OSPAR COMMISSION

Report of the Utrecht Workshop - Regional assessment

Biodiversity Series

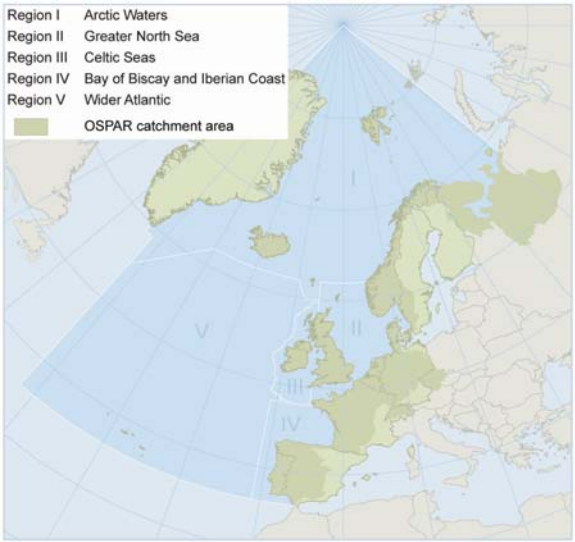
2009

OSPAR Convention

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

Convention OSPAR

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



1. The OSPAR maritime area and its five Regions.

Acknowledgement

This report has been prepared by Mr David Connor (UK) and Dr Lisette Enserink (the Netherlands) as convenors of the workshop, with support from Leonie Robinson, Chris Karman, Pepijn Nicolas, Mr Morten Pedersen and Ton Kuik.

Contents

Executive Summary

The ecosystem approach requires the comprehensive integrated management of human activities based on the best available scientific knowledge about ecosystems and their dynamics, in order to identify and take action on influences which are critical to the health of marine ecosystems. This presents a challenge to existing methods for the assessment of the marine environment by requiring consideration of the wider implications of human activities on the quality, structure and functioning of marine ecosystems.

OSPAR has made important steps towards tools to support the ecosystem approach through the concept of Ecological Quality Objectives (EcoQOs) which provide a link between human activities and impacts on biodiversity and collectively provide a means of expressing a clean, healthy and biologically diverse sea. Selected EcoQOs have so far been agreed and applied for for the North Sea (see Evaluation of the OSPAR system of Ecological Quality Objectives for the North Sea (OSPAR 2009)), but there are limitations to their use in an OSPAR-wise assessment.

Piloting an approach to regional ecosystem assessment

In preparing the QSR 2010, OSPAR has piloted one approach that aims to determine at regional scale the status of ecosystems building on the identification and quantification of the main pressures and their cumulative impacts on species groups and habitat types. The Utrecht workshop described in this report involved 70 experts in marine science from all OSPAR Regions in a trial assessment. The workshop followed a systematic analytical methodology which focused on assessing, at the scale of OSPAR Regions, the impact of pressures from human activities, listed in the EU Marine Strategy Framework Directive (2008/56/EC), (MSFD) and those driven by climate change, on a selection of four species groups (fish, cetaceans, seals, seabirds) and four habitat types (rock and biogenic reef habitats, shallow sediment habitats, shelf sediment habitats, deep-sea habitats).

The assessment drew upon data and information on the distribution of the range of human activities presented in the QSR 2010 and its supporting thematic assessments. In some cases, information on impacts from these activities and the status of species and habitats for all OSPAR Regions is very limited. These gaps were filled by collective expert knowledge which was also limited for some Regions and pressures. The level of confidence was determined for each assessment of impact. Lack of consensus among experts was addressed, but could not always be resolved.

Pilot provides valuable experience but results needed to be treated with caution

The Utrecht workshop provided good experience in linking human activities and their associated pressures to the assessment of the selected ecosystem components and trialled a generic, large-scale approach to ecosystem assessment. The results which are summarised in the tables below illustrate a possible outcome of impact assessments against pressures to support an overall assessment of quality status per region.

Table I shows how for each species group or habitat type an assessment was made of the degree of impact by each pressure, leading to a total impact assessment from the sum of the individual impacts given in section A. An overall status assessment for the component is given in section B, based on the criteria used by the workshop and taking into account the assessment against pressures (A) with the confidence level indicated. In many cases the results concur with the findings of the thematic assessments undertaken through regular OSPAR work, but there are also many gaps and short-comings, as would be expected when applying a new method to such a complex assessment for the first time. Limitations in the method used mean the results should be treated with caution. Status assessments with low confidence are omitted from this summary, but the full results are given at Annex 5.

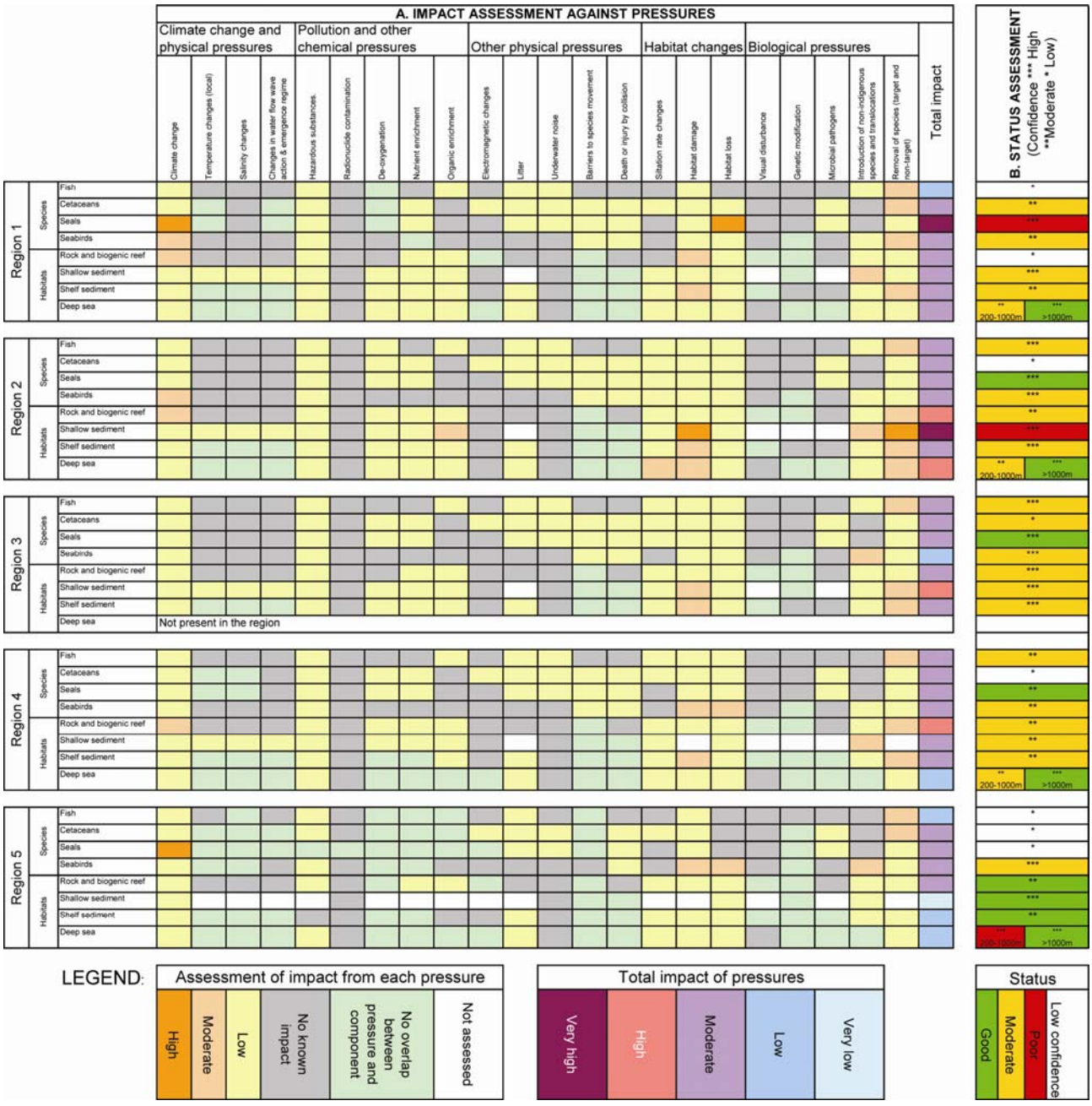


Table II gives examples (with high confidence rating) where the species group or habitat type in parts of a Region were in poorer condition than over the Region as a whole or where specific species and habitats within components were at a poorer status than the component as a whole

Fish

- Populations of around 40 fish species have declined in Region II as a result of commercial fishing;
- The status of the stocks of cod, haddock and whiting in waters to the west of Scotland (Region III) and stocks of cod and whiting in the Irish Sea (Region III) are of concern;
- Anchovy populations collapsed in Region IV;
- Bycatch and removal of non-target species is at unacceptable levels in many areas in Region III.

Seals

- Habitat loss of ice-dependent seal species in Region I;
- PCB contamination of seals in Region II;
- Seal displaced as result of causeway construction in the Outer Hebrides (UK) (Region III).

Seabirds

- Breeding failure and decline of some seabird populations in the northern North Sea (Region II);
- Decline of some seabird species, including the black legged kittiwake and the roseate tern, in Region III;
- Iberian population of the guillemot impacted by the *Prestige* oil spill and close to extirpation in Region IV;
- Significant loss of seabird breeding grounds around the Azores (Region V).

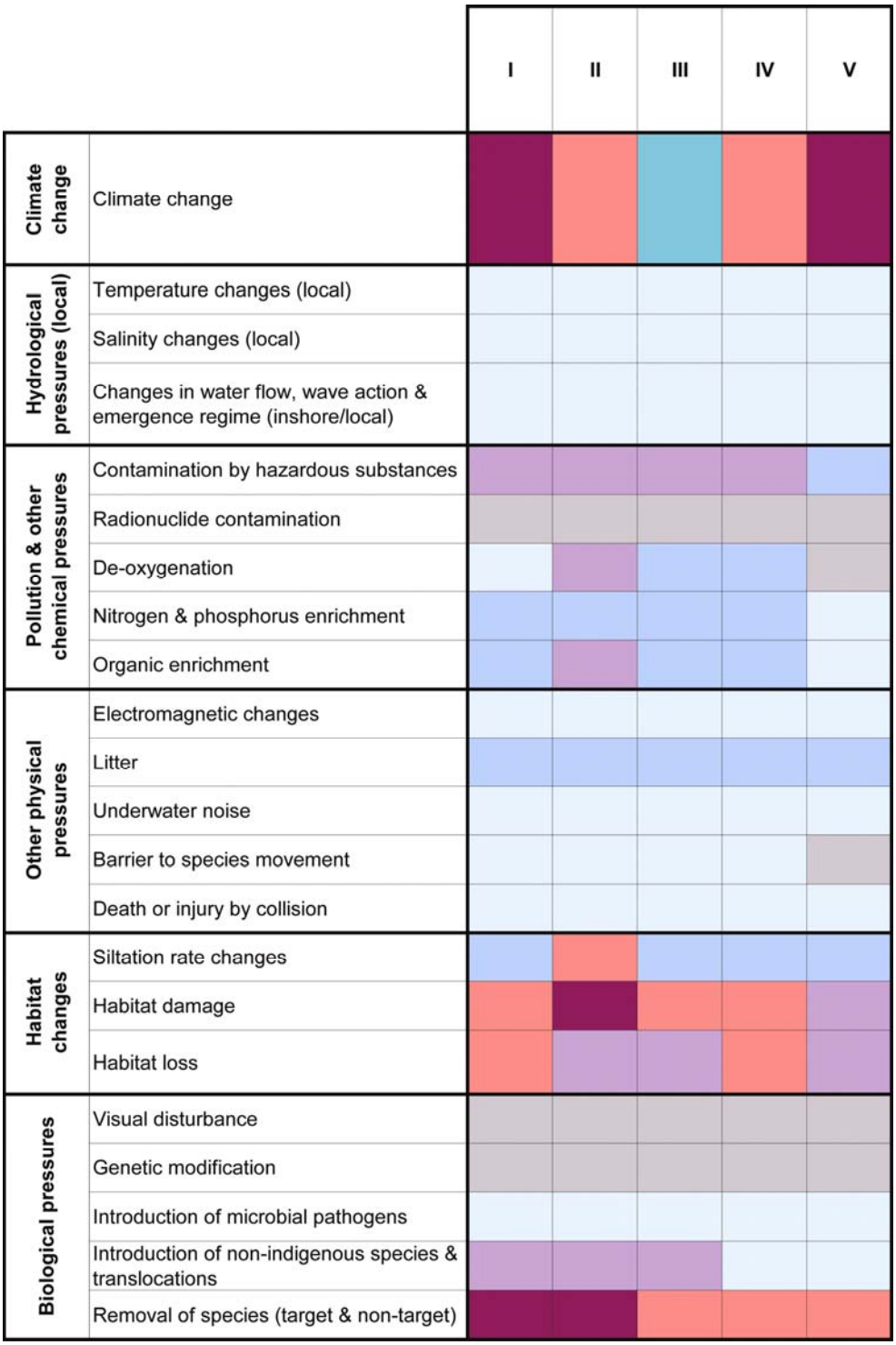
Rock and biogenic reef and sediment habitats

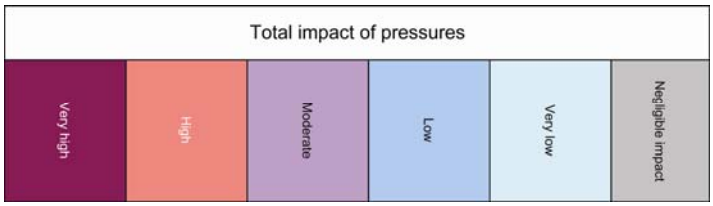
- Damage to shallow sediment habitats and rock and biogenic reefs, including deeper water habitats such as coral reefs through bottom trawling in Regions II and III.

Deep sea habitats

- Vulnerable deep sea habitats, including cold-water coral reefs and coral gardens damaged by past fishing activities in Region V, especially on the upper continental slope (200–1000 m) (*for example* Rockall and Hatton Bank);
- Local damage to mud volcanoes in the Gulf of Cadiz (Region IV) by fisheries.

Table III provides an example of the Utrecht conclusions on the relative contribution in each OSPAR Region of pressures to the impact on species groups and habitat types, this is based on impact scores from Table I summed across the eight ecosystem components.





The results of the Utrecht workshop have provoked considerable discussion between the Contracting Parties and OSPAR's Environmental Assessment and Monitoring Committee concluded that further effort needs to be put into both the development of methods for ecosystem assessment and their application reach a position where the results could be endorsed by consensus.

Pilot provides important lessons for future regional-ecosystem assessment

The pilot provided important insight into the complexity of assessing ecosystems, and the lessons learnt are an essential contribution to the further development of assessment methodologies. These lessons learnt include:

- Mapping of human activities and ecosystem components is promising for the assessment of separate and cumulative impacts on habitats and related sessile species (which are bound to a particular area). It seems less applicable to mobile species;
- Assessments at the scale of OSPAR Regions are too coarse to identify properly the often area-specific impacts of human activities. Many habitats also occur at a smaller geographical scale. It is therefore important that assessments of human impacts are undertaken at the appropriate scale, which may vary on a case by case basis;
- Generic assessment criteria and thresholds do not take into account the variation in life history characteristics for some species groups. The assessment criteria should be refined to allow for more differentiation in species and habitats groups;
- The pilot assessment yields a first indication of cumulative effects. Further development of the method is needed to improve the assessment of cumulative effects;
- Judgement by a designated group of experts following well-defined procedures can complement limited datasets. The credibility of the outcome is enhanced by recording the confidence level and by describing how gaps in data were treated and how issues were addressed for which there was insufficient consensus;
- The further development of ecosystem- assessment methodologies needs to be supported by aggregation and integration techniques that take into account the interactions of the components as part of ecosystem functioning.

Récapitulatif

L'approche écosytémique nécessite une gestion globale intégrée des activités humaines basées sur la meilleure connaissance scientifique disponible sur les écosystèmes et leurs dynamiques, dans le but d'identifier et d'agir sur les influences qui sont cruciales pour la santé des écosystèmes marins. Ceci représente un défi pour les méthodes existantes pour l'évaluation de l'environnement marin nécessitant la considération des vastes implications des activités humaines sur la qualité, la structure et le fonctionnement des écosystèmes marins.

OSPAR a franchi de nombreuses étapes vers les outils pour appuyer l'approche écosystémique à travers le concept des objectifs de qualité écologique (EcoQOs) qui fournissent un lien entre les activités humaines et les impacts sur la biodiversité et collectivement fournissent une signification de l'expression d'une mer propre, saine et biologiquement diverse. Les EcoQOs sélectionnés ont pour le moment été acceptés et appliqués pour la mer du Nord (voir l'évaluation du système OSPAR d'objectifs de qualité écologique pour la Mer du Nord (OSPAR 2009)), mais il existe des limitations pour leur utilisation dans une évaluation de type OSPAR.

Piloter une approche pour une évaluation écosystémique régionale

En préparant le QSR 2010, OSPAR a piloté une approche qui vise à déterminer à l'échelle régionale l'état des écosystèmes, construite sur l'identification et la quantification des principales pressions et leurs impacts cumulatifs sur les groupes d'espèces et les types d'habitats. L'atelier d'Utrecht décrit dans ce rapport a impliqué 70 experts en science marine provenant de toutes les régions d'OSPAR dans une évaluation test. L'atelier a suivi une méthode analytique systématique qui s'est concentrée sur l'évaluation, a l'échelle des régions OSPAR, de l'impact des pressions des activités humaines, listées dans la Directive – Cadre « Stratégie pour le milieu marin » de l'Union européenne, et ceux induit par le changement climatique, sur une sélection de 4 groupes d'espèces (les poissons, les cétacés, les phoques, les oiseaux de mers) et 4 types d'habitats (les habitats des récifs rocheux et biogénique, les habitats de sédiment peu profond, les habitats des sédiment du plateau continental, les habitats des mers profondes).

L'évaluation a été faite sur des données et informations sur la distribution d'une gamme d'activités humaines présente dans le QSR 2010 et ses évaluations thématiques. Dans certains cas, l'information sur les impacts de ces activités et l'état des espèces et habitats pour toutes les régions d'OSPAR est très limitée. Ces écarts ont été comblés par la connaissance collective des experts qui était aussi limitée pour certaines régions et pressions. Le niveau de confiance a été déterminé pour chaque évaluation d'impact. Le manque de consensus parmi les experts a été considéré mais ne pouvait toujours par être résolu.

Le pilote fournit une expérience de valeur mais les résultats doivent être traités avec prudence

L'atelier d'Utrecht a fournit une bonne expérience en matière de lien entre les activités humaines et leurs pressions associées pour l'évaluation des composants de l'écosystème sélectionné et ont testé une approche générique et étendue pour l'évaluation écosystémique. Les résultats qui sont résumés dans les tableaux ci-dessous illustrent un résultat possible d'évaluations d'impacts liés aux pressions pour étayer une évaluation globale des états de santé par régions.

Le **tableau I** (voir précédemment) montre comment pour chaque groupe d'espèces ou types d'habitat une évaluation a été faite sur le degré d'impact de chaque pression, menant à une évaluation totale d'impact issue de la somme des impacts individuels donné dans la section A. Une évaluation globale des états pour les composants est donné dans la section B, basée sur les critères utilisés par l'atelier et prenant en compte l'évaluation en fonction des pressions (A) avec le niveau de confiance indiqué. Dans de nombreux cas, les résultats sont concordants avec les conclusions des évaluations thématiques entreprises dans le cadre du travail régulier d'OSPAR, mais il existe aussi plusieurs écarts et points faibles, comme attendu lorsque qu'une nouvelle méthode pour une évaluation si complexe est mise en œuvre pour la première fois. Les limitations dans la méthode utilisée signifient que les résultats devront être traités avec prudence. Les évaluations des états avec un faible niveau de confiance sont omises de ce sommaire, mais tous les résultats sont donnés dans l'annexe 5.

Le **tableau II** donne des exemples (avec un haut niveau de confiance) où les groupes d'espèces ou les types d'habitat dans certaine parties d'une région sont dans une situation plus pauvre que dans l'ensemble de la région ou les espèces et habitats spécifiques dans la composante sont dans un état plus pauvre que la composante dans son ensemble.

Poisson

- Populations d'environ 40 espèces de poissons sont en déclin dans la Région II, conséquence de la pêche commerciale ;
- L'état des stocks de cabillaud, aiglefin et merlan dans les eaux de l'ouest de l'Ecosse (Région III) et les stocks de cabillauds et merlan dans la mer d'Irlande (Région III) est inquiétant ;
- La population d'anchois a chuté dans la Région I ;
- Les captures accidentelles et l'enlèvement d'espèces non-commerciales est à un niveau inadmissible dans plusieurs zones de la région III.

Phoques

- Perte d'habitat pour les espèces de phoques dépendant de la banquise en Région I
- Contamination des phoques au PCB en Région II ;
- Déplacement de phoques en raison de construction de chaussée dans les Hébrides (RU) (Région II).

Oiseaux de mer

- Echec d'élevage et déclin de certaines populations d'oiseux de mer dans le nord de la mer du Nord (Région II) ;
- Déclin de certaines espèces d'oiseaux de mer, y compris mouette tridactyle et sterne de Dougall, dans la Région III ;
- Population ibérique de guillemot de Troïl nordique impactée par la marée noire du Prestige et proche d'extinction locale dans la Régions IV ;
- Perte significative de zone d'élevage pour oiseau de mer autour des Açores (Région V).

Habitats des récifs rocheux et biogénique et habitats de sédiment peu profond

- Dommage sur les habitats de sédiment peu profond et habitats des récifs rocheux et biogénique, y compris les habitats d'eaux plus profondes tels que les récifs de coraux par dragage de fond en région II et III.

Habitats des mers profondes

- Habitats vulnérables des mers profondes, y compris récifs de coraux d'eaux froides et jardins de coraux endommagés par les activités de pêche en Région V, en particulier sur le haut de la pente continentale (200 – 1000m) (par exemple Rockall et le banc Hatton) ;
- Dommages localisés sur les volcans de boue dans le golfe de Cadix (région IV) par la pêche.

Le **tableau III** (voir précédemment) donne un exemple des conclusions d'Utrecht sur les contributions relatives dans chaque Région OSPAR des pressions sur l'impact sur les groupes d'espèces et types d'habitat, ceci étant basé sur les valeurs d'impact données en tableau I et additionné pour les 8 composantes de l'écosystème.

Les résultats de l'atelier d'Utrecht ont provoqué des discussions considérables entre les Parties Contractantes ; le Comité OSPAR évaluation et surveillance de l'environnement a conclu que plus d'efforts sont requis dans le développement des méthodes pour l'évaluation de l'écosystème et leurs applications pour atteindre une position où le résultat pourra être accepté par consensus.

Le projet-pilote délivre d'importantes leçons pour l'évaluation régionale de l'écosystème future

Le projet pilote donne une vue importante de la complexité pour évaluer les écosystèmes, et les leçons tirées constituent une contribution essentielle pour les futurs développements des méthodologies d'évaluation. Ces leçons comprennent :

- La cartographie des activités humaines et des composantes d'écosystème est prometteuse pour l'évaluation des impacts individuels et cumulatifs sur les habitats et les espèces sessiles connexes (qui sont liés à une zone particulière). Elle semble moins applicable aux espèces mobiles.
- Les évaluations à l'échelle des régions d'OSPAR sont trop rudimentaires pour identifier correctement les impacts souvent sectoriels des activités humaines. Beaucoup d'habitats sont présents également à une plus petite échelle géographique. Il est donc important que des évaluations des impacts humains soient entreprises à l'échelle appropriée, qui peut varier au cas par cas.
- Les critères et les seuils d'évaluation génériques ne prennent pas en considération la variation des caractéristiques au cours de la vie pour certains groupes d'espèces. Les critères d'évaluation devraient être raffinés pour pouvoir mieux différencier les espèces et les groupes d'habitats.
- L'évaluation pilote apporte une première indication des effets cumulatifs. L'élaboration ultérieure de la méthode est nécessaire pour améliorer l'évaluation des effets cumulatifs.
- Le jugement par un groupe désigné d'experts peut compléter les ensembles de données limités après des procédures bien définies. La crédibilité des résultats est améliorée en notant le niveau de confiance et en décrivant comment les lacunes dans les données ont été traitées et comment les enjeux pour lesquels il y avait consensus insuffisant ont été abordés.
- L'élaboration ultérieure des méthodologies d'évaluation d'écosystème doit être soutenue par des techniques d'agrégation et d'intégration qui prennent en considération les interactions des composants en tant qu'élément du fonctionnement d'écosystème.

