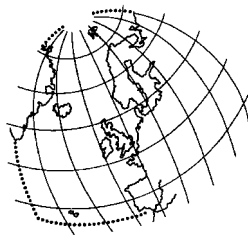


**Synergies between the OSPAR
Comprehensive Procedure, the integrated
set of OSPAR Ecological Quality
Objectives (EcoQOs) for eutrophication
and the EC Water Framework Directive**



**OSPAR Commission
2005**

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. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

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. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, 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 et la Suisse et approuvée par la Communauté européenne et l'Espagne.

© OSPAR Commission, 2005. Permission may be granted by the publishers for the report to be wholly or partly reproduced in publications provided that the source of the extract is clearly indicated.

© Commission OSPAR, 2005. *La reproduction de tout ou partie de ce rapport dans une publication peut être autorisée par l'Editeur, sous réserve que l'origine de l'extrait soit clairement mentionnée.*

ISBN 1-904426-73-5
Publication Number 231

contents

Executive Summary 4

Récapitulatif 4

1. Introduction 5

2. Similarities and differences with respect to eutrophication 5

 2.1 The OSPAR Common Procedure 5

 2.2 The Water Framework Directive 5

 2.3 OSPAR Ecological Quality Objectives 5

 2.4 Similarities and differences 6

3. Comparison of the different assessment “elements” 6

4. Recognising that different waters are different 7

5. Setting the boundaries between different classes 7

6. Bringing the “elements” together in assessments 7

7. Developing synergies in monitoring requirements 8

8. References 8

Executive Summary

This analysis gives an overview of similarities and differences in assessment tools available in OSPAR and the European Community frameworks to evaluate the ecological quality of marine waters with regard to eutrophication.

It compares the assessment parameters and their assessment levels set under the Comprehensive Procedure of the OSPAR Common Procedure for the Identification of the Eutrophication Status of the OSPAR Maritime Area and related Ecological Quality Objectives (EcoQOs) developed by OSPAR for eutrophication with the biological quality requirements under the EC Water Framework Directive for a good ecological status of a surface water body.

There is considerable agreement between OSPAR and Water Framework Directive requirements on the biological elements and assessment parameters necessary for assessing a water body's quality with regard to eutrophication and the need to take account of a water body's specific features in the assessment and classification process. Differences exist, however, in the detail.

While some OSPAR assessment parameters, for example relating to phytoplankton, aquatic flora and benthic invertebrate fauna for the assessment of direct and indirect eutrophication effects, are narrower in scope than comparable parameters under the Water Framework Directive, they still can assist the assessment process under the Water Framework Directive. Despite differences in the process of the overall quality classification of a water body with regard to its eutrophication status, a considerable degree of coherence has been achieved in setting the relevant boundaries for quality classes in OSPAR and under the Water Framework Directive for the purpose of identifying the eutrophication status of a water body. In conclusion, a number of opportunities exist in both forums to mutually seek complementation, harmonisation or synergy, as appropriate, with regard to eutrophication assessment parameters, assessment processes and water body classifications.

There are thus considerable similarities between the approach of the Water Framework Directive and that of the Comprehensive Procedure and the related integrated set of EcoQOs for eutrophication. There are, however, also limits to synergies because of important differences such as in the geographical coverage of marine waters by the assessment regimes under OSPAR instruments and the Water Framework Directive. In addition, the Comprehensive Procedure and OSPAR EcoQOs for eutrophication are only directed to the nutrients/eutrophication issue while the Water Framework Directive relates to (effects of) all human pressures.

Récapitulatif

Le récapitulatif sera inséré lorsque sa traduction de l'anglais aura été faite.

1. Introduction

1. The aim of this document is to provide information for discussion on synergies and similarities between work carried out in OSPAR in relation to eutrophication assessment and the respective development of eutrophication related Ecological Quality Objectives (EcoQOs), and in the European Community (EC) concerning the development of elements needed for the implementation of the Water Framework Directive. The intention is to ensure maximum added value and to avoid duplication of work by making the best use of expertise and conclusions in the different areas of activity in a spirit of mutual learning.

2. Similarities and differences with respect to eutrophication

2.1 The OSPAR Common Procedure

2. OSPAR has a key aim of achieving “a healthy marine environment where eutrophication does not occur” by 2010. The assessment of the status of waters, whether this is a (potential) problem area or a non-problem area with respect to eutrophication, is detailed in the Common Procedure for the Identification of the Eutrophication Status of the OSPAR Maritime Area (the “Common Procedure”). Following a “Screening Procedure” to identify which maritime areas are likely to be obvious non-problem areas with regard to eutrophication, the “Comprehensive Procedure” applies to all remaining areas, including local areas located in wider non-problem areas. The Comprehensive Procedure sets out the necessary assessment tools to identify the specific eutrophication status of marine waters. Its application may be repeated as many times as necessary.

