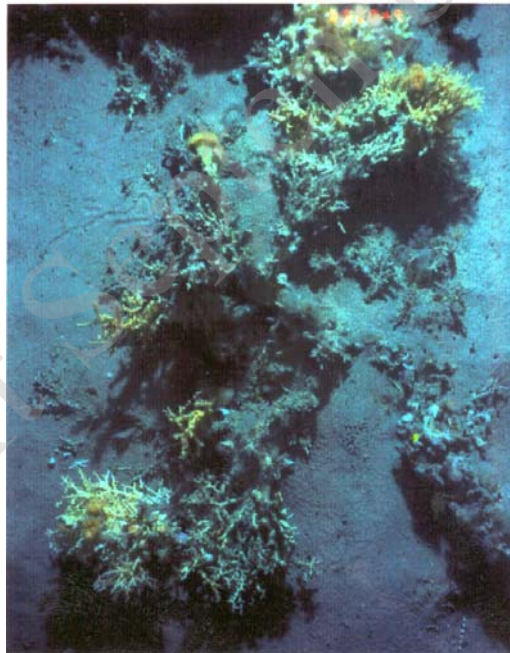


**Offshore Special Area of Conservation:
Darwin Mounds**

**Draft Conservation Objectives and Advice on
Operations**



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Version 3.0 (10th September 2007)

* Cover photo illustrates cold water coral 'thicket' on the Darwin Mounds

Cover note

In October 2002 Defra informed the European Commission of their intention to designate the Darwin Mounds as a SAC. Consultation on the proposed SAC boundary was conducted by Defra in September 2003.

Emergency measures under the EU Common Fisheries Policy prohibiting 'bottom trawl or similar towed nets operating in contact with the bottom of the sea' were introduced in August 2003 and extended in February 2004, with a permanent prohibition introduced in March 2004[†]. The boundary of the fishing restriction area is the same as that of the SAC.

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[†] Council Regulation (EC) No 602/2004 amending Regulation (EC) No 850/98 as regards the protection of deepwater coral reefs from the effects of trawling in an area north west of Scotland.

Document version control

Version and date	Amendments made	Issued to and date
DarwinMounds_ConservationObjectives+AdviceonOperations_3.0.doc (10 th September 2007)	<ul style="list-style-type: none"> - Stand alone Conservation Objectives and Advice on Operations (SAC Selection Assessment [including updated site boundary] moved to separate document) - Sensitivity, exposure and vulnerability assessments modified - Summary of Advice on Operations moved to front of document 	UK Marine Biodiversity Policy Steering Group and Competent Authorities (September 07)
DarwinMoundsDossier_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 - Sensitivity/exposure/vulnerability assessments added (<i>former document contained provisional management statements only</i>) - Advice on Operations amended 	Defra (25 th September 2006)
Darwin Mounds proposed Special Area of Conservation: JNCC 02 P10 (June 2002)		JNCC Committee (June 2002) and Defra (2002)

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Summary of Draft Advice on Operations for Darwin Mounds Special Area of Conservation (SAC)

This advice is based on information on the SAC presented in JNCC's 'Darwin Mounds: SAC Selection Assessment' (version 3.0 May 2007). JNCC's Advice on Operations is site and feature specific, and has been developed using best available scientific information and expert interpretation as at September 2007. 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 Darwin Mounds 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 Darwin Mounds Reefs to achieve their full natural biological diversity and the underlying physical structure of the interest feature to be 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 Reefs**, 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 (demersal fishing);
- ii) **Physical damage** by Changes in suspended sediment or Physical disturbance or abrasion (demersal fishing);
- iii) **Non-toxic contamination** by Changes in turbidity (demersal fishing);
- iv) **Biological disturbance** by Selective extraction of species (demersal fishing).

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.

The European Commission has already taken action to manage mobile demersal fishing activities such that they do not result directly or indirectly in the deterioration or disturbance of the reef through the pressures listed above. JNCC's advice is therefore based on the assumption that these pressures ceased entirely following the Common Fisheries Policy ban on bottom trawls and similar towed nets operating in contact with the seabed within the site in 2004. However, the following offshore activity may still pose a high risk to the interest feature:

- **(Illegal, unregulated or unreported) demersal fishing using mobile gear**

Competent Authorities are advised to consider management actions that could reduce the risk of damage associated with this activity to the Reef interest feature.

