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## Identifying OSPAR threatened and/or declining species and habitats for which area based protection may be appropriate in the UK and the contribution that Natura sites make to their protection

Submitted by the United Kingdom

**Cover note by Annabelle Aish**

This paper was produced by the UK in order to support the identification of OSPAR MPAs for Initial List threatened and declining features within UK waters. It is submitted to MASH 2008 as an information paper only, following interest expressed by other Contracting Parties. The paper identifies which species and habitats on the OSPAR Initial List (OSPAR Commission, 2004) are threatened and/or declining in UK waters, and of these, which would benefit from area-based protection. Of this subset of species and habitats, we evaluate whether management within the Natura 2000 network already fully or partially addresses the causes of their decline or potential decline. The paper concludes by listing those species and habitats which may require either i) supplementary management within existing SACs and SPAs or ii) additional marine protected areas to ensure their adequate protection in UK waters.

# **IDENTIFYING OSPAR THREATENED AND/OR DECLINING SPECIES AND HABITATS FOR WHICH AREA BASED PROTECTION MAY BE APPROPRIATE IN THE UK AND THE CONTRIBUTION THAT NATURA SITES CAN MAKE TO THEIR PROTECTION**

Paper by Annabelle Aish, Charlotte Johnston and Caroline Turnbull

## **1. Introduction**

This paper seeks to identify which OSPAR Initial List threatened and/or declining species and habitats (OSPAR Commission, 2004) are declining (or likely to decline) in UK waters, and for which of these management within marine protected areas (MPAs) would be an appropriate conservation measure. Current and proposed Natura sites will provide sufficient or partial protection for some of these species and habitats; for others, additional MPAs or supplementary management within existing SACs and SPAs may be required. This paper is a revised draft of paper MN2KPG9\_1\_OSPART&D, prepared to assist in deciding which Natura sites would be nominated in 2005 as UK's first contribution towards the OSPAR 'ecologically coherent network of well managed MPAs'.

## **2. OSPAR Marine Protected Areas**

An OSPAR MPA as defined by the OSPAR Commission (2003a) is "an area within the [OSPAR] maritime area for which protective, conservation, restorative or precautionary measures, consistent with international law have been instituted for the purpose of protecting and conserving species, habitats, ecosystems or ecological processes of the marine environment". This definition currently encompasses the full range of IUCN categories for marine protected areas (IUCN, 1994) and could include areas covered by site-based fisheries protection measures and non-extractive use areas.

An area qualifies for consideration as an OSPAR MPA if it meets one or more of the OSPAR MPA ecological criteria (OSPAR Commission, 2003b). Application of these ecological criteria by contracting parties will lead to the identification of a number of possible sites which are to be further prioritised for selection using OSPAR MPA practical criteria (see also OSPAR Commission, 2003b). Each Contracting Party should consider whether any areas within its jurisdiction justify selection as marine protected areas under these criteria and, if so, it should report to the OSPAR Commission the areas that it has selected as components of the OSPAR Network of Marine Protected Areas. As part of the two-stage site selection process, existing marine protected areas which have been designated under other initiatives or other area based mechanisms can be considered for inclusion within the OSPAR MPA network. As such, Natura 2000 sites may be reported to the OSPAR Commission by contracting parties, as components of the network if they meet OSPAR MPA selection criteria.

In December 2005, a list of 56 SACs was reported to the OSPAR Secretariat as UK's initial contribution towards the OSPAR network<sup>1</sup>. This first list was developed through discussions within the Marine Natura 2000 Project Group and Defra, Scottish Executive and Welsh Assembly Government, and is summarised in paper MN2KPG11\_2\_OSPARN2K\_Final.pdf (available through the password protected Marine Natura Project Group webpage). Natura 2000 sites for initial contribution towards the OSPAR MPA network were selected on the basis of one or more of the following OSPAR MPA Stage 1 Ecological criteria (OSPAR Commission, 2003b):

1. Threatened or declining species and habitats/biotopes
3. Ecological significance
5. Representativity

The purpose of the current paper is to further address the identified decline or potential decline of species or habitats under ecological criterion 1 (above) through MPA identification, taking into account those SACs the UK contributed towards the network in 2005.

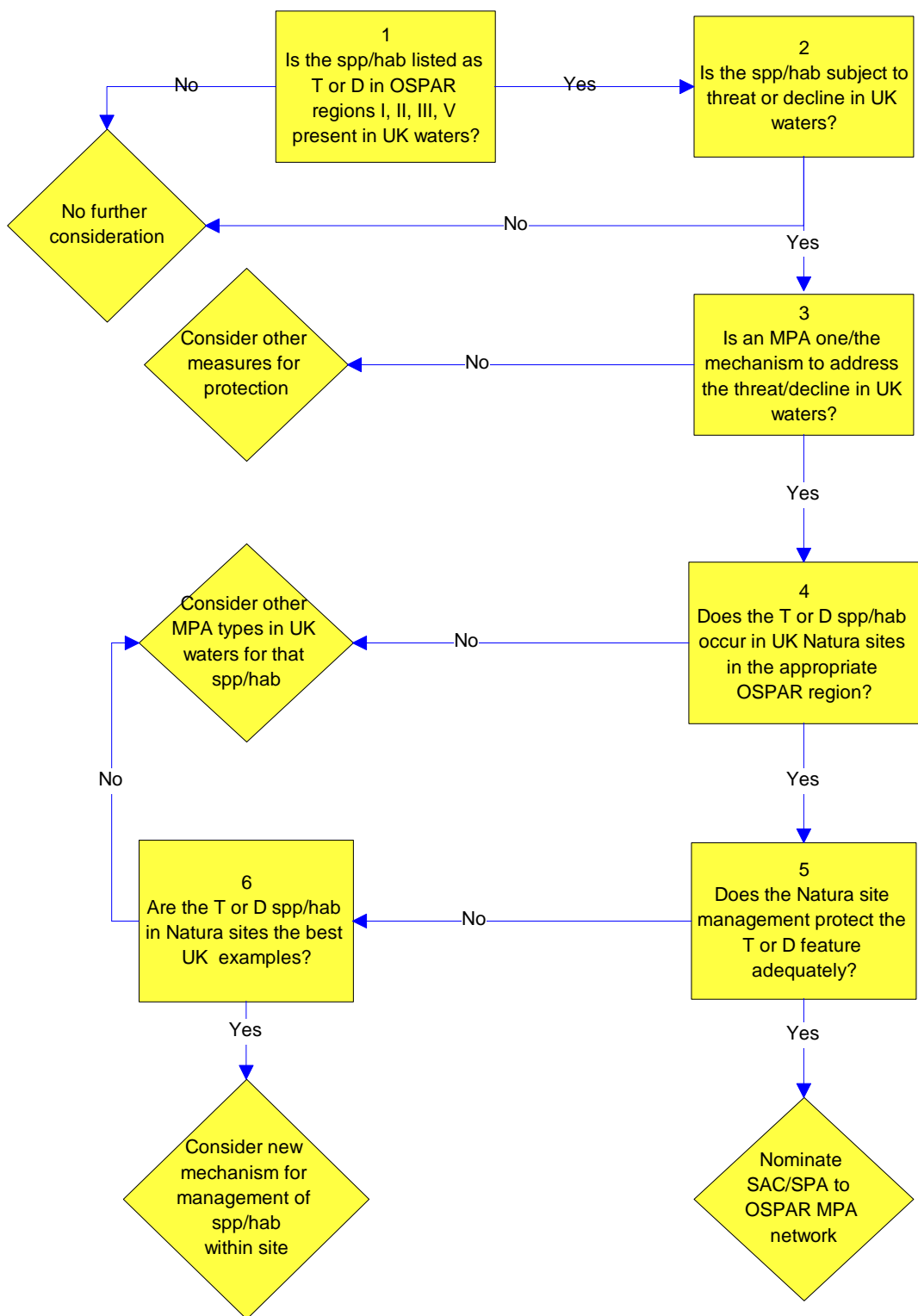
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<sup>1</sup> Note: one of these sites (Braunton Burrows) has since been removed from the UK's list of OSPAR MPAs.

