| | |
|---|---|
| **Title:**<br>Solan Bank Reef Special Area of Conservation<br>**IA No:**<br>**Lead department or agency:**<br>Marine Scotland<br>**Other departments or agencies:**<br>Joint Nature Conservation Committee (JNCC)<br>Scottish Natural Heritage | **Impact Assessment (IA)**<br>**Date:** 12/09/2012<br>**Stage:** Development/Options<br>**Source of intervention:** EU<br>**Type of measure:** Secondary legislation<br>**Contact for enquiries**:<br>Katherine Ross<br>Frin.Ross@jncc.gov.uk<br>01224 266588 |

## Summary: Intervention and Options

**RPC Opinion:** RPC Opinion Status

| Cost of Preferred (or more likely) Option | | | | |
|---|---|---|---|---|
| **Total Net Present Value** | **Business Net Present Value** | **Net cost to business per year** (EANCB on 2009 prices) | **In scope of One-In, One-Out?** | **Measure qualifies as** |
| £m | £m | £m | No | NA |

**What is the problem under consideration? Why is government intervention necessary?**

Anthropogenic pressures are causing the decline of many marine habitats and species. Intervention is needed in to manage activities in key areas for important species and habitats, and to promote a healthy, resilient marine environment that underpins the sustainable delivery of ecosystem services. JNCC have assessed this site against the Habitats Directive Annex III selection criteria and advised the Scottish Government that it is eligible for identification as a 'Site of Community Importance' and should therefore be transmitted to the European Commission as required under Reg 7 of the Offshore Marine Conservation Regulations 2007 (amended).

**What are the policy objectives and the intended effects?**

The EC Directive 92/43/EEC on the conservation of natural habitats and wild flora and fauna (the Habitats Directive, 1992; and the Habitat Regulations, 1994) aims to protect biodiversity. This Directive requires the UK to propose sites hosting habitat types and species in need of conservation (as listed in the Directive), which are eligible for identification as Sites of Community Importance and designation as Special Areas of Conservation (SACs). The UK is required to establish conservation measures for sites designated as SACs by managing potentially damaging activities where the habitats and species are present and in their vicinity. 'Reefs' (Habitat 1170 in Annex I) are the qualifying feature of Solan Bank Reef.

**What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)**

Baseline: Do nothing, that is do not designate the site.

Option 1: Propose the site to the EC for designation. This is the preferred option as it will contribute towards conserving habitat of European importance along with its typical species located in UK waters. The option to search for an alternative site has not been considered further here because alternative sites of a similar type are not currently known to exist (possible alternatives were considered in the scoping stage but not recommended on scientific grounds). Though the site could be conserved under voluntary agreements or a national designation this would not contribute to fulfilling the requirements of the Habitats Directive.

As the measure follows an EU directive, it is exempt from OIOO and moratorium on small businesses.

**Will the policy be reviewed?** It will be reviewed. **If applicable, set review date:** 01/2019

| | | | | | |
|---|---|---|---|---|---|
| Does implementation go beyond minimum EU requirements? | | | No | | |
| Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base. | **Micro**<br>No | **< 20**<br>Yes | **Small**<br>No | **Medium**<br>No | **Large**<br>No |
| What is the $CO_2$ equivalent change in greenhouse gas emissions? (Million tonnes $CO_2$ equivalent) | | | **Traded:**<br>na | **Non-traded:**<br>na | |

***I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.***

Signed by the responsible Chair: ---------- Date: ----------

# Summary: Analysis & Evidence

Policy Option 1

**Description:**

**FULL ECONOMIC ASSESSMENT**

| Price Base Year 2011 | PV Base Year 2011 | Time Period Years 10 | Net Benefit (Present Value (PV)) (£m) | | |
|---|---|---|---|---|---|
| | | | **Low:** na | **High:** na | **Best Estimate:** |

| COSTS (£m) | Total Transition (Constant Price) | Years | Average Annual (excl. Transition) (Constant Price) | Total Cost (Present Value) |
|---|---|---|---|---|
| **Low** | 0.699 | | 0.012 | **0.691** |
| **High** | 0.699 | | 0.070 | **1.075** |
| **Best Estimate** | 0.699 | | na | **na** |

**Description and scale of key monetised costs by 'main affected groups'**

Low: Administration, enforcement and monitoring (£669k and £12k .pa)
High: Administration, enforcement and monitoring (£669k and £12k .pa);
Lost profitability for fisheries (£58k. pa)

**Other key non-monetised costs by 'main affected groups'**

High: some fishermen exit sector, knock-on effect to local economy of costs to fishermen.

| BENEFITS (£m) | Total Transition (Constant Price) | Years | Average Annual (excl. Transition) (Constant Price) | Total Benefit (Present Value) |
|---|---|---|---|---|
| **Low** | Optional | | Optional | **Optional** |
| **High** | Optional | | Optional | **Optional** |
| **Best Estimate** | Unquantified | | Unquantified | **Unquantified** |

**Description and scale of key monetised benefits by 'main affected groups'**

It has not been possible to monetise the benefits because the benefits are not traded and cannont be easily quantified.

**Other key non-monetised benefits by 'main affected groups'**

Restoration of reef habitats and associated biological communities.
Low to moderate beneficial impacts on: fish stocks; non-use values of natural environment; and for scientific research.
Benefits for the sustainable delivery of esystem services beyond the next 10 yrs.
Important wider network and strategic benefits on biodiversity through the Natura suite of marine SACs.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

Management measures for site are not known before designation so a realistic range of measures is used for analysis. If site is not designated condition of the habitats could deteriorate. Formal mechanisms to avoid damage to the habitats are weaker if site is not designated. Risk of infraction if suite of proposed SACs not designated. Benefits could be jeopardised if appropriate fisheries management not agreed through the CFP or properly enforced. Risk of cumulative economic impacts of MPAs

**BUSINESS ASSESSMENT (Option 1)**

| Direct impact on business (Equivalent Annual) £m: | | | In scope of OIOO? | Measure qualifies as |
|---|---|---|---|---|
| **Costs:** 0-0.041 | **Benefits:** na | **Net:** | No | NA |

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# ANNEXES

# 1 INTRODUCTION

## 1.1 Purpose

Within Europe natural habitats are continuing to deteriorate and an increasing number of wild species are seriously threatened by human activities. The main aim of the European Habitats Directive[1] is to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species to a 'Favourable Conservation Status', introducing robust protection for those habitats and species of European importance.

This Impact Assessment (IA) addresses the recommendation by the Joint Nature Conservation Committee (JNCC) and Scottish Natural Heritage for designation of a Special Area of Conservation (SAC), in offshore and inshore waters, at Solan Bank Reef for its Reef habitat (Habitat H1170 in Annex I of the Habitats Directive).

Many of our marine habitats have been altered or damaged by human activities such as fishing, dredge disposal and oil and gas extraction (Eastwood 2007). Currently only 6% of the UK's marine environment is protected for conservation[2] and many offshore habitats are not protected. Additional management is needed to maintain and restore the healthy structure and function of such ecosystems, while permitting environmentally sustainable industries.

This IA informs the Scottish Government of the impacts that designating the site could have on the UK economy and the site's potential environmental and social effects. It should not inform the decision to designate the site (that decision is based on the site's Selection Assessment Document) because under the Habitats Directive economic or social impacts should not influence selection of SACs or delineation of their boundaries. However, information provided on the type and level of activities taking place in and near the site may inform management measures for the site.

## 1.2 Policy drivers

### a) Habitats Directive

Member States of the Council of Europe are committed to the Convention on the Conservation of European Wildlife and Natural Habitats[3]. The Wild Birds Directive[4] and Habitats Directive provide the framework within which the provisions of the Bern Convention are applied in the European Union. The Habitats Directive aims to conserve natural habitats and species that are considered to be most in need of conservation at a European level (which are listed in Annex I and Annex II of the Directive respectively). Habitats have been included in Annex I because they are either in danger of disappearing within their natural range, have a small natural range, or they present outstanding examples of typical characteristics of the biogeographical regions listed in the Directive. The Habitats Directive not only aims to conserve the habitats but also their typical species. The UK (as a Member State) is required to take measures to maintain or restore Favourable Conservation Status[5] of these natural habitats and to introduce robust protection for their future existence.

Under the Habitats Directive, habitats and species are to be protected by a coherent European ecological network of sites (called Natura 2000) identified by the European Commission from lists of national sites proposed by each Member State. The network of sites will enable habitat types to be

[1] Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna.
[2] JNCC marine protected area information http://jncc.defra.gov.uk/page-5201 [Accessed 06/01/2012].
[3] The Bern Convention , Bern, 1979,
[4] Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds
[5] Favourable conservation status is defined for a feature as the 'natural range and area it covers is increasing, and the specific structure and functions which are necessary for its long term maintenance exist and are likely to exist for the foreseeable future, and the conservation status of its typical species is favourable'.

maintained at, or restored to, favourable conservation status within their natural range. Once adopted in the Natura 2000 network the sites are designated by Member States as SACs.

The Conservation of Habitats and Species (Natural Habitats, & c.) Regulations 1994 (as amended in Scotland), and The Offshore Marine Conservation (Natural Habitats, & c.) Regulations 2007 (as amended in 2010) transpose the Habitats Directive (92/43/EEC) and Wild Birds Directive (2009/147/EC) into national law (hereafter these regulations have been referred to jointly as "the habitats regulations"). Together these regulations apply to inshore waters and the UK's offshore marine area which covers waters beyond 12 nautical miles, – within British Fishery Limits – and the seabed and subsoil of the UK Continental Shelf Designated Area. The Offshore Habitats Regulations enable the UK to comply with European law beyond inshore waters and ensure that activities regulated by the UK that have an effect on important species and habitats in the offshore marine environment can be managed. Under the Regulations, 'Competent Authorities' that have functions relevant to marine conservation in the offshore marine area, have a general duty to secure compliance with the EC Habitats and Wild Birds Directives.

The Habitats Directive provides site selection criteria within Annex III. These criteria evaluate:

- The degree of representativeness of the natural habitat at the site in question;
- The area of the site in relation to the area of that habitat type within the national territory;
- The degree of conservation of the structure and functions of the habitat type (including restoration possibilities); and
- A global assessment of the conservation value of the site for that habitat type.

JNCC is responsible for providing scientific advice to the UK Government and Devolved Administrations on nature conservation matters, including on the selection of SAC sites in the UK offshore marine area under the Offshore Habitats Regulations. In offshore waters off Scotland that advice is provided to Scottish Ministers. SNH provides this advice for marine SACs within 12nm of the coast.

The European Commission will assess whether the list of proposed SACs submitted to it by UK Government to them is sufficient or not. JNCC has worked to provide the best estimate of whether the UK's sites submitted so far will be sufficient in terms of both representing the habitat across its natural range, and also in proportion to the amount of that habitat type within UK waters[6].

There are currently 102 SACs with marine components, covering 5% of the UK sea area.
JNCC concluded that if at least one example of each Annex I habitat sub-type in offshore waters in each of the UK's Regional Seas[7] were included in the SAC network that would ensure minimum representation of each Annex I habitat within its natural range in the UK (JNCC 2003). The UK Government aims to substantially complete the network of marine SACs in 2012 through submission of 12 sites, including six Scottish sites (three in offshore waters, one inshore site, and two that span inshore and offshore waters).

## b) UK identification of Annex I reef sites

Between 2008 and 2012 fifteen sites in UK offshore waters were proposed to the European Commission and the submissions are now recognised as Sites of Community Importance (SCIs) or candidate SACs: seven of the sites are in waters off Scotland. A further five possible SACs (Anton Dohrn Seamount, East Rockall Bank, Hatton Bank, Pobie Bank Reef and Solan Bank Reef) have been recommended to Scottish Government[8].

Other offshore, or joint offshore-inshore, SACs with reef (H1170) as a qualifying feature are:

[6] JNCC 08 P14a December 2008 Progress towards completing the UK network of marine special areas of conservation (SACs) for Annex I habitats and site proposals for Hatton Bank and Bassurelle Bank
[7] Regional Seas: http://www.jncc.defra.gov.uk/page-161.
[8] These sites are were subject to public consultation between March and May 2012.

- Haig Fras, Stanton Banks and Darwin Mounds, which have been approved by the European Commission as Sites of Community Importance (SCIs); North-West Rockall Bank and Wyville Thomson Ridge candidate SACs (cSACs) proposals which were submitted to the EC in August 2010;
- Pisces Reef Complex and Wight Barfleur Reef cSACs, which were submitted to the EC in September 2012;
- Anton Dohrn Seamount, East Rockall Bank, Hatton Bank, and Pobie Bank Reef which have recently been approved as possible SACs (pSACs).

Solan Bank Reef pSAC is located in the Scottish Continental Shelf Regional Sea. There are five inshore SACs with reef as a qualifying feature in this region (Sanday, Papa Stour, North Rona, Sullom Voe and St Kilda). Offshore SACs with reef feature in the same regional sea are Stanton Banks SCI, and Wyville Thomson Ridge cSAC. Stanton Banks SCI is a series of granite rises south of the Outer Hebrides and is exposed to different oceanographic processes compared to Solan Bank Reef, resulting in a different biological community. Wyville Thomson Ridge cSAC is a rock ridge at the northern end of Rockall Trough rising from 1000 to 400m; the reef is thought to have been formed by ploughing icebergs. Both of these sites are deeper than Solan Bank Reef, which is the only example of infralittoral reef in offshore waters in the Scottish Continental Shelf Regional Sea.

### c) Conservation objectives and management of sites

JNCC and SNH are responsible for establishing conservation objectives for the feature in the site, and for advising Competent Authorities of operations that could cause deterioration of the habitat and/or decline in the populations of its typical species. These conservation objectives and advice on operations are presented in a Draft Conservation Objectives & Advice on Operations document and inform the responsibilities of the Competent Authorities in the management of activities within the site. Special provisions are made for the consideration of current and future plans and projects that impact on the site (but are not directly connected with management of the site for conservation purposes). The goal of these provisions is to ensure that carrying out plans and projects does not adversely affect the integrity of the site. Management activities are intended to ensure marine habitats and species are maintained at, or restored to, favourable condition. Management relating to conservation of the site features (e.g. fisheries management) must be established within six years of the site being designated as an SCI (so that the site can proceed to full SAC designation). Under UK regulations consideration of plans and projects that may have an impact on the site must be considered as soon as the site is submitted to the EC as a cSAC.

To fulfil conservation objectives for Annex I reef in offshore waters, a Competent Authority must, where possible, manage human activities to ensure that the feature is not negatively affected through: 1) physical damage by physical disturbance or abrasion; and/or 2) biological disturbance by selective extraction of species.

## 1.3 Background information on the Impact Assessment

This report sets out the evidence base that supports the IA summary page for the policy options for the Solan Bank Reef pSAC IA. Two options were considered for this site:

Baseline: do nothing
Option 1: designate the site

No other options are considered as Solan Bank Reef, along with existing SACs and the other reef sites currently proposed, has been identified as an example of reef habitat to contribute towards the Natura network of sites for conservation. Other areas of similar habitat sub-type, where they exist, have been considered for selection as SACs but have been rejected for scientific reasons during earlier scoping.

Under the baseline option activities (e.g. fishing) are assumed to continue at current levels, potentially causing damage to the reef habitat and species.

This IA presents JNCC's assessment of the potential costs and benefits of designating the site. The approach is based on that adopted by JNCC for previous offshore SAC IAs (Eftec 2008); it includes a quantitative assessment of economic impacts and a qualitative assessment of ecosystem benefits. A framework is used to combine and assess cost and benefit information on the likely impacts of designation.

This framework includes a description of:

- What the current situation at the site is (the baseline), such as the site's ecological characteristics, the economic activities taking place, their value, and their environmental impacts;
- What changes, relative to baseline, are expected to result from potential management measures that may be required to meet the site's conservation objectives;
- What the direct and indirect economic costs of those changes are to operators, enforcement authorities and wider society;
- The likely benefits of achieving the conservation objectives; and
- The different data that can be used to estimate costs and benefits, including: impacts on goods and services that are bought and sold in commercial markets that can be valued in monetary units; impacts on goods and services that are not traded in commercial markets (that are less easy to value); and other impacts (such as change to non-use value).

Impacts have been assessed over ten years. This timescale is sufficient for the conservation of some species and habitats and the implementation of fisheries management measures. Assessment of the impacts beyond ten years becomes more uncertain. For example, there is greater scope to adjust fishing activities and they may therefore avoid costs that arise in the short-term. Costs are calculated using a discount rate of 3.5% per annum, based on Green Book recommendations[9].

# 2 BACKGROUND INFORMATION ON THE SITE

## 2.1 Baseline

The current condition of the site forms a baseline scenario against which the potential impacts of the policy options are assessed. This section assesses the current activities at the site and what is likely to happen over the assessment period if the site is not designated. This is the baseline against which the potential costs and benefits of designation are compared in Section 4. The monetary costs and benefits of the baseline are zero since no additional actions will be taken (however considerable cost could be incurred if the European Commission pursued an infraction case against the UK for failing to fully implement the Habitats Directive).

