

Offshore Special Area of Conservation: Dogger Bank

Draft Conservation Objectives and Advice on Operations



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Version 4.1 (10th November 2008)

* Cover photo shows whiting (*Merlangius merlangus*) and sand eels (*Ammodytes* spp.) on the Dogger Bank.

Document version control

Version and date	Amendments made	Issued to and date
DoggerBank_ConservationObjectives+AdviceonOperations_4.1.doc (10 th November 2008)	<ul style="list-style-type: none"> - Typical species criteria moved to new appendix - Reformatted explanatory text 	UKMBPSG and UK MPA Policy Group, 14th Nov 08
DoggerBank_ConservationObjectives+AdviceonOperations_4.0.doc (21 st Oct 2008)	<ul style="list-style-type: none"> - Updated Conservation Objectives explanatory text - Added typical species criteria 	Defra (7 th November 2008)
DoggerBank_ConservationObjectives+AdviceonOperations_3.0.doc (10 th January 2008)	<ul style="list-style-type: none"> - Advice on Operations updated to reflect Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007 coming in to force. - Stand alone Conservation Objectives and Advice on Operations (SAC Selection Assessment moved to separate document) - Sensitivity, exposure and vulnerability assessments modified; exposure data from Eastwood <i>et al.</i> (2007) incorporated - Summary of Advice on Operations moved to front of document 	JNCC Committee and UK Marine Biodiversity Policy Steering Group
DoggerBankDossier_2.0_Draft.doc (26 th August 2006)	<ul style="list-style-type: none"> - Document structure modified: Conservation objectives and Advice on Operations combined with SAC selection assessment. - Map layout revised (boundary not changed) - Sensitivity/exposure/vulnerability assessments revised - Advice on Operations amended 	Defra (25 th September 2006)
Dogger Bank draft conservation objectives and management actions: JNCC 05 P10 (September 2005)	<ul style="list-style-type: none"> - Sensitivity/exposure/vulnerability assessments added (<i>former document contained provisional management statements only</i>) - Advice on Operations amended 	JNCC Committee (September 2005)
DoggerDraftManagementActions1204.doc (15 th December 2004)		Defra (15 th December 2004)

Further information

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Summary of Draft Advice on Operations for Dogger Bank Special Area of Conservation (SAC)

This advice is based on information on the SAC presented in JNCC's 'Dogger Bank: SAC Selection Assessment' (version 4.0 October 2008). JNCC's Advice on Operations is site and feature specific, and has been developed using best available scientific information and expert interpretation as at January 2008. The Advice is generated through a coarse grading of sensitivity and exposure of site interest features to physical, chemical and biological pressures associated with human activity. Sensitivity and exposure have been combined to give a measure of the vulnerability of an interest feature to operations which may cause damage or deterioration, and which therefore require management.

The exact impact of any operation will be dependent upon the nature, scale, location and timing of events. This Advice on Operations for the Dogger Bank site will be kept under review and will be periodically updated to reflect changes in both sensitivity and exposure.

Management actions should enable the biological communities associated with the Dogger Bank 'Sandbanks which are slightly covered by seawater all the time' to achieve their full natural biological diversity, and the underlying physical structure of the interest feature to be maintained. In addition, such management action should ensure that the habitat for the feature 'harbour porpoise' is maintained. This will require assessment and management of human activities likely to affect these adversely, and of activities likely to impact the functioning of natural processes upon which the feature is dependent.

To fulfil the conservation objectives for the **Annex I habitat Sandbanks which are slightly covered by seawater all the time**, the competent authorities for this area are advised to manage human activities within their remit such that they do not result in deterioration or disturbance of this feature through any of the following:

- i) **Physical loss** by Removal (aggregate dredging) or Obstruction (installation of petroleum and renewable energy industry infrastructure and cables);
- ii) **Physical damage** by Physical disturbance or abrasion (demersal trawling);
- iii) **Toxic contamination** by introduction of Synthetic and/or Non-synthetic compounds (pollution from oil and gas industry);
- iv) **Non-toxic contamination** by Changes in nutrient loading (sewage from oil and gas rigs);
- v) **Biological disturbance** by Selective extraction of species (demersal trawling).

To fulfil the conservation objectives for the **Annex II species harbour porpoise**, the competent authorities for this area are advised to manage human activities within their remit such that they do not result in deterioration of the habitat of the harbour porpoises using the SAC. In addition competent authorities should be guided by the document 'The Deliberate disturbance of marine European Protected Species' (JNCC, 2008a) to ensure that any activities undertaken on the site do not disturb the Annex II feature. This guidance does not include provisions for the fishing industry and the competent

authorities will need to manage these activities accordingly.

