

Offshore and inshore Special Area of Conservation Solán Bank Reef

Conservation Objectives and Advice on Operations



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Version 3.0 (March 2013)

* Cover photo illustrates *Alcyonium digitatum* and encrusting coralline algae on bedrock reef with dense *Ophiocomina nigra* and *Ophiothrix fragilis*.

Document version control

Version and date	Amendments made	Issued to and date
Solan Bank Reef Conservation and Advice on Operations v 3.0 (March 2013)	Updated background text and revised advice in line with recent information	Scottish Government, Defra and Competent Authorities. Made publicly available via the JNCC website
Solan Bank Reef Conservation Objectives and Advice on Operations v2.3 (February 2013)	Updated background text and revised advice in line with recent information	John Goad, Therese Cope (JNCC) and Sarah Cunningham (SNH)
Solan Bank Reef Draft Conservation Objectives and Advice on Operations v2.2 (January 2013)	Updated background text and revised advice in line with recent information	SNH and JNCC Marine Advice Teams
Solan Bank Reef Draft Conservation Objectives and Advice on Operations v2.0 (27/10/11)	Minor text amendment in light of comments received from MPA Sub-Group & JNCC Committee	Formally recommended to Scottish Government
Solan Bank Reef Draft Conservation Objectives and Advice on Operations v1.0 (14/09/11)	Amendments in light of comments received from SNH, JNCC Marine Advice Team, MPA TG, MPA SG & UKMBPSG	MPA Sub-Group (14/09/11) and JNCC Committee (30/09/11)

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Summary of Conservation Objectives and Advice on Operations for Solan Bank Reef Special Area of Conservation (SAC)

This advice is based on information on the SAC presented in SNH and JNCC's 'Solan Bank Reef: SAC Selection Assessment'¹ (version 5.0 November 2012) and the boundary version therein. SNH and 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 March 2013. 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 Solan Bank Reef is to maintain or restore the Annex I Reef at/to 'Favourable Condition'.

Management actions should enable reefs at Solan Bank 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.

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.

The Solan Bank Reef is moderately vulnerable to:

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

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 these pressures.

The following activity poses a moderate risk of damage to Solan Bank Reef habitat:

- **mobile demersal fishing**

As mobile demersal fishing is not subject to prior authorisation or licensing, this may result in damage to the reef feature within the Solan Bank Reef SAC. Risk to the feature of damage or deterioration associated with hooklining, creeling and the fishing activity of vessels <15m currently occurring over the feature is presently unknown.

Competent Authorities are advised to consider introducing management actions to reduce the risk of damage to the feature from this activity.

¹ Available from: <http://jncc.defra.gov.uk/default.aspx?page=4534#assessments>

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.

The feature is also sensitive to further pressures, outlined in Table 1, to which it is not thought to currently be exposed or exposed at levels which would result in moderate or high vulnerability. Therefore to fulfil the conservation objectives for this Annex I feature, the Competent Authorities for this area are advised to manage human activities within their remit such that they do not result in increased exposure to these pressures that may result in deterioration or disturbance of this feature.

Note:

The recent *Report of the Habitats and Wild Birds Directive Implementation Review* (HM Govt, 2012) and the European Commission guidance on Conservation Objectives concludes that all Conservation Objectives should be up-to-date, accessible, allow applicants to assess the impact of their proposed development against them, be clear and straightforward, operational in practice and specified in concrete terms and wherever possible be quantifiable in numbers and/or size. The Habitats and Wild Birds Directive Implementation Review only applies to English waters. However, SNH are currently considering what process maybe taken for updating Conservation Objectives in Scottish inshore waters in light of the EC guidance. Any updates to the Conservation Objectives for this site would need to be agreed by JNCC, SNH and Scottish Government.

Solan Bank Reef SAC: Conservation Objectives and Advice on Operations

1 Introduction

1.1 JNCC's and Scottish Natural Heritage's roles

The Solan Bank Reef SAC, as outlined in the SAC Selection Assessment document prepared by Scottish Natural Heritage (SNH) and JNCC, lies across both Scottish territorial and offshore waters.

The Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007 (as amended), hereafter referred to as the Offshore Regulations, transpose the Habitats Directive into law for UK offshore waters (from 12-200 nautical miles from the coast or the UK Continental Shelf). These Regulations give JNCC a statutory responsibility once a site has been submitted by Government to the European Commission to:

- i. establish conservation objectives for SACs and inform Competent Authorities of these; and
- ii. advise Competent Authorities of any operations which may adversely affect the integrity of the site.

This document for Solan Bank Reef SAC is therefore prepared by JNCC to fulfil requirements under Regulation 18 of the Offshore Regulations. 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).

The Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) transpose the Habitats Directive into law on land and in territorial waters of Scotland (out to 12 nautical miles from the coast). The Habitats Regulations give SNH a statutory responsibility to advise relevant authorities on the conservation objectives and operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species for which the sites have been designated, for European marine sites in Scotland.

This advice is based on information on the SAC presented in SNH and JNCC's "Solan Bank Reef: SAC Selection Assessment" (version 5.0 November 2012). JNCC's Conservation Objectives and Advice on Operations is a broad-scale assessment applied across the whole site. The assessment has been developed using best available scientific information and expert interpretation as at March 2013. This advice will be updated periodically in the light of surveillance required under Article 17 of the Habitats Directive.

The advice is generated through a broad grading scheme of sensitivity and exposure of the site interest features to physical, chemical and biological pressures associated with human activity. Sensitivity and exposure scores have been combined to give a measure of the vulnerability of an interest feature to pressures associated with operations currently consented or permitted and occurring in or near the SAC, or which may cause damage or deterioration to the feature of the site, and which therefore may require management action. A broad-scale assessment is also made of the risk of damage to the features of the site from activities which do not have a prior environmental assessment or licensing regime and which may result in pressures to which the feature is highly or moderately vulnerable.

JNCC and SNH's Advice on Operations outlines current knowledge of the nature and extent of activities taking place within or close to the site, which may significantly impact on the feature(s) for which a site has been selected. This advice will help focus the attention of the Competent Authorities on those activities that pose the greatest potential threat to the condition of the site and the development of appropriate management measures.

It is important to note that this advice is only a starting point for assessing impacts. Use of this advice does not remove the need for formal consultation on individual plans and projects. JNCC and SNH 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.

This operations advice is likely to need to be supplemented by further, more-detailed discussions with Competent and Relevant Authorities.

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, result in damage or deterioration to the features of the site and therefore prevent the feature(s) of the site from achieving/maintaining 'Favourable Condition'.

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 the 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).

1.2 Offshore (12 – 200 nautical miles): The role of Competent Authorities

Regulations 22, 23, 25 and 27 of the Offshore Regulations outline the responsibilities of Competent Authorities to ensure compliance with the Habitats Directive in regard to European Offshore Marine Sites. The main requirements are summarised below. These Conservation Objectives and Advice on Operations are provided to assist Competent Authorities in the execution of these responsibilities.

Regulation 22 of the Offshore Regulations requires Competent Authorities to consider appropriate conservation measures for Annex I habitats and Annex II species present within the SAC. Regulation 23 requires Competent Authorities to take appropriate steps to avoid the deterioration or disturbance of interest features for which the Offshore SAC is designated. 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 features.

Regulation 25 requires Competent Authorities to consider if a plan or project could be likely

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 have a significant effect on a European Offshore Marine Site and, if necessary, undertake an appropriate assessment for the plan or project 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.

Through an Appropriate Assessment, Competent Authorities are required to ascertain the impact on the integrity of the site in view of the site's conservation objectives (Article 6.3 of the Habitats Directive). 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'³.

Although closely linked, the judgement of impact 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 natural recovery of the site's features. For example, adverse effects upon integrity may not become apparent until some time after a plan or project has been initiated. 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.

Regulation 27 of the Offshore Regulations requires Competent Authorities to review existing consents, permissions or authorisations and if necessary, affirm, modify or revoke them, undertaking an appropriate assessment where necessary.

The scope and content of any appropriate assessment will depend on the size, location and significance of the proposed project and is informed by the conservation objectives and advice on operations provided herein. In addition to the advice provided in this document, JNCC will also advise on a case-by-case basis.