## 2.2 Characteristics of the site

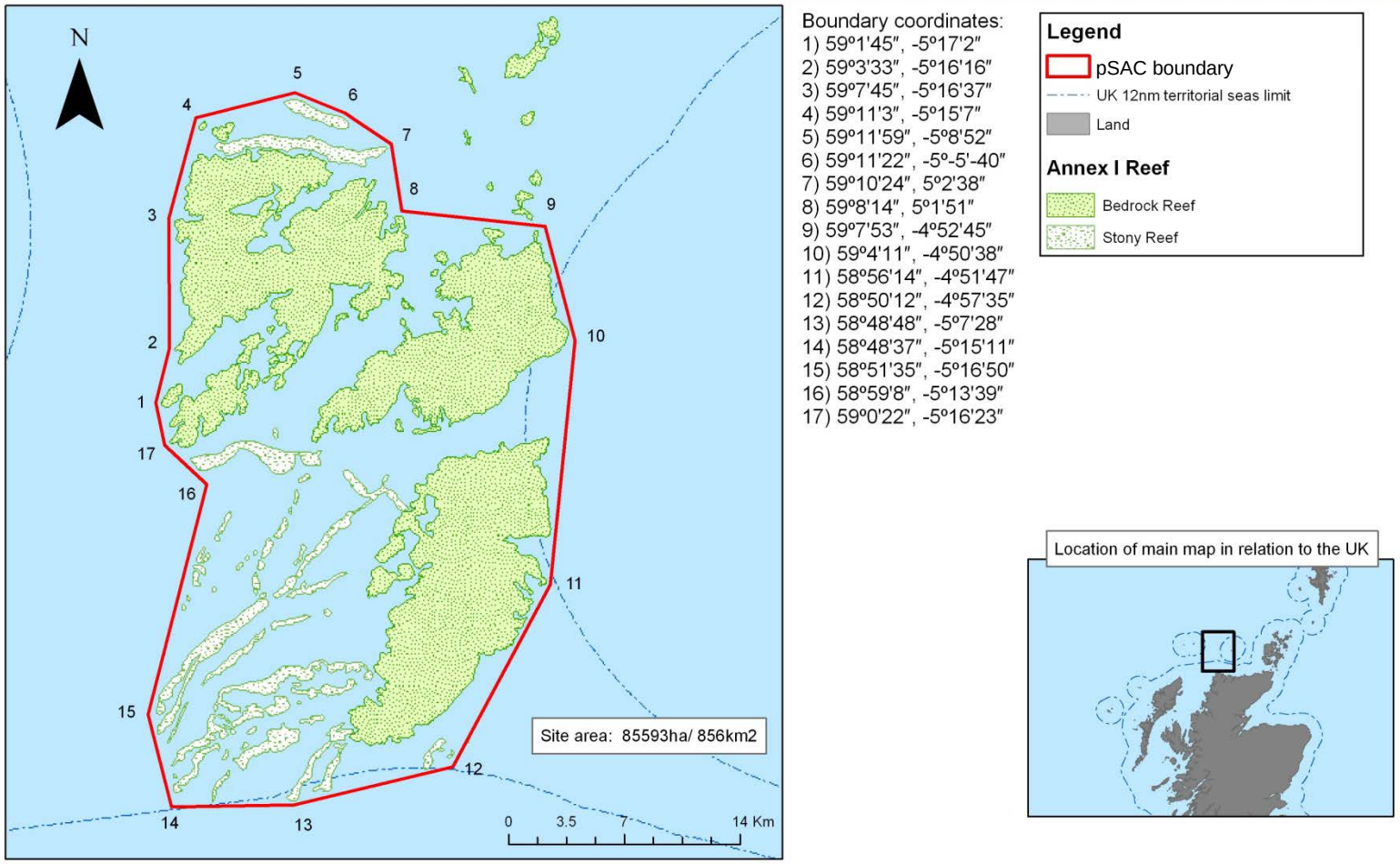
Solan Bank Reef is located approximately 50 km north of Cape Wrath off the north Scotland coast. The site lies in the vicinity of numerous geological structural features including Nun Rock, Sule Skerry, the East Rona highs, and the North Rona, North Lewis, North Minch and West Orkney basins. Solan Bank is a Precambrian basement topographical high, 130 km long and 25 km wide, composed of metamorphic basement rocks with sands and clays. The majority of the site lies in water depths of 60 – 80 m. However to the south east of the site an outcrop of bedrock reef rises to approx 20 m below the sea surface whereas the north of the site extends to over 90 m water depth.

The site represents the Annex I Reef sub-types 'bedrock' and 'stony' reef. Bedrock outcrops create areas of high topography, with linear features, thought to be bedrock joint planes, forming cliffs with relief of up to 10 m. In areas of bedrock where lineations are not as prominent, bedrock outcrops are smooth and undulating, having been carved by Pleistocene ('Ice Age') glacial erosion into features known as

[9] HM Treasury, The Green Book: http://www.hm-treasury.gov.uk/data_greenbook_index.htm

roches moutonnées. Stony reef, comprised of boulders and cobbles with a sandy veneer, occurs in ridges to the north west and south west of the site. These features are present across the site and are likely to be glacial in origin, representing morainic ridges (Whormesley *et al.* 2010). Boulders and cobbles also occur in the larger crevices in the bedrock, whereas smaller fissures in the bedrock are infilled with a mixture of coarse sand and shell gravel veneer. A veneer of sand is also present over the flat bedrock surfaces, indicating that sediment scour is a significant factor across the site.

The reefs are characterised by encrusting fauna, mainly encrusting bryozoans, and in the shallower areas, encrusting corallines. Cup corals are present throughout the site, and brittlestars are common on both bedrock and stony reef. Sediment scour appears to have a strong structuring force within the site, with low relief bedrock subject to scour having a lower faunal diversity than sites less affected by scour. Highly scoured bedrock is mainly colonised by the keel worm *Pomatoceros triqueter.* On less scoured bedrock reef a range of sponges occur, alongside bryozoans and hydroids. In shallower areas subject to increased water movement from tidal streams and wave action, there is an increasing abundance of species such as the soft coral *Alcyonium digitatum*, the cup coral *Caryophyllia smithii* and the jewel anemone *Corynactis viridis*, and in the shallowest locations foliose red algae and kelp.




Map projected in WGS 84 (Zone 28N). World Vector shoreline © US Defence Mapping Agency. Map copyright JNCC 2012.

**Figure 2.1** Solan Bank Reef pSAC boundary showing the distribution of reef habitat

## 2.3 Vulnerability of the site to human impacts

Table 2.1 below provides an initial assessment of the site's vulnerability; it is taken from the draft Conservation Objectives and Advice on Operations[10] for this site. Vulnerability depends on the sensitivity of the reef species to the specified pressures from human activities, and current exposure to those pressures. Only if a site feature is both sensitive and exposed to a human activity is it considered vulnerable.

Scores of relative sensitivity (likelihood of damage or death following exposure to a pressure), exposure to pressure and vulnerability have been derived using best available scientific information and informed scientific interpretation and judgement; the assessment is dynamic and will be revised as necessary to reflect new research or evidence. (See Solan Bank Reef draft Conservation Objectives and Advice on Operations[11] for more-detailed information.)

[10] Solan Bank Reef SAC: Draft Conservation Objectives and Advice on Operations v2.0 JNCC
[11] Available from:
http://jncc.defra.gov.uk/pdf/Solan%20Bank%20_DraftConservationObjectivesandAdviceonOperations_v2.0_withbookmarks.pdf

**Table 2.1** Sensitivity, exposure and vulnerability of the Solan Bank Reef reefs to physical, chemical and biological pressures (from Solan Bank Reef Conservation Objectives and Advice on Operations v2.0)

**Sensitivity key:** ••• = High sensitivity •• = Moderate sensitivity • = Low sensitivity, ○ = No known sensitivity* and **?** = Insufficient information to make assessment (*Meaning: 'Sensitivity of the feature has been researched and no evidence of sensitivity to this pressure has been found')
**Exposure key :** High = High exposure, Medium = Medium exposure, Low = Low exposure, None = No known exposure, Unknown level = Exposure of an unknown level and **?** = Insufficient information to make assessment.

| **List of pressures which may cause deterioration or disturbance (with example activities)** | | **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 | Moderate |
| | **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) | ○ | ? | 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) | ? | None | No known vulnerability |
| **Non-toxic contamination** | **Changes in nutrient loading** (e.g. outfalls) | ? | None | No known vulnerability |
| | **Changes in thermal regime** (e.g. cooling water discharges) | ? | None | No known vulnerability |
| | **Changes in turbidity** (e.g. laying of pipelines, aggregate dredging) | • | None | No known vulnerability |
| | **Changes in salinity** (e.g. outfalls from rigs, ships) | ••• | None | No known vulnerability |
| **Biological disturbance** | **Introduction of microbial pathogens** (e.g. outfalls) | ? | ? | 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 |

Table 2.1 shows that Solan Bank Reef and associated biological communities are:

- Moderately vulnerable to obstruction (wrecks), physical disturbance or abrasion (from demersal fishing) and selective extraction of species (from demersal fishing)

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

The reef is at risk of deterioration under the baseline as a result of the potential impacts of demersal fishing. Deterioration of the habitats would not achieve the aims of the Habitats Directive to maintain or restore Annex I habitats to favourable conservation status.

The conservation objective, based on current evidence, for the management of Solan Bank Reef is to maintain or restore the reefs to favourable condition. Activities that do not result in pressures to which the feature is sensitive may continue at current levels of spatial and temporal intensity. The management of other activities to which the feature is vulnerable may need to be reviewed by the Competent Authorities responsible.

## 2.4 Human activity and regulation of activity at the site

Current and proposed economic activity at Solan Bank Reef is described under the following sectors:

- Oil and gas – no activity or planned activity within or nearby likely to affect site;
- Renewables – part of the SAC overlaps an area of search for future development of offshore wind energy;
- Aggregate extraction – no licensed aggregate activities within or near the site;
- Shipping – low to moderate activity;
- Cables – no activity or planned activity within or nearby likely to affect site;
- Fisheries – low to moderate demersal fishing activity for megrim, haddock and squid using bottom otter trawls; also, pelagic fishing for mackerel and herring and potting for brown crab.

There are no other significant current or planned economic activities at the site.

Under both inshore and offshore Habitats Regulations Competent Authorities must carry out an Appropriate Assessment before undertaking or authorising a plan or project that could significantly affect a designated site. Initially the Competent Authority can agree to the plan or project only if it is certain that it will not adversely affect the integrity of the site. However, a Competent Authority can agree to a plan or project that will have an adverse effect if there are reasons of overriding public interest and permission from Scottish Ministers and the Secretary of State.

Not all activities that may affect the reef are considered plans or projects under the Habitats Regulations. Ongoing activities at the site which may be affecting the habitat of interest and preventing it from reaching or being maintained at favourable conservation status may need to be managed through the development of specific management measures (e.g. certain fishing methods, which may be controlled through measures taken under the European Common Fisheries Policy).

### a) Renewables

*Description of known current and future activity relevant to the site*

Part of Solan Bank Reef pSAC slightly overlaps an area of search (NW7) for future development of offshore wind energy which was identified in Scottish Government's Draft Plan for Offshore Wind Energy in Scottish Territorial Waters (Marine Scotland, 2010). Solan Bank Reef SAC could constrain development in a very small area of NW7, however it is not possible to determine the likelihood of development in this area and therefore potential costs are not considered further in this IA.

*Regulation of activity (baseline)*

Wind energy schemes in the Scottish region are regulated by Marine Scotland and an Environmental Impact Assessment (EIA) is required for all proposals. From these EIA, Marine Scotland will determine whether an Appropriate Assessment (AA) should be undertaken to fulfil the requirements of The Conservation (Natural Habitats &c.) Regulations 1994 or the Offshore Marine Conservation Regulations 2007 (as amended).

*Likely future regulation of activity following designation*

Any wind energy plan would be subject to screening to assess if it was likely to have a significant effect on the qualifying interest features of Solan Bank Reef SAC. If effects are likely to be significant an AA would be conducted by Marine Scotland with information provided by the developer, including environmental information such as that normally provided for EIA outside of a Natura site. It is normally possible to ensure that a plan or project will not have an adverse effect on site integrity. If mitigation measures are not possible, the proposed development must be refused, unless the competent authority considers that there are imperative reasons of overriding public interest (IROPI) for the development to proceed, and no alternative solutions available.

### b) Shipping

*Description of known current and future activity relevant to the site*

From Automatic Identification Systems (AIS) on the vessels, it is possible to calculate the number passing over a 5 km x 5 km cell within a given year. For the cells corresponding with Solan Bank Reef area, the number of vessel passes ranged from 0 to 400 for 2008. These values are low when compared to shipping lanes located 10 miles away where levels can reach 5000 vessel passes per year.

There are no anchorages within or near the site boundary.

*Regulation of activity (baseline)*

The International Convention for the Prevention of Pollution from Ships (MARPOL) aims to protect the marine environment from pollution from operational and accidental sources. The MARPOL Convention was adopted by the International Maritime Organisation in 1973; subsequently six technical Annexes were added and came into force in 1983:

| | |
|---|---|
| Annex I | Regulations for the Prevention of Pollution by Oil |
| Annex II | Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk |
| Annex III | Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form |
| Annex IV | Prevention of Pollution by Sewage from Ships |
| Annex V | Prevention of Pollution by Garbage from Ships |
| Annex VI | Prevention of Air Pollution from Ships (entry into force 19 May 2005) |

Signatories to the Convention, which include the UK, must accept Annexes I and II, but the other Annexes are voluntary.

*Likely future regulation of activity following designation*

The site is proposed for its reef habitat, which is unlikely to be affected by shipping passing above it, therefore under the 'designate' option, no change to current practices is likely to be required to fulfil the conservation objectives for the reef at Solan Bank Reef.

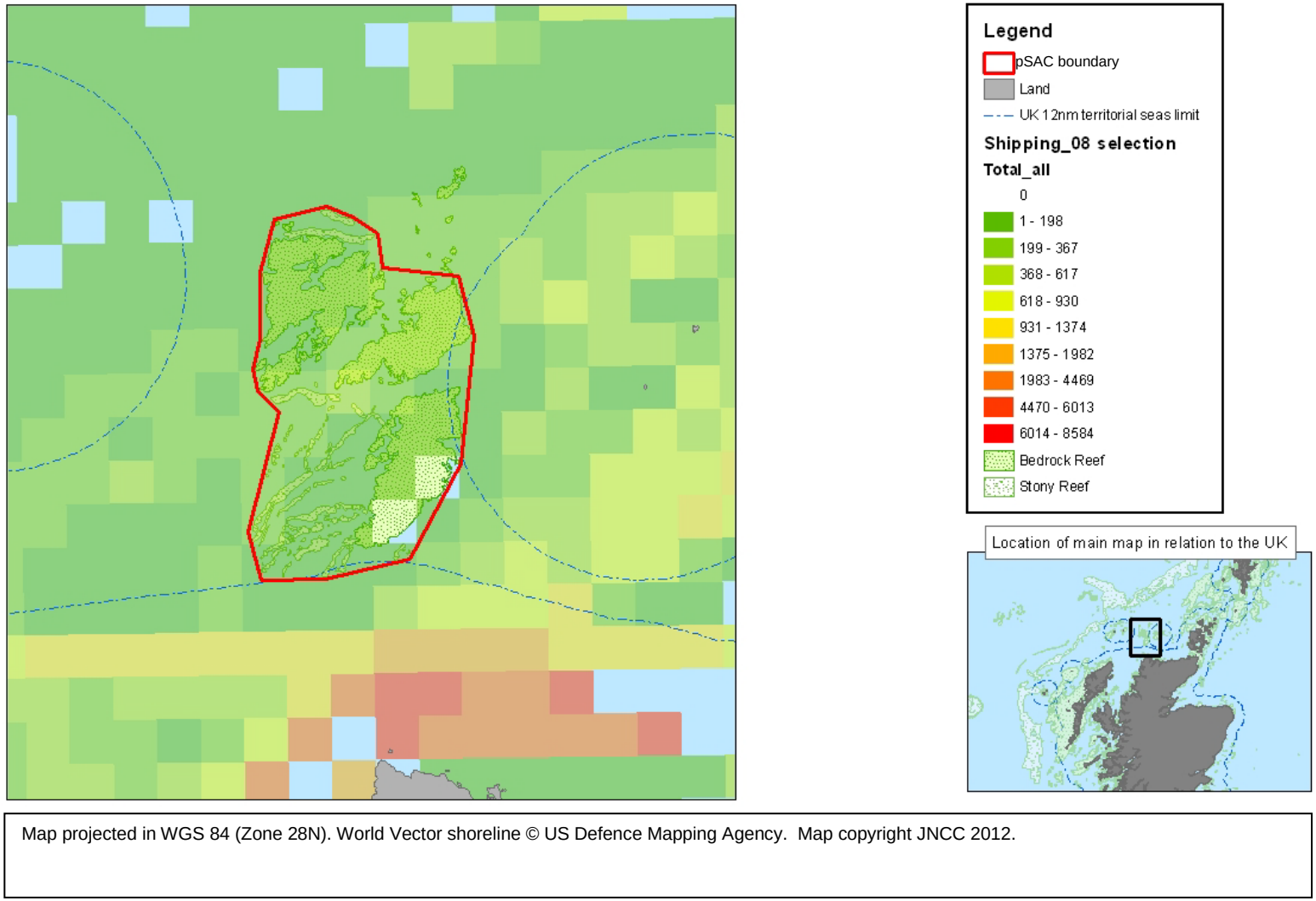



**Figure 2.2** Shipping activity around Solan Bank Reef SAC in 2008 (data from the Cefas MB106 contract, see footnote on next page). Data are derived from Automatic Identification Systems (AIS), a collision-avoidance system for ships >300GT in international waters. Data are represented as total number of vessels passing through a 5 km by 5 km grid cell.