Within the Dogger Bank SAC, the following offshore activity is likely to result in damage to the interest feature ‘Sandbanks which are slightly covered by seawater all the time’ and is not subject to prior authorisation or licensing. It is, therefore, currently considered to pose a high or medium-high risk of damage to the interest feature of the SAC:

- **Demersal fishing**

Competent Authorities are advised to consider management actions that need to be taken to reduce the risk of damage to the feature ‘Sandbanks which are slightly covered by seawater all the time’ associated with this activity.

The above list is not a catalogue of prohibitions but rather indicates where some form of management measure(s) may be required or further measures where actions are already in force. This advice is indicative and does not remove the need for formal consultation on individual plans and projects.

Dogger Bank SAC: Draft Conservation Objectives and Advice on Operations

Introduction

Under the Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007, JNCC is required to notify Competent Authorities of the conservation objectives for offshore Special Areas of Conservation and to advise them of operations which may adversely affect the integrity of the site. This requirement applies once a site has been advised to the European Commission. This advice is also required under the Offshore Petroleum Activities (Conservation of Habitats) Regulations (as amended in 2007); the Environmental Impact Assessment and Natural Habitats (Extraction of Minerals by Marine Dredging) Regulations 2007.

1) Conservation Objectives for Dogger Bank SAC interest features

The following Conservation Objectives set out what needs to be achieved at the site in order to fulfil the aims of the Habitats Directive. They are a starting point from which management of activities and monitoring of the conservation features of the site may be developed. Only qualifying interest features are considered in this section.

‘Sandbanks which are slightly covered by seawater all the time’

The Conservation Objectives for the Dogger Bank ‘Sandbanks which are slightly covered by seawater all the time’ are:

Subject to natural change, restore¹ the feature to favourable condition, such that:

- The natural environmental quality² is maintained
- The natural environmental³ processes are maintained.
- The extent⁴, diversity⁵, community structure⁶ and typical species⁷ representative of sand and gravely sand sediments on sandy mounds characteristic of the southern North Sea are restored

‘Harbour porpoise’

The conservation objectives for the Dogger Bank interest feature harbour porpoise are, subject to natural change, to

- Restore the habitats of harbour porpoise on the site
- Maintain the food resources (e.g. *Ammodytes* sp.) of harbour porpoise on the site
- Avoid disturbance⁸ of the harbour porpoise on the site

Explanation of terms used in the Conservation Objectives

1. Maintain or Restore

Maintain implies that the feature is in favourable condition and will, subject to natural change, remain at its condition at designation. Any existing activities are deemed to be sustainable and will not adversely affect the condition of the feature *if current practices are continued at current levels.*

Restore implies that the feature is degraded to some degree as described in the Dogger Bank SAC Site Assessment Document and that activities will have to be managed to reduce or eliminate negative impact(s). Restoration in the marine environment generally refers to natural recovery through the removal of unsustainable physical, chemical and biological pressures, rather than intervention (as is possible with the terrestrial features)

JNCC considers that maintenance or restoration of the following parameters (2- 7) will take account for the maintenance or restoration of natural structures and functions and ecological processes.

2. *Natural environmental quality* e.g. chemical quality parameters of water, suspended sediment levels, radionuclide levels etc should not deviate from baseline at designation (if available) or reference conditions
3. *Natural environmental processes* e.g. circulation, sediment deposition and erosion etc. should not deviate from baseline at designation (if available) or reference conditions
4. *Extent* - the area covered by the habitat and communities
5. *Diversity* - the number of different biological communities
6. *Community structure* e.g. age classes, sex ratios, distribution of species, abundance, biomass, reproductive capacity, recruitment, range and mobility
7. *Typical species* – see Appendix V
8. *Disturbance* – this refers to the deliberate disturbance of marine mammals as described by the JNCC guidance (JNCC 2008a)

Conservation objectives for inshore SACs have been provided in association with a ‘favourable condition’ table, which outlines how to recognise favourable condition status for the interest features in question. However, for offshore sites, there is presently insufficiently detailed information on i) the existing conditions of qualifying interest features and ii) the preferred or target condition of interest features in offshore waters. This currently limits the identification of measures and associated targets for condition monitoring. It is anticipated that further information on the condition of interest features will be obtained through baseline surveys and monitoring.

In the case of the Dogger Bank site, there is some evidence to date that, due to damage caused by bottom trawling and infrastructure development, the Annex I feature may not be in favourable condition and might require restoration where possible. As outlined, further information will be required to assess and monitor favourable condition of the interest feature at this offshore SAC.

2) Advice on operations

JNCC's Advice on Operations outlines our current knowledge of the nature and extent of activities taking place within or close to the site which may significantly impact on interest feature(s) for which the site has been proposed (Annex I 'Sandbanks which are slightly covered by seawater all the time' and Annex II 'Harbour porpoise'). We aim to link human activities and the ecological requirements of Annex I/II habitats or species, as required under Article 6 of the Habitats Directive. This advice will help focus the attention of the competent authorities on those activities that pose the greatest potential threat to the favourable condition of the Dogger Bank's interest features.