Background

The Quality Status Report 2010 (QSR 2010) has the task of reporting on the environmental quality of the five Regions in the OSPAR maritime area. Within the work of preparing the QSR 2010, approaches were explored for developing an overall assessment of the OSPAR Regions expressing the status of a suite of components of the marine environment, in each Region, and the pressures from human activities which act upon them. The aspiration was to find a way to summarise the overall status in a way that would be of interest to the general public, the media and politicians.

In 2008, OSPAR's Management Group for the QSR (MAQ) agreed terms of reference for a workshop to develop a contribution to the overall assessment of the status of the OSPAR Regions. The workshop intended to draw upon the thematic assessments being prepared for the QSR and being reported in Chapters 1 – 9, and in particular on the assessments of human activities, eutrophication, hazardous substances and radioactivity. At the outset it was recognised that an assessment of the state of the wider marine environment in each OSPAR Region, including its biodiversity and ecosystem functioning, represented a new and challenging component of the QSR. As this type of broader ecosystem assessment could make a useful contribution to an Initial Assessment for the Marine Strategy Framework Directive (2008/56/EC) (MSFD) in 2012, it was considered important for OSPAR to develop an approach that could contribute to the Directive's requirements, whilst acknowledging that further work would be required to develop the specific needs of the MSFD Initial Assessment.

Approach and organisation of the workshop

The workshop was hosted by the Netherlands at the LEF Future Centre of Rijkswaterstaat (Ministry of Transport, Public Works and Water Management) in Utrecht from 9 – 13 February 2009. The workshop was run by Mr Pepijn Nicolas and Mr Morten Pedersen (process facilitators associated with the LEF Future Centre) and Dr Leonie Robinson (University of Liverpool) and Dr Chris Karman (IMARES), experts in the methods to be used during the workshop. Mr Ton Kuik (KuBiQ management b.v.) facilitated voting sessions, using personal key pads and real time calculation of scores, to measure consensus and opinions of workshop participants. The workshop was convened and organised by Dr Lisette Enserink (The Netherlands) and Mr David Connor (United Kingdom). The following background documentation was made available on the OSPAR website:

a. Overview of the workshop process (CH11 09/00/03);

b. A regional assessment process for assessing the state of the marine environment (Connor, 2009) (CH11 09/00/04);

c. Methodology for assessing the status of species and habitats at the OSPAR Region scale for the OSPAR Quality Status Report 2010 (Robinson *et al.*, 2009) (CH11 09/00/05);

d. List of assessments supporting the QSR 2010;

e. Disturbance – effect relationships applied to an integral Ecological Risk Analysis for the human use of the North Sea (Karman *et al*. 2009) (CH11 09/00/06).

The workshop aimed to:

a. assess the quality status of the marine environment in each OSPAR Region, as represented by selected ecosystem components. The results would be presented per OSPAR Region, in 'traffic light' colours to reflect Good, Moderate and Poor quality levels;

b. assess trends since the QSR 2000 (past 10 years) was published and provide an outlook on likely future trends (next 20 years);

c. rank the pressures from human activities, based on their impact on the marine environment;

d. identify priorities for future assessment, monitoring and management measures, recognizing the need for indicator development under the MSFD for the eleven Good Environmental Status descriptors and any limitations in the data available.

The workshop set out to make assessments of the following major habitat types and species groups[1] for each of the five OSPAR Regions:

a. Fish;

b. Cetaceans;

c. Seals;

d. Seabirds;

e. Rock and biogenic reef habitats (0 – 200 m depth);

f. Shallow sediment habitats (0 – 50 m depth);

g. Shelf sediment habitats (50 – 200 m depth) ;

h. Deep-sea habitats (>200 m depth)[2].

The distribution of the broad habitat types is shown in Figure 1, whilst Table 1 provides an estimate of the proportion of each region occupied by each component.

Table 1. Estimates of the proportion of each Region occupied by each component (% by area). The figures for species components were defined by the expert subgroups during the workshop. The figures for habitats are based on GEBCO bathymetric data, with additional expert judgement to define the relative proportions of rock and sediment in the 0 – 50 m and 50 – 200 m depth zones.

Region:	**I**	**II**	**III**	**IV**	**V**
Fish	100	100	100	100	100
Cetaceans	100	100	100	100	100
Seals	100	100	100	1	20
Seabirds	95	100	100	100	100
Rock and biogenic reef	8	15	19	4	<0.1
Shallow sediment	2	31	7	4	<0.1
Shelf sediment	10	41	74	18	0.2
Deep-sea (200 – 1000 m)	30	11	0	8	4
Deep-sea (>1000 m)	50	2	0	66	96

[1] Referred to later and in the methodology paper (Annex 1) as 'ecosystem components'.
[2] Later in the workshop, this habitat was split into two (200-1000m; >1000m) for the 'overall assessment'.

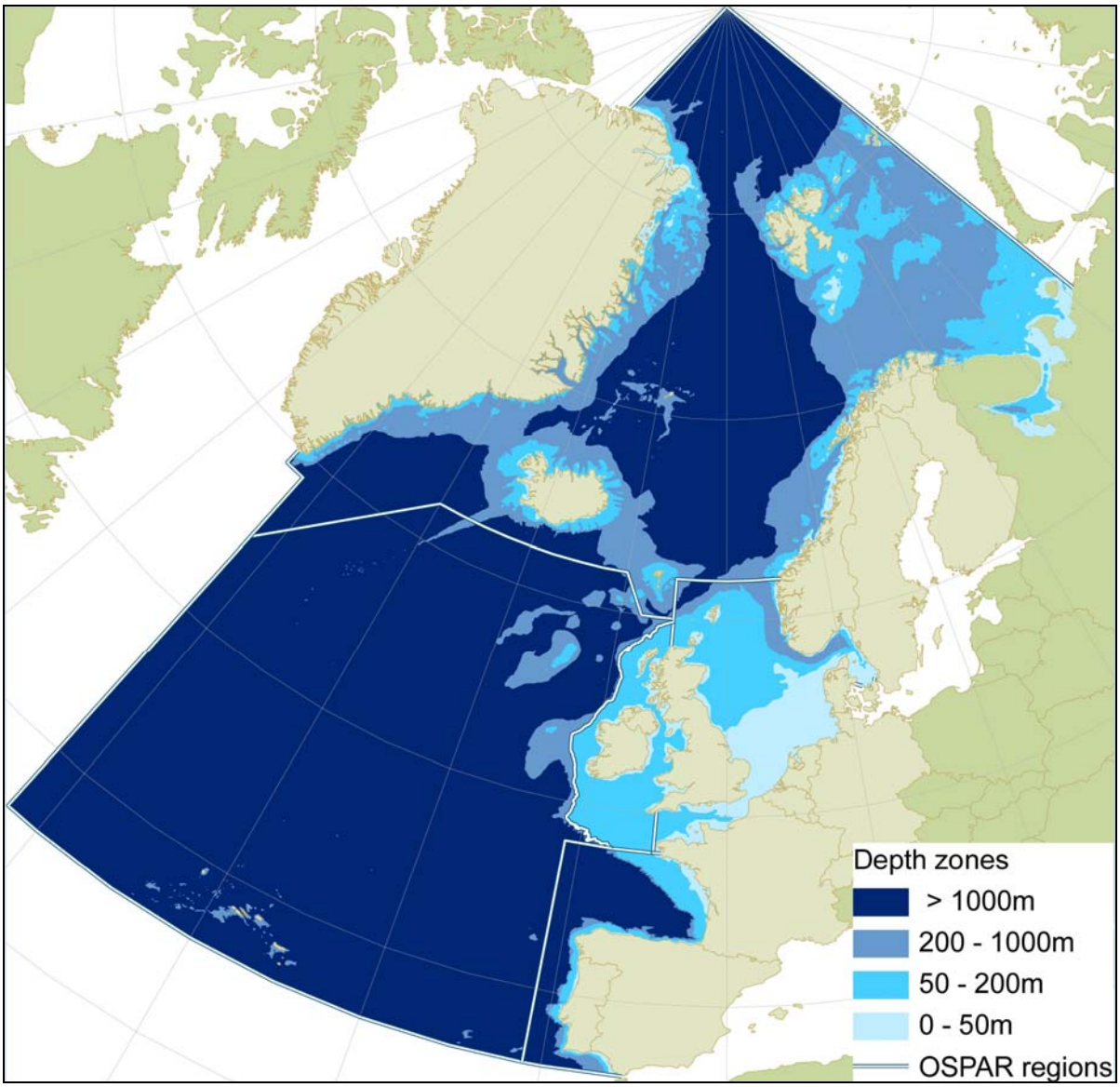


Figure 1 *Map showing distribution of the four depth zones used in the assessment. The two shallowest zones (0 – 50 m, 50 – 200 m) include both rock and sediment habitats. Rock habitats were assessed as a single unit over 0 – 200 m depth).*

The workshop did not intend to prepare assessments of water and sediment chemical quality (hazardous substances, radioactivity, and eutrophication) as these were being prepared by other OSPAR groups. However, the outcomes of these assessments were considered during the workshop in the relation to the extent that they provided conclusions on impacts on the species and habitats being assessed (for example how had the levels of hazardous substances affected the status of the species and habitats?).

The resolution of the 'ecosystem components' to be assessed was partly determined by the aim to provide for the QSR 2010 a high-level overview of the status of each OSPAR Region and related to the MSFD Annex III categories for the Initial Assessment and partly by the constraints of time and expertise to undertake the assessments. Thus, whilst from a public/policy perspective it was considered necessary to provide an overall assessment at the level of 'fish in the North Sea', from a scientific point of view, it was recognised that 'fish' represent a very broad and complex component of the ecosystem. Time and expertise constraints during the workshop would not permit assessment of a finer number of components (for example pelagic fish, demersal fish, deep-sea fish, coastal/estuarine

fish); however the methodology used was specifically designed to address some of the limitations of broad assessments by enabling 'worst-case' examples to be defined. The number of ecosystem components was also limited, as plankton communities, cephalopods and turtles were not assessed, owing to time constraints and limited availability of expertise.

In order to provide this broad-based assessment at the OSPAR Region scale, a structured expert-led and transparent assessment process was followed. This had been developed and trialled during 2008 by groups in the Netherlands and the United Kingdom, leading to the refined methodology which was used during the workshop (Annex 1 (Robinson *et al*., 2009)). This method has specified threshold values for categorising species and habitat quality, and requires an audit trail to be kept during the process to ensure the results are accountable. The criteria and threshold values are based on those given in EC guidance for assessing Favourable Conservation Status (FCS) of species and habitats under the Habitats Directive (92/43/EEC). It would draw upon the OSPAR thematic assessments which contribute the evidence to Chapters 1 – 10 of the QSR, as well as additional evidence and expert judgement available at the workshop, particularly on biodiversity issues.

To successfully undertake the assessments it was essential to have both a good geographical spread of expertise to cover the entire OSPAR area, and a spread of specialist knowledge at the workshop. The geographical spread of the workshop included participants from France, Germany, Ireland, the Netherlands, Norway, Portugal (Azores), Spain, Sweden, and the United Kingdom, thus covering each of the five OSPAR Regions. The specialist knowledge fell into three types:

a. Activity/pressures experts. The task managers or other contributors to the QSR thematic assessments (eutrophication, hazardous substances, radioactive substances, offshore oil and gas industry and the series of assessments of the environmental impact of human activities) contributed expertise on the distribution, extent and characteristics of human activities and the main types of pressure they exert on the marine environment;

b. Ecosystem component (species and habitat) experts. Experts with an understanding of the status of their specialist species group or habitat type, at a broad national or OSPAR region scale, including their distribution, population status (species), extent (habitat types) and condition;

c. Contracting Party leads. Heads of Delegation to the OSPAR Management Group for the QSR 2010 with oversight of Contracting Party perspectives and overall requirements for the QSR.

A list of participants is given in Annex 2.

In brief, the workshop followed the following process:

a. Introductory presentations to explain the overall process of the QSR, the aims of the workshop, the outcomes of the OSPAR process to assess cumulative pressures from human activities (BA-6), the information and tools available during the workshop and the methodology to be followed;

b. To provide participants with an introductory 'warming-up' session they were asked to rapidly assign the eight ecosystem components in the five regions to a Good, Moderate or Poor status category without prior discussion and based primarily on personal views. The outcomes of this exercise would be compared later in the workshop to the structured process which occupied the majority of the workshop;

c. The workshop then split into eight subgroups (see Annex 3 for their composition) to undertake systematic assessments according to the methodology in Annex 1. Each subgroup was led by a Chair and had a Rapporteur to complete the assessment spreadsheet which was set up to

enable a clear and rapid documentation of the assessment results, audit trail and confidence assessment. The Utrecht assessment process is summarised in Figure 2. The subgroups were supported throughout their work on technical and methodological issues by the workshop convenors and facilitators. Regular meetings of subgroup chairs were organised to discuss progress and consistency of the assessments between subgroups; Each group had access to:

(i) a bespoke Geographical Information System (GIS) containing a map of the OSPAR Regions, data layers on the BA-6 human activities and habitat and bathymetric maps (from the MESH project[3] and the OSPAR Secretariat respectively). The GIS application provided an essential visual data tool which would inform the expert discussions on the relationships between the pressures from activities and their impacts on the species and habitats being assessed (Figure 2);

(ii) other reference material, such as the QSR thematic assessments.

d. Each specialist subgroup (one for each ecosystem component) made an initial overall assessment of the status of the component to define status as Good, Moderate or Poor (see Table 1 for the criteria used). The reasoning and evidence for the assessment and a confidence rating were documented;

Table 1 Species and habitat criteria and threshold values used in the Utrecht pilot assessment to assess both **overall status** and the **degree of impact** from specific pressures. The three criteria were assessed using the % to summarise a deviation from the expected status or degree of impact in the absence of pressure. The bottom row of the table provides the overall result. These criteria are further defined in Annex 1 (see appendices to that Annex).

Habitats

Status	**Good**	**Moderate**	**Poor**
Degree of impact	**Low**	**Moderate**	**High**
Range	<1% decrease	1 – <10% decrease	≥10% decrease
Extent	<1% loss	1 – <10% loss	≥10% loss
Condition	<10% damage	10 – <25% damage	≥25% damage
Overall impact/ status	All 'good/low'	One or more 'moderate' but no 'poor/high'	One or more 'poor/high'

Species

Status	**Good**	**Moderate**	**Poor**
Degree of impact	**Low**	**Moderate**	**High**
Range	<10% of species with >10% decrease	10 – <50% of species with >10% decrease	>50% of species with >10% decrease
Population size	<10% of species with >25% decline	10 – <50% of species with >25% decline	>50% of species with >25% decline
Condition	<10% of species with major change	10 – <50% of species with major change	>50% of species with major change
Overall impact/ status	All 'good/low'	One or more 'moderate', but no 'poor/high'	One or more 'poor/high'

[3] www.searchMESH.net

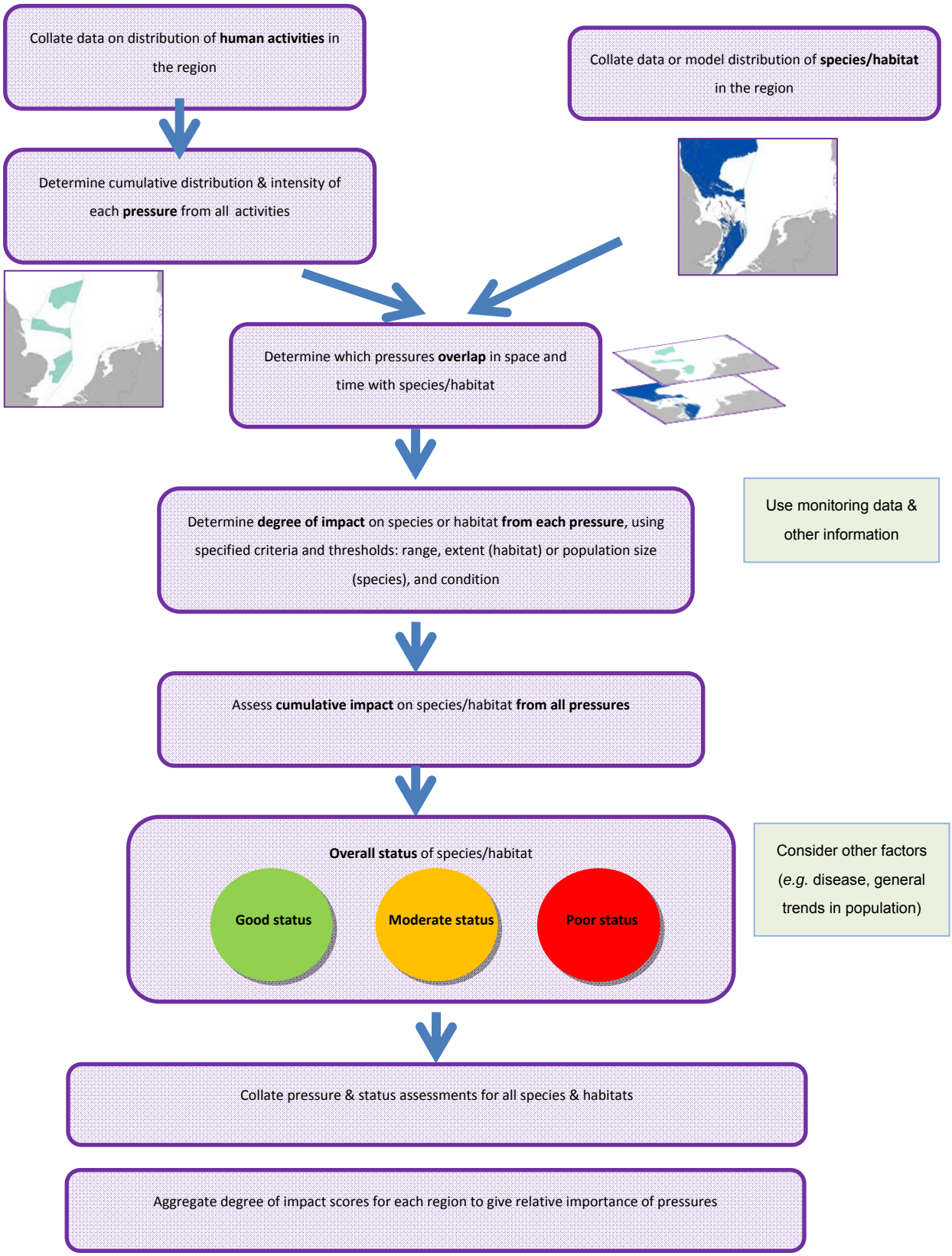


Figure 2 *"Utrecht" assessment process flow diagram.*

e. Each group then worked systematically through a set of 22 pressures (for example eutrophication, habitat damage), to assess whether the component was considered to have been adversely impacted by any of the pressures, as judged against the same criteria as the overall assessment. Because the ecosystem components and OSPAR regions are very coarse, an assessment of 'worst-cases' was also undertaken, to ensure more specific problems (for individual species and habitats or areas) from particular pressures were not overlooked. Again the evidence for the assessment and the confidence rating were documented;

f. Results from the subgroups were aggregated into summary tables per OSPAR Region on the status of each ecosystem component and a ranking of the main pressures affecting their status. These were reviewed collectively by the workshop. Aspects of the results, particularly any inconsistency across the subgroups and where certain assessments needed further expertise, were further examined before finalising the results. This review process included a voting session (led by Ton Kuik) which measured the degree of acceptance of the improved results. A report of the voting session is given in Annex 4;

g. As the deep-sea habitat assessments were considered to be masking the main impacts in the shallower part of the habitat (200 – 1000 m depth), a second overall assessment was undertaken, treating this as two separate habitat types (there was insufficient time to reassess the two deep-sea habitats against the set of 22 pressures);

Figure 3 *Deep-sea Habitats Subgroup using GIS application (right) and assessment spreadsheet (left).*

h. Groups for each OSPAR Region were then formed to discuss key outcomes of the assessment and to provide a set of headline issues relating to the status of the region and future requirements, which were intended to form the basis of text on each region for the QSR 2010;

i. A final review session, using the electronic voting system, sought views on the process, facilities and outcomes of the workshop. Feedback was given by the Convenors on how

issues raised about the methodology and results of the workshop would be addressed, as well as the forward process for its input into the QSR;

j. The entire workshop was facilitated (by Pepijn Nicolas and Morten Pedersen) to ensure good time keeping, to allow participants to raise points of view and to interchange views across the subgroups. There was opportunity for some of these issues to be discussed in further detail, and recommendations made on how the process/methodology could be improved.

Results from the workshop

The main results from the workshop are summarised in Annex 5. The output comprises the following:

a. a regional summary table of the assessment of pressures and overall status for each component;

b. a regional summary table of the status assessment, key pressures and worst-case examples;

c. key regional messages as the basis for an assessment text;

d. summary tables of the assessments of pressures and overall assessments for the species and habitats in all regions;

e. a ranking of the different pressures in each region, based on their cumulative effect on the ecosystem components assessed;

f. a cumulative impact score per ecosystem component and a summary table of all the overall status assessments.

These results are underpinned by a detailed audit trail as to how they were derived (following a step by step assessment methodology in Robinson *et al*. 2009; Annex 1) and the confidence in the assessment. This detailed assessment/audit trail, is provided at Annex 6.

The results from the initial 'warming session' are given in Annex 7. Whilst limited value can be derived from this initial assessment, it is of interest to compare the results with those from the more structured expert group assessments (Annex 5). Broadly, the results are comparable, although the introductory assessment tended to rate the status of fish and seabirds as being worse than the outcome of the more structured assessment.

Discussion

A variety of discussion points and ideas for the future were raised during the workshop; key points from plenary discussions were noted (for example on white boards). During the review of results, participants were asked to submit comments on any outstanding issues relating to the acceptability of the final overall assessments. A number of points raised related to aspects of the methodology being applied; where possible these were resolved as the workshop proceeded. For some topics, there was an opportunity during the workshop to discuss the issues in more detail. A list of the points raised and comments received is given in Annex 8; this includes an indication of how the points have or could be dealt with.