### c) Fisheries

*Description of known current and future activity relevant to the site*

Fishing is managed at a UK and European level, but non-European Union vessels may fish by agreement. Comprehensive data on location and type of fishing are difficult to obtain and recent fishing data are a reflection of activity already managed by total allowable catch and species quotas. Recent data are, however, used here as a best estimate of baseline fishing activities prior to any designation.

The distribution of fishing effort within the region can be obtained for UK vessels (≥15 m) that carry vessel monitoring systems (VMS). These provide a vessel's position, speed and heading either hourly or every two hours. As vessels fish at characteristic speeds, VMS data can be processed to provide proxy patterns of 'active fishing' based on vessel speed and these patterns can be analysed spatially in relation to the site boundary. Using a speed rule to partition active fishing from VMS is a coarse but effective means of estimating fishing effort (Mills *et al.*. 2007) for towed gear; it is less reliable for set gear such as pots and nets. It is not possible to obtain comprehensive data on the location of vessels with lengths of 15 m or less. VMS data has been used to estimate fishing effort within SACs as set out in section 4.2b.

There are no landings data available specifically for the area which is proposed for designation. Marine Scotland and the Marine Management Organisation compile various data at the level of ICES rectangles. Catch data encompasses information for UK-registered vessels landing in UK and non-UK ports, and for non-UK registered vessels landing in UK ports. Data includes:

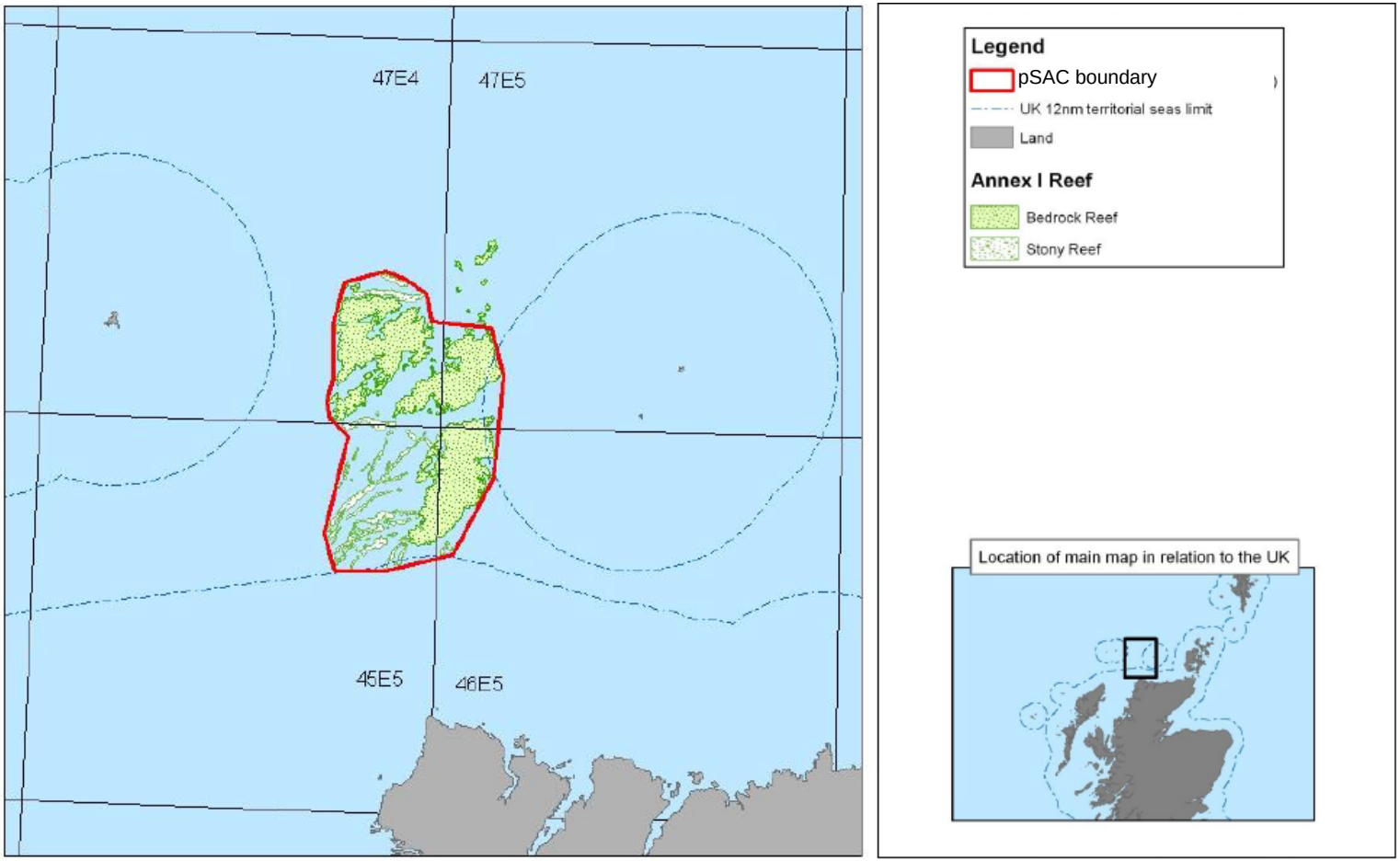
- year
- size of vessel
- type of gear
- species caught
- port of landing
- vessel nationality
- value of landing
- tonnage of landing

Note, the exception is for non-UK vessels that fish within territorial waters, but that land at non-UK ports; it is not possible to obtain weights and values of landings for these vessels. This IA is concerned with the impacts of the UK's potential designation of Solan Bank Reef on UK businesses. However the effects of designations on other Member States are relevant.

Information on landings from the region around Solan Bank Reef is given at the scale of ICES statistical rectangle ($0.5^o$ latitude, $1.0^o$ longitude). The data are presented below in tables 2.2 to 2.6; five years are shown (2006-10) to illustrate interannual variation in catches. The area of Solan Bank pSAC is 856 $km^2$ (25% of the ICES statistical rectangle). Resolving whether fishing activities actually overlap with the site and feature is not therefore possible from landings data alone. Analysed VMS data[12] gives us an indication of how fishing effort is spread across the site and surrounding area with a resolution of 0.05 decimal degrees, but this is still coarse information.

[12] Generated by Cefas from VMS, log-book and EU vessel register data for 2006-9. All vessels (UK & non-UK) are included and fishing is estimated using a simple speed rule of 1-6 knots to represent fishing activity

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.




Map projected in WGS 84 (Zone 28N). World Vector shoreline © US Defence Mapping Agency. Map copyright JNCC 2012.

**Figure 2.2** ICES Rectangles relating to Solan Bank

**Table 2.2** Fish landings from the ICES rectangles containing Solan Bank Reef pSAC (2006-10)

| ICES | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | Average | | Relative (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight | Value |
| 47E4 | 8,771 | 6,192 | 9,120 | 6,479 | 4,563 | 3,540 | 1,206 | 1,028 | 1,117 | 1,247 | 4,955 | 3,697 | 33 | 37 |
| 47E5 | 3,981 | 3,164 | 3,087 | 2,497 | 2,858 | 2,915 | 4,664 | 3,363 | 3,828 | 3,069 | 3,684 | 3,002 | 24 | 30 |
| 46E5 | 3,235 | 2,063 | 2,735 | 1,229 | 2,809 | 1,829 | 2,167 | 1,709 | 2,789 | 1,762 | 2,747 | 1,718 | 18 | 17 |
| 46E4 | 4,815 | 1,805 | 3,611 | 1,614 | 5,189 | 2,272 | 1,873 | 1,137 | 3,523 | 1,720 | 3,802 | 1,709 | 25 | 17 |
| **TOTAL** | **20,801** | **13,223** | **18,553** | **11,819** | **15,420** | **10,556** | **9,911** | **7,236** | **11,256** | **7,799** | **15,188** | **10,127** | | |

**Table 2.3** Fish landings from the ICES rectangle containing Solan Bank Reef pSAC (2006-10) by nationality of vessel

| Vessel nationality | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | Average | | Relative (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight | Value |
| Scotland | 14,966 | 9,686 | 13,409 | 8,665 | 9,889 | 6,532 | 7,356 | 5,674 | 5,702 | 4,580 | 10,264 | 7,027 | 68 | 69 |
| England | 2,708 | 1,754 | 2,887 | 2,247 | 3,240 | 1,965 | 2,332 | 1,291 | 3,224 | 2,110 | 2,878 | 1,873 | 19 | 18 |
| Northern Ireland | 1,180 | 469 | 2,101 | 688 | 1,405 | 1,012 | 0 | 0 | 2,256 | 991 | 1,388 | 632 | 9 | 6 |
| Ireland | 1,889 | 1,272 | 139 | 192 | 418 | 532 | 215 | 260 | 61 | 90 | 544 | 469 | 4 | 5 |
| Faeroe Islands | 46 | 11 | 0 | 0 | 381 | 413 | 0 | 0 | 0 | 0 | 85 | 85 | 1 | 1 |
| France | 13 | 30 | 16 | 27 | 86 | 102 | 7 | 9 | 8 | 16 | 26 | 37 | <1 | <1 |
| Spain | 0 | 0 | <1 | 1 | 0 | 0 | 1 | 2 | 5 | 12 | 1 | 3 | <1 | <1 |

**Table 2.4** Fish landings from the ICES rectangle containing Solan Bank Reef SAC (2006-10) by port of landing

| Port of Landing | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | Average | | Relative (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight | Value |
| Scrabster | 1,713 | 2,278 | 1,839 | 2,810 | 1,673 | 2,639 | 1,672 | 2,471 | 1,242 | 1,924 | 1,628 | 2,424 | 11 | 24 |
| Peterhead | 7,636 | 2,667 | 7,665 | 3,747 | 4,309 | 1,884 | 2,959 | 1,291 | 4,488 | 1,582 | 5,411 | 2,234 | 36 | 22 |
| Lerwick | 3,544 | 1,878 | 3,685 | 1,380 | 3,460 | 2,089 | 1,410 | 449 | 941 | 513 | 2,608 | 1,262 | 17 | 12 |
| Ijmuiden | 2,041 | 923 | 2,382 | 1,592 | 2,922 | 1,564 | 1,203 | 602 | 1,351 | 1,128 | 1,980 | 1,162 | 13 | 11 |
| Stromness | 315 | 499 | 328 | 405 | 412 | 477 | 544 | 651 | 681 | 949 | 456 | 596 | 3 | 6 |
| Kinlochbervie | 504 | 675 | 248 | 423 | 281 | 446 | 371 | 632 | 288 | 450 | 338 | 525 | 2 | 5 |
| Fraserburgh | 1,150 | 948 | 1,181 | 707 | 1,760 | 494 | 370 | 220 | 23 | 31 | 897 | 480 | 6 | 5 |
| Maloy | 1,914 | 1,899 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 383 | 380 | 3 | 4 |
| Erribol | 53 | 185 | 101 | 228 | 84 | 231 | 74 | 207 | 74 | 196 | 77 | 210 | 1 | 2 |
| Ullapool | 61 | 92 | 49 | 54 | 280 | 381 | 197 | 277 | 80 | 125 | 134 | 186 | 1 | 2 |
| Aberdeen | 321 | 412 | 104 | 138 | 53 | 53 | 8 | 12 | 4 | 7 | 98 | 124 | 1 | 1 |
| Norwegian Port (unspec.) | 437 | 306 | 0 | 0 | 0 | 0 | 0 | 0 | 301 | 269 | 148 | 115 | 1 | 1 |
| Plymouth | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,281 | 360 | 256 | 72 | 2 | 1 |
| Floro | 972 | 236 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 194 | 47 | 1 | <1 |
| Scheveningen | 0 | 0 | 0 | 0 | 0 | 0 | 673 | 194 | 103 | 28 | 155 | 44 | 1 | <1 |
| Lochinver | 4 | 10 | 23 | 40 | 87 | 105 | 8 | 12 | 13 | 29 | 27 | 39 | <1 | <1 |
| Killybegs | 0 | 0 | 872 | 152 | 0 | 0 | 0 | 0 | 0 | 0 | 174 | 30 | 1 | <1 |
| Scalloway and Isles | 12 | 15 | 22 | 43 | 31 | 56 | 8 | 15 | 12 | 13 | 17 | 28 | <1 | <1 |
| Kalvag | 0 | 0 | 0 | 0 | 0 | 0 | 359 | 110 | 0 | 0 | 72 | 22 | <1 | <1 |
| Skaagen | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 342 | 106 | 68 | 21 | <1 | <1 |
| Westray | 22 | 24 | 22 | 21 | 23 | 28 | 0 | 0 | 0 | 0 | 14 | 15 | <1 | <1 |
| Macduff | 14 | 22 | 3 | 6 | 5 | 10 | 14 | 21 | 6 | 13 | 9 | 14 | <1 | <1 |
| Buckie | 4 | 7 | 2 | 4 | 13 | 40 | 2 | 10 | 2 | 9 | 5 | 14 | <1 | <1 |
| Wick | 35 | 46 | 3 | 5 | 9 | 15 | 0 | 0 | 0 | 0 | 9 | 13 | <1 | <1 |
| other | 51 | 100 | 22 | 64 | 18 | 44 | 38 | 62 | 23 | 66 | 30 | 67 | <1 | 1 |

**Table 2.5** Fish landings from the ICES rectangle containing Solan Bank Reef SAC (2006-10) by gear type

| Gear | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | Average | | Relative (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight | Value |
| Otter trawls - midwater | 16,568 | 7,947 | 13,949 | 6,698 | 11,358 | 5,339 | 6,060 | 2,288 | 6,188 | 2,730 | 10,825 | 5,001 | 71 | 49 |
| Pots | 1,776 | 2,578 | 1,851 | 2,707 | 1,773 | 2,375 | 1,959 | 2,476 | 1,790 | 2,498 | 1,830 | 2,527 | 12 | 25 |
| Otter trawls - bottom | 1,198 | 1,566 | 948 | 1,259 | 1,395 | 1,693 | 735 | 1,430 | 1,214 | 1,265 | 1,098 | 1,443 | 7 | 14 |
| Pair trawls - midwater | 487 | 344 | 610 | 412 | 0 | 0 | 673 | 194 | 1,385 | 388 | 631 | 268 | 4 | 3 |
| Scottish seines | 76 | 97 | 92 | 164 | 270 | 509 | 85 | 150 | 65 | 108 | 118 | 206 | 1 | 2 |
| Dredges | 64 | 106 | 79 | 151 | 94 | 214 | 109 | 266 | 55 | 93 | 80 | 166 | 1 | 2 |
| Pair trawls - bottom | 67 | 73 | 64 | 99 | 355 | 135 | 192 | 229 | 186 | 290 | 173 | 165 | 1 | 2 |
| Otter twin trawls | 79 | 134 | 56 | 131 | 94 | 191 | 71 | 155 | 66 | 145 | 73 | 151 | 0 | 1 |
| Purse seins | 437 | 306 | 872 | 152 | 0 | 0 | 0 | 0 | 301 | 269 | 322 | 145 | 2 | 1 |
| Set gillnets (anchored) | 13 | 30 | 16 | 27 | 79 | 96 | 0 | 0 | 0 | 0 | 22 | 30 | <1 | <1 |
| Set longlines | 0 | 0 | 11 | 14 | 0 | 0 | 19 | 39 | 5 | 12 | 7 | 13 | <1 | <1 |
| Longlines (not spec.) | 31 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 8 | <1 | <1 |
| Hand fishing | 4 | 6 | 3 | 5 | 2 | 2 | 9 | 9 | 0 | 0 | 3 | 4 | <1 | <1 |
| Gillnets & entangling nets (not spec.) | <1 | <1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <1 | <1 |

Table 2.6 Fish landings from the ICES rectangle containing Solan Bank Reef SAC (2006-10) by target species.

| Species | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | Average | | Relative (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight (t) | Value (k£) | Weight | Value |
| Mackerel | 7,103 | 5,747 | 9,002 | 5,629 | 3,969 | 2,662 | 351 | 268 | 1,001 | 1,021 | 4,285 | 3,065 | 28 | 30 |
| Herring | 9,910 | 2,726 | 6,530 | 1,653 | 8,148 | 2,884 | 6,374 | 2,214 | 7,593 | 2,584 | 7,711 | 2,412 | 51 | 24 |
| Edible crab | 1,744 | 2,338 | 1,825 | 2,452 | 1,746 | 2,102 | 1,932 | 2,225 | 1,761 | 2,242 | 1,802 | 2,272 | 12 | 22 |
| Megrim | 32 | 90 | 171 | 509 | 313 | 986 | 299 | 897 | 148 | 501 | 193 | 597 | 1 | 6 |
| Haddock | 855 | 1,050 | 288 | 385 | 494 | 611 | 223 | 264 | 112 | 154 | 394 | 493 | 3 | 5 |
| Lobsters | 20 | 204 | 19 | 228 | 19 | 231 | 16 | 176 | 17 | 191 | 18 | 206 | <1 | 2 |
| Saithe | 273 | 228 | 164 | 95 | 205 | 140 | 229 | 201 | 220 | 256 | 218 | 184 | 1 | 2 |
| Scallops | 68 | 112 | 79 | 151 | 94 | 214 | 110 | 268 | 55 | 93 | 81 | 168 | 1 | 2 |
| Nephrops | 29 | 118 | 17 | 88 | 21 | 111 | 29 | 164 | 13 | 78 | 22 | 112 | <1 | 1 |
| Cod | 67 | 156 | 67 | 171 | 47 | 121 | 13 | 33 | 10 | 22 | 41 | 101 | <1 | 1 |
| Monks | 22 | 72 | 42 | 138 | 28 | 97 | 20 | 98 | 16 | 60 | 26 | 93 | <1 | 1 |
| Squid | 8 | 17 | 5 | 11 | 6 | 15 | 25 | 74 | 99 | 344 | 29 | 92 | <1 | 1 |
| Whiting | 30 | 28 | 89 | 94 | 125 | 158 | 70 | 78 | 33 | 37 | 69 | 79 | <1 | 1 |
| Hake | 24 | 50 | 28 | 42 | 93 | 112 | 34 | 62 | 20 | 36 | 40 | 60 | <1 | 1 |
| Spurdog | 56 | 63 | 83 | 64 | 16 | 21 | 55 | 66 | 2 | 3 | 42 | 43 | <1 | <1 |
| Horse Mackerel | 388 | 116 | 14 | 4 | 12 | 3 | 0 | 0 | 7 | 2 | 84 | 25 | 1 | <1 |
| Ling | 7 | 11 | 4 | 7 | 15 | 20 | 19 | 27 | 23 | 37 | 14 | 20 | <1 | <1 |
| Skate & Ray | 28 | 25 | 28 | 20 | 18 | 14 | 16 | 14 | 7 | 6 | 19 | 16 | <1 | <1 |
| Plaice | 20 | 16 | 22 | 18 | 15 | 12 | 17 | 13 | 16 | 12 | 18 | 14 | <1 | <1 |
| John Dory | 4 | 10 | 4 | 13 | 2 | 9 | 4 | 20 | 2 | 10 | 3 | 12 | <1 | <1 |
| Velvet crabs | 8 | 14 | 5 | 11 | 3 | 6 | 3 | 6 | 8 | 22 | 5 | 12 | <1 | <1 |
| other | 106 | 32 | 68 | 37 | 31 | 28 | 72 | 68 | 95 | 86 | 74 | 50 | <1 | <1 |

Fish are caught in the four ICES rectangles that include part the Solan Bank Reef pSAC; most catches come from 47E4 (£3.7m.pa; 36.5% by value) and least from 46E4 (£1.7m.pa; 16.9%, Table 2.2).

