

REVIEW OF DRAFT OSPAR QUALITY STATUS REPORT 2010

JANUARY 2010

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<https://doi.org/10.17895/ices.pub.18688346>



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Introduction

The OSPAR quality status report (QSR) 2010 is a major assessment report prepared jointly by the Contracting Parties to the OSPAR Convention, which seeks to evaluate the quality status of the marine environment of the North-East Atlantic and its development and provide an evaluation of the measures taken and planned for the protection of the marine environment and the identification of priorities for action. The QSR 2010 will be published on the occasion of the 2010 Ministerial Meeting of the OSPAR Commission in Bergen, Norway.

OSPAR has requested ICES to facilitate a peer review of the draft report as available in November 2009. The objective of this peer review is to assure the OSPAR Commission that the contents of the main QSR 2010 report:

- a. are generally robust and objective,
- b. reflect, and draw conclusions from, the evidence provided by the JAMP Thematic Assessments, and
- c. take other relevant evidence into account in drawing any conclusions.

The complete terms of reference for the request from OSPAR is found in Annex A including the Review Form that was used by the reviewers. This document records the reviews of 6 independent scientists whose work was overseen by one of the vice-chairs of the ICES Advisory Committee. This does not constitute ICES advice but rather the consensus view of the 6 independent scientists.

Organization of this report

This report is quite lengthy but it is organized in a manner to indicate the key messages from the reviewers for both the overall review and the individual chapters. While the organization of this material is not exactly as requested in the Review Form it was agreed by the review team that this simplified structure was better suited to the material. The following section, "Overview", is an overview of the findings of the peer review including The Reviewers' Key Messages. Sections "Key Findings" and "Chapter 1" through "Chapter 12" provide detailed reviews of each of the corresponding QSR chapters, following the high level format of the Review Form. At the beginning of each section are the key messages from the reviewers. While the reviewers were not asked to provide editorial comments some have been provided and they are located in the annexes numbered by chapter. Because of the varying nature of the chapters of the QSR not all chapters have all of the sub-headings of information.

The review process

The reviewers, see Appendix B, were selected by ICES to represent the broad range of marine science covered in the QSR. In addition particular effort was made to find experts who have not been involved with activities that contributed directly to the underlying assessments or the QSR itself. The reviewers began their work by correspondence as soon as the draft QSR and the background documents were available on November 30, 2009. Two reviewers were assigned chapters 1 through 4 to review, another 2 reviewers to chapters 5, 6, and 7, and finally another 2 reviewers to chapters 8 and 9. All reviewers provided comments on chapters 10, 11, and 12. Reviewers submitted their comments before the Review Group met December 15 to 17, 2009. The pairs of reviewers combined their comments and then each chapter was discussed in plenary and agreement was reached on the key messages and the details of the text. All reviewers have agreed to this final text.

Overview

In general the scientific peer review of a "non-scientific" document such as this is not easy since it is difficult to maintain a proper perspective on scientific rigor versus readability. It is important to place some of the comments in that perspective since there is a high degree of subjectivity associated with the less technical language that is being used. Also the quality of the QSR suffers from being written by multiple authors evi-

denced by inconsistency in the language, key messages, and interpretation. Therefore there is a need for a single editor or editorial staff to finalize the text. The reviewers have highlighted some of these inconsistencies but it is unlikely that all inconsistencies have been identified.

The layout and content of the QSR 2010 is driven by the target audience, that is, with a focus on policy makers, managers, and the public, rather than the scientific community. In order to communicate the science effectively to these groups, the text has been written in a generic style. However the reviewers feel that this has been overdone and that the text is too generic to be of use to policy makers and managers who are not given a clear indication of priorities in various jurisdictions.

The Reviewers' Key Messages

The positives

- OSPAR has made significant contributions in support of the ecosystem approach to management of human activities, including the development of ecological quality objectives for the North Sea, assessments of species and habitats that are threatened or in decline and development of an integrated assessment framework.
- OSPAR's activities are clearly responding to emerging pressures and impacts.
- The regional summaries are very effective in focussing on the key regional issues.
- There is a wealth of information in the underlying assessments.
- The language of the QSR strikes a good balance effectively presenting scientific information without an overwhelming amount of jargon.

Where attention is needed

- The reviewers felt that the report was not well-balanced. In many of the chapters the amount of background material, i.e. material not based on the assessments, was excessive. Quite often the excessive background material is accompanied by shallow treatment of the assessment.
- The QSR attempts to cover too many topics for the limited length of the document. Many pressures receive superficial treatment and there is no systematic indication of the relative importance of the pressures and their impacts.
- Inconsistencies exist in different chapters regarding the relative importance assigned to various pressures.
- The reviewers note that the document often promotes the positive aspect of the assessment rather than presenting the outcome of the assessment in a balanced and objective manner.
- Many of the chapters of the QSR2010 do not provide a useful overview of status and trends over the last 10 years.
- Many of the assessments are qualitative or semi-quantitative. The challenge is to move toward more quantitative assessments.
- There is no specific treatment of data/knowledge gaps in most of the chapters.
- It is noted that evidence drawn from one localized area of an OSPAR Region is routinely extrapolated to apply to an entire Region.
- There is an imbalance between the details provided for each OSPAR region. Ideally, there should be a standard framework of regional summaries so that findings for a standard set of items or indicators should be presented for all regions, with the associated level of uncertainties explicitly stated.
- Overall the QSR focuses on data presentation, monitoring strategies, and the need for collaboration. More attention should be given to the fact that the quality of environmental assessments also depends upon the scientific capabilities to perform the assessments using an integrated ecosystem approach.

- Chapter 1. Introduction: It is stated that the QSR 2010 provides a comprehensive baseline against which the effectiveness of future efforts can be measured. Since the chapter is supposed to be targeting for policy makers and the general public, the reviewers don't think that the report can provide comprehensive baseline for both groups with the same text.
- Chapter 2. North-East Atlantic: It would be useful to identify knowledge gaps, for example, in identifying linkages between oceanography, biogeography, and human activities. Such knowledge forms the basis for the other chapters (e.g., responses to climate change, impacts of over-fishing etc.).
- Chapter 3. Climate Change: The relative importance of climate change as noted in this chapter should be consistent throughout the report. It would help to have a consistent set of rankings or a qualitative assessment of the relative importance or contribution to the various impacts (e.g., on biodiversity, fisheries, water quality) in each OSPAR region.
- Chapter 4. Eutrophication: The importance of temporal and spatial scales is not adequately addressed. The response time of indicators is often long thus concealing the potential effectiveness of management actions. Spatial scales are not well accounted for when reporting on pressures that tend to be point sources and often have local scale impacts.
- Chapter 5. Hazardous Substances: For hazardous substances the major weakness is the limited information on and links to the biological effects of contaminants. Also the high level of aggregation of information in some instances results in partly misleading messages.
- Chapter 6. Radioactive Substances: Environmental concentrations of some radionuclides have been shown to decrease, however it is important to note that this does not include the α -emitters (resulting from oil and gas activities) since they were not examined in the environmental matrices.
- Chapter 7. Offshore oil and gas activities: This chapter appears to be based on one JAMP thematic assessment report which only offers a superficial assessment of limited data.
- Chapter 8. Use of Living Marine Resources: As with many of the other Chapters, this section on the use of living marine resources does not provide a useful overview of status and trends over the last 10 years.
- Chapter 9. Other Human Uses and Impacts: This chapter is confusing and very long as it deals with a long list of activities and impacts. It is recommended that OSPAR considers revising the chapter to provide more balance to the numerous topics that are covered.
- Chapter 10. Protection and Conservation of Biodiversity: The QSR 2010 is meant to represent the collective effort made by Contracting Parties over the period 1998 to 2008, yet there is very little new information provided for this period and it is impossible to separate out historical (in some cases centuries old) events from current trends. This is a serious flaw in the QSR as the document fails to provide managers, decision makers, politicians and the public with the tools to evaluate protective measures that have been put in place during the last decade.
- Chapter 11. Towards Ecosystem Assessment: The conclusions of integrated assessment are highly questionable. The approach taken is a useful example but has too many weaknesses to be considered a scientifically valid assessment hence there should be no reference to the conclusions.
- Chapter 12. Regional Summaries: Readers will be interested to know how the key issues from 2000 have changed over the 10 years and what, if any new issues have appeared. This information needs to be more prominent.

Chapter - Key Findings

The Reviewers' Key Messages

The reviewers consider that this chapter requires extensive revision after the text for the various assessments has been finalized. It is critical that any statements in this chapter be fully supported by the key findings in the individual assessments. Some examples of the types of inconsistencies that need to be avoided, based on the draft report, are given below.

For example:

Fishing:

- line 17: Data presented in section indicate that safe biological limits are exceeded for MOST stocks. Message sent here is overly positive.
- line 19: there is little evidence to support this statement. “(A)re worrying” seems too ambiguous. Certainly not a key finding as presented in Section 8
- line 23, what is the level of illegal, unreported and unregulated fishing? Any estimates? If not, it should be stated as a knowledge gap.
- line 25: Damage of habitat not documented. Could be more specific about the level of impacts to seabed and how pressure on deep-sea cold-water coral reefs is reduced.
- No mention of lack of data for deepwater species and many commercial stocks.
- This section is too general. It would be useful to provide specific figures on the status of fisheries and their impacts. For instance, line 17, how many stocks are within safe biological limits and how many exceeded the limits.
- line 28: the recommendation of “promote sustainable fishing” appears to general.

Eutrophication:

- line 37: To increase clarity, the sentence may be revised as “Nitrogen inputs into the ocean from the atmosphere remain high, of which the contribution to air emissions from shipping is increasing.”
- line 39: It may be useful to be more specific about the “positive effects”, e.g., reduce eutrophication.

Hazardous substances:

- P2, line 9: What does it mean by “phase out”? Prohibit to use or discharge? It would be useful to clarify.
- P2, line 11: Suggest rewording: “Adverse effects of the anti-fouling agent tributyl tin are still seen. However, since the global ban on its use, its levels (in OSPAR region?) are decreasing.
- P2, Line 14: Suggest change “are unacceptable” to “exceed acceptable levels”
- it may be useful to mention the major sources of the main hazardous substances.

Radioactive substances:

- It would be useful to provide reference of the status to the targets/limits.

1 Chapter 1 - Introduction

1.1 The Reviewers' Key Messages

This short chapter is an introduction to the report and gives an overview of the coming chapters. Since each thematic chapter contributes to the holistic assessment of ecosystems in the OSPAR regions, it would be useful to describe briefly the framework of the holistic assessment thus providing the context to understand the linkages between different thematic chapters.

The Introduction needs to state clearly who the target audience is; this is not very clear in the present draft.

Relating to this, the last bullet of the QSR INTRODUCTION states that the QSR 2010 provides a comprehensive baseline against which the effectiveness of future efforts can be measured. Since the chapter is supposed to be targeting policy makers and the general public, the reviewers don't think that the report can provide a comprehensive baseline for both groups with the same text.

