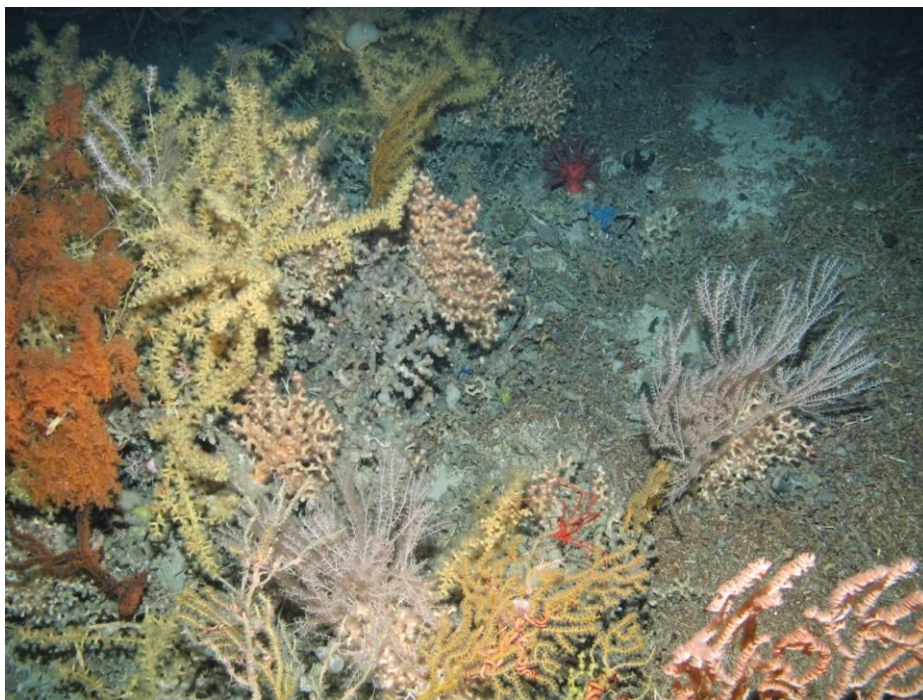




**Offshore Special Area of Conservation:
Anton Dohrn Seamount
Draft Conservation Objectives and Advice on Operations**



© JNCC¹

Version 2.0 (12th December 2011)

¹ Gorgonians, *Lophelia pertusa*, antipatharians and soft corals at Anton Dohrn Seamount

Document Version Control

Version and date	Amendments made	Issued to and date
Draft Conservation Objectives and Advice on Operations Version 2.0 (12.12.11)		Scottish Government
Draft Conservation Objectives and Advice on Operations Version 1.2 (16.11.11)	Incorporated comments and amended text for clarity, updated reference list.	JNCC Committee (02.12.11) JNCC Committee MPA sub-group (16.11.11)
Draft Conservation Objectives and Advice on Operations Version 1.1 (12.10.11)	Added text in explanation of inclusion of wreck presence	JNCC Committee MPA sub-group
Draft Conservation Objectives and Advice on Operations Version 1.0 (08.09.11)	Comments incorporated and sent to MPATG for approval	MPA Technical Group (intersessionally) and UKMBPSG
Draft Conservation Objectives and Advice on Operations Version 0.1 (01.09.11)	First draft document	JNCC MPA & Marine Advice teams

Further information

Please return comments or queries to:

Offshore SAC Management Advisor
Marine Protected Sites Team
Joint Nature Conservation Committee
Monkstone House
Peterborough
Cambs
PE1 1JY

Email: offshore@jncc.gov.uk
Tel: +44 (0)1733 562626
Fax: +44 (0)1733 555948
Website: jncc.defra.gov.uk

Summary of Draft Advice on Operations for Anton Dohrn Seamount Special Area of Conservation (SAC)

This advice is based on information on the SAC presented in JNCC's 'Anton Dohrn Seamount: SAC Selection Assessment' (v2.0 December 2011). JNCC's Conservation Objectives and Advice on Operations is site- and feature-specific, and has been developed using best available scientific information and expert interpretation as at December 2011. 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 may require management action.

The Conservation Objective for Anton Dohrn Seamount is to restore the reef to favourable condition.

The exact impact of any operation will be dependent upon the nature, scale, location and timing of events. This Advice on Operations for the Anton Dohrn Seamount site will be kept under review and will be periodically updated to reflect new evidence that suggests changes in either sensitivity or exposure.

Management actions should enable the Anton Dohrn Seamount reef to achieve Favourable Condition. This will require assessment and management of human activities likely to affect the feature adversely, and of activities likely to impact natural environmental quality and environmental processes upon which the features are dependent.

Anton Dohrn Seamount is currently moderately vulnerable to the pressures outlined below. Therefore to fulfil the conservation objectives for the **Annex I Reef**, the competent authorities for this area are advised to investigate and, if necessary, manage human activities within their remit such that they do not result in deterioration or disturbance of this feature through any of these pressures.

- **Physical damage** by physical disturbance or abrasion (demersal fishing);
- **Biological disturbance** by selective extraction of species (demersal fishing).

Risk of Damage to Anton Dohrn Seamount SAC

Within the proposed Anton Dohrn Seamount SAC, the following offshore activity may result in damage to the interest feature, and is not subject to prior authorisation or licensing. They are, therefore, currently considered to pose a medium risk of damage to the interest feature:

- **Demersal fishing**

Competent Authorities are advised to consider introducing management actions to reduce the risk of damage to the feature from this activity. Recent advice from ICES (International Council for the Exploration of the Sea) to the European Commission and NEAFC (North-East Atlantic Fisheries Commission) recommended closing the flanks of Anton Dohrn Seamount to fishing activities (WGDEC, 2011).