Breaking down the international landings from the four rectangles (Table 2.3), most landings are made by Scottish (£7m.pa on average 2006-2010; 69% of all vessels) and English (£2m.pa; 19%) vessels, though there are Northern Irish (6%), Irish (5%), Faroese, French and Spanish vessels (all 1% or less) fishing in the area. Most of the landings are made to three Scottish ports (Table 2.4): Scrabster (£2m.pa; 24%), Peterhead (£2m.pa; 22%), and Lerwick (£1m.pa; 12%) and Ijmuiden in the Netherlands ((£1m.pa; 11%). Other significant ports are Stromness, Kinlochbervie, and Fraserburgh in Scotland, and Maloy in Norway. It is important to remember that these landings data do not include foreign vessels landing in foreign ports.

Large quantities of mackerel were landed by midwater trawlers between 2006-2008 which boosted landings in these years. Variation in landings between years is high and reflects changing markets, regulations (e.g. proper implementation of the Buyers and Sellers Register), fishing effort, and quota allocation; in addition to changes in the abundance of fish and shellfish.

The most productive gear type is the midwater otter trawl, which contributes up to £5 m.pa (50% of landings). The next most productive gears are pots (£2.5m.pa; 12%) and bottom otter trawls (£1m.pa; 14%): many vessels using these gears are 15m or less. Other gear types include midwater pair trawls, dredges, purse seines, twin otter trawls and Scottish seines.

Most landings were mackerel (£3m.pa; 30% of all species), caught by midwater otter trawls and midwater pair trawls. Other species include herring (£2m.pa; 24%) caught with midwater otter trawls, and crabs (£2 m.pa; 22 %) which are caught with pots. Smaller landings are made of megrim (£597k.pa), haddock (£493k.pa), lobsters (£206k.pa) and saithe (£184k.pa). The National Federation of Fishermen's Organisations (NFFO) also recognise nephrops trawling as an important activity over Solan Bank[13].

The Scottish Fishermen's Federation[13] (SFF) states that the Solan Bank is an important haddock fishing area: haddock congregate seasonally around the bank to feed on herring eggs and have traditionally been targeted at these times. The SFF expect fishing effort and landings from the area to revive in 2012 (compared to the 2006-2010 data presented here) because haddock stocks have increased and consequently Total Allowable Catch allocations for haddock in 2012 are substantially higher than for previous years.

### *Current management of fishing activity (baseline)*

There are no fisheries closures over or close to Solan Bank Reef. However the European Union's Common Fisheries Policy (CFP) sets an overall framework for regulation of fisheries in UK offshore waters. European competence and specific regulations vary in their application depending on geography. In the UK, the management of fisheries in all waters beyond 12 nm fall under the jurisdiction of the European Union through the CFP. The policy is transposed through the Control Regulations which allow annual fish quotas to be set, and Technical Conservation Regulations which deal with measures such as gear restrictions and area closures. Member States receive an annual allocation (quota) of each stock at each December meeting of the European Union Fisheries Council (with a small amount of the total quota allocated to 0–12 nm)[14]. Non-pressured stocks such as scallops and cuttlefish still have no applicable quotas. When quota levels are reached vessels tend to move into the inshore to catch those species for which there is a market but fewer restrictions on what can be landed.

In addition to setting catch limits, the CFP sets out regulations including minimum landing sizes for certain fish and area-based measures. Spatial measures include prohibiting particular fishing techniques

[13] This information was provided in NFFO's written response to the Consultation Impact Assessment for Solan Bank Reef, in June 2012.

[14] Quotas are informed by annual scientific stock assessment advice formulated by ICES; adherence to their advice is not mandatory.

in certain areas permanently, seasonally, or temporarily. The CFP can also limit fishing effort by limiting amounts of static gear or the power of the vessels that can take part in a fishery.

Fisheries regulations and policy are enforced in Scottish waters by Marine Scotland and Marine Scotland Compliance. Enforcement includes inspection of: fishing vessels in port, fishing industry premises and fish markets. At sea, fishing vessels are inspected by Marine Protection Vessels and monitored by surveillance aircraft[15]. Vessels over 15 m in length are required to have a Vessel Monitoring System and their activities are monitored via satellite by Marine Scotland's Marine Monitoring Centre[16].

*Likely future regulation of activity following designation*

If management measures for a Marine Protected Area in offshore waters are required, the UK must seek them through a proposal for fisheries management measures under the CFP. The CFP is currently undergoing reform and a revised regulation will come into effect in January 2013.

If evidence shows that ongoing fishing activities at the site are posing a risk to feature condition, then the UK will consider applying to the EC for controls to close all or part of the site to at least some forms of fishing in order to minimise risk of damage to habitat and associated typical species, including target and non-target fish and shellfish species.

# 3 APPROACH TO ANALYSIS OF COSTS AND BENEFITS

## 3.1 Approach

This IA assesses the potential costs and benefits to the UK of the policy option to designate the site. Impacts have been assessed in the IA over a time scale of approximately ten years. Section 2 outlined the current situation at the site (the baseline) in terms of economic activities. It should be remembered that the baseline may not be static (it may be subject to ongoing change), and the assessments try to take account of this (for example, where a benefit is identified as preventing continuing decline).

The necessary data to fully understand the employment and profit impacts from landings to foreign ports and from foreign vessels landing into the UK are complex. The value of these landings to the UK economy is limited because landings by foreign vessels to UK ports are frequently transported directly overseas from their port of landing without any onshore processing or marketing. Furthermore, a large proportion of UK registered vessels landing overseas are UK Registered Foreign Owned vessels (UKRFO) which convey limited economic benefit to the UK economy (for a detailed discussion of these factors see Defra 2009). It is not possible to distinguish landings from UK registered UK owned vessels from those by UKRFO vessels. Landings to foreign ports and by foreign registered vessels landing to the UK have therefore been excluded from headline cost figures for this IA but the potential for indirect benefits to the UK economy (e.g. purchasing of fuel) from these landings should be recognised.

This method of assessment has been used to develop IAs for the suite of marine Natura 2000 sites consulted on by JNCC in 2009-2011. However, different sites have different baselines, activities and circumstances. Therefore the same type of impact may have different costs or benefit at different sites.

Section 4 examines the potential costs and benefits of the policy option. The costs and benefits are subject to significant uncertainty. The main causes for this uncertainty are that:

- It is difficult to predict what detailed management measures will be implemented at the site;
- It is difficult to know how operators will respond to them and what costs they will incur in doing so; insofar as they can predict this there may be reasons in some cases for not supplying this information, for example: commercial sensitivities;

[15] http://www.scotland.gov.uk/Topics/marine/Compliance/resources
[16] http://www.scotland.gov.uk/Topics/marine/Compliance/satellite

- It is difficult to predict how the condition of the protected features and surrounding environment would change under Option 1 (designate); and
- There is currently very little evidence which can be used to monetise values for environmental changes in the marine environment.

Therefore the approach to the assessment has:

- Used techniques to obtain the best available information on these areas of uncertainty. This is done firstly by developing scenarios on likely potential maximum and minimum management measures; and secondly by drawing on sources most likely to be able to predict the impacts of these potential management measures and provide relevant information;
- Used a framework of factors likely to determine the benefits to society of achieving the conservation objective of the site;
- Identified the possible minimum and maximum impact on economic sectors rather than the actual expected impact; and
- Not assessed the precise direct or indirect impacts on businesses, employees or elements of the supply chain potentially affected because insufficient evidence is available to accurately predict the distribution of net changes in activity within the regional economy.

The analysis presented in this document is based on the methods that are judged to be the best practicable option to address the issues considered.

## 3.2 Costs

### a) Policy costs to the private sector

The policy costs arising from designation of the site are the costs of changes to existing and planned human activities taking place within or in the vicinity of the site in order to comply with the policy objectives. The costs considered include the direct and indirect economic costs of those changes to operators, enforcement authorities and wider society. The costs are expected to result from the potential range of management measures that may be required to meet the site's objectives. The costs are considered relative to the baseline of not designating the site.

The costs borne by each key sector will depend on the extent to which their activity impacts on the site and the management measures deemed necessary to maintain or restore the reef and its typical species to favourable condition. These measure are not yet known. It has therefore been necessary to make assumptions about what measures might be required for this site. It is assumed that the site will be transmitted to the European Commission by October 2012, and that some costs (for example, survey work) could arise immediately. Fisheries management measures are likely to take at least a year to be developed and implemented but could take considerably longer as a range of issues must be addressed with domestic and foreign stakeholders. For this assessment we have assumed that fisheries management measures are implemented in 2014.

Policy costs to the private sector may arise if:

- Consent for a plan/project is granted, it may be subject to restrictions on the timing or manner in which it can be implemented which result in costs to businesses. Restrictions are determined by the by the Competent Authority;
- Consent for proposed plans or projects may be refused by the competent authority. The cost to businesses is assumed for this analysis to be the additional cost of undertaking the plan or project elsewhere; and,
- Activity in the area is restricted (e.g. certain fishing activity) and costs to business occur in the form of foregone income/profit.

### b) Administration costs to the private sector

Administration costs include time and expenditure necessary for the private sector to provide information and documentation to comply within the administration requirements of a regulation. They exclude policy costs, which are the time and expenditure necessary to adjust activities (e.g. to reduce pollution) to comply with regulatory standards. Potential administration costs to the private sector are:

- The costs to businesses of finding out about the designation and its management measures;
- For ongoing or new plans and projects, the cost to businesses of providing detailed information to inform the Competent Authority's[17] assessment under the habitats regulations; and,
- Undertaking more detailed analysis (such as Environmental Impact Assessment) and reporting if required.

### c) Costs to the public sector

Potential administration costs to the public sector are:

i. Costs of monitoring the site and maintaining information on its conservation status; and,
ii. Costs of regulating and enforcing human activities that might impact on the conservation status of the site.

## 3.3 Benefits

The benefits of site designation arise from the increase in the area protected for nature conservation[18]. Benefits are assessed as the impact on ecosystem services that benefits humans[19]. The following overarching categories of ecosystem services are used[20]:

- Provisioning services (e.g. provision of food);
- Regulating services (e.g. absorbing waste); and
- Cultural services (e.g. the role of marine species in culture and the artistic inspiration they provide).

Following Defra's guidance on the valuation of ecosystem services, benefits from supporting services[21] (such as cycling of nutrients and photosynthesis) are assumed to be captured by the other benefits listed and so are not examined separately[22]. The analysis in Section 4 is based on a list of ecosystem service categories that are relevant to the site.

The impacts of designation on these ecosystem services are analysed in Section 4.3. In addition to these categories it is recognised by many that biodiversity has an intrinsic value. This is an inherent characteristic of biodiversity that gives rise to other benefits. Intrinsic value cannot be assessed using conventional economic valuation techniques[23] and is not analysed further here, but it should not be overlooked.

[17] Competent Authorities include statutory undertakers, as well as regulators which grant consents for regulated activities in the marine area. For example, DECC is a competent authority which regulates certain activities for wind farm, and oil and gas development.
[18] Heritage benefits, such as conservation of archaeological site, are the only benefits discussed that arguably sit outside the scope of nature conservation. Such benefits are still included.
[19] As described in Parliamentary Office of Science and Technology (2007).
[20] These are the categories used in the Millennium Ecosystem Assessment (MEA 2005), http://www.millenniumassessment.org [Accessed 01.11.11].
[21] Supporting services described as "those that are necessary for the production of all other ecosystem services" in the MEA
[22] For example, small marine organisms called phytoplankton form the basis of the food chain, ultimately ending in caught fish species. Valuing phytoplankton on its own in addition to these services they support would lead to double counting.
[23] For example, in MEA (page 7, Section 2) : http://www.millenniumassessment.org/documents/document.354.aspx.pdf.

# 4 COSTS AND BENEFITS OF OPTION 1: DESIGNATE THE SITE

## 4.1 Implications of designation

Possible minimum and maximum management measures have been estimated for the site so that the range of potential costs and benefits can be determined. The minimum scenario requires the smallest change compared to the baseline while the maximum scenario requires the most change and highest costs. Together these scenarios enable us to estimate the range of possible costs for the site to achieve the conservation objective of "maintain or restore" the reef feature to favourable condition. The range of potential measures is based on site characteristics (Table 2.1) and experience of managing similar sites elsewhere. Potential measures given here are only to estimate the possible financial costs of designation: they will not steer future decisions on management of the site.

**Table 4.1** Possible management scenarios for Solan Bank Reef pSAC

| Minimum scenario: | Maximum scenario: |
|---|---|
| Existing activities<br>No additional management of existing activities.<br><br>Proposed activities<br>No plans or projects in or near the site are currently known. It is assumed that, due to the location and nature of the site, that there will be no plans or projects undertaken near the site which are likely to have a significant effect on site integrity. | Existing activities<br>Ban all forms of demersal fishing over the site (including both static and towed gears).<br><br>Proposed activities<br>No plans or projects in or near the site are currently known. It is assumed that, due to the location and nature of the site, that there will be no plans or projects undertaken near the site which are likely to have a significant effect on site integrity. |

## 4.2 Costs

In line with the purposes of this IA, this section deals only with costs to the UK economy. Fishing activities from other Member States are considered within the fisheries section, but are not included in the costs calculated below.

### a) Shipping

There are not expected to be any changes to shipping over the site, so there are no increases to costs.

### b) Fisheries

*Potential UK economic impact of foregoing landings*

The site may not be at risk from current levels of fishing if fishers using towed demersal gear avoid the reef to preserve their gear. A minimum scenario may therefore see no additional management of fishing activity at the site. The maximum scenario might be a fully precautionary approach where the site could be closed to all forms of bottom-contact gear (towed and static). (In reality management measures are likely to be somewhere between these two extremes.)

It is likely that activity within areas closed to fishing will be displaced to other fishing grounds with impacts on profitability and fishers elsewhere. To provide an indication of the maximum direct effect of designation, the impact on the UK economy of foregoing the landings from bottom contacting gears from the entire pSAC is considered.

Using input-output multipliers allows analysis of the impact on the UK economy of loss of landings.

However, it should be noted that multipliers are limited to a static reflection of economic linkages that change with time. The multipliers used were recommended by Sea Fish Industry Authority (SeaFish 2007) as the best available and account for landings in UK ports. Loss of £1m of landings could lead to a reduction in[24].

- UK Employment by 65 Full Time Employment jobs; and
- UK GDP by £1.73 million.

Although it does not take account of the potential indirect effects of any reduction in landings (e.g. losses to fish processors and gear suppliers), these estimates give an indication of the scale of the economic impact from changes in fishing activity as a result of designation.

The economic impacts of the potential closure of Solan Bank Reef are estimated as the loss of profitability of fishing effort at the site. This is based on the 2009 survey on the profitability of fishing, (Seafish 2011), which shows that the net profit ratio does not exceed around 30% for any segments of the industry with most segments having much lower ratios. The figures calculated here are based on landings data for 2006-2009 (Annex 1). The Scottish Fishermen's Federation state that they expect landings from the Solan Bank Reef area to increase in 2012 (see section 2.5).

The value of landings from the pSAC are calculated by multiplying landings values for each ICES rectangle by gear type by the proportion of fishing effort in that rectangle that occurs over the pSAC. Only landings to the UK by UK registered vessels are included. More detail on these calculations and the distribution of fishing effort is provided in Appendix I. Profit is calculated as 30% of gross landings from the pSAC.