### **3. Process for determining appropriate conservation action for OSPAR Initial List species and habitats**

It is necessary to develop a decision process by which appropriate conservation action can be determined for OSPAR Initial List of species and habitats. A process is presented in Figure 1 on page 4 (with detail presented in subsequent sections) which primarily addresses for the UK whether an OSPAR MPA would be an appropriate conservation measure for a species or habitat on the Initial List. For these species and habitats consideration is then given as to whether Natura 2000 sites are appropriate for submission as OSPAR MPAs, or whether additional site identification or management action within existing sites is needed. This decision process is simplified and, in many cases, species or habitats on the Initial List are likely to require a range of measures to support their conservation. Therefore, finding a threatened or declining habitat or species suitable for area based protection does not necessarily mean that it is the best or only protection mechanism for the species or habitat concerned. Figure 1 outlines the steps that can be taken at a UK level to determine if MPAs should be considered for species or habitats on the OSPAR Initial list.

**Figure 1** A process for the consideration of whether OSPAR MPAs are an appropriate conservation measure for Initial List species or habitats (rectangles indicate decisions to be made and diamond shapes indicate outcomes).



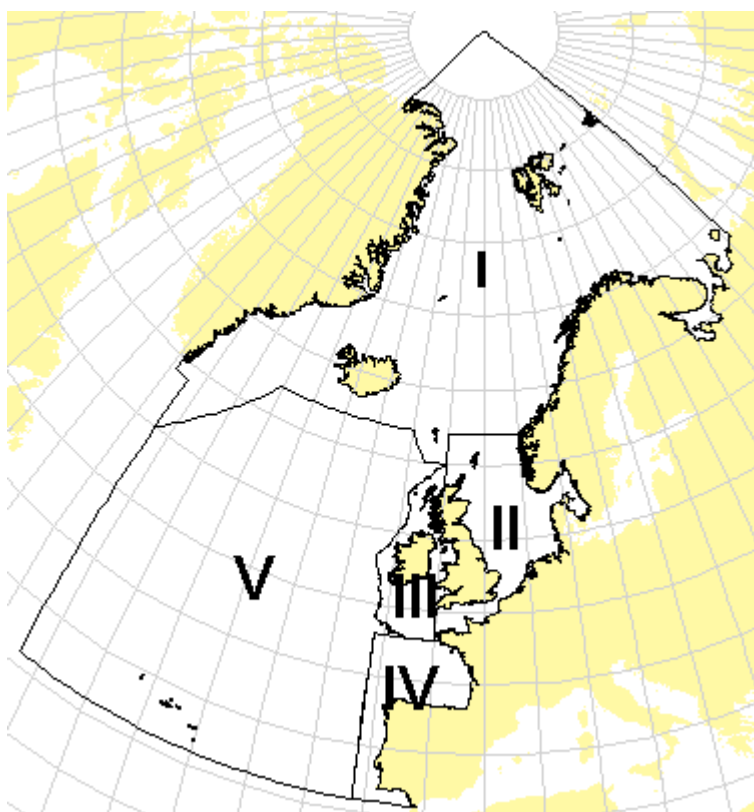
#### 4. Detail of decision making process

##### 4.1. Determining which OSPAR Threatened and/or declining species & habitats occur in UK waters

The OSPAR Initial List catalogues those species and habitats which have been assessed through various OSPAR working groups as being threatened and/or declining (according to the Texel-Faial criteria) in one or more of the OSPAR Regions (OSPAR Commission, 2003c). UK waters span parts of four of the five OSPAR regions:

- I - the Arctic;
- II - the Greater North Sea;
- III - the Celtic Seas;
- V - the Wider Atlantic.

Figure 2 OSPAR Regions



The following tables (1 and 2) highlight in which OSPAR regions the Initial List species/habitats are under threat and/or in decline. The tables also indicate whether the species or habitat in question occurs in UK waters. This evaluation is based on several different information sources: i) Case Reports for the Initial List of Threatened and/or Declining Species and Habitats in the OSPAR Maritime Area (OSPAR Commission, 2006) ii) OSPAR Initial List feature distribution data collated by the OSPAR Commission [http://www.ospar.org/eng/html/habitat\\_mapping.htm](http://www.ospar.org/eng/html/habitat_mapping.htm) iii) UKSeaMap (Connor *et al.*, 2006) iv) recent UK offshore survey by JNCC, DTI/Defra and others and v) expert opinion within the UK nature conservation agencies.

In this context, we consider all UK waters within the OSPAR Maritime Area, i.e. internal waters (up to the freshwater limit), territorial seas, 200 nautical mile Exclusive Fisheries Zone, and UK designated Continental Shelf area.

**Table 1 Species on the OSPAR Initial list which are present in UK waters.**

Scientific name	Common name	OSPAR Regions where the species is under threat and/or in decline (OSPAR, 2006)	Does the species occur in UK waters?
<b>INVERTEBRATES</b>			
<i>Arctica islandica</i> (Linnæus, 1767)	Ocean quahog	II	Yes
<i>Megabalanus azoricus</i> (Pilsbry, 1916)	Azorean barnacle	V	No
<i>Nucella lapillus</i> (Linnæus, 1758)	Dog whelk	II, III, IV	Yes
<i>Ostrea edulis</i> (Linnæus, 1758)	Flat oyster	II	Yes
<i>Patella ulyssiponensis aspera</i> (Röding, 1798)	Azorean limpet	V	No
<b>BIRDS</b>			
<i>Larus fuscus fuscus</i> (Linnæus, 1758)	Lesser black-backed gull (sub-species)	I	Yes (very occasional presence)
<i>Polysticta stelleri</i> (Pallas, 1769)	Steller's eider	I	Yes (very occasional presence)
<i>Puffinus assimilis baroli</i> (auct.incert.)	Little shearwater	V	Yes (very occasional presence)
<i>Sterna dougallii</i> (Montagu, 1813)	Roseate tern	II, III, IV, V	Yes
<b>FISH</b>			
* <i>Acipenser sturio</i> (Linnæus, 1758)	Sturgeon	II, IV	Yes
* <i>Alosa alosa</i> (Linnæus, 1758)	Allis shad	II, III, IV	Yes
* <i>Cetorhinus maximus</i> (Gunnerus, 1763)	Basking shark	All OSPAR Regions	Yes
<i>Coregonus lavaretus oxyrinchus</i> (Linnæus, 1758)	Houting	II	No (extinct)
* <i>Dipturus batis</i> (Linnæus, 1758) (synonym: <i>Raja batis</i> )	Common Skate	All OSPAR Regions	Yes
* <i>Raja montagui</i> (Fowler, 1910) (synonym: <i>Dipturus montagui</i> )	Spotted Ray	II, III, IV, V	Yes
* <i>Gadus morhua</i> (Linnæus, 1758)– populations in the OSPAR regions II and III <sup>2</sup>	Cod	I, II, III	Yes