Topics meriting particular commentary are dealt with below, including a post-workshop explanation where certain topics were not fully explained in the backing papers or during the workshop.

a. **Assessments needing further consideration**. A number of the assessments (both overall assessments and assessments of particular pressures) are considered to warrant further evidence or expert input. This is to be expected, given the limited amount of time for

participants to fully contribute to all assessments during the workshop, that other appropriate evidence may be available in some cases, and that for some regions there was insufficient expertise available. For example, the seabirds assessment (Region V) needs input from Iceland, and the shelf and slope habitats assessments for Region IV need input from mainland Portugal experts (see Annex 8 for further specific comments). The assessments made in some regions may therefore not be fully representative of the region as intended and should be treated as preliminary[4];

b. **Conclusions of other QSR assessment chapters**. Results of other OSPAR assessments (e.g on eutrophication and hazardous substances) and from the set of Ecological Quality Objectives may not have been fully taken into account. The assessments would therefore benefit from a cross-check with these assessments to ensure all assessments are compatible;

c. **Ranking of pressures**. The initial method used during the workshop to rank the pressures per Region used a combination of the degree of impact caused by the pressure and the expected recovery time (should the activity causing the pressure cease). This led to the initial results considered during the workshop showing that pressures which may have limited impact but very long recovery times (for example litter, non-native species, climate change) were ranked more highly than those pressures which were having a greater degree of impact (for example removal of target species, habitat damage). As a consequence, the ranking process was rerun after the workshop, using only the 'degree of impact' scores. These updated rankings are reflected in the results presented in Annex 5 and have addressed the concerns raised;

d. **Scale of the ecosystem components**. The broad scope of the ecosystem components (except seals) caused a number of difficulties in undertaking the assessments, particularly in trying to assess across an often very varied component which may be subject to quite differing pressures. A key concern during the workshop was that the scale of the components occasionally led to assessments which masked quite significant pressures. This was particularly the case for the deep-sea habitats, where very extensive areas of the habitat occur below 1000 m depth (Figure 1) and hence out of reach of the most significant pressures (from fisheries activities), and for coastal sediments where pressures and ecosystem responses are different between coastal (especially intertidal) and offshore shallow sediment habitats. For the workshop, this issue was addressed in two ways:

   i) Subgroups were asked to clearly draw attention to 'worst-case' examples in their assessments so that problems for particular species, habitats or areas of the broad component were not unduly lost;

   ii) The deep sea habitat was split into a shallower (200 – 1000 m) and a deeper (>1000 m) section, and an overall assessment undertaken for these two subunits. This appeared to resolve the major concerns in the overall assessment. There was insufficient time during the workshop to redo the more detailed assessment against the 22 pressures.

   For future assessments, given more time and resources, it is recommended that such assessments are undertaken on more finely divided ecosystem components, including smaller-scaled habitat types. It would be useful to agree a suitable set to be applied consistently at the regional scale and in the context of the MSFD.

[4] Following the workshop a review of the results was undertaken which identified some inconsistencies between subgroups and a number of overall assessments which received low confidence. Consultation with workshop participants after the workshop has led to amendment of the results or additional comments being added to the workshop assessment spreadsheets (Annex 6).

e. **Methodology**. The methodology was designed to achieve a specified end goal (for example a series of ecosystem assessments at the OSPAR Region scale via an expert judgement process). The workshop was asked to follow a predefined process which was new to most participants, as most had not been involved in the earlier workshops which developed and trialled the approach. This unfamiliarity with the approach together with questions about the quality threshold values used (for species) and the limited amount of time available to complete the work led to a number of points about the methodology being raised. Key points of uncertainty were addressed as the workshop progressed, and a discussion session on the methodology was held on the Thursday (see Annex 8 for notes). There were also very positive comments about the overall process and what was achieved in a consistent audited manner in a very short timescale.

   i) Threshold values for species. The application of a single set of threshold values across all species, as applied in Habitats Directive Favourable Conservation Status assessments, was considered by some to inadequately reflect differences in life history characteristics. This issue needs further consideration;

   ii) Threshold values for habitats: Ideally these should be derived on a scientifically sound basis (although this may not be possible due to limitations in current knowledge);

   Reference conditions. The assessments were done against 'former natural conditions'. Variation in approach 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, due to past hunting. 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 reference points, the current population size of fish is much lower, and this also leads to a "moderate" status assessment (for example fish). Inconsistency in the choice of reference point has led to inconsistency in the status outcomes;

   iii) Accounting for indirect effects and interactions between ecosystem components. 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 can 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;

   iv) More time and evidence needed. Whilst the framework for the assessment process was generally felt to be sound, it was recognised that further time and evidence to complete the assessments would have improved the overall results. During the workshop there was very limited time to consult QSR background material, although it was readily available in a library (both hard copies and digital versions). In future, undertaking the assessments over a longer time period, which would allow the collation of improved data sets and other evidence, is considered desirable;

   v) Pressures, for which insufficient or no knowledge, especially on population-level effects, was available at the workshop, need further consideration.

f. **Relationship to other assessments**. A number of other assessments are undertaken for different policy drivers, and the process adopted during the workshop inevitably raised questions as to how these might interrelate. Because of the importance of assessments undertaken in the frameworks of the Marine Strategy Framework Directive (2008/56/EC), the Water Framework Directive (2000/60/EC) (WFD), and the Habitats Directive (92/43/EEC), these were given particular consideration in the development of the approach adopted for the workshop. These were discussed in paper Ch11 09/00/04 and are further elaborated below:

i) Marine Strategy Framework Directive (2008/56/EC). Annex III of the MSFD provides a set of ecosystem components and pressures; these formed the basis of the ecosystem components and pressure types used in the Utrecht assessment, thus providing a clear link between this assessment and future MSFD requirements. The assessment framework in Annex 4 in paper Ch11 09/00/04 (Connor, 2009) provides a direct relationship between the terminology/categories used for the workshop and those given in MSFD Annex III. Whilst the full requirements for assessing GES for the MSFD are not yet known, the Utrecht assessments can provide an overall and broad-scale biodiversity assessment at the OSPAR Region scale (termed subregions in MSFD). The assessments undertaken during the workshop may therefore contribute to the requirements of the Initial Assessment for the Marine Strategy Framework Directive (2008/56/EC) in 2012, but it is expected that further consideration of the requirements of the 2012 Initial Assessment will be needed;

ii) Water Framework Directive (2000/60/EC). The workshop assessments will have benefited from the information available from recent WFD water body assessments. The two processes are, however, markedly different in geographical scale and the assessment elements used. The WFD assessments comprise a series of quality elements (for example plankton, macrobenthos, fish hydromorphology), some of which may broadly equate to the components assessed in the Utrecht workshop (for example the WFD macroinvertebrate assessment relates broadly to the Shallow sediments assessment), As the WFD assessments are restricted to within 1 nm of the coast, they are much more restricted in geographical scope than the Utrecht assessments;

iii) Habitats Directive (92/43/EEC). The assessment criteria and threshold values used for the Utrecht workshop are based on those used for assessing Favourable Conservation Status for Article 17 of the Habitats Directive. This alignment of assessment processes is very helpful in harmonising the ways in which species and habitats are assessed in different policy frameworks. The experience gained in application of the criteria, including some refinement, should be fed back into the FCS process. It should be noted that the Habitats Directive requires assessment of the individual species and habitats specified in the Annexes to the Directive. In contrast the Utrecht assessment was intended to be a holistic assessment of all the species in the four groups selected, and all seabed habitats (the species criteria were modified to accommodate this requirement);

iv) Quality thresholds and categories between the different policies. There are a number of categories of quality defined in different policy frameworks and the threshold between acceptable and unacceptable quality is also defined differently:

- Marine Strategy Framework Directive (2008/56/EC) – Two classes to assess Good Environmental Status (GES) (above and below values yet to be determined for GES);
- Water Framework Directive (2000/60/EC) – Five classes to assess Good Ecological Status, with boundary between Good and Moderate the most important;

- Habitats Directive (92/43/EEC) – Three classes to define Favourable Conservation Status (with boundary between Favourable and Unfavourable – Inadequate the most important).

As these seek to make assessments on often the same species and habitats, there is a need to ensure the quality thresholds are equivalent across the different policy frameworks.

Lessons learnt and advice for future work

The workshop was innovative, especially regarding the method and scale of the assessment. Therefore, experiences and lessons learnt are probably as important as the results themselves.

Good points

a. the workshop brought together 66 people with good knowledge of pressures and ecosystem components, reasonably covering the five OSPAR Regions;

b. a consistent assessment framework was used across ecosystem components and OSPAR Regions, following specified assessment criteria and threshold values and leading to a clear assessment of status, supported by an audit trail and confidence assessment;

c. this framework enabled semi-quantification of cumulative impacts of pressures and successive ranking of pressures;

d. the workshop delivered a contribution to a holistic assessment at the scale of the OSPAR Regions;

e. GIS maps with pressure information and distribution of habitat types provided easily accessible information during the workshop.

Lessons learnt

a. an improved and more thorough assessment could have been achieved with more time and more experts. Although the QSR thematic assessments were available during the workshop, there was limited time to properly consult these (although the relevant authors were available during the workshop to contribute information from the assessments). Some parts of the assessment could have been prepared in advance. Therefore the outcome of the workshop needs to be further checked with the results of the other thematic assessments;

b. limited expert knowledge was available for some Regions (leading to reduced confidence in some cases); where confidence is not sufficient, the assessments should remain blank to prevent misinterpretations; Additionally, the overall results may imply that a sufficient level of quality can be achieved based on expert judgement alone, whereas much greater certainty is needed for taking management actions;

c. some ecosystem elements (for example plankton, cephalopods, reptiles, oceanographic features) were not covered due to limited expertise and time constraints during the workshop;

d. in the future the status of the marine environment and the pressures /impacts need to be assessed on a smaller scale, at least in some sub-regions;

e. the method does not take into account relationships between ecosystem components (for example indirect effects), which was considered a major shortcoming by a number of participants.

Advice for the Marine Strategy Framework Directive GES assessment

The following points are relevant for developing criteria and assessment techniques for the MSFD:

a. a clear explanation of reference condition(s) and the boundary between 'acceptable and 'unacceptable status is essential (these were part of the workshop methodology). Reference conditions may conflict between ecosystem elements;

b. use of generic thresholds (for example 25% decline in population size for all ecosystem (species) components) may not always be appropriate. A more tailor made approach, especially for species, should be considered to better reflect the differences in life history traits, but retain equivalence across the species groups. EcoQOs for seals, seabirds and fish communities provide good examples (Note: they use current status as a reference point);

c. the workshop delivered very useful experience in undertaking broad-scale assessments (both ecosystem components and large geographical regions). Future assessments should have a finer resolution, regarding both geographical scale and the level of aggregation of the ecosystem components. There is a trade-off between simple, aggregated 'policy' statements and scientific credibility. Assessments at a very fine scale (for example individual species and habitat types) may be scientifically more desirable but are resource intensive; such a level of detail would also require aggregation of the results to make broader judgements about GES and such aggregations can bring their own difficulties;

d. the workshop has identified a number of data needs for future assessments (see Regional summary texts in Annex 5);

e. the methodology employed enables a systematic and consistent broad-scale assessment of biodiversity components to be undertaken. In order to improve the robustness of the assessments (for example higher confidence and greater resolution) the following need further consideration:

    i. threshold values used (especially for species);

    ii. the geographical scale used (finer than OSPAR Region scale);

    iii. the level of disaggregation of the ecosystem components (finer than used for the Utrecht workshop);

    iv. the availability of improved evidence on species and habitat distribution and extent, onpressures from human activities and on the impact of these pressures on the ecosystem (for example from monitoring programmes).

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Annex 1 – Methodology for assessing the status of species and habitats at the OSPAR Region scale for the OSPAR Quality Status Report 2010[1]

1. Introduction

The aim of the assessment is to assess the status of key ecosystem components in the OSPAR Regions, within the wider context of the OSPAR QSR 2010.

For this purpose, an assessment framework developed from the methodology of Robinson *et al*. (2008a) will be used, in which the following ecosystem components: four broad habitat types (covering intertidal rock and sediments to deep sea habitats); fish; seals; cetaceans; and seabirds; will be systematically assessed against a set of pressures associated with anthropogenic activities.

Eight expert groups (one per ecosystem component) will work simultaneously, and will assess each OSPAR Region in terms of:

- current status of a component (for example seabirds) relative to former natural conditions;
- recent trends in pressures affecting the component, to enable the interpretation of change in component condition over the last 10 years, and;
- future prospects for the component (20 years into the future).

These assessments will be based on the best available information on current and historical: (i) component distribution, extent and condition, and (ii) spatial distribution and variability in intensity of relevant pressures. Where this information is unavailable, expert judgement will be applied to complete the assessments. The use of expert judgement will be reflected in each step by an accompanying confidence assessment (see Appendix 1 for a definition of the Confidence Assessment). The overall assessment will be supported by an audit trail documenting the sources of the information used. Full details of the development of the methodology used can be found in Robinson *et al*. (2008 a and b)[2].

For each ecosystem component, the following process will be completed:

1. A broad assessment, based entirely on expert judgement, will initially be made on the likely status of the component relevant to former natural conditions based on clearly defined threshold descriptors (Step A in Chapters 2 and 3 below).

Two slightly different methods will then be used: one for Habitat components (Chapter 2 below) and the second for Species Group components (Chapter 3 below).

However, both will essentially:

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[1] For reference purposes this Annex should be cited as follows: Robinson, L.A. Karman, C., Rogers, S., and Frid, C.L.J., 2009. Methodology for assessing the status of species and habitats at the OSPAR Region scale for the OSPAR Quality Status Report 2010 . (Contract No: C-08-0007-0085 for the Joint Nature Conservation Committee). University of Liverpool, Liverpool and Centre for the Environment, Fisheries and Aquaculture Science, Lowestoft.

[2] Robinson, L.A. Rogers, S., and Frid, C.L.J., 2008a. A marine assessment and monitoring framework for application by UKMMAS and OSPAR – Assessment of Pressures (Contract No: F90-01-1075 for the Joint Nature Conservation Committee). University of Liverpool, Liverpool and Centre for the Environment, Fisheries and Aquaculture Science, Lowestoft. 108pp

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2. Assess the contribution to overall impact by relevant pressures, together with how quickly the component might recover if the pressure(s) were removed (Steps B – D). These steps will highlight the key (anthropogenic) pressures on ecosystem components in the OSPAR regions.
3. Produce an overall summary of the current status per ecosystem component in each OSPAR Region, also indicating key (anthropogenic) pressures, any other major drivers (for example disease), and recent trends and future prospects in these (Step E).

2. Habitat component assessments

Habitat components include their physical and biological features. In terms of biological features we refer only to benthic assemblages (macrofauna and flora) as associated fish and seabirds are covered elsewhere in the assessment.

To complete the assessment each group will require the following supporting documents and source files:

- The Assessment workbook (Excel);
- GIS source files on distributions of components and activities/pressures[3];
- Any additional reports or information on pressures and components in each Region;
- Information on the generic response of ecosystem components to different pressures.

Groups should familiarise themselves with these documents and files, assign roles amongst the group members and read over Appendix 1 of this document (definitions of Key Terms) before proceeding.

A. Overview of ecosystem component status

In each expert group, an initial overall assessment will be made on the status of a component in each OSPAR Region against the threshold descriptors (Appendix 2: A2.1 for habitat components). This initial assessment will be based on an aggregate view of the component (see Appendix A1.5 for a definition), and aims to get the group considering collectively the assessments in broad terms (at OSPAR Region scale and for entire components) before going into more detail in the remainder of the assessment.

Using Spreadsheet A of the Assessment workbook to record the process, the group will briefly describe:

A1. Whether the component occurs in each region (Yes or No) and the Confidence in this (using the guidelines in Appendix 1.6);

If it does occur in a region the group will go on to describe:

A2. A simple description of the extent and distribution of the component in each OSPAR Region, with reference to the information sources and how much confidence there is in this description:

- For **extent**, assessors should state in what percentage of the area being assessed (for example the OSPAR Region) is the component present? If it is not possible to give a specific number based on GIS data for example, give a range (for example 20 – 30%, or 50>X<100).
- For **distribution**, assessors should briefly describe whether the component is confined to particular habitat types (for example pelagic only and offshore; intertidal hard substrates; coastal, out to 50 m depth maximum) or not (for example widespread, dispersive) and whether

[3] GIS layers will be patchy in their distribution in terms of coverage of ecosystem components and pressures. Groups are encouraged to consider any other available information and to use expert judgement in completing the steps of the assessment. Groups should in no way be limited in their coverage of the issues by the available data.

it has a seasonality to its distribution in the Region (for example the description could be "all year, persistent", or "seasonal – present from January – April inclusive");

- For information sources, assessors should briefly list the sources of information available on the extent and distribution of the component in each Region (for example data, reports, expert knowledge), and indicate how much confidence there is in any modelled maps (indicate if they are considered broadly correct or not), and are there any major gaps in understanding;
- For the Confidence, in Step A2, assessors should use the guidelines in Appendix A1.6.

A3. The **current status** of the component in each region, relative to former natural conditions (see definition of this baseline in Appendix A1.4)? In doing so, the group will individually assess the status of the component in terms of its range, extent and condition using the descriptors in Table A2.1 (following Appendix 2.1); overall status is then automatically generated based on an algorithm that counts the number of scores that are Good (green), Moderate (amber) or Poor (red), using the descriptors in the last row of Table A2.1. The overall confidence reached at the end of Step A3 (Confidence current status) is also automatically generated using the guidance in the bottom cell of the Confidence column in Table A2.1 (Appendix 2).

B. Determine where components and pressures overlap

Twentytwo pressure types have been selected as being relevant to at least some of the ecosystem components being assessed at the OSPAR Ch11 workshop (see list in the Excel Assessment Spreadsheets B – D). As a first step in assessing the contribution of different pressures to any impact, the group will narrow down the number of pressures to be considered by:

- First, eliminating any pressures that would never overlap with the ecosystem component (for example cannot co-occur in space and/or time); and
- Second, eliminating any pressures that do not have any 'actual' (not 'potential') geographical overlap in the individual regions being assessed.

Using Spreadsheet B of the Assessment workbook to record the process, the group will fill in the columns 'Overlap?' and 'Confidence Overlap' recording their justification in the 'Comments' column and any reference to datasets used in the 'Dataset(s)' columns. Confidence in assessing 'Overlap' should be judged based on the description in Appendix 1.6 of this report; for this step this should be assessed based on the group's confidence in assessing both the component's and pressure's distributions (space and time) in the regions. If confidence in either of these is Low, 'Confidence Overlap' should be recorded as 'Low'.

To complete this step, the group should refer to the information sources on the distributions of pressures and components in each region (GIS layers and summary tables), and expert knowledge where necessary. It is important here to consider any sources (for example human activities) of each pressure type, and not to be restricted to those covered by the available data and/or reports. Assessors should document what information exists on the pressure types in each region, with reference to how much confidence there is in this information. For example, what are the sources of information (data, reports, expert knowledge), how much confidence is there in any modelled maps (indicate if they are considered broadly correct or not), and are there any major gaps in understanding?

C. Assessing Overall Impact for individual pressures

Having identified the relevant pressures for each region in Step B, it is then possible to assess the extent of any impact caused by relevant pressures, together with how quickly the component might recover if the pressure(s) were removed, following the steps (C1 – 5) outlined below.

To speed up the process it is strongly recommended that groups work through Steps C1 – 5 pressure by pressure, tackling the well understood pressures first. Thus for each pressure, all steps (C1 – 5) should be completed for all regions using Spreadsheet C of the Assessment workbook before moving onto the next pressure. Columns relevant to the individual steps (C1 – 5) are indicated by the code in the first row of Spreadsheet C of the Assessment workbook.

Important note:

Step C must be completed using an aggregate view of the component (see Appendix A1.5 for a definition) and in Step D the exercise is repeated where there is a known worst-case example. It is recommended that groups discuss any likely worst-case examples in completing Steps C1 – 3 and fill in the relevant columns in Spreadsheet D at the same time. Please read Appendix 1.5 for an explanation of a worst-case example before going any further.

C1. Degree of impact[4] of each pressure on the broad component?

Using the threshold descriptors and guidance given in Appemdox 2.2, the group are asked to assess whether the component is considered to have been subject to a 'High', 'Moderate' or 'No/Low' degree of impact due to the particular pressure being assessed alone. All descriptors (Range, Extent and Condition) should be considered and the final 'Degree of Impact' score should be picked using a precautionary approach (for example the 'worst' score of all three descriptors)[5].

In completing this step, assessors are asked to consider the available information on distribution, intensity, frequency and extent of the pressures (referring to all source information (GIS layers and reports)) and the type of response of the component to the pressure type. Confidence in this step should be judged based on the description in Appendix 1.6.

C2. *Percentage* (%) of the habitat's area impacted

The "% Area Impacted" column refers to the total area impacted (within a Region) of a habitat component (includes any habitat damage[6] and loss) by the individual pressure being assessed. In completing the column on "% Area Impacted" groups are asked to use an exact percentage, and to use <1% where the extent of impact is thought to be minimal but existing. Assessors are also asked to consider what the actual footprint of the pressure is. For example, the total area of extent of a wind farm may be much greater than the 'Habitat loss' pressure that is just associated with the footprint of the individual turbines. Justification for the area selected should be recorded in the 'Comments' column and any reference to datasets used in the 'Dataset(s)' columns. Confidence in this step should be judged based on the description in Appendix 1.6.

C3. Recovery of the component

Next, experts will assess the time required by a component to recover after cessation of any further activities causing the particular pressure, to give the recovery score. All recovery times are based on the assumption that the activity causing the pressure being considered stops, but recovery time is also affected by the time it will take for a pressure to stop causing an impact (given cessation of the activity). For example, if we stop releasing heavy metals into the marine environment, the pressure of heavy-metal contamination can persist in the system for many decades to follow, sometimes longer. As another example, if the pressure is 'habitat loss (to another substratum)', the pressure will remain

[4] The terminology used here is different to that used in Robinson et al. (2008 a & b) because feedback from earlier applications of the assessment suggested that the original terminology ('Resistance' and 'Resilience') was confusing. The concept is still exactly the same.

[5] As this is an assessment of current status relative to former natural conditions, the degree of impact to a component is based on its status now, in comparison with its status at the beginning of the assessment period. If the component was driven beyond either of the thresholds for any descriptor earlier in the assessment period, but has recovered and is now above them again, the lower degree of impact score is given.

[6] See definition of 'damage' in Appendix 2.1.

unless the area is actively restored and any permanent structures are removed. This must be considered when selecting a recovery category.

In determining this, experts need to consider the nature of the pressure (as discussed above) and the current status of the component. For example, a component that has suffered a high degree of impact in one region may have a slower recovery potential than the same component in another region. Recovery is determined as the time required for the component to recover its typical structure and functioning, recognising that all previous features and species may not return due to natural dynamics, but that similar types of species and features should be present for full recovery. The score distinguishes between four categories of recovery:

None:	>100 years, or no recovery possible
Low:	10 to <100 years
Medium:	2 to <10 years
High:	0 to <2 years

Groups should record their selected 'Recovery' category and confidence in this in Spreadsheet C with any supporting comments. **The aggregate recovery score is based on the slowest recovering sub-component as recovery by definition is to a state where all typical structure and function is recovered.**

C4. Overall impact of individual pressures

For each relevant component/pressure interaction, the Degree of Impact and Recovery scores are combined to give a final 'Overall impact' score (see Table 2.1 below). This score draws on the concept that components are more at risk from a pressure when they are suffering a high degree of impact (= low resistance to a pressure) and also have low or no recovery potential (= low resilience). The 'Overall Impact' score is automatically entered in column R of Spreadsheet C of the assessment, using a combination of the first letter of the 'Degree of Impact' score (H, M or L) with the first letter of the 'Recovery' score (N, L, M or H). Thus for a pressure having a 'Low' degree of impact on a component whose recovery status is currently 'Medium' (for example could recover between 2 – 10 years), the overall impact score would be LM. The 'Overall Impact' score provides useful information for managers in terms of prioritising monitoring and management schemes, as it combines information on both the severity of impacts, and how long it would take components to recover from them should the activities causing that pressure be reduced.

Table 2.1 Combined Overall Impact scores, where interactions between a pressure and component pose most risk to a component's status when there is a 'High' degree of impact and Recovery is scored as 'None' (Combined score = HN).

		DEGREE OF IMPACT (from specific pressure)		
		NO/LOW	**MODERATE**	**HIGH**
RECOVERY (Resilience)	**NONE**	LN	MN	HN
	LOW	LL	ML	HL
	MEDIUM	LM	MM	HM
	HIGH	LH	MH	HH

The number of low confidence scores accumulated from Step B and Steps C1 – 3 can then be summed along a row in Spreadsheet C. Where no lows are recorded the confidence assessment is

high (H); one out of four lows is moderate (M); two out of four lows is low (L); three or more out of four lows equates to very low confidence (VL).

Completing Step C4 will allow the assessors to see which individual pressures are currently having the greatest impact on the components being assessed in any of the OSPAR regions, and to assess the level of confidence in this.

