keep the text as it is now.
  - Join the three terms in one only indicator.
  - Keep two separate indicators but with the terms combined in a different manner, e.g. 9.1.1 including actual levels and 9.1.2 including number and frequency.
  - Remove number of contaminants and leave one only indicator including actual levels and frequency.
- Consistency is needed as for the Commission Decision texts for D8 and D9: D8 only refers to concentrations of contaminants and D9 refers to concentrations and frequency.

## 4. Identification of issues

This section presents the main issues and findings resulting from the previous assessments (the Commission/Milieu Article 12 reports and the JRC in-depth assessment), and from discussions held within the MSFD Expert Network on Contaminants during the first phase of the review process for Descriptor 8. The identified issues are accompanied by initial recommendations for the way forward in addressing them and diverse comments, which could support further decisions and actions.

### 1. AIM OF DESCRIPTOR 9

#### **Issue: The purpose for D9 assessments.**

**Comments:** If the purpose of D9 is to provide an assessment on the contamination of fish and seafood in the environment, from a human health perspective, the typical control type monitoring performed by responsible authorities, i.e. focused on species most likely to be non-compliant, would not be well suited for this purpose nor easily coordinated across regions. With the exception of a few substances or substance groups, limit values across different legislations have typically been set for different purposes and build on different assumptions, and are therefore neither directly compatible nor easily applied under D9. If the purpose is to prevent adverse effects on human health from seafood consumption, food safety regulations and food safety procedures that are already in place would provide sufficient protection. However, advice is also required to limit consumption of oily fish to avoid exceeding health based

guidance values for exposure to dioxins (as for large predators and mercury). This applies even though they are compliant with the limits.

## **2. RELATION BETWEEN DESCRIPTORS 8 AND 9**

### **Issue: The distinction between Descriptor 8 and Descriptor 9.**

**Recommendation:** As previously explained, both descriptors are closely related, but require a separate approach under the MSFD since they have different objectives and characteristics. However, in the WFD, the two approaches (protection of the environment and protection of human health) are integrated into one EQS, so these are not separated. It should be clarified whether a combination of measurements to provide data for both descriptors could be also used for MSFD.

**Comments:** Although sometimes the regulatory levels for contaminant in foodstuff seem to be too high to be suitable as indicators of pollution of the marine environment, the Directive 2013/39/EU takes some maximum levels from the food legislation. According to the WFD Guidance document No. 27, the EQS stated in the Directive is always based on the most stringent QS from the assessment, so compliance with an EQS will automatically mean that other receptors are protected, even if they are not explicitly addressed in the EQS (i.e. EQSs are protective of human health but may be unnecessarily tight since food law requires controls to be risk-based and proportionate). However, the limits in the Regulation 1881/2006 as amended apply only to edible parts, generally muscle meat. If the whole fish is tested, including liver (which has a separate, higher limit under Reg. 1881/2006) there will be a lot of non-compliance with the EQS, e.g. for dioxins. On the other hand, for WFD, according to the recent WFD CIS Guidance No. 32 on biota monitoring, lipid normalisation should be performed, while the standards according to Reg. 1881/2006 are not necessarily expressed on the basis of lipid content and it is agreed that lipid normalisation would not be required to address human health related issues under D9 when using the standard for e.g. dioxins. So even if the same substance and the same quality standard (to protect human health) is assessed, different conclusions can be made depending on whether the assessment is performed under D8 or D9.

### **Issue: The potential options for cost-effective and coordinated sampling strategies between Descriptors 8 and 9.**

**Recommendation:** Given the different aims of D8 and D9, there is limited scope for usefully integrating D8 and D9 sampling (i.e. same sampling for the assessment of concentrations of contaminants in the environment as for seafood consumption safety monitoring). Nevertheless, sampling synergies are desirable and should be explored and decided and information exchange between national food safety and environmental authorities should be encouraged.

**Comments:** Biota sampling for D8 is usually carried out on specific sizes, many times the smallest ones not being useful for D9 as unique source of data. D8 might be relevant for D9 if the species taken for D8 are commercially exploited and of a marketable size. Moreover, data for D8 could be generated in the same matrix as in D9, e.g. using the muscle of the fish, as recommended for many substances in some RSCs.

Furthermore, D8 shellfish data are often from beds not intended for human consumption, although there is nothing to prevent individuals collecting and eating them.

On the other hand, D9 can only rarely provide samples and data for D8. For D9, it is appropriate to target the highest risk species, which may not be the ones selected for D8. D9 data could be suitable for D8 only if the species fulfils the criteria of an indicator species for D8 (e.g. should reflect the local conditions, be key species for the ecosystem, be high sensitivity to contaminants...) and if it can be corrected for age and trophic status (for assessing compliance, although not trends). Therefore, some basic information has to be known about the sampling location/ homing behaviour or come from not-fed in situ cultivated species (e.g. sea bed or hanging cultures).

Any extra monitoring could be carried out as an alternative to the specific monitoring carried out by the Food Safety authorities, but improving upon the sample traceability. However current D8 objectives usually focus only in few target species (1-3 species, including mussels, fish and snails), while the monitoring for D9 should focus on a higher number of species and sizes. This would imply a much higher effort and would be conditioned by the capacities of MS.

According to the JRC's Task Group 9 Contaminants in fish and other seafood: "There rarely is a well-defined established simple quantitative link between levels of contaminants in marine environment and levels in fish and other seafood, demonstrating a general research need on transfer of contaminants from the marine environment to the fish/fishery species. In general it would be interesting to identify possible relations between contaminant levels in sediment, and tissues (such as liver and muscle) of fish and other seafood." This point of view is not necessarily accurate. In the marine environment many organisms get their contaminant levels from food or from water (e.g. filtering organisms) and from sediments. Moreover, elevated concentrations of contaminants in marine environmental matrices are not necessarily directly linked to bioaccumulation and/or effects on marine organisms. This is due to the behaviour of chemicals, e.g. bioavailability, distribution, patterns of accumulation and intracellular availability, but also to characteristics of organisms, e.g. metabolic capacity, excretion, storage and mobilisation from tissue compartments. The biomagnification of the levels of the persistent pollutants through the food chain should be of great interest for D9 since predatory fish might be relevant for human consumption too, so the selection of the right trophic level for monitoring should be taken into account.

The WFD CIS Guidance No. 32 on biota monitoring biota guidance includes a general text on the design of a cost effective monitoring programme, which perhaps could be also used for the MSFD.

### **3. SUBSTANCES (CONTAMINANTS) FOR WHICH GES CRITERIA SHOULD BE ESTABLISHED**

***Issue: The appropriateness and feasibility of selecting a European core set of substances to be monitored by all MS and specifying it in the Commission Decision text.***

***Recommendation:*** A list of contaminants for GES assessment should be established based on:

- Minimum requirements: All Chemical contaminants included in the EU Regulation 1881/2006 as amended should be included under D9.

- Country specific solutions should be allowed, therefore only a broader description of prerequisites is needed. However, there is lack of national standards for contaminants in food.

**Issue: The contemplation of biotoxins under D9.**

**Recommendation:** It seems to be more appropriate to leave this issue to food safety control programmes where biotoxins are included in any case.

**Comments:** Biotoxins are not included in the regulation 1881/2006, but included in Regulation 853/2004. If the systems work properly they are not a human health issue either as, as soon as they appear, shellfisheries are closed. However, this information and data are environmentally relevant, since when a shellfishery is closed, it is a result of a previous analysis which does not fulfil the established criteria.

**Issue: The contemplation of pathogens under D9.**

**Comments:** The introduction of microbial pathogens are not mentioned in the COM DEC2010/477/EU indicators although it appears as “Biological disturbance” in the Table 2 of Annex III of the MSFD. However, there is no clear understanding as to under which MSFD descriptor the pathogens should be dealt with. They could be considered under D1 (as natural occurring organisms), under D2 (as non-indigenous species), under D4 (as they are part of marine food chains), under D5 (as toxic algae can be related to eutrophication), and/or under D9 (as contaminant in seafood).

The occurrence of microbial pathogens in the marine environment may be the consequence of a number of different reasons, including indirect effects from a sub-GES situation with respect to ecosystem structure and function (that would allow pathogens to proliferate). To include pathogens under D9 would imply that all shellfish collected off the shore must be safe to eat. There would be a cost to preventing *Escherichia coli* entering the sea that society will not be willing to pay (i.e. zero agricultural run-off, or small sewage plants / septic tanks needing energy intensive UV treatment, etc.).

There is already a legal framework requiring Member States to improve and/or survey the quality of shellfish waters and edible products. The environmental requirements of the shellfish waters are listed in the Annex 1 of Shellfish Water Directive 2006/113/EC and include water physico-chemical parameters, chemical contaminants (e.g. heavy metals, IPA, organohalogenated substances) and also faecal coliforms in shellfish (flesh and intervalvular liquid) as microbiological indicator. This Directive has been repealed at the end of 2013 by the WFD, which should ensure the same level of protection of these water bodies, thus contributing to the quality of bivalve molluscs directly edible by man. Under Regulation 854/2004/EC, *Escherichia coli* is monitored to establish hygiene status of classified shellfish production areas. The Regulation 882/2004/EC lays down general rules for the performance of official controls to verify compliance with rules aiming at: preventing, eliminating or reducing to acceptable levels risks to humans and animals, either directly or through the environment; and guaranteeing fair practices in feed and food trade and protecting consumer interests, including feed and food labelling and other forms of consumer information. The Regulation 2073/2005/EC provides the microbiological criteria for edible shellfish based on levels of *E. coli* and the occurrence of *Salmonella* spp. This leads to an overall relationship among WFD, Food Hygiene Regulations and the MSFD. In this latter however, such link is highlighted in relation to

chemical contaminants in seafood, but not for microbial contaminants. GES criteria and indicators for microbial pathogens could be identified within the D9 based on the current legal framework. The objective is not to completely eliminate the faecal contamination in shellfish waters (impossible), but to reduce it as much as possible according to WFD microbiological parameters.

The MSFD Competence Center has developed a document “Discussion document\_Pathogens under MSFD\_18\_6\_2014.docx” (which can be found at CIRCABC JRC MSFD D8+D9), which contains some considerations on this topic that can be helpful with the discussions.

#### **4. SPECIES/TISSUES**

##### **Issue: The tissue in which measurements should be conducted.**

Recommendation: Only the edible tissues, as specified in the legislation, should be considered.

##### **Issue: The knowledge of biological parameters.**

Recommendation: Biological factors, such as trophic level of fish, diet, condition, and age, are not presently included in EU foodstuff regulations and are not needed for checking compliance with Regulatory standards. However, these parameters should be monitored because they can provide help in the data interpretation, particularly in the event of a non-compliance.

##### **Issue: Farmed species.**

Recommendation: Farmed fish should not be considered, since their contaminant burden is linked to their feed and additives. Concentrations in farmed fish therefore relate to husbandry and bear little relationship to the environment in which they are reared and thus are not appropriate for inclusion in MSFD. However farmed molluscs should not be associated with the same caveats as they are only passively allowed to settle and grow on artificial submerged surfaces without added feed and additives.

##### **Issue: The consideration or not of migratory species.**

Comments: The contaminant burden in migratory fish may not reflect primary uptake in the MSFD area where it is caught or even European waters depending on the species. It is not clear then how to interpret the data and link these to GES. It is still crucial to know the origin where (or where not) the contamination occurred to lead to potential measures in such cases. Information from migratory fish might be useful as a measure of control for management measurements at GES at the biggest European geographical scale.

##### **Issue: The consideration or not of edible jellyfish.**

Comments: Jellyfish are not mentioned in the Commission Decision text for descriptor 9, but they might get more popular in coming years and can be already found in some European restaurants, so they could also be a potential human health concern.

##### **Issue: Fish and seafood coming from European region overseas.**



Recommendation: Fish and seafood coming from European regions overseas (e.g. Reunion, in the Indian Ocean, which is clearly not part of European waters) can be directly supplied into Europe without any third country controls and would be monitored under the Commission Regulation EC 1881/2006, but they seem to be out of the scope of the MSFD.

## **5. METHODOLOGICAL STANDARDS**

### **Issue: The appropriate thresholds for the assessment of GES.**

Recommendation: The primary thresholds for the assessment of D9 should be those set in the EU food regulations. Other relevant standards can be relevant for the substances and/or for fish and other seafood which are not covered by the European legislation. However, care must be taken in selecting the limit values, having in mind that the purpose of Regulation 1881/2006 is food safety and not assessment of marine seafood contamination. For example, for PAHs the limit values in Regulation 1881/2006 refer to smoked and fresh foodstuff. Only limits for unprocessed seafood should be used for MSFD purposes.

### **Issue: How to deal with limit values from different legislations for some substances.**

Comments: As said before, the derivation of WFD EQSs in biota has considered both ecotoxicological exposure and human protection, so they might also cover D9 objectives. The application of proposed non-EU legislative thresholds for D9 could lead to some inconsistencies with SANCO food safety assessments (for example for PBDEs) and these issues need to be explored and reconciled. However, limits provided by food safety regulations should be used as a priority.

### **Issue: Substances for which no maximum level in food has been set.**

Recommendation: If specific hazards are known, there are necessary tools to conduct a risk assessment and there are legal powers to take action where necessary, it would seem incongruous to say it would not be relevant to D9.

Comments: It has been suggested to apply specific quality analysis for these samples following EU specific directives.

## **6. NUMBER OF CONTAMINANTS WHICH HAVE EXCEEDED MAXIMUM REGULATORY LEVELS/ FREQUENCY OF REGULATORY LEVELS BEING EXCEEDED**

### **Issue: The appropriateness of including those parameters under Descriptor 9.**

Recommendation: The potential elimination of these parameters has to be considered.

Comments: Some pollutants (e.g. metals) will probably not be 100% compliant of the legislation levels in all samples and species. Whether a certain percentage of non-compliance could be acceptable, especially if a decreasing trend is detected, or not (it does not go for human consumption) has to be clarified.

The frequency of (non)compliance (and the similar “number of contaminants in (non)compliance”) would only make sense if all countries had the same monitoring with respect to monitoring frequency,

geographical coverage, number of samples, sample size, set of contaminants measured, species, etc. This is not the situation today, and it is probably not the best way forward. Moreover, it is not clear how to establish thresholds for frequency of (non)compliance (and the similar “number of contaminants in (non)compliance”), e.g. which percentage of exceeding per sampling set, coupling it to an absolute upper limits. Therefore, perhaps “number of contaminants which have exceeded maximum regulatory levels” and “frequency of regulatory levels being exceeded” should be removed from the Commission Decision.

## **7. MONITORING**

### **7.1. TRACEABILITY**

#### **Issue: Traceability of the samples.**

Recommendation: The traceability of the samples is essential. Methodologies, for fisheries purpose and consumer protection purposes, are developing rapidly.

#### **Issue: How precise fishing location has to be known.**

Recommendation: The regional/sub-regional level would be the minimum level of geographical knowledge that is acceptable.

Comments: Sampling strategy and requirements are not presently specified in EU foodstuff regulations. Some suggestions include:

- Based on the ICES boxes approach. This is used in some MS, but it is not clear to what degree is used by others. For example, it would be with difficulty applied in the Mediterranean Area.
- Information on fish stock.
- Not very precise, at regional/sub-regional level would be enough. This would not help much if measures are required, as the area of concern would be unknown, but in order to assess the environmental state of a region-subregion, location is not needed to be very precise, being enough the fishing area.

### **7.2. SAMPLING STRATEGIES**

#### **Issue: The frequency of monitoring.**

Comments: It is not clear whether regular monitoring of all chemical contaminants in Regulation 1881/2006 in fish and seafood would be feasible and/or relevant. As most environmental contaminants slowly bioaccumulate, short term fluctuations in levels are highly unlikely. Once per MSFD reporting cycle might be a sensible minimum monitoring frequency. Where concentrations are close to the limits (or of increasing concern), or if the effectiveness of measures requires monitoring then MS could monitor more frequently.

#### **Issue: The appropriate number of samples to assess the actual levels of contaminants.**

Comments: It is not clear whether this should refer to the number of environmental samples, or samples per batch (fish landing).

Fish species, size, and age all matter for contaminant uptake and with respect to these parameters the sampling changes over time depending on the focus of the food safety control. For each species, the number of samples should result in a normal distribution. It might be convenient that for each species, a pilot sampling was performed to optimize the sampling size.

There are two relevant EC regulations strongly linked to the 1881/2006 that include directions on how to sample from a batch of fish, and how to sub-sample. These regulations concern 589/2014 (recently updated for dioxins/PCBs) and 333/2007.

**Issue: The appropriate sampling collection.**

Comments: Samples for this purpose are typically collected from a variety of points along the processing chain:

- At sea: e.g. extra sampling for MSFD purposes.
- At fishery landing points, when the catch location is known.
- At retail level. In some cases, it is not possible to know the geographical origin of the fish. Furthermore, foodstuffs may have been contaminated during processing and the data therefore not informative of environmental conditions. Finally, at market level the biological variability (size, age, etc.) can be very high.

**Issue: The basis of the monitoring approach and accordingly the selection of representative number of species.**

Comments: Some suggestions include:

- The selection of species should be based on their relevance for human consumption, and the amount caught by fishermen in the sea area under consideration. Task group 9 report should be taken into account.
- Risk based to protect consumers, protection of sectors at the highest risk (“worst case scenario”).
- Based on the trophic level, investigate one species per each trophic level (Shellfish, Fat fish...). However, the most contaminated fish could not be important as food.
- Indicator species should be defined for certain sea regions or sub-regions to ensure consistency between MS. Again, the most contaminated fish could not be important as food.

None of the points above are specified in EU foodstuffs regulations. A risk based approach can take the above points into consideration, but a risk based approach also means that a degree of flexibility must be allowed to reflect country specific situations. In this case, “risk-based” has to be defined (e.g. to look at oily fish because they have higher contaminant levels or to look at non-oily fish because they are most landed). As we are looking for non-compliances, the risk to take into account would be the highest risk of contamination, but only species that are sold commercially for consumption should be included.

### **7.3. AGGREGATION**

**Issue: The appropriate way to treat the data (mean concentration, maximum levels...).**

Comments: 100% compliance is required under food regulations, thus statistics are not required. This is the ideal situation (unfortunately not real), and consequently frequency of non-compliance per specie could be used as an indicator or for the evaluation of concentrations data available.

