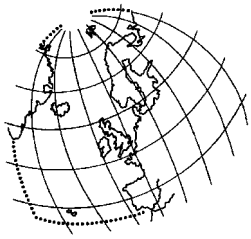
Eutrophication Series

OSPAR Integrated Report 2003 on the Eutrophication Status of the OSPAR Maritime Area Based Upon the First Application of the Comprehensive Procedure



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2003

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.

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EXECUTIVE SUMMARY

A principal element of the OSPAR Strategy to Combat Eutrophication is the Common Procedure for the Identification of the Eutrophication Status of the Maritime Area (the Common Procedure). This Common Procedure, adopted by OSPAR in 1997, sets the framework within which it is the responsibility of individual OSPAR Contracting Parties to assess the eutrophication status of their parts of the OSPAR maritime area.

The Common Procedure comprises 2 steps. The first step, the Screening Procedure, is a broad brush process performed only once by Contracting Parties to identify obvious Non-Problem Areas with regard to eutrophication. The Screening Procedure was completed in 2000. The second step, the Comprehensive Procedure, is the iterative procedure by which those parts of the maritime area which are not obvious Non-Problem Areas with regard to eutrophication are classified by Contracting Parties into Problem Areas, Potential Problem Areas, or Non-Problem Areas with regard to eutrophication. Common harmonised assessment criteria, their respective region specific assessment levels and the area classification methodology were developed, and adopted by OSPAR in 2001/2, for application under the Comprehensive Procedure, so that Contracting Parties could undertake their assessments and area classification in a harmonised way and based on a common approach. The OSPAR Nutrient Monitoring Programme and its related monitoring guidelines form the basis for obtaining the required information on the agreed harmonised assessment criteria. The region specific assessment levels are based on background values that are derived from historical data or, where this is not possible, have been derived from other relevant information.

National reports on the first complete application of the Comprehensive Procedure by individual Contracting Parties to their parts of the OSPAR maritime area were completed in 2002 and, under the lead of Germany and The Netherlands, were integrated and finalised into this integrated report by EUC 2002. On the basis of their assessments and area classification, a number of Contracting Parties have concluded that several of their coastal areas, fjords and/or estuaries and some offshore areas are classified as Problem Areas and Potential Problem Areas with regard to eutrophication. The marine areas assessed and classified in this way range in size from parts of estuaries to major areas of the Contracting Parties' coastal and offshore waters. This report provides details, including the eutrophication status, of all the areas assessed by Contracting Parties under the Comprehensive Procedure.

The European Commission is currently unable to endorse the classification as 'Non Problem Area' of certain marine areas of France, Ireland, Portugal, Spain and the UK. In addition, the assessment under the Nitrate Directive of waters affected or at risk from nitrate pollution and the designation of nitrate "vulnerable zones", and the identification under the Urban Wastewater Directive of "sensitive areas", may, for certain areas classified as 'Potential Problem Area', point to a more impaired status. This assessment is, therefore, without prejudice to any disputes that are ongoing or may arise between the European Commission and EU Member States regarding the classification of the eutrophication status of the OSPAR maritime area.

The national assessments showed that many coastal areas, fjords and/or estuaries to which the Comprehensive Procedure was applied had increased or significant riverine and/or transboundary nitrogen and phosphorus inputs, and elevated winter concentrations of dissolved inorganic nitrogen and phosphorus, and elevated winter nitrogen/phosphorus ratios. However, the assessment of the direct effects of nutrient enrichment, such as chlorophyll a, nuisance/toxic phytoplankton eutrophication indicator species and nuisance macrophytes, was not undertaken consistently by Contracting Parties, and in a number of cases information on these direct effects was not available. With regard to assessment of the indirect or other possible effects of nutrient enrichment, the degree of oxygen deficiency proved to be a valuable tool but was not used and assessed in a similar way by all Contracting Parties. Other indirect effects such as changes/kills in zoobenthos, fish kills, organic carbon and organic matter, have been shown to have potential for use in this assessment, but have not been extensively monitored in conjunction with the direct effect parameters or used to the same extent in this assessment.

Some Contracting Parties have indicated that they consider some of the areas they have identified as Problem Areas to result from nutrient enrichment due to transboundary transport from adjacent and other marine areas.

Contracting Parties used the assessment parameters, when monitored, according to the agreed procedure. All Contracting Parties applied in a harmonised way the second step of the Comprehensive Procedure, which is the integration of the assessment parameters resulting in an initial area classification. However, interpretation of the third step, "the appraisal of all relevant information concerning the harmonised assessment criteria and their respective assessment levels and the supporting environmental factors", differed between Contracting Parties.

The first application of the Comprehensive Procedure by Contracting Parties has therefore produced an assessment and area classification of the eutrophication status of OSPAR marine waters which is reasonably transparent but not totally harmonised. Transparency is greatest in respect of the data sets providing the raw material for the assessment and the initial area classification. The degree of harmonisation was diminished in respect of the final area classification.

To allow further harmonisation, there is a need for improvements to our assessment and area classification tools and for a common understanding of the way they should be applied and interpreted. These needs include issues to do with the derivation of background values for specific parameters, the nature of the classification process and research needs.

Some Contracting Parties indicated the need for improved information on atmospheric inputs especially to coastal areas and to include such information in the future eutrophication assessments. There is also a need to understand the contribution of nutrients from other marine areas relative to riverine-, direct- and atmospheric inputs, and the extent of their anthropogenic component. This indicates the need for concerted action to be taken in respect of transboundary affected areas. In order to address this there is a need for further development of tools (including validated numerical models) to arrive at total nutrient budgets for specific areas. Furthermore, where Contracting Parties' waters have common borders, they should aim to undertake joint assessments and area classification for their adjacent areas.

The assessment has shown some deficiencies in the available monitoring data and their quality, particularly for the direct and indirect effect parameters. The OSPAR Nutrient Monitoring Programme requires regular mandatory monitoring of nutrients and direct/indirect effects. The requirements of this programme should therefore be fulfilled and the data accommodated in future applications of the Comprehensive Procedure. There is also a need in some areas to improve the frequency and spatial coverage of the nutrients and eutrophication effects monitoring. Finally, there is a need to agree upon the time period that future applications of the Comprehensive Procedure should cover.

1. INTRODUCTION

Marine eutrophication is one of the major issues that has been tackled over the last 10 to 15 years by OSPAR. Much of this work has followed the decisions of North Sea Ministers in the framework of the International Conferences on the Protection of the North Sea. The approach to this work has been to identify those parts of the maritime area where nutrient inputs are likely, directly or indirectly, to cause pollution, and to achieve a substantial reduction in the inputs (in the order of 50%) of phosphorus and nitrogen into these areas (1, 2, 4, 5).

In 1992 PARCOM, followed by OSPAR in 1993 published a synthesis of maps with explanatory text, showing adverse eutrophication symptoms, and an integrated administrative map of areas identified as eutrophication problem areas by Contracting Parties (6). However, the identification of actual and potential eutrophication problem areas was not based on a common procedure. North Sea Ministers subsequently invited OSPAR to develop a common procedure for identifying actual and potential eutrophication problem areas, and agreed to develop further a strategy to combat eutrophication in the North Sea (3).

In 1998, OSPAR adopted a strategy to combat eutrophication (9). This sets out, *inter alia*, the objective of "combating eutrophication in the OSPAR maritime area, in order to achieve and maintain a healthy marine environment where eutrophication does not occur". A principal element of that Strategy is the Common Procedure for the Identification of the Eutrophication Status of the Maritime Area (the Common Procedure) (8), which was adopted by OSPAR in 1997 following several years of development.

In accordance with paragraph 3.1 of the OSPAR Strategy to Combat Eutrophication it is the responsibility of individual Contracting Parties to apply the Common Procedure and to identify the eutrophication status of their parts of the OSPAR maritime area. Following this, the OSPAR Commission assessed the results of this application.

The *Common Procedure* comprises 2 steps. The first step is the *Screening Procedure*, a broad brush process, performed only one time, to identify obvious Non-Problem Areas with regard to eutrophication. The Screening Procedure was completed in 2000, and identified those parts of the OSPAR maritime area to which the second step of the Common Procedure would be applied. The second step is the *Comprehensive Procedure*, by which those parts of the maritime area which are not obvious non-problem areas with regard to eutrophication are classified into areas which are considered to be Problem Areas (PA), Potential Problem Areas (PPA), or Non-Problem Areas (NPA) with regard to eutrophication. The Comprehensive Procedure is an iterative process, and repeated application should identify any changes in the eutrophication status of any area classified as a PA, PPA or NPA. Further details of the Comprehensive Procedure are given in Chapter 2 of this report.

Chapters 3 and 4 provide a synthesis of the results from national reports on the first complete application of the Comprehensive Procedure by individual Contracting Parties to their parts of the OSPAR maritime area. These Chapters describe the common harmonised assessment criteria and their respective assessment levels used in the harmonised area classification, and the different ways in which OSPAR Contracting Parties applied these criteria, interpreted their results and classified their waters. Chapter 5 of the report presents common conclusions and an evaluation of the first application of the Comprehensive Procedure.

Under the Nitrate Directive[1], EU and EEA Member States are obliged to identify waters affected or at risk from nitrate pollution and to designate nitrate “vulnerable zones” (see Articles 3.1 and 3.2) and, under the Urban Wastewater Directive[2], they are obliged to identify “sensitive areas” (see Article 5). In both cases, the relevant criteria for identification refer to the eutrophication status of the water bodies concerned.

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1 Council Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources (91/676).

2 Council Directive concerning urban waste-water treatment (91/271).

Following its assessment of the implementation of these directives by Member States, the European Commission is in dispute with some EU Member States which are also Contracting Parties to the OSPAR Convention *inter alia* regarding the extent of the identification of waters and the designation of vulnerable zones under the Nitrates Directive and the extent of the identification of sensitive areas under the Urban Wastewater Directive.

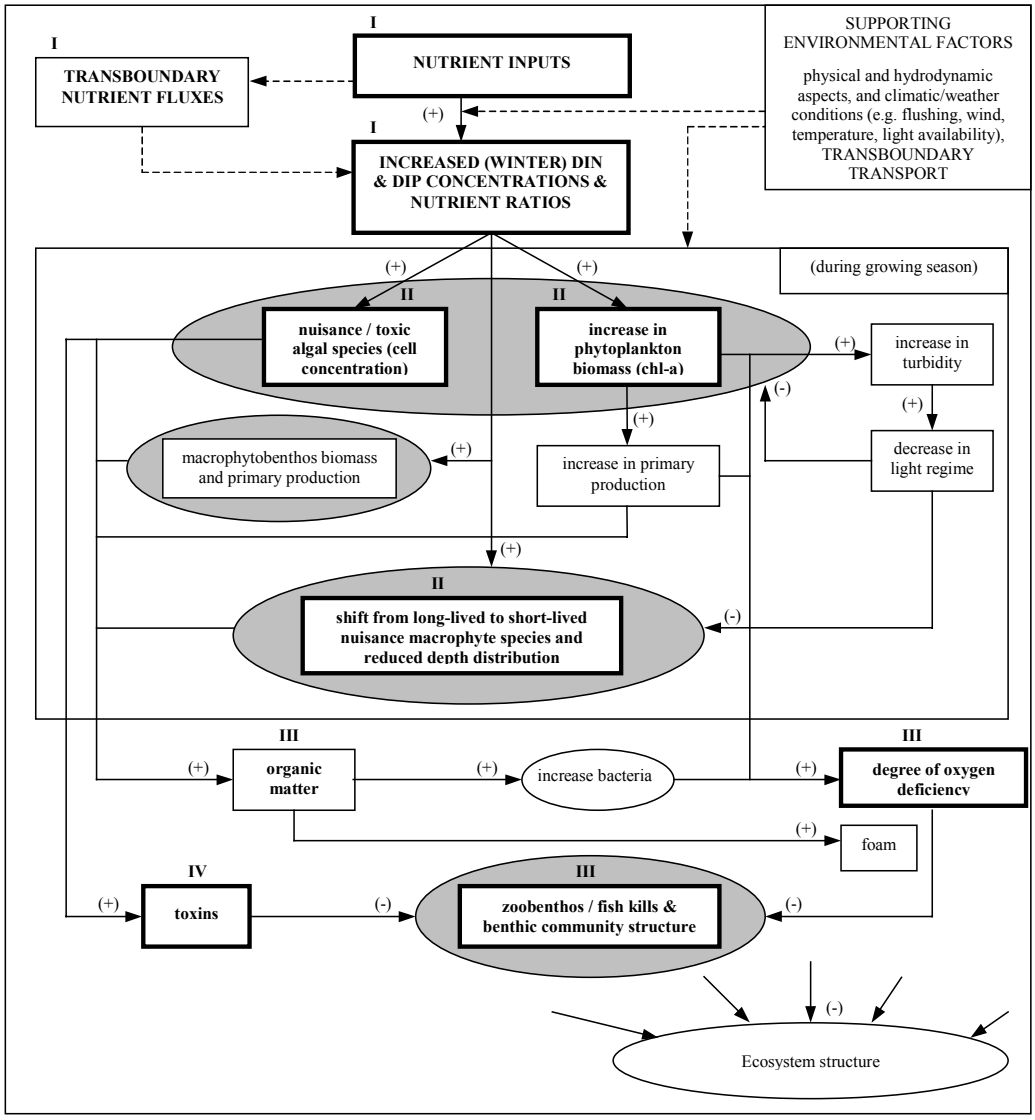
Against the background of differences in criteria and/or the interpretation of criteria, conclusions reached in the context of the application of the OSPAR Common Procedure by these Contracting Parties may be at variance with the assessment referred to above. With a view to avoiding potential ambiguities and taking into account its current information and analysis, the European Commission is currently unable to endorse the classification as 'Non Problem Area' of certain marine areas of France, Ireland, Portugal, Spain and the UK. In addition, the assessment referred to above may, for certain areas classified as 'Potential Problem Area', point to a more impaired status. Furthermore, this is without prejudice to any future disputes that may arise between the European Commission and EU Member States regarding the classification of the eutrophication status of the OSPAR maritime area.

2. OUTLINE OF THE ASSESSMENT AND AREA CLASSIFICATION OF THE OSPAR COMPREHENSIVE PROCEDURE

The Comprehensive Procedure consists of a set of common quantitative assessment criteria, including their respective assessment levels that are linked to form a holistic assessment and area classification with respect to the eutrophication status of the maritime area. The basic assessment parameters to be used for assessment throughout the whole maritime area are those contained in the OSPAR Nutrient Monitoring Programme on nutrients and eutrophication effects (7). All relevant common harmonised assessment parameters should be considered when applying the Comprehensive Procedure, although regional differences (for example in terms of hydrography) and differences in data availability affect the assessment levels of the parameters actually used in the assessment procedure. In addition, although the levels against which assessments are made may be region-specific, the methodology for applying these assessment criteria and their respective assessment levels in the area classification is based on a common approach. The overall area classification with respect to the eutrophication status of an area will also take into account the interaction of the causative - nutrient-enrichment related - factors and the supporting environmental factors.

In 2001 OSPAR adopted common harmonised assessment criteria and their respective (region-specific) assessment levels, and their use in the area classification of the Comprehensive Procedure of the Common Procedure (10). The main cause-effect relationships between the assessment parameters and the categories into which they fall are shown in Fig. 1, while the common harmonised assessment criteria and their respective assessment levels of the Comprehensive Procedure are presented in Table 1.

Figure 1. Main Interrelationships between the Assessment Parameters (in bold) of the Comprehensive Procedure. Parameters for which Assessment Criteria and their assessment levels are identified are shown in boxes with bold lines. Biological elements are shaded. Continuous arrow lines with (+) and (-) indicate 'having stimulating effects upon', and 'having inhibiting effects upon', respectively. Dashed arrow lines indicate 'having influence upon'.