1.2 Reporting and Methods

The chapter mentions the linkage with the Marine Strategy Framework Directive that is directly relevant to the QSR. Specifically it states that the QSR is a good basis for the initial assessment which the countries have to do by 2012. However, in Box1.1 (line 12), it should be mentioned also that the countries have to describe by 2012 the good environmental status (GES) and to formulate specific environmental aims. This information is currently missing. The QSR 2010 can be seen as a contribution by the Convention to the national obligations. Since the QSR raises this issue it should develop the subject further with respect to defining GES for Contracting Parties.

2 Chapter 2 - North- East Atlantic

2.1 The Reviewers' Key Messages

Generally, this section gives a good summary on the oceanography and biogeography of the North Atlantic and each OSPAR region. However, the section on socio-economic status is too brief. It would be useful to include in each region-specific section a brief summary of the socio-economic status of that region that is relevant to the objectives to the QSR.

There is no specific treatment of data and knowledge gaps in this chapter. It would be useful to identify these gaps, for example, in identifying linkages between oceanography, biogeography, and human activities.

2.2 Reporting and Methods

Chapter 2 is a more general description of the different OSPAR regions and their specifics and commonalities and, overall, the chapter is sufficient to achieve this objective in terms of the physical and biogeographic characteristics of the Northeast Atlantic. However, the human aspect could be strengthened. There is no major flaw in the argumentation and the assumptions are sound.

In general, the word “megafauna” refers to large animals such as marine mammals, birds etc. However, it is being used in this chapter to refer to macro-invertebrates. It would be useful to change such wordings in the text and be more specific. Also, in the specific OSPAR region descriptions, in some cases, “biodiversity hotspots” are mentioned. It should be explained what “hotspots” are and how they are identified.

2.3 Data and Analysis

There is no specific treatment of data and knowledge gaps in this chapter. It would be useful to identify these gaps, for example, any gaps in identifying linkages between oceanography, biogeography and human activities. Such knowledge forms the basis for the other chapters (e.g., responses to climate change, impacts of over-fishing etc.).

The figures are generally well-presented and support the information and conclusions presented in this section. It is suggested that some additional tables would be valuable including a table with the different sea areas (km²), sea volume (km³), mean and maximum depth. Also a table of the populations in the catchment areas of the different countries around the OSPAR area would be informative. In addition, a map with population density in the catchment area, percentage of arable land, and land cover classes, if available would be useful (see for example the Baltic Sea Environment Proceeding 82B, p.12).

2.4 Concluding

The title of this chapter is not particularly informative; a potential option would be “Physical Setting.”

In general, the conclusions are supported by the evidence presented. However, there is room to strengthen the human aspect by including how human activities shape the biogeography of the OSPAR regions. In the last section, “Many challenges but common pressures”, if the chapter expanded on the discussion of human activities in each region, it would then support the conclusion regarding the levels and differences in these pressures between regions.

There are a few places where expert judgement or evidence can be stated more clearly. For example, on p 8, Line 9, “Top predators such as sharks probably play an important role in maintaining the structure and diversity of fish communities...” Some elaboration on the rationale of such or similar statements would help.

3 Chapter 3 - Climate Change

3.1 The Reviewers' Key Messages

This chapter provides good general background information about the observed and potential impacts of climate change that is relevant to the OSPAR regions. It reasonably reflects the information presented in the supporting background document. There is no major flaw in the argument, although some statements could be revised to avoid confusion. Overall, a number of revisions would improve this chapter.

The chapter could be improved by utilizing the other climate change-related works that have been or are being conducted in the OSPAR regions. The information provided in this chapter is sometimes too general. More specific information for each OSPAR regions should be provided.

In this chapter climate change is stated to be an important issue throughout the OSPAR area however in the regional summaries climate change is not always identified as an issue.

There is an imbalance between the details provided for each OSPAR region. Ideally, there should be a standard framework of regional summaries so that findings for a standard set of items or indicators should be presented for all regions, with associated level of uncertainties explicitly stated. Where information is unavailable, data gaps should be explicit stated and discussed.

The potential implications of climate change on human well-being in the OSPAR area should be discussed. This is something that policy makers and the general public are very interested in.

3.2 Reporting and Methods

This chapter provides a good summary on current scientific understanding of observed and potential climate change impacts. In general, it achieves the objectives set out for QSR 2010. However, there are some revisions that could help improve the chapter in achieving the QSR 2010 objectives.

The chapter could be improved by utilizing other climate change-related work that has been done or is in progress in the OSPAR area. For example, comprehensive reviews of marine climate change impacts on fish populations and other aspects of the marine ecosystems have been conducted by ICES and the UK Marine Climate Change Impact Partnership.

The identified relative importance of climate change in this chapter should be consistent across the report. For example, in this chapter, climate change is identified as potentially the most significant threat to biodiversity in the OSPAR regions. However, in a table in Chapter 10 (p. 24), climate change is identified as a pressure for region I only. Consistency could be improved by having a set of rankings or a qualitative assessment of the relative importance of the various impacts (e.g., on biodiversity, fisheries, water quality) in each OSPAR region.

The synthesis presented is generally sound and robust and well supported by scientific evidence as provided in the assessment documents. However, there are a few places that could be improved to better reflect what has been reported in the assessments; e.g. the section on carbon sequestration as a possible mitigation measure. In the background document, the risks related to carbon capture and storage proposals are discussed in length but this is not sufficiently reflected in the QSR. Also the document makes note of the COP15 meeting in Copenhagen. Outputs from the COP15 may have implications for climate change policies in the OSPAR region. Therefore it is recommended that relevant sections of the report (e.g., "What happens next?") may need to be updated after COP15.

3.3 Data and Analysis

General knowledge gaps have been indicated however, it may be useful to be more specific about these in each section. For example, in the section on biological impacts, the key data gaps could be stated. This may be done using Table 3.1 and 3.2 for instance; by including a column that describes the key data and information gaps for each type of impact.

The text could also be revised to clarify the level of uncertainty of climate change and impacts. For example, on line 13 under the heading “Climate change is widely recognised but there are uncertainties”. It is not clear whether these uncertainties are with respect to whether or not climate change is occurring or if it refers to uncertainty in the predicted impacts, etc. The conclusion on the effects of climate change on nutrient inputs are weak (table 3.1). While increasing temperature, especially in northern region, will increase runoff and consequently nutrient input this may be offset by changes in the vegetation and a better binding of nutrients. Uncertainties about such conclusions should be clearly stated.

The wording of par. 2, p. 2 should be edited to reflect the fact that the major limitation on our ability to predict the impacts of climate change in the OSPAR marine area is the lack of knowledge about how this, and indeed any marine ecosystem will respond to climate change. The present wording indicates that the uncertainty of future scenarios of greenhouse gas emissions is a limiting factor. It is but only with respect to detailed projections. The important point is that we know that change will occur and that we need to develop a better understanding of how marine ecosystems will respond to those changes; this is an important knowledge gap.

The relative contributions between natural decadal and multi-decadal variability of ocean conditions and anthropogenic climate change should be discussed. Oceanography of the OSPAR regions is strongly influenced by decadal (e.g., North Atlantic Oscillation) and multi-decadal cycles. It would be useful to discuss these factors in terms of the observed and predicted trends. For example, with anthropogenic climate change becoming increasingly dominant compared to long-term natural variability during the present century it could be expected that the past oscillations in biological responses will be replaced by more permanent changes. If there are uncertainties about this topic, the uncertainties should be clearly stated and key knowledge gaps should be identified for future research.

Regarding ocean acidification (Box 3.3), the decrease of the surface water pH during rising atmospheric CO₂ is a matter of fact and prescribed by physical-chemical laws. At the current annual rate of increase of atmospheric CO₂ (1.2 – 1.5 ppm), the pH will decrease by 0.002 units per year. In the long-term this will cause a significant pH decrease. However, the North Sea is a physically and bio-geochemically highly dynamic system and it is extremely difficult to detect the expected pH changes on time scales of 10 – 20 years. In cases where trends larger than 0.002 were extracted from measurements, the authors must discuss the uncertainties associated with the estimates. Experience could be drawn from a recent HELCOM MONAS meeting where decreasing and increasing trends were reported simultaneously for the Baltic Sea. Therefore, care needs to be exercised with assessments based on potentially questionable trends and projections that were estimated or predicted from short time-series given their associated uncertainties.

Overall, the figures and tables are generally adequate.

4 Chapter 4 – Eutrophication

4.1 The Reviewers' Key Messages

The report clearly stated that eutrophication is still a major problem in regions II, III and IV. Problems cannot be solved in short time scales. Nutrient input has taken place over decades and one has to take similar time scales into account when evaluating improvements. Thus it is understandable that the aim to have OSPAR area free of eutrophication effects was not reached by 2010.

The chapter only discusses a subset of indicators in detail. For example, in OSPAR's Common Procedure (Box. 4.3) 10 indicators are used. The chapter should discuss all the indicators and in cases where a subset is selected, the rationale for that selection should be clearly stated.

In many cases, historical data (pre-1990) are available that are important in assessing the status and long-term trends of eutrophication in the OSPAR regions. These data should be discussed if available.

For the future it is recommended to set clear reduction targets for each country and to discuss their status relative to these targets. Also the contributions of the countries to the inputs to different regions/sub-regions should be given.

4.2 Reporting and Methods

When condensing the longer assessments for the QSR some shortcomings occur. For example on page 7, line 2 and line 20 it is said that some countries have reduced discharges. This unspecific information does not help and should be made more specific. On the same page it should be made clearer that point and diffuse sources, mainly agriculture, are the original sources of nutrient loadings whereas riverine inputs are the result (sum) of these sources.

The material in the chapter that is considered is comprehensive. It might be useful to include the issues related to inputs from non-OSPAR areas (transboundary inputs).

In most cases, the assumptions made are sound and clearly identified. However, on page 9, line 29, trends are discussed for the period 2004-2006. This period is by far too short to expect to see significant changes.

4.3 Data and Analysis

Gaps in data and information are not always clearly indicated. Generally little is said about region IV despite the eutrophication problems that occur there. Whereas Fig. 4.2 shows how targets were reached in regions II and III, no information is presented about how targets were reached in region IV. Similarly in Fig. 4.4 no input data are shown for region IV. These data should be shown indicating if any trend was observed. By contrast in this figure data for Region I are shown although this region was never classified as being a potential eutrophication problem area. If there are any data gaps, it should be clearly stated.

The figure in Box 4.2 is too small and cannot be seen properly; consider re-arranging the material in two columns, text and figure. It would be useful to also show the nutrient discharge levels by country thus indicating whether most of the reduction in discharges is in problem areas or not.

The picture in Box 4.3 does not seem to be very useful. A map showing the coverage of the monitoring stations would be more useful for this section.

Regarding Figures 4.6 and 4.7: Based on Fig. 4.6 the model predicts that there is nitrogen deposition in the whole of the southern North Sea. However Fig 4.7 shows that problem areas are mainly along the continental European coast. It may be useful to briefly explain this apparent discrepancy in the text.

4.4 Concluding

Most of the interpretation is based on changes in the period since 2000. Comparison with the previous assessment period 1990-2000 would be helpful. Also a comparison with background concentrations is important, if available.

Beside figures showing the inputs, there should be figures presenting the trends of indicators in each region; e.g. winter nutrient concentrations, Secchi disk depth, or chlorophyll a.

