



**OSPAR**  
**COMMISSION**

MSFD Advice document on  
Good environmental status - Descriptor 7:  
Hydrographical conditions

A living document - Version 17 January 2012

### **OSPAR Convention**

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. The Contracting Parties are Belgium, Denmark, the European Union, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

### **Convention OSPAR**

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. Les Parties contractantes sont l'Allemagne, la Belgique, le Danemark, l'Espagne, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède, la Suisse et l'Union européenne.

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Prepared and under the auspices of the OSPAR Committee of Environmental Impact of Human Activities Committee (EIHA)

### **Disclaimer**

**This Advice Document is a living document and reflects the state of discussion at expert level at the time of its drafting. The document is of a non-binding nature and aims at facilitating coordination between EU Member States that are parties to the OSPAR Convention, with regard to developing indicators and targets for MSFD Descriptor 7. It does not prejudice the ongoing decision making process in Contracting Parties and their final conclusions in 2012.**

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

### 7.1 Spatial characteristics 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).

## Common approach toward indicators and targets for GES 7

At EIHA 2011 document EIHA 12/4/5-E, considering GES descriptor 7, was discussed. In order to assess the need for additional work on Hydrographical Conditions under OSPAR and as a first assessment of how each CP is proceeding in developing indicators, targets and a description of Descriptor 7 under the MSFD, a questionnaire was sent to EIHA-HODs in February 2011 with a deadline of 31 March 2011. Denmark, Ireland, the Netherlands, Spain and the UK responded to this questionnaire, France responded at a later date. This advice document is mainly based on the EIHA discussion document and those responses to the questionnaire. A compilation of all returned questionnaires is provided as background to this advice. At OSPAR 2011 and ICG-MSFD (3) 2011 updated versions of the advice document were considered.

## Advice on GES

Large-scale human activities such as coastal defence works, damming of large rivers, land reclamation projects, and structures in coastal or open sea, such as wind farms, offshore airports, ocean energy device arrays and large scale aquaculture facilities may permanently influence the hydrographical regime of currents, waves and sediments.<sup>1</sup> These take place against a background of much broader scale hydrographical changes, both human induced and otherwise, such as climatic changes, ocean acidification, etc. The cumulative effects of the impact should be part of the GES definition of the Descriptor.

Such changes to currents and waves can in turn induce further changes to sediment transportation, bed forms, salinity and temperature which might lead to further positive or negative impacts on fauna as a result of changes to their immediate dynamic environment or through food chain effects. Changes in currents and salinity can also influence the spreading pattern of larvae and breeding and spawning areas.<sup>2</sup>

The table below outlines the GES indicators and the associated advice based on information collated from the questionnaire circulated to OSPAR Contracting Parties. Following this table, experiences or considerations on target setting are given.

<sup>1</sup> In addition there are also smaller-scale activities that affect hydrographical conditions, such as local changes in salinity and temperature derived from discharges at sea of brines and refrigeration water. These are not considered under this Descriptor because they are sufficiently covered by existing legislation (EIA).

<sup>2</sup> One CP noted that structures that extend above sea level such as pylons of offshore wind parks or bridges might pose a risk of collision for seabirds and migrating birds and can obstruct migration routes. This CP suggests some additional targets: - Reduction of the amount of collisions (e.g. green light initiative), - the amount of collisions should not lead to biogeographic population effects, - certain percentages of migration routes remain unobstructed. This CP advises to assess the collision risk at selected sites and determine population effects of such risk under descriptor 7. At OSPAR 2011 it was decided that this would not be part of the common approach. It was noted that the obstruction of bird migration routes and collision risks with offshore wind pylons were not adequately captured under any Descriptors. Divergent views were expressed as the most suitable Descriptor for covering these impacts. However, individual CPs are free to include these targets in their national marine strategy.