Risk to the feature of damage or deterioration associated with longlining, set gillnetting, potting and EU demersal fishing currently occurring over the feature is presently unknown.

The above is not a prohibition but rather indicates that 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.

Anton Dohrn Seamount SAC: Draft Conservation Objectives and Advice on Operations

1. Introduction

1.1. JNCC's role

The Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007 (as amended) transpose the Habitats Directive into law for UK offshore waters (from 12-200 nm from the coast or the UK Continental Shelf). These Regulations give JNCC a statutory responsibility to i) establish conservation objectives for SACs, ii) inform Competent Authorities of these conservation objectives and iii) advise Competent Authorities of any operations which may adversely affect the integrity of the site. This document for Anton Dohrn Seamount SAC is therefore prepared by JNCC to fulfil requirements under Regulation 18 of the Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007 (as amended).

This advice is based on information on the SAC presented in JNCC's 'Anton Dohrn Seamount: SAC Selection Assessment' (version 2.0 December 2011). JNCC's Conservation Objectives and Advice on Operations is site- and feature-specific, and has been developed using best available scientific information and expert interpretation as at September 2011. The draft 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 may require management action.

This advice is also required under the Offshore Petroleum Activities (Conservation of Habitats) Regulations (as amended in 2007); and the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended).

For offshore SACs, JNCC is required to provide conservation objectives and advice on operations once a site has been submitted by Government to the European Commission (i.e. becomes a candidate SAC).

1.2. Offshore (12-200 nautical miles): The role of competent authorities

Regulations 22 and 23 of the Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007 (as amended) require Competent Authorities to ensure compliance with the Habitats Directive. Competent Authorities must, within their jurisdiction, have regard to both direct and indirect effects on interest features of the site. This may include consideration of issues outside the boundary of the SAC.

1.3. Activity outside the role of competent authorities

Nothing within this document will require Competent Authorities to undertake any actions if it is shown that any changes result wholly from natural causes. Having issued Advice on Operations for SACs, JNCC will work with Competent Authorities and others to agree, within a defined time frame, a protocol for evaluating all observed changes to baseline data and to develop an understanding of natural change and provide further guidance as appropriate and possible. This does not, however, preclude Competent Authorities from taking action to prevent deterioration to the interest features, and indeed such actions should be taken when required.

1.4. Role of conservation objectives

The conservation objectives set out what is needed to ensure Favourable Condition of the Annex I feature. The UK conservation agencies use the term 'favourable condition' to represent the concept of Favourable Conservation Status for the interest features of an individual SAC (Davies *et al.*, 2001). For an Annex I habitat, Favourable Conservation Status under the Habitats Directive occurs when: i) its natural range and area it covers within that range are stable or increasing; and ii) the specific structure and functions, which are necessary for its long-term maintenance, exist and are likely to continue to exist for the foreseeable future; and iii) the conservation status of its typical species is favourable² (Article 1e).

Conservation objectives are the starting point from which management measures and monitoring programmes may be developed as they provide the basis for determining what currently, or may in the future, impact the site. The SAC Conservation Objectives will also inform appropriate assessment under the Offshore Regulations.

1.5. Role of advice on operations

Under the Habitats Directive, Member States are required to take appropriate steps to avoid the deterioration or disturbance of interest features within SACs (Article 6.2). The advice on operations set out in Section 2 provides the basis for discussion about the nature and extent of the operations taking place within or close to the site and which may have an impact on its interest features. The advice should also be used to identify the extent to which existing measures of control, management and forms of use are, or can be made, consistent with the conservation objectives, and thereby focus the attention of Competent Authorities on areas that may need management measures. This operations advice may need to be supplemented through further discussions with the Competent Authorities and any advisory groups formed for the SAC.

This document will also inform the scope and nature of any appropriate assessment which the Directive requires to be undertaken for a plan or project (Regulation 25 of the Offshore Regulations) that:

- a) either alone or in combination with other plans or projects would be likely to have a **significant effect** on a European Site; and
- b) is not directly connected with the management of the site for nature conservation.

Where a project is likely to undermine the site's conservation objectives, it is likely to have a significant effect on the site and therefore require an appropriate assessment. The scope and content of any appropriate assessment will depend upon the location, size and significance of the proposed project and JNCC will advise on a case-by-case basis.

Through an appropriate assessment, competent authorities are required to ascertain the effect on the integrity of the site in view of the site's conservation objectives (Article 6.3). The integrity of the site is defined as 'the coherence of its ecological structure and function, across its whole area, that enables it

² The term Favourable Conservation Status relates to the individual habitats and species over their natural range within the European Union. However, because the selection of the European network of SACs is seen as fundamental to achieving Favourable Conservation Status, the European Commission considers that the concept should also be applied at the site level.

to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified³.

Although closely linked, the judgement of effect upon site integrity is subtly different to determination of favourable condition of a specific feature. An assessment of favourable condition determines the current status of a feature. Any evaluation of effects on site integrity needs to consider whether the plan or project in question is compatible with the long-term maintenance of the site's features. For example, there may be a time-lag between a plan or project being initiated and a consequent adverse effect upon integrity becoming manifest in the condition assessment. In such cases, a plan or project may have an adverse effect upon long-term site integrity even though the features remain in favourable condition in the short term.

1.6. Anton Dohrn Seamount SAC conservation objectives

The conservation objectives for the Anton Dohrn Seamount SAC interest features are provided below. These are high level objectives for the site features, and JNCC may refine them in future as our understanding of the features improves. They should be read in the context of (and in conjunction with) other advice given, particularly the SAC Selection Assessment Document which provides more detailed information about the site and evaluates its interest features according to the Habitats Directive selection criteria and guiding principles.