Draft September 2007

Darwin Mounds 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 Darwin Mounds SAC interest feature

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.

The Conservation Objectives for the Darwin Mounds 'Reefs' are:

Subject to natural change, maintain* the Reefs in favourable condition, such that:

- The natural **environmental** and **ecological processes** of the reefs are maintained.
- The **extent, distribution, diversity** and characteristic species composition of biological communities representative of *Lophelia pertusa* biogenic reef in the Rockall Trough & Bank and Scottish continental shelf are maintained.

* Maintain implies restoration if the feature is currently not in favourable condition

Definition of terms:

- **Environmental processes:** the natural processes which may affect the water quality, turbidity or physical systems of the site
- **Ecological processes:** the biological interactions within communities and the overall productivity and diversity of the biological system
- **Extent:** the area covered by the habitat and communities
- **Distribution:** the geographical location of habitats and communities within the site
- **Diversity:** the number of different biological communities

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 Darwin Mounds SAC, there is some evidence that due to damage caused by bottom trawling prior to the EU fishing closure (Bett, 1999; 2001), 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 reefs 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 Reefs). 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 Darwin Mounds site's interest feature. 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 (**Reefs**) 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.

a) Sensitivity assessment

This assessment evaluates the relative sensitivity of the Darwin Mounds Reefs 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 reef feature at the Darwin Mounds SAC. They are drawn principally from MarLIN's (2005) evaluations of the sensitivity of the following biotope (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. 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 interest feature and associated biological communities of the Darwin Mounds site 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 Reefs is provided in Table 1.

b) Exposure assessment

Table 1 (column 4) highlights the relative exposure of the Darwin Mounds' 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 feature 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. 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.

It is likely that over the coming years, more detailed information on the levels of pressures associated with activities at the Darwin Mounds 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 interest feature and associated biological communities of the Darwin Mounds site are not believed to be exposed to any of the pressures associated with mobile demersal fishing listed in Table 1 (namely Physical loss, Physical damage and Biological disturbance), assuming that this type of fishing ceased entirely within the site since the Common Fisheries Policy ban in 2004.

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 II). 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 III.

Interest feature vulnerability to physical, chemical and biological pressures

The **Darwin Mounds' Reefs** and associated biological communities are not considered vulnerable to Physical loss, Physical damage or Biological disturbance associated with mobile demersal fishing (despite their sensitivity to these pressures), provided that a cessation of mobile demersal fishing took place within this site in 2004.

Vulnerability to **Noise (acoustic)**, **Introduction of radionuclides**, **Introduction of microbial pathogens** and **Introduction of non-native species** remains unknown for the 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 Darwin Mounds site, the following offshore activity may possibly pose a high risk to the interest feature:

- **(Illegal, unregulated or unreported) demersal fishing using mobile gear**

Competent Authorities are advised to consider management actions that could reduce the risk of damage associated with this activity to the Reef interest feature.

Table 1: Sensitivity, exposure and vulnerability of the Darwin Mounds 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’)