In addition, a risk assessment has been conducted to assess the risk, under current management regimes, of offshore activities damaging the features for which a SAC is selected. It is important to note that this advice is only a starting point for assessing impacts and will be further developed over the coming years. Moreover the provision of this advice does not remove the need for formal consultation on individual plans and projects. JNCC will provide more detailed advice to competent authorities to enable them to assess the implications of any given plan or project at the time it is being considered.

Six broad Pressure Categories which may cause i) deterioration of natural habitats or the habitats of species, or ii) disturbance of species, (either alone or in combination), are considered in this document:

- Physical Loss
- Physical Damage
- Non-physical disturbance
- Toxic contamination
- Non-toxic contamination
- Biological disturbance

Example sources of pressures are provided (See Table 1), although these examples are not inclusive of all potentially detrimental activities.

A three-step process is used to assess the vulnerability of the site's feature (**Sandbanks**) to the above pressures (see flow diagram in Appendix I):

- An assessment of the **sensitivity** of the interest feature to the listed pressures;
- An assessment of the current **exposure** of the interest feature to the pressures; and
- An assessment of the **vulnerability** of the interest feature to the pressures. Vulnerability occurs where sensitivity to a given pressure is combined with exposure to that pressure.

This approach is sufficiently robust to take into account the effects of new activities or changes in patterns of usage, and by assessing sensitivity, exposure and vulnerability independently, the reasoning behind current (and any future) advice is made clear. If an interest feature is known or thought to be sensitive to a particular pressure category, new activities or changes in patterns of activities which result in that pressure are likely to cause deterioration or disturbance.

All the scores of relative sensitivity, exposure and vulnerability are derived using best available scientific data and expert judgement. This method uses a coarse categorisation system, reflecting the current state of our understanding of the marine environment. It should be recognised that data for offshore habitats are sparse and assessments are likely to need revision in light of new research.

Due to the paucity of information it has not been possible to conduct a vulnerability assessment of these pressures for 'Harbour porpoise' in the same way as for the 'Sandbanks which are slightly covered by seawater all the time' feature. This feature has been considered separately (see section 2.2).

2.1) Assessment for 'Sandbanks which are slightly covered by seawater all the time'

a) Sensitivity assessment

This assessment evaluates the relative sensitivity of the Dogger Bank interest feature to the effects of the aforementioned pressures. Sensitivity is defined here as 'the intolerance of a habitat, community or individual (or individual colony) of a species to damage, or death, from an external factor and the time taken for its subsequent recovery' (MarLIN, 2006). For example, a very sensitive species or habitat is one that is very adversely affected by an external factor arising from human activities or natural events (killed/destroyed, 'high' intolerance) and is expected to recover over a very long period of time, i.e. >10 or up to 25 years ('low' recoverability) (MarLIN, 2006). The sensitivity of interest features (and scientific understanding of sensitivity) may change over time; hence an operation which is not currently deemed to have a negative effect may do so in the future.

Table 1 (column 3) shows the sensitivity assessments for the 'Sandbanks slightly covered by seawater all the time' feature of the Dogger Bank SAC. They are drawn principally from MarLIN's (2001) evaluations of the sensitivities of the following biotope (which is comparable to that present within the SAC):

- ***Fabulina fabula* and *Magelona mirabilis* with venerid bivalves in infralittoral compacted fine sand (IGS.FabMag)**

The applicability of the MarLIN assessments of sensitivity is dependent on the quality of available scientific information on these biotopes and their characterising species. In addition, both the biotope classification system and the MarLIN sensitivity assessments primarily rely on inshore biological data, so although they are applicable to habitats in offshore waters, confidence in these assessments in an offshore context is necessarily lower. JNCC have in some cases, therefore, adjusted the assessments of sensitivity to be more precautionary. Further detail on our approach to evaluating sensitivity can be provided on request.

Interest feature sensitivity to physical, chemical and biological pressures:

The Dogger Bank sandbank slightly covered by seawater all the time and its associated biological communities are sensitive to: **Physical loss**, **Physical damage**, **Toxic** and **Non-toxic contamination**, and **Biological disturbance**, resulting from a range of activities. Further detail on sensitivities of the 'Sandbanks slightly covered by seawater all the time' is provided in Table 1.

b) Exposure assessment

Table 1 (column 4) shows the relative exposure of the Dogger Bank's 'Sandbanks slightly covered by seawater all the time' interest feature to physical, chemical and biological pressures. This assessment is based on known human activities operating in or adjacent to the site, and the anticipated pressures associated with these activities.