Within the objectives below superscript letters refer to explanatory text provided subsequently in section 1.7.

The Conservation Objectives for the Annex I reef at Anton Dohrn Seamount are:

Subject to natural change, restore^a the reef to favourable condition, such that:

- The natural environmental quality^b is restored
- The natural environmental processes^c are maintained
- The extent^d, physical structure^e, diversity^f, community structure^g and typical species^h representative of **bedrock, biogenic and stony reef** in the *Rockall Trough and Bank* regional sea are restored

The Conservation Objectives for the Anton Dohrn Seamount site set out to restore the reef to favourable condition. This is because, although there is no direct evidence to date that the feature has been damaged by human activities, there is evidence that demersal fishing occurs over the reef feature, exposing it to pressures to which it is sensitive and subsequently moderately vulnerable. For the most sensitive sub-type, *Lophelia* reef, where restoration is considered difficult or impossible, removal of pressures to which it is highly sensitive is considered to provide the best opportunity for the slow recovery of damaged reef and as a preventative measure for further damage.

Anecdotal evidence indicates that bottom trawlers avoid hard substrate to prevent damage to their gear. Although Vessel Monitoring System (VMS) data does indicate that the majority of fishing is focused on the softer substrate on the summit, the evidence is not of sufficient spatial resolution to confirm this.

³ Institute of Ecology and Environmental Management (2010). Guidelines for Ecological Impact Assessment in Britain and Ireland.

Combined with observations of trawl marks and discarded gear within the proposed boundary, whilst not being conclusive, these three pieces of information support the assumption that *Lophelia* may be damaged and remain at risk from fishing activities. This leads us to take a precautionary approach and recommend setting a restore objective for this site. A rating of 'low confidence' is therefore associated with this objective and should further information become available which indicates the feature is in favourable condition then the objective may be set to 'maintain'.

The feature's vulnerability to human pressure is further documented in section 2.5. However there is a lack of detailed information on levels of exposure to human activities and their ecological impact on the feature at this site. In particular, the following activities require further investigation in order to be able to assess their impacts on the feature: mobile demersal fishing, longlining, potting, and demersal fishing activity of the non-UK EU sector within the site.

As outlined in section 1.8 below, further information will be required to assess and monitor favourable condition of the reef at this offshore SAC. The Conservation Objectives for the site may be revised at a later date if new information becomes available.

1.7. Explanation of terms used in the Conservation Objectives

a) Maintain or restore

Maintain implies that, based on our existing understanding, the feature is regarded as being in favourable condition and will, subject to natural change, remain at its condition at designation.

Restore implies that the feature is likely to have been degraded to some degree. In the absence of direct evidence of damage or deterioration, where activities associated with pressures to which the feature is sensitive overlap the feature, they may need to be considered for management to reduce or eliminate potential negative impact(s). The first step for a restore objective may be to seek new information on the current condition of the site feature. Restoration in the marine environment generally refers to natural recovery to favourable condition through the reduction or removal of impacts.

JNCC considers that maintenance or restoration of the following parameters (b - h) meets the requirements of the Habitats Directive to achieve favourable conservation status of the natural habitat through favourable 'distribution, structure and functions'.

- b) **Natural environmental quality** e.g. chemical quality parameters of water, suspended sediment levels, radionuclide levels etc. should not deviate from baseline levels at designation (if available) or reference conditions.
- c) **Natural environmental processes** e.g. circulation, sediment deposition and erosion etc. should not deviate from baseline levels at designation (if available) or reference conditions.
- d) **Extent** - the area covered by the habitat and communities.
- e) **Physical structure** - the shape, form and composition of the habitat and its substrata.
- f) **Diversity** - the number of different biological communities or number of species within a given community.

- g) **Community structure** e.g. age classes, sex ratios, distribution of species, abundance, biomass, reproductive capacity, recruitment, range and mobility.
- h) **Typical species** – see Appendix III for draft criteria for identifying typical species.

1.8. Favourable condition

Conservation objectives for inshore SACs have been provided in association with a 'favourable condition' table, which outlines how to recognise favourable condition for the interest features in question. However, understanding the functioning and condition of complex and dynamic offshore marine sites, which experience a variety of pressures resulting from historic and current activities, is difficult. For offshore sites, there is presently insufficiently detailed information on i) the existing condition of qualifying interest features and ii) the preferred or target condition of interest features. 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.

2. Advice on Operations

2.1. Purpose of advice

The aim of this advice is to enable all competent authorities to prioritise management of activities that pose a threat to the interest features of the Anton Dohrn Seamount site. The advice is linked to the conservation objectives outlined in the section above, and will help provide the basis for detailed discussions on management of activities that may affect the features of the site.

2.2. Methods of assessment of vulnerability to pressures

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 JNCC's Advice on Operations:

- 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 features (**reef**) to the above pressures (see flow diagram in Appendix I):

- An assessment of the **sensitivity** of the interest feature to the listed pressures (section 2.3);
- An assessment of the current **exposure** of the interest feature to the pressures (section 2.4); 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. 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.

2.3. Sensitivity assessment

This assessment evaluates the relative sensitivity of the features of the Anton Dohrn Seamount SAC to the effects of physical, chemical and biological pressures. Sensitivity is defined here as '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 features of the Anton Dohrn SAC. They are drawn principally from MarLIN's evaluation (Tyler-Walters, 2008) of the sensitivity of the following biotope (which is comparable to that present within the SAC):

- ***Lophelia* reefs (COR.Lop)**

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 has 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.

Three sub-types of Annex I reefs are found at the Anton Dohrn site (bedrock, stony and biogenic); however the biogenic reef (*Lophelia pertusa*) is the most sensitive of these three sub-types. Therefore, in support of the precautionary principle, the sensitivity assessment is based on the *Lophelia pertusa* biotope.