C5. Recent trends and future prospects

For each relevant pressure/component interaction, the expert group should make an assessment of recent trends (over the last 10 years) and likely future prospects (over the next 20 years) in the region, in terms of whether pressures have/will: increase, decrease, be stable, variable or unknown. A variable trend allows for mixed patterns within a region, to reflect examples where the pressure has/may be both increasing and decreasing in different areas of the region.

Assessors should use any of the information sources made available to them on activities and pressures, plus any additional source material or expert knowledge to decide on trends. For example, for any of the activities assessed for BA-6, summaries of trends should be available at the workshop.

D. Worst-case example

Step C is completed using an aggregate broad component assessment, as described in Appendix 1.5. We recognise that in many cases there are sub-components (for example individual species and habitats) that fall within the broad ecosystem components, that may be at higher risk to specific pressures than is reflected in the overall assessment (due to their increased sensitivity to the pressure or to the pressure and sub-component being concentrated in a proportion of the Region). To address this, each expert group should identify a 'worst-case' sub-component for any pressure/component interactions where relevant and this should be recorded in Spreadsheet D of the assessment. It is not necessary to include a worst-case example if it would lead to the same outcome as the broad aggregate assessment (for example there must be a higher degree of impact and/or slower recovery time than has been selected for the aggregate response).
Where a worst-case example is identified, Steps C1 – 4 should be repeated in Spreadsheet D (for example Steps D1 – 4) for that specific sub-component/pressure interaction. Worst-case examples may vary by region, and in some cases there may be a worst-case example in one region, but none in another.

E. Summary per OSPAR Region

In the final step of the assessment, current status and key pressures are summarised per OSPAR Region for the ecosystem component being assessed. The Current Status and associated Confidence score are automatically transferred into Spreadsheet E. Following this, the key pressures in each region are also automatically selected for both aggregate and worst-case assessments. These are generated from the regional summary tables of all pressures by selecting the worst 'Impact' scores in each region. The three "worst" pressures will be selected for both the aggregate assessment and the worst-case assessment, but groups can manually check through the summary tables to see if there are other pressures that should also be listed.

In the summary table, there is also an opportunity to record any drivers that are not described under the anthropogenic list, but which may have been important in terms of affecting the current status of the component (for example disease). Groups should discuss this as the final step in the assessment.

Final check

As a final check for each component in each region, assessors are asked to compare the highest degree of impact score from the individual pressure assessments with the overall current status score generated in the summary table of Spreadsheet E. As the descriptors of the thresholds for both

'current status' and 'degree of impact' are the same, a high 'degree of impact' score corresponds with a poor status score (see Appendixes 2 and 3 in Robinson *et al*., 2009; Appendix 2 here). Thus, the highest 'degree of impact' score for any one pressure should never be higher than the corresponding overall current status score. If it is, this may indicate that the original broad assessment of the current status of a component undertaken in Step A may have infact been rather inaccurate and that this should be reviewed. Where the highest 'degree of impact' score recorded for any one pressure on a given component in a particular region, is greater than the corresponding overall current status score, assessors must re-visit Spreadsheets A – C. Any changes made at this stage in the earlier spreadsheets should be documented in the relevant Comments box.

3. Species Group assessments

Species group components include all species represented by a broad ecological component such as 'Seabirds' or 'Cetaceans'.

To complete the assessment, each group will require the following supporting documents and source files:

- the Assessment workbook (Excel);
- any GIS source files on distributions of components[7] and activities/pressures[8];
- any additional reports or information on pressures and components in each region;
- information on the generic response of ecosystem components to different pressures.

Groups should familiarise themselves with these documents and files, assign roles amongst the group members, and read over Appendix 1 of this document (definitions of Key Terms) before proceeding.

A. Overview of ecosystem component status

In each expert group, an initial overall assessment will be made on the status of the component in each OSPAR Region against the threshold descriptors (Appendix 3: A3.1 for species components). This initial assessment will be based on an aggregate view of the component (the thresholds define the aggregate view), and aims to get the group considering collectively the assessments in broad terms (at OSPAR Region scale and for entire components) before going into more detail in the remainder of the assessment.

Using Spreadsheet A of the Assessment workbook to record the process, the group will briefly describe:

A1. Whether the component occurs in each region (Yes or No) and the Confidence in this (using the guidelines in Appendix 1.6);

If it does occur in a region the group will go on to describe:

A2. A simple description of the extent and distribution of the component in each OSPAR Region, with reference to the information sources and how much confidence there is in this description.

- For extent, assessors should state in what percentage of the area being assessed (for example the OSPAR Region) is the component present? If it is not possible to give a specific number based on GIS data, for example, give a range (for example 20 – 30%, or 50>X<100);

[7] It is unlikely that GIS source files will be available for many (any) of the species components.

[8] GIS layers will be patchy in their distribution in terms of coverage of ecosystem components and pressures. Groups are encouraged to consider any other available information and to use expert judgement in completing the steps of the assessment. Groups should in no way be limited in their coverage of the issues by the available data.

- For distribution, assessors should briefly describe whether the component is confined to particular habitat types (for example pelagic only and offshore; intertidal hard substrates; coastal, out to 50 m depth maximum) or not (for example widespread, dispersive) and whether it has a seasonality to its distribution in the Region (for example the description could be "all year, persistent", or "seasonal – present from January – April inclusive");
- For information sources, assessors should briefly list the sources of information available on the extent and distribution of the component in each Region (for example data, reports, expert knowledge), and indicate how much confidence there is in any modelled maps (indicate if they are considered broadly correct or not), and are there any major gaps in understanding;
- For the Confidence in Step A2, assessors should use the guidelines in Appendix A1.6.

A3. The current status of the component in each region, relative to former natural conditions (see definition of this baseline in Appendix A1.4). In doing so, the group will individually assess the status of the component in terms of its range, extent, and condition, using the descriptors in Table A3.1 (following Appendix 3.1); overall status is then automatically generated based on an algorithm that counts the number of scores that are 'Good' (green), 'Moderate' (amber) or 'Poor' (red), using the descriptors in the last row of Table A3.1. The overall confidence reached at the end of Step A3 (Confidence current status) is also automatically generated using the guidance in the bottom cell of the Confidence column in Table A3.1 (Appendix 3).

B. Determine where components and pressures overlap

Twenty-two pressure types have been selected as being relevant to at least some of the ecosystem components being assessed at the OSPAR Ch11 workshop (see list in the Excel Assessment Spreadsheets B – D). As a first step in assessing the contribution of different pressures to any impact, the group will narrow down the number of pressures to be considered by:

- First, eliminating any pressures that would never overlap with the ecosystem component (for example cannot co-occur in space and/or time); and
- Second, eliminating any pressures that do not have any 'actual' (not 'potential') geographical overlap in the individual regions being assessed.

Using Spreadsheet B of the Assessment workbook to record the process, the group will fill in the columns 'Overlap' and 'Confidence Overlap' recording their justification in the 'Comments' column and any reference to datasets used in the 'Dataset(s)' columns. Confidence in assessing 'Overlap' should be judged based on the description in Appendix 1.6 of this report; for this step this should be assessed based on the group's confidence in assessing both the component's and pressure's distributions (space and time) in the regions. If confidence in either of these is Low, 'Confidence Overlap' should be recorded as 'Low'.

To complete this step, the group should refer to the information sources on the distributions of pressures and components in each region (GIS layers and summary tables), and expert knowledge where necessary. It is important here to consider any sources (for example human activities) of each pressure type, and not to be restricted to those covered by the available data and/or reports. Assessors should document what information exists on the pressure types in each region, with reference to how much confidence there is in this information. For example, what are the sources of information (data, reports, expert knowledge), how much confidence is there in any modelled maps (indicate if they are considered broadly correct or not), and are there any major gaps in understanding?

C. Assessing Overall Impact for individual pressures

Having identified the relevant pressures for each region in Step B, it is then possible to assess the extent of any impact caused by relevant pressures, together with how quickly the component might recover if the pressure(s) were removed, following the steps (C1 – 4) outlined below.

To speed up the process it is **strongly recommended** that groups **work through Steps C1 – 4 pressure by pressure**, tackling the well understood pressures first. Thus for each pressure, all steps (C1 – 4) should be completed for all regions, using Spreadsheet C of the Assessment workbook, before moving onto the next pressure. Columns relevant to the individual steps (C1 – 4) are indicated by the code in the first row of Spreadsheet C of the Assessment workbook.

Important note:

Step C must be completed using an aggregate view of the component (**the thresholds in Appendix 3 define the aggregate view**), and in Step D the exercise is repeated where there is a known worst-case example. It is recommended that groups discuss any likely worst-case examples in completing Steps C1 – 3 and fill in the relevant columns in Spreadsheet D at the same time. Please read Appendix 1.5 for an explanation of a worst-case example before going any further.

C1. Degree of impact[9] of each pressure on the broad component?

Using the threshold descriptors and guidance given in Appendix 3.2, the group are asked to assess whether the component is considered to have been subject to a 'High', 'Moderate' or 'No/Low' degree of impact due to the particular pressure being assessed alone. All descriptors (Range, Extent, Condition) should be considered and the final 'Degree of Impact' score should be picked using a precautionary approach (for example the 'worst' score of all descriptors)[10.]

In completing this step, assessors are asked to consider the available information on distribution, intensity, frequency and extent of the pressures (referring to all source information (GIS layers and reports)) and the type of response of the component to the pressure type. Confidence in this step should be judged based on the description in Appendix 1.6.

C2. Recovery[8] of the component

Next, experts will assess the time required by a component to recover after cessation of any further activities causing the particular pressure, to give the recovery score. All recovery times are based on the assumption that the activity causing the pressure being considered stops, but recovery time is also affected by the time it will take for a pressure to stop causing an impact (given cessation of the activity). For example, if we stop releasing heavy metals into the marine environment, the pressure of heavy-metal contamination can persist in the system for many decades to follow, sometimes longer. As another example, if the pressure is 'habitat loss (to another substratum)', the pressure will remain unless the area is actively restored and any permanent structures are removed. This must be considered when selecting a recovery category.

In determining this, experts need to consider the nature of the pressure (as discussed above) and the current status of the component. For example, a component that has suffered a high degree of impact in one region may have a slower recovery potential than the same component in another region. Recovery is determined as the time required for the component to recover its typical structure and

[9] The terminology used here is different to that used in Robinson et al. (2008 a & b) because feedback from earlier applications of the assessment suggested that the original terminology ('Resistance' and 'Resilience') was confusing. The concept is still exactly the same.

[10] As this is an assessment of **current status** relative to former natural conditions, the degree of impact to a component is based on its status now, in comparison with its status at the beginning of the assessment period. If the component was driven beyond either of the thresholds for any descriptor earlier in the assessment period, but has recovered and is now above them again, the lower degree of impact score is given.

functioning, recognising that all previous features and species may not return, due to natural dynamics, but that similar types of species and features should be present for full recovery. The score distinguishes between four categories of recovery:

None:	>100 years, or no recovery possible
Low:	10 to <100 years
Medium:	2 to <10 years
High:	0 to <2 years

Groups should record their selected 'Recovery' category and confidence in this in Spreadsheet C with any supporting comments. **The aggregate recovery score is based on the slowest recovering sub-component as recovery by definition is to a state where all typical structure and function is recovered.**

C3. Overall impact of individual pressures

For each relevant component/pressure interaction, the Degree of Impact and Recovery scores are combined to give a final 'Overall impact' score (see Table 3.1 below). This score draws on the concept that components are more at risk from a pressure when they are suffering a high degree of impact (= low resistance to a pressure) and also have low or no recovery potential (= low resilience). The 'Overall Impact' score is automatically entered in column R of Spreadsheet C of the assessment, using a combination of the first letter of the 'Degree of Impact' score (H, M or L) with the first letter of the 'Recovery' score (N, L, M or H). Thus for a pressure having a 'Low' degree of impact on a component whose recovery status is currently 'Medium' (for example could recover between 2 – 10 years), the overall impact score would be LM. The 'Overall Impact' score provides useful information for managers in terms of prioritising monitoring and management schemes, as it combines information on both the severity of impacts, and how long it would take components to recover from them should the activities causing that pressure be reduced.

Table 3.1 Combined Overall Impact scores, where interactions between a pressure and component pose most risk to a component's status when there is a 'High' degree of impact and Recovery is scored as 'None' (Combined score = HN).

		DEGREE OF IMPACT (from specific pressure)		
		NO/LOW	**MODERATE**	**HIGH**
RECOVERY (Resilience)	**NONE**	LN	MN	HN
	LOW	LL	ML	HL
	MEDIUM	LM	MM	HM
	HIGH	LH	MH	HH

The number of low confidence scores accumulated from Step B and Steps C1 – 2 can then be summed along a row in Spreadsheet C. Where no lows are recorded the confidence assessment is high (H); one out of three lows is moderate (M); two out of three lows is low (L); three out of three lows equates to very low confidence (VL).

Completing Step C3 will allow the assessors to see which individual pressures are currently having the greatest impact on the components being assessed in any of the OSPAR regions, and to assess the level of confidence in this.

C4. Recent trends and future prospects

For each relevant pressure/component interaction, the expert group should make an assessment of recent trends (over the last 10 years) and likely future prospects (over the next 20 years) in the region, in terms of whether pressures have/will: increase, decrease, be stable, variable or unknown. A variable trend allows for mixed patterns within a region, to reflect examples where the pressure has/may be both increasing and decreasing in different areas of the region.

Assessors should use any of the information sources made available to them on activities and pressures, plus any additional source material or expert knowledge to decide on trends. For example, for any of the activities assessed for BA-6, summaries of trends should be available at the workshop.

D. Worst-case example

Step C is completed using an aggregate broad component assessment, following the descriptor thresholds in Appendix 3.2. We recognise that in many cases there are sub-components (for example individual species or assemblages) that fall within the broad ecosystem components, that may be at higher risk to specific pressures than is reflected in the overall assessment (due to their increased sensitivity to the pressure or to the pressure and sub-component being concentrated in a proportion of the Region). To address this, each expert group should identify a 'worst-case' sub-component for any pressure/component interactions where relevant and this should be recorded in Spreadsheet D of the assessment. It is not necessary to include a worst-case example if it would lead to the same outcome as the broad aggregate assessment (for example there must be a higher degree of impact and/or slower recovery time than has been selected for the aggregate response).

Where a worst-case example is identified, Steps C1 – 3 should be repeated in Spreadsheet D (for example Steps D1 – 3) for that specific sub-component/pressure interaction. Worst-case examples may vary by region, and in some cases there may be a worst-case example in one region, but none in another. In interpreting the threshold descriptors for the worst-case example in Appendix 3.2 assessors should use the descriptions provided but interpret them in terms of single species populations.

E. Summary per OSPAR Region

In the final step of the assessment, current status and key pressures are summarised per OSPAR Region for the ecosystem component being assessed. The Current Status and associated Confidence score are automatically transferred into Spreadsheet E. Following this, the key pressures in each region are also automatically selected for both aggregate and worst-case assessments. These are generated from the regional summary tables of all pressures by selecting the worst 'Impact' scores in each region. The three "worst" pressures will be selected for both the aggregate assessment and the worst-case assessment, but groups can manually check through the summary tables to see if there are other pressures that should also be listed.

In the summary table, there is also an opportunity to record any drivers that are not described under the anthropogenic list, but which may have been important in terms of affecting the current status of the component (for example disease). Groups should discuss this as the final step in the assessment.

Final check

As a final check for each component in each region, assessors are asked to compare the highest degree of impact score from the individual pressure assessments with the overall current status score generated in the summary table of Spreadsheet E. As the descriptors of the thresholds for both 'current status' and 'degree of impact' are the same, a high 'degree of impact' score corresponds with

a poor status score (see Appendix es 2 and 3 in Robinson *et al*., 2009; Appendix 2 here). Thus the highest 'degree of impact' score for any one pressure should never be higher than the corresponding overall current status score. If it is this may indicate that the original broad assessment of the current status of a component undertaken in Step A may have infact been rather inaccurate and that this should be reviewed. Where the highest 'degree of impact' score recorded for any one pressure on a given component in a particular region, is greater than the corresponding overall current status score, assessors must re-visit Spreadsheets A – C. Any changes made at this stage in the earlier spreadsheets should be documented in the relevant Comments box.

4. Aggregating pressures over components

The final presentation in Chapter 11 of the Quality Status Reports will include a ranked table of pressures for each OSPAR region, for which the impact of each of the pressures is aggregated over the individual ecosystem components (habitats and species). Using the individual assessments of impact and recovery for each component, the following steps are (automatically) applied:

1. translate:
    - the assessed impact into a (semi-)quantitative impact score;
    - the assessed recovery potential into a (semi-)quantitative recovery score.
2. calculate:
    - the sum of impact scores for each pressure over all ecosystem components;
    - the sum of recovery scores for each pressure over all ecosystem components.

The sum of impact scores represents the relative importance of a pressure with respect to its impact on the ecosystem. Equally, the sum of recovery scores represents the potential of the ecosystem to recover from the impact of a pressure once its source has been eliminated.

To translate assessed impact and recovery into scores, a scoring table is used that reflects the relative distance between the classes used for the assessment of impact and recovery (Table 4.1). The range of the scales used to score impact and recovery has been kept equal as both aspects should be given equal weights.

Table 4.1 Semi-quantitative scores given to each of the 'Degree of Impact' and 'Recovery' categories

Degree of Impact	Score	Recovery	Score
High	3	None (no or >100 yrs)	3
Moderate	2	Low (10 to <100 yrs)	2
Low	1	Medium (2 to <10 yrs)	1.3
		High (0 to <2 yrs)	1

The ranking of pressures per region (over components) is carried out using nested sorting: sorting (descending) on sum of impact scores (primary) and sum of recovery scores (secondary).

The (rounded) average impact score and (rounded) average recovery score (for example, sum of scores divided by the number of ecosystem components) is used to demonstrate the relative differences between the importance of pressures within a region and to compare pressure rankings between regions.

Appendix 1: Key terms and guidance

A1.1 Pressures and impacts

Here pressures are defined as "the mechanism through which an activity has an effect on any part of the ecosystem". Pressures can be physical, chemical or biological and the same pressure can be caused by a number of different activities. For example, both sand and gravel extraction and navigational dredging cause habitat structure changes, a habitat damage pressure that can affect a number of different ecosystem components. In some fora, pressure is used interchangeably with the terms human activity and/or impact. Impacts are the consequence of pressures, and different pressures can result in the same impact. For example, the habitat damage pressure 'habitat structure changes – abrasion and other physical damage' can result in impacts that include mortality to benthic invertebrates and change in habitat properties (such as particle size distribution, stability etc.), as can the habitat loss pressure 'habitat change (to another substratum)'. Impact is used here to describe the consequence of a pressure, where a change occurs that is different to the natural trajectory of what would be likely to occur. The degree of impact is thus what is assessed when applying the methodology to an interaction between a pressure and an ecosystem component.

A1.2 Ecosystem component

Ecosystem components are ecologically coherent elements of an ecosystem, that group together more disparate taxonomic groups into the minimum number of elements, based on the view that the lower the number of elements, the easier it is to gain a coherent and integrated assessment across the ecosystem. For example, seabirds are one ecosystem component, whilst cetaceans are another. In this methodology, ecosystem components are sometimes also referred to simply as "components". The following ecosystem components will be assessed at the Ch11 OSPAR workshop:

- Rock and biogenic reef habitats (intertidal and subtidal to 200 m);
- Coastal sediment habitats (intertidal and shallow subtidal to 50 m);
- Shelf sediment habitats (50 m down to 200 m depth);
- Deep-sea habitats (below 200 m depth);
- Fish;
- Cetaceans;
- Seals;
- Seabirds.

A1.3 Thresholds

Central to the Robinson *et al*. (2008a) method is the use of a threshold to determine the degree of impact to a given component over the period of assessment. This can be used in an overall assessment of the status of the component (Step A), and later, to assess the contribution of individual pressures to any impact on the overall status of the component (Steps B – D). The use of threshold descriptors that encapsulate information on the range, extent and condition of a component was encouraged, based on the premise that all thresholds should relate to an overall objective of maintaining good environmental status of ecosystem components against a background of sustainable use. Thus the threshold descriptors would represent a measurable target, beyond which the status of the component is threatened or considered unacceptable, and as all components would have a threshold related to the same overall objective, a consistent assessment across components would be possible. The thresholds were selected using the guidance from the Habitats' Directive Favourable Conservation Status descriptors and the OSPAR Annex V Texel-Faial guidance. A detailed rationale

for this approach is given in Chapter 2 of Robinson *et al*. (2008a), and developed further in Chapter 2 of Robinson *et al*. (2008b).

A1.4 Baseline – former natural conditions

For the assessment of current status relative to former natural conditions, the generic baseline is the population/habitat range and extent (of the component) prior to industrialisation and a description of condition in pristine condition (for example types of features/species that would be expected)[11]. In reality, the assessments of current status relative to former natural conditions will be based on best expert judgement in most cases, because the data simply do not exist over such long time scales. A single baseline description of population/ habitat range, extent and condition of the component prior to industrialisation (for example as near to pristine as possible) will suffice. Experts will then consider the current status of components relative to this (Step A), and whether any one, or combination of pressures, has caused a deviation of the component beyond the threshold since that baseline, using the pressure list as a check-list (Steps B – D).

For the assessment against former natural conditions, the assessment is relative to former natural conditions but it must reflect current status. This means that if a species was, for example, reduced in population size >25% relative to its former natural conditions 50 years ago, but is now back to levels near to its former size, it currently has good status and thus would be scored to have a low current degree of impact from the pressure. Assessors must be mindful of any species that have been extirpated from the area being assessed in the period since former natural conditions. These species would clearly have failed criteria (ii) and (iii) of the species component threshold descriptors.

A1.5 Aggregate and Worst-Case Assessments

As ecosystem components are grouped at very broad ecological levels (for example 'Seabirds' or 'Deep sea habitats'), it is suggested that each component should be assessed based on an aggregate response (Step C), but also considering any worst-case examples (Step D). The aggregate assessment takes account of the status of a component based on the majority response **(>50% by area for habitats; following the criteria specified in Appendix 3 for species)** of all sub-components, whilst the worst-case is based on the most sensitive (higher degree of impact and/or slower recovery time than the aggregate response) sub-component. Here sub-components are defined as a typical species/species group or feature of a broad component. For example, within the fish, a sub-component could be 'Gadoids' or even 'Atlantic Cod', whilst for habitats, a sub-component could be a more specific habitat type, such as 'estuarine gravel habitats', or a specific biotope (for example Modiolus modiolus beds).

Habitat component example

As an example, if considering the effect of the pressure 'habitat structure changes – abrasion' (as caused by dredging (fishing)) on the component subtidal rock: the aggregate response would be based on the majority response of all sub-components (infralittoral and circalittoral rock, and subtidal biogenic reef habitats) in the region being assessed, whilst the worst-case assessment would be based on the most sensitive sub-component (here probably Modiolus beds if they were exposed to dredging in the area being assessed). In the aggregate assessment, if, by area, the majority (for example >50% of the total area of subtidal reef habitats) of the sub-components had a low degree of impact from the pressure, the overall component would be assessed to have a low degree of impact. In the worst-case example, if Modiolus beds were assessed against the threshold to have a high

[11] The decision to set the assessment baseline as 'undisturbed' is in line with both the guidance for the OSPAR QSR and the Water Framework Directive.

degree of impact from the abrasion caused by dredging, the overall component would be assessed to have a high degree of impact.

Species group component example

Where applying the assessment based on the aggregate case, assessors simply follow the criteria defined in Appendix 3 as these set the aggregate thresholds. For the worst-case example, any one species deemed to be most sensitive to the pressure would need to have failed any one of the descriptors at the single species population level.

A1.6 Confidence assessment

This is an expert-judgement based approach, relying on a semi-quantitative assessment of a number of aspects. For most pressure/component combinations the information base on which to make such assessments is limited and as such, the score awarded will need to reflect best available knowledge and will probably involve some degree of extrapolation from other systems or other cases. There is a need to explicitly record confidence in these evaluations at each step.