Criterion & Indicator	Parameter	Monitoring	Target	Advice/ consideration
Extent of area affected by permanent alterations (7.1.1)	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)	Map human activities that cause permanent alterations of hydrographical conditions (using Directive 2000/60/EC marine morphology datasets and/or existing EIS, SEA and MSP) and subsequent use of models. Main aim of the models is to assess changes in the condition and extent of areas affected by permanent alterations. This would include changes in currents, upwelling patterns, waves, bathymetry, and salinity. Models should be calibrated and continuously supported and validated with "in situ" monitoring datasets.	Minimise impacts resulting from alterations of hydrographical conditions. This target can be further specified by: a. Prevent further deterioration; b. Area of different habitat functions (feeding zones, spawning areas etc.) stay in comparable quantity <sup>3</sup> or quality;	Implementation of the indicators 7.1.1, 7.2.1 and 7.2.2 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. Models should be supported by "in situ" monitoring datasets.
Spatial extent of habitats affected by the permanent alteration (7.2.1)	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)	Model changes in the spatial extent of habitats affected by permanent alterations, using field data and validated model data.		
Changes in habitats, in particular the functions due to altered hydrographical conditions (7.2.2).	As far not already covered by N2000 in coastal waters: Key species and habitat types (including benthic communities) <sup>4</sup> significantly affected by the changes in hydrographical condition (needs to be determined on a case-by-case basis)	Model changes in habitats due to altered hydrographical conditions, using field data and validated model data. Note: only if 7.2.1 gives reason for concern it will be necessary to define the change in function for diverse habitats by interpreting the changes determined in 7.2.1 in terms of food web and life cycle of concerned fauna		

<sup>3</sup> CPs can fill this in more quantitatively depending on their local situation

<sup>4</sup> Habitats/species should be chosen on the basis of the lists determined by ICG Cobam.

## Experiences in setting targets for GES 7

The hydrographical conditions outlined under the MSFD are, to a large extent, comparable to the hydromorphological conditions referred to under the WFD (See Annex II “Characterisation of surface water types” section 1.2.4 coastal waters system B). However, the MSFD Annex III, Table 1, lists some additional characteristics. It is recommended, therefore, that the Initial Assessment should ensure these additional characteristics are appropriately considered.

MSFD (from Annex III, Table 1)	WFD (from Annex II, section 1.2.4 B)
<p><u>Physical and chemical features</u></p> <ul style="list-style-type: none"> <li>- Topography and bathymetry of the seabed</li> <li>- Annual and seasonal temperature regime and <i>ice cover</i></li> <li>- Current velocity</li> <li>- <i>Upwelling</i></li> <li>- Wave exposure</li> <li>- Mixing characteristics</li> <li>- Turbidity</li> <li>- <i>Residence time</i></li> <li>- Spatial and temporal distribution of salinity</li> <li>- <i>Spatial and temporal distribution of nutrients and oxygen</i></li> <li>- <i>pH, pCO<sub>2</sub> profiles or equivalent information used to measure marine acidification.</i></li> </ul> <p><u>Habitat types</u></p> <ul style="list-style-type: none"> <li>- The predominant seabed and water column habitat type(s) with a description of the characteristic physical and chemical features, such as depth, water temperature regime, currents and other water movements, salinity, structure and substrata composition of the seabed,</li> </ul>	<p><u>Obligatory</u></p> <ul style="list-style-type: none"> <li>- Latitude, longitude, depth</li> <li>- <i>Tidal range</i></li> <li>- Salinity</li> </ul> <p><u>Optional</u></p> <ul style="list-style-type: none"> <li>- Current velocity</li> <li>- Wave exposure</li> <li>- Mean water temperature</li> <li>- Mixing characteristics</li> <li>- Turbidity</li> <li>- <i>Retention time (of enclosed bays)</i></li> <li>- Mean substratum composition</li> <li>- Water temperature range</li> </ul>

*Italics indicate additional characteristics that are listed under the MSFD and not under the WFD or vice versa*

## Detailed consideration of approaches for target setting

**A good status for hydrographical conditions is hard to define.** For coastal waters, a description of GES with regard to D7 should, in the first place, be associated with the GES of coastal waters under the WFD. The description of GES under the MSFD should also be directly related to relevant habitats and species, in particular those listed in Annexes I and II of the EC-Habitats-Directive. These should be in a favourable conservation status and not damaged or destroyed due to human-induced alterations in hydrographical conditions. ‘Good Environmental Status’ should, in principle, be associated with known ‘normal’ status and modified accordingly to account for changes arising in prevailing environmental conditions such as climate change<sup>5</sup>. Even when the current status is not considered to be ideal in some areas that have already been impacted, reverting to a former state is unlikely to be feasible. As permanent changes to hydrographical

