Offshore Special Area of Conservation:
Pisces Reef Complex

Draft Conservation Objectives and Advice on Operations

Version 2.0 (17th January 2011)

* Cover photo illustrates Annex I stony reef covered with a faunal turf of hydroids and cup sponges, recorded at Pisces Reef.

Document version control

Version and date	Amendments made	Issued to and date
Pisces Reef Draft Conservation Objectives & Advice on Operations Version 2.0 (17 January 2011)	Formally advised to Government to accompany draft SAC recommendation	Defra, Devolved Administrations
Pisces Reef Draft Conservation Objectives & Advice on Operations Version 1.0 (20.05.10)		Joint Committee (20.05.10)
Pisces Reef Draft Conservation Objectives & Advice on Operations Version 0.1 (19.04.10)		John Goold & UKMBPSG (19.05.10)

Further information

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Summary of Draft Advice on Operations for Pisces Reef Complex Special Area of Conservation (SAC)

This advice is based on information on the draft SAC presented in JNCC's 'Pisces Reef Complex: SAC Selection Assessment' (version 3.0 January 2011) and the boundary version 1.0 therein. 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 January 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 the Pisces Reef 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 Pisces Reef Complex 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 reef of the Pisces Reef Complex SAC 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.

Pisces reef is currently moderately vulnerable to the following pressures. Therefore 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 damage** by physical disturbance or abrasion (**mobile and static demersal fishing**);

ii. **Biological disturbance** by selective extraction of species (**mobile and static demersal fishing**).

Risk of Damage to Pisces Reef Complex SAC

Within the Pisces Reef Complex SAC, the following offshore activities may result in damage to the interest feature, and are not subject to prior authorisation or licensing. They are, therefore, currently considered to pose a medium-high 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.

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.

There is a lack of detailed information on levels of exposure to human activities and their ecological impact on the feature at this site. Further information will be required to assess and monitor favourable condition of Annex 1 reef at this offshore SAC.

Pisces Reef Complex 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 draft document for Pisces Reef Complex SAC is therefore prepared by JNCC in fulfilment of 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 'Pisces Reef Complex: SAC Selection Assessment' (version 3.0 January 2011) and the boundary version 1.0 therein. 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 January 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.

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

For offshore SACs, JNCC are 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 control 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 baselines 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 favourable[1] (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 Habitats 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:

- either alone or in-combination with other plans or projects would be likely to have a ***significant effect*** on a European Site; and
- 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 to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified'[2]

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

[1] 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 conceptshould also be applied at the site level.

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

adverse effect upon long-term site integrity even though the features remain in favourable condition in the short term.

1.6 Pisces Reef Complex SAC conservation objectives

The conservation objectives for the Pisces Reef Complex 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 Site Selection Assessment document which provides more detailed information about the site and evaluates its interest features according to the Habitats Directive selection criteria.

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 Pisces Reef Complex reef are:

Subject to natural change, restore[a] the reef in favourable condition, such that:

The natural environmental quality[b] is maintained

The natural environmental processes[c] are maintained

The extent[d], physical structure[e], diversity[f], community structure[g] and typical species[h] representative of the **reef** in the Irish Sea are restored

At the Pisces Reef Complex SAC, there is some direct evidence to date that demersal fishing on the soft sediment outside of the SAC boundary has led to damage of the benthic assemblages as evidenced by conspicuous trawl scars in the sediment (Judd 2004). There is no evidence that the trawling has impacted the reef feature or associated community. It is likely that mobile demersal fishers avoid the hard substrate to prevent them from damaging their fishing gear. However, given the limitations of the best data available we cannot confirm this. Due to potential damage caused by this activity, the Annex I feature may not be in favourable condition and could require restoration. Though, the conservation objective for the site may be revised at a later date if new information indicates this assessment is not correct.

The feature's vulnerability to human pressure is further documented in section 3.3. 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. 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.

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 and that activities may have to be managed to reduce or eliminate potential negative impact(s).Restoration in the marine environment generally refers to natural recovery to favourable condition through the reduction or removal of impacts.

JNCC consider that maintenance or restoration of the following parameters (b - h) will take

account of the maintenance or restoration of natural structures and functions and ecological processes.

b) **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

c) **Natural environmental processes** e.g. circulation, sediment deposition and erosion etc. should not deviate from baseline 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 Pisces Reef Complex 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 for 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):

1. An assessment of the **sensitivity** of the interest feature to the listed pressures (2.3);

2. An assessment of the current **exposure** of the interest feature to the pressures (2.4); and

3. 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 Pisces Reef Complex 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 Pisces Reef Complex SAC. They are drawn principally from MarLIN's (2004) evaluation of the sensitivity of the following biotope (which is comparable to that present within the SAC):

- **Brachiopods and Ascidians on low energy circalittoral rock (CR.LCR.BrAs)**

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 interest features and associated biological communities of the Pisces Reef Complex site are sensitive to: **physical loss**, **physical damage**, **toxic** and **non-toxic contamination**, and **biological disturbance**. Further detail on sensitivities of the reef is provided in Table 1.