Groups of experts will complete a number of steps following the methodology and complete an audit trail as they go. The audit trail records decisions made at each step of the process and a text record accompanies this explaining the rationale and references used (where available). An analysis of uncertainty is therefore necessary to account for the level of knowledge available to support decisions made at each step. We deal with uncertainty by explicitly recording the confidence, either low or high, behind the assessment made at each active step:

- **High confidence** should be given when data are available, particularly in the form of GIS outputs for the period being assessed, and/or a group of experts (>3) agree that they have high confidence in the assessment.
- **Low confidence** should be given where detailed information is not available for the period being assessed, or is not available at all, and/or there is no agreement, or the number of experts involved is <4.

Having completed all the steps an overall confidence rating is awarded as described in Step C. Where ‘very low’ or ‘low’ overall confidence has been given to a component/pressure combination it may indicate the need for further review and consultation, or a requirement for improved monitoring or research effort for particular issues to enable an improved assessment in future years.

Appendix 2: Descriptors for assessing overall current status of habitat components and the degree of impact from specific pressures

Scope: Habitat components include their physical and biological features. In terms of biological features we refer only to benthic invertebrate species and assemblages, as associated fish and seabirds are covered elsewhere in the assessment. Physical features (and biogenic habitat features) are covered by all three of the threshold descriptors below (range, extent and condition), whilst biological features are covered mainly by the 'condition' descriptor.

A2.1 Current Status relative to former natural conditions

Current status of Habitats is assessed using the descriptors in Table A2.1 on range, extent and condition. The descriptors are adapted from the Favourable Conservation Status Criteria used in the Habitats Directive assessments.

Assessors must first decide the most appropriate category for the current status of each descriptor, relative to former natural conditions, and then, using the criteria in the final row (current status) give an overall score of 'Good', 'Moderate' or 'Poor'. Confidence is recorded for each descriptor and an overall confidence given based on the criteria in the final row of Table A2.1.

Damage can be judged to have occurred where there has been a change in, or loss of, typical or natural elements (for example species, physical structures) of the habitat relative to former natural conditions (see description of baselines in Appendix A1.4) such that structure and/or functioning of the habitat is altered. In terms of a change in biological structure (for example species composition), damage is assumed to have occurred where several typical species of the assemblage have been extirpated from the area. This does not include short-term fluctuations in species whereby a species may be present in one year, absent in the next and present the following year. It must be an example where there has been a sustained change in the composition of species.

Table A2.1 Criteria used to assess the current status of habitat components relative to former natural conditions (Good, Moderate or Poor)

	Status			
Threshold descriptor	**Good**	**Moderate**	**Poor**	**Confidence**
(i) Range	Geographic range of habitat is stable (loss and expansion in balance) AND not smaller than former natural conditions	Geographic range of habitat has decreased <10% relative to former natural conditions AND is not stable	Geographic range of habitat has decreased >10% relative to former natural conditions	*Low or High*
(ii) Area within range (extent)	Total area of habitat is stable (decreases and increases in balance) AND negligible (<1%) loss in total surface area relative to former natural conditions.	Some loss (<10% X >1%) in surface area relative to former natural conditions	Large loss in surface area (>10% relative to former natural conditions)	*Low or High*
(ii) Condition (damage)	Structures and functions (including typical species) in good condition, with small areas (<10% in total) considered to be damaged.	Between 10 – 25% of the total area of the habitat is damaged.	Large area of habitat (>25%) is currently damaged[1] relative to former natural conditions	*Low or High*
Current status	All 'green'	One or more 'amber' but no 'red'	One or more 'red'	<u>Overall confidence</u> Very low = 3/3 'Low' Low = 2/3 'Low' Moderate = 2/3 'High' High = 3/3 'High'

[1]*See definition of damage above*

A2.2 Criteria for assessing Degree of Impact of pressures on habitat components

In assessing the 'Degree of impact' of specific pressures on a component, assessors are asked to decide whether a pressure could have caused the component to move across either of the thresholds for the individual descriptors in Table A2.2. These are the same descriptors as are used to assess current status, but the difference is that assessors are being asked whether Pressure X alone has affected the status of Component Y to the extent that it has caused the component to have, for example, poor Condition or a deterioration in Range. For example, has any one pressure caused damage to between 10 – 25% of the total area of the habitat? If so, that pressure would be described to be having a Moderate degree of impact on the component in terms of condition. In order to select the final 'Degree of Impact' score for each pressure on a component, assessors should take a precautionary approach and use the descriptor that has been given the highest degree of impact score out of the three.

Damage can be judged to have occurred where there has been a change in, or loss of, typical or natural elements (for example species, physical structures) of the habitat relative to former natural conditions (see description of baselines in Appendix A1.4) such that structure and/or functioning of the habitat is altered. In terms of a change in biological structure (for example species composition), damage is assumed to have occurred where several typical species of the assemblage have been extirpated from the area. This does not include short-term fluctuations in species whereby a species may be present in one year, absent in the next and present the following year. It must be an example where there has been a sustained change in the composition of species.

Table A2.2 Criteria used to assess the degree of impact of pressures on habitat components (No/Low, Moderate or High)

	Degree of Impact		
Threshold descriptor	**No/Low**	**Moderate**	**High**
(i) Range	Geographic range of habitat is stable (loss and expansion in balance) AND not smaller than former natural conditions	Geographic range of habitat has decreased <10% relative to former natural conditions AND is not stable	Geographic range of habitat has decreased >10% relative to former natural conditions
(ii) Area within range (extent)	Total area of habitat is stable (decreases and increases in balance) AND negligible (<1%) loss in total surface area relative to former natural conditions.	Some loss (<10% X >1%) in surface area relative to former natural conditions	Large loss in surface area (>10% relative to former natural conditions)
(ii) Condition (damage)	Structures and functions (including typical species) in good condition, with small areas (<10% in total) considered to be damaged.	Between 10 – 25% of the total area of the habitat is damaged.	Large area of habitat (>25%) is currently damaged[1] relative to former natural conditions

[1]See definition of damage above

Appendix 3: Descriptors for assessing overall current status of species group components and the degree of impact from specific pressures

Scope: Species group components include all species represented by a broad ecological component such as ‘Seabirds’ or ‘Cetaceans’. It will be important here to consider any extirpations of species that have occurred in the region being assessed as these would obviously fail descriptors (i) and (ii).

A3.1 Current Status relative to former natural conditions

Current status of Species Group components is assessed using the descriptors in Table A3.1 on range, extent and condition of the species. Most of the descriptors are adapted from the Favourable Conservation Status Criteria used in the Habitats Directive assessments. **The aggregate view is described in the descriptor thresholds.**

Assessors must first decide the most appropriate category for the current status of each descriptor, relative to former natural conditions, and then, using the criteria in the final row (current status) give an overall score of ‘Good’, ‘Moderate’ or ‘Poor’. Confidence is recorded for each descriptor and an overall confidence given based on the criteria in the final row of Table A3.1.

Table A3.1 Criteria used to assess the current status of species group components relative to former natural conditions. Descriptors apply to the aggregate view of a component.

	Status			
Threshold descriptor	**Good**	**Moderate**	**Poor**	**Confidence**
(i) Range	<10% of species have range declines >10% compared to former natural conditions.	10 – 50% of species have range declines >10% compared to former natural conditions	>50% currently have range declines >10% compared to former natural conditions.	Low or High
(ii) Population size (extent)	<10% of species currently have a large decline in population size (>25% relative to former natural conditions)	10 – 50% of species currently have a large decline in population size (>25% relative to former natural conditions)	>50% of species currently have a large decline in population size (>25% relative to former natural conditions)	Low or High
(iii) Population condition	<10% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]	10 – 50% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]	>50% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]	Low or High
Current status	All 'green'	One or more 'amber' but no 'red'	One or more 'red'	Overall confidence Very low = 3/3 'Low' Low = 2/3 'Low' Moderate = 2/3 'High' High = 3/3 'High'

[1]Trend information required for clear deviation in reproduction, mortality or age structure showing a significant deviation from former natural conditions.

A3.2 Criteria for assessing degree of impact of specific pressures on species group components

In assessing the 'Degree of impact' of specific pressures on a component, assessors are asked to decide whether a pressure could have caused the component to move across either of the thresholds for the individual descriptors in Table A3.2. These are the same descriptors as are used to assess current status, but the difference is that assessors are being asked whether Pressure X alone has affected the status of Component Y to the extent that it has caused the component to have, for example, poor Condition or a deterioration in Range. For example, has any one pressure caused any species to decline in population size by up to 25%? If so, that pressure would be described to be having at least a Low degree of impact on the component in terms of population size. In order to select the final 'Degree of Impact' score for each pressure on a component, assessors should take a precautionary approach and use the descriptor that has been given the highest degree of impact score out of all three.

Table A3.2 Criteria used to assess the degree of impact of specific pressures on the species group components. Descriptors apply to the aggregate view of the component; to assess degree of impact for the worst-case example, simply use the threshold values (for example >10% range decline compared to former natural conditions), but as applied to a single species population (descriptors may then only have two options (red or green).

	Degree of Impact		
Threshold descriptor	**No/Low**	**Moderate**	**High**
(ii) Range	<10% of species have range declines >10% compared to former natural conditions.	10 – 50% of species have range declines >10% compared to former natural conditions	>50% currently have range declines >10% compared to former natural conditions.
(iii) Population size (extent)	<10% of species currently have a large decline in population size (>25% relative to former natural conditions)	10 – 50% of species currently have a large decline in population size (>25% relative to former natural conditions)	>50% of species currently have a large decline in population size (>25% relative to former natural conditions)
(iv) Population condition	<10% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]	10 – 50% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]	>50% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]

[1]Trend information required for clear deviation in reproduction, mortality or age structure showing a significant deviation from former natural conditions.

Table A2.1 Criteria used to assess the current status of **habitat** components relative to former natural conditions (Good, Moderate or Poor)

	Status			
Threshold descriptor	**Good**	**Moderate**	**Poor**	**Confidence**
(i) Range	Geographic range of habitat is stable (loss and expansion in balance) AND not smaller than former natural conditions	Geographic range of habitat has decreased <10% relative to former natural conditions AND is not stable	Geographic range of habitat has decreased >10% relative to former natural conditions	Low or High
(ii) Area within range (extent)	Total area of habitat is stable (decreases and increases in balance) AND negligible (<1%) loss in total surface area relative to former natural conditions.	Some loss (<10% X >1%) in surface area relative to former natural conditions	Large loss in surface area (>10% relative to former natural conditions)	Low or High
(ii) Condition (damage)	Structures and functions (including typical species) in good condition, with small areas (<10% in total) considered to be damaged.	Between 10 – 25% of the total area of the habitat is damaged.	Large area of habitat (>25%) is currently damaged relative to former natural conditions	Low or High
Current status	All 'green'	One or more 'amber' but no 'red'	One or more 'red'	Overall confidence Very low = 3/3 'Low' Low = 2/3 'Low' Moderate = 2/3 'High' High = 3/3 'High'

Table A2.2 Criteria used to assess the degree of impact of pressures on habitat components (No/Low, Moderate or High)

	Degree of Impact		
Threshold descriptor	**No/Low**	**Moderate**	**High**
(i) Range	Geographic range of habitat is stable (loss and expansion in balance) AND not smaller than former natural conditions	Geographic range of habitat has decreased <10% relative to former natural conditions AND is not stable	Geographic range of habitat has decreased >10% relative to former natural conditions
(ii) Area within range (extent)	Total area of habitat is stable (decreases and increases in balance) AND negligible (<1%) loss in total surface area relative to former natural conditions.	Some loss (<10% X >1%) in surface area relative to former natural conditions	Large loss in surface area (>10% relative to former natural conditions)
(ii) Condition (damage)	Structures and functions (including typical species) in good condition, with small areas (<10% in total) considered to be damaged.	Between 10 – 25% of the total area of the habitat is damaged.	Large area of habitat (>25%) is currently damaged[1] relative to former natural conditions

Table A3.1 Criteria used to assess the current status of **species** group components relative to former natural conditions. Descriptors apply to the aggregate view of a component.

	Status			
Threshold descriptor	**Good**	**Moderate**	**Poor**	**Confidence**
(i) Range	<10% of species have range declines >10% compared to former natural conditions.	10 – 50% of species have range declines >10% compared to former natural conditions	>50% currently have range declines >10% compared to former natural conditions.	Low or High
(ii) Population size (extent)	<10% of species currently have a large decline in population size (>25% relative to former natural conditions)	10 – 50% of species currently have a large decline in population size (>25% relative to former natural conditions)	>50% of species currently have a large decline in population size (>25% relative to former natural conditions)	Low or High
(iii) Population condition	<10% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]	10 – 50% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]	>50% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]	Low or High
Current status	All 'green'	One or more 'amber' but no 'red'	One or more 'red'	Overall confidence Very low = 3/3 'Low' Low = 2/3 'Low' Moderate = 2/3 'High' High = 3/3 'High'

[1]Trend information required for clear deviation in reproduction, mortality or age structure showing a significant deviation from former natural conditions.

Table A3.2 Criteria used to assess the degree of impact of specific pressures on the species group components. Descriptors apply to the aggregate view of the component; to assess degree of impact for the worst-case example, simply use the threshold values (for example >10% range decline compared to former natural conditions), but as applied to a single species population (descriptors may then only have two options (red or green).

	Degree of Impact		
Threshold descriptor	**No/Low**	**Moderate**	**High**
(ii) Range	<10% of species have range declines >10% compared to former natural conditions.	10 – 50% of species have range declines >10% compared to former natural conditions	>50% currently have range declines >10% compared to former natural conditions.
(iii) Population size (extent)	<10% of species currently have a large decline in population size (>25% relative to former natural conditions)	10 – 50% of species currently have a large decline in population size (>25% relative to former natural conditions)	>50% of species currently have a large decline in population size (>25% relative to former natural conditions)
(iv) Population condition	<10% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]	10 – 50% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]	>50% of species have strong deviations in reproduction, mortality or age structure relative to former natural conditions[1]

[1]Trend information required for clear deviation in reproduction, mortality or age structure showing a significant deviation from former natural conditions.

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Annex 3 – Composition of subgroups

Rocky and biogenic reef habitats
Steven Benjamins (UK)
Patrick Camus (FR) – Chair
Hartvig Christie (NO)
Eugene Nixon (IE) – Rapporteur
Fernando Tempera (PT)

Shallow sediment habitats
Torjan Bodvin (NO)
Robbert Jak (NL) – Rapporteur
Mats Lindegarth (SE)
Stephen Malcolm (UK) – Chair
Thomas Merck (DE)
Fernando Tempera (PT)
Rona Vink (NL)
Christine Wenzel (DE)

Shelf sediment habitats
Per Erik Iversen (NO)
Adrian Judd (UK) – Rapporteur
Thomas Merck (DE)
Eike Rachor (DE)
Cristina Rodriguez Cabello (ES)
Francisco Sanchez (ES)
Anne-Britt Storeng (NO)
Ralph Wasserthal (DE) – Chair
Rob Witbaard (NL)
Lucia Viñas Dieguez (ES)

Deep-sea habitats
Angela Benn (UK)
Pål Buhl Mortensen (NO)
Alan Hughes (UK)
Filipe Porteiro (PT) – Rapporteur
Francisco Sanchez (ES)
Mark Tasker (ICES) – Chair

Fish
Heino Fock (DE)
Simon Greenstreet (UK)
Pilar Pereda (ES)
Gerjan Piet (NL) – Rapporteur
David Reid (IE)
Stuart Rogers (UK) – Chair

Cetaceans and seals
Arne Bjørge (NO) – Co-Chair
Philip Bloor (UK)
Callan Duck (UK) – Rapporteur
Santiago Lens (ES)
Nils Øien (NO) – Rapporteur
Meike Scheidat (NL) – Co-Chair
Mónica Silva (PT)

Seabirds
Philip Bloor (UK)
Mardik Leopold (NL)
Maria Magalhães (PT)
Jim Reid (UK) – Chair
Ana Tejedor Arceredillo (ES) – Rapporteur

Floaters during subgroup sessions (pressure experts and MAQ HODs)
Joop Bakker (NL)
John Campbell (OGP)
Sverker Evans (SE)
Justin Gwynn (NO)
Runar Mathisen (NO)
Colin Moffat (UK)
Bernard Moutou (FR)
Richard Moxon (UK)
Lex Oosterbaan (NL)
Stefan Schmolke (DE)
Katy Ware (UK)
Stefanie Werner (DE)
Gert Verreet (EC)

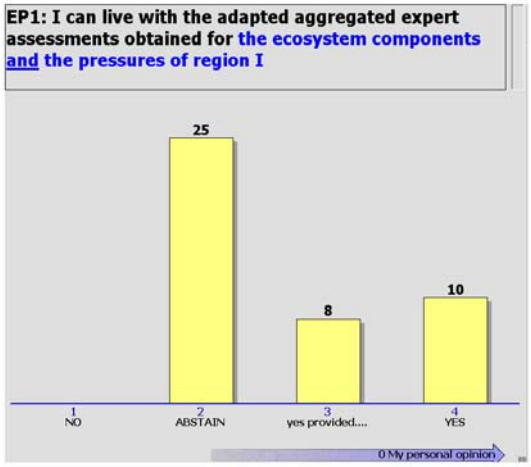
Attended part-week only
Laure Dallem (FR)
Ainhoa Pérez Puyol (ES)
Carien van Zwol (NL)
Agnes Vince (FR)
Andrea Weiss (OSPAR)
Wanda Zevenboom (NL)

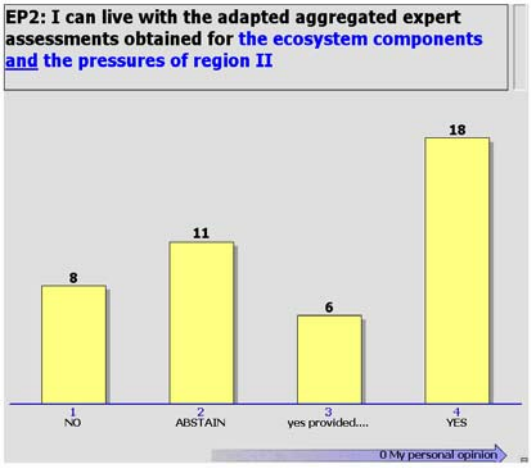
Workshop convenors
David Connor (UK)
Lisette Enserink (NL)
Richard Emmerson (OSPAR)
Chris Karman (NL)
Leonie Robinson (UK)

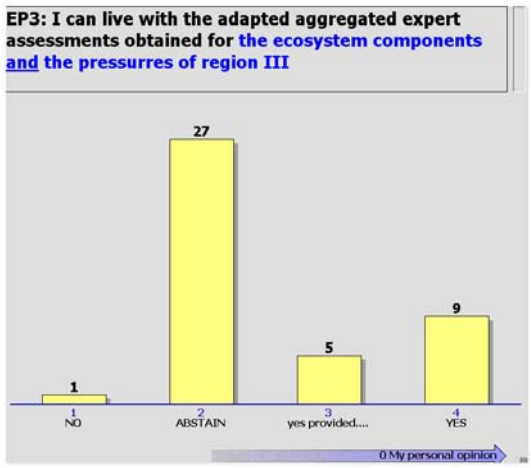
Workshop facilitators
Ton Kuik (NL)
Pepijn Nicolas (NL)
Morten Pedersen (NL

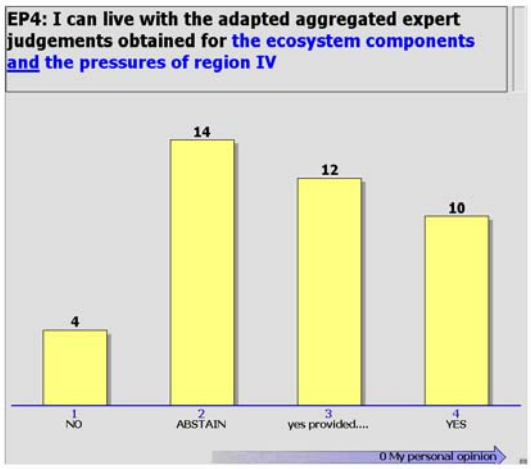
Annex 4 – Results from electronic voting sessions

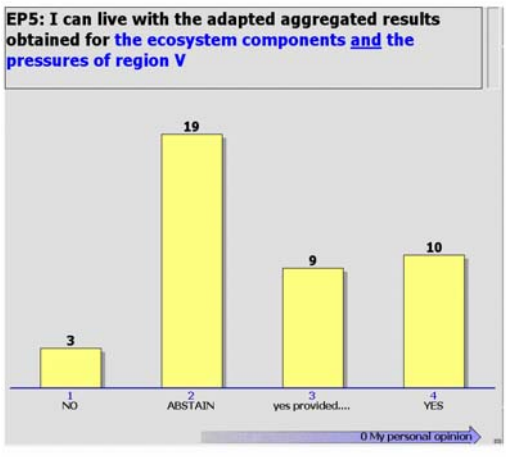
The following slides show the results from the voting session regarding the level of acceptability of the overall assessments for each Region (after the subgroups had checked them for consistency). Each participant was able to vote once for each Region. Participants with little expertise in a Region tended to abstain. Participants with specific concerns about the assessments (for example voting “Yes, provided…” or “No”) were asked to provide further details; these are included in the set of comments on the workshop in Annex 8.











Annex 5 – Summary results from the workshop

Regional summaries – overall assessments

Explanation for each assessment table:

a. The overall status of each component is shown as Good (G; green), Moderate (M; amber) or Poor (P; red) (see Annex 1 for details on assessment criteria and threshold values).

b. The depth ranges covered by the habitat types are as follows (see Figure 1 for map): Rock and biogenic reef habitats (Highest Astronomical Tide HAT-200 m); Shallow sediment habitats (HAT-50 m); Shelf sediment habitats (50 – 200 m); Deep-sea habitats (upper) (200 – 1000 m); Deep-sea habitats (lower) (>1000 m). Assessments of seabed habitats include their associated benthic communities, except fish which were assessed separately.

c. Confidence in the assessment is rated as High (****), Moderate (***), Low (**) or Very Low (*).

d. The pressures which caused a Moderate (M) or High (H) degree of impact are listed in the 'Main pressures' column of the overall assessment.

e. Where certain aspects of the ecosystem component (particular species, habitats or areas) have been identified as being in poorer condition than the component as a whole, these have been listed as 'worst-case examples', indicating which pressures are considered to have most affected their status. The list of examples is not exhaustive.

Low confidence in overall assessment

Where the overall assessments (Step A of the assessment methodology) received a low or very low confidence rating, the detailed assessments against pressures (Steps B and C) have been examined to determine how well they support the confidence rating in the overall assessment. In some cases the low/very low confidence rating does not seem appropriate when compared to the confidence rating given for the impacts of the pressures which most contribute to the overall status rating. Comments have been added as footnotes against the relevant assessments.

Table A5.1 Summary results from assessments for Region I – Arctic Waters

Overall assessment				**Worst-case examples**	
Ecosystem component	**Status**	**Confidence**	**Main pressures**	**Ecosystem component**	**Main pressures**
Fish	M	**[1]	(M) Removal of species (target & non-target)	Pelagic Redfish	Removal of species (target & non-target)
Cetaceans	M	***	(M) Removal of species (target & non-target)	Bowhead Whales	Removal of species (target & non-target) Climate change
Seals	P	****	(H) Climate change (H) Habitat loss	Phocid seals breeding on sea ice. Hooded seals.	Climate change
Seabirds	M[2]	***	(M) Climate change (M) Removal of species (target & non-target)	Small gulls, Ivory gull and kittiwake	Climate change
Rock & biogenic reef habitats	M	*[3]	(M) Climate change (M) Habitat damage	Lophelia pertusa reef	Habitat damage
Shallow sediment habitats	M	****	(M) Introduction of non-indigenous species & translocations	Gastropods in/close to harbours (TBT)	Contamination by hazardous substances
Shelf sediment habitats	M	***	(M) Removal of species (target & non-target) (M) Habitat damage	Arctica islandica	Habitat damage
Deep-sea habitats (upper)	M	***		Coral reefs	Habitat damage

[1] *Moderate status is primarily due to removal of target and non target species. The confidence of this impact is high.*

[2] Moderate status appears to be the right judgement on the basis of the criteria used during the workshop (Annex I); however there is concern about the poor status of seabirds in Arctic waters, as indicated by, for example, recent trends in populations for a number of seabird species in the Barents Sea and Norwegian Sea.