Statistics should be relevant to assess the trend of the occurrence level.

#### **7.4. MONITORING PROGRAMMES**

**Issue: The harmonization of the monitoring programmes.**

Comments: The monitoring programmes have been already designed by MS with differing degree of consultations at regional and EU level, so there could be still lack of consideration of the lessons learnt (In-depth assessment, article 12). An insufficiency in harmonization among MS at regional or EU level might lead to new inconsistencies in the second MSFD reporting cycle, if not addressed before the establishment of the monitoring programme for that cycle.

Moreover, although it has been recognized that the traceability of the samples is essential for an appropriate assessment of D9, according to the information provided by experts during the first phase of the review process (summarized below), this issue is not well covered in the designed monitoring programmes for Descriptor 9:

Belgium: Monitoring programmes under public consultation: Coordination with institutions for D8 and with Food safety legislation for D9.

Croatia: Public consultation of monitoring programmes is finished. For D9 same biota species as for D8 from common sampling will be analysed.

France: Monitoring programmes under public consultation. For D9, monitoring programmes are based on existing programmes, considering the EU legislation 1881/2006, and including microbiological contamination. Periodic fishery cruises under D3, which could provide biota samples for analysis of contaminants under D9. There is lack of traceability in the seafood monitoring programmes. Using of existing monitoring network stations with additional sampling coming from D3 cruises for off-shore waters.

Germany: Regarding D9, the traceability of fish and seafood catches is not very good.

Ireland: Working on drafting the monitoring programmes. D9 is well covered (although not reflected in the reporting process due to a technical transfer error) and relates to shellfish waters and port-based seafood monitoring. D9 monitoring will continue with port-based and shellfish waters monitoring.

Italy: For D9 there are some problems to collect data from Food Safety authorities, so there will be monitoring programmes in addition to human's health existing programmes.

The Netherlands: Monitoring programmes decided. For D9, monitoring programmes are based on existing programmes considering EU-legislation. Exploring the possibilities of combining the current food safety monitoring programme at sea (D 9) and the environmental monitoring programme (D 8). There are plans to combine the sampling of biota for both monitoring programmes in the Dutch part of the North Sea. For food safety monitoring programme the mixed samples of fish are used and the contaminants are analysed in edible parts of biota (filets). However, for the environmental monitoring individual fish of different length classes are used and the contaminants in liver or in whole biota are analysed. It will

therefore be difficult to combine analysis of contaminants for both programmes. (Sampling combined, analysis separated).

Norway: Alignment with WFD, and probably also with MSFD, though Norway does not implement the MSFD. Arctic issues to be addressed through OSPAR/AMAP.

Romania: Monitoring programmes under public consultation. For D9 same biota species as for D8 from common sampling will be analysed (sampling combined, but analysis and interpretation separated). Romania defines GES for Descriptor 9 with respect to levels in accordance with EU regulations legislation. Contaminants (heavy metals, OCP, PCB, PAH) data in biota are collected in the frame of national monitoring or research projects. Molluscs (mussels, snails) and fish are collected during NIMRD research cruises, for both D8 and D9. Microbiological contamination of molluscs is assessed in the framework of Shellfish Waters Directive. Periodic fishery cruises under D3 can provide biota samples for analysis of contaminants under D9. Molluscs are analysed as whole soft tissue, and fish as dorsal muscle (filets).

Spain: Monitoring programmes soon under public consultation. For D9, data will be collected from Food Safety Agency, which should improve the traceability and identified the origin of the samples collected in the Spanish marine areas in order to solve the gap identified in the initial assessment or the quality status report.

United Kingdom: Broad monitoring programmes have been consulted upon. There is a one-off monitoring project taking place for fish under D9 (chemical substances only), as earlier food monitoring has usually involved sampling at point-of-sale (retail outlets). Therefore information on catch locations was not available and samples could be guaranteed not to have suffered contamination during commercial fish processing. A good description of UK marine monitoring can be found at the UKDMOS (UK Directory of Marine Observing Systems) website. This includes monitoring that is not MSFD-related.

## PART II: CONCLUSIONS AND RECOMMENDATIONS

After completion of the information compilation, a questionnaire with specific questions on the main issues identified was circulated among experts and the outcome was analysed and discussed in the second working meeting of the MSFD Expert Network on Contaminants. Based on these findings and discussions, this section compiles and presents the final conclusions and recommendations derived from the review process, including the reasoning behind the recommendations and the proposed way forward.

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

#### 5.1 Conclusions on the use of the existing Decision criteria and indicators

**Recommendation 1:** The Descriptor 9 is proposed to be retained, although substantial changes in the overall structure are proposed to make it clearer and align with Descriptor 8, based on the discussions during the review process.

#### **Concentration of Contaminants (9.1)**

**Recommendation 2:** Establish an EU-wide minimum list of elements and/or parameters for assessing GES:

- Substances included in the EU Regulation 1881/2006 as amended.

Additionally, Member States should add country (region)-specific substances for which available assessments have shown indications of risk, whenever possible.

**Recommendation 3:** GES threshold values are the limit values as set in Regulation 1881/2006 and amendments. Only limit values for unprocessed seafood must be considered for MSFD purposes.

**Recommendation 4:** The traceability of the samples is essential in order to know where at sea the detected pollution occurs.

#### **Number of contaminants which have exceeded maximum regulatory levels (9.1.1)**

**Recommendation 5:** This part of the indicator 9.1.1 to be removed.

#### **Frequency of regulatory levels being exceeded (9.1.2)**

**Recommendation 6:** This indicator 9.1.2 to be removed.

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

#### 6.1 Aggregation rules

**Recommendation 7:** While D8 and D9 are closely related, they are separate descriptors within MSFD, therefore require separate reporting.

**Recommendation 8:** The level of compliance of concentration of contaminants/aggregation rules needed to establish whether an area is or not at GES has to be established.

### 7. Specifications and standardized methods for monitoring and assessment (in accordance with Art. 11(4))

#### 7.1 Specifications on methods for monitoring

##### 7.1.1 Collection of data

**Recommendation 9:** Farmed shellfish cannot be excluded.

**Recommendation 10:** Information/data exchange between Environmental and Food Safety Authorities is crucial for the assessment of Descriptor 9.

**Recommendation 11:** Samples can be obtained from cruises or fish markets, as long as the location is known.

#### **Tentative revised Commission Decision text taking into account the above recommendations**

*There is not final agreement among experts on specific wording. Therefore, further discussions are needed in the eventual revision of the Commission decision text.*

*Descriptor 9: Contaminants in fish and other seafood for human consumption do not exceed levels established in the Commission Regulation (EC) No 1881/2006 as amended or other relevant standards.*

*— 9.1. Concentration of contaminants*

*In the different regions or sub-regions, Member States need to monitor the possible presence of contaminants for which maximum levels are established at European, regional, or national level in edible tissues (muscle, roe, flesh, soft parts as appropriate) of fish and seafood destined to human consumption (crustaceans, molluscs and echinoderms, as well as seaweed, caught or harvested in the wild, and farmed shellfish), that carry the greatest risk of exceeding the limits, and that also provide information on the state of the environment.*

## 8. Rational and technical background for proposed revision

### 8.1 Justification and technical background justifying the above recommendations

#### **Explanation for Recommendation 1**

The purpose of Descriptor 9 is the assessment of contamination in fish and seafood in the environment, from a human health perspective. MSFD is not meant to protect the consumers, but to ensure that the environment produces healthy food. The assessment under MSFD could identify how environmental pollution causes high levels of contaminants in fish and seafood for human consumption.

One important issue is the opportunity to make links with traceability. Limitations could exist for the coverage of areas not covered by Food Regulation (they consider only Target areas).

#### **Explanation for Recommendation 2**

The comparability among marine regions is possible considering the list of regulated substances in the EU Food Legislation as a minimum list of element of parameters for all EU MS, and country (region)-specific substances should be added whenever possible and/or necessary. The difficulty would be the different species, sizes, sampling period, etc. in different regions.

Biotoxins are beyond the scope of D9 because they are not indicative of environmental status and are already covered in food safety control programmes.

Pathogens are not chemical contaminants and there are other regulations in place for their assessment (Shellfish water Regulation). Therefore, pathogens do not have to be assessed under D9. However, they should be assessed as part of the ecosystem.

### ***Explanation for Recommendation 3***

The limit values should be as set in Regulation 1881/2006 and amendments. However, care must be taken, having in mind that the purpose of Regulation 1881/2006 is food safety and not assessment of marine seafood contamination. For example, for PAHs the limit values in Regulation 1881/2006 refer to smoked and fresh foodstuff. Only limits for unprocessed seafood should be used for MSFD purposes.

The WFD EQS consider human health data, where available, but they are not food safety limits for consumer protection under Descriptor 9.

Substances with no limit values set in the Food regulation are not minimum elements for assessing GES, but they could/should be assessed if specific hazards are known. MS can derive their national standards, but the derivation is out the scope of MSFD.

### ***Explanation for Recommendation 4***

Traceability of samples to catch/collection area is essential. Not including information on the location would limit the use of sampling for other purposes than food safety. The regional/subregional level is the minimum acceptable level of geographical knowledge. The results should be integrated in a regional/subregional basis, using common criteria for species, sizes and sampling season. However, more accuracy would help to plan measures and evaluate the efficiency of adopted measures.

### ***Explanation for Recommendation 5***

The part of the indicator 9.1.1 regarding the number of contaminants which have exceeded maximum regulatory levels is proposed to be removed. This information might not be very relevant and does not take into account the number of times that this exceedance occurred or the distinction between the different contaminants. Aligning with D8 would denote that substances are evaluated on individual basis. Multiple substances are reported separately as being beyond food safety standards.

### ***Explanation for Recommendation 6***

The indicator related to the frequency of regulatory levels being exceeded is proposed to be removed. This is a good criterion to assess the ecological status of a subregion from a human safety point of view, but it is not relevant for compliance checking for MSFD. The threshold related to this indicator would be, as for D8, determined as GES and therefore not need to be specified in the Commission Decision. Moreover, the frequency of exceedances will be highly dependent upon the sampling strategy/design and this is unlikely to be consistent across MSs.

### ***Explanation for Recommendation 7***

D9 assessment is centered in human health protection, consequently the environmental representativity is limited and different results for D8 and D9 evaluations could be obtained. D8 and D9 have different objectives, so the lists for both descriptors have not to be directly related.



### ***Explanation for Recommendation 8***

100% compliance, as required in Food legislation, seems to be unachievable, particularly for some metals. Further discussions are needed to establish the level of compliance of concentration of contaminants/aggregation rules.

### ***Explanation for Recommendation 9***

Only edible tissues have to be assessed, as specified in Food legislation.

Farmed fish should not be considered, since their contaminant burden is likely to be linked mainly to their feed and additives. Concentrations in farmed fish therefore relate to husbandry and bear little relationship to the environment in which they are reared and thus are not appropriate for inclusion in MSFD. However farmed molluscs should not be associated with the same caveats as they are only passively allowed to settle and grow on artificial submerged surfaces without added feed and additives.

Migratory species are important for MSFD for assessment of GES at regional/European geographical scale, and should be taken into account, although they should not be included as minimum elements for GES assessment: Similar to D8.

MSFD does not apply to overseas territories, so the fish and seafood from European areas overseas are out the scope of MSFD.

### ***Explanation for Recommendation 10***

Information and data exchange between Environmental and Food Safety authorities is crucial, but currently not implemented in all MS. The MSFD expert network on contaminants should play a key role in triggering this.

### ***Explanation for Recommendation 11***

Samples can be obtained from cruises or fish markets, as long as the location is known. One advantage of the fish markets is their good representativeness of the food supply available for consumers compared with analysis of samples coming from cruises. However, to highlight hotspots, cruises seem to be more relevant.

Compliance should be based on human consumption and, among them, focus should be on highest risk species in order to get a conservative assessment (and to limit the number of samples). The main issues are the communication between Food and Environmental authorities and the traceability of the samples.

## 9. Other related products

### 9.1 Proposed way forward for identified issues

Issue	Way forward	Timeline
D9 set-up in Member States.	Preparation of a summary document and eventually need for guidance on “best practice”.	<i>Started/Finalized 2015.</i>
Need of information/data exchange between Environmental and Food Safety authorities.	To evidence and communicate to MSCG.	<i>Started/Finalized 2015.</i>
Traceability of samples taken by Food Authorities.	Guidance needed on traceability of seafood, supporting harmonized approaches. Identify who best can prepare it.	<i>Until 2018.</i>
Level of compliance of concentration of contaminants/aggregation rules.	Further discussions within the MSFD Expert Network on Contaminants.	<i>Until 2018.</i>

## 10. Reference Documents

- Article 12 Technical Assessment (Milieu ltd, 2014).
- Coherent geographic scales and aggregation rules in assessment and monitoring of Good Environmental Status – analysis and conceptual phase, (Deltares, 2014).
- Commission Directive 2001/22/EC of 8 March 2001 laying down the sampling methods and the methods of analysis for the official control of the levels of lead, cadmium, mercury and 3-MCPD in foodstuffs.
- Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs.
- Commission Regulation (EC) No 565/2008 of 18 June 2008 amending Regulation (EC) No 1881/2006 setting maximum levels for certain contaminants in foodstuffs as regards the establishment of a maximum level for dioxins and PCBs in fish liver.
- Commission Regulation (EC) No 629/2008 of 2 July 2008 amending Regulation (EC) No 1881/2006 setting maximum levels for certain contaminants in foodstuffs.
- Commission Regulation (EU) No 1259/2011 of 2 December 2011 amending Regulation (EC) No 1881/2006 as regards maximum levels for dioxins, dioxin-like PCBs and non-dioxin-like PCBs in foodstuffs.
- Commission Regulation (EU) No 420/2011 of 29 April 2011 amending Regulation (EC) No 1881/2006 setting maximum levels for certain contaminants in foodstuffs.
- Commission Regulation (EU) No 488/2014 of 12 May 2014 amending Regulation (EC) No 1881/2006 as regards maximum levels of cadmium in foodstuffs.
- Commission Regulation (EU) No 835/2011 of 19 August 2011 amending Regulation (EC) No 1881/2006 as regards maximum levels for polycyclic aromatic hydrocarbons in foodstuff.

- Common Implementation Strategy for the Water Framework Directive (2000/60/EC). 2011. Guidance Document No. 27. Technical Guidance For Deriving Environmental Quality Standards Technical Report - 2011 – 055.  
Common Implementation Strategy for the Water Framework Directive (2000/60/EC). 2014. Guidance Document No. 32 on biota monitoring (the implementation of EQS<sub>biota</sub>) under the Water Framework Directive. Technical Report - 2014 – 083.
- Common Understanding of (Initial) Assessment, Determination of Good Environmental Status (GES) & Establishment of Environmental Targets (Articles 8, 9 & 10 MSFD), (DG GES, 2014).
- First steps in the implementation of the Marine Strategy Framework Directive - Assessment in accordance with Article 12 of Directive 2008/56/EC, (CSWD, 2014).
- In-Depth Assessment of the EU Member States' Submissions for the Marine Strategy Framework Directive under articles 8, 9 and 10. 2014. JRC Scientific and policy reports, Report EUR 26473 EN.
- MSFD GES workshop on Eutrophication and Contaminants, October 2012.
- MSFD Task group 9 report. 2010. Contaminants in fish and other seafood. EUR 24339 EN.
- Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC.
- Review of Methodological Standards Related to the Marine Strategy Framework Directive Criteria on Good Environmental Status (JRC, 2011).
- Review of the GES Decision 2010/477/EU and MSFD Annex III Approach and outline for the process, (EC- Committee/07/2013/03rev, 2013).



EUROPEAN COMMISSION

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Water Resources Unit

# **Review of Commission Decision 2010/477/EU concerning MSFD criteria for assessing good environmental status**

## **Descriptor 10**

### **Properties and quantities of marine litter do not cause harm to the coastal and marine environment**

This report represents the result of the scientific and technical review of Commission Decision 2010/477/EU in relation to Descriptor 10. The review has been carried out by the EC JRC together with experts nominated by EU Member States, and has considered contributions from the GES Working Group in accordance with the roadmap set out in the MSFD implementation strategy (agreed on at the 11th CIS MSCG meeting).

The report is one of a series of reports (review manuals) including Descriptor 1, 2, 5, 7, 8, 9, 10 that conclude phase 1 of the review process and, as agreed within the MSFD Common Implementation Strategy, are the basis for review phase 2, towards an eventual revision of the Commission Decision 2010/477/EU.

The report presents the state of the technical discussions as of 30 April 2015 (document version 6.0: ComDecRev\_D10\_V6), as some discussions are ongoing, it does not contain agreed conclusions on all issues.

The views expressed in the document do not necessarily represent the views of the European Commission.

## **Foreword**

The review of MSFD Commission Decision 2010/477/EU, Descriptor 10 has been performed by the MSFD Technical Group on Marine Litter, led by JRC (Georg Hanke). The review process has been kicked-off during the TG ML meeting on 11.-13.6.2014 in Riga, Latvia. Based on the exchanges there a discussion document has been prepared and circulated. 7 Member States have provided direct contributions. While a number of the identified issues had already been taken up previously in the groups mandate, further exchanges on additional issues and a possible revision of the Commission Decision 2010/477/EU have been made. The current state of these discussions, work in progress, is reflected in this document.

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

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# PART I: COMPILATION OF INFORMATION

## 1. Approach

### General guiding principles for the review

The review of the Com Dec 2010/477/EU for D10 is facilitated, as the MSFD Technical Group on Marine Litter TG ML has been established in order to identify and close gaps. The MSFD Competence Centre, is therefore performing the review through the TG ML. EC JRC is responsible for coordinating the review process.

The review process should identify and analyse eventual shortcomings, inconsistencies and gaps and then recommend the way forward. In the first phase, up to October 2014, it is planned to compile all necessary information for the review process, discuss and prepare recommendations. The second phase, up to March 2015, will then allow the finalization of the recommendations (which can include proposals for dedicated work items for better harmonization, need for additional guidance and eventually proposals for amendments to the COM Decision (2010/477/EU).