Key:

I = Category I. Degree of Nutrient Enrichment (Causative factors)

II = Category II. Direct Effects of Nutrient Enrichment

III = Category III. Indirect Effects of Nutrient Enrichment

IV = Category IV. Other Possible Effects of Nutrient Enrichment

Table 1. The Agreed Harmonised Assessment Criteria and their Respective Assessment Levels of the Comprehensive Procedure

Assessment Parameter and Respective Assessment Levels	
Category I	**Degree of Nutrient Enrichment**
1	**Riverine total N and total P inputs and direct discharges (RID)** Elevated inputs and/or increased trends (compared with previous years)
2	**Winter DIN- and/or DIP concentrations** Elevated level(s) (defined as concentration > 50% above [3] salinity related and/or region specific background concentration)
3	**Increased winter N/P ratio (Redfield N/P = 16)** Elevated cf. Redfield (> 25)
Category II	**Direct Effects of Nutrient Enrichment (during growing season)**
1	**Maximum and mean Chlorophyll a concentration** Elevated level (defined as concentration > 50% above [3] spatial (offshore) / historical background concentrations)
2	**Region/area specific phytoplankton indicator species** Elevated levels (and increased duration)
3	**Macrophytes including macroalgae (region specific)** Shift from long-lived to short-lived nuisance species (e.g. *Ulva*)
Category III	**Indirect Effects of Nutrient Enrichment (during growing season)**
1	**Degree of oxygen deficiency** Decreased levels (< 2 mg/l: acute toxicity; 2 - 6 mg/l: deficiency)
2	**Changes/kills in zoobenthos and fish kills** Kills (in relation to oxygen deficiency and/or toxic algae) Long term changes in zoobenthos biomass and species composition
3	**Organic Carbon/Organic Matter** Elevated levels (in relation to Category III.1) (relevant in sedimentation areas)
Category IV	**Other Possible Effects of Nutrient Enrichment (during growing season)**
1	**Algal toxins (DSP/PSP mussel infection events)** Incidence (related to Category II.2)

Information was exchanged with the EC, which expressed its view about the usefulness of the well established Comprehensive Procedure Approach as a basis for criteria to be applied to assessments under the relevant EC Directives, and as such could form a basis for an overall European approach to marine eutrophication assessments.

To carry out the classification of the eutrophication status of areas of the maritime region each contracting party should undertake a number of steps which are outlined in sections below. The first step is to provide a score for each of the harmonised assessment criteria being applied according to the guidance in Table 1. The second step will bring these scores together according to the format in Table 2 to provide a classification of the area. The third step is to make an appraisal of all relevant information (concerning the harmonised assessment criteria their respective assessment levels and the supporting environmental factors), to provide a transparent and sound account of the reasons for establishing a particular status for the area (see Chapter 4).

2.1 Integration of Categorised Assessment Parameters for Classification

The assessment levels of the agreed harmonised assessment criteria form the basis of the first step of the classification.

[3] Other values less than 50% can be used if justified.

The second step is the integration of the categorised assessment parameters mentioned in Table 1 to obtain a coherent classification. For each assessment parameter of Categories I, II, III and IV mentioned in Table 1 it can be indicated whether its measured concentration relates to a problem area, a potential problem area or a non-problem area as defined in the OSPAR Strategy to Combat Eutrophication[4]. The results of this step are summarised in Table 2 and explained below:

A. Areas showing an increased degree of nutrient enrichment accompanied by direct and/or indirect/ other possible effects are regarded as **'problem areas'**[4];

B. Areas may show direct effects and/or indirect or other possible effects when there is no evident increased nutrient enrichment, e.g. 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'**[4 5];

C. Areas with an increased degree of nutrient enrichment, but without showing direct, indirect/other possible effects, are classified initially as **'potential problem areas'**[4];

D. Areas without nutrient enrichment and related (in)direct/other possible effects are considered to be **'non-problem areas'**[4].

Table 2. Integration of Categorised Assessment Parameters (see Table 1) as clarified and explained in Chapter 2.2).

	Category I Degree of nutrient enrichment Nutrient inputs Winter DIN and DIP Winter N/P ratio	Category II Direct effects Chlorophyll a Phytoplankton indicator species macrophytes	Categories III and IV Indirect effects/other possible effects Oxygen deficiency Changes/kills zoobenthos, fish kills Organic carbon/matter Algal toxins	Initial Classification
A	+	+	+	problem area[4]
A	+	+	-	problem area[4]
A	+	-	+	problem area[4]
B	-	+	+	problem area[4 5]
B	-	+	-	problem area[4 5]
B	-	-	+	problem area[4 5]
C	+	-	-	potential problem area[4]
C	+	?	?	potential problem area[4]
C	+	?	-	potential problem area[4]
C	+	-	?	potential problem area[4]
D	-	-	-	non-problem area[4]

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

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

? = 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.

[4] "problem areas with regard to eutrophication" are those areas for which there is evidence of an undesirable disturbance to the marine ecosystem due to anthropogenic enrichment by nutrients;

"potential problem areas with regard to eutrophication" are those areas for which there are reasonable grounds for concern that the anthropogenic contribution of nutrients may be causing or may lead in time to an undesirable disturbance to the marine ecosystem due to elevated levels, trends and/or fluxes in such nutrients;

"non-problem areas with regard to eutrophication" are those areas for which there are no grounds for concern that anthropogenic enrichment by nutrients has disturbed or may in the future disturb the marine ecosystem.

[5] caused by transport from other parts of the maritime area.

2.2 Overall Classification

The third step is to make an appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors), to provide a transparent and sound account of the reasons for establishing a particular status for the area.

Supporting environmental factors and region specific characteristics should be taken into account, such as physical and hydrodynamical aspects, and weather/climate conditions (see Figure 1). These region specific characteristics play a role in explaining the results of the classification. The following types of areas can be distinguished:

- Coastal/salinity gradient (riverine influenced) waters (salinity ≤ 34,5) *vs.* offshore waters (salinity > 34,5);
- Stratified waters (may be both coastal and offshore, e.g. Oyster Grounds) *vs*. mixed waters;
- Sedimentation areas (may both be coastal, e.g. Wadden Sea, and offshore, e.g. Oyster Grounds, ancient Elbe river valley (short-term sedimentation), Skagerrak (long-term sedimentation) *vs*. 'high energy' areas (e.g. offshore part of Southern North Sea);
- Areas with extended residence time of water masses which may enhance algal bloom formation and/or accumulation of organic material;
- Areas affected or likely to be affected by transboundary transport of nutrients and organic matter (e.g. German Bight and Skagerrak influenced by Southern North Sea waters; Oyster Grounds and Frisian Front may be affected by UK coastal erosive areas);
- Areas susceptible to the intermittent transport of nutrient rich oceanic water to the euphotic zone (episodic upwelling, mixing, currents) which may enhance eutrophication effects.

In elaborating the first assessment of the eutrophication status of the OSPAR maritime area on the basis of detailed assessments undertaken by the Contracting Parties concerned, two elements became clear:

a. Clarification of the Potential Problem Area classification was considered to be helpful, because a **PPA classification** could also be appropriate for an area with **increased degree of nutrient enrichment (Category I)** but where there is **not enough data on direct, indirect/other possible effects to perform an assessment or the data available is not fit for the purpose** (as indicated by '?' in Table 2);

   In such a situation the provision of 3.2(b) of the OSPAR Strategy to Combat Eutrophication would apply. This indicates that monitoring/research should be urgently implemented in order to enable a full assessment and area classification of the eutrophication status of each area concerned within 5 years of its being characterised as a PPA with regard to eutrophication. Preventive measures should be taken in accordance with the Precautionary Principle (see OSPAR Strategy to Combat Eutrophication);

b. with regard to step 3, there were differences of view between Contracting Parties: some considered that step 3 should be used solely to explain the product of step 2; others were of the opinion that step 3 should be used as a buffer between step 2 and a final assessment of the area concerned. This difference in view is further addressed in Chapter 4.

Consequently, in order to maintain a high degree of transparency, the results of step 2 were called the "initial classification", as shown in Table 2, and a further category the "final classification" was introduced to identify the outcome of step 3 [6]. This report uses the above terminology in reporting the outcome of the first application

[6] The use of the terms "initial classification" and "final classification" has not led at present to changes to OSPAR Agreement 2002-20, on the common assessment criteria, their assessment levels and area classification within the Comprehensive Procedure of the Common Procedure. These terms will be taken into account when evaluating the first application of the Comprehensive Procedure and when considering any consequent changes which have to be

of the Comprehensive Procedure by those Contracting Parties concerned.

The table at Appendix 1 shows the overall classification consisting of the steps outlined above including the initial classification, the appraisal of all relevant information (concerning the harmonised assessment criteria their respective assessment levels and the supporting environmental factors), and the subsequent final classification made by the Contracting Parties for their waters subject to the Comprehensive Procedure. The region specific characteristics, as listed above in this section play a role in explaining the results of the initial area classification.

3. RESULTS AND CONCLUSIONS OF THE COMPREHENSIVE ASSESSMENTS

This Chapter gives for each assessment category an overview of the results and conclusions on the outcome of the assessment part of the Comprehensive Procedure by Contracting Parties. A summary of the outcome of the assessment by Contracting Parties of each of their Parts of the maritime area subject to the Comprehensive Procedure is contained in Appendix 1. This provides information for each marine area assessed on the score given for each of the harmonised assessment criteria in table 1 that have been used in the assessment. Appendix 1 also provides information on the time period of each Contracting Party's assessment. The assessment period differs between Contracting Parties, but covers in general the years 1990 to 2001.

3.1 Category I: degree of nutrient enrichment (causative factors)

3.1.1 Nutrient Inputs: elevated and/or increased trends

Riverine Inputs and Direct Discharges (RID data)

Total N and Total P direct and riverine input data, data are available from 1985 onwards, using the information provided by Contracting Parties and the data from the Comprehensive Study of Riverine Inputs and direct Discharges (RID).

RID data have been used in the comprehensive assessment by Denmark, Germany, the Netherlands, Norway, Sweden and the UK. Some Contracting Parties used flow adjustment for the load calculations (Germany, the Netherlands, Norway, Denmark, Sweden) whereas UK did not. Except as noted below, all Contracting Parties provided RID data for the assessment where such input data was considered.

Ireland and Portugal used RID data for the initial screening procedure to identify non problem areas but did not use it again during the comprehensive assessment.

Spain included total N and total P input for the years 2000 and 2001 in its local coastal assessment but could not perform any trend analysis.

France did not use RID data as such, but calculated DIN- and DIP loads and used a cut-off level to determine elevated levels, and trends where significant. This cut-off level was estimated and will be refined in future assessments.

Most of the Contracting Parties who have carried out trend analysis of their RID data could not identify a significant decrease or increase, therefore elevated levels were determined by comparing nutrient loads to loads calculated from background concentrations of DIN and DIP. In Sweden the nutrient loads increased substantially between 1970s and 1990s due to increased runoff. However, no trends in nutrient concentrations were discernible in the river water. Belgium remarked that the error associated with their RID values was much bigger than any potentially identifiable trend.

made to OSPAR Agreement 2002-20.

Transboundary nutrient inputs

Transboundary nutrient inputs are considered an important assessment parameter especially for down stream countries with coastal currents, and for offshore sedimentation areas receiving nutrient inputs from adjacent marine areas.

Belgium recommended improved quantification of transboundary nutrient fluxes in order to better understand the significance of local RID inputs. Sweden and Norway have assessed this input for their waters.

Atmospheric deposition of nitrogen

Four Contracting Parties considered atmospheric deposition in their assessments. This input was considered especially relevant for some parts of the maritime area and quantification would be beneficial in any apportionment of nutrient inputs to such areas. Information (maps) on deposition of oxidised- and reduced-nitrogen in 1998 to the North Sea are presented by the Co-operative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe (EMEP) under the Convention on Long-Range Transboundary Air Pollution (LRTAP) and can be found on the website of EMEP (http:www.emep.int/areas).

3.1.2 Conclusions on nutrient inputs

Most Contracting Parties have included RID data in their assessments, but it was recognised that in addition there is a need to consider also transboundary nutrient fluxes and atmospheric deposition at least for some parts of the maritime area.

On the basis of their assessments it is concluded by Contracting Parties that many of their assessed coastal areas, fjords and estuaries show increased riverine N and P inputs, while in addition to this, some fjords and also offshore sedimentation areas receive increased transboundary nutrient inputs.

3.1.3 Winter nutrient concentrations (DIN and DIP): elevated levels

Winter DIN (NO_3 + NO_2 + NH_4) and DIP (ortho-P) concentrations are, and can be assessed in a harmonised way for the Central North Sea and its coastal waters, the Irish Sea, the Atlantic Sea, the Channel, the Wadden Sea, the Kattegat and the Skagerrak. Regional (salinity related) background concentrations and their related elevated assessment levels are used to assess the state of winter DIN and DIP nutrient enrichment.

The information on winter DIN and DIP concentrations was used by all Contracting Parties with the exception of France. France considered that in French waters the link between nutrient concentrations and eutrophication is too complex to define assessment criteria based upon nutrient concentrations. France did not provide information on winter nutrients, although France had acknowledged that monitoring of winter nutrients is a full part of the information required.

In their assessment Contracting Parties compared measured concentrations against background values and their respective elevated assessment, except Portugal who has established calculated background values for DIN, but nor for DIP due to a lack of data on DIP.

Germany, Ireland and Norway used both winter and summer concentrations in their assessments. In Nordic countries nutrient runoffs in summer are significant for the development of phytoplankton growth.

Denmark used the more stringent assessment criterion of > 25% above background concentrations for their waters.

3.1.4 Conclusions on winter nutrient concentrations (DIN and DIP): elevated levels

All Contracting Parties, with the exception of France, have included winter DIN and DIP concentrations in their assessments. For Norwegian waters, summer concentrations were used, while Portugal has only established

calculated background concentrations for DIN and related elevated assessment levels. The regional differences in background concentrations and their related elevated assessment levels reflect the agreed regional specific concentrations in the Comprehensive Procedure.

Elevated assessment levels (> 50% (> 25% for Denmark) above related background concentrations) of *winter DIN* are in the range of:

> 6-7 µmol N/l Danish and Swedish Kattegat, Wadden Sea

> 11-15 µmol N/l whole North Sea, Danish, Norwegian and Swedish Skagerrak, Andalusian Atlantic coast

> 10 µmol N/l UK England and Wales

> 18-30 µmol N/l salinity related elevated assessment levels in Irish, Dutch and German estuaries

> 32 µmol N/l Sado estuary (Portugal)

> 66 µmol N/l Mondego estuary (Portugal)

> 51 µmol N/l Tagus estuary (Portugal)

Elevated assessment levels (> 50% (> 25% for Denmark) above related background concentrations) for *winter DIP* are in the range of (see Appendix 1A):

> 0,5-0,6 µmol P/l Danish and Swedish Kattegat

> 0,7-0,9 µmol P/l Wadden Sea, whole North Sea, DK, NW and SW Skagerrak, Andalusian Atlantic coast

> 0,8 µmol P/l UK, England and Wales

> 1,2 µmol P/l Irish estuaries (salinity related – seawater endmember concentration)

On the basis of their assessments it is concluded by Contracting Parties that many of their coastal areas, fjords and / or estuaries to which the Comprehensive Procedure is applied, show elevated levels in winter DIN and DIP concentrations.

3.1.5 Winter N/P ratios: elevated levels

Increased winter N/P ratios (compared to the Redfield ratio = 16) and absolute excess of nitrate may increase the risk of nuisance and toxic algal species, while increased ratios of N/Si (> 2) and P/Si (> 0,125) may cause shifts in species composition (from diatoms to flagellates, some of which are toxic).

The Redfield ratio was used by all Contracting Parties except Ireland and France. Portugal used the ratio for the Tagus and Sado estuaries. Ireland's comprehensive assessment relates to estuarine waters only where the N:P ratio may be naturally elevated due to the freshwater influence. N:P ratios examined in over 1000 freshwater sites around Ireland were found to average 75:1. Ireland considers that a sliding scale based on salinity should be developed to assess estuarine waters.

The Netherlands determined an elevated assessment level for the N/P ratio of 33 for coastal waters and estuaries based on winter background concentrations of DIN and DIP. Therefore the assessment was performed against this value instead of the Redfield ratio of 16.

3.1.6 Conclusion on winter N/P ratios: elevated levels

All but two Contracting Parties included the winter N/P ratio in their assessments. Some Contracting Parties used region specific assessment levels of N/P ratios. Many assessed marine waters showed elevated winter N/P ratios.

3.2 Category II: direct effects of nutrient enrichment

3.2.1 Chlorophyll a: maximum and mean elevated levels

It has been acknowledged that this direct effect parameter of nutrient enrichment is highly influenced by environmental factors (such as light availability, phytoplankton species composition and their physiological state (type of growth-limitation)). Nevertheless, this parameter is considered to be a useful direct effect assessment parameter of nutrient enrichment, in relation to the elevated cell concentrations of nuisance phytoplankton indicator species.

All Contracting Parties used elevated levels of Chlorophyll a as assessment criteria, using their regional specific assessment levels. Not all Contracting Parties (Belgium, France, UK) derived their levels from background concentrations. The UK derived its assessment levels on the chlorophyll concentrations expected when nutrient concentrations were those found in Atlantic waters. For adjacent offshore areas (North Sea, Kattegat, Skagerrak areas) there are differences in the applied assessment levels.