3. In the first application of the “Comprehensive Procedure” of the Common Procedure (OSPAR 2003), a set of harmonised assessment parameters was used which represent cause factors and direct and indirect effects of eutrophication (OSPAR 2002). Based on the experience gained from this assessment, OSPAR 2005 reviewed the assessment parameters and their assessment levels with regard to the second application of the Comprehensive Procedure scheduled for 2007/2008. The harmonised assessment parameters are a lowest common denominator set derived from a checklist for a holistic assessment of the eutrophication status of the maritime area of the OSPAR Convention.

2.2 The Water Framework Directive

4. The Water Framework Directive has a key aim of achieving at least good ecological status for all waters, including transitional and coastal waters by 2015. The ecological status of a water body is determined by its assessment against a defined set of biological, physico-chemical and hydromorphological quality elements. There is no specific reference to eutrophication in the Directive but there is a requirement to undertake an assessment of the risk of not meeting good status due to human pressures, including nutrient pressure. In this way the Water Framework Directive also covers the eutrophication issue.

2.3 OSPAR Ecological Quality Objectives

5. OSPAR is also piloting an integrated set of Ecological Quality Objectives (EcoQOs) for eutrophication for the North Sea which was agreed by the Ministers responsible for the protection of the environment of the North Sea and the European Community at the Fifth North Sea Ministerial Conference, held at Bergen, Norway, on 21-22 March 2002 (the “Bergen Declaration”). This set of five EcoQOs is derived directly from the harmonised assessment parameters and their respective assessment levels of the Comprehensive Procedure of the Common Procedure, and is used as an integrated set (Table 1 at Annex 1). With regard to eutrophication, the desired level of ecological quality (the EcoQO) is referred to as assessment level. Parameters found in concentrations or levels above the relevant assessment level are at “elevated levels”.

6. The EcoQOs for eutrophication are closely linked to management (by showing a cause/effect relationship between nutrient enrichment and eutrophication effects), and monitoring (Eutrophication Monitoring Programme and OSPAR JAMP Guidelines). They provide the framework for evaluating the OSPAR 50% nutrient (N and P) reduction target and for assessing whether the general goal is reached “to achieve by the year 2010 a healthy marine environment where eutrophication does not occur”. This integrated set of EcoQOs for eutrophication is part of a wider framework that is the basis for an ecosystem approach to management of human activities. The assessment of ecosystem health based on EcoQOs (expressed as the desired levels of ecological quality) is similar to the use of biological, physico-chemical and hydromorphological quality elements to assess the ecological status under the Water Framework Directive.

7. In 2005, OSPAR reviewed the EcoQOs for eutrophication and their role, as an integrated set, in the suite of OSPAR EcoQOs for the evaluation of the ecological quality of the OSPAR Convention area (see “Background Document”).

2.4 Similarities and differences

8. There are considerable similarities between the approach of the Water Framework Directive, that of the Comprehensive Procedure and the approach of the related integrated set of EcoQOs for eutrophication. The two latter, however, are only directed to the nutrients/eutrophication issue while the Water Framework Directive relates to all human pressures.

9. There are also differences in approaches:

- in *geographical coverage*, namely: The Water Framework Directive covers waters up to one nautical mile seaward from the coastal base line for biological quality elements, including nutrients and oxygen, and 12 nautical miles for compliance with environmental quality standards for the 33 hazardous substances which does not include nutrients. OSPAR has a much broader geographical coverage (North-East Atlantic) and includes estuaries as well.
- in the number of “*classes*” of ecological quality: The Water Framework Directive provides for the classification of water types including estuaries and coastal waters, comprising the following five classes: high, good, moderate, poor and bad. The Comprehensive Procedures provides for a classification in problem areas, initial potential problem areas (showing elevated nutrient levels but where levels of eutrophication effects are not yet known), and non-problem areas. Figure 1 shows the relationship between the Comprehensive Procedure, the integrated set of OSPAR EcoQOs for eutrophication and the classification under the Water Framework Directive. It is clear that the integrated set of EcoQOs for eutrophication allows a certain level of deviation from background concentrations (see also Table 1 at Annex 1) as is the case under the Water Framework Directive for waters classified as “good” (“slight disturbance”).
- the Comprehensive Procedure focuses only on eutrophication, while the Water Framework Directive also addresses other aspects (e.g. contaminants) in relation to the five different quality classes.