There are some keywords and concepts which should be considered to perform the review. As recommended during the MSFD cross-cutting issues workshop (21.-22.1.2015, Copenhagen, Denmark), the MSFD Commission Decision should be:

- Simpler
- Clearer
- Introducing minimum standards (to be enhanced by regions and MS, if necessary)
- Self-explanatory
- Coherent with other EU legislation
- Coherent with regional assessment methods (where EU methods do not exist)
- Include a clear and minimum list of elements and/or parameters per descriptor

Furthermore the development of additional common understanding within the MSFD Drafting Group GES during the review can lead to an adaptation of terms and concepts, aiming at an enhanced harmonization of the MSFD implementation in general. The focus of the TG ML work is therefore on technical scientific items and discussions. Ideally, the text of the Commission Decision should provide specific technical details of the parameters to be considered in order to avoid incoherence by individual interpretations or the use of less comparable methodologies for monitoring and assessment.

### Glossary/Definitions

Marine litter is any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment. Marine litter consists of items that have been made or used by people and deliberately discarded or unintentionally lost into the sea and on beaches including

such materials transported into the marine environment from land by rivers, draining or sewage systems or winds. For example, marine litter consists of: plastics, wood, metals, glass, rubber, clothing, paper etc. This definition does not include semi-solid remains of for example mineral and vegetable oils, paraffin and chemicals that sometime litter sea and shores (JRC 2010).

“Harm” can be divided into three general categories: Social (reduction in aesthetic value and public safety), economic (e.g. cost to tourism, damage to vessels, fishing gear and facilities, losses to fishery operations, cleaning costs) and ecological (mortality or sublethal effects on plants and animals through entanglements, captures and entanglement from ghost nets, physical damage and ingestion including uptake of microparticles (mainly microplastics) and the release of associated chemicals, facilitating the invasion of alien species, altering benthic community structure). (JRC 2010).

Marine litter originates from different sea- and land-based sources and is largely based on the prevailing production and consumption pattern.

Although the relative proportions of these materials vary regionally, there is clear evidence that plastic litter is by far the most abundant type. In some locations plastics make up 90 % of marine litter of shorelines. A similar predominance of plastics is reported from sampling at the sea surface and on the seabed. Most plastics are extremely durable materials and persist in the marine environment for a considerable period, possibly as much as hundreds of years. However, plastics also deteriorate and fragment in the environment as a consequence of exposure to sunlight (photo-degradation) in addition to physical and chemical deterioration. This breakdown of larger items results in numerous tiny plastic fragments, which, when smaller than 5mm are called secondary micro plastics. Other micro plastics that can be found in the marine environment are categorized as primary micro plastics due to the fact that they are produced either for direct use, such as for industrial abrasives or cosmetics or for indirect use, such as pre-production pellets or nurdles.

### **Links with other Descriptors**

The accumulation of persistent organic pollutants, the potential release of toxic compounds, the transportation of non-indigenous species to new locations, the alteration/damage of seafloor habitats and the ingestion by and entanglement of organisms link descriptor 10 to descriptors 1, 2, 4, 6 and 8, 9.

The Commission Decision identifies two criteria for Descriptor 10:

(10.1) Characteristics of litter in the marine and coastal environment and

(10.2) Impacts of litter on marine life

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

EU legislation related to waste is relevant for marine litter. This includes:

- Directive 1994/62 as amended 2004/12/EC on packaging and packaging waste to encourage packaging re-use and recycling;
- Directive 2008/98/EC repealing Directive 2006/12/EC, Waste Framework Directive;
- Directive 91/271/EEC on Urban Wastewater Treatment
- Directive 2000/ 59/EC on port reception facilities for ship-generated waste and cargo residues focuses on ship operations in Community ports and addresses in detail the responsibilities of the different operators involved in delivery of waste and residues in ports;



- Directive 1999/31/EC on the landfill of waste to prevent negative effects on the environment from the landfilling of waste, including the pollution of surface water.

### **Linkages with international and Regional Sea Conventions (RSCs) assessment criteria and standards**

At the international level, the most relevant agreements to address marine litter are the 1978 MARPOL Convention (International Convention for the Prevention of Pollution from Ships) and the 1972 London Convention on the Prevention of Maritime Pollution by Dumping of Wastes and Other Matter and the 1996 Protocol thereto aiming to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping at sea of wastes and other matter generated on land. The 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is also relevant. In July 2011, IMO adopted the revised MARPOL Annex V which prohibits, in principle, the disposal of garbage at sea and which entered into force on 1 January 2013.

Plus:

- the United Nations Convention on the Law of the Sea and its obligations for States to protect and preserve the marine environment (Art 192) including to take measures to prevent, reduce and control pollution (Art 194) and related United Nations General Assembly Resolutions on Oceans and the Law of the Sea, recently Resolution A/RES/68/71 (2013) and earlier submissions;
- the Rio +20 commitment to take action to achieve significant reductions in marine debris by 2025 and the achievement of the goals and strategy objectives of the Honolulu strategy, as outlined in Resolution A/RES/66/288 (2012)
- marine litter to be one of the eight contaminant categories of UNEP's Global Programme of Action for the Protection of the Marine Environment from Land-Based Sources (GPA) as well as one of the key issues of the Regional Seas Programme (RSP) of UNEP

As part of the development of the Ecological Quality Objectives (EcoQO) approach within **OSPAR**, in order to consider how ecosystem health could be assessed to determine the extent of human impacts, a EcoQO on plastic particles in Fulmars' stomachs was proposed in 2001. Many of the Contracting Parties within the natural range of the Northern Fulmar have also adopted it as an indicator for MSFD purposes. OSPAR has also started the process of implementing measures to reduce marine litter with the adoption of Recommendation 2010/19 on the reduction of marine litter through the implementation of fishing for litter initiatives in 2010. Finally on 27.6.2014, the OSPAR Regional Action Plan against marine litter was agreed and adopted.

The HELCOM project CORESET II is developing indicators for the determination of GES in the marine environment, including indicators for beach litter and microliter in the water column.

An action plan for marine litter has been developed and was approved in March 2015 (HELCOM 36-2015) aiming at reducing significantly marine litter pollution by 2025.

Annex 1 of the Recommendation, which contains concrete actions to implement the RAP ML, is still being developed with the view of endorsement in June 2015.

**The Barcelona Convention** adopted its action plan on marine litter in December 2013. The Action plan aims at reducing marine litter pollution, removing as much as possible existing marine litter pollution and enhancing knowledge on marine litter.

The UNEP MAP Integrated Monitoring Correspondence Group CORMON is progressing through an informal online working group on Marine Litter.

Within the **Black Sea Convention** there are no legal instruments dedicated specifically to the management of marine litter. The Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea (the BS SAP 2009) seems to be the most appropriate framework for addressing marine litter issues of regional significance.

[Analysis of whether the criteria and/or indicators and/or methodological standards for the particular descriptor are likely to be common across the EU or need aspects to be specific at region or other scales](#)

Measures against marine litter are being developed by EU Member States collaboratively within Regional Action Plans through the Regional Sea Conventions. The MSFD TG ML as a platform at EU level allows exchange and collaboration across regions.

It needs to be identified which issues require harmonization at regional level and which at EU level. For marine litter generally, the strategic approaches, concepts and methodologies should be agreed at EU level, while technical specificities, such as the selection of species for biota monitoring or lists of litter items to be monitored should be agreed at a regional level. This is particularly important as D10 parameters are often operationally defined and an alteration in the methodology would give results which are not comparable.

## Definition of GES

Commission Decision currently sets out four indicators for marine litter:

- Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source
- Trends in the amount of litter in the water column (including floating at the surface) and deposited on the sea- floor, including analysis of its composition, spatial distribution and, where possible, source
- Trends in the amount, distribution and, where possible, composition of micro-particles (in particular micro- plastics)
- Trends in the amount and composition of litter ingested by marine animals (e.g. stomach analysis)

## Climate sensitivity

D10 will be affected indirectly. The expected increasing occurrence of extreme meteorological events, as heavy rainfalls, storms, dry periods followed by strong precipitation and flooding of inland drainage basins as well as coastal areas will lead to increased inland surface run-off. This will transport litter present in the terrestrial environment, into streams, rivers and coastal areas, thus leading to an increase in marine litter occurrence. Additionally climate change and related changes in marine foodchains (e.g. microbe presence) may lead to an alteration in pathways of (micro)plastic in the marine environment and plastic degradation.

## 2. Analysis of the implementation process

### Art. 12 assessment

Sixteen out of twenty one assessed Member States defined GES for Descriptor 10. The GES definitions in most cases were at the descriptor level. Only three Member States have defined GES at Commission Decision criteria level although their approach to defining these criteria varies significantly. Nine of the sixteen Member States that defined GES required a reduction of marine litter in the environment and one requires a reduction of the input of litter into the marine environment. Additionally, despite the lack of detail, some Member States have provided additional elements in their GES definitions that are not covered by Decision 2010/477/EU. Three Member States referred to marine litter as a pathway for the proliferation of invasive non-indigenous species. Three Member States have referred to the impacts of marine litter on the fecundity of marine organisms and from the aspect of bioaccumulation of contaminants. Five Member States reported that marine litter should not have adverse economic consequences for the maritime economic sectors (including shipping and fisheries) and coastal communities. Two Member States further specified that marine litter should not pose a risk for human health. Lastly two Member States reported that in the long term, the marine environment should be free of marine litter.

#### Criteria 10.1. Characteristics of litter in the marine and coastal environment

Three Member States have defined criterion 10.1 specifically, two of these then refer to trends of marine litter in the marine environment. Both of these Member States refer to reducing trends on their coastlines and one also on the seabed, while the other Member State also refers to litter in the water column. However, other Member States have also stated at the descriptor level that marine litter on the coasts and in the marine environment, in general, should be reduced over time.

#### Criteria 10.2. Impacts of litter on marine life

Three Member States have defined criterion 10.2 specifically although in one case this definition deviates significantly from the Commission Decision Criterion. One Member State has defined GES for criterion 10.2 by stating that litter that adversely affects marine organisms must decrease (specified in a corresponding environmental target to take also other impacts such as entanglement into account) while the other refers to trends of waste ingested by marine animals. The plastic particle content in the stomachs of washed up Fulmars (*Fulmarus glacialis*) (OSPAR EcoQO) is the only specific indicator provided under this criterion.

## Regional coherence descriptor

Member States from all regions except the Black Sea have defined GES for Descriptor 10. In the North East Atlantic and the Mediterranean regions, all Member States have defined Descriptor 10 while in the Baltic 4 out of 7 Member States defined Descriptor 10. The level of coherence is high in the North East Atlantic, moderate in the Mediterranean and low in the Baltic. There are no clear specific differences between regions.

## MS good practices

Four Member States (DE, DK, FR, SI) report that marine litter should not have adverse economic consequences for the maritime economic sectors and coastal communities. Three Member States (DE, DK, FR) also refer to marine litter as a pathway for the proliferation of invasive non-indigenous species.

## In-depth assessment of Art 8,9,10 reporting

An analysis of the Art. 8, 9 and 10 reporting by MS has been provided by the “in-depth assessment” report (JRC 2014). The MSFD Technical Group on Marine Litter analysed the gaps and shortcomings related to Litter under the MSFD since its start and provides recommendations and guidance for a stepwise improvement of MSFD D10 implementation (JRC 2011, Marine Litter Technical Recommendations for the Implementation of MSFD Requirements, EUR 25009 EN and JRC 2013, Guidance on Monitoring of Marine Litter in the European Seas, EUR 26113 EN).

### 3. Analysis of the current text of the Decision

Please find here the extracted elements of the Descriptor 10 Com Dec, which have been reviewed in terms of their properties and compatibility with the desired improvement in the implementation process. Suggestions have been derived from different, sometimes controversial contributions. Please note that there has been no agreement yet on the final recommendations and controversial technical discussions are ongoing. Final recommendations will be provided after the next step of the review process:

- *“Properties and quantities of marine litter”*

No change proposed, text appears appropriate.

- *“do not cause harm”*

No change proposed, as the mentioning of e.g. “direct and indirect harm” would appear redundant and not bring additional clarity.

- *“the coastal and marine environment”*

Unchanged, considering that coast includes the shoreline

*“The distribution of litter is highly variable, which needs to be taken into consideration for monitoring programmes”*

Can be eliminated as it does not contribute to clarity. There could be a clearer expression regarding the scale issue instead.

- *“It is necessary to identify the activity to which it is linked including, where possible, its origin.”*

Suggested change to: “It is necessary to identify sources and pathways, where technically feasible”

- *“There is still a need for further development of several indicators, notably those relating to biological impacts and to micro-particles, as well as for the enhanced assessment of their potential toxicity ( 21 ).”*

Still valid, no text change proposed.

- *“10.1. Characteristics of litter in the marine and coastal environment”*

Suggestion to change to: “Properties and quantities of litter in the marine and coastal environment”

- *“Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source (10.1.1)”*

Suggestion change to: “Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and sources (10.1.1)”

- *“Trends in the amount of litter in the water column (including floating at the surface) and deposited on the sea-floor, including analysis of its composition, spatial distribution and, where possible, source (10.1.2)”*

Suggestion change to: “Trends in the amount of litter floating in the seas surface layer and deposited on the sea-floor, including analysis of its composition, spatial distribution and sources (10.1.2)”

- *“Trends in the amount, distribution and, where possible, composition of micro-particles (in particular micro-plastics) (10.1.3)”*

Micro-particles might be included as a size class to be considered in the indicators for the environmental matrices, beach, surface water, seafloor and biota.

This is a controversial question as the importance of micro litter is being recognized and is shown by a dedicated indicator. On the other hand this holds the risk that it is treated as a separate issue while measures to combat marine litter need to be formulated covering all size classes (at least to prevent secondary micro particles). In the part two of the review therefore a tentative version with the combination of different litter types is presented. This would support the simplification of the ComDec. Arguments against an inclusion are mainly the highlighting of this previously less considered part of the litter issue.

- *“10.2. Impacts of litter on marine life “*

Impacts other than ingestion, such as entanglement should be considered.

- *“Trends in the amount and composition of litter ingested by marine animals (e.g. stomach analysis) (10.2.1)“*

The Northern Fulmar (long-established OSPAR EcoQO) and the Turtle (*Caretta caretta*), proposed for the Mediterranean Sea, are species which are used for the litter ingestion indicator. Other species (other birds, fish, mussels) might be added on the basis of research results. Therefore the listing of individual species might not be appropriate, although it could promote harmonization, at least within regions.

It is suggested to include here the consideration of impact other than ingestion, as e.g. entanglement. This could be under the same indicator or as a new indicator.

- *“This indicator needs to be developed further, based on the experience in some sub-regions (e.g. North Sea), to be adapted in other regions”*

Suggested to delete as this does not further specify the above text.

Additional discussions on the D10 Commission Decision content:

#### Simplicity and clarity

There are some options, see text above, to simplify and increase the clarity of the Commission Decision text for D10.

### Detailed technical provisions

There is agreement that the introduction of clear detailed technical provisions, such as e.g. methodological standards, the prescription of reporting units, methodologies for sampling strategy set-up and for aggregation of data would be possible. While the TG ML has already addressed these aspects through its guidance documents, the introduction of these specifications in a legally binding document would require additional work.

### Minimum requirements

Minimum requirements for the different descriptors should ensure that a basic and comparable assessments are done across Europe with a core set of assessment parameters. These parameters should be available as a list for consideration by Member States. Specifically for D10 the list is the category list of litter items, available through the Guidance of Monitoring for Marine Litter (JRC 2013).

## 4. Identification of issues

Here is a list of recurring main issues for discussion under D10. The list is non-exhaustive and might require further update in the implementation process.

- Sources and pathways  
The issues of litter sources and pathways of introduction into the marine environment are important for D10 implementation and for deriving measures and Regional Action Plans. The MSFD TG Marine Litter is therefore drafting a guidance report on that topic. In a first phase an approach for attributing litter items recorded in the marine environment to possible sources will be developed. Then modelling approaches to assess physical redistribution of litter and importance of different sources of litter pollution will be considered. This activity will be important in order to develop measures targeted at given sources and update them regularly depending on their effectiveness.
- Riverine Litter  
The quantification and identification of riverine litter, as source for marine litter is of importance as it is expected to be a major source of litter to the marine environment. The development and implementation of harmonized monitoring methodologies for the assessment of litter entering the marine environment via rivers across Europe is needed in order to develop measures and priority areas for their implementation.
- Harm  
The concept of harm has been discussed and is currently being treated in a dedicated document of the TG ML. It will contain considerations for the identification and quantification of harm. The harm report includes case studies for the different impacts on biota and habitats as well as for socioeconomic impacts taking into account the outcomes of current research projects.

- **Methodological Standards**  
There is need to further develop methodological standards and to implement them through harmonized monitoring programmes. This should include practical activities for dissemination of protocols and training of field personnel. The MSFD TG Marine Litter has proposed a number of protocols, some of which are still under development, which need to be tested and if necessary refined.
- **Micro-plastic**  
One of the challenges is to develop reliable and standardized extraction and instrumental analysis methods for microplastic (weight and number) in sediment and biota (compartments of main interest for accumulation). Accurate, precise and reliable extraction and analysis methods are an absolute prerequisite to collect reliable data on microplastic, and consequently derive appropriate measures.
- **Scales and Aggregation**  
Some details on scales of assessments and procedures for data aggregation and treatment are available but need further discussion, agreement and implementation at regional and EU scales.
- **Minimum operational requirements**  
EU wide operational parameters should be introduced in order to ensure a harmonized implementation. For Descriptor 10 this is provided by the list of litter categories, agreed upon at EU level (MSFD Technical Group on Marine Litter). This list needs to be updated based on feedback from monitoring data, e.g. by adding new categories or by removing obsolete ones.



## PART II: CONCLUSIONS AND RECOMMENDATIONS

This part of the review is compiling the outcome from previous discussions and providing recommendations for eventual changes in the text of Commission Decision 2010/477/EU, necessary short term work and items for future work.

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

The Commission Decision review for D10 should consider the review/revision timescales in comparison to the development of scientific knowledge. This is a particularity for D10, as much research progress has been made recently.

#### Current text of Commission Decision 2010/477/EU

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

The distribution of litter is highly variable, which needs to be taken into consideration for monitoring programmes. It is necessary to identify the activity to which it is linked including, where possible, its origin. There is still a need for further development of several indicators, notably those relating to biological impacts and to micro-particles, as well as for the enhanced assessment of their potential toxicity.