JNCC and SNH are aware that certain existing activities/ structures on a site may not be licensed as they were put in place prior to the implementation of the Regulations, (for example submarine cables). JNCC recommends that the advice given in this document should be used by Competent Authorities as widely as possible to ensure the Favourable Condition of sites and that those unlicensed activities are made aware of the vulnerability of the features for which the site is designated when carrying out their operations.

1.3 Inshore (0 – 12 nautical miles): The role of Competent and Relevant Authorities

Regulation 3 (3) of the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) require competent authorities to exercise their functions so as to secure compliance with the Habitats Directive. Regulation 48 (1) requires competent authorities to make an appropriate assessment of the implications for the site in view of that site's conservation objectives before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which is likely to have a significant effect on a European site in Great Britain or a European offshore marine site (either alone or in

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

combination with other plans or projects); and is not directly connected with or necessary to the management of the site.

A single management scheme may be drawn up by relevant authorities under Regulation 34 for the European marine site, which would provide a framework through which compliance with the Habitats Directive could be achieved and should be based on the advice in this document. Relevant authorities must, within their areas of 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.

1.4 Solan Bank Reef SAC conservation objectives

The conservation objectives for the Solan Bank Reef SAC interest features are provided below. These are high level objectives for the site features, and JNCC and SNH may refine them in future as our understanding of the features improves. They should be read in the context of 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 in section 1.5.

The Conservation Objectives for the Annex I Reef at Solan Bank Reef are:

Subject to natural change, maintain or restore the reef in/to favourable condition, such that:

- the natural environmental quality^b and processes^c supporting the habitat
- the extent^d of the habitat on site
- the physical structure^e, community structure^f, function, diversity^g and distribution of the habitat and typical species^h representative of the reef in the *Northern North Sea* regional sea

are maintained or restored, thereby ensuring the integrity of the site and also making an appropriate contribution to favourable conservation status of the Annex 1 habitats.

The Conservation Objectives for Solan Bank Reef SAC set out to maintain or restore⁴ the

⁴Solan Bank Reef SAC lies across both Scottish territorial waters and Scottish offshore waters, falling within the remit of SNH and JNCC respectively. JNCC and SNH differ slightly in respective approaches to setting objectives. SNH may set a recover objective in instances where they have direct evidence that the feature is in unfavourable condition, whereas JNCC may take a more precautionary approach; where if according to best available evidence we are aware that potentially damaging activities are occurring (exposing the feature to pressures to which it is moderately or highly sensitive) over the feature, we set a precautionary restore objective. This is based on the thinking that the feature may be damaged or deteriorated as a result of exposure to these activities and their associated pressures and we therefore cannot be certain that the feature is in favourable condition and it would not be precautionary to assume that it is, in the absence of direct evidence. A way forward was agreed jointly by SNH and JNCC, in which the objective would be set to 'maintain or restore' as opposed to 'restore' as initially recommended by JNCC).

reef to favourable condition. There is currently no direct evidence to date that the feature has been damaged by human activities, however best available evidence indicates that demersal fishing occurs over the reef feature, exposing it to pressures to which it is sensitive and subsequently it is assessed as moderately vulnerable.

Although it is likely that bottom trawlers avoid the hard substrate to prevent damage to their gear, the best available evidence is not of sufficient spatial resolution to confirm this and so the objective has been set to maintain or restore.

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. 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. In particular, the following activities require further investigation in order to be able to assess their impacts on the feature; mobile demersal fishing, hooklining, and creeling as well as the fishing activity of the <15m fleet within the site.

1.5 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 or, in the absence of evidence, that activities generating pressures to which the feature is sensitive overlap with the feature and that activities may have to be managed 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 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) Community structure** e.g. age classes, sex ratios, distribution of species, abundance, biomass, reproductive capacity, recruitment, range and mobility.
- g) Diversity** - the number of different biological communities or number of species within a given community.
- h) Typical species** – see Appendix IV for criteria for identifying typical species.