3. Comparison of the different assessment “elements”

10. A comparison of the biological quality elements of the Water Framework Directive with the OSPAR ecological quality elements and the harmonised assessment parameters (Table 1 at Annex 1) shows considerable similarity. The OSPAR “elements” that are relevant to the Water Framework Directive are described below. More details are given in Tables 1, 2a and 2b in Annex 1 including specification of differences relating to biological elements for transitional and coastal waters.

11. Phytoplankton. The Water Framework Directive requires assessment of the “*composition, abundance and biomass of phytoplankton*” as well as the “*frequency and intensity of planktonic bloom*” – OSPAR has identified (i) phytoplankton indicator species, an important element of composition, and has set area-specific abundance assessment levels for these species, and (ii) chlorophyll a, an indicator of phytoplankton biomass, and has set area-specific assessment levels. There is a comparable OSPAR EcoQO for eutrophication.

12. Aquatic flora (macroalgae and angiosperms).¹ The Water Framework Directive requires assessment of the “*composition and abundance of aquatic flora*” – OSPAR has not developed this criterion in depth but simply seeks to distinguish a shift from long-lived to short-lived nuisance species. A prerequisite for detection of such shifts is a sufficient knowledge about composition (and abundance) of these species. There is no comparable OSPAR EcoQO for eutrophication.

13. Benthic invertebrate fauna. The Water Framework Directive requires an assessment of the “*level of diversity and abundance of invertebrate taxa*” and the “*presence of disturbance-sensitive taxa*” – OSPAR has not developed this criterion in depth but simply seeks to distinguish changes and, *in extremis*, kills of benthic fauna linked to oxygen deficiency and nuisance and toxic phytoplankton indicator species. There is a comparable OSPAR EcoQO for eutrophication.

14. Other factors. The Water Framework Directive requires further assessment on the basis of hydromorphological elements and physico-chemical elements which support the biological elements.

¹ See different definitions of these quality elements for transitional and coastal waters in the Water Framework Directive as explained in Tables 2a and 2b in Annex 1.

OSPAR developed area-specific assessment levels for winter DIN and DIP concentrations (and for the respective N/P ratio) and for oxygen. In the assessment, OSPAR also takes into account possible trends in riverine and direct nutrient inputs. Furthermore, OSPAR recognises a set of supporting environmental factors but these are not used in the same way as under the Water Framework Directive.

15. The work done so far by OSPAR in designing and describing the assessment parameters, should be used as a relevant contribution to specific elements of the implementation of the Water Framework Directive. The existing harmonised assessment parameters and their respective area-specific assessment levels (and the related Ecological Quality Objectives) (Table 1 in Annex 1) can be used as part of the Water Framework Directive process but it is equally clear that further elaboration of the different biological quality elements (already underway) is required for the Water Framework Directive and could help the further development of the Comprehensive Procedure towards a highest common denominator model based on more components of the holistic checklist. There is a clear need to feed information and experience both ways.

4. Recognising that different waters are different

16. The OSPAR methods and the methods set out by the Water Framework Directive recognise differences between different types of waters. This is expressed in a specified way in the Water Framework Directive via a physical attribute-based typology. The Comprehensive Procedure also recognises area-specificity when selecting adequate assessment parameters and defining their respective background concentrations and assessment levels. Both approaches are used to help determine area-specific aspects for the relevant reference levels or conditions.

5. Setting the boundaries between different classes

17. As a starting point, the elevated level for some of the assessment parameters established in the first application of the Comprehensive Procedure was defined as a maximum % deviation of 50 compared to the natural background level. For the second application of the Comprehensive Procedure the assessment level for concentrations, except for oxygen, and for the N/P ratio shall be determined as a justified area-specific % deviation from background not exceeding 50%. In relation to this, the OSPAR assessment for the coastal areas and the Water Framework Directive's intercalibration process complement each other. In the context of eutrophication, the area-specific boundary between a problem area and a non-problem area in the coastal region should align with the boundary between the good and the moderate ecological status under the Water Framework Directive.

6. Bringing the “elements” together in assessments

18. There are differences between the methods by which the various elements are integrated to form an overall assessment in each approach. The Water Framework Directive requires the assessment of the biological elements against the reference conditions to produce an ecological quality ratio (EQR, range of 0-1) and has a “one out, all out” principle at the level of the biological quality elements. Likewise, the Comprehensive Procedure uses assessment levels and area-specific/historical background concentrations and levels for each parameter. On the basis of these parameters causative factors (Category I) and nutrient enrichment effects (Categories II-IV) are measured. The result of the assessment process is scored as ‘+’, ‘-’ or ‘?’ and is integrated in a table with categorised assessment parameters for the initial classification of areas with regard to eutrophication (cf. table in Annex 2).