##### 10.1. Characteristics of litter in the marine and coastal environment

- Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source (10.1.1)
- Trends in the amount of litter in the water column (including floating at the surface) and deposited on the sea- floor, including analysis of its composition, spatial distribution and, where possible, source (10.1.2)
- Trends in the amount, distribution and, where possible, composition of micro-particles (in particular micro- plastics) (10.1.3)

##### 10.2. Impacts of litter on marine life

- Trends in the amount and composition of litter ingested by marine animals (e.g. stomach analysis) (10.2.1).

This indicator needs to be developed further, based on the experience in some sub-regions (e.g. North Sea), to be adapted in other regions.

The proposed changes aim at making the ComDec simpler and clearer. They remove some text related to further development needs, as this has been recognized and does not need to be part of a legislative document. The changes reduce the number of indicators and propose to treat micro-litter along with other litter types.

Recommendations regarding criteria and indicators:

#### *10.1 Characteristics of litter in the marine and coastal environment*

Keep notification of need for further development

#### 10.1.1

Substitute “possible” by “feasible” regarding the identification of sources for beach litter

Introduce micro-litter (see also below)

#### 10.1.2

Substitute “possible” by “feasible” regarding the identification of sources for beach litter

Remove mid water retaining the surface (and directly underlying water layer) and the seafloor

#### 10.1.3

Integrate micro-litter as size fraction along with other litter fractions in the matrix related indicators

Note: While there is generally support to the inclusion of micro litter along with macro/meso litter, not all experts support this view. Some experts argue that micro litter is different from other litter types (meso/macro) and should be stated in a specific indicator. Arguments for this are that microlitter causes specific effects, a separate indicator makes it easier to link to specific primary sources and it might be easier to determine a target for macro/meso litter when separate.

### *10.2 Impacts of litter on marine life*

Add beside the ingestion also entanglement as an indicator for impact on wildlife.

**Tentative text of a revised ComDec D10, for illustrative purposes:**

**Descriptor 10:** Properties and quantities of marine litter do not cause harm to the coastal and marine environment. There is still a need for further development of several indicators, notably those relating to biological impacts and to micro-litter, as well as for the enhanced assessment of potential harm.

10.1. Properties and quantities of litter in the marine and coastal environment

10.1.1 Trends in the amount of litter, including micro-litter, washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, if feasible, pathway and source

10.1.2 Trends in the amount of litter, including micro-litter, floating in the surface layer and deposited on the sea- floor, including analysis of its composition, spatial distribution and, if feasible, pathway and source

10.2. Impacts of litter on marine life

10.2.1 Trends in the amount of litter ingested and/or number of entanglement incidents by marine animals

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

Discussions confirmed the TG ML position that currently quantitative thresholds can only be formulated for some parameters (e.g. Litter in Fulmar stomachs). At the moment assessments will have to be based on trends in most cases. Trend assessment will need common approaches and guidance for data treatment.

The setting of quantitative thresholds for marine litter should be a long-term target (of the TG-ML).

## **7. Standardised methods for monitoring for comparability (in accordance with Art. 11.4)**

Monitoring protocols, which have been developed and adopted by the TG Marine Litter, are available in a MSFD Guidance document on Monitoring of Marine Litter in European Seas:

(<http://mcc.jrc.ec.europa.eu/document.py?Num=0&mot=201&classement=D10&code=201406241434> )

The maturity of the different methodologies has been evaluated and is reviewed in the guidance document (Maturity of Protocols - General Overview, Page 18, Summary of monitoring protocols, page 30). The TG-MS is currently working on the further development and testing of the protocols.

Quality assurance and control measures are needed in order to provide comparable results. The MSFD document "Guidance on Monitoring of Marine Litter in European Seas" includes proposals for QA/QC measures.

The sampling and analysis of micro litter needs to consider recent and future findings of dedicated research. There are different methodological approaches, which provide operationally defined parameters and therefore need harmonization for comparability. A network of laboratories for the analysis of micro litter appears useful and there is need for proficiency testing schemes.

## **8. Standardised methods for assessment for comparability (in accordance with Art. 11.4 GES)**

Agreed units for reporting of data and common assessment procedures for national and RSCs assessments, should be referred to in the MSFD reporting mechanism.

The reporting units should be based on scientific knowledge and be of practical use in assessing litter quantities and potential harm.

As the assessment of trends for the evaluation of the environment status is an integral part of the D10 implementation, the calculation of these trends must be comparable and be based on appropriate methodologies<sup>1</sup>.

Aggregation of data at different levels of integration should be based on common approaches<sup>2</sup> and using the same reporting units

## 9. Rational and technical background for proposed revision

The focus of the MSFD TG ML work is on technical scientific items and discussions and it acts as a platform at EU level allows exchange and collaboration across regions.

The background for the ComDec review was provided by the ongoing work of the MSFD Technical group on Marine Litter and the work in RSCs, amended after discussions and exchanges in the TG ML.

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

The implementation of MSFD Descriptor 10 needs further support. D10 Com. MSFD D10 provisions are presently being implemented by Member States. This will provide further experience and knowledge, which should be fed back into the implementation process. The Com. Decision should provide the framework for this, while updated guidance ensures the harmonization within and between regional approaches. Dedicated research project should provide knowledge in support to the MSFD process. Uptake of the research outcome should be ensured through a functional science – policy interface.

The MSFD TG Marine Litter has identified number of topics, on which work is progressing:

- Harm
- Sources identification (identification of litter origin)
- Sources identification (modelling of litter transportation at sea)
- Riverine litter monitoring

Items to be considered for future work until 2018:

- Protocol development (for less mature protocols, as identified in the ML Monitoring Guidance) including identification of units
- Trend assessments and target setting (Guidance for assessment and implementation)
- QA/QC development and implementation
- Harmonization among European Regions and beyond
- Support for monitoring implementation
- Updating of Marine Litter category list

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<sup>1</sup> For indicators containing many subindicators, such as beach litter which contains about 100 different items, OSPAR is currently developing dedicated state and trend analysis software (Litter Analyst). This is necessary to obtain standardized and efficient assessment of beach litter.

<sup>2</sup> For example, in view of large temporal variations, a five (e.g. OSPAR Fulmar) or six year average (e.g. OSPAR beach litter) could be used.

## 11. Reference Documents

MSFD Common implementation strategy related documents are available through the MSFD Competence Centre website: <http://mcc.jrc.ec.europa.eu/>

- JRC, 2010, MARINE STRATEGY FRAMEWORK DIRECTIVE Task Group 10 Report Marine Litter, EUR 24340
- JRC, 2011. Marine Litter Technical Recommendations for the Implementation of MSFD Requirements, EUR 25009 EN
- JRC, 2013. In-Depth Assessment of the EU Member States' Submissions for the Marine Strategy Framework Directive under articles 8, 9 and 10, EUR 26473
- InterSus, 2013. Issue Paper to the "International Conference on Prevention and Management of Marine Litter in European Seas"
- JRC, 2013, Guidance on Monitoring of Marine Litter in the European Seas, EUR 26113 EN
- EC 2014, Report on the first phase of implementation of the Marine Strategy Framework Directive (2008/56/EC) The European Commission's assessment and guidance

## Possible Approach to amend Decision 2010/477/EC

### Descriptor 11: Energy, including underwater noise

Author	Version	Date
Milieu	V1	23.05.2014
Mark Tasker	v2 draft (taking account of D. Connor suggestions)	15 July 2014
Mark Tasker	v3 draft; new text in Part 2	24 July 2014
Mark Tasker	v4 draft, accommodating MAAX3, RL, VP, JP, FTx2, MA, RD comments,	1 September 2014
Mark Tasker	v5 responding to comments from Germany, RD, MC, RL	27 September 2014
Mark Tasker	v6 responding to comments from TG Noise, Germany (per Andrea Weiss), Nicolas Entrup (on behalf of the International Fund for Animal Welfare, Marine Conservation Society, Natural Resources Defense Council, OceanCare, Whale and Dolphin Conservation), CEDA, France and comments during the January 2015 cross-cutting workshop in Copenhagen	30 January 2015
Mark Tasker	v7 responding to comments from Germany (per Maria Boethling) and Netherlands (René Dekeling, Niels Kinneging, Sandra van der Graaf)	16 March 2015
Mark Tasker	v7.1 taking account of late comments on v5 (sic) by David Connor received 17 March	18 March 2015
René Dekeling	v8 based on discussion in WG GES, and written comments received from Oceancare, Germany, Spain and UK	3 June 2015

This document on the possible approach to amend Decision 2010/477/EC for Descriptor 11: Energy, including underwater noise, is based on an document presented by TG Noise (version 7) to the CIS WGGES meeting in April 2015.

During the WGGES meeting various participants made further comments on the document. The meeting agreed that these comments should be reflected in a new version of the document (version 8). The comments have been added to the manual to show potential options and have been included without further consultation with TG Noise. The comments have been added with no consideration of the relative importance of the issues raised, compared to the previous version (version 7) of the document.

## Descriptor 11; Energy, including underwater noise

<b>Title of Descriptor</b>
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*Good Environmental Status for Descriptor 11: Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.*

<b>Approach</b>
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### **General approach to version 8 of the Manual**

Work on this manual which provides advice for the review of the Commission Decision on indicators of Good Environmental Status started in 2014. The Technical Group on Noise of the MSFD CIS (TG Noise) provided technical advice (via ICES) on the current review by the Commission of their Decision, using the 'Manual' (based on a standard template). The first main drafts of the Manuals were considered by the higher level EU working group WG-GES last year, and comments were invited on these Manuals.

A "cross-cutting" workshop was held in January 2015 to deal with issues common to several or all indicators. Following receipt of the comments and the workshop outcomes, a draft version 7 was made of the Descriptor 11 Manual. Further guidance was received from the Commission/DG Environment in relation to issues where there was not agreement in relation to comments received. In those cases, the issue was to be noted and referred upwards for resolution further on in the European process. Therefore, next to version 7 of the Manual, an 'Unresolved Issues' document was provided.

In the March 2015 meeting of WG GES, version 7 of the Manual was discussed in the meeting of WG GES. It was suggested that the current version did not sufficiently reflect comments of a number of Member States/stakeholders, that the description of the use of the precautionary principle was not consistent with the report of the cross-cutting issues workshop (which was not available when version 7 was drafted) and explicit mention should be made of resolutions of international agreements (e.g. CBD). Therefore TG Noise was requested to come with a new version. That task was taken up, aiming for a new version that would address the different concerns of all parties concerned, noting that:

1. In the 2014 meeting of WG GES, MSCG and MD, TG Noise advised that initiating actual monitoring of current indicators should be a priority, and the view of TG Noise was that this is generally accepted as main priority;
2. Monitoring of underwater noise should be done in such a way that it is future proof;
3. As explained by the Commission during WG GES, when implementing monitoring, Member States have some freedom (flexibility), but minimum standards should be met;
4. The scope of the Manual is to provide guidance on criteria to determine GES, and at this stage TG Noise cannot advise on concrete targets and such advice will therefore not be part of this Manual.

For this new version, comments received after WG GES (of which some had been sent in an earlier stage) were reviewed and where possible taken over. The main unresolved issues/needed choices are mentioned in this document and not, as in the earlier version, (only) mentioned in an unresolved issues document; although that previous way of working was as requested, this implied that the Manual alone did not provide complete description of the discussion that was held or was still ongoing.

## Definition of the Descriptor

There are many kinds of anthropogenic “**energy**” that human activities “**introduce**” into the marine environment including sound, light, other electromagnetic fields, heat and radioactive energy. Energy inputs can occur at many scales of both space and time. To date the main focus of the Member States in their approach to Descriptor 11 has been on sound (noise when it becomes a problem). In the context of the Marine Strategy Framework Directive, radioactivity is considered as a property of a hazardous substance, not as an ‘energy’.

“**Underwater noise**” is defined as anthropogenic sounds which may be of short duration (e.g. impulsive such as from seismic surveys and piling for wind farms and platforms, as well as explosions) or long lasting (e.g. continuous such as dredging, shipping and energy installations). These can affect marine species in different ways. Species that are exposed to noise may be adversely affected over a short time-scale (acute effect) or a long time-scale (permanent or chronic effects). Adverse effects may be both physiological and behavioural and range from subtle (e.g. temporary harm to hearing, behavioural effects) to obvious (in the worst case, death).

The term “**level**”, as used in the MSFD Annex I and in relation specifically to underwater noise, is taken in a wide sense not only to describe sound pressure levels but also other features of sound (such as the degree of its spatial and temporal distribution).

Most commercial activities entailing high noise levels which affect relatively broad areas of sea are executed under regulated conditions subject to a licence. There is some variation in the degree to which commercial activities are subject to a licence between Member States, and where activities are subject to licensing there is variation about including emissions of underwater noise. Unlike chemical pollution, noise does not persist in the environment. Thus, if the source of noise is reduced, the amount of noise energy in the water is immediately lowered. There have been very few studies of long-term changes in levels of underwater noise in the oceans. Several studies, all in the north-east Pacific Ocean, suggest that there was a 10 dB increase in offshore marine ambient noise in the 10-50 Hz range during the last 35 years of the 20<sup>th</sup> century, attributed primarily to increases in commercial shipping traffic<sup>1</sup>. Although these findings need to be verified for European waters, human activities, including shipping, pile-driving and seismic surveys, have changed marine soundscapes not only in deeper waters but also in coastal areas, and the consequences for ecosystems are uncertain<sup>2</sup>. Despite a continuing increase in the number of ships worldwide, it is not known whether ambient noise levels at these frequencies continue to increase; there are probably differences between different regions, not only levels but also in trends. There is no knowledge of changes in ambient noise level in European waters, but lacking evidence that ships and piling have become drastically quieter, it can be assumed that if these activities are increasing, noise levels are likely also increasing.

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

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<sup>1</sup> Andrew, R. K., Howe, B. M., Mercer, J. A., & Dzieciuch, M. A. (2002). Ocean ambient sound: comparing the 1960s with the 1990s for a receiver off the California coast. *Acoustics Research Letters Online*, 3: 65-70.

McDonald, M. Hildebrand, J. and Wiggins, S. 2006. Increases in deep ocean ambient noise in the Northeast Pacific west of San Nicolas Island, California. *Journal of the Acoustical Society of America*, 120: 711-718.

<sup>2</sup> Merchant, N.D., Pirota, E., Barton, T.R., Thompson, P.M. Monitoring ship noise to assess the impact of coastal developments on marine mammals. *Marine Pollution Bulletin* 78 (2014) 85-95.



In 2011, JRC identified that “there are no methodological standards available within the framework of European or international conventions relevant to Descriptor 11”<sup>3</sup>.

The non-binding European Commission Guidelines for the establishment of the Natura 2000 network in the marine environment<sup>4</sup> consider noise as a source of pollution that affects the marine environment and biodiversity. The guidelines identify several sources of underwater noise pollution, including the propeller and machinery noise of ships. Member States need to regulate such-noise generating activities in accordance with the provisions of the Habitats Directive if they are likely to have significant effects on protected features in Natura 2000 sites or on species strictly protected as listed in Annex IV, including cetaceans.

The work at EU level is coordinated by the **Technical Group on Noise** of the MSFD CIS (TG Noise) for further development of Descriptor 11 Noise/Energy, noting that for issues related to defence or national security (e.g. military sonar), implementation of the MSFD is a national responsibility.

### **Linkages with international and RSC norms and standards**

Pursuant to the United Nations Convention on the Law of the Sea (**UNCLOS, 1982**), there are general duties to protect marine biodiversity (including marine mammals) and prevent, reduce and control pollution “from any source”. The Convention defines “pollution of the marine environment” as “the introduction by man, directly or indirectly, of substances of or energy into the marine environment, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.” As a form of energy, the introduction of sound (and other forms of energy) falls under the definition of pollution of the marine environment contained in the UNCLOS and most relevant regional instruments.

Additionally, several international conventions, such as the **UN Convention on Migratory Species (CMS)** and its daughter agreements, recognise underwater noise, including noise from shipping, as a potential threat to marine species and confirmed the need for limitation of harmful underwater noise; CMS resolution 10.24 a.o. recommends the adoption of Best Available Techniques (BAT) and Best Environmental Practice (BEP) and encourages Parties to integrate the issue of anthropogenic noise into the management plans of marine protected areas (MPAs) where appropriate.<sup>5</sup>

Of the regional agreements made under the framework of CMS, **ACCOBAMS** (Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area) and **ASCOBANS** (Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas) have a joint Working Group that addresses underwater noise in order to ensure the best possible advice is generated for the Parties on the topic. ACCOBAMS has adopted Resolution 4.17 (Guidelines to address the impact of anthropogenic noise on cetaceans in the ACCOBAMS area).

In the **Convention on Biological Diversity** Decision ~~XI/18~~ A XII/23 of 2014 governments are encouraged to take appropriate measures... to avoid, minimize and mitigate the potential significant adverse impacts of

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<sup>3</sup> Piha, H and Zampoukas, J. 2011. Review of Methodological Standards Related to the Marine Strategy Framework Directive Criteria on Good Environmental Status, JRC. Available at: <http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16069/1/lbna24743enn.pdf>

<sup>4</sup>European Commission 2007. Guidelines for the establishment of the Natura 2000 network in the marine environment. Application of the Habitats and Birds Directives. Available at: [http://ec.europa.eu/environment/nature/natura2000/marine/docs/marine\\_guidelines.pdf](http://ec.europa.eu/environment/nature/natura2000/marine/docs/marine_guidelines.pdf)

<sup>5</sup> Convention on Migratory Species/UNEP/CMS/Resolution 10.24- Further steps to abate underwater noise pollution for the protection of cetaceans and other migratory species. Adopted by the Conference of the Parties at its Tenth Meeting (Bergen, 20-25 November 2011). Available at [http://www.ascobans.org/sites/default/files/document/AC19\\_7-07\\_CMS\\_Res10-24\\_UnderwaterNoise\\_1.pdf](http://www.ascobans.org/sites/default/files/document/AC19_7-07_CMS_Res10-24_UnderwaterNoise_1.pdf)

anthropogenic underwater noise on marine and coastal biodiversity. A series of actions are proposed including specific research into species and sound sources, developing/transferring quieter technologies, combining acoustic and habitat mapping, utilising spatio-temporal management, conducting impact assessments, considering thresholds and standardizing metrics and sound measurements.