<sup>2</sup> That is, the populations/stocks referred to in ICES advice as the North Sea and Skagerrak cod stock, Kattegat cod stock, Cod west of Scotland, Cod in the Irish Sea, Cod in the Irish Channel and Celtic Sea.

<i>Hippocampus guttulatus</i> (Cuvier, 1820) (synonym: <i>Hippocampus ramulosus</i> )	Long-snouted seahorse	II, III, IV, V	Yes
<i>Hippocampus hippocampus</i> (Linnæus, 1758)	Short-snouted seahorse	II, III, IV, V	Yes
* <i>Hoplostethus atlanticus</i> (Collett, 1889)	Orange roughy	I, V	Yes
<i>Petromyzon marinus</i> (Linnæus, 1758)	Sea lamprey	II, III, IV, V	Yes
* <i>Salmo salar</i> (Linnæus, 1758)	Salmon	I, II, III, IV <sup>3</sup>	Yes
* <i>Thunnus thynnus</i> (Linnæus, 1758)	Bluefin tuna	V	Yes
<b>REPTILES</b>			
<i>Caretta caretta</i> (Linnæus, 1758)	Loggerhead turtle	IV, V	Yes (occasional presence)
<i>Dermochelys coriacea</i> (Vandelli, 1761)	Leatherback turtle	All OSPAR Regions	Yes (occasional presence)
<b>MAMMALS</b>			
<i>Balaena mysticetus</i> (Linnæus, 1758)	Bowhead whale	I	No
<i>Balaenoptera musculus</i> (Linnæus, 1758)	Blue whale	All OSPAR Regions	Yes (occasional presence)
<i>Eubalaena glacialis</i> (Müller, 1776)	Northern right whale	All OSPAR Regions	Yes (occasional presence)
<i>Phocoena phocoena</i> (Linnæus, 1758)	Harbour porpoise	II, III, IV	Yes

\* Fish species affected by fishing. These species are subject to management by an international or national fisheries authority or body. The OSPAR Commission has no competence to adopt programmes or measures on questions relating to the management of fisheries. Where the OSPAR Commission considers that action is desirable in relation to such a question, it is to draw that question to the attention of the authority or international body competent for that question.

**Table 2 Habitats on the OSPAR Initial list which are present in UK waters.**

Habitat	OSPAR Regions where such habitats are under threat and/or in decline (OSPAR, 2006)	Does the habitat occur in UK waters?
Carbonate mounds	V	Yes
Deep-sea sponge aggregations	V, (I, II) <sup>4</sup>	Yes
Oceanic ridges with	V	No

<sup>3</sup> In accordance with the comments of ICES in its review, the varying states of the numerous different stocks have to be taken into account.

<sup>4</sup> Recent UK SEA surveys (Howell *et al.*, in prep) cited in ICES (2007) suggest there may be deep sea sponge communities in the UK sector of the Faroe-Shetland Channel (OSPAR Regions I and II).

hydrothermal vents/fields		
Intertidal mudflats	I, II, III, IV	Yes
Littoral chalk communities	II	Yes
<i>Lophelia pertusa</i> reefs	All OSPAR Regions	Yes
Maerl beds	III	Yes
<i>Modiolus modiolus</i> beds	All OSPAR Regions	Yes
Intertidal <i>Mytilus edulis</i> beds on mixed and sandy sediments	II, III	Yes
<i>Ostrea edulis</i> beds	II	Yes
<i>Sabellaria spinulosa</i> reefs	II, III	Yes
Seamounts	I, IV, V	Yes
Sea-pen and burrowing megafauna communities	II, III	Yes
<i>Zostera</i> beds	II, III	Yes

#### 4.2. Determining which species and habitats from the OSPAR Initial list are threatened or declining in UK waters

Tables 3 and 4 below comprise an evaluation of which species and habitats on the OSPAR Initial List are considered to be threatened and declining in UK waters, based on the OSPAR Texel-Faial criteria (OSPAR, 2003c). Threats to these species and habitats, as identified in the 'Case Reports for the Initial List of Threatened and/or Declining Species and Habitats in the OSPAR Maritime Area' (OSPAR Commission, 2006) are also listed. Both expert opinion and published literature (for example, evidence cited in the 2007 UK BAP Report, the 2007 EC Habitats Directive Favourable Conservation Status Assessments and the OSPAR Case Reports for the Initial List of Threatened and/or Declining Species and Habitats (2006)) have been used to determine:

- i) Whether a species or habitat is experiencing or has experienced a **significant decline**
- ii) Whether there is a **high probability of significant decline** of the species or habitat in the foreseeable future under *current management practices*.
- iii) Whether the species or habitat is **currently** or **potentially threatened**.

[Supporting information is documented and referenced in the spreadsheet accompanying this paper: **OSPART&D\_Spp&Habs\_UKWaters\_vs0.3.xls**]

#### **Defining 'declining' species and habitats in an OSPAR context:**

For species, decline denotes 'an observed or indicated significant decline in numbers, extent or quality' (quality refers to life history parameters), though 'significant' need not be in a statistical sense. For habitats, decline means 'a significant decline in extent or quality'. For both species and habitats, decline can be of a historic, recent or current nature, but should only be regarded as occurring where it goes beyond that which can be expected based on long-term natural variability and resilience in the species/habitat in question. Making a judgement regarding the probability of significant decline of species/habitats in the future is not without difficulty, and inevitably relies heavily on expert opinion. However, this criterion permits the inclusion of species/habitats for which there is a high likelihood of significant decline in the future if management measures are not put in place (or further developed) *regardless* of whether data is available to assess the degree of historic, recent or current decline.

**Source: Criteria for the Identification of Species and Habitats in need of Protection and their Method of Application (The Texel-Faial Criteria) OSPAR Commission (2003c)**

**Defining ‘threatened’ species and habitats in an OSPAR context:**

The term ‘threatened’ refers to an anthropogenic cause of species or habitat decline. Therefore, where the decline is clear and present, and linked directly or indirectly to human activity, a species/habitat can be considered ‘currently threatened’. Where there is a high probability of significant decline which can be linked directly or indirectly to human activity, the species/habitat is considered to be ‘potentially threatened’<sup>5</sup>. As such, a species or habitat may be considered ‘in decline’ but not ‘threatened’ if the cause of decline is not linked to human activity.