The interest features and associated biological communities of the Anton Dohrn Seamount site are sensitive to: **physical loss, physical damage, toxic and non-toxic contamination, and biological disturbance**. Further detail on sensitivities of the Annex I Biogenic reef (*Lophelia pertusa*) is provided in Table 1 and the activities which may be associated with these pressures is given in Appendix II.

The interest feature and associated biological communities of the Anton Dohrn Seamount site are sensitive to:

Physical loss

L.pertusa is a fragile, slow growing coral with individual colonies taking up to thousands of years to develop (Bell and Smith, 1999; Roberts, 2002; Friewald *et al*, 2004). Recent research suggests that stony (scleractinian) corals do not recover from trawling impact quickly, with one study showing no signs of recovery on trawled seamounts after 5 and 10 years (Williams *et al*, 2010).

Any construction over the feature would lead to its (partial) removal, and permanent infrastructure may prevent its natural recovery through obstruction. Removal of the hard substrata on which the corals grow would prevent recovery (Shelton, 1980; Mortensen, 2001). In addition to *Lophelia*'s own sensitivity to

sediment deposition, the feature's associated ecological communities are also sensitive to smothering, particularly the more low lying or encrusting typical species.

Physical damage

L. pertusa's fragility is such that it has been observed to be knocked over by the turbulence of an advancing research submersible (Wilson, 1979). Coral rubble has been regularly observed on surveys and in addition to water movements, physical abrasion caused by mobile fishing gear can directly damage the interest feature and its typical species. Such physical disturbance is likely to reduce the structural complexity of the feature (for example, by damaging erect epifaunal species) and reduce biodiversity through the selective removal of large, sessile, long-lived species from the community (Sewell and Hiscock, 2005). Many of the feature's typical species, including *Lophelia*, itself are permanently attached to the substratum and will not re-attach once displaced.

Increases in suspended sediment may cause interference for some suspension feeders on the reef, including *Lophelia*, although recovery from this pressure is thought to be rapid.

Toxic and non-toxic contamination

The feature and associated communities are considered sensitive to various types of chemical disturbance. Assessing the effects of toxic contamination on biotopes is extremely difficult because varying quantities of different contaminants can have very different effects (including antagonistic and synergistic effects) on marine organisms. JNCC has assigned a sensitivity score of moderate to the introduction of synthetic and non-synthetic compounds. This is a precautionary approach, incorporating the effects of high levels of contamination (acute or chronic) and /or unexpected synergistic effects. The feature and associated communities are considered sensitive to various types of chemical disturbance. Assessing the effects of toxic contamination on biotopes is extremely difficult because varying quantities of different contaminants can have very different effects (including antagonistic and synergistic effects) on marine organisms. There is currently no information available to quantify sensitivity to toxic contamination and non-toxic contamination through changes in nutrient levels. The feature and associated communities are considered sensitive to changes in salinity and oxygen levels but these pressures are generally considered irrelevant to features in the offshore region. As such the biotope's sensitivity to toxic and non-toxic contamination is considered to be unknown as there is insufficient information to make an assessment.

Biological disturbance

The biological effects of fisheries can include:

- Removal of target species
- Mortality of non-target species

These effects can lead to shifts in community structure (e.g. if predators are removed from the system) which then lead to indirect effects on the food web as a whole.

In addition, many of the species targeted by fisheries in deep water areas are especially vulnerable to the effects of over fishing due to their long life histories (Pauly *et al*, 2002; Sewell and Hiscock, 2005).

It has not been possible to determine whether the interest feature is sensitive to introduction of radionuclides, introduction of microbial pathogens or introduction of non-native species.

2.4. Exposure assessment

Table 1 (column 4) shows the relative exposure of the Anton Dohrn Seamount interest features to physical, chemical and biological pressures. This assessment is based on known current 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, UK Deal for oil and gas industry activities and the United Kingdom Cable Protection Committee for submarine cable distribution. 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.

Fishing exposure data was derived from work on a Defra marine biodiversity research programme (MB106)⁴. Estimations of fishing activity were derived from Vessel Monitoring System (VMS) data and are available for 2006-9. The derived surfaces represent activity from all vessels (both UK and non-UK registered vessels) of at least 15m length. VMS data for UK vessels were linked to skipper logbook information in order to determine the fishing gear being employed. For non-UK registered vessels where logbook information is not available information on fishing gear employed has been obtained from 'primary gear' listed on the EU vessel register. Unprocessed VMS data have been filtered using a simple speed rule of between 1 and 6 knots to indicate fishing activity for all gear types. Date and time information attached to unprocessed VMS data were used to determine elapsed time between consecutive VMS locations for each vessel (usually 2 hours) and summarised at a resolution of 0.05 decimal degrees. The same programme recorded distribution of trapping/potting activity, though it should be noted that many vessels undertaking potting/trapping may be less than 15m in length and as such not recorded in this dataset.

From landings data, information is available on which species are removed from the ICES rectangle within which the site is located, using particular gear types and the size of the vessel used. We can therefore take into consideration the importance of these target species in the functioning of the biotope when assessing the level of biological disturbance through selective extraction of species by static gear. Landings data, however, does not provide information on the possible mortality/extraction of non-target species. Additional research to assess the distribution of static/set demersal gear use and the intensity of its physical and biological impacts is needed. Interest feature exposure and vulnerability to static/set demersal gears have therefore been assessed but are possibly an underestimate.