The Scientific Committee of the **International Whaling Commission (IWC)** has been considering the issue of underwater sound for more than a decade. At its 2008 meeting the Scientific Committee endorsed a reduction target in the contribution of shipping to ambient noise levels in the 10-300 Hz range by 3dB in 10 years and by 10 dB in 30 years relative to current levels; at this moment, this proposal for a target from this advisory body has not been taken over in a formal IWC resolution.

The International Convention for the Prevention of Pollution From Ships **MARPOL (73/78)** only defines pollution in terms of introduction of 'substance' and not 'energy'. At **IMO** level, in October 2008, based on a proposal by the United States, the IMO added "Noise from commercial shipping and its adverse impact on marine life" as a high priority item to the work programme of its Marine Environment Protection Committee (MEPC). In 2014, the MEPC approved Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life, recognising that underwater noise radiating from commercial ships may have both short- and long-term negative consequences on marine life.

The BIAS project in the Baltic Sea region is developing a common methodology for measuring acoustic data. In the **HELCOM** Initial Holistic Assessment (HELCOM 2010) the impact of noise was assessed using a 4-level indicator system and identified noise as "other physical disturbance": level 1 indicates that the noise is audible to biota; level 2 indicates that masking of communication occurs; level 3 indicates an avoidance reaction; and level 4 indicates physiological impacts. Level 1 and 2 were considered relevant for the major part of the Baltic Sea area at this time. The indicators are being considered for HELCOM Coreset II.

Currently, no **OSPAR** Contracting Party has incorporated noise into any permanent monitoring programme<sup>6</sup>. In 2009, the OSPAR Commission considered an overview document on the effects of man-made underwater noise on marine life and in its core part documented the effects of sound from human activities on marine life. The OSPAR QSR 2010 also considers the negative effects of anthropogenic underwater noise. The ambient noise indicator (11.2.1) is a (priority) candidate indicator; in 2014 the OSPAR Commission decided that the impulsive noise indicator (11.1.1) was sufficiently developed and was accepted as common indicator (for all OSPAR areas).<sup>7</sup> An OSPAR working group (ICG Noise), co-working with ICES, has developed a proposal for an impulsive noise registry that would be managed by ICES and could become operational in 2015/2016; for one (sub)region, a proposal was made for a **joint** ambient noise monitoring programme, but at this stage there is no agreement on funding this programme and it is not likely to be operational in time to contribute to the OSPAR 2017 Intermediate Assessment.

Underwater noise has yet to be addressed by either the **Barcelona** or the **Bucharest Conventions**, but a proposal has been submitted for a basin wide strategy for monitoring (see further on).

### **Definition of GES**

The energy descriptor is primarily a 'pressure' descriptor. This largely means that if GES is to be achieved, the introduction of energy should not compromise the achievement of GES for marine species (as covered

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<sup>6</sup> MSFD Advice Manual and Background document on Good environmental status - Descriptor 11: Underwater noise, 2012

<sup>7</sup> OSPAR 14/21/1-E, Summary Record of the Meeting of the OSPAR Commission (OSPAR) of 23-27 June 2014

under Descriptors 1, 3 and 4). In its report published in February 2012, TG Noise made an analysis and provided a number of recommendations with regards to methodological standards and possible threshold values to be used for impulsive sound (indicator 11.1.1) and continuous low frequency noise (indicator 11.2.1); in the report published in 2014 TG Noise suggested possible use of the data for impulsive noise to decide whether GES is reached or not, and identified further steps needed, of which establishing knowledge how displacement affects a species at the population level is a priority topic. Currently there is much international effort directed at obtaining improved information on population effects, both from military funded research on the effects of sonar, and from research aimed at characterising the effects of offshore wind energy, e.g. the PCoD and DEPONS projects. Modelling and risk assessment tools are available that can provide a high level of detail, e.g. mapping the areas where thresholds may be exceeded by noise generating activities. Using this approach an update of the assessment of the marine environment (e.g. the OSPAR 2017 Intermediate Assessment) may well be possible, at least for some well studied species as harbour porpoises.

For ambient noise, TG Noise concluded that even if information on actual trends and levels would become available by monitoring, much greater understanding of the relationship between the environmental pressure caused by ambient noise and the state of the ecosystem is still needed before GES can be understood and a target can be set for indicator 11.2.1.

### **The "climate sensitivity" for D11 (or criteria/indicators)**

Descriptor 11 is not directly climate sensitive but climate related issues might affect this descriptor. The increase in atmospheric levels of CO<sub>2</sub> not only results in atmospheric climate change but also in ocean acidification, and an increase in sea surface temperature. It has been claimed that the acidification of marine waters could potentially increase the propagation range of underwater noise<sup>89</sup> which effect would make the ocean noisier, with biological impacts e.g. on the behaviour of marine mammals. However, additional physically-based analyses indicate that the problem seems unlikely to be significant<sup>1011</sup>. Seasonal variations in sea surface temperature (and possibly of water stratification) have been proposed as an explanation of observed seasonal cycles in the amplitude of ambient noise in the frequency range 25 Hz to 50 Hz<sup>12</sup>. While this link requires further investigation, if confirmed, it has implications for long term trends: specifically, a long term increase in sea surface temperature would result in a corresponding *decrease* in expected deep water ambient noise on a global scale, partly compensating for the increase expected due to increased shipping<sup>13</sup>. Such changes would apply to the propagation of both 'natural' and anthropogenic underwater sound. As can be seen, there is no certainty about the overall effects of climate change on the transmission of underwater sound.

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<sup>8</sup> Hester, K. C., Peltzer, E. T., Kirkwood, W. J., and Brewer, P. G. 2008. Unanticipated consequences of ocean acidification: A noisier ocean at lower pH. *Geophysical Research Letters* 35, L19601.

<sup>9</sup> Ilyina T, Zeebe RE, Brewer PG (2010) Future ocean increasingly transparent to low-frequency sound owing to carbon dioxide emissions. *Nature Geoscience* 3: 18-22.

<sup>10</sup> Reeder, D.B. and Chiu, C.-S. 2010. Ocean acidification and its impact on ocean noise: phenomenology and analysis. *Journal of the Acoustical Society of America* 128 Express Letters 137-143. DOI: 10.1121/1.3431091.

<sup>11</sup> Joseph, J.E., Chiu, C.-S. 2010. A computational assessment of the sensitivity of ambient noise level to ocean acidification. *Journal of the Acoustical Society of America* 128: Express Letters 144-149.

<sup>12</sup> Ainslie, M.A. 2013. Periodic changes in ambient noise: possible causes and implications for long term prediction. In 1st International Conference and Exhibition on Underwater Acoustics. pp 655-662.

<sup>13</sup> Ainslie, M. 2012. Potential causes of increasing low frequency ocean noise levels. In *Proceedings of Meetings on Acoustics*, 12: 070004. Acoustical Society of America.

## Results of the Article 12 assessment (incl. in depth assessment)

### Descriptor

A total of fifteen Member States (MS) have defined GES at descriptor level and according to MSFD Annex I whilst five MS have not defined GES for underwater noise. All MS who have defined GES for D11 have used different approaches. In addition the definitions provided appear to have been based on different interpretations (in some cases mistranslations) of the 2010 Commission Decision. Two MS provided a definition of GES that was a copy or very similar to that provided in Annex I of the MSFD. Three MS included threshold values in their definition. In addition to underwater noise, one MS included also other forms of energy in their definition, and identified them as light, electromagnetism and changes in temperature. One MS reported an elaborate GES definition, stating that GES is achieved when the abundance, mortality risk and communication behaviour of sensitive species is not affected by underwater noise.

### Criteria

Eleven MS have included the criteria provided in the Commission Decision 2010/477/EU although a few MS did not make use of both criteria or did not differentiate clearly between them, or, provided a GES definition that was not or only roughly in line with the definitions as provided in the Commission Decision.

### Indicators

Not all MS applied the indicators as provided in the Commission Decision. At indicator level, only two MS have included details as specified in the Commission Decision.

### Regional coherence descriptor

Although the limited development of the GES definitions by most MS could provide an opportunity to achieve a high level of regional coherence, in the North-east Atlantic and Baltic coherence was assessed as low and in the Mediterranean as moderate. Neither of the Black Sea MS defined GES for Descriptor 11.

### MS good practices

Three MS have provided threshold values, meaning that the other definitions are all qualitative. One MS specifically mentions in their GES definition other forms of energy, namely, emission of light, other electromagnetic fields and heat.

## Analysis of the current text of the Decision

### ➤ Criteria to be kept in the Decision, in accordance with the mandate provided by the Directive

The following two Criteria are clearly the operative part of the Commission decision and should be kept, but see below for improvements in wording to remove ambiguities, and options how these criteria could be further developed/adapted.

#### *11.1. Distribution in time and place of loud, low and mid frequency impulsive sounds*

— *Proportion of days and their distribution within a calendar year over areas of a determined surface, as well as their spatial distribution, in which anthropogenic sound sources exceed levels that are likely to entail significant impact on marine animals measured as Sound Exposure Level (in dB re 1µPa 2.s) or as*

*peak sound pressure level (in dB re 1 $\mu$ Pa peak) at one metre, measured over the frequency band 10 Hz to 10 kHz (11.1.1)*

#### 11.2. Continuous low frequency sound

— *Trends in the ambient noise level within the 1/3 octave bands 63 and 125 Hz (centre frequency) (re 1 $\mu$ Pa RMS; average noise level in these octave bands over a year) measured by observation stations and/or with the use of models if appropriate (11.2.1).*

##### ➤ **Recommended improvements to wording of Criteria**

**Indicator 11.1.1. Distribution in time and place of loud, low and mid frequency anthropogenic impulsive sounds.** TSG Noise noted (van der Graaf et al. 2012) that the current Commission Decision of Indicator 11.1 is not unambiguous, and there is a need for an explanation as to how it should be interpreted. TSG Noise (Dekeling et al. 2014b) therefore defined “impulsive” in this context as including all sounds of duration less than 10 seconds and recommends improving Indicator 11.1.1 to:

*The proportion of days and their distribution within a calendar year, over geographical locations whose shape and area are to be determined, and their spatial distribution in which either the monopole energy source level (in units of dB re 1  $\mu$ Pa<sup>2</sup> m<sup>2</sup> s), or the zero to peak monopole source level (in units of dB re 1  $\mu$ Pa m) of impulsive anthropogenic sound sources, measured over the frequency band 10 Hz to 10 kHz, exceeds a value that is likely to entail significant impact on marine animals (11.1.1).*

It has to be noted that for some sources (notably pile driving) it will be difficult to determine a ‘monopole source level’, and in the register as set up now (based on TG Noise guidance) other options to characterize sources are given. This is likely sufficient to use the data in an assessment.

**Indicator 11.2.1. Continuous low frequency anthropogenic sound** There has been some variation in the understanding of the terminology surrounding the complex issue of underwater sound and its effects. TSG Noise (van der Graaf et al. 2012) therefore defined the terms used in Indicator 11.2.1.

- **Trends:** the Oxford Dictionary defines ‘trend’ as ‘general direction in which something is developing or changing’. Following this, ‘trend’ refers to year-to-year (or longer) changes in ambient noise levels.
- **Average noise level:** TSG Noise realised that the term ‘average noise level’ is not unambiguous; there are different methods to establish a value for an average that are all correct, but lead to different values. TSG Noise recommended defining ‘average noise level’ as ‘average of the squared sound pressure’, since this definition is robust to changes or differences in the duration of individual time samples.
- **Use of models:** Measurements are considered essential to ground-truth models. The use of models can strengthen analyses by, for instance, addressing bias introduced by the variability of the spatial distribution of human pressure, and by the natural variability of the environment, and to extend the results of monitoring to poorly or uncovered areas.

Based on these points, TSG Noise recommended improving Indicator 11.2.1 to:

*Trends in the annual average of the squared sound pressure associated with ambient noise in each of two third octave bands, one centred at 63 Hz and the other at 125 Hz, expressed as a level in decibels, in units of dB re 1  $\mu$ Pa, either measured directly at observation stations, or inferred from a model used to interpolate between or extrapolate from measurements at observation stations.*

TG Noise did not regard these recommended changes as adding any burden to the process of implementing MSFD, but they should ensure further clarity and help ensure that Member States do not vary in their understanding of the indicators.

The choice of the 63 Hz and 125 Hz bands (as initially proposed in 2010 by Task Group 11, see Tasker et al. 2010) was based on monitoring the contribution of shipping to ambient noise. The use of (only) these two frequencies has been discussed in (a.o.) the TG Noise, and there have been suggestions to add additional frequencies, and restricting monitoring to these two frequencies has been criticized by (e.g.) Oceancare.

In the BIAS project it was decided that next to the two MSFD bands, the 2 kHz third octave band would be monitored, being more representative for hearing of sensitive species. Initial results of the BIAS project indicate that part of the shipping in the Baltic Region emits noise in a wider (higher) band. No concrete results have been published at this stage.

In the proposal made for an ambient noise monitoring strategy for the North Sea, made by the OSPAR ICG Noise (and which was accepted by the OSPAR EIHA committee as formal OSPAR Guidance)<sup>14</sup>, it was suggested that there was no clear benefit monitoring outside the range of 10 Hz to 1 kHz, suggesting (based on a modelled sound map) that in the North Sea the contribution of shipping noise above 1 kHz would be small compared to natural sources.

In a proposal made in the context of the Ecosystems Approach (EcAp) initiative, as implemented in the framework of the Barcelona Convention, a proposal was made for a basin-wide strategy for underwater noise monitoring in the Mediterranean. The proposed strategy on noise monitoring (which is based on the TG Noise monitoring guidance (Dekeling et al. 2014a,b,c)) recommends several adaptations for the Mediterranean case<sup>15</sup>. Next to the two present frequency bands, other frequencies have been proposed based on bio-acoustical properties of key marine mammal species of the Mediterranean, i.e. the fin whale, the sperm whale and the Cuvier's beaked whale. At this stage it is not clear whether the monitoring strategy will be implemented as proposed.

In a scientific workshop organized with support of the International Whaling Commission in Leiden, The Netherlands, in 2014, it was suggested that one third octave bands in the range of 10-1000 Hz should be covered when making sound maps<sup>16</sup>. If this suggestion were followed, the MSFD frequency bands would be covered on a wider scale and (part of) this advice can be used to align efforts in North America and the EU, but this is a significant extension of the Commission Decision.

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<sup>14</sup> Snoek, R.C., Ainslie, M.A., Prior, M.K., Van Onselen, E., Ambient noise monitoring strategy and joint monitoring programme for the North Sea- Part I: monitoring strategy ambient noise, OSPAR document EIHA 15/5/7 Add.1-E, 2015

<sup>15</sup> Achieving underwater noise regulation through an ecosystems-based approach: the "Mediterranean strategy on Underwater Noise Monitoring" Maglio, A., Pavan, G., Castellote, M., Salivas, M., Descroix-Comanducci, F., OCEANOISE 2015, Vilanova y la Geltrú, Barcelona, 2015

<sup>16</sup> International Whaling Commission, Joint workshop report: Predicting sound fields- global soundscape modelling to inform management of cetaceans and anthropogenic noise, 15-16 April 2014, Leiden, The Netherlands

With the information available at this stage, **TG Noise cannot provide one agreed advice** on the inclusion of an option for monitoring concrete additional frequency bands. The following considerations are relevant:

- There is agreement that monitoring should become operational as a priority, to enable assessments and setting concrete targets;
- Monitoring additional frequencies will increase the cost to some extent and thus may delay implementation of monitoring, and some MS have indicated that the initial focus should be on the present two frequency bands;
- For the longer term, decisions made on any monitoring programme need to be robust, in that sense that options remain to adapt or extend monitoring programmes in a cost-effective way, the programmes should be 'future-proof'. TG Noise itself suggested that MS should consider covering a wider frequency band (10 Hz to 20 kHz) in the measurements, and potentially in analysis, and so extending the knowledge base;
- The present frequencies are relevant to characterize shipping, the dominant source of continuous low frequency noise in many regions;
- Other frequencies may be more relevant for biota, e.g. lower frequencies for baleen whales, higher frequencies for toothed whales.

The conclusion at this stage is that, in general, there is consensus that the present indicators should be kept; there is **no consensus** whether additional frequency bands should be chosen, and if so, which frequency bands would be most appropriate. A practical solution could be that the option to include monitoring other bands in (sub)regions is included in either a new Commission Decision, or in additional guidance provided by the Commission, RSC-committees or TG Noise. The approach taken in the BIAS project (to investigate monitoring other frequencies) should be repeated in new initiatives so that relevance of other frequency bands can be confirmed parallel to monitoring present frequency bands. This would be consistent with the requirement in MSFD article 11-1 that monitoring programmes should be compatible within marine regions or subregions. The choice to include other bands would then still be for MS cooperating in a region, formally they would not be obliged by the CD to include other bands.

➤ **Explicative text**

The following part of the Decision provides explanation on the scope of the Descriptor, broadening to include other forms of energy. If not covered by the criteria or indicators, such information is not really necessary in the Commission Decision and may lead to confusion as to whether it should be addressed or not (but see consideration under 'Proposals for new criteria (including other topics than noise) not yet covered', below, related to new criteria other forms of energy).

*Together with underwater noise, which is highlighted throughout Directive 2008/56/EC, other forms of energy input have the potential to impact on components of marine ecosystems, such as thermal energy, electromagnetic fields and light.*

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

The following part of the Decision could be taken out as it constitutes guidance for assessment methodologies of underwater noise (but it should be noted that some parties preferred to keep this text within the Decision):

*At the current stage, the main orientations for the measurement of underwater noise have been identified as a first priority in relation to assessment and monitoring subject to further development, including in relation to mapping. Anthropogenic sounds may be of short duration (e.g. impulsive such as from seismic surveys and piling for wind farms and platforms, as well as explosions) or be long lasting (e.g. continuous such as dredging, shipping and energy installations) affecting organisms in different ways. Most commercial activities entailing high level noise levels affecting relatively broad areas are executed under regulated conditions subject to a licence. This creates the opportunity for coordinating coherent requirements for measuring such loud impulsive sounds.*

If it chosen to keep this guidance in the Decision, TG Noise can make an update/improvement.