Data availability with respect to sampling frequency and spatial coverage was considered in order to determine how robust the assessment was. It varied between Contracting Parties from higher (Denmark, France, Germany, Ireland, Netherlands, Norway, Sweden) to lower sampling frequencies and less spatial coverage (Portugal, Spain, UK). Belgium identified and used the best available spatial coverage at the best possible time (growing season).

Most Contracting Parties assessed both maximum and mean levels of Chl. a during the growth season. Belgium and Spain used only maximum Chl. a. France considered the mean concentration inappropriate to the available datasets. Then France used a compromise as the 5% data > 20 µg/l criteria, which captures the essence of using maximum and mean concentrations. Ireland assessed its Chl. a data by using a median and 90 percentile approach.

3.2.2 Conclusions on Chlorophyll a: maximum and mean elevated levels

All Contracting Parties used elevated levels of Chl. a as assessment criteria, using region specific assessment levels. However, it is not specified if reference values are defined for means or maxima. *Elevated assessment levels* (50% (25% for Denmark) above their related background concentrations) are in the range of:

> 2	µg/l	Denmark, Sweden
> 4,5	µg/l	Norway, Dutch and German offshore North Sea
> 9	µg/l	Mondego and Sado (Portugal)
> 9-10	µg/l	Western Scheldt, Ireland (median values for estuaries)
> 10	µg/l	UK offshore > 34 salinity
> 12	µg/l	Andalusian Atlantic coast
> 14	µg/l	Tagus estuary (Portugal)
> 15	µg/l	Belgium, Dutch- and German coast, UK coastal waters <34 salinity
> 18-20	µg/l	France, Ireland (90 percentile), Ems-Dollard estuary
> 22-24	µg/l	Wadden Sea.

Data availability with respect to sampling frequency and spatial coverage was considered to be too low for some areas to make a proper assessment.

On the basis of their assessments it was concluded by a number of Contracting Parties that many of their assessed coastal areas, fjords and / or estuaries, and some offshore North Sea areas, show elevated levels of chlorophyll a.

3.2.3 Region/area specific phytoplankton indicator species: elevated levels

Region/area-specific phytoplankton indicator species, such as nuisance species (*Phaeocystis*, *Noctiluca)* and potentially toxic (dinoflagellates) species (e.g. *Chrysochromulina polylepis*, *Gymnodinium mikimotoi*, *Alexandrium* spp., *Dinophysis* spp., *Prorocentrum* spp.) are important direct effect assessment parameters. The species show elevated "bloom"/toxic levels (cell concentrations) and increased duration of "blooms" compared with previous years.

Denmark, France, Germany, Netherlands, Norway and Sweden used elevated levels of their region specific phytoplankton indicator species. Ireland, Spain did not use it because of lack of data. Portugal did not use it for the Mondego Estuary because of the lack of data. The UK, in line with current ICES advice, continues to study the use of specific phytoplankton as indicators of eutrophication and has not adopted specific assessment levels. Instead, the UK has examined available data about phytoplankton communities in their waters and assessed whether the balance of organisms has been perturbed as a result of nutrient enrichment. Belgium did use their region-specific indicator species in their revised assessment. UK provided some data on cell concentrations of toxic phytoplankton species but mentioned this information not under this Category II but under Category IV: Algal Toxins. UK data derived from the Continuous Plankton Recorder provide only qualitative information on phytoplankton species of larger size.

For those Contracting Parties who used this assessment criteria and their respective assessment levels, the data availability was generally sufficient. However, many Contracting Parties expressed the need to increase sampling frequency and spatial coverage, and compliance to the provided OSPAR JAMP guidance.

France deviated from the agreed assessment procedure with regard to phytoplankton. A positive score was given when at least 3 indicator species were present above the assessment level over the growing season.

3.2.4 Conclusions on region/area specific phytoplankton indicator species: elevated levels

On the basis of their assessments (Belgium, France, Germany, Netherlands, Norway and Sweden) it is concluded by these Contracting Parties that many of their assessed coastal areas, fjords and / or estuaries, and some offshore North Sea areas, show elevated levels of their region/area specific nuisance and/or toxic phytoplankton indicator species. The *elevated "nuisance bloom" or toxic assessment levels* and their type of effects for some phytoplankton indicator species are summarised below (this list is not exhaustive).

3.2.5 Nuisance species

Phaeocystis spp. (colony form)	> 10^6 cells/l (and 30 days duration)	Nuisance, Foam, Oxygen Deficiency
Noctiluca scintillans	> 10^4 cells/l (area coverage > 5 km^2)	Nuisance, Oxygen Deficiency

3.2.6 Toxic (toxin producing) species

Chrysochromulina polylepis	> 10^6 cells/l	Toxic; Fish and Benthos Kills
Gymnodinium mikimotoi	> 10^5 cells/l	Toxic; Fish kills, PSP mussel infection
Alexandrium spp.	> 10^2 cells/l	Toxic; PSP mussel infection
Dinophysis spp.	> 10^2 cells/l	Toxic; DSP mussel infection
Prorocentrum spp.	> 10^4 cells/l	Toxic; DSP mussel infection

3.2.7 Macrophytes including macroalgae (region-specific): shifts in species

Shifts in species (from long-lived species like eel-grass to nuisance short-lived species like *Ulva*) form an important region-specific direct effect assessment parameter: in shallow waters, estuaries and embayments. In some of these areas, specific assessment levels (reduced depth distribution) are mentioned.

The use of macrophytes including macroalgae was only relevant in specific regions (Wadden Sea and some Danish, Irish, Spanish, Swedish, Norwegian, Portuguese and UK waters/estuaries). Data were reported for the Wadden Sea (by Denmark, Netherlands and Germany), and by Denmark, France, Norway and Portugal for

their waters. Ireland made use of limited qualitative data where available, while for Spain no data are available yet.

3.2.8 Conclusion on macrophytes including macroalgae (region-specific): shifts in species

On the basis of their assessments of Danish- Dutch- and German Wadden Sea, Danish-, French-, Portuguese-, UK waters, it is concluded by these Contracting Parties that some of their assessed coastal areas and / or estuaries, show shifts in species (from long-lived species like eel-grass to nuisance short-lived species like *Ulva*) and increased trends in these nuisance species.

3.3 Categories III/ IV: indirect/other possible effects of nutrient enrichment

3.3.1 Degree of oxygen deficiency

All Contracting Parties are using this parameter. Belgium used O_2 in revised assessment but demonstrated it was not relevant because of mixing of its water masses.

Different thresholds have been used which take into account of region-specific conditions, ranging from < 2 (acute toxic) to < 6 mg/l (oxygen deficient). Ireland has set criteria for dissolved oxygen both in respect of deoxygenation and supersaturation.

France, in relation to sufficient data availability used a more refined assessment criteria, namely that not more than 5% of the data may be less than 5 mg oxygen per litre. For Ireland, oxygen criteria for estuaries require that not more than 5% of the data may be less than 80% saturation and at least 95% of the data must be less than 120% saturation.

All Contracting Parties with the exception of Spain use summer values as recommended in the Comprehensive Procedure. Spain used winter values because in winter, lower values are measured, while in summer, values are higher.

The UK considered oxygen deficiency as part of the assessment procedure of its waters. Generally oxygen levels are good but, in one local case, where depressed levels occur, the UK concludes “that this is due to a combination of stratification and action of bacteria digesting land-based forms of detritus, i.e. natural events, which cause oxygen demand to exceed supply”.

3.3.2 Conclusions on degree of oxygen deficiency

Degree of oxygen deficiency parameter is a valuable tool that has been used by all Contracting Parties depending on its relevancy with regard to the zone concerned. However, in the assessment, different region-specific thresholds have been used by some Contracting Parties. Ireland has set criteria for dissolved oxygen, both in respect of concentrations and percentage saturation.

3.3.3 Changes/kills in zoobenthos and fish kills as affected by eutrophication

This parameter is indirectly related to nutrient enrichment. A distinction can be made between acute toxicity (directly related to oxygen deficiency and/or toxic blooms), and long-term changes in zoobenthos species composition as result of long term increased eutrophication. However, the latter can also be caused by other factors like fisheries which may have an overriding effect compared with eutrophication effects.

Information is partly available and for some areas needs updating.

3.3.4 Kills in zoobenthos and fish

Seven Contracting Parties make use of this criterion. Four Contracting Parties do not apply this criterion.

This has been used as a yes/no parameter (occurrence scored with +, non-occurrence with -) without any consideration of thresholds. Thresholds that can be used in this assessment do not seem to exist for this parameter.

3.3.5 Conclusion on kills in zoobenthos and fish

When this assessment parameter is used it is applied in a qualitative way and there are no relevant thresholds available for this assessment.

3.3.6 Changes in zoobenthos

This is a difficult parameter to apply due to interference of factors other than eutrophication, such as fishing.

Some benthic indicator species for eutrophication are known and have been used. Denmark is the only Contracting Party that uses indices which have been derived from long time series of data.

3.3.7 Conclusion on changes /kills in zoobenthos and fish kills as affected by eutrophication

Where it has been used by Contracting Parties, this parameter has been applied in a qualitative descriptive way, registering changes and kills due to eutrophication.

3.3.8 Organic Carbon/Organic Matter

This indirect effect parameter is relevant for certain specific regions (sedimentation areas like e.g. German Bight, Oyster Ground and Skagerrak).

Only a few Contracting Parties used this parameter. The main problem is that this parameter is not regularly monitored and therefore there is a lack of data. Norway applies a general threshold in those areas where data exist.

3.3.9 Conclusion on Organic Carbon/Organic Matter

This parameter is used by a few Contracting Parties especially for sedimentation areas. Difficulties can be encountered because of insufficient data and a lack of reference values (see Appendix 1C).

3.3.10 Algal Toxins (DSP/PSP Mussel Infection Events)

This is a relevant assessment parameter used by several Contracting Parties in relation to potential toxic algal species (direct effect parameter of nutrient enrichment) in areas where cultivated or wild shellfish stocks are harvested for human consumption. There are no relevant thresholds available for this assessment parameter.

On the basis of their assessments it is concluded by Contracting Parties that algal toxin induced DSP/PSP mussel infection events occur in Dutch-, German- and Danish Wadden Sea, French waters, several Norwegian fjords, Swedish coastal Skagerrak and Danish- and Swedish Kattegat, and UK waters.

3.3.11 Conclusion on Algal Toxins (DSP/PSP Mussel Infection Events)

Where relevant (e.g. shellfish culture areas) mussel infection events have been used as an additional assessment parameter in a qualitative descriptive way by several Contracting Parties.

4. RESULTS AND CONCLUSIONS OF AREA CLASSIFICATION BASED ON THE HARMONISED CLASSIFICATION PROCEDURE

This chapter and the associated Appendix 1 reports the outcome of the overall classification by the Contracting Parties concerned of their waters, into problem areas, potential problem areas and non-problem area with regard to eutrophication, illustrated in the map(s) contained in Appendix 2. Appendix 1 contains detailed information relating to the use of the various assessment criteria and the monitoring periods for which associated data was available.

The overall classification table contains the outcome of the first application of the Comprehensive by all Contracting Parties concerned. Conclusions on how individual Contracting Parties applied the agreed overall classification procedure, and on the outcome, are given below.

Belgium: applied the assessment and area classification to its waters according to the agreed assessment and overall classification procedure of the Comprehensive Procedure with the exception of the RID based assessment (because the error associated with RID figures is bigger than any identifiable trend). In almost all investigated years in the assessment period 1995 to 2000, winter DIN/DIP were above the thresholds and therefore, chlorophyll a concentration was determinant in the distribution of PA. Generally PA appear near the coast with an increasing gradient towards the north-east. The offshore waters can be classified as PPA. For some years NPAs are sometimes identified at the northern limit of the EEZ.

Denmark: applied the assessment and area classification to its waters according to the agreed assessment- and overall classification procedure of the Comprehensive Procedure. All Danish marine waters (Danish Skagerrak, Kattegat, North Sea and Wadden Sea) are classified as PA, which is due to direct- and transboundary transport nutrient enrichment, except for Danish offshore North Sea (NPA), for the period 1989 - 2001.

France: applied the assessment and area classification to its waters according to the agreed assessment- and overall classification procedure of the Comprehensive Procedure, except for assessments of Riverine Inputs and Direct Discharges (RID data not used but local data sets were used), winter DIN and DIP (not used), toxic phytoplankton indicator species (a "3-species criterium" used) and their related algal toxins. France applied the agreed overall classification procedure, except for Arcachon and Landes (local PA instead of NPA (except in a sub-area)). France indicates that for some assessment parameters a more frequent monitoring and/or better spatial coverage of the monitoring stations is required. The Comprehensive Procedure was applied to a total of 26 areas, of which 12 areas were classified as PA, 4 (3 with '?') areas as PPA, and 10 (8 with '?') as NPA, for the period 1990-2000 (1997-2001 for macrophytes).

Germany: applied the assessment and area classification to its waters according to the agreed assessment- and overall classification procedure of the Comprehensive Procedure. Germany indicates that for some assessment parameters a more frequent monitoring and/or better area coverage of the monitoring stations is required. All German marine waters and estuaries are classified as PA, except the German offshore North Sea which inner part with long residence time is addressed as PPA, mostly due to insufficient data, and the outer part of the German offshore waters which are classified as PPA. This assessment was for the period 1980-2000.

Ireland: applied the assessment and area classification to its waters according to the agreed assessment and overall classification procedure of the Comprehensive Procedure. Not all parameters however were reported due to a lack of data for certain parameters, e.g. phytoplankton indicator species and macrophytes. As Ireland's assessment under the Common Procedure relates to estuarine waters only (where the N:P ratios may be naturally elevated due to the freshwater influence), Ireland did not include consideration of N:P ratios in its comprehensive assessment. The Comprehensive Procedure was applied to a total of 53 (sub) areas, as part of the 19 examined estuaries and bays that were not identified as non problem areas during the initial screening procedure. Of the 53 (sub) areas, 21 are classified as problem areas on the basis of the initial classification; of the remainder, 12 are classified as potential problem areas and 19 are classified as non-problem areas. One area (Garavoge estuary) is unclassified. Ten of the 12 potential problem areas (initial classification) are ultimately classified as non-problem areas following appraisal of all relevant information (step 3, final classification). All

such areas indicate elevated nutrient levels (either nitrogen or phosphorus), but in all cases did not exhibit either direct or indirect effects throughout the monitoring period (1995 to 1999 inclusive).

Netherlands: applied the assessment and area classification to its waters according to the agreed assessment- and overall classification procedure of the Comprehensive Procedure. The Netherlands indicates a strengthening of organic carbon monitoring in the offshore sedimentation area Oystergrounds in future and the need for concerted actions in and for transboundary affected areas. The Dutch coastal North Sea waters, Dutch Ems and Western Scheldt estuaries and Dutch Wadden Sea) are classified as PA, Dutch southern and northern offshore North Sea waters, separately re-assessed and classified as transboundary affected PA, and Dutch utmost Northern offshore waters are classified as NPA, for the period 1990-2001.

Norway: applied the assessment and area classification to its waters according to the agreed assessment- and overall classification procedure of the Comprehensive Procedure. For some areas there were not enough monitoring data for some assessment parameters. Norway indicates that for some assessment parameters a more frequent monitoring and/or better spatial coverage of the monitoring stations is required. The Comprehensive Procedure was applied to a total of 44 areas, of which 21 were classified as PPAs. 14 of the PPA areas were classified as such due to transboundary transport. For several regions there is due to the length of the Norwegian coastline an outstanding application of the Screening Procedure which will be finalised in the future.

Portugal: applied the assessment and area classification to three estuaries according to the agreed assessment and overall classification procedure of the Comprehensive Procedure, except for some assessment parameters due to the lack of data. Two estuaries (Tagus and Sado) are classified as NPA and Mondego estuary is classified as PPA, for the period 1994-2001. A study is being undertaken on the Mondego estuary to provide more monitoring data, to complete the spatial description of the estuary, and to establish whether there is any link between the direct effects and the causative factors.

Spain: assessed and classified its one recently (2000-2001) examined coastal area as PPA according to the agreed assessment and overall classification procedure of the Comprehensive Procedure.

Sweden: applied the assessment and area classification to its waters according to the agreed assessment- and overall classification procedure of the Comprehensive Procedure. All Swedish marine waters (Kattegat and Skagerrak) are classified as PA for the period 1980s - 1990s.