**Source: *Criteria for the Identification of Species and Habitats in need of Protection and their Method of Application (The Texel-Faial Criteria)* OSPAR Commission (2003c)**

For some species and habitats there is disagreement amongst evaluators as to their status (‘Contested’) or insufficient information with which to evaluate their status (‘Unknown’). By taking a precautionary approach to the inclusion of potentially threatened and declining species/habitats, we avoid omitting any relevant species and habitats at this stage.

**Table 3 Species on the OSPAR Initial list which are threatened and/or declining in UK waters**

Scientific name	Common name	OSPAR Regions where the species is under threat and/or in decline	Identified threat in OSPAR Region (OSPAR Commission, 2006)	Is the species under threat or in decline in UK waters?
<b>INVERTEBRATES</b>				
<i>Arctica islandica</i> (Linnæus, 1767)	Ocean quahog	II	Sea bed disturbance e.g. by beam trawling, aggregate extraction and oil and gas extraction	Decline? <b>Yes (Contested)</b> High probability of decline? <b>Yes (Contested)</b>  Currently threatened? <b>Yes (Contested)</b> Potentially threatened? <b>Yes (Contested)</b>
<i>Nucella lapillus</i> (Linnæus, 1758)	Dog whelk	II, III, IV	TBT	Decline? <b>No</b> High probability of decline? <b>No</b>  Currently threatened? <b>No</b> Potentially threatened? <b>No</b>
<i>Ostrea edulis</i> (Linnæus, 1758)	Flat oyster	II	Directed fishing, poor water quality, introduction of non-native species, and disease	Decline? <b>Yes</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>

<sup>5</sup> Where the species or habitat satisfies criterion 3 (rarity) or 4 (sensitivity), a lower threshold of probability can justify regarding the species as ‘potentially threatened’

<b>BIRDS</b>				
<i>Larus fuscus fuscus</i> (Linnæus, 1758)	Lesser black-backed gull (sub-species)	I	Man-made pollution (e.g. PCBs) decline in prey, competition and predation by the Herring Gull	<b>Not assessed.</b> Occurs naturally only occasionally and in very small numbers in UK waters.
<i>Polysticta stelleri</i> (Pallas, 1769)	Steller's eider	I	Fishing by-catch, oil pollution, disturbance and offshore development	<b>Not assessed.</b> Occurs naturally only occasionally and in very small numbers in UK waters.
<i>Puffinus assimilis baroli</i> (auct.incert.)	Little shearwater	V	Predation at breeding sites, oil pollution	<b>Not assessed.</b> Occurs naturally only occasionally and in very small numbers in UK waters.
<i>Sterna dougallii</i> (Montagu, 1813)	Roseate tern	II, III, IV, V	Disturbance from human activities and/or predation from avian and ground predators at colonies	Decline? <b>Yes (Recent)</b> High probability of decline? <b>No</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>No</b>
<b>FISH</b>				
* <i>Acipenser sturio</i> (Linnæus, 1758)	Sturgeon	II, IV	Obstruction of migration routes, river water quality, directed fishing, damage to spawning grounds and by-catch in estuaries	Decline? <b>Yes (Historic) (Contested)</b> High probability of decline? <b>Unknown</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
* <i>Alosa alosa</i> (Linnæus, 1758)	Allis shad	II, III, IV	Obstruction of migration routes, pollution of lower river reaches and damage to spawning grounds	Decline? <b>Yes</b> High probability of decline? <b>Yes (Contested)</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
* <i>Cetorhinus maximus</i> (Gunnerus, 1763)	Basking shark	All OSPAR Regions	Directed and by-catch fishing, vessel collision, disturbance from watchers	Decline? <b>Yes (Contested)</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes (Contested)</b> Potentially threatened? <b>Yes</b>
* <i>Dipturus batis</i> (Linnæus, 1758) (synonym: <i>Raja batis</i> )	Common Skate	All OSPAR Regions	Directed and by-catch fishing	Decline? <b>Yes</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes</b>

				Potentially threatened? <b>n/a</b>
<i>*Raja montagui</i> (Fowler, 1910) (synonym: <i>Dipturus montagui</i> )	Spotted Ray	II, III, IV, V	Directed and by-catch fishing	Decline? <b>No</b> High probability of decline? <b>Unknown (Contested)</b>  Currently threatened? <b>No</b> Potentially threatened? <b>Unknown (Contested)</b>
<i>*Gadus morhua</i> (Linnæus, 1758) – populations in the OSPAR regions II and III6	Cod	I, II, III	Directed and by-catch fishing	Decline? <b>Yes</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
<i>Hippocampus guttulatus</i> (Cuvier, 1820) (synonym: <i>Hippocampus ramulosus</i> )	Long-snouted seahorse	II, III, IV, V	Directed and by-catch fishing, habitat destruction	Decline? <b>Unknown</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Unknown</b> Potentially threatened? <b>Yes</b>
<i>Hippocampus hippocampus</i> (Linnæus, 1758)	Short-snouted seahorse	II, III, IV, V	Directed and by-catch fishing, habitat destruction	Decline? <b>Unknown</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Unknown</b> Potentially threatened? <b>Yes</b>
<i>*Hoplostethus atlanticus</i> (Collett, 1889)	Orange roughy	I, V	Directed fishing	Decline? <b>Yes</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
<i>Petromyzon marinus</i> (Linnæus, 1758)	Sea lamprey	II, III, IV, V	Poor water quality, and obstructions in rivers, and degradation of spawning grounds	Decline? <b>Unknown</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Unknown</b>

6 That is, the populations/stocks referred to in ICES advice as the North Sea and Skagerrak cod stock, Kattegat cod stock, Cod west of Scotland, Cod in the Irish Sea, Cod in the Irish Channel and Celtic Sea.