**Conclusions (part I):**

- Redrafting of the Criteria will make them unambiguous but not change any actions or burden on Member States.
- Monitoring or registering of underwater noise has been very limited to date, resulting in a lack of available data on which to base recommendations. Starting monitoring of the existing indicators should have priority.
- There is no general consensus on monitoring additional frequency bands for continuous noise; validation of the need for monitoring additional frequency bands should have priority.
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- Further research on the effects of the introduction of all forms of energy, including sound, into the marine environment is still needed.
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<b>GES criteria (in accordance with Art. 9.3)</b>
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- Proposal to combine criteria.

There is no proposal to combine criteria.

- GES boundaries defined according to limit values.

As noted above, three Member States included threshold values for the emission of sound in their definitions of GES relevant to Indicator 11.1.1. Such values apply mainly to certain individual activities in the waters of those Member States and aim to protect certain sensitive species. Such values have not been discussed by TG Noise and do not account for the cumulative effects of exposure to underwater noise. Further work is required in order to be able to better quantify and understand the phrase “...likely to entail significant impact on marine animals” whether in relation to individual or cumulative impacts of underwater sound. There are, at present, no clear links between pressure and state responses of underwater noise that would allow clear boundaries or thresholds to be set for either Indicator 11.1.1 or 11.2.1.

In January 2015 a meeting on ‘cross-cutting issues’ was held in Copenhagen at ICES. In this meeting the use of ‘maximum acceptable levels of pressures in the marine environment’ to provide a proxy of GES was discussed; the use of ‘acceptable pressure levels’ was seen as useful when the relation between pressure and impacts was known, but for pressure like litter (D10) and underwater noise (D11), because of the limited scientific understanding of impacts, it was suggested that setting precautionary pressure levels might be the only feasible option at present.

The monitoring guidance provided by TG Noise also discussed setting targets when there was insufficient knowledge, and concluded that the use of trend-based targets could be used (e.g. a downward or non-increasing trend) in line with the precautionary principle.

Whether a (precautionary) target is based on an ‘acceptable pressure level’ or is a trend-based target, the absence of data on levels and trends of both impulsive and ambient noise would make it difficult at present to define and/or to validate any concrete target. The initiation of actual monitoring of both impulsive and ambient noise therefore remains essential to enable verifying any target, and was identified as priority in the November 2014 TG Noise progress report (Dekeling et al. 2014d). If the pressure indicators on underwater noise are to be clearly linked to Good Environmental Status then it will also be necessary to be coherent with any thresholds set in the state indicators (e.g. D1). Underwater noise is not the only pressure on marine species and ecosystems and plainly its significance may vary depending upon other pressures on those species and ecosystems.

- Proposals for new criteria (including other topics than noise) not yet covered

Options for additional criteria have been discussed within TG Noise and are explained below. There are no **agreed** proposals for new criteria.

Other forms of energy:

TG Noise has developed a paper on “criteria for criteria” to allow consideration of other introductions of energy than those included so far. TG Noise has proposed that these “criteria for criteria” would be

adopted, and could be applied when other forms of energy introduction will be considered. There appears to have been little further research beyond that reviewed by TG11 (Tasker *et al.* 2010) so it seems unlikely at this time that TG Noise's recommendations will differ from those of TG11; but it should be noted that additional information will become available at short notice (mid-2015) by the EU funded MarVEN-project, and with this information, using the 'criteria for criteria' an advice can be given on suitability of indicators for other forms of energy; at this stage **no** information is available to substantiate an EU-wide indicator. This has been reported earlier in the November 2014 progress report of TG Noise (Dekeling *et al.*, 2014d). At present, **no criteria for other forms of energy** are proposed.

#### Other indicators of noise:

##### High frequency impulsive noise

In the initial advice that formed the basis of the present Commission Decision (Tasker *et al.* 2010) another possible noise indicator on high frequency impulsive noise was suggested, acknowledging that scientific evidence for adverse effects was limited. Over the last years, no additional evidence has become available suggesting impact at a large scale and it has not been brought up as priority issue. Further research providing information on the (scale of) effects of high frequency sound remains necessary **before this can be considered** as new indicator.

##### Impact indicator

The present indicators are both 'pressure indicators'. There has been discussion on the need for additional impact indicators, as for most GES descriptors both pressure as impact indicators are available.

NGO Oceancare mentioned the need for an impact indicator, and suggested a number of steps that need to be taken to assess impacts of noise (evaluation of effects on biota; weighting of the effects; cumulative interpretation (using maps).

Germany also proposed the use of an impact indicator and earlier this year provided a text proposal<sup>17</sup> but this proposal has not been discussed or agreed on in TG Noise or with other stakeholders. The present proposal should be further discussed and developed.

In the TG Noise monitoring guidance, it was noted that pressure indicators (and pressure targets) may be used if a clear understanding of the relationship between pressure, state and impact exists. The Netherlands have indicated that methodologies are available so that the information collected using the present impulsive noise indicator (11.1.1) can be used to determine impact, using recently developed tools enabling an exposure assessment using noise maps<sup>18</sup> (the methodology has similarities with the approach proposed by Oceancare). Although parts of this methodology need further development and validation, such methodology probably will enable use of the present pressure indicator in assessing GES; this will be further evaluated by the OSPAR ICG Noise, contributing to the OSPAR 2017 Intermediate Assessment.

The interim conclusion is that a concrete **impact indicator cannot** be proposed at this stage, but it should also be noted that the present pressure indicator for impulsive noise probably can be used to assess impact in the future. If it would be decided that a separate impact indicator is needed, it could be a priority

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<sup>17</sup> Indicator 11.3.1. Impact indicator: In sensitive areas or/and at sensitive times only a certain number (or percent) of animals belonging to a regional population of a sensitive species should be effected by anthropogenic impulsive underwater sound.

<sup>18</sup> De Jong, C.A.F., Binnerts, B., Heinis, F., Modelling of impact pile driving noise for assessing the impact on marine animals, OCEANOISE 2015, Vilanova y la Geltrú, Barcelona, 2015

topic for the work programme of TG Noise, but even then it is uncertain that an impact indicator will be sufficiently developed in time.

- Link to possible future EEA indicator

There are no known future EEA indicators.

#### **GES methodological standards (in accordance with Art. 9.3)**

There are no proposals to change the standard for defining GES. Further research is required to define the relationship between the introduction of underwater energy and the effects on the state of the environment.

#### **Standardised methods for monitoring for comparability (in accordance with Art. 11.4)**

- Proposals for specifications which aim at improving comparability of monitoring results on the basis of JRC / ICES / RSCs inventories and Article 12 findings linked to proposed criteria.

Dekeling et al. (2014a,b,c) provides comprehensive guidance to standardise registration of the location of the distribution in time and place of loud, low and mid frequency impulsive sounds and the monitoring of continuous low frequency sound. In order to assess the usability of the TG Noise Monitoring Guidance for Member States and to identify common problems preventing effective monitoring of underwater noise, in 2014 a questionnaire was developed by the Commission, and sent to Member States; TG Noise has analysed the results and responses received.; although all EU Member States have indicated (in 2014) that they plan to implement a register for impulsive noise and intended to set up monitoring ambient noise, both based on the TG Noise guidance, no RSC or individual Member State has implemented full monitoring of impulsive or ambient noise at this moment.

#### **Standardised methods for assessment for comparability (in accordance with Art. 11.4 GES)**

- Proposals for specifications which aim at improving comparability of assessment results on the basis of general guidance prepared by Deltares taking account of JRC / ICES / RSCs inventories and Article 12 findings linked to proposed criteria.

If Member States followed the monitoring guidance provided by TG Noise (Dekeling 2014a,b,c) then assessment results should be comparable. Part of this guidance recommends an integrated approach between Member States that would involve the establishment of noise registers for Regional Seas, and the collective design of an ambient noise monitoring system to represent each Regional (or possibly sub-Regional) Sea. Such approaches would undoubtedly be more efficient and cost-effective than for each Member State to establish its own monitoring system. TG Noise is attempting to determine if there are any particular practical barriers to Member States working collectively, with early indications being that long-term (non project) funding mechanisms being likely to be one issue (e.g. how would costs of long-term monitoring be shared equitably and in a guaranteed way between relevant Member States).

#### **Rational and technical background for proposed revision**

- Justification and technical background justifying the above proposals.

For further background justifying this advice (next to what is summarised above) – further detail can be found in the TG11 and TG Noise reports (Tasker et al. 2010, Van der Graaf et al. 2012, Dekeling et al. 2014).

### Conclusions (part II):

- No new indicator is proposed for other forms of energy at this stage.
- A new indicator for high frequency impulsive noise is not considered a priority.
- There is no agreed impact indicator available at this stage, but the present pressure indicator for impulsive can be used in the (near) future to describe impact.

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

Dekeling, R.P.A., Tasker, M.L., Van der Graaf, A.J., Ainslie, M.A, Andersson, M.H., André, M., Borsani, J.F., Brensing, K., Castellote, M., Cronin, D., Dalen, J., Folegot, T., Leaper, R., Pajala, J., Redman, P., Robinson, S.P., Sigray, P., Sutton, G., Thomsen, F., Werner, S., Wittekind, D., Young, J.V., 2014. Monitoring Guidance for Underwater Noise in European Seas, Part I: Executive Summary, JRC Scientific and Policy Report EUR 26557 EN, Publications Office of the European Union, Luxembourg, 2014, doi: 10.2788/29293

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## Descriptor

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

Together with underwater noise, which is highlighted throughout Directive 2008/56/EC, other forms of energy input have the potential to impact on components of marine ecosystems, such as thermal energy, electromagnetic fields and light. Additional scientific and technical progress is still required to support the further development of criteria related to this descriptor including in relation to impacts of introduction of energy on marine life, relevant noise and frequency levels (which may need to be adapted, where appropriate, subject to the requirement of regional cooperation). At the current stage, the main orientations for the measurement of underwater noise have been identified as a first priority in relation to assessment and monitoring subject to further development, including in relation to mapping. Anthropogenic sounds may be of short duration (e.g. impulsive such as from seismic surveys and piling for wind farms and platforms, as well as explosions) or be long lasting (e.g. continuous such as dredging, shipping and energy installations) affecting organisms in different ways. Most commercial activities entailing high-level noise levels affecting relatively broad areas are executed under regulated conditions subject to a licence. This creates the opportunity for coordinating coherent requirements for measuring such loud impulsive sounds.

### 11.1. Distribution in time and place of loud, low and mid frequency impulsive sounds

— Proportion of days and their distribution within a calendar year over areas of a determined surface, as well as their spatial distribution, in which anthropogenic sound sources exceed levels that are likely to entail significant impact on marine animals measured as Sound Exposure Level (in dB re  $1\mu\text{Pa}$  2.s) or as peak sound pressure level (in dB re  $1\mu\text{Pa}$  peak) at one metre, measured over the frequency band 10 Hz to 10 kHz (11.1.1)

### 11.2. Continuous low frequency sound

— Trends in the ambient noise level within the 1/3 octave bands 63 and 125 Hz (centre frequency) (re  $1\mu\text{Pa}$  RMS; average noise level in these octave bands over a year) measured by observation stations and/or with the use of models if appropriate (11.2.1).



## Marine Strategy Framework Directive (MSFD)

### *Common Implementation Strategy*

## 13<sup>th</sup> meeting of the Working Group on Good Environmental Status (WG GES)

22-23 April 2015

Conference Centre Albert Borschette (Room 2/C), Rue Froissart 36, 1040, Brussels

Agenda item:	5b
Document:	GES_13-2015-02 Annex 3
Title:	Towards a possible revision of MSFD Annex III
Prepared by:	DG Environment
Date prepared:	14/04/2015, revised 12 June 2015
Background:	<p>The MSFD Committee provided a mandate for the review and possible revision of the 2010 Decision on GES criteria and methodological standards, together with Annex III of the MSFD. Whilst this review has been overseen by WG GES and its Drafting Group, the considerations relating to a possible revision of MSFD Annex III is linked also to reporting systems and the underlying standardized lists of elements (ecosystem components, pressures and uses and activities).</p> <p>This paper was presented to WG DIKE (29-30 September 2014) and to WG GES (20-21 October 2014). This version has been prepared following comments received from: DE, DK, ES, FI, FR, PT, RO, NAVI, together with discussions and outcomes of the cross-cutting workshop in January 2015 at EEA, Copenhagen. It is an integral part of the cross-cutting document GES_13-2015-02.</p> <p>This version has been updated following WG GES in April 2015: the embedded spreadsheet has been updated to be in line with the paper (term lists used for pressures and activities).</p>

**See main document for actions requested.**

# Towards a possible revision of MSFD Annex III

## 1 BACKGROUND

In November 2013, the MSFD Committee agreed a mandate for the review and possible revision of the GES Decision on criteria and methodological standards (Decision 2010/477/EU) and of MSFD Annex III<sup>1</sup>.

This review is being led by the WG GES, with technical support from the Joint Research Centre and ICES who are reviewing the criteria and methodological standards for each of the GES Descriptors.

Regarding the review of Annex III, the Committee mandate states the following:

1. *Define role of Annex III*
  - a. Elements for assessment (Art. 8) with regard to GES (Art 9);
  - b. Elements for monitoring (Art 11) - supportive for the purpose of assessment (e.g. temperature, salinity);
  - c. Define whether the elements are of indicative nature (as relevant to MS waters) and whether generic or specific (e.g. 'hazardous substances' or 'specified list of Priority substances').
2. *Content of Tables 1 and 2*
  - a. Distinguish better between State and Pressure lists (e.g. chemicals, NIS from Table 1 as pressures);
  - b. Define the need for current 'additional' texts, the need for some elements (e.g. features and characteristics) and possible need for new elements;
  - c. Define relationship to art 8, 9, and 10.
  - d. Explore the possibility to introduce new standards, criteria and indicators for cumulative effects.
3. *Consider the need for a Table of human activities, to provide a framework for the collection of information and/or monitoring with respect to Art. 8.1c and Art. 11.*

The review of MSFD Annex III is needed to compliment the review of the GES Decision. Annex III forms a key part of the implementation of Articles 8, 9 and 10<sup>2</sup>, where it provides indicative lists of features and characteristics of the marine environment and of pressures and impacts upon it. However, its relationship to the Annex I descriptors and to the GES criteria was not made explicit in the directive or in the 2010 Decision. The 2011 CSWP<sup>3</sup>, however, established relationships between the three elements, but could provide only a partial answer due to their inherent content. The

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<sup>1</sup> [Review of GES Decision 2010/477/EU and MSFD Annex III: approach and outline for the process.](#)

<sup>2</sup> Article 10 is also supported by further guidance in MSFD Annex IV.

<sup>3</sup> [Commission Staff Working Paper SEC\(2011\)1255.pdf](#)

present review therefore offers an opportunity to further clarify these relationships and thus support future implementation.

This paper aims to:

- a. provide an analysis of the current content of Annex III;
- b. outline the role of Annex III within the overall architecture of Directive;
- c. describe an analysis of ecosystem components, pressures, uses and activities across relevant marine policies, leading to a proposed restructuring and updating of the lists of these features as a basis for revision of Annex III.

## 2 ANALYSIS OF CURRENT ANNEX III

### 2.1 References to and role of Annex III in the Directive

Specific references to Annex III in the Directive are as follows (emphasis added):

- a. **Article 8 – initial assessment**
  - i. analysis of the essential features and characteristics, and current environmental status of those waters, based on the **indicative lists** of elements in Table 1
  - ii. analysis of the predominant pressures and impacts, including human activity, based on the **indicative lists of elements** in Table 2
- b. **Article 9 – determination of GES**
  - i. take into account the **indicative lists of elements** set out in Table 1
  - ii. take into account the pressures or impacts of human activities in each marine region or subregion, having regard to the **indicative lists** set out in Table 2
- c. **Article 10 – environmental targets**
  - i. taking into account the **indicative lists** of pressures and impacts set out in Table 2
- d. **Article 11 – monitoring programmes**
  - i. on the basis of the **indicative lists of elements** set out in Annex III
  - ii. Annex V.1 - in accordance with Annex III
  - iii. Annex V.12 - Need to address, as part of the initial assessment provided for in Article 8, the **relevant elements listed** in Annex III including their natural variability

From the above, it can be concluded that:

- a. MSFD Annex III is intended to provide lists of 'elements' for features of marine waters and marine ecosystems, and for pressures, impacts and human activities affecting these features;
- b. these elements are to be used for the initial assessment (Art. 8), taken into account when determining GES (Art. 9) and setting environmental targets (Art. 10) and used for establishing monitoring programmes (Art. 11);



- c. these elements are indicative, which means they may not all be essential (cf Art. 8 (1a.)), predominant (cf. Art 8 (1b.)) or relevant to every marine (sub)region and Member State and that there could be additional elements which are not listed. Therefore Annex III has a guiding rather than a prescriptive role.

Additionally, it is notable that the directive provides no specific guidance on how Annex III is to be used in relation to Annex I, such as how the elements listed in Annex III relate to the Descriptors of Annex I.

## 2.2 Nature of current content of Annex III

Annex III currently comprises two tables.

Table 1 of Characteristics includes:

- a. An indicative list of physical, chemical and biological (species, habitats) 'state' elements
- b. Some additional elements (chemicals, NIS, pCO<sub>2</sub>-acidification) which can also be 'pressures' when there is additional inputs to the marine environment
- c. Criteria for selection of specific elements (e.g. 'recognised under Community legislation', subject to intense pressures')
- d. Additional details on how to address some elements (description, mapping, annual/seasonal variability)

Table 2 of Pressures and Impacts includes:

- a. An indicative list of 'pressure' elements (coarse/fine typology)
- b. Selected examples of relevant human activities for most pressures
- c. One mention of 'impacts' ('impact on the seabed of commercial fishing, boating, anchoring'), but gives few types of impact.

It can be concluded that the content of tables 1 and 2 could be improved to better separate the issues of pressure and state, and also to more clearly relate the indicative lists to the Annex I Descriptors and to the text of Article 8. In addition any revision of the GES Decision should be clearly linked to the content of Annex III.

## 3 OUTLINE OF A REVISED ANNEX III

### 3.1 Role of Annex III in the MSFD architecture

As an essential part of the review of the Decision and MSFD Annex III, there has been work to clarify the roles and relationships of different parts of the Directive in defining GES, including that of Annex III, and the relationship between Article 9 on determination of GES and Article 10 on establishment of environmental targets. Developing a common understanding of these relationships is an essential precursor to the reviews of the GES Decision and of Annex III, as these reviews can then be clearly developed within the context of the overall architecture of the Directive and with complementary and coordinated content.