The exposure assessment is based on best available information on the levels of pressures associated with activities at the Anton Dohrn Seamount site. If new information becomes available this may lead to modification of the advice on operations presented herein. In addition, an activity may not currently be

⁴ Cefas (2010) Report no. 1: Objective 1 – Provision of geo-database containing standardised layers showing the distribution of specified activities, sites and resources with associated metadata and comments. Project MB106: Further development of marine pressure data layers and ensuring the socio-economic data and data layers are developed for use in the planning of marine protected area networks

occurring on the site but may do so in future. As such, Competent Authorities will need to take into account both the sensitivity of the feature and the conservation objectives outlined in section 1.6 whenever a new activity is proposed.

Interest feature exposure to physical, chemical and biological pressures

The interest features and associated biological communities of the Anton Dohrn Seamount site may be exposed to the following pressures:

- **Physical loss** through obstruction (wrecks) at low levels;
- **Physical damage** through **physical disturbance and abrasion** (demersal fishing) at low levels;
- **Biological disturbance** through **selective extraction of species** (demersal fishing) at low levels.

Physical loss

The feature may be exposed to **obstruction** at low levels (wrecks). Data from the MB106 project shows a small number of wrecks within the proposed boundary and as they constitute a very small area of the feature exposure would be considered to be very low pressure. In addition, wreck events would not be considered a regular occurrence.

Physical damage

The feature may be exposed to **physical disturbance** or **abrasion** at low levels (demersal fishing) and to **changes in suspended sediment** at low levels (adjacent demersal fishing).

VMS data (2006-2010) indicates that there is significant otter bottom trawling in the vicinity of the proposed boundary of this site. This is the main gear used in the ICES rectangle overlapping Anton Dohrn. Faint lineations around the cliff edge were detected with acoustic techniques collected on the JNCC 2009 survey of Anton Dohrn Seamount (Stewart *et al*, 2009), which have been interpreted as trawl marks (Long *et al*, 2010). No severe damage to the seamount from fishing activity was apparent from seabed imagery collected on this survey and the live biogenic reef was seen to be intact in most areas. This is most likely due to avoidance of coral/rocky outcrops to prevent net damage and this correlates with the VMS data which indicates that effort only occurs in a portion of the site, to the northwest and recorded hours within the site are very low e.g. up to 4 hours over 4 years which possibly do not constitute hours fished. An accurate assessment of EU mobile demersal effort is difficult but the indication is also low effort (up to 60hrs over 2006-2009).

VMS data (2006-2007) indicates that pots and traps are employed within the site. Long-lining also occurs but it is unclear if they are anchored. In addition, Spanish gill-netters were observed setting nets in the vicinity of the site (2010 JNCC survey, pers. comm.), and discarded gear was observed on the south eastern side of the seamount (Long, 2010). The majority of the fishing effort is focussed on the softer substrate on the summit but it does stretch into the inner section of the site, occurring over approximately half the site. It also appears to be more heavily focused anticlockwise from the west to the south of the site, with the lightest activity in the SW section. Although there appears to be quite high coverage over the site, landings from this gear type (long-lining, pots and traps) is relatively low compared to demersal catches, approximately 30,000 kg for the period 2006-2008, in the whole of the overlapping ICES

rectangle. It is not possible, given the data currently available, to assess exposure to abrasion from static gears.

The softer sediment on the summit is mainly targeted by fishing using demersal mobile gear. However, it is unlikely that the feature is exposed to any related changes in suspended sediment above an ambient level because this is already an area of moderate energy. This site's position within the Rockall Trough means exposure to the prevailing currents that have velocities in the range of 0.3 - 1 m/s which are strong enough to mobilise sediments (Long *et al*, 2010).

Biological disturbance

The level of exposure of the feature to **selective extraction of species** is unknown. Much of the effort over the feature is by EU demersal gear. As this combines many trawl gear types, it is not possible to quantify bottom fishing effort. It is also not possible to assess UK pot, trap, long-lining or gill-netting efforts. The trawling effort within the site is very low (e.g. up to 4 hours over 4 years) and may possibly not constitute actual fishing.

It has not been possible to determine whether the interest features are exposed to noise or the introduction of non-native species. Ministry of Defence military fleet exercises may occur within the site boundary but they are not considered to be associated with any pressure to which the site features are sensitive. In addition, future plans would need an appropriate assessment.

2.5. 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. 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 interest features' vulnerability (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 **Anton Dohrn Seamount reef** and associated biological communities may be moderately vulnerable to:

physical disturbance or abrasion (mobile demersal fishing) and **selective extraction of species** (static gears and mobile demersal fishing).

and vulnerability is considered low to:

- **Obstruction** (wrecks)

Moderate vulnerability of the reef to these pressures is based on low exposure to demersal fishing which may be occurring over the feature. JNCC does not think that trawling occurs on or near the reef feature itself due to its location but this cannot be confirmed by VMS data due to its poor spatial resolution. If exposure of the feature to pressures associated with demersal fishing is shown to be absent (as in the case of a fisheries closure) then the vulnerability would be reduced to none.

ICES (International Council for the Exploration of the Sea) advised the European Commission and NEAFC (North-East Atlantic Fisheries Commission) to close the flanks of Anton Dohrn Seamount to fishing activities in May 2011 (WGDEC, 2011). Consideration of all data from survey presented a strong case for closing the steep slopes of the seamount to bottom trawling to protect both vulnerable marine ecosystems (VMEs) and habitats. The proposed fisheries closure boundary traces the inner extent of the proposed SAC boundary but has a narrower outer extent as some Annex I features occur out to 2000m water depth, and the proposed SAC boundary is therefore wider to account for these features.

Vulnerability to physical removal through obstruction is considered to be low given that the exposure of the feature to this pressure is very low in relation to the size of the feature, i.e. from a small number of wrecks. Although the feature is highly sensitive to this pressure and would thus be vulnerable to any level of exposure to such a pressure, the feature's overall structure and function is not considered to be affected by this obstruction and so the overall vulnerability rating has been reduced from moderate to low.