The interest feature and associated biological communities of the Pisces Reef Complex are sensitive to:

Physical loss

Many of the species within the biotope are attached to the substratum or are slow moving so that substratum removal would result in loss of most faunal populations. With the loss of adult populations, recovery depends upon recolonisation by larvae during the breeding season. For species representative of the CR.LCR.BrAs biotope, recovery by recolonisation is likely to be slow.

Toxic and non-toxic contamination

The feature and associated communities are considered sensitive to various types of chemical disturbance, though there is currently no information available to quantify this disturbance

Physical damage

Erect epifaunal species are particularly vulnerable to physical disturbance. Hydroids and bryozoans are likely to be removed or damaged by bottom trawling or dredging (Holt *et al*., 1995). Veale *et al.* (2000) reported that the abundance, biomass and production of epifaunal assemblages decreased with increasing fishing effort. Hydroid and bryozoan matrices were reported to be greatly reduced in fished areas (Jennings & Kaiser, 1998 and references therein). The removal of rocks or boulders to which species are attached by the passage of mobile fishing gears (Jennings & Kaiser, 1998) may also result in substratum loss.

The majority of the characterizing species in this biotope are sessile, attached to the substratum and so are unable to move away and are likely to be physically removed or damaged by a passing trawl or dredge. Therefore, given the evidence above, an overall intolerance of high has been recorded. Recovery of the biotope is likely to be high as effects are local and partial.

Biological disturbance

The biological effects of fisheries include**:**

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

These effects 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 Pisces Reef Complex 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 was derived from work on a Defra marine biodiversity research programme (MB106)[3]. 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

[3] 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

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 Pisces Reef Complex 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 occurring on the site but may do 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 Pisces Reef Complex site are exposed to the following pressures:

- **Physical damage** through **changes in suspended sediment** (demersal fishing) at low levels and possibly through **physical disturbance and abrasion** (mobile and static demersal fishing) at low levels;
- **Toxic contamination** through the **introduction of radionuclides** at low levels;
- **Biological disturbance** through **selective extraction of species** (possible mobile demersal fishing at low levels.

Physical damage

The feature is also likely to be exposed to **changes in suspended sediment** at low levels due to mobile demersal fishing activity on or near the feature (mainly trawling for *Nephrops norvegicus*). VMS data is inconclusive as to the exact location of fishing effort in relation to the reef, although it is highly likely that trawlers would avoid trawling over the reef to prevent the loss or damage of gear.

The reefs are possibly exposed to **physical disturbance and abrasion** at low levels due to potting and mobile demersal fishing. In 2009, five pots were laid in the area to the north of the site (around area 1) but our data is currently insufficiently detailed enough to determine whether these were left on the feature or surrounding muddy sediment. Prior to this, between 2006 and 2008 no potting was recorded in the area of the feature. Bradshaw Veale Hill and Brand (2001) have shown that bottom trawling for Nephrops and scallops in the northern Irish Sea can transform the soft bottom benthic community through direct mortality and by homogenising the sedimentary habitat. However, the potentially destructive fishing practices they describe are incompatible with hard bottoms such as that represented by the reef feature and so are unlikely to pose a risk to the feature unless by accident.

Toxic contamination

It is possible that the feature is being exposed to the **introduction of radionuclides**. Levels of radioactive isotopes in the Irish Sea have increased as a result of authorised discharge from the British Nuclear Fuels plc (BNFL, 1991–1998) reprocessing plant at Sellafield (e.g. Smith *et al*., 2001). Artificial radionuclides - including caesium (^{137}Cs), plutonium ($^{239/240}$Pu), Technetium-99, and ^{241}Am - have all been recorded in marine organisms and sediments in the region around Pisces Reef as a result of discharge.

Observed and modelled data shows that levels of artificial radionuclides within the Irish Sea are lower to the northwest of the Isle of Man, around Pisces Reef, due to the distance from Sellafield, but that these levels are still higher than baseline (e.g. 1-2 Bq per kg ^{137}Cs and 0.1-0.9 m Bq per l for $^{239/240}$Pb) (Aldridge *et al.,* 2003). As such, we estimated the exposure to be moderate.

Biological disturbance

It is possible that the reef feature is exposed to a very low level of **selective extraction of species** through potting. VMS data has shown that in 2009 as few as 5 pots were placed in the area of the feature and between 2006 and 2008 there was no potting recorded in the area. The data is too coarse to be able to determine whether or not the pots were left on the feature or the surrounding muddy sediment. The potting targets species such as Nephrops and other crustaceans such as edible crabs and velvet swimming crabs as well as some whitefish.

Although the demersal fishing effort in the region is high (mostly Nephrops trawling) as mentioned previously, trawling over the rocky feature would almost certainly result in lost or damaged fishing gear and it is likely that mobile gear fishers would avoid the feature itself.

It has not been possible to determine whether the interest features are exposed to noise (acoustic), introduction of microbial pathogens or introduction of non-native species.

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 2.1) 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 **Pisces Reef Complex reefs** and associated biological communities are moderately vulnerable to:

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

Moderate vulnerability of the reef to both these pressures is based on low exposure to demersal fishing which may be occurring over the feature. We do not think that trawling occurs on or near the reef feature itself but the data we have available is not of sufficient resolution to confirm this. If exposure to pressures associated with demersal fishing is shown to be absent then the vulnerability would be reduced to low.