As offshore sites cover a relatively large geographical area and precise information on operations within SAC boundaries is not yet available, assigning scores for exposure carries certain assumptions about the spatial extent, frequency and intensity of the pressures associated with offshore activities. Expert judgement was used to determine where onsite activities are likely to affect interest features physically, chemically and/or biologically. Spatial data on offshore industry activities has been provided by the Crown Estate for aggregate extraction and windfarm development and UK Deal for oil and gas industry activities. UK-wide fisheries data for offshore waters are not yet available to JNCC at sufficient resolution to enable a full assessment of exposure to different types of fishing activities. Availability of Vessel Monitoring System (VMS) data combined with logbook and/or vessel registration data for all European vessels across UK waters on an annual basis would allow the spatial extent and intensity of physical and biological pressures associated with demersal fishing to be evaluated more thoroughly. We are not aware of an adequate methodology to assess the distribution of static/set demersal gear use, or the intensity of its physical and biological impacts. Interest feature exposure and vulnerability to static/set demersal gears have therefore not been assessed.

In 2007, the Centre for Environment, Fisheries & Aquaculture Science (Cefas) published a study documenting the spatial distribution of direct, physical pressures on the seabed caused by industries operating in the English and Welsh sector of UK offshore waters in 2004 (Eastwood *et al.*, 2007). Pressure was estimated as the spatial extent of each industry activity; the intensity, frequency, and impacts arising from the pressures were not considered. Cefas has provided JNCC with the GIS datasets from this study, which has enabled an evaluation of the level at which three offshore SACs (Haig Fras, Dogger Bank and North Norfolk Sandbanks and Saturn Reef) are exposed to six pressures: i) Removal, ii) Smothering, iii) Changes in suspended sediment, iv) Physical disturbance and abrasion, v) Obstruction and vi) Selective extraction of species (a biological pressure). Further information on how Cefas' data have been interpreted, and the level of confidence associated with these assessments can be provided by JNCC on request. The limitations of this study, as identified by Eastwood *et al.* (2007) are noted in Appendix II.

It is likely that over the coming years, more detailed information on the levels of pressures associated with activities at the Dogger Bank site will be collected or collated, and this may lead to modification of the advice on operations presented here.

Interest feature exposure to physical, chemical and biological pressures

The 'Sandbanks slightly covered by seawater all the time' interest feature and associated biological communities of the Dogger Bank site are exposed to the following pressures.

- **Physical loss:** The Sandbank is exposed to low levels of **Removal** (aggregate dredging), low levels of **Obstruction** (oil and gas industry infrastructure, wrecks and cables) and low levels of **Smothering** (oil and gas cuttings piles)

- **Physical damage:** The Sandbank is exposed to low levels of **Changes in suspended sediment** (demersal trawling) and high levels of **Physical disturbance or abrasion** (demersal trawling)
- **Toxic contamination:** The Sandbank is likely to be exposed to both **Synthetic** and **Non-synthetic compounds** at unknown levels (due to onsite oil and gas industry activities)
- **Non-toxic contamination:** The Sandbank is likely to be exposed to **Changes in nutrient loading** at unknown levels (sewage from oil and gas industry onsite) and is exposed to low levels of **Changes in turbidity** (demersal trawling)
- **Biological disturbance:** The Sandbank is exposed to high levels of **Selective extraction of species** (demersal trawling).

It has not been possible to determine whether the interest feature is exposed to **Noise (acoustic)**, **Introduction of radionuclides**, **Introduction of microbial pathogens** or **Introduction of non-native species**.

c) Vulnerability assessment

The vulnerability of the interest feature to external pressures is determined by integrating the sensitivity evaluation with that of exposure. Only if a feature is both sensitive *and* exposed to a human activity is it considered vulnerable (see Appendix III). In this context, therefore, ‘vulnerability’ has been defined as the exposure of the habitat, community or individual (or individual colony) of a species to an external factor to which it is sensitive (Hiscock, 1996). An assessment of the interest feature’s vulnerability (column 5 in Table 1) helps to guide site management decisions by highlighting potentially detrimental activities that may need to be managed (or continue to be managed) by the competent authorities.

The vulnerability of the SAC to climate change is not considered in the tables below, given the uncertainties surrounding the effects of global change on the oceans. Possible effects of climate change, based on best available information are set out in Appendix IV.

Interest feature vulnerability to physical, chemical and biological pressures

The Dogger Bank ‘Sandbanks slightly covered by seawater all the time’ and associated biological communities are:

- Highly vulnerable to **Physical disturbance or abrasion** (demersal trawling), and **Selective extraction of species** (demersal trawling).
- Moderately vulnerable to **Removal** (aggregate dredging) and **Obstruction** (oil and gas industry infrastructure, wrecks and cables)

Vulnerability of the interest feature to the **Introduction of synthetic compounds**, **Introduction of non-synthetic compounds** and **Changes in nutrient loading** (all due to onsite oil and gas industry activities) has been identified, but this cannot be quantified at present.