The costs shown below assume that the distribution of fishing effort is the same for all sizes of fishing vessel within each gear category as we do not have data on the distribution of fishing effort for vessels of 15 m or under. This may be particularly significant for small potting vessels which we have assumed fish across the pSAC matching the distribution of effort by over 15 m potting vessels (charts showing the distribution of fishing effort by gear type are included in Annex I).

**Table 4.2** Summary of management assumptions made in estimating costs to fisheries (Calculations are shown in Appendix I).

| **Minimum scenario** | **Assumptions** | **Change in costs** |
|---|---|---|
| No additional management of existing activities. | No additional information demonstrating that fishing at damages reef species. | None |
| **Maximum scenario** | **Assumptions** | **Change in costs** |
| Ban all forms of demersal fishing (including potting) over the whole site. | Profit estimated at 30% of average annual landings to UK ports by UK vessels from the pSAC (£194k.pa gross: £37k.pa from bottom otter trawls and 157k.pa from potting).<br><br>Vessels of 15 m or under fish in the same areas as larger vessels using the same gear. | Loss of total net profit for all demersal gear:<br><br>£58k.pa |

[24] Based on hybrid multipliers used in Table 3 ("The regionally disaggregated impact of £1m landings") of the report (SeaFish 2007). As data were not available at a regional level, the mean of the regional impacts was taken to represent the UK impact. http://www.seafish.org/upload/file/economics/FINAL-%20Input%20output%20report%20%20,full%20report.pdf [Accessed 1.11.11].

Under the maximum scenario vessels using demersal gear would be impacted: landings data for the ICES rectangles containing the pSAC show that these are primarily Scottish and English vessels. Scottish vessels used towed and static gear (largely bottom otter trawls and pots) while English vessels chiefly employed static gear (mainly pots). Catches were landed to a large number of Scottish ports, most frequently: Erribol, Kinlochbervie, Scrabster, Fraserburgh, Macduff, Peterhead, Aberdeen, Stromness and Lerwick.

No significant demersal catches from the ICES rectangles containing Solan Bank Reef pSAC were landed to foreign ports by UK registered vessels. Landings to the UK from foreign vessels have not been resolved at a site level but average annual demersal landings from *the whole of all of the ICES rectangles* containing the pSAC were £233 k pa. These landings were from chiefly from Irish registered potting vessels but also included French and Spanish vessels using bottom otter trawls and static longlines respectively. The landings were made to Ullapool, Lochinver and Scrabster.

### *Further analysis*

The analysis carried out to inform this IA was intended to provide an indication of economic impacts and their scale resulting from changes in fishing activity over the pSAC. Further information and analysis would be needed to understand more precisely how fishers would respond to measures and the impacts of their responses.

The SFF suggest that if demersal trawling was prohibited across all of Solan Bank Reef pSAC lost catches could not be wholly made-up elsewhere: they predict that this measure would impact fishers and fishery dependent communities. If the site was closed to creeling the SFF predicted that effort would immediately be displaced to other grounds with detrimental impacts to fishers there[25].

Where fishermen do find alternative grounds there may be implications on costs and profitability such as increased fuel and labour costs and potentially a higher proportion of time spent steaming rather than fishing and therefore reduced profitability. Alternative grounds may also be less productive and mean that fishing days are less productive and therefore less profitable.

In some cases, particularly where moving to an alternative ground would become unprofitable, individual fishermen may stop fishing. This change may not necessarily mean that total income to the sector will reduce, given fixed quotas for many stocks and if other vessels are able to draw on quota foregone, for example through co-operative arrangements. However, in many cases this will not happen. Quotas are often not fully used in any case and some stocks are not subject to quota. Where individual fishermen stop fishing then there may also be implications to the fishermen themselves wider than foregone revenue, such as: the need to dispose of a vessel, potential decline in the market value of vessels and potential decline in the value of quotas.

Given the issues above, it is very difficult to predict how individual fishermen will respond to closures and the associated cost implications. At this stage the best that can be done for most of the closures is to provide an indication of the profitability of fishing within the area and suggest that the direct effect of a closure would be to reduce the profitability of the area by some margin.

A further important issue is that any closures, even if undertaken unilaterally by the UK, would have to be agreed with other Member States of the European Union through the CFP. It is assumed that this process may take a minimum of a year to carry out and therefore that closures would not be in place until 2014. Although it may take longer than this period to actually put measures in place, using the minimum timeframe it ensures that the costs are not underestimated.

[25] This information was provided in the SFF's written response to the Consultation Impact Assessment for Solan Bank Reef, in June 2012.

It is recognised that fishers are currently subject to a combination of impacts including marine SAC designations, proposed Marine Protected Area designations, and renewable energy related developments, however consideration of cumulative impacts is beyond the scope of this IA.

### c) Administration costs to Government

The estimate of the costs to Government arising as a result of the SAC designation have been largely based on the Financial Memorandum, published in relation to the Marine (Scotland) Act 2010. This presents a summary of the costs to the Scottish Government for implementing new marine site conservation measures[26].

One-off costs are related to: consultation, developing management schemes, and statutory instruments. Key stakeholders are likely to include the Scottish Government, fishers and their representatives, JNCC, Scottish Natural Heritage, and non-government conservation organisations. Further work could also be required to assess the impacts of present-day activities.

Monitoring would be undertaken by JNCC: an initial detailed survey would provide baseline information on the topography, geology and ecology of the reef; subsequent surveys would monitor the condition of the site and fulfilment of its Conservation Objectives, on a five year cycle. Survey techniques have not yet been decided but are likely to include acoustic mapping and ground truthing by video or grab sampling.

Marine and aerial surveillance in the vicinity of the wider area already takes place and ensure compliance with fisheries restrictions.

Costs to government are summarised as:

*i.* *Requirements to review and manage existing activities.* It is assumed that work is necessary to develop, implement and communicate site-specific management measures. One-off costs of this work are estimated at £77k (£50k for consultation, £23k for work on management schemes and £4k for statutory instruments).
*ii.* *Enforcement.* Additional enforcement costs (e.g. prosecutions) to Marine Scotland Compliance for any fisheries management measures are estimated to be £12k annually. This cost is assumed to start in 2014 when fisheries management measures are predicted to be in place.
*iii.* *Ecological assessment and monitoring.* Assessment and monitoring costs are estimated at a one-off cost of £342k for baseline information gathering (assumed to occur in 2013) and further costs of £250k every five years for monitoring (assumed to first occur in 2018)[27]. Note that these are tentative average estimates based the cost of previous surveys and assume work is carried out under partnership agreements rather than at commercial rates. The estimates are precautionary and may significantly decrease - JNCC aims to refine their survey and monitoring plans in 2012 and new timings and costs will be incorporated in this IA if they become available.

This IA assumes that administration costs are the same for minimum and maximum scenarios. Under both scenarios estimated impacts are one-off costs of £669k and annual costs of £12k.

## 4.3 Benefits of designating the site

Protecting the Solan Bank Reef site from damage will enable species that are associated with the reef to grow, feed and reproduce. Some species live primarily on the reef (e.g. sponges and corals) while others (e.g. certain fish and shellfish) may use the reef temporarily for feeding, reproduction or protection. The benefits of protecting the reef habitat are both site-specific and Europe wide (as part of the network of Natura 2000 sites). Wider benefits occur because animals and plants disperse to other

[26] Summary of Costs to the Scottish Government for Implementing New Site Protection Measures in the Marine (Scotland) Bill: Final Regulatory Impact Assessment 2009. (Paragraph 96)
[27] N.Golding JNCC *pers. comm.* 7.11.2011

areas (e.g. invertebrates release larvae into the water which are swept to new sites by ocean currents). Together the Natura 2000 sites help towards maintaining and restoring the quality, productivity and diversity of marine ecosystems in European waters: these functions are vital for the sustainable delivery of ecosystem services. Benefits of designating the site are discussed below in terms of ecosystem services.

Fishing occurs over or adjacent to Solan Bank Reef (Appendix 1) but we do not know if it impacts the reef community directly[28]. If the reef was not designated it would remain at risk of damage from demersal fishing which can cause physical damage and removes fish and shellfish. Tall fauna which attach solidly to rocky surfaces are common; they include sponges and bryozoans. Such species are vulnerable to abrasion damage from demersal fishing and can be very slow to recover from such damage. More detailed information on the sensitivity and exposure of the reef to fishing is given in Solan Bank Reef draft Conservation Objectives and Advice on Operations. Deterioration of the stony or bedrock reef would undermine the aims of the EC Habitats Directive to maintain or restore Annex I habitats and their species to favourable conservation status. It would also prevent the site from delivering the beneficial ecosystem services described below.

## a) Provisioning services

*Fish, shellfish and other crustaceans for human consumption*

The topography and benthic communities of Solan Bank Reef provide a local 'island' of heterogeneous habitat within the wider geographic area off northern Scotland. Such structures have been shown to increase the number of juvenile fish species surviving to adulthood in other regions (e.g. Connell and Jones 2003 – New Zealand) by offering refugia from predation and competition.

## b) Regulating services

Regulating services are not mentioned further here as their value is considered to be minimal at a site level.

## c) Types of value

*Option Values*

Some people will gain from having the option to benefit in future from conservation of a good example of reef habitat, even if they do not currently plan to benefit from it (option value). This arises because if the site is not protected now there may not be good examples of reef habitat still available to conserve in future. Also, some will gain from knowing that it is conserved in case future information reveals that the reef habitat provides important benefits that we are not currently aware of (quasi-option value).

*Non-use Values*

Some people will gain from having the option to benefit in future from conservation of a good example of reef, even if they do not currently plan to benefit from it (option value). This arises because if the site is not protected now there may not be good examples of reef to conserve in future. Also, some will gain from knowing that it is conserved in case future information reveals that the reef provides important benefits that we are not currently aware of (quasi-option value).

There is reliable evidence in the UK and elsewhere that the general population has significant positive non-use values associated with rare species (see for example Christie *et al.* 2004 for general discussion or White, *et al.* 2001 for examples of value of conservation of specific mammal species). Additionally, Beaumont *et al.* (2006) estimate the non-use value of biodiversity of the UK marine environment at £0.5-1.1 billion per year across the UK population.

The effects of designation of Solan Bank Reef for the provision of each of the ecosystem services described above is summarised in Table 4.3 below as the difference due to site designation in comparison to the baseline (no designation). It is assumed that fisheries management measures and

[28] Solan Bank Reef SAC: Draft Conservation Objectives and Advice on Operations v2.0 JNCC

ecological monitoring will occur if the site is designated while if the site is not designated fishing will continue at current levels and the reef habitat will not be monitored.

There are four additional columns of information in the table to clarify our understanding of the qualitative changes in ecosystem services arising from (non-) designation:

- ***Relevance*** Relating to the amount of ecosystem good or function arising from site
- ***Value weighting*** Categorisation of how valuable the amount of ecosystem good or function from the site is in providing benefits to human population
- ***Scale of benefits*** Consideration of actual potential to deliver benefits (for example considering leakage, delivery to human population, etc.)
- ***Confidence*** Level of confidence in our current knowledge of all other categories (in other words, scale of benefit, level of improvement, etc.)

Based on the above categories, an overall level of each ecosystem service is defined with its own confidence level. Following, an overall level of total benefits is also defined.

The parameters are assigned a level for each service from a menu, defined as:

- ***Nil*** Not present/none.
- ***Minimal*** Present at a very low level, unlikely to be large enough to make a noticeable impact on ecosystem services.
- ***Low*** Present/detectable, may have a small noticeable impact on ecosystem services, but unlikely to cause a meaningful change to site's condition.
- ***Moderate*** Present/detectable, noticeable incremental change to site's condition.
  ***High*** Present/detectable order of magnitude impact on sites condition.

**Table 4.3** Potential significance of ecosystem services improvements for Solan Bank Reef pSAC

| Services | Relevance to site | Baseline Decline | Designate Min management | Designate Max management | Value weighting | Scale of benefits | Confidence |
|---|---|---|---|---|---|---|---|
| *Fish for human consumption* | **Low.** May provide shelter and habitat heterogeneity for commercially exploited fish and shellfish. | **Low.** Interruption of lifecycle processes could mean significant decline. | **Low.** Fishing continues at current levels. | **Low- Moderate.** Improvement on site may support species of human interest and crustaceans could 'spill-over' to the surrounding area. | **Moderate**. One of a few hard outcrops in a largely sedimentary area. | **Low.** Increase in stocks may be to be offset by declines elsewhere caused by displacement of fishing. | **Low.** |
| *Fish for non-human consumption* | | | | | | | |
| *Carbon sequestration* | **Minimal.** Features are likely to have low effect. | **Minimal.** Unlikely to affect biological pump. | **Minimal.** Unlikely to affect biological pump. | **Minimal.** Unlikely to affect biological pump. | **Moderate**. High value but site plays minimal role. | **Minimal** | **Moderate**. Biological pump not well understood. |
| *Waste assimilation* | **Minimal.** The features are likely to have a low effect and cover a small area. | **Minimal.** Unlikely to affect assimilation functions. | **Minimal.** Unlikely to affect assimilation functions and processes. | **Minimal.** Unlikely to affect assimilation. | **Minimal.** Site plays minimal role. | **Nil.** | **Moderate**. Assimilation not well understood. |
| *Non-use value of natural environment* | **Low- Moderate.** Public has preference for rare and visually appealing features. | **Low.** Impacts not known maybe slow decline. | **Low-Moderate.** Impacts not known maybe slow decline. | **Low-Moderate.** Some recovery of biodiversity and community composition possible. | **Moderate.** All UK population is relevant but relatively low value per capita. | **Low - Moderate** | **Low.** Charismatic marine mammals which may have higher non-use values. |
| *Scientific research* | **Low.** Some basic scientific value, but level of uniqueness is unclear. | **Low.** Degradation could remove scientific value. | **Low-Moderate.** Degradation could remove scientific value. | **Low-Moderate.** Some recovery of biodiversity and community composition possible. | **Moderate.** For sediment management & biological resources. | **Low - Moderate** | **Moderate**. |
| **Total value of changes in ecosystem services** | | | **Low- Moderate for both scenarios** | | | | **Low-Moderate** |

### d) Benefits to economic activity

Designation of sites may assist the different sectors that make use of the marine environment in the context of marine spatial planning and a more strategic consideration of available resources. This support would mean that sectors can undertake future plans and applications for their operations (for example applications for licenses) with the better knowledge of a) the nature conservation significance of different parts of the marine environment, and b) the added costs of these applications within or adjacent to a site boundary, as opposed to outside of it. This could focus activity away from a site if resources are available.

## 4.4 Summary of costs and benefits

Table 4.4 below summarises the potential costs and benefits of the site. Costs are analysed over a period of 10 years from designation in 2012, and are discounted at 3.5% pa [29]. There are uncertainties in the assessment of costs, and some costs have not been quantified.

[29] HM Treasury, The Green Book: http://www.hm-treasury.gov.uk/data_greenbook_index.htm

**Table 4.4** Summary costs and benefits table for Option 1: Designate the site.

| | **Minimum management scenario** | | **Maximum management scenario** | |
|---|---|---|---|---|
| | **Costs** | **Benefits** | **Costs** | **Benefits** |
| **Assessed** | **Sectors**<br>Shipping: £0<br>Fishing: £0<br>Government:<br>Enforcement £12k.pa<br>Management £77 one-off<br>Ecological assessment<br>£342k one-off, and<br>£250k 'one-off'(every five years) | Low-Moderate: possible impacts scientific and non-use values. | **Sectors**<br>Shipping: £0<br>Fishing: £58k.pa<br>Government:<br>Enforcement £12k.pa<br>Management £77 one-off<br>Ecological assessment<br>£342k one-off, and<br>£250k 'one-off'(every five years) | Low-Moderate: beneficial impacts on values of fish and shellfish, scientific and non-use natural environment. |
| **Total annual** | £12k.pa | Low | £70k.pa | Low |
| **Total one-off** | £669k | | £669k | |
| **Total (Present Value*)** | £691k | Low-Moderate | £1076k | Low-Moderate |
| **Not assessed** | • Costs if any projects are refused<br>• Costs from cumulative MPA impacts and beyond next 10 years. | • Role of feature in wider ecosystem including suite of marine SACs<br>• Intrinsic value of biodiversity improvements<br>• Ecosystem recovery beyond next 10 years. | • Costs if any projects are refused<br>• Costs from cumulative MPA impacts and beyond next 10 years | • Role of feature in wider ecosystem including suite of marine SACs.<br>• Possible benefits to shellfish and fish stocks.<br>• Intrinsic value of biodiversity improvements<br>• Ecosystem recovery beyond next 10 years |

(*this is the value over 10 years with the annual green book discount applied to costs occurring after 2012.)

*Risk of unintended consequences*

The main risks of unintended consequences are assessed to be the following:

- Fishermen may seek compensation for moving grounds.
- Displacement of fishing effort to alternative grounds may intensify fishing at those grounds to unsustainable levels, causing net damage to fish stocks overall.

Each of these risks is greater under the maximum scenario, and when considered cumulatively with other SAC designations and marine planning restrictions (e.g. MoD activity, shipping, fishing). Some of these risks can be mitigated by involving stakeholders in the process of designation.

Under the habitats regulations, and following an Appropriate Assessment, a Competent Authority can agree to a plan or project for imperative reasons of overriding public interest (even where a project would have an adverse effect on site integrity). Assessing such grounds would entail additional costs.