There is a need for clear targets for each country and to discuss present status relative to these targets. Also the relative share of each country contributing to the inputs should be given. (For example see the reduction goals in the Baltic Sea Action Plan of HELCOM.)

Some alternative explanations have been discussed, e.g., the possibility of climate change intensifying eutrophication is suggested and identified as a knowledge gap.

Any conclusion based on expert judgement rather than evidence is clearly recognisable.

5 Chapter 5 - Hazardous Substances

5.1 The Reviewers' Key Messages

The chapter addresses the objectives set out and the work done by OSPAR on hazardous priority substances.

The major weakness of the section is the limited information on and links to the biological effects of contaminants. Another limitation is that considerable aggregation of information in some instances results in partly misleading messages.

Reliable conclusions have been made about regions where data is available, although there are some areas where the information is scarce.

5.2 Reporting and Methods

The chapter addresses the work done by OSPAR on hazardous priority substances in a form of an overview. Status on inputs, effects of regulation, levels in marine compartments, and some biological effects are given as a condensed text with little detail. The section addresses the objectives set out for QSR 2010. The major weakness of the section is a limited information and links to the biological effects of contaminants

Most of the section presents a sound synthesis of the underlying thematic assessments listed in the reference list. However, due to the high degree of simplification and condensation of the data, some parts of the text are not totally correct. For example, the statement that "Environmental concentrations of monitored chemicals have fallen" implies that this applies to all contaminants monitored. As shown in the draft CEMP 2008/2009 report presenting trends and concentrations in sediment and biota, this is not always so. For instance, mercury in biota in many stations has been showing an increasing trend. For some other contaminants there are no changes in trends. An emphasis has been placed on the statement that the cessation target for a third of priority chemicals will very likely be reached by 2020. It would be informative to emphasize in that same paragraph that for more than half of the priority contaminants this will not be achieved despite the measures that have been taken.

The report has been based on several most current OSPAR documents and on the ICES 2009 advice regarding fish diseases in the OSPAR area. All information available in the assessment reports appears to have been considered. Scientific literature has been only taken into account to a limited extent, for example data on HBCD in the Arctic shown in Box 5.7, but no source information has been given in the reference list.

No clear flaws in the argumentation have been found.

Most of the assumptions made in the text are sound and identifiable. However, some assumptions seems to be scientifically unsound. One of these would be to presume that actions and regulation can lead to reduction in contamination with some man-made chemicals so that their levels will be close to zero, e.g. PAHs and metals like mercury. This obviously will not be possible.

5.3 Data and Analysis

Gaps in data and information have been indicated in the text. Data coverage is highly variable for different areas, matrices, and parameters. The fact that Region V was basically omitted in the assessment is not clearly indicated in the report. Other gaps in information which have not been pointed out include the data presented in Fig.5.2. i.e., it is not indicated that data for Cd, Hg, Pb, PAHs, and PCBs in sediments for Region I and IV are partly lacking, nor is there any indication how this has affected the assessment. The Region I assessment is based on data for the coastal area of Norway and Iceland, the vast majority of that region area is not covered including the Greenland and Svalbard area, and this has not been stated. The need for more information on contaminant status in these regions should be noted. Also a big challenge is to assess the link between the multitude of contaminants and other stress factors and resulting biological effects. It would be informative to have a "textbox" summarizing biological effects for the data available.

Most figures and tables are of acceptable quality. However, the supporting text and explanations to legends could be improved. Fig.5.2 summarising the status and trends on Cd, Hg, Pb, PAHs, and PCBs, is quite

busy; the trends are difficult to understand and should be better explained. The caption of Figure 5.5 is difficult to follow. The fragment regarding PCBs and PAHs giving “rise to the risk of pollution effects at a third of the sites monitored” is especially awkward and difficult to understand.

Reliable conclusions have been made about regions where data are available, although there are some areas where the information is scarce. The conclusions, despite being hindered by data gaps, are due to the monitoring or sampling close to sources, therefore input related statements are sound.

Most conclusions are based on evidence found in the supporting thematic assessment reports and some expert judgement. However, there are several statements in the text that are not very well supported by science. There is no discussion on alternative explanations which constitutes a limitation.

6 Chapter 6 - Radioactive Substances

6.1 The Reviewers' Key Messages

The section provides background information on characteristics and sources of radioactive substances to the OSPAR regions. It presents the progress made with respect to the radioactive discharge reduction with a focus on a significant decrease in β -activity emitting elements from the nuclear sector. It recognizes that α -activity discharge from the offshore oil and gas industry is a substantial and potentially growing source of radioactivity.

The lack of information on α -radioactivity present in the marine compartments is a major weakness of the section hampering the overall picture of radioactive pollution. This is especially true for Region I, II and III assessments, where the offshore oil and gas industry is well developed.

Further, the impact of radioactive pollution on biota has not received sufficient attention. Doses estimated for marine biota and humans have been based exclusively on limited data for radionuclides coming from the nuclear sector.

There is an obvious need to continue to improve the assessment and to measure radiological impacts on marine biota especially in areas that are in close to the industrial activity.

6.2 Reporting and Methods

The chapter addresses the main objectives set out for radioactive substances. OSPAR has focused on regulatory action to reduce inputs of radioactive substances from different nuclear installations in Europe. A lot of information has been collected during many years for nuclear power and reprocessing plants with regard to radioactivity inputs to the environment. Results and trends based on monitoring data are presented mainly for this sector. Inputs of naturally occurring radioactive elements resulting from discharges of large volumes of produced water from offshore oil and gas production have been taken into account only for the most recent years. These have been presented as estimates based on individual radionuclide radioactivity and not on actual measurements of radioactivity.

The main message calls for the need to evaluate the impacts of radioactivity discharges on the marine environment and to develop environmental quality criteria. The reviewers support that message as this is necessary to assess the current environmental status and any future developments.

In general, the information has been presented in an understandable way and no clear flaws in the argumentation have been found. The assumptions that have been made are sound and clearly identifiable.

6.3 Data and Analysis

Gaps in data and information have been clearly indicated in the text. These include, as indicated above, the only recently started collection of data on radioactivity discharges from sources other than the nuclear sector and the lack of environmental quality criteria, which obviously put some limitations on the assessment.

In Figure 6.2 doses to man from radionuclides through seafood consumption have been expressed as $\mu\text{Sv/yr}$. Figure 6.7 shows the maximum total dose rates estimated for seaweed, crab and plaice expressed as $\mu\text{Gy/h}$ (data in both Figures actually are presented as rates). It would be nice to see an explanation how the units relate to each other.

Figure 6.5.A which gives a summary of statistical tests on mean concentrations of the radioactive substances in monitored matrixes and shows the time trends, is very busy, but presents the information in a readable and understandable way. Information shown in Fig.6.5.B provides a clear picture of trends for ^{137}Cs in seawater, ^{99}Tc in seaweed, and ^{239}Pu in molluscs in selected OSPAR areas and supports the conclusions. Data shown in Fig 6.5.A indicate that ^{137}Cs was measured in three matrixes in selected areas. It would be valuable to see how the levels of ^{137}Cs in seawater relate to those in seaweed and fish.

In general, the figures and tables support the conclusions.

6.4 Concluding

Overall, the conclusions are sound and based on a combination of evidence and expert judgement. Discharges of some radionuclides from the nuclear sector during the assessment period have decreased. This conclusion relates to the β -activity emitting elements which have decreased by almost 40% and this has been clearly illustrated in Figures 6.2 and 6.3. An increase in discharge of α -activity by 15% during the same period has been indicated where the change is not statistically significant. This is confusing and the reference to this “increase” should be omitted.

Nuclear and non-nuclear sectors contribute to the radioactivity present in the OSPAR marine areas in a different ways. Presented data support the conclusion which is also clearly depicted in Figure 6.4. Environmental concentrations of some radionuclides have decreased. This conclusion has been based on measurements of man-made radioactive elements in seawater, seaweeds, molluscs, and fish in selected areas. The evidence presented supports the conclusion, however it does not include the α -emitters (resulting from oil and gas activities) since they were not examined in these matrixes. The statement “some radionuclides” is rather vague. It would be informative to indicate the overall trend in a given area. How did the 24 cases, which all but one gave strong evidence for reduction in environmental concentrations (page 10 lines 20-22), relate to all cases included in the assessment?

The need to improve the baseline information and to develop assessment tools with which to evaluate the impacts of radioactive contamination has been highlighted.

There is no discussion on alternative explanations.

7 Chapter 7 - Offshore oil and gas activities

7.1 The Reviewers' Key Messages

The offshore oil and gas industry should be credited for the work they have done during the last years to reduce inputs of harmful substances and to reduce environmental impact from their offshore activities. However, it is important to stress that this work should continue and that there is still more work to be done.

Conclusions that characterize the impact on marine biota are presented in general terms for all regions, but have not been well supported by evidence. The discussion of impact on individual organisms, communities and ecosystem is either lacking or very brief. Trends in discharges of oil and chemicals as well as the impacts are presented for entire OSPAR regions without any consideration that this industry is particularly developed at sub-region scales in some specific offshore areas.

The reference list is very brief. To what extent information from other sources has been used for preparation of the chapter is unclear. There are a large number of reports prepared by the petroleum industry that have not apparently been used in this assessment.

7.2 Reporting and Methods

The chapter addresses the objectives set out for the QSR in a condensed style. The section provides a well presented synthesis of information on trends in total offshore production of oil and gas, oil and gas fields under exploitation, potentially polluting activity, as well as the OSPAR measures undertaken to handle the pressure from these activities within the OSPAR area during the 2000-2007 period. There is no clear message whether or not there is concern about the environmental impact of the offshore oil and gas industry. The chapter has handled this important point superficially.

The petroleum industry has developed in the OSPAR maritime areas over the last 40 years. The main pressures on the marine environment include operational and accidental discharges of chemicals, crude oil and produced water containing substances such as oil components, polycyclic aromatic hydrocarbons, alkyl phenols, heavy metals and many other compounds. In addition there could be concerns related to atmospheric emissions, low level naturally occurring radioactive material, noise, and the placement of installations and pipelines on the seabed. These topics have been partly addressed in the chapter. In 2007 there were 1281 operational oil and gas offshore installations in the OSPAR maritime area, of which 730 released substances to the sea or the air. These obviously have had an impact in several offshore areas, but this message is not very clearly presented in the QSR 2010.

One JAMP thematic assessment report is given in the literature list. This is a relatively short report where information about the offshore petroleum industry and its potential impact on the marine environment is presented as an overview. Biological and ecological implications of the oil and gas activities for the marine environment have been only briefly summarised in the documents listed in the reference list. Information from scientific literature and presented in a lot of reports prepared by the industry itself during many years on potential impacts from operational discharges of chemicals and oil seem not to have been used to any great extent in the assessment.

7.3 Data and Analysis

No gaps in data or information have been noticed other than the amount of information regarding the impact of offshore oil and gas activities on the marine environment that has been used in the assessment seems to be very limited. While the naturally occurring radioactive elements that are released to the environment during these activities have been covered in Chapter 6 and PAHs in Chapter 5 (to some extent), not much information about the impact of other chemicals used or released during the oil and gas production has been provided. Of the total amount of chemicals (900 000 tonnes) used in the offshore activities in 2007, 250 000 tonnes were discharged into the sea of which 2500 tonnes were those identified by OSPAR for priority action or substances that should be substituted by less hazardous ones. Even if this was a 90% decrease in comparison to 2003, both the current and the past discharges should cause concern.