				Potentially threatened? <b>Yes</b>
* <i>Salmo salar</i> (Linnæus, 1758)	Salmon	I, II, III, IV <sup>7</sup>	Directed and by-catch fishing, obstructions in rivers, poor river quality (rivers) degradation of spawning grounds, sea lice infestations, and aquaculture developments	Decline? <b>Yes</b> High probability of decline? <b>Unknown</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
* <i>Thunnus thynnus</i> (Linnæus, 1758)	Bluefin tuna	V <sup>8</sup>	Directed and by-catch fisheries	Decline? <b>Yes (Contested)</b> High probability of decline? <b>Unknown</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
<b>REPTILES</b>				
<i>Caretta caretta</i> (Linnæus, 1758)	Loggerhead turtle	IV, V	Disturbance on nesting beaches, habitat loss, egg collecting, by-catch, ingestion of marine rubbish and marine pollution.	<b>Not assessed.</b> Occurs naturally only occasionally and in very small numbers in UK waters.
<i>Dermochelys coriacea</i> (Vandelli, 1761)	Leatherback turtle	All OSPAR Regions	Directed and by-catch fishing, habitat damage to nesting beaches, egg collecting, ingestion of marine rubbish and marine pollution	<b>Not assessed.</b> Occurs naturally only in small numbers in UK waters.
<b>MAMMALS</b>				
<i>Balaenoptera musculus</i> (Linnæus, 1758)	Blue whale	All OSPAR Regions	Acoustic disturbance and boat collisions	<b>Not assessed.</b> Occurs naturally only occasionally and in very small numbers in UK waters.
<i>Eubalaena glacialis</i> (Müller, 1776)	Northern right whale	All OSPAR Regions	Ship collisions, marine pollution, water quality (through bioaccumulation), acoustic disturbance, entanglement in fishing gear	<b>Not assessed.</b> Occurs naturally only occasionally and in very small numbers in UK waters.

<sup>7</sup> In accordance with the comments of ICES in its review, the varying states of the numerous different stocks have to be taken into account.

<sup>8</sup> The main threat is the high rate of catch of juvenile fish of the species (SCRS Report, page 59).

<i>Phocoena phocoena</i> (Linnæus, 1758)	Harbour porpoise	II, III, IV	By-catch fishing, marine pollution, acoustic disturbance, reduction in prey species	Decline? <b>No</b> High probability of decline? <b>No</b>  Currently threatened? <b>No</b> Potentially threatened? <b>No</b>
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\* Fish species affected by fishing. These species are subject to management by an international or national fisheries authority or body. The OSPAR Commission has no competence to adopt programmes or measures on questions relating to the management of fisheries. Where the OSPAR Commission considers that action is desirable in relation to such a question, it is to draw that question to the attention of the authority or international body competent for that question.

**Table 4 Habitats on the OSPAR Initial list which are threatened and/or declining in UK waters**

Habitat	OSPAR Regions where such habitats are under threat and/or in decline	Identified threat in OSPAR Region (OSPAR Commission, 2006)	Is the habitat under threat or in decline in UK waters?
Carbonate mounds	V	Demersal fishing	Decline? <b>Unknown</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Unknown</b> Potentially threatened? <b>Yes</b>
Deep-sea sponge aggregations	V (I, II)	Demersal fishing and bioprospecting.	Decline? <b>Unknown</b> High probability of decline? <b>Yes (Contested)</b>  Currently threatened? <b>Unknown</b> Potentially threatened? <b>Yes (Contested)</b>
Intertidal mudflats	I, II, III, IV	Coastal development, pollution (e.g. oil spills), organic enrichment, demersal fishing, bait digging and sea level rise.	Decline? <b>Yes</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
Littoral chalk communities	II	Coast protection works, toxic contaminants and physical loss (e.g. human disturbance)	Decline? <b>Yes (Historic)</b> High probability of decline? <b>Unknown</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
<i>Lophelia pertusa</i> reefs	All OSPAR Regions	Damage from demersal fishing, exploration for oil & gas	Decline? <b>Yes</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
Maerl beds	III	Direct extraction/dredging, smothering, demersal fishing, coastal development, organic enrichment, pollution from aquaculture, invasive species	Decline? <b>Yes</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
<i>Modiolus modiolus</i> beds	All OSPAR Regions	Demersal fishing, seabed disturbance from human	Decline? <b>Yes</b> High probability of decline? <b>Yes</b>

		development, aggregate extraction and navigational dredging	Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
Intertidal <i>Mytilus edulis</i> beds on mixed and sandy sediments	II, III	Spat collection, directed fishing, phytoplankton blooms due to nutrient enrichment and antifouling chemicals	Decline? <b>Unknown</b> High probability of decline? <b>Unknown</b>  Currently threatened? <b>Unknown</b> Potentially threatened? <b>Unknown</b>
<i>Ostrea edulis</i> beds	II	Demersal fishing (habitat damage), disease, poor water quality, non-native species and disease	Decline? <b>Yes (Historic)</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
<i>Sabellaria spinulosa</i> reefs	II, III	Physical disturbance from dredging, demersal fishing, net fishing and potting, aggregate dredging, seabed infrastructure, pollution, coastal engineering (changing hydrological regime)	Decline? <b>Yes</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>
Seamounts	I, IV, V	Demersal fishing and deep sea mining.	Decline? <b>Yes (Contested)</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes (Contested)</b> Potentially threatened? <b>Yes</b>
Sea-pen and burrowing megafauna communities	II, III	Demersal fisheries and marine pollution (e.g. organic enrichment from fish farms)	Decline? <b>Yes (Contested)</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes (Contested)</b> Potentially threatened? <b>Yes</b>
<i>Zostera</i> beds	II, III	Physical disturbance (demersal fishing), nutrient enrichment, marine pollution, disease, increased turbidity, non-native species	Decline? <b>Yes</b> High probability of decline? <b>Yes</b>  Currently threatened? <b>Yes</b> Potentially threatened? <b>n/a</b>

There is sufficient evidence to suggest that Dog whelk and Harbour porpoise are neither i) declining in UK waters or ii) likely to decline *under current management practices*. They will therefore not be considered further in this paper. Moreover, the following Initial List species are found only occasionally in UK waters (often as vagrants) and as such their status in the UK cannot be assessed: Lesser black-backed gull (sub-species), Steller's eider, Little shearwater, Loggerhead turtle, Leatherback turtle, Blue whale and Northern right whale. Given their infrequent occurrence in the UK, protection of these species through MPAs in UK waters will not be considered further in this paper. However, for all the other features listed, where decline or high probability of decline is unknown or contested, that feature will be considered here in support of the precautionary principle.

### 4.3. Determining whether MPAs are an appropriate conservation mechanism for Initial list features which are threatened and/or declining in UK waters

From the sub-set of the OSPAR Initial list features shown to be threatened and/or declining in UK waters, a further assessment can be made to answer question 3 in Figure 1: Is an MPA one or the best mechanism to address the threat or decline in UK waters for each species or habitat? MPAs are not considered to be an appropriate, or indeed the best, mechanism to address the decline or potential decline of all of the species and habitats on the Initial List relevant to UK waters. Work to determine for which species and habitats they might be appropriate is in its initial stages.

A number of key principles should be considered when determining whether an Initial List feature may benefit from an MPA:

1. The nature of a threat: is it diffuse or direct?
2. The life history characteristics of a species: is it wide-ranging or sedentary? Does it form aggregations?
3. Nature of the presence of a species: is this predictable and/or regular?
4. Management considerations as identified in the 'Case Reports for the Initial List of Threatened and/or Declining Species and Habitats in the OSPAR Maritime Area' (OSPAR Commission, 2006)
5. Total conservation benefit of MPAs versus other suitable management measure

Tables 5 and 6 list potential management measures to address relevant threats to Initial List features, and highlight where, according to this information, MPAs may have a role to play in the conservation of the species and habitat in UK waters. As with threats, listed management measures have been taken from the Case Reports for the Initial List of Threatened and/or Declining Species and Habitats in the OSPAR Maritime Area (OSPAR Commission, 2006). The list of features which may benefit from MPAs is inclusive and might change upon further discussion. Inclusion of a feature in the sub-set does not imply that marine protected areas are the only, or indeed the most, appropriate conservation measure for the species or habitat or that a marine protected area may be identified for the species or habitat in UK waters; it merely indicates that management within an MPA could fully or partially address the identified decline (or likely decline).