19. The Comprehensive Procedure seeks to finally divide waters into two classes: non-problem areas (high/good status under the Water Framework Directive), which is the desired state, and problem areas (moderate/poor/bad status under the Water Framework Directive). There is a possibility within the Comprehensive Procedure to further discriminate classes of problem areas into moderate, poor and bad. For a comparison of the classification under the Comprehensive Procedure and the Water Framework Directive see Figure 1. In addition, water bodies which show an elevated level of nutrient enrichment but where the level of eutrophication effects is still unknown are initially classified as potential problem areas. Latest within five years of their classification, monitoring and assessment in conformity with the Comprehensive Procedure and/or research has to prove whether they finally classify as non-problem or problem areas. In the context of eutrophication, it seems appropriate to equate waters that are non-problem areas according to the Comprehensive Procedure with the good and high ecological status of the Water Framework Directive (cf. Figure 1).

20. It should be noted, however, that for example chemical contamination may alter the status of an area from that derived from an assessment of the eutrophication status only. Thus, a non-problem area with

respect to eutrophication under the OSPAR Common Procedure may have moderate, poor or even bad quality status under the Water Framework Directive due to effects of hazardous substances.

21. In overall conclusion from what is said in the paragraphs above, Figure 1 on the relationship between the classification of water under the Comprehensive Procedure, the integrated set of OSPAR EcoQOs for eutrophication and the Water Framework Directive can be drafted as follows:

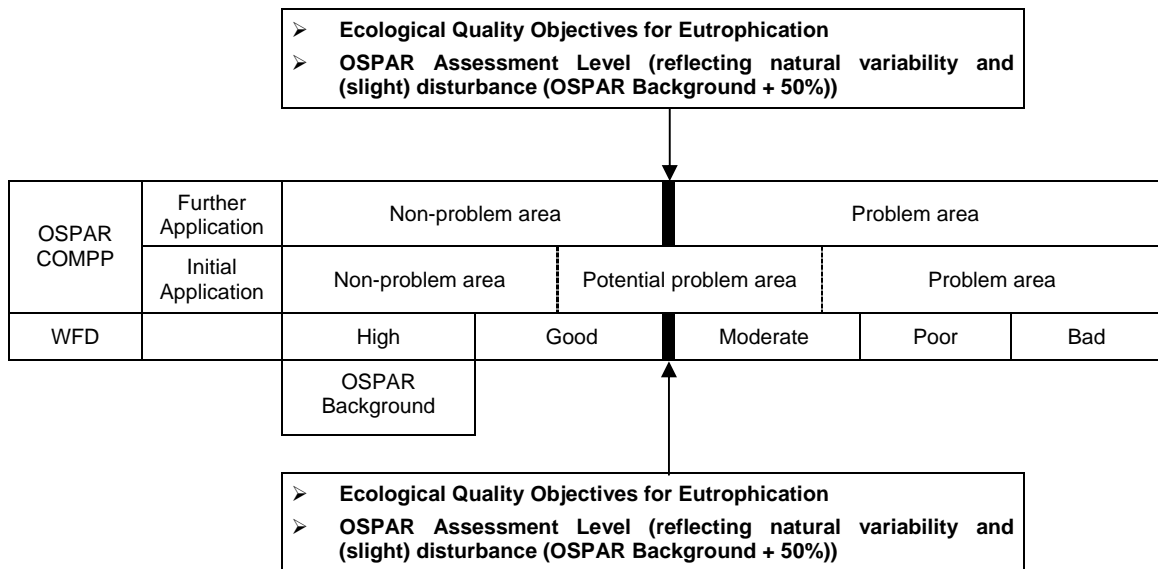


Figure 2. Relationship between the classification under the Comprehensive Procedure, the integrated set of EcoQOs for eutrophication and the Water Framework Directive.

Note: Assessment levels are based on a justified area-specific % deviation from background not exceeding 50%. OSPAR COMPP = the Comprehensive Procedure; WFD = the Water Framework Directive.

7. Developing synergies in monitoring requirements

22. Synergies in monitoring under OSPAR and WFD requirements have been subject to a close analysis in OSPAR resulting in a synergy report (OSPAR 2005). Further synergies need to be developed. To this end, work is ongoing in the context of the 2005 review of the Common Procedure which might trigger more revisions of this Procedure, and the continuous work on the development of future additional harmonized assessment parameters and their assessment levels. It might be used in mutual efforts to seek co-ordination, harmonisation or synergies, as appropriate, in the EC under the Water Framework Directive and in OSPAR under the Comprehensive Procedure.