## 4.5 Impact tests

Consideration has been given within the main body of this assessment to relevant and identifiable environmental impacts and effects on sustainable development of designating Solan Bank SAC.

The further tests specified by the IA guidance are considered here.

### a) Competition assessment

This assessment, shown in Table 4.5 is restricted to the sectors where significant potential costs are identified in Table 4.4 above, namely fisheries and Government. The table analyses the impact of the maximum potential management measures that may be required (which represent the maximum impact on activities in the site). The maximum scenario is used to assess whether any significant impact is likely. A more detailed assessment of likely impacts should also take into account the minimum scenario. Cumulative impacts of designation of Natura 2000 sites in the marine environment could have more significant effects on competition in some sectors. It is assumed that any management measures will apply to domestic and foreign operations.

The designation of the site is not expected to have a significant impact on competition.

**Table 4.5 Competition assessment for Solan Bank Reef pSAC**

| *Would the proposal:* | *Fisheries* |
|---|---|
| *1. Directly limit the number or range of suppliers?* | No direct restrictions |
| *2. Indirectly limit the number or range of suppliers?* | The main tests of this parameter are whether the policy is expected to:<br>- raise significantly the costs of new suppliers relative to existing suppliers;<br>- raise significantly the costs of some existing suppliers relative to other existing suppliers; or<br>- raise significantly the costs of entering, or exiting, the affected market.<br>In general these factors should not be realised although if some fishing gear types are considered more damaging than others management measures may impose restrictions on those gear types raising their costs relative to other gear types. |
| *3. Limit the ability of suppliers to compete?* | No restrictions on factors on which suppliers can compete. |
| *4. Reduce suppliers' incentives to compete vigorously?* | No reduction of incentive to compete. |

### b) Small firms impact test

Small and Medium Enterprises (SMEs) are considered for these purposes to be those with fewer than 250 employees. The industries potentially affected by the designation with a significant number of SMEs are related to fishing.

In the fishing industry it is likely that the fishing vessels that may be adversely affected by any additional management measures would be owned by SMEs and in most cases the company would not own more than one vessel. The number of fishing vessels affected would depend on the actual management measures implemented. Under the maximum scenario, the profitability of some small fishing businesses could potentially be affected. For example, their adaptations to the management measures for the site may increase costs, reduce value of landings or both.

Down-stream and up-stream effects in other sectors could also impact on SMEs, but impacted activities are likely to be displaced, at least partly to other locations in the UK economy, limiting the overall impact on SME's in the UK. For example, there are a number of SMEs which are directly and indirectly connected to the fishing sector, which could potentially be impacted on by designation. These include, the retail trade (fish mongers, markets) fish processing plants, ship builders and diesel suppliers.

### c) Legal aid

No new criminal penalties are introduced by these proposals therefore we do not anticipate that there will be an impact on the Legal Aid Fund.

### d) Carbon assessment

The impact of designating the site on greenhouse gas emissions is unknown but not expected to be significant. If fishing vessels have to travel longer distances to access alternative fishing grounds this would increase emissions depending on vessel size and whether they already operate over a variety of fishing grounds.

### e) Rural proofing

Some of the economic costs identified in relation to fisheries and other sectors may occur in remote coastal communities in predominantly rural areas of the UK. Due to the less diversified nature of their local economies, the potential impacts may be relatively more important as a proportion of economic activity in these locations.

### f) Other impact tests

The effect of designating the site on health, disability, race, gender equality and human rights has been considered and it is not thought to have an impact. Consequently these impact tests are not examined further here.

# 5 CONCLUSIONS

The purpose of this IA is to provide information about the benefits and impacts of the designation of Solan Bank Reef pSAC to inform stakeholders and Government about the options for the site. This assessment considered the impacts of Option 1 (designating the site) relative to the baseline (to not designate the site).

Designating this site will protect a reef habitat, and its associatied species, which are of European biodiversity importance, from damage by marine industries. In addition to conservation of the local reef habitat there are wider network and strategic benefits on biodiversity through the Natura suite of marine SACs. (Establishing a network of protected sites is a key purpose of the Habitats Directive.) Healthy and diverse marine ecosystems underpin the sustainable delivery of ecosystem services beyond the next 10 years. These benefits are difficult to monitise and have been presented qualitatively.

Designation of the site may also result in the restriction of certain types of fishing and therefore potential costs to fishers have been assessed. No other industries are likey to be impacted, but there are costs to Government in administering, enforcing and monitoring the proposed SAC.

As specific management measures for the site will be developed after it has been designated, it is necessary to make assumptions about the measures that might be required. This assessment analysed the impacts of a range of potential management scenarios. The reef is vulnerable to damage from demersal fishing, but we do not know if it is currently impacted. If not designated the reef would not be routinely surveyed and could be damaged by fishing in the future. The UK Government could risk infraction proceedings, and large fines from the EC, should this site not be designated.

The minimum scenario involves the smallest change in activities that may be needed compared with the baseline and therefore presents the minimum potential effect on activities. The maximum scenario entails the largest change in activities that may be needed compared with the baseline and thereby presents the maximum potential effect on activities.

As Table 4.4 shows, under Option 1 (for the 10 years of IA framework): the minimum management scenario estimated total costs at £691k over ten years. Costs are higher under the maximum management scenario (£1, 076k). Indirect costs from potential fisheries losses have not been examined quantitatively. Both scenarios bring low to moderate benefits for non-use attributes and scientific research and knowledge; the maximum scenario also brings potential benefits for fish and shellfish.

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# ANNEXES

# ANNEX I: CALCULATIONS OF COSTS TO FISHING INDUSTRY BY GEAR TYPE

The distribution of UK over 15m vessels that have a vessel monitoring systems (VMS) is shown below. Vessel monitoring systems provide a vessel's position, its speed and heading either hourly or every two hours. As vessels fish at characteristic speeds, VMS data can be processed to provide proxy patterns of 'active fishing' based on speed. This analysis is a coarse but effective means of estimating fishing effort[1], particularly for towed gear; it is less reliable for set gear such as pots and nets.

The data mapped here were generated by Cefas from VMS, log-book, and EU vessel register data for UK registered vessels in 2006-9[2]. Fishing is estimated using a simple speed rule where 1-6 knots represents fishing activity. These data enabled fishing effort both inside and outside of the pSAC to be estimated by ICES rectangle: the value of catches from the pSAC could then be estimated by partitioning landings values for each rectangle accordingly. Maps of fishing activity for dominant gears are shown here (including pelagic gears). Calculations are only presented for vessels using demersal gear as these may be impacted by future management at the site. Landings data by ICES rectangle were sourced from Marine Scotland and the Marine Management Organisation, only landings data for UK registered vessels landing to UK ports are included in these analyses.

[1] Lee J, South, A B and Jennings, S. (2010) Developing reliable, repeatable, and accessible methods to provide high-resolution estimates of fishing-effort distributions from vessel monitoring system (VMS) data. ICES Journal of Marine Science 67: 1260-1271.

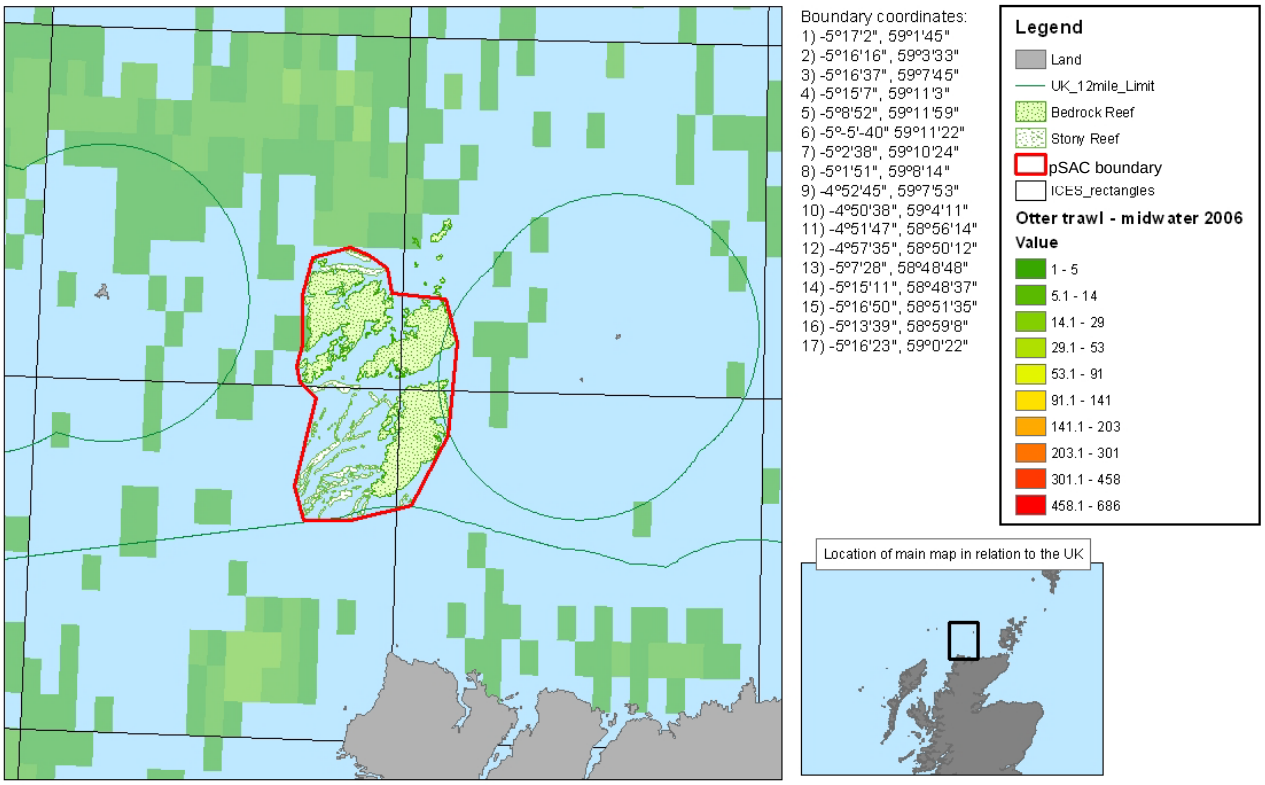
[2] Cefas (2010) Report no. 1: Objective 1 – Provision of geo-database containing standardised layers showing the distribution of specified activities, sites and resources with associated metadata and comments. Project MB106: Further development of marine pressure data layers and ensuring the socio-economic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

Landings by UK registered demersal fishing vessels to UK ports, partitioned by ICES rectangle and fishing effort over the site (Solan Bank Reef pSAC). (Some inconsistencies arise between VMS and landings data because of the different ways the data are collected.) Note that landings data are for all vessels while VMS data are only for vessels over 15m: for these calculations it has been assumed that all vessels fish in the same locations.

| ICES | 2006 | | | 2007 | | | 2008 | | | 2009 | | | Average | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Value from ICES (£) | % of landings from site | Value from site (£) | Value from ICES (£) | % of landings from site | Value from site (£) | Value from ICES (£) | % of landings from site | Value from site (£) | Value from ICES (£) | % of landings from site | Value from site (£) | % of landings from site | Value from site (£) |
| **Otter trawl (bottom)** | | | | | | | | | | | | | | |
| 46E4 | 289,134 | 1 | 2,574 | 208,947 | 3 | 7,219 | 245,213 | 4 | 9,351 | 200,792 | 2 | 4,220 | 3 | 5,841 |
| 46E5 | 323,179 | 0 | 0 | 159,355 | 4 | 6,663 | 290,696 | 0 | 0 | 169,748 | 0 | 337 | 1 | 1,750 |
| 47E4 | 145,739 | 13 | 18,753 | 173,439 | 15 | 26,457 | 108,067 | 9 | 9,251 | 198,610 | 15 | 29,158 | 13 | 20,905 |
| 47E5 | 807,624 | 1 | 5,728 | 716,949 | 2 | 11,431 | 1,043,179 | 1 | 10,016 | 851,825 | 1 | 6,476 | 1 | 8,412 |
| **TOTAL** | | | **27,055** | | | **51,769** | | | **28,618** | | | **40,190** | | **36,908** |
| **Potting** | | | | | | | | | | | | | | |
| 46E4 | 252,077 | 23 | 58,771 | 441,830 | 17 | 74,831 | 197,685 | 12 | 23,501 | 237,509 | 11 | 24,951 | 16 | 45,513 |
| 46E5 | 434,587 | 7 | 31,437 | 406,600 | 10 | 41,445 | 334,811 | 9 | 31,249 | 501,400 | 8 | 38,569 | 9 | 35,675 |
| 47E4 | 848,953 | 4 | 30,848 | 811,491 | 3 | 23,924 | 342,572 | 5 | 16,581 | 513,517 | 9 | 47,963 | 5 | 29,829 |
| 47E5 | 997,541 | 5 | 48,063 | 855,760 | 4 | 32,521 | 967,924 | 5 | 50,682 | 963,671 | 6 | 53,379 | 5 | 46,161 |
| **TOTAL** | | | **169,119** | | | **172,720** | | | **122,013** | | | **164,863** | | **157,179** |

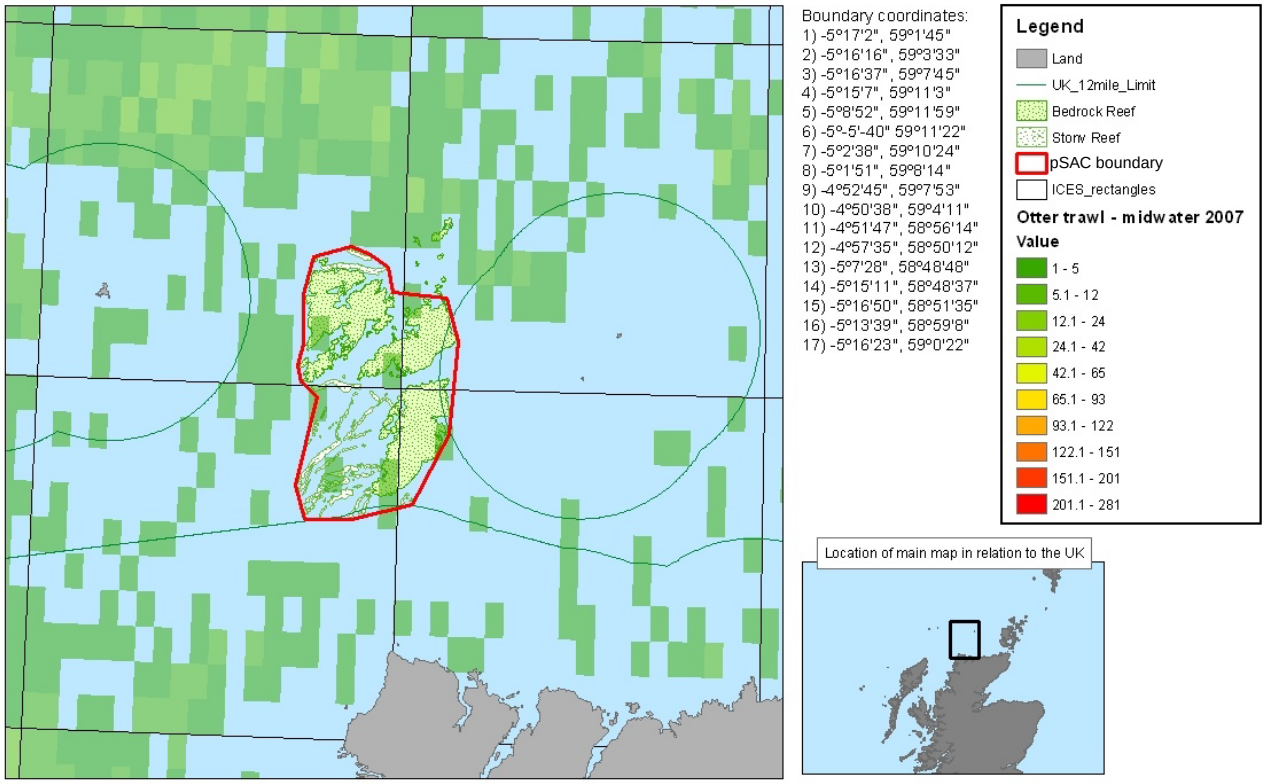
# Otter trawling (midwater)