As previously stated, OSPAR MPAs encompass the full range of IUCN MPA categories. Spatially bounded fisheries measures are therefore considered to be MPAs in an OSPAR context. However, it may be useful to differentiate between i) protected areas which are identified to protect entire ecological assemblages in specific locations (A) and ii) those established to protect mobile species from the (direct or indirect) effects of fishing (B). The latter are more likely to extend over large areas, and afford protection to mobile or migratory species by way of fishing quotas or gear restrictions. These sites are also less likely to remain static; rather their spatial location/extent will depend on the movements of the managed species.

**Table 5 Management measures identified by the OSPAR Commission for Initial list species and a consideration of whether MPAs could help to address their threat or decline in UK waters**

Scientific name	Common name	Management measures (OSPAR Commission, 2006)	Management measure could be achieved through MPA identification and management?
<b>INVERTEBRATES</b>			
<i>Arctica islandica</i> (Linnæus, 1767)	Ocean quahog	Limiting or prohibiting demersal trawling	Yes (A)
<i>Ostrea edulis</i> (Linnæus, 1758)	Flat oyster	Regulation of the fishery, control spread of non-native species, reduce disease transmission and maintain suitable habitat	Yes (A)

<b>BIRDS</b>			
<i>Sterna dougallii</i> (Montagu, 1813)	Roseate tern	Protect breeding areas.	Yes (A)
<b>FISH</b>			
* <i>Acipenser sturio</i> (Linnæus, 1758)	Sturgeon	Improve water quality, habitat conditions, and access to suitable spawning grounds in estuaries and rivers	No
* <i>Alosa alosa</i> (Linnæus, 1758)	Allis shad	Improvement of water quality, habitat conditions, and access to suitable spawning grounds in the estuaries and rivers	Yes (A)
* <i>Cetorhinus maximus</i> (Gunnerus, 1763)	Basking shark	Seasonal gear restrictions (preventing incidental capture), trade prohibition (shark products), recommended routing measures and Codes of Conduct (preventing collisions/harassment).	Yes (B)
* <i>Dipturus batis</i> (Linnæus, 1758) (synonym: <i>Raja batis</i> )	Common Skate	Gear restrictions and closed areas	Yes (B)
* <i>Raja montagui</i> (Fowler, 1910) (synonym: <i>Dipturus montagui</i> )	Spotted Ray	Gear restrictions and closed areas	Yes (B)
* <i>Gadus morhua</i> (Linnæus, 1758)– populations in the OSPAR regions II and III <sup>9</sup>	Cod	Reduce fishing mortality	Yes (B)
<i>Hippocampus guttulatus</i> (Cuvier, 1820) (synonym: <i>Hippocampus ramulosus</i> )	Long-snouted seahorse	Control of collection and the trade in seahorses, protection of habitat	Yes (A)
<i>Hippocampus hippocampus</i> (Linnæus, 1758)	Short-snouted seahorse	Control of collection and the trade in seahorses, protection of habitat	Yes (A)
* <i>Hoplostethus atlanticus</i> (Collett, 1889)	Orange roughy	Controls on the directed fishery and by-catch, and closed areas	Yes (A)
<i>Petromyzon marinus</i> (Linnæus, 1758)	Sea lamprey	Improvement of water quality, habitat conditions, and access to suitable spawning grounds in estuaries and rivers	Yes (A)
* <i>Salmo salar</i> (Linnæus, 1758)	Salmon	Address effects of farmed salmon, remove estuary drift net fisheries, improve water quality and access to spawning grounds and control directed and by-	Yes (A and B)

<sup>9</sup> That is, the populations/stocks referred to in ICES advice as the North Sea and Skagerrak cod stock, Kattegat cod stock, Cod west of Scotland, Cod in the Irish Sea, Cod in the Irish Channel and Celtic Sea.

		catch fishery	
* <i>Thunnus thynnus</i> (Linnæus, 1758)	Bluefin tuna	Controls on the direct and by-catch fisheries	Yes (B)

**Table 6 Management measures identified by the OSPAR Commission for Initial list habitats and a consideration of whether MPAs could help to address their threat or decline in UK waters**

Habitat	Management measures (OSPAR Commission, 2006)	Management measure to be achieved through MPA identification?
Carbonate mounds	Closed areas for demersal fishing	Yes (A)
Deep-sea sponge aggregations	Closed areas for demersal fishing	Yes (A)
Intertidal mudflats	Controls on human activities, water quality improvement.	Yes (A)
Littoral chalk communities	Controls on development and water quality improvements	Yes (A)
<i>Lophelia pertusa</i> reefs	Closed areas for demersal fishing	Yes (A)
Maerl beds	Prevention of dredging, fishing controls, spatial planning (e.g. aquaculture) and water quality controls	Yes (A)
<i>Modiolus modiolus</i> beds	Closed areas for demersal fishing	Yes (A)
Intertidal <i>Mytilus edulis</i> beds on mixed and sandy sediments	Fishing controls (including spat collection for aquaculture) and protection from physical damage	Yes (A)
<i>Ostrea edulis</i> beds	Restrictions on fishing, control spread of introduced species, reduce risk of disease transmission, maintain suitable habitat	Yes (A)
<i>Sabellaria spinulosa</i> reefs	Closed areas for fishing and aggregate extraction, spatial planning and water quality control	Yes (A)
Seamounts	Closed areas for demersal fishing	Yes (A)
Sea-pen and burrowing megafauna communities	Closed areas for demersal fishing, spatial planning and water quality improvement	Yes (A)
<i>Zostera</i> beds	Protected areas, restoration programmes and pollution control	Yes (A)

## 5. Presence of Initial OSPAR List species and habitats within existing Natura 2000 sites

For those species and habitats identified as suitable for protection through management within a Marine Protected Area, it is important to assess the existing contribution of SACs and SPAs to their protection in UK waters. As Natura 2000 sites are a major suite of marine protected areas in UK waters, it is necessary to determine what contribution these can make, either directly or indirectly, to the conservation of threatened or declining species and habitats for which protected areas are appropriate. As shown in the decision process in Figure 1, this can be done by examining whether an Initial OSPAR List species and habitat occurs in a Natura site and, if so, whether the management of the site adequately protects the species and habitat. If the answer to both of these is 'Yes' then the site may be appropriate for proposal as an OSPAR MPA. However, where the answer at either stage is 'No' additional considerations are necessary (See Figure 1, questions 4 and 5).