8. References

Background Document: OSPAR Background Document on Ecological Quality Objectives for the Greater North Sea with Regard to Nutrients and Eutrophication Effects, OSPAR publication no. 229 (2005).

Bergen Declaration: Fifth International Conference on the Protection of the North Sea, 20-21 March 2002, Bergen Norway, ISBN-82-457-0361-3.

Common Procedure: Common Procedure for the Identification of the Eutrophication Status of the Maritime Area of the Oslo and Paris Conventions, reference number: 2005-3, updating and superseding OSPAR agreement, reference number 1997-11.

Eutrophication Monitoring Programme: Agreement on the Eutrophication Monitoring Programme, reference number 2005-4, updating and superseding the Nutrient Monitoring Programme, reference number 1995-5.

OSPAR 2002: OSPAR Agreement on Common Assessment Criteria, their Assessment Levels and Area Classification within the Comprehensive Procedure of the Common Procedure, reference number 2002-20, updated and superseded by OSPAR agreement, reference number 2005-3.

OSPAR 2003: OSPAR Integrated Report 2003 on the Eutrophication Status of the OSPAR Maritime Area based upon the First Application of the Comprehensive Procedure, OSPAR publication no. 189 (2003), ISBN: 1-904426-25-5.

OSPAR 2005: Synergies in Assessment and Monitoring between OSPAR and the European Union. Analysis of synergies in assessment and monitoring of hazardous substances, eutrophication, radioactive substances and offshore industry in the North-East Atlantic, OSPAR publication no. 230 (2005).

OSPAR JAMP Guidelines: JAMP Eutrophication Monitoring Guidelines relating to nutrients, oxygen, chlorophyll *a*, phytoplankton indicator species, and benthos and quality assurance procedures; reference numbers 1997-2 to 1997-6.

Water Framework Directive: Directive 2000/60/EC of the European Parliament and the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

Comparative overview tables

Table 1: Comparison between assessment parameters and assessment levels of the Comprehensive Procedure, Ecological Quality elements, and Ecological Quality Objectives for eutrophication

Comprehensive Procedure assessment parameters and their assessment levels ²	Ecological Quality elements (ref. Bergen Declaration) ³	Ecological Quality Objectives (ref. Bergen Declaration) ³
<p><i>Category I; Degree of nutrient enrichment:</i></p> <p>Winter DIN and/or DIP concentrations:</p> <p>Assessment level(s) (defined as % deviation from salinity-related and/or area-specific background concentration not exceeding 50%)</p>	<p>(t) Winter nutrient concentrations: Dissolved Inorganic Nitrogen (DIN) and Dissolved Inorganic Phosphate (DIP)</p>	<p>Winter DIN and/or DIP should remain below elevated levels, defined as concentrations > 50% above salinity-related and/or region-specific natural background concentrations.</p>
<p><i>Category II; Direct effects of nutrient enrichment:</i></p> <p>Maximum and mean chlorophyll a concentration:</p> <p>Assessment level(s) (defined as % deviation from spatial (offshore) / historical background concentrations not exceeding 50%)</p>	<p>(q) Phytoplankton chlorophyll a</p>	<p>Maximum and mean chlorophyll a concentrations during the growing season should remain below elevated levels, defined as concentrations > 50% above the spatial (offshore) and/or historical background concentration.</p>
<p><i>Category II; Direct effects of nutrient enrichment:</i></p> <p>Area-specific phytoplankton indicator species:</p> <p>Elevated levels (and increased duration of blooms)</p>	<p>(r) Phytoplankton indicator species for eutrophication</p>	<p>Region/area-specific phytoplankton eutrophication indicator species should remain below respective nuisance and/or toxic elevated levels (and increased duration).</p>
<p><i>Category III; Indirect effects of nutrient enrichment:</i></p> <p>Oxygen deficiency:</p> <p>Decreased levels (< 2 mg/l: acute toxicity; 2 - 6 mg/l: deficiency) and lowered % oxygen saturation</p>	<p>(u) Oxygen</p>	<p>Oxygen concentration, decreased as an indirect effect of nutrient enrichment, should remain above region-specific oxygen deficiency levels, ranging from 4-6 mg oxygen per litre.</p>
<p><i>Category III; Indirect effects of nutrient enrichment:</i></p> <p>Changes/kills in zoobenthos and fish kills:</p> <p>Kills (in relation to oxygen deficiency and/or toxic algae)</p> <p>Long-term changes in zoobenthos biomass and species composition</p>	<p>(m) Changes/kills in zoobenthos in relation to eutrophication</p>	<p>There should be no kills in benthic animal species as a result of oxygen deficiency and/or toxic phytoplankton species.</p>

² In the first application of the Comprehensive Procedure, the assessment level was defined as the concentration 50% above the salinity-related and/or area-specific background concentration. This definition was reviewed in 2005 and superseded by the definition as "a % deviation from background not exceeding 50%" (reference number: 2005-3).