[3] Moderate status is primarily due to climate change and habitat damage. The confidence of these impacts is low.

Table A5.2 Summary results from assessments for Region II – Greater North Sea

Overall assessment				**Worst-case examples**	
Ecosystem component	**Status**	**Confidence**	**Main pressures**	**Ecosystem component**	**Main pressures**
Fish	M	****	(M) Removal of species (target & non-target)	Common Skate	Removal of species (target & non-target)
Cetaceans	M	*[4]		N/A	N/A
Seals	G	****		Harbour seals (PCBs)	Contamination by hazardous substances
Seabirds	M	****	(M) Climate change	Loss of De Beer nature reserve for extension to Rotterdam Harbour	Habitat loss
Rock & biogenic reef habitats	M	***	(M) Climate change (M) Removal of species (target & non-target)	Rapid recent expansion of *Crassostrea* into biogenic reef structures	Climate change
Shallow sediment habitats	P	****	(H) Removal of species (target & non-target) (H) Habitat damage (M) Introduction of non-indigenous species & translocations (M) Organic enrichment	Coastal zone (<5 m) Gastropods in/close to harbours: TBT	Habitat loss Contamination by hazardous substances
Shelf sediment habitats	M	****	(M) Removal of species (target & non-target) (M) Habitat damage	*Arctica islandica*	Habitat damage
Deep-sea habitats (upper)	M	***	M) Removal of species (target & non-target) (M) Habitat damage (M) Siltation raye changes	Coral reefs and sponge beds in the Faroe-Shetland Channel	Habitat damage
Deep-sea habitats (lower)	G	****			

[4] Unclear which pressures are responsible for moderate status. Low confidence of status assessment mainly due to insufficient monitoring data on population size and condition and geographic extent.

Table A5.3 Summary results from assessments for Region III – Celtic Seas

Overall assessment				**Worst-case examples**	
Ecosystem component	**Status**	**Confidence**	**Main pressures**	**Ecosystem component**	**Main pressures**
Fish	M	****	(M) Removal of species (target & non-target)	Cod, Haddock, Whiting	Removal of species (target & non-target)
Cetaceans	M	*[5]		N/A	N/A
Seals	G	****		Harbour seals: construction of causeways in the Outer Hebrides (UK) resulted in abandonment of haul out sites	Barrier to species movement (behaviour, reproduction)
Seabirds	M	****	(M) Introduction of non-indigenous species & translocations	Kittiwakes Roseate Terns	Climate change Habitat damage
Rock & biogenic reef habitats	M	****		*Lophelia* reefs	Habitat damage
Shallow sediment habitats	M	****	(M) Removal of species (target & non-target) (M) Habitat damage	in/close to harbours: TBT impacting gastropods	Contamination by hazardous substances
Shelf sediment habitats	M	****	(M) Removal of species (target & non-target) (M) Habitat damage	None identified	N/A
Deep-sea habitats (upper)	Not present		N/A	Not present	N/A
Deep-sea habitats (lower)	Not present		N/A		

[5] Unclear which pressures are responsible for moderate status. Low confidence of status assessment mainly due to insufficient monitoring data on population size and condition and geographic extent.

Table A5.4 Summary results from assessments for Region IV – Bay of Biscay and Iberian Coast

Overall assessment				**Worst-case examples**	
Ecosystem component	**Status**	**Confidence**	**Main pressures**	**Ecosystem component**	**Main pressures**
Fish	M	***	(M) Removal of species (target & non-target)	Southern Hake	Removal of species (target & non-target)
Cetaceans	M	*[6]		Northern Right Whale	Removal of species (target & non-target)
Seals	G	***		Harbour and grey seals at southern limit of breeding range; susceptible to increasing temperatures	Climate change
Seabirds	M	****	(M) Habitat loss (M) Habitat damage	*Uria aalge* is genetically extinct in Region IV; regarded by some as sub-species (*ibericus*). Severely affected by Prestige oil spill	Contamination by hazardous substances
Rock & biogenic reef habitats	M	***	(M) Climate change (M) Removal of species (target & non-target)	Loss of kelp due to warmer waters along Portuguese coasts – southern distribution limit appears to be shifting northwards	Climate change
Shallow sediment habitats	M	***	(M) Introduction of non-indigenous species & translocations	in/close to harbours: TBT impacting gastropods	Contamination by hazardous substances
Shelf sediment habitats	M	***	(M) Removal of species (target & non-target) (M) Habitat Damage	N/A	N/A
Deep-sea habitats (upper)	M	***		Destruction of mud volcanoes in Cadiz Bay by *Nephrops* fisheries	Habitat damage
Deep-sea habitats (lower)	G	****			

[6] Unclear which pressures are responsible for moderate status. Low confidence of status assessment mainly due to insufficient monitoring data on population size and condition and geographic extent.

Table A5.5 Summary results from assessments for Region V – Wider Atlantic

Overall assessment				**Worst-case examples**	
Ecosystem component	**Status**	**Confidence**	**Main pressures**	**Ecosystem component**	**Main pressures**
Fish	M	*[7]	(M) Removal of species (target & non-target)	Overexploitation in shelf fisheries (*for example* Orange Roughy, squaliforms)	Removal of species (target & non-target)
Cetaceans	M	*[8]	(M) Removal of species (target & non-target)	N/A	N/A
Seals	P	*[9]	(H) Climate change	Mediterranean monk seals lost from Azores 300 years ago, probably due to hunting	Removal of species (target & non-target)
Seabirds	M	****	(M) Introduction of non-indigenous species & translocations (M) Habitat loss (M) Habitat damage	Significant loss of breeding space for unique island fauna in Azores over time	Habitat loss
Rock & biogenic reef habitats	G	***		Biogenic reefs (*Lophelia*) on Rockall, Porcupine and Hatton banks	Habitat loss Habitat damage
Shallow sediment habitats	G	****		N/A	N/A
Shelf sediment habitats	G	***		N/A	N/A
Deep-sea habitats (upper)	P	****		Destruction of coral reefs on Hatton bank; coral gardens on seamounts	Habitat damage
Deep-sea habitats (lower)	G	****			

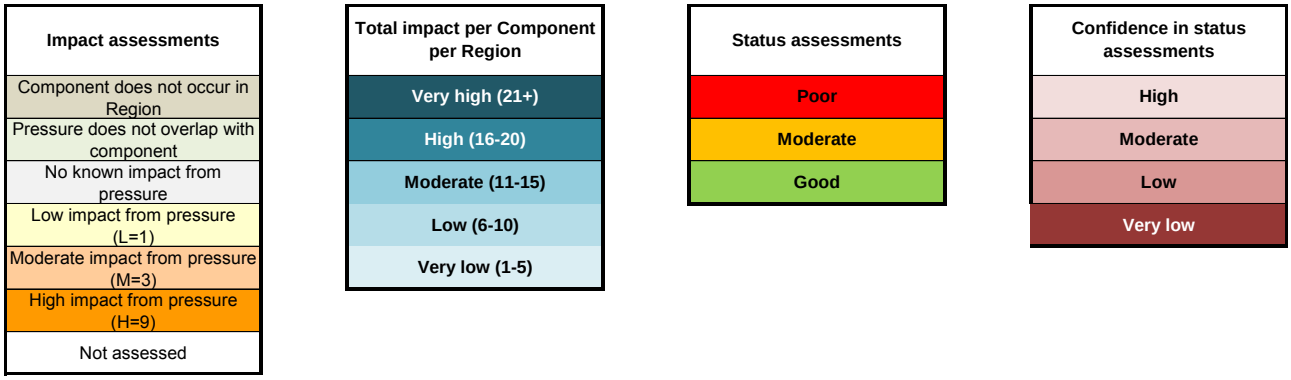
[7] Moderate status is primarily due to removal of target and non target species. The confidence of this impact is moderate.

[8] Moderate status is primarily due to removal of target and non target species. The confidence of this impact is high.

[9] Poor status is primarily due to climate change. The confidence of this impact is moderate.

Regional summaries –assessments of pressures

Key to colour coding in Tables A5.6 – A5.10:



The pressure assessments in Tables A5.6 – 10 each have two letters:

- First letter is the Degree of Impact, where L = No/Low impact; M = Moderate impact; H = High impact;
- Second letter is the Recovery period, where H = High (0 – <2 yrs); M = Medium (2 – <10 yrs); L = Low (10 – <100 yrs); N = None (>100 yrs, or no recovery possible).

For each pressure, the following scores were assigned: 1 for Low impact, 3 for Moderate impact, 9 for High impact. The scores have then been summed across the 22 pressures in each region to give a cumulative *Total impact* score for each ecosystem component. These have then been categorised into one of five classes (Very high to Very low) as shown above.

Table A5.6 Summary results from pressures assessments for Region I – Arctic Waters

		Region I							
		Fish	Cetaceans	Seals	Seabirds	Rock & biogenic reef habitats	Shallow sediment habitats	Shelf sediment habitats	Deep-sea habitats
Climate change	Climate change	L - N	L - L	H - N	M - L	M - N	L - L	L - N	L - N
Hydrological pressures (local)	Temperature changes (local)	-	-	-	-	-	L - H	-	-
	Salinity changes (local)	-	-	-	-	-	L - H	-	-
	Changes in water flow, wave action & emergence regime (inshore/local)	-	-	-	-	-	L - H	-	-
Pollution & other chemical pressures	Contamination by hazardous substances	L - L	L - L	L - L	L - M	L - M	L - L	L - L	L - L
	Radionuclide contamination	-	-	-	-	-	-	-	-
	De-oxygenation	-	-	-	-	-	L - M	L - L	L - L
	Nitrogen & phosphorus enrichment	-	L - M	L - M	-	L - M	L - M	L - M	L - L
	Organic enrichment	L - M	-	-	-	L - H	L - M	L - L	L - L
Other physical pressures	Electromagnetic changes	-	L -	-	-	-	-	-	-
	Litter	L - M	L - L	L - L	-	-	-	L - L	L - N
	Underwater noise	L - H	L - H	L - H	-	-	-	-	-
	Barrier to species movement	-	L - H	L - M	L - H	-	-	-	-
	Death or injury by collision	-	L - L	L - L	L - H	-	-	-	-
Habitat changes	Siltation rate changes	-	L -	-	-	-	L - M	L -	L - M
	Habitat damage	L - L	L - M	L - L	L - M	M - M	L - M	M - L	L - L
	Habitat loss	-	L - L	H - N	L - N	L - M	L - N	L - L	L - L
Biological pressures	Visual disturbance	-	-	-	-	-	-	-	-
	Genetic modification	-	-	-	-	-	-	-	-
	Introduction of microbial pathogens	-	L -	L - M	-	-	-	-	-
	Introduction of non-indigenous species &	L - H	-	-	L - L	L - M	M - N	L -	L - N
	Removal of species (target & non-target)	M - L	M - L	L - M	M - M	L - H	L - M	M - L	L - L
	Total impact	**10**	**15**	**27**	**12**	**12**	**15**	**15**	**11**
								200-1000m	Deep sea >1000m
	Status assessment	Moderate	Moderate	Poor	Moderate	Moderate	Moderate	Moderate	Moderate	Good
	Confidence in status assessment	Low	Moderate	High	Moderate	Very low	High	Moderate	Moderate	High

Table A5.7 Summary results from pressures assessments for Region II – Greater North Sea

		Region II							
		Fish	Cetaceans	Seals	Seabirds	Rock & biogenic reef habitats	Shallow sediment habitats	Shelf sediment habitats	Deep-sea habitats
Climate change	Climate change	L - N	L - L	L - M	M - L	M - N	L - L	L - N	L - N
Hydrological pressures (local)	Temperature changes (local)	-	-	-	-	-	L - H	-	-
	Salinity changes (local)	-	-	-	-	-	L - H	-	-
	Changes in water flow, wave action & emergence regime (inshore/local)	-	-	-	-	-	L - H	-	-
Pollution & other chemical pressures	Contamination by hazardous substances	L - L	L - L	L - L	L - M	L - M	L - L	L - L	L - L
	Radionuclide contamination	-	-	-	-	-	-	-	-
	De-oxygenation	L - H	L - M	L - M	-	L - M	L - M	L - L	L - L
	Nitrogen & phosphorus enrichment	-	L - M	L - M	-	L - M	L - M	L - M	L - L
	Organic enrichment	L - M	-	-	-	L - H	M - M	L - L	L - L
Other physical pressures	Electromagnetic changes	-	L -	-	-	-	-	-	-
	Litter	L - H	L - L	L - L	-	-	-	L - L	L - N
	Underwater noise	L - H	L - H	L - H	-	-	-	-	-
	Barrier to species movement	-	L - H	L - L	L - H	-	-	-	-
	Death or injury by collision	-	L - L	L - L	L - H	-	-	-	-
Habitat changes	Siltation rate changes	L - H	L -	L - M	L - H	L - M	L - M	L -	M - M
	Habitat damage	L - L	L - M	L - L	L - M	L - M	H - M	M - L	M - L
	Habitat loss	L - N	L - L	L - L	L - N	L - N	L - N	L - L	L - L
Biological pressures	Visual disturbance	-	-	-	-	-	-	-	-
	Genetic modification	-	-	-	-	-	-	-	-
	Introduction of microbial pathogens	-	L -	L - M	-	-	-	-	-
	Introduction of non-indigenous species &	L - H	-	-	L - L	L - M	M - N	L -	L -
	Removal of species (target & non-target)	M - L	L - L	L - H	L - M	M - M	H - M	M - L	M - L
	Total impact	**13**	**14**	**13**	**11**	**14**	**33**	**15**	**17**
								200-1000m	Deep sea >1000m
	Status assessment	Moderate	Moderate	Good	Moderate	Moderate	Poor	Moderate	Moderate	Good
	Confidence in status assessment	High	Very low	High	High	Moderate	High	High	Moderate	High

Table A5.8 Summary results from pressures assessments for Region III – Celtic Seas

		Region III							
		Fish	Cetaceans	Seals	Seabirds	Rock & biogenic reef habitats	Shallow sediment habitats	Shelf sediment habitats	Deep-sea habitats
Climate change	Climate change	L - N	L - L	L - M	L - L	L - N	L - L	L - N	-
Hydrological pressures (local)	Temperature changes (local)	-	-	-	-	-	L - H	-	-
	Salinity changes (local)	-	-	-	-	-	L - H	-	-
	Changes in water flow, wave action & emergence regime (inshore/local)	-	-	-	-	-	L - H	-	-
Pollution & other chemical pressures	Contamination by hazardous substances	L - L	L - L	L - L	L - M	L - M	L - L	L - L	-
	Radionuclide contamination	-	-	-	-	-	-	-	-
	De-oxygenation	-	L - M	L - M	-	-	L - M	L - L	-
	Nitrogen & phosphorus enrichment	-	L - M	L - M	-	L - M	L - M	L - M	-
	Organic enrichment	L - M	-	-	-	L - H	L - M	L - L	-
Other physical pressures	Electromagnetic changes	-	L -	-	-	-	-	-	-
	Litter	L - H	L - L	L - L	-	-	-	L - L	-
	Underwater noise	L - H	L - H	L - H	-	-	-	-	-
	Barrier to species movement	-	L - H	L - N	L - H	-	-	-	-
	Death or injury by collision	-	L - L	L - L	L - H	-	-	-	-
Habitat changes	Siltation rate changes	L - H	L -	L - N	-	L - M	L - M	L -	-
	Habitat damage	L - L	L - M	L - L	L - M	L - L	M - M	M - L	-
	Habitat loss	L - N	L - L	L - L	L - N	L - N	L - N	L - L	-
Biological pressures	Visual disturbance	-	-	-	-	-	-	-	-
	Genetic modification	-	-	-	-	-	-	-	-
	Introduction of microbial pathogens	-	L -	L - M	-	-	-	-	-
	Introduction of non-indigenous species &	L - H	-	-	M - L	L - M	L - N	L -	-
	Removal of species (target & non-target)	M - L	L - L	L - M	L - M	L - M	M - M	M - L	-
	Total impact	**12**	**14**	**13**	**10**	**9**	**17**	**15**	**0**
								200-1000m	Deep sea >1000m
	Status assessment	Moderate	Moderate	Good	Moderate	Moderate	Moderate	Moderate	Not present	Not present
	Confidence in status assessment	High	Very low	High	High	High	High	High		

Table A5.9 Summary results from pressures assessments for Region IV – Bay of Biscay and Iberian coast

		Region IV							
		Fish	Cetaceans	Seals	Seabirds	Rock & biogenic reef habitats	Shallow sediment habitats	Shelf sediment habitats	Deep-sea habitats
Climate change	Climate change	L - N	L - L	L - M	L - L	M - N	L - L	L - N	L - N
Hydrological pressures (local)	Temperature changes (local)	-	-	-	-	-	L - H	-	-
	Salinity changes (local)	-	-	-	-	-	L - H	-	-
	Changes in water flow, wave action & emergence regime (inshore/local)	-	-	-	-	-	L - H	-	-
Pollution & other chemical pressures	Contamination by hazardous substances	L - L	L - L	L - L	L - M	L - M	L - L	L - L	L - L
	Radionuclide contamination	-	-	-	-	-	-	-	-
	De-oxygenation	-	L - M	L - M	-	L - M	L - M	-	-
	Nitrogen & phosphorus enrichment	-	L - M	L - M	-	L - M	L - M	-	-
	Organic enrichment	L - M	-	-	-	L - H	L - M	L - L	-
Other physical pressures	Electromagnetic changes	-	L -	-	-	-	-	-	-
	Litter	L - H	L - L	L - L	-	-	-	L - L	L - N
	Underwater noise	L - H	L - H	L - H	-	-	-	-	-
	Barrier to species movement	-	L - H	L - N	L - H	-	-	-	-
	Death or injury by collision	-	L - L	L - L	L - H	-	-	-	-
Habitat changes	Siltation rate changes	L - H	L -	-	-	L - M	L - M	L -	L - M
	Habitat damage	L - L	L - M	L - L	M - M	L - M	-	M - L	L - L
	Habitat loss	L - N	L - L	L - L	M - N	L - N	L - N	L - L	L - L
Biological pressures	Visual disturbance	-	-	-	-	-	-	-	-
	Genetic modification	-	-	-	-	-	-	-	-
	Introduction of microbial pathogens	-	L -	L - M	-	-	-	-	-
	Introduction of non-indigenous species &	-	-	-	L - L	L - H	M - N	L -	-
	Removal of species (target & non-target)	M - L	L - L	L - L	L - M	M - M	-	M - L	L - L
	Total impact	**11**	**14**	**12**	**13**	**14**	**13**	**13**	**7**
								200-1000m	Deep sea >1000m
	Status assessment	Moderate	Moderate	Good	Moderate	Moderate	Moderate	Moderate	Moderate	Good
	Confidence in status assessment	Moderate	Very low	Moderate	High	Moderate	Moderate	Moderate	Moderate	High

Table A5.10 Summary results from pressures assessments for Region V – Wider Atlantic

		Region V							
		Fish	Cetaceans	Seals	Seabirds	Rock & biogenic reef habitats	Shallow sediment habitats	Shelf sediment habitats	Deep-sea habitats
Climate change	Climate change	L - N	L - L	H - M	L - L	L - N	L - L	L - N	L - N
Hydrological pressures (local)	Temperature changes (local)	-	-	-	-	-	-	-	-
	Salinity changes (local)	-	-	-	-	-	-	-	-
	Changes in water flow, wave action & emergence regime (inshore/local)	-	-	-	-	-	-	-	-
Pollution & other chemical pressures	Contamination by hazardous substances	L - L	L - L	-	L - M	L - M	-	-	L - L
	Radionuclide contamination	-	-	-	-	-	-	-	-
	De-oxygenation	-	-	-	-	-	-	-	-
	Nitrogen & phosphorus enrichment	-	-	-	-	L - H	-	-	-
	Organic enrichment	-	-	-	-	L - H	-	-	-
Other physical pressures	Electromagnetic changes	-	L -	-	-	-	-	-	-
	Litter	L - M	L - L	L - L	-	-	-	L - L	L - N
	Underwater noise	-	L - H	L - H	-	-	-	-	-
	Barrier to species movement	-	-	-	-	-	-	-	-
	Death or injury by collision	-	L - L	L - L	L - H	-	-	-	-
Habitat changes	Siltation rate changes	-	L -	-	-	L - M	-	L -	L - M
	Habitat damage	L - L	L - M	L - L	M - M	L - L	-	L - H	L - L
	Habitat loss	-	-	-	M - N	L - N	L - N	L - L	L - L
Biological pressures	Visual disturbance	-	-	-	-	-	-	-	-
	Genetic modification	-	-	-	-	-	-	-	-
	Introduction of microbial pathogens	-	L -	L - M	-	-	-	-	-
	Introduction of non-indigenous species &	-	-	-	M - L	L - M	L - N	L -	-
	Removal of species (target & non-target)	M - L	M - L	L - N	L - M	L - M	-	L - L	L - L
	Total impact	**7**	**12**	**15**	**13**	**9**	**3**	**7**	**7**
								200-1000m	Deep sea >1000m
	Status assessment	Moderate	Moderate	Poor	Moderate	Good	Good	Good	Poor	Good
	Confidence in status assessment	Very low	Very low	Very low	High	Moderate	High	Moderate	High	High

Regional summaries –key messages

Region I: Arctic Waters

Overall assessment What key comments should be made on the results of the overall assessment? for example aspects that should be highlighted (striking outcomes)	• climate change is important pressure in the Region and particularly affects ice habitat for marine mammals (for example breeding ground for seals, ice association for bowheads and polar bears) • [seabird status and associated pressure (habitat loss) is unexpected. Status was expected to be worse] • recovery is in general slower in cold waters and explains status being moderate (for example worse than expected)
Worse and better areas Are there significant areas within the region that differ markedly from the overall assessment status for any components? Are there significant areas within the region where main pressures are not an issue?	• spread of non-indigenous crab species in shallow and deeper waters which exerts pressures on the food web. Snow crab spreads in Barents Sea, king crab spreads in the South along Norwegian coast • concern of declining kelp forests along northern Norwegian coast due to increased feeding of sea urchin. Various reasons may contribute to this but there is no firm evidence • stress on benthic habitat due to fisheries (see Arctica example in Icelandic waters) • no such areas
Confidence Which are the most important issues affecting the confidence of the assessment in the region?	• level of knowledge differs between species and habitats and is lowest in the deepest of deep sea (*Note: look at confidence levels in the regional assessment sheet for consistency*) • method masks the real status of the deep seas due to the scales used • additional stress from UV may impact macroalgae but there is no firm evidence • available information of the group was better for the East of Region I than the West
Future trends Which important future trends need to be highlighted including pressures with no current effect?	• melting ice and retreat of marginal ice zones will o induce changes to ecosystems (for example fish and seabirds moving North) o give new opportunities for human activities and change in pressures (for example shipping; oil production in northern parts) o polar bears and other species depending on ice habitats may be more adversely affected o oxygen conditions may worsen in deep sea in coming years • increasing pressure from tourism (for example Svalbard) • (increased acidification may have adverse effects on *Lophelia* and carbon-shell generating species)
Past successes Have past pressures on specific components been reduced?	• overall reduction of pressures on coral reefs due to measures (management of damaging activities, including MPAs) • unregulated fishing has decreased • management plan for the Barents Sea
Priorities for action What should be the priorities for action, in terms of: - management measures - monitoring and assessment (and indicator development under MSFD) - research?	• better spatial coverage of habitat mapping • research on possible impact of UV on coastal ecosystems • more investigation into seabird trends and their effects on the ecosystem

Region II: Greater North Sea

Overall assessment What key comments should be made on the results of the overall assessment for example aspects that should be highlighted (striking outcomes)	• Overall the Region II has a moderate score for status, however, almost in any component there are worst cases with poor conditions • There is two exceptions for the overall moderate score, one is seals being rated to be in a good status; the other would be the shallow sediment habitats scoring poor • The main pressures identified in Region II are climate change, habitat damage and loss as well as removal of species
Worse and better areas Are there significant areas within the region that differ markedly from the overall assessment status for any components Are there significant areas within the region where main pressures are not an issue	• There are areas, in particular the shallow habitats (sediment, rocky and biogenic), that are significantly impacted, compared to the overall status of Region II • Examples of worst case assessments are: o 1. decline of about 40 fish species: a result of fishery[10] o 2. decline in biogenic reef habitat o 3. impact of specific hazardous substances (for example TBT) o 4. seabirds in the northern North sea (decline due to breeding failure) • Prevailing eutrophication in the coastal areas of the North Sea
Confidence Which are the most important issues affecting the confidence of the assessment in the region	• Overall the confidence of our assessment was high, with the exception of for example cetaceans where baseline data as well as current data is lacking • Strong concerns have been raised on the scale, thresholds and the consideration of community effects used in the assessment
Future trends Which important future trends need to be highlighted including pressures with no current effect	• Climate change • Fishery is declining: effect on habitat loss, removal of species • Renewable energies: increase in offshore construction for renewable energies (habitat change, etc.)
Past successes Have past pressures on specific components been reduced	• In general several pressures (for example fishery, nutrients, hazardous substances) have been reduced, however, the pressures are still present and continue to have an impact on components
Priorities for action What should be the priorities for action, in terms of: - management measures - monitoring and assessment (and indicator development under MSFD) - research	• research in areas where data is lacking, including the impact of new activities • further development of the method is needed • further reduction of fishery pressure • establishing of well-managed Marine Protected Areas • implement mitigation measures on the impacts of climate change

[10] An further explanation of the status of fish was provided by the Region II group: Moderate was defined as 10% to 50% of species showing a population decline of >25%. Many species in the North Sea have certainly declined by such a level. Most commercial species, despite recent improvements, still have population sizes around 50-60% of levels prevalent in the early 1980s. Many non-target species have been driven to abundance levels that are 10-20% of those prevalent earlier in the 20th century. Taken in total, it is possible to list at least 30 to 40 species where population declines >25% are evident. However, the total species suite in the North Sea numbers approximately 250. Consequently, these data would suggest the a component status score of moderate is appropriate. Many scientists would feel uncomfortable with this result. The fact is that as many as 40n species can clearly be shown to have declined in abundance as a direct result of human activities in the North Sea. The current definition of the criteria directly leads to a moderate score. An alternative definition would undoubtedly produce a different result; one that many scientists might feel was more appropriate.