### 5.1. Natura 2000 sites which support and manage Initial OSPAR List species and habitats

It is possible to identify which Natura 2000 interest features correspond to Initial OSPAR List species and habitats. However, it is important to distinguish between those Initial OSPAR List species and habitats which are the same as or a sub-type of a Natura 2000 interest feature, (e.g. *Sabellaria spinulosa* reefs are formally described as a sub-type of Annex I Reef in the Interpretation manual of European Union Habitats (2007)), and those which may be associated with a Natura 2000 habitat interest feature but may not be managed explicitly within the site, e.g. salmon or *Ostrea edulis* beds, both of which may occur in Annex I Estuaries and Large Shallow Inlets and Bays. Initial OSPAR List species and habitats which occur in UK waters and directly correspond to (or are part of) Natura 2000 site features according to the EU interpretation manual 2007 are summarised below in Table 7. [Note, however, that while some OSPAR Initial List features are recognised sub-types of Natura 2000 features, their presence does not always correspond with that of the Natura 2000 feature in question. For example, a SAC containing Annex I reefs may not support *Modiolus modiolus* beds or *Sabellaria spinulosa* reefs. As a result, Annex I features need to be checked for the presence of relevant OSPAR Initial List sub-types in all cases. ]

**Table 7 Initial OSPAR List species and habitats in UK waters which correspond to (or are subsumed within) managed Annex I and II features in Natura 2000 sites according to the Interpretation manual of European Union Habitats (2007).**

Initial OSPAR List species or habitat	Corresponding Natura 2000 feature according to the EU interpretation manual 2007
Roseate tern	Roseate tern
Allis shad	Allis shad
Sea lamprey	Sea lamprey
Intertidal mudflats	Mudflats and sandflats not covered by seawater at low tide (Annex I feature must be checked for the presence of this habitat sub-type)
Littoral chalk communities	Reefs (Annex I feature must be checked for the presence of this habitat sub-type)
<i>Lophelia pertusa</i> reefs	Reefs (Annex I feature must be checked for the presence of this habitat sub-type)
Maerl beds	Sandbanks which are slightly covered by seawater all the time (Annex I feature must be checked for the presence of this habitat sub-type)
<i>Modiolus modiolus</i> beds	Reefs (Annex I feature must be checked for the presence of this habitat sub-type)
Intertidal <i>Mytilus edulis</i> beds on mixed and sandy sediments	Reefs (Annex I feature must be checked for the presence of this habitat sub-type)
<i>Sabellaria spinulosa</i> reefs	Reefs (Annex I feature must be checked for the presence of this habitat sub-type)
Seamounts	Reefs (Annex I feature must be checked for the presence of this habitat sub-type)
<i>Zostera</i> beds	Sandbanks which are slightly covered by seawater all the time (Annex I features must be checked for the presence of this habitat sub-type) Mudflats and sandflats not covered by seawater at low tide (Annex I feature must be checked for the presence of this habitat sub-type) Estuaries (Annex I feature must be checked for the presence of this habitat sub-type) Large shallow inlets and bays (Annex I feature must be checked for the

	presence of this habitat sub-type)
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	Coastal lagoons (Annex I feature must be checked for the presence of this habitat sub-type)
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Based on the presence of managed threatened and declining features, and consideration of two other ecological selection criteria (Representativity and Ecological significance), the UK reported a first tranche of 55 SACs to the OSPAR Commission as OSPAR MPAs in 2005. (See Appendix I for a list of the 33 SACs containing managed OSPAR Initial List features which have been submitted to OSPAR). As new Natura sites away from the coast are identified by the UK nature conservation agencies in inshore and offshore waters (for example, offshore SACs for Annex I *Lophelia pertusa* reefs or marine extensions to Roseate Tern breeding colony SPAs), their potential contribution to the protection of these Initial List features will be evaluated. The relevant Natura 2000 sites 'away from the coast' will be then submitted to the OSPAR Commission as OSPAR MPAs. It is anticipated that Roseate terns, *Lophelia pertusa* reefs and Seamounts will all be sufficiently represented within Natura 2000 sites (and submitted as OSPAR MPAs) once the Natura 2000 network is complete, although this will be evaluated once the network is finalised.

### **5.2. Initial OSPAR List species and habitats which may occur in Natura 2000 sites but may not be protected adequately**

A number of OSPAR Initial List species and habitats may occur in (existing or proposed) Natura 2000 sites but may not be directly protected by management schemes since they are not recognised by the Interpretation manual of European Union Habitats (2007) as being an interest feature or part of an interest feature. Based on expert judgement from the UK nature conservation agencies these are:

#### **Species**

- Ocean quahog (likely to occur in some Natura sites but largely occurs in habitats which are not eligible for consideration as part of the Natura 2000 suite).
- *Ostrea edulis* (flat oyster)
- Long-snouted seahorse
- Short-snouted seahorse
- Salmon<sup>10</sup>

#### **Habitats:**

- *Ostrea edulis* beds
- Intertidal *Mytilus edulis* beds on mixed and sandy sediments
- *Zostera* beds
- Maerl beds
- Deep-sea sponge aggregations\*
- Sea-pen and burrowing megafauna communities\*

Maerl beds and *zostera* beds are recognised by the Interpretation manual of European Union Habitats (2007) as being sub-types of certain Annex I habitats but are not exclusively found in association with these features within Natura sites. Similarly intertidal *Mytilus edulis* beds on mixed and sandy sediments may not qualify as Annex I Reefs in all SACs. All the features listed above may be managed, for instance, if they happen to be closely associated with a managed Natura 2000 interest feature. For example, *Ostrea edulis* beds are associated with both the Annex I Estuaries and Annex I Large shallow inlets and bays features in Milford Haven (within the Pembrokeshire Marine SAC, Wales), and are addressed in the SAC management plan. However, such management will need to be ascertained on a case-by-case basis, based on expert judgement within the UK nature conservation agencies.

The two habitats marked with an asterisk are likely to occur within offshore pSACs, dSACs or Areas of Search (AoS), although further survey is required to ascertain this. If their presence is confirmed, management of the Initial List features within these sites (once designated) may need further consideration.

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<sup>10</sup> The caveat with regards to management competency of fish species affected by fishing is relevant to this species.

If the occurrence of the Initial OSPAR List feature within a Natura site is one of the best representative examples of this feature in the UK, and it is not adequately managed within the site, then it will be necessary to consider a new management mechanism before the site can be considered a well-managed OSPAR MPA for that Initial List species or habitat. If the location of the Initial List species or habitat within a Natura site is not considered the most suitable example for proposal (or if other excellent examples also occur outside the Natura 2000 network) then it may be necessary to consider other existing MPAs in UK waters or the creation of new protected areas for these species or habitats.