³ The Ecological Quality Objectives for elements (m), (q), (r), (t) and (u) form an integrated set and cannot be considered in isolation (cf. Bergen Declaration, Annex 3, Table B). They are related by cause/effect relations: causes (winter DIN and DIP), direct effects (phytoplankton indicator species, chlorophyll a) and indirect effects of eutrophication (oxygen, zoobenthos changes/kills).

Table 2a: Relationship between the elements of the Water Framework Directive (WFD), the assessment parameters of the Comprehensive Procedure and the OSPAR Ecological Quality (EcoQ)-elements

WFD elements ⁴	Comprehensive Procedure	OSPAR EcoQ-elements
Biological elements		
<ul style="list-style-type: none"> • <i>Composition, abundance and biomass of phytoplankton; frequency and intensity of planktonic blooms</i> • <i>TW: Composition of macroalgal taxa and changes in macroalgal cover</i> <i>Composition and changes in abundance of angiosperms</i> • <i>CW: Presence of disturbance-sensitive macroalgal and angiosperm taxa. Macroalgal cover and angiosperm abundance</i> • <i>Level of diversity and abundance of benthic invertebrate taxa</i> <i>Presence of disturbance-sensitive taxa</i> 	<ul style="list-style-type: none"> • Phytoplankton indicator species and shifts in species (duration/frequency of blooms) • Algal toxins • Chlorophyll a • Macrophytes including macroalgae shifts from long-lived to short-lived nuisance species • Changes/kills in zoobenthos • Changes in zoobenthos biomass and species composition 	<ul style="list-style-type: none"> • Phytoplankton indicator species for eutrophication • Phytoplankton chlorophyll a • Changes/kills in zoobenthos in relation to eutrophication
Hydromorphological elements		
<p><i>Morphological conditions:</i></p> <ul style="list-style-type: none"> • <i>depth variation</i> • <i>substrate condition/structure</i> • <i>structure/conditions of the inter-tidal zone</i> <p><i>Tidal regime:</i></p> <ul style="list-style-type: none"> • <i>direction of dominant currents</i> • <i>wave exposure</i> 	<p>See list of environmental factors in § 3.3 of the Common Procedure (reference number 2005-3)</p> <ul style="list-style-type: none"> • hydrodynamic conditions 	
Chemical and physico-chemical elements		
<p><i>General:</i></p> <ul style="list-style-type: none"> • <i>Transparency</i> • <i>Thermal conditions</i> • <i>Salinity</i> • <i>Oxygenation conditions</i> • <i>Nutrient conditions</i> <p><i>Specific Pollutants:</i></p> <ul style="list-style-type: none"> • <i>Pollution by all priority substances identified as being discharged into the body of water</i> • <i>Pollution of other substances identified as being discharged in significant quantities into the body of water.</i> 	<p>Supporting environmental factors</p> <ul style="list-style-type: none"> • SEF • SEF • SEF • Degree of oxygen deficiency • Winter DIN and DIP concentrations • Organic carbon/organic matter 	<ul style="list-style-type: none"> • Oxygen • Winter nutrient (DIN and DIP) concentrations
<i>Impact / pressure</i>	<ul style="list-style-type: none"> • Riverine input and direct discharges of nitrogen and phosphorus • Atmospheric N input (under investigation) 	

⁴ The Water Framework Directive sets different elements for transitional waters (TW) in table 1.2.3. of its Annex V and for coastal waters (CW) referred to in table 1.2.4. of Annex V. The main differences concern biological elements, namely macroalgae and angiosperms.