The assessment of vulnerability of the feature to obstruction by wrecks is included herein for completeness as it presents a current pressure that informs the assessment of feature condition. There is currently no expectation of a requirement of management measures, as the vulnerability, and therefore risk of damage or deterioration to the feature is low. In the highly unlikely instance where any feature vulnerability to obstruction from wrecks is assessed to be moderate to high, any management measures which we may advise would need to take into account the feature's sensitivity to pressures, e.g. removal of a wreck may cause more physical disturbance or abrasion and/or smothering than leaving the wreck in place.

Vulnerability to pressures associated with the following activities occurring on the site cannot be quantified given the data available:

- Longlining;
- Set gillnetting;
- Potting; and
- EU demersal fishing.

Vulnerability to introduction of non-native species remains unknown for this interest feature.

2.6. Risk of damage or disturbance

JNCC considers 'risk' to be the likelihood of deterioration of the feature due to an activity. It is the vulnerability of the feature to an activity, assessed against the level of management of that activity.

High risk activities will be those to which the feature is highly or moderately vulnerable, and for which there is insufficient management. For example, industries which are not location specific and not subject to prior consent procedures or reliable enforcement are more likely to cause damage/disturbance to the interest feature. These industries include fishing and shipping. However, clearly not all activities associated with these industries are detrimental to interest features.

Low risk activities will be those where there is no feature vulnerability (i.e. the activity does not interact with the feature) or where the moderate or high vulnerability is mitigated for by management. For

example, 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. Under regulation 25 of the Offshore Habitats Regulations, before a Competent Authority undertakes or authorises a plan or project which may have a significant effect on the site, it is required to carry out an Appropriate Assessment to assess the implications for the site in view of its conservation objectives. The Competent Authority can only agree to the plan or project if it has ascertained that it will not adversely affect the integrity of the site but can agree to a plan or project for imperative reasons of overriding public interest (IROPI), notwithstanding its adverse effect, if there are no alternative solutions.

If consent has already been granted by a Competent Authority for a plan or project at the time a site becomes a European Offshore Marine Site, under the Offshore Habitats Regulations that consent will need to be reviewed against the conservation objectives for the site, and affirmed, modified or revoked. This includes the activities of the oil and gas, aggregates and renewable energy industry sectors.

Only high or medium risk activities are noted here. Table 2 shows the risk assessment for the Anton Dohrn Seamount reef.

Within the Anton Dohrn Seamount site, the following offshore activity is currently considered to pose a high risk to the interest features:

- **demersal fishing**

Competent Authorities are advised to consider management actions that might need to be taken to assess and, if necessary, reduce the risk of damage associated with this activity to the SAC features. ICES (International Council for the Exploration of the Sea) have advised the European Commission and NEAFC (North-East Atlantic Fisheries Commission) to close the flanks of Anton Dohrn Seamount to all fishing to protect *L.pertusa* biogenic reef. This decision followed a meeting of the ICES Working Group on Deep-water Ecology (WGDEC) in May 2011 where data collected during the JNCC 2009 survey of Anton Dohrn Seamount (Stewart *et al*, 2009) was analysed to define the presence of Vulnerable Marine Ecosystems.

The feature's risk to pressures associated with the following activities is unknown because although vulnerability has been identified it cannot be quantified as exposure cannot be assessed given the available information:

- Longlining;
- Potting; and
- EU demersal fishing

Competent Authorities are advised to consider management actions that might need to be taken to assess and, if necessary, reduce the risk of damage associated with these activities to the SAC features.

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.

Table 1: Sensitivity, exposure and vulnerability of the Anton Dohrn Seamount *Lophelia pertusa* reefs 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)		Anton Dohrn Seamount: <i>Lophelia pertusa</i> reef		
		Sensitivity	Exposure	Vulnerability
Physical Loss	Removal (e.g. aggregate dredging, isolated rock dump, infrastructure development)	***	None	No known vulnerability
	Obstruction (e.g. permanent constructions [oil & gas infrastructure, windfarms, cables] & wrecks)	***	Low	Low vulnerability
	Smothering (e.g. drill cuttings)	**	None	No known vulnerability
Physical Damage	Changes in suspended sediment (e.g. screening plumes from aggregate dredging)	•	None	No known vulnerability
	Physical disturbance or abrasion (e.g. mobile demersal fishing, anchoring, windfarm scour pits, pipeline burial, potting)	***	Low	Moderate vulnerability
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)	••	None	No known vulnerability
	Introduction of non-synthetic compounds (e.g. heavy metals, crude oil spills)	••	None	No known vulnerability
	Introduction of radionuclides (e.g. nuclear energy industry)	?	None	No known vulnerability
Non-toxic contamination	Changes in nutrient loading (e.g. outfalls)	••	None	No known vulnerability
	Changes in thermal regime (e.g. cooling water discharges)	•••	None	No known vulnerability
	Changes in turbidity (e.g. laying of pipelines, aggregate dredging)	•••	None	No known vulnerability
	Changes in salinity (e.g. outfalls from rigs, ships)	•••	None	No known vulnerability
Biological disturbance	Introduction of microbial pathogens (e.g. outfalls)	?	?	No known vulnerability
	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)	•••	Low	Moderate vulnerability

Table 2: Risk of damage to Anton Dohrn Seamount reefs from current or planned activities (based on vulnerability identified in Table 1).

Risk key: Low=low risk of damage to feature; Moderate=moderate risk of damage to feature; High=high risk of damage to feature.