The determination of GES, and subsequent assessment of whether it has been achieved or maintained, is a core part of the MSFD implementation process. The definition of GES is progressively refined from its high-level definition in Art. 3(5) through to the (sub)regionally-specific definitions (determinations) of Art. 9(1), via the Descriptors of Annex I, the elements of Annex III and the criteria and methodological standards of Art. 9(3). The role of Annex III (and the criteria and methodological standards of Art. 9(3)) within this overall architecture is illustrated, with a worked example, in Figure A3.1.

MSFD provision	Role/contents	Applied example
<b>Art. 3 (5)</b> GES definition	Goal	GES by 2020: "the environmental status of marine waters where ... "
<b>Annex I</b> GES descriptor	Quality objective	<b>D1:</b> "Biological diversity is maintained. The quality and occurrence of ..."
<b>Annex III</b> GES elements	Assessment elements	Birds, <b>mammals</b> , reptiles, fish, water column habitats, seabed habitats
<b>Art. 9(3)</b> GES criteria and methodological standards	EU-wide minimum specifications: <b>Criteria:</b> a. Assessment elements b. Assessment parameters c. Reference levels (baseline and GES boundary values) <b>Methodological standards:</b> d. Assessment tools and procedures e. Assessment scale (generic)	<b>Example: Mammals</b> a. List of mammal functional groups (e.g. seals, small cetaceans) b. Distribution, population size, health condition c. Reference condition and acceptable deviation values (cf FCS target levels of Habitats Directive) d. FCS aggregation procedures/methods e. Cetaceans at subregional scale; seals at subdivision scale (nested approach)
<b>Art. 9(1)</b> Determination of GES	Sub(regional) specification by MS: a. Further specify criteria and methodological standards (e.g. RSC region/subregion-specific assessment elements, common indicators and assessment tools) b. Additional characteristics for region/subregion	<b>Example: North-East Atlantic</b> a. Harbour seal, grey seal (species agreed at (sub)region level) b. OSPAR common indicators: • M-3 Seal abundance and distribution • M-5 Grey seal pup production c. Subdivisions of subregions (nested approach) defined by MS via OSPAR
<b>Art. 11(4)</b> – Specifications and standardised methods for monitoring and assessment: e.g. EU-wide minimum specifications for spatial and temporal resolution of monitoring, monitoring methods (sampling, analysis, QA/QC), scaling, aggregation rules		

**Figure A3.1:** Relationship of MSFD provisions for determining GES. The specificity of what constitutes GES increases from Art. 3(5) through to Art. 9(1) MSFD. The generic role outlined in the central column (see subsequent text sections for explanation) is applied and worked through with an example for Descriptor 1 and the element "Mammals" in the right-hand column.

Proposed role for Annex III, having regard to the references to Annex III in the Directive:

- a. To provide elements for assessment (Art. 8) with regard to GES (Art 9);
- b. To provide additional elements for monitoring (Art 11), which are complimentary to assessment (e.g. temperature, salinity);
- c. To provide elements for consideration when setting targets (Art. 10).

The relevance of these elements will vary by region and Member State (i.e. elements need to be present in Member State's waters, and would not be addressed are not considered essential features and characteristics (cf. Art. 8( 1a)) or predominant pressures and impacts (cf. Art. 8(1b)) or do not occur in a particular region/subregion/MS marine Waters.

From the proposed architecture of the Directive (Table 1) it is necessary to also ensure the elements in Annex III can be clearly related to the Descriptors of Annex I and to the (revised) Decision (Article 9(3)). In this context, the elements provided in Annex III need to be generic/high level and generally applicable across Europe, on the basis that more specific elements can be provided in the (revised) Decision and via the determinations of GES under Article 9(1).

### 3.2 Proposed outline content of Annex III

Based on the proposed role of Annex III within the overall architecture of the MSFD, and its links to Articles 8, 9, 10 and 11, it is proposed that the existing Tables 1 and 2 be clarified to more clearly relate to state elements (table 1) and to pressure elements (table 2), and for these to clearly linked with the Annex I descriptors and revised Decision criteria.

To guide the assessments on uses of marine waters (under Article 8.1c) and on human activities (under Article 8.1b) and associated monitoring (Art. 11), it is recommended that a new table be added on human uses and activities. In line with the nature of the other two tables, this would include an indicative list of elements, defined at quite broad level, to provide a level of consistency in how the human uses and activities are assessed.

The tables of characteristics (Table 1) and pressures and impacts (table 2) should more clearly distinguish between the lists of State and Pressure elements (e.g. moving non-indigenous species from Table 1 to Table 2 as pressures). Certain elements which are naturally occurring (e.g. nutrients, certain hazardous substances, temperature) can also be considered as pressures when there are additional inputs to the marine environment; it may be necessary to list them in both tables, whilst indicating that in table 2 refers to them as inputs/changes to natural conditions.

There is a need to review the current 'additional' texts and decide if it would better sit in an associated guidance document, or be deleted. The need for some existing elements (e.g. features and characteristics) or for new elements needs review.

It is therefore proposed that Annex III be revised to include the following tables:

- Table 1 Elements of the marine environment
- Table 2 Pressures on the marine environment
- Table 3 Uses and human activities of the marine environment.

Each table may provide additional information, where necessary, to clarify the contents and inter-linkages between the tables [or this may better sit in associated guidance].

## 4 REVISING ANNEX III TABLES

The Tables in Annex III provide the indicative elements to be used in relation to Articles 8, 9 10 and 11. These lists of elements (or typologies) could be updated, in the light of clarifying the use of Annex III within the overall architecture of the Directive and from practical experiences in their use to date (for reporting under Articles 8, 9, 10 and 11 in 2012 and 2014). Further, it is helpful to also consider the relationship to other reporting systems if synergies can be made to make better use of data.

## 4.1 Table 1 – Characteristics

- a. **Proposed content:** Generic set of elements (ecosystem components) to be assessed and/or monitored. These can be further specified under Art. 9(3) Decision and Art. 9(1). Table A3.1 provides an outline structure.
- b. **Indicative set of characteristics/ features/ properties of these elements:** Linked to impacts of MSFD Annex III Table 2.
- c. **Move some topics to Table 2:** pCO<sub>2</sub>, marine acidification, NIS, Chemicals [to be considered further].
- d. **Remove topics that add little value:** ‘habitats in areas which .... merit a particular reference’, ‘features or characteristics typical of region’.

Table A3.1: Outline of ecosystem elements for GES determination and assessment, indicating where they are or would be specified.

Annex I	Annex III		Art. 9(3) Decision	Art. 9(1) (sub)regional GES
Descriptors	Element theme	Generic elements	Specific elements (EU-wide)	Specific elements (subregion-specific)
D1, D3, D4	Highly mobile species	<p>Birds, mammals, reptiles, fish, cephalopods</p> <p>Listed species: in Birds and Habitats Directives and on international agreements</p>	<p>List of functional groups (2011 CSWP list, modified if necessary)</p> <p>Listed species: international agreements to be included and current lists (i.e. those in place at time Decision is adopted)</p> <p>Commercial fish: method for selection and 'current' list</p>	<p>To be specified per (sub)region to adequately represent the broader groups and the main pressures upon them, based on appropriate selection criteria (e.g. as agreed by RSC for common indicators) or for use under D3.</p> <p>Listed species and habitats: may be part of list selected above. TO BE DECIDED – inclusion of all other listed species and habitats</p>
D1, D4	Water column habitats	<p>Predominant habitats of the water column and seabed</p> <p>Listed ('special') habitats: in Habitats Directive and on international agreements</p>	<p>List of predominant habitats (2011 CSWP list modified to align with 2015 EUNIS marine classification)</p> <p>Listed habitats: international agreements to be included and current lists</p> <p>Commercial shellfish: method for selection and 'current' list</p>	
D1, D3, D6	Seabed habitats			
D1, D4, D6	Ecosystem	<p>Natural physical and chemical elements (T, S, etc) – for monitoring</p> <p>Functions and processes</p>	Types of functions and processes (to be developed)	Specific functions and processes per (sub)region

See Table 5 of main document for a worked example (mammals).

Further considerations in developing a revised MSFD Annex III Table 1:

- a. **Keep list of elements generic and high level:** Further specification via Decision and Art. 9(1).

- b. **Review the CSWP 2011 lists of functional groups and predominant habitat types:** Limited use in 2012 assessments, but they provide basis for categorising the very broad 'biodiversity' descriptor D1. Predominant seabed habitats should be equated to 'substrate types' of D6, and addressed together as a single assessment per habitat type.
- c. **Ecosystems:** It is not proposed to provide a typology (equate to subdivisions of (sub)regions, i.e. assessment areas), but could provide characteristics (of structure, functions, processes).

## 4.2 Table 2 – Pressures and impacts

The possible revision of Annex III Table 2 offers an opportunity to check the list of pressures provided in relation to pressure typologies used in related policies. This can help to make more effective use of data and information collected under other policies and promote synergies in implementation, for example, via measures based on the same pressure terminology. To this end, the following pressure typologies were reviewed, leading to a correlation of the typologies and a proposed 'common typology' (see Excel file embedded in Annex 1):

- a. MSFD Annex III Table 2 (2008)
- b. WFD – 2014 reporting guidance
- c. Habitats Directive – 2011 reference list
- d. OSPAR – 2014 JAMP
- e. HELCOM – Initial holistic assessment 2010 (HOLAS)
- f. Standardised lists of pressures for use within the Barcelona Convention/UNEP-MAP and the Bucharest Convention were not available.

The analysis revealed that:

- a. The term 'pressure' is not always used consistently and can, for example, include elements that are better defined as activities and impacts;
- b. The lists of pressures used under MSFD, OSPAR and HELCOM are quite similar;
- c. The list of pressures under WFD is shorter but generally compatible (except for its approach to point-source and diffuse inputs in relation to nutrient enrichment and hazardous substances) with each coupled to specific uses and activities;
- d. The list used for the Habitats Directive is very extensive and contains many elements which are better considered as uses and activities, climate-related changes and other impacts, and natural processes.

From this, it is important to clarify what constitutes a pressure in the context of MSFD so that any revision of the list of pressures is conceptually sound. This issue is further discussed in detail in the main cross-cutting document (Annex 2). From this a proposed definition of a pressure has been developed, building upon the definition in the 2011 Common Understanding document:

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

Based on the analysis and proposed definition, a 'common typology' of pressures relevant to the marine environment has been developed (Table A3.2), which is provided in two levels of detail (pressure theme, specific pressure). The pressure categories are based on whether they relate to adding something to the environment, taking something out of the environment, or change what is already there; this approach is used to organise the pressures within each theme (physical, chemical, biological) in a consistent way. The pressures are correlated with the pressures in use in the main policies relevant for MSFD (Annex 1). The typology is considered to be widely applicable (i.e. could equally be applied in terrestrial, freshwater and atmospheric contexts). For the marine environment, certain pressures are more relevant to coastal waters and therefore maybe addressed under WFD. The relative importance to coastal (WFD) and offshore (MSFD) waters is indicated, which can allow for a more simplified list to be used in a revised MSFD Annex III.

**Table A3.2: Common typology of pressures on the natural (marine) environment resulting from anthropogenic activities, and an indication of their relevance (yes=can be significant; +=typically limited) to the coastal and offshore zones. Grey rows could be excluded from a revised MSFD Annex III Table 2.**

Pressure themes	Pressures	Relevant to 0-1nm	Relevant beyond 1nm <sup>4</sup>
Physical	Change of seabed substrate or morphology (~ physical loss)	Yes	Yes
	Disturbance or damage to seabed	Yes	Yes
	Extraction of seabed or subsoil (e.g. sand, gravel, rock, oil, gas)	Yes	Yes
Hydrological	Input of water	Yes	+
	Changes to hydrological conditions	Yes	Yes
	Extraction of water	Yes	
Energy	Input of sound	+	Yes
	Input of electromagnetic and seismic waves	+	Yes
	Change in water temperature	+	
	Input of light	+	+
Chemicals and other pollutants	Input of nutrients and organic matter	Yes	Yes
	Input of contaminants (synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, acute events	Yes	Yes
	Input of CO <sub>2</sub> [and other greenhouse gases]	Yes	Yes
	Input of litter (solid waste matter, including micro-size litter)	Yes	Yes
Biological	Extraction or, or mortality/injury to, species (targeted, non-targeted)	Yes	Yes
	Disturbance of species	Yes	+
	Translocation of (native) species	+	
	Introduction of genetically modified species	+	+
	Introduction or spread of non-indigenous species	Yes	Yes
	Introduction of microbial pathogens	Yes	+
	Cultivation/artificialisation of natural habitat	+	

Further considerations in developing a revised MSFD Annex III Table 2:

<sup>4</sup> Beyond 1nm refers to outside of WFD Coastal Waters.

- a. **The list of pressures in Table A3.2 is comprehensive:** Whilst all of the pressures have some relevance to the marine environment (and are used in one of the policies reviewed) they are clearly very different in the scale of their importance. As indicated, certain pressures are unlikely to occur in waters beyond 1nm and could be excluded from a revised MSFD Table 2 list. Several others are likely to be of only minor overall relevance, but could be retained, as they may be locally important. There is thus a need to provide guidance on its use to reflect its 'indicative' nature: e.g.
  - i. Pressure is specified in a Descriptor – should be assessed
  - ii. Pressure is significant in the country/region – recommend assessment
  - iii. Pressure is minor – assess if necessary (needs additional guidance)
- b. **'Input of contaminants' is a very general/broad category:** This pressure has not been subdivided (e.g. into Metals, pesticides, PAHs, organics, hydrocarbons, etc) as it is not the substance group that is the pressure but the functional group. For instance, some contaminants from several substance groups disturb hormonal functions, while others can cause malformations of offspring, etc
- c. **The current Table 2 gives very few 'impacts':** An indicative list of impacts e.g. change in substrate, chemical characteristics, habitat of species, community composition, species behaviour should be provided in associated guidance (see worksheet 'pressure-impact framework' in Annex 1 for examples).
- d. **The current Table 2 gives example activities:** these should be moved to a third table of activities. An indicative relationship between activities and pressures should be provided in associated guidance (modified from that in CSWD 2011).

### 4.3 Possible Table 3 –Uses and human activities

MSFD Annex III currently does not provide an indicative list of uses and activities which can be used in the assessments of uses of marine waters (under Article 8.1c) and on human activities (under Article 8.1b). However a working list of uses and activities was developed for the 2012 reporting exercise.

As was done for pressures, the use of activity categories across the following policies has been reviewed (see Excel file embedded in Annex 1) in order to develop a harmonised list that can be correlated to each of the policies:

- a. MSFD Annex III Table 2 (2008)
- b. MSFD typology for reporting in 2012
- c. WFD – 2014 reporting guidance
- d. Habitats Directive – 2011 reference list
- e. OSPAR – 2014 JAMP
- f. Barcelona Convention EcAp list for social and economic analysis (2014) – to be added
- g. ODEMM (FP7 project, Kosse et al. 2011)
- h. Standardised lists of activities for use within HELCOM, and the Bucharest Convention were not available.

From the analysis, a common typology has been developed which accommodates all of the above and which could provide the basis for a possible new MSFD Annex III Table 3 (Table 3).

Add a correlation table between activities and pressures.

**Table 3:** Typology of uses and activities relevant to the marine environment. Note, this table will be reviewed in relation to NACE categories of human activities used by Eurostat.

Theme	Activity	Sub-activity (this column is not for inclusion in Annex III, just for illustrative purposes)	
Physical restructuring of coastline or seabed (including construction phase)	Land claim (permanent changes)		
	Canalisation and other watercourse modifications	Canalisation Culverting/trenching Causeways and dams	
	Coastal defence and flood protection	Sea walls Breakwaters Groynes	
		Flood protection	
	Semi-permanent restructuring of seabed morphology	Dredging (for navigation purposes) Beach replenishment/ nourishment	
Man-made structures (incl. construction phase)	Urban developments		
	Industrial developments		
	Transport infrastructure	Bridges Causeways Tunnels	
		Tourism & leisure infrastructure - land-based structures	
		Tourism & leisure infrastructure - sea-based structures	Piers Marinas Slipways
	Ports and other coastal constructions	Ports Harbours	
	Offshore marine infrastructure (including associated with mineral and energy extraction)	Offshore platforms (oil, gas) Renewable energy infrastructure Artificial reefs and islands	
	Cables & pipelines	Trenching	
Extraction of non-living resources	Extraction of oil and gas	Exploration for oil and gas Extraction of oil & gas Decommissioning of structures	
		Extraction of sand and gravel	
		Extraction of rock & minerals	Exploration for minerals Extraction of rock & minerals
	Extraction of salt		
	Extraction of water		
Extraction of energy	Renewable energy generation (wind, wave & tidal power)	Wind energy production Tidal energy production Wave energy production	
		Non-renewable energy generation	Fossil fuel energy production Nuclear energy production
	Extraction of living resources	Fish & shellfish harvesting (professional, recreational)	Potting/ creeling Netting Demersal long lining Pelagic long lining Benthic trawling Pelagic trawling Demersal seining



Theme	Activity	Sub-activity (this column is not for inclusion in Annex III, just for illustrative purposes)
		Purse seining
		Benthic dredging
		Suction/ hydraulic dredging
		Leisure fishing
	Marine plant harvesting	Hand collecting (shellfish)
		Machine collection (fucoids, kelp)
		Dredging (maerl)
	Hunting and collecting (e.g. for non-food purposes)	Hand collecting (seaweed)
		Hunting
		Harvesting/ collecting eggs
Collecting (curios)		
Cultivation of living resources	Aquaculture	Bait digging
		Fin-fish mariculture
		Seaweed culture
	Agriculture	Shellfish mariculture
	Forestry	
Uses of environment and infrastructure	Transport - shipping	Passage
	Transport - air	Anchorage
	Tourism and recreation	Boating, yachting
		Beach use
		Water sports (surface)
		Scuba diving
		Wildlife watching
	Research and survey	
	Military use	Military - waste disposal (munitions)
	Waste and material disposal	Solid waste disposal, incl. dredge material
Carbon sequestration		

Further considerations in developing an MSFD Annex III Table 3:

- a. **Keep list of activities generic and high level:** e.g. just use the theme and activity list (the sub-activity list should be excluded).
- b. **Further develop links to other reporting processes to ensure synergies of typology and data collection:** e.g. data collection under the MSP Directive, EMODnet Human Activities, Eurostat (NACE lists).