Table 2b: Relationship between the integrated set of OSPAR Ecological Quality Objectives (EcoQOs) for eutrophication, the “good” and “high” status under the Water Framework Directive (WFD) and the Comprehensive Procedure

OSPAR EcoQOs for eutrophication ⁵	Water Framework Directive (WFD) ⁶ (ref. tables 1.2.3. and 1.2.4., Annex V to WFD)		Comprehensive Procedure
	<i>“Good” ecological status</i>	<i>“High” ecological status</i>	
<i>Phytoplankton</i>			
<p>Region/area-specific phytoplankton eutrophication indicator species should remain below respective nuisance and/or toxic elevated levels (and increased duration).</p> <p>Maximum and mean chlorophyll <i>a</i> concentrations during the growing season should remain below a justified area-specific % deviation from background not exceeding 50%.</p>	<p>The composition and abundance of planktonic taxa show slight signs of disturbance (<i>CW</i>) or slight changes (<i>TW</i>).</p> <p>There are slight changes in biomass compared to the type-specific conditions. Such changes do not indicate any accelerated growth of algae resulting in undesirable disturbance to the balance of organisms present in the water body or to the (<i>physio-chemical</i>) quality of the water.</p> <p>A slight increase in the frequency and intensity of the type-specific planktonic blooms may occur.</p>	<p>The composition and abundance of the phytoplanktonic taxa are consistent with undisturbed conditions.</p> <p>The average phytoplankton biomass is consistent with the type-specific physico-chemical conditions and is not such as to significantly alter the type-specific transparency conditions.</p> <p>Planktonic blooms occur at a frequency and intensity which is consistent with the type-specific physico-chemical conditions.</p>	<p>Phytoplankton indicator species: area-specific assessment levels and increased duration of blooms.</p> <p>Maximum and mean chlorophyll <i>a</i> concentrations in the growing season:</p> <p>Area-specific assessment levels</p>
<i>Macroalgae and angiosperms</i>			
	<p>a) <i>TW</i>: There are slight changes in the composition and abundance of macroalgal taxa compared to the type-specific communities. Such changes do not indicate any accelerated growth of phytobenthos or higher forms of plant life resulting in undesirable disturbance to the balance of organisms present in the water body or to the physico-chemical quality of the water.</p> <p>There are slight changes in the composition of angiosperm taxa compared to the type-specific communities. Angiosperm abundance shows slight signs of disturbance.</p>	<p>a) <i>TW</i>: The composition of macroalgal taxa is consistent with undisturbed conditions. There are no detectable changes in macroalgal cover due to anthropogenic activities.</p> <p>The taxonomic composition of angiosperms corresponds totally or nearly totally to undisturbed conditions. There are no detectable changes in angiosperm abundance due to anthropogenic activities.</p>	<p>Area-specific</p> <p>Macrophytes including macroalgae: shifts from long-lived to short-lived nuisance species, e.g. <i>Ulva</i>.</p>

⁵ In the review of the EcoQOs by OSPAR 2005, the EcoQOs for eutrophication, as set out in the Bergen Declaration, were confirmed but editorially revised to align them with the terminology of the Common Procedure from which they are derived. For details see the “Background Document”.

⁶ The Water Framework Directive sets different elements for transitional waters (*TW*) in table 1.2.3. of its Annex V and for coastal waters (*CW*) referred to in table 1.2.4. of Annex V. The main differences concern biological elements, namely macroalgae and angiosperms. Headings in italics refer to the terminology of the Water Framework Directive.

	<p>b) CW: Most disturbance-sensitive macroalgal and angiosperm taxa associated with undisturbed conditions are present.</p> <p>The level of macroalgal cover and angiosperm abundance show slight signs of disturbance.</p>	<p>b) CW: All disturbance-sensitive macroalgal and angiosperm taxa associated with undisturbed conditions are present.</p> <p>The levels of macroalgal cover and angiosperm abundance are consistent with undisturbed conditions.</p>	
Benthic invertebrate fauna			
<p>There should be no kills in benthic animal species as a result of oxygen deficiency and/or toxic phytoplankton species.</p>	<p>The level of diversity and abundance of invertebrate taxa is slightly outside the range associated with the type-specific conditions.</p> <p>Most of the sensitive taxa of the type-specific communities are present.</p>	<p>The level of diversity and abundance of invertebrate taxa is within the range normally associated with undisturbed conditions.</p> <p>All the disturbance-sensitive taxa associated with undisturbed conditions are present.</p>	<p>Area-specific</p> <p>Changes/kills in zoobenthos and fish kills or kills in relation to oxygen deficiency and/or toxic phytoplanktonic indicator species.</p> <p>Long-term changes in zoobenthos biomass and species composition.</p>
Hydromorphology			
<i>Morphological elements</i>	<p>Conditions consistent with the achievement of the values specified above for the biological quality elements.</p>	<p>a) TW: Depth variations, substrate conditions, and both the structure and condition of the inter-tidal zones correspond totally or nearly totally to undisturbed conditions.</p> <p>b) CW: The depth variation, structure and substrate of the coastal bed, and both the structure and condition of the inter-tidal zones correspond totally or nearly totally to undisturbed conditions.</p>	<p>Also covered in the Comprehensive Procedure</p>
<i>Tidal regime</i>	<p>Conditions consistent with the achievement of the values specified above for the biological quality elements</p>	<p>a) TW: The freshwater flow regime corresponds totally or nearly totally to undisturbed conditions.</p> <p>b) CW: The freshwater flow regime and the direction and speed of dominant currents correspond totally or nearly totally to undisturbed conditions.</p>	<p>Also covered in the Comprehensive Procedure</p>
Chemical and physico-chemical elements			
<p>Oxygen concentrations, decreased as an indirect effect of nutrient enrichment, should remain above area-specific oxygen assessment levels, ranging from 4-6 mg oxygen per liter.</p>	<p>Temperature, oxygenation conditions and transparency do not reach levels outside the ranges established so as to ensure the functioning of the ecosystem and the achievement of the values specified above for the biological quality elements.</p>	<p>Physico-chemical elements correspond totally or nearly totally to undisturbed conditions.</p> <p>Temperature, oxygen balance and transparency do not show signs of anthropogenic disturbance and remain within the range normally associated with undisturbed conditions.</p>	<p>Oxygen deficiency</p>