<sup>5</sup> As explained in the MSFD, preamble (34) In view of the dynamic nature of marine ecosystems and their natural variability, and given that the pressures and impacts on them may vary with the evolution of different patterns of human activity and the impact of climate change, it is essential to recognise that the determination of good environmental status may have to be adapted over time. Accordingly, it is appropriate that programmes of measures for the protection and management of the marine environment be flexible and adaptive and take account of scientific and technological developments. Provision should therefore be made for the updating of marine strategies on a regular basis.

conditions arise mostly from human activities such as coastal defence works, land reclamation or the building of other infrastructures, returning to a previous hydrographical state would likely result in a significant loss of invested capital and use benefits. Under the WFD these waters would be classified as heavily modified water bodies. In this context it should be noted, however, that in accordance with international obligations, abandoned or disused offshore installations have to be removed. The basis for this obligation is the principles given in Article 60 of the United Nations Convention on the Law of the Sea. In this connection, the IMO adopted in 1989 “Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone”. Furthermore, the OSPAR Commission adopted in 1998 a legally binding regulation for the disposal of disused offshore oil and gas installations (OSPAR Decision 98/3 on the Disposal of Disused Offshore Installations).<sup>6</sup>

**This descriptor is meant to address new developments** such as wind farms, large artificial islands, etc. For this reason it is pertinent to choose a baseline in the (very) near future for the initial assessment from which good status can be based upon. This does not mean that the current status can or should be maintained in all circumstances; it is important to recognise there can be good reasons for an activity that changes the hydrographical conditions and some of these changes may only be temporary. Efforts should, however, be made to prevent further deterioration and to minimise any negative effects on the ecosystem. In some cases it may even be possible to promote positive effects. This may be achieved through existing EIA and associated measures. Also measures taken for the WFD may already improve several aspects of Descriptor 7 - e.g. many MS plan to improve the possibilities for migrating fish in and between marine and freshwaters. If needed, deterioration by new permanent structures or activities can be prevented by mitigation, for example by facilitating development of habitats that were lost or by improving the quality of the remaining habitat.

**This descriptor is meant to address large-scale developments**. Smaller scale activities, such as aggregate extraction, capital dredging etc. can also result in hydrographical changes – albeit at a more local, site specific scale. Before implementing new plans or projects, the making of an Environmental Impact Assessment (EIA) is compulsory for a range of human activities, including the activities mentioned above. If such works are part of a higher level strategic plan, a Strategic Environmental Impact Assessment (SEA) is often required. Hydrographical changes caused by those smaller scale activities are not considered under this Descriptor because they are sufficiently covered by existing legislation.<sup>7</sup>

**This descriptor is meant to address permanent alterations** in hydrographical conditions. Therefore, it is important to differentiate between permanent and temporary changes – potential for recovery, and the timescales involved need to be factored in. It is recommended that constructions lasting for more than [ 10 (e.g.)]<sup>8</sup> years should be considered to be permanent.

Close coordination with the Descriptors 1, 4 and 6 covering Biodiversity, Food Webs and Sea Floor Integrity will be necessary due to the links between them. Some of the targets and indicators for these Descriptors may also be relevant in relation to Descriptor 7. In the event that mixing-characteristics and / or retention time are changed, a link to Descriptor 5 on Eutrophication should also be made since both are important factors with regard to eutrophication. A link to the Descriptor 10 on Litter could also be appropriate since hydrographical conditions could be an important factor in the distribution and local accumulation of litter

The main target in the table, to minimise impact, is derived from the Directive. The subtargets are suggestions. Further development of appropriate sub-targets is needed. These targets may be more quantitative, such as a proportion of the seabed that should not experience significant negative effects by

<sup>6</sup> Text in quotation marks from: § 92 of the OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Developments (Agreement 2008/3)

<sup>7</sup> EIA Directive 85/337/EEC, SEA Directive 2001/42/EC

<sup>8</sup> EIHA 2012 should discuss when an alteration is considered to be permanent (see follow-up section ‘Medium Term’).

human activity causing changes in hydrographical conditions. In this context it is important to clarify when a pressure or a combination of pressures becomes significant.

Marine spatial planning should be used as a tool to incorporate environmental concerns when installing new structures in the marine environment in order to minimise impacts on habitats and biota. The appropriate modelling and assessment should be undertaken through proposals coming forward through the licensing system *i.e.* as licensing applications and during EIA. Furthermore, best available techniques that minimise the impacts on habitat and biota should be used for the installation and operation of structures.