UK: The UK, which had the most extensive part of the maritime area to be assessed, focussed on offshore areas in its first application of the Comprehensive Procedure. Twenty individual areas were assessed using the Comprehensive Procedure. The results of these assessments were coupled with the results of assessment of 16 nearshore waters and estuaries made under the UWWTD and Nitrates Directive, to ensure that the overall assessment of UK waters was comprehensive. In summary, the UK has identified 12 problem areas and 4 potential problem areas.

For those areas where the Comprehensive Procedure was applied, the UK mainly used the assessment parameters relating to nutrient enrichment, chlorophyll and oxygen deficiency. The UK found that in 15 cases the initial classification gave results which did not indicate an undesirable disturbance and, thus, did not satisfy the conditions of the OSPAR definition which determine eutrophication. Following step 3 of the assessment procedure, these areas were classified as NPAs on the basis that there were no undesirable effects or reasonable grounds for concern. Special consideration was given to fish farm sites as a class of local marine areas of possible concern. This assessment was presented to ASMO and the UK concluded that NPA was the most likely status for fish farm sites. However, the UK recognised the need for further work to substantiate this conclusion.

The UK highlighted the need for step 3 of the procedure to be more specific in its requirement to check that any exceedence of the criteria for direct or indirect effects does amount to an undesirable disturbance or gives rise to reasonable grounds for concern.

4.1 Overall conclusions on area classification

All Contracting Parties applied in a harmonised way the second step of the Comprehensive Procedure, which is the integration of the assessment parameters resulting in an initial area classification.

In those cases where there were not enough data on direct and indirect assessment parameters, most Contracting Parties classified those areas as Potential Problem Areas, in accordance to the area classification procedure (see Table 2 in Chapter 2).

However, the interpretation of the third step, the appraisal of all relevant information concerning the harmonised assessment criteria and their respective assessment levels and the supporting environmental factors, differed between Contracting Parties, leading to a non harmonised final classification.

A number of Contracting Parties used this step to explain their results of the initial classification, taking account these supporting environmental factors. In these cases this final classification is identical to the initial classification. Other Contracting Parties, i.e. Ireland, Norway, Portugal and UK, reviewed initial classifications using step 3.

In the case of Ireland, a number of PPAs have been identified where nutrient concentrations exceed the Comprehensive Procedure thresholds. As the link between nutrient concentrations and eutrophication is complex and not fully understood, and as the thresholds for direct and indirect effects for the areas concerned were not exceeded over a five-year period, Ireland considers that the areas should be classified as NPAs. The absence of undesirable effects, in these cases, is probably a function of mitigating supporting environmental factors.

Norway observed, in the case of some deep sill fjords, that it was difficult to differentiate between anthropogenic and naturally occurring nutrient enrichment effects. Consequently, some of these sill fjord areas which were given an initial PA classification were finally classified as PPAs.

Four Contracting Parties (Ireland, Norway, Portugal, UK) observed that the initial classification in some cases needed to be revised (see Table 3). This was because the scoring against the various assessment parameters did not reflect the eutrophication status. To some extent this was to be expected because exceedence of the threshold levels is an indicator of eutrophication and not necessarily eutrophication as defined in the OSPAR Strategy to Combat Eutrophication.

The UK interpreted the third step in an additional way, namely that it allows for testing whether any exceedence of the direct and/or indirect effects assessment parameters amounts to an 'undesirable disturbance' as referred to in the relevant OSPAR definition. This led to reclassifications from initial classifications as shown in Table 3.

Table 3: Summary of the number of areas classified by each Contracting Party

Contracting Party	Number of classified areas	Number of initial classifications revised			
		NPA to PPA	PPA to NPA	PA to PPA	PA to NPA
Belgium	1	0	0	0	0
Denmark	7	0	0	0	0
France	26	0	0	0	0
Germany	6	0	0	0	0
Ireland	53	0	10	0	0
Netherlands	7	0	0	0	0
Norway	44	5	0	14	0
Portugal	3	0	0	1	0
Spain	1	0	0	0	0
Sweden	4	0	0	0	0
UK	36	0	9	0	6

In its assessment report the UK noted that some UK marine areas identifies as NPAs are downstream of key catchment areas, i.e. those which are of particular interest because of the size of population and/or level of agricultural activity. The UK indicated its intention for these marine areas, to review its monitoring activities to ensure that there is an appropriate long-term monitoring programme, specifically designed to detect any adverse anthropogenic related changes, so that OSPAR can be assured of continuing NPA status.

It was also observed that some assessment parameters were more reliable as indicators of eutrophication than others.

The four Contracting Parties concerned concluded that these considerations need to be taken into account in the further development of the Comprehensive Procedure.

5. OVERALL CONCLUSIONS AND RECOMMENDATIONS

This section provides overall conclusions, an evaluation of the first application of the Comprehensive Procedure, and recommendations for future work. On the basis of their assessment and area classification, several Contracting Parties concluded that several of their coastal areas, fjords and/or estuaries and some offshore areas to which this procedure was applied, are classified as Problem Areas and Potential Problem Areas, while a number of offshore areas are classified as Non Problem Areas. The outcome has been visualised in the maps, and also in the list of areas contained in Appendix 2.

5.1 Overall Conclusions

5.1.1 Category I: Nutrient Enrichment

On the basis of their assessments it is concluded by Contracting Parties that many of their coastal areas, fjords and / or estuaries to which the Comprehensive Procedure is applied, show increased or significant riverine and /or transboundary N and P inputs, and elevated levels in winter DIN and DIP concentrations, and elevated winter N/P ratios.

5.1.2 Category II: Direct effects of nutrient enrichment

For Chlorophyll a the assessment levels applied by the Contracting Parties showed large differences. For a number of areas, region-specific phytoplankton indicator species with their respective assessment levels were used, but some of these Contracting Parties dealt with them in different ways, and for a number of area the information is lacking. The region specific assessment of macrophytes was generally well covered by the Contracting Parties concerned. For a number of OSPAR regions, the frequency and spatial coverage of monitoring for these direct effect assessment parameters need to be reconsidered.

5.1.3 Category III / IV: Indirect / other possible effects of nutrient enrichment

Degree of oxygen deficiency parameter is a valuable tool that has been used by all Contracting Parties depending on its relevancy with regard to the zone concerned. However, in the assessment, different region-specific thresholds have been used by some Contracting Parties. Ireland has set criteria for dissolved oxygen, both in respect of concentrations and percentage saturation.

The other parameters within Categories III and IV have potential but have not been extensively monitored in conjunction with the direct effect parameters or used in this assessment to the same extent. For a number of OSPAR regions, the frequency and spatial coverage of monitoring for these indirect / other possible effect assessment parameters need to be reconsidered.

Where changes/kills in zoobenthos and fish kills as affected by eutrophication has been used by Contracting Parties, this parameter has been applied in a qualitative descriptive way.

Organic Carbon/Organic Matter is used by a few Contracting Parties especially for sedimentation areas. Difficulties can be encountered because of insufficient data and a lack of reference values.

On the basis of their assessments it is concluded by a number of Contracting Parties that several of their assessed coastal areas, fjords and / or estuaries, and some offshore North Sea sedimentation areas, show oxygen deficiency levels during nuisance phytoplankton "blooms", under dense surface algal layers, and/or in (organic) nutrient enriched sedimentation areas.

Assessment and area classification: overall area classification

A number of Contracting Parties (Belgium, Denmark, Germany, Netherlands, Norway, Sweden) indicate that some of their Problem Areas result from nutrient enrichment due to transboundary transport from adjacent marine areas. There is a need to understand the relative contribution from other areas and from riverine and direct inputs and indicate, therefore, the need for concerted actions in and for their transboundary affected areas.

5.1.4 Outlook

Contracting Parties were also asked to provide - where possible - a consideration of an outlook for the future development of the eutrophication status of their maritime waters concerned in connection to the possible need for further action in order to achieve by 2010 a healthy marine environment where eutrophication does not occur.

Only three Contracting Parties have provided an outlook containing an estimate of the effectiveness of the measures agreed and implemented already. From these outlooks, the following appears: Denmark set up a national Action Plan in 1987 already for which the inclusion of additional measures is currently under consideration. Germany and the Netherlands stressed that further reductions of direct riverine nutrient inputs (especially nitrogen) and indirect nutrient inputs from maritime areas (via transboundary transports) adjacent to their maritime areas are necessary in order to achieve in 2010 a healthy marine environment where anthropogenic caused nutrient enrichment and eutrophication effects do not occur.

5.1.5 Evaluation

The use of assessment parameters

Contracting Parties have used the assessment parameters according to the agreed procedure. The assessment methodology has been based on a common approach using region specific levels for each harmonised assessment parameter (Table 1). The agreed set of harmonised parameters has been used for assessing most of the OSPAR maritime area though some parameters are considered more valuable than others in different regions. The region specific assessment levels for quantified parameters are based on background values that are derived from historical data or, where this is not possible, have been derived from other relevant information. The availability of data, with good spatial and temporal coverage, is a problem in some areas and may affect the apparent quality of the assessment.

The initial classification process

The initial area classification step was followed by all Contracting Parties concerned according to the agreed procedure. However, for three Contracting Parties the initial classification of a number of their areas showed some deviation from the agreed procedure.

Overall classification

The first application of the Comprehensive Procedure has produced an assessment of the eutrophication status of marine waters which is reasonably transparent but not totally harmonised. Transparency is greatest in respect of the data sets which provided the raw material of the assessment. The degree of harmonisation was diminished in respect of the reference values used by respective Contracting Parties and in the application of the methodology. This latter aspect reflects the fact that eutrophication assessment is not easy due to the

difficulties of determining what constitutes a problem, especially when the indicators of undesirable disturbance are not strong and not clearly linked to anthropogenic sources of nutrients. Also, reflecting that this was the first application of a developing OSPAR methodology, there were differences in interpretation which have reduced the degree of harmonisation.

This problem of different interpretation is reflected most in the outcome of the third step of the assessment process. In refining their initial assessments in this step, some Contracting Parties made changes, while the majority of Contracting Parties did not make any changes in the area classification as indicated in table 3 in Chapter 4.

The number of changes from the initial classification to the final classification indicates that the third step is important to ensure that a thorough overall assessment is made. The differing proportions in the changes that have been made indicate that there is a difference in view. This indicates that there is a need for refining the methodology and/or improving the guidance on its application.

While this process is underway, the Contracting Parties that have refined their initial classification by moving to a lower classification should maintain monitoring programmes to further justify their proposed classifications.

5.1.6 Recommendations

The first application of the Comprehensive Procedure has identified a need for improvements to our assessment tools to allow further harmonisation. These needs include issues to do with the derivation of background values for specific parameters, the nature of the classification process and research needs.

There is a need to understand the relative contribution from other areas and from riverine and direct inputs and indicate, therefore, the need for concerted action to be taken in and for their transboundary affected areas. In order to address this there is a need for further development of tools (including numerical models) to arrive at total nutrient budgets for specific areas. Furthermore, where Contracting Parties' waters have common borders, they should aim to undertake joint assessments for their adjacent areas.

The recent assessment has shown some deficiencies in the available monitoring data, and has identified some potential enhancements to the assessment procedure:

a. there is a need in some areas to improve the frequency and spatial coverage of the nutrients and eutrophication effects monitoring;

b. there is a need to agree upon the time period that the assessment should cover;

c. consideration should be given to the use in future applications of the Comprehensive Procedure of oxygen saturation as an assessment parameter in addition to the assessment parameter oxygen concentration;

d. the OSPAR Nutrient Monitoring Programme requires monitoring of nutrients together with direct/indirect effects during the growing season for Problem Areas and Potential Problem Areas. Therefore this data should be accommodated in future assessments;

e. there is a need to develop guidance on monitoring frequency and coverage to supplement the JAMP monitoring Guidelines for nutrients and eutrophication effects.

The further application of the Comprehensive Procedure as envisaged in the OSPAR Strategy to Combat Eutrophication and the Joint Assessment and Monitoring Programme should be coordinated with the reporting requirements of the relevant EC Directives and other international reporting agreements. To facilitate this, Contracting Parties concerned should ensure that they undertake their monitoring obligations in line with the requirements of the OSPAR Nutrient Monitoring Programme.

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APPENDIX 1: COMPLETED OVERALL CLASSIFICATION TABLES FROM CONTRACTING PARTIES

Key to the tables

NI Riverine total N and total P inputs and direct discharges
DI Winter DIN and/or DIP concentrations
NP Increased winter N/P ratio
Ca Maximum and mean Chlorophyll a concentration
Ps Region/area specific phytoplankton indicator species
Mp Macrophytes including macroalgae
O_2 Degree of oxygen deficiency
Ck Changes/kills in zoobenthos and fish kills
Oc Organic carbon/organic matter
At Algal toxins (DSP/PSP mussel infection events)

\+ = Increased trends, elevated levels, shifts or changes in the respective assessment parameters
\- = Neither increased trends nor elevated levels nor shifts nor changes in the respective assessment parameters
? = Not enough data to perform an assessment or the data available is not fit for the purpose

BELGIUM

Area	**Category I** Degree of nutrient enrichment		**Category II** Direct effects		**Category III and IV** Indirect effects/ other possible effects				Initial classification	Appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors)	Final classification	Assessment period
Belgian Continental Shelf (BCS)	NI	?	Ca	+/-	O_2	-	At	(-)[7]	Problem Area or Potential Problem Area or Non Problem Area	In almost all situations, winter DIN and/or DIP concentrations (Category I assessment parameter) were above the thresholds. Therefore, Chl-a concentrations (and the subsequent distribution pattern) have been determinant in the identification of the eutrophication status. However, there are strong inter-annual variations in maximum Chl-a concentrations and their geographical distribution. A problem area appears in coastal waters, extending from the Scheldt mouth to, at least, Oostende. Another problem area appears South-West in adjacent marine waters. Depending on the year, the western half of the coastal waters qualify either as problem areas or as potential problem areas. Offshore waters can be classified as potential problem areas with the presence of non problem waters themselves extending Northwards.	Problem Area or Potential Problem Area or Non Problem Area	[1974-2000]
	DI	+	Ps	(+)[7]	Ck	(-)[7]						
	NP	+	Mp	?	Oc	?						

In carrying its assessment, Belgium considered all its EEZ/Continental Shelf (its "responsibility" within OSPAR). A full assessment has been carried out for each monitoring station, separately for 4 recent years. This choice was done to keep as far as possible the quality of information. The result allowed us not only to assess the status of the water masses but also the delimitation of these zones. In the contrary, working with predefined zones causes a loss of information (by i.e. working with average values) and imposes a delimitation. Therefore, inter-comparability of assessments is very much reduced.

[7] No threshold defined.