List of pressures which may cause deterioration or disturbance (with example activities)		Anton Dohrn Seamount: bedrock, biogenic and stony reef				
		Vulnerability	Activity associated with pressure	Current management	Level of Risk	Action advised
Physical Damage	Physical disturbance or abrasion	Moderate vulnerability	demersal fishing	No site-specific management of this activity currently in place.	Moderate	Competent Authority to assess & consider need for management action
Biological disturbance	Selective extraction of species	Moderate vulnerability	demersal fishing	No site-specific management of this activity in place.	Moderate	Competent Authority to assess & consider need for management action

References

- BELL, N. & SMITH, J. 1999. Coral growing on North Sea oil rigs. *Nature*, **402**, 601.
- CROWN ESTATE. 2006. UK Licensed marine aggregate dredging areas (GIS data). Provided by Royal Haskoning on behalf of the Crown Estate, London.
- DAVIES, J., BAXTER, J., BRADLEY, M., CONNOR, D., KHAN, J., MURRAY, E., SANDERSON, W., TURNBULL, C. & VINCENT, M. 2001. Marine Monitoring Handbook, 405 pp, JNCC, Peterborough. ISBN 1 85716 550 0. Available from: <http://www.jncc.gov.uk/page-2430#download>. [Accessed December 2011]
- DEAL. 2006a. UK Offshore Oil, gas and condensate fields [online]. Deal: UK Offshore Oil and Gas Information. Available from: <http://www.ukdeal.co.uk>. [Accessed December 2011]
- DEAL. 2006b. UK Offshore Oil and Gas well positions and descriptive attributes [online]. Deal: UK Offshore Oil and Gas Information. Available from: <http://www.ukdeal.co.uk>. [Accessed December 2011]
- DEAL. 2006c. UK Offshore Oil and Gas Sub-sea pipelines and umbilicals [online]. Deal: UK Offshore Oil and Gas Information. Available from: <http://www.ukdeal.co.uk>. [Accessed December 2011.]
- FREIWALD, A., FOSSÅ, J.H., GREHAN, A., KOSLOW, T. & ROBERTS, J.M. 2004. Cold-water coral reefs. Cambridge, UK:UNEP-WCMC. Available from: <http://www.unep-wcmc.org/medialibrary/2010/09/10/29fef54/CWC.pdf> [Accessed December 2011]
- HISCOCK, K. (ed.) 1996. Marine Nature Conservation Review: rationale and methods. Peterborough: Joint Nature Conservation Committee. (Coasts and seas of the United Kingdom. MNCR series.)
- ICES, 2011. General advice. Update of cold-water coral and sponge maps and the information underpinning such maps on Vulnerable Marine Habitats (including Hatton and Rockall Banks) [online]. Available from: <http://www.ices.dk/committe/acom/comwork/report/2011/Special%20Requests/NEAFC-EC%20Vulnerable%20Marine%20Habitats.pdf> [Accessed December 2011].
- LONG, D., HOWELL, K.L., DAVIES, J. and STEWART, H. 2010. JNCC Offshore Natura. survey of Anton Dohrn Seamount and East Rockall Bank Areas of Search, JNCC Report Series 437.
- MARLIN. 2006. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [online]. Plymouth: Marine Biological Association of the United Kingdom. Available from: <http://www.marlin.ac.uk/>. [Accessed December 2011].
- MORTENSEN, P.B. 2001. Aquarium observations on the deepwater coral *Lophelia pertusa* (L., 1758) (Scleractinia) and selected associated invertebrates. *Ophelia*, **54**, 83-104.
- PAULY, D. V. CHRISTENSEN, S. GUENETTE T.J. PITCHER, U.R. SUMAILA, C.J. WALTERS, R. WATSON and D. ZELLER. 2002. Toward sustainability in world fisheries. *Nature* 418: 689-695.
- ROBERTS, J.M. 2002. The occurrence of the coral *Lophelia pertusa* and other conspicuous epifauna around an oil platform in the North Sea. *Journal of the Society for Underwater Technology*, **25**, 83-91.

SEWELL, J. & HISCOCK, K., 2005. Effects of fishing within UK European Marine Sites: guidance for nature conservation agencies. Report to the Countryside Council for Wales, English Nature and Scottish Natural Heritage from the Marine Biological Association. Plymouth: Marine Biological Association. CCW Contract FC 73-03-214A. 195 pp.

SHELTON, G.A.B. 1980. *Lophelia pertusa* (L.): electrical conduction and behaviour in a deep-water coral. *Journal of the Marine Biological Association of the United Kingdom*, **60**, 517-528

STEWART, H., DAVIES, J., LONG, D., STROMBERG, H. AND HITCHEN, K., 2009. JNCC Offshore Natura Survey, Anton Dohrn Seamount and East Rockall Bank Areas of Search, 2009/03 - JNCC Cruise Report. British Geological Survey Commissioned Report CR/09/113 (JNCC Contract Number: C08-0025-0050).