1.6 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 Solan Bank Reef site. The advice is linked to the Conservation Objectives outlined in the section above, and will help provide the basis for detailed discussions within the management group to formulate and agree a management scheme for the site, where one is felt to be necessary.

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 SNH and 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 (2.3);
- An assessment of the current **exposure** of the interest feature to the pressures (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 (section 2.5).

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 step by step, 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 Solan Bank Reef 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 Solan Bank Reef SAC. They are drawn principally from MarLIN's evaluation (Jackson and Hiscock 2008) of the sensitivity of the following biotope from the Marine Habitat Classification for Britain and Ireland (Connor *et al* 2004), present within the SAC:

- **Erect sponges, *Eunicella verrucosa* and *Pentapora fascialis* on slightly tide-swept moderately exposed circalittoral rock (CR.HCR.XFa.ByErSp.Eun)⁵**

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 low. JNCC have in some cases, therefore, adjusted the assessments of sensitivity scores to pressures to take account of site-specific, prevailing conditions. This is a justifiable approach but does involve an element of expert judgement. JNCC's assessments of sensitivity to pressures are explained in detail below.

Several biotopes were found to be present within the site, the most sensitive of which (CR.HCR.FaT.CTub.Adig) has not been assessed for sensitivity by MarLIN. The biotope chosen is the closest biotope comparable to that present within the SAC, and is comparable in terms of functionality.

⁵ This correlates to the 2007-11 EUNIS code: A4.131 Mixed faunal turf communities on circalittoral rock
http://jncc.defra.gov.uk/pdf/EUNIS_Correlation_2007-11_20101206v2.pdf

The interest features and associated biological communities of the Solan Bank Reef site are sensitive to:

- **Physical loss** through removal (high level), obstruction (high level) and smothering (moderate level)
- **Physical damage** through changes in suspended sediment (low level) and physical disturbance or abrasion (high level)
- **Toxic contamination** through the introduction of synthetic and non-synthetic compounds (moderate level)
- **Non-toxic contamination** through changes in salinity (high level) and changes in thermal regime (low).
- **Biological disturbance** through the selective extraction of species (high level)

2.3.1 Sensitivity to Physical loss

Removal of the feature would result in loss of its ecological communities and substratum which supports these communities. Removing hard substratum in a predominately soft sediment wider environment can have significant effects on marine communities. Many species benefit from reef structures as they increase habitat complexity, create refugia and provide a surface for attachment (Bruno and Bertness, 2001). As a loss of any reef structure would likely lead to a cascading loss of biodiversity, sensitivity is assessed as high.

Any construction over the feature would lead to its (partial) removal, and permanent infrastructure may prevent its natural recovery through obstruction, sensitivity is therefore assessed as high.

The feature's ecological communities are also moderately sensitive to smothering, particularly typical species that are encrusting or low-lying.

2.3.2 Sensitivity to Physical damage

Physical abrasion (for example, by mobile fishing gear) can damage the interest feature and its typical species. Physical abrasion is likely to reduce the structural complexity of the feature (for example, by damaging erect epifaunal species such as *Alcyonium digitatum*, Axinellid sponges, massive sponges and cold water coral) 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 are permanently attached to the substratum and will not re-attach once displaced. Sensitivity to physical disturbance and abrasion is therefore assessed as high.

Increases in suspended sediment may cause interference for some suspension feeders on the reef which is not thought to result in mortality, merely a loss of fitness. Therefore sensitivity is assessed as low.

2.3.3 Sensitivity to toxic contamination

Assessing the effects of toxic contamination on biotopes is extremely difficult. No benchmark is provided by MarLIN as varying quantities of different contaminants can have very different effects (including antagonistic and synergistic effects) on marine organisms. MarLIN therefore has a low level of confidence in its biotope sensitivity assessments for this pressure category. JNCC has decided to adopt a precautionary approach to this pressure category and all biotopes will be considered moderately sensitive to the **introduction of synthetic and non-synthetic compounds** (even where MarLIN has given a score of 'unknown'). In this way, we incorporate the effects of high levels of contamination (acute or chronic) and/or unexpected synergistic effects i.e. the 'worst case scenario'.

It has not been possible to determine the sensitivity of *Lophelia* to the introduction of radionuclides, due to insufficient information.