DENMARK

Area	**Category I** Degree of nutrient enrichment		**Category II** Direct effects		**Category III and IV** Indirect effects/ other possible effects				Initial classification	Appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors)	Final classification	Assessment period
Kattegat Coastal areas	NI	+	Ca	+	O_2	+	At	+	Problem area	Elevated inputs and/or increased trends of nutrients. Elevated concentrations of DIN. Elevated chlorophyll a concentrations, Blooms of *Chatonella, Karenia mikitmotoi, pseudo-nitzschia, Gymnodinium chlorophorum, Prorocentrum minimum* and *Chrysochromulina*, decreased depth limit of eelgrass, oxygen depletion and algae toxins found in some areas with mussel banks (Limfjorden).	Problem area	1989 – 2001
	DI	+	Ps	+	Ck	+						
	NP	+	Mp	+	Oc							
Kattegat Open areas	NI	+	Ca	+	O_2	+	At	-	Problem area	Elevated inputs and/or increased trends of nutrients. Elevated concentrations of DIN. Elevated chlorophyll a concentrations, Blooms of *Chatonella, Karenia mikitmotoi, Gymnodinium chlorophorum* and *Chrysochromulina*. Oxygen depletion.	Problem area	1989 – 2001
	DI	-	Ps	+	Ck	+						
	NP	-	Mp	+/-	Oc							
Skagerrak Coastal area	NI	+	Ca	+	O_2	-	At	-	Problem area	Concentration of N and P elevated due to transboundary input (Jutland current from German Bight). Elevated concentrations of DIN. Elevated chlorophyll a concentrations, Blooms of *Chatonella, Karenia mikitmotoi, Gymnodinium chlorophorum.*	Problem area	1989 – 2001
	DI	+	Ps	+	Ck	-						
	NP	+	Mp	+	Oc							
Skagerrak Open area	NI	-	Ca	+	O_2	-	At	-	Problem area	Elevated chlorophyll a concentrations, Blooms of *Chatonella*, *Karenia mikitmotoi*.	Problem area	1989 – 2001
	DI	-	Ps	+	Ck							
	NP	-	Mp		Oc							
North Sea Coastal area	NI	+	Ca	+	O_2	-	At	-	Problem area	Concentration of N and P elevated due to transboundary input (Jutland current from German Bight). Blooms of *Phaocystis, pseudo-nitzschia, Karenia mikitmotoi* and *Chatonella*. The western limit of the area to be defined.	Problem area	1989 – 2001
	DI	+	Ps	+	Ck	-						
	NP	+	Mp	+	Oc							
Central North sea	NI	-	Ca	?	O_2	-	At	-	No problem area	No elevated nutrient concentrations The limit between the open area and the coastal area needs to be specified. A possible potential problem area in between the coast and the open sea area should also be identified.	Non problem area	All available data
	DI	-	Ps	?	Ck	-						
	NP	-	Mp	?	Oc							
Wadden Sea	NI	+	Ca	+	O_2	-	At	+	Problem area	Concentration of N and P elevated due to local and transboundary input (Jutland current from German Bight). Mass occurrence of algae, including annual nuisance macroalgae. Algae toxins found in mussels in some areas.	Problem area	1989 - 2001
	DI	+	Ps	-	Ck	-						
	NP	+	Mp	+	Oc							

FRANCE

Area	**Category I** Degree of nutrient enrichment		**Category II** Direct effects		**Category III and IV** Indirect effects/ other possible effects				Initial classification	Appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors)	Final classification	Assessment period
Dunkerque and Calais	NI	+	Ca	-	O_2	+	At		Problem area		Problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Boulogne and Canche	NI	-	Ca	-	O_2	-?	At		Problem area		Problem area	See note
	DI		Ps	+	Ck							
	NP		Mp	-	Oc							
Authie and Somme	NI	+	Ca	+	O_2	?	At		Problem area		Problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Dieppe and Fécamp	NI	-	Ca	-	O_2	-?	At		Non-problem area ?	The lacking data is not likely to change the classification as non-problem area. Further monitoring is required before next revision of the common procedure.	Non-problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Estuary and Bay of Seine	NI	+	Ca	+	O_2	+	At		Problem area		Problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Calvados	NI	+	Ca	+	O_2	-	At		Problem area		Problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Bay of Veys and St Vaast	NI	+	Ca	+?	O_2	-	At		Potential problem area		Potential problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Rance	NI	-	Ca	-	O_2	-?	At		Non-problem area ?	The lacking data is not likely to change the classification as non-problem area. Further monitoring is required before next revision of the common procedure.	Non-problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Arguenon and Fresnaye	NI	-	Ca	-	O_2	-?	At		Problem area (locally)	The eutrophication problem occurs only in the upper part of the Bay of Fresnaye.	Problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	+	Oc							
St Brieuc	NI	-	Ca	-	O_2	-?	At		Problem area		Problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	+	Oc							
Paimpol to Perros-Guirec	NI	-	Ca	-	O_2	-?	At		Non-problem area ?	The lacking data is not likely to change the classification as non-problem area. Further monitoring is required before next revision of the common procedure.	Non-problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							

Lan nion	NI	-	Ca	-	O_2	-?	At		Problem area		Problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	+	Oc							
Morlaix	NI	-	Ca	-	O_2	-?	At		Problem area		Problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	+	Oc							
Abers finistérien	NI	-	Ca	-?	O_2	-?	At		Non-problem area		Non-problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Brest	NI	+	Ca	-	O_2	-?	At		Potential problem area		Potential problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Douarnenez	NI	-	Ca	-	O_2	-?	At		Problem area		Problem area	See note
	DI		Ps	+	Ck							
	NP		Mp	-	Oc							
Audierne	NI	-	Ca	-	O_2	-	At		Non-problem area		Non-problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Concarneau	NI	-	Ca	-	O_2	-?	At		Problem area		Problem area	See note
	DI		Ps	+	Ck							
	NP		Mp	-	Oc							
Aven Belon and Laïta	NI	-	Ca	-?	O_2	-?	At		Non-problem area ?	The lacking data is not likely to change the classification as non-problem area. Further monitoring is required before next revision of the common procedure.	Non-problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Lorient	NI	+	Ca	-	O_2	-	At		Potential problem area		Potential problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Etel	NI	-	Ca	-?	O_2	-?	At		Non-problem area ?	The lacking data is not likely to change the classification as non-problem area. Further monitoring is required before next revision of the common procedure.	Non-problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Bay of Quiberon and Belle Ile	NI	-	Ca	-	O_2	-?	At		Non-problem area ?	The lacking data is not likely to change the classification as non-problem area. Further monitoring is required before next revision of the common procedure.	Non-problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Gulf of Morbihan	NI	-	Ca	-?	O_2	-?	At		Non problem area ?	The lacking data is not likely to change the classification as non-problem area. Further monitoring is required before next revision of the common procedure.	Non-problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Vilaine	NI	+	Ca	-	O_2	-?	At		Potential problem area		Potential problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							

Loire and Bourgneuf	NI	+	Ca	+	O_2	+	At		Problem area		Problem area	See note
	DI		Ps	-	Ck							
	NP		Mp	-	Oc							
Arcachon and Landes	NI	-	Ca	-	O_2	-	At		Non-problem area (except in a sub-area)	The Bassin d'Arcachon is a specific part of this area. It is considered a problem area.	Non-problem area (except in a sub-area)	See note
	DI		Ps	-	Ck							
	NP		Mp	+(local)	Oc							

Note on assessment period: for nutrients, chlorophyll and oxygen, mainly 1990-2000; for phytoplankton 1990-1995 (harmful and toxic to fauna phytoplankton species) or 1992-2001 (toxic to human phytoplankton species); for macrophytes, 1997-2001.

GERMANY

Area (salinity)	**Category I** Degree of nutrient enrichment		**Category II** Direct effects		**Category III and IV** Indirect effects/ other possible effects				Initial classification	Appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors)	Final classification	Assessment period
Estuaries (<28): Elbe, Weser, Ems	NI	+	Ca	+	O_2	+	At	?	Problem area	Nutrient loads elevated, especially in the Elbe river significant oxygen deficiency was observed until 1995; elevated chlorophyll concentrations but high turbidity limits primary production; improvement by further reduction of nutrient loads (esp. N) seems possible.	Problem area	1980-2000 (chemical parameters) 1994-1996 (biological parameters)
	DP	+	Ps	-	CK	?						
	NP	+	Mp	?	OC	?						
Wadden Sea (15-33):	NI	+	Ca	+	O_2	+	At	+	Problem area	Affected by high discharges of passing rivers, transboundary imports and trapping of organic material, causing dominating remineralisation mode; occasional nuisance phytoplankton development; seldom signals of exceptional oxygen depletion, no sufficient monitoring of MP, OC and AT; due to trapping of organic material eutrophication can not be avoided completely, further nutrient reduction (> 50%) necessary.	Problem area	1977-1997 (chemical/ biological parameters)
	DP	+	Ps	+	CK	?						
	NP	+	Mp	+	OC	?						
Coastal Water (25-34,5): Mostly unstratified, long residence time	NI	+	Ca	?	O_2	-	At	?	Problem area	Affected by high discharges, transboundary imports and long residence time; occasional harmful algae observed, but no long lasting dominance; no sufficient data available, e.g. phytoplankton monitoring restricted to near coastal waters; further reduction of nutrient discharges would reduce eutrophication effects.	Problem area	1980-2000 (chemical parameters) 1990-1997 (biological parameters)
	DP	+	Ps	+	CK	-						
	N/P	-	Mp	+	OC	?						
Coastal Water (25-34,5): Seasonally stratified, Elbe River Valley, long residence time	NI	+	Ca	?	O_2	+	At	?	Problem area	Due to stratification and long residence time accumulation of organic matter and succeeding oxygen exhaustion in the bottom layer occasionally was observed, possibly caused already by imports of nutrients and organic matter at moderate concentrations; monitoring and modelling to be increased; eutrophication effects can not be avoided completely due to physical processes.	Problem area	1980-2000 (chemical parameters) 1990-1997 (biological parameters)
	DP	+	Ps	+	CK	+						
	NP	-	Mp	-	OC	?						

Offshore (>34,5): Seasonally stratified, long residence time	NI	-	Ca	?	O_2	?	At	*NR*	Potential problem area	No systematic monitoring of the relevant eutrophication effects; in stratified areas oxygen depletion may occur, transboundary imports may be significant; long residence time may accelerate eutrophication effects which probably can not be avoided by reduction of local nutrient discharges only.	Potential problem area	1980-2000 (chemical parameters) 1990-1997 (biological parameters)
	DP	-	Ps	*NT*	CK	*NT*						
	NP	-	Mp	*NR*	OC	?						
Offshore (>34,5): Seasonally stratified, transboundary imports	NI	-	Ca	*NT*	O_2	*NR*	At	*NR*	Non problem area	No sufficient monitoring of the relevant eutrophication effects; but shorter residence time and dilution of nutrients probably inhibit effects, in spite of transboundary imports from the Southern North Sea including UK coastal erosive areas.	Non problem area	1980-2000 (chemical parameters) 1990-1997 (biological parameters)
	DP	-	Ps	*NT*	CK	*NR*						
	NP	-	Mp	*NR*	OC	*NR*						

IRELAND

Area	**Category I** Degree of nutrient enrichment		**Category II** Direct effects		**Category III and IV** Indirect effects/ other possible effects				Initial classification	Appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors)	Final classification	Assessment period
Castletown Estuary and Dundalk Bay												
E16 Castletown Estuary	NI		Ca	-	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E17 Dundalk Bay	NI		Ca	-	O_2	-	At		Potential problem area	Direct or indirect effects not arising during five year assessment period.	Non problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
Boyne Estuary and Adjacent Coastal Waters												
E10 Boyne Estuary	NI		Ca	-	O_2	-	At		Potential problem area	Direct or indirect effects not arising during five year assessment period.	Non problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E11 Coastal	NI		Ca	-	O_2	-	At		Potential problem area	Direct or indirect effects not arising during five year assessment period.	Non problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
Rogerstown Estuary and Adjacent Coastal Waters												
E33 Lower Rogerstown Estuary	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
E34 Adjacent Coastal	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							

Broadmeadow Estuary and Adjacent Coastal Waters											
E12 Broadmeadow Estuary (Inner)	NI		Ca	+	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E13 Broadmeadow Estuary (Outer)	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
E14 Adjacent Coastal	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
Liffey Estuary, Dublin Bay and Adjacent Coastal Waters											
E30 Liffey Estuary	NI		Ca	+	O_2	-	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E31 Dublin Bay	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
E32 Adjacent Coastal	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
Slaney Estuary and Wexford Harbour											
E39 Slaney Estuary (Upper)	NI		Ca	+	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E40 Slaney Estuary (Lower)	NI		Ca	+	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E41 Wexford Harbour	NI		Ca	-	O_2	-	At		Potential problem area	Direct or indirect effects not arising during five year assessment period.	Non problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
Barrow-Nore-Suir Estuaries											
E3 Barrow Estuary	NI		Ca	+	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E3a Barrow Nore Estuary (Lower)	NI		Ca	-	O_2	-	At		Potential problem area	Direct or indirect effects not arising during five year assessment period.	Non problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							

E5 Suir Estuary (Upper)	NI		Ca	+	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E6 Suir Estuary (Lower)	NI		Ca	-	O_2	-	At		Potential problem area	Direct or indirect effects not arising during five year assessment period.	Non problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E7a Barrow Nore Suir Estuary (Outer)	NI		Ca	-	O_2	-	At		Potential problem area	Direct or indirect effects not arising during five year assessment period.	Non problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E7b Outer Waterford Harbour	NI		Ca	-	O_2	-	At		Potential problem area	Direct or indirect effects not arising during five year assessment period.	Non problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
Colligan Estuary and Dungarvan Harbour												
E18 Colligan River	NI		Ca	-	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E19 Dungarvan Harbour	NI		Ca	-	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
Blackwater Estuary and Youghal Harbour												
E8a Blackwater Estuary Upper	NI		Ca	+	O_2	-	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E8b Blackwater Estuary Lower	NI		Ca	+	O_2	-	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E9 Youghal Harbour	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
Lee Estuary and Cork Harbour												
E26a Lee Estuary/Lough Mahon	NI		Ca	+	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E26b Owennacurra Estuary/North Channel	NI		Ca	-	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E27 Cork Harbour	NI		Ca	-	O_2	-	At		Potential problem area	Direct or indirect effects not arising during five year assessment period.	Non problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							

Bandon Estuary and Kinsale Harbour											
E1a Upper Bandon Estuary	NI		Ca	+	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E1b Lower Bandon Estuary	NI		Ca	+	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E2 Kinsale Harbour	NI		Ca	-	O_2	-	At		Potential problem area	Direct or indirect effects not arising during five year assessment period.	Non problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
Lee (Tralee) Estuary and Tralee Bay											
E28a Upper Lee (Tralee) Estuary	NI		Ca	+	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E28b Lower Lee (Tralee) Estuary	NI		Ca	(?)	O_2	+	At		Problem area		Problem area	1995-1999
	DI	(?)	Ps		Ck							
	NP		Mp		Oc							
E29 Tralee Bay	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
Cashen Feale Estuary											
E15a Upper Feale Estuary	NI		Ca	(?)	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E15b Cashen Feale Estuary	NI		Ca	(?)	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
Shannon Estuary											
E35a Shannon Estuary Upper	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
E35b Shannon Estuary Middle	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
E35c Shannon estuary Lower	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							

E36 Maigue Estuary	NI		Ca	-	O_2	-	At		Potential problem area		Potential problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E37 Deel Estuary	NI		Ca	-	O_2	-	At		Potential problem area		Potential problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E38 Fergus Estuary	NI		Ca	-	O_2	+	At		Problem area		Problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
Corrib Estuary and Inner Galway Bay												
E20 Corrib Estuary	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
E21 Inner Galway Bay	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
Moy Estuary and Killala Bay												
E44 Moy Estuary	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
E45 Killala Bay	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
Garavoge Estuary and Sligo Bay												
E22 Garavoge Estuary	NI		Ca	+	O_2	-	At		?		?	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
E23 Sligo Bay	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
Killybegs Harbour and McSwyne's Bay												
E24 Killybegs Harbour	NI		Ca	+	O_2	+	At		Problem area		Problem area	1995-1999
	DI	+	Ps		Ck							
	NP		Mp		Oc							
E25 McSwyne's Bay	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							

Lough Swilly											
E42 Upper Lough Swilly	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							
E43 Lower Lough Swilly	NI		Ca	-	O_2	-	At		Non problem area		Non problem area	1995-1999
	DI	-	Ps		Ck							
	NP		Mp		Oc							

NETHERLANDS

Area	**Category I** Degree of nutrient enrichment		**Category II** Direct effects		**Category III and IV** Indirect effects/ other possible effects				Initial classification	Appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors)	Final classification	Assessment period
Dutch utmost Northern offshore waters	NI	-	Ca	-	O_2	-	At	*NR*	Non problem area	The well mixed Dutch North Sea utmost northern offshore waters, situated on the border of German- and UK -offshore waters, is classified as a non-problem area when based on results from the utmost offshore monitoring stations: "Rottum 70 and Terschelling 235", 70 km and 235 km off the Dutch northern coast.	Non problem area	1990-2001
	DP	-	Ps	-/-	Ck	*NT*						
	NP	-	Mp	*NR*	Oc	-						
Dutch offshore Oystergrounds Area	NI	[2]	Ca	-	O_2	+	At	*NR*	Problem area[2]	The Dutch offshore sedimentation area Oystergrounds, temperature stratified during spring/summer and situated north of the Frisian Front, is a problem area affected by transboundary transport of nutrients and organic matter from adjacent marine areas (UK- and Dutch coastal waters).	Problem area[2]	1990-2001
	DP	-	Ps	-/+	Ck	*NT*						
	NP	-	Mp	*NR*	Oc	+						
Dutch offshore Southern waters	NI	[2]	Ca	+	O_2	-	At	*NR*	Problem area[2]	The Dutch southern offshore non-sedimentation area with well mixed waters, receiving waters from Channel and Belgian waters, is a problem area affected by transboundary transport of nutrients and nuisance phytoplankton indicator species.	Problem area[2]	1990-2001
	DP	-	Ps	+/-	Ck	*NT*						
	NP	-	Mp	NR	Oc	-						
Dutch coastal waters (salinity < 34,5)	NI	+	Ca	+	O_2	+	At	*NR*	Problem area	The Dutch well mixed shallow waters, receiving nutrient enriched riverine waters of Scheldt, Meuse, Rhine and Ems, and Channel waters, is a problem area.	Problem area	1990-2001
	DP	+	Ps	+/+	Ck	*NT*						
	NP	+	Mp	*NR*	Oc	*NT*						
Dutch Wadden Sea	NI	+	Ca	+	O_2	+	At	+	Problem area	The Dutch shallow sedimentation tidal mudflat area Wadden Sea, receiving nutrient enriched riverine waters of Rhine (Lake IJssel) and Ems, and southern coastal North Sea and Channel waters, is a problem area.	Problem area	1990-2001
	DP	+	Ps	+/+	Ck	*NT*						
	NP	+	Mp	+	Oc	+						
Dutch Ems Dollard	NI	+	Ca	+	O_2	+	At	*NR*	Problem area	The Dutch shallow Ems-Dollard tidal mudflat estuary, situated between Dutch-German border and Wadden Sea, receiving nutrient enriched riverine Ems waters and outlets along the Dutch part of the estuary, is a problem area.	Problem area	1990-2001
	DP	+	Ps	+/+	Ck	*NT*						
	NP	+	Mp	*NR*	Oc	+						