Vulnerability to **Noise (acoustic)**, **Introduction of radionuclides**, **Introduction of microbial pathogens** and **Introduction of non-native species** remains unknown for this interest feature.

d) Risk Assessment

JNCC has assessed the risk posed by offshore industries to SAC interest features as part of our Advice on Operations. Risk is defined in terms of the likelihood of an event occurring and its associated impact. Probability of damage or disturbance to interest features of the SAC is based on existing knowledge of industry activities on-site and the spatial extent of their associated pressures. With regard to industries which are location specific, are always subject to prior consent and have clear reliable methods of enforcement, there is generally a lower likelihood of causing damage or disturbance to interest features. This includes the activities of the oil and gas, aggregates and renewable energy industry sectors. Industries which are not location specific and not subject to prior consent procedures are more likely to cause damage/disturbance to the interest feature. These industries include fishing and shipping. Not all activities associated with these industries are detrimental to interest features (e.g. most pelagic fisheries cause minimal harm to Annex I features). The severity of impact is assessed independently, and will vary according to feature sensitivities. If an activity results in more than one (physical, chemical or biological) pressure, the sensitivities to each pressure are taken into consideration. Overall risk to interest features is determined by combining evaluations of probability of occurrence with severity of damage. Only high or medium-high risk activities are noted here.

Within the Dogger Bank site, the following offshore activity is currently considered to pose a high or medium-high risk to the ‘Sandbanks slightly covered by seawater all the time’ interest feature:

- **Demersal fishing**

Competent Authorities are advised to consider management actions that might need to be taken to reduce the risk of damage associated with this activity to the SAC feature.

Table 1: Sensitivity, exposure and vulnerability of the Dogger Bank Sandbanks which are slightly covered by seawater all the time to physical, chemical and biological pressures

Sensitivity key: ●●● = High sensitivity ●● = Moderate sensitivity ● = Low sensitivity, ○ = No known sensitivity* and ? = Insufficient information to make assessment (*Meaning: 'Sensitivity of the feature has been researched and no evidence of sensitivity to this pressure has been found')

Exposure key: High = High exposure, Medium = Medium exposure, Low = Low exposure, None = No known exposure, Unknown level = Exposure of an unknown level and ? = Insufficient information to make assessment.

List of pressures which may cause deterioration or disturbance (with example activities)		Dogger Bank: Sandbanks which are slightly covered by seawater all the time		
		Sensitivity	Exposure	Vulnerability
Physical Loss	Removal (e.g. aggregate dredging, isolated rock dump, infrastructure development)	●●●	Low	Moderate
	Obstruction (e.g. permanent constructions [oil & gas infrastructure, windfarms, cables] & wrecks)	●●●	Low	Moderate
	Smothering (e.g. drill cuttings)	●	Low	Low
Physical Damage	Changes in suspended sediment (e.g. screening plumes from aggregate dredging)	●	Low	Low
	Physical disturbance or abrasion (e.g. mobile benthic fishing, anchoring, windfarm scour pits, pipeline burial, potting)	●●	High	High
Non-physical disturbance	Noise (e.g. boat activity, seismic)	○	?	No known vulnerability
	Visual presence (e.g. recreational activity)	○	None	No known vulnerability
Toxic contamination	Introduction of synthetic compounds (e.g. TBT, PCBs, industrial chemical discharge, produced water, fuel oils)	●●●	Unknown level	Vulnerability (not quantifiable)
	Introduction of non-synthetic compounds (e.g. heavy metals, crude oil spills)	●●●	Unknown level	Vulnerability (not quantifiable)
	Introduction of radionuclides (e.g. nuclear energy industry)	?	?	Insufficient information
Non-toxic contamination	Changes in nutrient loading (e.g. outfalls)	●●	Unknown level	Vulnerability (not quantifiable)
	Changes in thermal regime (e.g. cooling water discharges)	●●	None	No known vulnerability
	Changes in turbidity (e.g. laying of pipelines, aggregate dredging)	●	Low	Low
	Changes in salinity (e.g. outfalls from rigs, ships)	●●	None	No known vulnerability
Biological disturbance	Introduction of microbial pathogens (e.g. outfalls)	?	?	Insufficient information
	Introduction of non-native species and translocation (e.g. ballast water, hull fouling)	?	?	Insufficient information
	Selective extraction of species (e.g. bioprospecting, scientific research, demersal fishing)	●●	High	High

2.2) Assessment for ‘Harbour Porpoise’

We have limited understanding of the reason for the usage of the area by harbour porpoise; however, it is likely that the use of the area by harbour porpoises is associated with feeding, particularly on sandeels (CEFAS, 2007).

a) Sensitivity Assessment

There are a number of pressures that may affect harbour porpoises including bycatch, chemical pollution, marine industries (e.g. noise associated with construction) and prey availability.