2.3.4. Sensitivity to non toxic contamination

The feature and associated communities are assessed to have low sensitivity to changes in thermal regime and highly sensitive to changes in salinity.

2.3.5 Sensitivity to biological disturbance

The biological effects of fisheries can include the removal of target species and the mortality of non-target species.

Deepwater fish associated with the reefs are targeted by fisheries. 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. Due to the slow life histories of these deepwater fish, they are especially vulnerable and slow to recover (Pauly *et al* 2002; Sewell and Hiscock 2005). Therefore, sensitivity to the selective extraction of species is considered to be high.

There is insufficient evidence available to determine whether the interest feature and its associated biological communities are sensitive to biological disturbance through the introduction of microbial pathogens or non-native species.

It is important to notice that the scientific information on the sensitivity of one species or an interest feature will most probably evolve over time. Hence, an operation which is not currently deemed to have a negative effect may do so in the future.

2.4 Exposure assessment

Table 1 (column 4) shows the relative exposure of the Solan Bank Reef 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.

Offshore sites cover a relatively large geographical area and precise information on operations within SAC boundaries is not yet available. Hence, 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 Department of Energy and Climate Change (DECC) for aggregate extraction, windfarm development and for oil and gas industry activities and the United Kingdom Cable Protection Committee for submarine cable distribution.

Assessment of fishing exposure was derived from work on a Defra marine biodiversity research programme (MB106)⁶. 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.

Interest feature exposure and vulnerability to pressures associated with static/set demersal gears effort provided via VMS is not assessed because the data is provided in a format which while providing a spatial indication of effort cannot provide useful information regarding levels of effort e.g. soak time or number of pots. Additional research to assess the distribution of static/set demersal gear use and the intensity of its physical and biological impacts is needed

It should be noted that many vessels undertaking mobile demersal gear (e.g. trawling) may be less than 15m in length and this data is not recorded in this dataset.

From landings data, (for UK- and non-UK vessels landing to UK ports), provided by the Marine Management Organisation (MMO) information is also available on which target species are removed from the ICES rectangle within which the site is based using particular gear types and the size of the vessel used. In some instances this may prove useful in indicating whether or not the feature is exposed to biological disturbance through extraction of species. However, this information obviously cannot take account of non-target species which may be caught.

The exposure assessment is based on best available information on the levels of pressures associated with activities at the Solan Bank Reef 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 1.4 whenever a new activity is proposed⁷.**

⁶ 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

⁷ For a list of activities that may contribute to the listed pressures, but that are not comprehensive, see Annex II

Based on best available information the interest features and associated biological communities of the Solan Bank Reef site are assessed as exposed to:

- **Physical loss** through **obstruction** (low level);
- **Physical damage** through **physical disturbance and abrasion** (low level);
- **Biological disturbance** through **selective extraction of species** (low level).

2.4.1 Exposure to physical loss

The reef is exposed to very low levels of **obstruction** from historic wrecks. There is a wreck identified of an unknown craft within the site boundary.

2.4.2 Exposure to physical damage

The reef is exposed to **physical disturbance and abrasion** at low levels due to otter trawling and creeling. VMS data indicates that the region is fished at very low levels by UK demersal otter trawls (individual fishing effort grids of up to 50 hrs cumulatively over 2006-09) with the effort distributed unevenly throughout the site. VMS data indicates that creeling from > 15 m vessels occurs over the entirety of the site. This is likely to be targeting the edible crab, *Cancer pagarus*, Velvet Swimming crab, *Necora puber* and lobster, *Homarus gammarus*, however, it is possible to undertake only a very coarse assessment of exposure to abrasion or physical damage from creeling, based on the area of the site exposed as indicated by VMS gridded data. VMS indicates creeling is focussed on the eastern half of the site. It must be noted, however, that low confidence accompanies this portion of the assessment.

Any otter trawling over fishable portions of the feature is likely to represent a mixed demersal fishery. VMS data indicates that the trawling extends over the reef feature and is also conducted over a wider area around the site and appears to be focused in deeper waters surrounding the reef. VMS data is inconclusive as to the exact location of fishing effort in relation to the reef, although it is likely that trawlers would avoid trawling over the reef to prevent loss or damage of gear. The total exposure score for abrasion is assessed as moderate.