Dutch Western Scheldt	NI	+	Ca	+	O_2	+	At	*NR*	Problem area	The Dutch shallow well mixed Western Scheldt estuary, situated between the Dutch-Belgian border and the Dutch North Sea coast, receiving nutrient enriched riverine Scheldt waters, is a problem area.	Problem area	1990-2001
	DP	+	Ps	+/+	Ck	*NT*						
	NP	+	Mp	*NR*	Oc	*NT*						

NORWAY

Area	**Category I** Degree of nutrient enrichment		**Category II** Direct effects		**Category III and IV** Indirect effects/ other possible effects				Initial classification	Appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors)	Final classification	Assessment period.
A1 Iddefjorden	NI	+	Ca	+	O_2	+	At		Problem area		Problem area	1990-94
	DI	+	Ps	+	Ck	?						
	NP	+	Mp	+	Oc							
A2 Hvaler/Singlefjord	NI	+	Ca	+	O_2	+	At	+	Problem area		Problem area	1990-94
	DI	+	Ps	+	Ck	-						
	NP	+	Mp	-	Oc	-						
A3 Inner Oslofjord	NI	+	Ca	+	O_2	+	At	+	Problem area		Problem area	1990-2000
	DI	+	Ps		Ck	+						
	NP	+	Mp	+	Oc							
A4 Drammensfjord	NI	+	Ca	+	O_2	+	At		Problem area	Extreme sill fjord. Extended residence time in deep water.	Problem area	1984, 1995, 2001
	DI		Ps		Ck	+						
	NP		Mp	+	Oc							
A5 Sandebukta etc.	NI	+	Ca	+	O_2	+	At	+	Problem area	Extended residence time in bottom waters, transboundary load of nutrients and organic matter.	Problem area	1987-90, 1999-2001
	DI	+	Ps	+	Ck	+						
	NP	+	Mp	+	Oc							
A6 Middle part of outer Oslofjord	NI	-	Ca	+	O_2	+	At	+	Problem area	Extended residence time in deep water, transboundary load of nutrients and organic matter.	Problem area	1999-2001
	DI	+	Ps	+	Ck	-						
	NP	+	Mp	+	Oc	+						
A7 Southern part of outer Oslofjord	NI	-	Ca	-	O_2	-	At	?	Problem area	Transboundary load of nutrients and organic matter. Extended residence time in deep water.	Potential problem area	1999-2001
	DI	+	Ps	?	Ck	-						
	NP	+	Mp	+	Oc							
A8 Tønsbergfjord	NI	+	Ca	+	O_2	+	At		Problem area		Problem area	1990-1997, 2000-2001
	DI		Ps		Ck							
	NP		Mp	+	Oc							
A9 Southern part of Tønsbergfjord	NI	-	Ca		O_2		At		Non problem area	Transboundary load of nutrients and organic matter. Local area (Mefjorden): Problem area.	Potential problem area	1997-98
	DI		Ps		Ck							
	NP		Mp		Oc							
A10 Sandefjordsfjord	NI	+	Ca	-	O_2	+	At		Problem area	Strong horizontal gradients. Classification based on inner part.	Problem area	1997-98, 2001
	DI	+	Ps	+	Ck	+						
	NP	+	Mp	+	Oc							

A11 Larviksfjord and Viksfjord	NI	+	Ca		O_2	?	At	?	Potential problem area		Potential problem area	2000-2001
	DI		Ps		Ck	?						
	NP		Mp	?	Oc							
A12-A13 Frierfjord/Grenlandsfjord	NI	+	Ca	-	O_2	+	At		Problem area	Extended residence time deep water behind sills. Transboundary load of nutrients and organic matter.	Problem area	1990-2001, numerous studies
	DI	+	Ps		Ck	+						
	NP	+	Mp	+	Oc	+						
A14 Telemark coastline	NI	-	Ca	-	O_2	?	At		Potential problem area	Transboundary load of nutrients, organic matter and phytoplankton. Possibly local areas with oxygen problems in bottom water.	Potential problem area	2001
	DI		Ps		Ck	?						
	NP		Mp		Oc							
A15-A16 Stølefjord/ Kragerøfjord	NI	-	Ca	-	O_2	+	At	+	Problem area	Extended residence time deep water behind shallow sills. Transboundary load of nutrients, organic matter and phytoplankton. Monitoring station for harmful algae/shellfish poison.	Area 15: Potential problem area Area 16: Problem area	1990-2000
	DI		Ps	+	Ck	+						
	NP		Mp		Oc							
A17-A18 Søndeledfjord/ Sandnesfjord	NI	-	Ca		O_2	+	At		Problem area	Extended residence time in deep water behind sills.	Problem area	1990-2000
	DI		Ps		Ck							
	NP		Mp		Oc							
A19 Lyngør archipelago	NI	-	Ca		O_2	+	At		Problem area	Extended residence time deep in local basins. Transboundary load of nutrients, organic matter and phytoplankton.	Potential problem area	1990-2000
	DI		Ps		Ck							
	NP		Mp	-	Oc							
A20 Tvedestrandsfjord	NI	-	Ca		O_2	+	At		Problem area	Extended residence time deep water behind sills. Local and transboundary load of nutrients and organic matter.	Problem area	1996-97
	DI		Ps		Ck							
	NP		Mp	+	Oc	+						
A21 Flostadøysund	NI	-	Ca		O_2	+	At		Problem area	Local effects on oxygen and softbottom fauna in semi-enclosed basins.	Potential problem area	1990-2000
	DI		Ps		Ck							
	NP		Mp		Oc	+						
A22 Tromøysund	NI	-	Ca		O_2	-	At		Problem area	Local effects in semi-enclosed basins. In general small effects.	Potential problem area	1990-2000 (espec. 1992-94)
	DI	-	Ps		Ck							
	NP		Mp	+	Oc							
A23-A24 Arendal fjord and Utnes	NI	+	Ca	?	O_2	-	At	+	Problem area	Transboundary load of nutrients, organic matter and phytoplankton. Local oxygen problems in inner areas. Monitoring station for harmful algae/shellfish poison.	Area 23: Problem area Area 24: Potential problem area	1990-2000 (espec. 1992-94)
	DI	-	Ps	+	Ck	-						
	NP	-	Mp	-	Oc	-						
A25 Fevik coast	NI	-	Ca		O_2		At		Non problem area	Open coast with transboundary load of nutrients, organic matter and phytoplankton.	Potential problem area	1990-2000
	DI		Ps		Ck							
	NP		Mp	-	Oc							

A26-A27 Grosfjord, Vikkil and Bufjord	NI	-	Ca		O_2	+	At		Problem area	Extended residence time and oxygen problem in deep water behind sill. Local and transboundary load of nutrients and organic matter.	Potential problem area	1990-2000
	DI	+	Ps		Ck							
	NP	?	Mp		Oc	+						
A28 Kaldvellfjord A29 Lillesand outer A30 Skallefjord and Tingsakerfjord	NI	-	Ca		O_2	+	At		Problem area	Extended residence time deep water behind sills. Local and transboundary load of nutrients and organic matter.	Potential problem area	1990-2000 (espec. 1995-98)
	DI		Ps		Ck	+						
	NP		Mp	-	Oc	?						
A31-A33 Steindalsfjord, Isefjærfjord and Blindleia south	NI	-	Ca	-	O_2	+	At		Problem area	Region specific phytoplankton indicator species: *Chatonella* Basins with local oxygen problems, nutrient and organic sediment load. Transboundary load of nutrients and organic matter.	Area 31-32: Problem area Area 33: Potential problem area	1990-2000 (espec. 1995-98,2001))
	DI		Ps	+	Ck	+						
	NP		Mp	+	Oc	+						
A34 Kvåsefjord	NI	-	Ca		O_2		At		Non problem area	Classification upgraded to Potential problem area due to lack of data.	Potential problem area	1990-2000
	DI		Ps		Ck							
	NP		Mp		Oc							
A35-A36 Ålefjærfjord, Topdalsfjord and Kristiansandsfjord	NI	-	Ca		O_2	+	At		Problem area	Extended residence time deep water behind sills. Local and transboundary load of nutrients and organic matter.	Potential problem area	1990-2000 (1990,1993)
	DI		Ps		Ck	+						
	NP		Mp	-	Oc	?						
A37-A38 Vågsbygd and Songvårdsfjord	NI	-	Ca		O_2		At	+	Problem area	Monitoring station for harmful algae/shellfish poison.	Potential problem area	1990-2000
	DI		Ps		Ck							
	NP		Mp		Oc							
A39 Trysfjord	NI	-	Ca		O_2	+	At		Problem area	Long residence time for deep water behind sills. Fish kills during deep water renewals.	Problem area	1990-2000
	DI		Ps		Ck	+						
	NP		Mp		Oc	?						
A40 Harkmarksfjord	NI	-	Ca	-	O_2	+	At		Problem area	Extended residence time of bottom water. Transboundary load of nutrient and organic matter.	Potential problem area	1990-2000 (1997)
	DI		Ps		Ck							
	NP		Mp	+	Oc							
A41 Buøysund	NI	-	Ca		O_2		At		Non problem area	Classification upgraded to Potential problem area due to lack of data.	Potential problem area	1990-2000 (1999)
	DI		Ps		Ck							
	NP		Mp		Oc							
A42 Skogsfjord	NI	-	Ca	?	O_2	-	At		Non problem area	Artificial aeration of the fjord deep water improves deep water exchange and water quality. Classification upgraded to Potential problem area.	Potential problem area	1990-2000 (1995)
	DI		Ps	-	Ck	-						
	NP		Mp	?	Oc	?						
A43 Mannefjord	NI	-	Ca		O_2		At		Problem area	Local effects on softbottom fauna and sediments.	Potential problem area	1990-2000 (1990,1997)
	DI		Ps		Ck	+						
	NP		Mp		Oc	+						

A44 Hillesund-Snigsfjord	NI	-	Ca		O_2	+	At		Problem area	Local effects on oxygen in small enclosed basins.	Potential problem area	1990-2000 (1999)
	DI		Ps		Ck							
	NP		Mp	+	Oc	+						

PORTUGAL

Area	**Category I** Degree of nutrient enrichment		**Category II** Direct effects		**Category III and IV** Indirect effects/ other possible effects		Initial classification	Appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors)	Final Classi-fication	Assess-ment period
Mondego Estuary	NI	Considered in initial screening procedure; not further used for comprehensive assessment	Ca	Background value: 6 µg/L Elevated value 9 µg/L 6,4 µg/L (average) 12,4 µg/L (percentile 90)	O_2	11,2 mg O_2/L (average) 6,8 mg O_2/L (percentile 10)		Shifts in Macroalgae species (*Zostera* to *Enteromorpha* and *Ulva*) This is mainly a consequence of the hydrodynamical properties of the channel, linked to the management of the Pranto river sluice. There is an unclear link between causative effects and direct effects observed. Modelling confirms that the north channel is a non-problem area, mostly because of its short residence time. Local characteristics of the south channel bring the necessity of further study.		1994 - 2001
	DI	51µmol N/L (average) 87 µmol N/L (percentile 90) Background value 44 µmol N/L Elevated value 66 µmol N/L	Ps	Not available	Ck	No changes/kills in Zoobenthos and fish mortality have been reported in the literature				
	NP	?	Mp	Y	Oc	Not available				
					At	No nuisance or toxic algal blooms have been reported in the literature				
		+		+		-	Problem area		Potential problem area	

Tejo Estuary	NI	Considered in initial screening procedure; not further used for comprehensive assessment	Ca	Background value: 9 µg/L Elevated value 14 µg/L 9,1 µg/L (average) 22,4 µg/L (percentile 90)	O_2	7 mg O_2/L (average) 5,5 mg O_2/L (percentile 10)		Nutrient inputs are considered low with a tendency to be even lower in the future The estuary does not show undesirable disturbance to the balance of organisms nor to water quality and is, therefore, classified as a non-problem area. Modelling confirms that the Tagus is a non-problem area, because it is a well-mixed estuary with high dilution potential and production is light limited.		1980 - 1999
	DI	37,5µmol N/L (average) 67,3 µmol N/L (percentile 90) Background value 34 µmol N/L Elevated value 51 µmol N/L	Ps	Diatoms are the most important group. No indicator species shifts observed	Ck	No changes/kills in Zoobenthos and fish mortality have been reported in the literature				
	NP	10 (average) 16,3 (percentile 90)	Mp	Maximum biomass for *Ulva lactuca* can be considered low	Oc	Not available data				
					At	No nuisance or toxic algal blooms have been reported in the literature				
		-		-		-	Non problem area		Non problem area	

Sado Estuary	NI	Considered in initial screening procedure; not further used for comprehensive assessment	Ca	Background value: 6 µg/L Elevated value 9 µg/L 5 µg/L (average) 7,1 µg/L (percentile 90)	O_2	7,6 mg O_2/L (average) 5,4 mg O_2/L (percentile 10)		The estuary receives substantial inputs of nutrients, but there are no signs of undesirable disturbance of the balance of organisms. Modelling confirms that the Sado is a non-problem area, because it is a well-mixed estuary with a high dilution potential. Production is nutrient limited.		1978 - 2001
	DI	24 µmol N/L (average) 52 µmol N/L (percentile 90) Background value 21 µmol N/L Elevated value 32 µmol N/L	Ps	Diatoms are the most important phytoplankton group with indicators species such us *Skeletonema costatum, Thalassiosira excentrica, Pleurosigma angulatum, Odontella mobiliensis* and *Chaetocerus subtilis*	Ck	No changes/kills in Zoobenthos and fish mortality have been reported in the literature				
	NP	5 (average) 6 (percentile 90)	Mp	Submerged aquatic vegetation (SAV) occurs in the Sado, essentially around the Troia Península (Seawater Zone)	Oc	Not available data				
					At	No nuisance or toxic algal blooms have been reported in the literature				
		-		-		-	Non problem area		Non problem area	

SPAIN

Area	**Category I** Degree of nutrient enrichment		**Category II** Direct effects		**Category III and IV** Indirect effects/ other possible effects				Initial classification	Appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors)	Final classification	Assessment period
P. N. Bahía de Cádiz	NI	+	Ca	-	O_2	-	At	-	Potential problem area	The classification of this local area is based on elevated levels of winter DIN compared to background values defined from available data.	Potential problem area	2000-2001
	DI	+	Ps	-	Ck	-						
	NP	+	Mp	?	Oc	?						