The UK maintains a stranding and post mortem scheme for cetaceans. Harbour porpoises are the most commonly stranded species (Jepson, 2006). There was a gradual increase in the numbers reported stranding in the North Sea between 1997 and 2006. Between 2002 and 2006, the most important recorded causes of death in UK waters are bycatch (c 21%) and disease (c 21%), followed by bottlenose dolphin attack (c 18%) and starvation (c 17%).

Bycatch by a variety of fishing gear (particularly bottom-set gillnets) is the greatest anthropogenic threat to this species in the UK and adjacent waters. Recent estimates suggest that around 400 porpoises die in UK fishing operations in the North Sea annually (JNCC, 2007).

Death through infectious disease has been linked to chemical pollution in some instances. Jepson *et al.* (2005) recently demonstrated that individuals dying as a result of infectious disease had significantly higher levels of PCBs than healthy porpoises that died as a result of traumatic deaths such as bycatch.

Prey availability changes might also exert pressure on this species. The literature on porpoise diet in the north-east Atlantic suggests that there has been a long term shift from predation on clupeid fish (mainly herring *Clupea harengus*) to predation on sandeels and gadoid fish, possibly related to the decline in herring stocks since the mid-1960s (Santos and Pierce, 2003). Around Shetland, for example, lower sightings rates were observed coincident with depleted sandeel stocks (Evans *et al.*, 2003). More recently, the diet of harbour porpoises using Dogger Bank has been found to be dominated by planktivorous fish (e.g. sandeels, CEFAS, 2007). Although based on a relatively small sample size, MacLeod *et al.* (2007a) noted in recent years, for north-east Scotland, a concurrent increase in the proportion of stranded porpoises for which the cause of death was due to starving and the lack of sandeels in the diet and suggested a link between the two. However, there has been some debate about the biological significance of this work (Thompson *et al.*, 2007). The original authors acknowledge that the phenomenon is limited to spring and that considerably more research covering a larger area is needed before the link between diet and starvation can be fully ascertained (McLeod *et al.*, 2007b).

b) Exposure assessment

There are no data on the level of bycatch within the site presently available. Under the UK's Bycatch Monitoring Programme, significant effort is being put into assessing harbour porpoise bycatch in the North Sea during 2008 and results will become available in 2009. However, from UK landing statistics for 2006, the majority of fishing activity conducted in ICES area IVb (which contains Dogger Bank) is demersal trawling for round and flat fish species, as well as for sandeels (MFA, 2007)¹. Information on the location of other fisheries (e.g. gill netting) is currently difficult to derive from quantitative sources. However, as there would be conflict between the two fisheries it is unlikely that significant gill netting occurs and thus little scope for bycatch.

There are no data on the levels of pollution or noise associated with location specific marine industries (i.e. the oil and gas, aggregates and renewable energy industry sectors). However, these industries, through specific legislation, are always subject to prior consent and there are clear reliable methods of mitigation and enforcement (e.g. JNCC, 2004; Gordon et al., 2007; Nehls et al., 2007). There is therefore generally a low likelihood of these industries causing damage or disturbance to harbour porpoise in the longer term. .

Industries such as fishing and shipping are not subject to prior consent procedures and are considered more likely to disturb harbour porpoises. Ships are, however, subject to the Marine Conservation (Natural Habitats, &c.) Regulations 2007 (OMR) which includes a deliberate disturbance offence. It is now an offence (under regulation 32 of the OMR) to deliberately disturb wild animals of a European Protected Species (species in the Annex II of the Habitats Directive) in such a way as to be likely to significantly affect:

a) the ability of any significant group of animals of that species to survive, breed, or rear or nurture their young; or

b) the local distribution or abundance of that species.

JNCC has provided guidance on interpretation of the disturbance offence, (<http://www.jncc.gov.uk/page-4227>) Final guidance will be published in late 2008.

Fishing is generally considered exempt from this legislation where compliance with the relevant Community instrument (e.g. Common Fisheries Policy and other fisheries regulations adopted thereunder) can be demonstrated.

There are no data for the site on the effects on prey availability due to fishing intensity.

c) Risk Assessment

It is unlikely that any one of the above pressures alone could affect the long-term viability of harbour porpoise in UK waters or within the SAC in particular, but the combined action of the pressures could possibly affect the species.

Maintenance of the interest feature 'Sandbanks which are slightly covered by seawater all the

¹ However, these statistics do not account for catches landed outside of the UK. The Danish in particular are known to have major sandeel fisheries in the region

time' and thus the habitat used by the harbour porpoise is considered the most practical approach to the management of potential pressures on the species in the SAC.