The feature is also unlikely to be exposed to **changes in suspended sediment** due to mobile demersal fishing activity on or near the feature. A veneer of sand is present over the flat bedrock surfaces, indicating that sediment scour is a significant factor across the site (Whomersley *et al* 2010, it is therefore likely that the feature and its communities are naturally exposed to elevated levels of suspended sediment. It is not expected that changes in suspended sediment associated with demersal trawling would exceed ambient levels.

VMS data may not be a comprehensive indicator of all fishing activity for areas in close proximity to the coast, where vessels <15m can easily access the site and subsequently this effort is not captured in VMS data. The contribution of <15m vessels to this pressure therefore cannot currently be assessed.

2.4.3 Exposure to biological disturbance

VMS data indicates that the reef feature may be exposed to a low level of **selective extraction of species** through demersal trawling (see information on effort provided under Solan Bank Reef Draft Conservation Objectives and Advice on Operations 3.0

physical damage).

The contribution of the fishing effort of <15m vessels to this pressure cannot currently be assessed, as is the case with creeling which is widespread over the feature, likely targeting crabs and lobster. It has therefore been recorded as unquantifiable.

2.5 Vulnerability assessment for current activities

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 Solan Bank Reef reefs and associated biological communities are moderately vulnerable to:

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

Moderate vulnerability of the reef to physical disturbance or abrasion and selective extraction of species is based on low exposure to demersal fishing which may be occurring over the feature. Trawling might not occur on the reef feature itself but this cannot be confirmed by VMS data due to its poor spatial resolution.

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 (from one wreck). The feature's overall structure and function is not considered to be affected by this obstruction and so the overall vulnerability has been reduced from moderate to low.

Vulnerability to pressures associated with hooklining, creeling and the fishing activity of vessels <15m occurring on the site cannot be quantified given the data available. Vulnerability to introduction of non-native species is also unknown.

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 and the limitations of application to site level.

2.6 Risk of damage or disturbance

An assessment is made of the risk of damage to the features of the site from activities which may result in pressures to which the feature is highly or moderately vulnerable. This assessment is made against the current management of that activity. Highlighting activities which currently pose moderate or high risks of damage to the feature can assist Competent Authorities in their development of effective management measures, to enable the sandbank feature to achieve favourable condition.

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 or activities 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 by management measures. 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 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. In such cases, compensation can be provided for the loss of habitat (e.g. creating compensatory habitat elsewhere).

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 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, see Table 2 for the risk assessment.

Within the Solan Bank Reef site, demersal fishing is currently considered to pose a moderate risk to the interest features.

The feature's risk to pressures associated with hooklining, creeling and the fishing activity of vessels <15m is unknown because although vulnerability has been identified it cannot be quantified as exposure cannot be assessed given the available information.

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.

Table 1: Sensitivity, exposure and vulnerability of the Solan Bank Reef 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)		Solan Bank Reef: rocky and stony 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
	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)	***	Low	Moderate
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	Introduction of microbial pathogens (e.g. outfalls)	?	None	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

Table 2: Risk of damage to Solan Bank 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)		Solan Bank: rocky 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 (otter trawling & creeling)	No site-specific management of this activity currently in place.	High	Competent Authority to assess and consider need for demersal fisheries management measure(s)
Biological disturbance	Selective extraction of species	Unquantified vulnerability	demersal fishing (otter trawling & creeling)	No site-specific management of this activity in place.	High	Competent Authority to manage within remit