## Distribution of UK-registered otter (mid) trawl activity (hrs fished pa) (2006)



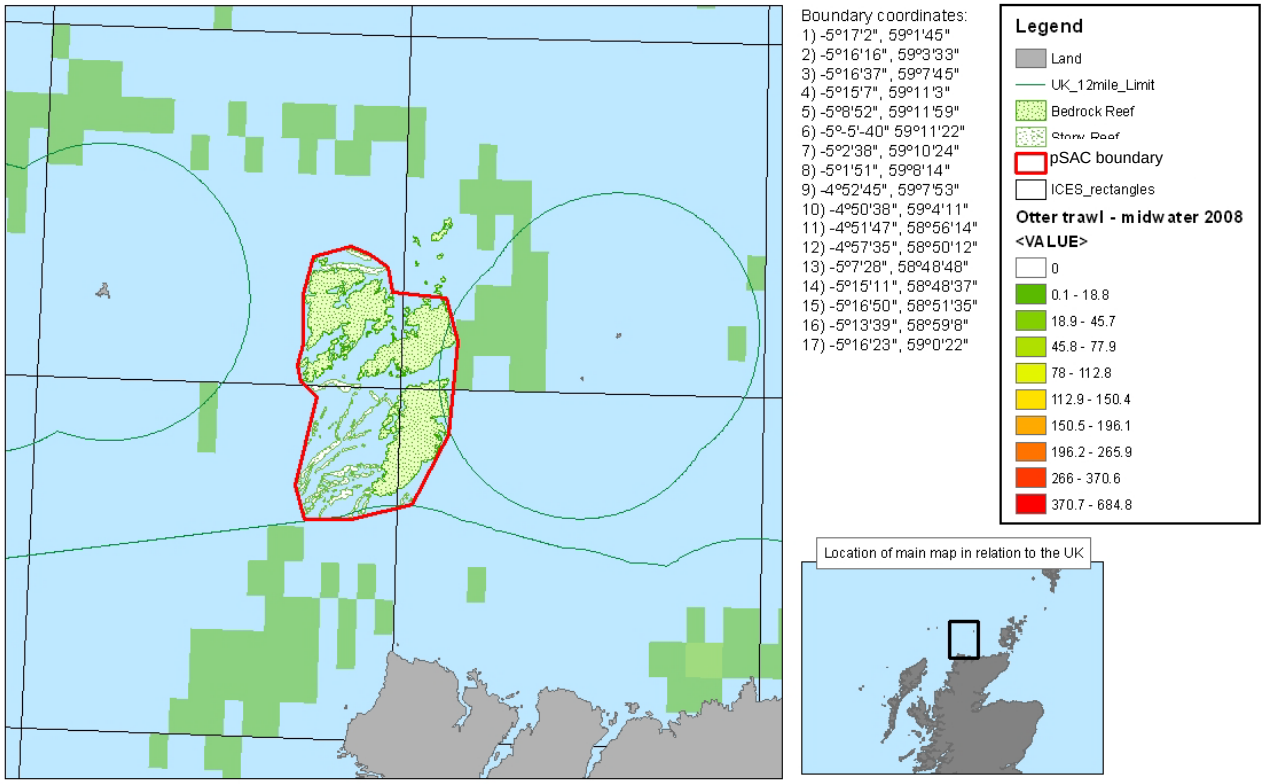

Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

## Distribution of UK-registered otter (mid) trawl activity (hrs fished pa) (2007)



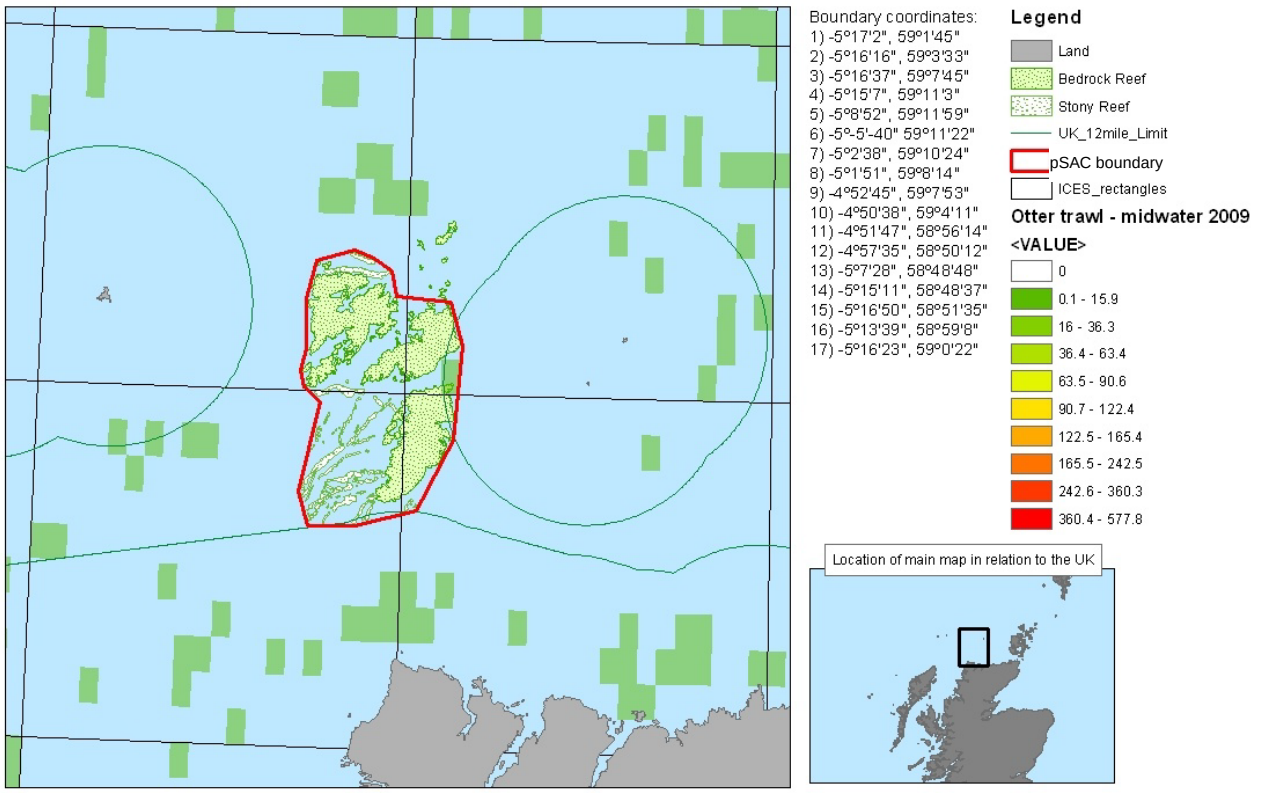

Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

## Distribution of UK-registered otter (mid) trawl activity (hrs fished pa) (2008)




Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

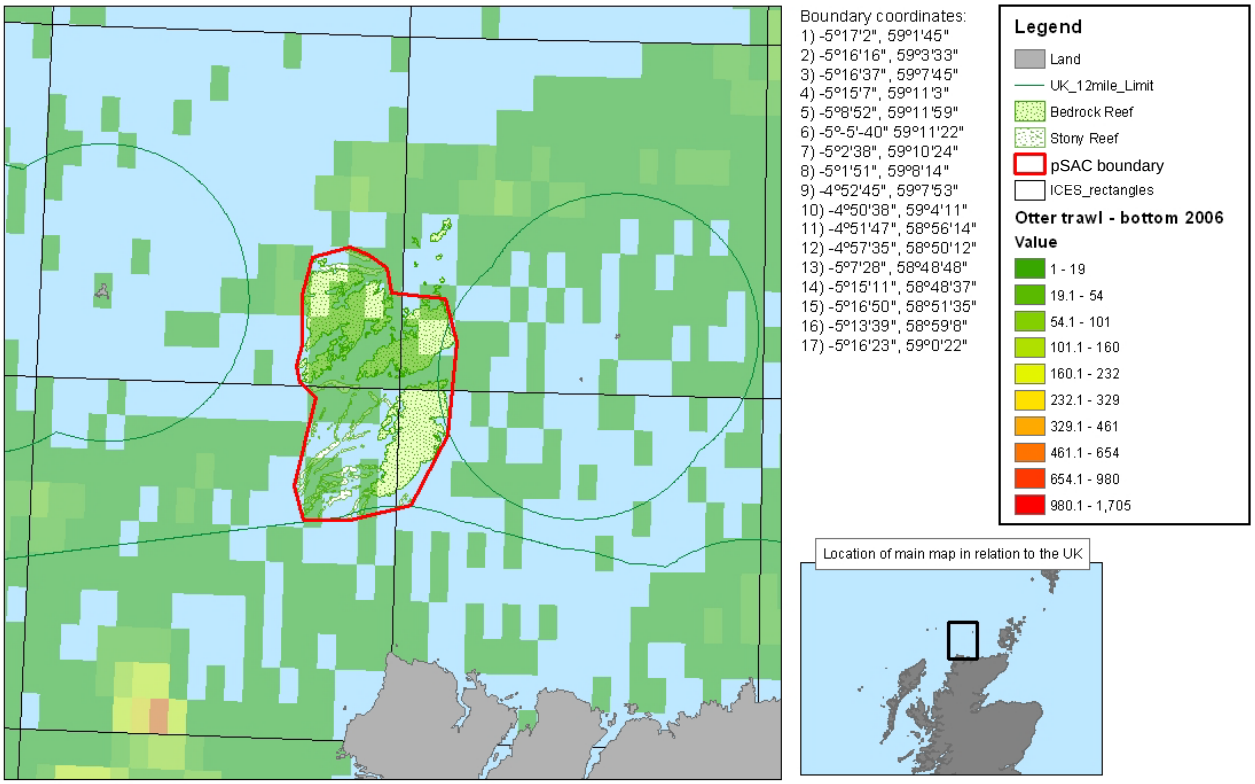
## Distribution of UK-registered otter (mid) trawl activity (hrs fished pa) (2009)




Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

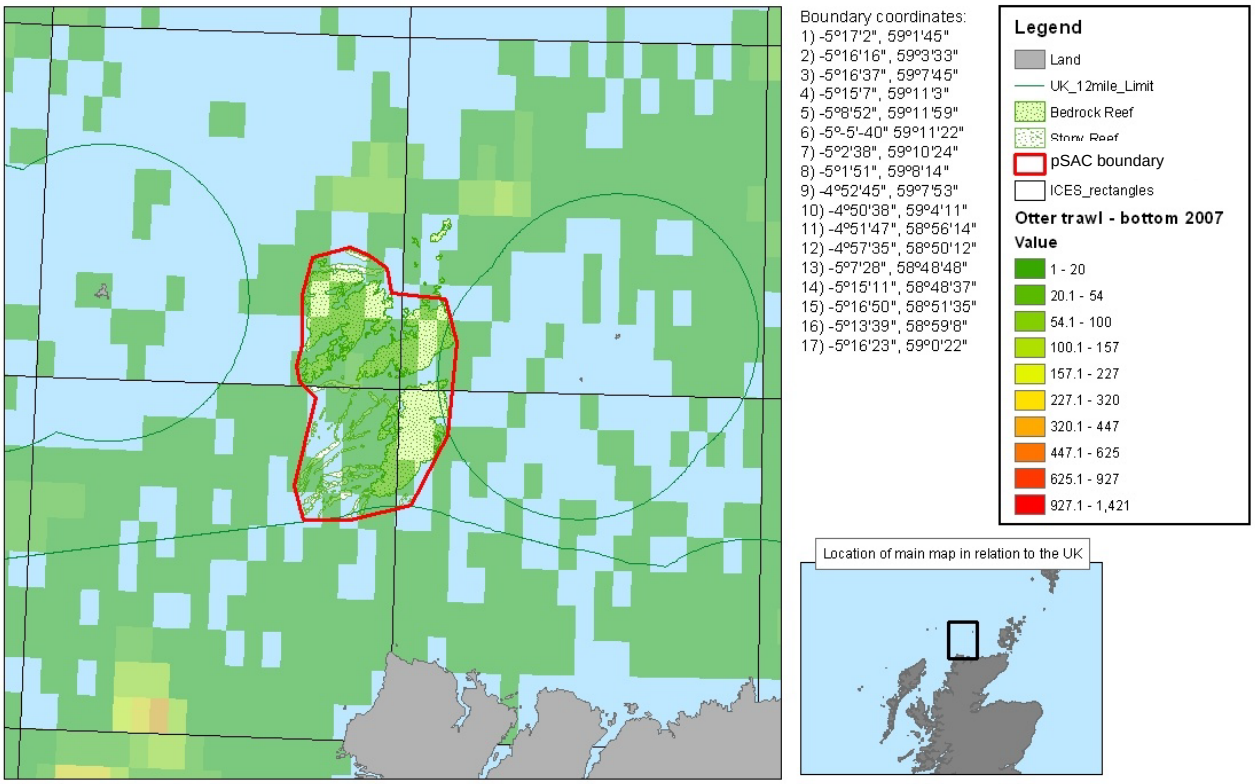
# Bottom trawling

## Distribution of UK-registered otter trawl (bottom) activity (hrs fished pa) (2006)



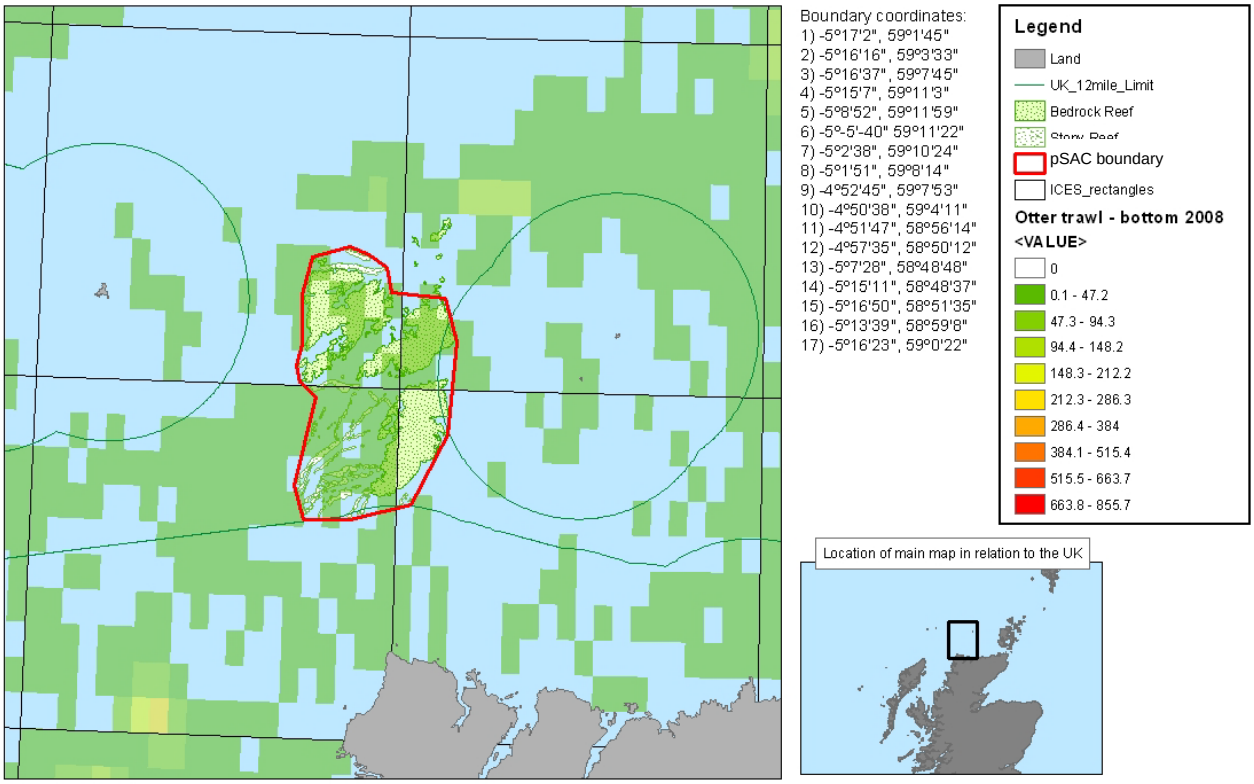

Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

## Distribution of UK-registered otter trawl (bottom) activity (hrs fished pa) (2007)



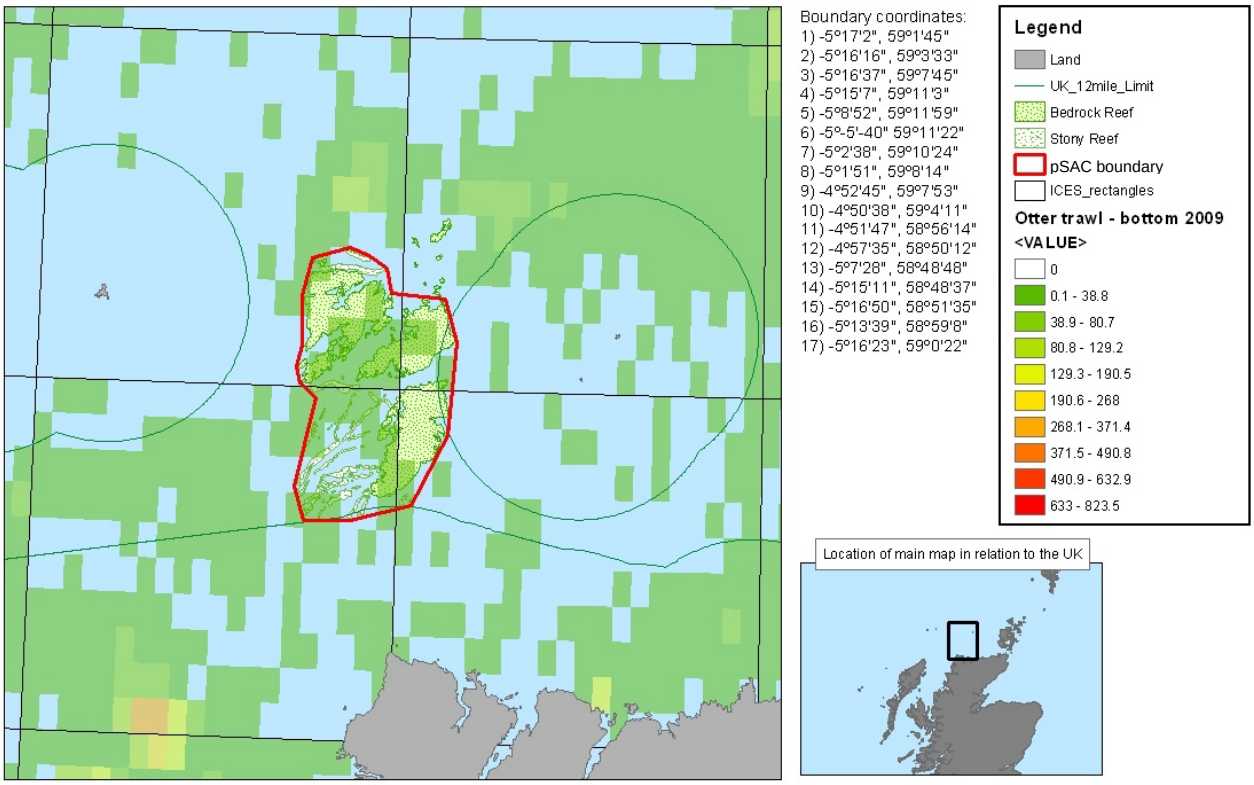

Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

## Distribution of UK-registered otter trawl (bottom) activity (hrs fished pa) (2008)




Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

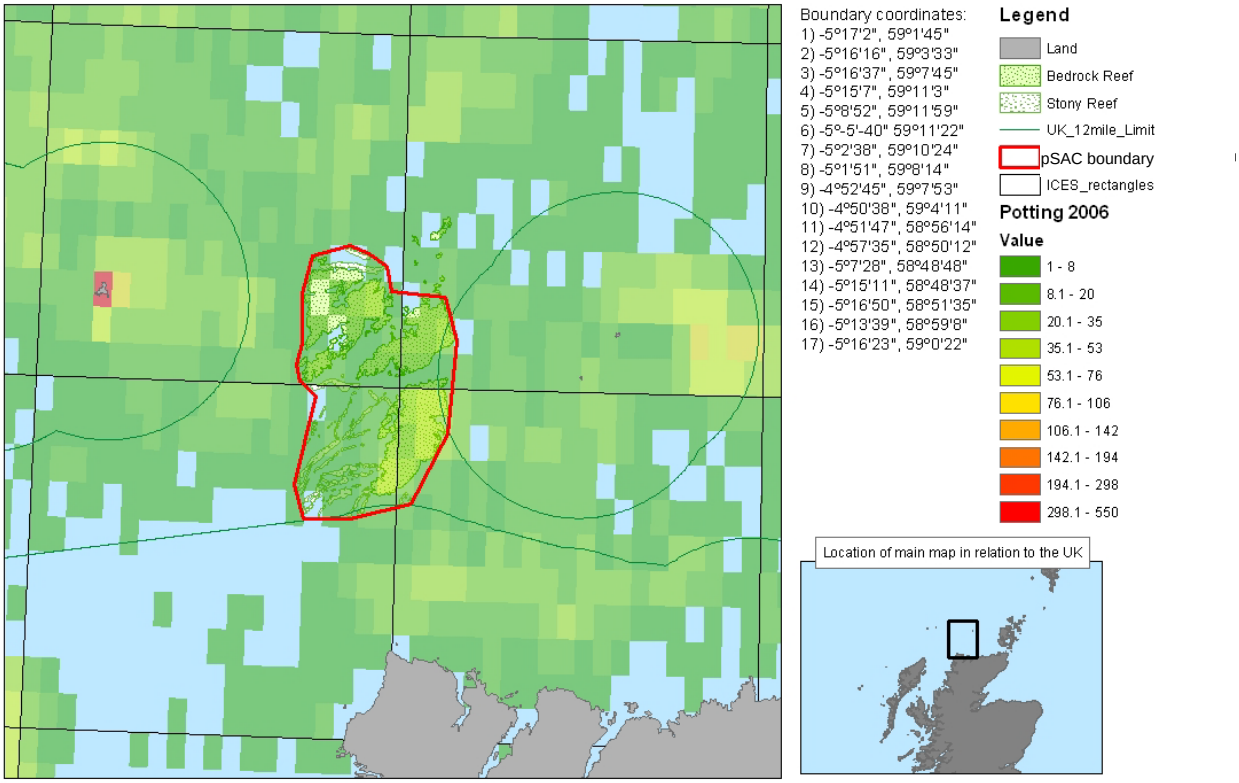
## Distribution of UK-registered otter trawl (bottom) activity (hrs fished pa) (2009)




Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

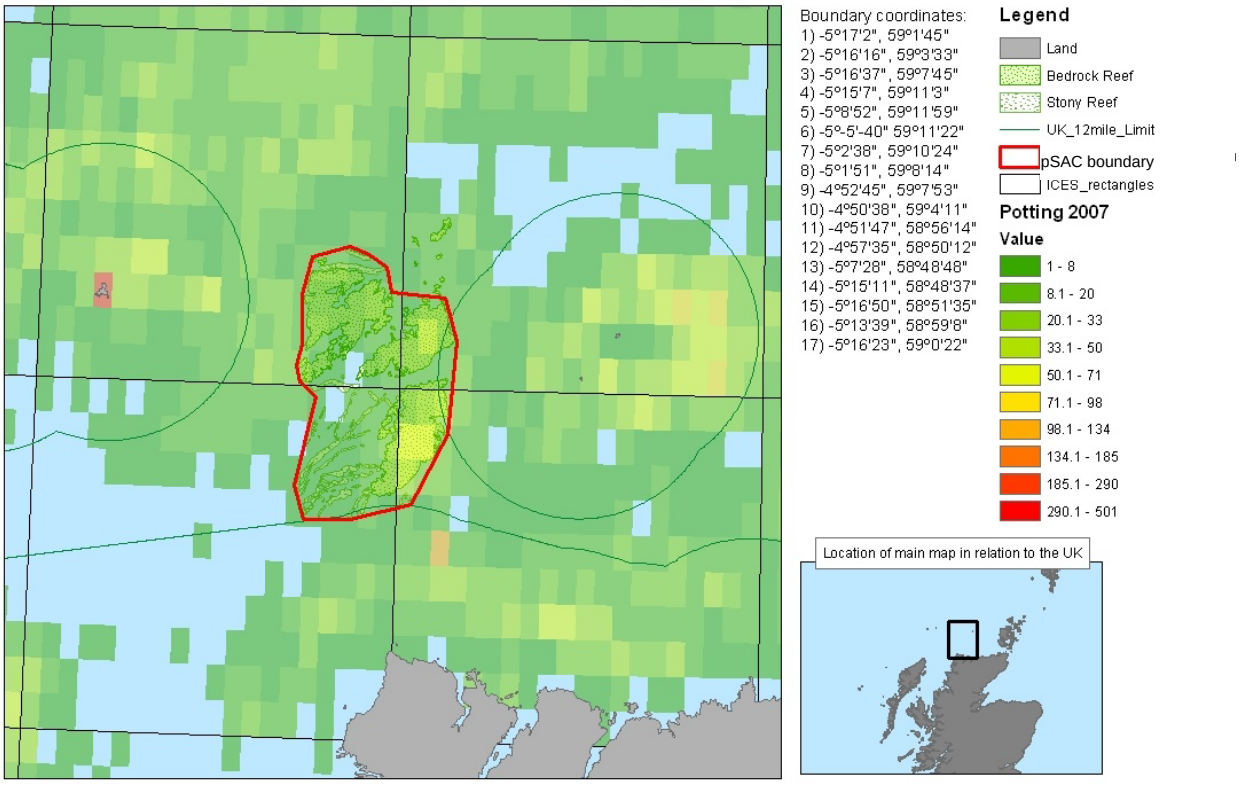
# Potting

## Distribution of UK-registered potting activity (hrs fished pa) (2006)



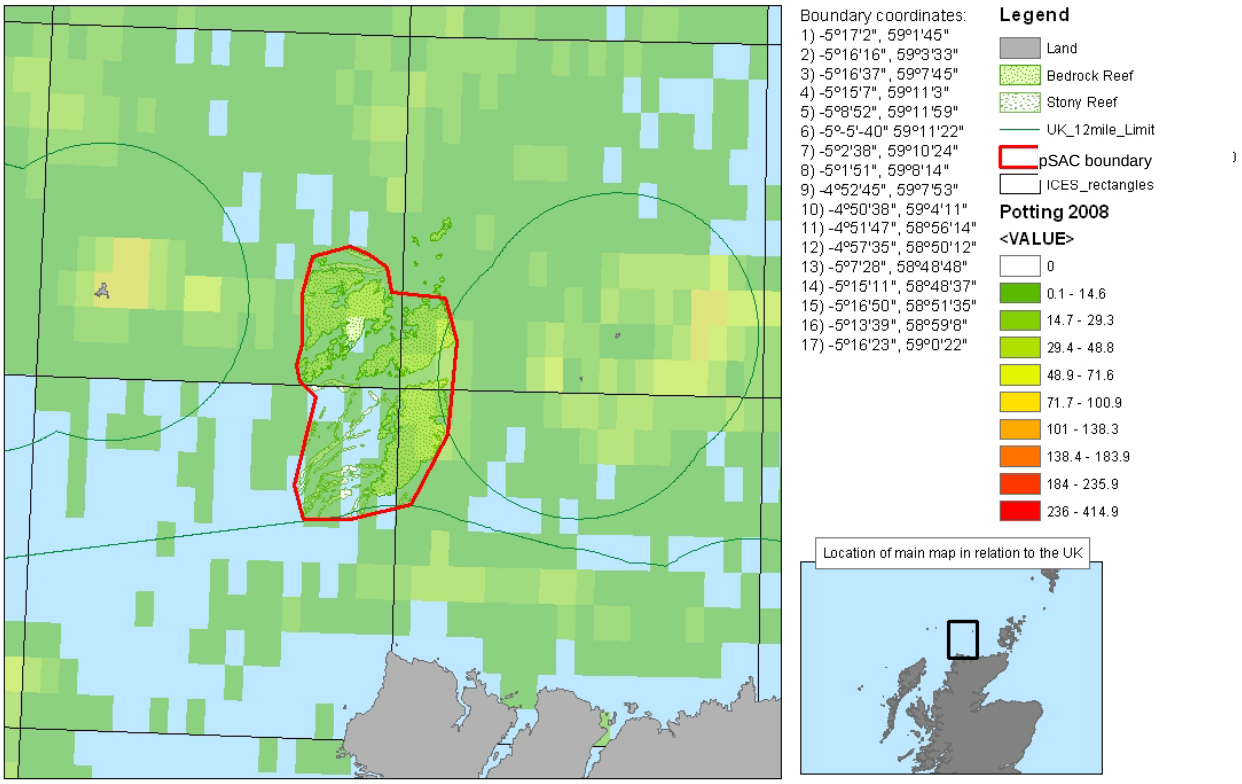

Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

## Distribution of UK-registered potting activity (hrs fished pa) (2007)



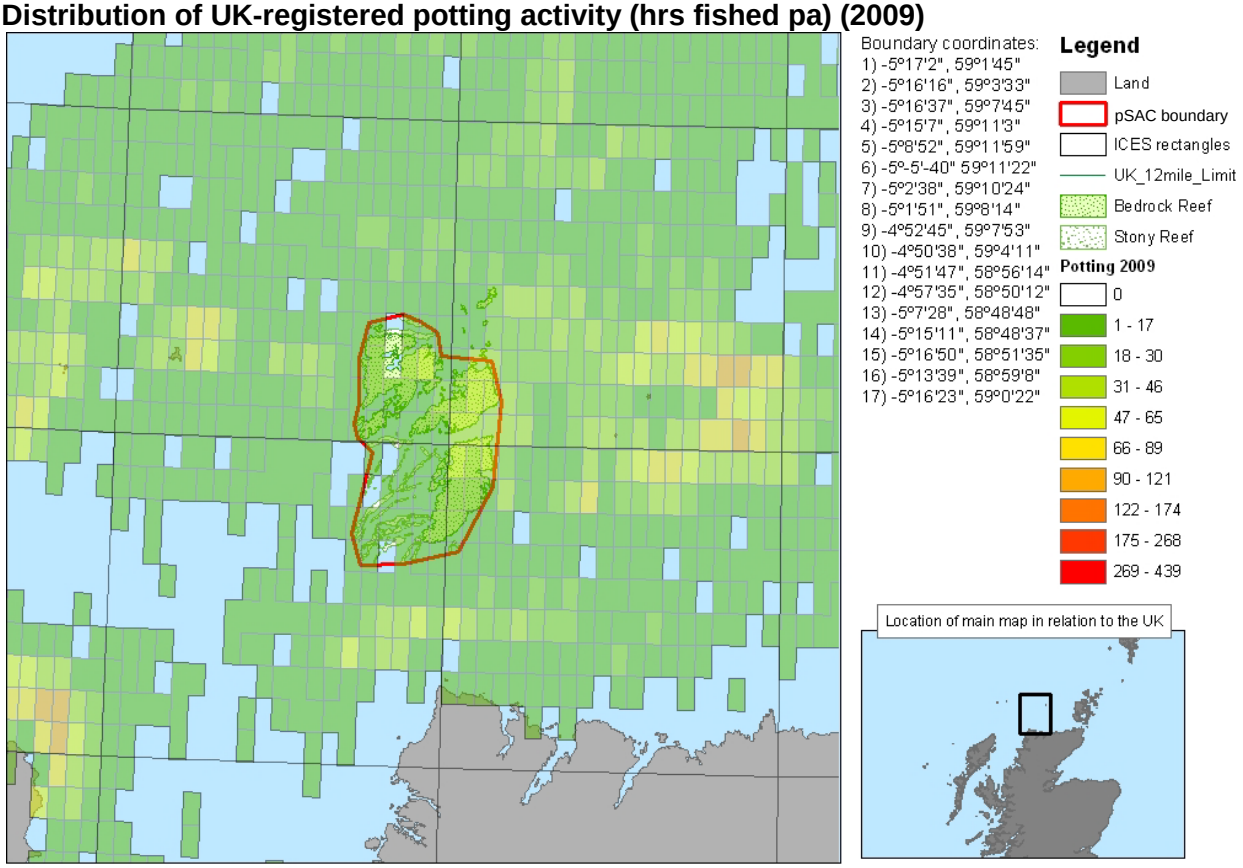

Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

## Distribution of UK-registered potting activity (hrs fished pa) (2008)




Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

## Distribution of UK-registered potting activity (hrs fished pa) (2009)




Map projected in UTM ( Zone 30N, WGS84 datum). World Vector shoreline © US Defence Mapping Agency. Map © JNCC 2012.

# ANNEX II: COSTS OF DESIGNATION OF SOLAN BANK pSAC BY SECTOR

## ENFORCEMENT and MONITORING

Minimum and maximum scenarios cost the same

Costs are calculated over the 10-year period using a discount rate of 3.5%, based on Green Book recommendations[3].

| Enforcement and Monitoring | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | | | One-off Cost | | Annual Cost | | |
| *Scenario* | *Cost Item* | *Type* | *Cost £k* | *Year Experienced* | *Cost £k* | *Year Commencing* | *Average* |
| **BOTH** | Develop management measures | Policy | 77 | 2012 | | | 0 |
| | Surveillance and monitoring | Admin | | | 12 | 2014 | 8 |
| | Initial ecological Monitoring | Policy | 342 | 2013 | | | 0 |
| | Ongoing ecological Monitoring | Admin | 250 | 2018 | | | 0 |
| **Total** | | ***Admin*** | 250 | | 12 | | 8 |
| | | ***Policy*** | 419 | | 0 | | 0 |
| | | ***Both*** | 669 | | 12 | | 8 |

| *Cost £k* | *Present Value* | *2012* | *2013* | *2014* | *2015* | *2016* | *2017* | *2018* | *2019* | *2020* | *2021* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 77 | 77 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 80 | 0 | 0 | 11 | 11 | 10 | 10 | 10 | 9 | 9 | 9 |
| | 330 | 0 | 330 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 203 | 0 | 0 | 0 | 0 | 0 | 0 | 203 | 0 | 0 | 0 |
| ***Admin*** | 283 | 0 | 0 | 11 | 11 | 10 | 10 | 213 | 9 | 9 | 9 |
| ***Policy*** | 407 | 77 | 330 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ***Both*** | 691 | 77 | 330 | 11 | 11 | 10 | 10 | 213 | 9 | 9 | 9 |

[3] HM Treasury, The Green Book: http://www.hm-treasury.gov.uk/data_greenbook_index.htm

# FISHERIES

Minimum scenario – no cost

Costs are calculated over the 10-year period using a discount rate of 3.5%, based on Green Book recommendations[4].

| Fisheries | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | | | One-off Cost | | Annual Cost | | |
| *Scenario* | *Cost Item* | *Type* | *Cost £k* | *Year Experienced* | *Cost £k* | *Year Commencing* | *Average* |
| **MAXIMUM** | Loss of revenue | Policy | | | 58 | 2014 | 41 |
| **Total** | | ***Admin*** | 0 | | 0 | | 0 |
| | | ***Policy*** | 0 | | 58 | | 41 |
| | | ***Both*** | 0 | | 58 | | 41 |

| *Cost £k* | *Present Value* | *2012* | *2013* | *2014* | *2015* | *2016* | *2017* | *2018* | *2019* | *2020* | *2021* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **MAXIMUM** | 385 | 0 | 0 | 54 | 52 | 51 | 49 | 47 | 46 | 44 | 43 |
| ***Admin*** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ***Policy*** | 385 | 0 | 0 | 54 | 52 | 51 | 49 | 47 | 46 | 44 | 43 |
| ***Both*** | 385 | 0 | 0 | 54 | 52 | 51 | 49 | 47 | 46 | 44 | 43 |

[4] HM Treasury, The Green Book: http://www.hm-treasury.gov.uk/data_greenbook_index.htm