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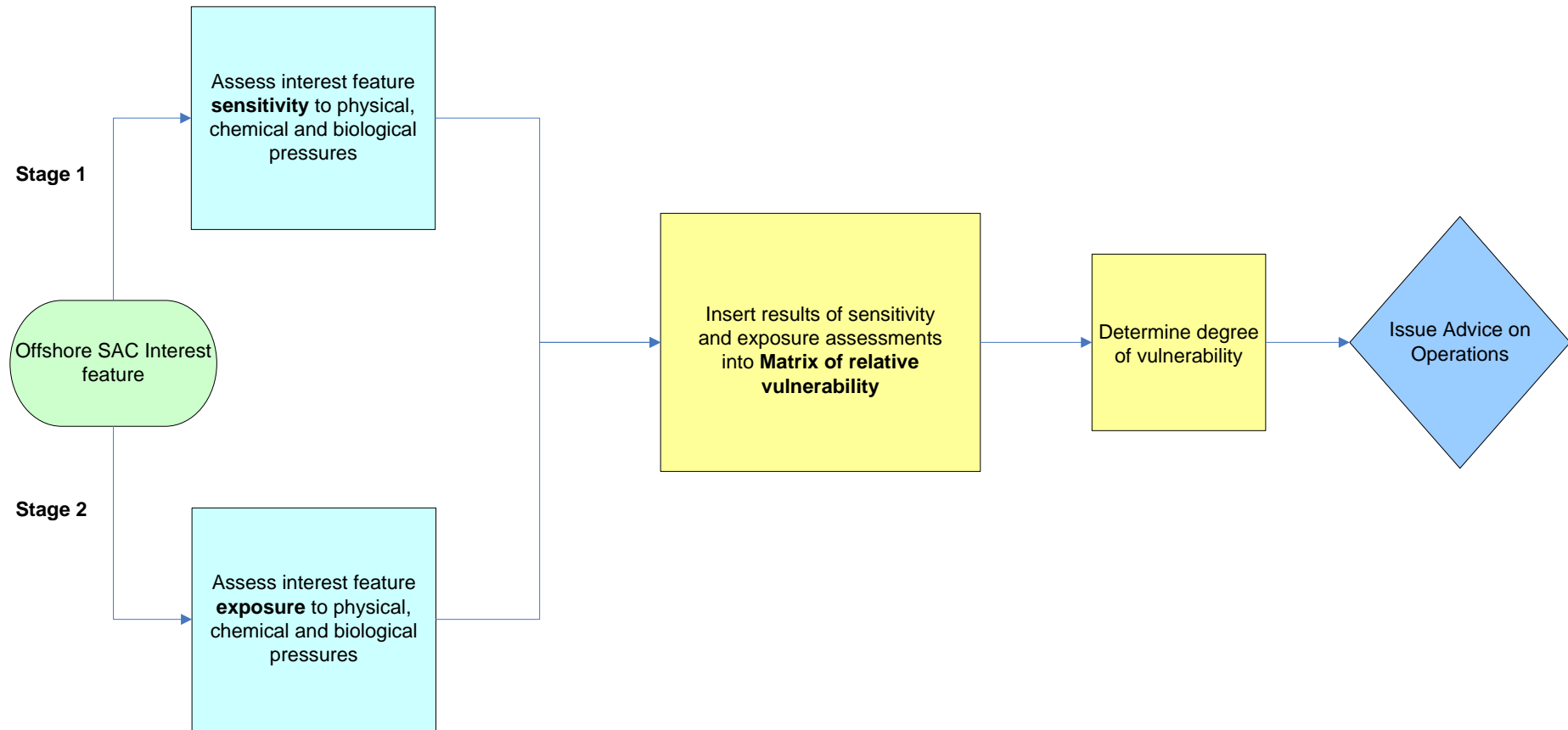
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Appendix I: Flow diagram illustrating process of determining vulnerability of interest features



Appendix II: Limitations of Cefas' assessments of physical pressures in offshore waters, as outlined in Eastwood *et al.*, 2007

- Estimates of the **spatial extent** or the '**footprint**' of each activity were used as a **proxy for direct, physical pressure**. **Pressure intensity** (e.g. the number of times a pressure was superimposed, such as the number of passes of a trawl per m²) was not quantified.
- This 'footprint' assessment is based on **2004 data only**, and is a snapshot of offshore activities in '**English**' and '**Welsh**' offshore waters alone.
- **Cumulative pressure** leading up to 2004 was not quantified.
- No **time element** was attributed to the pressures, which would have allowed an assessment of the duration of the pressures in 2004
- **Recovery of benthic environments** depends on biological sensitivity to pressure type and intensity, but will also be affected by **cumulative pressures** from a single source and **in-combination pressures** from multiple sources.
- The European **VMS database** only contains positions for **18m vessels in 2004** and **under-represents the total number of vessels**. The spatial extent of demersal trawling may therefore be much higher than estimated
- Other types of fishing, such as **potting** and the use of **certain fixed nets** will also cause direct, physical pressure on the seabed. Information on the sites of these activities is currently difficult to derive from **quantitative sources**.
- **Oil spills** will cause direct, physical pressure, but again **spatial data are not commonly available**.
- In addition to physical pressures, human activities cause a range of **direct and indirect chemical and biological pressures** on the seabed: many of these are more problematic to assess, but are essential for a more complete assessment of human pressure in offshore waters.