Figures and tables in the chapter illustrate the text well, support the conclusion, and give a relevant and clear message.

The assessment contains very little information on gaps in knowledge with regards to the effects the industry may cause on the environment due to routine operations and accidents.

8 Chapter 8 - Use of Living Marine Resources

8.1 The Reviewers' Key Messages

The layout and content of the QSR 2010 is driven by a change in target audience, that is, with a focus on policy makers, managers and the public, rather than the scientific community. In order to communicate the science effectively to these groups, the text has been written in a generic style. However this has been overdone and the reviewers felt that the text is too generic to be of use to policy makers and managers who are not given a clear indication of priorities in various jurisdictions.

As with many of the other Chapters, this section of the QSR2010 does not provide a useful overview of status. It should provide an objective assessment which also includes negative reports of environmental status.

8.2 Reporting and Methods

The source documents refer to the dependency of coastal communities on the condition of coastal marine habitats; ironically the more valuable the marine coastal zone is to the economy, the more attractive the area becomes to society and therefore the more threatened it becomes. Also the interaction between fisheries and mariculture as it shapes coastal socio-economy is very important as mariculture grows. Notably these land-sea interactions were themes not mentioned in the source documents. Further, the document has much more information on fisheries than on mariculture and there are no recommendations for Contracting Parties regarding mariculture. The trends in mariculture are not discussed and so do not support the Main Message that mariculture is a growing activity.

In general, this section is well-written and generally addresses the objectives set out for the QSR2010. However, the statement in the "Main message" at the top of the section that "The overall status of many fish stocks is improving but they remain a cause for concern" is overly positive. The QSR 2000 highlighted the lack of precautionary reference points for the biomass and mortality of some commercially exploited stocks, and Fig. 8.1.3 suggests that there has been little or no change in the number of stocks (~50) whose status cannot be assessed due to poor data (23) and that 25-30 stocks are outside safe biological limits. This should be a main message in the report given that only 10 stocks assessed by ICES are inside of safe biological limits and this has not changed since 2003. The report focuses on the improving trend but not the current status which is still dire.

The QSR2000 highlighted the need to address the particular vulnerability of deep-sea species and this issue is not included in the QSR2010 except in the Main Message. ICES Advice in this respect is clear. "Modern fishing fleets are capable of causing a very significant reduction in demersal deep-water fish biomass in just a few years; a consequence of this has been the collapse of several fisheries. There is strong evidence that some deepwater fish (500–1800 m) have been severely depleted in the Celtic Sea (Region V) by the deep-water fisheries carried out in this area (ICES, 2008b). Unlike the commercial groundfish these fish all have attributes which make them particularly vulnerable to overfishing such as slow growth rates, late age of maturity, low or unpredictable recruitment, and long lifespans. Examples include the roundnose grenadier *Coryphaenoides rupestris*, black scabbard fish *Aphanopus carbo*, blue ling *Molva macrophthalma*, and orange roughy *Hoplostethus atlanticus* as well as deep-sea squalids (sharks) and Macrouridae (ICES, 2008b). Populations of large fish that aggregate on oceanic bathymetric features such as seamounts are particularly sensitive to overfishing, due to low productivity and high catchability. On the southern part of the mid-Atlantic Ridge and adjacent seamounts, populations of alphonosinops were depleted also in the 1970s. More recently, longline fisheries appear to have depleted seamount populations of "giant" redfish on seamounts of the northern mid-Atlantic Ridge (ICES, 2008b)." This type of message should be included in the body of the text.

Par. 6. Discarding practices are not discussed in detail. The background document states that "In the Bay of Biscay (Region IV), the mixed species fishery has increased its level of discards to the highest yet reported." More details as opposed to generic statements would be helpful here to make the point.

Except for the reference to climate change, there is little or no reference of the importance of shifting species habitats, and how these should be regulated in the future as species cross national boundaries, particularly

outside of CFP-regulated areas. Also, some species currently cross management areas outside the scope of the OSPAR area. For example, Atlantic Bluefin Tuna migrate across the North Atlantic. Since ICCAT countries do not include all OSPAR member states, how should this species be effectively regulated? If addressing regulation of species whose habitats extend beyond management areas is a challenge, then it should be stated in the QSR 2010.

It is notable that effects of fishing on size at maturity and possible evolutionary (genetic) effects are not discussed. These are highlighted in the background document prepared by ICES: “Northeast Arctic cod (Heino *et al.*, 2002) and, in the North Sea, cod (Law and Rowell, 1993), haddock (Wright, 2005), and plaice (Grift *et al.*, 2007) all show indications of fishing-induced effects on reproductive traits.”

Further, the reviewers feel that the links between terrestrial habitat usage and harvesting of living marine resources (LMRs) should be described at least in brief in this chapter on Use of Living Marine Resources. This relationship is interactive. Human activities (urbanization, tourism, etc) on land can modify essential habitats for marine LMRs. Similarly exploitation of marine LMRs is an important factor for the social and economic condition of coastal communities. Information on this relationship would support implementation of coastal zone management and marine spatial planning.

For the majority of the text the assumptions made appear sound and are clearly identifiable, however the document suffers from extracting information from one area within a Region and applying it to all Regions. For example, Par. 34, line 17: reference to coral areas impacted is not supported. These percentages are drawn from Norwegian Sea only and may not be representative of the entire OSPAR area or necessarily of Region I. If extrapolations to larger scales are made, they should be clearly stated.

8.3 Data and Analysis

The discussion of IUU should precede the discussion on the changes in landings (Par. 17) so that the reader is aware of the quality of the landings data.

Further, there are large gaps in data which are not highlighted and should be discussed. Over 50 commercial stocks are considered data poor and cannot be assessed by ICES (Fig. 8.1.3) and this had not changed.

For the most part, the graphics and tables were well made but some issues were noted:

- Box 8.1.2 does not explain the colours in the graphic
- The upper graphic in Box 8.1.3 (as opposed to Fig. 8.1.3 outside the box) has some lettering which is too small, and although this is a visually attractive graphic, a good legend would help the reader significantly. As it is, it is cumbersome and does not "speak" for itself. Also, inverting the fishing mortality axis (or revising the text, which would be much easier to do) would make the graphic more intuitive and reflective of the accompanying text.
- Figure 8.1.4 seems to contradict information in Figure 8.1.3 (outside of box).
- Figure 8.1.5 contains interesting information on recovery time estimates that does not seem to be linked to the reference in the text (Par. 35 line 30).

9 Chapter 9 - Other Human Uses and Impacts

9.1 The Reviewers' Key Messages

This chapter provides a fairly comprehensive overview of “other” (i.e. not related to fisheries, hunting or mariculture) human activities and their impacts on marine habitats in the OSPAR area. The reviewers applaud one of the main messages of this chapter, namely that “the cumulative environmental impact of these pressures is not fully understood.”

Unfortunately, the chapter in general is a bit confusing and very long, since it deals with both activities (e.g. transport) and impacts (e.g. marine litter). The reviewers note that some topics receive an inordinate amount of attention, whereas others are not addressed in sufficient detail or at all.

Regarding data interpretation, some of the temporal patterns described in this chapter are not well documented even in the listed source documents. Further, cumulative effects assessment is not addressed in sufficient detail in this chapter. How are the listed activities and impacts linked to terrestrial human activities and impacts? Addressing these questions will support current and future efforts for marine spatial planning and coastal zone management.

9.2 Reporting and Methods

This chapter provides a fairly complete overview of “other” (i.e. not related to fisheries, hunting or mariculture) human activities and their impacts on marine habitats in the OSPAR area. However the reviewers note that some activities such as marine transportation and litter receive an inordinate amount of attention, whereas other factors such as non-indigenous species are not addressed in much detail and probably should be. Indeed some activities of relevance such as hydrokinetic energy production and non-point-source contamination are not addressed in this chapter at all, although from the chapter title, one would expect these to be included. Because of this imbalance the reader is (unintentionally) led to believe that some activities and impacts are of greater concern than others for the OSPAR region. It is recommended that OSPAR considers revising the sections to inject more balance into the chapter.

The chapter lacks a compelling synthesis of the underlying JAMP thematic assessments. For example, the paper on “Trend analysis of maritime human activities and their collective impact on the OSPAR maritime area” presents important research needs and environmental issues of particular interest relative to cumulative impacts of multiple stressors. Indirectly, this document also points out the importance of integrated ecosystem assessments (IEAs). Overall, these are major scientific challenges which in the opinion of the reviewers deserve more attention in the QSR. In fact overall the QSR focuses almost exclusively on data presentation, monitoring strategies and the need for collaboration. An important aspect regarding assessment of environmental quality is recent scientific advancement and need for continued improvements in our ability to perform the assessments. (See also related comments in the next section, below.) This need is stated in this chapter, but the supporting text is meagre. A description of advancements to evaluate cumulative effects as well as a stronger focus on approaches to implement an integrated ecosystem assessment would benefit this chapter.

Some relevant information could be added to this chapter. For example, the reviewers applaud one of the main messages of this chapter, which is that “the cumulative environmental impact of these pressures is not fully understood. There is a need to balance the needs of different users of the sea and ensure environmental protection.” And further, the chapter states that “OSPAR Contracting Parties should cooperate to.....improve international coordination on integrated management, including marine spatial planning, in conjunction with the MSFD and building on existing experience in some OSPAR countries.” Yet this topic is not addressed in sufficient detail in this chapter, although more information of relevance is available in the literature. A consideration of findings in additional sources may help to answer important questions, such as the following. What is the state of science on analysis of cumulative effects? Are there interactions between subsets of activities / impacts of particular concern to managers and the public? How are the listed activities and impacts linked to terrestrial human activities and impacts? Addressing these questions will support current and future efforts for marine spatial planning and coastal zone management. It is recommended that

the authors provide one or more examples of types of data collection and analysis which are proving to be useful from e.g. national initiatives for integrated ecosystem assessments.

OSPAR should consider making stronger reference to such national and relevant international programs that have made progress in developing CEA frameworks.

The types of data sources required to complete CEA should be defined so that data gaps can be identified at an early stage. As an example of useful information from a national initiative, essential data information needs were identified for a Canadian Cumulative Effects Assessment approach. These are

- **Nature/Direction of Effect** - Positive or negative impact or direct or indirect effect.
- **Magnitude** - The typical effects of the impact (low, medium or high impact) on the environment/community.
- **Spatial Extent** - Area or volume covered (immediate, local or regional area).
- **Timing** Construction, operation, decommissioning.
- **Duration of Impacts** - Short term, long term, intermittent, continuous.
- **Reversibility / Irreversibility** - An estimate of whether or not an effect, once it has been stopped, can return to its preexisting situation.
- **Likelihood of Occurrence Without Mitigation** An estimate of whether the effect is likely to occur if mitigation options are not implemented (likely, not likely).