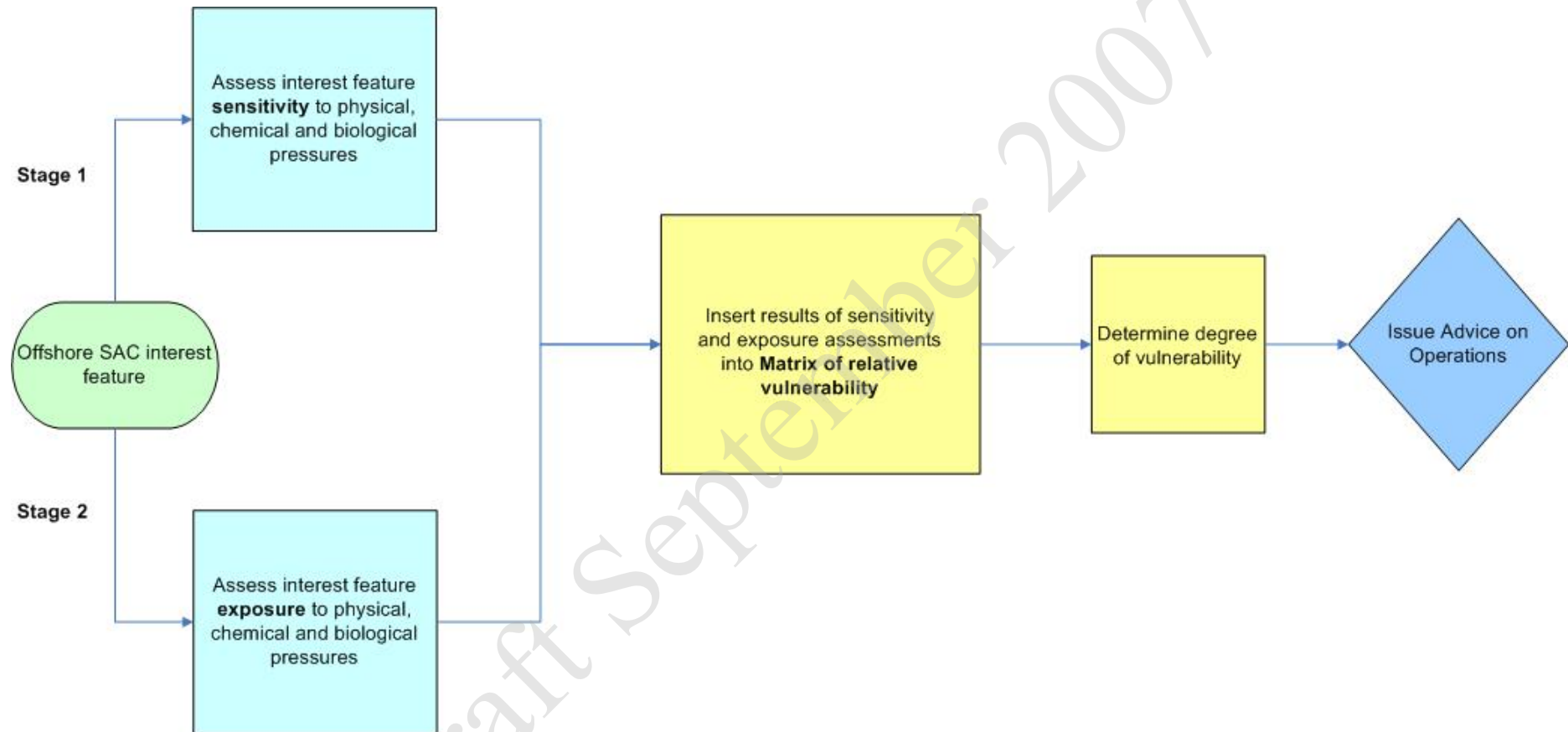
Exposure key: High = High exposure, Medium = Medium exposure, Low = Low exposure, None = No known exposure, Unknown level = Exposure of an unknown level and ? = Insufficient information to make assessment.

List of pressures which may cause deterioration or disturbance (with example activities)		Darwin Mounds: <i>Lophelia pertusa</i> reefs		
		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)	●●●	None	No known 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 benthic fishing, anchoring, windfarm scour pits, pipeline burial, potting)	●●●	None	No known 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)	?	?	Insufficient information
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)	?	?	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)	●●●	None	No known vulnerability

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



Appendix II: 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	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 III: The effects of climate change on the Darwin Mounds site

According to the UKCIP (2002), sea surface temperatures in this area may rise by between 0-0.5°C by the 2020s, and by 0.5-1.5 °C by the 2080s (under low and high emissions scenarios respectively). Similar changes will be observed throughout the upper layers of the water column. Over the last 30 years, the temperature and salinity of the upper layer in this part of the North Atlantic is known to have increased significantly. The temperature of North Atlantic water in the Rockall Trough has increased by more than 0.6°C in the upper layers (0-800m) over the last 30 years (Sarah Hughes (FRS), pers. comm. June 2007). It is, however, important to realise that decadal and multidecadal variability is also high. It is known from other longer time series in the region that a period of high temperature and salinity was also observed in the North Atlantic between 1945 and 1965 (Sarah Hughes (FRS), pers. comm. June 2007). It is still difficult to determine whether changes in climate could have any significant effect on the circulation in the area. The slope current appears to vary with the seasons, and can be stronger in winter than in summer. Its strength and direction can be affected by local winds. Future changes in climate may have a small influence the strength and location of the slope current (Sarah Hughes (FRS), pers. comm. June 2007). As well as the physical impact of climate change on benthic communities, ecosystem effects should also be taken into account, but these are currently difficult to quantify. 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).

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