Appendix III: Matrix of relative vulnerability

The relative vulnerability of an interest feature is determined by combining the sensitivity and exposure assessments according to the table below.

Relative exposure of the interest feature at the site	Relative sensitivity of the interest feature				
		High ●●● (3)	Moderate ●● (2)	Low ● (1)	None detectable ○ (0)
High (3)		9	6	3	0
Medium (2)		6	4	2	0
Low (1)		3	2	1	0
Exposure at an unknown level					0
None (0)		0	0	0	0

Note that if there is insufficient information to assess either the exposure OR sensitivity of a given interest feature, vulnerability will always be categorised ‘insufficient information to make any assessment’.

Categories of relative vulnerability

High vulnerability	6 to 9
Moderate vulnerability	5 to 3
Low vulnerability	1 to 2
Vulnerability identified, but not quantified as level of exposure unknown.	
No known vulnerability	0
Insufficient information to make any assessment	

Appendix IV: The effects of climate change on the Dogger Bank site

According to the UKCIP (2002), sea temperatures in this area may rise by between 0.5-1 °C by the 2020s, and by 1.5-3 °C by the 2080s (under low and high emissions scenarios respectively). Salinity and nutrient status may change with increased seasonality in runoff from the catchments in the east of England. (Stephen Dye (FRS), Pers. Comm., February 2006). Tides are unlikely to be affected by climate change. Due to its shallow, well-mixed waters, this site is likely to experience the full change in surface ocean acidity over the next 100 years (The Royal Society, 2005). The biological outcomes of climatic changes are difficult to forecast. Minor changes are expected over the next 10-25 years, with major biological shifts potentially occurring in the longer term (100 years). It is unknown how this site's biological communities will be affected. However, there is potential for rapid alterations in the nature of benthic communities and a northwards migration of both benthic and pelagic organisms as temperatures increase (Stephen Dye (FRS), Pers. Comm., February 2006). Increases in global ocean acidity are likely to reduce the resilience of marine ecosystems (The Royal Society, 2005), particularly affecting calcifying benthic species (Baker, 2005). Changes in the frequency and direction of storms is likely to change the light field and potentially production at the sea bed.

Appendix V: Typical species criteria

Identification of a species as typical is not in itself sufficient to indicate the importance of the species or any need for management. The importance of the species should be judged on the contribution made by the species to ecological integrity of the feature. These criteria are intended to help identify or classify typical species and are not limited to the benthos and are relevant to the Annex 1 habitat feature and its component parts at the *site* level.

A typical species should meet one or more of the following criteria a – e below:

a) Consistently associated with, but not necessarily restricted to, the feature

For example

- Can be predicted to occur at certain seasons/times (e.g. seasonal & temporal)
- Stages of life cycle associated with the feature (e.g. spawning)
- Species is dependent upon feature (for food, shelter, nest)

b) A species on which identification of the habitat is founded

- This criterion is unlikely to apply to complex physiographic features which may be composed include other Annex 1 features (e.g. H1130 Estuaries, H1160 Large Shallow Inlets and Bays which may include ‘H1170 Reefs’, ‘H1110 Sandbanks which are slightly covered by seawater all the time’ etc.)

c) Characteristic of the habitat

For example

- *Ammodytes tobianus*, *Zostera marina* for ‘H1110 Sandbanks which are slightly covered by seawater all the time’

d) An integral part of the structure of the habitat

For example

- Any species that gives the habitat structural complexity (e.g. kelp)
- Any species that forms the habitat (e.g. biogenic reef species, maerl)

e) A species which influences the habitat’s structure and function

For example:

- Bioturbators
- Grazers
- Animals which bore into the substratum
- Predators
- Keystone species (i.e. A species that influences the ecological composition, structure, or functioning of its community far more than its abundance would suggest (EEA, 2008))

Note: the above criteria should not be used to describe non-native species as typical

Non-Native – These are marine species and plants and algae are transported from their native range to ‘new’ areas. Species can be introduced to non-native environments accidentally or deliberately. Introductions and transfer of non-native marine species to their non-native environment mainly occurs by the transport and discharge of ballast water, and to a lesser extent by transport of fouling organisms on hulls or through aquaculture (JNCC, 2008b)