Flaws in argumentation were noted. As an example, the document claims that tourism is responsible for buildings of various types on beachfront properties. There is no or only scant reference to urbanization of the coast. Undoubtedly tourism is not the only factor here and no data are presented to support this claim. Further, the background document only presents data for 2004 and there is no indication of change over the last 10 years. If this is the first time such data have been collected then it should be noted as a benchmark for future years and highlighted as such in the Main Messages.

The QSR has a number of tables with trends indicated but there is no evidence for these either in the QSR or in the background document. They may be from expert opinion but it is not clear.

A large problem with this section is that the background documents are also OSPAR documents and what is presented in the QSR is an edited version of those. To get to the sources you have to go a further layer into the literature. For some sections, for example the “Demand for water resources” and “Over frequentation of natural sites” caused by increased tourism, there are no references in the background document at all to support the text.

Most of the assumptions made appear to be sound but the reviewers, again, feel that the chapter lacks a good balance between highlighting all issues and highlighting the most important ones. This is common throughout.

In general the reviewers agree with the correctness of the spatial and temporal patterns described. However, some of the patterns described in this chapter are not well documented even in the listed sourced documents. For example, in Table 9.15.1 projections of impacts are made for the year 2020. The source document also presented the data but lacked a description of methods leading to this table. How were these projected states determined? It is recommended that the authors review and, as needed, add primary sources of information for key findings in this chapter. Also, on a more editorial note, why are fisheries and mariculture trends listed in this table, when the chapter is intended to exclude those activities?

9.3 Data and Analysis

Some gaps in data and information are not clearly indicated. For example, see the comment, above, on Table 9.15.1.

In general the tables and figures are adequate. However the data feeding into the tables and figures are not always available. Again, for example, see the comment, above, on Table 9.15.1. Further, the font size is too small in some figures.

10 Chapter 10 - Protection and Conservation of Biodiversity and Ecosystems

10.1 The Reviewers' Key Messages

The reviewers applaud OSPAR for recognizing the importance of biodiversity for the functionality of marine ecosystems and for including a chapter in the QSR 2010 dedicated to this topic. Further, OSPAR has done a good job to draw attention to a number of vulnerable marine species and habitats, and the reviewers commend OSPAR for its leadership role and the significant work conducted to create the listings for these vulnerable species and habitat. Unfortunately in the last 10 years there seem to have been few positive actions towards protecting and conserving these, however the QSR for the most part does a good job of summarizing the current status and trends for the OSPAR listed species and habitats.

Overall this chapter is written fairly well and the main points are clear. The reviewers however felt that the chapter tended to defend OSPARs actions to date and was not as objective as it should be.

Clearly some refinement in the language is required to improve articulation of several points. More importantly, the term "biodiversity" should be clearly defined and the objectives for conservation of biodiversity better described. The reviewers note that supporting information for conclusions in this chapter was not always available or did not actually support the statement.

The QSR 2010 is meant to represent the collective effort made by Contracting Parties over the period 1998 to 2008, yet there is very little new information provided for this period and it is impossible to separate out historical (in some cases centuries old) events from current trends. This is a serious flaw in the QSR as the document fails to provide managers, decision makers, politicians and the public with the tools to evaluate protective measures that have been put in place during the last decade.

Further, regarding implications for management, the reviewers note that establishing Marine Protected Areas is a legislative mandate for the OSPAR member states. However, what is the scientific basis for choosing this action? Alternatives including rotational closures and gear modifications may be more appropriate for some areas, and this should be addressed. Further, the chapter should provide information to help managers reconcile differences in management objectives and jurisdiction also in offshore waters.

10.2 Reporting and Methods

The chapter is rather long and superficial with numerous generic statements that are not linked to specific issues within the OSPAR regions. The chapter fails to provide some important information and findings relevant for this QSR. The chapter would benefit from a description of advancements in relevant science, and what the research priorities for the future should be. What is the role of connectivity? What is the role of genetic diversity? There are major scientific initiatives focusing on biodiversity science. These include Census of Marine Life, Marine Biodiversity and Ecosystem Function (MARBEF) and the Canadian Healthy Oceans Network (CHONE). Notably, many of the important research findings will be showcased at various venues in 2010. The advancements in science should underpin management decisions (e.g. MPA networks).

One of the stated objectives in the Introduction is that the QSR 2010 is meant to represent the collective effort made by Contracting Parties over the period 1998 to 2008, yet there is very little new information provided for this period and it is impossible to separate out historical (in some cases centuries old) events from current trends. This is a serious flaw in the QSR as the document fails to provide managers, decision makers, politicians and the public with the tools to evaluate protective measures that have been put in place during the last decade.

Portions of the document are well written although the background data are often missing or inadequate to support conclusions. A large number of species and Latin names of species and communities are used. Are they all helpful for the expected readership?

The Joint Assessment and Monitoring Program calls for a comprehensive thematic assessment in 2010 and in the reviewers' opinion this has not been achieved for this chapter. The document refers to EcoQOs that OSPAR has developed but fails to produce any data on their trends and status. There is no assessment of biodiversity except as it pertains to the list of threatened and endangered species and habitats. For these they are

considered for the most part in isolation and they are not reviewed to provide an ecosystem assessment. Again, the scientific, process-related underpinnings could be synthesized better. Trends and patterns in biodiversity (function, composition and structure) are driven by processes and this should be elucidated. It was noted that evidence drawn from one localized area of the OSPAR Region is routinely extrapolated to apply to the whole Region.

Despite a generally good presentation, the ordering of species in the text often seems to be arbitrary, jumping randomly from one taxon to another. Further, it is unclear if the species of interest in Box 10.7 are more important than others mentioned in the text. If not, it should be stipulated that the material in Box 10.7 serves only as an example.

The chapter contains a wealth of information gathered from different sources. However, in paragraph 6, it is falsely stated that “OSPAR is the only international organisation that recognises that this [sea-pen] habitat needs protection from human activities...” The reviewers note that NAFO not only recognizes sea-pens as components of vulnerable marine ecosystems (NAFO, 2008) but has closed areas on Flemish Cap to protect significant concentrations of them. Reference: NAFO, 2008. Report of the NAFO Scientific Council Working Group on Ecosystem Approach to Fisheries Management (WGEAFM). Serial No. N5511 *NAFO Scientific Council Summary Document* 08/10, 70pp.

Section 18, Box 10.5 cites fisheries closed areas for the protection of cold-water corals (*Lophelia pertusa*) but it does not provide any evidence that this habitat was threatened by fisheries. Many of the areas described are very deep in the mid-Atlantic and to our knowledge are not characterized by extensive damage to coral habitat. On the other hand, the extensive reefs shown in the figure in Box 10.5 appear not to be protected.

Box 10.7, line 20 “Apparent relationship....” and line 27 “Due to difficulties of establishing a clear linking mechanism...”. These statements appear to contradict each other, and some editing is recommended to correct this.

Also, some redundancy might be excised from the chapter. In particular:

p.17, par. 32. This is a repetition from points which were dedicated to single species.

p. 18, par. 37. This partly mentioned already in par. 15.

The same holds to par. 40 and 41 on p. 21. This is already said more or less earlier.

Unfortunately, the assumptions are not always supported. For example, in the very first sentence of the main text, it is stated that “Biologically diverse oceans and seas are important for the proper functioning of marine ecosystems.” Some experts would argue that this is not true, and rather that functionality can be achieved by a suite of species with a common ecological niche.

There are several other statements, which require revision and deserve a more complete explanation. For example, it is stated that “Historically, the management of human activities in the marine environment has not paid enough attention to conserving biodiversity. One of the reasons is that clear evidence of the impacts on species, habitats and ecological processes has only developed in recent decades and still remains scarce in some instances, especially deeper waters. OSPAR is working together with other international efforts to remedy this...” Notably an unstated reason is that short-term management goals usually focus on short term socio-economic needs and not long-term sustainability. Further, habitat functionality is not considered to be dependent upon biodiversity by all managers or it is ignored. Like it or not, the chapter in places gives the impression that management actions (or lack of them) to date are being defended. The reviewers recommend that the chapter be more objective in its presentation of management achievements to date.

Par. 23. There is no evidence to support the statement that most diadromous fish species have been strongly declining. This may be true but some evidence should be provided.

10.3 Data and Analysis

Methods to describe biodiversity are not well established in comparison to those for e.g. monitoring and assessment of nutrients. Quite often the description of biodiversity is qualitative and an exact quantification is lacking. This should be clearly acknowledged.

Much of the content in the background documents is summarized in Table 10.2 and 10.3. These tables classify the species or habitat as either 1) under threat or in decline, or 2) species occurs but is not under threat or in decline. These tables and discussion around them form a key portion of the document. However, there are many inconsistencies between the tables and the supporting evidence (see below). For many species the status is assumed either based on life history characteristics in the face of pressures or on IUCN or other designations. For many species and habitats there is insufficient data upon which to base a determination and the classification is based on expert judgement. The reviewers believe that this chapter would be considerably more defensible if a third classification was used to indicate 3) insufficient data and a fourth to indicate 4) trend in the last 10 years.

- A) Table 10.2/3: Footnotes appear in the table but are not listed in the table legend (1-5). There is no distinction between key pressures active on the populations and theoretical or past pressures. All potential pressures are listed whether they are low or high. One or two key pressures for all would make these tables more understandable. *Ostrea edulis* occurs in OSPAR Regions: I, II, III, IV according to the background document provided. It is only threatened in Region II and that is the only symbol indicated in Table 10.2. Reading this Table one would think that it only occurs in Region II and that it is under threat or declining which is false. Further the background text states “It was believed to be extinct in the Dutch Wadden Sea from 1940 although a small number were found in 1992 (Dankers *et al.*, 1999). In recent years natural beds have become re-established in the Danish Limfjord and now support a fishery.” This suggests that there is an improvement in Region II. In Region III (Ireland) the text states “Over the past 10 years oyster beds in Ireland that have been well managed have maintained and even increased production although production is still below historic levels.” Further the supporting document for this species is incomplete with the following text in the current version: [Additional information on the decline of, British, French and Spanish waters is needed as well as additional information on the situation in the Nordic countries]. The frame of reference for the decline of this species and the beds is the 18th and 19th century. While this is useful background it appears that efforts in the last decade have had a positive effect which is not reflected in this document. Regarding *Ostrea edulis* beds as habitat the supporting document states: The number of viable *Ostrea* beds on the Irish coast seems to be stable although oyster density within many of these beds is low. Production has remained stable or even increased in managed areas.”, while the indicator for Region III is decline/threatened. The supporting document lists a number of threats to this species/habitat and evaluates sensitivity to key pressures; however it does not provide any evidence that these pressures are currently a threat. For example it lists trawling as a threat on the basis of the fragility of the species but does not have any information to support listing it as an active pressure.

There is no supporting documentation for the Azorean barnacle and the listing is based on “expert judgement”.

The text on page 12, par. 19 states that dog whelks are no longer declining and are re-colonising some sites from which they had previously disappeared. This is not reflected in the Table 10.2, where it appears to be declining in Regions II, III, and IV.

There is debate over the inclusion of the Iberian guillemot as per the supporting document: “An important issue to be resolved is whether the form of guillemot in Iberia is taxonomically separable from other forms. ICES (2002) report that most experts consider that it is not separate sub-species. This will affect the assessment as the common guillemot is not considered to be threatened or declining in the OSPAR Maritime Area.”