## 5 CONCLUSION

The role of Annex III is proposed as follows:

- a. To provide an indicative list of elements for assessment (state, pressure), linked explicitly to the descriptors and the criteria in a revised Decision, as outlined in Figure A3.1;
- b. To provide additional pressures (and impacts) (where not explicitly referred to in a descriptor) that should be considered, where appropriate, under MSFD Art. 8.1b assessments;

- c. To provide an indicative list of uses and activities to be considered, where relevant, under MSFD Art. 8.1c assessments and for Art. 8.1b.

The review of typologies of pressures and activities which are in use for related EU Directives and in the Regional Sea Conventions has helped to develop consolidated lists of these elements for consideration as updated parts of MSFD Annex III.

Based on initial feedback on this initial analysis of the role and content of Annex III, it will be further developed, ensuring it links effectively with MSFD Annex I and with proposals for a revised GES Decision.

**Annex: Analysis of pressures and activities in use in marine-relevant Directives and Regional Sea Conventions**

The detailed analysis is provided in the embedded Excel file.



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entframework\_Activit

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**Marine Strategy Framework Directive**  
**Review of Commission Decision 2010/477/EU and MSFD Annex III**  
**Consultation on Descriptor Manuals and Annex III**  
**June - July 2015**

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**In the descriptor specific tabs (D1 to D11)**

Please provide comments per descriptor document (manual) – highlighting the position that you support.


**[In the tab entitled "Horizontal comments"](#)**


Please provide overarching comments in relation to better coordination and management (e.g. between Directives).


Please highlight issues that require short-term action.


Please highlight issues that should be proposed to be included in the next Common Implementation Strategy Work Programme (CIS WP) for 2016-2018.


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 ComDecRev\_D01


 ComDecRev\_D02


 ComDecRev\_D03


 ComDecRev\_D04


 ComDecRev\_D05


 ComDecRev\_D06

 ComDecRev\_D07

 ComDecRev\_D08

 ComDecRev\_D09

 ComDecRev\_D10

 ComDecRev\_D11

 MSFD Annex III











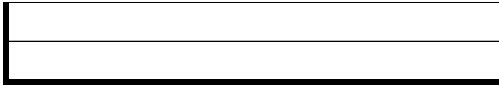












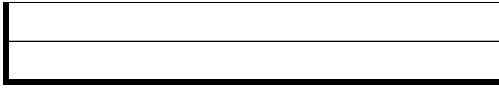






















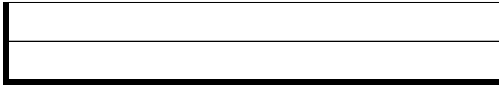












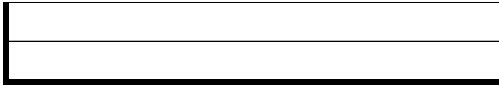

Work Directive  
Motor Manuals

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**Focus on Chapters 3 (page 18), 5 (page 22) and 6 (page 26)**

**Comment / Observation**







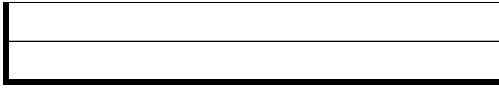

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**Focus on Chapters 3 (page 34) and 4 (page 35)**

**Comment / Observation**



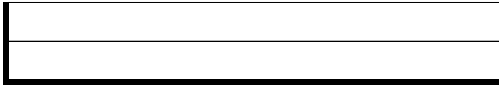














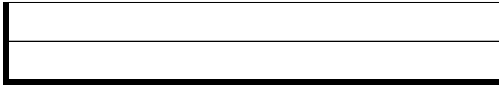

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**Focus on Chapters 5.1 (page 30) and 9 (page 38)**





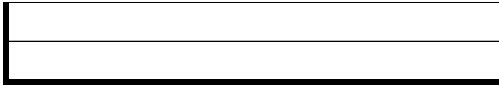

















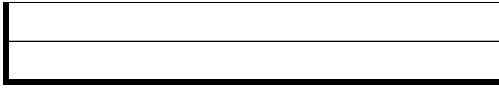

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**Focus on Chapters 5 (page 15) and 10 (page 17)**

**Comment / Observation**






Work Directive  
Operator Manuals

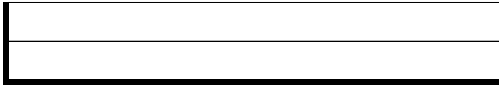
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**Focus on Part II**

**Comment / Observation**








Work Directive  
Annex III

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**Comment / Observation**


## **List of relevant chapters per descriptor on which to focus consultation comments**

1. Review manual for Descriptor 1: Chapters 3.1 (page 29), 5 (page 35), 6 (page 48) and 9 (page 53)
2. Review manual for Descriptor 2: Chapters 3 (page 22), 5 (page 26) and 9 (page 29)
3. Review manual for Descriptor 3: Chapters 3 (page 10), 4 (page 12) and 5 (page 15)
4. Review manual for Descriptor 4: Chapters 3 (page 23), 4 (page 25), 5 (page 26) and 6 (page 27)
5. Review manual for Descriptor 5: Chapters 3 (page 18), 5 (page 22) and 6 (page 26)
6. Review manual for Descriptor 6: Chapters 3 (page 34) and 4 (page 35)
7. Review manual for Descriptor 7: Chapters 3 (page 16) and 9 (page 26)
8. Review manual for Descriptor 8: Chapters 5.1 (page 30) and 9 (page 38)
9. Review manual for Descriptor 9: Chapters 7.1 (page 18) and 9 (page 22)
10. Review manual for Descriptor 10: Chapters 5 (page 15) and 10 (page 17)
11. Review manual for Descriptor 11: Part II (page 12)



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**Til:** Ane-Marie Løvendahl Raun (anlra@mst.dk), lioel@mst.dk (lioel@mst.dk)  
**Fra:** Niilonen, Tonny (tonny@nst.dk)  
**Titel:** VS: Consultation on the outcomes of the technical and scientific review of the GES Decision 2010/477/EU and MSFD Annex III - extension  
**Sendt:** 22-06-2015 14:37:49

Kære Ane og Lisbet

Vi fik den ønskede fristforlængelse til den 14. august for bemærkninger til manualen.

Mvh  
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**Fra:** Anna.CHEILARI@ec.europa.eu [mailto:Anna.CHEILARI@ec.europa.eu]  
**Sendt:** 22. juni 2015 14:32  
**Til:** Tonny Niilonen; Karin.Pettersson@havochvatten.se; Samuli.Korpinen@ymparisto.fi  
**Cc:** Matjaz.MALGAJ@ec.europa.eu; David.CONNOR@ec.europa.eu; Fabio.PIROTTA@ec.europa.eu; sarine.barsoumian@milieu.be; georg.hanke@jrc.ec.europa.eu; francesca.somma@jrc.ec.europa.eu; andreas.palialexis@jrc.ec.europa.eu; ana-cristina.cardoso@jrc.ec.europa.eu  
**Emne:** Consultation on the outcomes of the technical and scientific review of the GES Decision 2010/477/EU and MSFD Annex III - extension

Dear all,

We would like to inform you that exceptionally we will accept your request for extension of the GES review consultation period until the 14<sup>th</sup> of August.

Please note that almost all the relevant documents (with the exception of the Annex III MSFD) were available since the beginning of May.

We hope you understand that a further extension would cause delays in the work of the review and the following planned steps.

Kind regards,  
The Marine team

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**Til:** 'sarine.barsoumian@milieu.be' (sarine.barsoumian@milieu.be)  
**Cc:** 'anna.cheilari@ec.europa.eu' (anna.cheilari@ec.europa.eu), lioel@nst.dk (lioel@nst.dk), 'david.connor@ec.europa.eu' (david.connor@ec.europa.eu), 'fabio.pirota@ec.europa.eu' (fabio.pirota@ec.europa.eu)  
**Fra:** Ane-Marie Løvendahl Raun (anlra@mst.dk)  
**Titel:** Consultation on the outcomes of the technical and scientific review of the GES Decision 2010/477/EU and MSFD Annex III  
**Sendt:** 14-08-2015 15:06:05

Dear Sarne Barsoumian

Unfortunately, I must inform you, that comments to the technical and scientific review of the GES Decision from Denmark will not be available today (the 14<sup>th</sup> of august). However, we are very close to finishing the comments and aim to deliver on Monday the 17<sup>th</sup> of August.

I hope that this will not delay the process significantly.

Best regards,  
Ane-Marie L. Raun

**Ane-Marie Løvendahl Raun**  
Marine biologist | Water management plans and marine environment  
+45 93 58 81 18 | [anlra@nst.dk](mailto:anlra@nst.dk)

**Ministry of the Environment and Food**  
The Danish nature Agency | Haraldsgade 53 | DK - 2100 Copenhagen | Tlf. +45 72 54 30 00 | [nst@nst.dk](mailto:nst@nst.dk) | [www.naturstyrelsen.dk](http://www.naturstyrelsen.dk)

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**Til:** 'sarine.barsoumian@milieu.be' (sarine.barsoumian@milieu.be)  
**Cc:** Niilonen, Tonny (tonny@nst.dk), lioel@nst.dk (lioel@nst.dk), 'anna.cheilari@ec.europa.eu' (anna.cheilari@ec.europa.eu), 'david.connor@ec.europa.eu' (david.connor@ec.europa.eu), 'fabio.pirota@ec.europa.eu' (fabio.pirota@ec.europa.eu)  
**Fra:** Ane-Marie Løvendahl Raun (anlra@mst.dk)  
**Titel:** Consultation on the outcomes of the technical and scientific review of the GES Decision 2010/477/EU and  
**Sendt:** 21-08-2015 10:09:41  
**Bilag:** Danish comments\_ComDecReview\_Consultation.xlsx;

Dear Sarine Barsoumian

Herby, submission of comments from Denmark to the technical and scientific review of the GES Decision.

Best regards,

**Ane-Marie Løvendahl Raun**

Marine biologist | Water management plans and marine environment  
+45 93 58 81 18 | [anlra@nst.dk](mailto:anlra@nst.dk)

**Ministry of the Environment and Food**

The Danish nature Agency | Haraldsgade 53 | DK - 2100 Copenhagen | Tlf. +45 72 54 30 00 | [nst@nst.dk](mailto:nst@nst.dk) | [www.naturstyrelsen.dk](http://www.naturstyrelsen.dk)

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**Marine Strategy Framework Directive**  
**Review of Commission Decision 2010/477/EU and MSFD Annex III**  
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 ComDecRev\_D07

 ComDecRev\_D08

 ComDecRev\_D09

 ComDecRev\_D10

 ComDecRev\_D11

 MSFD Annex III

















Template for Comments on Marine Strategy Framework Directive Commission Decision Review 2010/477/EU - Descriptor Manuals		
Member State/Stakeholder name	Denmark	
Name of respondent	Ane-Marie L. Raun, Tonny Niilonen, Lisbet Olgaard	
Contact details	Ane-Marie L. Raun (anlra@nst.dk), Tonny Niilonen (tonny@nst.dk), Lisbet Olgaard (liol@nst.dk)	
Date	21.08.2015	
Descriptor	D1	Focus on Chapters 3.1 (page 29), 5 (page 35), 6 (page 48) and 9 (page 53)
Comment number	Heading / Section / Page	Comment / Observation
1	D1 mammals in general	With respect to marine mammals the respondent generally agree with the way marine mammals are assessed in the Biodiversity indicator. DK supports that when possible methods are coordinated across national borders for shared populations to be able to make assessment on regional level as seem to be decided in the document.
2	chapter 3.1 in general	The change to include the wording 'Assessment methods and standards, to address each criterion should reflect the actual knowledge, and should evolve according to scientific and technical improvements.' is a substantial improvement of the current text. However, it is unclear why it would be an advantage to delete the text 'The three criteria for the assessment of any species are species distribution, population size and population condition.' These criteria still remain relevant and are not replaced by other text specifying the same content. A similar comment applies to the text on habitats. Page 31: it does not seem appropriate to require an assessment of all habitat types in all areas - there may be cases where certain habitat types are absent in specific (sub) regions. This could be addressed by inserting the word 'relevant' before 'habitat types'.
3	(first paragraph) /3.1 / p29	Order of arguments in suggested changes seems invert: First it is necessary to identify relevant site/ location/ habitat/ ecosystem-specific biological feature then prioritize among biodiversity features to assess.
4	(first paragraph) /3.1 /p30	Modelling tools will surely be an important tool to help achieve the goals of the ecosystem level parts of the descriptors. But exactly this part of the demand is also the most challenging to achieve. DK therefore finds that the development of the descriptors in general would benefit from treating the species and the habitat level as data feeders to the ecosystem level. It is premature to be specific about how the ecosystem level modelling should be handled. Could well be GIS systems, but no need to specify that in the present document. There are numerous pit falls in modelling work, and a coordination of development of agreed standards will be crucial to the success of this part of the work.
5	Species Level /3.1 / p30	"The identification of the "relevant species" should be based on harmonized methodology applied to a common agreed list of species...". DK assume this refers to inter-regional or sub-region selections, but this might be important to specify.
6	Species Level /3.1 / p30	How functional groups are defined and species/populations are selected is very important to the outcome of the analysis. Thus the essence of the paragraph is actually not described yet.
7	Species Level /3.1 / p30	The text is not clear: It is not clear how the various combinations of locations (regions, subregions, subdivision) communities and functional groups link up to assessment of diversity at species level. As the text is it describes an assessment of ecosystem functions through population dynamics of individually species with specific well defined functions, and with possible relations to GES. This however should not be confused with terms such as species diversity which is also a relevant measure of GES.
8	Species Level / 3.1 / p 30	We should in general be wary of harmonization of methodology within, for example, an entire region, but instead work towards coordination within the region where each MS play a conclusive role in their own territory.
9	Species Level / 3.1 / p 30	With the aim of describing diversity of functional groups (or diversity of ecosystem functions), identification of relevant species to describe is probably not an option within near future for benthic biodiversity.
10	Habitat level /3.1 / p31	How habitats are defined is very important to the outcome of the analysis. Thus the essence of the paragraph is actually not described yet.
11	Habitat level /3.1 / p31	In line with comment 2: It is necessary to set criteria how to select representative habitats.
12		see comment under comment number 2.
13	Ecosystem Level / 3.1 / p31 Regional coherence / 5.1 / p 36	We should be cautious with standardizing the way MS manage their monitoring. A certain amount of common understanding is of course necessary and beneficial, but simultaneously it is important that MS organize their own monitoring programs based on tradition and knowledge of local conditions. Our monitoring program is, for example, mainly based on protection of ecosystems and not selected species.
14	5.1 / p36	It is important to evaluate whether or not data for populating the three criteria at the lower part of p.38 are available for the selected species. For instance, population dynamics data are not commonly available or easily achieved in the case of most bird species. Specification of "natural range" requires a considerable monitoring effort, not least for birds in light of changes in for instance wintering range due to increasingly milder winters.
15	5.1 / p36	DK agree that key terms and concepts regarding GES need to be clearer explained.

	16	Species level (Table 3) / 5.2 / p37	What is the rationale for focusing on only mobile organisms i Table 3? - a review is a good idea.
	17	Species level (Table 3) / 5.2 / p37	This table appears to be a mix of functional and taxonomic groups. It is unclear how it relates to biodiversity as being e.g. the number of functional nodes. At the current aggregation level, biodiversity seems to be reduced to the outcome of a very coarse ecosystem model
	18	Species level / 5.2 / p 38	It is important, that MS are not required, through RSC, to assess species that are not relevant to the local waters. MS should have a conclusive role in determining which species they find relevant to assess.
	19	1.1. Species distribution geographic distribution / 5.2 / p39	Upper set of bullets: DK finds that the content of these bullets does not reflect "methodological standards" when related to birds. They more or less quote the same thing. DK assumes they mean <ul style="list-style-type: none"> <li>• the geographical range of a species</li> <li>• clarification of factors affecting the distribution of a species within that general geographical range</li> <li>• a predictive spatial distribution model based on data from the above points</li> <li>• a specification of area selection within the general geographical range, based on the above</li> </ul>
	20	page 40	The statement that 'MSFD species population abundance and/or biomass should be in line with the assessments conducted for the HD, BD and RSCs agreements and not be deteriorated significantly by human activities.' is perhaps a usefull minimum requirement, but seems to indicate that the HD, BD and RSC should dictate GES levels. This does not seem like a usefull way forward, especially considering the previous statement that 'Assessment methods and standards, to address each criterion should reflect the actual knowledge, and should evolve according to scientific and technical improvements.' Allowing GES indicators to change only as a result of changes to indicators in the other directives will increase the time required to include knew knowledge in management.
	21	1.2 Population size / 5.2 / p40	Species abundance and population trend are the key parameters for bird species.
	22	1.3 population conditions / 5.2 / p41	Linking species distribution and abundance to population condition is a very valuable step, but also a challenging one. A region-based approach to select relevant species that can deliver most of these parameters will be of high priority in order to succeed.
	23	page 43	Stating the most common indicator groups found in a review is not equivalent to stating guidelines for appropriate indicators. If you look back in time far enough, the most common means of transportation was by foot, but that does not make this a recommendation for the future. This comment applies to a variety of places in the document.
	24	1.4 Habitat geographic distribution and ectent / 5.2 / p43	The definition and difference of habitat range and habitat extent is not completely clear. Range is defined: "Range is the actual distribution of a habitat and not the potential distribution delineated by environmental limitations and reflected in the habitat extent.", which indicates that range is within extent. On the other hand Extent is defined "Habitat extent refers to the area or volume effectively occupied by the habitat within its range.", which indicates the opposite.
	25	page 48	The One-Out-All-Out (OOAO) is not suitable for D1, due to the large number of assessment elements under each criterion'. Agreed.
	27	page 51	Point 2 on the list should be an integral part of point 2. It is not realistic to think that dedicated sampling programmes will be set up for all potential representative, threatened and functional groups, since a number of these species are rare and therefore difficult to monitor. The requirement for distribution models invalidates the use of trend based indicators, and therefore limits the GES indicators to species with abundant data.

