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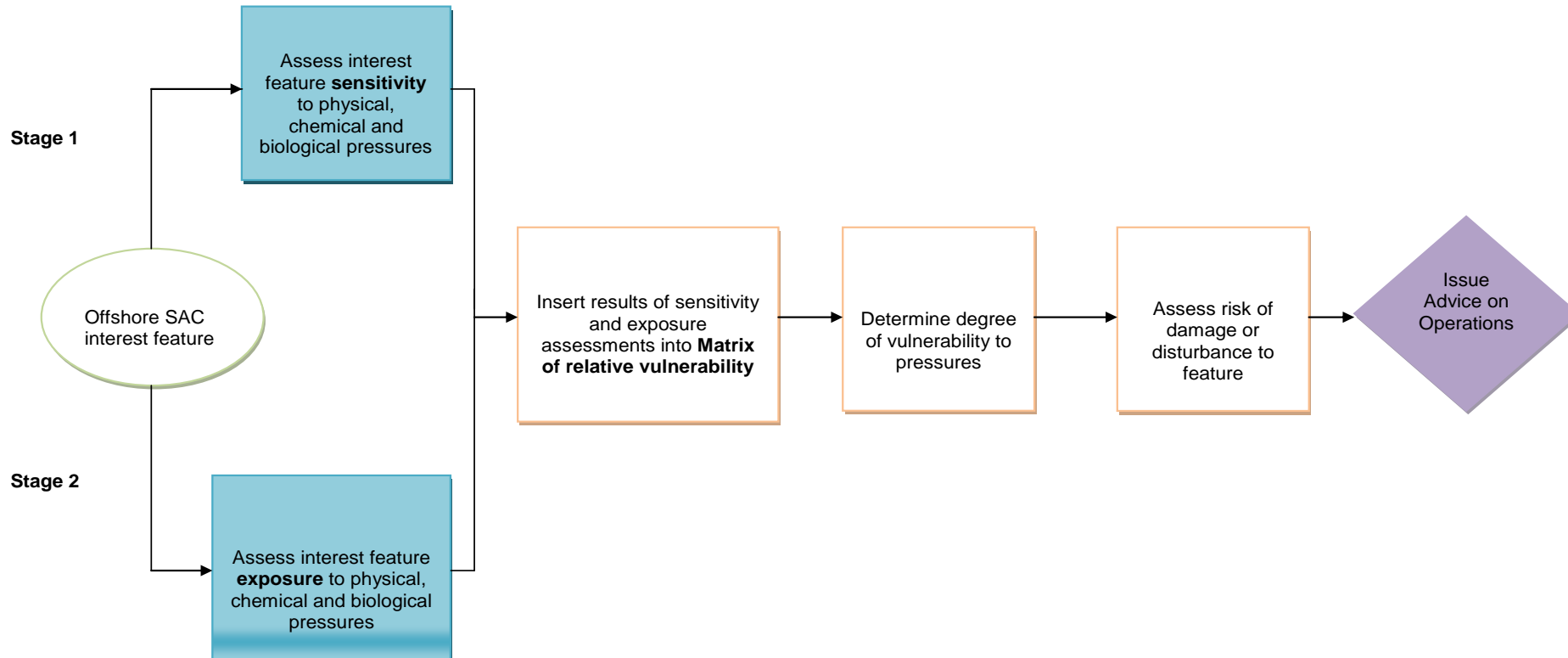
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Appendix I: Flow diagram illustrating process of determining vulnerability of interest features



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

This list is 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 from EC Guidance

The following criteria are quoted from the EC Reporting Guidance for Favourable Conservation Status (EC, 2006):

- “Typical species” should be good indicators for favourable habitat quality, e.g. by indicating presence of a wider group of species with specific habitat requirements. They should be sensitive to changes in the condition of the habitat (“early warning indicator species”).
- It should be possible to detect “typical species” by non-destructive and inexpensive means.
- The list of “typical species” chosen for the purpose of assessing conservation status should ideally remain stable over the middle-to long-term.
- The degree of flexibility in choosing species is somewhat restrained by the need for consistency across nations and consistency with the use of characteristic species of the Interpretation Manual in the site-selection process.

Characteristic species of the Interpretation Manual may be used as typical species if they meet the criteria in the above bullets (EC, 2006).

Suggested criteria were given by Shaw and Wind (1997) and quoted in the FCS Guidance (EC, 2006):

1. A species on which identification of the habitat is founded
2. A species which is inseparable from the habitat
3. Consistently present but not restricted
4. Characteristic of the habitat
5. An integral part of the structure of the habitat
6. A keystone