For the long-snouted seahorse “(t)he Advisory Committee of Ecosystems of ICES reviewed information on this species (ICES 2003), and concluded that there was no evidence for decline although the extent of the seagrass habitat used by this species has decreased. There was considered to be sound evidence of threat to seagrass habitats but no evidence of threats to this seahorse”. Updated documentation provided in the background links does not add to the data deficiency. In fact it suggests that the species can also use “weed” and rocks as cover. Its congener, the short-snouted seahorse has

a broader habitat preference and is found abundantly on artificial substrates. It too does not have any quantitative data to support a decline.

There is no evidence to support a decline in *Lophelia pertusa* reefs in OSPAR Regions III, IV, V. The best evidence comes from Norway (primarily Region I). All other damage is not well supported in the background documentation.

- B) Table 10.2. Deep-sea sponge aggregations are missing.
- C) Figure 10.1. Very difficult to see symbols due to the colouring and size. Too much
- D) Table 10.1. The Baltic Sea as bordering sea should be contained in the table. HELCOM defines the following objectives:
 - Viable populations of species
 - Favourable conservation status of Baltic Sea biodiversity
 - Thriving and balanced communities of plants and animals
- E) Box 10.2: The fonts and symbols in this box are small and difficult to read. Please reformat to correct this. In the map “mud volcano” should be replaced by “cold seeps” to be consistent with the text.

10.4 Concluding

The support of conclusions could be improved. For example, if MPA networks are the mandated management action prescribed to conserve biodiversity, what is the scientific justification for this choice? More importantly, what are the alternatives in areas for which MPAs are not appropriate? Are temporary closures or rotational closures effective enough to meet objective e.g. to halt loss of biodiversity in the near term? The reviewers feel that the alternative management actions require at least brief discussion, especially considering that the fisheries industry will look very closely at this section.

Paragraph 4: There is no evidence to support the statement that the common skate is close to extirpation in Regions II and III.

Paragraph 8bis: There is no supporting documentation for this section.

Paragraph 36. The statement that ecological coherence has not been reached in the preliminary assessment is not supported by documentation. It appears to contradict the statements made in the previous section. How is ecological coherence being evaluated?

11 Chapter 11 - Towards Ecosystem Assessment

11.1 The Reviewers' Key Messages

OSPAR has made significant contributions in support of the ecosystem approach to management of human activities, including the development of ecological quality objectives for the North Sea, assessments of species and habitats that are threatened or in decline and development of an integrated assessment framework. This Chapter summarizes the current status of this work but remains highly qualitative. A more quantitative evaluation, especially of the EcoQOs would be useful. Further, the results of the Utrecht workshop are too prominent given the scientific reservations surrounding this approach. Because there was a high and variable degree of confidence expressed by the experts in evaluating some components in some regions there should be no reference to the conclusions, since they are highly questionable. Instead it should be presented as an example of what could be done and further developments, such as incorporating trends into the evaluation, should be highlighted.

11.2 Reporting and Methods

This section reviews the extensive work OSPAR has done to produce integrated assessments. It covers the North Sea assessment and the first attempt to apply the REA approach to all of the OSPAR regions at Utrecht. The chapter starts with a quite long explanation of problems encountered with EcoQOs. This gives the impression that many things are still not in place and many problems exist. A more positive approach would be to describe what information is available (Table 11.2), then mention the shortcomings, and finally describe the steps forward.

Some additional background information would strengthen the Chapter. An introductory paragraph explaining the intent of this Chapter and also defining terminology (including a definition for Ecosystem Approach, as used here) would be useful, especially given the target audience. This Chapter suffers more than others from the use of scientific jargon. This introduction should clarify that the Chapter deals with methodologies and not actual findings.

This chapter is about how one might do an integrated assessment so in that context the use of the thematic assessments is appropriate. However with respect to the example for an integrated assessment some critical aspects of the REA approach identified by WGECCO (ICES, 2009) have not been highlighted. Table 11.3 proposes a three class evaluation system. It would be interesting to read if there are any ideas to move to a five class system as used in the Water Framework Directive to have a better comparability between coastal and offshore regions. Are the parameters obligatory for the WFD also taken into account when formulating EcoQO? . It is also assumed that in the upcoming MSFD a five class system will be used.

It would have been informative to consider other assessment methods, for example those used by other marine conventions. For example, HELCOM has developed quantitative tools to evaluate the eutrophication state (HEAT), the biodiversity state (BEAT), and also the state with respect to hazardous substances (Chase). A holistic assessment is under way as well (compare different Baltic Sea Environment Proceedings).

The Chapter could benefit from one or more examples of how the EcoQOs have been received and applied by management. This might help to explain, why the Objectives have largely not been achieved, and generally help the reader to understand how the science leads to ecological quality objectives which lead to management actions which should be evidenced through monitoring. This may also help scientists to develop EcoQOs, which can be understood clearly and intuitively by managers. The DPSIR (driver – pressure – state – indicator – response) cyclical model, which is used often in the US, helps to identify the links which are not often obvious especially to the public.

There exist several inconsistencies between the evaluations given in different Chapters with respect to pressure. In Chapter 3 the overall importance of climate change is postulated. Also Table 11.6 mentions high pressure from climate change in most of the regions. In contrast, the table on p.24 of Chapter 10 mentions climate change as important pressure only for Region I. Unification is urgently needed among the chapters, especially with respect to general conclusion and key findings.

In Table 11.6 it is also hard to understand why Region III is faced only to a low degree to climate change processes whereas the surrounding sea areas are influenced to a high degree.

The effects of spatial scale in evaluating EcoQOs should be noted. Scale can vary from very local and specific to broad-scaled and pervasive. The “small scale” EcoQO can be very useful and actionable for managers. The broad-scale statements are probably harder to translate into management. The variety of spatial and temporal scales, which EcoQOs cover, can be confusing. A paragraph on this would be helpful for the chapter.

WGECO (ICES, 2009) noted that comments by contributors at Utrecht confirmed that the methodology needed to explicitly cover a step to record trends in the status of components. The following comments are extracted from various parts of the WGECO report. The overall process did record trends in components in the summaries for each Region, but these were generated by the expert groups outside of the structured assessment process. WGECO felt that it would be possible to examine recent trends in many of the ecosystem components assessed using state and pressure indicators, for at least some of the OSPAR regions. Previous reports by WGECO have listed indicators that could be used for this purpose.

Table 6.3.2.1. Percentage of voters (excluding abstainers) that voted that they (i) could not (No), (ii) could provided that (Yes provided...), or (iii) could (Yes) agree with the outcomes of the assessments for each of the five OSPAR Regions. The proportion of the total number of participants that abstained from voting on each Region is also given. Generally participants abstained where they did not feel they had relevant local expertise to comment on the outcomes of the assessment in a particular Region.

OSPAR Region	No	Yes provided...	Yes	Proportion abstained
I	0	45	55	58
II	25	19	56	26
III	7	33	60	64
IV	15	46	39	35
V	14	41	45	46

Table 6.3.2.1 extracted from the WGECO report (ICES, 2009) identifies a high and disproportionate level of abstention and/or level of acceptability from the Utrecht experts which is not expressed in the QSR. The lowest levels of acceptability were recorded for the Region II assessment. This was also the Region for which there was the highest representation of expertise (only 26% of participants abstained from voting on this Region's outcomes) and the most information available. In the summary provided for Region II (Annex V, OSPAR 2009a), concerns were raised about the credibility of some of the assessments, as it was identified that some of the expert groups had interpreted terminology central to the assessment in different ways (see discussion in 6.3.3. (i)). Also there were general comments about the scientific credibility of aspects of the REA methodology (most notably the indicators and thresholds used, the aggregation of ecosystem components (particularly not separating fish assemblages and commercial species in the assessment), geographic scale and the reference period used- all discussed further in 6.3.3) and it is clear that these concerns would need to be reduced in the further development of the assessment process to improve acceptability of the overall process.

The Utrecht workshop assessments were undertaken against ‘former natural conditions’. Variation in interpretation of ‘former natural conditions’ adopted by each subgroup led to some inconsistent outcomes. For example, the seabirds subgroup concentrated on recent trends, many of which show population declines, and led to a “moderate” status assessment. However this ignored long-term increases in population size over most of the 20th century in several Regions, which mean that current population sizes are considerably higher than they were historically. Conversely, the fish subgroup (and other subgroups) used much more historical reference points, when fishing pressure was much lower than it is today. Compared with such a

reference period, the current population size of fish is much lower, and this also led to a “moderate” status assessment (e.g. fish) (OSPAR, 2009).

Inconsistency in the interpretation of the baseline used has led to inconsistency in the status outcomes. WGECO also note that in future development of the overall process, the issue of setting a suitable baseline needs to be considered and discussed in relation to the needs of the end users.

WGECO note that there is currently no accounting of the interactions between ecosystem components, nor the cumulative effects of pressures on individual components. A truly integrated ecosystem assessment should be based on an approach that achieves both of these aims. As commented on by various participants in the Utrecht workshop, the complexity of biological interactions is often difficult to separate from direct effects of particular pressures. Where indirect effects can be reliably related to the status of a component, they should be considered in the assessment. However in general, the complexity of indirect effects and ecosystem interactions will require further research to enable them to be incorporated into individual component assessments and into any integrated assessment process.

In summary, WGECO felt that the shortcomings in the performance of the assessment related most to its credibility. However, the diversity of experts engaged in the process and the means by which they were heard had clearly added credibility to the expert opinion assessment. WGECO note that overall credibility could be improved significantly by further developing some of the detailed steps of the methodology, improving the availability and use of information used in the assessment and ensuring that a suitable peer review and quality assurance step is built into the process.

OSPAR. 2009. Report of the Workshop on Biodiversity Assessments for the QSR 2010. Meeting of the Environmental Assessment and Monitoring Group (ASMO) 20-24 April 2009.ASMO 09/3/ E (L).

11.3 Data and Analysis

The gaps in defining EcoQOs are mentioned clearly as are the differences for the different OSPAR Regions. Establishing the links between science, objectives and management would be a good thing in this chapter.

Table 11.4 is very voluminous and relatively complicated to read. Understanding is in addition hampered by the use of different colours for the impact of pressure and the status assessment. One wonders if such a voluminous table is really helpful with all the limitations given in the text.

Table 11.3 is not readable due to small fonts.

The colour codings in Table 11.6 do not match the legend consistently.

All uses of colour: Will the subtle differences in shading be readable in black and white? This should be evaluated before posting.

12 Chapter 12 - Regional Summaries

12.1 The Reviewers' Key Messages

The focus of the peer review is intended to “address whether the summary report is generally robust and objective, reflects and draws conclusions from the evidence provided by OSPAR’s assessment work, and takes other relevant evidence into account in drawing conclusions.” In general these non-technical summaries accurately reflect the detailed descriptions provided in other Sections of the Report. However the Chapter needs to be closely checked for consistency with the thematic chapters.

It is likely that readers will be interested in how or if the situation in a given Region has changed since the 2000 assessment. This information needs to be more prominent. It will be of interest to know how the key issues from 2000 have changed over the 10 years and what new issues have developed.