<p>Winter DIN and/or DIP should remain below a justified salinity-related and/or area-specific % deviation from background not exceeding 50%.</p>	<p>Nutrient concentrations do not exceed the levels established so as to ensure the functioning of the ecosystem and the achievement of the values specified above for the biological quality elements.</p>	<p>Nutrient concentrations remain within the range normally associated with undisturbed conditions.</p>	<p>Winter DIN and/or DIP concentrations: Area-specific assessment levels</p>
---	---	---	--

Integrating categorised assessment parameters for initial area classification in step 2 of the Comprehensive Procedure

In the Comprehensive Procedure of the Common Procedure, maritime areas are assessed on the basis of common assessment parameters for measuring causative factors (Category I) and nutrient enrichment effects (Categories II-IV) and their area-specific assessment levels. The result of the assessment process is scored as '+', '-' or '?' and is integrated in a table with categorised assessment parameters for the initial classification of areas with regard to eutrophication. The initial classification shall be as follows:

- a. areas showing an increased degree of nutrient enrichment accompanied by direct and/or indirect/ other possible effects are regarded as **'problem areas'**;
- b. areas may show direct effects and/or indirect or other possible effects, when there is no evident increased nutrient enrichment, for example, as a result of transboundary transport of (toxic) algae and/or organic matter arising from adjacent/remote areas. These areas could be classified as **'problem areas'**;
- c. areas with an increased degree of nutrient enrichment where
 - (i) either there is firm, scientifically based evidence of the absence of (direct, indirect, or other possible) eutrophication effects – these are classified initially as **'non-problem areas'**, although the increased degree of nutrient enrichment in these areas may contribute to eutrophication problems elsewhere;
 - (ii) or there is not enough data to perform an assessment or where the data available is not fit for the purpose – these are classified initially as **'potential problem areas'**;
- d. areas without nutrient enrichment and related (in)direct/ other possible effects are considered to be **'non-problem areas'**.

Table. Examples of the integration of categorised assessment parameters for an initial classification.

	Category I Degree of nutrient enrichment Nutrient inputs Winter DIN and DIP Winter N/P ratio	Category II Direct effects Chlorophyll <i>a</i> Phytoplankton indicator species Macrophytes	Categories III and IV Indirect effects/other possible effects Oxygen deficiency Changes/kills in zoobenthos, fish kills Organic carbon/matter Algal toxins	Initial Classification
a	+	+	+	problem area
	+	+	-	problem area
	+	-	+	problem area
b	-	+	+	problem area ⁷
	-	+	-	problem area ⁷
	-	-	+	problem area ⁷
c	+	-	-	non-problem area ⁸
	+	?	?	Potential problem area
	+	?	-	Potential problem area
	+	-	?	Potential problem area
d	-	-	-	non-problem area

(+) = Increased trends, elevated levels, shifts or changes in the respective assessment parameters in Table 1 of the Common Procedure

(-) = Neither increased trends nor elevated levels nor shifts nor changes in the respective assessment parameters in Table 1 of the Common Procedure

? = Not enough data to perform an assessment or the data available is not fit for the purpose

Note: Categories I, II and/or III/IV are scored '+' in cases where one or more of its respective assessment parameters is showing an increased trend, elevated level, shift or change.

⁷ For example, caused by transboundary transport of (toxic) algae and/or organic matter arising from adjacent/remote areas.

⁸ The increased degree of nutrient enrichment in these areas may contribute to eutrophication problems elsewhere.