Large-scale developments and small scale-developments that have large cumulative impacts on GES for Descriptor 7 should be addressed in the EIA and SEA processes. 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 component (*i.e.* considering the total level of impacts on a component and assessing the potential additional impact of any new proposals in the light of the definition of GES and associated targets). Also it is an obligation under the EU Directive on environmental impact assessment to notify and consult neighbouring countries on projects under consideration that are likely to have adverse environmental impact across national boundaries.

## Monitoring

**The EC has indicated that this indicator is related to planned activities that will have to fulfil EIA requirements. Any possible additional<sup>9</sup> monitoring should be seen in the light of such activities.**

Any monitoring programme tailored to meet the requirements of D7 should not focus on extensive and expansive monitoring of changes in benthic fauna (which can have several different causes), but be designed to determine the extent and size of any changes in current and wave regimes resulting from human activities. This could be undertaken within EIA. Bottom shear stress is one example of a good indicator of changes in the dynamic environment of the seabed. Another good parameter could be the pressure variation range induced by waves at the seabed, where relevant. This repetitive process facilitates the erosion of crumbly sediments so that an increase in wave height may significantly increase the erosion of specific habitat.

Also important is that the monitoring of the effects of hydrographical changes should not aim primarily at field based measurements in the affected area, but concentrate on modelling of the changes in currents, waves and bottom shear stress due to human activities in the area (this could be undertaken within EIA), using appropriately calibrated models, validated with *in situ* datasets. Naturally, the models used must be based on, and be validated by, regular field measurements. This will make it possible to determine the extent of any parameter changes including how large the change will be in a certain area. From this starting point the effect on marine ecosystems can be determined. Field measurements will only be necessary in areas where the changes are large enough to have significant effects on the marine ecosystem at which point ground truthing will be considered appropriate. In such a situation ongoing monitoring of changes in benthic fauna could be used to indicate any effects of permanent hydrographical alterations.

Monitoring undertaken for the WFD on hydromorphological changes in coastal waters is also important for meeting the requirements of the MSFD, especially given that the majority of current permanent alterations to hydrographical conditions arise from human activities occurring in coastal marine waters. In these cases the necessary measures and monitoring are entirely the responsibility of the WFD and the MSFD will not go further or take additional action.

Even though climate change is considered to be part of the prevailing environmental conditions and therefore not addressed through the MSFD, for the interpretation of monitoring data, the effects from climate change need to be taken into account. For this reason the existence of an adequate monitoring program able to describe these background large-scale changes is an implicit requirement for this descriptor and for the

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<sup>9</sup> See also next paragraph for the need to maintain existing long-term time series



MSFD as a whole. Some countries lacking an established climate change observation program for the oceans are advised to consider the inclusion of large-scale hydrographical changes in their current monitoring regime as part of this descriptor.

The following table lists all existing hydrographical monitoring currently being undertaken by CPs.

Indicator	Monitoring Type	BE	DE	DK	ES	FR	IE	IS	NL	NO	PT	SE	UK
7.1.1	Bathymetry	X				X			X			X	
7.1.1	Measurements and modelling of currents and waves	X	X		X	XX			X				X
7.1.1	Salinity, temperature and pH	X	X		X		X		X				X

Additionally, some countries have indicated that they undertake monitoring of hydrographical properties and bathymetric surveys in relation to construction projects.

## Appropriate scales of assessment

A scale must be applied that detects hydrographical changes in line with the intentions of the MSFD in preventing significant negative effects on ecosystems. At EIHA it was advised that **the most appropriate scale for assessing this Descriptor is one equivalent to EUNIS level 3**. This has been agreed by CoG(2)2011. Emphasis has to be placed also on the proportion of habitat that is affected. On this scale the effects of permanent changes in conditions on the marine ecosystem can be detected in a comparable manner. However, some further discussion within OSPAR will be needed on the most relevant scale at which to assess this Descriptor. It will also be important to consider the use of scale for other Descriptors, in particular Descriptor 6.

Reasoning for advising to use a scale equivalent to EUNIS level 3 for assessing Descriptor 7 are as follows. Descriptor 7 states that the permanent changes to hydrographical conditions should not adversely affect marine ecosystems. Because human interventions on hydrographical conditions are hardly visible on a very large scale, e.g. on the scale of the subregion North Sea, it will be necessary to consider smaller scales in the first instance in order to build a full picture of GES at the relevant scale. It should be noted that using very small scales (e.g. EUNIS level 5 habitats) to determine GES is not appropriate given they cannot be connected directly to status of marine ecosystems, as required under the MSFD.