12.2 Reporting and Methods

The section provides a summary of previous sections. It would be helpful for the casual reader, if references to previous chapters were made, as appropriate. Alternatively an introductory paragraph could be used to explain the source of the information. This is important, because more often than not, the reader will see only one chapter; this is especially true for this non-technical, regional summary. The section provides an overview about pressures, key issues, successes, and ongoing concerns in the 5 OSPAR Regions in a comparable way. These sections are really helpful because in the thematic chapters the focus is often on selected Regions; information about Regions I and V is scarce. However, there is no indication of the relative importance of the pressures and issues in a region.

As already mentioned in the review of Chapters 3, 10, and 11 contradictory conclusions with respect to the main pressure exist. In the key findings these differences have to be eliminated to give the readership, mainly non-experts, a clear idea which pressure is most important; this may be different for different Regions. This is important knowledge for policy makers and managers.

12.3 Data and Analysis

The statement on page 5 line 38 that “It was difficult to assess changes in the status of Region II in 2000, because of a lack of historical data.” seems to be untrue. This area has more historical data than most regions on the planet. The statement should be qualified if it refers to certain data elements.

Page 10 line 25. Very high discard rates in the Bay of Biscay should be noted.

The figure on page 2 is not adequate. There is no legend and the details are not supported by the text in this and other sections. For example the figure says that there is no information on fishing in any of the Regions but on page 1, line 27 it states that fishing pressure is causing widespread problems. Further confusion is caused because 7 of the indicators are black which means that the status is unknown but then outlooks are provided. This figure does not appear to be evidence-based.

Fig. on page 2: In this graph climate change is not mentioned at all. Again homogeneity with other conclusion has to be reached (see also A4). In addition a legend is missing for this figure.

Annex 1. Chapter 1 - Additional Suggestions for Improvement

The figures are adequate. Just a few minor suggestions of edits for figure 1.2: It would be useful to clarify what “Straight base lines”, “Internal waters” and “Salinity limit” are.

Annex 2. Chapter 2 - Additional Suggestions for Improvement

P 1, Line 12, it may be better to change to “a wide range of **goods and services...**”

p. 1, line 9: It would be helpful to have a table with catchment areas for the different regions and inhabitants within. I wonder if the number of 58% of population living within 10km of the coast is right. In the Baltic Sea these are roughly 18% only.

P 3. Line 3. “a strong **effects** on the ecosystems...”.

p.4, line5: A concrete number of temperature increase would be more informative.

Fig. 2.1.. Legend: May be better to be “Maritime employment...”. Also, it needs to explain that the area of the circle is proportional to number of maritime employment (?) and the inserted table. Also, The legend should be revised as: Percentage of maritime employment and number of employees (in thousands) in all sea-related areas for the EU and Norway. Source:....

Annex 3. Chapter 3 - Additional Suggestions for Improvement

P 1., line 2, suggest to revise as “are potentially one of the major threats to biodiversity ...” (see comments above).

P 1., line 3, suggest to revise as “... and will alter human activities and their pressures on the sea.”

P 1., line 13, suggest to revise the heading regarding “uncertainties” (see comments above).

Figure 3.3, need a label for the colour scale (°C).

p. 5, line 4: by 1 – 2 °C instead of 1 – 2 C.

p.6, line 13/14. better oil and gas exploration instead of hydrocarbon activity.

p.10, lines 21 and 24: doubling

p. 2: There exist 2 Figures 3.1. upper, Fig. 3.1: the description of the 3 different scenarios should be placed below the main legend.

Fig. 3.3 The unit °C should be inserted

p. 10, line 10: It is not productive to cite the flood of 1953 in the context of climate change.

Annex 4. Chapter 4 - Additional Suggestions for Improvement

p. 2 lines 4/5: The conclusion that hazardous substances enhance eutrophication effects is questionable.

p.2, line 8: Be precise: the decay of algae leads at first to oxygen deficiency and if consumed to the formation of hydrogen sulphide (not release). Furthermore stratification of the water column is a precondition.

p.2., line 16: Decaying blooms... is from a separate topic and should not be listed under point 3.

p. 2/3: It should be explicitly mentioned that agriculture is the main contributor to the diffuse sources.

p. 3, lines 14/15: The conclusion that change in salinity and stratification result in an increased occurrence of harmful algal blooms is not supported by any evidence.

p. 4: It makes no sense to have under “What has been done?” only one sub-heading.

- p. 6: Fig. 4.2: France is missing in this graph. In addition, the reader will be very much interested in an explanation why Sweden and Ireland have reached only very low reductions compared to the other countries.
- p. 7, Fig. 4.3: It should be tried to place this figure not under point sources.
- p.9: It is said that more than 5100kt of nitrogen were emitted. Summing up the numbers in Fig. 4.5 one gets only 4460kt. A value for “other sources” should be added.
- p.13, number 34: This is a repetition what was said earlier.

Annex 5. Chapter 5 - Additional Suggestions for Improvement

- Page 1/23. Main messages: Delete end of sentence since it under this heading is too detailed: Continue and improve abatement of pollution with OSPAR priority chemicals at source, (including PAH emissions from combustion of fossil fuels such as coal;)
- Page 1/23. Main messages: Delete end of sentence since it under this heading is too detailed: Improve OSPAR’s understanding of the effects of hazardous substances, particularly cumulative effects (and endocrine disruption;)
- Page 2/23, line 15: Various biological effects have also been observed, such as fish diseases. Comment: Delete end of sentence since there is no proof of this direct link (this is also mentioned later in the chapter).
- Page 2/23, line 18: It is here that most man-made and naturally occurring compounds (chemicals), some of which are
- Page 2/23, line 28: Insert “urban areas”: collect inputs from inland sources such as urban areas, industry and agriculture.
- Page 3/23, line 6: Delete part of sentence (text in brackets): Changes in the food web structure(, such as the introduction of new species,) may affect contaminant pathways.
- Page 3/23, line 38: Insert “also”: OSPAR actively co-operates in this work also with non-governmental organisations representing
- Page 7/23, line 14: A reference to other organisations is mentioned and it would be useful to mention some name(s).
- Page 7/23, line 16: A short explanation on the definition of the term “EcoQOs” should be inserted.
- Page 8/23, line 5: 11. The phase-out of a third of the 26 priority (groups of) chemicals which pose a risk to the marine environment is well underway in the OSPAR area. As a result, it is likely that an end to discharges, emissions and losses of these substances by 2020 will be achieved if current efforts continue. Comment: This statement is too strong and should be modified since a decrease but not an elimination of inputs of the mentioned substances most probably will take place.
- Page 8/23, line 17-19: (This includes the need for improved tracing of releases and the environmental fate of pharmaceuticals, such as clotrimazole, given that evidence is increasing that trace concentrations in the sea can give rise to concern for risks of disruption of ecological processes.) Comment: Delete entire sentence.
- Page 8/23, line 22-26: 13. The phase-out of old technologies and stringent pollution control measures have resulted in substantial reductions in the release of heavy metals from industrial combustion processes, metal production, transport and waste streams. Much of the reduction occurred in the 1990s as a result of technological and regulatory advances. Comment: Implementation of BAT for different industries and countries on metal emissions has been very variable and it is suggested this should be mentioned in text.
- Page 9/23, line 28: Insert the word “systematically”: i.e. collected systematically over relatively long periods.
- Page 9/23, line 31-33: 17. Concentrations of cadmium, mercury and lead exceed EC food standards in fish and shellfish at various sites, especially in Regions II and III: on the Danish coast and in some of the heavily populated and industrialised estuaries on the UK and Norwegian coasts. Comment: This is an example of too high aggregation of information resulting in a partly misleading message. Different metals, fish and shell-

fish and broad areas with different inputs are mentioned in one sentence. As an example for Norway there are generally no problems with EC food standards for metals for fish, but some problems with shellfish (partly from natural sources). A few localised areas in some fjords close to known point sources have elevated levels and particular problems like the Hardangerfjord and Oslofjord. Along most of the coast the levels of metals are at natural background concentrations for both fish and shellfish.

Page 10/23, line 4: Delete last part of sentence: natural factors (i.e. volcanicity) but the exact source still needs to be confirmed.

Page 12/23, line 8: Delete global: OSPAR area and of regional and global concern.

Page 12/23, line 12: 20. Trends in PAH concentrations in fish and shellfish are predominantly downward. Comment: PAH in fish are generally very low and a much lower than in shellfish due to the high metabolic capacity for fish to excrete PAH. This should be mentioned in the text.

Page 12/23, line 15: 21. Progress toward ending reducing the release of PAHs by 2020 will require more. Comment: Release of PAH will not end.

Page 12/23, line 33-35: At many locations in Regions II, III and IV concentrations of at least one PCB congener in fish and shellfish pose a risk of causing pollution effects. Studies show that PCBs may still be causing adverse biological effects over large parts of the OSPAR area (see Box 5.4). Comment: This is unclear and should be better explained.

Page 14/23, line 8-10: A small yacht painted with a TBT-based antifoulant could release enough TBT in the course of a season to give theoretically ten million cubic metres of water a TBT concentration sufficient to affect sensitive gastropod species. A similar amount could be leached from the paintwork of a large tanker in an hour. Comment: Insert theoretically (or delete the whole sentence) since this text do not take into consideration the important role of physical factors like movement of vessels and dilution.

Page 14/23, line 14-15: "It should also help promote good practice in dealing with historical contamination of sediments, particularly from harbours, which continues to present a problem." Comment: This sentence is not very clear and could be deleted

Page 15/23, line 15-17: There continues to be a clear decreasing gradient in lindane deposition with increasing distance from mainland Europe. By 2007, deposition in the southern North Sea, for example, was up to 50 times lower but levels were still well above background. Comment: Lower than what?

Page 15/, line 22: However, concentrations in some other local areas are still at levels with a risk of pollution effects. Comment: Insert two words since high lindane levels not is a pollution problem over wider areas (also stated in next sentence).

Page 17/23, line 1-20: Comment: Box 5.7 shows results from one (or more) study that are not cited in the reference list.

Page 18/23, line 2: 32. Long-range transport through air, water and biological pathways carries POPs, including like perfluorooctane sulphonates (PFOS), SCCPs, and brominated flame retardants,

Page 18/23, line 20: The presence of hazardous substances leads to a range of responses within marine organisms, including for example production of specific enzymes, changes in tissue pathology and (death). Comment: Suggest to delete the word "death"

Page 18/23, line 22: means of linking the presence of contaminants and ecological biological responses. Comment: Very few examples on ecological responses has been documented

Page 19/23, line 16-19: 38. OSPAR has developed guidelines for monitoring endocrine-disrupting effects in fish. These are not a formal part of the OSPAR monitoring programme, but allow ad hoc surveys of, for example, vitellogenesis (the process of yolk formation in the female germ cell) and intersex in male fish (feminised male fish). Comment: Suggest to delete this "arbitrary" sentence of information on development of methods.