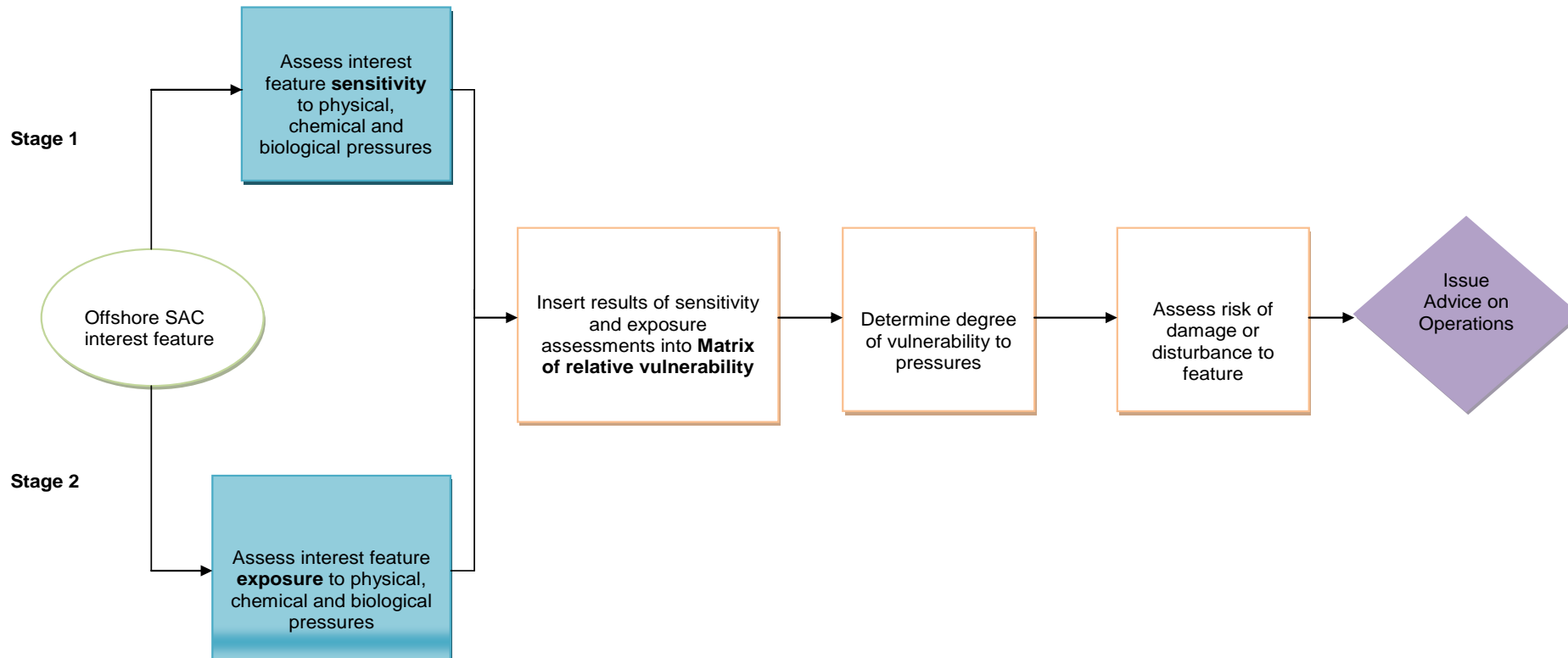
Tyler-Walters, H. 2008. *Lophelia* reefs. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. Available from: <http://www.marlin.ac.uk/habitatsensitivity.php?habitatid=294&code=1997> [Accessed December 2011].

UNITED KINGDOM CABLE PROTECTION COMMITTEE. 2007. Distribution of submarine cables in the UK offshore area (GIS data).

WILLIAMS, A., SCHLACHER, T.A., ROWDEN, A.A., ALTHAUS, F., CLARK, M.R., BOWDEN, D.A., STEWART, R., BAX, N.J., CONSALVEY, M. AND KLOSER, R.J. 2010. Seamount megabenthic assemblages fail to recover from trawling impacts. *Marine Ecology*, **31** (Suppl.1), 183 – 199.

WILSON, J.B. 1979. 'Patch' development of the deep-water coral *Lophelia pertusa* (L.) on Rockall Bank. *Journal of the Marine Biological Association of the United Kingdom*, **59**, 165-177.

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



Appendix II: Associated activities that contribute to pressures to which reef feature of site is sensitive:

This list is draft, not definitive, and intends merely to provide Relevant/Competent Authorities with an indication to as to the type of activities which may cause damage or deterioration to the feature for which the site is designated. These include activities which may not currently be affecting the site.

Physical loss

Removal

Aggregate dredging, isolated rock dump, infrastructure development and ship wrecks

Obstruction

Permanent constructions [oil & gas infrastructure, offshore windfarms, wave and tidal renewable developments, cables and pipelines] & wrecks

Smothering

Drill cuttings

Physical Damage

Changes in suspended sediment

Screening plumes from aggregate dredging

Physical disturbance or abrasion

Mobile benthic fishing, anchoring, windfarm scour pits, pipeline burial, creeling/potting

Toxic contamination

Introduction of synthetic compounds

TBT, PCBs, industrial chemical discharge, produced water, fuel oils

Introduction of non-synthetic compounds

Heavy metals, crude oil spills

Introduction of radionuclides

Nuclear energy industry

Non-toxic contamination

Changes in nutrient loading

Outfalls

Changes in thermal regime

Cooling water discharges

Changes in turbidity

Laying of pipelines, aggregate dredging

Changes in salinity

Outfalls from rigs, ships

Biological disturbance

Introduction of microbial pathogens

Outfalls

Introduction of non-native species and translocation

Ballast water, hull fouling

Selective extraction of species

Bioprospecting, scientific research, demersal fishing

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 sensitivity of the interest feature			
		High ●●●	Moderate ●●	Low ●	None ○
Relative exposure of the interest feature	High (3)	9	6	3	0
	Medium (2)	6	4	2	0
	Low (1)	3	2	1	0
	Unknown				0
	None (0)	0	0	0	0

Note: if there is insufficient information to assess either 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	3 to 5
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: 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 the ecological integrity of the feature. These criteria are intended to help identify or classify typical species and are not limited to the benthos. They are relevant to the Annex I 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 include other Annex 1 features (e.g. H1130 Estuaries, H1160 Large Shallow Inlets and Bays 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; these are marine species and plants and algae transported from their native range to 'new' areas. 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).