SWEDEN

Area	**Category I** Degree of nutrient enrichment		**Category II** Direct effects		**Category III and IV** Indirect effects/ other possible effects				Initial classification	Appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors)	Final classification	Assessment period
Coastal Kattegat	NI	+	Ca	+	O_2	+	At	+	+	Permanent stratified water, small water volume below the halocline. Transboundary transports of nutrients.	+	Generally 1980s-1990s
	DI	+	Ps	+	Ck	+						
	NP	-	Mp	+	Oc	+						
Offshore Kattegat	NI	?	Ca	-	O_2	+	At	?	+	Permanent stratified water, small water volume below the halocline. Transboundary transports of nutrients.	+	Generally 1980s-1990s
	DI	+	Ps	+	Ck	+						
	NP	-	Mp	?	Oc	+						
Coastal Skagerrak	NI	+	Ca	+	O_2	+	At	+	+	Transboundary transports of nutrients.	+	Generally 1980s-1990s
	DI	-	Ps	+	Ck	+						
	NP	-	Mp	+	Oc	+						
Offshore Skagerrak	NI	?	Ca	-	O_2	-	At	?	+	Transboundary transports of nutrients. Sedimentation area.	+	Generally 1980s-1990s
	DI	-	Ps	+	Ck	-						
	NP	-	Mp	?	Oc	-						

UNITED KINGDOM

Area	**Category I** Degree of nutrient enrichment		**Category II** Direct effects		**Category III and IV** Indirect effects/ other possible effects				Initial classification	Appraisal of all relevant information (concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors)	Final classification	Assessment period
UK Offshore central North Sea	NI	-	Ca	-	O_2	-	At		Non problem area	There is some uncertainty over the atmospheric deposition of N to this area but, given that such deposition will not contribute significantly to nutrient levels, the initial classification holds.	Non problem area	Nutrients (1960-2001) Biomass (1997-2001)
	DI	-	Ps	-	Ck	-						
	NP	-	Mp		Oc							
Offshore Southern North Sea	NI	-	Ca	-	O_2	-	At		Non problem area	Nutrient concentrations are above background but are not elevated and show no trend of increase, or decrease, over time. The spring maximum biomass can exceed the elevated level but the growing season mean biomass is low indicating little disturbance of phytoplankton growth. Low levels of primary productivity also support this undisturbed assessment. The CPR provides evidence of changing diatom to flagellate index but the cause of this is 'climatic'. Therefore, the initial classification holds.	Non problem area	Nutrients (1961-2001) Biomass (1988-2001)
	DI	-	Ps	?	Ck	-						
	NP	-	Mp		Oc							

UK: South East England coastal water-Humber to Norfolk area	NI	+	Ca	+	O_2	-	At	-	Problem area	Although nutrient enrichment has led to the production of extra biomass there are no impacts on water quality or, despite elevated nutrient ratios, any impact on the balance of organisms. It follows that the area does not show evidence of an undesirable disturbance to the balance of organisms nor to water quality and is, therefore, a non-problem area.	Non problem area	Biomass (1974–2002)
	DI	+	Ps	-	Ck	-						
	NP	+	Mp		Oc							
UK: South East England Coastal Water – Norfolk to Thames	NI	+	Ca	+	O_2	-	At	-	Problem area	Nutrient enrichment has lead to the production of elevated maximum spring biomass (in 50%) of the years sampled but the growing season mean is below the background level. There are no impacts of the balance of organisms, despite elevated nutrient ratios and there is no impact on water quality (dissolved oxygen). The area does not exhibit undesirable disturbance and is therefore classified as a non problem area.	Non problem area	(1978-2002)
	DI	+	Ps	-	Ck	-						
	NP	+	Mp		Oc							
UK: Irish Sea/Liverpool Bay Region	NI	+	Ca	+	O_2	-	At	-	Problem area	Nutrient enrichment has lead to the production of elevated maximum spring biomass (in 50%) of the years sampled but the growing season mean is below the background level. There are no impacts of the balance of organisms, despite elevated nutrient ratios, and there is no impact on water quality (dissolved oxygen). The area does not exhibit undesirable disturbance and is therefore classified as a non problem area.	Non problem area	Biomass (1985-2002)
	DI	+	Ps	-	Ck	-						
	NP	-	Mp		Oc							
UK: Mersey Estuarine Area	NI	+	Ca	+	O_2		At	-	Problem area	Nutrient enrichment has lead to the production of elevated maximum spring biomass (in 67%) of the years sampled and the growing season mean is high. There are no impacts of the balance of organisms, despite elevated nutrient ratios, and there is no impact on water quality (dissolved oxygen). The area does not exhibit undesirable disturbance and is therefore classified as a non problem area.	Non problem area	Biomass (1994-2002)
	DI	+	Ps	-	Ck							
	NP	-	Mp		Oc							
UK: Bristol Channel Coastal Water	NI	+	Ca	-	O_2	-	At	-	Potential problem area	The area receives substantial inputs of nutrients but the dynamic and very turbid nature of the area precludes the development of substantial plant growth. There are no signs of the undesirable disturbance that results from nutrient enrichment. The area is therefore a non problem area.	Non problem area	Biomass (1990-2002)
	DI	+	Ps	-	Ck	-						
	NP	-	Mp		Oc							
UK: East Coast of Scotland - Aberdeenshire Coast	NI	-	Ca	-	O_2	-	At		Non problem area		Non problem area	1997-2000
	DI	-	Ps	-	Ck							
	NP	-	Mp	-	Oc							
UK: East Coast of Scotland - Angus Coast	NI	-	Ca	-	O_2	-	At		Non problem area		Non problem area	1999-2000
	DI	-	Ps	-	Ck							
	NP	-	Mp	-	Oc							

UK: Montrose Basin	NI	-	Ca	-	O_2	-	At		Potential problem area	The macroalgae growth shows large inter-annual variation but no increasing trend and does not appear to affect diversity in this marine conservation area. This, coupled with the lack of any nutrient enrichment causative factors, indicate that Non problem area classification is appropriate.	Non problem area	1991-2000
	DI	-	Ps	-	Ck							
	NP	-	Mp	+	Oc							
UK: East Coast of Scotland - Tay Estuary	NI	+	Ca	-	O_2	-	At		Potential problem area	Although inputs of nutrients are significant this is a function of high flows rather than elevated concentrations. Nutrient loads do not lead to any undesirable disturbance. Therefore, Non problem area status is appropriate.	Non problem area	1997-2001
	DI	-	Ps	-	Ck							
	NP	-	Mp	-	Oc							
UK: East Coast of Scotland - Tay to Forth	NI	-	Ca	-	O_2		At		Potential problem area	The maximum N:P ratio is 26 and this is not considered a material exceedence of the threshold. This, coupled with the lack of any other nutrient enrichment causative factors or any undesirable disturbance, indicate that Non problem area classification is appropriate.	Non problem area	1998-1999
	DI	-	Ps	-	Ck							
	NP	+	Mp	-	Oc							
UK: East Coast of Scotland – Forth estuary	NI	-	Ca	-	O_2	-	At		Potential problem area	As the Redfield ratio exceeded threshold once since 1983 (i.e. 27 in 1996), this is not considered significant and Non problem area status is appropriate.	Non problem area	1983-2001
	DI	-	Ps	-	Ck							
	NP	+	Mp	-	Oc							
UK: East Coast of Scotland – Firth of Forth	NI	+	Ca	-	O_2	-	At		Potential problem area	As nutrient inputs do not lead to any undesirable disturbance, a Non problem area classification is appropriate.	Non problem area	1983-2001
	DI	-	Ps	-	Ck							
	NP	-	Mp	-	Oc							
Eden Estuary	NI	+	Ca	-	O_2	-	At		Potential problem area	As nutrients do not lead to any undesirable disturbance, a Non problem area classification is appropriate.	Non problem area	1994, 1998
	DI	+	Ps	-	Ck	-						
	NP	-	Mp	-	Oc							
UK: East Coast of Scotland – Berwickshire coast	NI	-	Ca	-	O_2	-	At		Non problem area		Non problem area	2000
	DI	-	Ps	-	Ck							
	NP	-	Mp	-	Oc							
Clyde Estuary	NI	+	Ca	-	O_2	+	At	-	Problem area	Nutrient inputs to the estuary are high, with 70% of the DIN from rivers. These inputs are not increasing with time. Secondary treatment is already in place at the STWs. Nutrient levels normalised to salinity 30 are elevated, but not increasing with time. Of the direct and indirect effects, only oxygen deficiency is of possible concern. Oxygen deficiency is observed in summer in bottom waters in the upper estuary only. This is due to a combination of stratification and the action of bacteria digesting detritus from land-based sources, which cause oxygen demand to exceed supply, at times of low river flow. There is no undesirable disturbance associated with eutrophication and no adverse trends related to nutrient enrichment. These factors indicate that a Non problem area classification is appropriate.	Non problem area	1982-2000
	DI	+	Ps	-	Ck							
	NP	-	Mp	-	Oc							

Firth of Clyde	NI	+	Ca	-	O_2	-	At	-	Potential problem area	Nutrient inputs to the Firth are mainly from the Estuary. These are high, but not increasing with time. Direct inputs are small. Winter DIN is elevated, and increasing with time at 2 sites, because of decreasing salinity caused by increasing fresh water flows, which are a function of higher rainfall in recent years. Winter DIP was slightly elevated due to the influence of estuary water, but decreasing with time. Nutrient ratios were typically below the thresholds and not increasing with time. Chlorophyll a levels were occasionally above 10 ug/l but the median concentrations were in the range 1,5-5 ug/l. No detrimental effects on water quality are observed, with waters well oxygenated. This reflects an absence of any undesirable disturbance which, when considered with the absence of any adverse trends related to anthropogenic nutrient enrichment, indicates that a Non problem area classification is appropriate.	Non problem area	1977-2002
	DI	+	Ps	-	Ck	-						
	NP	-	Mp	-	Oc	-						
Solway Estuary	NI	+	Ca	+	O_2	-	At	-	Problem area	Nutrient inputs to the Estuary are high, with over 95% of the DIN from rivers, but not increasing with time. Nutrient concentrations in the estuary are strongly correlated with salinity. Chlorophyll levels were above 10 ug/l in spring, at low salinities typical of an estuary, but low in summer. Macroalgal populations are restricted by available substrate and not exceptionally dense. Overall, there is no evidence of an undesirable disturbance. This, coupled with the absence of adverse trends related to nutrient enrichment, indicates that a Non problem area classification is appropriate.	Non problem area	2001-2002
	DI	-	Ps	-	Ck	-						
	NP	+	Mp	-	Oc	-						
Solway Firth	NI	+	Ca	-	O_2	-	At	-	Potential problem area	Nutrient inputs to the Firth are mainly from the estuary and directly from rivers. These inputs are not increasing with time. Nutrient concentrations are strongly correlated with salinity. Winter DIN was 6-16 uM for salinities 34-31,5 in 2002 and 3-28 uM for salinities 33-28 in 2001. Phosphate concentrations are very low, giving rise to high N:P ratios between 10-70. Nutrient levels normalised to salinity 30 gave ratios close to the expected values. Chlorophyll levels are in the range 3-6 ug/l, similar to coastal waters. Therefore, there is no undesirable disturbance associated with eutrophication. This, coupled with the absence of adverse trends related to nutrient enrichment, indicates that a Non problem area classification is appropriate.	Non problem area	2001-2002
	DI	-	Ps	-	Ck	-						
	NP	-	Mp	-	Oc	-						
Ythan Estuary										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem area	

Lindisfarne NNR Area										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem area	
Seal Sands, Tees Estuary										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem Area	
Pagham Harbour										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem Area	
Chichester Harbour										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem Area	
Langstone Harbour										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem Area	
Portsmouth Harbour										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Potential Problem Area	
Holes Bay/Poole Harbour *(NB Holes Bay is a small part of Poole Harbour embayment)*										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem Area /Potential Problem Area	
The Fleet										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Potential Problem Area	
Truro, Tresillian and Fal Estuaries										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem Area	
Taw Estuary										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem Area	
Tawe										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem Area	
Loughor Estuary										Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Potential Problem Area	

Quoile Pondage (in Strangford Lough Catchment)									Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem Area	
Inner Belfast Lough & Tidal Lagan Impoundment									Area which has been assessed and identified following the review of UK near shore waters under the UWWT and/or Nitrates Directive.	Problem Area	

APPENDIX 2: MAPS SHOWING THE LOCATIONS OF, AND COMPLETE LIST OF, THE PROBLEM AREAS AND POTENTIAL PROBLEM AREAS WITH REGARD TO EUTROPHICATION IDENTIFIED BY CONTRACTING PARTIES THROUGH THE FIRST APPLICATION OF THE COMPREHENSIVE PROCEDURE[8]

Map 1: Kattegat Skagerrak and Eastern North Sea

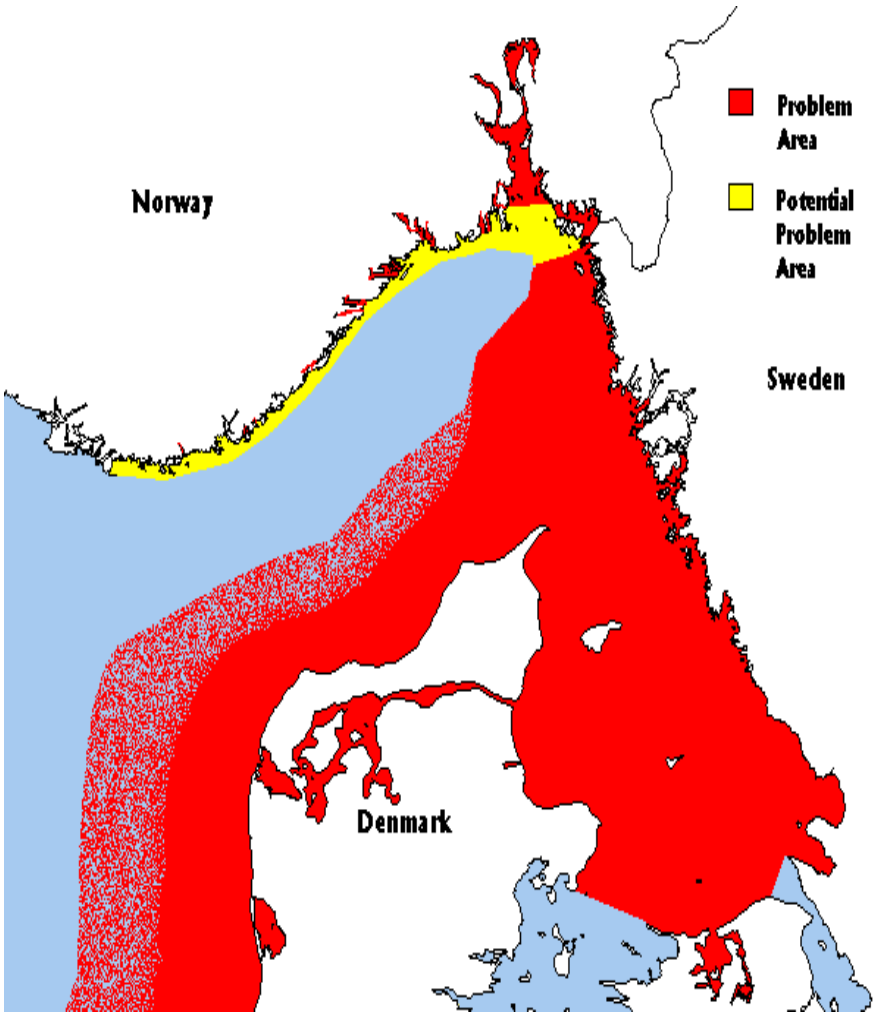
Map 2: Southern North Sea and Channel

Map 3: Coastal waters of Ireland and the United Kingdom

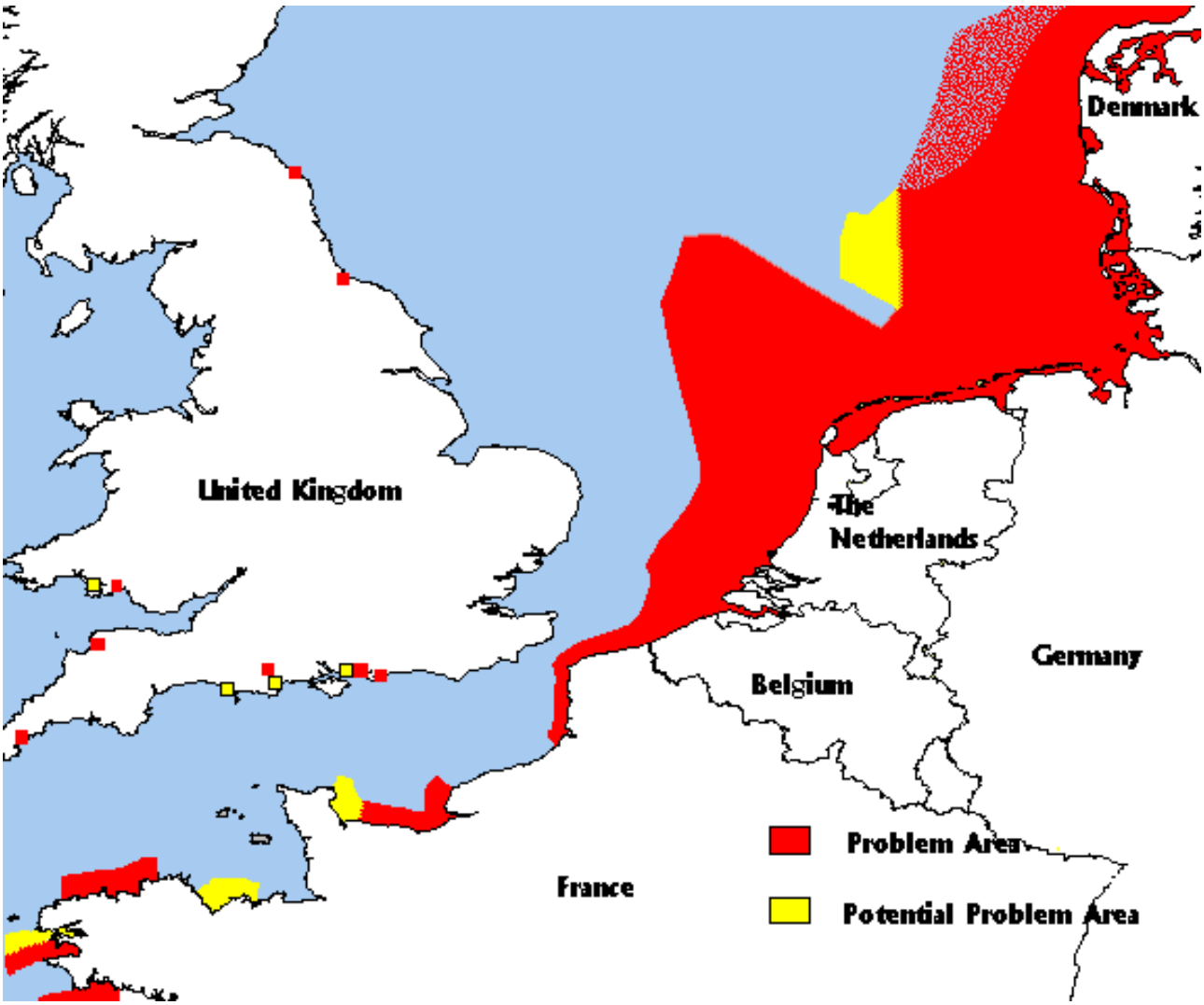
Map 4: Channel, Bay of Biscay and Iberian coastline