Page 20/23, line 19: hazardous substances that can reach the sea as the product is used (e.g. washing of clothes impregnated with hazardous substances) and following its disposal. Comment: This example is not a particularly good one and could be deleted

Page 20/23, line 35: Concentrations of heavy metals, PCBs and PAHs in sediment, fish and shellfish have decreased since 1998 but at a slower rate than in the previous decade. Comment: PAH in fish is generally not detected due to a rapid metabolism and excretion. To monitor PAHs exposure it can be more appropriate to measure PAH metabolites.

Annex 9. Chapter 9 - Additional Suggestions for Improvement

It is recommended that OSPAR considers revising this chapter to provide more balance in the presentation of activities and impacts of concern.

It is noted that the chapter is a bit confusing and very long, since it deals with a combination of activities (such as transport, shipping, tourism and recreational activities, offshore wind farms, cables, land reclamation) as well as impacts (such as marine litter and microbiological contamination), because the chapter is intended to address a diverse suite of anthropogenic activities and impacts on the marine environment. That is a big challenge. The reviewers recommend that OSPAR considers treating activities and impacts in separate chapters. In fact the entire report could be arranged such that there is a clear section on activities separate from impacts.

It is recommended that the authors provide one or more examples of types of data collection and analysis which are proving to be useful from e.g. national initiatives focusing on cumulative effects / integrated ecosystem assessments. Further, it would be useful to highlight for each activity/impact a specific example where it is an important issue for one of the ecosystem components in one of the Regions. Otherwise the threats are once again too generic for the reader to determine where the issues are.

Annex 10. Chapter 10 - Additional Suggestions for Improvement

It is noted that this chapter is quite long. Many examples and messages are given, which may confuse the reader. OSPAR should consider condensing the text and presenting a smaller number of the most useful cases from the field.

The chapter requires an overall rewrite to ensure that the main points are properly articulated. See appendix 10.

p.1, box main message: When MPA is used first it should be completely written with abbreviation in brackets.

p. 13, line 31: IUCN should be written in full and inserted into table 10.1 as well.

p. 15, line 13: replace Box 9.3 by Box 10.3

Why is there no reference to Ardron, J. A. 2008. Three initial OSPAR tests of **ecological coherence**: heuristics in a data-limited situation. – ICES Journal of Marine Science, 65: 1527–1533?

Annex 12. Chapter 12 - Additional Suggestions for Improvement

Several sentences are a bit awkward. Overall, the chapter should be reviewed and the language improved.

p. 1, line 38: replace “acidity” with “acidification;” acidity implies that the system is already acidic which is not the case. Acidification describes the process.

In the Table on the first page for each regional summary “Fish” is always in brackets. If there is no relevant information available one should delete this.

p.4, line 22: In the summary for Region I northern fulmar and common guillemot are mentioned as populations that are experiencing a strong decline. Both species are not discussed in Chapter 10. There should be a

focus on selected species and habitats demonstrating main threats and the text should be consistent with different chapters.

A more appropriate heading for the chapter would be "Regional Summaries."

Page 1, line 3 states that fisheries is the most widespread impact; this is confusing and perhaps contradictory with the text that follows.

Page 1 The overviews need to be better balanced; for example the overview for "oil and gas" is overly positive while the overview for "fishing" is overly pessimistic.

Annex A: Terms of Reference for Peer Review of the QSR 2010

Background

1. The OSPAR quality status report (QSR) 2010 is a major assessment report prepared jointly by the Contracting Parties to the OSPAR Convention, which will seek to evaluate the quality status of the marine environment of the North-East Atlantic and its development and provide an evaluation of the measures taken and planned for the protection of the marine environment and the identification of priorities for action. The QSR 2010 will be published on the occasion of the 2010 Ministerial Meeting of the OSPAR Commission in Bergen, Norway.
2. The QSR 2010 represents the culmination of the work under OSPAR's Joint Assessment and Monitoring Programme (JAMP) since 2000, when the last QSR was published. The JAMP defines a general assessment of the quality of the OSPAR maritime area or its sub regions as:

“A statement of the whole or part of the current knowledge of the health of the environment of a defined coastal area and its coastal margin. A complete statement includes an analysis of the region's hydrodynamics, chemistry, habitats and biota with an evaluation of the impact of humans over space and time against this background of natural variability. All aspects of human influence on the maritime area concerned should be examined. This should include discharges, emissions and losses of contaminants, nutrient and radioactive substances occurring in that maritime area, or reaching it from the catchments draining into it or by airborne transport. It should also include inputs, concentrations and environmental effects of contaminants, nutrients and radioactive substances, dumping, transport, and the exploitation of biological and non-biological resources. The evaluation of the effectiveness of measures taken and planned for the protection of the marine environment and the identification of priorities for action should also form part of it”.
3. The main objectives that the OSPAR Commission has agreed for the QSR 2010 are:
 - a. to assess the quality status of the marine environment of the OSPAR maritime area;
 - b. to evaluate progress in applying the ecosystem approach to the management of human activities which may affect the marine environment, and (as part of this) in implementing the OSPAR Strategies;
 - c. to highlight any new, changed or emerging threats to the marine environment;
 - d. to identify priorities for regulatory action;
 - e. to identify significant gaps in knowledge in order to define priorities for further scientific, economic and/or social investigations, particularly including those needed to support further application of an ecosystem approach to the management of human activities;
 - f. to cover, as far as possible, the assessment requirements of the EC Marine Strategy Framework Directive.
4. The QSR 2010 report itself will seek to provide a 120 page synthesis of a series of Thematic Assessments prepared by OSPAR under the JAMP since 2000. These reports will be published together with the report and in the electronic presentation of the report, will be linked to the main text through hyperlinks. The preparation of the QSR 2010 is coordinated by OSPAR's Environmental Assessment and Monitoring Committee (ASMO) through a specially convened management group (MAQ).

Objective of peer review

5. The objective of this peer review is to assure the OSPAR Commission that the contents of the main QSR 2010 report:
 - a. are generally robust and objective,

- b. reflect, and draw conclusions from, the evidence provided by the JAMP Thematic Assessments,
- c. takes other relevant evidence into account in drawing any conclusions.

Issues to be addressed by the peer review

6. Each review should seek as a minimum to address the following questions:
 - a. Reporting and methods
 - i does the section reviewed address the objectives set out for QSR 2010?
 - ii does the section reviewed present a sound and robust synthesis of the underlying JAMP thematic assessments(s)?
 - iii has other relevant information been taken sufficiently into account?
 - iv are there any flaws in the argumentation?
 - v are the assumptions made sound and clearly identifiable?
 - b. Data and analysis
 - i are gaps in data and information clearly indicated?
 - ii are the figures and tables adequate, not actually or potentially misleading, and support the conclusions drawn from them?
 - c. Concluding
 - i are the conclusions supported by the evidence presented?
 - ii how well have alternative explanations for the conclusions been evaluated in the QSR?
 - iii are conclusions based on expert judgement rather than evidence clearly recognisable?
 - d. specific issues in the section to be reviewed that OSPAR Strategy Committees have identified as requiring particular attention in the peer review.
7. The attached appraisal form should be used for addressing these questions.

Process of review

8. The peer review should be organised by ICES as coordinating body to take place during November and December 2009 so that the results are delivered in the first week of January 2010. The coordinating body will be responsible for:
 - a. identifying and engaging appropriately qualified experts in the field of marine science and its interface with marine policy to review each of the chapters of the main QSR 2010 report, as follows:
 - (i) each of the thematic chapters of the QSR 2010 (chapters 3 to 9) should be reviewed by at least [two] peer reviewers, who will need to familiarise themselves with the underlying JAMP thematic assessments;
 - (ii) Chapter 10 and 11 of the report (Ecosystem approach assessment) should be reviewed by two experts who will need to develop conclusions on whether the chapter draws objective conclusions on a regional basis from the material presented in the proceeding thematic chapters. They will therefore need to have developed an overview review of the report in its entirety;
 - b. coordinating the work of the peer reviewers: The OSPAR Secretariat will supply the coordinating body with the final consolidated version of the report on [1 November 2009] for onward distribution to the peer reviewers. OSPAR will also make the underlying JAMP thematic assessments available for information purposes, to enable peer reviewers to assess whether the

main QSR 2010 report is an accurate reflection of these assessments. These reports will be made available at the earliest opportunity in 2009. All parties should be aware that target of the peer review is the main QSR 2010, a review of the JAMP thematic assessments is not required;

- c. any communication between OSPAR and the reviewers;
- d. resolving any differences of opinion between reviewers where these are critical for the process of finalising the report;
- e. preparing the final report from the peer review for submission to OSPAR by 8 January 2010 at the latest, comprising
 - i) a summary document of the reviews each chapter, and;
 - ii) an overview report on the outcome of the peer review. The final report should be presented in a form that is suitable for publication as a companion document to the QSR 2010.

Use of the review

9. The report on the peer review will be circulated to MAQ and ASMO in early January 2010 prior to a meeting of ASMO to be held at the end of January 2010. In preparation for this meeting the Chairman of ASMO, the Convenor of MAQ and the Secretariat may take action or initiate action by task managers to develop materials to address any significant comments. The meeting of ASMO will consider the comments made in peer review, take action to adjust the text of the final consolidated draft of the QSR 2010 with a view to arriving at the final text of the QSR.

10. OSPAR intends to publish a report on the peer review as a companion document to the QSR which will include information on how OSPAR through ASMO has responded to the comments made. In the interests of transparency and openness members of the peer review panel should be content to be identified.

Annex 1**Review Form**

1. This appraisal form might be useful as guidance for the peer review of the consolidated draft Quality Status Report (QSR) 2010. Please use one appraisal form for each chapter reviewed.
2. The appraisal form should be used to provide written comments in response to each of the questions that have been set out. The text fields should be expanded as necessary. Feel free to use separate comments (even in a separate file). When using this option, please number and mark these clearly with your name, the chapter involved and the question number.
3. OSPAR is interested to hear other views beyond the questions posed and you should use section D to express further opinions or provide further information.

Review Form¹ for QSR 2010 Chapter:

A REPORTING AND METHODS

1. Does the section reviewed address the objectives set out for QSR 2010?

Please comment:

2. Does the section reviewed present a sound and robust synthesis of the underlying JAMP thematic assessments(s)

Please comment:

3. Has other relevant information been taken sufficiently into account?

Please comment:

4. Are there any flaws in the argumentation?

Please comment:

5. Are the assumptions made sound and clearly identifiable?

Please comment:

B. DATA AND ANALYSIS

1. Are gaps in data and information clearly indicated?

Please comment:

2. Are the figures and tables adequate, not actually or potentially misleading, and support the conclusions drawn from them?

Please comment:

C. CONCLUDING

1. Are the conclusions supported by the evidence presented?

Please comment:

2. How well have alternative explanations for the conclusions been evaluated in the QSR?

¹ This is a revised form as agreed by OSPAR and ICES.

Please comment:

3. Are conclusions based on expert judgement rather than evidence clearly recognisable?

Please comment:

D. ADDITIONAL SUGGESTIONS FOR IMPROVEMENT

Comment on specific issues for the section concerned which the relevant OSPAR Strategy Committee has highlighted as requiring specific attention in the QSR (if applicable)

Please provide any suggestion for improvement of the QSR 2010. Where necessary refer to the paragraph, figure or table.

Comment:

Date:

Your name:

Signature:

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