A lot of the above mentioned human activities occur on a small scale in the coastal waters and have been considered under and covered by the WFD. The small-scale changes are also considered in other Directives like the Birds and Habitat Directives and especially the Directive on Environmental Impact Assessment. If appropriate an effect on that scale should be judged and monitored under those Directives and the national EIA legislation. However, small-scale changes can be aggregated up to assessments at larger scales and this would give the opportunity to identify where many small-scale changes add up to a significant cumulative impact across a larger spatial extent that reaches the scale of the MSFD. At present we are unable to efficiently assess these cumulative impacts, even though it is recognised that this is needed. Therefore, more work on assessing cumulative impacts is needed (see section 'Short term').

## Recommendation

Unless there is evidence to the contrary, the requirements under the MSFD to address Descriptor 7 might be fulfilled if:

- measures have been identified under the WFD to safeguard GES;
- permanent changes of hydrographical conditions are restricted to the coastal waters;
- permanent changes of hydrographical conditions are assessed in the Initial Assessment.

However it has to be recognised that, in the future, situations may occur where WFD does not apply *i.e.* outside of coastal waters or where EIA is not enough *i.e.* in picking up effectively those cumulative effects. Examples are offshore windfarms, airports, a tidal power barrage across the southern North Sea, *etc.*

**Under the condition that effects of the permanent changes of hydrographical conditions are restricted to the coastal waters, it is recommended that Descriptor 7 does not need further work.**

## Taking forward regional work on descriptor 7

### Short term (up to July 2012)

Since CPs who responded to the questionnaire indicated that they believe GES is currently not at stake for this Descriptor, it does not seem to be a significant priority in the short term. However, between now and July 2012 it is recommended that CPs use ICG-MSFD as a forum for exchanging information on the approach they are taking to defining GES and developing targets and indicators for this Descriptor as well as for other Descriptors that may be relevant in relation to Descriptor 7 (see § beginning: 'This descriptor is meant to address large-scale developments').

At ICG MSFD (4) the following tasks for improvement of coherence were identified:

- a. Each CP takes into account as much as possible the recommendations formulated in this advice document;
- b. Each CP addresses the following concepts in the qualitative definition of GES to be adopted by each Member State:
  - i. The spatial scale to consider for impacts to take into account in the framework of D7 is EUNIS level 3;
  - ii. Cumulative impacts;
  - iii. The notion of "permanent" modifications.
- c. identify further actions for EIHA to take forward after July 2012;
- d. [develop common text for an environmental target regarding EIA/SEA] – ES/UK/FR.

### Medium term (EIHA 2012 – OSPAR 2013)

At EIHA 2012 an ICG-hydrographical conditions could be considered. This ICG would need a dedicated task leader<sup>10</sup> and commitment from CPs to actively participate; also it would need a clearly outlined work package for the period up to EIHA 2013. This work package should include:

- Coordinate methodologies on the determination of GES, on the development of targets and on indicators for measuring progress towards GES descriptor 7 (EIHA 2011/12 product 21). Reach further coherence. Topics that should be discussed include:
  - When an alteration is considered to be permanent;
  - When a pressure or combination of pressures becomes significant.
- Coordinate data and develop methodological standards for (monitoring of) hydrographical conditions at the scale of marine regions (starting with identification of existing best practice);
- Prioritize the list of ecosystem components to take into account under D7:
  - Physical (EIHA);
  - Biological (species/habitats) – (ICG-Cobam).

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<sup>10</sup> The Netherlands has committed to act as a task leader up to OSPAR 2011. At EIHA 2012 a new task leader should be found.

- carry out a reflection on the efficiency of current existing regulation (EIA/SEA, WFD, HD) to reach GES for D7 (taking into account UK work on the subject).

One option could be to hold a one-off meeting back-to-back with EIHA 2012 to exchange information and address any defined tasks.

The task leader of this work should request the latest outputs from the ICES Working Group on oceanic hydrography to inform this work.

### **Long term**

OSPAR should continue to address the spatial and temporal cumulative effects of different activities on hydrographical conditions. This should be part of existing work of ICG-C.

CPs should bring forward any plans that may cause permanent changes of hydrographical conditions outside coastal waters and therefore not covered under the WFD. OSPAR should at that point in time start a discussion on how these will be considered.



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**OSPAR's vision is of a clean, healthy and biologically diverse  
North-East Atlantic used sustainably**

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