Region III: Celtic Seas

Overall assessment What key comments should be made on the results of the overall assessment for example aspects that should be highlighted (striking outcomes)	• Predominantly moderate apart from seals which were of good status. High confidence in all assessments apart from cetaceans (there is a reasonably comprehensive one-off survey, but no trend information due to extremely limited monitoring programmes in the area as a whole) • Within the predominately moderate classifications, there were a number of local problems flagged up as "worst case" examples • Climate change has come out as a main pressure in all components apart from seals. However the conclusions on climate change were not based on a substantial evidence base. For most of the region, climate change has not yet led to physical parameter change outside the range of historic variation. • Shallow sediments were also expected to be affected by climate change but other direct pressures predominated • Pressure caused by removal of removal of targeted species is diminishing due to decline in fishing effort and capacity
Worse and better areas Are there significant areas within the region that differ markedly from the overall assessment status for any components Are there significant areas within the region where main pressures are not an issue	• Cod, haddock and whiting are all considered to have reduced reproductive capacity, and high total mortality in the west of Scotland. Assessments are uncertain elsewhere in the region, but ICES advice indicates low biomass and high fishing mortality • Kittiwake, Roseate tern – are there regional problems? what are they caused by? • ports still subject to effects from TBT – probably not
Confidence Which are the most important issues affecting the confidence of the assessment in the region	• Overall assessment confidence generally high except for cetaceans (due to limited monitoring) • TBT – low confidence assessment in the worst case example is a mistake • Colour coding – this is an inherent problem because the traffic light colour is not necessarily a good indication of actual status and could be misinterpreted • The categories (<10% *etc.)* were difficult to apply due to lack of clear information and this led to some changes during the assessment. However, there are still uncertainties, and flexibility for the experts in setting these criteria would have increased confidence
Future trends Which important future trends need to be highlighted including pressures with no current effect	• Climate change is considered important, and expected to have an increasing impact, but the evidence of impact is currently lacking. • Fishing pressure is expected to continue to decline, reducing pressure on habitat decline and species removal • Constructions in coastal and shelf seas will increase
Past successes Have past pressures on specific components been reduced	• Fishing pressure has reduced due to improved management measures and fleet reductions • Special Areas of Conservation (SACs) for habitats and species and Special Protected Areas for birds have been introduced • Closures and no-take zones to protect fish have been introduced • Various EC Directives have been adopted to protect habitats, birds and which will also help to minimise pollution

Priorities for action What should be the priorities for action, in terms of: - management measures - monitoring and assessment (and indicator development under MSFD) - research	*Management measures* • Agreement of better and more meaningful indicators of ecosystem health to give a more confident ecosystem assessment of Region III • For example for fish, develop and introduce community state indicators for the ecosystem-based management of fisheries • For example explore use of community state indicators in management of coastal development, for example renewable energy • Introduce marine protected areas or relevant measures where damage to key ecosystems is unsustainable *Monitoring and Assessment* • better monitoring of most components needed to provide better assessments • Very few accepted analytical stock assessments for demersal fish stocks in the area, due to poor data • established monitoring programme for cetaceans would provide the information currently lacking to inform status assessment (one complete survey exists, need for more, and possibly data archaeology work) • the current five or six-yearly assessment of harbour seals is the absolute minimum required to inform status and could be improved • need metrics to establish how much damage a particular population or habitat can tolerate to help implement an ecosystem approach and sustainable use of the sea *Research* All the above monitoring recommendations will need research programmes to develop and implement them

Region IV: Bay of Biscay and Iberian Coast

Overall assessment What key comments should be made on the results of the overall assessment for example aspects that should be highlighted (striking outcomes)	• Climate change has been overestimated in comparison to other pressures that are more relevant for the period covered by the QSR • Expert judgement has lacked the balanced contribution from all Contracting Parties of the Region • Deep sea habitats' results do not reflect the real situation of vulnerable habitats due to scale. Impacts are concentrated in very specific areas, small in size in relation to the whole deep sea surface, so the evaluation of these impacts is diluted
Worse and better areas Are there significant areas within the region that differ markedly from the overall assessment status for any components Are there significant areas within the region where main pressures are not an issue	• The Bay of Biscay anchovy population has collapsed, and therefore would be in poor status • Coral gardens and sponge aggregations have been locally very damaged by fisheries • Two areas closed to trawl fisheries in the Cantabrian continental shelf show a better overall quality than the rest of the shelf
Confidence Which are the most important issues affecting the confidence of the assessment in the region	• Lack of information/expertise in key pressures • Lack of access to previous QSR chapters • Gaps in monitoring and time series • Knowledge sometimes biased to very specific geographic areas of Region IV, since not all countries in the region managed to contribute for the assessment.

Future trends Which important future trends need to be highlighted including pressures with no current effect	• Creation of several marine protected areas is expected to improve the status of ecosystem components • Reduction of hazardous substances. • Planned CO_2 storage sites in the Asturian shelf, possible risks, unknown effects • New wind, tidal and wave energy initiatives, new uses and conflicts
Past successes Have past pressures on specific components been reduced	• Spain has prohibited the use of rock-hopper trawl gear in the Bay of Biscay, which has a positive effect on biogenic habitats • The ban on drift-nets reduced by-catch of cetaceans • Monitoring of inputs (direct and riverine) to the marine environment has significantly increased • Monitoring of hazardous substances has increased and improved, including new areas and species
Priorities for action What should be the priorities for action, in terms of: - management measures - monitoring and assessment (and indicator development under MSFD) - research	• Need to improve monitoring of cetacean populations and impacts on them • Need to identify representative and/or vulnerable areas in order to create a coherent network of MPAs • Need to increase monitoring beyond coastal areas, in the high seas • Need to develop conservation plans for non-commercial marine species

Region V: Wider Atlantic

Overall assessment What key comments should be made on the results of the overall assessment for example aspects that should be highlighted (striking outcomes)	• Area V is a very large and remote region • Relevant studies within this area are sparse in space and time. Therefore the assessment was based on limited datasets • Research is needed to understand species and habitats processes and patterns as well as the impacting pressures at better spatio-temporal resolutions • From the habitat perspective the impact of fishing is the main pressure for all the ecosystem components • Populations of several large whales haven't yet recovered from severe exploitation up to the mid-1980s, that resulted in reduced ranges and population sizes • Seals have been highlighted as poor status on account of hooded seals using the north of the area for foraging. The seals are from both the Canadian and Norwegian side and are highly susceptible to reduction in breeding ice cover in Region I. Except for vagrant individuals, the component does not occur in the remainder of Region V • A significant amount of the deep-sea fish species that are currently exploited on the continental slopes, oceanic ridges and seamounts in this region are long-lived and expected to have long recovery times • Climate change was identified as a main pressure. However, there is a lack of background information on which to assess changes which may be attributed to this pressure

Worse and better areas Are there significant areas within the region that differ markedly from the overall assessment status for any components Are there significant areas within the region where main pressures are not an issue	• The overall assessment of the habitat components was good • The pressures highlighted in the overall assessment of seabirds are not fully representative of the pressures affecting birds in international waters, north of the Azores. Consult with Iceland and Spain seabird experts for a better understanding of pressures impacting on birds that winter in the Region coming from other regions (for example, Greater and Balearic shearwaters) • By-catch of cetaceans in the Azores EEZ appears to be minimal and should not present a significant pressure for this component. However, information on this pressure is lacking in the rest of Region V • The assessment of the status of deep-sea habitats in the region is biased by the fishing practices utilized on the banks located off Ireland and the UK and the size of these banks. The fishing practices used in this area (namely trawling) are much more destructive that the long-line and hand-line that prevail on the Azores seamounts, where trawling was never used commercially
Confidence Which are the most important issues affecting the confidence of the assessment in the region	• The limited amount of data, when compared to the size of the area, constrain the robustness of the assessments • Lack of data from the northern range of the region (consult with Iceland) • Low overall confidence in the assessment of cetaceans due to the lack of information on past and present distribution, population size and dynamics
Future trends Which important future trends need to be highlighted including pressures with no current effect	• The exploitation of living and mineral resources is expected to grow as resources on continental margins become depleted and technology is developed that allows for the extraction of resources in deeper areas • Although difficult to quantify at present, underwater noise and collision with vessels are likely to become pressures of greater relevance to cetaceans in Region V • A number of countries are expected to have their Extended Continental Shelve Areas declared under UNCLOS which will significantly reduce the areas of sea beyond national jurisdiction in Region V. However the water column will remain as High Seas; this is expected to complicate the management framework if MPAs are established in such situations
Past successes Have past pressures on specific components been reduced	• Closure of the Azorean part of the Mid-Atlantic Ridge to bottom trawling and deep-water gill-netting • Regulation of the whale-watching activities in the Azores • Designation of MPAs within and outside EEZs (for example UK Darwin Mounds MPA, Azores network of MPAs, Rainbow hydrothermal Vent Field)
Priorities for action What should be the priorities for action, in terms of: - management measures - monitoring and assessment (and indicator development under MSFD) - research	• Continue the effort to give effective protection to marine areas in the Wider Atlantic, not only in areas under national jurisdiction but also in the High Seas through the OSPAR MPA network • Establishment of an online data centre where geo-referenced data and/or metadata on pressures, governance, environmental variables, species and habitats is shared for the entire region • Facilitate access to VMS data cross-referenced to catch data to assess fishery activities • Expansion of Fisheries Observer's Programme to validate fisheries data and collect information on entire by-catch • Increase temporal resolution of VMS data • Mapping of marine landscapes for the entire region • Understand the ecological processes and patterns of the pelagic ecosystem

	• Execution of seafloor surveys (namely using multibeam systems) to produce habitat distribution maps and understand spatial seafloor patterns at enhanced resolutions • Implementation of routine sampling throughout the region for species and habitat components • Expansion and creation of long-term observatories aimed at major ecosystem components (for example, continental and island margins, seamounts and banks, mid-Atlantic ridge, abyssal plains) • Establishment of monitoring programmes of species, habitats and pressures • Establishment of a monitoring programme of cetacean populations and of impacts acting on them to assess current population status and trends • Hydrothermal vent fields are very sensitive ecosystems, especially due to their small size and spatial discontinuity. Scientific research is the main pressure on these ecosystems; a code of conduct needs to be promoted among the scientific teams that study these environments • Characterize and quantify impacts of deep-sea fishing gear alternative to trawling, namely in the long-line and hand-line

Ranking of pressures per Region

A ranked list of pressures for each OSPAR Region is provided in Table A5.11, based on assessments of the eight ecosystem components. For each pressure, the following scores were assigned: 1 for Low impact, 3 for Moderate impact, 9 for High impact. The scores have then been summed across the eight components in each region (Tables A5.6 – 10) to give a cumulative impact score per pressure. The pressures have then been ranked as follows: Very high 16+; high 10 – 15; moderate 7 – 9; low 4 – 6; very low 1 – 3; no impact/not assessed 0.

Table A5.11 Ranked list of pressures for the OSPAR regions, based on assessments of eight ecosystem components

Summary - total impact per Region

		I	II	III	IV	V
Climate change	Climate change	20	12	7	10	16
Hydrological pressures (local)	Temperature changes (local)	1	1	1	1	0
	Salinity changes (local)	1	1	1	1	0
	Changes in water flow, wave action & emergence regime (inshore/local)	1	1	1	1	0
Pollution & other chemical pressures	Contamination by hazardous substances	8	8	7	8	5
	Radionuclide contamination	0	0	0	0	0
	De-oxygenation	3	7	4	4	0
	Nitrogen & phosphorus enrichment	6	6	5	4	1
	Organic enrichment	5	7	4	4	1
Other physical pressures	Electromagnetic changes	1	1	1	1	1
	Litter	5	5	4	5	5
	Underwater noise	3	3	3	3	2
	Barrier to species movement	3	3	3	3	0
	Death or injury by collision	3	3	3	3	3
Habitat changes	Siltation rate changes	4	10	6	6	4
	Habitat damage	12	20	11	11	9
	Habitat loss	15	8	7	10	7
Biological pressures	Visual disturbance	0	0	0	0	0
	Genetic modification	0	0	0	0	0
	Introduction of microbial pathogens	2	2	2	2	2
	Introduction of non-indigenous species &	8	8	7	6	6
	Removal of species (target & non-target)	16	24	13	13	11

Summary assessment of impact and overall status across the Regions

Tables A5.12 – 13 provides a summary of the pressure assessments for each ecosystem component. For each pressure assessment, the following scores were assigned: 1 for No/Low impact; 3 for Moderate impact; 9 for High impact.

Table A5.12 Summary of the pressure assessments for the four species components

Pressure theme	Pressure	Fish					Cetaceans					Seals					Seabirds				
	Region:	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V
Climate change	Climate change	1	1	1	1	1	1	1	1	1	1	9	1	1	1	9	3	3	1	1	1
Hydrological pressures (local)	Temperature changes (local)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Salinity changes (local)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Changes in water flow, wave action & emergence regime (inshore/local)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pollution & other chemical pressures	Contamination by hazardous substances	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	1	1	1	1	1
	Radionuclide contamination	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	De-oxygenation	-	1	-	-	-	-	1	1	1	-	-	1	1	1	-	-	-	-	-	-
	Nitrogen & phosphorus enrichment	-	-	-	-	-	1	1	1	1	-	1	1	1	1	-	-	-	-	-	-
	Organic enrichment	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other physical pressures	Electromagnetic changes	-	-	-	-	-	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-
	Litter	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-
	Underwater noise	1	1	1	1	-	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-
	Barrier to species movement	-	-	-	-	-	1	1	1	1	-	1	1	1	1	-	1	1	1	1	-
	Death or injury by collision	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Habitat changes	Siltation rate changes	-	1	1	1	-	1	1	1	1	1	-	1	1	-	-	-	1	-	-	-
	Habitat damage	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3
	Habitat loss	-	1	1	1	-	1	1	1	1	-	9	1	1	1	-	1	1	1	3	3
Biological pressures	Visual disturbance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Genetic modification	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Introduction of microbial pathogens	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-
	Introduction of non-indigenous species & translocations	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	3	1	3
	Removal of species (target & non-target)	3	3	3	3	3	3	1	1	1	3	1	1	1	1	1	3	1	1	1	1
	Total impact per region	**10**	**13**	**12**	**11**	**7**	**15**	**14**	**14**	**14**	**12**	**27**	**13**	**13**	**12**	**15**	**12**	**11**	**10**	**12**	**13**
	Status assessment	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Poor	Good	Good	Good	Poor	Moderate	Moderate	Moderate	Moderate	Moderate
	Confidence in status assessment	Low	High	High	Moderate	Very low	Moderate	Very low	Very low	Very low	Very low	High	High	High	Moderate	Very low	Moderate	High	High	High	High

Table A5.13 Summary of the pressure assessments for the four habitat components

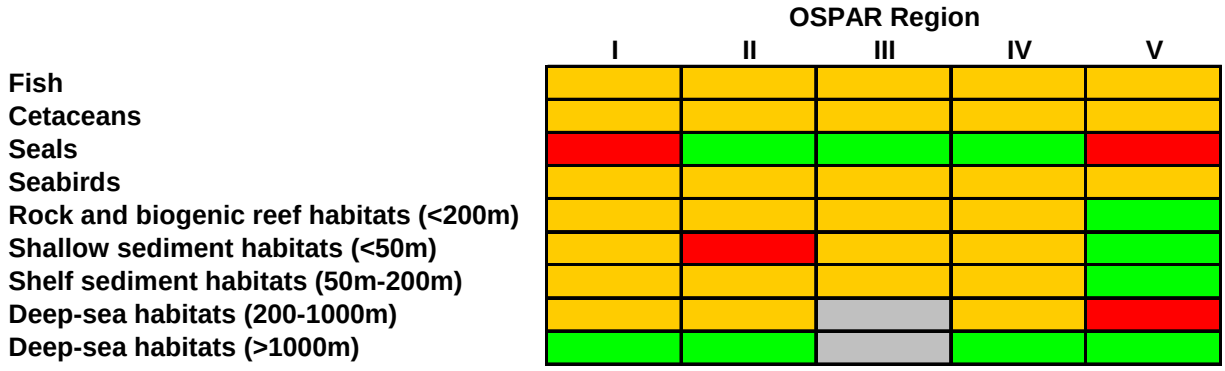
Pressure theme	Pressure	Rock & biogenic reef					Shallow sediment					Shelf sediment					Deep sea				
	Region:	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V
Climate change	Climate change	3	3	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	-	1	1
Hydrological pressures (local)	Temperature changes (local)	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
	Salinity changes (local)	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
	Changes in water flow, wave action & emergence regime (inshore/local)	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
Pollution & other chemical pressures	Contamination by hazardous substances	1	1	1	1	1	1	1	1	1	-	1	1	1	1	-	1	1	-	1	1
	Radionuclide contamination	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	De-oxygenation	-	1	-	1	-	1	1	1	1	-	1	1	1	-	-	1	1	-	-	-
	Nitrogen & phosphorus enrichment	1	1	1	1	1	1	1	1	1	-	1	1	1	-	-	1	1	-	-	-
	Organic enrichment	1	1	1	1	1	1	3	1	1	-	1	1	1	1	-	1	1	-	-	-
Other physical pressures	Electromagnetic changes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Litter	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	-	1	1
	Underwater noise	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Barrier to species movement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Death or injury by collision	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Habitat changes	Siltation rate changes	-	1	1	1	1	1	1	1	1	-	1	1	1	1	1	1	3	-	1	1
	Habitat damage	3	1	1	1	1	1	9	3	-	-	3	3	3	3	1	1	3	-	1	1
	Habitat loss	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	1	1
Biological pressures	Visual disturbance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Genetic modification	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Introduction of microbial pathogens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Introduction of non-indigenous species & translocations	1	1	1	1	1	3	3	1	3	1	1	1	1	1	1	1	1	-	-	-
	Removal of species (target & non-target)	1	3	1	3	1	1	9	3	-	-	3	3	3	3	1	1	3	-	1	1
	Total impact per region	**12**	**14**	**9**	**14**	**9**	**15**	**33**	**17**	**13**	**3**	**15**	**15**	**15**	**13**	**7**	**11**	**17**	**0**	**7**	**7**
	Status assessment	Moderate	Moderate	Moderate	Moderate	Good	Moderate	Poor	Moderate	Moderate	Good	Moderate	Moderate	Moderate	Moderate	Good	Moderate	Moderate		Moderate	Poor
	Confidence in status assessment	Very low	Moderate	High	Moderate	Moderate	High	High	High	Moderate	High	Moderate	High	High	Moderate	Moderate	Moderate	Moderate		Moderate	High
																	Good	Good		Good	Good
																	High	High		High	High

200-1000m

>1000m

The *overall status* of the components in each Region is shown in Table A5.14 (this is a summary of the tables presented earlier in this Annex in which Green=Good, Amber=Moderate, Red=Poor status and Grey=Not present).

Table A5.14 Summary of the overall assessments for the eight ecosystem components in each of OSPAR Region



Annex 6 – Assessment results from the workshop

The full set of records for each of the eight assessment groups ilisted here are in a separate folder.

1. Cetacean species assessment table
2. Deep sea habitat assessment table
3. Fish species assessment table
4. RockBiogenic habitat assessment table
5. Seabirds species assessment table
6. Seals species assessment table
7. Shallow sediment habitat assessment table
8. Shelf Sediment habitat assessment table

Annex 7 – Results from the initial 'warming session'

As a way of getting the workshop participants to start considering assessments at very broad geographical and ecosystem component scales, an introductory 'gut-feeling' assessment was undertaken without prior discussion (first session of workshop). Participants used colour stickers to assign a Good, Moderate or Poor status to each component in each region, based on their own views of the status, and to indicate any trend in status. The results are presented below. The category (Good-Moderate-Poor) receiving the highest number of votes has been regarded as the opinion of the group.