Vulnerability to noise, introduction of radionuclides, introduction of microbial pathogens and 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, for 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. Only high or medium-high risk activities are noted here.

Within the Pisces Reef Complex site, the following offshore activity is currently considered to pose a moderate 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.

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 Pisces Reef Complex reef to physical, chemical and biological pressures

Sensitivity key: ••• = High sensitivity •• = Moderate sensitivity • = Low sensitivity, ○ = No known sensitivity and **?** = Insufficient information to make assessment
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)		**Pisces Reef Complex: bedrock and boulder 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)	•	Low	**Low vulnerability**
	Physical disturbance or abrasion (e.g. mobile benthic fishing, anchoring, windfarm scour pits, pipeline burial, potting)	•••	Low	**Moderate vulnerability**
Non-physical disturbance	**Noise** (e.g. boat activity, seismic)	○	?	**Insufficient information**
	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)	**?**	Low	**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)	•••	Low	**Moderate vulnerability**

3 References

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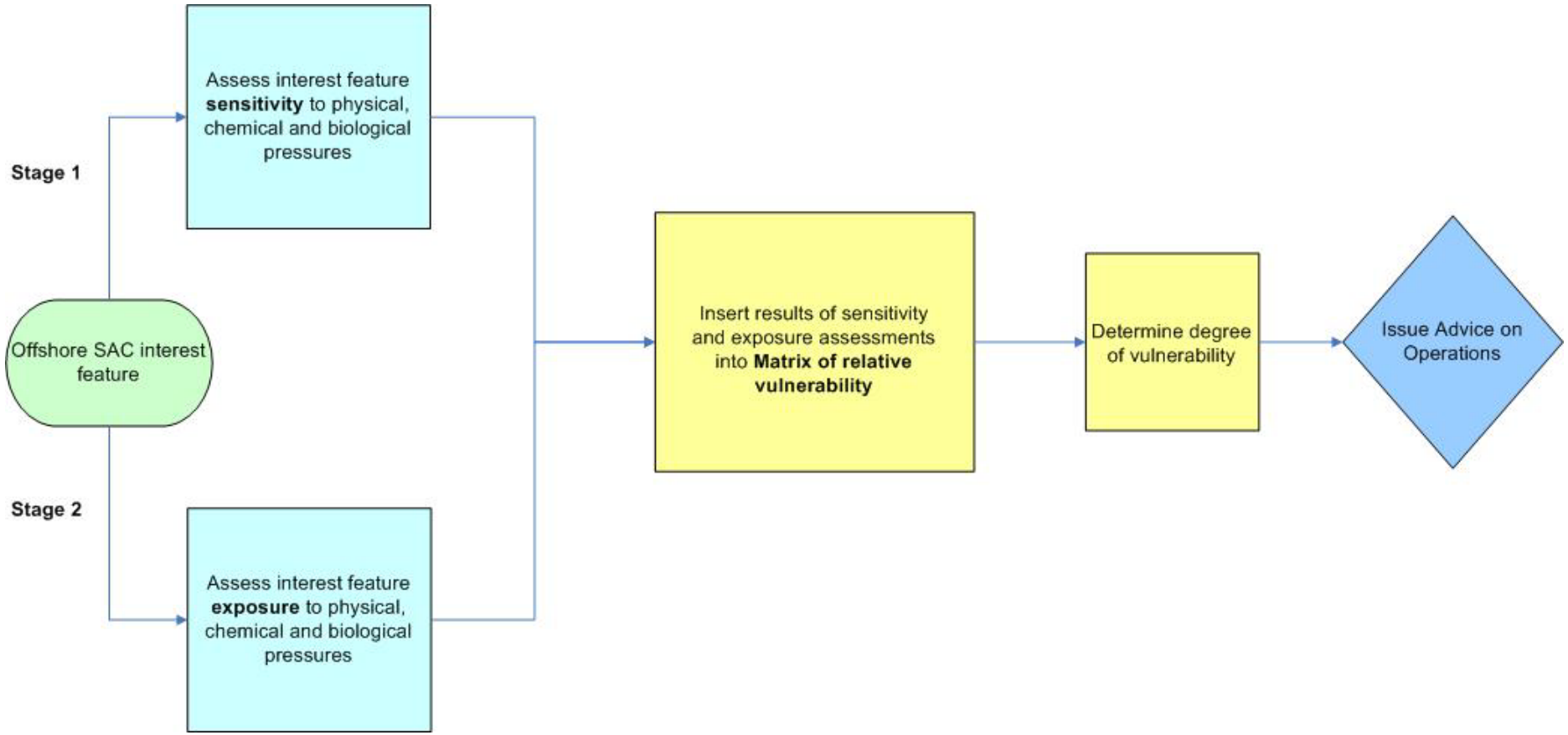
Appendix I: Flow diagram illustrating process of determining vulnerability of interest features



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 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 III: 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. 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 be composed of or 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: above criteria should not be used to describe non-natives 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).