Table 1: List of the Problem Areas and Potential Problem Areas with regard to eutrophication identified by Contracting Parties through the first application of the Comprehensive Procedure

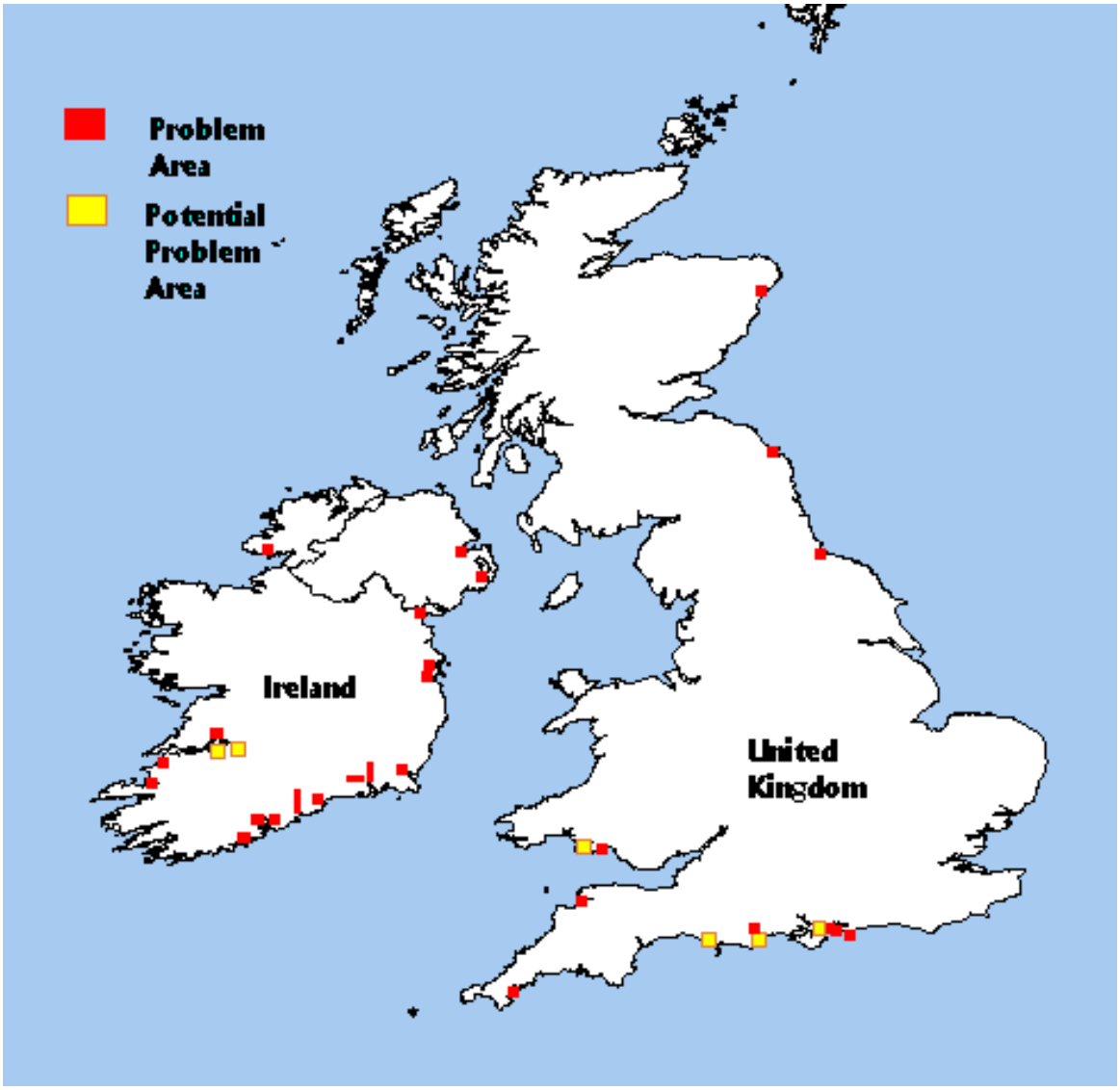
[8] The interpretation of the third step of the Comprehensive Procedure, the appraisal of all relevant information concerning the harmonised assessment criteria and their respective assessment levels and the supporting environmental factors, differed between Contracting Parties.



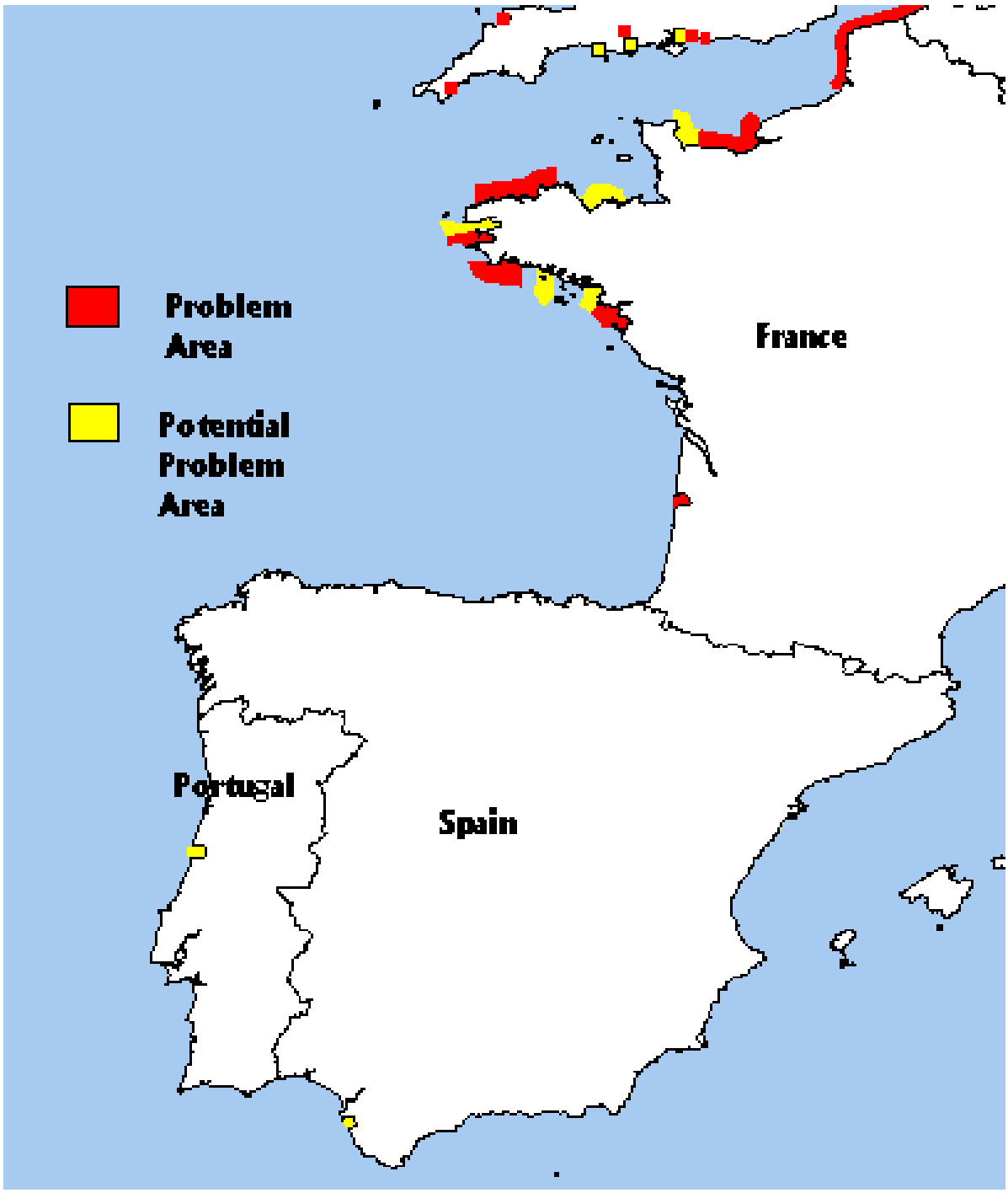
Map 1: Kattegat Skagerrak and Eastern North Sea



Map 2: Southern North Sea and Channel



Map 3: Coastal waters of Ireland and the United Kingdom



Map 4: Channel, Bay of Biscay and Iberian coastline

Table 1: List of the Problem Areas and Potential Problem Areas with regard to eutrophication identified by Contracting Parties through the first application of the Comprehensive Procedure

Contracting Party and marine area	Classification
Belgium	
Belgian Continental Shelf (BCS)	Problem Area / Potential Problem Area / Non-Problem Area

Denmark	
Kattegat Coastal areas	Problem area
Kattegat Open areas	Problem area
Skagerrak Coastal area	Problem area
Skagerrak Open area	Problem area
North Sea Coastal area	Problem area
Wadden Sea	Problem area

France	
Dunkerque and Calais	Problem area
Boulogne and Canche	Problem area
Authie and Somme	Problem area
Estuary and Bay of Seine	Problem area
Calvados	Problem area
Bay of Veys and St Vaast	Potential problem area
Arguenon and Fresnaye	Problem area
St Brieuc	Problem area
Lan nion	Problem area
Morlaix	Problem area
Brest	Potential problem area
Douarnenez	Problem area
Concarneau	Problem area
Lorient	Potential problem area
Vilaine	Potential problem area
Loire and Bourgneuf	Problem area
Bassin d'Arcachon (Arcachon and Landes)	Problem area

Germany	
Estuaries (<28): Elbe, Weser, Ems	Problem area
Wadden Sea (15-33)	Problem area
Coastal Water (25-34,5)	Problem area
Coastal Water (25-34,5)	Problem area
Offshore (>34,5)	Potential problem area

Ireland	
E16 Castletown Estuary	Problem area
E12 Broadmeadow Estuary (Inner)	Problem area
E30 Liffey Estuary	Problem area
E39 Slaney Estuary (Upper)	Problem area
E40 Slaney Estuary (Lower)	Problem area
E3 Barrow Estuary	Problem area
E5 Suir Estuary (Upper)	Problem area
E18 Colligan River	Problem area
E19 Dungarvan Harbour	Problem area
E8a Blackwater Estuary Upper	Problem area
E8b Blackwater Estuary Lower	Problem area
E26a Lee Estuary/Lough Mahon	Problem area
E26b Owennacurra Estuary/North Channel	Problem area
E1a Upper Bandon Estuary	Problem area
E1b Lower Bandon Estuary	Problem area
E28a Upper Lee (Tralee) Estuary	Problem area
E28b Lower Lee (Tralee) Estuary	Problem area
E15a Upper Feale Estuary	Problem area
E15b Cashen Feale Estuary	Problem area
E36 Maigue Estuary	Potential problem area
E37 Deel Estuary	Potential problem area
E38 Fergus Estuary	Problem area
E24 Killybegs Harbour	Problem area

The Netherlands	
Dutch offshore Oystergrounds Area	Problem area
Dutch offshore Southern waters	Problem area
Dutch coastal waters (salinity < 34,5)	Problem area
Dutch Wadden Sea	Problem area
Dutch Ems Dollard	Problem area
Dutch Western Scheldt	Problem area

Norway	
A1 Iddefjorden	Problem area
A2 Hvaler/Singlefjord	Problem area
A3 Inner Oslofjord	Problem area
A4 Drammensfjord	Problem area
A5 Sandebukta etc.	Problem area
A6 Middle part of outer Oslofjord coastline	Problem area
A7 Southern part of outer Oslofjord	Potential problem area
A8 Tønsbergfjord	Problem area
A9 Southern part of Tønsbergfjord	Potential problem area
A10 Sandefjordsfjord	Problem area

A11 Larviksfjord and Viksfjord	Potential problem area
A12-A13 Frierfjord/Grenlandsfjord	Problem area
A13 Frierfjord/Grenlandsfjord	Problem area
A14 Telemark	Potential problem area
A15 Stølefjord/ Kragerøfjord	Potential problem area
A16 Stølefjord/ Kragerøfjord	Problem area
A17 Søndeledfjord/ Sandnesfjord	Problem area
A18 Søndeledfjord/ Sandnesfjord	Problem area
A19 Lyngør archipelago	Potential problem area
A20 Tvedestrandsfjord	Problem area
A21 Flostadøysund	Potential problem area
A22 Tromøysund	Potential problem area
A23 Arendal fjord and Utnes	Problem area
A24 Arendal fjord and Utnes	Potential problem area
A25 Fevik coast	Potential problem area
A26 Grosfjord, Vikkil and Bufjord	Potential problem area
A27 Grosfjord, Vikkil and Bufjord	Potential problem area
A28 Kaldvellfjord	Potential problem area
A29 Lillesand outer	Potential problem area
A30 Skallefjord and Tingsakerfjord	Potential problem area
A31 Steindalsfjord, Isefjærfjord and Blindleia south	Problem area
A32 Steindalsfjord, Isefjærfjord and Blindleia south	Problem area
A33 Steindalsfjord, Isefjærfjord and Blindleia south	Potential problem area
A34 Kvåsefjord	Potential problem area
A35 Ålefjærfjord, Topdalsfjord and Kristiansandsfjord	Potential problem area
A36 Ålefjærfjord, Topdalsfjord and Kristiansandsfjord	Potential problem area
A37 Vågsbygd and Songvårdsfjord	Potential problem area
A38 Vågsbygd and Songvårdsfjord	Potential problem area
A39 Trysfjord	Problem area
A40 Harkmarksfjord	Potential problem area
A41 Buøysund	Potential problem area
A42 Skogsfjord	Potential problem area
A43 Mannefjord	Potential problem area
A44 Hillesund-Snigsfjord	Potential problem area

Portugal	
Mondego Estuary	Potential problem area

Spain	
P. N. Bahía de Cádiz	Potential problem area

Sweden	
Coastal Kattegat	Problem area
Offshore Kattegat	Problem area
Coastal Skagerrak	Problem area
Offshore Skagerrak	Problem area

UK	
Ythan Estuary	Problem area
Lindisfarne NNR Area	Problem area
Seal Sands, Tees Estuary	Problem area
Pagham Harbour	Problem area
Chichester Harbour	Problem area
Langstone Harbour	Problem area
Portsmouth Harbour	Potential problem area
Holes Bay (*a small part of Poole Harbour embayment*)	Problem area
Poole Harbour	Potential problem area
The Fleet	Potential problem area
Truro, Tresillian and Fal Estuaries	Problem area
Taw Estuary	Problem area
Tawe	Problem area
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