### 5.3 Consideration of other marine protected areas for Initial OSPAR List species or habitats

Some Initial List species or habitats which could benefit from spatial management measures do not occur in existing or proposed Natura sites (or AoS) and in other cases, significant occurrences of the species or habitats may be found outside the Natura 2000 network. In these cases, other existing, or new, marine protected areas might be considered. Existing marine protected areas other than Natura sites will need to be evaluated using the same decision process as Natura sites (see Figure 1). Initial List species or habitats which may be inadequately represented by the UK suite of Natura sites and therefore might be considered for presence in other marine protected areas or creation of new areas are:

#### Species

- Ocean quahog
- *Ostrea edulis*
- Basking shark<sup>11</sup>
- Common skate<sup>11</sup>
- Spotted ray<sup>11</sup>
- Cod<sup>11</sup>
- Long-snouted seahorse
- Short-snouted seahorse
- Orange roughy<sup>11</sup>
- Salmon<sup>11</sup>
- Bluefin tuna<sup>11</sup>

#### Habitats:

- Deep-sea sponge aggregations<sup>12</sup>
- Maerl beds
- Intertidal *Mytilus edulis* beds on mixed and sandy sediments
- Sea-pen and burrowing megafauna communities
- *Ostrea edulis* beds
- *Zostera* beds
- *Sabellaria spinulosa* reefs
- Littoral chalk communities
- *Modiolus modiolus* beds

The lists of habitats and species are derived from a preliminary review of the distribution of OSPAR Initial List habitats<sup>13</sup> and species in UK waters, supported by expert judgement within the UK nature conservation agencies. A precautionary approach was taken to the inclusion of species and habitats on these lists. A more detailed assessment of the extent and status of Initial List features beyond Natura 2000 network (once complete) would need to be undertaken by the UK nature conservation agencies in order to ascertain whether

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<sup>11</sup> The caveat with regards to management competency of fish species affected by fishing is relevant to this species.

<sup>12</sup> No up to date maps of deep-sea sponge aggregations in the UK are available; however, there is evidence that this Initial List habitat occurs in UK offshore waters north east of Scotland in the Faroe-Shetland Channel (Howell *et al.*, in prep, cited in ICES, 2007).

<sup>13</sup> Further information about Initial List habitat distribution data can be found at [http://www.ospar.org/eng/html/habitat\\_mapping.htm](http://www.ospar.org/eng/html/habitat_mapping.htm), and a more recent update paper submitted by the UK to MASH 2007 on feature distribution can be provided on request.

additional MPAs might be identified for these features. This detailed evaluation is beyond the scope of the current paper.

## 6. Conclusion

This paper identifies which species and habitats on the OSPAR Initial List (OSPAR Commission, 2004) are threatened and/or declining in UK waters, and of these which would benefit from area-based protection (Marine Protected Areas). Of this subset of species and habitats, we have evaluated whether management within the Natura 2000 network already fully or partially addresses the causes of their decline or potential decline. If the occurrence of the Initial List feature within a Natura 2000 site is one of the best representative examples of this feature, and appropriate management is lacking, the UK nature conservation agencies may wish to consider additional management measures to allow these sites to be submitted as well-managed OSPAR MPAs for the features in question. For OSPAR threatened and declining features which occur predominantly outside the Natura network, new MPAs may be identified by the UK nature conservation agencies to ensure their adequate protection in UK waters.

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**Appendix 1: 33 UK Natura 2000 sites submitted to OSPAR in 2005 on the basis of presence of threatened or declining species and habitats/biotopes (OSPAR Ecological selection criteria 1).** [Note that an additional 22 Natura 2000 sites were also submitted on the basis of OSPAR Ecological selection criteria 3 (Ecological significance) and 5 (Representativity)]

<b>Natura 2000 site submitted to OSPAR in 2005 as OSPAR MPA</b>	<b>Country</b>	<b>Initial List threatened and/or declining species or habitat actively managed within the site</b>
Drigg Coast SAC	E	Intertidal mudflats
Essex Estuaries SAC	E	Intertidal mudflats <i>Zostera</i> beds
Fal and Helford SAC	E	Intertidal mudflats Maerl beds <i>Zostera</i> beds
Flamborough Head SAC	E	Littoral chalk
Isles of Scilly Complex SAC	E	<i>Zostera</i> beds
Morecambe Bay SAC	E	Intertidal mudflats
Plymouth Sound and Estuaries SAC	E	Allis shad Intertidal mudflats Seapen & burrowing megafauna <sup>14</sup> <i>Zostera</i> beds
Solent Maritime SAC	E	<i>Zostera</i> beds Intertidal mudflats
South Wight Maritime SAC	E	Littoral chalk
Thanet Coast SAC	E	Littoral chalk
The Wash and North Norfolk Coast SAC	E	Intertidal mudflats <i>Sabellaria spinulosa</i> <i>Zostera</i> beds
Tweed Estuary SAC	E	Sea lamprey Intertidal mudflats
Berwickshire and North Northumberland Coast SAC	E/S	Intertidal mudflats Seapen & burrowing megafauna <sup>15</sup>
Solway Firth SAC	E/S	Sea lamprey Intertidal mudflats
Strangford Lough SAC	NI	Intertidal mudflats <i>Modiolus modiolus</i> Seapen & burrowing megafauna <sup>15</sup>
Dornoch Firth and Morrich More SAC	S	Intertidal mudflats <i>Zostera</i> beds

<sup>14</sup> Confirmed to be an actively managed feature within this site by relevant Country Conservation Agency

Firth of Tay and Eden Estuary SAC	S	Intertidal mudflats <i>Zostera</i> beds
Loch Creran SAC	S	<i>Modiolus modiolus</i>
Loch Laxford SAC	S	Intertidal mudflats Seapen & burrowing megafauna <sup>15</sup> <i>Zostera</i> beds
Loch Moidart and Loch Shiel Woods SAC	S	Intertidal mudflats
Loch nam Madadh SAC	S	Intertidal mudflats Seapen & burrowing megafauna <sup>15</sup> <i>Zostera</i> beds Maerl beds
Lochs Duich, Long and Alsh Reefs SAC	S	Seapen & burrowing megafauna <sup>15</sup> <i>Modiolus modiolus</i>
Luce Bay and Sands SAC	S	Intertidal mudflats
Mòine Mhór SAC	S	Intertidal mudflats
Moray Firth SAC	S	<i>Zostera</i> beds
Sanday SAC	S	Intertidal mudflats Maerl beds <i>Modiolus modiolus</i> <i>Zostera</i> beds
Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC	S	Seapen & burrowing megafauna <sup>15</sup> <i>Zostera</i> beds Maerl beds
Sullom Voe SAC	S	Seapen & burrowing megafauna <sup>15</sup>
Cardigan Bay/Bae Ceredigion SAC	W	Sea lamprey
Carmarthen Bay & Estuaries/ Bae Caeryrddin ac Aberoedd SAC	W	Allis shad Sea lamprey Intertidal mudflats <i>Zostera</i> beds
Pembrokeshire Marine/Sir Benfro Forol SAC	W	Intertidal mudflats Allis shad Sea lamprey <i>Zostera</i> beds Maerl beds
Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC	W	Intertidal mudflats <i>Modiolus modiolus</i> <i>Zostera</i> beds
Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC	W	Intertidal mudflats <i>Zostera</i> beds