Region	Ecosystem component	Good	Moderate	Poor	Trend of majority
1	Fish	3	7		no trend
1	Cetaceans	5	3	4	no trend
1	Seals	2	6	2	no trend
1	Seabirds		4	8	deteriorating
1	Rock and biogenic reef habitats (0 – 200 m)	3	5	2	no trend
1	Shallow sediment habitats (0 – 50m)		5	2	no trend
1	Shelf sediment habitats (50 – 200m)	1	7	1	no trend
1	Deep sea habitats (>200 m)	8	2	1	deteriorating
2	Fish	2	2	22	deteriorating
2	Cetaceans	1	14	2	no trend
2	Seals	14	9	1	no trend
2	Seabirds	3	10	8	no trend
2	Rock and biogenic reef habitats (0 – 200 m)	1	7	5	no trend
2	Shallow sediment habitats (0 – 50 m)		8	9	deteriorating
2	Shelf sediment habitats (50 – 200 m)	1	8	6	no trend
2	Deep sea habitats (>200m)	1	9	1	deteriorating
3	Fish		1	10	deteriorating
3	Cetaceans	3	6	2	no trend
3	Seals	2	5	3	no trend
3	Seabirds	1	4	5	deteriorating
3	Rock and biogenic reef habitats (0 – 200 m)	1	5	4	no trend
3	Shallow sediment habitats (0 –50 m)	1	4	4	no trend
3	Shelf sediment habitats (50 – 200 m)	1	2	4	no trend
3	Deep sea habitats (>200 m)	1	3	2	deteriorating
4	Fish			8	deteriorating
4	Cetaceans	5	3	1	no trend
4	Seals	2	2	1	no trend
4	Seabirds	1	1	3	deteriorating
4	Rock and biogenic reef habitats (0 – 200 m)		5		no trend
4	Shallow sediment habitats (0 – 50 m)	1	3	1	no trend
4	Shelf sediment habitats (50 – 200 m)	1	3		no trend
4	Deep sea habitats (>200 m)	2	3	2	no trend
5	Fish	0	4	11	deteriorating
5	Cetaceans	5	5	1	no trend
5	Seals		3		no trend
5	Seabirds		5	4	no trend
5	Rock and biogenic reef habitats (0 – 200 m)	2	1	6	deteriorating
5	Shallow sediment habitats (0 – 50 m)	1		3	deteriorating
5	Shelf sediment habitats (50 – 200 m)	2	4	2	no trend
5	Deep sea habitats (>200 m)	5		2	deteriorating

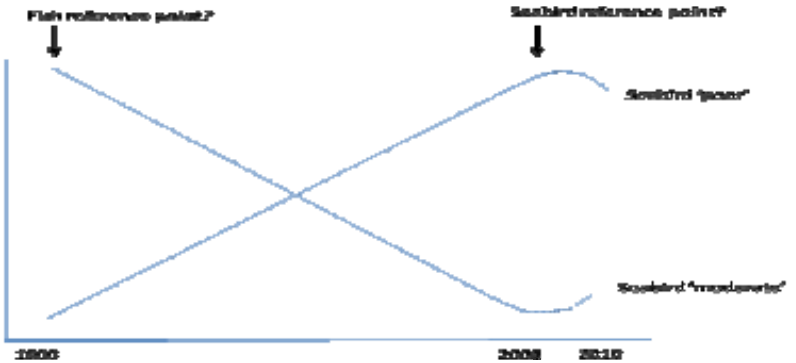
Summary:

	OSPAR Region				
	I	II	III	IV	V
Fish					
Cetaceans					
Seals					
Seabirds					
Rock and biogenic reef habitats (0 – 200 m)					
Shallow sediment habitats (0 – 50 m)					
Shelf sediment habitats (50 – 200 m)					
Deep sea habitats (>200 m)					

Annex 8 – Comments raised during the workshop

A number of comments were raised during plenary discussions and as a result of the voting sessions (Thursday) on the acceptability of the final assessment results. These have been organised into a series of topics with comments added as to how these have been dealt with (either during the workshop or subsequently in preparing the workshop report), or possible ways in which they could be addressed in the future. The comments are given below, to accompany the commentary provided in the Discussion section of the main report.

Source	Region	Issue	Topic	Action/comment
Results session (Thur pm) – Joop Bakker	II	Seabed sediments (all): as all pressures are related to fisheries, I certainly miss the still bad condition of the sediments by hazardous substances. I do not belief this comes after climate change and should be in the top 3 pressures.	Assessment – component	Check detailed assessments for evidence of impact from both pressures and consider amendments if appropriate
Results session (Thur pm)	I	Seabirds overall assessments: scientific evidence points towards poor condition	Assessment – component	Justification needed to change overall assessment
Results session (Thur pm) – Anne-Britt Storeng	I	Seabirds overall assessments: Barents sea shows a dramatic reduction in the amount of different seabirds. The assessment should be Red (poor status)	Assessment – component	Justification needed to change overall assessment
Results session (Thur pm) – Eike Rachor	I	Deep sea habitats: reconsider, especially regarding climate change and deep-water renewal and retreat of marginal ice zone	Assessment – component	Justification needed to change overall assessment
Results session (Thur pm) – Joop Bakker	I	Deep-sea habitat: although the confidence claims “High” no information was found on the level of hazardous substances in particulate (sediment) matter (as far as I know). There are theories that climate change and by that melting of ice and glaciers/snow will increase the particle-bound transport of hazardous substances not only to rocky and shallow sediment habitats, but also to both the shelf and deep-sea sediments. This being a source to the biota-food chain, like fish. I would say this has to be mentioned as least as a prospect development. Considering the Norwegian monitoring results of hazardous substances in fish liver in the northern Norwegian marine water already now would place it higher in the ranking.	Assessment – component	Justification needed to change overall assessment

Regional Group – North Sea	II	**Relationship between fish and seabird assessments** Where is pristine? 1900 for fish, 2000 for seabirds? OR Has increase in population size in seabirds been considered as 'bad' giving 'poor' state score? If latter then there are problems in consistency of approach. Climate change is likely to cause increase in fish populations, so ignored because criteria only asked us to consider declines.	Assessment – component	Justification needed to change overall assessment
Regional Group – North Sea	II		Assessment – component	Justification needed to change overall assessment
Results session (Thur pm) – Joop Bakker	II	Seals: although I'm not sure, I learned that food scarcity (removal of species) is causing Wadden Sea seals to feed much more out in the North Sea and problems with fisherman around Scotland	Assessment – component	Justification needed to change overall assessment
Results session (Thur pm)	II	Rock and biogenic reefs for Region II: Major habitat change (disappearance of sugar kelp, invation of Crassostrea in Mytilus beds, coastal developments) not adequately reflected in overall assessment	Assessment – component	Reflect in worst case assessments. Provide justification is proposal is to change overall assessment
Results session (Thur pm)	IV	Region IV: climate change should be highlighted as a key pressure for some components	Assessment – pressure ranking	Ranked third overall for Region IV (revised scoring, recovery excluded)
Results session (Thur pm)	General	I do not agree with the results of the deep sea habitats (due to a methodology problem)	Assessment – pressure ranking	Ranking procedure modified to exclude Recovery score

Results session (Thur pm)	General	I do not agree with the fact that climate change is highlighted as a major threat (mainly for the model values), hiding others such as noise pollution (for cetaceans) or habitat damage (deep-sea habitat)	Assessment – pressure ranking	Ranking procedure modified to exclude Recovery score
Results session (Thur pm) – Alan Hughes	I	Deep sea habitats: Pressure scoring system does not lead to most important pressure being highlighted. Litter comes out high due to long recovery time, but trawling is by far the greater pressure	Assessment – pressure ranking	Ranking procedure modified to exclude Recovery score
Results session (Thur pm) – Angela Benn	I	Deep sea habitats: damage should be main pressure, not litter. This results from pressure scoring system	Assessment – pressure ranking	Ranking procedure modified to exclude Recovery score
Results session (Thur pm)	IV	Climate change should probably not be the worst pressure	Assessment – pressure ranking	Ranking procedure modified to exclude Recovery score
Results session (Thur pm)	IV	Climate change should not be the worst pressure (mainly results from the methodology for scoring pressures), as it hides others such as noise pollution (cetaceans) and habitat damage (deep sea habitats)	Assessment – pressure ranking	Ranking procedure modified to exclude Recovery score
Results session (Thur pm) – Alan Hughes	IV	Deep sea habitats: results are scewed as litter shows as main pressure	Assessment – pressure ranking	Ranking procedure modified to exclude Recovery score
Results session (Thur pm) – Angela Benn	IV	Deep sea habitats: damage should be main pressure, not litter. This results from pressure scoring system	Assessment – pressure ranking	Ranking procedure modified to exclude Recovery score
Results session (Thur pm)	I – V	Long recovery periods over-ride very small impacts and artificially raise the pressure ranking	Assessment – pressure ranking	Ranking procedure modified to exclude Recovery score
Results session (Thur pm)	V	Deep sea habitats: main pressure is habitat damage, but pressure methodology does not show this	Assessment – pressure ranking	Ranking procedure modified to exclude Recovery score
Results session (Thur pm) – Alan Hughes	V	Deep sea habitats: Pressure scoring system does not lead to most important pressure being highlighted. Habitat damage was considered to be the main pressure	Assessment – pressure ranking	Ranking procedure modified to exclude Recovery score
Results session (Thur pm) – Alan Hughes	General	Assessment of litter: does not seem to have been considered consistently across groups. Could it be deleted and assessed separately by a specialist group?	Assessment – pressures	Check final assessments and agree any follow-up
Deep sea habitats board	Deep sea	Munition dump – put with HS contamination	Assessment – pressures	Needs further explanation of the issue

Deep sea habitats board	Deep sea	HS not consistent in terminology – ?or between groups	Assessment – pressures	Needs further explanation of the issue
Results session (Thur pm) – Adrian Judd	II, III	After preliminary assessments, yes [i.e.acceot results], but would like to have more time to review results	Forward process	Distribute all results and draft text to workshop particpants
Board 4	General	Lack of data in the maps f.e. underwater noise	Forward process	Improve data set on pressure
Board 5	General	Future process could be very much improved:	Forward process	Needs further ideas on how from participants
Results session (Thur pm) – Adrian Judd	II, III	Peer review process	Forward process	OSPAR is expected to ask ICES to undertake a peer review
Results session (Thur pm)	II	Plankton was not considered as a component	Forward process	Plankton were not considered due to lack of time and experts. Any future assessments should include plankton
Results session (Thur pm) – Adrian Judd	II, III	Results (overall assessments) are those of workshop; should not be changed by non-participants	Forward process	Some results may benefit from additional expert input to confirm assessment/improve confidence. Any propoopsed changes should be agreed with Subgroup
Board 1	General	Representation across regions	Forward process	
Board 1	General	Lack of knowledge	Forward process	
Board 1	General	How to quantify all information	Forward process	
Board 3	General	Future harm of data collection (CFP) for indicators	Forward process	
Results session (Thur pm) Stephanie Werner	General	Thematic assessments and Chapter 11 should be cross-checked and in line	Forward process	

Results session (Thur pm) Stephanie Werner	General	Composition of the experts should be in a way that all pressures will be treated equally. Experts should match the numbers mentioned in the method description	Forward process	
Results session (Thur pm) Stephanie Werner	General	All biotic and abiotic elements should be covered in the assessments (e.g. phytoplankton, sea-ice) (hydrological and pelagic features)	Forward process	
Results session (Thur pm)	II	SCALE (e.g. Rock areas at coast are heavily affected)	Habitat scale	Consider doing assessment at finer habitat scale in future
Board 2	General	Scale matters (Pal Buhl-Mortensen)	Habitat scale	Further explanation of comment needed
Deep sea habitats board	Deep sea	This ecosystem component is very heterogeneous and would be better treated in a greater level of detail (abyssal and slope)	Habitat scale	Habitat split into two (200 –– 1000m; >1000m). Separate overall assessments provided on each (but insufficient time at workshop to undertake pressures assessment on the separate habitat types)
Results session (Thur pm)	IV	Deep sea habitats for Region IV: the methodology used is not adequate to reflect the real situation of vulnerable habitats	Habitat scale	Habitat split into two (200 –– 1000m; >1000m). Separate overall assessments provided on each (but insufficient time at workshop to undertake pressures assessment on the separate habitat types)
Results session (Thur pm)	IV	Deep sea habitats: disagree with overall assessment, due to method	Habitat scale	Habitat split into two (200 – 1000m; >1000m). Separate overall assessments provided on each (but insufficient time at workshop to undertake pressures assessment on the separate

				habitat types)
Results session (Thur pm) – Patrick Camus	IV	Deep sea habitats for Region IV: overall assessment is too optimistic taking not enough into account the deep sea fisheries	Habitat scale	Habitat split into two (200 – 1000m; >1000m). Separate overall assessments provided on each (but insufficient time at workshop to undertake pressures assessment on the separate habitat types)
Results session (Thur pm)	I – V	Heterogeneity of sub-components dilutes the 'signal' of 'real' pressures	Habitat scale	Habitat split into two (200 – 1000m; >1000m). Separate overall assessments provided on each (but insufficient time at workshop to undertake pressures assessment on the separate habitat types)
Deep sea habitats board	I	Not sure about deep (1400m) fjords. We think yes but need to check with rock/biogenic reef group	Habitat scale	Subgroup decided the deep habitat below 200m in fjords did constitute 'deep-sea habitat and therefore included t in the assessments
Deep sea habitats board	III	Should we count small patches of >200m on shelf (e.g. Rathin Island)? We think not	Habitat scale	Subgroup decided the very small patches below 200m in Region III did not constitute 'deep-sea habitat..
Board 4	General	Why is scientific research not included?	Methodology	All subgroups were asked to consider all available knowledge in undertaking their assessments. This

				would include scientific research
Board 5	General	No accounting for increase in range into a Region (distribution changes not picked up)	Methodology	An increase in range is not normally considered to reduce the conservation status of a species, hence this issue is not addressed in the methodology. Where the increase in range is at the expense of another species, than the status of the other species might be affected
Introductory session (Monday pm) – Mark Tasker	General	How are combined effects considered?	Methodology	Can be taken into account in overall assessment (but no method to specifically deal with this)
Deep sea habitats board	Deep sea	Scale of impact depends on scale of assessment	Methodology	Clarify how scale of impact should be assessed in Methodology
Board 4	General	The scale of the impact depends on the scale of the measurement	Methodology	Clarify how scale of impact should be assessed in Methodology
Deep sea habitats board	Deep sea	A3 terminology around component/habitat component is not clear	Methodology	Clarify methodology paper
Chair's briefing (Tuesday pm)	General	Scope of species groups – include all species which use the marine area, including their freshwater and terrestrial use	Methodology	Clarify methodology paper
Results session (Thur pm)	II	THRESHOLDS (Reference levels should be set at a historic date where the weakest link (= component as part of a set of components=ecosystem) was OK. Reference levels of other components should be according to the status on this date. OR: current reference levels are not OK. Needs to be resolved.)	Methodology	Clarify methodology paper

Board 1	General	How to deal with population size for fish	Methodology	Consider issues raised in further development of the methodology
Board 1	General	How to define quality of habitat for cetaceans	Methodology	Consider issues raised in further development of the methodology
Board 4	General	Improving the method	Methodology	Consider issues raised in further development of the methodology
Board 4	General	How to incorporate indirect effects and relations between ecosystem conponents	Methodology	Consider issues raised in further development of the methodology
Board 4	General	Ecosystem approach does not equal traffic lights	Methodology	Consider issues raised in further development of the methodology
Board 5	General	Functional aspects for species components not picked up	Methodology	Consider issues raised in further development of the methodology
Results session (Thur pm) Stephanie Werner	General	Thresholds should be based scientifically, not socio-economic	Methodology	Consider issues raised in further development of the methodology
Results session (Thur pm) Stephanie Werner	General	Biological interactions between the different biological components need to be reviewed – ecosystem approach means also to consider influences/interactions between organisms	Methodology	Consider issues raised in further development of the methodology

Thursday discussion group	General	Methodological issues:– need for harmonized definitions (habitats, measurement of pressures, measurement of impacts, temporal scale of impact).– need for agreed reference levels and period to measure deviation of current status. – indicator may require a more generic threshold to tailor them for the relevant regions and components.– criteria (10% rule/time) used for species and habitats are not adequate. *E.g.* seals (generation time needed).– overall assessment biased by set up (expertise, methods e.g. few species/spatial scale; interpretation; implementation of definitions etc).– underlying mathematical analysis is fit for assessment but not for management advice. Results need to be presented as assessment results only. Point needs to be define when and how to change to management issues. Example: North Sea habitats represent small % of the area but a lot of those habitats are not ok.– method does not allow for comparing Regions.– cetaceans, seals and seabirds recognized for EcoQOs at population level. Fish: collected information is at species level. ICES assessment is at –community level. All analysis has been communities. Difficult to use this in a species approach.– Chapter 11 builds on criteria different from those use for assessing human activities in Chapter 8.– components need to be revisited – not a longer but a different list is needed (e.g. depth zones are inadequate; deep seas habitat needs subdividing etc).– difficulties in applying definitions include lack of information and of causal link between pressure and impact.– flaws in methods means that when they are addressed in the next assessment there is no link up with the results of this assessment: changes will be result of change in method not change in real quality status.How to address them:– useful exercise – put down the lessons learnt and what problems are to ensure transparency about flaws – low quality/confidence needs to be reflected in final assessment presentation.– methodological peer review will be important for credibility of exercise	Methodology	Consider issues raised in further development of the methodology

Introductory session (Monday pm) – Simon Greenstreet	General	Concerned about focus on Recovery, as length of recovery may not be right to focus on as all components are important, regardless of their recovery periods. Need to assess how long it takes to remove the pressure and how long it takes to recover from the impact.	Methodology	Consider issues raised in further development of the methodology. Use of recovery time allows prioritisation of actions to reduce pressures where degree of impact is the same (i.e. focus on more sensitive features)
Board 5	General	Generation times and recovery more appropriate	Methodology	Consider using variable threshold values for species to account for their differing life history traits
Board 4	General	Using undisturbed former natural conditions as the basis for the green traffic light is different to the Hazardous Substances CEMP assessment and Eutrophication assessment which are based on lack of harmful effects	Methodology	Lack of harmful effects' indicates no impact, which is equivalent to 'undisturbed former natural conditions'. Note that 'former natural conditions' is NOT the target threshold value but the reference value, as the boundary between Good and Moderate status allows for a degree of impact beyond the reference value
Board 2	General	Confidence in trends (Leonie)	Methodology	Methodology modified during workshop
Board 2	General	Overlap but no impact (Leonie)	Methodology	Methodology modified during workshop
Results session (Thur pm) – Joop Bakker	General	I have still strong doubts whether the determinands of the pressure-impact matrix are suitable for the integrative analysis (both in parameter as in criteria).	Methodology	Needs further clarity on the concerns

Board 5	General	Trends should be about impact not pressure (or at least pressure and impact)	Methodology	Strictly, yes. In practice, trends in pressures offers a suitable surrogate, based on a known or expected relationship of pressure to impact
Board 4	General	Is there any option to have something between moderate and good?	Methodology	There seems little benefit in creating further threshold values to have extra status categories, as this further increase the complexity of the process
Board 5	General	Someone (Secretariat or group leader or any named person of habitat group) could have filled in obvious aspects of monster matrix, e.g. parts of A and B. Part of this (like % area of habitat is X) is available. Open cells trigger unnecessary discussions. Such a 'pre-job' would have left much more time for the important parts C and D and possibly given a better overall result.	Methodology	Yes, this could have been done. A reason for asking each subgroup to do this was to help ensure all group members were clear on the scope of their group/assessment from the outset
Results session (Thur pm) – Joop Bakker	General	“Very Low” confidence cells: shouldn’t they be coloured WHITE (lack of knowledge)	Presentation	Examine pressures assessment to see if overall confidence rating is supported by pressures confidence rating
Results session (Thur pm) Stephanie Werner	General	If knowledge is too low, boxes should be left empty (particularly to get the gaps in knowledge)	Presentation	Examine pressures assessment to see if overall confidence rating is supported by pressures confidence rating
Results session (Thur pm) – Joop Bakker	III	“Very Low” confidence cells: shouldn’t they be coloured WHITE (lack of knowledge)	Presentation	Examine pressures assessment to see if overall confidence rating is supported by pressures

				confidence rating
Results session (Thur pm) – Joop Bakker	IV	"Very Low" confidence cells: shouldn't they be coloured WHITE (lack of knowledge)	Presentation	Examine pressures assessment to see if overall confidence rating is supported by pressures confidence rating
Results session (Thur pm) – Joop Bakker	V	"Very Low" confidence cells: shouldn't they be coloured WHITE (lack of knowledge)	Presentation	Examine pressures assessment to see if overall confidence rating is supported by pressures confidence rating
Results session (Thur pm)	General	Specific comments are made in the Chapter 11 on the "initial stage" of the methodology used.	Presentation	Reflect in QSR presentation
Results session (Thur pm) – Stephen Malcolm	General	Limitations of methodology should be clearly expressed in presentation of results	Presentation	Reflect in QSR presentation
Results session (Thur pm)	IV	Clearly explain that results are of a one-week experimental method	Presentation	Reflect in QSR presentation
Results session (Thur pm)	IV	Specifically state the results are an 'initial' stage'	Presentation	Reflect in QSR presentation
Results session (Thur pm)	V	Region V: caveats of the method, the confidence levels, and the lack of data should be clearly acknowledged in the presentation of the traffic light summary	Presentation	Reflect in QSR presentation
Results session (Thur pm) – Colin Moffat	V	Note a lot of very low confidence scores	Presentation	Reflect in QSR presentation
Board 1	General	Concern – how trivial is the result?	Presentation	
Board 2	General	Red traffic lights (Richard Moxon)	Presentation	
Board 4	General	Where there is a red traffic light, it should be clear what needs to be done (or has been started) to change it to green. Policy makers need to know this.	Presentation	
Board 4	General	The audit trail makes important argument on which the scores are based. Not good enough for outsider.	Presentation	

Board 3	General	Will we be able to use this assessment for the Initial Assessment for the MSFD?	Relationship to other assessments and frameworks	Chapter 11 assessments were intended to be a trial for MSFD requirements. Expect to build on overall approach with further methodological development and improvement in confidence through improved supporting data/information
Board 3	General	Unharmonised number of classes compared with WFD (5), Natura 2000 (3) and Ch11 (3), MSFD (2)	Relationship to other assessments and frameworks	Despite variation in number of quality classes, each policy aims to achieve a specified quality level (GEcS, GEnS, FCS). It is not currently clear how well these relate to each other, but it would be desirable for these quality thresholds to be the same where they relate to assessing the state of species and habitats
Board 3	General	Unharmonised list of species compared with Natura2000	Relationship to other assessments and frameworks	Habitats and Birds Directives used specified species listed in Annexes. Chapter 11 assessment aimed to assess whole taxon groups, as will be expected under MSFD
Board 3	General	MSFD takes commercial fish separately, while Chapter 11 integrated these with non-commercial fish.	Relationship to other assessments and frameworks	MSFD requires assessment of biodiversity (GES descriptor 1) which will include all fish (as assessed for Chapter 11). MSFD also has a separate assessment for commercial fish (GES

				Descriptor 3).
Board 2	General	Inconsistencies with MSFD, WFD (Lisette Enserink)	Relationship to other assessments and frameworks	Relationship of ecosystem components and pressure categories in MSFD is clearly shown in assessment framework (Annex 4 in Ch11 09/00/04)
Board 3	General	Inconsistent use of terminology and definitions compared with MSFD	Relationship to other assessments and frameworks	Relationship of ecosystem components and pressure categories in MSFD is clearly shown in assessment framework (Annex 4 in Ch11 09/00/04)
Board 4	General	Match assessment to EU Directives and Wadden Sea TMP	Relationship to other assessments and frameworks	See other comments regarding links to other Directives. In a similar manner to WFD, the Wadden Sea assessments should contribute to the overall OSPAR assessment, but form a small proportion of the North Sea and may therefore be reflected in the worst-case assessments
Board 4	General	Link to OSPAR Strategy	Relationship to other assessments and frameworks	The Chapter 11 assessments contribute to the overall objectives of the Biological Diversity and Ecosystems strategy, including the identification of which pressures from human

				activities are considered to be most affecting the status of biodiversity
Board 5	General	Criteria don't deal with community assessors/measures (e.g. diversity and Large fish assessor). Ignores previous work by OSPAR (EcoQO issues 1–4 species, 5–7 community. Criteria focus on species level response	Relationship to other assessments and frameworks	The results from individual indicators, including EcoQOs, should have been used to inform the overall assessment of each ecosystem component. However, the overall assessment of status typically encompasses a broader perspective (criteria) than considered by specific indicators which may consider one aspect (e.g. population size) or one pressure (e.g. oil contamination). Indicators and EcoQOs are a contribution to an overall assessment, rather than an alternative
Board 4	General	Consistency with other already implemented assessment methods such as WFD – same biological components beyond 1nm and MSFD also responsible for components inside 1nm not covered by the WFD	Relationship to other assessments and frameworks	There is generally a need to align the requirements under the diffeent policy mechanisms, both the assessment units and the quality thresholds

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